ITEM 552.22 04 – JET GROUT WALL

DESCRIPTION

This work shall consist of the construction of a jet grout wall at locations indicated in the plans. A jet grout wall is comprised of a series of interlocking jet grout columns placed in existing soils.

MATERIALS

A.	Portland Cement	§701-01
B.	Admixtures	§711-08
C.	Fly Ash	§711-10
D.	Water	§712-01

E. Cementitious Materials. Portland Cement shall be Type I or II. Use only cementitious materials meeting §701-01 whose brand name and type appears on the Department's Approved List. Cementitious materials stored over the winter at concrete producing facilities will be retested for specification compliance. All contaminated or hardened cementitious material will be rejected and not used in Department work.

F. Equipment. Drilling equipment shall be capable of drilling the required hole sizes and depths, and for lowering, raising and rotating jet grout equipment at the rates required to produce the jet grout columns. Jet grouting equipment shall consist of either a single or double phase fluid drill pipe, designed to form jet grouted columns of the size and depth shown in the plans. Mixing and injection equipment shall be capable of thoroughly mixing the materials in sufficient quantity to maintain placing continuity.

G. Compressive Strength. The proportion and injection of the jet grout mix shall create jet grout columns with a minimum 3-day unconfined compressive strength of 2.76 MPa and a minimum 28-day unconfined compressive strength of 5.52 MPa when tested in accordance with ASTM C 39.

CONSTRUCTION DETAILS

A. Jet Grouting Plan. The Contractor shall submit a Jet Grouting Plan to the Engineer at least 30 calendar days prior to mobilization of jet grouting equipment to the site. The plan shall describe the proposed plant and equipment, layout of plant and equipment, location of boreholes, methods of drilling and supporting boreholes, construction sequence and schedule, and the layout and procedures of the test program to establish jet grouting parameters.

B. Mix Design Report. The Contractor shall submit a Mix Design Report to the Engineer at least 30 calendar days prior to starting any grouting work. The report shall include the soil and grout mix to be used based on representative soil from the site (at the natural moisture content) and the water to be used during

construction. The report shall include the source of mix materials, mix proportions, density of mix, and the unconfined compressive strength at 3 and 28 days.

C. Qualifications. The Contractor shall submit evidence to the Engineer at least 30 calendar days prior to starting any grouting work to verify the firm is experienced in jet grouting in a variety of subsurface conditions, including conditions similar to those expected at the site. The Contractor shall also employ and furnish a full-time, on-site supervisor who is experienced and competent in jet grouting operations. The Contractor shall also demonstrate that a sufficient number of competent personnel will be on-site to carry out the operations specified and that these personnel have experience in this type of construction.

D. Test Program. A test program consisting of a minimum of two pairs of overlapping jet grout columns shall be conducted to evaluate the proposed construction methods and the grout mix's ability to produce grout columns meeting the depth, diameter, column spacing and material property requirements. The test columns shall be made part of the work and shall not be located anywhere other than the designated wall alignment. Test columns shall be installed to the same depth and diameter as those required for the project. Each column pair shall be cored no earlier than 36 hours after installation at locations selected by the Engineer. Cores shall have a minimum diameter of 76 mm and shall penetrate at least 600 mm into bedrock to confirm the columns bear on bedrock. Core recovery shall be a minimum of 85 percent. Two representative samples from each core shall be selected by the Engineer. Each core sample shall be strength tested 3 days after column installation, and shall produce a minimum 3-day unconfined compressive strength of 2.76 MPa when tested in accordance with ASTM C 39. The upper 1.5 meters of each test column shall be excavated 3 days after installation to verify the column diameter. Based the results of the test program, the jet grout column procedures shall be modified to achieve satisfactory results. Any modification of the jet grout procedures may result in the need for additional test columns to be installed, cored and tested, at the discretion of the Engineer. Test columns that fail to comply with specification requirements shall not be accepted and shall be replaced at no additional cost to the State. Test columns that comply with specification requirements shall be retained and accepted as part of the work.

E. Column Construction. Jet grout injection and jetting tool rotation and extraction rates shall be sufficient to produce the grout columns of the diameter, length and spacing shown in the plans. The borehole drilling and jet grouting sequence shall not allow freshly grouted columns to be damaged by drilling and grouting an adjacent column.

F. Column Coring. The entire length of two production jet grout columns shall be cored at locations selected by the Engineer. Coring shall be conducted no earlier than 36 hours after completion of the grout columns. Core recovery shall be a minimum of 85 percent. Cores shall have a minimum diameter of 76 mm.

G. Unconfined Compressive Strength Test. Unconfined compressive strength tests shall be conducted on two samples selected by the Engineer from each core. Representative samples shall be selected from the upper and lower limits of each core. One pair of samples shall be tested at 3 days and the other pair tested at 28 days. The core samples shall produce a minimum 3-day unconfined compressive strength of 2.76 MPa and a minimum 28-day unconfined compressive strength of 5.52 MPa when tested in accordance with ASTM C 39.

H. Daily Records. Submit the following information to the Engineer on a daily basis during the execution of the test program and production jet grouting:

1. Grout hole geometry (column size, length and location)
2. Date and time of beginning and completion of each grout column
3. Grout mix data, including mix proportions
4. Air-water jet pressures used to construct each grout column, if applicable
5. Grout rates and takes for each grout column
6. Rate of rotation and withdrawal of jet grout equipment for each column
7. Core sample locations and percent recovery
8. Results of unconfined compressive strength tests
9. Other pertinent observations such as grout escapes, ground heave, etc.

I. Repairs. Jet grout holes lost or damaged shall be backfilled with grout and replaced by another jet grout column at no additional cost to the State. Core holes shall be backfilled with grout at no additional cost to the State.

J. Site Clean-up. At the completion of jet grouting operations, the site shall be thoroughly cleaned of excess grout, debris and water. Excess material, slurry and contaminated materials shall be removed and legally disposed of off-site by the Contractor.

METHOD OF MEASUREMENT

This work shall be measured as the number of meters of jet grout columns that are satisfactorily constructed.

BASIS OF PAYMENT

The unit price bid per meter shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work, including test columns, coring, testing and repairs.