**THE SUTTON GROUP**
*3708 Mount Diablo Blvd, Suite 215, Lafayette, CA, 94549*
*phone: (925) 284-4208 fax: (925) 284-4189*
*e-mail johnrsutton@mindspring.com*

# Document Transmittal



**To:** Eva Chu
**From:** John Sutton
**CC:** Mike Cortez, w/o attachment
**Date:** April 10, 2003
**Re:** 2600 Grant Avenue, San Lorenzo, CA

---

Attached is a copy of the Geotechnical Report that was prepared for the subject property. The objective of the report was to provide geotechnical design criteria for design of an open excavation for bulk soil removal adjacent to the Oro Loma Sanitary District's office buildings. This open excavation plan was studied but rejected with agency and RWQCB concurrence.

Please note that the borings in the report were designated SB-1 and SB-2. To avoid conflict, they were later re-designated GB-1 and GB-2.

RO-288

August, 95
Project No. 3022.6



# REPORT OF GEOTECHNICAL INVESTIGATION

*FOR*

## *1,000 GALLON GASOLINE TANK SITE CLOSURE*

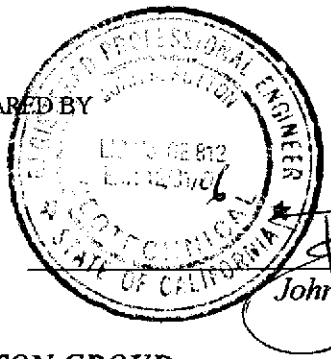
*AT*

## 2600 GRANT AVENUE
## SAN LORENZO, CALIFORNIA

PREPARED FOR

Mr. Mike Cortez
Oro Loma Sanitary District
2600 Grant Avenue
San Lorenzo, CA, 94580

PREPARED BY




*John R. Sutton, GE No. 812*

*THE SUTTON GROUP*
Engineering and Environmental Services
51 Shuey Drive, Moraga, California, 94556-2620
phone (510) 631-1688 fax (510)631-1371

**Report of Geotechnical Investigation,**
**1,000 gallon Gasoline Tank Site Closure at the**
**Oro Loma Sanitary District Service Center,**
**2600 Grant Avenue**
**San Lorenzo, California**

TABLE OF CONTENTS

**Report of Geotechnical Investigation,**
**1,000 gallon Gasoline Tank Site Closure at the**
**Oro Loma Sanitary District Service Center,**
**2600 Grant Avenue**
**San Lorenzo, California**

## INTRODUCTION

Contractors will be bidding on removal and management of petroleum fuel (gasoline) contaminated soil near the former location of a 1,000 gallon, underground gasoline storage tank. The tank and fuel island was located in the parking lot which bounds the Maintenance Building and Engineering Building at the Oro Loma Sanitary District (OLSD) Service Center, 2600 Grant Avenue in San Lorenzo, un-incorporated Alameda County, California. The site location is shown on Figure 1.

As presently conceived, gasoline contaminated soils, which are a result of leakage from the tank, will be removed by excavation with subsequent remediation nearby. These gasoline contaminated soils have been extrapolated to extend to about eight or nine feet depth. This report documents a geotechnical investigation that was designed to collect subsurface data for use by potential excavation contractors in the development of bids.

## HISTORY

Previous subsurface investigations of the tank area, both by The Sutton Group (Sutton) and by a previous consultant to the District were directed toward determining the extent and degree of contamination. Those investigations were not directed toward collection of geotechnical design information. In the previous investigation by Sutton, performed late in 1994, soil caving limited the depth of shallow test pits dug in the proposed excavation location.

The Engineering Department building was founded on driven piling and is in good condition from a structural view point. Sidewalks and landscaping a adjacent to the building are also in good condition. OLSD engineering personnel described unstable soil conditions experienced by the contractor during construction of the Engineering Department Building in the early 1990s. These conditions are indicative of the soft and unstable bayland deposits upon which the site has been developed. It is apparent that removal of soil at this site will require engineered solutions to prosecute the work without impacting the continued use or integrity of the existing buildings and infrastructure.

## WORK SCOPE

The work scope included site reconnaissance, subsurface exploration, geotechnical laboratory testing, engineering evaluation of the field and laboratory data, and preparation of this report. The data obtained and the evaluations performed were scoped with the intent of providing preliminary design and construction information about the proposed excavation to the contractors' engineers in preparing bids for the work. Due to the plethora of potential excavation

support solutions, a contractor may have need to perform design-specific investigations particular to a specific procedure

## FIELD INVESTIGATION

This investigation comprised the drilling of two soil borings in the parking lot adjacent to the District's offices and maintenance shops. A truck mounted CME-55 model drilling rig was equipped with 8 inch OD, 3½ inch ID hollow stemmed augers (HSA). Borings SB-1 and SB-2 were extended to 51.5 and 36.5 feet depth respectively. The boring locations are shown in relation to the Engineering Department Building on Figure 2.

The drill hole was advanced using HSA with an end plug. Samples were generally collected by driving a California sampler fitted with 2 inch ID liners. Selected zones were sampled by pushing 2½ inch diameter Shelby tubes. The California samples were collected by driving on the rod with a hydraulically actuated 140 pound hammer, free falling 30 inches in accordance with the Standard Penetration Test (SPT). The sampler was typically driven a total 18 inches, with the cumulative blow-count for the final 12 inches recorded on the boring log as the SPT "N-value". Samples of the surficial man-made fill soils were not collected since much data is available from the previously performed environmental investigations. Based on poor recovery of initial samples, and due to the expected low strength of the majority of native soils encountered, a catcher was used in the California sampler to ensure sample retention. Shelby tubes were 30 inches long, were pushed 24 inches using the rig's hydraulic down-drive.

Soils were continuously logged in the field by our engineer. All samples and cuttings were field classified in accordance with the Unified Soil Classification System (ASTM D2487). The boring logs are included in Appendix A.

The soil cuttings removed from the borings were collected and removed by the District to the near-site location where soils removed from the tank excavation are being temporarily stored in a bermed, covered containment. The borings were backfilled with a neat cement grout on the day of drilling.

Drilling was subcontracted to Soils Exploration Services, Inc. of Benicia, California. This contractor holds C57 Contractor's License No. 582696. The work was verbally authorized in advance of the field work by Alameda County Flood Control and Water Conservation District (Zone 7) who have local jurisdiction. A copy of the issued permit is included in Appendix A.

## LABORATORY TESTING

Samples collected from the borings were transported to Cooper Testing Laboratory in Mountain View, California. A log of the samples collected and the requested analyses is included in Appendix B. Selected samples were variously tested for field moisture content and dry density, Atterberg limits, #200 screen analysis, and unconsolidated, undrained, triaxial compressive

strength. Soils tested by the laboratory did not exhibit characteristics indicative of contamination. Results of the testing program are summarized on Table 1. The report from the laboratory is included in Appendix B

## SUBSURFACE CONDITIONS

### Soil Conditions

The site subsurface profile comprises man-made fill placed over soft, low strength bayland deposits, which are in turn underlain by sands and clays. [Borings and test trenches excavated in the parking lot for the two investigation stages show the asphalt surfacing is about 2½ inches thick over ¾ inch sized crushed rock aggregate base, and a 1½ inch sized crushed quarry stone sub-base that is typically a very gravely sand or sandy gravel with some clayey phases and is brown to tan to blue colored. The thickness of fill was shown to increase from a minimum nearer Grant Avenue to a maximum nearer the maintenance building. This well compacted fill material was underlain at from 2.5 to 4 feet depth by a " bridging fill" about 0.5 to one foot thick. This bridging fill included broken concrete and general construction debris in a (typically crusted) Bay Mud matrix. This bridging fill zone was absent in some locations].

The man-made fill, as seen in the borings drilled for this investigation, extended to about three feet depth. The bridging fill in boring SB-2 extended to approximately seven feet depth. The lower foot of the fill was a black sand which exhibited a strong gasoline odor.

The bayland deposits are very soft to soft, moist to very moist, moderately high to high plasticity clays. These bayland deposits are black, gray or green in color and contain peat zones. These soils are locally referred to as Bay Mud. The Bay Mud extends to about 21 feet depth.

Beneath the Bay Mud are stiff, shell-cemented, moderately high to high plasticity, gray-green clays. Clayey sand and sandy clay layers were present from 21 to 25 feet, at which depth the clays were observed to change to brown color. These deeper soils were medium stiff to stiff, silty, and lower in plasticity. The zone at from about 32 feet to 45 feet depth in boring SB-1 appeared to include very silty, fine, flowing sand zones within the clay.

### Ground Water

The borings in this investigation were not allowed remain open sufficiently long for measurement of ground water depth. A zone of flowing sand in boring SB-1 produced water when advancing the auger deeper than about 30 feet. Drilling conditions were indicative of water laden sand zones between 32 and 45 feet depth in that boring.

In the test trench investigation, ground water was noted at 7 feet depth in trench TT-3. This is equivalent to about 4 feet deep in the Bay Mud zone.

**Seismicity**
The site is located in one of the most seismically active regions of the United States. The site lies approximately four miles south west of the northwest trending, active, Hayward fault. The site conditions include soils highly susceptible to liquefaction. While the proposed excavation will open for a relatively short duration, the excavation design should consider the potential impact of a seismic event on the project and the nearby structures

## CONCLUSIONS AND RECOMMENDATIONS

**Excavation**
Excavation to a planned ten foot depth will entail removal of structural-quality fill materials, followed by excavation of bayland soils to below ground water level. As shown on Table 1, which summarizes the geotechnical laboratory test data collected, the bayland soils within, and underlying the zone to be excavated have low in-place densities (average dry densities of 73 pcf) and high moisture contents (average 49 per cent) which in several cases exceed the liquid limit of the soil. Shear tests on the bayland clays indicate compressive strengths of the order of 500 pounds per square foot.

Excavation to remove contaminated soils in the near vicinity of the Engineering building will, unless appropriate engineered controls are included within the excavation process, impact the Engineering Building substructure and infrastructure. Shoring should be designed to ensure continued support of the low strength bayland deposits to protect the building, its paving and landscaping against loss of ground during the time the excavation is open. Surcharge effects due to the existing fills, adjacent buildings at greater elevation, and transient load conditions should be considered in the designs, as should pressures due to ground water and dewatering effects.

The contractor should be required to have excavation support and dewatering system designs performed under the direction of Registered Professional Engineer who is familiar with the design of temporary retaining structures for similar conditions. The excavation design should be considerate of heave of the excavation bottom, and the impact on the excavation itself and the impact on the soils beneath the existing building. The effect on the existing building of a significant seismic event occurring during the period of the work should also receive consideration.

**Backfilling**
Backfill materials placed greater than three feet below parking lot grade should be clayey soils, similar in soil classification and density to the native materials. Excessive compactive effort should be minimized during backfill placement within 15 feet of the side of the Engineering Building, until the backfill grade is restored to within three feet of the paving surface. Backfill in the upper three feet should be granular fill of similar material properties to the import fill now in place. The upper two feet of this material should be compacted to no less than 95 percent of

maximum density, ASTM D1557. Excavation support should remain in place as long as possible to minimize transfer of backfill load to the existing soils.

**Observation**

We should be engaged during the construction work to review the contractor's submittals, and to observe the conditions exposed so that we can evaluate the discovered conditions. If such changes are indicated, we should be given the opportunity to re-evaluate our recommendations based on the actual materials discovered, and to review and provide recommendations about the materials the contractor plans to use as backfill.

