

GRADING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavating subsoil.
 - 2. Cutting, grading, filling, rough contouring, compacting, for site surfacing.
- B. Related Sections:
 - 1. Trenching: Trenching and backfilling for utilities.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 3. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
 - 4. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).
 - 5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with City of Casper Standard Specifications for Public Works Constructions and Infrastructure Improvements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Fill: Import fill from a contractor furnished source. Soils shall meet AASHTO A-1-a, A-1-b, A-2-4, or A-3 classification and be free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify intended elevations for the Work are as indicated on Drawings.

3.2 PREPARATION

- A. Call Local Utility Line Information service at **811 (One Call of Wyoming)** not less than **three (3)** working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Notify utility company to relocate utilities as required.
- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- F. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be further excavated, relandscaped, or regraded.
- B. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.
- C. Soft Subgrade:
 - 1. Cut out soft areas of subgrade not capable of compaction in place.
 - 2. Backfill with fill and compact to density equal to or greater than specified requirements for subsequent fill material.
- D. Scarify and recompact top 8 inches below subgrade to 95% standard proctor.
- E. When excavating through roots, perform Work by hand and cut roots with sharp axe.
- F. Remove excess subsoil not intended for reuse, from site.
- G. Stability: Replace damaged or displaced subsoil as specified for fill.
- H. Unauthorized excavation: Fill unauthorized excavations as directed by Architect/Engineer.

3.4 FILLING

- A. Fill areas to contours and elevations with unfrozen materials.

- B. Place material in continuous layers as follows:
 - 1. Fill: Maximum 8 inches loose depth for material compacted by heavy compaction equipment and 6 inches for hand-operated tampers.
- C. Compact each layer of fill soil material to 95% standard proctor.
- D. Maintain +2% to -4% optimum moisture content of fill materials to attain required compaction density.
- E. Make grade changes gradual. Blend slope into level areas.
- F. Repair or replace items indicated to remain damaged by excavation or filling.
- G. Stockpile borrow soil materials and excavated satisfactory soils without intermixing. Place away from edge of excavations. Grade stockpiles to drain and cover to prevent windblown dust.

3.5 TOLERANCES

- A. Top Surface of Subgrade: Plus or minus 0.1 feet from required elevation.

3.6 FIELD QUALITY CONTROL

- A. Allow testing agency to inspect and test subgrade and fill or backfill layers. Proceed with earthwork operations only after test results comply with requirements.
- B. Inform Engineer when subgrade under pavements has been prepared. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll saturated subgrades.
 - 1. Proof-roll with loaded dump truck or water truck not weighing less than 15 tons.
 - 2. Excavate soft spots, unsatisfactory soils, and areas of excess pumping or rutting as determined by engineer and replace with compacted backfill as directed.
- C. Perform laboratory material tests in accordance with ASTM D698.
- D. Perform in place compaction tests in accordance with the following:
 - 1. Density Tests: ASTM D2922.
 - 2. Moisture Tests: ASTM D3017.
- E. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- F. Frequency of Tests:
 - 1. Paved areas: At subgrade and each compacted fill layer, at least 1 test for every 1,000 sq. yds. or less, but in no case less than 1 test.

3.7 PROTECTION

- A. Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

- B. Repair and reestablish grades to specified tolerances where newly graded surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

END OF SECTION