

SECTION 02225

EARTHWORK FOR UTILITIES

PART 1 GENERAL

1.01 SCOPE OF WORK

Work under this section shall include all operations necessary for excavating, backfilling and compaction of material necessary for the construction of pipelines and all appurtenant facilities including sewage pump station, concrete saddles, pipe protection, etc., and for the disposal of waste and unsuitable materials.

1.02 RELATED WORK

- A. Section 02270 – Temporary Erosion Control
- B. Section 02931 - Grassing

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM), Annual Book of Standards
 - 1. ASTM D 698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft³).
 - 2. ASTM D2167, Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
 - 3. ASTM D1556, Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
 - 4. ASTM D 2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 - 5. AWWA C600, Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances.
 - 6. AWWA C605, Standard for Underground Installation of PVC Pressure Pipe and Fittings for Water
 - 7. AWWA C150, American National Standard for the Thickness Design of Ductile-Iron Pipe
 - 8. ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes
- B. Occupational Safety and Health Administration (OSHA), Code of Federal Regulations 29

CFR Part 1926, Subpart P – Excavation, latest revision.

1.04 GEOTECHNICAL ENGINEERING SERVICES

- A. The CONTRACTOR-DEVELOPER shall obtain the service of a Georgia registered geotechnical engineer to perform all compaction tests specified herein. Evidence and documentation of testing shall be required at the TOWN's discretion.

PART 2 PRODUCTS

2.01 BEDDING STONE

Class IA or IB aggregate materials in accordance with ASTM D 2321.

2.02 BACKFILL

Reused or imported earth free of stone, clods, broken rock, or concrete larger than 3 inches in largest dimension, or organic matter, rubbish, or other unsuitable material.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify bedding and backfill material to be used are acceptable. Do not use frozen material.
- B. Verify areas to be backfilled are free of debris, snow, ice, or water and surfaces are not frozen.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. When necessary, compact subgrade surfaces to density requirements for backfill material.

3.03 SHEETING, SHORING AND BRACING

- A. CONTRACTOR shall be responsible for supporting and maintaining all excavations required even to the extent of sheeting and shoring the sides and ends of excavations with timber or other supports. All sheeting, shoring and bracing shall have sufficient strength and rigidity to withstand the pressure exerted and to conform with OSHA 29 CFR 1926, Subpart P – Excavations, latest revision.
- B. Excavations adjacent to existing or proposed utilities, buildings and structures, or in paved streets or alleys shall be sheeted, shored and braced adequately to prevent undermining beneath or subsequent settlement of such structures or pavements. Underpinning of adjacent utilities and structures shall be done when necessary to maintain utilities and structures in safe

condition. The CONTRACTOR-DEVELOPER shall be held liable for any damage resulting to such utilities, structures or pavements as a result of his operations.

- C. The need and adequacy of sheeting, shoring, bracing, or other provisions to protect men and equipment in a trench or other excavation shall be the sole and exclusive responsibility of CONTRACTOR-DEVELOPER.

3.04 EXCAVATION

A. Trench Excavation

1. Trench excavation shall consist of the removal of materials necessary for the construction of pipelines and all appurtenant facilities including collars, concrete saddles, and pipe protection called for on Drawings.
2. Excavation for pipelines shall be made in open cut unless otherwise shown on Drawings. Trenches shall be cut true to lines and grades shown on Drawings. Minimum pipe cover shall be 48" measured from the top of pipe to the ground surface.
3. Use of motor-powered trenching machine will be permitted but full responsibility for the preservation, replacement, and/or repair of damage to any existing utility services and private property shall rest with CONTRACTOR.
4. Bell holes for bell and spigot pipe and/or mechanical joint pipe shall be excavated at proper intervals so the barrel of the pipe will rest for its entire length upon the bottom of the trench or bedding material.
5. Pipe trenches shall not be excavated more than 400 feet in advance of pipe laying and all work shall be performed to cause the least possible inconvenience to the public. Adequate temporary bridges or crossings shall be constructed and maintained where required to permit uninterrupted vehicular and pedestrian traffic.
6. Unless otherwise specified herein or shown on Drawings, wherever pipe trenches are excavated below elevation shown on Drawings, CONTRACTOR-DEVELOPER, at his own expense, shall fill the void thus made to proper grade with Class D concrete or with compacted layers of crushed rock or other material conforming to requirements specified herein for backfill.
7. In all cases where materials are deposited along open trenches they shall be placed so that no damage will result to the WORK and/or adjacent property in case of rain or other surface wash.
8. Remove soft, spongy, or otherwise unstable materials encountered at elevation of pipe which will not provide a firm foundation for the pipe. Extend bedding depth as necessary to reach firm materials.

- B. Any unauthorized excavation shall be corrected at the CONTRACTOR-DEVELOPER's expense.
- C. Protect bottom of excavations and soil adjacent to and beneath foundations from frost.
- D. Grade top perimeter of excavation to prevent surface water run-off into excavation.
- E. Notify TOWN and ENGINEER of unexpected subsurface conditions and discontinue work in affected area until notification to resume work.