## LIMITATIONS

This investigation has been performed according to generally accepted, engineering principles and practices. No other warranty, either expressed or implied is made. The evaluations, conclusions and recommendations presented in this report are based in part on the information from subsurface borings. Soil conditions are known to vary between borings, and extrapolations of data are necessary as a basis of formulating conclusions and recommendations. The nature and extent of such variation may not become evident until exposed in excavations. Changes in the information or data gained from any of these data sources could result in changes in our conclusions and recommendations. We should be engaged during the construction work to observe the conditions exposed so that we can have the opportunity to observe and evaluate such exposed conditions. If such changes are indicated in our absence, we should be advised so that we can have the opportunity to review our opinions and recommendations in light of these discoveries.

*** ***** ***

**Report of Geotechnical Investigation,**
**1,000 gallon Gasoline Tank Site Closure at the**
**Oro Loma Sanitary District Service Center,**
**2600 Grant Avenue**
**San Lorenzo, California**

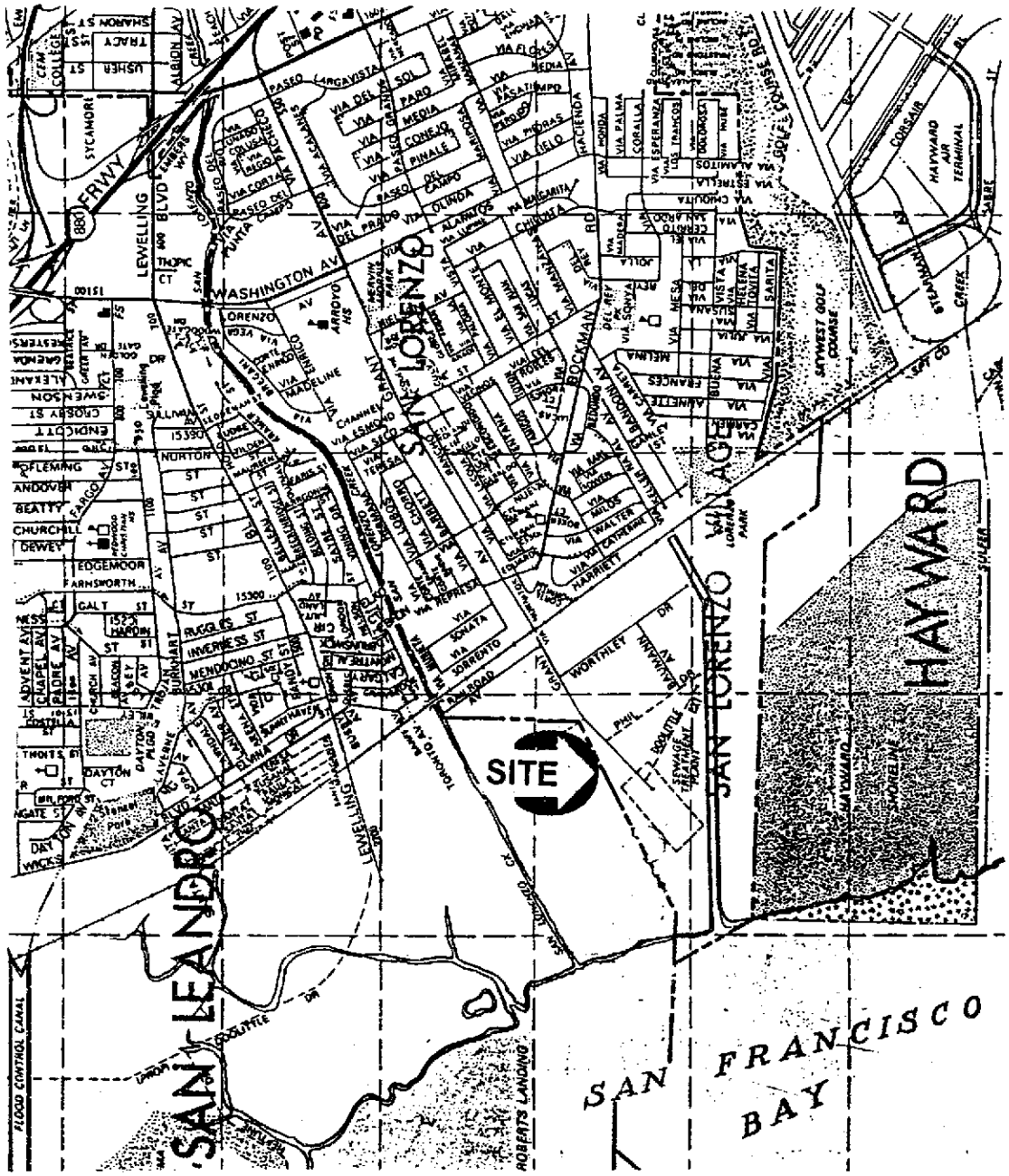
## TABLE 1

## SUMMARY OF LABORATORY TEST DATA

| Boring No. | Depth (feet) | Dry Density (pcf) | Moisture Content | Liquid Limit | Plasticity Index | % Passing No. 200 sieve | Shear Strength (psf) | Unified Soils Classification (USCS) |
|---|---|---|---|---|---|---|---|---|
| SB-1 | 10-12 | 59.1 | 69.5 | - | - | 95 | 460 | CH/CL |
| " | 15-16.5 | 78.4 | 42.3 | 45 | 21 | - | - | CL/CH |
| " | 20-22 | 103.9 | 20.9 | 53 | 31 | 85 | 1,660 | CH |
| " | 25-26.5 | 111.6 | 18.7 | - | - | - | - | CL |
| " | 40-41.5 | 103.9 | 23.9 | - | - | 73 | - | CL |
| " | 50-51.5 | 90.1 | 29.1 | - | - | - | - | CL/CH |
| | | | | | | | | |
| SB-2 | 7 - 9 | 75.8 | 43.2 | 48 | 23 | - | 540 | CL/CH |
| " | 15-16.5 | 80.0 | 40.8 | 39 | 15 | 99 | 480 | CL |
| " | 20-21.5 | 105.0 | 23.4 | - | - | - | - | CL/CH |
| " | 25-25.5 | 106.0 | 23.0 | - | - | 81 | - | CL |
| " | 30-31.5 | 101.7 | 23.8 | 40 | 20 | - | - | CL |
| " | 35-36.5 | 104.8 | 22.0 | - | - | - | - | CL |

Job No. 3022.6

ww/sg/olsd/3022R6T.doc 8/30/95

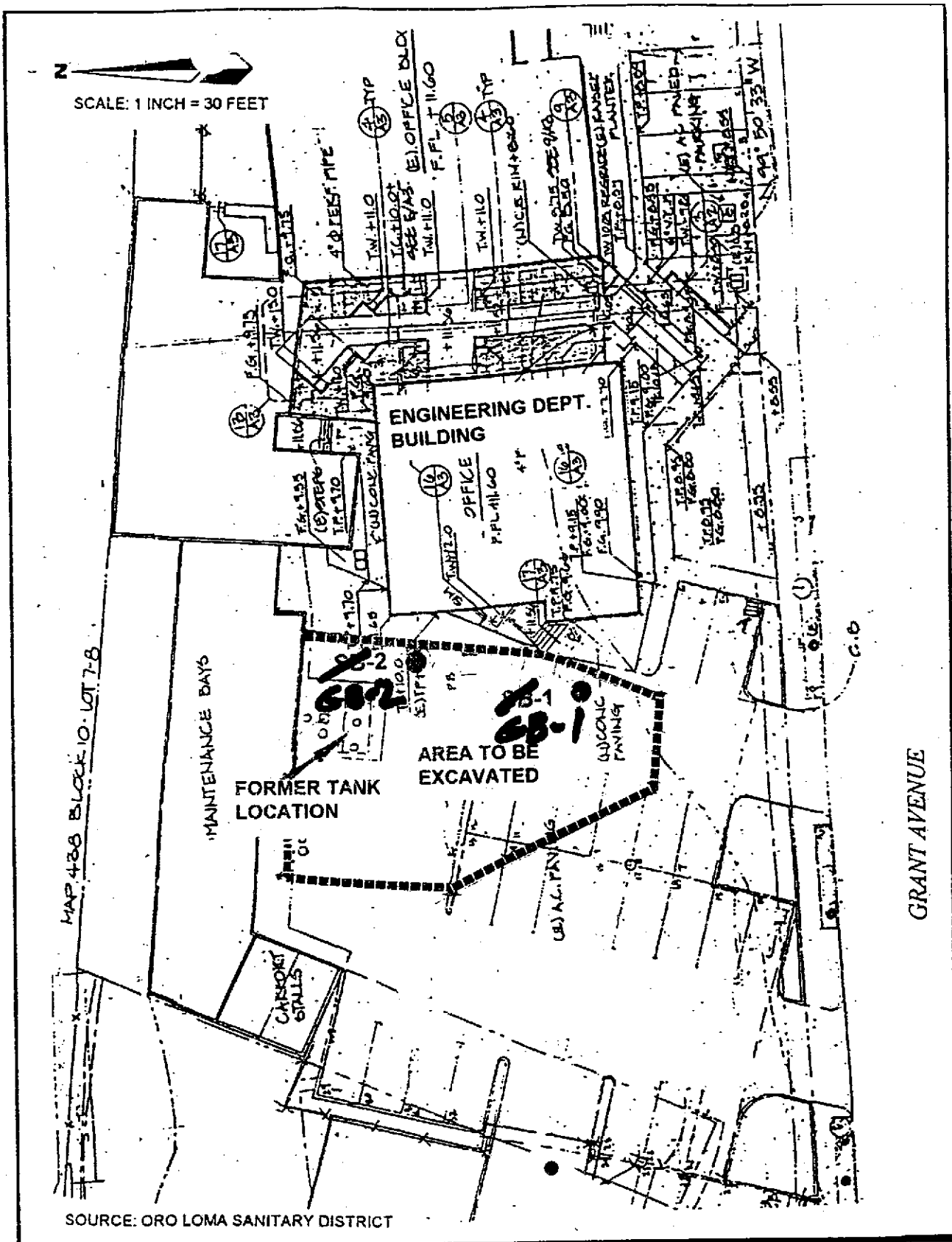



SOURCE: THOMAS BROS MAPS, ALAMEDA COUNTY, CALIFORNIA

*THE SUTTON GROUP*
*Engineering and Environmental Services*
*51 Shuey Drive*
*Moraga, California, 94556-2620*
*phone (510) 631-1688*

**SITE LOCATION MAP**
1000 GALLON TANK REMOVAL
ORO LOMA SANITARY DISTRICT
SAN LORENZO, CALIFORNIA

PROJECT NO. 3022
FIGURE No **1**
5/30/95




SOURCE: ORO LOMA SANITARY DISTRICT

*THE SUTTON GROUP*
*Engineering and Environmental Services*
*51 Shuey Drive*
*Moraga, California, 94556-2620*
*(510) 631-1688*

**BORING LOCATION PLAN**
1,000 GAL. GASOLINE TANK SITE CLOSURE
GEOTECHNICAL INVESTIGATION
ORO LOMA SANITARY DISTRICT
San Lorenzo, California

