# Appendix D

# Geotechnical Report

# GEOTECHNICAL INVESTIGATION

**Proposed Couttolenc Commercial Development**
**Greenfield, California**
**APN 024-151-011**

**November 9, 2004**

Prepared for:

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**By:**

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## 1.0 PURPOSE

We are pleased to present this Geotechnical Investigation report for the proposed Commercial Development, including Motel, Multipurpose Room, and Public Laundry Facility to be located in Greenfield, California. The purpose of this Geotechnical Investigation is to provide soil and foundation design criteria for the proposed buildings. Conclusions and recommendations pertaining to site preparation, grading and compaction, foundations and allowable bearing capacities, slabs-on-grade; backfill for utility trenches, and surface drainage control are presented herein.

## 2.0 INTRODUCTION

The property is located on Fourth Street, between Palm Ave. and Apple Ave., Greenfield, Monterey County, California. The lot is relatively flat and the proposed construction will consist of an approximately 16,000 sq ft of a 2-story Motel/Commercial building in a vacant spot. This will be an addition to the existing structures.

Please refer to the Vicinity Map (**Figure 1** within Appendix "A") for the general location of the site and to the Site Plan (**Figure 2** within Appendix "A") for general layout of the subject site.

## 3.0 INFORMATION PROVIDED

We were provided with a site plan (Figure 2) that indicates the approximate location of boreholes within the proposed building area.

## 4.0 SCOPE OF WORK

The scope of work for the Geotechnical Investigation consisted of the following:

1. Review of available geologic and geotechnical information pertaining to the site.

2. Exploration, sampling, and classification of surface and subsurface soils by drilling a total of Seven (7) borings (Four (4) deep, and Three (3) shallow exploratory). The deep exploratory borings terminated at depths up to 13.0 feet due to refusal, and shallow borings were up to 4 feet deep (to determine the soil properties for pavement design). Soil samples were obtained at various depths within each test boring. At the completion of boring activities, the boreholes were backfilled with cut soils.

3. Laboratory testing of selected soil samples to determine their relevant engineering properties.

4. Compilation and analysis of collected field and laboratory data.

5. Preparation of this written report presenting our findings, and providing preliminary geotechnical recommendations for: site preparation, grading and compaction; foundations and allowable bearing capacities; backfill requirements for utility trenches; and surface drainage control. This report includes boring logs indicating the soil profile encountered and a site plan showing the test boring locations.

This report does not include an evaluation of the site geology, or analyses of the soil for corrosivity, contaminants, or other chemical properties. Also beyond the scope of this report are estimates of soil shrinkage and subsidence, temporary slope angles, excavatibility, site safety, and other issues within the domain of contractors.

## 5.0 FINDINGS

### 5.1 Existing Site Conditions

The existing site is vacant, and it is quite flat.

## 5.2 Field Exploration Procedures

Subsurface soil conditions were explored by drilling Four (4) exploratory borings to depths of up to 13.0 feet. The borings were drilled with a truck mounted drill rig equipped with 8-inch diameter, continuous flight, hollow-stem auger See Pictures 1 and 2 within Appendix). Disturbed and relatively undisturbed samples were obtained by means of a 2.5-inch O.D. and 3.0-inch Samplers. Samples were obtained from samplers that were driven by a hammer with a weight of 140 pounds and a drop of 30 inches. The number of blows per foot required to drive the sampler is indicated in the boring logs. Borings were backfilled upon the completion of the drilling.

## 5.3 Laboratory Investigation

The laboratory tests were chosen to assist in classifying the surface and subsurface soils, and to provide soil strength information for use in developing allowable bearing capacities and other geotechnical design criteria. The following laboratory tests were performed: Moisture Content (ASTM D-4959-00); Density (ASTM D-2937-00) and Particle Size Analysis with #200 wash (ASTM D-422). For a presentation of laboratory results, refer to **Figures 3 to Figure 6,** and the test boring logs (both submitted within the Appendix "A").

## 5.4 Soil Conditions

The upper soils at the boring locations were described as silty sands (with trace of organics in the top 6 inches) that were brown or light brown, moist to dry, and medium to dense. These strata extend to depths of about 4.0 to 6.0 feet below ground surface (bgs).

Below these strata were silty sands, silty gravel, and well graded gravelly sand that were light brown to brown, moist and dense to very dense. Groundwater was not encountered in any of the borings.

Materials encountered during the subsurface exploration are described on the Boring Logs located within the Appendix. The logs depict subsurface conditions at the locations and on the date the holes were drilled. Subsurface conditions at other locations might be different. Stratification lines shown on the logs represent the approximate boundaries between soil types; the actual transitions from one soil type to another may be gradual.

Our findings at this site are consistent with our findings from a nearby project (within 2 miles from this site). Having authorization from Sampson Engineering Inc., the materials encountered during the subsurface exploration of this nearby project are described on the Boring Logs located within the Appendix "B".

## 5.5 Seismic Considerations

The parcel is located within the seismically active Monterey Bay region, and may be subject to severe ground shaking.

Known active or potentially active faults nearest to the site include: Rinconada Fault, Monterey Bay-Tularcitos Fault, Zayante-Vergeles Fault, and San Andreas located approximately 5 km to the south, 14 km to the southwest, 20 km to the northwest, and 24 km to the northeast of the site, respectively.

Seismic hazards can be divided into two general categories: hazards due to ground rupture and hazards due to ground shaking. Since no known active or potentially active faults cross the site, the risk of earthquake-induced ground rupture occurring across the property is considered low.

Should a major earthquake occur with an epicenter location close to the site, ground shaking at the site will be severe. The effects of ground shaking on the proposed modifications, future planned structures and other improvements can be reduced by earthquake resistant design in accordance with the latest edition of the California Building Code (CBC). If the 2001 version of the CBC is utilized for seismic design, the recommendations of the "2001 CBC Design Considerations" section 6.6 of this report

should be followed.

Based on the boring logs, the potential for liquefaction or lateral spreading to occur at the site is low.

## 6.0 RECOMMENDATIONS

The following section provides our recommendations concerning the proposed development of the site.

### 6.1 Suitability of Project

Based on the results of the subsurface investigation and the laboratory-testing program, and from a geotechnical engineering standpoint, we consider the subject site to be suitable for the intended development provided that the findings and recommendations of this Geotechnical Investigation are strictly considered and adhered to during the design and construction phases of the project.

### 6.2 General

Our recommendations are presented as guidelines to be used by project planners and designers for the development. These recommendations have been prepared assuming that we will be commissioned to review project grading and foundation plans prior to construction, and to observe and test earthwork operations. This additional opportunity to examine the site will allow us to compare subsurface conditions exposed during construction with those encountered during this investigation.

### 6.3 Site Preparation, Grading and Compaction

Prior to grading, the site should be cleared of obstructions and deleterious material such as abandoned utility lines (if present). Debris and materials arising from clearing and removal operations should be properly disposed of off-site.

The organic topsoil, if any, should be stripped Soil containing more than 2 percent by weight of organic matter should be considered organic. For planning purposes, a stripping depth of 6 inches should be assumed. The geotechnical consultant in the field should determine the actual stripping depth at the time of stripping.

Structural fill should be placed on firm native material that has been approved by the geotechnical consultant. Loose material should be removed before placement of structural fill. The geotechnical consultant should determine the depth of removal at the time of construction.

Prior to placement of fill, the soil surface should be scarified a minimum of 8 inches, moisture conditioned, and re-compacted to a minimum 92 percent relative compaction based on the ASTM D1557-00 Test Procedure. Surfaces to receive slabs, exterior flatwork, or other improvements should be scarified and re-compacted in a similar manner.

Structural fill should be placed and water-conditioned in lifts not exceeding 8 inches in thickness (before compaction). Structural fill should be compacted to at least 92 percent relative compaction, based on the ASTM D1557-00 Test Procedure. The soils should be conditioned with water to produce minimum water content of 1 to 3 percent above the laboratory optimum.

The upper 12 inches of finished sub grade soil in pavement areas, the aggregate base and sub base and slabs-on-grade areas, should be compacted to at least 95 percent relative compaction based on the ASTM D1557-00 Test Procedure.

Structural fill may consist of either native soils, or approved imported material. Soils to be used as structural fill should not contain deleterious material, rocks or clods over 4 inches in greatest dimension, and more than 15 percent by weight of rocks or clods larger than

2.5 inches. Soils to be used as structural fill should also contain less than 2 percent organic matter. Import soils should have a Plasticity Index less than 15 and have enough binder to allow footing and utility trenches to stand without caving.

The geotechnical consultant should evaluate proposed imported material before being imported to the site and on a periodic basis during grading.

Sub-excavation and re-compaction of native soils directly beneath the footings will be required because of the nature of the silty sand surface soils. The upper 18 inches of native soil beneath all footings must be sub-excavated and re-compacted to at least 92 percent relative compaction based on the ASTM D1557-00 Test Procedure.

Temporary cut and fill slopes should have gradients no steeper than 2.0:1 (horizontal to vertical), for slopes of up to 6 feet high. Slope stability analysis is required for slopes of larger height. Finished cut and fill slope areas should be protected from erosion as soon as possible after construction. Please refer to the section "Surface Drainage" for additional recommendations.

### 6.4 Conventional Shallow Footings

The proposed structures may be supported by conventional continuous strip footings as outlined herein. The footings should have minimum depths of 18 inches below the lowest adjacent grade and should be reinforced per the specifications of the design engineer. The footings should be a minimum of 18 inches wide. To improve the foundation capabilities for seismic loads, it is strongly recommended to interconnect the strip footings (Grid System) approximately every12 feet, if perimeter foundation is used. The interconnection elements should meet the footing specifications. The footings may be designed to impose pressures on foundation soils up to 2,800 pounds per square foot from dead plus normal live loading. This value may be increased by one-third for wind or seismic loading.

Concrete should be placed in foundation excavations that have been kept moist, are free from drying cracks, and contain no loose or soft soil or debris. Sub grade in footing areas should be prepared per the recommendations of the "Site Preparation, Grading and Compaction" section of this report prior to footing construction.

Our representative should observe and test for minimum relative compaction of the footing excavations prior to placing formwork and steel reinforcing.

### 6.5 Concrete Slabs-on-Grade

Slabs-on-grade areas should have the top 12 inches of the soil scarified and re-compacted as structural fill, as described in the "Site Preparation, Grading and Compaction" section of this report. We strongly recommend to sub-excavate at least the top 6 inches and backfill with Caltrans Class II AB material, compacted to at least 95 percent relative compaction based on the ASTM D1557-00 Test Procedure.

To reduce floor dampness, a minimum 4-inch section of capillary break material should be placed between the floor slab and the soil sub grade. Capillary break material should be free-draining, clean 3/4-inch crushed gravel. A vapor barrier is recommended to further reduce floor dampness. The design engineer should specify the type of vapor barrier, but if visqueen or similar material is to be utilized, it should have a minimum thickness of 10 mils. A 2-inch sand cushion to protect the membrane and to aid in the curing of the concrete should cover the vapor barrier.

