REPORT OF PRELIMINARY GEOTECHNICAL INVESTIGATION

Cottonwood Industrial Site
Northwest of State Route 52 and Cottonwood Avenue
Santee, California

JOB NO. 14-10558
10 July 2014

Prepared for:

BTW Development

Geotechnical Exploration, Inc.
SOIL AND FOUNDATION ENGINEERING ● GROUNDWATER ● ENGINEERING GEOLOGY

10 July 2014

BTW Development
110 Town Center Parkway
Santee, CA 92071
Attn: Mr. Michael Grant

Job No. 14-10558

Subject: **Report of Preliminary Geotechnical Investigation**
Cotton Industrial Site
Northwest of State Route 52 and Cottonwood Avenue
Santee, California

Dear Mr. Grant:

In accordance with your request, and our proposal of June 5, 2014, ***Geotechnical Exploration, Inc.*** has performed a preliminary geotechnical investigation for the subject property. The fieldwork was performed on June 19, 2014.

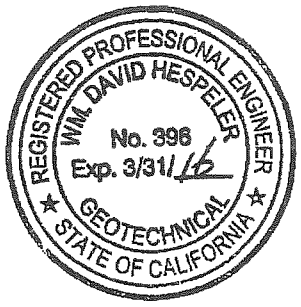
If the conclusions and recommendations presented in this report are incorporated into the design and construction of the proposed industrial building project, it is our opinion that the site is suitable for the project.

This opportunity to be of service is sincerely appreciated. Should you have any questions concerning the following report, please do not hesitate to contact us. Reference to our **Job No. 14-10558** will expedite a response to your inquiries.

Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

Wm. D. Hespeler, G.E. 396
Senior Geotechnical Engineer



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Northwest of State Route 52 and Cottonwood Avenue
Santee, California

JOB NO. 14-10558

The following report presents the findings and recommendations of ***Geotechnical Exploration, Inc.*** for the subject proposed industrial building project in Santee, California. Refer to the Vicinity Map, Figure No. I, for the location of the site.

I. PROJECT SUMMARY AND SCOPE OF SERVICES

It is our understanding, based on our conversation, that the currently vacant 3-acre site will be developed to receive one or more single-story buildings with pavements and other associated improvements. Although site development and grading plans are not available at this time, we anticipate that grading to achieve the desired finish site grades will be minimal with cuts and fills of less than 2 feet.

The scope of work performed for this investigation included a site reconnaissance and subsurface exploration program, laboratory testing, geotechnical engineering analysis of the field and laboratory data, and the preparation of this report. The data obtained and the analyses performed were for the purpose of providing design and construction criteria for the project earthwork, building foundations, slab on-grade floors and pavements.

II. SITE DESCRIPTION

The relatively flat, rectangular-shaped lot, measuring about 218 by 485 feet in plan dimensions, is located northwest of State Highway 52 and Cottonwood Avenue in Santee, California. The lot was formerly a part of a mobile home park and is

currently vacant. Existing AC pavement and concrete slabs associated with the former use are present and the bare ground surface is covered by a moderate growth of dry grass and brush.

III. FIELD INVESTIGATION

The field investigation consisted of a surface reconnaissance and a subsurface exploration program using a truck-mounted continuous flight auger drill to investigate and sample the subsurface soils. Five exploratory borings were drilled across the site on June 19, 2014, to a maximum depth of 13½ feet. The soils encountered in the borings were continuously logged in the field by our representative and described in accordance with the Unified Soil Classification System (refer to Appendix A). The approximate locations of the borings are shown on the Site Plan, Figure No. II.

Representative samples were obtained from the exploratory borings at selected depths appropriate to the investigation. All samples were returned to our laboratory for evaluation and testing. Standard penetration resistance blow counts were obtained by driving a 2-inch O.D. split spoon sampler with a 140-pound hammer dropping through a 30-inch free fall. The sampler was driven a maximum of 18 inches and the number of blows for each 6-inch interval was recorded. The blows per foot indicated on the boring logs represent the accumulated number of blows that were required to drive the last 12 inches or portion thereof. Samples contained in liners were recovered by driving a 3.0-inch O.D. California sampler 18 inches into the soil using a 140-pound hammer.

Boring logs have been prepared on the basis of our observations and laboratory test results. Logs of the borings are attached as Figure Nos. IIIa-e. The following chart provides an in-house correlation between the number of blows and the relative density of the soil for the Standard Penetration Test and the 3-inch sampler.

SOIL	***DENSITY DESIGNATION***	***2-INCH O.D. SAMPLER BLOWS/FOOT***	***3-INCH O.D. SAMPLER BLOWS/FOOT***
Sand and Nonplastic Silt	Very loose	0-4	0-7
	Loose	5-10	8-20
	Medium	11-30	21-53
	Dense	31-50	54-98
	Very Dense	Over 50	Over 98
Clay and Plastic Silt	Very soft	0-2	0-2
	Soft	3-4	3-4
	Firm	5-8	5-9
	Stiff	9-15	10-18
	Very stiff	16-30	19-45
	Hard	31-60	46-90
	Very Hard	Over 60	Over 90

IV. LABORATORY TESTS AND SOIL INFORMATION

Laboratory tests were performed on disturbed and relatively undisturbed soil samples in order to evaluate their index, strength, expansion, and compressibility properties. The following tests were conducted on the sampled soils and the results are presented on the boring logs:

1. *Laboratory Compaction Characteristics (ASTM D1557-09)*
2. *Determination of Percentage of Particles Passing #200 Sieve (ASTM D1140-06)*
3. *Ring-lined Barrel Density Test (ASTM D3550-07)*

Laboratory compaction tests establish the laboratory maximum dry density and optimum moisture content of the tested soils and are used to aid in evaluating the degree of compaction of existing fill soils and their strength characteristics.

