

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

SPEC WRITER NOTE: Use this section only
for NCA projects. Delete text between
// _____ // not applicable to project.
Edit remaining text to suit project.

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Lime slurry application into ground at specified intervals // within 3000 mm (10 feet) // on either side of new road for entire length of new road. //

1.2 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
 1. C977-10 - Quicklime and Hydrated Lime for Soil Stabilization.
- C. D1586-11 - Standard Penetration Test (SPT) and Split-Barrel Sampling.

1.3 PREINSTALLATION MEETINGS

- A. Conduct preinstallation meeting at project site minimum 30 days before beginning Work of this section.

SPEC WRITER NOTE: Edit participant list
to ensure entities influencing outcome
attend.

1. Required Participants:

- a. Contracting Officer's Representative (COR).
- b. // Architect/Engineer. //
- c. // Inspection and Testing Agency. //
- d. Contractor.
- e. Installer.
- f. // Manufacturer's field representative. //
- g. Other installers responsible for adjacent and intersecting work, including // _____ //.

SPEC WRITER NOTE: Edit meeting agenda to
incorporate project specific topics.

2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.

- a. Installation schedule.
 - b. Installation sequence.
 - c. Preparatory work.
 - d. Protection before, during, and after installation.
 - e. Installation.
 - f. Terminations.
 - g. Transitions and connections to other work.
 - h. Inspecting and testing.
 - i. Other items affecting successful completion.
3. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.4 SUBMITTALS

- A. Submit according to Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Show size, configuration, and installation details.
- C. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Application instructions.
- D. Qualifications: Substantiate qualifications comply with specifications.
 - 1. Installer with project experience list.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Regularly installs specified products.
 - 2. Installed specified products with satisfactory service on five similar installations for minimum five years.
 - a. Project Experience List: Provide contact names and addresses for completed projects.
- B. Preconstruction Testing:
 - 1. Engage independent testing laboratory to perform tests and submit reports.

1.6 WARRANTY

SPEC WRITER NOTE: Always retain construction warranty. FAR includes Contractor's one year labor and material warranty.

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

PART 2 - PRODUCTS**2.1 SYSTEM DESCRIPTION**

- A. Lime slurry application to chemically transform unstable soils to provide strong and stable base in road construction.

2.2 LIME SLURRY

- A. Lime Slurry: Pumpable suspension of hydrated lime in water.
 - 1. Water: May not contain dissolved material in sufficient quantity and/or nature injurious nor objectionable for the purpose intended.
 - 2. Solids: Hydrated lime of quality and fineness sufficient to meet ASTM C977, for chemical composition and residue.
- B. Proportion: 300 to 350 kilograms per cubic meter (2-1/2 to 3 pounds per gal.) hydrated lime to water. Check specific gravity of slurry with Ertco Hydrometer No. 2545 or equivalent. Specific gravity readings to range from 1.14 to 1.16, which is dimensionless ratio of fluid's density to standard reference density.
- C. Surfactant: Include wetting agent approved by testing lab in lime slurry, according to manufacturer's recommendations, but in no case less than one part per 5.7 cubic meters (1500 gallons) of water.

2.3 EQUIPMENT

- A. Equipment: Suitable for work, as approved by the testing lab, constructed to provide positive seal to prevent slurry from flowing out onto ground, with controls and gauges for setting and determining pressure.
- B. Packers: Acceptable type and length, minimum 100 mm (4 inches) diameter, to prevent slurry from flowing out onto ground surface.
- C. Mixer Tanks: Approved by the testing lab and continuously agitated to ensure uniformity of mixture.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Shape subgrade rough to designed grades and scarified or plowed so excess slurry will be trapped within specified limits.
- B. Pre-drill holes to accommodate inflatable packers to 900 mm (3 feet). Provide injection spacing maximum 1500 mm (5 feet) on center in each direction and extend minimum 3000 mm (10 feet) beyond limits of new asphalt road and concrete curb and gutter.
- C. Set and inflate packer or seal holes.

3.2 LIME SLURRY APPLICATION

- A. Inject each hole through packer at minimum 350 kPa (50 psi) pressure and maximum 1400 kPa (200 psi) pump pressure, adjusted to disperse maximum slurry volume, and continue to inject slurry to refusal, as defined by testing lab.
- B. Continuously agitate lime slurry to ensure mixture uniformity. Make specific gravity checks at both mixer tanks and injectors at rate of no less than one test per four hours agitation.
- C. Apply excess lime slurry evenly across scarified or plowed sub-grade during stabilization process. Scarify excess slurry ponded on ground surface into soil and soil-lime mixture re-compacted to sub-grade specifications before fill placement, if required.

3.3 FIELD QUALITY CONTROL

- A. Field Inspections: Testing lab representative will inspect the work, measure mixture specific gravity, determine suitable equipment operation, and determine injection refusal point.
- B. Acceptance of soil stabilization will be on basis of continuous on-site inspection and testing by testing lab representative. At testing lab's discretion, on-site testing may include before and after testing of sub-grade soils to evaluate stabilization process. Post installation tests will typically be performed seven days after injection to ensure interaction of lime and soil mixture. Typical tests may include standard penetration tests according to ASTM D1586 or similar test as considered applicable by testing laboratory. More than one lime slurry injection may be required at portions of the site to meet testing lab approval.

- C. Submit weight certification to testing lab for all lime delivered to site for use in stabilization.

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