ADDENDUM No. 1
Request for Competitive Sealed Proposals (CSP)
20CSP007 Parking Lot Repair at Delco Activity Center

July 11, 2019

Received by bidder:

Date:______________________________

Name:_____________________________

Signature:__________________________

Item 1: Restricted Contact Period

Item 2: Questions and Answers

Item 1: Restricted Contact Period

AISD observes a restricted contact period during the solicitation process. The restricted contact period shall begin upon the date of issuance of a solicitation and shall end upon execution of the awarded contract by all parties.

In an effort to demonstrate its commitment to ethical procurement and contracting standards, and to improve accountability and public confidence, all District purchases of goods and services through competitive methods as provided in CH(LEGAL) and CV(LEGAL) shall be subject to a restricted contact period. Except as provided in this policy communication between a vendor and vendor's representative, and a Board member, the Superintendent, assistant superintendent, chief, officer, executive director, principal, department head, director, manager, project manager, or any other District representative who has influence on or is participating in the evaluation or selection process is prohibited.

Please review the full board policies available here.

Item 1: Questions and Answers

Answers and clarifications have been provided by AISD's consultant. Please see the attached pages.

ADDENDUM NO. 1

AISD Project No. AISD 19-1050-DELCO / CIVILITUDE A413-001

Pavement Repairs at Wilhelmina Delco Center
Location: Delco Activity Center; 4601 Pecan Brook Drive Austin, TX 78724
Technical Questions: Austin ISD
Name: Jennifer Nix
Email: jennifer.nix@austinisd.org

This addendum is being issued on July 12th, 2019 to make the following changes.

Answers to Bidder Questions

1. Will the striping be part of the bid?
    a. Yes, the layout is specified on the plans. There are some other striping that local police academy and/or High School bands use for training exercises, those are not included.

2. How does the final floor elevation remain the same if you take out more material than what you are putting in?
    a. The elevation is to remain the same, the material removed must equal the material replaced. 8" of material will be reused, and 6" that are disposed will be expected to equal 3" of new additional flex base materials and 3" HMAC type C.

3. Do you need the recycled asphalt to keep the same density as the existing, or what standards will need to be followed for the new pavement?
    a. Compaction of recycled base to achieve 98% density per City of Austin Specification 211S.4 **(Attached).** At the time of construction, if field conditions prove this requirement is unattainable by the geotechnical engineer, deviation may be granted.

4. Can the whole parking lot be captured for the entire duration of construction?
    a. We assume that for the complete duration of the project the facility will be made available for the Contractor.
5. Are there any scheduled activities at the center, day time or night time, during the scheduled construction?
    a. We assume that for the complete duration of the project the facility will be made available for the Contractor.

6. Will the building need to be accessed during construction?
    a. We assume that for the complete duration of the project the facility will be made available for the Contractor.

7. Is there a geotechnical report for this project?
    a. Yes (attached)

8. Please confirm that rock excavation is not required to install the storm lines.
    a. For the purpose of this bid, please assume not.

9. Are we required to install a temporary construction fence around the entire job site?
    a. Yes, please follow sheet 3 LOC and Silt fence specifications.

10. Will root pruning of existing trees be required when trenching near or under drip lines?
    a. Yes, but only for roots smaller than 2" in diameter.

    If so, will root pruning need to be done by a certified arborist?

    b. This will not be required.

11. Please confirm the contractor is not responsible for replacing any trees that do not survive due to construction requirements. Such as excavation with-in any existing tree drip line.
    a. The contractor is expected to avoid harming the trees, any damage to existing trees during construction shall be the contractor's responsibility. The contractor shall perform remedial work to damaged trees at the contractor's expense.

12. Are all ADA areas compliant to the most current ADA codes?
    a. For the purpose of this bid we will assume that they are.

13. It is probable that the excavation depth will damage existing parking lot light conduits. Please address this potential "un-foreseen" issue and how to account for it in the pricing.
    a. Un-foreseen issues will be reviewed and addressed as change order as needed, contractor is responsible to identify conflict without damaging the infrastructure.

14. Note 4, Sheet 2 - Quantities called out on plans are for base bid. Actual quantities will use unit prices as additions/Deductions. Is this a lump sum project, and unit rates are for changes, or will they pay based on unit calculated in the field?
    a. Unit rates are for changes only

15. Limits of sidewalks around the building?
    a. No intention of modifying sidewalks next to buildings

16. What is happening with the existing light poles and bases?
    a. Light pole bases to remain. Contractor to work around them

17. Are any of the existing handicap signs to be replaced?
    a. All ADA signs to remain (no new installation part of this project).

18. Is the existing pond to be modified in any way … it is within the LOC
    a. Pond modifications are not in the scope of work for this project, please refer to sheet #3 LOC and Silt fence specifications.

19. Are there to be handicap ramps at the new sidewalks at the existing driveways?
    a. The proposed scope does not include replacing existing driveway approach in the public ROW. If the sidewalk crosses inside the property we just need to provide curb termination, no detectable ramps.

ITEM NO. 211S - RECYCLING EXISTING AGGREGATE 8-18-00

211S.1 - Description

This item governs: (1) breaking up existing asphalt pavement surfaces, (2) salvaging and placing existing broken up asphalt surface and flexible base materials on an existing subgrade and (3) compacting the courses in conformity with typical sections indicated in the Drawings, directions of the Engineer or designated representative and requirements herein specified.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

211S.2 - Submittals

The submittal requirements of this specification item may include:

A. Source, gradation and test results for the recycled existing material, and

B. Field density test results for in-place compacted recycled aggregate layers.

211S.3 - Materials

Materials required for use under this specification item shall conform to the following specification items as applicable:

Description of Activity	Item No.
Street Excavation	110S
Hydrated Lime and Lime Slurry	202S
Lime Treatment for Materials in Place	203S
Portland Cement Treatment for Materials in Place	204S
Flexible Base (Crushed Stone)	210S
Asphalts, Oils and Emulsions	301S
Emulsified Asphalt Treatment	310S
Two Course Surface Treatment	320S
Hot Mix Asphaltic Concrete Pavement	340S

211S.4 - Construction Methods

The existing roadway right of way shall be cleared of any vegetation or contaminants that would be in the path of the recycling equipment. The existing asphaltic concrete surface shall be scarified, loosened and broken up and pulverized in place into 1 inch (25 mm) maximum size pieces. The salvaged asphaltic concrete surface materials will be removed prior to scarifying the underlying existing base material. The Contractor shall make any necessary provision to prevent contamination of the asphaltic material during and after removal. When the existing pavement consists only of a surface treatment, it will not be necessary to remove the surface treatment before scarifying the underlying existing base material.

The existing base, with or without an existing asphaltic concrete pavement, shall be cleaned of all objectionable materials by blading, brooming or other approved methods, prior to scarifying. After cleaning, the existing material shall be scarified for its full width and depth, unless otherwise shown on the Drawings. In no case shall the underlying subgrade be disturbed. Unless otherwise shown on the Drawings, the materials shall be broken into particles of no more than 2½ inches (63 millimeters) in largest dimension.

All salvaging operations, including temporary stockpiling or windrowing, shall be conducted in such a manner as not to interfere with traffic, proper drainage or the general requirements of the Work. All material shown on the Drawings to be salvaged shall be kept reasonably free of soil from the subgrade or roadbed during the salvaging operation. The scarified material shall be removed from the roadbed using equipment approved by the Engineer or designated representative. The salvaged material may be placed in temporary stockpiles or windrows until sufficient subgrade has been prepared to receive the material.

Prior to replacing the salvaged material, the subgrade shall be constructed and shaped to conform to the typical sections as shown on the Drawings or as established by the Engineer or designated representative. This work shall be done in accordance with the provisions of Standard Specification Item 201S, "Subgrade Preparation".

Prior to replacing the salvaged material, when shown on the Drawings and when directed by the Engineer or designated representative, the Contractor shall proof roll the roadbed in accordance with Standard Specification Item 236S, "Proof Rolling". Soft spots, unstable or spongy areas shall be undercut, backfilled with suitable material and compacted by approved methods.

The salvaged base material shall be mixed, spread and shaped to conform to the typical sections shown on the Drawings. However, in no case, shall the underlying subgrade be disturbed. New base material and/or salvaged asphaltic materials, when shown on the Drawings to be mixed with the scarified base materials, shall be placed on the existing scarified material, and uniformly incorporated.

Unless shown otherwise on the Drawings, each lift of salvaged material shall be sprinkled as required and compacted to the extent necessary to provide not less than 98 percent density as determined by TxDoT Test Method Tex-113-E. Field density determination shall be made in accordance with TxDoT Test Method Tex-115-E

If the reworked base material, due to any reason or cause, loses the required stability, density or finish before placement of the next lift of the reworked base material, placement of the next course of material or prior to acceptance of the project, it shall be recompacted and refinished at the Contractor's expense. All initial testing will be paid for by the City of Austin. All retesting shall be paid for by the Contractor.