PROJ. No **3022.6**

FIGURE **2**

*8/30/1995*

# APPENDIX A

# BORING LOGS

# REHOLE LITHOLOGIC LOG

| | | | |
|---|---|---|---|
| Date Drilled | 7/12/1995 | Drilling Company | Soils Exploration Services |
| Client | Oro Loma Sanitary District | Driller | Morris |
| Site Name | 1,000 gal Gas. Tank | Rig Model | CME-55 |
| City/Town | San Lorenzo, CA | Drilling Method | Hollow Stemmed Auger |
| | | Sampling Method | Calif, Shelby tube |
| Logged By | J.R.S. | Surface Elevation | 9.5 ± |
| | | Borehole Diameter | 9" |

| Depth (ft) | Graphic Symbol | USCS Symbol | Soil Description | Sample Type/ BlowCounts/ N-Value | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | | ASPHALT, 2" thick | | | | |
| | | GP/GM | FILL:Base Course Gravel, well graded, dry,brown | | | | |
| | | CL/CH | CLAY stiff, gravelly, moist..Bay Mud/Fill interface | C | 2,3,4 | 7 | |
| | | | | | | | |
| 5 | | | | | | | |
| | | | | | | | |
| | | | BAY MUD, soft to medium stiff | S | | | Push 7-9, |
| | | | | | | | 2"/24 recovery |
| | | CL | BAY MUD, soft, very moist, gray | | | | |
| 10 | | CH/CL | BAY MUD, soft, very moist, gray | | | | ST,10-12',. |
| | | | DD=89.5, w=50%, , -200=95%, | | | | 24/24 recov |
| | | | | S | | | |
| | | | | | | | |
| | | | | | | | |
| 15 | | MH/CH | BAY MUD, soft, SILT/CLAY, mod.plasticity,very | C | 1,1,1 | 2 | |
| | | | moist, olive green, strong organic.decomp.odor | | | | |
| | | | DD=78, w=42%, LL=45, PI=21 | | | | |
| | | | | | | | |
| | | | | | | | |
| 20 | | | easy push then sand at 21.5' | | | | ST 20-22 lost |
| | | CH | CLAY,high plastic, w/#8 sized cem, shell nodules | S | | | in hole |
| | | | lt. green/gray DD=103.9,w=20.9,LL=53.p=PI=31 | | | | due to sand |
| | | SC | SAND Lens, Clayey, green | | | | layer @ 21.5 |
| | | | | | | | |
| 25 | | CL | CLAY, very stiff, sandy, brown | C | 3,7,9 | 16 | |
| | | | | | | | |
| | | SC | ....@ 26.3 becomes SAND, clayey, brown | | | | |
| | | | DD=111.6 pcf, w=18.7 %, -#200=81% | | | | |
| | | | | | | | |
| 30 | | | | | | | |

*THE SUTTON GROUP*
51 Shuey Drive
Moraga, CA 94556

(510) 631-1688
FAX (510) 631-1371

sg\olsd/logSB1-1.doc 8/15/95

Project No. 3022.6

**Boring No. SB-1**

# BOREHOLE LITHOLOGIC LOG

| Depth (ft) | Graphic Symbol | USCS Symbol | Soil Description | Sample Type/ BlowCounts/ N-Value | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | CL/ML | CLAY,very silty, sandy (fine) olive brown, | C | 2,2,3 | 5 | No recov. |
| | | | moist, to wet | | | | went back, |
| | | CL | CLAY, sandy ,silty to SAND, clayey, olive brown | | | | pushed to 32' |
| | | | | | | | |
| 35 | | | | | | | |
| | | | | | | | thin slurry of |
| | | | | | | | gray water |
| | | | | | | | being |
| | | | | | | | returned from |
| 40 | | CL | CLAY,very silty, very sandy (fine), , | | | | auger at > 30 |
| | | | wet/flowing, brown | C | 2,3,4 | 7 | |
| | | | DD=103.9 pcf, w=23.9%, -#200=73% | | | | |
| | | | | | | | |
| | | | | | | | |
| 45 | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 50 | | CL/CH | CLAY, stiff, silty, moist, brown | C | 3,4,6 | 10 | |
| | | | TERMINATED @ 51.5 ft. | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | Caved to 5.8 feet in 2hrs. Redrilled, | | | | |
| | | | shaft grouted w/ neat cement slurry, topped off. | | | | |

*THE SUTTON GROUP*
51 Shuey Drive
Moraga, CA 94556

(510) 631-1688
FAX (510) 631-1371

sg\olsd/logSB1-2.doc, 8/15/95

Project No. 3022.6

**Boring No. SB-1**

Sheet 2 of 2.

# BOREHOLE LITHOLOGIC LOG

| | | | |
|---|---|---|---|
| Date Drilled | 7/12/1995 | Drilling Company | Soils Exploration Services |
| Client | Oro Loma Sanitary District | Driller | Morris |
| Site Name | 1,000 gal Gas. Tank | Rig Model | CME-55 |
| City/Town | San Lorenzo, CA | Drilling Method | Hollow Stemmed Auger |
| | | Sampling Method | Calif, Shelby tube |
| Logged By | J.R.S. | Surface Elevation | [illegible] |
| | | Borehole Diameter | 9" |

| Depth (ft) | Graphic Symbol | USCS Symbol | Soil Description | Sample Type/ BlowCounts/ N-Value | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | | ASPHALT, 2" thick over roadbase:Gravelly SAND, | | | | |
| | | | dry, blue green, odorless | | | | |
| | | | | | | | |
| | | | MIXED FILL including Bay Mud and peat with | | | | |
| 5 | | | sand and gravel | | | | |
| | | | 6' Black fine sand with strong odor of gasoline | C | 2,3,3 | 6 | |
| | | | | | | | |
| | | CH/CL | CLAY, moderate to high plasticity, organic, soft to | S | | | ST 7.0-9.0, |
| | | | medium stiff, gray, green, black..LL=48, PI=23 | | | | 100% recovery |
| 10 | | | | | | | |
| | | | CLAY, gray-green as above | C | | | advanced |
| | | | | | | | under rod wt. |
| | | | | | | | |
| | | | | | | | |
| 15 | | CL | CLAY, silty, soft gray-green | S | | | ST 15.0-16.6' |
| | | | LL=39, PI=15, -#200=99.4 | | | | (20") 100% recov. |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 20 | | | | C | 5,9,10 | 19 | |
| | | CL/CH | CLAY with cementation, shell (gravel size), | | | | |
| | | | nodules, stiff, wet, light gray | | | | |
| | | | DD=105 pcf, w=23.4% | | | | |
| | | | | | | | |
| 25 | | | | | | | |
| | | CL | @25.2 CLAY,silty, very stiff, moist, olive brown | C | 4,7,12 | 19 | |
| | | | DD=106pcf, w=23.0% | | | | |
| | | | | | | | |
| | | | | | | | |
| 30 | | | | | | | |

*THE SUTTON GROUP*
51 Shuey Drive
Moraga, CA 94556

(510) 631-1688
FAX (510) 631-1371

sg\olsd\logSB2-1.doc 8/15/95

Project No. 3022.6

**Boring No. SB-2**

# BOREHOLE LITHOLOGIC LOG

| Depth (ft) | Graphic Smbol | USCS Symbol | Soil Description | Sample Type/ BlowCounts/ N-Value | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | CL | CLAY, as above, less stiff, moist, olive brown | C | 3,5,6 | 11 | |
| | | | DD=101.7, w=23.8% | | | | |
| 35 | | CL | CLAY, stiff, slightly sandy, moist, olive brown | | | | |
| | | | DD=104.8 pcf, w=22.0% | C | 4,8,9 | 17 | |
| | | | TERMINATED at 36.5 feet | | | | |
| | | | shaft grouted w/ neat cement slurry, topped off. | | | | |
| 40 | | | | | | | |
| | | | Catcher used with California samples | | | | |

*THE SUTTON GROUP*
51 Shuey Drive
Moraga, CA 94556

(510) 631-1688
FAX (510) 631-1371

sg\olsd\logSB2-2.doc 8/15/95

Project No. 3022.6

**Boring No. SB-2**

# ZONE 7 WATER AGENCY

5997 PARKSIDE DRIVE PLEASANTON, CALIFORNIA 94588 VOICE (510) 484-2600
FAX (510) 462-3914

## DRILLING PERMIT APPLICATION

RECEIVED JUL 28 1995

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT On Loma Parking Lot
2600 Grant Avenue,
San Lorenzo

CLIENT
Name On Loma Sanitary District
Address 2600 Grant Ave Voice (510) 276-4700
City San Lorenzo Zip 94580

APPLICANT
Name The Sutton Group
Fax ~~510-276-4150~~ 631-1377
Address 57 Shuey Drive Voice 631-1688
City Moraga CA Zip 94556

TYPE OF PROJECT
Well Construction
Cathodic Protection ___
Water Supply ___
Monitoring ___
Geotechnical Investigation
General ___
Contamination X upper 10 only
Well Destruction ___

PROPOSED WATER SUPPLY WELL USE
Domestic ___ Industrial ___ Other ___
Municipal ___ Irrigation ___

DRILLING METHOD: if necessary.
Mud Rotary X Air Rotary ___ Auger X
Cable ___ Other ___

DRILLER'S LICENSE NO. (C57) 582696

WELL PROJECTS
Drill Hole Diameter ___ in. Maximum
Casing Diameter ___ in. Depth ___ ft.
Surface Seal Depth ___ ft. Number ___

GEOTECHNICAL PROJECTS
Number of Borings 2 Maximum
Hole Diameter 8 in. Depth 50 ft.

ESTIMATED STARTING DATE 7/12/95
ESTIMATED COMPLETION DATE 7/12/95

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE John Sutton Date 7/10/95

FOR OFFICE USE

PERMIT NUMBER 95460
LOCATION NUMBER ___

PERMIT CONDITIONS

Circled Permit Requirements Apply

A. GENERAL
(1.) A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or drilling logs and location sketch for geotechnical projects.
(3.) Permit is void if project not begun within 90 days of approval date.

B. WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

(C.) GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

D. CATHODIC. Fill hole above anode zone with concrete placed by tremie.

E. WELL DESTRUCTION. See attached.

Approved Wyman Hong Date 26 Jul 95
Wyman Hong

91092

# APPENDIX B

# GEOTECHNICAL LABORATORY TEST DATA

Reporting Information:

1. Client: ORO LOMA SANITARY DISTRICT
Address: 2600 Grant Avenue
San Lorenzo CA. 94580
Contact: Michael Cortez
Alt. Contact: _____

# THE SUTTON GROUP

*Engineering and Environmental Services*
*51 Shuey Drive*
*Moraga, California, 94556-2620*
*phone (510) 631-1688 fax (510) 631-1371*
Tel. No.: (510) 743-8300 (510) 743-9150



**REQUEST FOR ANALYSIS / CHAIN OF CUSTODY**

Lab Job Number: _____
Lab Destination: _____
Date Samples Shipped: _____
Lab Contact: _____
Date Results Required: 7/21/95
Date Report Required: 7/25/95
Client Phone No.: _____
Client FAX No.: _____

Address Report To:

2. John Sutton, PE
The Sutton Group
51 Shuey Drive
Moraga, CA, 94556-2620

Send Invoice To:

3. Oro Loma Sanitary District
2600 Grant Ave
San Lorenzo, CA, 94580
Att. Mr. Michael Cortez

Send Report To: 1 or 2 (Circle one)

