

TECHNICAL SPECIAL PROVISION

FOR

GROUTING OF VOIDS AND LOOSE ZONES
LANIER STREET DRAINAGE MAINTENANCE
LEON COUNTY, FLORIDA

The official record of this package is the electronic file signed and sealed under Rule 61G 15-23.003, F. A. C.

Prepared by: Myron L. Hayden, P.E.
Florida Professional Engineer No.: 34067
Florida Certificate of Engineering Authorization No.: 6222

1.0 Description

This Technical Special Provision applies to the grouting beneath the proposed retaining wall (AREA A) and in the slope between the retaining wall and the garage (AREA B). The intent of this grouting program is to fill the voids and densify the subsoils.

The work consists of furnishing all the labor, equipment, and materials required to pressure inject cement grout into the voids and loose soils.

2.0 Contractor

All grouting shall be performed by a Contractor experienced in this type of work. The superintendent or foreman in charge of grouting operations shall have a minimum of three (3) years of acceptable experience in similar types of grouting.

At the preconstruction conference or no later than 10 days prior to the start of the grouting operations, the Contractor shall provide a detailed Grouting Plan to the Engineer for approval. The Grouting Plan shall include the following:

- The name, experience, and references for the superintendent or foreman in-charge;
- List at least three (3) jobs where similar work has been performed;
- The types, names, and sizes of equipment proposed;
- Equipment calibration procedures;
- Details of the planned grouting procedures and injection sequence layout; and,
- Details of the proposed ground movement monitoring.

3.0 Materials and Equipment

3.1 Grout Mixture

The materials used shall conform to the requirements of the 2010 Florida Department of Transportation's (FDOT) Standard Specifications for Road and Bridge Construction.

The grout shall be a pumpable mix having a consistency which permits flow through the grout pipes. Fine aggregate shall meet the requirements of Section 902-3.3 of the FDOT's Standard Specifications. The grout mixture shall have a slump of no more than eight (8) inches. The grout mixture shall have a minimum 28-day compressive strength of 500 lb/in².

3.2 Mix Design

The Contractor shall provide a Mix Design to the Engineer for approval.

3.3 Equipment

Contractor shall provide all equipment needed to:

- Drive a 2-inch to 3 inch diameter injection pipe to a depth of 4 feet the locations shown;
- Continuously pump the uniform, thoroughly mixed grout at variable pressures up to 50 lb/in² and at a rate of between 0.5 and 12 ft³ per minute;
- Measure the pressure, flow rate, and volume of a grout injected;
- The pressure gauge shall be capable of reading in 5 lb/in² increments; and,
- Measure any movement of the surrounding ground surface and garage.

3.4 Injection Pipes

Pipes and connectors shall be composed of steel with sufficient strength to withstand the pumping pressures to which they will be subjected. Pipes shall have a minimum outside diameter of two (2) inches. Connections shall be flush jointed and the inside walls of the pipes and connectors shall be smooth and unobstructed to facilitate the flow of grout without plugging.

4.0 Layout and Sequencing of Grouting

The area to be treated, spacing of the injection pipes, and grouting sequence are shown in the attached Construction Plans. The grouting program shall commence using the following sequence:

Retaining Wall (AREA A):	A-1, A-4, A-7, A-10, A-13, A-16, A-19, A-22, A-25, A-28, A-31, A-34, A-37, A-40, A-2, A-5, A-8, A-11, A-14, A-17, A-20, A-23, A-26, A-29, A-32, A-35, A-38, A-41, A-3, A-6, A-9, A-12, A-15, A-18, A-21, A-24, A-27, A-30, A-33, A-36, A-39
Slope (AREA B):	B-1, B-3, B-8, B-11, B14, B-15, B-12, B-5, B-2, B-4, B-7, B-13, B-9, B-6, B-10

5.0 Grouting Procedures

The grouting shall be performed by placing the injection pipe to a depth of four (4) feet below the surrounding ground surface. The pipes shall be free of soil or other debris.

The grout shall be injected at a slow, constant rate until the following is observed:

- A maximum pressure of 50 lbs/in² is reached;
- Grout is observed exiting the ground,
- Movement of the surrounding ground surface or the garage is detected; or,
- As directed by the Engineer or his representative.

The grout pipe shall then be immediately removed.

The end result will fill all voids and densify the loose soils.

6.0 Records

Records of grout volume delivered, grout volume pumped, maximum grouting pressure observed, and the magnitude of observed ground movement shall be kept for each injection point. The Records shall be provided to the Engineer on a daily basis.

7.0 Monitoring

The Contractor shall establish, and be responsible for providing and reading a monitoring system which will detect any movement of the surrounding ground surface and garage during the grouting operation. Grout injection shall be suspended if surface heave greater than 1/16-inch is observed by the monitoring system. The Contractor shall inspect the garage for cracks that might be created by grout injection. If new cracks are created by the grouting procedures, the grouting operations shall be suspended and the Engineer shall be notified immediately. The Contractor shall verify that no neighboring utilities have been adversely impacted before resuming grouting.

8.0 Certification and Acceptance

The Contractor shall furnish an approved Delivery Ticket with each batch of grout before unloading at the jobsite. The Delivery Ticket shall include a record of the material quantities used in the grout mix. The Batch Plant Operator responsible for production of the grout shall sign the Delivery Ticket certifying that the batch was produced in accordance with these specification requirements and the approved grout mix design.

Grout acceptance by the Engineer will be by the Certification on the Delivery Ticket signed by the Batch Plant Operator and provided to the Engineer.

The Engineer will hold the Contractor responsible for rejecting loads of grout that do not meet specification requirements or are not within the allowable batching tolerance of the approved mix design.

9.0 Method of Measurement

The quantities to be paid for will be the number of grout injection points drilled, and grout pumped as logged in the records of the grouting operation, as verified by the Engineer.

10.0 Basis of Payment

Price and payment shall be full compensation for all labor, materials (in-place and accepted), and incidentals necessary to complete the grouting program. All mobilization, demobilization, grout wasted, and any per diem costs associated with the grouting operations shall be included in the cost for the Compaction Grout Pay Item.

Compensation shall be in accordance with the follow Pay Items:

Pay Item No.: 173-76 –Grout Pipe Installation – LF

Pay Item No.: 173-71-1 – Compaction Grout – CY