

SECTION 31 23 13
SUBGRADE PREPARATION

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. ASTM International (ASTM):
 - a. D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - b. D6938, Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.02 DEFINITIONS

- A. Bedrock Subgrade: Surface of bedrock after completion of clearing, grubbing, scalping of topsoil, removing of overburden soil and removal of disturbed or loosened materials to expose undisturbed bedrock. Where structure walls are cast against bedrock, Bedrock Subgrade shall include the sidewalls of the excavation.
- B. Optimum Moisture Content: As defined in Section 31 23 23, Fill and Backfill.
- C. Prepared Ground Surface: Ground surface after completion of clearing and grubbing, scalping of sod, stripping of topsoil, dewatering, excavation to grade, and scarification and compaction of subgrade.
- A. Proof-Rolling: Test rolling of subgrade by heavily load vehicle or roller to identify areas that will not support the future loading without excessive settlement or rutting.
- B. Relative Compaction: As defined in Section 31 23 23, Fill and Backfill.
- C. Soil Subgrade: Layer of existing soil after completion of clearing, grubbing, scalping of topsoil prior to placement of fill, roadway structure or base for floor slab.
- D. Unsuitable Material: Subgrade material unsuitable for the project consisting of rubble, debris, vegetation, and undocumented fill.

1.03 SEQUENCING AND SCHEDULING

- A. Complete applicable Work specified in Section 02 41 00, Demolition; Section 31 10 00, Site Clearing; and Section 31 23 16, Excavation, prior to subgrade preparation.

1.04 QUALITY ASSURANCE

- A. Notify Contracting Officer when subgrade is ready for compaction or proof-rolling or whenever compaction or proof-rolling is resumed after a period of extended inactivity.
- B. Rock Subgrade: Notify Contracting Officer when rock excavation has reached subgrade level and when rock subgrade has been prepared and cleaned.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Prepare subgrade when unfrozen and free of ice and snow.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Keep subgrade free of water, debris, and foreign matter during compaction or proof-rolling.
- B. Bring subgrade to proper grade and cross-section and uniformly compact surface.
- C. Do not use sections of prepared ground surface as haul roads. Protect prepared subgrade from traffic.
- D. Maintain prepared ground surface in finished condition until next course is placed.

3.02 BEDROCK SUBGRADE

- A. Excavate to required grades and remove overlying soils, dirt, debris, mud, and loose disturbed material.
- B. Protect prepared Bedrock Subgrade from disturbance, contamination, loosening of rock blocks. If subgrade damage, contamination, or deterioration occurs, complete additional excavation and subgrade preparation to relatively undisturbed bedrock.

- C. Remove loose blocks or pieces disturbed during excavation to expose undisturbed bedrock subgrade.
- D. Clean subgrade with pressurized water, pressurized air, or other means to remove soil, film, mud, debris, or other loose material.
- E. Obtain Contracting Officer's approval of subgrade and maintain prepared subgrade in clean prepared condition until concrete placement is complete.

3.03 COMPACTION

- A. Under Earthfill and Embankment Fill: Scarify and compact upper 6 inches to minimum of 90 percent relative compaction as determined in accordance with ASTM D1557 Method.
- B. Pavement Structure, Floor Slabs On Grade, or Granular Fill Under Structures Bearing on Soil Subgrade: Scarify and compact the upper 10 inches to minimum of 92 percent relative compaction as determined in accordance with ASTM D1557 Method.

3.04 MOISTURE CONDITIONING

- A. Dry Subgrade: Add water, then mix to make moisture content uniform throughout.
- B. Wet Subgrade: Aerate material by blading, discing, harrowing, or other methods, to hasten drying process.

3.05 TESTING

- A. Bedrock Subgrade: Inspect completed cleaned subgrade using a pry bars, steel rod, rock hammer, or similar tools to inspect for loose rock blocks, soft zones, or areas of disturbance.
- B. Soil Subgrade: In-place density test in accordance with ASTM D6938. Test as follows:
 - 1. One test every 1,000 square feet of subgrade.
 - 2. Minimum of one test for each structure having a footprint greater than 500 square feet.
- C. Additionally, in areas determined by the Contracting Officer, proof-roll subgrade with equipment specified in Article Compaction, to detect soft or loose subgrade or unsuitable material, as determined by Contracting Officer.

3.06 CORRECTION

A. Soft or Loose Subgrade:

1. Adjust moisture content and recompact.
2. Overexcavate as specified in Section 31 23 16, Excavation, and replace with suitable material from the excavation that meet the requirement for earthfill material as specified in Section 31 23 23, Fill and Backfill.

B. Unsuitable Material: Overexcavate as specified in Section 31 23 16, Excavation, and replace with suitable material from the excavation, as specified in Section 31 23 23, Fill and Backfill.

END OF SECTION