SECTION 31 22 13 - SITE GRADING

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. This Section pertains to the earthwork generally consisting of excavation, filling, backfilling and subgrade preparation as required for construction of site retaining walls/structures, slab on grade walks, pavement surfaces, landscaped areas and the general shaping of the site as shown, described or reasonably inferred on the drawings.

B. Subsurface data is available from the *Owner. Contractor is urged to carefully analyze the site conditions.

C. This section excludes work necessary for building pad preparations. Work within the building footprint and surrounding 5 feet shall be accomplished under technical specification 31 23 00 Excavation and Fill prepared by *STRUCTURAL ENGINEER].

D. Construction Means, Methods, Techniques, Sequences and Procedures:

1. The Contractor is solely responsible for, and has sole control over, construction means, methods, techniques, sequences and procedures, and for coordinating all portions of the Work.

2. Shoring that is required to complete the Work, is considered a method or technique and is the sole responsibility of the Contractor. If a regulatory agency requires a licensed engineer to design, approve or provide drawings for shoring, then it is the sole responsibility of the Contractor to engage the services of a qualified Engineer for shoring design services.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Drawings and general provisions of the Contract, including A-procurement and Contracting Requirements, Division 00 and Division 01 apply to this section.

B. Section 31 11 00 Clearing and Grubbing

C. Section 31 23 33 Trenching, Backfilling and Compaction

D. Section 31 25 13 Erosion and Sedimentation Control

E. Section 32 12 16 Asphalt Concrete Paving

F. Section 32 13 13 Concrete Paving

G. Section 31 23 00 Excavation and Fill

H. Contractor shall comply with all current, applicable codes and regulations, including the Uniform Building Code.

I. Contractor shall comply as applicable with Standard Specifications for Public Works Construction, Current Edition, including all City and County Amendments (herein after referred to as "Standard Specifications"). *[REVISE TO STATE SPECIFIC CITY AND COUNTY REGULATIONS]

J. Geotechnical Data: Subsurface data is available from the *Owner. Contractor is urged to carefully analyze the site conditions.

1.3 PERMITS

A. Prior to commencement of work, the Contractor shall be responsible for obtaining, at the contractors own expense unless otherwise specified in the Contract, Supplementary or General Conditions, all construction permits necessary to complete the site grading according to the plans and specifications.

1.4 APPLICABLE PUBLICATIONS

A. The following specifications of the latest issue listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent required by the references thereto.

1. Texas Department of Transportation 2004 Standard Specifications for Construction of Highways, Streets and Bridges (TxDOT).

*2. American Society for Testing and Materials (ASTM).

[THESE MAY CHANGE. REVIEW THE GEOTECH REPORT TO GET THE PROPER STANDARDS AND TESTING METHODS.]

a. D 698 Laboratory Compaction Characteristics of Soil Using Standard Effort.

b. D 1556 Density & Unit Weight of Soil in Place by the Sand-Cone Method.

c. D 1557 Laboratory Compaction Characteristics of Soil Using Modified Effort.
**[TO BE USED IF MODIFIED PROCTOR DENSITIES REQUIRED.]

d. D 4253 Maximum Index Density & Unit Weight of Soils using a Vibratory Table.

e. D 4254 Minimum Index Density & Unit Weight of Soils in Calculation of Relative Density.

f. D 2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths)

3. *[REFERNECE ANY LOCAL CODES OR REGULATIONS THAT PERTAIN TO THE PROJECT INTENT THAT THE CONTRACTOR NEEDS TO BE AWARE OF]

1.5 PROTECTION OF EXISTING UTILITIES AND ADJACENT WORK

A. Prior to earthwork operations, existing utilities, facilities and permanent objects to remain shall be located and adequately protected. Contractor shall contact the local utility

coordinating committee or the utility company involved to locate all public and private utility company lines.

B. If unknown and uncharted utilities are encountered during excavation, promptly notify Owner and the governing utility company when determinable and wait for instructions. Also refer to the University of Houston's Plant Operations Planned and Emergency Utility Outage Policy.

C. For private property utilities found, if it is ascertained by Owner that such utility line has been abandoned, properly cap line at a depth approved by Owner or remove line as directed. All work to cap and remove abandoned public utilities found, must be coordinated through the governing utility company.