211S.5 - Measurement

Recycled aggregate will be measured by the cubic yard (cubic meters: 1 cubic meter equals 1.307 cubic yards), or by the square yard (square meter: 1 square meter equals 1.196 square yards) of the thickness indicated on the Drawings, complete in place.

211S.6 - Payment

This item will be paid for at the contract unit bid price for "Recycling Existing Aggregate". The unit bid price shall include full compensation for all work herein specified, including: scarifying, loosening and breaking up the existing asphaltic surface and base materials; removing, saving, loading, hauling and stockpiling materials; placing of salvaged materials with or without additional base materials; all water required and all equipment, tools, labor and incidentals necessary to complete the work. Any new materials required shall be paid under their respective items listed above, but the pulverizing of new and old materials shall be incidental to complete the work.

Payment will be made under:

Pay Item No. 211S-A:	Recycling Existing Aggregate -	Per Cubic Yard.
Pay Item No. 211S-B:	Recycling Existing Aggregate - ___ In.	Per Square Yard.

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification 211S, "Recycling Existing Aggregate"	
City of Austin Standard Specifications	
Designation	Description
Item No. 110S	Street Excavation
Item No. 201S	Subgrade Preparation
Item No. 202S	Hydrated Lime and Lime Slurry
Item No. 203S	Lime Treatment for Materials in Place
Item No. 204S	Portland Cement Treatment For Materials in Place
Item No.	Flexible Base

210S	
Item No. 236S	Proof Rolling
Item No. 301S	Asphalts, Oils, and Emulsions
Item No. 310S	Emulsified Surface Treatment
Item No. 320S	Two Course Surface Treatment
Item No. 340S	Hot Mix Asphaltic Concrete Pavement
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-113-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Base Materials and Cohesionless Sand
Tex-115-E	Field Method for Determination of In-Place Density of Soils & Base Materials

RELATED CROSS REFERENCE MATERIALS	
Specification 211S, "Recycling Existing Aggregate"	
City of Austin Standard Specifications	
Designation	Description
Item No. 101S	Preparing Right of Way
Item No. 102S	Clearing and Grubbing

Item No. 104S	Removing Portland Cement Concrete
Item No. 111S	Excavation
Item No. 230S	Rolling (Flat Wheel)
Item No. 232S	Rolling (Pneumatic Tire)
Item No. 307S	Tack Coat
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 204	Sprinkling
Item No. 210	Rolling (Flat Wheel)
Item No. 211	Rolling (Tamping)
Item No. 213	Rolling (Pneumatic Tire)
Item No. 300	Asphalts, Oils and Emulsions
Item No. 301	Asphalt Antistripping Agents
Item No. 345	Asphalt Stabilized Base (Plant Mixed)
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-114-E	Laboratory Compaction Characteristics & Moisture Density Relationship of Subgrade &

	Embankment Soil

GEOTECHNICAL INVESTIGATION
NORTH ACTIVITIES CENTER
SPRINGDALE ROAD AND PECAN BROOK DRIVE
AUSTIN, TEXAS

TMI REPORT NO. AE99-045

Prepared for

BLGY/SVERDRUP, AISD SERVICE CENTER, BOND CENTRAL
AUSTIN, TEXAS

Prepared by

TERRA-MAR, INC.
DALLAS/FORT WORTH/HOUSTON/AUSTIN/LONGVIEW

NOVEMBER, 1999

TERRA-MAR

Consulting Engineers · Geotechnical · Environmental · Construction Materials Testing

AUSTIN • DALLAS • FORT WORTH • HOUSTON • LONGVIEW • LUBBOCK

Berry R. Grubbs, P.E., President
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Wayne A. Eddins, Operations Manager
Donald L. Anderson, P.E., Tech. Services Mgr.

November 9, 1999
TMI Report No. AE99-045

Mr. Curt Shaw
Austin Independent School District
1111 West 6th Street
Suite 300
Austin, Texas 78704

Re: Geotechnical Investigation
North Activities Center
Springdale Road and Pecan Brook Drive
Austin, Texas

Dear Mr. Rouse:

This report provides geotechnical recommendations to guide the design and construction of the proposed North Activities Center at the above referenced project site. This study was performed in accordance with our proposal PAE99-4113 dated August 26, 1999.

For your future construction materials testing and related quality control requirements, it is recommended that the work be performed by Terra-Mar, Inc. in order to maintain continuity of inspection and testing services for the project under the direction of the geotechnical project engineer.

We thank you for the opportunity to provide you with our professional services. If we can be of further assistance, please do not hesitate to contact us.

Sincerely,

TERRA-MAR, INC.

Syed Hanefsuddin, P.E.
Geotechnical Engineer

Donald L. Anderson, P.E.
Manager, Technical Services

STATE OF TEXAS
DONALD L. ANDERSON
71880
PROFESSIONAL REGISTERED ENGINEER

ACCREDITED

CC: Mr. Scott Rouse - BLGY/Sverdrup (2)

4150 Freidrich Lane, Suite D, Austin, Texas 78744 Phone 512-441-5186 Fax 512-441-5713

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ILLUSTRATIONS

GEOTECHNICAL INVESTIGATION
NORTH ACTIVITIES CENTER
SPRINGDALE ROAD AND PECAN BROOK DRIVE
AUSTIN, TEXAS

1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

The proposed project will consist of a new activity center to be constructed south of the intersection of Springdale Road and Pecan Brook Drive in Austin, Texas. The proposed building will be a two-story structure approximately 250 feet by 250 feet in plan dimensions with a gymnasium/auditorium area. The building is expected to be of tilt-wall panel construction, and isolated columns loads may approach 200 kips. The project will also include approximately 400,000 square feet of paved parking areas and access roadways. For the purposes of this report, we have assumed that cuts and fills required to achieve final grades will be 2 feet or less.

1.2 PURPOSE AND SCOPE

The purpose of this study is to provide recommendations to guide the design and construction of the building, and the planned parking areas and access roadways. The scope of services included:

1. Exploration of subsurface conditions at the site;
2. Evaluation of the pertinent engineering properties of the subsurface materials;
3. Development of recommendations for the building foundations;
4. Comments and recommendations for site grading and drainage; and
5. Development of recommendations for pavements and pavement subgrades.

2.0 FIELD INVESTIGATION

The field investigation consisted of drilling nine sample borings at locations suggested by the project structural engineer. Five borings were drilled within the foundation area of the building. Four borings at the corners of the building were terminated at a depth of 60 feet and one boring in the middle of the building was terminated at a depth of 30 feet. Four shallow borings were drilled in the pavement areas and terminated at a depth of 5 feet. The borings were established in the field by measuring distances from the existing streets. The borings were located at the approximate locations shown on the Plan of Borings, Figure 1. The results of the boring program are presented on the Logs of Borings, Figures 2 through 10. A key to the descriptive terms and symbols used on the logs is presented on Figure 11.

A truck-mounted drilling rig was used to advance these borings and to obtain samples for laboratory evaluation. Undisturbed samples of cohesive soils were obtained continuously to a depth of 6 feet and at intermittent intervals below the 6 feet depth with standard, thin-walled, seamless tube samplers. These samples were extruded in the field, logged, sealed, and packaged to protect them from disturbance and maintain their in-situ moisture content during transportation to our laboratory.

3.0 LABORATORY TESTING

Laboratory tests were performed on representative samples of the soil to aid in classification of the soil materials. These tests included Atterberg limits tests, moisture contents and dry unit weight determinations. Unconfined compressive strength tests and hand penetrometer tests were performed on selected samples of the cohesive soils to provide indications of the swell potential and the foundation bearing properties of the subsurface strata. The results of these tests are presented on the Logs of Borings, Figures 2 through 10.

To provide additional information about the swell characteristics of these soils (at their in-situ moisture conditions), absorption swell tests were performed on selected samples of the clay soils. The results of these tests are presented on Figure 12.

Consolidation tests were performed on selected samples of the clay soils to assess the load carrying capacity and settlement potential. The results of these tests are presented on Figures 13 and 14.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 GENERAL SITE CONDITIONS

The approximate 20-acre project site is located south of the intersection ofSpringdale Road and Pecan Brook Drive in Austin, Texas. Most of the site is vegetated with tall grasses and mesquite trees, and large areas contain thicker concentrations of brush, weeds and small trees. The extreme northwestern and southeastern portions of the site are wooded. Isolated, small piles of concrete and other miscellaneous debris were observed at two locations.

Topographically, the site is composed of a low rise that crests near the proposed building area in the northern portion of the site. The ground surface typically slopes gently downward away from the crest of the rise in all directions.

