Geotechnical Investigation

Sunnyvale Materials and Recovery Station

Sunnyvale, California

May 1990

WAHLER ASSOCIATES

Geotechnical and Environmental Engineers

Project WMN-101H

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INTRODUCTION

A. PROJECT DESCRIPTION

This report has been prepared by Wahler Associates to provide geotechnical recommendations for the design of the proposed Sunnyvale Materials and Recovery Transfer (SMaRT) Station in Sunnyvale, California. The work was performed in accordance with the terms and conditions of the Technical Consulting Services Agreement dated April 1990.

The cities of Sunnyvale, Palo Alto, and Mountain View, and the unincorporated Stanford community are evaluating the feasibility of a transfer station/resource recovery facility as part of a solution to their near and long term solid waste disposal needs. The SMaRT Station would be located adjacent to the Sunnyvale Landfill, and non-processible refuse would be transferred to the Kirby Canyon Landfill in southern San Jose. The SMaRT Station would be built and operated by Waste Management of North America (WMNA) at the location shown on Figure I-1.

The SMaRT Station is proposed to be located on a city-owned site adjacent to the Sunnyvale Landfill, the Sunnyvale Water Pollution Control Plant (WPCP), and San Francisco Bay. Nearby land uses also include the Sunnyvale Baylands Park and office/industrial park complexes. The Kirby Canyon landfill is located south of San Jose, California, approximately 27 miles from the transfer station.

The SMaRT Station will consist of one main building for commercial and public waste receiving and processing, a building handling yard debris, wood waste and vehicle maintenance, an office and visitor building and an entrance scale house, scale and pay booths.

The approximate sizes of the different facilities are:

o	Waste Processing and Recovery Building	100,000 sq. ft.
o	Yard/Wood Waste Processing & Vehicle Maint. Bldg	19,000 sq. ft.
o	Office and Visitor Building	9,600 sq. ft.
o	Entrance Scale House	200 sq. ft.
	TOTAL	128,800 sq. ft.

The primary structures are anticipated to be steel-frame and concrete or masonry wall construction typically found in industrial facilities. Steel columns are planned to carry roof loads to the foundation system. In general, both waste processing and recovery buildings will be 30 to 40 feet in height with a concrete slab floor. The office building will also be a two-story structure approximately 30 feet in height.

Information provided to us by Mr. Robert Carn, of URS Corporation, indicates that preliminary column loads are anticipated to range from approximately 10 to 300 kips. Anticipated reinforced concrete mat pressures range from 1,000 psf on an 8-foot x 60-foot slab to 2,000 psf on a 4-foot x 20-foot slab. Miscellaneous equipment operating within the building will impose additional loads.

B. SCOPE OF WORK

The scope of our services consisted of an assessment of the overall soil conditions at the site to evaluate the geotechnical aspects of foundation design and site development.

Specifically, our work included:

1. Review of pertinent geologic maps and literature, aerial photographs and the Preliminary Geotechnical Investigation Report for the Sunnyvale Materials Recovery Facility performed by EMCON Associates, dated August 7, 1989.

2. Surface reconnaissance and subsurface exploration with a truck-mounted rotary mud drill rig, with a truck-mounted auger rig and a truck-mounted backhoe to aid in the evaluation of soil conditions.

3. Laboratory observation and testing of representative soil samples obtained during the course of our field investigation to evaluate appropriate geotechnical characteristics of the site soils.

4. Engineering analyses to provide a basis for developing design recommendations for appropriate foundation types, slabs-on-grade, engineered fill, utility backfill, compaction requirements, stripping requirements, pavement design and drainage; delineate existing utilities underneath the site, and provide a conceptual cost estimate for the two alternatives evaluated.

5. Weekly meetings with WMNA's and URS Corporation's representatives, to discuss the findings and the progress of the work.

6. Preparation of this report, summarizing the geotechnical work on the project.

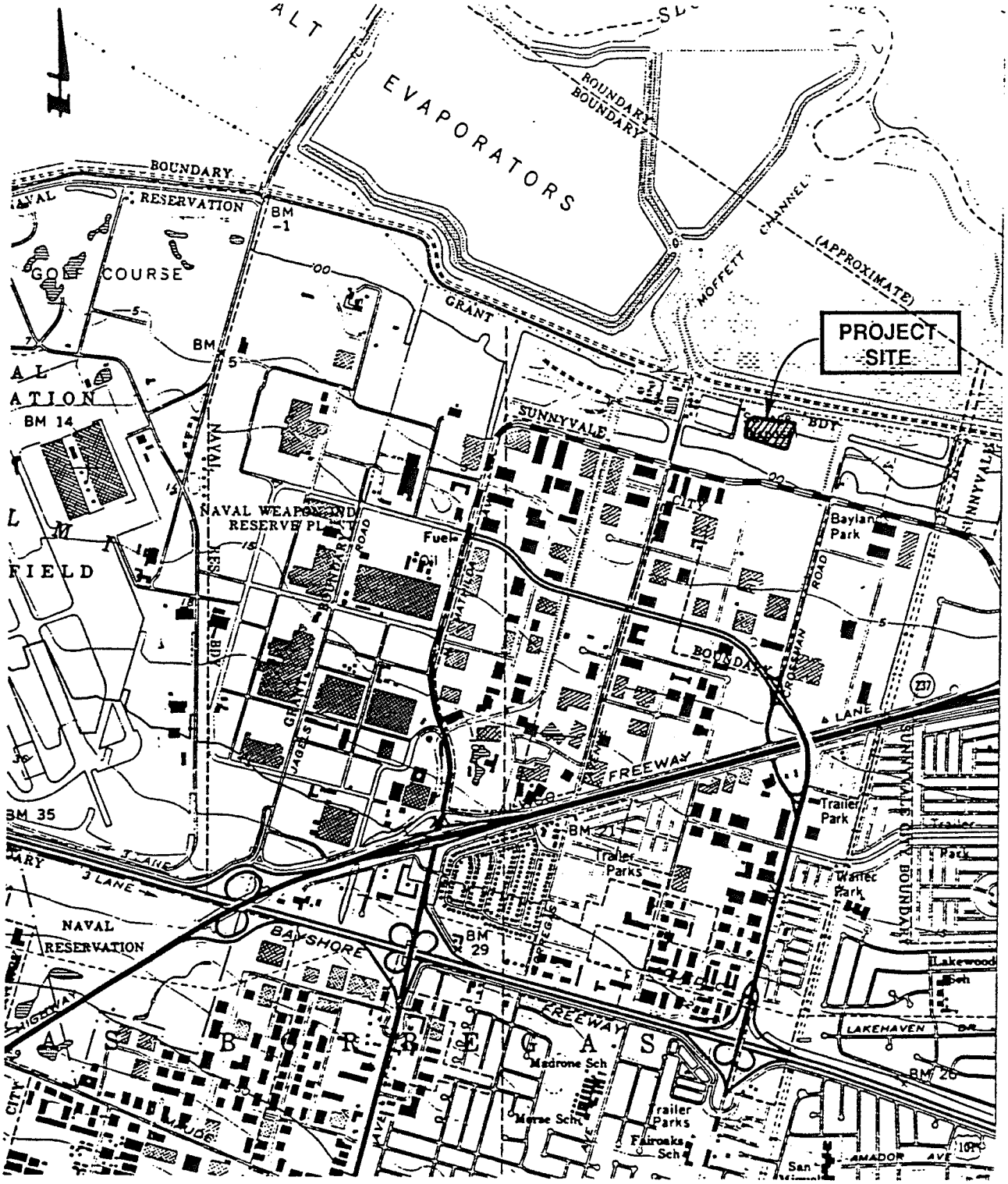
7. Preparation of a report presenting site soil chemical constituent levels and a regulatory analysis of soil handling and disposal options.

C. LIMITATIONS

The data, information, interpretations, and recommendations contained in this technical report are presented solely as bases and guides to the geotechnical design of the proposed SMaRT Station project in Sunnyvale, California The conclusions and professional opinions presented herein were developed by Wahler Associates in accordance with generally accepted geotechnical engineering principles and practices. The opinions expressed herein are subject to revisions in light of new information which may be developed in the future, and no warranties are expressed or implied.

This report has not been prepared for use by parties other than the designers of the project. It may not contain sufficient information for the purposes of other parties or other uses. If any changes are made in the project as described in this report, the conclusions and recommendations contained herein should not be considered valid, unless the changes are reviewed by Wahler Associates, and the conclusions and recommendations are modified or approved in writing.

Soil deposits may vary in type, strength and many other important properties between points of observation and exploration. Additionally, groundwater and soil moisture conditions may change due to seasonal variations, or for other reasons. Furthermore, the distribution of chemical concentrations in the soil and ground water can vary seasonally or for other reasons. Therefore, it must be recognized that we do not and cannot have complete knowledge of the subsurface conditions underlying the subject site. The criteria presented are based upon the findings at the points of exploration and upon interpretative data, including interpolation and extrapolation of information obtained at points of observation.



REFERENCE: U.S.G.S. 7 1/2 MIN. MOUNTAIN VIEW QUAD., 1981.

SCALE

2000 0 2000 FEET

Wahler Associates	SMaRT STATION SUNNYVALE, CALIFORNIA	SITE LOCATION MAP		
PALO ALTO • CALIFORNIA		PROJECT NO.	DATE	FIGURE NO.
		WMN-101H	MAY 1990	I-1

CHAPTER II

CHAPTER II

GEOLOGY AND SEISMICITY

A. GENERAL GEOLOGY

The project site is located in the alluvial flatlands near the northern margin of the Santa Clara Valley at the margin of San Francisco Bay. The valley is part of a prominent northwest-trending structural trough in the Coast Range geologic province. In the project region, the trough, which extends northward to include San Francisco Bay, separates the Santa Cruz Mountains on the southwest and the Diablo Range on the northeast. The alluvial deposits which underlie much of the valley floor are 1,200 to 1,300 feet thick near the project site (Hazelwood, R.M., 1976, Bedrock Contours, South San Francisco Bay, M.F. 796).

Complexly folded and faulted, geologically old deposits comprise the ranges bordering the valley with a regional northwest to southeast trend.

B. LOCAL GEOLOGY

The Geologic Map (Figure II-1) shows that the project site is adjacent the historic marshlands and about 2 miles southwest of the Guadalupe River. The map indicates that the site is underlain by older "San Francisco Bay Mud" consisting of semi-consolidated organic-rich clay deposits.

C. SEISMICITY

The project area is located in a seismically active region, which has been subjected to several strong earthquakes in recent history. Recorded earthquakes have occurred throughout the San Francisco Bay Area since the early 1800's with the majority of these events having epicenters along the northwest-trending San Andreas, Hayward, and Calaveras fault zone. The distribution of earthquakes in the San Francisco Bay region with magnitude 4.0 or greater, for the period from 1900 to April 1984, is shown on

Figure II-2. Also shown on Figure II-2 is the epicenter of the October, 1989 Loma Prieta earthquake.

The San Andreas fault zone is located approximately 10.5 miles southwest of the site, and the Hayward and Calaveras fault zones approximately 8.5 and 10 miles northeast of the site, respectively. The inferred trace of the Silver Creek Fault is located about 3 miles east of the site and is not considered active. The geologic maps reviewed did not indicate faulting on or in close proximity to the site.

D. SEISMIC CONSIDERATIONS

Earthquakes have occurred throughout the San Francisco Bay region, but most of them have been concentrated along the active San Andreas, Hayward, and Calaveras fault zones. It is therefore highly probable that the project will, at some point in the economical life of the structures, be subjected to strong shaking. Although severe shaking is expected during an earthquake, we are of the opinion that the intensity of shaking will be no more serious than most other areas in the San Francisco Bay region.

The following general discussion reflects the possible earthquake hazards that often have an effect on the degree of damage to structures.

1. Fault Rupture

Because there is no evidence of existing faults at the site, the possibility of rupturing of the ground surface is remote.

2. Ground Shaking

Ground shaking is the horizontal and vertical motions associated with earthquakes. The magnitude, duration, and frequency of ground motions are influenced by: 1) magnitude of the earthquake; 2) properties and thickness of the foundation materials at the site; and 3) the distance between the site and the ruptured fault plane.

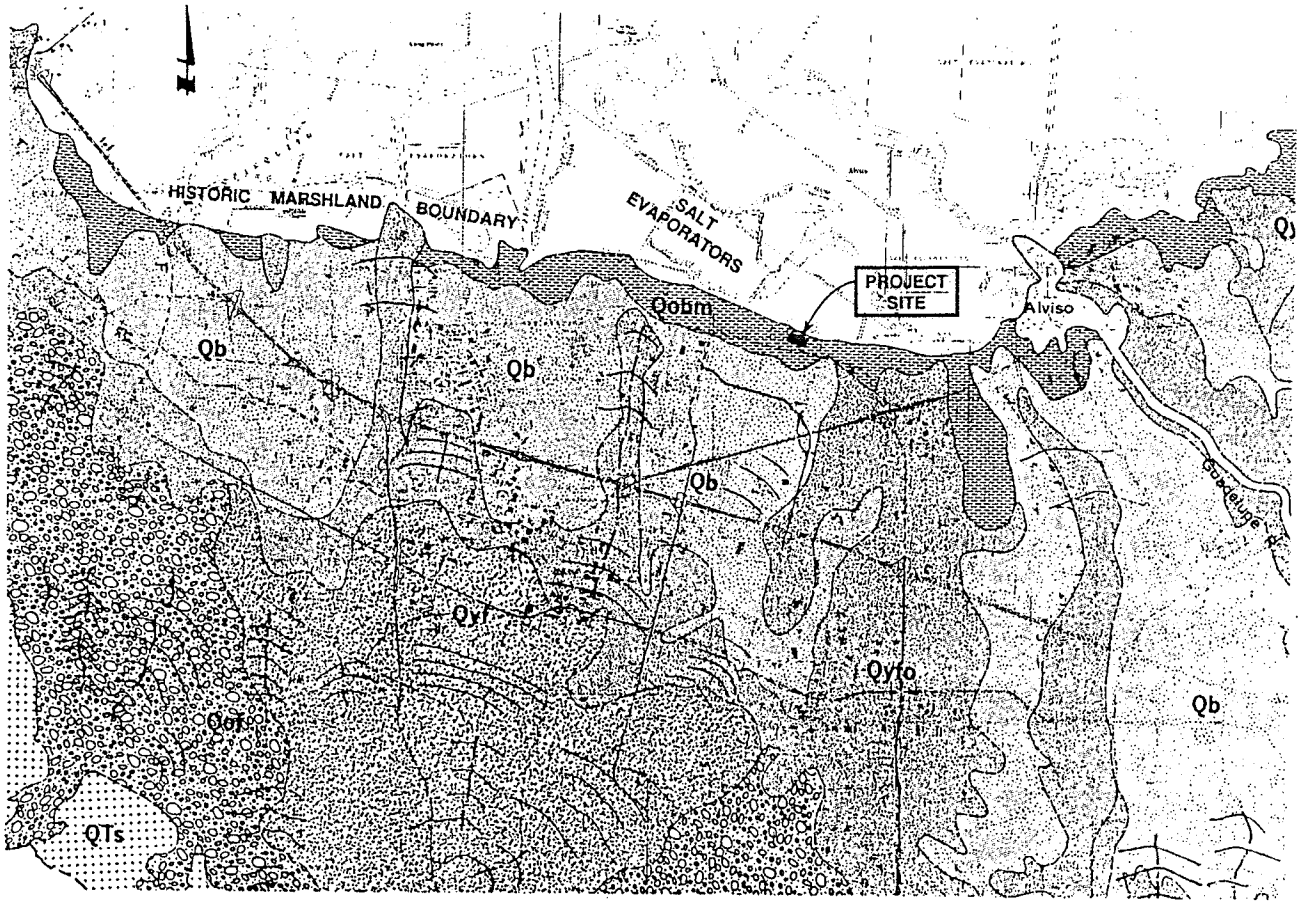
Severe shaking at the site would be induced if a moderate to large earthquake was to occur along either the Calaveras, Hayward, or San Andreas Faults. Therefore, severe ground shaking should be considered in any design.

3. Liquefaction

Liquefaction is the process by which water-saturated granular type material is transformed from a semi-solid state to a semi-viscous state. Such transformation can occur in loose, water saturated, sands or silts during earthquake vibrations. Our investigation and the references reviewed indicate that the project site is within a region of moderate to high liquefaction potential. However, assessments of the soil classification, in-place dry densities, depth to groundwater and Standard Penetration test results from our laboratory and field testing programs, indicate that the potential for shallow soil liquefaction is generally low over most of the site. Based on the Simplified Procedure for Evaluating Liquefaction Potential (Seed 1971), the sands below a depth of 30 feet are, in our opinion, not likely to liquefy; it is also our opinion that the thick clay layer overlying these sands should confine the sands below 30 feet; therefore, liquefaction of these sands would not adversely affect the project.

4. Lateral Spreading and Lurching

Lateral spreading is normally induced by vibration of near-horizontal alluvial layers adjacent to an exposed face. Lurching is an action which produces cracks or fissures parallel to streams or banks when the earthquake motion is at right angles to them. The project site is relatively flat and no significant exposed face or bank exists except for the sideslopes along channels bordering the north and west sides of the site. Therefore, the potential for lateral ground spreading and lurching is low, except immediately adjacent to the channels. To minimize the potential for structural damage due to lateral spreading or lurching, future development plans should locate structures at least 50 feet from the edges of the channels.



REFERENCE: E.J. HELLEY AND E.E. BRAB (1971)
GEOLOGIC MAP OF LATE CENOZOIC DEPOSITS,
SANTA CLARA COUNTY, CA., U.S.G.S., M.F. 335

SCALE
0 1 2 MILES

EXPLANATION

Qb Qyfo Qyf

Younger alluvial fan deposits

Qb, interfluvial basin deposits; mainly organic-rich clay and silty clay that locally contain modern fresh-water gastropods and pelecypods. Sunnyvale, Willows, and Reyshore Soil Series of U.S. Soil Conservation Service (1968) are developed on these deposits

Qyfo, fluvial deposits at the outer edge of young alluvial fans (Qyf); forms levees between basin deposits (Qb) and characterized by variable grain size. Mainly fine-sand, silt, and silty clay. Clear Lake, Centro, and Campbell Soil Series of U.S. Soil Conservation Service (1968) are developed on these deposits

Qyf, young alluvial fan deposits grading basward to terrace and levee deposits of channels incised in Qof. Consists of moderately well sorted fine sand and silt with minor gravel beds becoming more abundant toward fan heads. Locally contains aboriginal artifacts and skeletal remains. The weakly developed Yolo, Carretero, and Cortina Soil Series of U.S. Soil Conservation Service (1968) are developed on these deposits

Qobm

Older San Francisco Bay mud

Qobm, semi consolidated organic-rich clay deposits; underlies younger San Francisco Bay mud of Nichols and Wright (1971) and young alluvial fan deposits; extends landward to maximum elevation of 10 feet above mean sea level. The distinctive Alviso Soil Series of U.S. Soil Conservation Service (1968) is developed on these deposits

Qof

Older alluvial fan deposits

Qof, older fan deposits bordering uplands; at fan heads incised by channels partly filled by Qyf; at outer margins overlapped by younger alluvial fan deposits, Qyf, Qyfo and Qb. Mainly coarse sand and gravel with local accumulations of middle and late Pleistocene vertebrate fossils. The strongly developed Laguna, Pleasanton, San Ysidro, Arbuckle, Cropley, and Rincon Series of U.S. Soil Conservation Service (1968) are developed on these deposits

QTs

QTv

Sedimentary and volcanic rocks

QTs, poorly consolidated conglomerate, sandstone, siltstone, and claystone with minor lignite deposits. Folded and faulted in part; includes Santa Clara Formation, Packwood Gravels of Crittenden (1951), and small areas of Merced Formation in the Palo Alto 7-1/2-minute quadrangle
QTv, basalt and other volcanic rocks

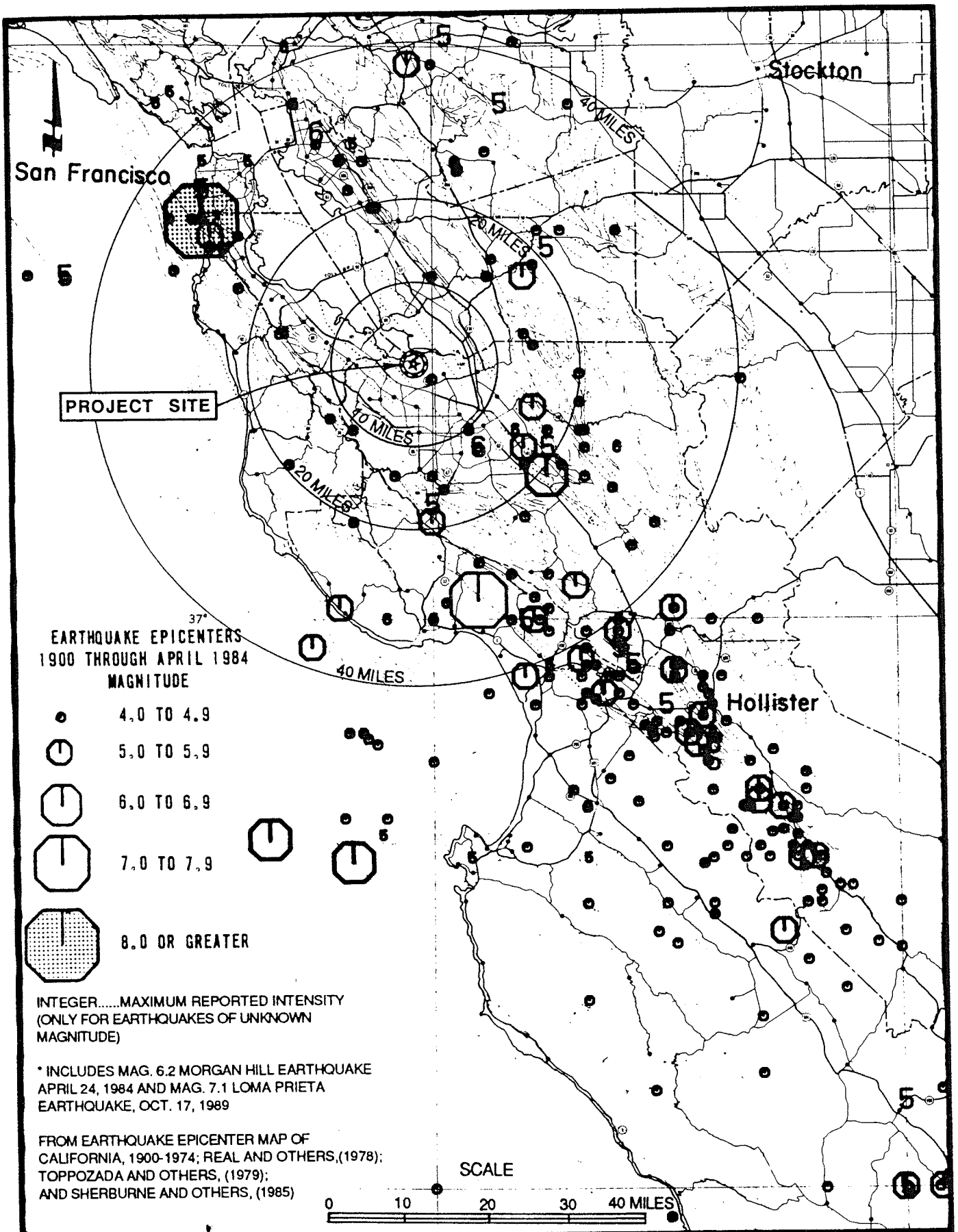
Undifferentiated slope deposits and older bedrock

Areas underlain by older bedrock or colluvium derived from bedrock

Selected topographic contours and unpaved stream channel

Holocene
Pleistocene
Pliocene
QUATERNARY
TERTIARY

Wahler Associates	SMaRT STATION SUNNYVALE, CALIFORNIA	GEOLOGIC MAP		
	PALO ALTO • CALIFORNIA	PROJECT NO.	DATE	FIGURE NO.
		WMN-101H	MAY 1990	II-1



Wahler Associates	SMaRT STATION SUNNYVALE, CALIFORNIA	SEISMICITY MAP SAN FRANCISCO BAY REGION	
PALO ALTO • CALIFORNIA		PROJECT NO.	DATE	FIGURE NO.
		WMN-101H	MAY 1990	II-2

CHAPTER III

CHAPTER III
SITE CONDITIONS

A. SITE DESCRIPTION

The site consists of a rectangularly shaped parcel covering approximately 7 acres, as shown in the Site Exploration Plan, Figure III-1. The area was formerly used by the Raisch Company for asphalt and concrete recycling. The Raisch operation has been moved to the western side of the Sunnyvale Landfill to accommodate the SMaRT Station. The existing site is mostly flat, at approximate Elevation 0 (National Geodetic Vertical Datum, NGVD).