Client P.O. No.: _____ Client Project I.D. No.: SG3022.6

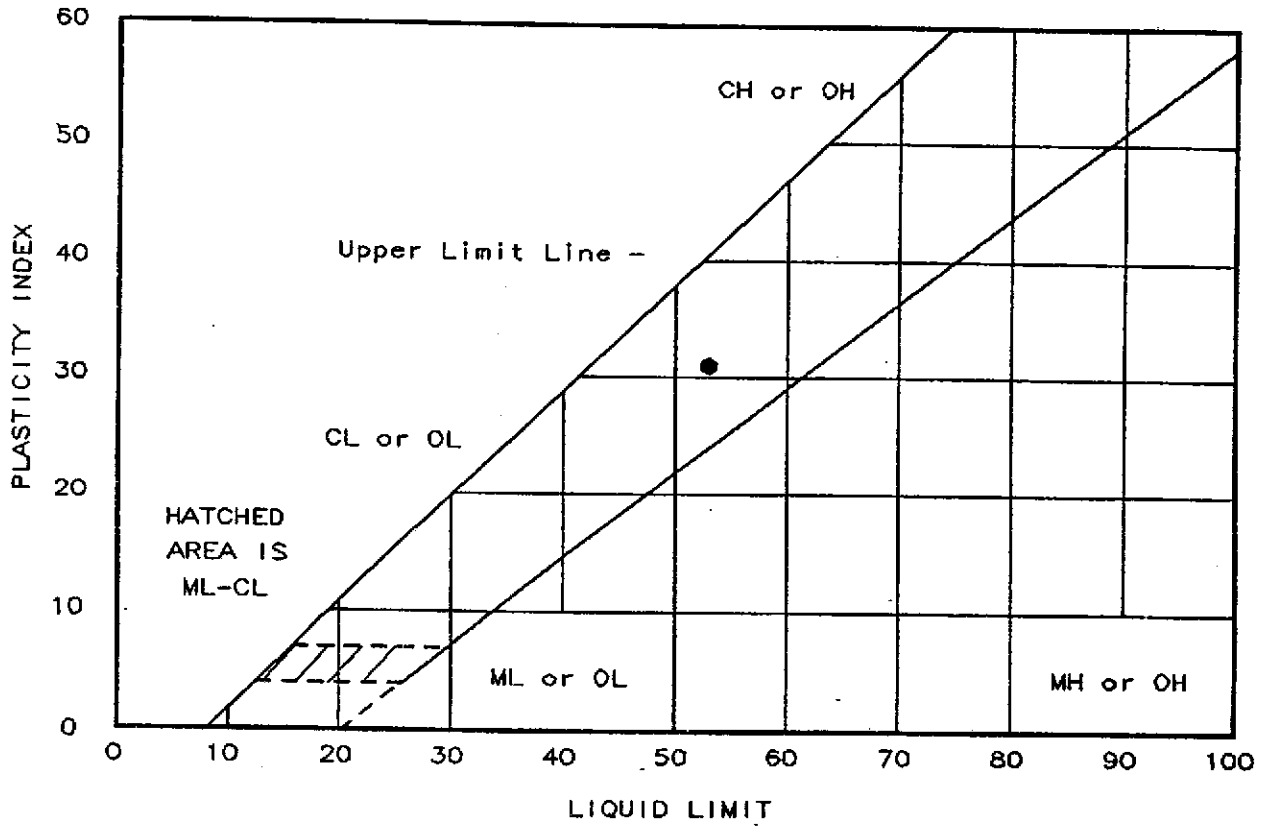
Sample Team Member (s) _____

| Lab Number | Client Sample Indentification | Air Volume | Date/ Time Collected | Sample Type* | Pres. | No. of Cont. | Type of Cont. | ANALYSIS: Moisture density / Atterberg limits / -200 sieve / UU triax | Comments / Hazards |
|---|---|---|---|---|---|---|---|---|---|
| | SB-1 @ 10-12' | | 7/12/95 | ST | - | 1 | | | 2psi |
| | SB-1 @ 16-17.5' | | 7/12/95 | cal | - | 1 | | | 5psi |
| | SB-1 @ 20-22' | | 7/12/95 | ST | - | 1 | | | |
| | SB-1 @ 25-26.5 | | 7/12/95 | Cal | - | 1 | | | not found |
| | SB-1 @ 30-31.5 | | 7/12/95 | Cal | - | 1 | | | |
| | SB-1 @ 40-41.5 | | 7/12/95 | Cal | - | 1 | | | |
| | SB-1 @ 50-51.5 | | 7/12/95 | Cal | - | 1 | | | |
| | SB-2 @ 5-6.5 | | 7/12/95 | Cal | | 1 | | | |
| | SB-2 @ 7-9 | | 7/12/95 | ST | | 1 | | | 2psi |
| | SB-2 @ 10-11.5 | | 7/12/95 | Cal | | 1 | | | |
| | SB-2 @ 15-16.5 | | 7/12/95 | ST | | 1 | | | 4psi |
| | SB-2 @ 20-21.5 | | 7/12 | Cal | | 1 | | | |
| | SB-2 @ 25-25.5 | | 7/12 | Cal | | 1 | | | |
| | SB-2 @ 30-31.5 | | 7/12 | Cal | | 1 | | | |
| | SB-2 @ 35-36.5 | | 7/12 | Cal | | 1 | | | |

| | | | |
|---|---|---|---|
| Relinquished by: (Signature) | DATE | TIME | Received by: (Signature) DATE TIME |
| Relinquished by: (Signature) | DATE | TIME | Received by: (Signature) DATE TIME |
| Relinquished by: (Signature) | DATE | TIME | Received by: (Signature) DATE TIME |
| Method of Shipment | | | Lab Comments |

*Sample type (Specify): 1) 37mm 0.8 µm MCEF 2) 25mm 0.8 µm MCEF 3) 25mm 0.4 µm polycarb. filter
4) PVC filter, diam. _____ pore size _____ 5) Charcoal tube 6) Silica gel tube 7) Water 8) Soil 9) Bulk Sample
10) Other _____ 11) Other _____

# LIQUID AND PLASTIC LIMITS TEST REPORT




| | Location + Description | LL | PL | PI | -200 | ASTM D 2487-90 |
|---|---|---|---|---|---|---|
| ● | SB-1 @ 20-22'<br>light olive gray Clay w/sand | 53 | 22 | 31 | 84.7 | CH, Fat clay with sand |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Project No.: 221-01
Project: 3022.6

Client: Sutton
Location:

Date: 8/8/95

Remarks:

LIQUID AND PLASTIC LIMITS TEST REPORT

COOPER TESTING LABORATORY

Fig. No. _____

# LIQUID & PLASTIC LIMIT TEST DATA

## PROJECT DATA

Project No.: 221-01
Client: Sutton
Project: 3022.6

Date: 8/8/95

Project location:

Remarks:

Figure Number:

## TEST DATA - Test number 1

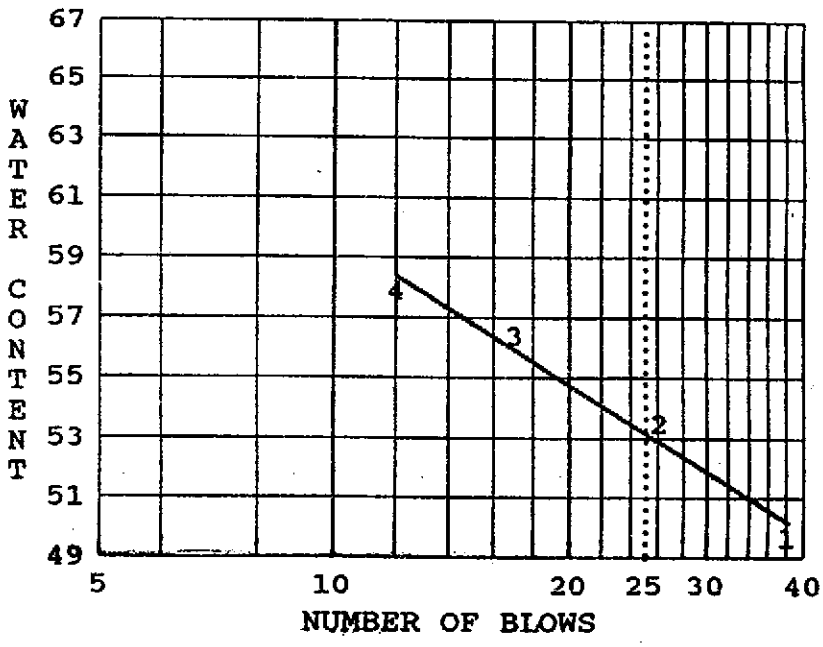
Location and description: SB-1 @ 20-22'
light olive gray Clay w/sand

LIQUID LIMITS

| Run No. | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| MT w+t | 12.73 | 15.05 | 13.96 | 12.53 |
| MT d+t | 9.93 | 11.34 | 10.53 | 9.56 |
| MT tare | 4.3 | 4.41 | 4.45 | 4.43 |
| # Blows | 38 | 26 | 17 | 12 |
| Moisture | 49.7 | 53.5 | 56.4 | 57.9 |

PLASTIC LIMITS

| Run No. | 1 | 2 | 3 |
|---|---|---|---|
| MT w+t | 23.25 | 24.07 | 22.97 |
| MT d+t | 21.13 | 21.78 | 20.93 |
| MT tare | 11.22 | 11.57 | 11.48 |
| Moisture | 21.4 | 22.4 | 21.6 |

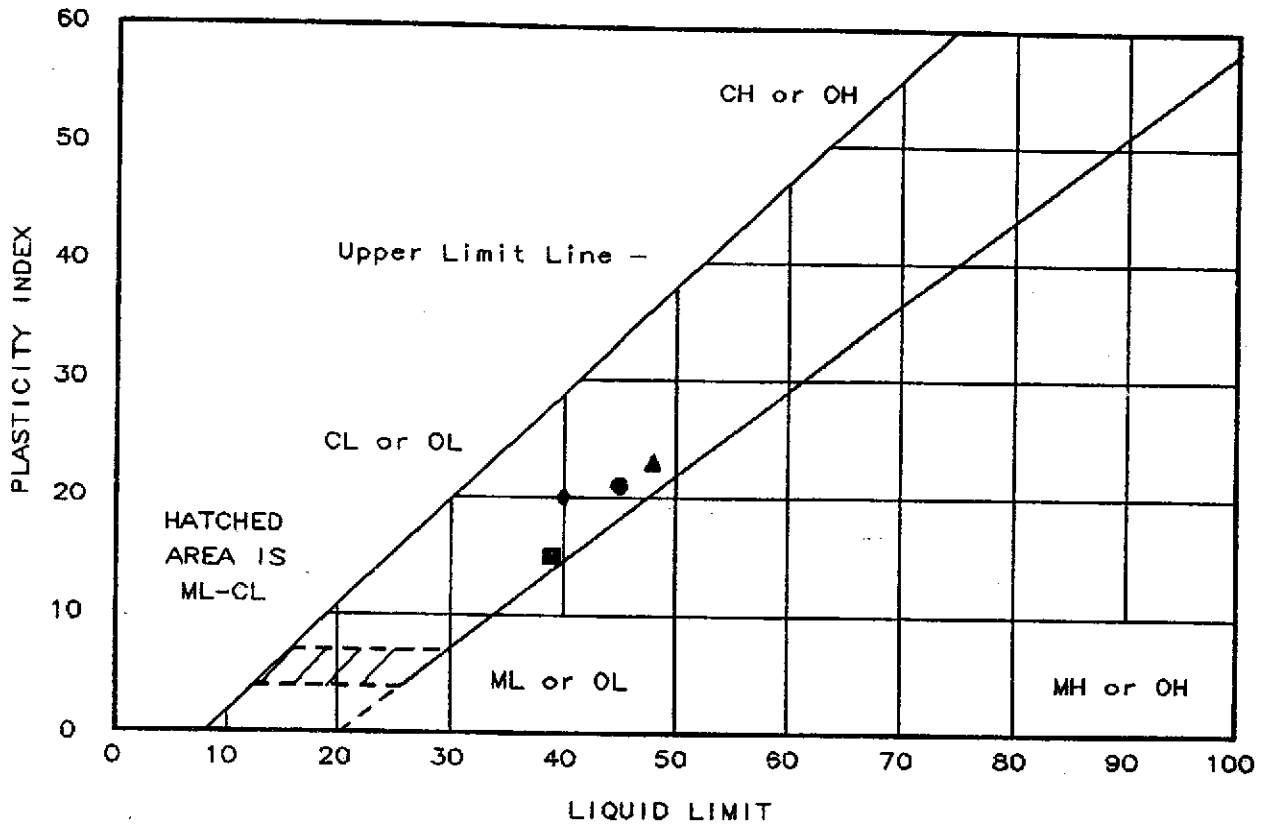



Liquid Limit = 53
Plastic Limit = 22
Plasticity Index = 31

## CLASSIFICATION DATA

%-4 = %-10 = %-40 = %-200 = 84.7
Uniformity Coefficient = Curvature Coefficient =
LL = 53 PL = 22 PI = 31 LL (oven dry) =
ASTM = CH, Fat clay with sand
AASHTO = A-7-6(28)