If joints exist between footings and slabs we recommend 30 pound felt to be used as a separator between the edges of slabs-on-grade and footing areas.

### 6.6 2001 CBC Seismic Design Considerations

If the 2001 CBC is utilized for structural design of the proposed addition, the following

design criteria should apply. The Rinconada Fault (Seismic Source Type B) is considered the critical fault segments with respect to 2001 CBC seismic design. At a distance of approximately 8.0 kilometers, respectively from the site, with Soil Profile Type $S_D$ this fault generates the following values: $N_a$ = 1.0; $N_v$ = 1.1; $C_a$ = 0.44; and $C_v$ = 0.69, Ts = 0.628, and To = 0.126. These are recommended values. The structural designer may utilize different values at his or her discretion.

6.7 Pavement Sections

Based on laboratory tested R-value of 30-40 for the materials obtained from 3 shallow borings, our recommended flexible pavement sections for parking lots, driveways, and the pavement over the trenches are as follows:

Table 1 - Recommended Flexible Pavement Sections

| TRAFFIC INDEX | ASPHALTIC CONCRETE | CLASS 2 AGGREGATE BASE | CLASS 2 AGGREGATE SUBBASE | TOTAL THICKNESS |
|---|---|---|---|---|
| 5 | 2.5" | 7" | --------- | 9.5" |
| 6 | 3.0" | 9" | --------- | 12.0" |
| 7 | 4.0" | 11" | --------- | 15.0" |
| 8 | 5.0" | 11" | --------- | 16.0" |

Aggregate used for asphaltic concrete should conform to the gradation specified in Section 39, Caltrans Standard Specifications, latest edition, for 3/8-inch or ½-inch maximum, medium grading.

All aggregate bases should be compacted to a relative compaction of at least 95 percent, based on the ASTM D1557-00 Test Procedure.

6.8 Utility Trenches

For the purpose of this section of the report, backfill is defined as material placed in a trench starting 1 foot above the pipe, and bedding is all material placed in a trench below the backfill.

Unless concrete bedding is required around utility pipes, free-draining sand should be used as bedding. Sand bedding should be compacted to at least 90 percent relative compaction based on ASTM D1557-00 Test Procedure, or to the degree of compaction specified by the utility designer. Clean sand may be used for utility trench backfill. Backfill in trenches located under and adjacent to structural fill, foundations, concrete slabs and pavements should be placed in

horizontal layers no more than 8 inches thick. Each layer of trench backfill should be water conditioned and compacted to at least 92 percent relative compaction based on the ASTM D1557-00 Test Procedure. The upper foot of backfill in pavement areas should be compacted to a minimum 95 percent relative compaction. Compaction of backfill by water jetting should not be permitted.

We recommend that within three feet of the structure foundation, a clayey material or control density fill (CDF) be used for the trench backfill and bedding to seal the trench and prevent a conduit for water to enter beneath the structure foundation.

6.9 Surface Drainage

Surface drainage gradients should be planned to prevent ponding and to promote drainage of surface water away from structure foundations, slabs, edges of pavements and sidewalks, toward suitable collection and discharge facilities. We recommend that within 5 feet of the perimeter foundations, the ground surface be sloped at least 2 percent away from the structure.

Building roof eaves should have rain gutters, with the outlets from the down spouts provided with adequate capacity to carry the storm water away from the structure to reduce the possibility of soil saturation and erosion. The connection should be in a closed conduit that discharges at an approved location away from the structure. Discharge points should be protected from erosion by cobble blankets or other suitable measures.

6.10 Post-Report Geotechnical Services

We recommend our firm be commissioned to provide the following services:

1. Review project grading and foundation plans during project design.
2. Observe, test and advise during site preparation, grading and compaction.
3. Observe foundation excavations for conventional shallow footings.
4. Observe, test and advise during backfilling and compaction of on-site utility trenches.

## 7.0 LIMITATIONS

Changes in project design will render our recommendations invalid unless our staff reviews such changes and our specific recommendations are modified accordingly.

Our recommendations have been made in accordance with the principles and practices generally employed by the geotechnical engineering profession. This is in lieu of all other warranties, express or implied.

Subsurface exploration of any site is necessarily confined to selected locations and conditions may, and often do, vary between and around these locations. If varied conditions are encountered during construction, additional exploration, testing and construction modification may be required. To compare the generalized site conditions assumed in this report with those found on the site at the time of construction, all earthwork and associated operations should be observed and tested by our field representative.

This report is issued with the understanding that it is the responsibility of the Owner or his representative, to ensure that the information and recommendations contained within this report are called to the attention of the Architects and Engineers for the project and incorporated into the plans, and that the

necessary steps are taken to ensure that the Contractors and Subcontractors carry out such recommendations in the field.

The findings of this report are valid as of the present date. However, changes in the conditions of the property could occur with the passage of time, whether they are due to natural processes or the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated, wholly or partially, by changes outside our control. This report should be reviewed in light of future planned construction and then current applicable codes.

Any person concerned with this project who observes conditions or features of the site or the surrounding areas that are different from those described in this report should report them immediately to this office for evaluation.

If you should have any questions or if we can be of any further assistance, please do not hesitate to contact our office at (831) 325-1048.

Sincerely,



Ali M. Oskoorouchi, Ph.D., P.E., G.E.
State of California licensed Civil and Geotechnical Engineer
C62004
GE2594
Expires 9/30/05

**APPENDIX "A"**

**Vicinity Map - Figure 1**
**Site Map - Figure 2**
**Pictures 1 & 2 Drilling and Sampling**
**Laboratory Test Results - Figures 3 to Figure 6**
**Key to Test Boring Logs**
**Test Boring Logs**

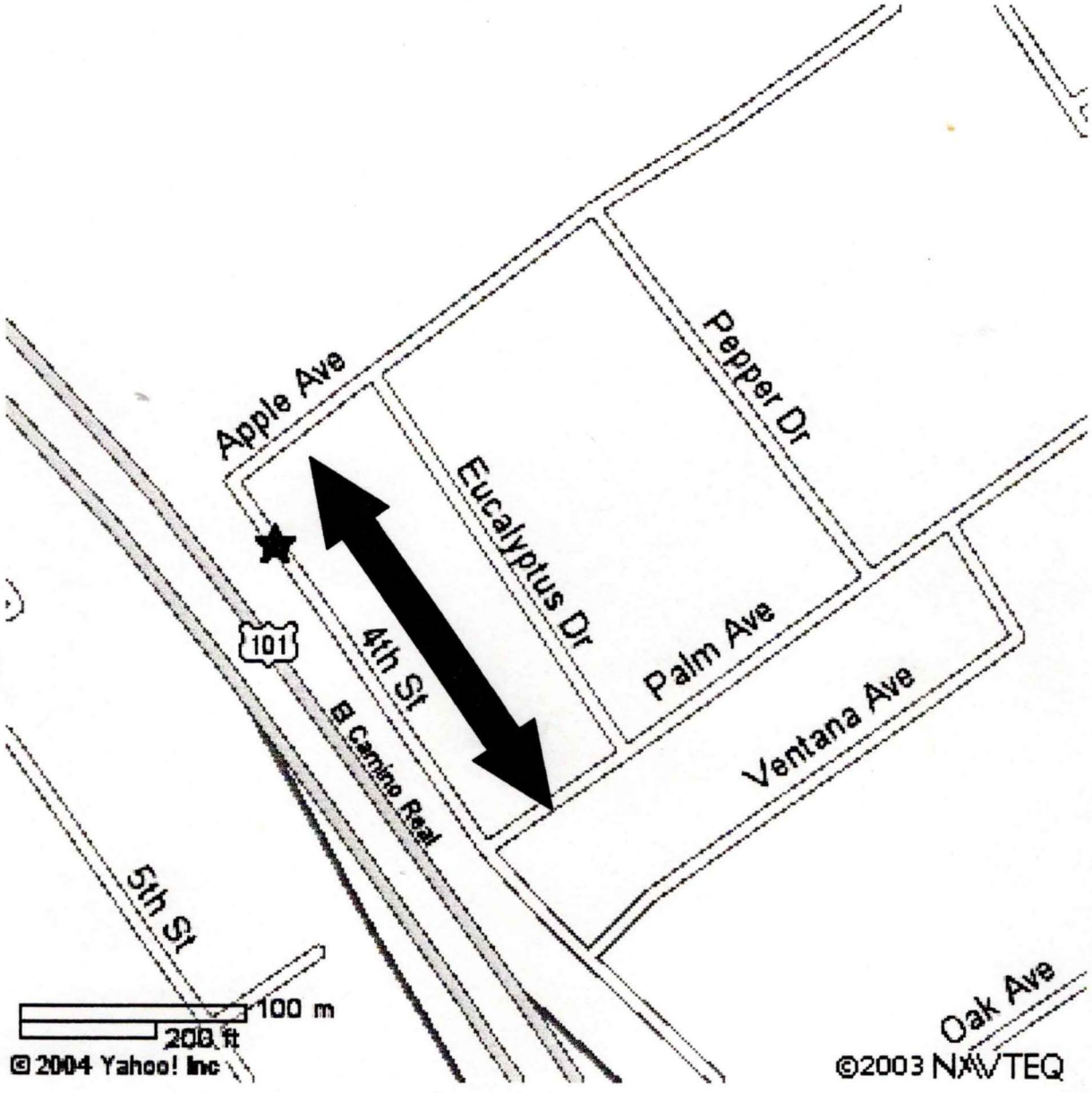
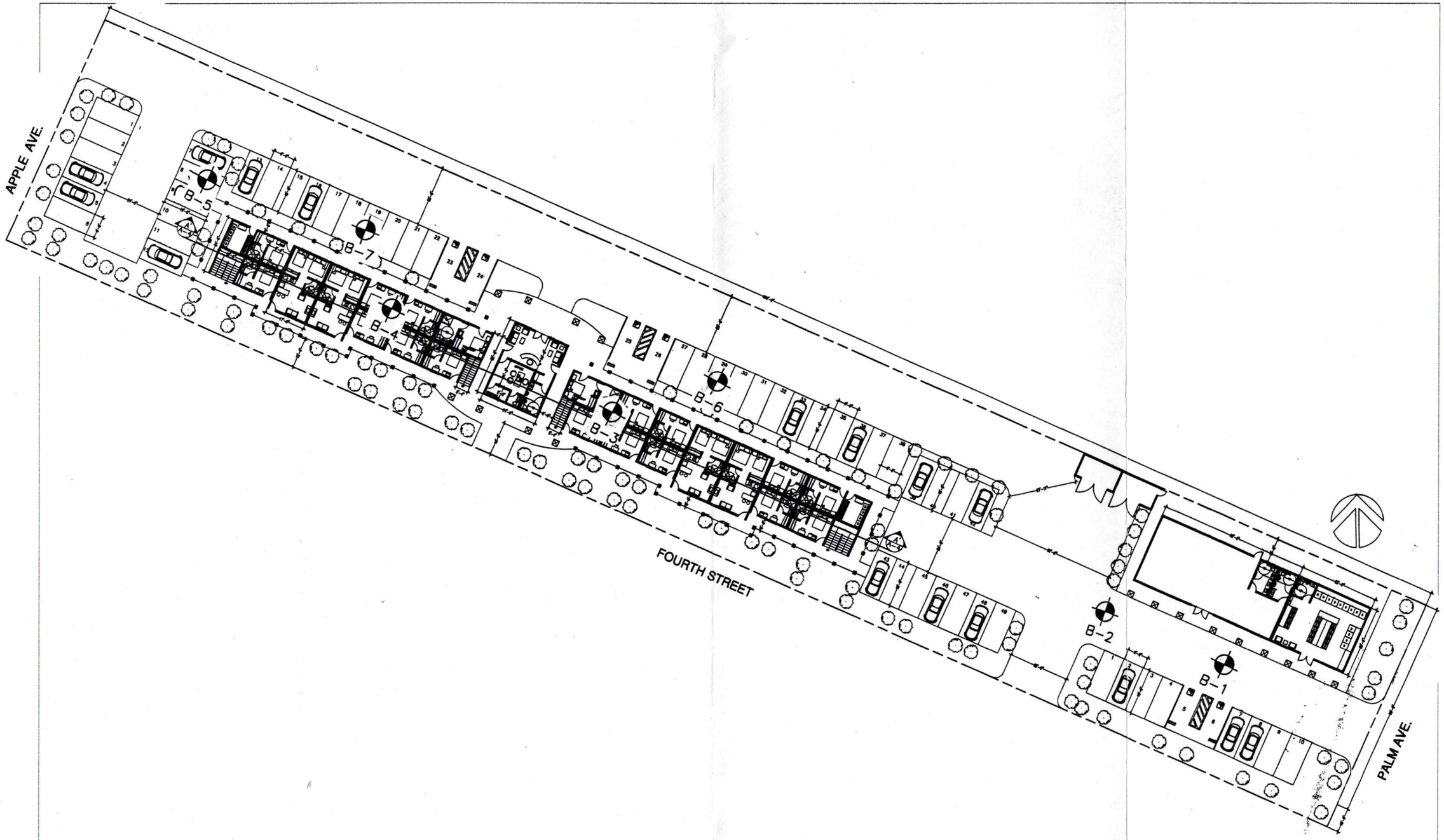