The site is bordered on the north by marsh land and abandoned salt evaporation ponds, on the west by a sludge pond which is part of the Sunnyvale sewage treatment plant, on the east and south by the Sunnyvale Landfill. A partially paved road leading to the landfill borders the south side of the site, and a channel borders the north and west perimeters of the site.

At the time of our investigation the site was used to store recycled aggregate. A stockpile up to about 30 feet in height is located along the west side of the site. A smaller stockpile about 20 feet in height is located on the southeast corner of the site and a stockpile about 10 feet in height is located in the center of the site. The surface was generally covered with gravelly material and with some vegetation near the perimeter.

B. SUBSURFACE SOIL CONDITIONS

The exploration of the subsurface soil conditions at the site consisted of drilling exploratory borings and excavating backhoe pits. The drilling included seven deep borings 71-1/2 to 81-1/2 feet in depth, and five shallow borings 11-1/4 to 12-1/2 feet in depth for a total of about 607 feet. Twelve exploratory pits were excavated to depths ranging from 2 to 8 feet. The approximate locations of the drill holes and exploratory pits are shown

on Figure III-1. The logs of the borings and pits are presented in Appendix A of this report.

1. Fill

Our exploration generally indicates that the site consists of alluvial and bay deposits, overlain with 2-1/2 to 10 feet of variable fill. The fill encountered in most of the borings and pits consisted predominantly of clayey gravel with some large to small concrete debris. Some of the borings and pits encountered silty clay or silty/clayey sand fill material with minor amounts of household garbage. The distribution of the fill materials appeared to be random. The concrete debris at times hampered the drilling and pit excavation operations.

2. Sludge

Sludge material was mainly encountered in the north half of the site with the bottom of the sludge at about 7 feet from the surface. The sludge material varied in thickness from 1/2-foot to 4-1/2-foot with increasing thickness to the west. The overall extent and depth of the sludge cannot be determined due to the lack of access to portions of the site because of the existing stockpiles. Reportedly, the sludge was pushed to the sides of the pond prior to the placement of the existing fill.

3. Alluvium

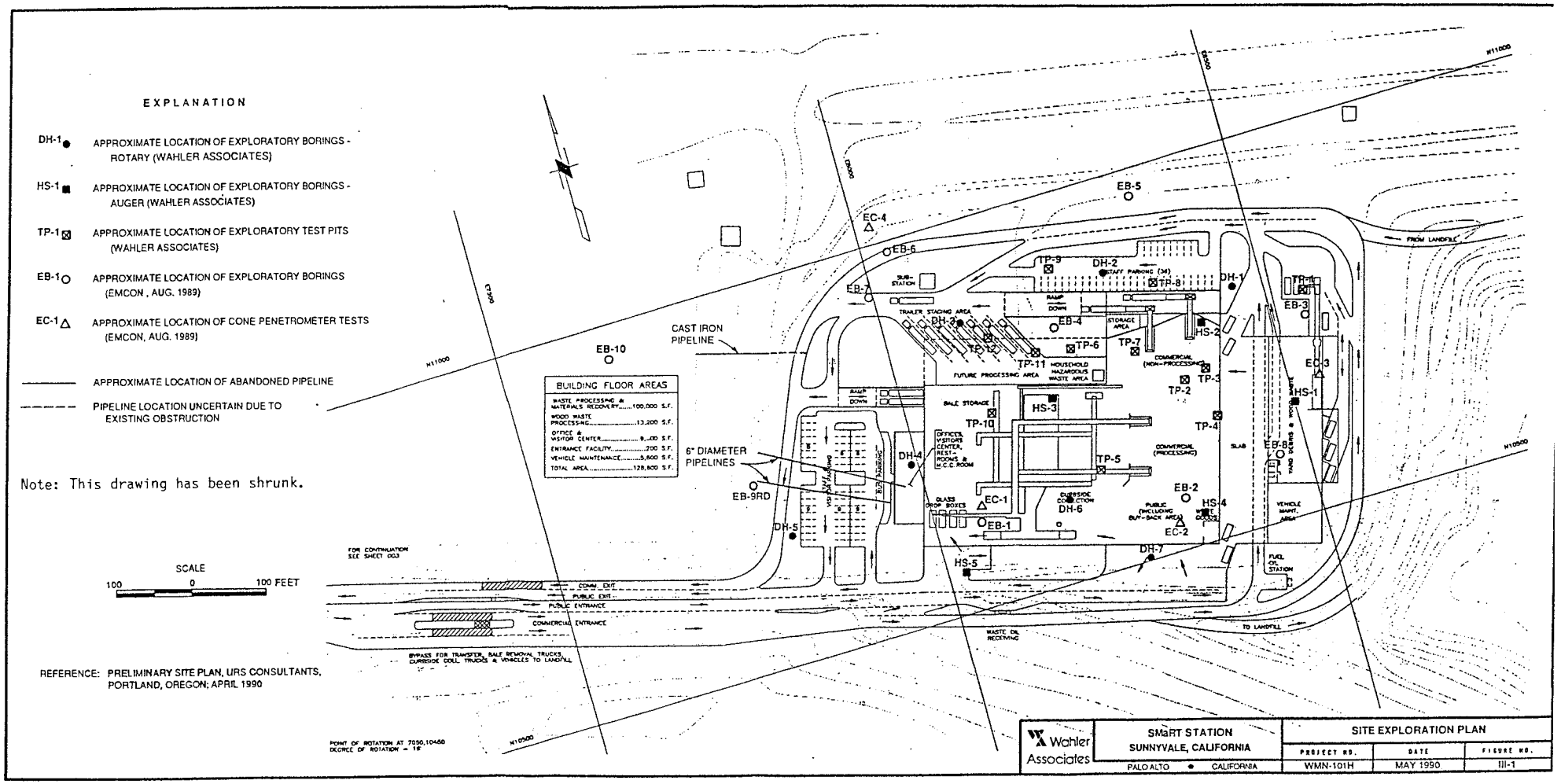
The alluvial soils encountered are predominantly silty and sandy clays, interlayered with discontinuous silty sand and gravelly sand deposits. Generally the south portion of the site has 2-1/2 to 8 feet of fill, increasing from west to east, overlying 63 to 69 feet of silty clay and sandy clay, and sand below a depth of 70 to 75 feet. The thick clay layer is interspersed with discontinuous sand layers 2½ to 4 feet thick. The north portion of the site has about 8 feet of fill overlying 22 to 24 feet of silty clay and sandy clay, 16 to 20 feet of silty sand, 30 to 32 feet of silty clay, and sandy clay and sand below a depth of 78 to 80 feet. The

subsurface conditions have been summarized into two idealized profiles representative of the north and south areas of the site and are presented on Figure III-2.

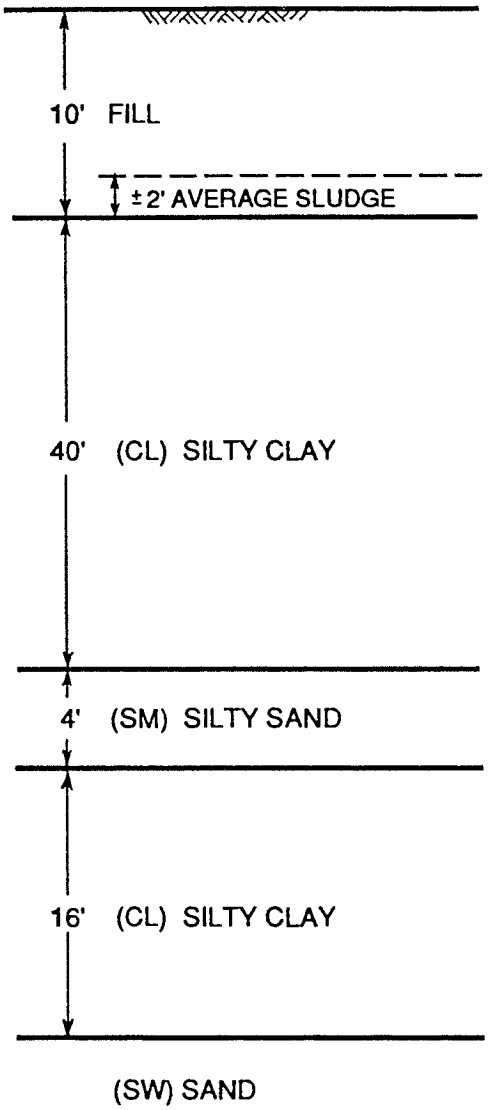
The clays are moderately to highly plastic and, based on the unconfined compression strength, most clays are stiff to very stiff in consistency. The clays are medium in compressibility. The sands encountered are medium dense to very dense.

C. GROUNDWATER

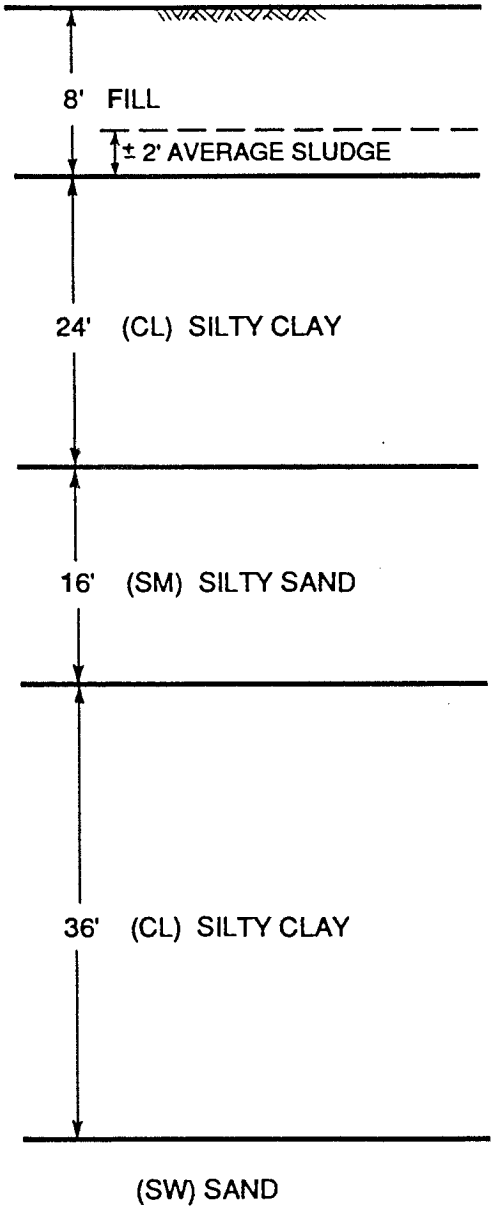
Due to the drilling method used, groundwater levels were not observed in the deep borings. Groundwater was encountered at a depth of 7-1/2 feet along the east side of the site in boring HS-1 and pit TP-4. In pit TP-10 perched water at a depth of about 4 feet was encountered.


EXPLANATION
DH-1 APPROXIMATE LOCATION OF EXPLORATORY BORINGS - ROTARY (WAHLER ASSOCIATES)
HS-1 APPROXIMATE LOCATION OF EXPLORATORY BORINGS - AUGER (WAHLER ASSOCIATES)
TP-1 APPROXIMATE LOCATION OF EXPLORATORY TEST PITS (WAHLER ASSOCIATES)
EB-1 APPROXIMATE LOCATION OF EXPLORATORY BORINGS (EMCON , AUG. 1989)
EC-1 APPROXIMATE LOCATION OF CONE PENETROMETER TESTS (EMCON, AUG. 1989)
APPROXIMATE LOCATION OF ABANDONED PIPELINE
PIPELINE LOCATION UNCERTAIN DUE TO EXISTING OBSTRUCTION
Note: This drawing has been shrunk.
SCALE
100 0 100 FEET
REFERENCE: PRELIMINARY SITE PLAN, URS CONSULTANTS, PORTLAND, OREGON; APRIL 1990
BUILDING FLOOR AREAS
CAST IRON PIPELINE
6" DIAMETER PIPELINES
EB-10
EB-9RD
EB-1
EB-2
EB-3
EB-4
EB-5
EB-6
EB-7
EB-8
DH-1
DH-2
DH-3
DH-4
DH-5
DH-6
DH-7
EC-1
EC-2
EC-3
EC-4
HS-1
HS-2
HS-3
HS-4
HS-5
TP-1
TP-2
TP-3
TP-4
TP-5
TP-6
TP-7
TP-8
TP-9
TP-10
TP-11
SUB-STATION
TRAILER STAGING AREA
STAFF PARKING (34)
STORAGE AREA
FUTURE PROCESSING AREA
HOUSEHOLD HAZARDOUS WASTE AREA
COMMERCIAL (NON-PROCESSING)
COMMERCIAL (PROCESSING)
BALE STORAGE
OFFICES, VISITORS CENTER, REST-ROOMS & C.I.C. ROOM
GLASS DROP BOXES
CURBSIDE COLLECTION
PUBLIC DROP-OFF AREA
VEHICLE MAINT. AREA
FUEL OIL STATION
WASTE OIL RECEIVING
SLAB
RAMP DOWN
FROM LANDFILL
TO LANDFILL
DOWN EXIT
PUBLIC EXIT
PUBLIC ENTRANCE
COMMERCIAL ENTRANCE
BYPASS FOR TRANSFER, BALE REMOVAL TRUCKS, CURBSIDE COLL. TRUCKS & VEHICLES TO LANDFILL
FOR CONTINUATION SEE SHEET 003
POINT OF ROTATION AT 7050,10450
DEGREE OF ROTATION = 15°
Wahler Associates
SMART STATION
SUNNYVALE, CALIFORNIA
PALO ALTO • CALIFORNIA
SITE EXPLORATION PLAN
PROJECT NO. WMN-101H
DATE MAY 1990
FIGURE NO. III-1

PROFILE I (SOUTH SIDE)



PROFILE II (NORTH SIDE)



Wahler Associates	SMaRT STATION SUNNYVALE, CALIFORNIA	IDEALIZED SOIL PROFILES		
PALO ALTO ● CALIFORNIA		PROJECT NO.	DATE	FIGURE NO.
		WMN-101H	MAY 1990	III-2

CHAPTER IV

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

A. GENERAL

Based upon our field exploration, laboratory testing, and engineering analyses, the proposed usage of the site is believed to be feasible from a geotechnical standpoint, provided that recommendations presented in this report are incorporated into the final design and construction of the proposed transfer station. The recommendations presented herein are based strictly on geotechnical considerations. Regulatory issues which could affect project feasibility and costs are addressed in a separate report titled, "Special Handling and Regulatory Issues, SMaRT Station Site, Sunnyvale, California".

Two possible alternatives are presented in this report. Alternative A requires that about 8 feet of engineered fill be placed to raise the site to about Elevation +8 feet (NVGD). The structures would be supported on shallow spread footing foundations with slab-on-grade floors.

Alternative B involves siting the structures at or near the existing grade and supporting the structures on a deep pile foundation. This alternative would include up to 2 feet of new engineered fill and the removal and recompaction of abut 3 feet of existing fill.

B. ALTERNATIVE A - FILL TO ELEVATION +8 FEET

1. Grading and Earthwork

a. Clearing and Stripping - Filling of the site will be required in order to achieve the desired finished grades. The fills will impose loads on the underlying soils and areal settlements will occur over the long term. These settlements depend on the height of the fill, among other considerations, and are discussed in a subsequent section of this chapter.

Prior to the start of any grading activity, the site should be stripped of surface vegetation and topsoil containing a significant amount of organic matter, roots and soft soils. The depth of stripping is estimated to average 2 to 3 inches in most areas. The stripping depth will probably increase toward the perimeter of the site where weeds, etc. are concentrated. The stripped material should be either removed from the site, or stockpiled in designated areas for later use in landscaping. The existing stockpiles may be removed before construction of the SMaRT station begins. The materials composing the stockpiles appear suitable for use in structural fills but should be tested to confirm their suitability.

The exposed surfaces, after stripping, should be scarified to a depth of at least 6 inches, and compacted to a minimum of 90 percent of the laboratory maximum dry density determined in accordance with ASTM D1557-78

b. Fill Material - Materials to be used for the construction of the fill should be non-organic, have no rock or similar irreducible material with a maximum dimension greater than 6 inches. No material larger than 2 inches in maximum size should be used in the upper 3 feet of fill. The upper 3 feet of fill should be non-expansive, and it should have a maximum plasticity index of 12, and a minimum R-value of 20. All materials should be approved by the Geotechnical Engineer. Materials intended for use as fill should be submitted to the Geotechnical Engineer for approval at least two weeks prior to their intended use.

c. Compaction - The upper 6 inches of the subgrade exposed after stripping or excavation should be scarified, moisture-conditioned, and properly compacted to achieve at least 90 percent relative compaction prior to fill placement. All fill material placed for the proposed fill should be compacted, by mechanical means, to a minimum of 90 percent relative compaction, except the upper 5 feet of embankment where the minimum relative compaction should be 95 percent, in accordance with ASTM D1557-78. Embankment materials should be compacted at a moisture content within 2 percent of the optimum moisture content determined in the laboratory by the recommended compaction standard.

d. Embankment Face - To minimize the probability of slumping and/or erosion of fill embankments, the faces of the embankments should be properly treated. Proper compaction of the face should be accomplished by constructing the embankment approximately 2 feet (horizontally) beyond the planned final face plane. The embankment face could then be trimmed back to the final face plane. This operation should expose properly compacted material on the finished face of the embankment. The final slope face should be seeded to retard erosion.

2. Estimated Settlement Induced By New Fill

Based on consolidation data obtained from tests performed on samples taken from borings DH-1, DH-2, DH-5 and DH-7, maximum total settlement of about 6.5 inches was estimated for the 8 feet of new fill.

We estimate that approximately 15 percent of the total settlement will occur during construction of the fill, due to the elastic deformation of the partially saturated foundation and older fill soils. The remaining settlement is time-dependent and is governed by the rate of dissipation of excess pore pressures generated in the foundation soils by the additional overburden load created by the new fill and footings. Based on our analyses, we estimate that a period of about 6 months will be necessary for about 70 percent of the time-dependent settlement to occur. The time-rate estimate of settlement at the site is shown on the graph on Figure IV-1. Additional settlements induced by the foundations are discussed in a subsequent section.

The settlements were computer-analyzed using the Boussinesq stress distribution for a uniform fill thickness of 8 feet, and for four preliminary footing sizes and anticipated loadings. Existing stresses and the stresses after construction of the fill, and the various footings, were calculated and used in the settlement analyses. The settlements were estimated at the mid-point, the corners and the middle of the longest side for the fill and the footings.

Conventional methods used in estimating the time-rate of settlement generally tend to overestimate the time required for the settlements to occur. This is primarily due to the difficulty in detecting thin layers of sandy soils during the subsurface exploration. It is recommended that the settlement of the new fill be monitored to verify the design assumptions regarding the rate of settlement.

3. Preloading, Surcharging

In view of the project schedule and the magnitude of the estimated settlements, preloading of the site may be desirable. This would require that a prudent amount of time be permitted to elapse between the completion of the 8 feet of new fill and the start of construction of the structures. Based on the considerations discussed in the previous section, we recommend that a settlement period of at least 6 months be established between the completion of fill placement and the start of construction of the structures.

The settlement period can be expedited with a surcharge load placed over the fill material. A surcharge of 4 feet of additional fill placed over 8 feet of new fill would reduce the recommended settlement period to about 3 months.

4. Slope Stability

The stability analysis was performed on an embankment with a height of 13 feet, and 3:1 (horizontal to vertical) slopes. Based on water levels observed in the shallow exploratory borings, the groundwater was assumed to be about 10 feet below the existing ground surface.

The shear strength characteristics of the foundation soils used in the analyses were selected based upon unconfined compression data from laboratory tests on undisturbed samples, on published strength correlations with field standard penetration test values, and on the data obtained from the (EMCON) preliminary report. Assumed soil properties for the new fill material were used in the stability analyses.

The results of our analysis indicate a safety factor of 3 under long-term static conditions, and a safety factor of more than 1.3 under seismic conditions using a pseudostatic coefficient of 0.2.

The overall stability of the side slopes for the embankment fill was analyzed by conventional limit equilibrium methods to determine factors of safety against sliding. The slopes were computer-analyzed for circular arc failure modes using the Fellenius Ordinary Method of Slices (OMS) and the Bishop's Modified Method of slope stability analysis. The computer program performs an automatic search for the circular slip surface having a minimum factor of safety. Both methods incorporate, as basic input data, the geometry of the slope, unit weight and shear strength characteristics of the soils, and distribution of the boundary and internal water forces. Earthquake-induced loading, as represented by the use of a pseudostatic coefficient, was also included in the stability analyses.

5. Foundations

a. Allowable Bearing Pressure - In this alternative, the structures would be supported on shallow spread footings founded on 8 feet of new engineered fill. The footings should be founded a minimum depth of 18 inches below the lowest adjacent finished grade and should be adequately reinforced. For exterior footings, grade may be taken as final adjacent pad grade and for interior footings, grade may be taken as finished floor elevation. Footings constructed in accordance with these recommendations may be sized for an allowable bearing pressure of 2 kips per square foot (ksfs) for dead loads and 3 ksf for dead plus live loads.

b. Settlement Induced By Foundations - In addition to the settlements induced by the new fill, settlements will be caused by the foundation loads. The estimated settlements due to structural loads are as follows:

Size of Loaded Area	Contact Pressure (psf)	Estimated Settlement (in.)
10 ft x 10 ft	3,000	1.2
3 ft x 3 ft	1,000	0.2
8 ft x 60 ft	1,000	0.7
4 ft x 20 ft	2,000	0.5

Approximately 50 percent of the estimated settlements due to structural loads are anticipated to occur during construction. The structures will be designed to accommodate the remaining settlement. According to the structural engineer, adjustment of individual columns in the steel structures will be possible.

b. Lateral Loads - Lateral loads on shallow footings, resulting from wind or earthquake, may be resisted in the form of passive pressure on the side of footings and friction between the bottom of the footings and the soils on which they are supported. The passive soil resistance against footings may be taken equal to a fluid having an equivalent density of 300 pounds per square foot, per foot of depth. This assumes that the footings are placed neat against the soil face or that properly compacted backfill is placed in the space between the footings and the soil faces. A frictional coefficient of 0.35 may be used to resist lateral loads.

C. ALTERNATIVE B - DEEP FOUNDATION

1. Grading and Earthwork

a. Clearing and Stripping - Minor filling will be required to achieve the approximate finish grade of Elevation +2. To provide uniform support beneath the proposed facilities, it is recommended that the existing fill be removed to at least Elevation -3, and recompacted after removing organics, debris and any other unsuitable materials. New fill can then be placed and compacted over the recompacted fill. The recommendations presented in Section B.1 of this chapter should be followed for the grading and earthwork under this alternative.

b. Estimated Settlement Induced by New Fill - Based on consolidation data a maximum total settlement of about 1-3/4 inches was estimated for the 2 feet of new fill. We estimate that approximately 15 percent of the total settlement will occur during construction of the fill, due to the elastic deformation of the partially saturated foundation and older fill soils. The remaining settlement is time-dependent and is governed by the rate of dissipation of excess pore pressures generated in the foundation soils by the additional overburden load created by the new fill and footings.

2. Deep Foundation

a. Allowable Loads - It is recommended that the structures be supported on a driven pile foundation. Because of the high groundwater conditions encountered on the site, driven pile foundations would be a desirable foundation alternative, rather than cast-in-place concrete piers. Piles should derive their support through peripheral friction in the surrounding soils and not rely on end bearing. Skin friction resistance in the clay layers is based on adhesion factors compiled by McClelland (1974), and in the sand layers by friction coefficients developed by Meyerhof (1976). A safety factor of 2.0 has been applied to the ultimate load to determine the allowable pile load. The relationships between the allowable pile load and the required pile depths for 12-inch and 14-inch square piles are presented on Figure IV-2.

Due to the nature of the subsurface materials, increase in resistance should be anticipated when penetrating through layers of granular soils. Because of the variability of the existing fill, which contains gravelly material and some concrete debris, the piles should be pre-drilled through the existing fill to about Elevation -10. The diameter of the pre-drilled holes should be made equal to, or less than, the side dimensions of the piles to maintain lateral load resistance. Removal of obstructions, such as concrete slabs and asphalt, may be necessary in order to drive the piles.