# LIQUID AND PLASTIC LIMITS TEST REPORT




| | Location + Description | LL | PL | PI | -200 | ASTM D 2487-90 |
|---|---|---|---|---|---|---|
| ● | SB-1 @ 10-12'<br>bay mud | 45 | 24 | 21 | | |
| ▲ | SB-2 @ 7-9'<br>grayish black Clay | 48 | 25 | 23 | | |
| ■ | SB-2 @ 15-16.6'<br>dark grayish green Clay | 39 | 24 | 15 | | |
| ◆ | SB-2 @ 30-31.5'<br>olive gray silty Clay | 40 | 20 | 20 | | |
| | | | | | | |

Project No.: 221-01
Project: 3022-6

Client: Sutton
Location:

Date: 7/24/95

Remarks:

LIQUID AND PLASTIC LIMITS TEST REPORT

COOPER TESTING LABORATORY

Fig. No. _____

# LIQUID & PLASTIC LIMIT TEST DATA

## PROJECT DATA

Project No.: 221-01 Date: 7/24/95
Client: Sutton
Project: 3022-6

Project location:

Remarks:

Figure Number:

## TEST DATA - Test number 1

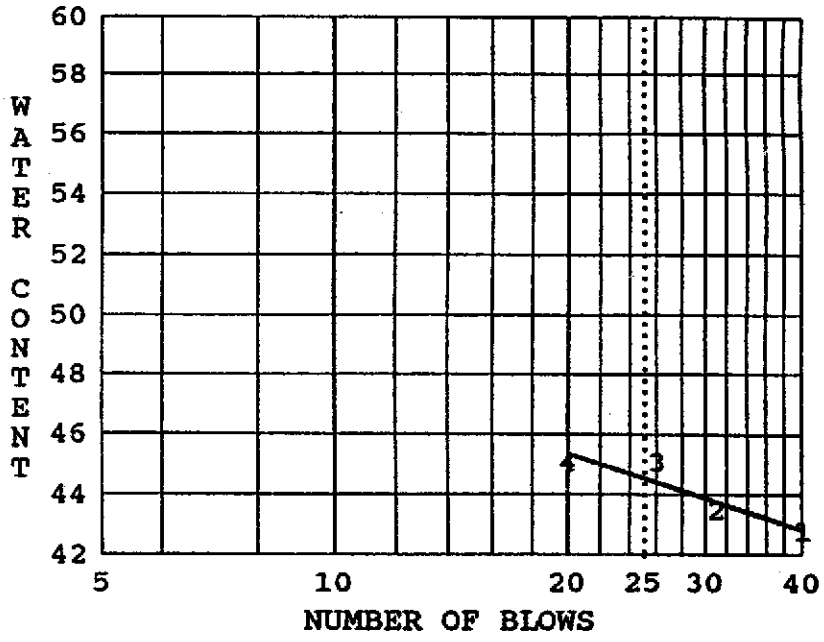
Location and description: SB-1 @ 10-12'
bay mud

LIQUID LIMITS

| Run No. | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| WT w+t | 11.47 | 11.93 | 13.36 | 12.25 |
| WT d+t | 9.32 | 9.64 | 11.31 | 9.8 |
| WT tare | 4.3 | 4.37 | 6.76 | 4.37 |
| Blows | 40 | 31 | 26 | 20 |
| Moisture | 42.8 | 43.5 | 45.1 | 45.1 |

PLASTIC LIMITS

| Run No. | 1 | 2 | 3 |
|---|---|---|---|
| WT w+t | 18.55 | 18.36 | 19.96 |
| WT d+t | 17.19 | 17.05 | 18.4 |
| WT tare | 11.45 | 11.42 | 11.78 |
| Moisture | 23.7 | 23.3 | 23.6 |




Liquid Limit = 45
Plastic Limit = 24
Plasticity Index = 21

## CLASSIFICATION DATA

%-4 = %-10 = %-40 = %-200 =
Uniformity Coefficient = Curvature Coefficient =
LL = 45 PL = 24 PI = 21 LL (oven dry) =
ASTM =
AASHTO =

## LIQUID & PLASTIC LIMIT TEST DATA

### PROJECT DATA

'roject No.: 221-01 Date: 7/24/95
:lient: Sutton
'roject: 3022-6

'roject location:

:emarks:

'igure Number:

### TEST DATA - Test number 2

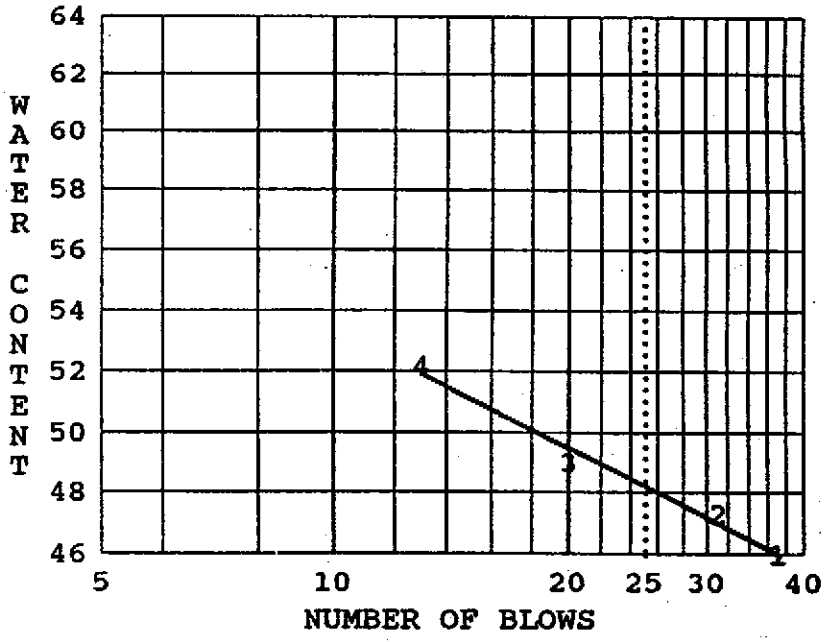
ocation and description: SB-2 @ 7-9'
grayish black Clay

LIQUID LIMITS

| un No. | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| T w+t | 11.36 | 12.67 | 12.7 | 11.48 |
| T d+t | 9.17 | 9.99 | 9.93 | 8.98 |
| T tare | 4.41 | 4.32 | 4.28 | 4.19 |
| Blows | 37 | 31 | 20 | 13 |
| oisture | 46.0 | 47.3 | 49.0 | 52.2 |

PLASTIC LIMITS

| un No. | 1 | 2 | 3 |
|---|---|---|---|
| T w+t | 22.03 | 21.83 | 21.69 |
| T d+t | 19.9 | 19.82 | 19.72 |
| T tare | 11.43 | 11.79 | 11.48 |
| oisture | 25.1 | 25.0 | 23.9 |




iquid Limit = 48
lastic Limit = 25
lasticity Index = 23

### CLASSIFICATION DATA

%-4 = %-10 = %-40 = %-200 =
Uniformity Coefficient = Curvature Coefficient =
LL = 48 PL = 25 PI = 23 LL (oven dry) =
ASTM =
AASHTO =

COOPER TESTING LABORATORY

# LIQUID & PLASTIC LIMIT TEST DATA

## PROJECT DATA

'roject No.: 221-01 Date: 7/24/95
:lient: Sutton
'roject: 3022-6

'roject location:

:emarks:

'igure Number:

## TEST DATA - Test number 3

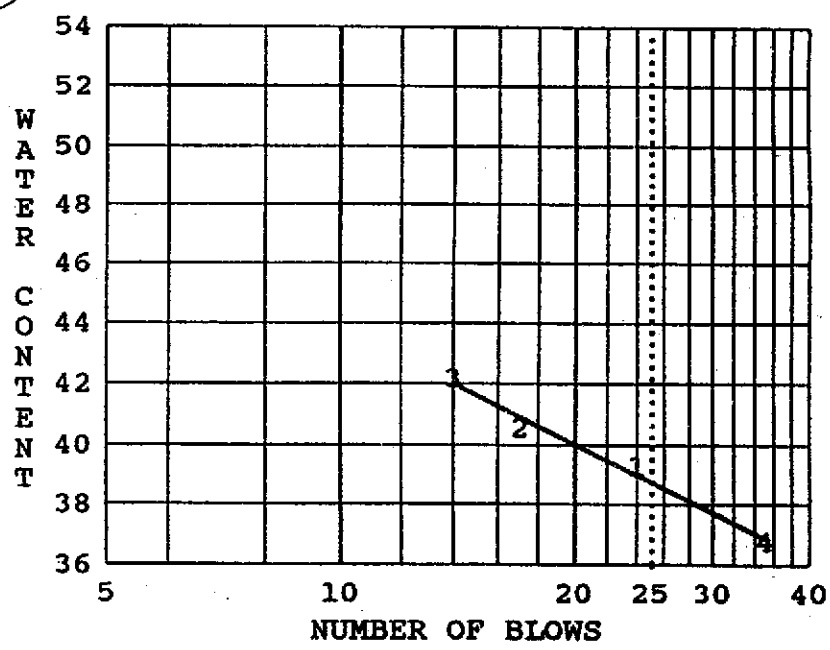
ocation and description: SB-2 @ 15-~~17~~ 16.6'
dark grayish green Clay

LIQUID LIMITS

| un No. | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| T w+t | 12.78 | 12.78 | 13.32 | 13.41 |
| T d+t | 10.4 | 10.35 | 10.65 | 10.96 |
| T tare | 4.35 | 4.37 | 4.33 | 4.3 |
| Blows | 24 | 17 | 14 | 35 |
| oisture | 39.3 | 40.6 | 42.2 | 36.8 |

PLASTIC LIMITS

| un No. | 1 | 2 | 3 |
|---|---|---|---|
| T w+t | 20.76 | 23.99 | 22.42 |
| T d+t | 19.01 | 21.66 | 20.32 |
| T tare | 11.41 | 11.86 | 11.51 |
| oisture | 23.0 | 23.8 | 23.8 |




iquid Limit = 39
lastic Limit = 24
lasticity Index = 15

## CLASSIFICATION DATA

%-4 = %-10 = %-40 = %-200 =
Uniformity Coefficient = Curvature Coefficient =
LL = 39 PL = 24 PI = 15 LL (oven dry) =
ASTM =
AASHTO =