**Figure 1. Vicinity Map, Proposed Greenfield Motel Location, Greenfield, California**

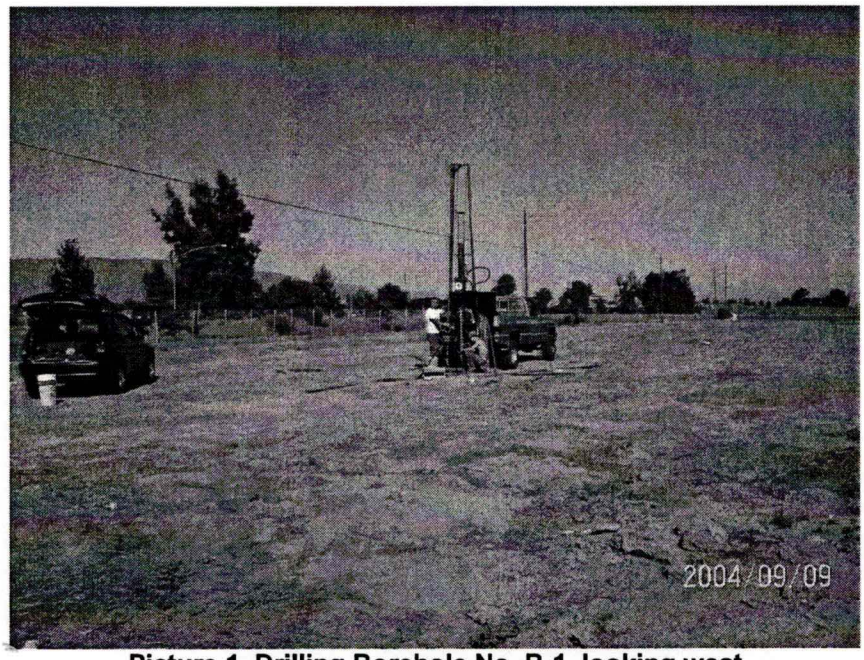



ALI M. OSKOOROUCHI, Ph.D., G.E.
GEOTECHNICAL ENGINEER

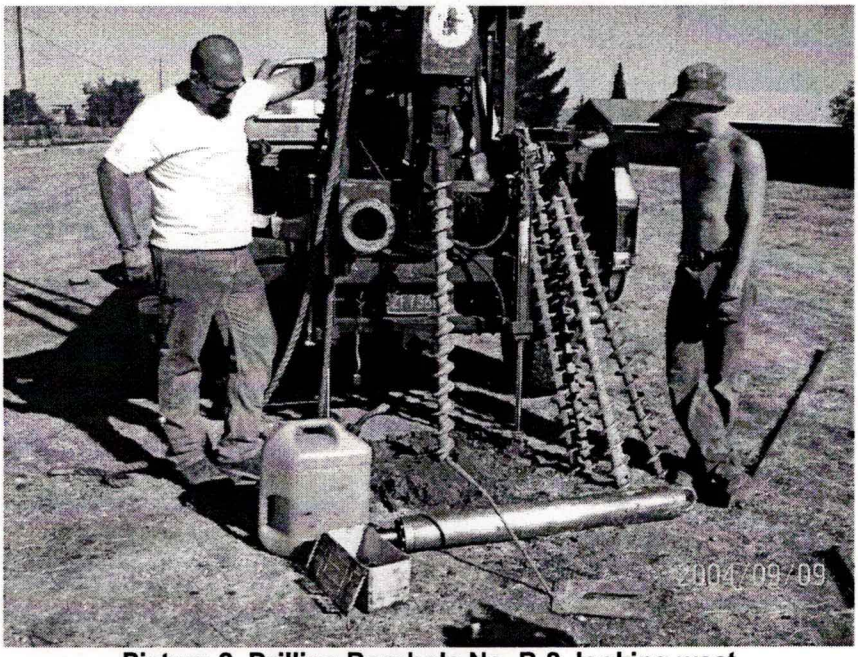
SITE PLAN & LOCATION OF BOREHOLES
GREENFIELD MOTEL
4TH & PALM STREET
GREENFIELD, CALIFORNIA

DRAWN BY: AMO
CHECKED BY: AMO

FIGURE 2
REV. 0 10/22/2004




**Picture 1. Drilling Borehole No. B-1, looking west**




**Picture 2. Drilling Borehole No. B-2, looking west**

## MOISTURE DENSITY/PERCENT PASSING #200 WORKSHEET

| Boring No. | B-1 | B-2 | B-2 | B-4 | B-4 |
|---|---|---|---|---|---|
| Depth (feet) | 3.0 - 4.5 | 3.0 - 4.5 | 8.0 - 9.5 | 3.0 - 4.5 | 8.0 - 9.5 |
| Soil Type | light gray SILTY SAND | light gray/brown SILTY SAND with GRAVEL | brown SAND and GRAVEL | brown SILTY SAND | dark gray well graded GRAVELY SAND |
| Specific Gravity (Assumed) | 2.65 | 2.65 | 2.65 | 2.65 | 2.65 |
| Moisture (%) | 3.3 | 3.9 | 2.8 | 5.8 | 3.0 |
| Wet Density (pcf) | 113.7 | 100.8 | 109.8 | 113.7 | 113.9 |
| Dry Density (pcf) | 110.1 | 97.0 | 106.8 | 107.5 | 110.6 |
| Passing # 200 Sieve (%) | 47 | 18 | | | 5 |
| Porosity (%) | | | | | |
| Void Ratio | | | | | |

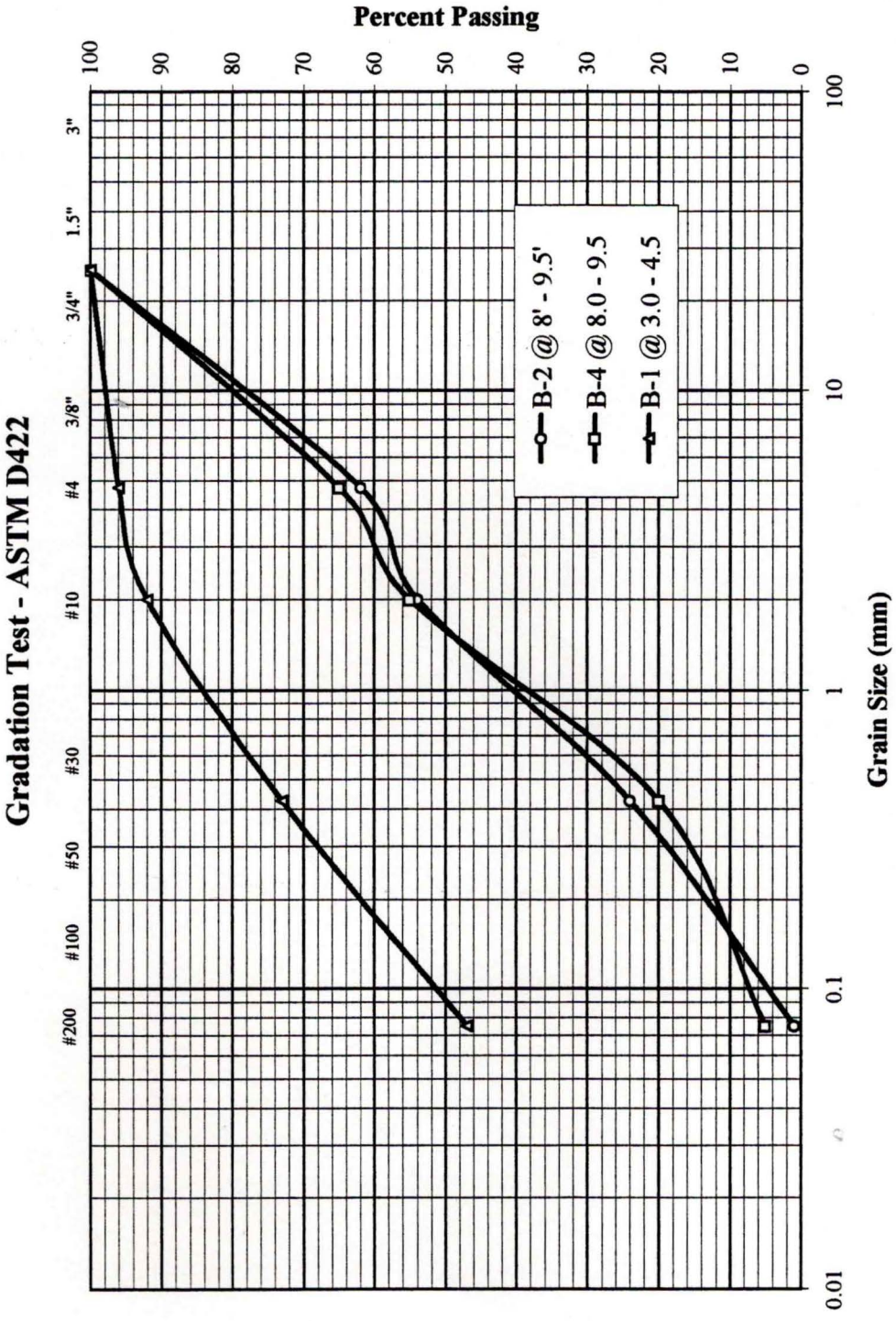
| | | |
|---|---|---|
| Ali M. Oskoorouchi, Ph.D., P.E., G.E.<br>P.O. Box 3494<br>Freedom, CA 95019 | Moisture/Density/Pass #200 Test Results<br>Greenfield Motel<br>Greenfield, California | Figure No. 3<br>Project No. GRF-01-04<br>Date: 10/23/2004 |