It is recommended that design assumptions and the capacity of the piles be verified by driving a minimum of one pile near each of the exploratory

borings within the structure, using the pile driving analyzer. The selected piles should be retapped after a period of about two weeks. The analyses should be completed prior to driving the remaining piles.

b. Lateral Loads - Lateral forces, such as seismic and wind loads, can be resisted by the piles through a combination of cantilever action and passive resistance of the soil adjacent to the pile below Elevation -10. The maximum design value recommended for lateral loading is 3 kips for 12-inch concrete piles and 5 kips for 14-inch concrete piles. The actual design values should be determined when the final structure design has been completed and the type of piles to be used selected.

c. Uplift Loads - Resistance to uplift loads can be developed by friction along the pile shaft. For intermittent uplift forces, the uplift resistance of the piles may be assumed to be 40 percent of the recommended compressive maximum allowable axial load of the pile. Uplift resistance of 50 percent of the allowable pile load may be assumed for short-term dynamic loading, such as during an earthquake. Piles used to resist uplift should be adequately reinforced along their entire length to resist tensile forces.

d. Downdrag - Settlement of the proposed fill is anticipated to result in the development of negative skin friction (downdrag) loads on the piles due to the relative downward movement of the surrounding soil and the pile. It is estimated that downdrag loads of up to 8 tons will develop on a 12-inch square pile, and 10 tons will develop on a 14-inch square pile. These downdrag loads will reduce the service load capacity of the piles, and should be discounted from the allowable loads presented on Figure IV-2.

e. Pile Groups - Piles installed in groups will not possess the same load carrying capacity as the sum of the individual piles. This reduction in pile efficiency may be computed by several methods, one of which is the Converse-Labarre equation, which states:

$$\text{Group Efficiency, } Eg = 1 - \theta \frac{(n-1)m+(m-1)n}{90\ mn}$$

$$\text{where } \theta = \arctan \frac{d}{s} \quad \text{(in degrees)}$$

n = number of piles per row
m = number of rows in pile group
d = pile diameter, ft
s = pile spacing (center to center), ft

The center-to-center pile spacing should not be less than three times their side dimension.

Some small settlement of the pile foundations will result from the settlement of the soils below the pile tips. The native soils anticipated at the pile tip elevations are stiff to very stiff clays. Therefore, it is estimated that the settlement of these soils will generally be very small.

f. Pile Driving - Piles should be driven continuously, without interruption, until the driving and depth criteria are attained. Adjacent piles should not be driven in sequence. The piles should be driven to the required elevation using a hammer with a minimum driving energy compatible with the piles.

3. Shallow Foundations

Although the structures will be supported on a deep pile foundation some slabs will be structurally independent of the structures and will be supported on-grade. The estimated settlements of these reinforced concrete mats are as follows:

Size of Loaded Area	Contact Pressure (psf)	Estimated Settlement (in.)
8 ft x 60 ft	1,000	1.6
4 ft x 20 ft	2,000	2.0

Approximately 40 percent of the estimated settlements due to structural loads are anticipated to occur during construction.

D. SEISMIC DESIGN

Peak ground accelerations at the site using the Seed and Schnabel (1980) relationship for the maximum probable earthquakes in the area are as follows:

Fault	Distance	Maximum Credible Earthquake Magnitude	Maximum Probable Earthquake Magnitude	Maximum Peak Ground Acceleration*
San Andreas	10.5 miles	8.3	8.0	.41
Hayward	8.5 miles	7.5	7.25	.39
Calaveras	10.0 miles	7.5	7.0	.36

*Based on Maximum Probable Earthquake

E. SLABS-ON-GRADE

Slab-on-grade floors should be supported on a minimum thickness of about 24 inches of non-expansive, engineered fill, placed in accordance with the grading recommendations. This fill will be placed under slabs in both design alternatives in order to achieve the desired finished grades. In the storage areas, and in areas where vehicular traffic is anticipated, slabs-on-grade should be underlain by a layer of clean gravel or crushed rock, not less than 18 inches in thickness, which can be considered part of the 24 inch non-expansive layer.

This layer of rock will help to distribute the heavy floor loads more evenly to the foundation soils. The layer of rock should be compacted to at least 70 percent relative density, based on the maximum dry density determined in accordance with ASTM D4254-83.

Elsewhere, all slabs-on-grade should be underlain by a layer of compacted clean rock or sand, not less than 4 inches in thickness. This thickness can be considered as a portion of the recommended 24-inch non-expansive structural fill thickness indicated above.

The 4-inch thick base course layer will serve as a capillary break. However, moisture may accumulate in the base course zone. Therefore, a plastic vapor barrier of at least six mil thickness should be provided over the base course layer where vinyl floor covering, carpets, or tile will be placed on the floor or where moisture protection is desired. To aid in curing the concrete and to protect the vapor barrier against puncture, the vapor barrier should be covered by a 2-inch layer of moistened sand.

F. LOADING DOCK

1. Lateral Earth Pressures

A loading dock will be incorporated into the northern corner of the processing building. It is assumed that the dock will not exceed 4 to 5 feet in height to accommodate trucks. Walls that are free to deflect at the top should be designed to resist an equivalent fluid pressure of 40 pcf. Unyielding walls should be designed to withstand an equivalent fluid pressure of at least 60 pcf. These pressures assume that the wall is backfilled with a clean, granular, free-draining material compacted to approximately, but not substantially more than, 90 percent of the laboratory maximum dry density for a minimum horizontal distance of 3 feet, and are exclusive of hydrostatic pressures. Greater compaction should be avoided since it will increase lateral wall pressures considerably.

A live load surcharge from traffic, equal to at least 2 feet of soil, should be applied to the wall when traffic can come within a distance of one-half the height of the wall. A minimum soil density of 130 pcf should be used for this purpose. Surcharges due to adjacent footings, vehicles, construction equipment, etc., should be added to the above pressures.

The foundations for the retaining walls should be designed in accordance with the recommendations previously provided for the building foundation. The subgrade beneath the ramp should be prepared as previously discussed and 24 inches of compacted, crushed rock or gravel should be placed beneath the slab.

In addition to the static lateral earth pressures, the wall will experience lateral earth pressures during an earthquake. This pressure is a function of the maximum ground surface acceleration and should be assumed to act uniformly over the entire height of the wall. Based on the seismicity of the site, it is recommended that the additional lateral pressure caused by earthquake shaking be estimated with the following relationship:

$$\Delta P = 10H$$

where: ΔP = uniform horizontal lateral earth pressure in psf.
H = depth of wall below ground surface, in feet.

Lateral loads can be resisted by the walls through passive resistance in the soils used as backfill and in the native soils at the base of the walls. For design purposes, the ultimate passive pressure can be represented by an equivalent fluid pressure of 300 psf (Alternative A) and 200 psf (Alternative B) per foot of footing wall depth, neglecting the upper 1-foot of materials.

2. Drainage

In order to prevent the buildup of hydrostatic forces, drainage should be provided behind the dock walls. Drainage should incorporate either a 6-inch diameter perforated drain pipe extending along the base of the wall, or 4-inch diameter weep holes on 6-foot centers, in addition to the granular backfill discussed in the next section.

3. Backfill

Granular backfill should extend a minimum horizontal distance of 2 feet beyond the inside face of the wall, and it should be compacted to at least 90 percent of the laboratory maximum dry density as determined by ASTM 1557-78. Excessive compaction in the granular backfill could result in large pressures being exerted on the wall. Therefore, the relative compaction of this backfill should not exceed 95 percent.

G. PAVEMENT

The proposed project development plan indicates at-grade driveways and parking areas. Recommended pavement thicknesses for driveways and parking areas are summarized in Table IV-1, presented at the end of this chapter, based on an assumed subgrade R-value of less than 5 and on assumed traffic indices.

Traffic indices for parking lots and driveways generally range from 4 to 8. We have used these indices in developing the pavement sections shown in Table IV-1. However, because of the heavy truck traffic anticipated at the transfer station, it is possible that higher traffic indices may be required for use in the pavement design. Other pavement sections can be provided reflecting higher traffic indices.

Two alternate sections are presented. Other alternate sections, with different thicknesses, are possible; however, the recommended sections reflect minimum thicknesses of asphaltic concrete and Class 2 Base.

All pavement construction and materials should conform to applicable sections of the latest edition of the Caltrans Specifications, (State of California, Department of Transportation). The top 6 inches of subgrade beneath pavements should be stabilized and compacted to a minimum degree of compaction of 95 percent, based upon California Test Method 216.

Water from planter areas adjacent to pavements can seep below the concrete curb and into the baserock within the pavement section. Continued saturation of the baserock leads to permanent wetness towards the lower elevation of the pavement where the water ponds. Soft subgrade conditions and pavement damage can occur as a result.

The practice of building the concrete curb on the subgrade does not prevent water from seeping underneath the pavement, and we are of the opinion that is is necessary to provide an effective cut-off. In order to avoid the

early deterioration of the pavement, we suggest the inclusion of a continuous barrier adjacent to the pavement, or extending the concrete curb at least 4 inches below the bottom of the baserock layer.

H. LANDFILL GAS

Due to the proximity of the site to the adjacent landfill, migration of gasses from the landfill is anticipated. In Alternative A the facilities will be sited 8 feet above existing surface elevation. The potential effects of gas migration under the facilities would be greater in Alternative B where the facilities will be built at or near existing grade. The exact path of gas migration has not been determined. However, it is recommended that as a minimum a collection/extraction or venting trench be constructed along the south and east boundaries for either alternative.

I. NEW UNDERGROUND UTILITIES

Depending on which alternative is selected, underground utilities may be placed within new engineered fill or within existing fill. It is our opinion that construction of utilities up to a depth of 8 feet (new fill) and 6 feet (existing fill) will not experience significant difficulty with side slopes, provided adequate shoring is placed and groundwater is not encountered. Trench excavations penetrating the existing fill should anticipate encountering large concrete slabs and asphalt and other obstructions.

All backfill should be compacted by mechanical means. No jetting should be used. The backfill soils should be compacted to a minimum relative compaction of 95 percent in the upper 3 feet in structural areas, and 90 percent below that. All imported backfill material should also be compacted to at least 90 percent relative compaction, or 70 percent relative density if the material used is very granular in nature.

Where utilities cross perimeter footing lines, the trench backfill should consist of a vertical barrier of impervious material. Similar impervious

plugs should be included where utility trenches backfilled with granular materials cross through planter areas and extend below pavements or slabs.

Any trenches excavated within the area of the previously completed building pad or other structural areas should be adequately shored or protected to prevent caving or other distress. All buried utilities should be installed outside of an imaginary 1.5 horizontal to 1 vertical plane, drawn downward from the lowest edge of the closest footing.

The installation of all underground utilities should be performed in accordance with the requirements of the agency responsible for occupational safety and health.

J. EXISTING UTILITIES

California Underground Locator Company was retained to identify the underground utilities within the site which are not shown on any available maps. The survey was conducted on the portions of the site not occupied by stockpiles. Three abandoned utility lines were field-located and their approximate locations are shown on Figure III-1.

K. COST ESTIMATE

Cost estimates are presented on Table IV-2 for the two alternatives evaluated. Alternative A consists of raising the site elevation from about Elevation 0 to about Elevation +8.0 and supporting the structures on shallow footings. Alternative B consists of raising the site elevation from about Elevation 0 to about Elevation +2.0 and supporting the structures on a pile foundation. The costs provided include the cost of the engineered fill, transportation of the material from a source less than 10 miles away from the site, and placement of the fill to the required elevation.

In addition, the costs involved in removal of the existing fill and sludge are presented on Table IV-3. These costs are intented to provide a range of costs involved in the disposal of the fill and sludge, and they reflect the

possibility that the existing fill and sludge may be contaminated and would need special handling, if they were to be removed.

- Case I consists of removal and disposal of the sludge and the remaining fill to a Class III landfill.

- Case II consists of removal and disposal of the sludge to a Class I landfill and the remaining fill to a Class III landfill.

- Case III consists of removal and disposal of the sludge and fill to a Class I landfill.

The costs for each case are in addition to the costs of alternative foundations shown on Table IV-2.The volume of existing sludge was estimated based on an assumed thickness of 2 feet over the entire site. The existing fill (including sludge) was assumed to be 10 feet deep over the entire site. The costs include disposal of the contaminated materials and placement of engineered fill to Elevation 0.

L. ADDITIONAL SERVICES

Upon completion of the design, the grading and foundation plans should be reviewed by the Geotechnical Engineer to determine that the design is consistent with the recommendations of this report. The foundation recommendations should be reanalyzed if the actual imposed building loads exceed the present values.

All grading and earthwork should be performed under the observation and testing of a representative of the Geotechnical Engineer to verify proper materials selection and to determine that the subgrade compaction, and placement and compaction of all fills are properly achieved.

TABLE IV-1
PAVEMENT DESIGN FOR PARKING LOTS AND DRIVEWAYS

Traffic Index	Alternative Sections	Asphaltic Concrete (inches)	Class 2 Aggregate Base (inches)	Class 2 Aggregate Subbase (inches)
4	A	2.0	9.0	---
	B	2.0	4.0	6.0
5	A	2.5	11.5	---
	B	2.5	6.0	6.0
6	A	2.5	15.0	---
	B	2.5	6.0	10.0
7	A	3.0	18.0	---
	B	3.0	6.0	13.5
8	A	3.5	21.0	---
	B	3.5	8.0	14.0

NOTE:
1. All layers in compacted thickness
2. Caltrans Standard Specifications, latest edition
3. Based on an assumed R-value of 5

TABLE IV-2

COST ESTIMATE - FILL PLACEMENT

	Approximate Volume (cubic yds.)	Unit Cost ($/cu.yd.)	Estimated Total Cost to Raise Site to Rough Grade
Alternative A			
Fill Placement to Elevation +8.0	120,000	$8.00-$10.50	$960,000 to $1,260,000
Alternative B			
Fill Placement to Elevation +2.0	30,000	$8.00-$10.50	$240,000 to $315,000

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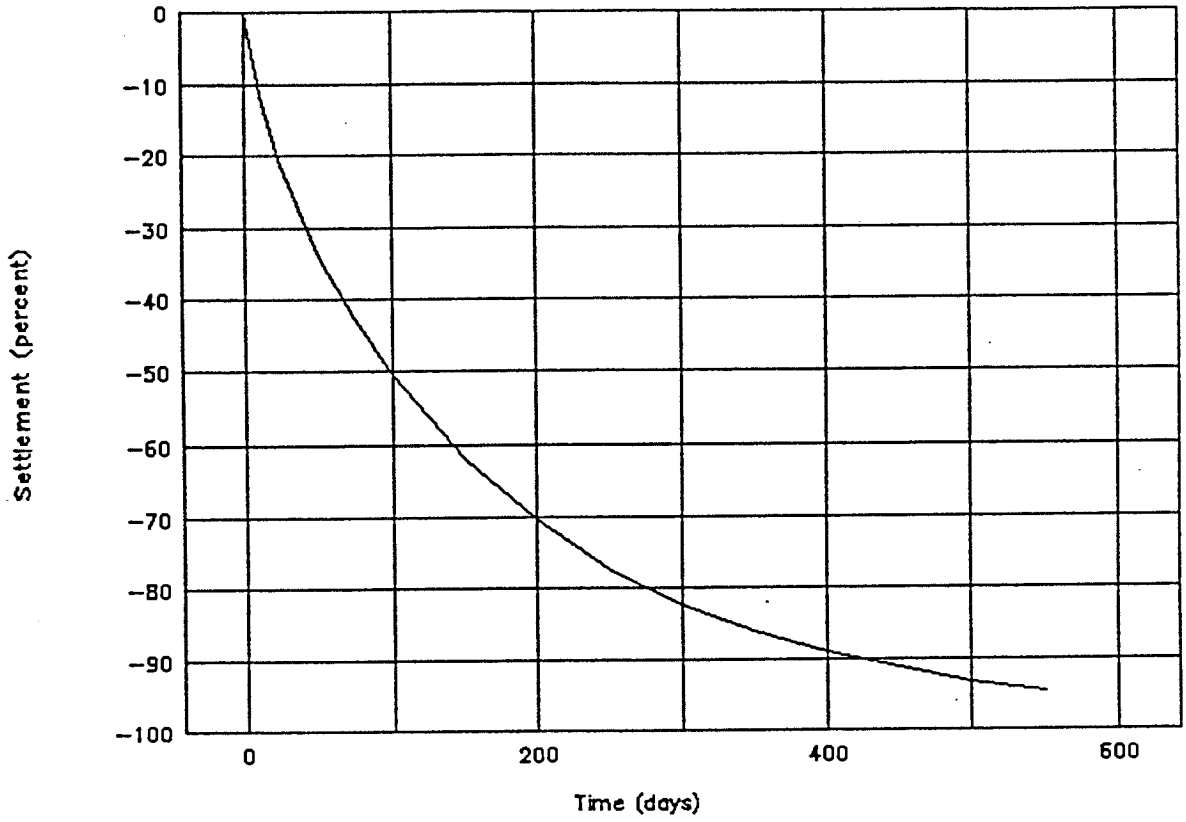
TABLE IV-3

COST ESTIMATE

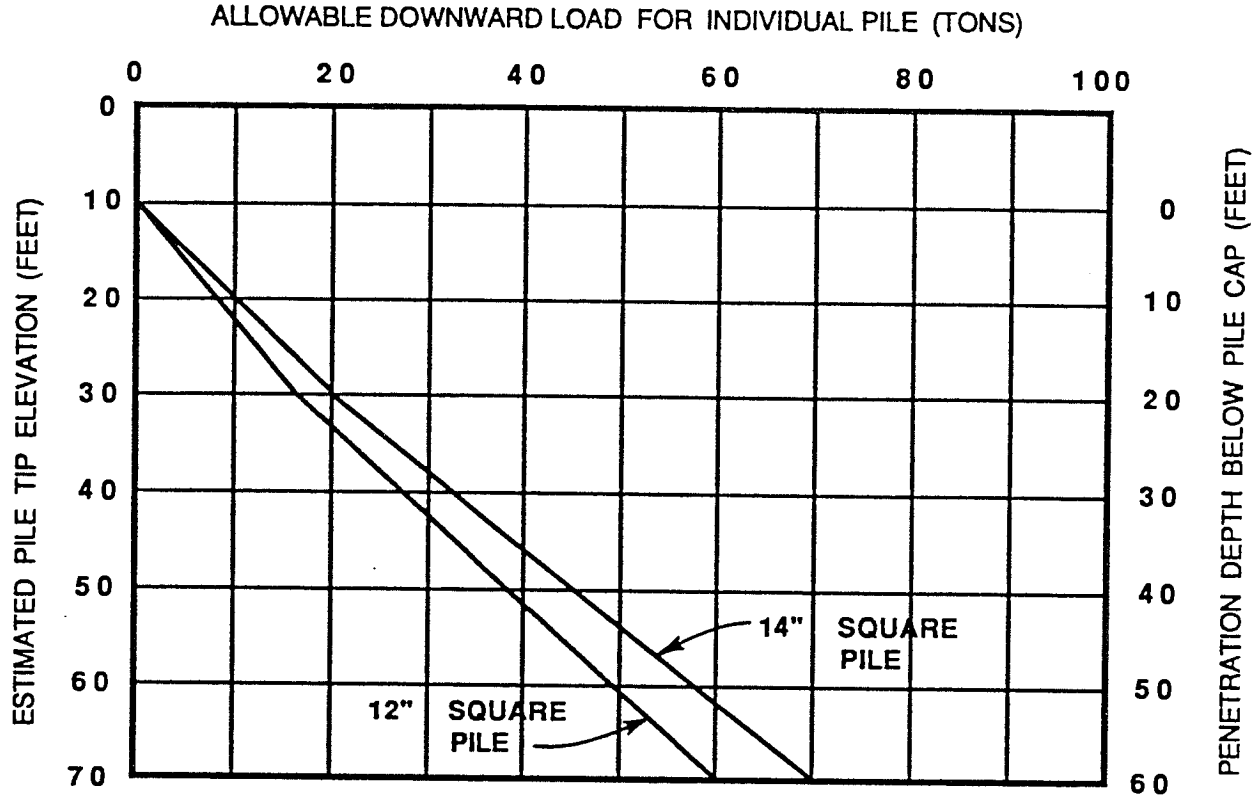
REMOVAL OF EXISTING SLUDGE AND FILL

Task	Approximate Sludge Volume (yd^3)(1)	Sludge Disposal Site (Excavation and Disposal Cost/yd^3)	Approximate Volume of Existing Fill (yd^3)(2)	Fill Disposal Site (Excavation and Disposal Cost/yd^3)	Cost of Sludge Disposal (Millions)	Cost of Fill Disposal (Millions)	Total Cost of Fill Placement to Elev. 0.0 (Millions)(3)	Total Cost (Millions)
Case I	30,000	Class 3 Landfill ($39 to $109)	120,000	Class 3 Landfill ($39 to $109)	$1.2 to $3.3	$4.7 to $13.1	$1.2 to $1.6	$7.1 to $18.0
Case II	30,000	Class 1 Landfill ($450 to $600)	120,000	Class 3 Landfill ($39 to $109)	$13.5 to 18.0	$4.7 to 13.1	$1.2 to $1.6	$19.4 to $32.7
Case III	30,000	Class 1 Landfill ($450 to $600)	120,000	Class 1 Landfill ($450 to $600)	$13.5 to $18.0	$54.0 to $72.0	$1.2 to $1.6	$68.7 to $91.6

(1) Based upon assumed average thickness of 2 feet
(2) Based upon assumed average thickness of 8 feet
(3) Includes cost of compacted fill, imported from local sources



Wahler Associates	SMaRT STATION SUNNYVALE, CALIFORNIA	TIME RATE OF SETTLEMENT		
		PROJECT NO.	DATE	FIGURE NO.
PALO ALTO ● CALIFORNIA		WMN-101H	MAY 1990	IV-1



NOTES:
1. PENETRATION DEPTH IS MEASURED FROM BOTTOM OF PILE CAP OR ELEVATION -10, WHICHEVER IS LOWER.
2. VALUES SHOWN ARE FOR DEAD PLUS LIVE LOADS AND MAY BE INCREASED BY ONE THIRD FOR WIND OR SEISMIC LOADING.
3. THE INDICATED LOADS ARE LIMITED BY THE STRENGTH OF THE SUPPORTING SOIL. THE ALLOWABLE STRESSES OF THE PILE ITSELF MAY IMPOSE FURTHER LIMITATIONS.
4. PILES INSTALLED IN GROUPS SHOULD BE SPACED A MINIMUM OF THREE TIMES THE PILE WIDTH BUT NOT LESS THAN 3 FEET CENTER TO CENTER.
5. THE ALLOWABLE DOWNWARD LOAD SHOULD BE REDUCED BY THE RECOMMENDED DOWNDRAG LOADS

Wahler Associates	SMaRT STATION SUNNYVALE, CALIFORNIA	ALLOWABLE PILE LOAD		
PALO ALTO CALIFORNIA		PROJECT NO.	DATE	FIGURE NO.
		WMN-101H	MAY 1990	IV-2

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REFERENCES

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APPENDIX A

APPENDIX A
FIELD INVESTIGATION

A. GENERAL

The field investigation for the proposed development was directed toward providing data for foundation design and site grading recommendations. The field investigation began on April 9, 1990, and was concluded on April 16, 1990.

The drilling and exploratory pits were performed under the observation of an engineer or geologist from Wahler Associates who maintained a continuous log of the soils encountered and obtained soil samples suitable for laboratory testing. The soils were classified in accordance with the Unified Soil Classification System illustrated on the "Key for Exploration Logs" presented on Figure A-1. Additional subsurface information was obtained during the course of our exploration from five shallow borings performed by us for an environmental assessment of the site.

B. DRILLING AND SAMPLING PROCEDURES

The drilling subcontractor used during the course of the field investigation program was Pitcher Drilling Company of East Palo Alto. The deep borings ranged in depth from 71-1/2 to 81-1/2 feet and the shallow borings ranged in depth from 11 to about 12.5 feet for a total of about 607 feet. The deep borings were drilled using a Failing 1500 rotary wash drill rig and the shallow borings were drilled using 8-inch augers. The backhoe subcontractor was Diganics Equipment, Inc., of San Jose, California. Twelve exploratory pits were excavated at the site using a track-mounted backhoe with a 24-inch wide bucket. The pits ranged in depth from 2 to 9 feet. The approximate locations of the borings and pits are shown on Figure II-1.