4.2 SITE GEOLOGY

As shown on the Austin sheet of the Geologic Atlas of Texas, the site is located in an area underlain by the Ozan Formation ("lower Taylor Marl"). The Ozan Formation consists of calcareous clay with variable amounts of sand and silt. Soils derived from the Ozan Formation are typically plastic clays exhibiting high shrink/swell potential with variations in moisture content.

4.3 SUBSURFACE CONDITIONS

Subsurface conditions encountered in the borings, including descriptions of the various strata and their depths and thickness, are presented on the Logs of Boring. Note that depth on all borings refers to the depth from the existing grade or ground surface present at the time of the investigation. Boundaries between the various soil types are approximate.

In Boring B-1, tan clayey gravel was encountered from the ground surface to a depth of 2 feet. Hard clay was then present to a depth of 8 feet in Boring B-1, and this material was underlain by very stiff to hard tan and gray shaley clay. In Boring B-2, hard tan gravely clay was encountered from the ground surface to a depth of 5 feet. Tan calcareous clay (chalk) was then detected in Boring B-2 to a depth of 13 feet, and this soil was underlain by very stiff to hard tan and gray shaley clay. In Boring B-3, tan gravely clay was encountered from the ground surface to a depth of 2 feet followed by very stiff to hard tan and gray clay and underlain by very stiff to hard tan and gray shaley clay.

In Boring B-4, hard tan clay was present from the ground surface to a depth of 8 feet. Below a depth of 8 feet, of very stiff to hard tan underlain by grayshaley clay and very stiff to hard dark gray shale was present in Boring B-4. In Boring B-5, hard tan and gray clay was encountered from the ground surface to a depth of 4 feet and was underlain by hard tan and gray shaley clay. In Boring P-1, hard tan and gray clay was encountered from the ground surface to the termination depth, and in Borings P-2 and P-3, hard clay was encountered to a depth of 4 feet followed by shaley clay. In Boring P-4, hard clay was encountered.

The clays encountered in the borings at the site exhibited liquid limits ranging from 36 to 64 percent with plasticity indices (PI) ranging from 19 to 40 percent. The shaley clays encountered in the borings at the site exhibited liquid limits ranging from 69 to 76 percent with plasticity indices (PI) ranging from 43 to 51 percent. Swell tests indicated that the shaley clays had swell potentials of 0.8 to 5.8 percent and swell pressures of 3.4 to 13.5 ksf at moisture contents measured at the time this investigation was performed. The shaley clays exhibited compressive strengths ranging from 3.7 to 12.9 tsf.

4.4 GROUNDWATER CONDITIONS

The borings were advanced with continuous flight auger drilling equipment. This method allows relatively accurate groundwater observations to be made while drilling. Groundwater observations were recorded during drilling and at completion of boring. Groundwater was not encountered in the borings at the time of this investigation.

It is not possible to accurately predict the magnitude of subsurface water fluctuations that might occur based upon short-term observations. The subsurface water conditions are subject to change with variations in climatic conditions and are functions of subsurface soil conditions.

5.0 FLOOR SLAB AND FOUNDATION RECOMMENDATIONS

5.1 FOUNDATION/SLAB SYSTEM FOR BUILDING

The subsurface exploration revealed the presence of expansive clay soils with a high shrink/swell potential. Potential Vertical Rise (PVR) calculations were performed using swell test results, pocket penetrometer readings, and moisture content tests to estimate the swell potential of the soil. The soils are estimated to have potential vertical movements on the order of 6 to 9 inches at present moisture contents. These movements are based on the existing soil conditions at the time of this investigation.

The removal and replacement of expansive soils with non-expansive, select fill under floor slabs was evaluated as a procedure to reduce the potential for excessive post-construction movement of the soil-supported slabs. However, calculations indicated that removal and replacement of 8 feet of existing clay under floor slabs would only reduce the Potential Vertical Rise (PVR) of the subgrade to 1½ to 2 inches; furthermore, ten feet of undercutting and replacement would be needed to lower the PVR of the subgrade to less than I inch.

It appears that soil-supported ground floor slabs are not a viable option for the planned building due to the extreme depths of undercutting and replacement that would be necessary to reduce the subgrade PVR to acceptable magnitudes. Therefore, a structurally suspended slab is recommended to provide a void space between the ground floor slab and the underlying potentially expansive subgrade soils. A structurally suspended floor system consists of a slab suspended above the expansive soil and supported by drilled piers founded at a depth below which the expansive soils are least affected by seasonal moisture changes. The superstructure is also pier supported and is elevated above the expansive soils and thus not affected by soil movements.

5.2 STRUCTURALLY SUSPENDED SLAB AND FOUNDATION SYSTEM

5.2.1 DRILLED AND UNDERREAM BELLED PIER FOUNDATION SYSTEM

The drilled piers should be underreamed (belled) and should bear in the very stiff to hard, tan and gray shaley clay at a depth of at least 18 feet below existing grade or below finished subgrade elevation, whichever is deeper. The clays of the bearing stratum will tend to consolidate under the loads of the dilled piers. Since pier settlement will decrease with decreasing pier loads, the project designers may wish to limit pier loadings and reduce pier settlement.

To limit potential pier settlement to ¾ to 1 inch, a maximum allowable bearing pressure of 7,000 pounds per square foot (psf) is recommended for use in design of pier foundations. This value has a factor-of-safety of 3.0 against a bearing failure. Underreamed piers proportioned using an allowable bearing pressure of 5,000 psf should experience total settlements of approximately ½ inch or less. Differential settlement between adjacent, similarly loaded piers should be approximately ½ of the total settlement realized.

5.2.2 SUSPENDED GRADE BEAMS AND FLOOR SLAB

The grade beams should be supported by the piers. A minimum void space of 10 inches should be provided beneath all grade beams and floor slabs. Provisions should be made to provide drainage from under the building. If possible, ventilation of the void below the floor slab should be provided to further reduce the potential for moisture accumulation.

Structural cardboard forms can be used to provide the required voids beneath the floor slab and grade beams. If carton forms are used, care should be taken to assure that the void boxes are not allowed to become wet or crushed prior to or during concrete placement and finishing operations. Corrugated steel, placed on the top of the carton forms, could be used to reduce the risk of crushing of the carton forms during concrete placement and finishing operations. As a quality control measure during construction, "actual" concrete quantities placed should be checked against "anticipated" quantities. Significant concrete "overage" would be an early indication of a collapsed void.

The exterior portions of the grade beams along the perimeter of the building should be carefully backfilled with on-site clayey soils. The backfill soils should be placed at a moisture content between +2 and +5 percentage points wet of optimum. The fill should be compacted to 95 percent of maximum dry density as determined in accordance with ASTM D-698 (Standard Proctor).

5.2.3 DRILLED SHAFT SOIL INDUCED UPLIFT LOADS

Underreamed belled piers will be subject to uplift loads as a result of swelling within the overlying clays. The underreamed shafts should have a base to shaft diameter ratio of at least 2.0 to 1.0 to provide anchorage to resist potential uplift loads induced by soil heave in the overlying clays. The underreamed drilled shafts should have sufficient continuous vertical reinforcing steel extending to the base of the shafts to resist the computed net uplift loads (uplift less dead load).

The magnitude of the uplift loads varies with the shaft diameter, soil parameters, free water sources, and the depth of the active clays acting on the shaft. For calculation of reinforcing steel to resist tension in the pier shaft, the uplift pressures at the site can be approximated by assuming a uniform uplift pressure of 2,000 pounds per square foot acting on the shaft perimeter for a depth of 10 feet.

5.2.4 DRILLED SHAFT CONSTRUCTION CONSIDERATIONS

Concrete used for the shafts should have a slump of 6 inches plus or minus 1 inch and placed using a tremie to limit the free fall of the concrete to five feet in a manner to avoid striking the reinforcing steel and walls of the shaft during placement. Complete installation of individual shafts should be accomplished within an 8-hour period in order to help prevent deterioration of bearing surfaces. The drilling of individual shafts should be excavated in a continuous operation and concrete placed as soon as practical after completion of the drilling.

We recommend that Terra-Mar, Inc. is retained to observe and document the drilled pier construction. The engineer, or his representative, should document the shaft diameter, underream diameter, depth, cleanliness, plumbness of the shaft, and the type of bearing material. The drilled pier excavation should be observed to verify the bottom of the hole is dry and thoroughly cleaned of cuttings after belling. No build-up of cuttings what-so-ever should be allowed.

5.2.5 SUBGRADE PREPARATION

Only limited subgrade preparation is necessary beneath suspended floor slabs. This includes removal of surface vegetation and topsoil, and grading the building to provide positive drainage. On-site clays may be used as fill to support formwork beneath slabs. If carton forms are used, fill should be compacted to at least 92% of its ASTM D 698 (standard Proctor) maximum dry density. If other formwork is used that will subject the subgrade to higher, more concentrated loads, fill should be compacted to at least 95% of its maximum dry density. The moisture content of the fill should typically be maintained within -2 to +4 percent of optimum at the time of placement.

