

SECTION 02223

BACKFILLING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Structure Backfilling to Subgrade Elevations.
- B. Site Filling and Backfilling.
- C. Consolidation and Compaction.
- D. Fill Under Roadways, Driveways, Sidewalks, Parking Lots, and Other Traveled Surfaces.
- E. Utility Trench Backfilling.
- F. Backfill for Drain Crossing and Traveled Surfaces.
- G. Fill Materials.
- H. Building Pads Filling to Subgrade Elevations.
- I. Site Berming.
- J. Fill Under Slabs-on-Grade Pads.
- K. Fill Subgrade Undercutting.
- L. Area G Sand Beach Fill.

1.2 RELATED SECTIONS

- A. Section 01400 – Quality Control.
- B. Section 02222 – Excavation.
- C. Section 02226 – Storm Sewer Trenching and Backfilling.
- D. Section 02227 – Articulated Concrete Mat.
- E. Section 02710 – Subdrainage Systems.
- F. Section 02751 – Drain Crossings.
- G. Section 03300 – Cast-in-Place Concrete: Concrete materials.
- H. Section 02225 – Trenching: Backfilling of utility trenches.
- I. Section 02732 – Sanitary Sewerage System: Pipe bedding.

1.3 REFERENCES

- A. ANSI/ASTM C136 or MTM 108 & 109 - Method for Sieve Analysis of Fine and Coarse Aggregates.

- B. ANSI/ASTM C117 or MTM 108 - Test method for materials finer than 15mm (No. 200 Sieve) in mineral aggregates by washing.
- C. ASTM D2992 - Test methods of Density of Soil and Soil Aggregate in place by the Nuclear Methods (Shallow Depth).
- D. MDOT 2003 Standard Specifications for Construction.
- E. MDOT Density Control Handbook, 1998.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300 –Submittals.
- B. Samples: Submit a 5 gallon bucket sample of each type of fill to Engineer in airtight containers.

1.5 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Backfill Materials:
 - 1. Basis of Measurement: Included in unit price bid for the pay item being installed or constructed as stated in the proposal.
 - 2. Basis of Payment: Includes material, labor, and equipment necessary to backfill and compact to proposed subgrade as specified for this Project.
- B. Granular Subbase:
 - 1. Basis of Measurement: At the unit price bid per square yard as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material, and equipment necessary to place, grade, and compact granular subbase to the thickness specified on the plans.
- C. Flowable Fill:
 - 1. Basis of Measurement: At the unit price bid per cubic yard as stated in the proposal based on actual fill placed on pipe.
 - 2. Basis of Payment: Includes all labor, material, and equipment necessary to place concrete in the storm or sanitary sewer as indicated on the plans or in the specifications. No payment will be made for wasted or extra filling.
- D. Sand Beach Fill:
 - 1. Basis of Measurement: At the unit price per square yard as stated in the proposal.
 - 2. Basis of Payment: Includes material, labor, and equipment necessary to place filter fabric and to place and compact the sand beach fill as specified on the plans.

2. PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Type A - Coarse Stone Fill: MDOT 6A, 100% crushed - for wet excavation, excavation within open drain, backfill for subgrade undercutting for poor soil or in pipe trench, compacted to a minimum of 95 percent of the materials maximum dry density as determined by modified proctor method in layers not to exceed 12 inches loose depth, unless otherwise specified. A ballast type crushed stone free of shale, clay, friable material, sand, and debris graded in accordance with ANSI/ASTM C136.

- B. Type B - Granular Fill: MDOT Class IIA - for dry excavation, pipe bedding to 12" above pipe, and trench backfill within roadway influence or dry excavation. Compacted to a minimum of 95 percent of the materials maximum dry density as determined by modified proctor method in layers not to exceed 12 inches loose depth. Substitute with Type A MDOT 6A coarse stone for wet excavation.
- C. Type C - Structural Fill: MDOT Class I - for lower area of excess excavation over 24", compacted to a minimum of 95 percent of the materials maximum dry density as determined by modified proctor method in layers not to exceed 12 inches loose depth.
- D. Type D - Native Subsoil: Site soils reused, free of gravel larger than 3 inch size, organic material, and debris, backfill above bedding of pipe to subgrade in greenbelt area. Compacted to a minimum of 90 percent of the materials maximum dry density as determined by modified proctor method in layers not to exceed 12 inches loose depth, unless otherwise specified or as approved by the Engineer.
- E. Type E - Dense Aggregate: MDOT 22A dense graded aggregate - for driveway and temporary patches on traveled surfaces, compacted to a minimum of 95 percent of its maximum dry density as determined by modified proctor method in layers not to exceed 12 inches loose depth.
- F. Type F – MDOT Standard Flowable Fill (Fill Class C concrete) – for headwall, sheet piling repair, and culvert storm sewer backfilling.
- G. Type G - Clay Embankment: Silty or sandy clay soils meeting the criteria for the designation of "CL" in accordance with the United Soil Classification System – for clay embankment construction, compacted to a minimum of 90 percent of its maximum dry density and at a moisture content ranging from 0 to 3 percent above of the optimum moisture as determined by the modified proctor method in layers not to exceed 12 inches loose depth. The Contractor shall provide samples of the proposed clay embankment material to the Geotechnical Engineer for visual examination and possible laboratory testing/analysis to confirm the material meets the criteria for the designation of "CL." Approved material shall be excavated from the borrow area free from frozen soil, organics, or other deleterious materials.
- H. Type H - Granular Embankment: MDOT Class I, Class II, or Class III – for granular embankment construction, compacted to a minimum of 95 percent of its maximum dry density as determined by the modified proctor method in layers not to exceed 12 inches loose depth. The Contractor shall provide samples of the proposed sand embankment material to the Geotechnical Engineer for visual examination and possible laboratory testing/analysis to confirm the material meets the specified material type. Approved material shall be excavated from the borrow area free from frozen soil, organics, or other deleterious materials.
- I. Type I – Sand Beach: Tour Grade 535 sand from Fairmont Minerals Chardon, 11830 Ravenna Rd, Chardon, Ohio, 44204 (ph. 800-237-4986, fx. 440-285-4109) – for sand beach at Area G, compacted to a minimum of 90 percent of the materials maximum dry density as determined by modified proctor method in layers not to exceed 12 inches loose depth, unless otherwise specified or as approved by the Engineer.