Relatively undisturbed, as well as disturbed, samples were obtained from the exploratory holes. Relatively undisturbed samples were obtained with 2.875 inch I.D. Shelby tubes that were hydraulically pushed a distance of 30 inches into underlying soils, and with 2.4-inch I.D. ring sampler that was driven into the underlying soils, using a 140-pound hammer falling 30 inches. The number of blows to drive the hammer 0 to 6 inches, 6 to 12 inches, and 12 to 18 inches or to refusal are recorded on each drill log. Samples were also obtained with a split-spoon Standard Penetrometer sampler that was driven by a 140-pound hammer falling 30 inches. The number of blows to drive the hammer in 6-inch increments was recorded similarly to the method described above for the relatively undisturbed ring samples. All soil samples obtained from the drill holes were transported to our Palo Alto laboratory for further examination and testing.

BORING LOCATION: SEE SITE MAP	APPROVED BY:	GROUND EL: ~0
DEPTH/ELEV.WATER NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING	TOTAL DEPTH: 81.5'
DRILL RIG: FAILING 1500	BORING DIA.: 5" rotary	DATE DRILLED: 4/9/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	FILL	0					HNU calibrated to 100 ppm isobutylene at 0830 Reading =PID
GW	0-1' SANDY GRAVEL; Gray, dry, medium dense						
CH	1-5' SILTY CLAY, Black to very dark yellow brown, moist, stiff to very stiff, some gravel 5-10% to 1/2"	2				AD	
	@ 3-3.5' Yellow brown to tan clay lense	4					
			R-1 L-1	6 12 26	1.3 1.5	DR	PID=1.0
SW	5-7' SAND, Dark yellow brown, moist, dense, small piece of plywood	6				RD	
	ALLUVIUM						
CL	7-18.5' SILTY CLAY, Olive -gray with light gray mottling, wet, stiff	8	R-2 L-2	10 16 26	1.3 1.5	DR	PID=1.0
		10					
		12				RD	
		14					
		16	S-1		2.5 2.5	P	PID=0.8
		18					
CL	18.5-24' SILTY CLAY, Olive with yellow-brown mottling, wet, stiff					RD	
		20					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	DH-1
		WMN101H	1 of 5	

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0
DEPTH /ELEV.WATER: NOT NOTED	DRILL CONTRACTOR: PITCHER DRIILLING		TOTAL DEPTH: 81.5 '
DRILL RIG: FALLING 1500	BORING DIA.:5" rotary	DATE DRILLED: 4/9/90	LOGGED BY: J.S.

		DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	18.5-24.0' SILTY CLAY: (continued)	20	R-3	6 9 15	0.8 1.5	DR	PID=0.9
		22				RD	
CL	24-29' SANDY CLAY, Olive with yellow-brown mottling, wet, stiff.	24					
		26	R-4	4 8 12	1.2 1.5	DR	PID=0.8
		28				RD	
SW	29-49' GRAVELLY SAND, Olive-gray, wet, dense, subrounded to rounded gravel to 1/2".	30	SPT-1	16 22 23	1.0 1.5	DR	
		32				RD	
		34					
		36					
		38	SPT-2	13 16 21	1.0 1.5	DR	PID=1.0
		40					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	DH-1
		WMN101H	2 of 5	

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0
DEPTH /ELEV.WATER: NOT NOTED	DRILL CONTRACTOR: PITCHER DRIILLING		TOTAL DEPTH: 81.5 '
DRILL RIG: FALLING 1500	BORING DIA.:5" rotary	DATE DRILLED: 4/9/90	LOGGED BY: J.S.

		DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
SW	29-49' GRAVELLY SAND:(continued)	40					
	42-44' GRAVEL TO 1"	42				RD	
		44					
		46	SPT-3	21 31 48	0.7 1.5	DR	PID=0.8
		48				RD	
CL	49-81' SILTY CLAY,Olive,wet,stiff to very stiff,slightly sandy	50					
	@ 50-51' sandier	52	SPT-4	6 9 16	0.2 1.5	DR	
		54					
	@ 56-58' sandier	56				RD	
		58					
		60					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	3 of 5	DH-1

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0
DEPTH/ELEV. WATER : NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 81.5'
DRILL RIG: FALLING 1500	BORING DIA.:5" rotary	DATE DRILLED: 4/9/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	49-81' SILTY CLAY: (continued)	60	R-5	9 13 20	1.5 1.5	DR	
		62					
		64				RD	
		66					
		68					
		70	R-6	7 15 21	1.5 1.5	DR	
		72					
		74				RD	
		76					
		78					
		80					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. WMN101H	SHEET 4 of 5	DH-1

BORING LOCATION: SEE SITE MAP		APPROVED BY: B.Y.	GROUND EL: ~0
DEPTH/ELEV. WATER : NOT NOTED	DRILL CONTRACTOR:: PITCHER DRILLING		TOTAL DEPTH: 81.5'
DRILL RIG:	BORING DIA.	DATE DRILLED: 4/9/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	49-81 SILTY CLAY : (continued)	80	R-7	18 / 50 / 4"	0.7 / 1.5	DR	
SP	81-81.5' SAND, Yellow-brown, moist, very dense, poorly graded with thin silt lenses						
	BORING TERMINATED AT 81.5 feet	82					Boring backfilled with cement grout
		84					
		86					
		68					
		90					
		92					
		94					
		96					
		98					
		100					

DATA ON THIS LOG ARE AN APPROXIMATION OF THE GEOLOGIC AND SUBSURFACE CONDITIONS BECAUSE THE INFORMATION WAS OBTAINED FROM INDIRECT, DISCONTINUOUS, AND POSSIBLY DISTURBED SAMPLING NECESSITATED BY USE OF SMALL-DIAMETER HOLES. ROTARY AND WASH BORING HOLES HAVE FURTHER COMPLICATIONS IN THIS REGARD BECAUSE OF THE NEED TO USE DRILLING FLUID AND/OR CASING IN ADVANCING HOLES.

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SOIL CLASSIFICATIONS SHOWN ON LOGS ARE FIELD CLASSIFICATIONS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. WMN101H	SHEET 5 OF 5	DH-1

BORING LOCATION: SEE SITE MAP	APPROVED BY: JC	GROUND EL: ~ 0.5
DEPTH/ELEV.WATER : NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING	TOTAL DEPTH: 81.5'
DRILL RIG: FAILING 1500	BORING DIA.: 5" rotary	DATE DRILLED: 4/10/90	LOGGED BY: JS

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	FILL	0					
GP	0-0.5' GRAVEL,Gray,dry,medium dense						
CH	0.5-5' SILTY CLAY, Dark brown, moist, stiff.	2				AD	
		4	R-1 L-1	7 17 24	1.2 1.5	DR	
	ALLUVIUM	6					
CH	5-7.5' SILTY CLAY, Black, moist, very stiff.					RD	
CL	7.5-23' SILTY CLAY, Olive, very moist to wet, very stiff, olive-gray mottling, some calcareous nodules to 1/2"	8					
		10	R-2 L-2	9 19 26	0.9 1.5	DR	
	At 13' mottling changes to yellow-brown	12				RD	
		14					
		16	R-3	12 21 36	1.5 1.5	DR	
		18				RD	
		20					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	1 of 5	DH-2

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0.5
DEPTH /ELEV.WATER: NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 81.5'
DRILL RIG: FALLING 1500	BORING DIA.:5" rotary	DATE DRILLED: 4/10/90	LOGGED BY: J.S.

		DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	7.5-23' SILTY CLAY:(continued)	20	R-4	6 9 13	1.5 1.5	DR	
		22				RD	
SP	23-25.5' FINE SAND, Olive, wet, loose	24					
		26	SPT-1	0 1 3	1.5 1.5	DR	PID=2.0ppm
CL	25.5-30' SILTY CLAY, Olive, wet, firm.	28				RD	
SW	30-47' SAND, Olive-brown to olive-gray, wet, dense, medium grained, rounded gravel to 1/4",	30	SPT-2	14 20 25	1.0 1.5	DR	PID=4.0ppm
		32					
	- gravel lenses to 1" at 31.5', 34' and 38'	34				RD	
		36	SPT-3	7 24 23	1.0 1.5	DR	PID=1.5ppm
		38				RD	
		40					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	DH-2
		WMN101H	2 of 5	

BORING LOCATION: : SEE SITE MAP		APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV. WATER : NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 81.5'
DRILL RIG: FALLING 1500	BORING DIA.: 5" rotary	DATE DRILLED: 4/10/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
SW	30-47' SAND: (continued)	40	SPT-4	6 17 19	1.0 1.5	DR	
		42					
		44				RD	
		46					
CL	47-78' SILTY CLAY, Olive brown, wet, very stiff .	48	R-5	7 14 25	0.8 1.5	DR	
		50					
	@ 52' grades to less stiff	52				RD	
		54					
		56	R-6	5 6 9	1.5 1.5	DR	
						RD	
		58	S-1		2.5 2.5	P	
		60					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	3 of 5	DH-2

BORING LOCATION: SEE SITE MAP	APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV. WATER : NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING	TOTAL DEPTH: 81.5'
DRILL RIG: FALLING 1500	BORING DIA.:: 5" rotary	DATE DRILLED: 4/10/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	47-78' SILTY CLAY: (continued)	60					
		62				RD	
		64					
		66					
		68	R-7	8 14 16	0 1.5	DR	
		70					
		72					
		74				RD	
		76					
		78					
ML	78-81.5' SANDY SILT, Yellow-brown, wet, firm	80					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	4 of 5	DH-2

BORING LOCATION: SEE SITE MAP		APPROVED BY: B.Y.	GROUND EL: 0.5'
DEPTH/ELEV. WATER : NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 81.5 '
DRILL RIG: FALLING 1500'	BORING DIA.: 5" rotary	DATE DRILLED: 4/10/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
ML	78-81.5' SANDY SILT: (continued)	80	SPT-5	12 15 23	1.5 1.5	DR	
	BORING TERMINATED AT 81.5 feet	82					Boring backfilled with cement grout
		84					
		86					
		68					
		90					
		92					
		94					
		96					
		98					
		100					

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Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	DH-2
		WMN101H	5 OF 5	

BORING LOCATION: SEE SITE MAP	APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV.WATER: NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING	TOTAL DEPTH: 81.5'.
DRILL RIG: FAILING 1500	BORING DIA.: 5" rotary	DATE DRILLED: 4/11/90	LOGGED BY: JS

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
GC	FILL 0-4.5' CLAYEY GRAVEL, Brownish gray, slightly moist, gravel to 1",with 5-10% fines,medium dense	0 2 4				AD	
	4.5-6' (SLUDGE), Black to dark gray, highly organic	6	S-1		2.5 / 2.5	P	PID=1.0
CL	ALLUVIUM 6-12' SANDY CLAY, Olive with yellowish brown mottling, very moist, very stiff.	8				RD	
			L-1 R-1	14 24 35	1.3 / 1.5	DR	PID=0
		10					
CL	12-29.5' SILTY CLAY, Olive with yellow brown mottling, very stiff, minor whitish mottling and some calcareous nodules to 1/4"	12				RD	
		14					
		16	R-2	13 25 44	1.5 / 1.5	DR	
	@ 18' changes to yellow brown with some olive mottling	18				RD	
		20					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	1 of 5	DH-3

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0.5
DEPTH /ELEV.WATER NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 81 .5'
DRILL RIG: FAILING 1500'	BORING DIA.:: 5" rotary	DATE DRILLED: 4/11/90	LOGGED BY: J.S.

		DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	12-29.5' SILTY CLAY: (continued)	20	R-3	12 24 37	1.3 1.5	DR	
		22				RD	
		24					
		26	R-4	12 21 14	1.5 1.5	DR	
		28				RD	
SM	29.5-46.5' SILTY SAND, Olive with yellowish brown mottling,wet, medium dense,fine grained sand	30	R-5	5 10 30	1.4 1.5	DR	PID=3.0
		32				RD	
		34					
		36	SPT-1	10 19 18	1.5 1.5	DR	PID= 2.0
		38				RD	
		40					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	2 of 5	DH-3

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV. WATER : NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 81.5'.
DRILL RIG: FALLING 1500'	BORING DIA.: 5" rotary	DATE DRILLED: 4/11/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
SM	29.5-46.5' SILTY SAND, continued	40	SPT-2	5 15 25	1.0 1.5	DR	
		42				RD	
SW	44-46.5' SAND,Olive-brown, wet, medium dense, fine grained.	44					
		46	L-3 R-6	25 30 21	0.8 1.5	DR	
CL	46.5-60.5' SILTY CLAY,Olive with abundant yellow-brown mottling, very moist, very stiff.	48					
		50				RD	
		52					
		54	R-7	7 16 27	1.5 1.5	DR	
		56					
		58				RD	
		60					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN-101H	3 of 5	DH-3

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV. WATER : NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 81.5'.
DRILL RIG: FALLING 1500'	BORING DIA.: 5" rotary	DATE DRILLED: 4/11/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	46.5-60.5' SILTY CLAY; continued	60	R-8	6 8 16	1.5 1.5	DR	
CL	60.5-63' SANDY CLAY, Olive with yellow-brown mottling, wet, firm	62					
CL	63-81.5' SILTY CLAY, Olive with abundant yellow-brown mottling, very moist, stiff	64				RD	
		66					
		68					
		70	R-9	7 13 22	1.5 1.5	DR	
		72					
		74					
		76				RD	
		78					
		80					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	4 of 5	DH-3

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV. WATER : NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 81.5'
DRILL RIG: FALLING 1500'	BORING DIA. 5" rotary	DATE DRILLED: 4/11/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	63-81.5' SILTY CLAY: (continued) 80.5-81' 6" lense of fine sand(SP)	80	SPT-3	12 27 40	1.5 1.5	DR	
	BORING TERMINATED AT 81.5 feet	82					Boring backfilled with cement grout
		84					
		86					
		68					
		90					
		92					
		94					
		96					
		98					
		100					

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Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	5 OF 5	DH-3

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV.WATER: NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 71.5'
DRILL RIG: FAILING 1500	BORING DIA.: 5" rotary	DATE DRILLED: 4/11/90	LOGGED BY: JS

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	FILL	0					
GC	0-3.5' CLAYEY GRAVEL,Grayish-brown, slightly moist, medium dense 5-10% fines	2				AD	
	ALLUVIUM	4					
SC	3.5-6' CLAYEY SAND, Dark olive-gray, moist, medium dense		L-1 R-1	3 4 12	0.9 1.5	DR	PID=1.0
CL	6-47' SILTY CLAY, Olive with some light olive and yellow brown mottling, moist, stiff to very stiff, some sand.	6				RD	
		8	R-2	2 15 24	1.2 1.5	DR	
	@ 11' grades less sandy	10				RD	
		12	L-2 R-3	7 15 29	1.4 1.5	DR	PID=4.0
		14					
		16				RD	
		18	R-4	7 15 27	1.5 1.5	DR	
		20				RD	

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. WMN101H	SHEET 1 of 4	DH-4

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0.5
DEPTH /ELEV.WATER: NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: '71.5'
DRILL RIG: FALLING 1500'	BORING DIA.:5" rotary:	DATE DRILLED: 4/11/90	LOGGED BY: J.S.

		DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	6-47' SILTY CLAY: (continued)	20				RD	
		22					
		24	R-5	10 20 31	1.3 1.5	DR	
		26				RD	
		28	R-6	15 36 50	0 1.4	DR	
		30				RD	
		32					
	at 34' some fine sand	34	R-7	14 26 26	1.3 1.4	DR	
		36				RD	
		38	R-8	15 24 50/4.5	1.3 1.5	DR	
		40					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	2 of 4	DH-4

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV. WATER : NOT NOTED		DRILL CONTRACTOR: PITCHER DRILLING	TOTAL DEPTH:71.5'
DRILL RIG: FALLING 1500'	BORING DIA.:5" rotary	DATE DRILLED: 4/11/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	6-47' SILTY CLAY: (continued)	40					
		42				RD	
		44	R-9	8 14 17	1.2 1.5	DR	
		46				RD	
SW	47-50' SAND, Brown, medium to coarse grained,medium dense, minor fine grained gravel to 1/4"	48					
		50	SPT-1	4 16 18	1.5 1.5	DR	
CL	50-59.5' SILTY CLAY, Olive brown with yellow-brown mottling, hard @ 53' becomes less stiff.	52					
		54				RD	
		56					
		58	R-10	6 7 7	1.1 1.5	DR	
CL	59.5-62' SANDY CLAY,Olive brown, with yellow-brown mottling, firm to stiff minor fine gravel to 1/2"	60				RD	

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	3 of 4	DH-4

BORING LOCATION: SEE SITE MAP	APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV. WATER : NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING	TOTAL DEPTH: 71.5'
DRILL RIG: FALLING 1500	BORING DIA.:5" rotary:	DATE DRILLED: 4/11/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	59.5-62' SANDY CLAY: (continued)	60					
CL	62-71.5' SILTY CLAY, Olive brown with yellow brown mottling,moist, very stiff	62				RD	
		64					
		66					
		68					
		70	R-11	9 16 23	1.4 1.5	DR	
	BORING TERMINATED AT 71.5 feet	72					Boring backfilled with cement grout
		74					
		76					
		78					
		80					

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Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	4 of 4	DH-4

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~2.0
DEPTH/ELEV.WATER: NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 80.5'
DRILL RIG: FAILING 1500	BORING DIA.: 5" rotary	DATE DRILLED: 4/12/90	LOGGED BY: JS

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
SM /GM	FILL 0-2.5' SILTY GRAVEL/SILTY SAND, Gray, slightly moist, medium dense, 10-15% silt	0 2				AD	
CH	ALLUVIUM 2.5-6' SILTY CLAY, Black yellowish-brown mottling, moist, very stiff	4	L-1 R-1	9 20 30	1.1 1.5	DR	
CL	6-51' SILTY CLAY,Olive-brown, very moist, very stiff, yellowish-brown mottling, minor gravel to 1/4"	6				RD	
		8	L-2 R-2	7 15 27	0.8 1.5	DR	
	- at 10' becomes wet	10 12 14				RD	
		16	R-3	7 18 24	1.3 1.5	DR	
		18 20				RD	

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	1 of 5	DH-5

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~2.0
DEPTH /ELEV.WATER: NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 80.5'
DRILL RIG: FALLING 1500	BORING DIA.::5" rotary	DATE DRILLED: 4/12/90	LOGGED BY: J.S.

		DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	6-51' SILTY CLAY: (continued)	20					
		22	S-1		2.1 / 2.5	P	
		24				RD	
		26	R-4	13 23 28	1.3 / 1.5	DR	
		28				RD	
		30	SPT-1	8 16 22	1.5 / 1.5	DR	
		32				RD	
		34					
		36	R-5	7 21 30	1.4 / 1.5	DR	
		38				RD	
		40					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	2 of 5	DH-5

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~2.0
DEPTH/ELEV. WATER : NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 80.5'
DRILL RIG: FALLING 1500'	BORING DIA.:5" rotary	DATE DRILLED: 4/12/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	6-51' SILTY CLAY: (continued)	40	R-6	7 24 45	1.5 1.5	DR	
		42				RD	
		44					
		46	R-7	5 12 14	1.4 1.5	DR	
		48				RD	
		50	S-2		2.5 2.5	P	
SM	51-54' SILTY SAND, Olive with yellow-brown mottling, wet,dense	52					
CL	54-68.5' SANDY CLAY, Olive brown, with some yellow-brown mottling, very moist, very stiff.	54				RD	
		56					
		58	R-8	10 15 21	1.4 1.5	DR	
		60					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	3 of 5	DH-5

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~2.0
DEPTH/ELEV. WATER :NOT NOTED	DRILL CONTRACTOR: PITCHERDRILLING		TOTAL DEPTH: 80.5'
DRILL RIG: FALLING 1500'	BORING DIA.:5" rotary	DATE DRILLED: 4/12/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	54-68.5' SANDY CLAY: (continued)	60					
		62				RD	
	- at 64-66' becomes very sandy	64					
		66					
		68	R-9	8 17 39	0 1.5	DR	
CL	69.5-81.5' SILTY CLAY, Olive brown, wet, stiff to very stiff, yellowish-brown mottling	70					
	@ 72' becomes slightly sandy	72				RD	
		74					
		76					
		78					
		80	SPT-2	21 37 45	1.5 1.5	DR	

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	DH-5
		WMN101H	4 of 5	

BORING LOCATION: SEE SITE MAP		APPROVED BY: .	GROUND EL: ~2.0
DEPTH/ELEV. WATER : NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 80.5'
DRILL RIG: FALLING 1500'	BORING DIA.:5" rotary	DATE DRILLED: 4/12/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	69.5-81.5' SILTY CLAY: (continued)	80	SPT-2	45		DR	
	BORING TERMINATED AT 80.5 feet	82 84 86 68 90 92 94 96 98 100					Boring backfilled with cement grout

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THE STRATIFICATION LINES ON DEPTH INTERVALS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES, AND THE TRANSITIONS MAY BE GRADUAL.

SOIL CLASSIFICATIONS SHOWN ON LOGS ARE FIELD CLASSIFICATIONS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	5 OF 5	DH-5

BORING LOCATION: SEE SITE MAP	APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV.WATER: NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING	TOTAL DEPTH: 71.5'
DRILL RIG: FAILING 1500	BORING DIA.: 5" rotary	DATE DRILLED: 4/13/90	LOGGED BY: JS

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
GC	FILL 0-9'CLAYEY GRAVEL,Gray,slightly moist,medium dense,5-10% fines	0				AD	
		2					
		4					
			L-1	20	1.2	DR	PID =17-25ppm
			R-1	21 15	1.5		
		6				RD	
	ALLUVIUM	8					
CH	9-9.5' SILTY CLAY, Black, moist,soft						
CL	9.5-23 SILTY CLAY, Olive brown, very stiff, moist, yellow-brown mottling		L-2	6	1.2	DR	PID=17ppm
		10	R-2	13 24	1.5		
		12				RD	
			L-3	10	1.0	DR	
		14	R-3	26 38	1.5		
		16				RD	
		18		12			
			R-4	27 48	0.8 1.5	DR	
		20					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. WMN101H	SHEET 1 of 4	DH-6

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV.WATER: NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 71.5 '
DRILL RIG: FALLING 1500'	BORING DIA.:5" rotary	DATE DRILLED: 4/13/90	LOGGED BY: J.S.

		DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	9-23' SILTY CLAY: (continued)	20				RD	
		22					
CL	23-55' SANDY CLAY, Yellowish-brown, very moist, very stiff, slight olive-brown mottling	24	R-5	15 27 27	1.5 1.5	DR	
	At 26-28' minor coarse sand and fine gravel to 1/8"	26				RD	
		28	SPT-1	8 14 24	1.5 1.5	DR	
		30					
		32				RD	
		34					
		36	R-6	13 26 37	1.4 1.5	DR	
		38					
		40					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. WMN101H	SHEET 2 of 4	DH-6

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV. WATER : NOT NOTED	DRILL CONTRACTOR: PITCHER		TOTAL DEPTH: 71.5'
DRILL RIG: FALLING 1500	BORING DIA.:5" rotary	DATE DRILLED: 4/13/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	23-55' SILTY CLAY: (continued)	40					
		42				RD	
		44	S-1		2.2 / 2.5	P	
		46					
		48				RD	
		50	R-7	13 29 50	1.4 / 1.5	DR	
		52					
		54					
CL	55-71.5' SANDY CLAY, Yellow-brown with some olive brown mottling; very moist; firm to stiff.	56				RD	
		58					
		60					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. WMN101H	SHEET 3 of 4	DH-6

BORING LOCATION: SEE SITE MAP	APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV. WATER :NOT NOTED	DRILL CONTRACTOR: PITCHER	TOTAL DEPTH: 71.5'
DRILL RIG: FALLING 1500'	BORING DIA.:5"rotary	DATE DRILLED: 4/13/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
		60					
CL	55-71.5' SANDY CLAY: (continued)		R-8	6 10 14	1.5 1.5	DR	
		62					
		64				RD	
		66					
		68					
		70	R-9	7 15 17	1.5 1.5	DR	
	BORING TERMINATED AT 71.5 feet	72					Boring backfilled with cement grout
		74					
		76					
		78					
		80					

DATA ON THIS LOG ARE AN APPROXIMATION OF THE GEOLOGIC AND SUBSURFACE CONDITIONS BECAUSE THE INFORMATION WAS OBTAINED FROM INDIRECT, DISCONTINUOUS, AND POSSIBLY DISTURBED SAMPLING NECESSITATED BY USE OF SMALL-DIAMETER HOLES. ROTARY AND WASH BORING HOLES HAVE FURTHER COMPLICATIONS IN THIS REGARD BECAUSE OF THE NEED TO USE DRILLING FLUID AND/OR CASING IN ADVANCING HOLES.