5.2.6 FLAT WORK CONSIDERATIONS

Provisions should be made for post-construction differential upward movement between flat work adjacent to the building and the pier supported building. Project plans should include provisions for the effects of soil movements on access and entry slabs and adjacent sidewalks. Construction of structural ramps at entryways may be considered to compensate for elevation fluctuations between pier-supported structures and the surrounding soils. Furthermore, site grading should be designed to accommodate potential subgrade shrinkage and swelling, and resulting grade variations, such that water does not pond around the building perimeter.

6.0 PAVEMENT RECOMMENDATIONS

6.1 PAVEMENT ANALYSIS

The parking lot and drives may consist of either hot mix asphaltic concrete (HMAC) or Portland cement concrete (PCC) pavement. The pavement thickness required for support of expected traffic at the site is a function of the subgrade soil support characteristics, and traffic volume and type. The pavement subgrade support was based on a compacted subgrade without lime stabilization. Recommendations for lime stabilized subgrade are not included. The presence of calcite deposits in the soil samples indicates a high probability of sulfates in the soil. Sulfates will react with lime and cause heaving of the pavement. For this reason lime stabilization is not recommended at this site.

We assume that drive and bus loading/unloading areas will be subjected to moderate bus traffic with occasional heavy trucks, and will be designed as medium duty pavement areas. It is also assumed that parking lots will be subjected to relatively light traffic consisting of passenger automobiles, vans and light trucks. The section thicknesses recommended for medium duty pavements are based on assumed traffic loads of an average of 50 to 60 busses per week and occasional trucks for a 20-year service life. If the expected traffic volume is different from these assumptions, we should be contacted to re-evaluate the effect of difference of traffic volume on our recommendations presented in this report.

The recommended pavement sections have been developed using the Pavement Analysis Software (Version 5.0) of the American Concrete Pavement Association using traffic loads and concrete strengths discussed in the following sections. The computer program is based on the AASHTO Guide for Design of Pavement Structures, published by the American Association of State Highway and Transportation Officials.

6.2 RIGID PAVEMENT SECTION

Rigid pavement systems typically tend to perform better than flexible pavements in areas with expansive subgrades and heavy traffic. The recommended rigid pavement sections are shown in Table 2 for light and medium duty pavement.

TABLE 2 - RECOMMENDED CONCRETE PAVEMENT SECTIONS

	LIGHT DUTY	MEDIUM DUTY
Portland Cement Concrete	5 inches	6 inches
Scarified and Compacted Subgrade	6 inches	6 inches

A minimum 6-inch thick concrete pavement is recommended for dumpster pads and the area in front of the dumpsters where trash disposal equipment handle the dumpsters.

The concrete in automobile traffic only areas should have a minimum 28-day compressive strength of 3,000 psi. In drive areas, and bus and truck parking areas, the concrete strength should be increased to 3,500 psi for improved performance. Concrete quality will be important in order to produce the desired flexural strength and long term durability. Assuming a nominal maximum aggregate size of 1 inch to 1-3/8 inches, we recommend that the concrete have entrained air of 5 percent (± 1%) with a maximum water cement ratio of 0.50.

Proper joint placement and design is critical to pavement performance. Control joints should be sawed within 5 to 12 hours after placing concrete. All joints including sawed joints should be properly cleaned and sealed as soon as possible to avoid infiltration of water, small gravel, etc. Isolation joints should be installed around light standards, bollards, or other pavement penetrations.

Our previous experience indicates that joint spacing on 12 to 15 foot centers have generally performed satisfactorily. Due to potential for the pavement subgrade to experience significant vertical movement with variations in moisture content, it is recommended that the concrete pavement be reinforced with a minimum of No. 4 bars placed on chairs on approximately 18-inch centers in each direction. We recommend that the perimeter of the pavements have a stiffening curb section to prevent possible distress due to heavy wheel loads near the edge of the pavements and also to provide channelized drainage.

6.3 FLEXIBLE PAVEMENT SECTION

The recommended flexible pavement sections for the light and medium duty pavement are shown in Table 3.

TABLE 3 – RECOMMENDED FLEXIBLE PAVEMENT SECTIONS

	LIGHT DUTY	MEDIUM DUTY
Asphaltic Concrete – Type D	2.0 inches	2.0 inches
Crushed Limestone Base Material	9.0 inches	12.0 inches

Asphaltic concrete pavement should be placed in accordance with Item 340 of TxDOT's Standard Specification, 1995 edition. The asphaltic concrete should comply with Type D of TxDOT Item 340.

Crushed Limestone Base Material should comply with TxDOT Item 247, Type A, Grade 2 or better. The base layer should be constructed in lifts not exceeding 6 inches compacted thickness and to a minimum density of 95 percent of maximum as determined by ASTM D

1557 (modified Proctor) or 98% maximum as determined by ASTM D 698 (standard Proctor).

6.4 PAVEMENT SUBGRADE PREPARATION

It is recommended that provisions be made in the contract to provide for proofrolling in areas where the subgrade will support new pavements. It is also recommended that an item be included for removal and replacement of soft materials, which are identified by this procedure.

Proofrolling can generally be accomplished using a heavy (25 ton or greater total weight) pneumatic tired roller making several passes over the areas. Where soft or compressible zones are encountered, these areas should be removed to a firm subgrade. Wet or very moist surficial materials may need to be undercut and either dried in place and compacted or replaced with new soil fill and compacted.

Available on-site soils may be used to raise grades in pavement areas. Pavement areas fill should be placed in 6-inch compacted lifts compacted to at least 95 percent of maximum dry density as determined by ASTM D 698 at -1 to +3 percentage points of optimum

Achieving the required field density is dependent upon the adequate pulverization of the clay fill materials, the magnitude of compaction energy and the maintenance of field moisture near optimum. All joints and pavements should be inspected at regular intervals to ensure proper performance and to prevent crack propagation.

In cut areas and in areas have not received at least 8 inches of compacted fill, the upper 8 inches of the subgrade should be scarified and recompacted to at least 95 percent of the maximum dry density as determined by the ASTM D 698. The moisture content of the clay subgrade soils at the time of compaction should be from -1 to +3 percentage points of the optimum moisture content. The subgrade moisture content and density must be maintained until paving is completed.

Only on-site soil (comparable to the underlying subgrade soil) should be used for fine grading the pavement areas. After fine grading, the subgrade should again be watered if needed and re-compacted in order to re-achieve the moisture and density levels discussed above and provide a tight non-yielding subgrade. Sand should not be allowed for use in fine grading the pavement areas. The subgrade moisture content and density must be maintained until paving is completed.

Due to the presence of expansive clay soils, upward pavement movements should be anticipated. Inspection during construction is particularly important to insure proper construction procedures are followed. Furthermore, after construction, joints and pavements should be inspected at regular intervals. Cracks should be sealed to prevent water intrusion into the subgrade and to maintain the serviceability of the pavement systems. Asphaltic content pavements will typically require a seal coat or overlay after 8 to 12 years to extended the pavements service life.

6.5 DRAINAGE AND GRADING

Good drainage is important to reduce water percolation into the subgrade soils through joints and cracks in pavement. In order to reduce rain water infiltration through the pavement surface, all cracks and joints in the pavement should be sealed on a routine basis. The pavement should be graded to prevent water from ponding against the edge of the pavement and to promote rapid drainage from the pavement.

7.0 EARTHWORK GUIDELINES

7.1 SITE GRADING AND DRAINAGE

All grading should provide positive drainage away from the proposed building and should prevent water from collecting or discharging near the foundations. Water must not be permitted to pond adjacent to the structure during or after construction. Surface drainage gradients should be designed to divert surface water away from the building and edges of pavements. Surface drainage gradients within 10 feet of the building should be constructed with maximum slopes allowed by local codes (5% if possible).

The roofs should be provided with gutters and downspouts to prevent the discharge of rainwater directly onto the ground adjacent to the building foundations. Downspouts should discharge directly onto well-drained areas or drainage swales, if possible. Roof downspouts and surface drain outlets should discharge into erosion-resistant areas. Water permitted to pond in planters, open areas, or areas with unsealed joints next to the structure can result in excessive slab or pavement movements as indicated in this report.

Leave outs for drilled shafts or around the perimeter of the structure should not be allowed to collect and hold water. These leave outs should be pumped out as needed.

Exterior sidewalks and pavements will be subject to some post construction movement as indicated in this report. These potential movements should be considered during preparation of the grading plan. Flat grades should be avoided. Where concrete pavement is used, joints should also be sealed to prevent the infiltration of water. Since some post construction movement of pavement and flat work may occur, joints particularly around the building should be periodically inspected and resealed where necessary.

