

## **SECTION 31 32 23 PRESSURE GROUTING SOIL STABILIZATION**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

This section covers the application of lime slurry into the ground at specified intervals //within 3000 mm (10 feet)// on either side of the new road for the entire length of the new road.

#### **1.2 EQUIPMENT**

- A. Equipment shall be suitable for the work, as approved by the testing lab. Equipment shall be constructed to provide a positive seal for preventing the slurry from flowing out onto the ground and shall have controls and gauges for setting of pressure and determination of pressure.
- B. Packers of an acceptable type and length with a minimum diameter of 100 mm (4 in.) shall be utilized by the Contractor to prevent slurry from flowing out onto the ground surface.
- C. Mixer tanks shall be approved by the testing lab and shall be continuously agitated to insure uniformity of mixture.

#### **1.3 RELATED WORK:**

- A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Safety requirements: Section 00 72 00, GENERAL CONDITIONS, Article, ACCIDENT PREVENTION.
- C. Protection of existing utilities, fire protection services, existing equipment, roads, and pavements: Section 01 00 00, GENERAL REQUIREMENTS.
- D. Subsurface Investigation: Section 01 00 00, GENERAL REQUIREMENTS, Article, PHYSICAL DATA.

#### **1.4 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. Texas Department of Transportation (TxDOT):  
English Specifications Book, Item 264 (1993: Lime and Lime Slurry)
- C. American Society for Testing and Materials (ASTM):  
D1586.....Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils.

## 1.5 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Lime Slurry Mix Design: Provide the lime slurry mix design along with a Plan of work including equipment and methods to be used for approval by the Resident Engineer.
- C. Certificates: Submit a letter certifying the subcontractor has been engaged in similar work for a minimum of 5 years.

## PART 2 - PRODUCT

### 2.1 LIME SLURRY

- A. The lime slurry shall be pumpable suspension of hydrated lime in water. The water or liquid portion of the slurry shall not contain dissolved material in sufficient quantity and/or nature injurious or objectionable for the purpose intended. The solids portion of the mixture, when considered on the basis of "solids contents", shall consist principally of hydrated lime of a quality and fineness sufficient to meet TxDOT Item 264, Type A as to chemical composition and residue.
- B. Proportion lime slurry within the range of 300 to 350 kg/m<sup>3</sup> (2-1/2 to 3 pounds per gallon) water of hydrated lime. Check specific gravity of slurry with Ertco Hydrometer No. 2545 or equivalent. Specific gravity readings shall range from 1.14 to 1.16.
- C. A surfactant (wetting agent) approved by the testing lab shall be used in the lime slurry, according to manufacturer's recommendations, but in no case shall proportion be less than one part per 5.7 m<sup>3</sup> (1500 gallons) of water.

## PART 3 - EXECUTION

### 3.1 PROCEDURE

- A. Shape the subgrade rough to designed grades and scarified or plowed so that excess slurry will be trapped within the specified limits.
- B. Pre-drill holes to accommodate the Contractor's inflatable packers to 900 mm (3 feet). The spacing for injections shall not exceed 1500 mm (5 feet) on center in each direction, and extend a minimum of 3000 mm (10 feet) beyond the limits of the new asphalt road and concrete curb and gutter.
- C. Set and inflate packer or seal holes.
- D. Inject each hole through a packer at a minimum pressure of 350 kPa (50 psi) and a maximum of 1400 kPa (200 psi) pump pressure, adjusted to disperse the maximum possible volume of slurry, and continue to inject slurry to refusal, as defined by the testing lab.
- E. Continuously agitate the lime slurry to insure uniformity of mixture. Specific gravity checks shall be made at both mixer tanks and at injectors no less than one test per four hours of agitation.

- F. The Contractor shall insure that excess lime slurry is applied evenly across the scarified or plowed sub-grade during the stabilization process. The excess slurry ponded on the ground surface shall be scarified into the soil and the soil-lime mixture re-compacted to sub-grade specifications prior to placement of fill, if required.

### **3.2 INSPECTION AND CONTROL**

- A. The work shall be under the direct inspection of a representative of the testing lab who will measure the specific gravity of the mixture, determine suitable operation of the equipment used, and determine the point of injection refusal.
- B. Acceptance of the soil stabilization shall be on the basis of continuous on site inspection and testing by a representative of the testing lab. At the testing labs discretion, on site testing may include before and after testing of the sub-grade soils to evaluate the stabilization process. After tests will typically be performed at seven days after injection to assure interaction with the lime and soil mixture. Typical tests may include standard penetration tests in accordance with ASTM D1586 or similar test as considered applicable by the testing laboratory. The Contractor may be required to inject portions of the site with lime slurry more than once to meet the approval of the testing lab.
- C. The testing lab shall be provided weight certificates of all lime delivered to the site for use in stabilization.

**END OF SECTION 31 32 23**