COOPER TESTING LABORATORY

## LIQUID & PLASTIC LIMIT TEST DATA

### PROJECT DATA

Project No.: 221-01 Date: 7/24/95
Client: Sutton
Project: 3022-6

Project location:

Remarks:

Figure Number:

### TEST DATA - Test number 4

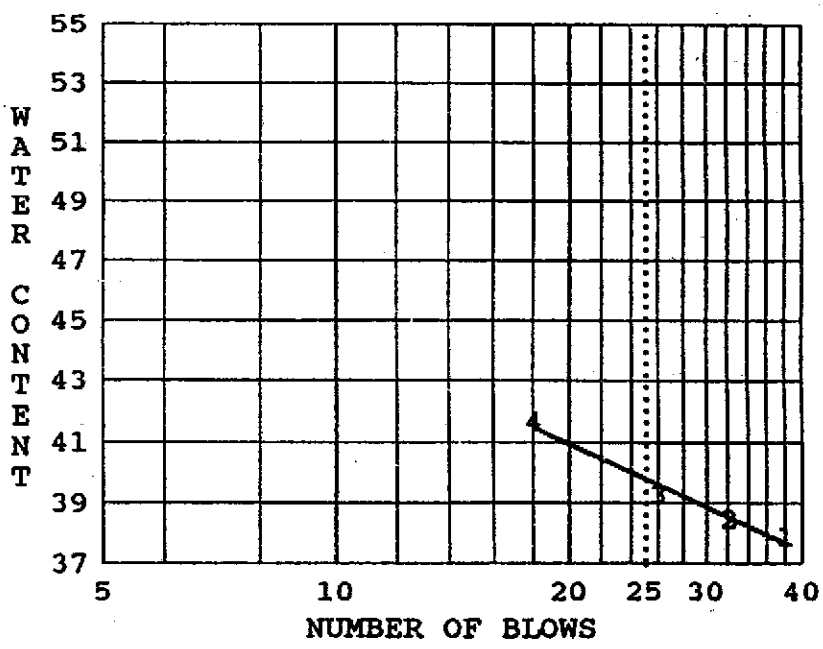
Location and description: SB-2 @ 30-31.5'
olive gray silty Clay

LIQUID LIMITS

| Run No. | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| T w+t | 15.91 | 12.37 | 11.57 | 11.87 |
| T d+t | 13.39 | 10.18 | 9.54 | 9.65 |
| T tare | 6.74 | 4.49 | 4.38 | 4.33 |
| Blows | 38 | 32 | 26 | 18 |
| oisture | 37.9 | 38.5 | 39.3 | 41.7 |

PLASTIC LIMITS

| un No. | 1 | 2 | 3 |
|---|---|---|---|
| T w+t | 19.45 | 18.64 | 18.37 |
| T d+t | 18.14 | 17.44 | 17.23 |
| T tare | 11.48 | 11.47 | 11.22 |
| oisture | 19.7 | 20.1 | 19.0 |




iquid Limit = 40
lastic Limit = 20
lasticity Index = 20

### CLASSIFICATION DATA

%-4 = %-10 = %-40 = %-200 =
Uniformity Coefficient = Curvature Coefficient =
LL = 40 PL = 20 PI = 20 LL (oven dry) =
ASTM =
AASHTO =

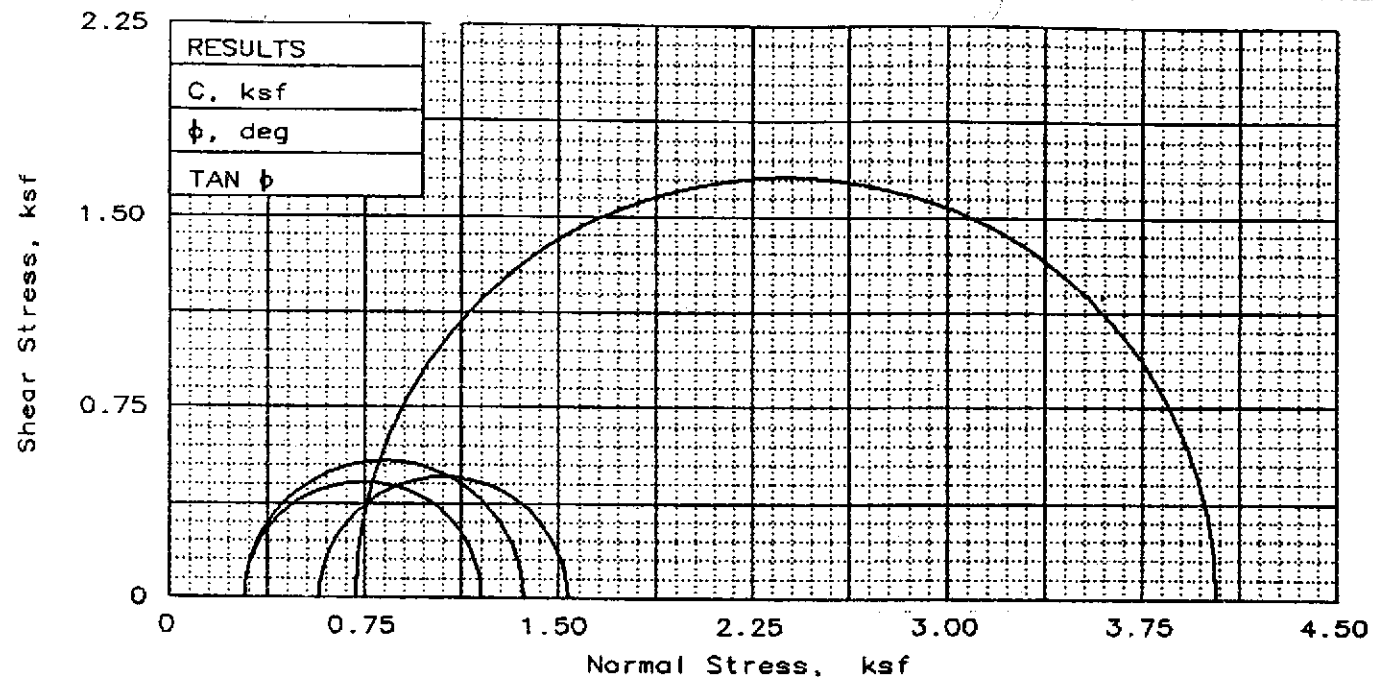
COOPER TESTING LABORATORY

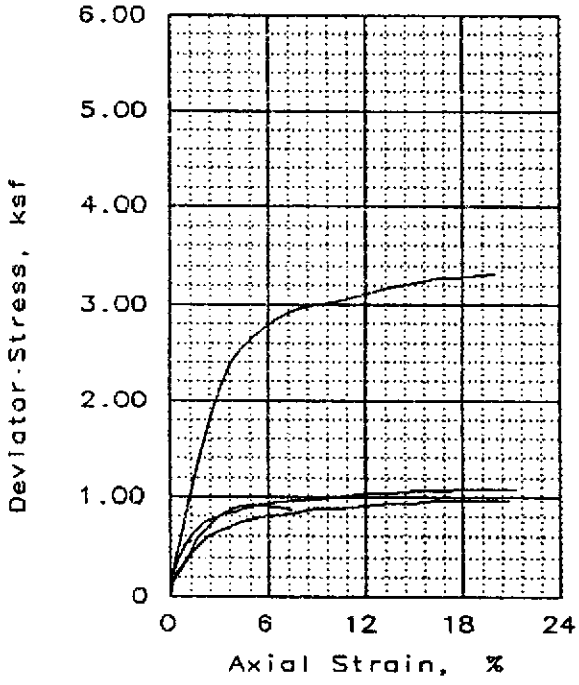
Wash Analysis
ASTM D-1140

Cooper Testing Lab, Inc.

| Job No.: 221-01 | | | Project: Oro Loma | | | |
|---|---|---|---|---|---|---|
| Client: SG 3022.6 | | | Date: 07/19/95 | | By: | DC |
| Boring: | SB-1 | SB-1 | SB-2 | SB-1 | | |
| Sample: | | | | | | |
| Depth, ft.: | 10-12 | 40-41.5 | 15-16 | 25-26.5 | | |
| Soil Type: | bay mud | olive brown sandy Clay | dusky yellow green Clay | olive gray brown Clay with sand | | |
| Total Wt., gm | 112.2 | 201.2 | 143.8 | 198.3 | | |
| Wt. Retained, gm | 5.5 | 54.2 | 0.9 | 36.9 | | |
| % Course | 4.9% | 26.9% | 0.6% | 18.6% | ERR | ERR |
| % Fines | 95.1% | 73.06% | 99.4% | 81.4% | ERR | ERR |

Remarks: Fines represents the material passing the #200 sieve.




| SAMPLE NO. | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| INITIAL | WATER CONTENT, % | 67.5 | 20.9 | 43.2 | 40.8 |
| | DRY DENSITY, pcf | 59.1 | 103.9 | 75.8 | 80.0 |
| | SATURATION, % | 98.3 | 90.6 | 95.3 | 99.5 |
| | VOID RATIO | 1.854 | 0.622 | 1.223 | 1.108 |
| | DIAMETER, in | 2.86 | 2.88 | 2.89 | 2.86 |
| | HEIGHT, in | 6.00 | 6.00 | 6.60 | 6.71 |
| AT TEST | WATER CONTENT, % | 67.5 | 20.9 | 43.2 | 40.8 |
| | DRY DENSITY, pcf | 59.1 | 103.9 | 75.8 | 80.0 |
| | SATURATION, % | 98.3 | 90.6 | 95.3 | 99.5 |
| | VOID RATIO | 1.854 | 0.622 | 1.223 | 1.108 |
| | DIAMETER, in | 2.86 | 2.88 | 2.89 | 2.86 |
| | HEIGHT, in | 6.00 | 6.00 | 6.60 | 6.71 |
| Strain rate, %/min | | 1.000 | 1.000 | 1.000 | 1.000 |
| BACK PRESSURE, ksf | | 0.00 | 0.00 | 0.00 | 0.00 |
| CELL PRESSURE, ksf | | 0.29 | 0.72 | 0.29 | 0.58 |
| FAILURE STRESS, ksf | | 0.92 | 3.32 | 1.08 | 0.96 |
| PORE PRESSURE, ksf | | | | | |
| ULTIMATE STRESS, ksf | | | | | |
| PORE PRESSURE, ksf | | | | | |
| $\sigma_1$ FAILURE, ksf | | 1.20 | 4.04 | 1.37 | 1.53 |
| $\sigma_3$ FAILURE, ksf | | 0.29 | 0.72 | 0.29 | 0.58 |

TYPE OF TEST:
Unconsolidated undrained
SAMPLE TYPE: undisturbed
DESCRIPTION:

LL= PL= PI=
SPECIFIC GRAVITY= 2.70
REMARKS: 1:SB-1 @ 10-12' baymud
2:SB-1 @ 20-22' (CH)
3:SB-2 @ 7-9' (CH)
4:SB-2 @ 15-17.6' bay mud
FIG. NO.

