

SECTION 31 32 13.19 - LIME STABILIZATION

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This Section specifies the requirements for treating and stabilizing existing subgrade material or select fill material under pavements or site structures as shown on the drawings, by pulverizing, adding lime, and finishing to the lines and grades shown on the drawings and constructed as specified herein.
- B. 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**].

1.2 APPLICABLE PUBLICATION

The following publications of the latest issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by references thereto:

- A. Texas Department of Transportation 2004 Standard Specifications for Construction of Highways, Streets and Bridges (TxDOT):
 - 1. Item 260 - Lime Treatment (Road Mixed).
 - 2. Item 263 – Lime Treatment (Plant Mixes)
- B. Texas Department of Transportation Departmental Material Specifications (DMS) latest edition.
 - 1. DMS 6350 – Lime and Lime Slurry
- C. American Society for Testing and Materials Standards (ASTM):
 - 1. D 698-07e1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Efforts (12,400 ft-lbf/ft³ (600 kN-m/m³))
 - 2. D 1556-07 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

1.3 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 22 13 – Site Grading
- D. Section 32 12 16 – Asphalt Concrete Pavement
- E. Section 32 13 13 – Concrete Pavement

1.4 DEFINITIONS

- A. 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.
- B. Backfill: Soil material or controlled low-strength material used to fill an excavation.
- C. Base Course: The layer placed between the subgrade and surface pavement in a paving system.
- D. 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.

1.5 SUBMITTALS

- A. None required for this section.

1.6 PROJECT CONDITIONS

***[PROVIDE A NARRATIVE IN THIS SECTION IF THE PROJECT SCOPE REQUIRES SUCH. IF NOT, NOTE (NOT USED) NEXT TO 1.6 PROJECT CONDITIONS]**

1.7 QUALITY ASSURANCE

- A. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.
- B. 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.
- C. 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 Geotechnical Engineer in accordance with ASTM D 698, D1556, or other test method selected by Geotechnical Engineer.

PART 2 - PRODUCTS

2.1 LIME SLURRY

- A. Lime slurry for use in treating the subgrade shall conform to the chemical and physical requirements listed in Tables 1 and 2 of TxDOT Departmental Material Specification (DMS) 6350 for Commercial Lime Slurry. Lime Slurry may be prepared at the job site or other Owner approved location by using Hydrated Lime or Quicklime as specified by chemical and physical requirements in Tables 1 and 2 of TxDOT Departmental Material Specifications (DMS) 6350.

2.2 WATER

- A. Water used for mixing or curing shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable matter or other substances injurious to the finished product.
- B. Water sources other than the local municipal domestic water supply must be approved by the Owner.
- C. If onsite reclaimed water sources are used, tanks and apprenices must be clearly marked with the words "non-potable" water.

2.3 SOIL

- A. Soil should be a clayey type soil, free of organic material, large rocks and other unsuitable materials with a plasticity index greater than 15 and a liquid limit in excess of 30. The soil should not contain more than twenty percent sands or silts.

PART 3 - EXECUTION

3.1 GENERAL

- A. Construction methods shall conform to the applicable specifications of the TxDOT specifications, Item 260, Lime Treatment.
- B. Lime shall be spread only on that area where the first mixing operations can be completed during the same working day.

3.2 APPLICATION

- A. The percent of lime to the dry weight of the soil shall be a minimum of **five (5)** percent. Refer to the Project Geotechnical Report.

[*CHECK WITH GEOTECHNICAL REPORT FOR EXCEPTIONS.]

- B. The lime shall be mixed with water in trucks with approved distributors and applied as a thin water suspension or slurry.
- C. The distribution of lime shall be uniformly placed in such quantity that all soil to be treated receives the minimum percentage of lime and successive passes made until the proper moisture and lime content is obtained.

- D. The distributor truck shall be equipped with an agitator which will keep the lime and water in uniform mixture unless the prescribed consistency can be otherwise maintained. If an agitator is not used, a standby pump shall be available at the site for agitating the lime and water in case of delays in dispersing the slurry.

3.3 MIXING

- A. The material and lime shall be thoroughly mixed by approved road mixers until a homogeneous, friable mixture of material and lime is obtained, free from all clods or lumps.
- B. Immediately after the "first mixing" operation, the mixture shall be brought to the proper moisture content and sealed with a light pneumatic rubber tire roller and left to cure for 1 to 4 days, as directed by the Owner. If rework is required to obtain compaction after 72 hours of the last mixing, add 25% of the specified rate of lime.
- C. After curing time the material shall be uniformly mixed. All clods shall be reduced in size by raking, blading, discing, harrowing, scarifying or other approved method.

3.4 COMPACTION

- A. Compaction of the mixture shall begin immediately after final mixing and in no case later than 3 calendar days after final mixing.
- B. The moisture content at time of compaction shall be at optimum to 4 percent above optimum.

***[CHECK GEOTECHNICAL REPORT AND REVISE IF NEEDED]**

- C. The mixture when used as pavement subgrade shall be compacted by sheepsfoot rollers or 25 ton pneumatic self-propelled rollers until a minimum density of 95 percent of Standard Maximum Density (ASTM D-698-07e1) is obtained.
- D. The mixture when used for support of a building slab or foundation shall be compacted by the same method above until a minimum density of 90 percent of Standard Maximum Density (ASTM D-1557-07) is obtained.

3.5 FINISHED SUBGRADE GRADING

- A. Surface of the subgrade shall not show any deviation in excess of 1/4 inch above or one inch below established subgrade elevation. Thickness of the finished subgrade shall be at least the thickness shown on the plans within ¼ inch tolerance and can exceed the thickness shown on the plans as needed to meet the needs of the project.
- B. The surface shall be uniform and smooth without large clumps or voids.

END OF SECTION