The particle size smaller than a No. 200 sieve analysis aids in classifying the tested soils in accordance with the Unified Soil Classification System and provides qualitative information related to engineering characteristics such as expansion potential, permeability, and shear strength.

Laboratory dry density tests were performed on selected relatively undisturbed samples of the existing fill soils encountered and provides qualitative information related to engineering characteristics such as compressibility and shear strength.

The test results are presented on the boring logs at the appropriate sample depths.

V. SOIL DESCRIPTION

Existing fill soils consisting of damp to moist, loose clayey sands were encountered in all the borings to depths of 1 to 8 feet. The fill soils were underlain in all the borings by older alluvial soils consisting of medium dense to dense clayey sand to depths of 10 to 12 feet. In Boring #2, the clayey sand older alluvium was underlain by older alluvium consisting of very stiff sandy clay from depths of 12 to 13 feet.

VI. GROUNDWATER

Free groundwater was not encountered in the exploratory borings at the time of drilling. It must be noted, however, that fluctuations in the level of groundwater may occur due to variations in ground surface topography, subsurface stratification,

rainfall, and other possible factors that may not have been evident at the time of our field investigation.

It should be kept in mind that grading operations can change surface drainage patterns and/or reduce permeabilities due to the densification of compacted soils. Such changes of surface and subsurface hydrologic conditions, plus irrigation of landscaping or significant increases in rainfall, may result in the appearance of surface or near-surface water at locations where none existed previously. The appearance of such water is expected to be localized and cosmetic in nature, if good positive drainage is implemented, as recommended in this report, during and at the completion of construction.

It must be understood that unless discovered during initial site exploration or encountered during site grading operations, it is extremely difficult to predict if or where perched or true groundwater conditions may appear in the future. When site fill or formational soils are fine-grained and of low permeability, water problems may not become apparent for extended periods of time.

Water conditions, where suspected or encountered during construction, should be evaluated and remedied by the project civil and geotechnical consultants. The project developer and property owner, however, must realize that post-construction appearances of groundwater may have to be dealt with on a site-specific basis.

VII. SEISMIC CONSIDERATIONS

The San Diego area, as most of California, is located in a seismically active region. The San Diego area has been referred to as the eastern edge of the Southern California Continental Borderland, an extension of the Peninsular Ranges

Geomorphic Province. The borderland is part of a broad tectonic boundary between the North American and Pacific Plates. The plate boundary is dominated by a complex system of active major strike-slip (right lateral), northwest trending faults extending from the San Andreas fault, about 70 miles east, to the San Clemente fault, about 50 miles west of the San Diego metropolitan area.

Based on our review of some available published information there are no faults known to pass through the site. The prominent fault zones generally considered having the most potential for earthquake damage in the vicinity of the site are the active Rose Canyon and Coronado Bank fault zones mapped approximately 13 and 26 miles southwest of the site, respectively, and the active Elsinore and San Jacinto fault zones mapped approximately 29 and 50 miles northeast of the site, respectively.

Although research on earthquake prediction has greatly increased in recent years, geologists and seismologists have not yet reached the point where they can predict when and where an earthquake will occur. Nevertheless, on the basis of current technology, it is reasonable to assume that the proposed structures may be subject to the effects of at least one moderate to major earthquake during their design life. During such an earthquake, the danger from fault offset through the site is remote, but relatively strong ground shaking is likely to occur.

VIII. CONCLUSIONS AND RECOMMENDATIONS

From a geotechnical engineering standpoint, it is our opinion that the site is suitable for construction of the proposed industrial buildings provided the conclusions and recommendations presented in this report are incorporated into their design and construction.

Detailed earthwork and foundation recommendations are presented in the following paragraphs. The opinions, conclusions, and recommendations presented in this report are contingent upon ***Geotechnical Exploration, Inc.*** being retained to review the final plans and specifications as they are developed and to observe the site earthwork and installation of foundations.

A. Site Preparation and Earthwork

1. *Clearing and Stripping:* The site should be cleared of the existing pavement and concrete slabs as well as any abandoned underground piping. After clearing, the ground surface should be stripped of surface vegetation as well as associated root systems. Holes resulting from the removal of buried obstructions that extend below the proposed finished site grades should be cleared and backfilled with suitable material compacted to the requirements given under Recommendation No. 5, "Compaction." The cleared and stripped materials should be properly disposed of off-site. Alternatively, the existing AC may be ground and blended with on-site soil sufficiently to meet the materials for fill recommendations in Recommendation No. 4.

2. *Treatment of Existing Fill Soils:* In order to provide suitable foundation support for the proposed buildings and other improvements (such as exterior flatwork and pavements), we recommend that all existing fill soils that remain after the necessary site excavations have been made be removed and recompacted. The areal extent and depth required to remove the existing fill soils should be determined by our representatives during the excavation work based on their examination of the soils being exposed. Any unsuitable materials (such as oversize rubble, construction debris and/or organic matter

as encountered in Boring #2 at depths of 6 to 8 feet) should be selectively removed as directed by our representative and disposed of off-site.

3. *Subgrade Preparation:* After the site has been cleared, stripped, and the required excavations made, the exposed subgrade soils in those areas to receive fill or building improvements (including any exterior flatwork or pavement areas) should be scarified to a depth of 12 inches, moisture conditioned, and compacted to the requirements of Recommendation No. 5, "Compaction."

4. *Materials for Fill:* All on-site soils with an organic content of less than 3 percent by volume are in general suitable for reuse as fill. Fill material should not, however, contain rocks or lumps over 6 inches in greatest dimension and not more than 15 percent larger than 2½ inches. No more than 25 percent of the fill should be larger than ¼-inch. In addition to the preceding size requirements, any required imported fill material should be a granular soil with an Expansion Index of 50 or less as determined by ASTM D4829.

