

**KANSAS DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION TO THE
STANDARD SPECIFICATIONS, EDITION 2007**

Add a new SECTION in DIVISION 800

COMPACTION GROUTING

1.0 DESCRIPTION

Repair the void-filled area of the embankments by boring and injecting stiff grout at the designated locations to fill voids and stabilize the embankment as shown in the Contract Documents.

BID ITEMS

Compaction Grouting
Compaction Grout

UNITS

Linear Foot
Cubic Yards

2.0 MATERIALS

a. Provide materials that comply with the applicable requirements.

Fine Aggregate..... **DIVISION 1100**
Cement.....**DIVISION 2000**
Fly Ash (Type C).....**DIVISION 2000**
Water.....**DIVISION 2400**

b. Compaction Grout. Use portland cement, fine aggregate, and water to create the grout. Type C Fly Ash and bentonite may also be used.

The Engineer will approve the constituents and proportions of the proposed grout. Provide a grout with a maximum slump of 3 inches and with a minimum unconfined 28-day compressive strength of 450 psi using 2x2 inch mortar cube molds. Responsibility for the unconfined compression strength testing will be determined on a project specific basis.

The Engineer will accept the compaction grouted location based on performing the work and the results of CPT testing performed prior to and post-compaction grouting or coring results with an NX-size (2.125 inches) core.

c. Specialty Contractor Prequalification. The Specialty Contractor must be regularly engaged in compaction grouting work, and document that the company has performed a minimum of the following work in the United States:

- Provided all supervision, labor, material, and equipment necessary to successfully compaction grout 25 separate projects.
- Ten of the documented, successfully completed projects must be similar to this project in difficulty and/or scope.
- Provide contact names and their telephone numbers as part of this submittal.

Submit the specialty contractor's qualifications to the Geotechnical Unit at the Materials and Research Center for prequalification. The Geotechnical Unit will approve or deny the specialty contractor's qualifications. The prequalified contractors will be listed on KDOT's Prequalified List (PQL). If the specialty contractor does not complete a project as specified, then that specialty contractor will be removed from the PQL.

3.0 CONSTRUCTION REQUIREMENTS

a. General. Perform the grouting program under the supervision of a grouting engineer who has been in responsible charge of supervising compaction grouting operations for at least 2 years. The supervisor is to be present at the work site at all times during grouting operations.

b. Submittals

- (1) Submit a list of personnel to be used on this project, outlining their experience in this type of work.
- (2) Submit a list of equipment currently owned for use in the performance of the specialized drilling and grouting work.
- (3) Submit, in proposal form, a detailed description of the compaction grouting program that meets industry and KDOT standards. Include a detailed description of the work procedure, monitoring, and instrumentation intended to be included, for approval by the Engineer.
- (4) Submit, for the approval of the Engineer, a grout mix including strength data.
- (5) Submit daily compaction grouting performance records during the execution of the test and production compaction grouting programs that includes the following information:
 - Name of driller
 - Time and date of beginning and completion of each boring.
 - Location of boring.
 - Type of drill.
 - Drilling method used.
 - Type of material encountered and depth.
 - Name of grouting technician.
 - Constituents and proportions of grout.
 - Log of quantity of grout injected per lineal foot of boring.
 - Date.
 - Rate of pumping.
 - Grouting pressure at boring.

c. Compaction Grouting.

- (1) Install grout pipe using the primary and secondary-theory of grouting. Grout the primary pipes before injecting the secondary pipes.
- (2) Install minimum 2 inch inside diameter flush joint steel casing to minimize flow restrictions and prevent plugging.
- (3) Use steel casing with adequate strength to maintain the hole and to withstand the required jacking and pumping pressures.
- (4) Install the casing so that there is intimate contact with the drilled hole in order to prevent grout leakage and/or premature upward movement of the casing during injection of high pressure compaction grout.
- (5) Use no drilling fluids other than foam to install the grout pipes.
- (6) Install all grout pipes to within three degrees of the intended alignment.
- (7) Use grout with a maximum 3 inch slump.
- (8) Continuously monitor the grouting pressure at the hole and the pump with suitable protected gages.
- (9) Inject compaction grout on a continuous basis throughout the depth of hole withdrawing the grout casing in increments of 18 inches or less.
- (10) Use controlled compaction grout pumping rates of 0.1 to 5.0 cubic feet per minute.
- (11) Raise the grout pipes to the next increment when one of the following occur:
 - The grout pressure at the gage exceeds 600 psi.
 - When more than 10.0 cubic feet of grout has been injected per 1 foot interval.
- (12) Replace any holes lost due to faulty grouting equipment.
- (13) Take precautions to prevent drill cuttings, equipment exhaust, oil, wash water and grout from defacing and/or damaging the landscape.
- (14) Clean all waste resulting from the operations.
- (15) Prepare a minimum of three 2x2 inch mortar cube molds samples per day. Perform unconfined compression tests at 3, 7 and 28 days.
- (16) Perform a continuous NX-size core through the compaction/slurry grouted zone at the location specified by the Engineer.

4.0 MEASUREMENT AND PAYMENT

The Engineer will measure the compaction grouting by linear foot of boring.

The Engineer will measure grout injected by the cubic yard.
Payment for "Compaction Grouting" and "Compaction Grout" at the contract unit prices is full compensation for the specified work.

07-10-07 M&R (GTU) (JJB)