MICHIGAN

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FOR

**MECHANICALLY STABILIZED EARTH WALL GROUT BACKFILL FOR JOB NUMBER 214294**

BRG:MGB 1 of 3 APPR:DMG:TEB:03-24-22

**a. Description.** The work consists of performing all operations necessary for stabilizing backfill and filling voids behind the structure by injection of grout backfill at locations shown on the plans and described herein to facilitate the repair of the damaged mechanically stabilized earth (MSE) wall. Perform all work in accordance with the standard specifications, as directed by the Engineer and this special provision.

**b. Contractor.** Ensure the work is conducted by a Contractor with experience in this type of operation and with a successful record of job performance in work of similar scope. Ensure the work is supervised by a full-time superintendent or technical specialist qualified by experience in similar injection procedures. Perform the grout backfill work using experienced crews familiar with the equipment and methods specified. Furnish evidence to the satisfaction of the Engineer of relevant experience prior to starting work.

**c. Materials.** Furnish a mixture of Portland cement, water, and chemical admixtures for the grout backfill as desirable to accomplish the intent of this special provision.

1. Cementitious Materials. Furnish Type I Portland cement in accordance with subsection 901.03.A of the Standard Specifications for Construction. If a cementitious replacement is used, furnish slag cement in accordance with subsection 901.06 of the Standard Specifications for Construction or fly ash in accordance with subsection 901.07 of the Standard Specifications for Construction.

2. Admixtures. Furnish chemical admixtures in accordance with subsections 903.01 and 903.03 of the Standard Specifications for Construction.

3. Water. Furnish water in accordance with section 911 of the Standard Specifications for Construction.

**d. Equipment.** Use a mechanically driven mixer and a positive displacement grout pump for the grout mixing and pumping equipment.

Use a double-tub mixer or a mixer and agitator capable of mixing grout with water/cementitious material ratios varying from 0.4 to 0.6 measured by weight. The maximum volume of grout per batch must not exceed the rated capacity of the mixer. The mixer must also have a suitable water-measuring device, consisting of a water meter or a calibrated water batching tank.

For the grout pump, use a positive displacement piston type to deliver material at a maximum pressure of 10 psi at the pump discharge.

Remove all oil or other rust inhibitors from the mixing drums, stirring mechanisms, and other parts of the equipment in contact with the grout before the mixers are used.

Ensure the hoses connecting the grout pump to the grout injection pipe are at least 1 inch or of such diameter to convey the grout with a minimum amount of friction.

In addition to the above equipment, provide all valves, pressure gauges, pressure hose packers, inserts, tools, and accessories required to provide a continuous supply of grout and accurate pressure control.

**e. Mix Proportions and Trial Batches.** Construct a test specimen consisting of similar existing sand backfill to model the field conditions as approved by the Engineer. Inject a trial batch of grout into the test specimen and then examine the stability of the fill. Adjust the injection points and mix design until the test specimen shows that the sand backfill is stabilized to prevent the flow of sand from behind the wall during removal operations.

**f. Construction.** Place grout backfill by injection under pressure with or without the use of a primer solution and at such location, depths, and pressures as is necessary to stabilize the backfill and fill voids within backfill soil, whenever possible. The placement of grout backfill within the voids or soil must act to fill and stabilize the surrounding soil so that fill material does not flow from behind the wall during removal operations.

Temporarily fill existing holes in damaged area of existing structure to prevent grout backfill from flowing out during grouting operations. Ensure the temporary material can be removed and will not interfere with the final proposed work.

Drill injection holes of the sizes and at the locations shown on the plans to ensure that grout has entirely filled the voids. Verify and avoid the location of existing reinforcement using a pachometer or similar device prior to drilling injection holes.

Use the split-spacing method of injection point location, in which primary points are first located at maximum anticipated spacing, as determined by structure conditions. After completing grout injection at these points, locate secondary injection points at the midpoint between the primary points. Further splitting of injection point spacing may be required, depending on results obtained in previous grouting operations.

Place primary injection points to maximum anticipated depth or locations as determined by structure conditions. Rely on results obtained at previous locations to determine depth or location of succeeding injection points. In soils or embankments of unconsolidated materials, drive, drill, or jet injection points into place without disturbing soil structure, as would occur, for example, by consolidating or plugging voids in such a way as to reduce grout quantities or permit undesirable relief of grouting pressure at the interface of soil and injecting pipes.

Ensure the diameter of injection pipes or drill holes is adequate to permit injection of the most viscous mix anticipated without undue loss of head due to hydraulic friction; the diameter must in no case be less than the existing drill hole of 3/4 inch pipe. Keep accurate installation records for all types of injection points, including location and depth, installation method and other pertinent data, such as water loss during rotary drilling, difficulties during drilling or pipe driving, and blow count data, if using hand pipe drivers.

In soils or unconsolidated materials, generally start grout injection at maximum depth and continue steadily as the injection point is withdrawn to a minimum depth. Determine injection pressure by grout consumption and structure conditions. Ensure that injection pressure is in no case great enough to cause heaving of surrounding soil, movement of existing wall panels or cause distress in the structure.

Lower pressure and take measures to prevent uplift of the structure when grout injection is proceeding near the bottom of the structure or surface level. Continue until the void is completely filled and backfill is stabilized once grouting has started.

Keep accurate records of grout mix proportions, quantities at each location, and injection pressures. The actual sequence of grouting operations, proportioning of grout mixes, etc., will be as herein provided, except as modified by the Engineer as required by field conditions.

**g. Measurement and Payment.** The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

**Pay Item Pay Unit**

Mechanically Stabilized Earth Wall Grout Backfill Cubic Yard

**Mechanically Stabilized Earth Wall Grout Backfill** includes producing the test specimen, grout and injection to fill voids and stabilize backfill. No allowance will be made for excess, waste, or otherwise unused materials.