7.2 UTILITY TRENCH EXCAVATION

Trench excavation for utilities should be sloped or braced in the interest of safety. Attention is drawn to OSHA Safety and Health Standards (29 CFR 1926/1910), Subpart P, regarding trench excavations greater than 5 feet in depth. A positive cut-off at building lines is recommended to minimize water migration through utility trenches.

7.3 PROOFROLLING AND SUBGRADE PREPARATION

Prior to placing fill in structural or pavement areas, the exposed subgrade in areas to receive fill should be stripped and proofrolled using a fully loaded dump truck. Soft areas should be undercut and replaced with compacted on-site soils. The exposed subgrade in pavement areas be scarified to a depth of 8 inches and recompacted to a minimum of 95 percent of the maximum density as determined by ASTM D 698 between -2 to +4 percentage points above the optimum moisture content.

7.4 FIELD SUPERVISION AND DENSITY TESTING

Field density and moisture content determinations should be made on each lift of fill with a minimum of 1 test per lift per 5,000 sf in the building pad area, 1 test per lift per 5,000 to 10,000 square feet in other fill areas, and 1 test per lift per 100 linear feet of utility trench backfill. Supervision by the field technician and the project engineer is required. Some adjustments in the test frequencies may be required based upon the general fill types and soil conditions at the time of fill placement.

Many problems can be avoided or solved in the field if proper inspection and testing services are provided. It is recommended that all drilled shaft construction, proofrolling, site and subgrade preparation, and pavement construction be monitored by a qualified engineering technician. Density tests should be performed to check the compaction and moisture content of any earthwork. Inspection should be performed prior to and during concrete placement operations. Terra-Mar, Inc. employs a group of experienced, welltrained technicians for inspection and construction materials testing who would be pleased to assist you on this project.

8.0 LIMITATIONS

The professional services, which have been performed, the findings obtained, and the recommendations prepared were accomplished in accordance with currently accepted geotechnical engineering principles and practices. The possibility always exists that the subsurface conditions at the site may vary somewhat from those encountered in the bore holes. The number and spacing of test borings were chosen in such a manner as to decrease the possibility of undiscovered abnormalities, while considering the nature of loading, size, and cost of the project. If there are any unusual conditions differing significantly from those described herein, Terra-Mar, Inc. should be notified to review the effects on the performance of the recommended foundation system.

The recommendations given in this report were prepared exclusively for the use of BLGY/Sverdrup, Austin Independent School District and their consultants. The information supplied herein is applicable only for the design of the previously described development to be constructed at locations indicated at this site and should not be used for any other structures, locations, or for any other purpose. Further, subsurface conditions can change with passage of time. Recommendations contained herein are not considered applicable for an extended period after the completion date of this report. It is recommended our office be contacted for a review of the contents of this report for construction commencing more than one year after completion of this report.

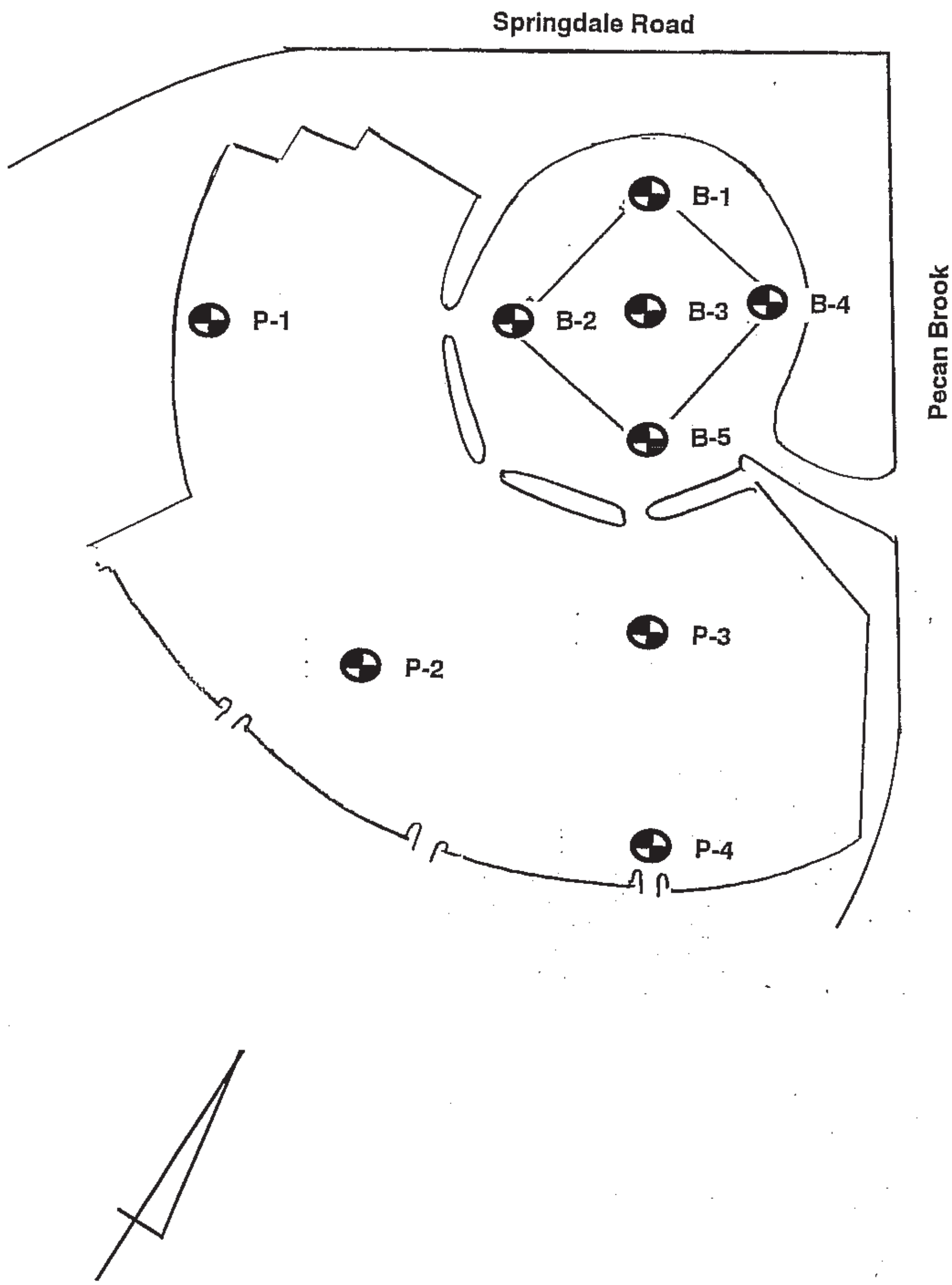
The scope of services provided herein does not include an environmental assessment of the site or investigation for the presence or absence of hazardous materials in the soil, surface water and groundwater.

All contractors referring to this geotechnical report should draw their own conclusions regarding excavations, trafficability etc. for bidding purposes. Terra-Mar, Inc. is not responsible for conclusions, opinions or recommendations made by others based on these data. This report is intended to guide preparation of project specifications and should not be used as a substitute for the project specifications.

Recommendations provided in this report are based on our understanding of information provided by the Client about characteristics of the project. If the Client notes any deviation from the facts about characteristics of the project, our office should be contacted immediately since this may materially alter the recommendations.

We will retain the samples acquired for this project for a period of 30 days subsequent to the submittal date printed on the report. After this period, the samples will be discarded unless otherwise notified by the owner in writing.

ILLUSTRATIONS



NTS

Terra-Mar, Inc.

BORING LOCATION PLAN

Proposed North Activity Center

Austin, Texas

TMI Job No. AE99-045

FIGURE 1

LOG OF BORING B-1

Project: **North Activities Center** Project No.: **AE99-045**

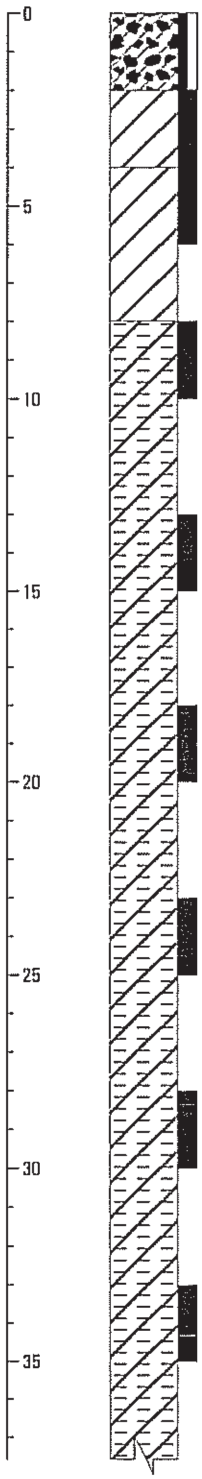
Date: **09-15-1999** Elev.: **NA** Location: **See Figure 1**