D. If such unknown utilities are encountered and work is continued without contacting the Owner for instructions, and damage is caused to said utilities, Contractor shall repair, at his own expense, such damage to the satisfaction of the Owner and the Utility Company.

E. Refer to Specification section 31 11 00 for other site related items requiring protection.

1.6 DEFINITIONS

*[REVISE DEFINITIONS BELOW TO MEET PROJECT INTENT AND SCOPE]

A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.

B. Subgrade: The uppermost surface of an excavation, including excavation for trenches, or the top surface of a fill or backfill immediately below base course, pavement, or topsoil materials.

C. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from excavations.

D. Base Course: The layer placed between the subgrade and surface pavement in a paving system.

E. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the *Owner's rep. Unauthorized excavation, as well as remedial work directed by the Owner's Rep shall be at the Contractor's expense.

G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below ground surface.

H. Unforeseen Excavation: Excavation of material, regardless of its character or nature, below the subgrade elevation required to construct the work as indicated on the drawings or specified herein.

I. Geotechnical Engineer: Person or company contracted by the owner and/or through the architect to provide testing and onsite Geotechnical services during the construction schedule.

1.7 QUALITY ASSURANCE

A. Pre-Excavation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

B. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.

C. Testing and Inspection Service: Owner will employ a qualified independent geotechnical engineering testing agency to classify proposed on-site and borrow soil materials to verify that soils comply with specified requirements and to perform required field and laboratory testing. Contractor responsible to coordinate with the testing agency prior to start of work requiring testing so as to minimize unnecessary cost or delays to the project.

D. Testing:

1. Owner will retain and pay a qualified Geotechnical engineer to take all field samples and do all laboratory testing necessary to verify compliance of the work to these Specifications or as required by City or other regulatory agencies. The Geotechnical Engineer shall submit results of all testing done during the course of the work to the Owner, Architect, and Contractor.

2. Notify testing lab a minimum of 48 hours in advance of the time testing is required to satisfy requirements of this section.

3. Should testing specified above show work which does not satisfy these Specifications, the Contractor shall pay, through the Owner, for all additional tests required to determine the extent of work that is not satisfactory and for all additional tests necessary to demonstrate compliance with these specifications.

4. All tests shall be performed by the Soil Engineer in accordance with ASTM D 1557, D1556, D2922, D3017, or other test method selected by Geotechnical Engineer.

E. Certification: *[NOTE HERE ANY ITEMS THAT ARE NEEDED UPON COMPLETION OF WORK, IF NEEDED]

1.8 PROJECT/SITE CONDITIONS

A. *[USE THIS PARAGRAPH TO DESCRIBE THE PROJECT. VIRGIN SITE, PREVIOUSLY USED FOR BUILDINGS, ROADWAYS, UTILITIES, ETC. PROVIDE THE BIDDER/CONTRACTOR WITH AN EXPLANATION OF WHAT WE KNOW OF THE SITE AND WHAT WE EXPECT HE MAY ENCOUNTER. ALSO INCLUDE ANY PARTICULAR WORK CONDITIONS THAT THE OWNER OR THE AREA MIGHT IMPOSE (DIFFERENT THAN ANOTHER PROJECT).]

1.9 SUBMITTALS

A. Samples: Submit samples of all materials used for Architect's approval wherever specified or as directed by the Architect.

B. Shoring and Slope Protection Design:

1. Prior to beginning any excavation, submit certification to the Architect that the proposed shoring and slope protection system has been accepted and approved by all

governing jurisdictions. Certification shall be signed and sealed by the engineer of record for the shoring design.

2. Provide signed letter from the Geotechnical Engineer stating that the proposed design complies with the recommendations of geotechnical reports.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Fill materials and sources must be approved by the Owner. The Contractor is responsible for providing adequate samples and testing results to the Owner for testing and approval.

B. Select fill per 2.2 shall be used beneath all site retaining walls and site structures where fill material is required to achieve the grades and elevations on the plans.

C. General fill per 2.3 material shall be used for fill in landscaping areas not supporting structures. Topsoil per 2.4 shall be spread over landscape areas as needed.

D. Fill material beneath paving can be per 2.2 and 2.3. Regardless of the fill material used, subgrade treatment shall be chemically stabilized for the thickness specified and detailed in the drawings.