5. *Compaction:* All structural fill and backfill should be compacted to a minimum degree of compaction of 90 percent at a moisture content at least 2 percent above the optimum moisture content based upon ASTM D1557-09. Fill material should be spread and compacted in uniform horizontal lifts not exceeding 8 inches in uncompacted thickness. Before compaction begins, the fill should be brought to a water content that will permit proper compaction by either: (1) aerating and drying the fill if it is too wet; or (2) moistening the fill with water if it is too dry. Each lift should be thoroughly mixed before compaction to ensure a uniform distribution of moisture.

6. *Permanent Slopes:* We recommend that any required permanent cut or fill slopes be constructed to an inclination no steeper than 2 to 1 (horizontal to vertical). The project plans and specifications should contain all necessary design features and construction requirements to prevent erosion of the on-site soils both during and after construction. Slopes and other exposed ground surfaces should be appropriately planted with a protective groundcover.

7. *Trench Backfill:* ***All*** pipeline trenches should be backfilled with compacted fill. Backfill material should be placed in lift thicknesses appropriate to the type of compaction equipment utilized and compacted to a minimum degree of compaction of 90 percent by mechanical means. Our experience has shown that even shallow, narrow trenches, such as for irrigation and electrical lines, which are not properly compacted, can result in problems, particularly with respect to shallow groundwater accumulation and migration.

8. *Drainage:* Positive surface gradients should be provided adjacent to the buildings, and roof gutters and downspouts should be installed to direct water away from foundations and slabs toward suitable discharge facilities. Ponding of surface water should not be allowed, especially adjacent to the buildings or on pavements.

B. Design Parameters for Proposed Foundations

9. *Footings:* We recommend that the proposed buildings be supported on conventional, individual-spread and/or continuous footing foundations bearing on well-compacted fill soil and/or dense natural soils. All footings

should be founded at least 18 inches below the lowest adjacent finished grade.

At the recommended depth, footings may be designed for allowable bearing pressures of 3,000 pounds per square foot (psf) for combined dead and live loads and 4,000 psf for all loads, including wind or seismic. The footings should, however, have a minimum width of 12 inches.

10. *General Criteria For All Footings*: Footings located adjacent to the tops of slopes or on sloping natural ground should be extended sufficiently deep so as to provide at least 10 feet of horizontal cover or 1½ times the width of the footing, whichever is greater, between the slope face and outside edge of the footing at the footing bearing level. Footings located adjacent to utility trenches should have their bearing surfaces situated below an imaginary 1.5 to 1.0 plane projected upward from the bottom edge of the adjacent utility trench.

All continuous footings should contain top and bottom reinforcement to provide structural continuity and to permit spanning of local irregularities. We recommend that a minimum of two No. 5 top and two No. 5 bottom reinforcing bars be provided in the footings. A minimum clearance of 3 inches should be maintained between steel reinforcement and the bottom or sides of the footing. In order for us to offer an opinion as to whether the footings are founded on soils of sufficient load bearing capacity, it is essential that our representative inspect the footing excavations prior to the placement of reinforcing steel or concrete.

NOTE: The project Civil/Structural Engineer should review all reinforcing schedules. The reinforcing minimums recommended herein are not to be construed as structural designs, but merely as minimum reinforcement to reduce the potential for cracking and separations.

11. *Lateral Loads:* Lateral load resistance for the buildings supported on footing foundations may be developed in friction between the foundation bottoms and the supporting subgrade. An allowable friction coefficient of 0.35 is considered applicable. An additional allowable passive resistance equal to an equivalent fluid weight of 300 pcf acting against the foundations may be used in design provided the footings are poured neat against the adjacent undisturbed compacted fill materials. These lateral resistance values assume a level surface in front of the footing for a minimum distance of three times the embedment depth of the footing and any shear keys.

12. *Settlement:* Settlement under building loads is expected to be within tolerable limits for the proposed structures. For footings designed in accordance with the recommendations presented in the preceding paragraphs, we anticipate that total settlements should not exceed 1 inch and that post-construction differential settlements should be less than ½-inch in 25 feet.

13. *Seismic Design Criteria:* Site-specific seismic design criteria for the proposed residence are presented in the following table in accordance with Section 1613 of the 2013 CBC, which incorporates by reference ASCE 7-10 for seismic design. We have determined the mapped spectral acceleration values for the site, based on a latitude of 32.833 degrees and longitude of -116.974 degrees, utilizing a tool provided by the USGS, which provides a

solution for ASCE 7-10 (Section 1613 of the 2013 CBC) utilizing digitized files for the Spectral Acceleration maps. Based on our past experience with similar conditions, we have assigned a Site Soil Classification of C.

TABLE I
Mapped Spectral Acceleration Values and Design Parameters

S_s	S_1	F_a	F_v	S_{ms}	S_{m1}	S_{ds}	S_{d1}
0.874	0.339	1.051	1.461	0.918	0.495	0.612	0.330

14. *Retaining Walls:* Retaining walls must be designed to resist lateral earth pressures and any additional lateral pressures caused by surcharge loads on the adjoining retained surface. We recommend that unrestrained (cantilever) retaining walls with level backfill be designed for an equivalent fluid pressure of 35 pcf. We recommend that restrained walls (i.e., any retaining walls with angle points or that are curvilinear that restrain them from rotation) with level backfill be designed for an equivalent fluid pressure of 35 pcf plus an additional uniform lateral pressure of 8H pounds per square foot where H is equal to the height of backfill above the top of the wall footing in feet.

For seismic design of unrestrained walls, we recommend that the seismic pressure increment be taken as a fluid pressure distribution utilizing an equivalent fluid weight of 9 pcf. For restrained walls we recommend that the seismic pressure increment be taken as a fluid pressure distribution utilizing an equivalent fluid weight of 15 pcf added to the active static fluid pressure utilizing an equivalent fluid weight of 35 pcf.