CLIENT: The Sutton Group

PROJECT: Oro Loma

SAMPLE LOCATION:

PROJ. NO.: 221-01 DATE: 7/17/95

TRIAXIAL SHEAR TEST REPORT

**COOPER TESTING LABORATORY**

TRIAXIAL COMPRESSION TEST
Unconsolidated undrained

7-17-1995
4:49 pm

## Project Data

Project No.: 221-01  Date: 7/17/95  Data file: 221-01
Client: The Sutton Group
Project: Oro Loma
Sample location:
Sample description:
Remarks: 1:SB-1 @ 10-12' baymud 2:SB-1 @ 20-22' (CH)
3:SB-2 @ 7-9' (CH) 4:SB-2 @ 15-17.6' bay mud  Fig No.

## Sample No. 4 Data

Type of sample: undisturbed
Specific Gravity= 2.70  LL= 39  PL= 24  PI= 15

| Sample Parameters | Before Test | At Testing | After Test |
|---|---|---|---|
| Diameter, in | 2.86 | 2.86 | |
| Height change, in | | 0.00 | |
| Height, in | 6.71 | 6.71 | |
| Weight, grams | 1274.3 | | |
| Moisture, % | 40.8 | 40.8 | 40.8 |
| Wet density, pcf | 112.6 | 112.6 | |
| Dry density, pcf | 80.0 | 80.0 | |
| Saturation, % | 99.5 | 99.5 | |
| Void ratio | 1.108 | 1.108 | |

## Test Data

Deformation dial constant= 0.001 in per input unit
Primary load ring constant= 1 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Strain rate, %/min = 1.000
Cell pressure = 4 psi = 0.576 ksf
Back pressure = 0 psi = 0 ksf
Effective confining stress = 0.576 ksf
Peak deviator stress = 0.96 ksf at reading no. 17
Ult. deviator stress =

| No. | Def. Dial Units | Def. in | Load Dial Units | Load lbs. | Strain % | Deviator Stress ksf | Principal Stresses Minor ksf | Major ksf | 1:3 Ratio | P ksf | Q ksf |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.0 | 0.000 | 0.00 | 0.0 | 0.0 | 0.00 | 0.58 | 0.58 | 1.00 | 0.58 | 0.00 |
| 1 | 10.0 | 0.010 | 6.00 | 6.0 | 0.1 | 0.13 | 0.58 | 0.71 | 1.23 | 0.64 | 0.07 |
| 2 | 20.0 | 0.020 | 9.00 | 9.0 | 0.3 | 0.20 | 0.58 | 0.78 | 1.35 | 0.68 | 0.10 |
| 3 | 40.0 | 0.040 | 12.00 | 12.0 | 0.6 | 0.27 | 0.58 | 0.84 | 1.46 | 0.71 | 0.13 |
| 4 | 80.0 | 0.080 | 19.00 | 19.0 | 1.2 | 0.42 | 0.58 | 1.00 | 1.73 | 0.79 | 0.21 |
| 5 | 140.0 | 0.140 | 26.00 | 26.0 | 2.1 | 0.57 | 0.58 | 1.15 | 1.99 | 0.86 | 0.29 |
| 6 | 180.0 | 0.180 | 29.00 | 29.0 | 2.7 | 0.63 | 0.58 | 1.21 | 2.10 | 0.89 | 0.32 |

TRIAXIAL COMPRESSION TEST 7-17-1995
Unconsolidated undrained 4:49 pm

## Project Data

Project No.: 221-01 Date: 7/17/95 Data file: 221-01
Client: The Sutton Group
Project: Oro Loma
Sample location:
Sample description:
Remarks: 1:SB-1 @ 10-12' baymud 2:SB-1 @ 20-22' (CH)
3:SB-2 @ 7-9' (CH) 4:SB-2 @ 15-17.6' bay mud Fig No.

## Sample No. 1 Data

Type of sample: undisturbed
Specific Gravity= 2.70 LL= 45 PL= 24 PI= 21

| Sample Parameters | Before Test | At Testing | After Test |
|---|---|---|---|
| Diameter, in | 2.86 | 2.86 | |
| Height change, in | | 0.00 | |
| Height, in | 6.00 | 6.00 | |
| Weight, grams | 1000.8 | | |
| Moisture, % | 67.5 | 67.5 | 67.5 |
| Wet density, pcf | 98.9 | 98.9 | |
| Dry density, pcf | 59.1 | 59.1 | |
| Saturation, % | 98.3 | 98.3 | |
| Void ratio | 1.854 | 1.854 | |

## Test Data

Deformation dial constant= 0.001 in per input unit
Primary load ring constant= 1 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Strain rate, %/min = 1.000
Cell pressure = 2 psi = 0.288 ksf
Back pressure = 0 psi = 0 ksf
Effective confining stress = 0.288 ksf
Peak deviator stress = 0.92 ksf at reading no. 12
Ult. deviator stress =

| No. | Def. Dial Units | Def. in | Load Dial Units | Load lbs. | Strain % | Deviator Stress ksf | Principal Stresses Minor ksf | Major ksf | 1:3 Ratio | P ksf | Q ksf |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.0 | 0.000 | 0.00 | 0.0 | 0.0 | 0.00 | 0.29 | 0.29 | 1.00 | 0.29 | 0.00 |
| 1 | 10.0 | 0.010 | 7.00 | 7.0 | 0.2 | 0.16 | 0.29 | 0.44 | 1.54 | 0.37 | 0.08 |
| 2 | 20.0 | 0.020 | 10.00 | 10.0 | 0.3 | 0.22 | 0.29 | 0.51 | 1.78 | 0.40 | 0.11 |
| 3 | 40.0 | 0.040 | 14.00 | 14.0 | 0.7 | 0.31 | 0.29 | 0.60 | 2.08 | 0.44 | 0.16 |
| 4 | 60.0 | 0.060 | 18.00 | 18.0 | 1.0 | 0.40 | 0.29 | 0.69 | 2.39 | 0.49 | 0.20 |
| 5 | 80.0 | 0.080 | 22.00 | 22.0 | 1.3 | 0.49 | 0.29 | 0.77 | 2.69 | 0.53 | 0.24 |
| 6 | 100.0 | 0.100 | 26.00 | 26.0 | 1.7 | 0.57 | 0.29 | 0.86 | 2.99 | 0.57 | 0.29 |

| No. | Def. Dial Units | Def. in | Load Dial Units | Load lbs. | Strain % | Deviator Stress ksf | Principal Stresses Minor ksf | Major ksf | 1:3 Ratio | P ksf | Q k. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 120.0 | 0.120 | 29.00 | 29.0 | 2.0 | 0.64 | 0.29 | 0.93 | 3.21 | 0.61 | 0.32 |
| 8 | 140.0 | 0.140 | 32.00 | 32.0 | 2.3 | 0.70 | 0.29 | 0.99 | 3.43 | 0.64 | 0.35 |
| 9 | 180.0 | 0.180 | 37.00 | 37.0 | 3.0 | 0.80 | 0.29 | 1.09 | 3.79 | 0.69 | 0.40 |
| 10 | 220.0 | 0.220 | 40.00 | 40.0 | 3.7 | 0.86 | 0.29 | 1.15 | 4.00 | 0.72 | 0.43 |
| 11 | 260.0 | 0.260 | 42.00 | 42.0 | 4.3 | 0.90 | 0.29 | 1.19 | 4.13 | 0.74 | 0.45 |
| 12 | 300.0 | 0.300 | 43.00 | 43.0 | 5.0 | 0.92 | 0.29 | 1.20 | 4.18 | 0.75 | 0.46 |
| 13 | 340.0 | 0.340 | 43.00 | 43.0 | 5.7 | 0.91 | 0.29 | 1.20 | 4.16 | 0.74 | 0.45 |
| 14 | 400.0 | 0.400 | 43.00 | 43.0 | 6.7 | 0.90 | 0.29 | 1.19 | 4.12 | 0.74 | 0.45 |
| 15 | 450.0 | 0.450 | 42.00 | 42.0 | 7.5 | 0.87 | 0.29 | 1.16 | 4.02 | 0.72 | 0.44 |

TRIAXIAL COMPRESSION TEST
Unconsolidated undrained

7-17-1995
4:49 pm

## Project Data

Project No.: 221-01  Date: 7/17/95  Data file: 221-01
Client: The Sutton Group
Project: Oro Loma
Sample location:
Sample description:
Remarks: 1:SB-1 @ 10-12' baymud 2:SB-1 @ 20-22' (CH)
3:SB-2 @ 7-9' (CH) 4:SB-2 @ 15-17.6' bay mud  Fig No.

## Sample No. 2 Data

Type of sample: undisturbed
Specific Gravity= 2.70  LL=  PL=  PI=

| Sample Parameters | Before Test | At Testing | After Test |
|---|---|---|---|
| Diameter, in | 2.88 | 2.88 | |
| Height change, in | | 0.00 | |
| Height, in | 6.00 | 6.00 | |
| Weight, grams | 1284.4 | | |
| Moisture, % | 20.9 | 20.9 | 20.9 |
| Wet density, pcf | 125.6 | 125.6 | |
| Dry density, pcf | 103.9 | 103.9 | |
| Saturation, % | 90.6 | 90.6 | |
| Void ratio | 0.622 | 0.622 | |

## Test Data

Deformation dial constant= 0.001 in per input unit
Primary load ring constant= 1 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Strain rate, %/min = 1.000
Cell pressure = 5 psi = 0.72 ksf
Back pressure = 0 psi = 0 ksf
Effective confining stress = 0.72 ksf
Peak deviator stress = 3.32 ksf at reading no. 25
Ult. deviator stress =

| No. | Def. Dial Units | Def. in | Load Dial Units | Load lbs. | Strain % | Deviator Stress ksf | Principal Stresses Minor ksf | Major ksf | 1:3 Ratio | P ksf | Q ksf |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.0 | 0.000 | 0.00 | 0.0 | 0.0 | 0.00 | 0.72 | 0.72 | 1.00 | 0.72 | 0.00 |
| 1 | 10.0 | 0.010 | 10.00 | 10.0 | 0.2 | 0.22 | 0.72 | 0.94 | 1.31 | 0.83 | 0.11 |
| 2 | 20.0 | 0.020 | 17.00 | 17.0 | 0.3 | 0.38 | 0.72 | 1.10 | 1.52 | 0.91 | 0.19 |
| 3 | 40.0 | 0.040 | 28.00 | 28.0 | 0.7 | 0.62 | 0.72 | 1.34 | 1.86 | 1.03 | 0.31 |
| 4 | 60.0 | 0.060 | 40.00 | 40.0 | 1.0 | 0.88 | 0.72 | 1.60 | 2.22 | 1.16 | 0.44 |
| 5 | 80.0 | 0.080 | 50.00 | 50.0 | 1.3 | 1.09 | 0.72 | 1.81 | 2.52 | 1.27 | 0.55 |
| 6 | 100.0 | 0.100 | 60.00 | 60.0 | 1.7 | 1.31 | 0.72 | 2.03 | 2.82 | 1.37 | 0.65 |