3.05 DEWATERING

- A. CONTRACTOR shall provide and maintain at all times during construction, ample means and devices with which to promptly remove and properly dispose of all water from any source entering the excavations or other parts of the WORK. Dewatering shall be accomplished by methods which will ensure a dry excavation and preservation of final lines and grades of bottoms of excavations. Methods of dewatering may include sump pumps, well points, deep wells, or other suitable methods which do not damage or weaken structures, foundations, or subgrades. Shallow excavations may be dewatered using open ditches provided such ditches are kept open and free-draining at all times. Dewatering methods used shall be acceptable to ENGINEER. Footing pits or trenches shall be protected by small earth dikes and plastic covers when they are left open in rainy weather.
- B. Unless specifically authorized by TOWN, groundwater encountered within the limits of excavation shall be depressed to an elevation not less than twelve (12) inches below the bottom of such excavation before pipe laying or concreting is started and shall be so maintained. No concrete structures shall be exposed to unequal hydrostatic forces until the concrete has reached its specified 28-day strength. Water shall not be allowed to rise above bedding during pipe laying operations. CONTRACTOR shall exercise care to prevent damage to pipelines or structures resulting from flotation, undermining, or scour. Dewatering operations shall commence when ground or surface water is first encountered and shall be continued until such times as water can safely be allowed to rise in accordance with provisions of this section.
- C. Standby pumping equipment shall be kept on the job site. A minimum of one standby unit (one for each ten in the event well points are used) shall be available for immediate installation should any pumping unit fail. Installation of well points or deep wells shall be adequately sized to accomplish the WORK.
- D. CONTRACTOR-DEVELOPER shall not operate dewatering devices (i.e., pumps, etc.) before the hour of 8:00 AM and after the hours of 8:00 PM in a residential area unless otherwise approved by TOWN.
- E. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with foundation backfill. Foundation backfill shall be placed in bottom of trench to within 6" of the bottom of pipe. Six (6) inches of bedding stone shall be placed over the top of the foundation backfill.

- F. CONTRACTOR shall dispose of water from the WORK in a suitable manner without damage to adjacent property. Conveyance of water shall be such as to not interfere with construction operations or surrounding property owners. No water shall be drained into WORK built or under construction. CONTRACTOR-DEVELOPER will be held responsible for the condition of any pipe or conduit which he may use for drainage purposes, and all such pipes or conduits shall be left clean and free of sediment.
- G. Storm water runoff shall be controlled by means of temporary erosion control methods specified, as shown on Drawings, or as directed by ENGINEER.
- H. Water shall be disposed of in such a manner as not to be a menace to public health and in accordance with applicable Environmental Protection Agency, Corps of Engineers, and State Environmental Protection Division standards and permits.

3.06 BEDDING/BACKFILLING

- A. The backfilling of trenches shall be started immediately after construction. Bedding and backfill material shall be earth or aggregate in accordance with Part 2 and the Drawings. Material shall be deposited in the initial horizontal layer (before compaction) on each side of the pipe. The initial layer shall be thoroughly tamped or rammed around the pipe until the initial layer's density is equal to the density of the adjacent undisturbed soils, as per the TOWN Standard Details. The second bedding material layer shall be deposited horizontally to a depth to provide a cover of not less than 12 inches over top of pipe. The remainder of the backfill shall be placed in horizontal layers 18 inches (maximum) in depth. The second and subsequent bedding/backfill layers shall be compacted by compaction tools to a density equal to the density of the adjacent undisturbed soils.
- B. Compact aggregate and soil backfill under roads, structures, and driveways to a minimum of 95% of maximum dry density at not less than 2% below nor more than 2% above the optimum moisture content as determined by ASTM D 698.
- C. All backfilling shall be done in such a manner that the pipe or structure over or against which it is being placed will not be disturbed or injured. Any pipe or structure injured, damaged or moved from its proper line or grade during backfilling operations shall be removed and repaired to the satisfaction of TOWN and then re-backfilled.
- D. Backfilling shall not be done in freezing weather, and shall not be done with frozen material or upon frozen materials.
- E. All backfilling shall be left with smooth, even surfaces, properly graded and shall be maintained in this condition until final completion and acceptance of the work.
- F. Leave stockpile areas completely free of excess fill materials. After construction and cleanup, stockpile areas shall be seeded in accordance with provisions specified in Section 02931.
- G. Use "Class B" bedding in all wet trenches and under driveways, regardless of pipe material. See Detail S-9 in the Town of Braselton Water & Sewer Departments Standard Construction Details.

Use "Class B" bedding for all PVC gravity sewer laterals. See Detail S-9 in the Town of Braselton Water & Sewer Departments Standard Construction Details.

- H. Use "Class C" bedding for DIP gravity sewer, laterals, and sewer force mains. See Detail S-10 in the Town of Braselton Water & Sewer Departments Standard Construction Details.
- I. Use "Class D" bedding for DIP water mains. See Detail S-11 in the Town of Braselton Water & Sewer Departments Standard Construction Details.

