

SECTION 02223 BACKFILLING

PART 1 -- GENERAL

1.01 WORK INCLUDED

- A. Site filling and backfilling.
- B. Consolidation and compaction.
- C. Fill for over-excavation.

1.02 RELATED SECTIONS

- A. Section 01400 - Quality Control
- B. Section 01410 - Testing Laboratory Services; Testing Fill Compaction
- C. Section 02050 - Excavation, Demolition and Disposal
- D. Section 03300 - Concrete

1.03 REFERENCES

- A. ASTM C 136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-pound rammer and 12-inch drop.
- C. ASTM D 1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- D. ASTM D 1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10-pound rammer and 18-inch drop.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Samples: Submit 10-pound sample of each type of fill to testing laboratory, in air-tight containers.

PART 2 -- PRODUCTS

2.01 FILL MATERIALS

- A. Type A - Classified fill, well graded, non-frost susceptible; free of shale, clay, friable material, debris; graded in accordance with ASTM C 136 within the following limits: gravelly material shall have a coefficient of uniformity

greater than four (4), and the sandy material shall have a coefficient of uniformity greater than six (6).

<u>Sieve Size</u>	<u>Percent Passing</u>
3 inches	100
3/8-inch	56 to 100
No. 4	35 to 60
No. 10	30 to 64
No. 40	9 to 34
No. 200	0 to 6

- B. Type B - Bedding Material: Material for Type B bedding shall conform to the specifications for Type A fill materials of this Section, and in addition, shall contain material no larger than 3/4-inch.
- C. Type C - Filter Sand: Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, or organic matter; graded within the following limits:

<u>Sieve Size</u>	<u>Percent Passing</u>
No. 4	100
No. 10	85 to 100
No. 20	60 to 90
No. 40	25 to 50
No. 200	Less than 5%

Sand shall also not have more than 45% of the total weight passing any one sieve and retained on the next consecutive sieve of this list. The Coefficient of Uniformity (Cu) must be less than 4; the Coefficient of Curvature (Cc) must be equal to or less than one.

- D. Type D Pea Gravel: Natural stone, free of clay, shale, organic matter, graded in accordance with ASTM C 136, to the following:
 1. Minimum size: 1/4-inch.
 2. Maximum size: 5/8-inch.
- E. Type E - Classified Fill

<u>Sieve Size</u>	<u>Percent Passing</u>
8-inch	100
3-inch	66 to 100
1/2-inch	32 to 100
No. 4	20 to 60
No. 10	2 to 50
No. 40	2 to 30
No. 100	0 to 10

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Verify fill materials to be reused are acceptable.

3.02 PREPARATION

- A. Compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of in-situ compaction. Backfill with Type A fill and compact to density equal to or greater than requirements for subsequent backfill material.
- C. Prior to placement of aggregate base course material at paved areas, compact subgrade to 95 percent of its maximum dry density in accordance with ASTM D 1557.

3.03 BACKFILLING

- A. Backfill areas to contours and elevations shown on the drawings 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. Classified Fill: Place and compact materials in continuous layers not exceeding 6 inches compacted depth.
- D. Fill: Place and compact material in continuous layers not exceeding 8 inches compacted depth.
- E. Employ a placement method that does not disturb or damage foundation dampproofing and utilities in trenches.
- F. Maintain optimum moisture content of backfill materials to attain required compaction density.
- G. Make grade changes gradual. Blend slope into level areas.
- H. Remove surplus backfill materials from site.
- I. Leave fill material stockpile areas completely free of excess fill materials.

3.04 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.

- B. Tests and analysis of fill material will be performed in accordance with ASTM C 136, ASTM C 177 and with Section 01400.
- C. Compaction testing will be performed in accordance with ASTM D 1556 and with Section 01400.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to the Department.
- E. Frequency of Tests
 - 1. Mechanical analysis on material: One sample for approval, prior to use of the following, plus regular checks as shown:
 - Classified backfill, all types - one per 2,000 tons
 - Foundation Material - one per 500 linear feet
 - Bedding, all types - one per 1,000 linear feet
 - Leveling course - one per 1,000 tons
 - 2. Density Tests for Compaction Requirements: One test of subgrade prior to placement of concrete ballast pad in tank pit. One test prior to pouring concrete topping slab on aggregate base course.

3.06 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01500.
- B. Recompact fills subjected to vehicular traffic.

3.07 SCHEDULE

- A. Type A Classified Fill:
 - 1. Tank concrete ballast subgrade as required.
- B. Type D Fill Material:
 - 1. Compacted noncorrosive pea gravel or crushed rock around underground storage tanks and piping systems.

(Completed by Specifier)

END OF SECTION