SECTION 02220

SITE EXCAVATION, BACKFILLING AND GRADING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements for excavating, backfilling and grading as necessary to properly complete the project in accordance with the plans and related specifications herein.

1.2 REFERENCES

A. OSHA Handbook for excavation supports.

B. ASTM D698 (AASHTO T99) – Test Methods for Moisture Density Relations of Soils Using a 5.5 lb. (2.49 Kg) Rammer and a 12-inch (304.8 mm) Drop.

C. ASTM D2167 – Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

D. ASTM D2487 – Classification of Soils for Engineering Purposes

E. ASTM D1556 – Test Method for Density of Soil in Place by the Sand-Cone Method.

F. ASTM D2922 – Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.3 QUALITY ASSURANCE

A. Employ an approved, competent testing laboratory to conduct the required density testing.

B. When unstable soils are encountered, consult with a qualified Soils Engineer to determine if, when and how trenches should be shored or protected.

1.4 REGULATORY REQUIREMENTS

A. Occupational Safety and Health Association (OSHA).

B. North Dakota Department of Health Clean Air Standards and Storm Water Monitoring Program.

C. Williams County Guidelines for County Major Collectors and Local Roads.

D. If a highway or County Road permitting is required, the following shall govern:
   1. Obtain copy of permit from Owner.
   2. Coordinate with appropriate officials who issued the permit.
   3. Arrange for appropriate flag persons or inspectors as required by permit.
   4. Provide proof of appropriate insurance to Engineer prior to starting construction.
   5. Have all materials on hand before starting construction.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Report any indication of soil contamination to Engineer immediately.

B. Minimize dust, noise and erosion control by whatever means necessary. Erosion control measures shall be used to prevent material from washing off the construction site.

C. Request approval from Engineer before digging or backfilling in frost.

D. Develop and enforce an erosion and pollution control program.

PART 2 NOT APPLICABLE

PART 3 EXECUTION

3.1 PREPARATION

A. Measure and document the locations of buried utilities by providing surface ties to existing, visible, permanent structures.

B. Identify required lines, levels, contours and datum.

C. Locate, identify and protect utilities that are to remain, from damage.

D. Notify Utility Company(s) to locate, remove and/or relocate utilities as needed.

E. Protect plant life, lawns and other features that are to remain as a portion of final landscaping.

F. Protect benchmarks and all existing structures and appurtenances from damage.

G. Maintain and keep in good working order, all warning lights, barriers, signs and other traffic control devices as required for safety of the public and maintenance of traffic.

3.2 CONSTRUCTION

A. Install temporary signing and barricades in accordance with the latest Manual of Uniform Traffic Control Devices for Streets and Highways.

   1. Excavation
      a. Remove all existing topsoil from the construction area and stockpile as indicated on the plans or directed by the Engineer.
      b. Excavate subsoil as required to properly complete construction according to the lines and grades established on the plans.
      c. Remove all existing asphalt, concrete and other demolition items from the construction area and properly dispose at a designated disposal area. Aggregate surfacing removed shall be stockpiled for later reuse.

d. Cut trenches sufficiently wide to enable safe installation and allow for safe construction. Notify Engineer if details cannot be met or maintained.
e. Hand trim excavation for bell and spigot pipe joints and other appurtenant items. Remove or compact all loose soil under pipe to form firm bedding.
f. Machine slope bank to reduce sloughing.
g. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified by Engineer in writing to resume work.
h. Correct problem areas in accordance with written direction from Engineer.
i. Provide berms or channels to prevent flooding of the subgrade and maintain ample means and devices to promptly dispose of all water from every source entering the excavated area.
j. In case of an archaeological discovery, construction shall be halted immediately. Notify the Owner and the Engineer, who shall contact the State Historic Preservation Officer.
k. Whenever unstable soils are encountered, trenches shall be protected by sheeting or by trench jacks.

2. Backfilling
a. Remove lumped subsoil, boulders, frozen lumps, rocks or other material that, in the opinion of the Engineer, is unsuitable.
b. Topsoil and organics shall be removed and stockpiled prior to the placement of fill in construction areas.
c. When installing pipe, place bedding material under, along side and above pipe per plan detail in even lifts not exceeding 6 inches.
d. Compact all bedding by hand tamping.
e. Systematically backfill in continuous layers not exceeding 8 inches compacted depth.
f. Each layer shall be compacted before the next layer is placed.
   - Maximum dry density shall be determined using the Standard Proctor (T99) Method. The moisture content at the time of compaction shall not be less than 1 percent below the optimum moisture content and no more than 3 percent above the optimum moisture content. This may require some minor field adjustment to prevent sponginess or rutting.
   - Compaction in areas under streets or driven areas that are covered with surfacing, either gravel, asphalt or concrete, shall be 95 percent of maximum dry density as determined by the Standard Proctor.
   - Compaction in areas other than above shall be 90 percent of maximum dry density as determined by the Standard Proctor.
g. Employ a placement and compaction method that does not disturb or damage adjacent foundations, underground utilities, and perimeter drainage.
h. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
i. Maintain appropriate moisture content of fill materials prior to placement to attain the required compaction density. If the backfill is unstable, as evidenced by sponginess, rutting or any type of movement when compaction to the required density is taking place, the moisture content in the soil shall be adjusted to obtain stability. This may require drying below the optimum moisture. Contractor shall be prepared and equipped to take whatever action is appropriate to stabilize backfill material.
j. Remove all surplus backfill materials from site and dispose of as directed by Engineer.
k. Backfill all areas to contours and elevations shown on the plans or matching existing adjacent contours and elevations. Topsoil shall be placed to a minimum depth of 4 inches as the final course over all fill areas outside of the roadways.

3. Grading
    a. Grade all disturbed areas as required to obtain the elevations shown on the drawings or as directed by Engineer.
    b. All areas shall be graded to provide positive drainage.

3.3 TOLERANCES

A. Maintain all backfill layers within plus or minus 1-inch of the specified lift thickness.

B. Finish grade to within 0.10 feet of the required elevations.

C. All density test results stated herein are minimum.

3.4 FIELD QUALITY CONTROL

A. Unless otherwise instructed on plans or special provisions, obtain the services of a certified laboratory, approved by the Engineer, to obtain proctor and density tests on all backfill.

B. Provide one passing density test for every 500 cubic yards of backfill material for areas other than trenches. The Engineer will choose the locations for the tests based upon random locations.

C. In trench areas, one passing density test is required at mid-depth of trench and the second passing density test is required at one foot below finished grade elevation at 400-foot (horizontal) intervals.

D. For a failing test the Engineer will define the limits of the failing area and all backfill within the defined area shall be removed or scarified, recompacted, and retested.

E. If continued test failures are encountered, contact the Engineer to determine appropriate action necessary to correct the problem and retest the area.

3.5 CLEANUP AND PROJECT CLOSEOUT

A. Shape all backfilled and graded areas to provide positive drainage until permanent surfacing is installed.

B. Clear the entire construction site of all surplus and salvaged material.

C. Dispose of all dirt, rubbish, asphalt, concrete, rock, excess earth and demolition items in an approved disposal site as directed by the Engineer.

D. All areas adjacent to the construction area which are disturbed or damaged during construction must be returned to a condition equal to or better than existed prior to construction.

END OF SECTION