3.07 SUBSURFACE OBSTRUCTIONS

- A. In excavating, backfilling, and laying pipe, care must be taken not to remove, disturb, or injure any existing water, telephone, gas pipes, storm drainage pipe, headwalls or catch basins, or other conduits or structures. If necessary, the CONTRACTOR-DEVELOPER at his own expense, shall sling, shore up, and maintain such structures in operation, and shall repair any damage to them. Before final acceptance of the work, he shall return all such structures to as good condition as before the work started.
- B. The CONTRACTOR-DEVELOPER shall give sufficient notice to the interested utility of his intention to remove or disturb any pipe, conduit, etc., and shall abide by their regulations governing such work. In the event that any subsurface structure becomes broken or damaged in the execution of the work, the CONTRACTOR-DEVELOPER shall immediately notify the proper authorities, and shall be responsible for all damage to persons or property caused by such breaks. Failure of the CONTRACTOR-DEVELOPER to promptly notify the affected authorities shall make him liable for any needless loss so far as interference with the normal operation of the utility.
- C. When pipes or conduits providing service to adjoining buildings are broken during progress of the work, the CONTRACTOR shall repair them at once.
- D. Delays such as would result in buildings or residences being without services overnight or for a needlessly long period during the day will not be tolerated. Should it become necessary to move the position of a pipe, conduit or structure, it shall be done by the CONTRACTOR-DEVELOPER in strict accordance with the instructions given by the utility owner involved.
- E. The TOWN will not be liable for any claim made by the CONTRACTOR-DEVELOPER based on underground obstructions being different from that indicated in the plans.

3.08 BORROW EXCAVATION

Wherever the backfill of excavated areas or the placement of embankments or other fills require material not available at the site, suitable material shall be obtained from other sources. This may require the opening of borrow pits at points not immediately accessible to the WORK. Before a borrow pit is opened, the quality and suitability of the material to be obtained shall be approved by the TOWN. Any soil tests required for approval of the borrowed material proposed shall be at the DEVELOPER'S expense.

3.09 DISPOSAL OF WASTE AND UNSUITABLE MATERIALS

- A. Materials removed by excavation, which are suitable for the purpose, shall be used to extent possible for backfilling pipe trenches and for making embankment fills, subgrades or for such other purposes as may be shown on Drawings. Materials not used for such purposes shall be considered waste material and shall be disposed of at the CONTRACTOR-DEVELOPER's expense.
- B. Waste materials shall be spread in uniform layers and neatly leveled and shaped. Spoil banks shall be provided with sufficient and adequate openings to permit surface drainage of adjacent lands.
- C. Unsuitable materials, consisting of rock, wood, vegetable matter, debris, soft or spongy clay, peat, and other objectionable material so designated by the TOWN, shall be removed from the work site and disposed of by CONTRACTOR-DEVELOPER at his expense.
- D. No waste material shall be dumped on private property unless written permission is furnished by owner of property and unless a dumping permit is issued from local jurisdiction.

3.10 TESTING

- A. Compaction of fill and backfill to the specified moisture-density relationship of soils shall be verified by in-place density tests using ASTM D 2167, 1556 or other ASTM in-place density tests approved by the TOWN. Maximum density determination and in-place density tests shall be performed by a soils technician employed by the CONTRACTOR-DEVELOPER. Frequency and location of tests shall be adequate to ensure proper compaction has been achieved.
- B. Areas not meeting the required compaction shall be re-compacted until the desired degree of compaction is achieved. All costs associated with **re-testing** failed areas of compaction shall be paid for by the CONTRACTOR-DEVELOPER.

3.11 PROTECTION

Protect excavation by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in of loose soil into excavation. Protection shall be in accordance with OSHA 29 CFR 1926, Subpart P-Excavations, latest revision.

3.12 FINAL GRADING

- A. After other earthwork operations have been completed, sites of all structures and embankments shall be graded to finished grade as shown on the Drawings. Grading operations shall be so conducted that materials shall not be removed or loosened beyond required limits. Finished surfaces shall be left in smooth and uniform planes such as are normally obtainable from use of hand tools. If CONTRACTOR is able to obtain required degree of evenness by means of mechanical equipment, he will not be required to use hand labor methods. Slopes and ditches shall be neatly trimmed and finished.

- B. Unless otherwise specified or shown on the Drawings, all finished ground surfaces shall be graded and dressed to present a surface varying not more than plus or minus 0.10 foot. Any finished surfaces resulting in inadequate drainage or washouts shall be corrected by the CONTRACTOR-DEVELOPER at his expense.

3.13 SETTLEMENT

- A. CONTRACTOR-DEVELOPER shall be responsible for all settlement of backfill, fills, and embankments which may occur during warranty period.
- B. CONTRACTOR-DEVELOPER shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after receipt of written notice from TOWN.

END OF SECTION