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Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. WMN101H	SHEET 4 of 4	DH-6

BORING LOCATION: SEE SITE MAP	APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV.WATER: NOT NOTED	DRILL CONTRACTOR: PITCHER DRILLING	TOTAL DEPTH: 81.5'
DRILL RIG: FAILING 1500	BORING DIA.: 5" rotary	DATE DRILLED: 4/16/90	LOGGED BY: JS

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
SM /GM	FILL 0-8' SILTY GRAVEL/SILTY SAND,Dark yellowish-brown to brown gray, slightly moist,medium dense, 10-15% silt	0				AD	
		2					
		4	L-1 R-1	13 15 36	1.0 1.5	DR	
	At 6-8' wood and reinforcing steel	6				RD	
		8					
CH	ALLUVIUM 8-11' SILTY CLAY, Olive brown, moist, stiff, plant stems, dark olive brown at 8-9' and 10-11'	10	L-2 R-2	5 8 17	1.1 1.5	DR	
CL	11-58' SILTY CLAY, Olive brown, very very stiff, moist, with yellowish-brown mottling, some calcareous nodules to 1/4", minor fine gravel to 1/8"	12				RD	
		14					
		16	L-3 R-3	10 15 30	1.2 1.5	DR	
	Below 18' less nodules	18				RD	
		20					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	1 of 5	DH-7

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0.5
DEPTH /ELEV.WATER: NOT NOTED	DRILL CONTRACTOR: PITCHER		TOTAL DEPTH: 81.5 '
DRILL RIG: FALLING 1500	BORING DIA.:5" rotary	DATE DRILLED: 4/16/90	LOGGED BY: J.S.

		DEPTH	SAMPLE NO.	PR / REC	REC.	MODE	REMARKS
CL	11-58' SILTY CLAY: (continued)	20	L-4 R-4	10 16 28	1.2 1.5	DR	
	@ 22' Changes to yellowish-brown with olive brown mottling	22				RD	
		24					
		26	L-5 R-5	15 24 50	1.3 1.5	DR	
		28				RD	
		30	R-6	12 21 35	1.4 1.5	DR	
		32				RD	
		34					
	@ 36-40' Becomes sandy 5-10% fine sand	36	R-7	18 31 45	1.4 1.5	DR	
		38				RD	
		40					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	2 of 5	DH-7

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV. WATER : NOT NOTED		DRILL CONTRACTOR: PITCHER	TOTAL DEPTH: 81.5'
DRILL RIG: FALLING 1500	BORING DIA.:5" rotary	DATE DRILLED: 4/16/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	11-58' SILTY CLAY: (continued)	40	R-8	12 31 23	1.4 1.5	DR	
		42					
		44				RD	
		46					
		48	L-6 R-9	16 33 45	1.5 1.5	DR	
	Grades - less than 5% sand	50					
		52				RD	
		54					
		56	R-10	7 23 29	1.4 1.5	DR	
		58				RD	
CL	58-75' SANDY CLAY, Olive brown, wet, firm, 10-15% fine sand	60					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	DH-7
		WMN101H	3 of 5	

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL: ~0.5
DEPTH/ELEV. WATER :NOT NOTED	DRILL CONTRACTOR: PITCHER		TOTAL DEPTH: 81.5'
DRILL RIG: FALLING 1500'	BORING DIA.:5" rotary	DATE DRILLED: 4/16/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	58-75' SANDY CLAY: (continued)	60				RD	
		62					
		64	S-1		2.5 / 2.5	P	
		66				RD	
		68					
		70	S-2		2.5 / 2.5	P	
		72					
		74				RD	
SM	75-81.5' SILTY SAND, Olive brown; wet, medium dense.	76					
		78					
		80					

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO. WMN101H	SHEET 4 of 5	DH-7

BORING LOCATION: SEE SITE MAP		APPROVED BY: .	GROUND EL: ~0.5
DEPTH/ELEV. WATER : NOT NOTED	DRILL CONTRACTOR: PITCHER		TOTAL DEPTH: 81.5'
DRILL RIG: FALLING 1500	BORING DIA. :5" rotary	DATE DRILLED: 4/16/90	LOGGED BY: J.S.

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
SM	75-81.5' SILTY SAND, continued	80	SPT-1	6 8 13	1.5 1.5	DR	
	BORING TERMINATED AT 81.5 feet	82					Boring backfilled with cement grout
		84					
		86					
		68					
		90					
		92					
		94					
		96					
		98					
		100					

DATA ON THIS LOG ARE AN APPROXIMATION OF THE GEOLOGIC AND SUBSURFACE CONDITIONS BECAUSE THE INFORMATION WAS OBTAINED FROM INDIRECT, DISCONTINUOUS, AND POSSIBLY DISTURBED SAMPLING NECESSITATED BY USE OF SMALL-DIAMETER HOLES. ROTARY AND WASH BORING HOLES HAVE FURTHER COMPLICATIONS IN THIS REGARD BECAUSE OF THE NEED TO USE DRILLING FLUID AND/OR CASING IN ADVANCING HOLES.

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Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. WMN101H	SHEET 5 OF 5
			DH-7

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL:
DEPTH/ELEV. WATER: 7.5 Ft.	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 12.5 Ft.
DRILL RIG: CME -55	BORING DIA.: 8 "	DATE DRILLED: 4-10-90	LOGGED BY: LAF

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
GC	FILL 0.0' - 10.0': CLAYEY GRAVEL: Dark olive gray; damp; medium dense;1/4" to 2" dia., subangular; 30-40% fines; moderate plasticity. ~ 2.25' Gravelley sand in sampler, still a lot of clay. DATA ON THIS LOG ARE AN APPROXIMATION OF THE GEOLOGIC AND SUBSURFACE CONDITIONS BECAUSE THE INFORMATION WAS OBTAINED FROM INDIRECT, DISCONTINUOUS, AND POSSIBLY DISTURBED SAMPLING NECESSITATED BY USE OF SMALL-DIAMETER HOLES. ROTARY AND WASH BORING HOLES HAVE FURTHER COMPLICATIONS IN THIS REGARD BECAUSE OF THE NEED TO USE DRILLING FLUID AND/OR CASING IN ADVANCING HOLES. ~ 6.5' Clayey gravel: dark grey; gravel content decreases slightly, some sludge (?) intermixed.	0				HA	Advance hole with 8" Hollow Stem Auger (HA)
		2	B-1 R-1	12 11 11	1.25 1.25	DR	1.0' - 2.25' Drive 2 1/2"ID. CALIF. MOD SPLIT SPOON SAMPLER w/ 140lb. hammer dropping 30" (CMS)
		4				HA	B-1: PID:1.0; GASTEC:0 R-1: 1.75' - 2.25' ~3' driller felt less gravel more clay
		6	B-2 R-2	6 11 11	1.0 1.25	DR	5.0' - 6.25' CMS B-2: PID:1.0; GASTEC: 0 R- 2: 5.5' - 6.0'
			R-3	5 4 6	0.5 1.5	DR	6.25' - 7.75' Drive 2" ID.CALIF SPLIT SPOON SAMPLER w/ 140lb hammer dropping 30" (CS)
		8				HA	No bag sample collected R-3: 6.25' - 6.75' groundwater encountered at 7.5 feet during drilling
CH	ALLUVIUM 10.0-12.5' -CLAY:Pale yellow green with very pale green mottling; moist to very moist; stiff; highly plastic.	10	B-3 R-4	6 13 20	1.25 1.25	DR	10.0' - 11.25' CMS B-3: PID: 1.0; GASTEC: 0 R-4: 10.75' - 11.25'
		12	B-4 R-5	6 9 12	1.0 1.5	DR	11.25' - 12.75' CS B-4: PID:1.0; GASTEC: 0 R-5: 11.25' - 12.25'
	BORING TERMINATED AT 12.5 feet THIS LOG INDICATES CONDITIONS IN THIS HOLE ONLY ON THE DATE INDICATED AND MAY NOT REPRESENT CONDITIONS AT OTHER LOCATIONS AND ON OTHER DATES. ANY WATER LEVELS SHOWN ARE SUBJECT TO VARIATION. THIS HOLE WAS LOGGED IN SUCH A WAY AS TO PROVIDE DATA PRIMARILY FOR DESIGN PURPOSES AND NOT NECESSARILY FOR THE PURPOSES OF SPECIFIC CONTRACTORS THE STRATIFICATION LINES OR DEPTH INTERVALS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES, AND THE TRANSITIONS MAY BE GRADUAL. SOIL CLASSIFICATIONS SHOWN ON LOGS ARE FIELD CLASSIFICATIONS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.	14 16 18 20					Boring backfilled with cement grout

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	1 OF 1	HS-1

BORING LOCATION: SEE SITE MAP	APPROVED BY:	GROUND EL:
DEPTH/ELEV. WATER: NOT ENCOUNTERED	DRILL CONTRACTOR: PITCHER DRILLING	TOTAL DEPTH: 11.25 Ft.
DRILL RIG: CME-55 / BORING DIA.: 8"	DATE DRILLED: 4-10-90	LOGGED BY LAF

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL /GC	FILL 0.0' - 2.25': GRAVELLY CLAY/CLAYEY GRAVEL: Dark green gray,slightly moist, medium dense,moderately plastic, 30 % gravel 1/4-1/2" angular to subangular, sludge (?) bits,wood,roots,and glass	0				HA	Advance hole with 8" Hollow Stem Auger (HA)
		2	B-5 R-6	6 10 10	1.25 1.25	DR	1.0 - 2.25' Drive 2 1/2" ID. CALIF.MOD. SPLIT SPOON SAMPLER w/ 140lb hammer dropping 30" (CMS)
CL	2.25' - 4': SILTY CLAY: Orange brown w/ gray mottling; slightly damp; moderate plasticity; sparse gravel.	4				HA	B-5: GASTEC: 0; HNU:1.0 R-6: 1.75' - 2.25'
GM	4' - 8.5': SILTY GRAVEL: Dark brown; dry; loose; 1/4 to 1" dia., subangular to angular; fines - 30-40%.	6	R-7	14 11 10	0.5 1.25	DR	5.0' - 6.25' CMS No bag sample collected R-7: 5.0' - 5.5'
		8				HA	
CL	ALLUVIUM 8.5' - 11.25': SILTY CLAY: Pale yellow w/ very pale green mottling; slightly damp; stiff; moderate to high plasticity; < 10% ocassional gravel.	10	B-6 R-8	7 11 14	1.25 1.25	DR	10.0' - 11.25' CMS B-6: GASTEC:0; HNU: 1.0 R-8: 10.75' - 11.25'
	BORING TERMINATED AT 11.25 feet	12					Boring backfilled with cement grout
		14					
		16					
		18					
		20					

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Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	
		WMN101H	1 OF 1	HS-2

BORING LOCATION: SEE SITE MAP		APPROVED BY:	GROUND EL:
DEPTH/ELEV. WATER: NOT ENCOUNTERED	DRILL CONTRACTOR: PITCHER DRILLING		TOTAL DEPTH: 11.25Ft.
DRILL RIG: CME-55	BORING DIA.: 8"	DATE DRILLED: 4-10-90	LOGGED BY LAF

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
GM	FILL 0.0' - 5.2': SILTY GRAVEL: Yellow brown; dry; dense; 1/4 to >2" dia., angular to subangular; 20-30% fines; minor sand, fine to coarse. ~ 4' sludge (?)	0				HA	Advance hole w/ 8" Hollow Stem Auger (HA)
		2	B-7 R-9	45 25 22	1.25 1.25	DR	1.0' - 2.25' Drive 2 1/2" ID. CALIF. MOD. SPLIT SPOON SAMPLER w/ 140lb hammer dropping 30" (CMS) B-7: GASTEC:0 R-9: 1.75' - 2.25'
		4				HA	
CL	5.2'- 9': SILTY CLAY: Dark gray to black; damp; soft; moderate to highly plastic; 15% fines; a lot of sludge (?); rare gravels.	6	B-8 R-10	2 4 7	1.25 1.25	DR	5.0' - 6.25' CMS B-8: GASTEC: >500 R-10: 5.75' - 6.25'
		8				HA	~ 8.5' driller felt increase in stiffness
CL	ALLUVIUM 9'-11.25' SILTY CLAY: Pale yellow green w/pale green mottling; damp;moderate to highly plastic; stiff; rare gravels.	10	B-9 R-11	7 11 11	1.0 1.25	DR	10.0' - 11.25' CMS B-9: GASTEC:0 R-11: 10.5' - 11.0'
	BORING TERMINATED AT 11.25 feet	12					Boring backfilled with cement grout
		14					
		16					
		18					
		20					

DATA ON THIS LOG ARE AN APPROXIMATION OF THE GEOLOGIC AND SUBSURFACE CONDITIONS BECAUSE THE INFORMATION WAS OBTAINED FROM INDIRECT, DISCONTINUOUS, AND POSSIBLY DISTURBED SAMPLING NECESSITATED BY USE OF SMALL-DIAMETER BOLES. ROTARY AND WASH BORING HOLES HAVE FURTHER COMPLICATIONS IN THIS REGARD BECAUSE OF THE NEED TO USE DRILLING FLUID AND/OR CASING IN ADVANCING HOLES.

THIS LOG INDICATES CONDITIONS IN THIS HOLE ONLY ON THE DATE INDICATED AND MAY NOT REPRESENT CONDITIONS AT OTHER LOCATIONS AND ON OTHER DATES. ANY WATER LEVELS SHOWN ARE SUBJECT TO VARIATION.

THIS HOLE WAS LOGGED IN SUCH A WAY AS TO PROVIDE DATA PRIMARILY FOR DESIGN PURPOSES AND NOT NECESSARILY FOR THE PURPOSES OF SPECIFIC CONTRACTORS.

THE STRATIFICATION LINES OR DEPTH INTERVALS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES, AND THE TRANSITIONS MAY BE GRADUAL.

SOIL CLASSIFICATIONS SHOWN ON LOGS ARE FIELD CLASSIFICATIONS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	HS-3
		WMN101H	1 OF 1	

BORING LOCATION: SEE SITE MAP	APPROVED BY:	GROUND EL:
DEPTH/ELEV. WATER: NOT ENCOUNTERED	DRILL CONTRACTOR: PITCHER DRILLING	TOTAL DEPTH: 11.25 Ft.
DRILL RIG: CME-55 / BORING DIA.: 8"	DATE DRILLED: 4-10-90	LOGGED BY LAF

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
	FILL	0					Advance hole w/ 8" Hollow Stem Auger (HA)
GC	0.0' - 5.0': CLAYEY GRAVEL: Yelowish brown; dry to slightly damp; dense; 1/4 to 1" dia., subangular; some sludge (?) chunks; low plasticity; some silt .					HA	
		2	B-10 R-12	24 24 28	1.25 1.25	DR	1.0' - 2.25' Drive 21/1" ID. CALIF. MOD. SPLIT SPOON SAMPLER w/ 140lb dropping 30" (CMS) B-10: GASTEC:0 R-12: 1.75' - 2.25'
		4				HA	
CL	5.0' - 9.5': GRAVELLY CLAY: Dark brown; damp (slightly); stiff; moderate plasticity; 10 - 30% gravel, 1/2 to 1" dia., subangular; sludge in sample (black), refuse debris, plastics, wood etc.		B-11 R-13	8 16 25	1.0 1.25	DR	5.0' - 6.25' CMS B-11: GASTEC: 150 R-13: 5.5' - 6.0'
		8				HA	
	ALLUVIUM	10					
CL	9.5'-11.25': SILTY CLAY: Pale yellow green w/ light to pale green mottling;damp, moderate plasticity;stiff,rare gravel		B-12 R-14	6 8 11	1.25 1.25	DR	10.0' - 11.25' CMS B-12: GASTEC: 50 R-14: 10.75' - 11.25'
	BORING TERMINATED AT 11.25 feet	12					Boring backfilled with cement grout
		14					
		16					
		18					
		20					

DATA ON THIS LOG ARE AN APPROXIMATION OF THE GEOLOGIC AND SUBSURFACE CONDITIONS BECAUSE THE INFORMATION WAS OBTAINED FROM INDIRECT, DISCONTINUOUS, AND POSSIBLY DISTURBED SAMPLING NECESSITATED BY USE OF SMALL-DIAMETER HOLES. ROTARY AND WASH BORING HOLES HAVE FURTHER COMPLICATIONS IN THIS REGARD BECAUSE OF THE NEED TO USE DRILLING FLUID AND/OR CASING IN ADVANCING HOLES.

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THE STRATIFICATION LINES ON DEPTH INTERVALS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES, AND THE TRANSITIONS MAY BE GRADUAL.

SOIL CLASSIFICATIONS SHOWN ON LOGS ARE FIELD CLASSIFICATIONS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG		BORING NO.
		PROJECT NO.	SHEET	HS-4
		WMN101H	1 OF 1	

BORING LOCATION: SEE SITE MAP	APPROVED BY:	GROUND EL:
DEPTH/ELEV. WATER: NOT ENCOUNTERED	DRILL CONTRACTOR: PITCHER DRILLING	TOTAL DEPTH: 11.25 Ft.
DRILL RIG:CME-55	BORING DIA.: 8"	DATE DRILLED: 4-10-90	LOGGED BY LAF

SOIL CLASS	DESCRIPTION	DEPTH	SAMPLE NO.	PR / RQD	REC.	MODE	REMARKS
CL	FILL 0.0' - 4.0': GRAVELLY CLAY: Dark brown; damp; stiff; moderate plasticity; 10 - 15%, 1/2 to 1" dia.,subangular; refuse, debris, wood fragments, concrete	0				HA	Advance hole w/ 8" Hollow Stem Auger (HA)
		2	B-13 R-15	12 8 10	1.0 1.25	DR	1.0' - 2.25' Drive 2 1/2" ID. CALIF. MOD. SPLIT SPOON SAMPLER w/ 140lb hammer dropping 30" (CMS) B-13: GASTEC:0 R-15: 1.5' - 2.0'
		4				HA	
CL	ALLUVIUM 4.0'-11.25': SILTY CLAY: Yellow brown; damp; stiff; moderate plasticity; rare gravel. ~ 5.5' some black mottling, some roots, possibly sludge (?)	6	B-14 R-16	4 6 11	1.25 1.25	DR	5.0' - 6.25' CMS B-14: GASTEC: 70 R-16: 5.75' - 6.25'
		8				HA	
	~10.0' color changes to pale yellow green w/ very pale green mottling, moderate to high plasticity.	10	B-15 R-17	4 9 13	1.25 1.25	DR	10.0' - 11.25' CMS B-15: GASTEC: 0 R-17: 10.75' - 11.25'
	BORING TERMINATED AT 11.25 feet	12					Boring backfilled with cement grout
		14					
		16					
		18					
		20					

DATA ON THIS LOG ARE AN APPROXIMATION OF THE GEOLOGIC AND SUBSURFACE CONDITIONS BECAUSE THE INFORMATION WAS OBTAINED FROM INDIRECT, DISCONTINUOUS, AND POSSIBLY DISTURBED SAMPLING NECESSITATED BY USE OF SMALL-DIAMETER HOLES. ROTARY AND WASH BORING HOLES HAVE FURTHER COMPLICATIONS IN THIS REGARD BECAUSE OF THE NEED TO USE DRILLING FLUID AND/OR CASING IN ADVANCING HOLES.

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SOIL CLASSIFICATIONS SHOWN ON LOGS ARE FIELD CLASSIFICATIONS BASED ON THE UNIFIED SOILS CLASSIFICATION SYSTEM.

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE,CALIFORNIA	EXPLORATION BORING LOG	BORING NO.
		PROJECT NO. WMN101H / SHEET 1 OF 1	HS-5

SHEET: 1 OF 5			LOCATION: CARIBBEAN DRIVE AT CROSSMAN, SUNNYVALE, CALIFORNIA				
RIG: JD 450 - C			PIT WIDTH: 24"		DATE: 4 - 10 - 90	LOGGED BY: D.S.	
TEST PIT NO.	DEPTH INTERVAL	SOIL TYPE	WATER DEPTH	MATERIAL DESCRIPTION EXCAVATION CHARACTERISTICS		SAMPLE NUMBER	SAMPLE DEPTH
TP-1	0.0 - 4.0'	GP-GM		FILL SANDY SILTY GRAVEL: Moderate yellowish brown; damp to very moist; gravel, fine to medium, appx. 50-60%; sand, fine to coarse, appx. 30-40%; fines 5-10%		TP-1	3'
	4.0'- 5.5'	SM	▽ 5.0'	SILTY SAND: Olive gray; very moist to wet; sand, fine, appx. 70-80%; fines, slightly plastic, 20-30%, (pond sediment?), a few pieces of plastic. ALLUVIUM		TP-1	5'
	5.5' - 6.5'	CL-CH		SILTY CLAY; Brownish black; very moist; moderately to highly plastic; appears to have minor sand and slight bioturbation. TOTAL DEPTH: 6.5'		TP-1	6'
TP-2	0.0 - 3.5'	GP/GC		FILL GRAVEL/CLAYEY GRAVEL/GRAVELLY CLAY (Randomly Mixed): Dark yellow brown; moist; large asphalt slabs, refusal at 3.5' due to asphalt slabs. TOTAL DEPTH: 3.5'		TP-2	1.5'
TP-3	0.0 - 3.0'	GC/CL		FILL CLAYEY GRAVEL/GRAVELLY CLAY (Randomly Mixed): Dark yellowish brown; moist; large asphalt slabs; metal rod, copper wire and concrete block also observed. TOTAL DEPTH: 3.0		TP-3	
				NOTE: ALL TRENCHES WERE BACKFILLED WITH EXCAVATED MATERIALS			

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE, CALIFORNIA	DESCRIPTIVE TEST PIT LOG		
		PROJECT NO.	DATE	FIGURE NO.
		WMN - 101H	4-10-90	

SHEET: 2 OF 5			LOCATION: CARIBBEAN DRIVE AT CROSSMAN, SUNNYVALE, CALIFORNIA				
RIG: JD 450 - C			PIT WIDTH: 24"		DATE: 4 - 10 - 90	LOGGED BY: D.S.	
TEST PIT NO.	DEPTH INTERVAL	SOIL TYPE	WATER DEPTH	MATERIAL DESCRIPTION EXCAVATION CHARACTERISTICS		SAMPLE NUMBER	SAMPLE DEPTH
				FILL			
TP - 4	0.0 - 1.5'	SP		GRAVELLY SAND: Dark yellowish brown; damp, fine to coarse, appx. 60%; gravel, fine, appx. 40%; plastic strips.		TP - 4	1.0'
	1.5' - 2.5'			ASPHALT SLABS, scattered laterally at this depth.			
	2.5' - 8.0'	SC/ CL	▽ 7.5'	CLAYEY SAND/SILTY CLAY: Moderate yellowish brown, Graysih brown; moist to very moist; materials are mixed, contain plastic and other debris.		TP - 4	4.0'
				ALLUVIUM			
	8.0' - 9.0'	CL		SANDY SILTY CLAY: Light olive gray; moist; moderately plastic; root holes and bioturbation present; caliche-like infilling; charcoal fragments.		TP - 4	8.5'
				TOTAL DEPTH: 9.0'			
				FILL			
TP - 5	0.0 - 2.0'	SP - SM		GRAVELLY SILTY SAND: Dark yellowish brown; moist; sand, fine to coarse, appx. 75%; gravel, appx. 15%; fines, non-plastic, appx. 10%.		TP - 5	1.5'
	2.0' - 7.0'	SC/ CL		GRAVELLY CLAYEY SAND/SILTY CLAY: Moderate yellowish brown, Grayish brown; moist to very moist; materials are mixed		TP - 5	4.5'
				ALLUVIUM			
	7.0'- 8.0'	CL		SANDY SILTY CLAY: Light olive gray; moist; moderate plasticity; rootholes and bioturbation, charcoal fragments.		TP - 5	7.5'
				TOTAL DEPTH: 8.0'			

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE, CALIFORNIA	DESCRIPTIVE TEST PIT LOG		
		PROJECT NO.	DATE	FIGURE NO.
		WMN - 101H	4 -10 - 90	