## MOISTURE DENSITY/PERCENT PASSING #200 WORKSHEET

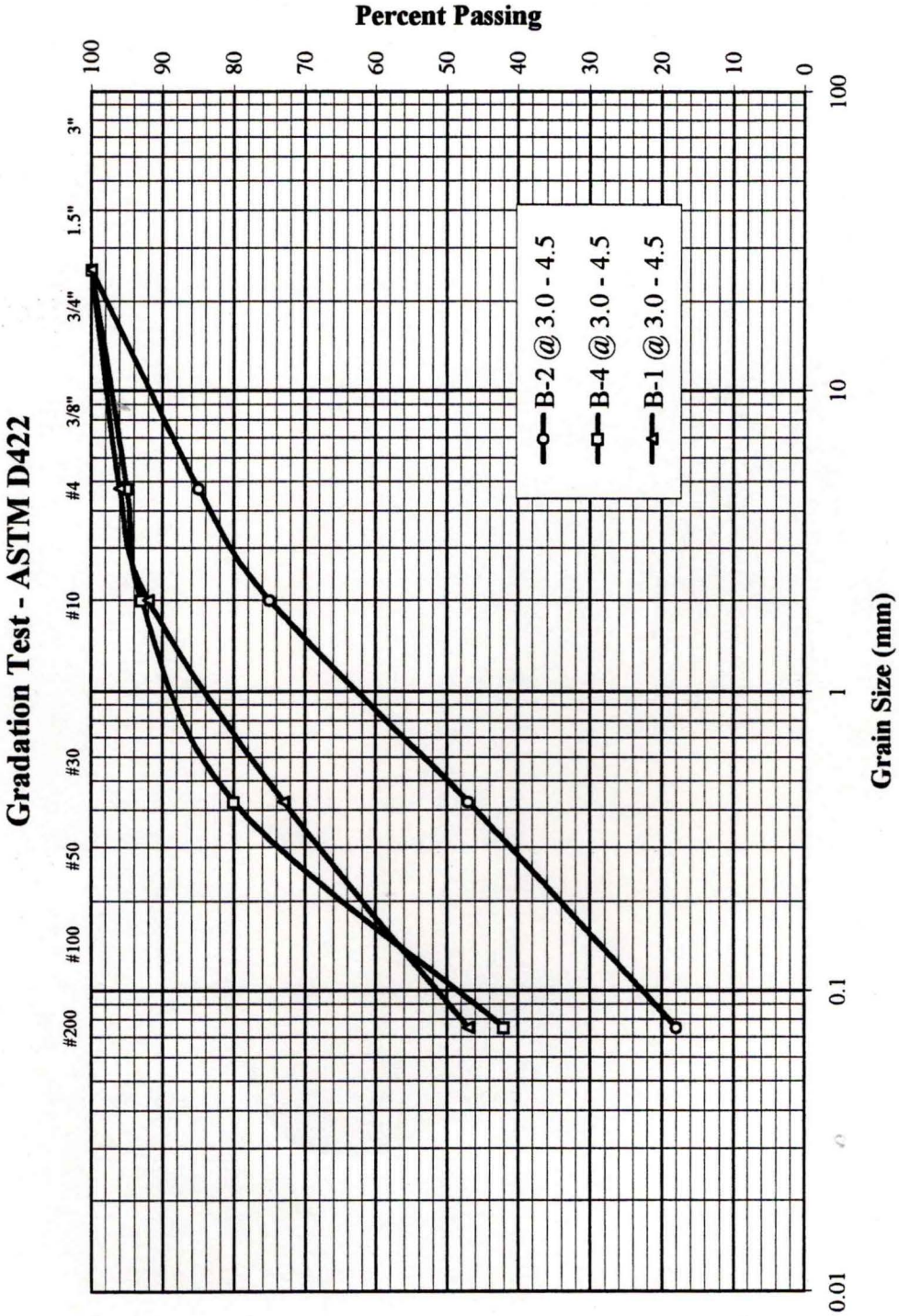
| Boring No. | B-1 | B-3 | B-3 | B-4 | B-5 |
|---|---|---|---|---|---|
| Depth (feet) | 8.0 - 8.5 | 3.0 - 4.5 | 7.0- 8.0 | 9.5-10.0 | 3.0 -4.5 |
| Soil Type | SAND, Gravel with SILT | brown SILTY SAND w/ GRAVEL | GRAVEL with SILT and SAND | GRAVELY SAND | Fill Material w/ construction debris |
| Specific Gravity (Assumed) | 2.65 | 2.65 | 2.65 | 2.65 | 2.65 |
| Moisture (%) | 7.1 | 4.9 | | | 3.0 |
| Wet Density (pcf) | | | | | |
| Dry Density (pcf) | | | | | |
| Passing # 200 Sieve (%) | | | | | |
| Porosity (%) | | | | | |
| Void Ratio | | | | | |

Volume for 2" jars 18.85 cubic inches
Volume for 2.5 " ja 29.45 cubic inches

| | | |
|---|---|---|
| Ali M. Oskoorouchi, Ph.D., P.E., G.E.<br>P.O. Box 3494<br>Freedom, CA 95019 | Moisture/Density/Pass #200 Test Results<br>Greenfield Motel<br>Greenfield, California | Figure No. 4<br>Project No. GRF-01-04<br>Date: 10/23/2004 |




| | | |
|---|---|---|
| **Ali M. Oskoorouchi, Ph.D., P.E., G.E.**<br>**P.O. Box 3494**<br>**Freedom, California 95019** | **Gradation Test**<br>Greenfield Motel<br>Greenfield, California | Figure No. 5<br>Project No. GRF-01-04<br>Date 10/22/04 |




| | | |
|---|---|---|
| **Ali M. Oskoorouchi, Ph.D., P.E., G.E.**<br>**P.O. Box 3494**<br>**Freedom, California 95019** | **Gradation Test**<br>Greenfield Motel<br>Greenfield, California | Figure No. 6<br>Project No. GRF-01-04<br>Date 10/22/04 |

# KEY TO EXPLORATORY BORING LOGS

| PRIMARY DIVISION | | | GROUP SYMBOL | SECONDARY DIVISION |
|---|---|---|---|---|
| COARSE GRAINED SOILS<br><br>More than half of the material is larger than the No. 200 sieve | GRAVELS<br><br>More than half of the coarse fraction is larger than the No. 4 sieve | Clean Gravels (less than 5% fines) | GW | Well graded gravels, gravel-sand mixtures, little or no fines. |
| | | | GP | Poorly graded gravels, gravel-sand mixtures, little or no fines. |
| | | Gravel with Fines | GM | Silty gravels, gravel-sand-silt mixtures, non-plastic fines. |
| | | | GC | Clayey gravels, gravel-sand-clay mixtures, plastic fines. |
| | SANDS<br><br>More than half of the coarse fraction is smaller than the No. 4 sieve | Clean Sands (less than 5% fines) | SW | Well graded sands, gravelly sands, little or no fines. |
| | | | SP | Poorly graded sands or gravelly sands, little or no fines. |
| | | Sands with Fines | SM | Silty sands, sand-silt mixtures, non-plastic fines. |
| | | | SC | Clayey sands, sand-clay mixtures, plastic fines. |
| FINE GRAINED SOILS<br><br>More than half of the material is smaller than the No. 200 sieve | SILTS AND CLAYS<br><br>Liquid Limit is less than 35 (lean) | | ML | Inorganic silts, clayey silts, rock flour, very silty fine sands. |
| | | | CL | Inorganic clays of low plasticity, gravelly clays of low plasticity. |
| | | | OL | Organic clays and silty clays of intermediate plasticity. |
| | SILTS AND CLAYS<br><br>Liquid Limit is greater than 50 (fat) | | MH | Inorganic silts, clayey silts, elastic silts, micaceous or diatomaceous silty or fine sandy soils. |
| | | | CH | Inorganic clays of high plasticity. |
| | | | OH | Organic clays of high plasticity. |
| HIGHLY ORGANIC SOILS | | | Pt | Peat, meadow mat, and highly organic soils. |

**GRAIN SIZES**

| SILTS AND CLAYS | SAND | | | GRAVEL | | COBBLES | BOULDERS |
|---|---|---|---|---|---|---|---|
| | Fine | Medium | Coarse | Fine | Coarse | | |
| | #200 | #40 | #10 | #4 | 3/4" | 3" | 12" |

(U.S. STANDARD SIEVE SIZES/SIEVE SQUARE OPENING SIZE)

**RELATIVE DENSITY**

| SANDS, GRAVELS AND NON-PLASTIC SILTS | SPT BLOWS PER FOOT |
|---|---|
| VERY LOOSE | 0 - 4 |
| LOOSE | 4 - 10 |
| MEDIUM DENSE | 10 - 30 |
| DENSE | 30 - 50 |
| VERY DENSE | over 50 |

**CONSISTENCY**

| CLAYS AND PLASTIC SILTS | Qu STRENGTH (psf) | SPT BLOWS PER FOOT |
|---|---|---|
| VERY SOFT | 0 - 250 | 0 - 2 |
| SOFT | 250 - 500 | 2 - 4 |
| FIRM | 500 - 1000 | 4 - 8 |
| STIFF | 1000 - 2000 | 8 - 16 |
| VERY STIFF | 2000 - 4000 | 16 - 32 |
| HARD | over 4000 | over 32 |

| SYMBOLS | DEFINITIONS |
|---|---|
| * | Standard Penetration Test (SPT) split spoon sampler with 2" O.D. |
| L | Large split spoon sampler (a.k.a Dames and Moore sampler) with 3" O.D. |
| M | Modified California split spoon sampler with 2.5" O.D. |
| B | Bulk sample from test boring cuttings |
| S | Slough |
| Qu | Unconfined compressive sheer strength based on Pocket Penetrometer or ASTM D2166 |

Initial Groundwater Level

Final Groundwater Level

Unless otherwise noted, Blow Counts result from driving sampler with a 140 lb. Hammer, which falls 30 inches