Depth to water at completion of boring: **Dry**

Depth to water when checked: **NA** was: **NA**

Depth to caving when checked: **NA** was: **NA**

ELEVATION/ DEPTH (feet) | SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA



DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P.PEN tsf	UNCON tsf	Strain %
Tan clayey GRAVEL									
Hard light brown CLAY w/ gravel (CH)							4.5+		
Hard tan CLAY w/ calcite deposits (CH)							4.5+		
Very stiff to hard tan & gray shaley CLAY	24						3.0		
	22	76	25	51			4.5+		
-w/ silicate deposits									
	23					106.4	4.5+	3.9	2.6
-trace iron stains									
							4.5+		
	26						4.5+		
							4.5+		

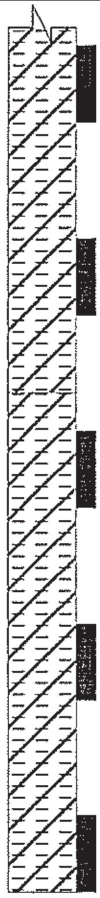
Notes: **Completion Depth: 60.0'**

FIGURE 2

LOG OF BORING B-1

Project: **North Activities Center**

Project No.: **AE99-045**



ELEVATION/ DEPTH (feet)	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P.PEN tsf	UNCON tsf	Strain %
	Very stiff to hard tan & gray <u>shaley CLAY</u>	28						2.0		
40	-w/ some silicate deposits									
								4.5+		
45	-w/ calcite deposits									
	(CH)									
	Hard tan & gray <u>shaley CLAY</u> w/ dark gray shale									
								4.5+		
50										
								4.5+		
55										
								4.5+		
	(CH)									
60										
65										
70										
75										

Notes: **Completion Depth: 60.0'**

FIGURE 3

LOG OF BORING B-2

Project: **North Activities Center** Project No.: **AE99-045**

Date: **09-15-1999** Elev.: **NA** Location: **See Figure 1**

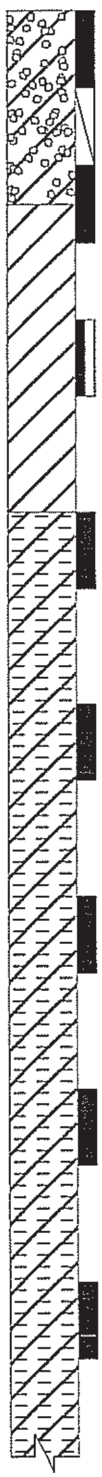
Depth to water at completion of boring: **Dry**

Depth to water when checked: **NA** was: **NA**

Depth to caving when checked: **NA** was: **NA**

ELEVATION/ DEPTH (feet): 0, 5, 10, 15, 20, 25, 30, 35

SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA



Depth	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P.PEN tsf	UNCON tsf	Strain %
	Hard tan gravelly CLAY									
								4.5+		
	(CH)									
	Tan clacareous CLAY (chalk)									
		10	36	17	19			3.75		
	(CL)									
	Very stiff to hard tan & gray shaley CLAY									
		21					106.7	4.5+	6.6	2.7
		24						4.5+		
								4.5+		
		21						4.5+		

Notes: **Completion Depth: 60.0'**

FIGURE 4

LOG OF BORING B-2

Project: **North Activities Center** Project No.: **AE99-045**

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P.PEN tsf	UNCON tsf	Strain %
		Very stiff to hard tan & gray shaley CLAY							4.5+		
40											
									4.5+		
		-w/ calcite seams									
45											
			25						4.5+		
50											
									4.5+		
55											
		(CH)							4.5+		
60											
65											
70											
75											

Notes: **Completion Depth: 60.0'**

FIGURE 5

LOG OF BORING B-3

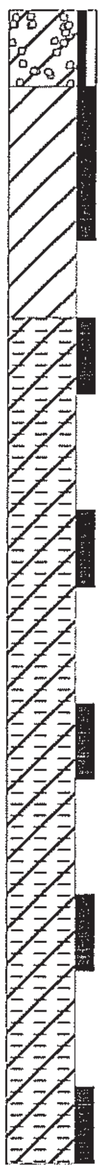
Project: **North Activities Center** Project No.: **AE99-045**

Date: **09-14-1999** Elev.: **NA** Location: **See Figure 1**

Depth to water at completion of boring: **Dry**

Depth to water when checked: **NA** was: **NA**

Depth to caving when checked: **NA** was: **NA**



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P.PEN tsf	UNCON tsf	Strain %
0		Hard tan gravelly CLAY (CH)							4.5+		
		Very stiff to hard tan & gray CLAY w/ calcareous deposits	22	64	24	40			3.0		
5		(CH)									
		Very stiff to hard tan & gray shaley CLAY	25	69	26	43			4.5+		
10											
									3.75		
15											
			24					102.5	4.5+	3.7	2.7
20											
			23					109.5	4.5+	7.2	4.9
25											
30		(CH)							4.5+		
35											

Notes: **Completion Depth: 30.0'**

FIGURE 6

LOG OF BORING B-4

Project: **North Activities Center** Project No.: **AE99-045**

Date: **09-14-1999** Elev.: **NA** Location: **See Figure 1**

Depth to water at completion of boring: **Dry**

Depth to water when checked: **NA** was: **NA**

Depth to caving when checked: **NA** was: **NA**

ELEVATION/ DEPTH (feet)	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P.PEN tsf	UNCON tsf	Strain %
0	Hard tan CLAY w/ calcareous deposits									
								4.5+		
								4.5+		
5		19	59	24	35			4.5+		
	(CH)									
	Very stiff to hard tan & gray shaley CLAY w/ calcareous deposits & trace iron nodules	26						4.5+		
10										
								4.5		
15										
		21					110.2	4.5+	8.6	4.0
20										
								4.5+		
25										
		23						4.5+		
30										
								3.25		
35	-w/ calcite seams									

Notes: **Completion Depth: 60.0'**

FIGURE 7

LOG OF BORING B-4

Project: **North Activities Center** Project No.: **AE99-045**

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P.PEN tsf	UNCON tsf	Strain %
		(CH)							4.5+		
40		Hard tan & gray <u>shaley CLAY</u> w/ dark gray shale									
									4.5+		
45		(CH)									
		Very stiff to hard dark gray shale w/ traces of iron stains & calcite deposits	25						4.5		
50											
									3.25		
55											
									4.5+		
60		(CH)									
65											
70											
75											

Notes: **Completion Depth: 60.0'**

FIGURE 8

LOG OF BORING B-5

Project: **North Activities Center** Project No.: **AE99-045**

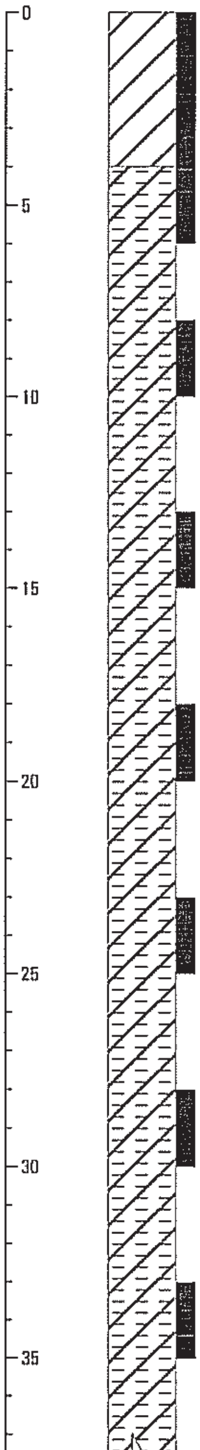
Date: **09-16-1999** Elev.: **NA** Location: **See Figure 1**

Depth to water at completion of boring: **Dry**

Depth to water when checked: **NA** was: **NA**

Depth to caving when checked: **NA** was: **NA**

ELEVATION/ DEPTH (feet) | SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA



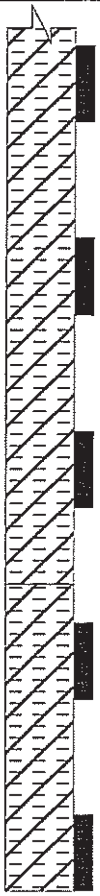
DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P.PEN tsf	UNCON tsf	Strain %
Hard tan & gray CLAY									
							4.5+		
(CH)							4.5+		
Hard tan & gray shaley CLAY									
	21	73	25	48			4.5+		
-w/ calcite deposits									
							4.5+		
	21						4.5		
	20					116.1	4.5+	12.9	1.7
							4.5+		
-w/ trace iron stains									
	21						4.5+		
							4.5+		
-w/ calcite seams									

Notes: **Completion Depth: 60.0'**

FIGURE 9

LOG OF BORING B-5

Project: **North Activities Center** Project No.: **AE99-045**



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P.PEN tsf	UNCON tsf	Strain %
		Hard tan & gray shaley CLAY							4.5		
40											
									4.5+		
		-w/ calcite seams									
45											
									4.25		
50											
		(CH)									
		Hard tan & gray shaley CLAY w/ dark gray shale									
									4.5+		
55											
									4.5+		
		(CH)									
60											
65											
70											
75											