E. Material excavated onsite may be used as fills, with prior Geotechnical Engineer approval.

1. Site Materials:
*[REVISE THIS SECTION AS NEEDED TO MEET PROJECT SPECIFICS IN GEOTECHNICAL REPORT]
a. Onsite fill materials shall be free of organic or deleterious products.

b. *[USE THIS PART TO DESCRIBE HOW EXISTING MATERIALS ON SITE CAN BE USED PER GEOTECHNICAL REPORT. THE FOLLOWING IS AN EXAMPLE FROM A SPECIFIC PROJECT] (*Soils derived from the existing fills, and the Lindavista formational soils, are generally suitable for use in engineered fills. However, materials containing significant quantities of cobbles and boulders may require mixing with finer-grained on-site material to obtain gradations for fill soils that meet project specifications for use as engineered structural fill. Discontinuous residual clay soils may be encountered beneath the fill. These soils are considered potentially expansive and/or compressible and therefore are unsuitable for the direct support of structures. Selective grading of these soils is recommended, if encountered, and these materials shall be removed from the site or well mixed into nonstructural fills.)*

c. Moisture content of existing soils may require adjustment for compaction approval.

2.2 SELECT FILL

A. The select fill shall consist of sandy clay, lime stabilized clays or clean sand, uniformly graded and free of objectionable material. ***[COORD WITH GEOTECHNICAL REPORT AND REVISE PREVIOUS SENTENCE AS NEEDED. THEN DELETE 1, 2, AND/OR 3 AS NEEDED TO MEET

PROJECT INTENT. WE TYPICALLY DO NOT WANT SAND BENEATH PAVEMENT AT ANY TIME BUT THERE COULD BE REASONS THAT IT IS NEEDED ON THE PROJECT]

1. Sandy Clay Fill: Sandy clay fill shall have a plasticity index between 10 and 20. The fill materials shall be placed in loose lifts not exceeding eight (8) inches in height and compacted to 95 percent of Standard Maximum Density at the proper moisture content for that soil type as defined by ASTM D 698.

2. Lime Stabilized Clay Fill: [CHEMICALLY STABILIZED SOILS ARE TYPICALLY USED WHEN SANDY CLAY FILL IS AVAILABLE ON SITE OR NOT COST EFFECTIVE TO USE OR BRING TO THE SITE] Lime clays may be stabilized in place or mixed with lime at another location on the site and placed and compacted. Lime stabilization shall be performed in accordance with Section 31 32 13.29 "Lime Stabilization" or 31 32 13.26 Lime-Fly Ash or Fly Ash Stabilization. The percent of lime to be used shall be determined by the testing laboratory at the source prior to acceptance of the material for fill. The material shall be placed in loose lifts not exceeding eight (8) inches in thickness and compacted to 95 percent of Standard Maximum Density at the proper moisture content for that soil type as determined by ASTM D 698.

3. Clean Sand Fill: Clean sand fill is defined as having less than 12 percent passing the No. 200 sieve and less than 12 percent retained on the No. 10 sieve and having a plasticity index below 10. Clean sand fill should be placed in loose lifts 12 inches thick and compacted using vibratory equipment to at least 80 percent relative density as determined by ASTM D 4253 and ASTM D 4254 or other equivalent test method. Where determined necessary by the Owner's testing laboratory or Geotechnical engineer, cement stabilization will be required. [DO NOT USE DIRECTLY BENEATH PAVEMENT AT ANY TIME. CLEAN SAND IS TYPICALLY NOT DESIRED IN AREAS WHERE THE UNDERLYING SOILS ARE EXPANSIVE CLAYS OR OTHER MATERIALS THAT MOISTURE WOULD CAUSE TO MOVE OR LOOSE SRTENGTH. DO NOT INCLUDE UNLESS COORDINATED WITH THE GEOTECH AND SRTUCTURAL ENGINEER. DO NOT USE DIRECTLY BENEATH PAVEMENT AT ANY TIME.]

2.3 GENERAL FILL

A. General fill material shall be used for fill in landscaping areas not supporting structures, but may be used beneath pavement where approved by the Engineer. General fill material may be any native soil free of debris, trash, rocks over 2 inches in diameter and other objectionable material. General fill shall be placed and compacted in lifts not exceeding 12" in thickness to 95 percent standard density as defined by ASTM D 698. Where called for by the plans or by the landscape specifications, the fill shall be kept sufficiently low to accommodate the proper depth of topsoil and related sod or other vegetation.