SHEET: 3 OF 5			LOCATION: CARIBBEAN DRIVE AT CROSSMAN, SUNNYVALE, CALIFORNIA				
RIG: JD 450 - C			PIT WIDTH: 24"		DATE: 4 - 10 - 90	LOGGED BY: D.S.	
TEST PIT NO.	DEPTH INTERVAL	SOIL TYPE	WATER DEPTH	MATERIAL DESCRIPTION EXCAVATION CHARACTERISTICS		SAMPLE NUMBER	SAMPLE DEPTH
				FILL			
TP - 6	0.0 - 7.5'	GP		SANDY GRAVEL: Dark yellowish brown; damp to moist; loose; gravel, appx. 70%, fine to medium; sand, fine to coarse, appx. 30%.		TP - 6	2.0'
	7.5' - 8.5'			SLUDGE:: Brownish black, moist; fibrous appearance, spongy texture; organic odor		TP - 6	8.0'
				ALLUVIUM			
	8.5' - 9.0'	CL		SILTY CLAY: Olive gray; moist; moderately plastic; root holes and bioturbation; occasional sand grains.		TP - 6	9.0'
				TOTAL DEPTH: 9.0'			
				FILL			
TP - 7	0.0 - 6.0'	GP		SANDY GRAVEL: Dark yellowish brown; damp; loose; gravel, appx. 70%, fine to medium; sand, fine to coarse, appx. 30%.		TP - 7	3.0'
	6.0' - 8.0'	CL		SILTY CLAY: Dusky brown; very moist; material is reworked and contains much debris; plastic, rebar, plant matter.		TP - 7	7.0'
	8.0' - 8.5'			SLUDGE:: Browish black; moist; fibrous, spongy texture, organic odor		TP - 7	8.3'
				ALLUVIUM			
	8.5 '- 9.0'	CL		SILTY CLAY: As described above.		TP - 7	9.0'
				TOTAL DEPTH: 9.0'			

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE, CALIFORNIA	DESCRIPTIVE TEST PIT LOG		
		PROJECT NO.	DATE	FIGURE NO.
		WMN - 101H	4 -10 - 90	

SHEET: 4 OF 5			LOCATION: CARIBBEAN DRIVE AT CROSSMAN, SUNNYVALE, CALIFORNIA				
RIG: JD 450 - C			PIT WIDTH: 24"		DATE: 4 - 10 - 90	LOGGED BY: D.S.	
TEST PIT NO.	DEPTH INTERVAL	SOIL TYPE	WATER DEPTH	MATERIAL DESCRIPTION EXCAVATION CHARACTERISTICS		SAMPLE NUMBER	SAMPLE DEPTH
				FILL			
TP - 8	0.0 - 7.5'	SP		GRAVELLY SAND: Moderate brown; moist; loose; sand, fine to coarse, 60-80%; gravel, fine, 20-40%; asphalt slabs occur randomly		TP - 8	3.0'
	7.5' - 7.8'			SLUDGE: Brownish black, mois; fibrous; hard; organic odor		TP - 8	7.6'
				ALLUVIUM			
	7.8' - 8.3'	CL		SILTY CLAY: Olive gray,moist,moderately plastic, root holes and bioturbation,occasional sand grains		TP - 8	8.0'
				TOTAL DEPTH: 8.3'			
				FILL			
TP - 9	0.0 - 2.0'	GP		GRAVEL with asphalt slabs: Light gray; dry.			
	2.0 '- 7.0'	CL		SILTY CLAY: Dusky brown; moist; moderately plastic; appears to contain grasses; soil is disturbed		TP - 9	6.0'
	7.0 '- 7.5'			SLUDGE: Brownish black; moist; moderately plastic; odor present; slightly fibrous;		TP - 9	7.2'
				ALLUVIUM			
	7.5' - 8.5'	CL		SILTY CLAY: Greenish black; slightly to moderately plastic; moist.		TP - 9	8.0'
	8.5 '- 9.0'	CL		SILTY CLAY: Light olive gray; moist; moderately plastic; root holes and bioturbation; trace of sand		TP - 9	8.7'
				TOTAL DEPTH: 9.0'			

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE, CALIFORNIA	DESCRIPTIVE TEST PIT LOG		
		PROJECT NO.	DATE	FIGURE NO.
		WMN - 101H	4 -10 - 90	

SHEET: 5 OF 5	LOCATION: CARIBBEAN DRIVE AT CROSSMAN, SUNNYVALE, CALIFORNIA		
RIG: JD 450 - C	PIT WIDTH: 24"	DATE: 4 - 10 - 90	LOGGED BY: D.S.

TEST PIT NO.	DEPTH INTERVAL	SOIL TYPE	WATER DEPTH	MATERIAL DESCRIPTION EXCAVATION CHARACTERISTICS	SAMPLE NUMBER	SAMPLE DEPTH
T P - 10	0.0 - 6.0'	GP		FILL SANDY GRAVEL: Moderate brown; damp to moist; loose gravel, appx. 70%, fine to medium; sand, fine to coarse, appx. 30%.		
	6.0 '- 6.5'			SLUDGE: Brownish black; moist; moderately plastic; odor present; slightly fibrous;	T P - 10	6.2'
	6.5 '- 7.0'	C L		ALLUVIUM SILTY CLAY: Light olive gray; moist; moderately plastic; root holes and bioturbation. Note: what appears to have been abundant perched free water was encountered at approximately 4.0-5.0'. TOTAL DEPTH: 7.0'		
T P - 11	0.0 - 2.5'	G P		FILL SANDY GRAVEL: Moderate brown; damp; loose; gravel, appx. 70%, fine to medium; sand, fine to coarse, appx. 30%; also asphalt slabs are mixed in with sandy gravel.		
	2.5' - 7.0'			SLUDGE: Brownish black; moist; fibrous; spongy to sightly hard; strong organic odor; plastics	T P - 11	5.0'
	7.0' - 7.5'	C L		ALLUVIUM SILTY CLAY: Light olive gray; moist; moderately plastic; root holes and bioturbation. TOTAL DEPTH: 7.5'	T P - 11	7.2'
T P - 12	0.0 - 2.0'	G P		FILL GRAVEL with asphalt slabs: Light gray; moist; dry; backhoe refusal at 2.0'. TOTAL DEPTH: 2.0'		

Wahler Associates	SMaRT TRANSFER STATION SUNNYVALE, CALIFORNIA	DESCRIPTIVE TEST PIT LOG		
		PROJECT NO.	DATE	FIGURE NO.
		WMN - 101H	4 -10 - 90	

APPENDIX B

APPENDIX B
LABORATORY INVESTIGATION

A. INTRODUCTION

This appendix includes a discussion of test procedures and results of the laboratory investigation performed by Wahler Associates for use in the preliminary foundation evaluation. The program was carried out employing, wherever practical, currently accepted test procedures of the American Society for Testing and Materials (ASTM).

Undisturbed samples used in the laboratory investigation were obtained from various locations during the course of the field investigation, as discussed in Appendix A of this report. Identification of each sample is by hole number, sample number, and depth. The laboratory tests performed during the course of the investigation are described below.

B. INDEX PROPERTIES TESTING

The method of identifying and classifying soils according to their engineering properties used in this study is the Unified Soil Classification System (USCS), as described by ASTM D2487-69.

The index properties tests discussed in this report include the determination of natural water content, in-place dry density, Atterberg limits and grain-size distribution.

1. Natural Water Content and Dry Density

Natural water content and dry density of the soils were determined, often in conjunction with other tests, on selected undisturbed samples. The samples were extruded and visually classified, trimmed to obtain a smooth flat face, and accurately measured to obtain volume and wet weight. The samples were then dried, in accordance with the procedures of ASTM 2216-66, for a period of 24 hours in an oven maintained at a temperature of 110°C. After drying,

the weight of each sample was determined and the moisture content and dry density calculated. The water content and dry density results are summarized in Table B-1 and, where appropriate, are also shown with the various other index and engineering properties test results.

2. Atterberg Limits

Liquid and plastic limits were determined on five samples, representative of the foundation materials, in accordance with the procedures of ASTM Designation D423-66 and D424-59. Results of the Atterberg limits tests are summarized on Figure B-1.

3. Grain-Size Distribution

The gradation characteristics of two selected samples were determined in accordance with ASTM Designation D422-63, except as modified below. Each representative sample was soaked in water until individual soil particles were separated and then washed on the No. 200 mesh sieve in accordance with ASTM D1140-54. That portion of the sample retained on the No. 200 mesh sieve was oven-dried and then mechanically sieved. The grain-size distribution test results are presented on Figure B-2.

C. ENGINEERING PROPERTIES TESTING

The engineering properties testing consisted of unconfined compression, and one-dimensional consolidation tests.

1. Unconfined Compression Tests

Thirty-six unconfined compression tests were performed in accordance with ASTM 2166-66 at field moisture conditions. The primary purpose of these tests was to obtain approximate quantitative values of the compressive strength of the foundation soils possessing sufficient cohesion to permit testing in an unconfined state. The results of the unconfined compression tests are presented in Table B-1.

2. Consolidation Tests

Six one-dimensional consolidation tests were performed in general accordance with ASTM D2435-80 on selected undisturbed samples representative of the foundation materials. Each sample was loaded incrementally to 500 psf, flooded with water and observed, and then loaded to 2,000, 4,000, 8,000, 16,000, and 32,000 psf. The sample was allowed to consolidate under each load increment for approximately 24 hours. Loads were applied to the sample by the use of air pressure regulators feeding into the consolidometer.

Accuracy was maintained throughout the loading range by the use of sensitive oil and mercury manometers for the lower loads and psi gauges for the higher loads. Results of the consolidation tests, in the form of percent compression versus log of pressure, are presented on Figures B-3 through B-8. Time-compression test results are presented on Figures B-9 through B-14.

TABLE B-1

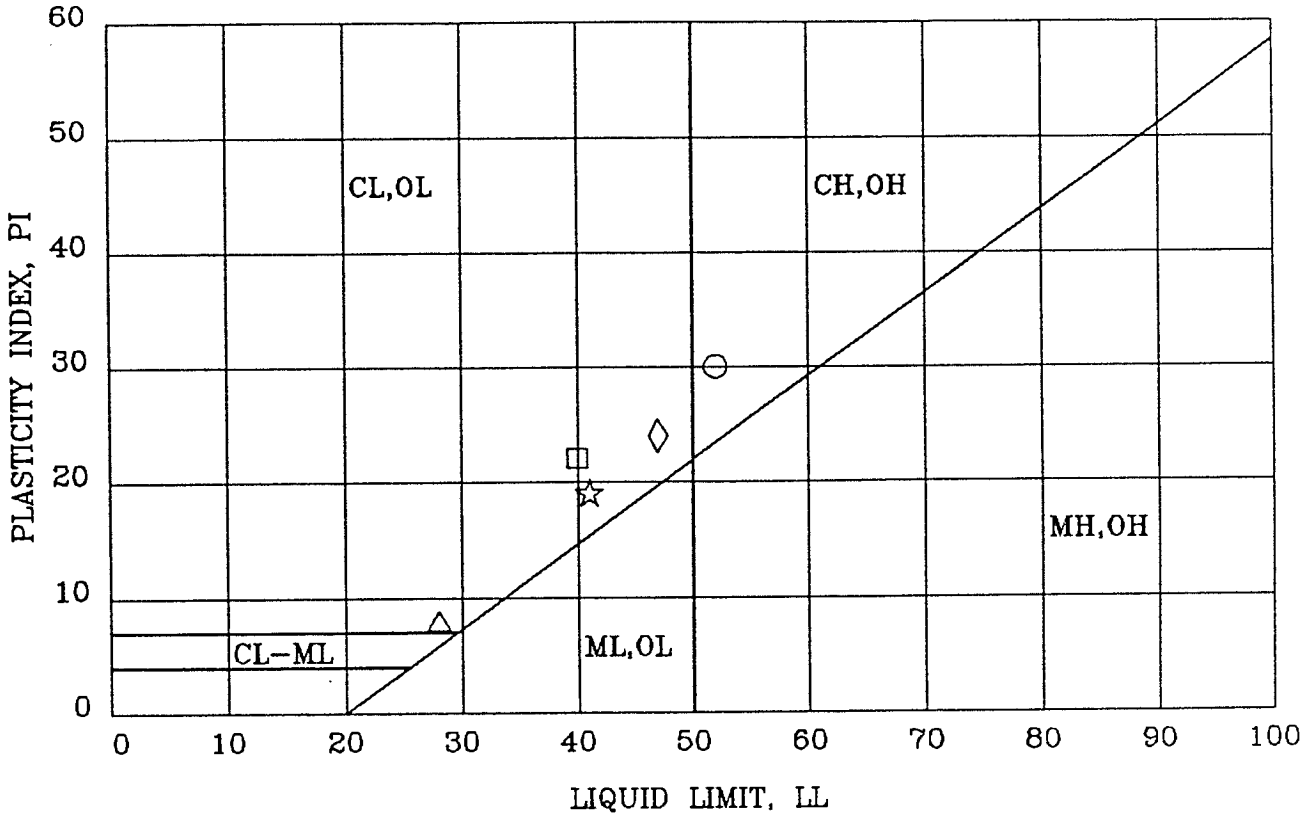
NATURAL WATER CONTENT, DRY DENSITY
AND UNCONFINED COMPRESSIVE STRENGTH

Hole No.	Sample No.	Depth (ft.)	Moisture Content, %	Dry Density (pcf.)	Unconfined Compressive Strength, psf. (Peak or 10% Strain)
DH-1	R-1	4.5- 5.5	23.6	96.4	3,088 @ 10%
DH-1	R-2	8.5- 9.5	21.1	106.5	2,820 @ 10%
DH-1	S-1	15.0-18.0	26.7	100.2	
DH-1	R-3	21.0-26.5	24.0	99.5	1,561 @ 10%
DH-1	R-4	26.0-26.5	25.5	99.2	2,268 @ 10%
DH-1	R-4	26.0-26.5	27.9	97.9	
DH-1	R-6	71.0-71.5	22.4	105.6	1,873 @ 10%
DH-1	R-6	71.0-71.5	21.8	107.0	
DH-1	R-7	81.0-81.5	21.4	110.7	1,123 @ 3%
DH-2	R-1	4.5- 5.5	28.6	87.3	2,170 @ 7%
DH-2	R-2	10.5-11.5	22.5	102.5	2,436 @ 8%
DH-2	R-3	16.0-16.5	24.5	101.5	3,469 @ 7%
DH-2	R-4	21.0-21.5	33.6	88.6	2,100 @ 10%
DH-2	R-5	49.0-49.5	25.5	99.8	4,619 @ 10%
DH-2	R-6	56.0-56.5	24.8	99.5	846 @ 10%
DH-2	S-1	58.0-61.0	22.7	104.6	
DH-3	R-1	9.0- 9.5	21.6	106.7	2,214 @ 10%
DH-3	R-2	16.0-16.5	19.3	110.1	4,431 @ 10%
DH-3	R-3	21.0-21.5	20.6	108.6	5,371 @ 10%
DH-3	R-4	26.0-26.5	23.0	102.7	4,699 @ 10%
DH-3	R-5	31.0-31.5	22.2	105.2	
DH-3	R-6	46.0-46.5	13.8	114.7	
DH-3	R-7	54.0-54.5	21.4	106.0	3,840 @ 10%
DH-3	R-8	61.0-61.5	21.1	106.6	1,355 @ 10%
DH-3	R-9	71.0-71.5	28.0	95.5	2,355 @ 10%
DH-4	R-1	4.0- 5.5	22.6	101.5	3,572 @ 10%
DH-4	R-2	8.0- 9.5	21.7	105.5	2,846 @ 10%
DH-4	R-3	13.0-14.5	21.1	106.4	3,596 @ 8%
DH-4	R-4	18.0-19.5	20.5	107.8	3,088 @ 10%
DH-4	R-7	33.0-34.5	22.6	104.8	3,182 @ 10%
DH-4	R-9	43.0-44.5	24.8	101.3	1,518 @ 10%
DH-5	R-1	3.5- 5.0	25.2	95.4	5,123 @ 3%
DH-5	S-1	20.0-22.0	22.2	103.1	2,557 @ 5%
DH-5	S-1	20.0-22.0	19.8	109.2	
DH-5	R-7	47.0-48.5	26.8	97.1	2,469 @ 10%
DH-6	R-6	35.0-36.5	22.4	105.2	3,786 @ 10%
DH-6	R-8	60.0-61.5	21.4	106.3	1,512 @ 10%
DH-6	R-9	70.0-71.5	27.8	95.9	2,114 @ 10%

TABLE B-1 (Continued)

NATURAL WATER CONTENT, DRY DENSITY
AND UNCONFINED COMPRESSIVE STRENGTH

Hole No.	Sample No.	Depth (ft.)	Moisture Content, %	Dry Density (pcf.)	Unconfined Compressive Strength, psf. (Peak or 10% strain.)
DH-7	R-2	9.0-10.5	30.7	90.0	2,227 @ 10%
DH-7	R-3	15.0-16.5	22.0	105.0	4,377 @ 10%
DH-7	R-7	35.0-36.5	21.0	110.1	
DH-7	R-10	55.0-56.5	26.2	98.3	3,102 @ 10%
DH-7	S-1	63.0-65.5	22.5	102.6	1,443 @ 4%
TP-12	S-1	3.5-5.0	86.3	41.0	1,918 @ 7%



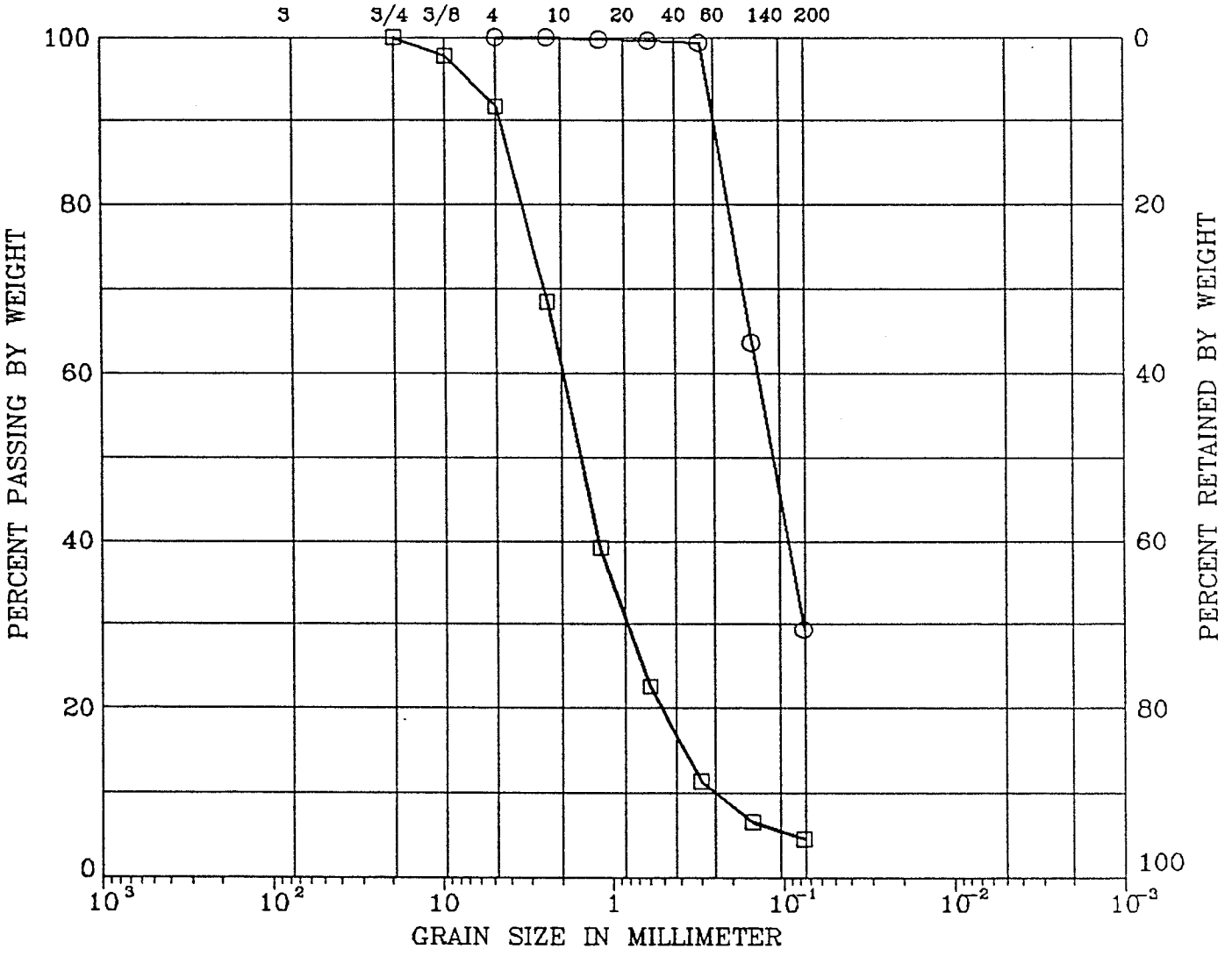
SYMBOL	BORING	DEPTH (ft)	MC (%)	LL (%)	PL (%)	PI (%)	LI (-)	DESCRIPTION
○	DH-1, R-1	4.5-5.5	23.6	52	22	30	.05	sandy CLAY, black (CH)
□	DH-1, R-2	8.5-9.5	21.1	40	18	22	.14	sandy silty CLAY, gray (CL)
△	DH-1, R-4	25-25.5	25.5	28	20	8	.69	sandy silty CLAY, gray brown (CL)
◇	DH-3, R-3	21-21.5	20.6	47	23	24	-.10	silty sandy CLAY, yellow brown (CL)
☆	DH-3, R-9	71-71.5	28.0	41	22	19	.32	silty CLAY, yellow gray (CL)

Remark : April 1990

Project WMN-101H	SMaRT Station - Sunnyvale
Wahler Associates	PLASTICITY CHART Figure No. B-1

UNIFIED SOIL CLASSIFICATION

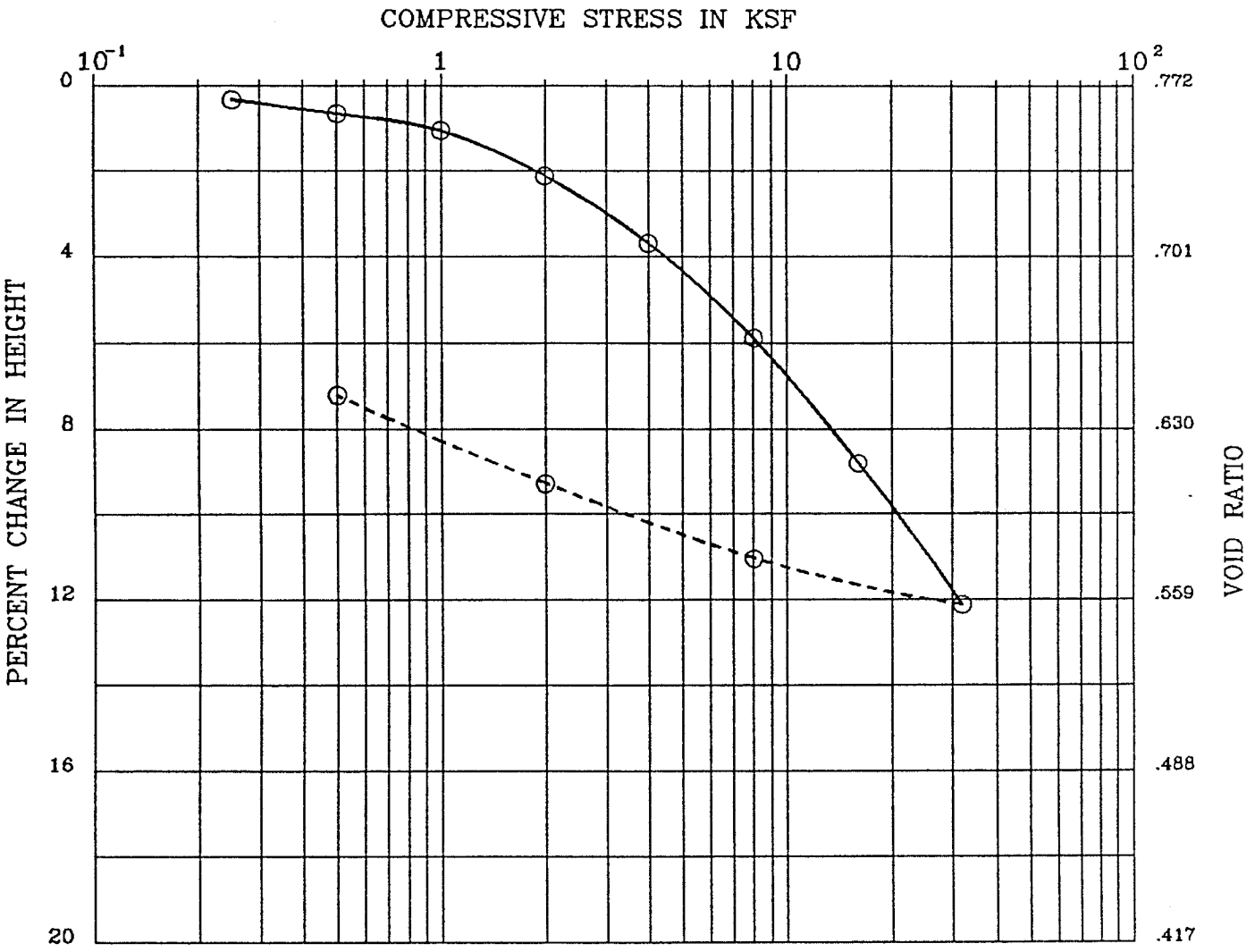
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN INCHES			U.S. STANDARD SIEVE No.			HYDROMETER