Notes: **Completion Depth: 60.0'**

FIGURE 10

LOG OF BORING P-1

Project: **North Activities Center** Project No.: **AE99-045**

Date: **9-16-1999** Elev.: **NA** Location: **See Figure 1**

Depth to water at completion of boring: **Dry**

Depth to water when checked: **NA** was: **NA**

Depth to caving when checked: **NA** was: **NA**

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P.PEN tsf	UNCON tsf	Strain %
0		Hard tan & gray CLAY	12	41	19	22			4.5+		
		(CL)							4.5+		
5											

Notes: **Completion Depth: 5.0'**

FIGURE 11

LOG OF BORING P-2

Project: **North Activities Center** Project No.: **AE99-045**

Date: **9-16-1999** Elev.: **NA** Location: **See Figure 1**

Depth to water at completion of boring: **Dry**

Depth to water when checked: **NA** was: **NA**

Depth to caving when checked: **NA** was: **NA**

ELEVATION/ DEPTH (feet)	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P.PEN tsf	UNCON tsf	Strain %
0	Hard brown CLAY (POSSIBLE FILL) (CH)	12	57	22	35			4.5+		
	Hard grayish brown CLAY (CH)							4.5+		
5	Hard tan & gray shaley CLAY (CH)							4.5+		

Notes: **Completion Depth: 5.0'**

FIGURE 12

TERRA-MAR

LOG OF BORING P-3

Project: **North Activities Center** Project No.: **AE99-045**

Date: **9-16-1999** Elev.: **NA** Location: **See Figure 1**

Depth to water at completion of boring: **Dry**

Depth to water when checked: **NA** was: **NA**

Depth to caving when checked: **NA** was: **NA**

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P.PEN tsf	UNCON tsf	Strain %
0		Hard dark brown CLAY (CH)							4.5+		
		Hard grayish brown CLAY (CH)	12	51	22	29			4.5+		
5		Hard tan & gray shaley CLAY (CH)							4.5+		

Notes: **Completion Depth: 5.0'**

FIGURE 13

LOG OF BORING P-4

Project: **North Activities Center** Project No.: **AE99-045**

Date: **9-16-1999** Elev.: **NA** Location: **See Figure 1**

Depth to water at completion of boring: **Dry**

Depth to water when checked: **NA** was: **NA**

Depth to caving when checked: **NA** was: **NA**

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P.PEN tsf	UNCON tsf	Strain %
0		Hard dark brown CLAY	11	61	24	37			4.5+		
									4.5+		
		(CH)							4.5+		
5											
10											
15											
20											
25											
30											
35											

Notes: **Completion Depth: 5.0'**

FIGURE 14

KEY TO SYMBOLS

Symbol Description

Strata symbols

 GRAVEL, clayey

 CLAY

 CLAY, shaley

 CLAY, gravelly

 SHALE

 Fill

Misc. Symbols

 Boring continues

Soil Samplers

 Auger

 Thin Wall Shelby Tube

 No Recovery

Notes:

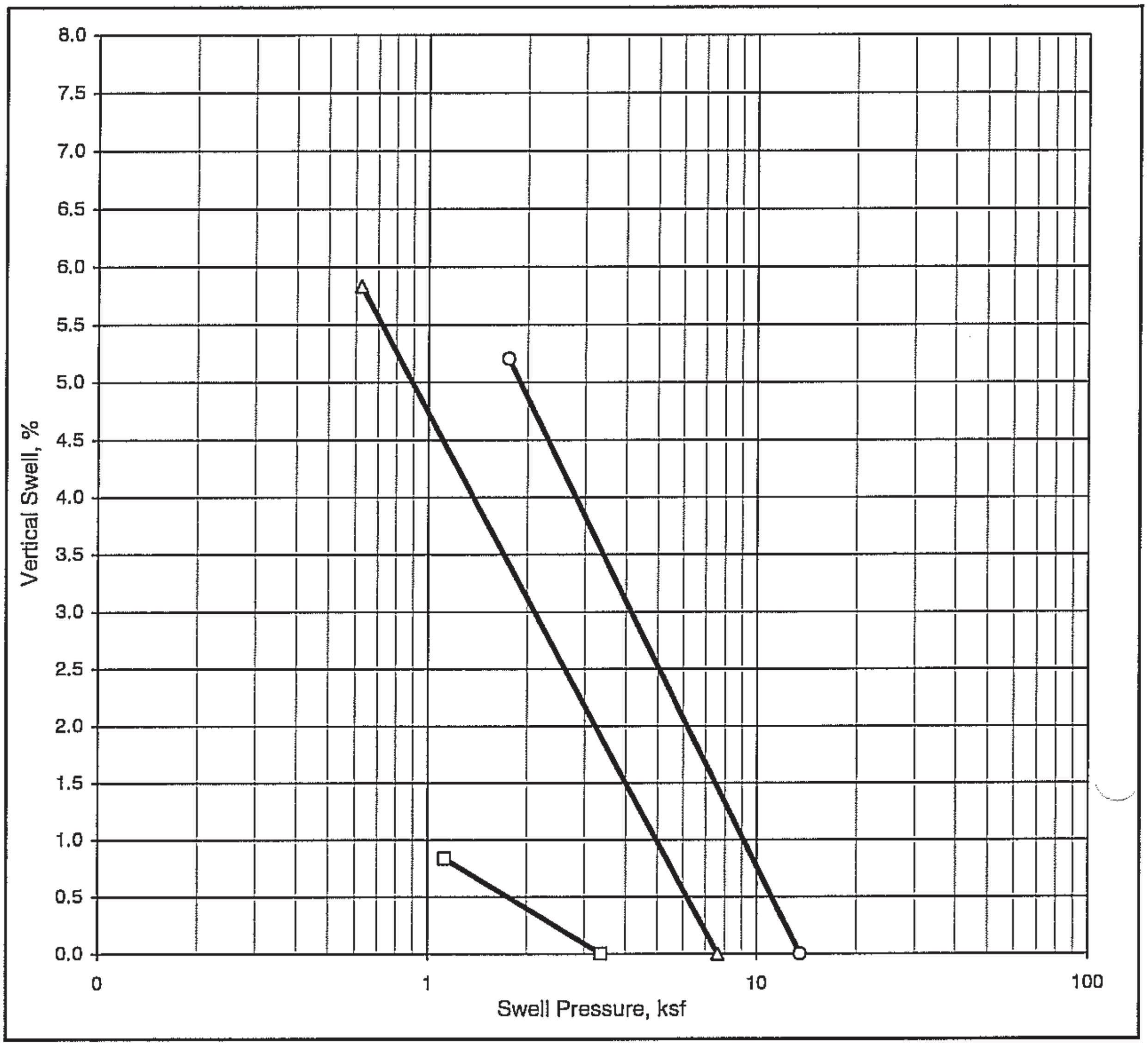
1. Exploratory borings were drilled on dates indicated using truck mounted drilling equipment.

2. Water level observations are noted on boring logs.

3. Results of tests conducted on samples recovered are reported on the boring logs. Abbreviations used are:

DD =	natural dry density (pcf)	LL =	liquid limit (%)
MC =	natural moisture content (%)	PL =	plastic limit (%)
Uncon.=	unconfined compression (tsf)	PI =	plasticity index
P.Pen.=	hand penetrometer (tsf)	-200 =	percent passing #200

4. Rock Cores
   - REC = (Recovery) sum of core sample recovered divided by length of run, expressed as percentage.
   - RQD = (Rock Quality Designation) sum of core sample recovery 4" or greater in length divided by the run, expressed as percentage.