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# EXPLORATORY BORING LOG

**No. B-1**

| | | |
|---|---|---|
| Greenfield Motel | DATE: 9/9/2004 | LOGGED BY: AMO |
| DRILL COMPANY: Calif. Geotechnical | BORING DIA.: 4" | BORING ELEV.: --- |
| GROUNDWATER DEPTH: Not encountered | SAMPLER: L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH | |

NOTES: 64' from Palm, 37' from 4th Street

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. f (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Silty sand w/ trace of organic | | | | | | | | | | | | | | |
| Dense Silty Sand, moist to dry | SM | 1–6 | L | 16<br>17<br>26 | 4.5 | 110 | 3.0 | 47 | 46 | 7 | | | | |
| Very Dense Silty Sand, moist to dry | SM | 7–12 | M | 29<br>50/4" | | | 7.1 | | | | | | | |
| Silty Sand with Gravel | | 13–25 | | | | | | | | | | | | |
| **Boring Terminated Due to Refusal** | | | | | | | | | | | | | | |

# EXPLORATORY BORING LOG

**No. B-2**

| | | |
|---|---|---|
| Greenfield Motel | DATE: 9/9/2004 | LOGGED BY: AMO |
| DRILL COMPANY: Calif. Geotechnical | BORING DIA.: 4" | BORING ELEV.: --- |
| GROUNDWATER DEPTH: Not encountered | SAMPLER: L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH | |
| NOTES: 121' from Palm, 36' from 4th Street | | |

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. f (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Silty sand w/ trace of organic | | | | | | | | | | | | | | |
| Silty Sand with Gravel | SM | 1 2 3 4 5 6 | M | 18 16 25 | | 97 | 4.0 | 18 | 67 | 15 | | | | |
| Very Dense SILTY Gravel, moist to dry | GM | 7 8 9 10 11 12 | M | 38 50/5" | | 107 | 3.0 | | | | | | | |
| **Boring Terminated Due to Refusal** | | 13 14 15 16 17 18 19 20 21 22 23 24 25 | | | | | | | | | | | | |

PROJ NO.:GRF-01-04 **ALI M. OSKOOROUCHI, PH.D., P.E., G.E.** PAGE 1 OF 1

# EXPLORATORY BORING LOG

**No. B-3**

| | | |
|---|---|---|
| Greenfield Motel | DATE: 9/9/2004 | LOGGED BY: AMO |
| DRILL COMPANY: Calif. Geotechnical | BORING DIA.: 4" | BORING ELEV.: — |
| GROUNDWATER DEPTH: Not encountered | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH** | |

NOTES: 34' from 4th& 260' from April Street

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. f (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Silty sand w/ trace of organic | | | | | | | | | | | | | | |
| Dense to Very Dense Light Brown Silty Sand with Gravel | SM | 1 2 3 4 5 6 | M | 42 52 | | | 5.0 | | | | | | | |
| Very Dense Gravel | | 7 | | 55/2" | | | | | | | | | | |
| **Boring Terminated Due to Refusal** | | 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 | | | | | | | | | | | | |

PROJ NO.:GRF-01-04 **ALI M. OSKOOROUCHI, PH.D., P.E., G.E.** PAGE 1 OF 1

# EXPLORATORY BORING LOG

**No. B-4**

| | | |
|---|---|---|
| Greenfield Motel | DATE: 9/9/2004 | LOGGED BY: AMO |
| DRILL COMPANY: Calif. Geotechnical | BORING DIA.: 4" | BORING ELEV.: — |
| GROUNDWATER DEPTH: Not encountered | SAMPLER: L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH | |
| NOTES: 38' from 4th& 120' from April Street | | |

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR FRIC. ANG. f (deg.) | DIRECT SHEAR COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Silty sand w/ trace of organic | | | | | | | | | | | | | | |
| Dense to Very Dense Light Brown Silty Sand | SM | 1 2 3 4 5 | M | 28 28 33 | | 108 | 6.0 | 42 | 54 | 4 | | | | |
| Very Dense Gravelly Sand | SW | 6 7 8 9 | M | 23 13 33 | | 111 | 3.0 | 5.0 | 60 | 35 | | | | |
| **Boring Terminated Due to Refusal** | | 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 | | | | | | | | | | | | |

PROJ NO.:GRF-01-04 **ALI M. OSKOOROUCHI, PH.D., P.E., G.E.** PAGE 1 OF 1

## APPENDIX "B"

**Test Boring Logs from a nearby Project**
**Courtesy of Sampson Engineering, Inc., A Division of ATI**

# TEST BORING LOG

**No. B-1**

PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC .

DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: ---

GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH**

NOTES:

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR FRIC. ANG. $\varphi$ (deg.) | DIRECT SHEAR COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ASPHALT 1"; BASE MATERIAL 3"; WELL GRADED SAND WITH SILT AND GRAVEL; Brown, moist, dense; rounded gravel shards up to 2.5"; | | 1–6 | L L L | 47 | | | 6.8 | 5.8 | 58.5 | 35.7 | | | | |
| WELL GRADED GRAVEL WITH SAND; Brown, moist, dense; rounded gravel shards up to 2.5"; | | 7–9 | L L L | 58 | | | 6.1 | 4.7 | 42.6 | 52.7 | | | | |
| | | | - | 50/1" | | | | | | | | | | |
| Boring terminated at 9.5' due to refusal; | | 10–20 | | | | | | | | | | | | |

PROJECT NO.: **R3801** **SAMPSON ENGINEERING - A DIVISION OF ATI** PAGE 1 OF 1

# TEST BORING LOG

**No. B-2**

PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC

DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: ---

GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH**

NOTES:

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. $\varphi$ (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SILTY SANDY WITH GRAVEL; Brown, dry, dense; rounded gravel up to 1/2"; | | 1 | L | | | | | | | | | | | |
| | | 2 | L | | | | | | | | | | | |
| | | 3 | L | 52 | >5 | 115.8 | 4.2 | 42.5 | | | | | | |
| | | 4 | | | | | | | | | | | | |
| | | 5 | | | | | | | | | | | | |
| | | 6 | | | | | | | | | | | | |
| | | 7 | L | | | | | | | | | | | |
| | | | L | | | | | | | | | | | |
| WELL GRADED SAND WITH GRAVEL; Brown, moist, dense; rounded gravel shards up to 2.5"; | | 8 | L | 66 | | | 3.7 | 3.7 | 47.6 | 48.7 | | | | |
| | | 9 | | | | | | | | | | | | |
| | | 10 | | | | | | | | | | | | |
| | | 11 | | | | | | | | | | | | |
| material consistent; | | 12 | S<br>B | 50/5" | | | | | | | | | | |
| | | 13 | | | | | | | | | | | | |
| | | 14 | | | | | | | | | | | | |
| | | 15 | | | | | | | | | | | | |
| Material consistent; increase in silt content; | | 16 | L | 50/0" | | | | | | | | | | |
| | | 17 | | | | | | | | | | | | |
| | | 18 | | | | | | | | | | | | |
| | | 19 | | | | | | | | | | | | |
| | | 20 | | | | | | | | | | | | |

# TEST BORING LOG

**No. B-2**

PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC .

DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: ---

GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH**

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | FRIC. ANG. $\varphi$ (deg.) | COHESION, c (ksf) |
| | | 21 | - | | | | | | | | | | | |
| Material consistent; | | | - | | | | | | | | | | | |
| | | | * | 24 | | | | | | | | | | |
| Boring terminated at 21.5'; | | 22 | | | | | | | | | | | | |
| | | 23 | | | | | | | | | | | | |
| | | 24 | | | | | | | | | | | | |
| | | 25 | | | | | | | | | | | | |
| | | 26 | | | | | | | | | | | | |
| | | 27 | | | | | | | | | | | | |
| | | 28 | | | | | | | | | | | | |
| | | 29 | | | | | | | | | | | | |
| | | 30 | | | | | | | | | | | | |
| | | 31 | | | | | | | | | | | | |
| | | 32 | | | | | | | | | | | | |
| | | 33 | | | | | | | | | | | | |
| | | 34 | | | | | | | | | | | | |
| | | 35 | | | | | | | | | | | | |
| | | 36 | | | | | | | | | | | | |
| | | 37 | | | | | | | | | | | | |
| | | 38 | | | | | | | | | | | | |
| | | 39 | | | | | | | | | | | | |
| | | 40 | | | | | | | | | | | | |

# TEST BORING LOG

**No. B-3**

PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC .

DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: ---

GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH**

NOTES:

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. φ (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SANDY SILT; Brown, dry, stiff; | | 1 | L | | | | | | | | | | | |
| | | 2 | L | | | | | | | | | | | |
| | | 3 | L | 15 | 5 | 86.0 | 5.6 | 57.8 | | | | | | |
| | | 4 | | | | | | | | | | | | |
| | | 5 | | | | | | | | | | | | |
| | | 6 | | | | | | | | | | | | |
| WELL GRADED GRAVEL WITH SAND; Brown, dry, very dense; rounded gravel sharts up to 1"; No recovery, sample description is from cuttings; | | 7 | - | 50/6" | | | | | | | | | | |
| | | 8 | | | | | | | | | | | | |
| | | 9 | | | | | | | | | | | | |
| | | 10 | | | | | | | | | | | | |
| | | 11 | | | | | | | | | | | | |
| Material consistent; | | 12 | * | 50/3" | | | | | | | | | | |
| | | 13 | | | | | | | | | | | | |
| | | 14 | | | | | | | | | | | | |
| | | 15 | | | | | | | | | | | | |
| | | 16 | | | | | | | | | | | | |
| Material consistent; increase in silt content; | | 17 | * | | | | | | | | | | | |
| | | 18 | * | 88 | | | | 8.9 | | | | | | |
| | | 19 | * | | | | | | | | | | | |
| | | 20 | | | | | | | | | | | | |

# TEST BORING LOG

**No. B-3**

PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC .

DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: ---

GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH**

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. $\varphi$ (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SILTY SAND; Brown, moist, loose; fine graned sand; | | 21 | * | | | | | | | | | | | |
| | | 22 | * | | | | | | | | | | | |
| | | | * | 11 | 1.5 | | | | | | | | | |
| | | 23 | | | | | | | | | | | | |
| | | 24 | | | | | | | | | | | | |
| | | 25 | | | | | | | | | | | | |
| | | 26 | | | | | | | | | | | | |
| POORLY GRADED SAND WITH SILT AND GRAVEL; Multicolored, dry, medium dense; angular gravel up to 1/2"; | | 27 | L | | | | | | | | | | | |
| | | | L | | | | | | | | | | | |
| | | | - | 23 | | | 15.6 | 5.3 | | | | | | |
| | | 28 | | | | | | | | | | | | |
| | | 29 | | | | | | | | | | | | |
| | | 30 | | | | | | | | | | | | |
| | | 31 | | | | | | | | | | | | |
| WELL GRADED GRAVEL WITH SAND; Brown, slightly moist, medium dense; sub-rounded gravel shards up to 1"; | | 32 | * | | | | | | | | | | | |
| | | | * | | | | | | | | | | | |
| | | | * | 27 | | | | 4.5 | | | | | | |
| | | 33 | | | | | | | | | | | | |
| | | 34 | | | | | | | | | | | | |
| | | 35 | | | | | | | | | | | | |
| | | 36 | | | | | | | | | | | | |
| SILT; Light brown, very moist, stiff; fine grained sand; low plasticity; | | 37 | * | | | | | | | | | | | |
| | | | * | | | | | | | | | | | |
| | | | * | 13 | 1 | | | 94.0 | 6.0 | | | | | |
| Boring terminated at 37.5'; | | 38 | | | | | | | | | | | | |
| | | 39 | | | | | | | | | | | | |
| | | 40 | | | | | | | | | | | | |

# TEST BORING LOG

**No. B-4**

PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC .

DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: —

GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH**

NOTES:

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. $\varphi$ (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SANDY SILT; Brown, moist, stiff; fine grained sand; | | 1 | - | | | | | | | | | | | |
| | | 2 | L | | | | | | | | | | | |
| WELL GRADED GRAVEL WITH SAND; Multicolored, dry, dense; angular gravel shards up to 1.5"; | | 3 | L | 33 | 4 | 95.2 | 10.1 | | | | | | | |
| | | 4 | | | | | | | | | | | | |
| | | 5 | | | | | | | | | | | | |
| | | 6 | | | | | | | | | | | | |
| Material consistent; no recovery except a sub-rounded gravel shard 2.5"; | | 7 | - B | 50/3" | | | | | | | | | | |
| | | 8 | | | | | | | | | | | | |
| | | 9 | | | | | | | | | | | | |
| | | 10 | | | | | | | | | | | | |
| | | 11 | | | | | | | | | | | | |
| Material consistent; | | 12 | - * | | | | | | | | | | | |
| WELL GRADED SAND WITH SILT AND GRAVEL; Brown, moist, medium dense; rounded gravel up to 1/4"; | | 13 | * | 26 | | | | 7.4 | | | | | | |
| | | 14 | | | | | | | | | | | | |
| | | 15 | | | | | | | | | | | | |
| | | 16 | | | | | | | | | | | | |
| WELL GRADED GRAVEL WITH SAND; Light tan, dry, very dense; sub-rounded gravel shards up to 1"; | | 17 | - * | | | | | | | | | | | |
| | | | * | 52 | | | | | | | | | | |
| Boring terminated at 17.5'; | | 18 | | | | | | | | | | | | |
| | | 19 | | | | | | | | | | | | |
| | | 20 | | | | | | | | | | | | |

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# TEST BORING LOG

**No. B-5**

PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC .

DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: ---

GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH**

NOTES:

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. $\varphi$ (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ASPHALT 2.5"; | | | | | | | | | | | | | | |
| WELL GRADED SAND WITH GRAVEL; Brown, moist, loose; | | 1 | - | | | | | | | | | | | |
| | | 2 | * | | | | | | | | | | | |
| | | 3 | * | 5 | | | | | | | | | | |
| | | 4 | | | | | | | | | | | | |
| | | 5 | | | | | | | | | | | | |
| | | 6 | | | | | | | | | | | | |
| Material consistent; increase in gravel content; increase in silt content; | | 7 | * | | | | | | | | | | | |
| | | 8 | * | 30 | | | | 5.1 | | | | | | |
| | | 9 | | | | | | | | | | | | |
| | | 10 | | | | | | | | | | | | |
| | | 11 | | | | | | | | | | | | |
| | | 12 | - | | | | | | | | | | | |
| Material consistent; | | 13 | * | 23 | | | | | | | | | | |
| | | 14 | | | | | | | | | | | | |
| | | 15 | | | | | | | | | | | | |
| | | 16 | | | | | | | | | | | | |
| Material consistent; increase in clay content; | | 17 | * | | | | | | | | | | | |
| | | 18 | * | 12 | | | | | | | | | | |
| Boring terminated at 17.5'; | | 19 | | | | | | | | | | | | |
| | | 20 | | | | | | | | | | | | |

PROJECT NO.: **R3801** **SAMPSON ENGINEERING - A DIVISION OF ATI** PAGE 1 OF 1

# TEST BORING LOG

**No. B-6**

| | | |
|---|---|---|
| PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC . |
| DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: --- |
| GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH** | |

NOTES:

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. $\varphi$ (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ASPHALT 2.5"; | | | | | | | | | | | | | | |
| SILTY SAND; Brown, moist, very loose; | | 1 | * | | | | | | | | | | | |
| | | 2 | * | | | | | | | | | | | |
| | | 3 | * | 3 | | | | 46.1 | 53.9 | | | | | |
| | | 4 | | | | | | | | | | | | |
| | | 5 | | | | | | | | | | | | |
| | | 6 | | | | | | | | | | | | |
| | | 7 | * | | | | | | | | | | | |
| | | | * | | | | | | | | | | | |
| WELL GRADED GRAVEL WITH SILT AND SAND; Brown, moist, medium dense; | | 8 | * | 15 | | | | | | | | | | |
| | | 9 | | | | | | | | | | | | |
| | | 10 | | | | | | | | | | | | |
| | | 11 | | | | | | | | | | | | |
| | | 12 | * | | | | | | | | | | | |
| Material consistent; increase in silt content; | | 13 | * | 36 | | | | 20.3 | | | | | | |
| | | 14 | | | | | | | | | | | | |
| | | 15 | | | | | | | | | | | | |
| | | 16 | | | | | | | | | | | | |
| Material consistent; | | 17 | * | | | | | | | | | | | |
| | | | * | 10 | | | | | | | | | | |
| | | 18 | | | | | | | | | | | | |
| | | 19 | | | | | | | | | | | | |
| | | 20 | | | | | | | | | | | | |

# TEST BORING LOG

**No. B-6**

PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC .

DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: ---

GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH**

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. $\varphi$ (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Material consistent; | | 21 | * | | | | | | | | | | | |
| | | 22 | * | | | | | | | | | | | |
| | | | * | 21 | | | | | | | | | | |
| Boring terminated at 22.5'; | | 23 | | | | | | | | | | | | |
| | | 24 | | | | | | | | | | | | |
| | | 25 | | | | | | | | | | | | |
| | | 26 | | | | | | | | | | | | |
| | | 27 | | | | | | | | | | | | |
| | | 28 | | | | | | | | | | | | |
| | | 29 | | | | | | | | | | | | |
| | | 30 | | | | | | | | | | | | |
| | | 31 | | | | | | | | | | | | |
| | | 32 | | | | | | | | | | | | |
| | | 33 | | | | | | | | | | | | |
| | | 34 | | | | | | | | | | | | |
| | | 35 | | | | | | | | | | | | |
| | | 36 | | | | | | | | | | | | |
| | | 37 | | | | | | | | | | | | |
| | | 38 | | | | | | | | | | | | |
| | | 39 | | | | | | | | | | | | |
| | | 40 | | | | | | | | | | | | |

# TEST BORING LOG

**No. B-7**

PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC .

DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: ---

GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH**

NOTES:

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. $\varphi$ (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SILTY SAND WITH GRAVEL; Brown, dry, hard; rounded gravel up to 1"; | | 1 | L | | | | | | | | | | | |
| | | 2 | L | | | | | | | | | | | |
| | | 3 | L | 46 | | | 4.1 | 26.8 | | | | | | |
| | | 4 | | | | | | | | | | | | |
| | | 5 | | | | | | | | | | | | |
| | | 6 | | | | | | | | | | | | |
| POORLY GRADED GRAVEL WITH SAND; Brown, dry, very dense; sub-rounded gravel shards up to 2.5"; | | 7 | L | 50/6" | | | 12.8 | 1.7 | | | | | | |
| | | 8 | | | | | | | | | | | | |
| | | 9 | | | | | | | | | | | | |
| | | 10 | | | | | | | | | | | | |
| | | 11 | | | | | | | | | | | | |
| WELL GRADED GRAVEL WITH SAND AND CLAY; Brown, moist, dense; sub-rounded gravel shards up to 1"; | | 12 | * | | | | | | | | | | | |
| | | 13 | * | 46 | | | | 11.2 | | | | | | |
| | | 14 | | | | | | | | | | | | |
| | | 15 | | | | | | | | | | | | |
| | | 16 | | | | | | | | | | | | |
| Material consistent; | | 17 | * | | | | | | | | | | | |
| | | 18 | * | 26 | | | | | | | | | | |
| | | 19 | | | | | | | | | | | | |
| | | 20 | | | | | | | | | | | | |

# TEST BORING LOG

**No. B-7**

PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC .

DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: ---

GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH**

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. $\varphi$ (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Material consistent; | | 21 | * | | | | | | | | | | | |
| | | 22 | * | | | | | | | | | | | |
| | | | * | 28 | | | | | | | | | | |
| Boring terminated at 22.5'; | | 23 | | | | | | | | | | | | |
| | | 24 | | | | | | | | | | | | |
| | | 25 | | | | | | | | | | | | |
| | | 26 | | | | | | | | | | | | |
| | | 27 | | | | | | | | | | | | |
| | | 28 | | | | | | | | | | | | |
| | | 29 | | | | | | | | | | | | |
| | | 30 | | | | | | | | | | | | |
| | | 31 | | | | | | | | | | | | |
| | | 32 | | | | | | | | | | | | |
| | | 33 | | | | | | | | | | | | |
| | | 34 | | | | | | | | | | | | |
| | | 35 | | | | | | | | | | | | |
| | | 36 | | | | | | | | | | | | |
| | | 37 | | | | | | | | | | | | |
| | | 38 | | | | | | | | | | | | |
| | | 39 | | | | | | | | | | | | |
| | | 40 | | | | | | | | | | | | |

# TEST BORING LOG

**No. B-8**

PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC .

DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: ---

GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH**

NOTES:

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. $\varphi$ (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SILTY GRAVEL WITH SAND; Dark brown, moist, medium dense; sub-rounded gravel shards up to 1"; | | 1–5 | L L L | 25 | | 106.6 | 5.1 | 26.9 | | | | | | |
| SILTY GRAVEL WITH SAND; Brown, slightly moist, medium dense; sub-rounded gravel shards up to 2.5"; | | 6–10 | L L L | 37 | | 113.3 | 2.4 | 20.3 | | | | | | |
| Material consistent; | | 11–15 | S L L | 42 | | | | | | | | | | |
| Material consistent; | | 16–17 | * * * | 50 | | | | | | | | | | |
| Boring terminated at 17.5'; | | 18–20 | | | | | | | | | | | | |

# TEST BORING LOG

**No. B-9**

PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC .

DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: ---

GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH**

NOTES:

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. φ (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ASPHALT 3"; | | | | | | | | | | | | | | |
| BASE MATERIAL 4"; | | 1 | | | | | | | | | | | | |
| GRAVELLY SILT WITH SAND; Dark brown, moist, stiff; sub-rounded gravel shards up to 2.5"; | | 2 | S L L | 15 | 5 | 98.0 | 13.1 | | | | | | | |
| | | 3 | | | | | | | | | | | | |
| | | 4 | | | | | | | | | | | | |
| SANDY CLAY; Dark brown, very moist, firm; medium plasticity; | | 5 | | | | | | | | | | | | |
| | | 6 | | | | | | | | | | | | |
| WELL GRADED GRAVEL WITH SAND AND CLAY; Brown, slightly moist, medium dense; sub-rounded gravel shards up to 2.5"; | | 7 | S L L | 40 | | | | | | | | | | |
| | | 8 | | | | | | | | | | | | |
| | | 9 | | | | | | | | | | | | |
| | | 10 | | | | | | | | | | | | |
| | | 11 | | | | | | | | | | | | |
| Material consistent from cuttings; no recovery; | | 12 | - - | 50/6" | | | | | | | | | | |
| | | 13 | | | | | | | | | | | | |
| | | 14 | | | | | | | | | | | | |
| | | 15 | | | | | | | | | | | | |
| | | 16 | | | | | | | | | | | | |
| Material consistent from cuttings; no recovery; | | 17 | - - * | 27 | | | | | | | | | | |
| Boring terminated at 17.5'; | | 18 | | | | | | | | | | | | |
| | | 19 | | | | | | | | | | | | |
| | | 20 | | | | | | | | | | | | |

PROJECT NO.: **R3801** **SAMPSON ENGINEERING - A DIVISION OF ATI** PAGE 1 OF 1

# TEST BORING LOG

**No. B-10**

PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC .

DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: ---

GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH**

NOTES:

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. $\varphi$ (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SANDY SILT; Brown, dry, very stiff; rounded gravel up to 1/2"; | | 1 | S | | | | | | | | | | | |
| | | 2 | L | | | | | | | | | | | |
| | | 3 | L | 35 | 5 | 96.9 | 4.1 | | | | | | | |
| | | 4 | | | | | | | | | | | | |
| | | 5 | | | | | | | | | | | | |
| | | 6 | | | | | | | | | | | | |
| WELL GRADED GRAVEL WITH SAND; Brown, dry, dense; sub-rounded gravel shards up to 2.5"; | | 7 | L | | | | | | | | | | | |
| | | 8 | L | 59 | | | | | | | | | | |
| | | 9 | | | | | | | | | | | | |
| | | 10 | | | | | | | | | | | | |
| | | 11 | | | | | | | | | | | | |
| Material consistent; rounded gravels up to 1.5"; | | 12 | L | | | | | | | | | | | |
| | | 13 | B | 41 | | | | | | | | | | |
| | | 14 | | | | | | | | | | | | |
| | | 15 | | | | | | | | | | | | |
| | | 16 | | | | | | | | | | | | |
| Material consistent; | | 17 | * | 50/6" | | | | | | | | | | |
| Boring terminated at 17.5'; | | 18 | | | | | | | | | | | | |
| | | 19 | | | | | | | | | | | | |
| | | 20 | | | | | | | | | | | | |

PROJECT NO.: **R3801** **SAMPSON ENGINEERING - A DIVISION OF ATI** PAGE 1 OF 1

# TEST BORING LOG

**No. B-11**

PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC .

DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: ---

GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH**

NOTES:

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. $\varphi$ (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ASPHALT 3"; | | | | | | | | | | | | | | |
| BASE MATERIAL 4"; | | | | | | | | | | | | | | |
| SANDY SILT; Brown, moist, stiff; rounded gravel up to 1/2"; | | 1 | S | | | | | | | | | | | |
| | | 2 | L | | | | | | | | | | | |
| WELL GRADED GRAVEL WITH SAND; Brown, dry, medium dense; rounded gravel shards up to 2.5"; | | 3 | L | 21 | | | | | | | | | | |
| | | 4 | | | | | | | | | | | | |
| | | 5 | | | | | | | | | | | | |
| | | 6 | | | | | | | | | | | | |
| Material consistent; | | 7 | L | | | | | | | | | | | |
| | | 8 | L | 56 | | | | 3.2 | 35.3 | 61.5 | | | | |
| | | 9 | | | | | | | | | | | | |
| | | 10 | | | | | | | | | | | | |
| | | 11 | | | | | | | | | | | | |
| Material consistent; | | 12 | * - | 50/6" | | | | | | | | | | |
| Boring terminated at 12.0'; | | 13 | | | | | | | | | | | | |
| | | 14 | | | | | | | | | | | | |
| | | 15 | | | | | | | | | | | | |
| | | 16 | | | | | | | | | | | | |
| | | 17 | | | | | | | | | | | | |
| | | 18 | | | | | | | | | | | | |
| | | 19 | | | | | | | | | | | | |
| | | 20 | | | | | | | | | | | | |

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# TEST BORING LOG

**No. B-12**

PROJECT: **2001 SS & WATER INFRAST. IMROVEMENT PROJ.** | DATE: 9/25/02 | LOGGED BY: KWC .

DRILL COMPANY: **EXPLORATION GOESERVICES** | BORING DIA. 8.0" | BORING ELEV.: ---

GROUNDWATER DEPTH: **NONE ENCOUNTERED** | SAMPLER: **L=3" O.D.; M=2" O.D.; *= SPT; B=BULK; S=SLOUGH**

NOTES:

| DESCRIPTION | USCS SOIL TYPE | DEPTH (feet) | SAMPLE | BLOWS PER FOOT | POCKET PEN. (tsf) | DRY DENSITY (pcf) | WATER CONTENT (%) | FINES (%) | SANDS (%) | GRAVELS (%) | LIQUID LIMIT | PLASTIC LIMIT | DIRECT SHEAR: FRIC. ANG. $\varphi$ (deg.) | DIRECT SHEAR: COHESION, c (ksf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ASPHALT 3"; BASE MATERIAL 4"; SANDY SILT; Brown, moist, stiff; rounded gravel up to 1/2"; | | 1–6 | * * * | 3 | | | | 55.8 | | | | | | |
| WELL GRADED SAND WITH SILT AND GRAVEL; Brown,moist, medium dense; rounded gravel shards up to 1"; | | 6–11 | - - * | 20 | | | | 12.6 | 52.3 | 35.1 | | | | |
| Material consistent; | | 11–12 | * * - | 50/6" | | | | | | | | | | |
| Boring terminated at 12.0'; | | 13–20 | | | | | | | | | | | | |

PROJECT NO.: **R3801** **SAMPSON ENGINEERING - A DIVISION OF ATI** PAGE 1 OF 1

SOIL SURVEYS GROUP INC.

103 CHURCH ST • SALINAS, CALIFORNIA 93901 • TELEPHONE (831) 757-2172

June 26, 2014
Job #6318

Mr. Eduardo Couttolenc
6 Santa Clara Avenue
Salinas, CA 93906

Re.: Update and Transfer of Responsibility for Geotechnical Investigation Report for Proposed Commercial Development on Fourth Street, Between Palm Avenue and Apple Avenue, APN 024-151-011, in Greenfield, California

Dear Mr. Couttolenc:

On June 17, 2014, our field technician visited the project site and found that the lot is still vacant with some debris piles. No grading or excavation work has been done to the site. We also reviewed the prior Geotechnical Investigation Report, prepared by Ali Oskoorouchi, G.E., and dated November 9, 2004. We confer with most of Mr. Oskoorouchi's findings and agree to accept responsibility for this report subject to the following revisions:

**Section1.0, replace the first sentence with the following:** The current commercial development includea two buildings with a proposed use of a swap meet and a parking lot. There will no longer be a motel on this site.

**Section 2.0, replace the last two sentences with the following:** The proposed construction will consist of two 11,000 square feet, one-story buildings and a parking lot. A motel is no longer to be constructed on this site.

Please refer to the.....Site Plan (new Figure 2).

**Section 5.5, replace entire section:** No known faults have been mapped or projected through the project site. However, severe ground vibration will result from a major earthquake centered on any of the nearby area faults. The commercial development shall be designed to withstand severe shaking and lateral accelerations generated by a severe earthquake centered nearby on one of the area faults.

The proposed buildings must be designed in strict compliance with the 2013 California Building Code to help withstand such seismically generated ground accelerations for a reasonably expected duration without suffering major damage.

The project site is located approximately 8.0 kilometers (5.0 miles) northeasterly of the Rinconada Fault, 24.5 kilometers (15.2 miles) southeasterly of the Monterey Bay-Tularcitos Fault, both considered B Faults and 22.5 kilometers (14.0 miles) southwesterly of the San Andreas Fault (creeping section), considered an A Fault on the **"Maps of Known Active Fault Near Source Zones in California and Adjacent Portions of Nevada, to be used with the 1997 Uniform Building Code."**

Frame and semi-rigid structures with proper strengthening connections and hold-down fasteners (where needed) are recommended for the project buildings. With proper design parameters, seismic damage to the buildings should be reduced during major earthquakes centered near the project area.

Surface rupture, lurch cracking, liquefaction, lateral spreading, and differential settlement are all seismic hazards that must be considered at the project site. Surface rupture and lurch cracking usually occur along or close to fault lines, and no known faults have been mapped through the project site.

Liquefaction and lateral spreading tend to occur in loose, fine, saturated sands and in places where the liquefied soils can move toward a free face (e.g. a cliff or ravine). The deeper soil underlying the project site is typically dense, sands and gravels, and no ground water was encountered in the test holes. Considering the dense subsurface soil and lack of groundwater at the project site, the potential risk for occurrence of damaging liquefaction or lateral spreading is considered to be low.

Differential compaction and settlement occur generally in loose, granular or unconsolidated semi-cohesive soils during severe ground vibration. In our opinion, the risk for differential compaction and settlement during a major seismic event is considered low provided that any loose near surface soil within the building sites are recompacted. However some total settlement (perhaps as much as an inch) and differential settlement of a half inch could still occur.

**Section 6.2, replace the second sentence with:** Soil Surveys Group, Inc. should review and approve the project plans.

**Section 6.3 replace paragraphs 4-10 with the following:** The building pad areas, extending a minimum of five feet in each direction past the foundation footings, shall be cleared and grubbed of all surface vegetation, debris, and organic topsoil before recompacting the original ground, placing engineered fill or finishing the subgrade for the new building pads. **On-site surface or subsurface grass, roots, deleterious material, or brush (if any) within the new building pad areas shall be removed.** Depressions created by the removal of any debris, shrubs or vegetative debris shall be backfilled to design grade with suitable fill placed in eight inch loose lifts and compacted to a minimum of 90 percent relative compaction. Any new cut and fill slopes shall be 2:1 or flatter unless retained. Engineered fill placed on cross slopes of more than 10 percent shall be properly keyed in. The keyway cuts shall be inspected and approved by the geotechnical engineer prior to placing engineered fill. The native sandy soil is suitable to be used as engineered fill after removing organics and vegetative debris. Any native soil used for fill or any imported fill soil for the new buildings shall be compacted to at least 90 percent relative compaction. ***Grading, filling, compaction operations, and foundation excavations shall be inspected and tested by the project Geotechnical engineer.***

Laboratory soils compaction test method shall be *A.S.T.M. D 1557-09.* Subgrade *in existing soil* beneath the new building pads shall be compacted to 90 percent relative compaction. Subgrade soil below any new pavement shall also be compacted to 90 percent relative compaction, and aggregate base beneath new pavement shall be compacted to 95 percent relative compaction. Any imported sandy soil fill placed for the new building pads shall also be compacted to a minimum of 90 percent relative compaction.