2.2 ACCESSORIES

- A. Filter Fabric: See Section 02279 - Filter Fabric.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that fill materials to be used are acceptable.
- B. Verify foundation and/or perimeter drainage installation has been inspected.

3.2 PREPARATION

- A. Generally, compact subgrade to density requirements for subsequent backfill materials.
- B. In areas that are suspect and may require subgrade undercutting, notify Engineer immediately. Do not proceed until it is agreed subgrade undercutting is required and quantities can be documented. See Section 02222 – Excavation, Subgrade Undercutting and Section 02223 - Backfilling.
- C. Prior to placement of aggregate surface material at gravel-paved areas, compact subsoil to a minimum of 95 percent of the materials maximum dry density as determined by modified proctor method.
- D. Thoroughly proof-roll all areas of building pads, slabs-on-grade, bituminous pavement, concrete curb and gutter and sidewalks with a fully loaded tandem-axle truck, or its equivalent.
- E. Loose or soft areas revealed during the proof-rolling operations are to be compacted or removed and replaced according to Section 02222 – Excavation, Subgrade Undercutting and Section 02223 - Backfilling.
- F. Install geotextile fabric between subgrade and aggregate in parking and drive areas as specified by the Engineer.

3.3 BACKFILL - COUNTY ROADS, BITUMINOUS DRIVES, & GRAVEL DRIVES

- A. Complete Type B Backfill to subgrade of road compacted to a minimum of 95 percent of the materials maximum dry density as determined by modified proctor method.

3.4 BACKFILL - NATIVE CROSSINGS

- A. Type B Backfill to spring line of pipe.
- B. Type D Backfill above spring line of pipe to subgrade of road compacted to a minimum of 95 percent of the materials maximum dry density as determined by modified proctor method.

3.5 BACKFILL - DRAIN CROSSING AT OTHER ROADWAYS

- A. Type B Backfill to subgrade of road.

3.6 BACKFILL - SEWER AND UTILITY TRENCHES

- A. Type B Bedding to 12 inches above the top of pipe.
- B. Type B Backfill above pipe bedding under roadways, driveways, sidewalks, or other traveled surfaces to subgrade elevations.

- C. Type D Backfill outside of traveled surfaces to topsoil subgrade elevation.

3.7 BACKFILLING

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Type B - Granular Fill: Place and compact materials as specified in Part 2 of this Section.
- D. Type D - Native Subsoil: Place and compact material as specified in Part 2 of this Section.
- E. Machine compact under springline of pipe with T-bar or Engineer approved equivalent.
- F. Employ a placement method that does not disturb or damage foundation perimeter drainage conduit in trenches.
- G. Maintain optimum moisture content of backfill materials to attain required compaction density.
- H. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.
- I. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- J. Backfill simultaneously on all sides of utility structures, manholes, and catchbasins.
- K. Type F - Flowable Fill: Place in locations indicated on plans. Protect from freezing temperatures for 24 hours after placement.
- L. Make grade changes gradual. Blend slope into level areas.
- M. Remove surplus backfill materials from Site.
- N. Leave fill material stockpile areas completely free of excess fill materials.
- O. Backfill wet excavation and subgrade undercutting according to Section 02222 – Excavation, Subgrade Undercutting and Section 02223 - Backfilling.
- P. Backfill subgrade undercutting in open drain according to Section 02222 – Excavation, Subgrade Undercutting and Section 02223 - Backfilling.
- Q. Place geotextile fabric over Type A bedding prior to placing the next lift of bedding.

3.8 TOLERANCES

- A. Top Surface of Backfilling Under Paved Areas: Plus or minus 0.10 foot from required elevations.

3.9 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400 – Quality Control.
- B. Tests and analysis of fill material will be performed in accordance with One Point Michigan Cone Test.
- C. Compaction testing will be performed in accordance with MDOT standard requirements.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
- E. Frequency of Tests: At the discretion of the Engineer.
- F. Proof roll compacted fill surfaces under slabs-on-grade.

3.10 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01500 – Construction Facilities and Temporary Controls.
- B. Recompact fills subjected to vehicular traffic.

END OF SECTION