2.4 TOPSOIL

A. Topsoil material shall be native earthen material suitable for growth of vegetation such as silty and sandy loams. The site stripings may be used as topsoil unless otherwise dictated by the Owner. Topsoil shall be spread over landscape areas to a depth of 4 to 6 inches and compacted to 85 percent of standard density ASTM D 698. Stockpiling of Topsoil may not exceed 6 feet in height.

2.5 SPECIAL DRAINAGE MEDIA

A. All Retaining Wall backfill material shall be clean open-graded crushed rock or gravel, maximum 3/4" particle size in accordance with the Standard Specifications and detail in the geotechnical report.*[STATE HERE IN THIS PREVIOUS STATEMENT WHERE THE DETAILS CAN BE FOUND ie IN THE PLANS, IN THE GEOTECH REPORT, ETC]

B. Drainage Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:

1. Grab Tensile Strength: 110 lbf; ASTM D 4632.

2. Tear Strength: 40 lbf; ASTM D 4533.

3. Puncture Resistance: 50 lbf; ASTM D 4833.

4. Water Flow Rate: 150 gpm per sq. ft.; ASTM D 4491.

5. Apparent Opening Size: No. 50; ASTM D 4751.

C. Approved Materials

1. Mirafi 140 filter fabric

2. or acceptable substitution.

PART 3 - EXECUTION

3.1 PREPARATION

A. Inspection:

1. Prior to performing the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where work may properly commence.

2. Verify that work may proceed in complete accordance with the design.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the *[Architect, Engineer].

C. General

1. Use all means necessary to control dust on or near the site resulting from the performance of the Work. Thoroughly moisten all surfaces to prevent dust being a nuisance to the public, adjacent uses, and concurrent work on site. Moisture level

during compaction operations shall not exceed that amount as specified by Geotechnical Engineer.

2. Verify existing grades and dimensions before starting any grading operations. If any discrepancy exists, notify Architect immediately.

3. Use all means necessary to protect all existing features, products, or items designated to remain, as well as all work of this Section. In the event of damage, repair or replace immediately to the approval of and at no additional cost to the Owner.

4. Protect and maintain existing benchmarks throughout the course of the work. Reestablish monuments or stakes disturbed or destroyed during the course of the Work at no additional expense to the Owner.

5. Conduct work so as to avoid injury to persons and damage to adjacent property. Provide appropriate shoring, bracing and barriers, including light when necessary.

6. Coordinate operations with, and provide access to, the Geotechnical Engineer or designated representative during demolition and construction for purposes of testing, investigation and inspection.

D. Preparation

1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
2. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3. Protect subgrade from excessive drying or excessive moisture.

3.2 EXCAVATION

A. General - Contractor shall complete all excavation required regardless of the variations in hardness, type, or density of materials encountered, to the dimensions and elevations shown on the drawings. When unsatisfactory material is uncovered, that material shall be removed and replaced with select fill, the extent of such excavation to be directed by the Owner. Unsatisfactory material shall be removed to the stockpile area or from the site as directed by the Owner. Payment for over excavation directed by Owner shall be paid as directed in Division 01 Specifications

1. Unclassified Excavation: Excavation is unclassified and includes excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.

a. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

b. Remedial work due to over-excavation including provision of suitable and stable backfill meeting the degree of compaction required shall be at the Contractor’s expense.

2. Borrow Material: If excavated materials of a suitable nature are not of sufficient quantity to complete the work, contractor may provide borrow material in sufficient quantity to complete the work at Owner's approval at no additional cost to the Owner.

3. Disposing of Excavated Material: Dispose of excess satisfactory soil material and all unsatisfactory soil material and rock obtained from excavations in accordance with the provisions of this Section. [IF KNOWN AT TIME OF EDITING SPECS, EXPAND THIS SECTION TO INCLUDE ANY PROJECT SPECIFIC DIRECTION TO CONTRACTOR REGARDING STOCKPILING, DISPOSAL, ETC]

B. Excavation for Pavement

1. The material exposed after excavation shall be scarified to a depth of six (6) inches and compacted to at least 95 percent of Standard (ASTM D 698) Maximum Density within **minus 3 to plus 5 ** percent of

[**COORDINATE WITH THE GEOTECH REPORT. IF COHESIONLESS SOIL IS USED FOR SUBGRADE SUCH AS SAND, USE ASTM D 4253 AND ASTM D 4254 INSTEAD OF ASTAM D698 AND REDUCE DENSITY REQUIREMENTS TO 80 PERCENT RELATIVE DENSITY.]

optimum moisture content of the soil. ***Where necessary to achieve the required compaction, stabilization methods as outlined in paragraph 3.2.B.4 of this specification shall be used.