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
○	DH-3 R-5	31-31.5			silty SAND, yellow brown (SM)
□	DH-3 R-6	46-46.5			slightly silty gravelly SAND, gray brown (SW)

Remark : April 1990

Project WMN-101H	SMaRT Station - Sunnyvale
Wahler Associates	GRAIN SIZE DISTRIBUTION Figure No. B-2



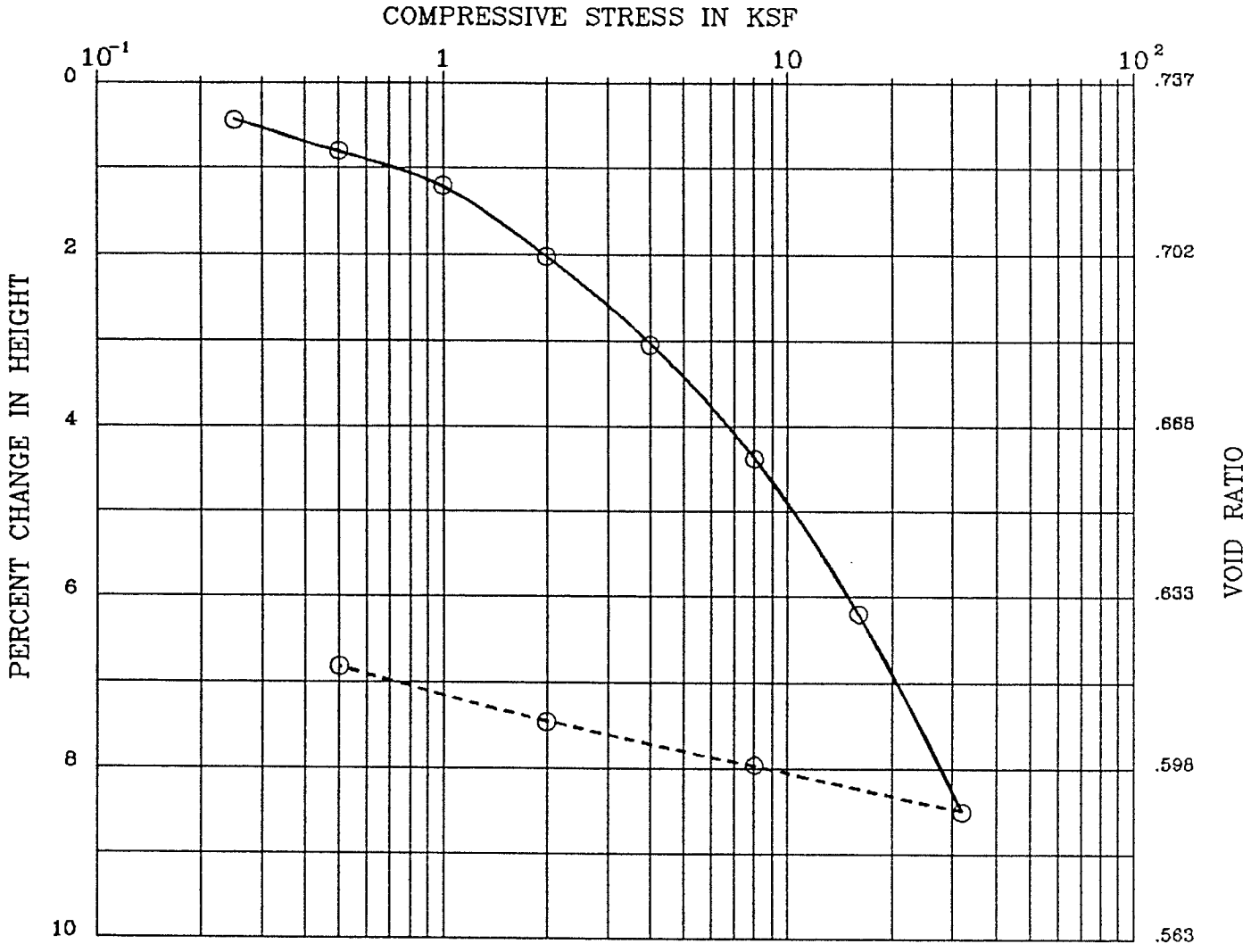
BORING : DH-1, S-1
DEPTH (ft) : 15-18
SPEC. GRAVITY : 2.84

DESCRIPTION : sandy silty CLAY, yel gray brown
LIQUID LIMIT :
PLASTIC LIMIT :

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	26.7	100.2	99	.772
FINAL	22.6	108.0	100	.644

Remark : April 1990

Project WMN-101H	SMaRT Station - Sunnyvale
Wahler Associates	CONSOLIDATION TEST Figure No. B-3

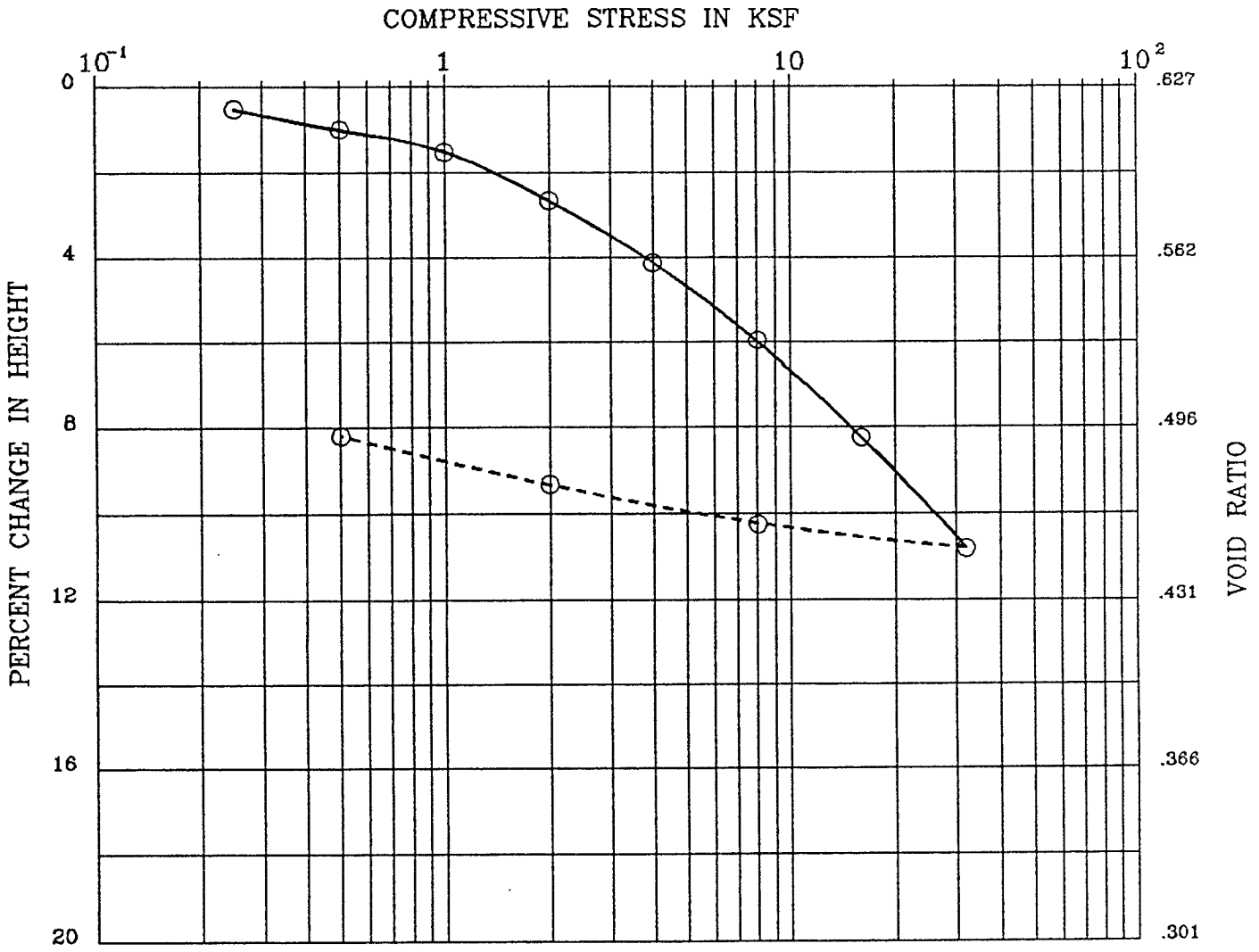


BORING	: DH-1, R-4	DESCRIPTION	: sandy SILT, gray yellow brown
DEPTH (ft)	: 26-26.5	LIQUID LIMIT	:
SPEC. GRAVITY	: 2.72	PLASTIC LIMIT	:

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	27.9	97.9	103	.737
FINAL	22.7	105.0	100	.619

Remark : April 1990

Project WMN-101H	SMaRT Station - Sunnyvale
Wahler Associates	CONSOLIDATION TEST Figure No. B-4

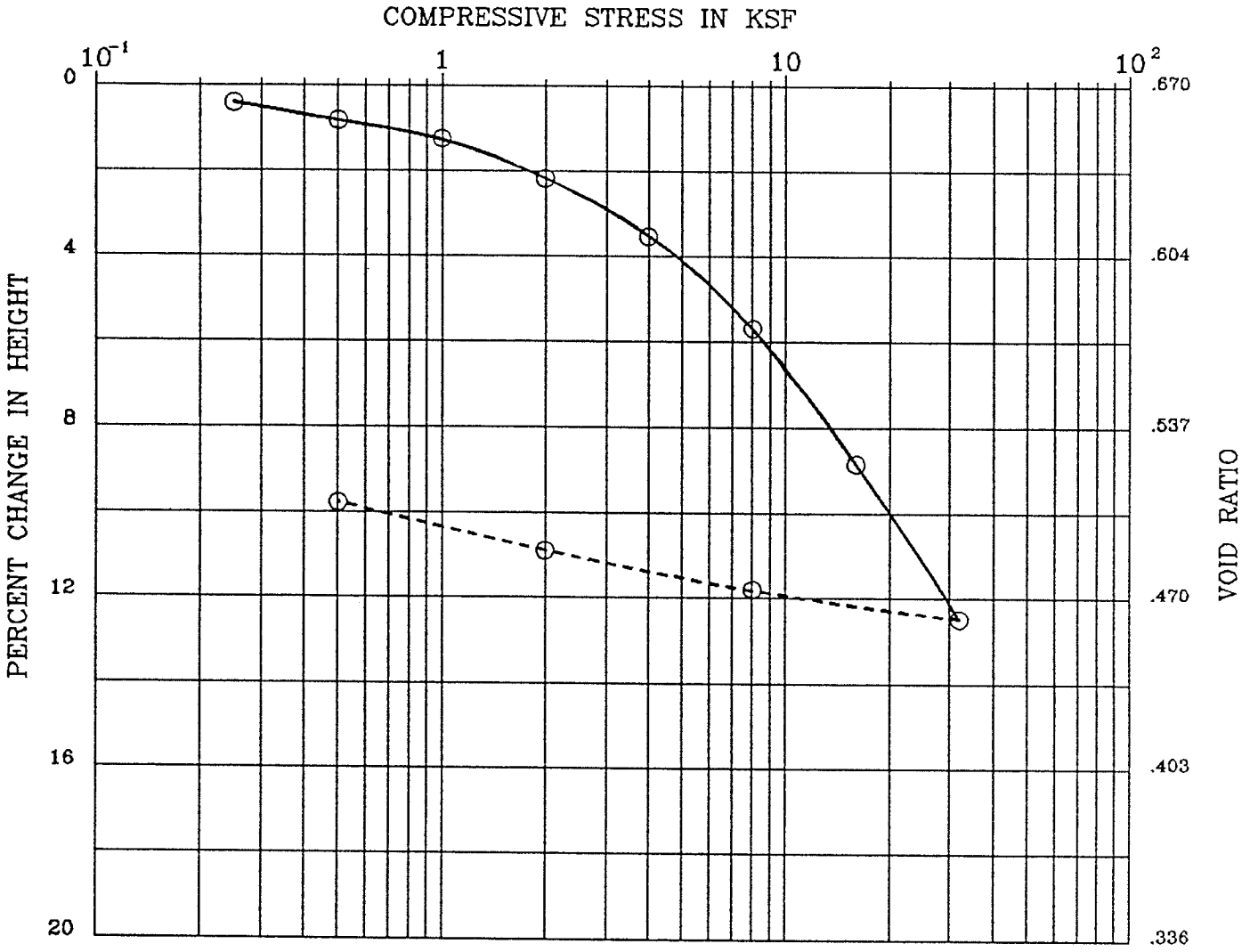


BORING	: DH-1, R-6	DESCRIPTION	: silty CLAY, gray yellow brown
DEPTH (ft)	: 71-71.5	LIQUID LIMIT	:
SPEC. GRAVITY	: 2.79	PLASTIC LIMIT	:

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	21.8	107.0	97	.627
FINAL	17.6	116.6	100	.493

Remark : April 1990

Project WMN-101H	SMaRT Station - Sunneyvale
Wahler Associates	CONSOLIDATION TEST Figure No. B-5

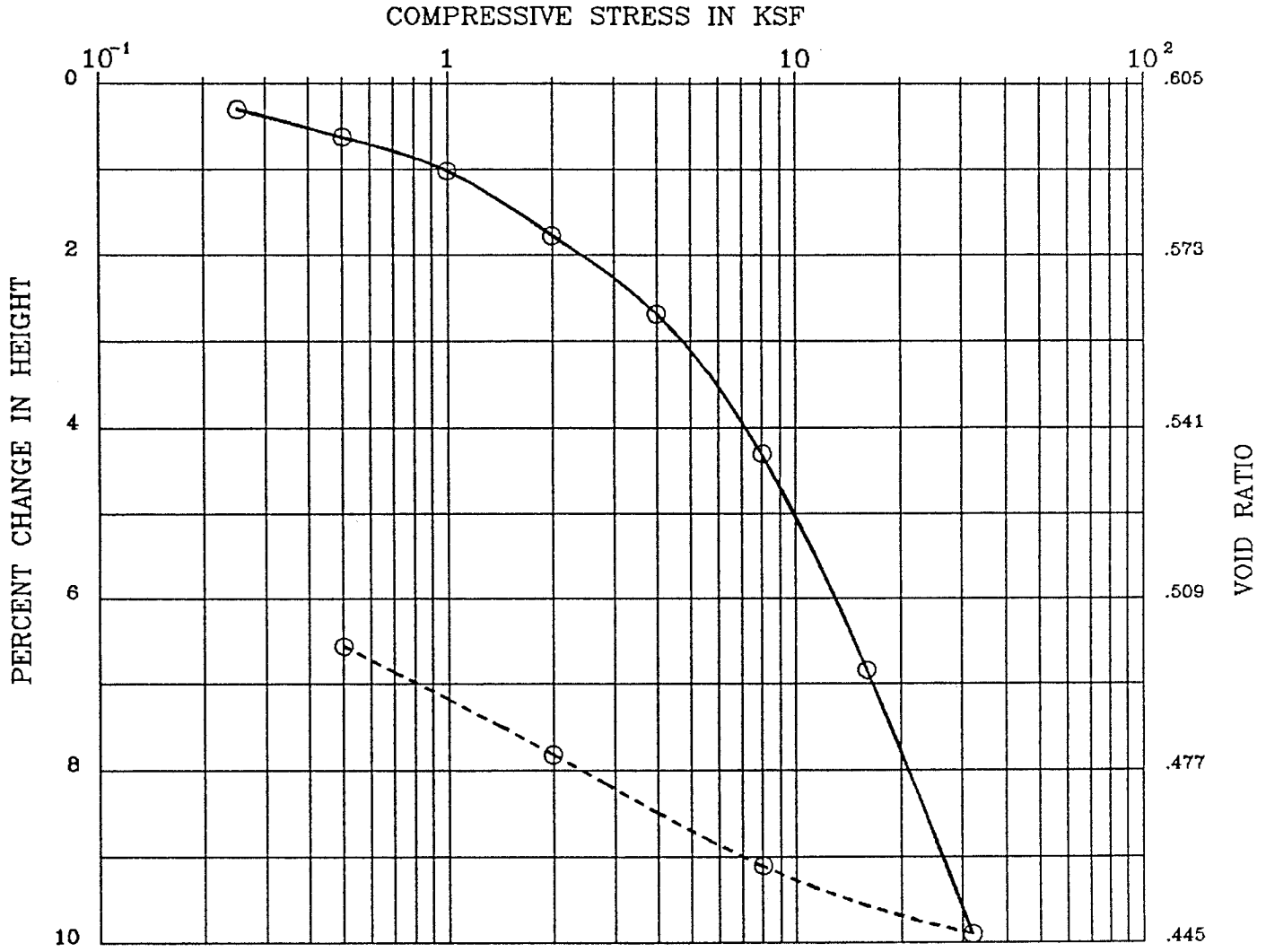


BORING	: DH-2, S-1	DESCRIPTION	: silty CLAY, yellow gray
DEPTH (ft)	: 58-61	LIQUID LIMIT	:
SPEC. GRAVITY	: 2.80	PLASTIC LIMIT	:

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	22.7	104.6	95	.670
FINAL	18.1	115.8	100	.508

Remark : April 1990

Project WMN-101H	SMaRT Station - Sunneyvale
Wahler Associates	CONSOLIDATION TEST Figure No. B-6

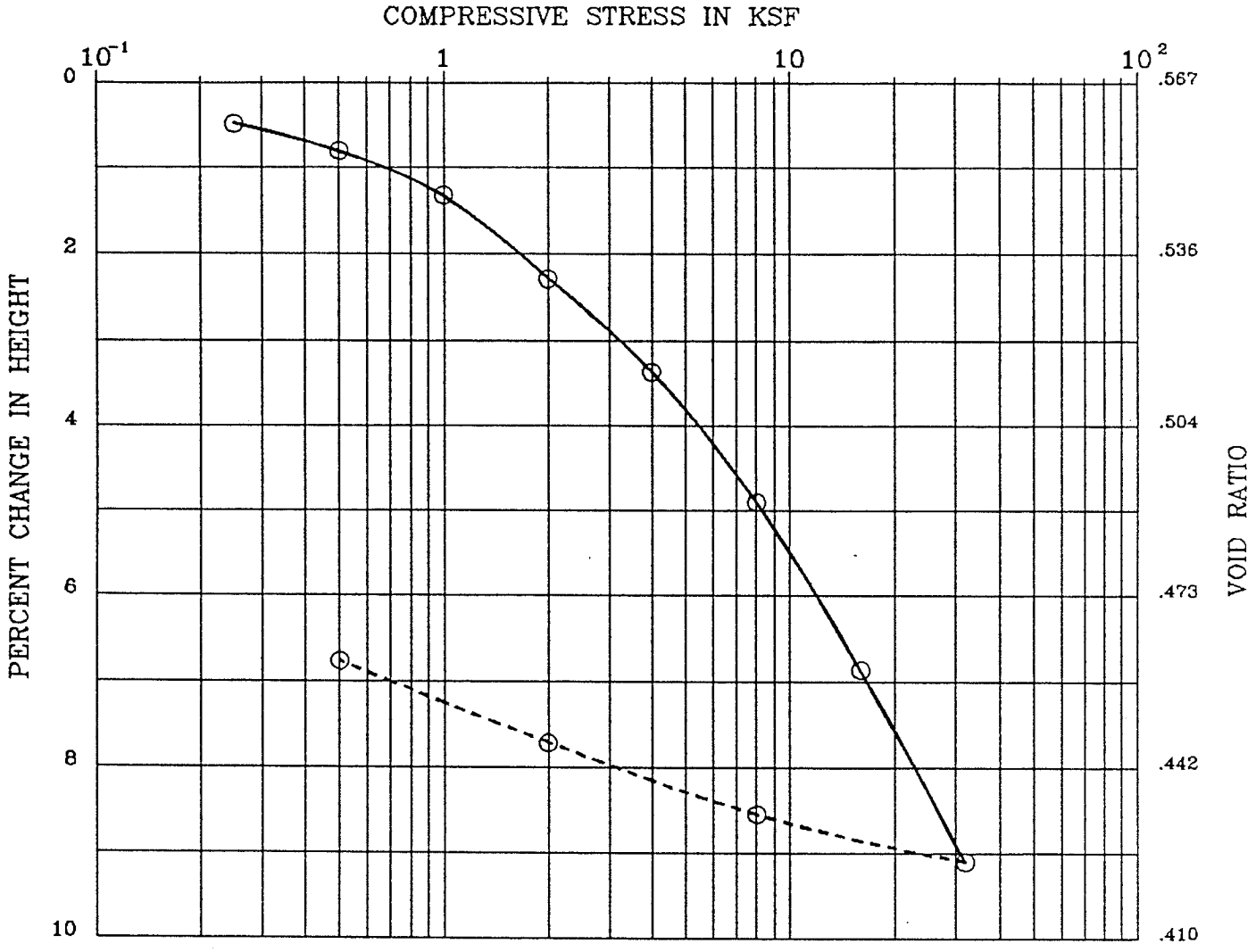


BORING	: DH-5, S-1	DESCRIPTION	: silty CLAY, yellow brown
DEPTH (ft)	: 20-22	LIQUID LIMIT	:
SPEC. GRAVITY	: 2.81	PLASTIC LIMIT	:

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	19.8	109.2	92	.605
FINAL	17.7	116.9	100	.499

Remark : April 1990

Project WMN-101H	SMaRT Station - Sunnyvale
Wahler Associates	CONSOLIDATION TEST Figure No. B-7