The preceding design pressures assume that the walls are backfilled with low expansion potential on-site or imported materials and that there is sufficient drainage behind the walls to prevent the build-up of hydrostatic pressures from surface water infiltration. We recommend that drainage be provided by a composite drainage material such as Miradrain 6000/6200 and QuickDrain or equivalent. No gravel or perforated pipe is used with the Miradrain/QuickDrain system. The drain material should terminate 12 inches below the finish surface where the surface is covered by slabs or 18 inches below the finish surface in landscape areas.

Backfill placed behind the walls should be compacted to a minimum degree of compaction of 90 percent using light compaction equipment. If heavy equipment is used, the walls should be appropriately temporarily braced.

Retaining walls should be supported on footing foundations designed in accordance with the recommendations presented previously under Recommendation Nos. 9 and 10. Lateral load resistance for the walls can be developed in accordance with the recommendations presented under Recommendation No. 11 "Lateral Loads."

C. Concrete Slab On-grade Criteria

15. *Minimum Floor Slab Reinforcement:* Based on our experience, we have found that, for various reasons, floor slabs occasionally crack, causing brittle surfaces such as ceramic tiles to become damaged. Therefore, we recommend that all slabs-on-grade contain at least a minimum amount of reinforcing steel to reduce the separation of cracks, should they occur.

15.1 Interior floor slabs should be a minimum of 5 inches actual thickness and be reinforced with No. 4 bars on 18-inch centers, both ways, placed at midheight in the slab. Slab subgrade soil should be verified by a ***Geotechnical Exploration, Inc.*** representative to have the proper moisture content within 48 hours prior to placement of the vapor barrier and pouring of concrete.

15.2 Following placement of any concrete floor slabs, sufficient drying time must be allowed prior to placement of floor coverings. Premature placement of floor coverings may result in degradation of adhesive materials and loosening of the finish floor materials.

16. *Concrete Isolation Joints:* We recommend the project Civil/Structural Engineer incorporate isolation joints and sawcuts to at least one-fourth the thickness of the slab in any floor designs. The joints and cuts, if properly placed, should reduce the potential for and help control floor slab cracking. We recommend that concrete shrinkage joints be spaced no farther than approximately 20 feet apart, and also at re-entrant corners. However, due to a number of reasons (such as base preparation, construction techniques, curing procedures, and normal shrinkage of concrete), some cracking of slabs can be expected.

17. *Slab Moisture Protection and Vapor Barrier Membrane:* Although it is not the responsibility of geotechnical engineering firms to provide moisture protection recommendations, as a service to our clients we provide the following discussion and suggested minimum protection criteria. Actual recommendations should be provided by the architect and waterproofing consultants.

Soil moisture vapor can result in damage to moisture-sensitive floors, some floor sealers, or sensitive equipment in direct contact with the floor, in addition to mold and staining on slabs, walls and carpets. The common practice in Southern California is to place vapor retarders made of PVC, or of polyethylene. PVC retarders are made in thickness ranging from 10- to 60-mil. Polyethylene retarders, called visqueen, range from 5- to 10-mil in thickness. These products are no longer considered adequate for moisture protection and can actually deteriorate over time.

Specialty vapor retarding products possess higher tensile strength and are more specifically designed for and intended to retard moisture transmission into and through concrete slabs. The use of such products is highly recommended for reduction of floor slab moisture emission.

The following American Society for Testing and Materials (ASTM) and American Concrete Institute (ACI) sections address the issue of moisture transmission into and through concrete slabs: ASTM E1745-97 (2009) Standard Specification for Plastic Water Vapor Retarders Used in Contact Concrete Slabs; ASTM E154-88 (2005) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth; ASTM E96-95 Standard Test Methods for Water Vapor Transmission of Materials; ASTM E1643-98 (2009) Standard Practice for Installation of Water Vapor Retarders Used in Contact Under Concrete Slabs; and ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

17.1 Based on the above, we recommend that the vapor barrier consist of a minimum 15-mil extruded polyolefin plastic (no recycled content or woven materials permitted). Permeance as tested before and after

mandatory conditioning (ASTM E1745 Section 7.1 and sub-paragraphs 7.1.1-7.1.5) should be less than 0.01 perms (grains/square foot/hour in Hg) and comply with the ASTM E1745 Class A requirements. Installation of vapor barriers should be in accordance with ASTM E1643. The basis of design is 15-mil StegoWrap vapor barrier placed per the manufacturer's guidelines. Reef Industries Vapor Guard membrane has also been shown to achieve a permeance of less than 0.01 perms. We recommend that the slab be poured directly on the vapor barrier which is placed directly on the prepared subgrade soil.

17.2 Common to all acceptable products, vapor retarder/barrier joints must be lapped and sealed with mastic or the manufacturer's recommended tape or sealing products. In actual practice, stakes are often driven through the retarder material, equipment is dragged or rolled across the retarder, overlapping or jointing is not properly implemented, etc. All these construction deficiencies reduce the retarder's effectiveness. In no case should retarder/barrier products be punctured or gaps be allowed to form prior to or during concrete placement.

17.3 Vapor retarders/barriers do not provide full waterproofing for structures constructed below free water surfaces. They are intended to help reduce or prevent vapor transmission and/or capillary migration through the soil and through the concrete slabs. Water-proofing systems must be designed and properly constructed if full waterproofing is desired. The owner and project designers should be consulted to determine the specific level of protection required.

17.4 Following placement of concrete floor slabs, sufficient drying time must be allowed prior to placement of any floor coverings. Premature placement of floor coverings may result in degradation of adhesive materials and loosening of the finish floor materials.

18. *Exterior Slab Reinforcement:* As a minimum for protection of on-site improvements, we recommend that all exterior pedestrian concrete slabs be founded on properly compacted and tested fill, with No. 3 bars at 15-inch centers, both ways, at the center of the slab, and contain adequate isolation and control joints. The performance of on-site improvements can be greatly affected by soil base preparation and the quality of construction. It is therefore important that all improvements are properly designed and constructed for the existing soil conditions. The improvements should not be built on loose soils or fills placed without our observation and testing.