[***IF STABILIZATION IS ALWAYS TO BE REQUIRED, OMIT "WHERE NECESSARY"]

2. Excavation required beneath pavement sections shall comply with elevations and dimensions shown on the plans and detailed sections within a tolerance of plus or minus 0.10 foot. Contractor shall take care not to disturb areas that are designated to be protected or are outside the construction limits. Excavated areas shall be kept free of ground and surface water.

C. Cut Slopes and Ditches

1. Slopes and grades of ditches shall conform to the plans within a tolerance of plus or minus 0.10 foot. No exposed slopes shall be steeper than three feet horizontal to one foot vertical. Where slope protection is specified or called out on the plans, said protection shall be placed as soon as practical, after exposing the slope. Erosion and sedimentation controls shall be implemented in all cut areas as specified in Section 31 25 13 Erosion and Sedimentation Control.

3.3 FILL AND BACKFILL

A. Placement

1. Fill material shall be placed in loose lifts not exceeding eight (8) inches for areas beneath site structures and pavement, and twelve (12) inches for landscape areas not supporting structures. Fill areas shall be compacted to 95 percent of Standard Maximum Density at the proper moisture of that soil as defined by ASTM D 698.

2. Each lift shall be thoroughly compacted and shall have obtained satisfactory density prior to proceeding with the next lift.

3. The top six (6) inches of material beneath vehicular pavement shall be * stabilized after placement as shown in the details. . *[THERE ARE TIME, PLACES AND SITUATIONS WHERE STABILIZATION OF THE TOP 6 INCHES MAY NOT BE REQUIRED. COORD WITH THE PROJECT INTENT AND GEOTECH REPORT AND REVISE 3.2.A.3 AS NEEDED]

4. Material shall be free of trash and rocks over three (3) inches in diameter.

5. Fill shall be brought up to the proper elevations as determined from the lines, grades, sections and elevations shown on the plans.

B. Site Retaining Wall/Structure Backfill:

1. Place granular material as engineered backfill at all building and site retaining walls.

2. For precast site retaining walls, install specified gravel and filter fabric prior to backfill installation. Position according to manufacturers recommendations

3. Place in accordance with applicable portions of the Standard Specifications.

4. Compact per approved methods, using hand operated compaction equipment. Compact to at least 90% per ASTM D1557.*[REVISE AS NEEDED TO FIT PROJECT AND CONFORM TO GEOTECHNICAL REPORT]

C. Compaction and Finishing

1. Suitable compaction equipment commonly used to meet the requirements for this type of compaction work should be used.

2. The finished surface shall be reasonably smooth, compacted, and free from irregular surface changes. The surface grade shall be consistent with the drainage intent shown on the plans such that no unwanted ponding shall occur.

3. Surface shall not be more than 0.10 feet above or below the established grade, and all ground surfaces shall vary uniformly between indicated grades.

4. Cut material from the site may be used for fill material if approved by Owner. Where cut material is used as fill, each lift of such material shall be properly mixed to obtain a uniform material, with clay being the predominant material when mixed with silt, maintaining a plasticity index less than 20.

[*COORDINATE THIS WORK THE PROJECT INTENT AND GEOTECH REPORT.]

a. Lime stabilization shall be used for clay material and shall conform to Section 31 32 13.19 - Lime Stabilization or 31 32 13.26 Lime-Fly Ash or Fly Ash Stabilization.

b. Cement stabilization shall be used for sandy or silty materials and shall conform to Section 31 32 13.16 - Cement Stabilization.

3.4 EROSION & PROTECTION

A. There shall be at all times adequate protection to newly graded areas to prevent soil erosion as provided in Section 31 25 13, Erosion and Sedimentation Control.

B. Soil erosion that occurs prior to acceptance of the work shall be repaired at no expense to the Owner.

C. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

D. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Owner's Testing and Inspection Service; reshape and re-compact.

E. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.5 GRADING

A. Rough Grading

1. Cut and fill shall be left sufficiently high to require cutting by fine grading.

2. Grade to subgrade depths required for construction of finished surface materials and for controlled internal drainage of site.

B. Fine Grading

1. Fine grading shall conform to elevations required to insure finished elevations as indicated on the drawings.

2. Provide a smooth transition between adjacent existing grades and new grades

C. Slope grades to direct water away from buildings and to prevent ponding at a minimum of 5% grade for the initial 20 feet, as shown on the drawings or as directed by architect. Maximum cross slope for all walkways shall be 2% for disabled access. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 0.1 foot (1.2 inches)

2. Walks: Plus or minus ½ inch

3. Pavements: Plus or minus ½ inch

3.6 TESTING AND INSPECTION

A. Testing of Materials and Installed Work

1. Materials and installed work require testing to show that the specifications for the materials and work have been met. The Owner may, at the Owner's expense, take random tests on materials and installed work. The Contractor shall allow free access to material stockpiles and facilities at all times. In fill areas each lift must be tested and approved before proceeding on the next lift. Tests, not specifically indicated to be done at Owner's expense including the retesting of rejected materials and installed work, shall be done at the Contractor's expense.

a. Testing to be provided by Owner

i. All tests

b. Testing to be provided by Contractor

i. All retesting for areas failing the first test.

B. Contractor shall notify Owner's testing laboratory 24 hours in advance of beginning any earth work operations and coordinate testing schedules to meet these specifications.

C. Maximum density tests per ASTM D 698 shall be taken on all fill materials at a rate of one test for each type of soil to be used and at least one test for every 1000 cubic yards of fill.

D. Field density tests per ASTM D 1556 or ASTM D 2922 shall be taken on all fill material at a rate of one test for every 10,000 square feet and at least one test per lift.

E. All imported fill material shall be approved prior to importing.

3.7 DUST ABATEMENT

A. The Contractor shall comply with applicable Federal, State, and local laws and regulations concerning the prevention and control of dust pollution.

B. During the performance of the work required by these specifications or any operations appurtenant thereto, whether on right-of-way provided by the Owner or elsewhere, the Contractor shall furnish all the labor, equipment, materials, and means required, and shall carry out proper and efficient measures wherever and as often as necessary to reduce the dust nuisance, and to prevent dust which has originated from the contractor's operations from damaging crops, orchards, cultivated fields, and dwellings, or causing a nuisance to persons. The Contractor will be held liable for any damage resulting from dust originating from the contractor's operations under these specifications.

*C. Dust Control shall be accomplished by one of the following methods:
[*THIS MAY BE DELETED OR MODIFIED BASED UPON PROJECT NEEDS.]

1. Whenever ordered by the Owner, the Contractor shall furnish and distribute over the traveled road surfaces, which have not yet been fully restored, an application of

Calcium Chloride. The material used shall be Regular Flake Calcium Chloride having a minimum chemical content of Calcium Chloride of 77%. Unless otherwise specified or ordered by the Owner, rate of application shall be three (3) pounds per square yard of surface covered.

2. Whenever ordered by the Owner, the Contractor shall apply on traveled road surfaces "Bituminous Surface Treatment" in accordance with the current Texas Standard Specifications for Construction of Highways, Streets and Bridges.

D. The cost of sprinkling or of other methods of reducing formation of dust shall be included in the prices bid in the schedule for other items of work.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

2. Stockpile Topsoil may not exceed 6 feet in height.

3.9 FIELD QUALITY CONTROL

A. General: Testing shall be the responsibility of the Owner and costs of initial testing shall be paid by Owner. Cost of all subsequent testing necessary due to non-compliance with specifications shall be paid by Contractor.

B. Density Test:

1. Density tests shall be performed by an approved commercial testing laboratory approved per ASTM D 1557.

2. Tests shall be performed in accordance with the referenced Standards.

3. Field and laboratory tests for moisture-density relations shall be determined in accordance with ASTM D 1557. The frequency and location of field density tests will be determined by the Geotechnical Engineer.

4. Trenches improperly compacted shall be reopened to the depth directed, then refilled and compacted to the density specified at no additional cost to the Owner.

3.10 DRAINAGE CONTROLS

A. Provide all necessary temporary apparatus, pumps, curbs or ditches as required to divert or convey water from any source away from the Work. Do not allow water from any source to accumulate within or damage earthwork.

END OF SECTION