Subexcavation, if any, to be determined in field by Geotechnical engineer.

**Section 6.4, replace entire section with:** Spread footings may be used for the new building foundations after the site is cleared and grubbed, and the building pad is graded, compacted and properly prepared. The soil within the building pad shall be moisture conditioned and recompacted to the depths recommended in the field by the Geotechnical engineer(see Sections 6.3 and 6.5). Spread footings (except for basement footings) shall be installed to a minimum depth of 12 inches below the lowest adjacent grade for one story portions of the proposed building and to a minimum depth of 18 inches below the lowest adjacent grade for any two story portions of the proposed building. Mitigations for loose soil conditions must be followed.

*Allowable foundation pressures after recompaction of the building pad are:*
**Continuous footings = 1800 p.s.f.**
**Isolated rectangular footings = 2000 p.s.f.**

Continuous footings shall be reinforced with two #4 steel rebars placed near the bottom of footing, and a #4 steel rebar shall be installed at 16 inches on center horizontally within the building stem wall or basement wall as a minimum or as specified by the project engineer. Spread footings shall also meet the minimum requirements of the 2013 California Building Code and the City fo Greenfield building ordinances for width, thickness, embedment and reinforcement steel. The new structure and any future additions shall be designed in strict accordance with the requirements specified in the 2013 California Building Code, or latest approved edition, to resist seismic forces.

**Section 6.5, replace entire section with:**
Subgrade in recompacted soil under any concrete floor or garage slab-on-grade shall be brought to at least 2% over optimum moisture prior to placing native or imported sandy soil fill, prior to placing the capillary break rock and moisture proof barrier or prior to pouring concrete. We recommend that a capillary break consisting of :

- a mat of clean, open graded rock, four inches thick, placed over finished soil subgrade
- a minimum 15 mil. water-proof membrane (such as Stego, Moistop or equal) placed over the open graded rock
- two inches of clean, moistened sand shall be placed between the water-proof membrane and the bottom of the floor slab. The moistened sand will help protect the membrane and will assist in equalizing the concrete curing rate to minimize shrinkage cracking.

Class 2 Aggregate Base or sand should not be used as the capillary break material. Capillary break material shall com ply with and be installed according to the following:

1. MATERIAL:
The mineral aggregate for use under the floor slabs shall consist of broken stone, crushed or uncrushed gravel, quarry waste, or a combination of the above. The aggregate shall be free of adobe, vegetable matter, loam, volcanic tuff and other deleterious materials. It shall be of such quality that the absorption of water in a saturated, surface dry condition does not exceed 3% of the oven dry weight of the sample.

2. GRADING:
The mineral aggregate shall be of such size that the percentage composition by dry weight as determined by laboratory sieves (U.S. Sieves) will conform to the following grading:

| Sieve Size | Percentage Passing Sieve |
|---|---|
| ⅜" to ½" | 100 |
| No. 4 | 0-10 |
| No. 200 | 0-2 |

3. PLACING:
Subgrade, upon which aggregate base, gravel or crushed rock is to be placed, shall be prepared by removing grass and roots. Where loose topsoil is present, it shall be removed and cleaned of debris and recompacted to 90 percent of maximum density.

4. THICKNESS AND STRENGTH:
Concrete slabs should be at least five inches thick. Concrete shall be five sack minimum (5.5 sack if pumped) and shall achieve a 28 day compressive strength of at least 2500 p.s.i., or as specified by the project engineer.

5. REINFORCEMENT:
Concrete slabs-on-grade shall be reinforced with a minimum of #3 reinforcing bars placed 16 inches on center, each way, or #4 reinforcing bars placed 32 inches on center, each way and shall be bent a minimum of eight-inches into the perimeter footings.

**Section 6.6, replace the entire section with the following:**
The following are the project site coordinates and the seismic design criteria/coefficients per the requirements of the 2013 California Building Code (CBC):

| Site Class | Latitude | Longitude | $S_S$ | $S_1$ | $F_a$ | $F_v$ |
|---|---|---|---|---|---|---|
| D | 36.32626° | -121.23955° | 1.349 | 0.456 | 1.00 | 1.50 |

**Section 6.7, replace the last sentence with:** Aggregate bases should be compacted to 95 percent relative compaction based on compaction test method *A.S.T.M. D 1557-09.*

**Section 6.8, replace the entire section with:** All new on-site utility trenches shall be backfilled with a clean sand having a sand equivalent of 30 or higher. A two feet thick plug of compacted, **clayey soil backfill** or lean concrete shall be required around the pipe or conduit at places where utility trenches intersect the building perimeter. All trench backfill of imported clean sand or clean native sand shall be compacted to 95 percent relative compaction at all locations. Clean native sand shall be approved by Soil Surveys Group, Inc., prior to using for trench backfill.

**Section 6.10, replace the entire section with:** Soil Surveys Group, Inc. should be retained to review and approve plans as well as for all construction observation and testing including but not limited to: grading, foundation excavations, slab-on-grade installation, utility trench backfilling and drainage installation.

**Add Section 6.11:** Unforeseen Conditions
If any unforeseen or unsuitable soil conditions are found during grading or construction of the new buildings, the Geotechnical engineer shall be notified immediately so that remedial action can be taken. Such unsuitable conditions could be:

1. Wet or unsuitable pockets of soil or areas of unexpected loose soil within the building sites.
2. Buried foundation footings, debris, tanks, and/or pipes within the proposed building sites.
3. Any other unforeseen conditions that would require remedial action by the Geotechnical engineer, project engineer, architect or contractor.

**Section 7:** The limitations for this Transfer of Responsibility Report are modified as follows:

This Transfer of Responsibility Report necessarily assumes that the subsurface soil conditions are as found in the prior test hole logs. It should be recognized that the soil conditions described in the prior geotechnical report are based on spaced test holes, and it should be understood that subsurface soil conditions can vary between test holes and from site to site. If any unusual soil conditions are found during project grading or foundation construction, the Geotechnical engineer should be notified immediately so that remedial action can be taken.

This report is issued with the understanding that it is the responsibility of the Owner or his representative to ensure that the applicable provisions of the recommendations contained herein–as well as in the original geotechnical report–are incorporated into the plans and specifications and that the necessary steps are taken to see that contractors and subcontractors carry out such provisions in the field. The use of this Transfer report, its contents or any part thereof, by a party or its agents, other than Mr. Eduardo Couttolenc, his engineer, architect or designated agents, is hereby disallowed unless specific permission is given to do so by Soil Surveys Group, Inc. This Transfer of Responsibility report was prepared with the understanding that a new replacement single family home will be constructed at the project site as shown on the Figure II map enclosed herein. The use of this report shall be restricted to the original use for which it was prepared and publication by any method, in whole or in part, is prohibited without the written consent of the project Geotechnical engineer. Title to the Report and test hole logs remains with Soil Surveys Group, Inc., without prejudice. Visual contact with this Report and Appendix constitutes prima facie evidence of the acceptance of these restrictions.

Soil Surveys Group, Inc. will not take responsibility for or assume any liability for the recommendations made in this report unless Soil Surveys Group, Inc. performs the field inspections and testing mentioned herein.

The findings and recommendations of this report are considered valid at the present date; however, changes in the property conditions can occur with the passage of time on this or adjacent properties, whether due to natural processes or the works of man. Therefore the findings of this report shall be considered valid for a period of not more than three years without being reviewed and updated by Soil Surveys Group, Inc.

With the modifications herein I agree to accept responsibility for grading inspection and testing and to ensure that the recommendations for grading, site preparation and foundation design and construction are carried out per the previously referenced Geotechnical Investigation Report subject to the recommended revisions specified herein for the subject building site.

It is a pleasure working with you on this project. If you have any questions regarding this report which transfers responsibility to our firm, or the recommended modifications to the original Geotechnical Investigation Report, please contact our office.

Very truly yours,

SOIL SURVEYS GROUP, INC.

Richard E. Dante, P.E.
R.G.E. 0259
R.C.E. 20251

REGISTERED PROFESSIONAL ENGINEER
RICHARD E. DANTE
NO. 00259
EXP. 9/30/15
GEOTECHNICAL
STATE OF CALIFORNIA

Belinda A.Taluban, P.E.
R.C.E. 44217

REGISTERED PROFESSIONAL ENGINEER
BELINDA A. TALUBAN
No. 44217
Exp. 6/30/15
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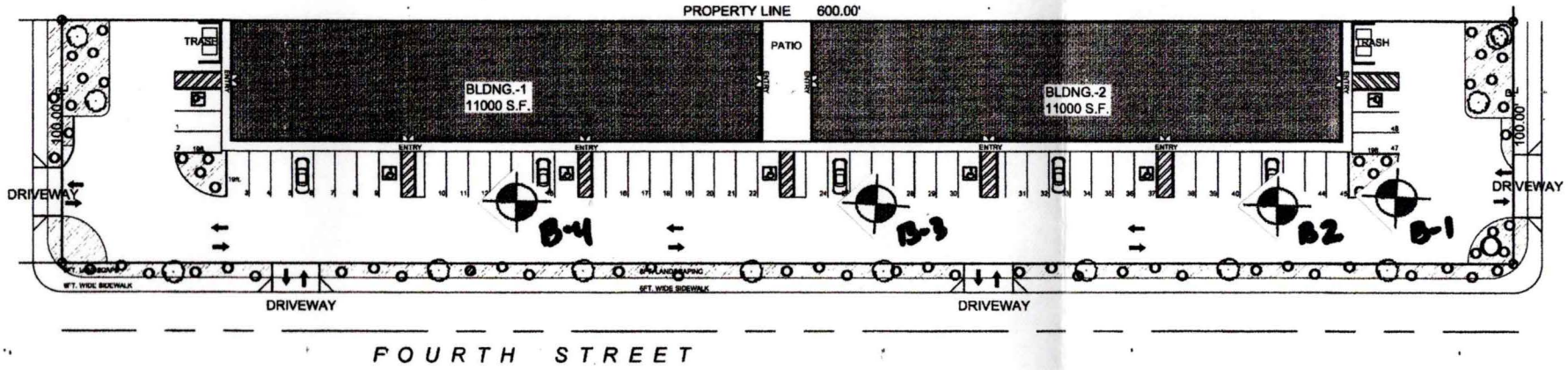
STATE OF CALIFORNIA

BAT/mmg

cc. City of Greenfield, Building and Planning Department




① SITE PLAN

NOT TO SCALE

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