For exterior slabs with the minimum shrinkage reinforcement, control joints should be placed at spaces no farther than 15 feet apart or the width of the slab, whichever is less, and also at re-entrant corners. Control joints in exterior slabs should be sealed with elastomeric joint sealant. The sealant should be inspected every 6 months and be properly maintained.

19. *Asphalt Concrete Pavements*: Based on the results of our exploratory borings and laboratory tests as well as our experience with soils similar to those encountered at the site, we anticipate that pavement sections for the proposed development will be on the order of 2 inches of asphalt concrete on 6.5 inches of aggregate base for parking stalls and minor traffic channels (Traffic Index of 4.0), 2½ inches on 8 inches for major automobile traffic channels (TI of 5.0), and 3 inches on 9 inches for pavements subject to up

to 13 heavy 2-axle trucks per week (TI of 5.5). Final pavement section recommendations should be based on R-value (Resistance) tests performed on bulk samples of the soils that are exposed at the finished subgrade elevations across the site at the completion of the mass grading operations.

Asphalt concrete should consist of Type III-C2-PG64-10 conforming to the Standard Specifications for Public Works Construction, 2000 Edition (Standard Specifications), Section 400-4 and be placed in accordance with Section 302-5. Aggregate base should conform to the requirements for Crushed Aggregate Base or Crushed Miscellaneous Base in Section 200-2 of the Standard Specifications. The upper 6 inches of the pavement subgrade soil as well as the aggregate base layer should be compacted to a minimum degree of compaction of 95 percent. Preparation of the subgrade and placement of the asphalt concrete and base materials should be performed under the observation of our representative.

D. Slope Performance

20. *Slope Top/Face Performance:* The soils that occur in close proximity to the top or face of even properly compacted fill or dense natural ground cut slopes often possess poor lateral stability. The degree of lateral and vertical deformation depends on the inherent expansion and strength characteristics of the soil types comprising the slope, slope steepness and height, loosening of slope face soils by burrowing rodents, and irrigation and vegetation maintenance practices, as well as the quality of compaction of fill soils. Structures and other improvements could suffer damage due to these soil movement factors if not properly designed to accommodate or withstand such movement.

21. *Slope Top Structure Performance:* Rigid improvements such as top-of-slope walls, columns, decorative planters, concrete flatwork, and other similar types of improvements can be expected to display varying degrees of separation typical of improvements constructed at the top of a slope. The separations result primarily from slope top lateral and vertical soil deformation processes. These separations often occur regardless of being underlain by cut or fill slope material. Proximity to a slope top is often the primary factor affecting the degree of separations occurring.

Typical and to-be-expected separations can range from minimal to up to 1 inch or greater in width. In order to minimize the effect of slope-top lateral soil deformation, we recommend that the top-of-slope improvements be designed with flexible connections and joints in rigid structures so that the separations do not result in visually apparent cracking damage and/or can be cosmetically dressed as part of the ongoing property maintenance. These flexible connections may include "slip joints" in wrought iron fencing, evenly spaced vertical joints in block walls or fences, control joints with flexible caulking in exterior flatwork improvements, etc.

E. General Recommendations

22. *Project Start Up Notification:* In order to minimize any work delays during site development, this firm should be contacted 24 hours prior to any need for observation of footing excavations or field density testing of compacted fill soils. If possible, placement of formwork and steel reinforcement in footing excavations should not occur prior to observing the excavations; in the event that our observations reveal the need for deepening or redesigning foundation structures at any locations, any formwork or steel reinforcement

in the affected footing excavation areas would have to be removed prior to correction of the observed problem (i.e., deepening the footing excavation, recompacting soil in the bottom of the excavation, etc.).

IX. GRADING NOTES

Geotechnical Exploration, Inc. recommends that we be retained to verify the actual soil conditions revealed during site grading work and footing excavations to be as anticipated in this "*Report of Preliminary Geotechnical Investigation*" for the project. In addition, the compaction of any fill soils placed during site grading work must be observed and tested by the soil engineer. It is the responsibility of the grading contractor to comply with the requirements on the grading plans and the local grading ordinance. All retaining wall and trench backfill should be properly compacted. ***Geotechnical Exploration, Inc.*** will assume no liability for damage occurring due to improperly or uncompacted backfill placed without our observation and testing.

X. LIMITATIONS

Our conclusions and recommendations have been based on available data obtained from our field investigation and laboratory analysis, as well as our experience with similar soils and formational materials located in this area of San Diego County. Of necessity, we must assume a certain degree of continuity between exploratory borings. It is, therefore, necessary that all observations, conclusions, and recommendations be verified at the time grading operations begin or when footing excavations are placed. In the event discrepancies are noted, additional recommendations may be issued, if required.

The work performed and recommendations presented herein are the result of an investigation and analysis that meet the contemporary standard of care in our profession within the County of San Diego. No warranty is provided.

This report should be considered valid for a period of two (2) years, and is subject to review by our firm following that time. If significant modifications are made to the building plans, especially with respect to the height and location of any proposed structures, this report must be presented to us for immediate review and possible revision.

It is the responsibility of the owner and/or developer to ensure that the recommendations summarized in this report are carried out in the field operations and that our recommendations for design of this project are incorporated in the structural plans. We should be retained to review the project plans once they are available, to verify that our recommendations are adequately incorporated in the plans.

This firm does not practice or consult in the field of safety engineering. We do not direct the contractor's operations, and we cannot be responsible for the safety of personnel other than our own on the site; the safety of others is the responsibility of the contractor. The contractor should notify the owner if he considered any of the recommended actions presented herein to be unsafe.