Test Symbol	Boring No.	Sample Depth Feet	Unit Dry Weight pcf	Moisture Content Initial %	Moisture Content Final %	Liquid Limit %	Plastic Limit %	Swell Pressure Ksf	Vertical Swell %	Final Swell Pressure Ksf
—○—	B-1	13-15	102.4	23.0	28.1	76	25	13.47	5.20	1.75
—□—	B-3	8-10	103.9	25.4	26.8	69	26	3.38	0.84	1.13
—△—	B-5	4-6	101.8	21.5	28.8	73	25	7.61	5.8	0.62

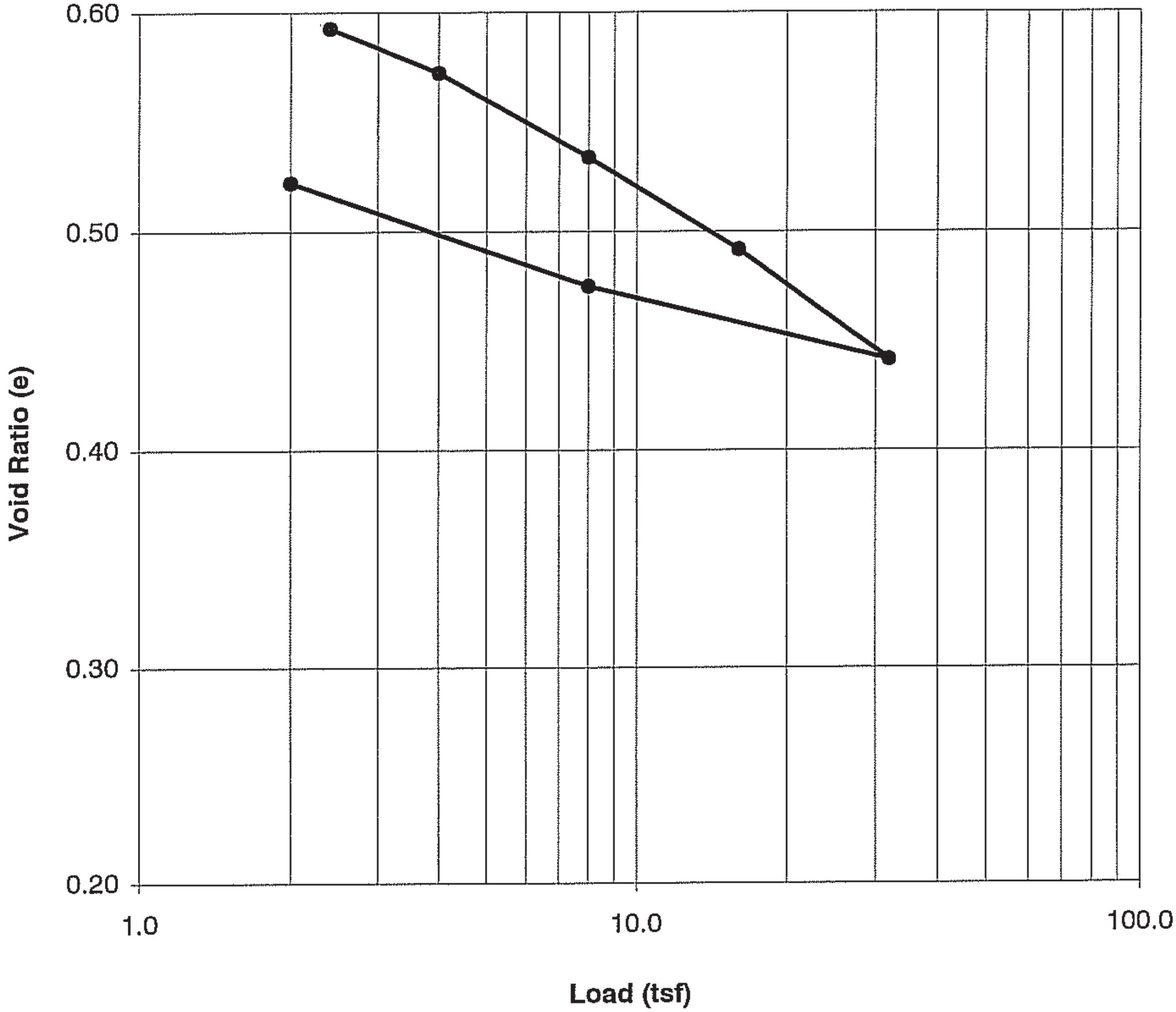
SWELL TEST RESULTS

North Activities Center

Austin, Texas

TERRA-MAR INC.

AE99-045 | **FIGURE 16**



Sample Information

Boring No.: B-1 Depth, ft.: 18'-20'

Material: Tan and Gray Shaley Clay

Test Results

Liquid Limit, %: N/A

Plastic Limit, %: N/A

Dry Unit Weight, pcf: 105.9

Initial Void Ratio: 0.5928

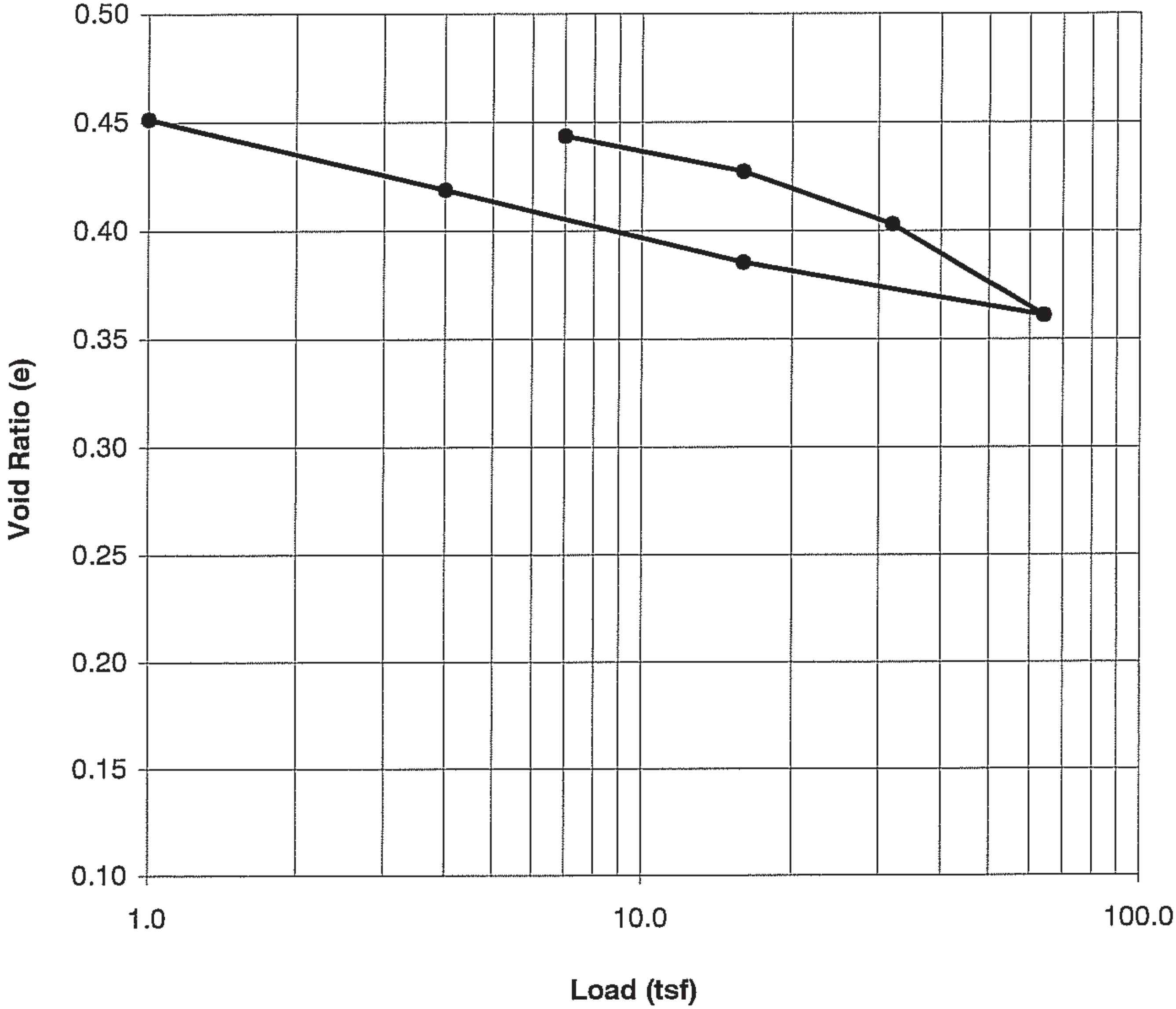
Intial Moisture Content, %: 19.9

Pre-Consolidation Pressure, tsf: 4.7

Compression Index Cc: 0.142

Re-Compression Index Cr: 0.0788

TERRA-MAR 11050 Ables Lane Dallas, Texas 75229 (972) 488-8800	North Activities Center Austin, Texas Project No.: **AE99-045**	**CONSOLIDATION TEST RESULTS** ASTM D2435-90	**FIGURE** **17**



Sample Information

Boring No.: B-5

Depth, ft.: 18'-20'

Material: Tan and Gray Shaley Clay

Test Results

Liquid Limit, %: N/A

Plastic Limit, %: N/A

Dry Unit Weight, pcf: 116.8

Initial Void Ratio: 0.4436

Intial Moisture Content, %: 16.3

Pre-Consolidation Pressure, tsf: 11.5

Compression Index Cc: 0.0807

Re-Compression Index Cr: 0.0556

TERRA-MAR 11050 Ables Lane Dallas, Texas 75229 (972) 488-8800	North Activities Center Austin, Texas Project No.: **AE99-045**	**CONSOLIDATION TEST** **RESULTS** ASTM D2435-90	**FIGURE** **18**