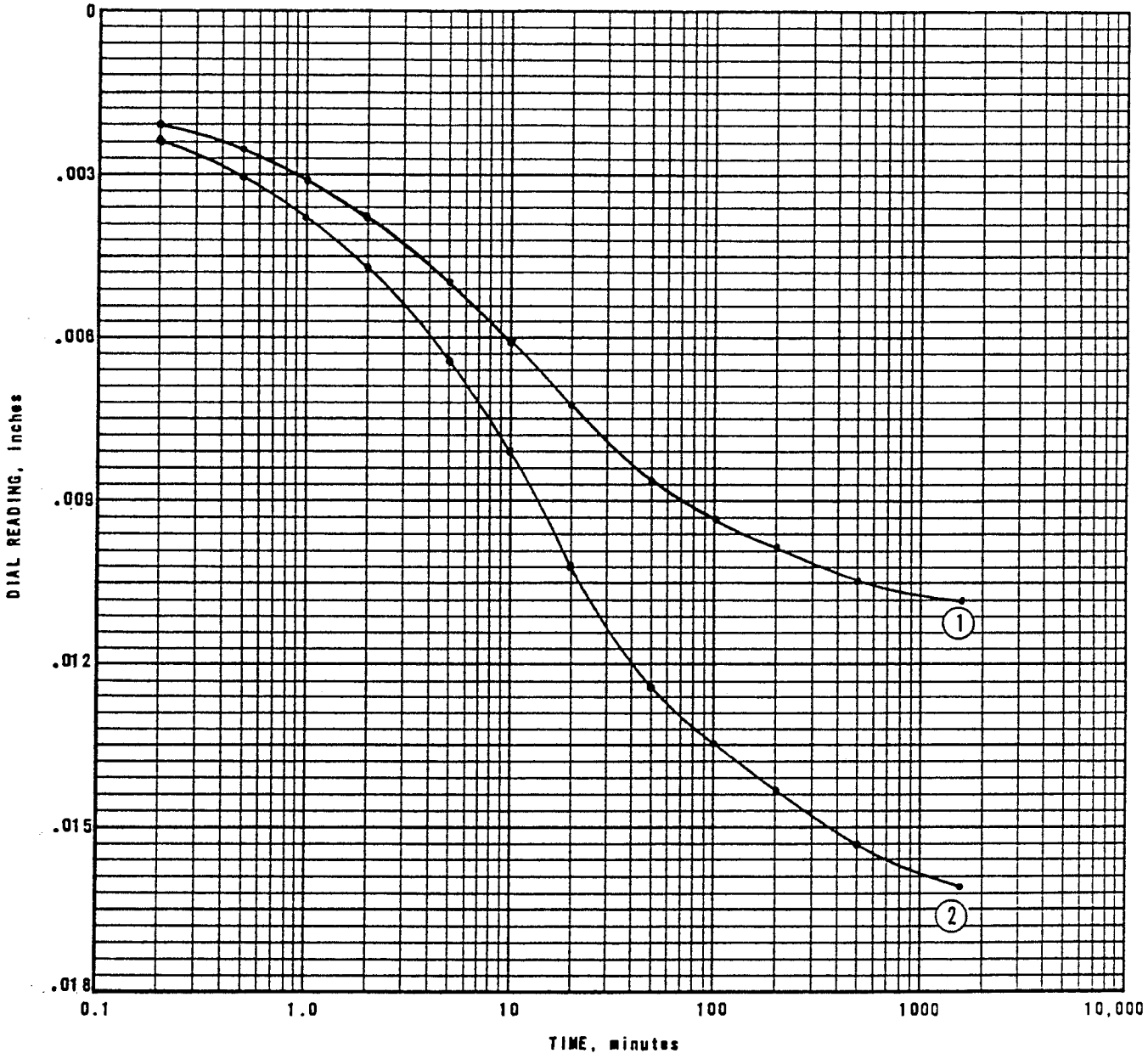
BORING : DH-7, R-7
DEPTH (ft) : 35-36.5
SPEC. GRAVITY : 2.76

DESCRIPTION : sandy silty CLAY, gray yel brown
LIQUID LIMIT :
PLASTIC LIMIT :

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	20.6	110.1	101	.567
FINAL	16.6	118.1	100	.461

Remark : April 1990

Project WMN-101H	SMaRT Station - Sunnyvale
Wahler Associates	CONSOLIDATION TEST Figure No. B-8

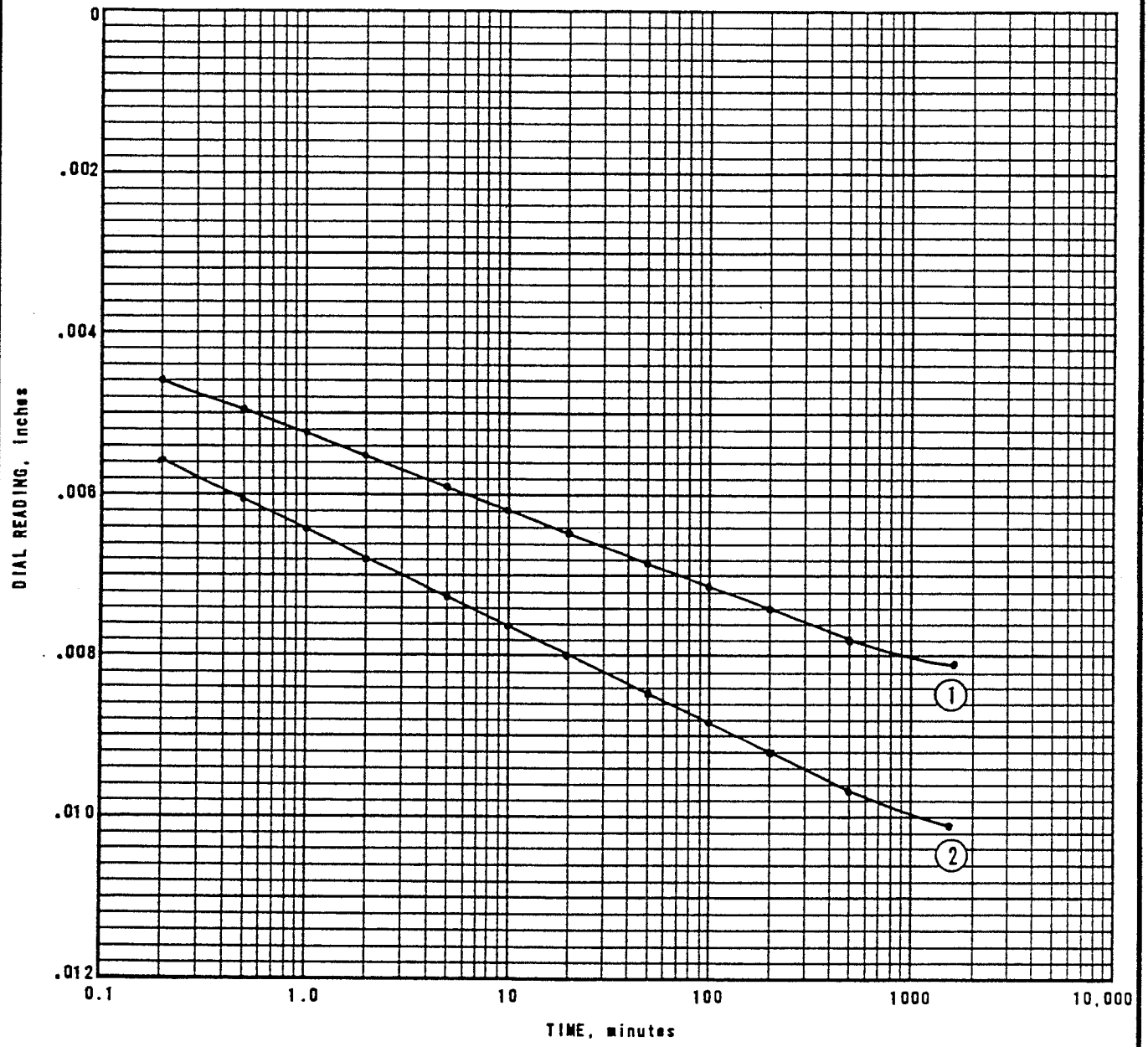


HOLE NO. DH-1, SAMPLE NO. S-1, DEPTH 15.0-18.0 FEET

(1) 1000-2000 psf

(2) 2000-4000 psf

Wahler Associates	SMaRT STATION SUNNYVALE, CALIFORNIA	CONSOLIDATION TEST TIME - COMPRESSION CURVES		
		PROJECT NO.	DATE	FIGURE NO.
	PALO ALTO • CALIFORNIA	WMN-101H	APRIL 1990	B-9

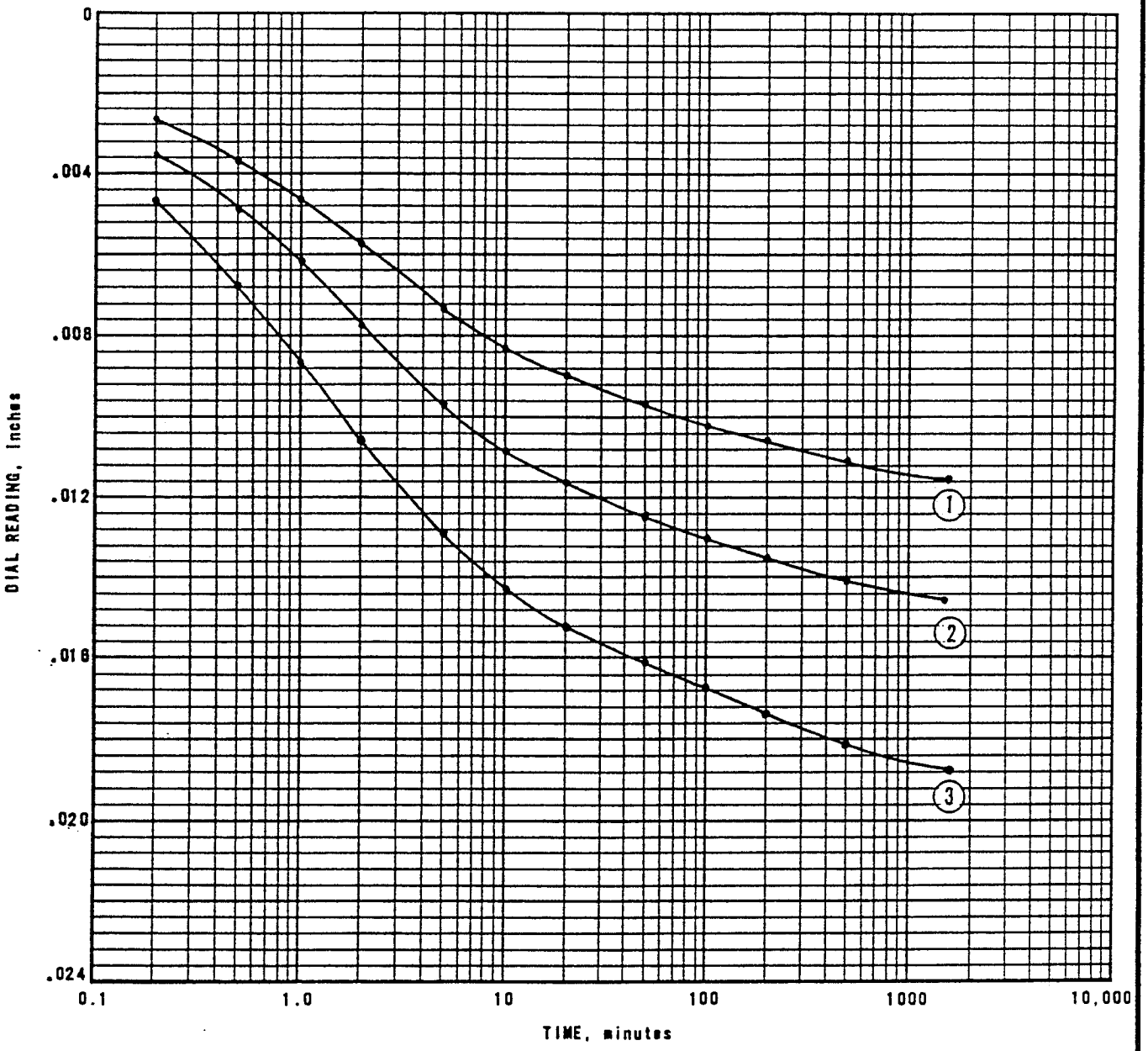


HOLE NO. DH-1, SAMPLE NO. R-4, DEPTH 26.0-26.5 FEET

(1) 1000-2000 psf

(2) 2000-4000 psf

Wahler Associates PALO ALTO • CALIFORNIA	SMaRT STATION SUNNYVALE, CALIFORNIA	CONSOLIDATION TEST TIME – COMPRESSION CURVES		
		PROJECT NO.	DATE	FIGURE NO.
		WMN-101H	APRIL 1990	B-10



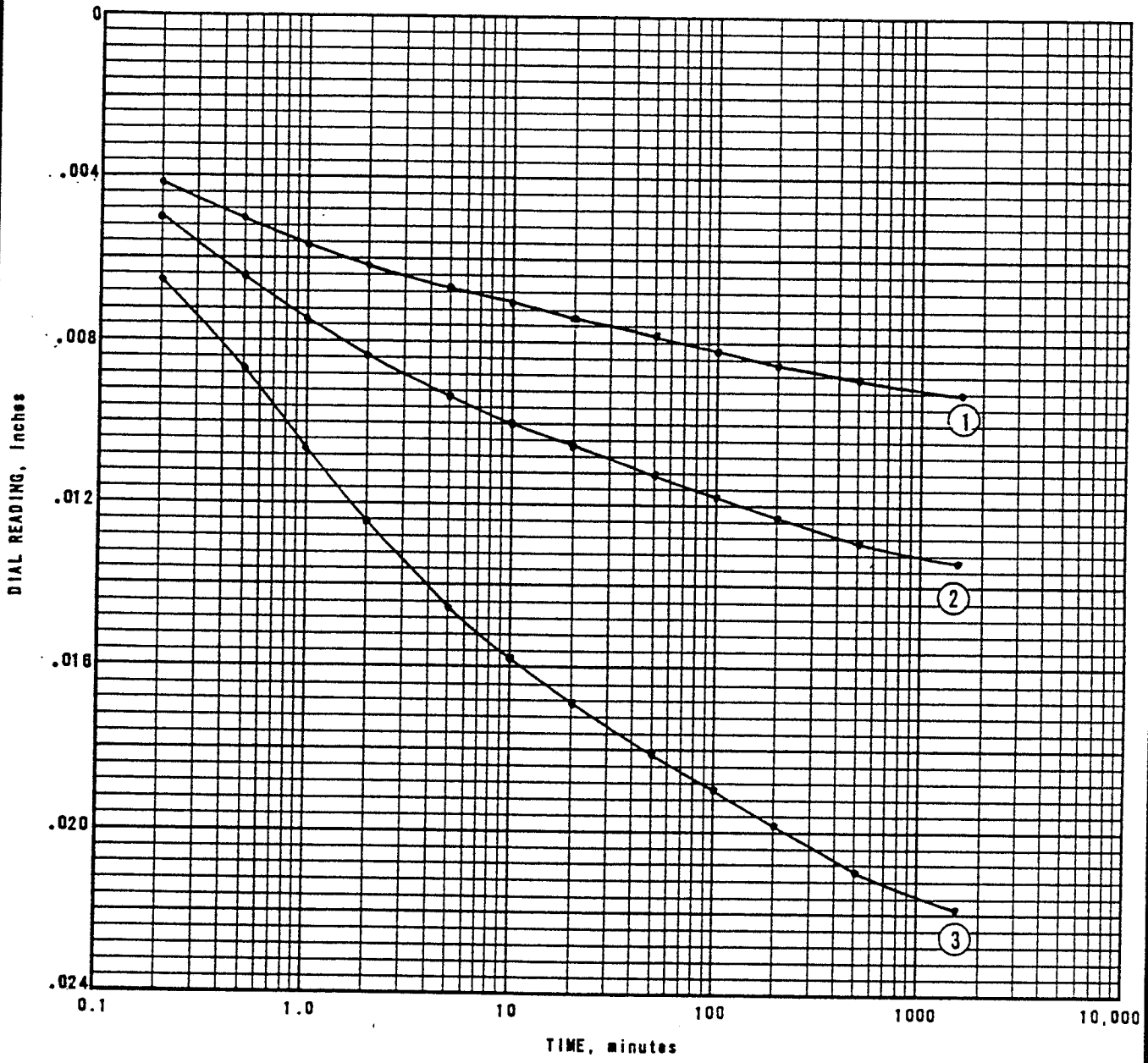
HOLE NO. DH-1, SAMPLE NO. R-6, DEPTH 71.0-71.5 FEET

(1) 1000-2000 psf

(2) 2000-4000 psf

(3) 4000-8000 psf

Wahler Associates	SMaRT STATION SUNNYVALE, CALIFORNIA	CONSOLIDATION TEST TIME - COMPRESSION CURVES		
		PROJECT NO.	DATE	FIGURE NO.
PALO ALTO • CALIFORNIA		WMN-101H	APRIL 1990	B-11



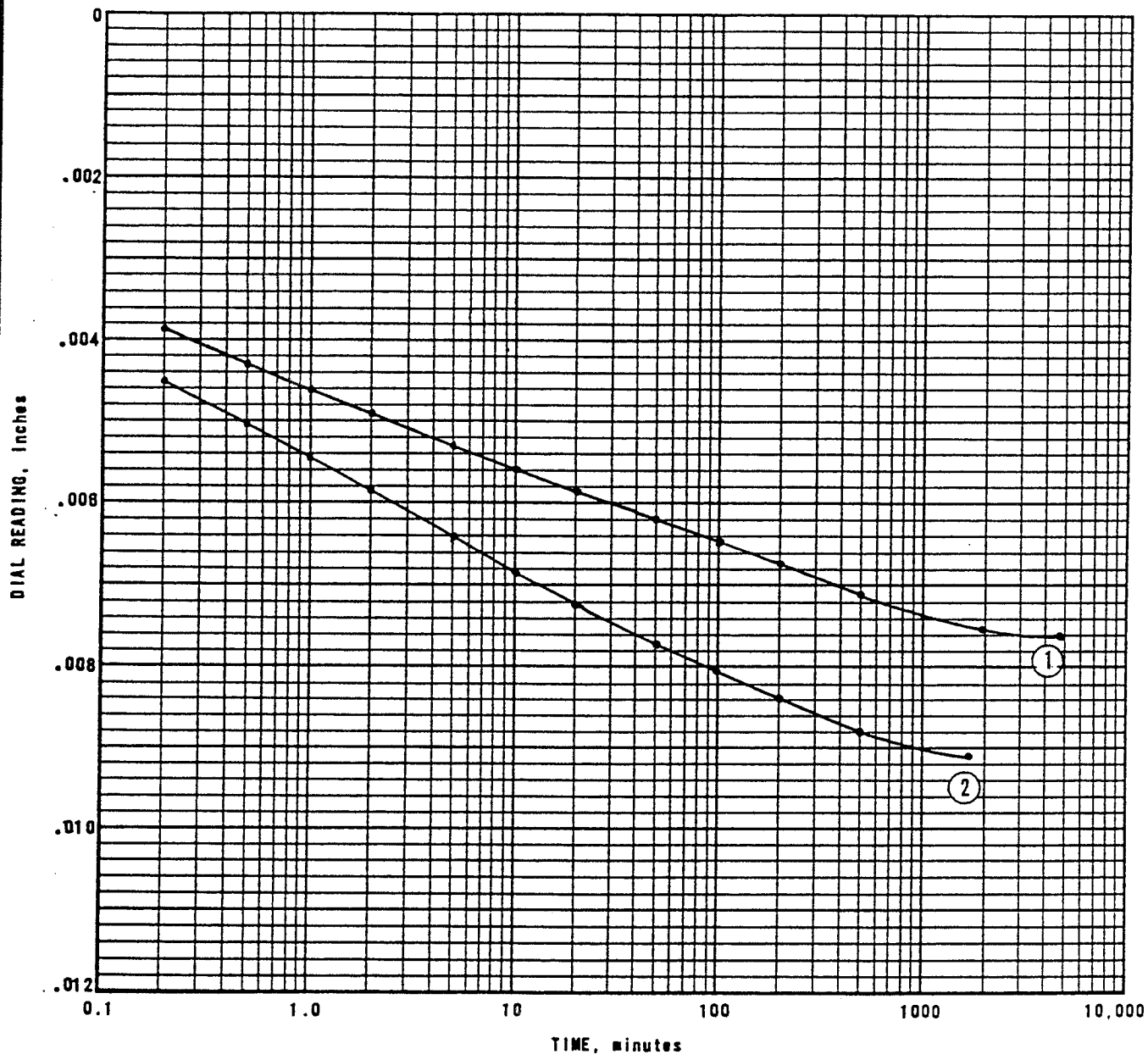
HOLE NO. DH-2, SAMPLE NO. S-1, DEPTH 58.0-61.0 FEET

(1) 1000-2000 psf

(2) 2000-4000 psf

(3) 4000-8000 psf

Wahler Associates	SMaRT STATION SUNNYVALE, CALIFORNIA	CONSOLIDATION TEST TIME - COMPRESSION CURVES		
		PROJECT NO.	DATE	FIGURE NO.
PALO ALTO • CALIFORNIA		WMN-101H	APRIL 1990	B-12

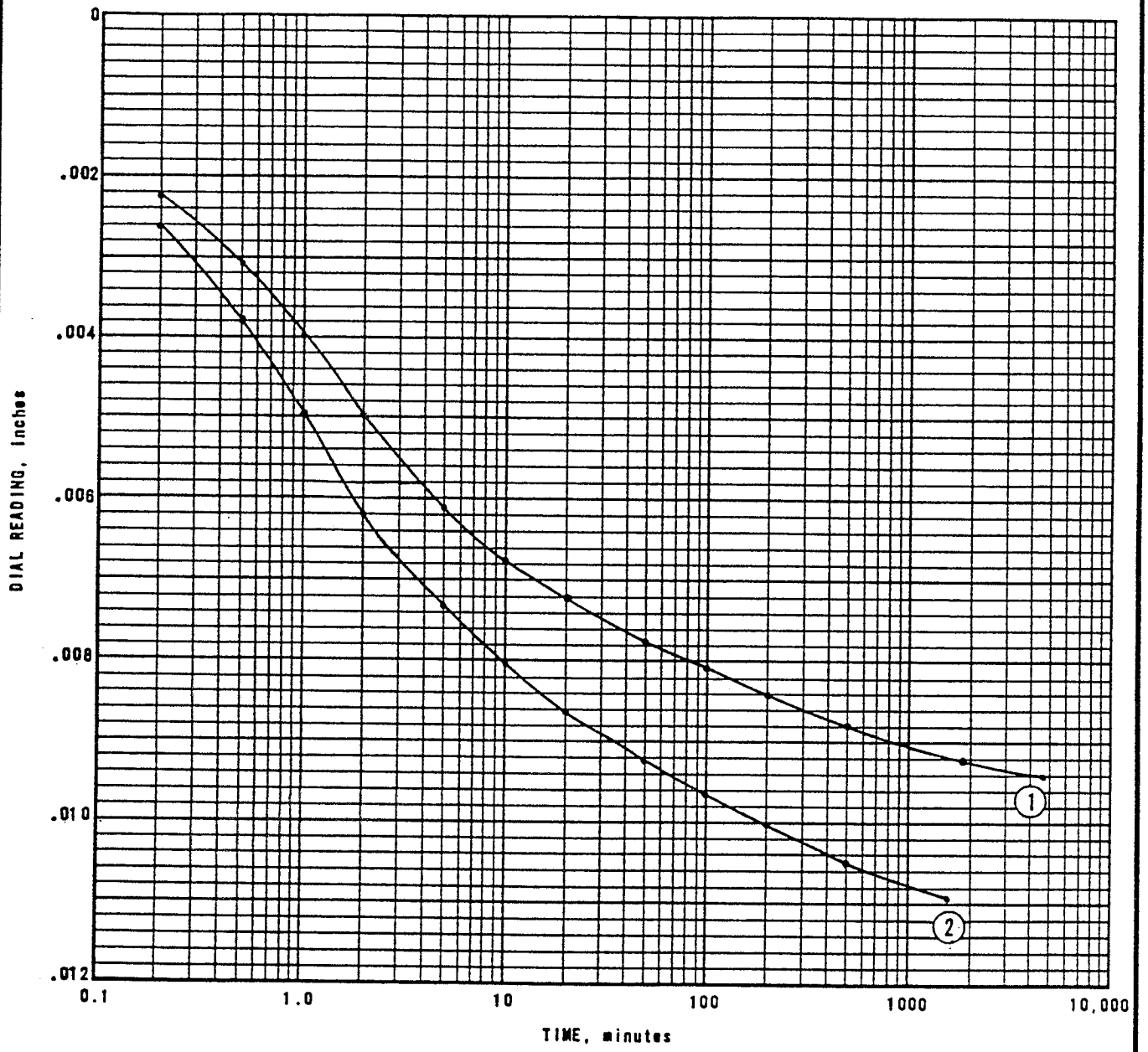


HOLE NO. DH-5, SAMPLE NO. S-1, DEPTH 20.0-22.0 FEET

(1) 1000-2000 psf

(2) 2000-4000 psf

Wahler Associates	SMaRT STATION SUNNYVALE, CALIFORNIA	CONSOLIDATION TEST TIME - COMPRESSION CURVES		
		PROJECT NO.	DATE	FIGURE NO.
PALO ALTO • CALIFORNIA		WMN-101H	APRIL 1990	B-13



HOLE NO. DH-7, SAMPLE NO. R-7, DEPTH 35.0-36.5 FEET

(1) 1000-2000 psf

(2) 2000-4000 psf

Wahler Associates	SMaRT STATION SUNNYVALE, CALIFORNIA	CONSOLIDATION TEST TIME – COMPRESSION CURVES		
		PROJECT NO.	DATE	FIGURE NO.
PALO ALTO • CALIFORNIA		WMN-101H	APRIL 1990	B-14