The firm of ***Geotechnical Exploration, Inc.*** shall not be held responsible for changes to the physical condition of the property, such as addition of fill soils or changing drainage patterns, which occur subsequent to issuance of this report and the changes are made without our observations, testing, and approval.

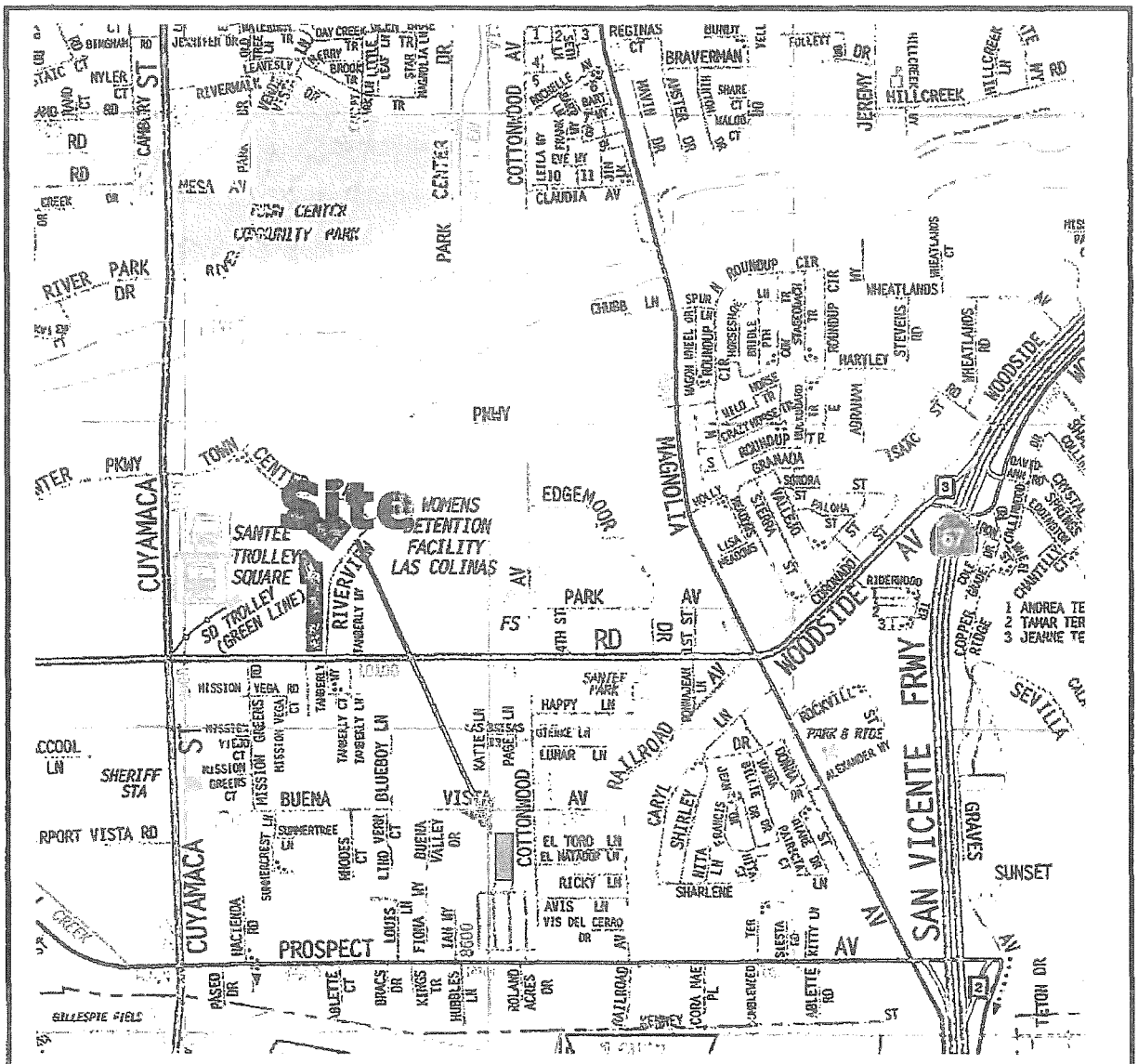
Once again, should any questions arise concerning this report, please feel free to contact the undersigned. Reference to our **Job No. 14-10558** will expedite a reply to your inquiries.

Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

Wm. D. Hespeler, G.E. 396
Senior Geotechnical Engineer

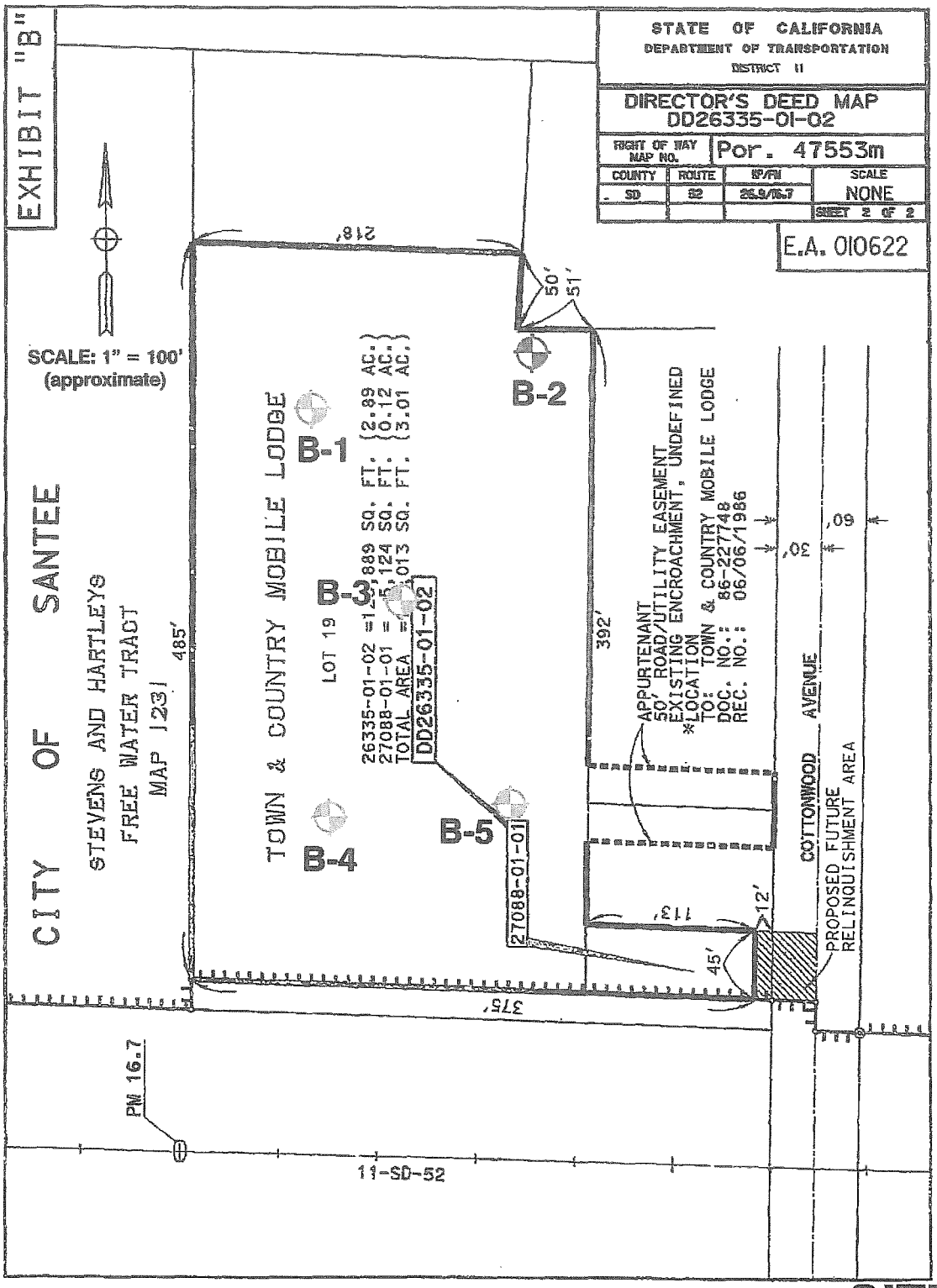
VICINITY MAP



Thomas Bros Guide San Diego County pg 1231-E7

Cottonwood Industrial Site
Northwest of State Route 52 and Cottonwood Avenue
Santee, CA.

Figure No. I
Job No. 14-10558



SITE MAP

Cottonwood Industrial Site
Northwest of State Route 52
and Cottonwood Avenue
Santee, CA.
Figure No. II
Job No. 14-10558

LEGEND

INDICATES APPROXIMATE LOCATION OF EXPLORATORY BORING

B-5

14-10558-p.ai

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
CME 55 Auger Drill Rig	8-inch diameter Boring	6-19-14
SURFACE ELEVATION	**GROUNDWATER/ SEEPAGE DEPTH**	**LOGGED BY**
± 354' Mean Sea Level	Not Encountered	AH

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
			CLAYEY SAND, fine- to medium-grained. Medium dense. Moist. Dark brown.	SC								
			FILL (Qaf)									
			CLAYEY SAND, fine- to medium-grained. Dense. Moist. Red-brown.	SC								
2			**OLDER ALLUVIUM (Qoa)**									
			-- 57% passing #200 sieve.								78/ 10"	3"
			Bulk bag from 2'- 5'.									
4			-- 41% passing #200 sieve.				11.0	124.0				
6												
			-- medium dense.									
8											28	2"
10			Bottom @ 10'									

- PERCHED WATER TABLE
- BULK BAG SAMPLE
- LOOSE SMALL BAG SAMPLE
- MODIFIED CALIFORNIA SAMPLE
- NUCLEAR FIELD DENSITY TEST
- STANDARD PENETRATION TEST

JOB NAME		
Cottonwood Industrial Site		
SITE LOCATION		
NW of Cottonwood Ave. & Highway 52, Santee, CA		
JOB NUMBER	REVIEWED BY	LOG No.
14-10558	WDH	B-1
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIIa		

EXPLORATION LOG 10558 COTTONWOOD.GPJ GED_EXPLGDT 7/8/14

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
CME 55 Auger Drill Rig	8-inch diameter Boring	6-19-14
SURFACE ELEVATION	**GROUNDWATER/ SEEPAGE DEPTH**	**LOGGED BY**
± 353' Mean Sea Level	Not Encountered	AH

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
0			**CLAYEY SAND**, fine- to medium-grained. Loose. Dry to damp. Red-brown.	SC								
			FILL (Qaf)									
2			-- 42% passing #200 sieve.		11.7	104.8			85		14	3"
4												
6			--encountered a 1'- 2' thick layer of construction debris (bbrick, pvc pipe, rocks, etc.).									
8			**CLAYEY SAND**, fine- to medium-grained. Dense. Moist. Red-brown.	SC							82	3"
			OLDER ALLUVIUM (Qoa)									
10												
12			**SANDY CLAY**, fine- to medium-grained. Very stiff. Moist. Gray-brown.	SC	25.6						22	2"
			OLDER ALLUVIUM (Qoa)									
			-- 62% passing #200 sieve.									
14			Bottom @ 13.5'									

- PERCHED WATER TABLE
- BULK BAG SAMPLE
- LOOSE SMALL BAG SAMPLE
- MODIFIED CALIFORNIA SAMPLE
- NUCLEAR FIELD DENSITY TEST
- STANDARD PENETRATION TEST

JOB NAME	
Cottonwood Industrial Site	
SITE LOCATION	
NW of Cottonwood Ave. & Highway 52, Santee, CA	
JOB NUMBER	REVIEWED BY
14-10558	WDH
FIGURE NUMBER	LOG No.
IIIb	B-2

Geotechnical Exploration, Inc.