| No. | Def. Dial Units | Def. in | Load Dial Units | Load lbs. | Strain % | D. ..tor Stress ksf | Principal Stresses Minor ksf | Major ksf | 1:3 Ratio | P ksf | Q ks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 140.0 | 0.140 | 81.00 | 81.0 | 2.3 | 1.75 | 0.72 | 2.47 | 3.44 | 1.60 | 0.88 |
| 8 | 180.0 | 0.180 | 98.00 | 98.0 | 3.0 | 2.11 | 0.72 | 2.83 | 3.93 | 1.77 | 1.05 |
| 9 | 220.0 | 0.220 | 111.00 | 111.0 | 3.7 | 2.37 | 0.72 | 3.09 | 4.29 | 1.91 | 1.19 |
| 10 | 260.0 | 0.260 | 120.00 | 120.0 | 4.3 | 2.55 | 0.72 | 3.27 | 4.54 | 1.99 | 1.27 |
| 11 | 300.0 | 0.300 | 126.00 | 126.0 | 5.0 | 2.66 | 0.72 | 3.38 | 4.69 | 2.05 | 1.33 |
| 12 | 340.0 | 0.340 | 131.00 | 131.0 | 5.7 | 2.74 | 0.72 | 3.46 | 4.81 | 2.09 | 1.37 |
| 13 | 380.0 | 0.380 | 136.00 | 136.0 | 6.3 | 2.83 | 0.72 | 3.55 | 4.92 | 2.13 | 1.41 |
| 14 | 420.0 | 0.420 | 140.00 | 140.0 | 7.0 | 2.89 | 0.72 | 3.61 | 5.01 | 2.16 | 1.44 |
| 15 | 440.0 | 0.440 | 142.00 | 142.0 | 7.3 | 2.92 | 0.72 | 3.64 | 5.05 | 2.18 | 1.46 |
| 16 | 480.0 | 0.480 | 145.00 | 145.0 | 8.0 | 2.96 | 0.72 | 3.68 | 5.11 | 2.20 | 1.48 |
| 17 | 540.0 | 0.540 | 149.00 | 149.0 | 9.0 | 3.01 | 0.72 | 3.73 | 5.18 | 2.22 | 1.50 |
| 18 | 600.0 | 0.600 | 152.00 | 152.0 | 10.0 | 3.03 | 0.72 | 3.75 | 5.21 | 2.24 | 1.52 |
| 19 | 700.0 | 0.700 | 158.00 | 158.0 | 11.7 | 3.10 | 0.72 | 3.82 | 5.30 | 2.27 | 1.55 |
| 20 | 800.0 | 0.800 | 165.00 | 165.0 | 13.3 | 3.17 | 0.72 | 3.89 | 5.41 | 2.31 | 1.59 |
| 21 | 900.0 | 0.900 | 171.00 | 171.0 | 15.0 | 3.22 | 0.72 | 3.94 | 5.48 | 2.33 | 1.61 |
| 22 | 1000.0 | 1.000 | 177.00 | 177.0 | 16.7 | 3.27 | 0.72 | 3.99 | 5.54 | 2.36 | 1.64 |
| 23 | 1050.0 | 1.050 | 179.00 | 179.0 | 17.5 | 3.28 | 0.72 | 4.00 | 5.55 | 2.36 | 1.64 |
| 24 | 1100.0 | 1.100 | 182.00 | 182.0 | 18.3 | 3.30 | 0.72 | 4.02 | 5.58 | 2.37 | 1.65 |
| 25 | 1200.0 | 1.200 | 187.00 | 187.0 | 20.0 | 3.32 | 0.72 | 4.04 | 5.61 | 2.38 | 1.66 |

TRIAXIAL COMPRESSION TEST
Unconsolidated undrained

7-17-1995
4:49 pm

## Project Data

Project No.: 221-01  Date: 7/17/95  Data file: 221-01
Client: The Sutton Group
Project: Oro Loma
Sample location:
Sample description:
Remarks: 1:SB-1 @ 10-12' baymud 2:SB-1 @ 20-22' (CH)
3:SB-2 @ 7-9' (CH) 4:SB-2 @ 15-17.6' bay mud  Fig No.

## Sample No. 3 Data

Type of sample: undisturbed
Specific Gravity= 2.70  LL= 48  PL= 25  PI= 23

| Sample Parameters | Before Test | At Testing | After Test |
|---|---|---|---|
| Diameter, in | 2.89 | 2.89 | |
| Height change, in | | 0.00 | |
| Height, in | 6.60 | 6.60 | |
| Weight, grams | 1233.6 | | |
| Moisture, % | 43.2 | 43.2 | 43.2 |
| Wet density, pcf | 108.5 | 108.5 | |
| Dry density, pcf | 75.8 | 75.8 | |
| Saturation, % | 95.3 | 95.3 | |
| Void ratio | 1.223 | 1.223 | |

## Test Data

Deformation dial constant= 0.001 in per input unit
Primary load ring constant= 1 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Strain rate, %/min = 1.000
Cell pressure = 2 psi = 0.288 ksf
Back pressure = 0 psi = 0 ksf
Effective confining stress = 0.288 ksf
Peak deviator stress = 1.08 ksf at reading no. 18
Ult. deviator stress =

| No. | Def. Dial Units | Def. in | Load Dial Units | Load lbs. | Strain % | Deviator Stress ksf | Principal Stresses Minor ksf | Major ksf | 1:3 Ratio | P ksf | Q ksf |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.0 | 0.000 | 0.00 | 0.0 | 0.0 | 0.00 | 0.29 | 0.29 | 1.00 | 0.29 | 0.00 |
| 1 | 10.0 | 0.010 | 10.00 | 10.0 | 0.2 | 0.22 | 0.29 | 0.51 | 1.76 | 0.40 | 0.11 |
| 2 | 20.0 | 0.020 | 14.00 | 14.0 | 0.3 | 0.31 | 0.29 | 0.59 | 2.06 | 0.44 | 0.15 |
| 3 | 40.0 | 0.040 | 20.00 | 20.0 | 0.6 | 0.44 | 0.29 | 0.72 | 2.52 | 0.51 | 0.22 |
| 4 | 60.0 | 0.060 | 24.00 | 24.0 | 0.9 | 0.52 | 0.29 | 0.81 | 2.81 | 0.55 | 0.26 |
| 5 | 100.0 | 0.100 | 30.00 | 30.0 | 1.5 | 0.65 | 0.29 | 0.94 | 3.25 | 0.61 | 0.32 |
| 6 | 140.0 | 0.140 | 35.00 | 35.0 | 2.1 | 0.75 | 0.29 | 1.04 | 3.61 | 0.66 | 0.38 |

| No. | Def. Dial Units | Def. in | Load Dial Units | Load lbs. | Strain % | Deviator Stress ksf | Principal Stresses Minor ksf | Principal Stresses Major ksf | 1:3 Ratio | P ksf | Q ksf |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 180.0 | 0.180 | 37.00 | 37.0 | 2.7 | 0.79 | 0.29 | 1.08 | 3.74 | 0.68 | 0.40 |
| 8 | 220.0 | 0.220 | 39.00 | 39.0 | 3.3 | 0.83 | 0.29 | 1.12 | 3.87 | 0.70 | 0.41 |
| 9 | 260.0 | 0.260 | 40.00 | 40.0 | 3.9 | 0.84 | 0.29 | 1.13 | 3.93 | 0.71 | 0.42 |
| 10 | 300.0 | 0.300 | 42.00 | 42.0 | 4.5 | 0.88 | 0.29 | 1.17 | 4.06 | 0.73 | 0.44 |
| 11 | 400.0 | 0.400 | 45.00 | 45.0 | 6.1 | 0.93 | 0.29 | 1.22 | 4.22 | 0.75 | 0.46 |
| 12 | 500.0 | 0.500 | 47.00 | 47.0 | 7.6 | 0.95 | 0.29 | 1.24 | 4.31 | 0.76 | 0.48 |
| 13 | 600.0 | 0.600 | 49.00 | 49.0 | 9.1 | 0.98 | 0.29 | 1.27 | 4.40 | 0.78 | 0.49 |
| 14 | 800.0 | 0.800 | 54.00 | 54.0 | 12.1 | 1.04 | 0.29 | 1.33 | 4.62 | 0.81 | 0.52 |
| 15 | 900.0 | 0.900 | 55.00 | 55.0 | 13.6 | 1.04 | 0.29 | 1.33 | 4.62 | 0.81 | 0.52 |
| 16 | 1000.0 | 1.000 | 57.00 | 57.0 | 15.2 | 1.06 | 0.29 | 1.35 | 4.69 | 0.82 | 0.53 |
| 17 | 1100.0 | 1.100 | 58.00 | 58.0 | 16.7 | 1.06 | 0.29 | 1.35 | 4.68 | 0.82 | 0.53 |
| 18 | 1200.0 | 1.200 | 60.00 | 60.0 | 18.2 | 1.08 | 0.29 | 1.37 | 4.74 | 0.83 | 0.54 |
| 19 | 1300.0 | 1.300 | 61.00 | 61.0 | 19.7 | 1.08 | 0.29 | 1.36 | 4.73 | 0.83 | 0.54 |
| 20 | 1400.0 | 1.400 | 62.00 | 62.0 | 21.2 | 1.07 | 0.29 | 1.36 | 4.72 | 0.82 | 0.54 |

| No. | Def. Dial Units | Def. in | Load Dial Units | Load lbs. | Strain % | Deviator Stress ksf | Principal Stresses Minor ksf | Major ksf | 1:3 Ratio | P ksf | Q ksf |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 220.0 | 0.220 | 31.00 | 31.0 | 3.3 | 0.67 | 0.58 | 1.25 | 2.17 | 0.91 | 0.34 |
| 8 | 260.0 | 0.260 | 33.00 | 33.0 | 3.9 | 0.71 | 0.58 | 1.29 | 2.23 | 0.93 | 0.36 |
| 9 | 300.0 | 0.300 | 35.00 | 35.0 | 4.5 | 0.75 | 0.58 | 1.33 | 2.30 | 0.95 | 0.37 |
| 10 | 400.0 | 0.400 | 38.00 | 38.0 | 6.0 | 0.80 | 0.58 | 1.38 | 2.39 | 0.98 | 0.40 |
| 11 | 500.0 | 0.500 | 40.00 | 40.0 | 7.5 | 0.83 | 0.58 | 1.41 | 2.44 | 0.99 | 0.41 |
| 12 | 600.0 | 0.600 | 43.00 | 43.0 | 8.9 | 0.88 | 0.58 | 1.45 | 2.52 | 1.01 | 0.44 |
| 13 | 700.0 | 0.700 | 44.00 | 44.0 | 10.4 | 0.88 | 0.58 | 1.46 | 2.53 | 1.02 | 0.44 |
| 14 | 800.0 | 0.800 | 46.00 | 46.0 | 11.9 | 0.91 | 0.58 | 1.48 | 2.58 | 1.03 | 0.45 |
| 15 | 900.0 | 0.900 | 48.00 | 48.0 | 13.4 | 0.93 | 0.58 | 1.51 | 2.62 | 1.04 | 0.47 |
| 16 | 1000.0 | 1.000 | 49.00 | 49.0 | 14.9 | 0.93 | 0.58 | 1.51 | 2.62 | 1.04 | 0.47 |
| 17 | 1100.0 | 1.100 | 51.00 | 51.0 | 16.4 | 0.96 | 0.58 | 1.53 | 2.66 | 1.05 | 0.48 |
| 18 | 1200.0 | 1.200 | 52.00 | 52.0 | 17.9 | 0.96 | 0.58 | 1.53 | 2.66 | 1.05 | 0.48 |
| 19 | 1300.0 | 1.300 | 53.00 | 53.0 | 19.4 | 0.96 | 0.58 | 1.53 | 2.66 | 1.05 | 0.48 |
| 20 | 1400.0 | 1.400 | 54.00 | 54.0 | 20.9 | 0.96 | 0.58 | 1.53 | 2.66 | 1.05 | 0.48 |