EXPLORATION LOG 10558 COTTONWOOD.GPJ GEO_EXPL.GDT 7/8/14

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
CME 55 Auger Drill Rig	8-inch diameter Boring	6-19-14
SURFACE ELEVATION	**GROUNDWATER/ SEEPAGE DEPTH**	**LOGGED BY**
± 354' Mean Sea Level	Not Encountered	AH

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
			CLAYEY SAND, fine- to medium-grained. Medium dense. Dry. Red-brown.	SC								
			FILL (Qaf)									
2			**CLAYEY SAND**, fine- to medium-grained. Dense. Moist. Red-brown.	SC							70	3"
			OLDER ALLUVIUM (Qoa)									
4												
6			-- very dense.									
8											64	2"
10			Bottom @ 10'									

EXPLORATION LOG 10558 COTTONWOOD.GPJ GEO_EXPL.GDT 7/8/14

PERCHED WATER TABLE	
BULK BAG SAMPLE	
LOOSE SMALL BAG SAMPLE	
MODIFIED CALIFORNIA SAMPLE	
NUCLEAR FIELD DENSITY TEST	
STANDARD PENETRATION TEST	

JOB NAME: Cottonwood Industrial Site		
SITE LOCATION: NW of Cottonwood Ave. & Highway 52, Santee, CA		
JOB NUMBER: 14-10558	REVIEWED BY: WDH	LOG No.: B-3
FIGURE NUMBER: IIIc	Geotechnical Exploration, Inc.	

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
CME 55 Auger Drill Rig	8-inch diameter Boring	6-19-14
SURFACE ELEVATION	**GROUNDWATER/ SEEPAGE DEPTH**	**LOGGED BY**
± 354' Mean Sea Level	Not Encountered	AH

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
0			**CLAYEY SAND**, fine- to medium-grained. Very loose. Moist. Red-brown.	SC								
			FILL (Qaf)									
2			-- 35% passing #200 sieve.		8.6	116.1					8	3"
4			**CLAYEY SAND**, fine- to medium-grained. Dense. Moist. Red-brown.	SC								
			OLDER ALLUVIUM (Qoa)									
6												
			-- very dense.									
8											54	2"
10												
			Bottom @ 11'									
12												

EXPLORATION LOG 10558 COTTONWOOD.GPJ GEO_EXPL.GDT 7/8/14

- PERCHED WATER TABLE
- BULK BAG SAMPLE
- LOOSE SMALL BAG SAMPLE
- MODIFIED CALIFORNIA SAMPLE
- NUCLEAR FIELD DENSITY TEST
- STANDARD PENETRATION TEST

JOB NAME		
Cottonwood Industrial Site		
SITE LOCATION		
NW of Cottonwood Ave. & Highway 52, Santee, CA		
JOB NUMBER	REVIEWED BY	LOG No.
14-10558	WDH	B-4
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIId		

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
CME 55 Auger Drill Rig	8-inch diameter Boring	6-19-14
SURFACE ELEVATION	**GROUNDWATER/ SEEPAGE DEPTH**	**LOGGED BY**
± 356' Mean Sea Level	Not Encountered	AH

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
			CLAYEY SAND, fine- to medium-grained. Loose. Moist. Red-brown.	SC								
			FILL (Qaf)									
			CLAYEY SAND, fine- to medium-grained. Dense. Moist. Red-brown.	SC								
2			**OLDER ALLUVIUM (Qoa)**								66	3"
4												
6												
8											31	2"
10			Bottom @ 10'									

EXPLORATION LOG 10558 COTTONWOOD.GPJ GED_EXPL.GDT 7/8/14

- PERCHED WATER TABLE
- BULK BAG SAMPLE
- LOOSE SMALL BAG SAMPLE
- MODIFIED CALIFORNIA SAMPLE
- NUCLEAR FIELD DENSITY TEST
- STANDARD PENETRATION TEST

JOB NAME		
Cottonwood Industrial Site		
SITE LOCATION		
NW of Cottonwood Ave. & Highway 52, Santee, CA		
JOB NUMBER	REVIEWED BY	LOG No.
14-10558	WDH	B-5
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIIe		

APPENDIX A
UNIFIED SOIL CLASSIFICATION CHART
SOIL DESCRIPTION

Coarse-grained (More than half of material is larger than a No. 200 sieve)

GRAVELS, CLEAN GRAVELS (More than half of coarse fraction is larger than No. 4 sieve size, but smaller than 3")	GW	Well-graded gravels, gravel and sand mixtures, little or no fines.
	GP	Poorly graded gravels, gravel and sand mixtures, little or no fines.
GRAVELS WITH FINES (Appreciable amount)	GC	Clay gravels, poorly graded gravel-sand-silt mixtures
SANDS, CLEAN SANDS (More than half of coarse fraction is smaller than a No. 4 sieve)	SW	Well-graded sand, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines.
SANDS WITH FINES (Appreciable amount)	SM	Silty sands, poorly graded sand and silty mixtures.
	SC	Clayey sands, poorly graded sand and clay mixtures.

Fine-grained (More than half of material is smaller than a No. 200 sieve)

SILTS AND CLAYS		
Liquid Limit Less than 50	ML	Inorganic silts and very fine sands, rock flour, sandy silt and clayey-silt sand mixtures with a slight plasticity
	CL	Inorganic clays of low to medium plasticity, gravelly clays, silty clays, clean clays.
	OL	Organic silts and organic silty clays of low plasticity.
Liquid Limit Greater than 50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
	CH	Inorganic clays of high plasticity, fat clays.
	OH	Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils

(rev. 6/05)