SECTION 02250
TRENCH EXCAVATION, BACKFILL AND COMPACTION

1.0 GENERAL

A. Description

1. Trench excavation, backfill and compaction shall include, but not necessarily be limited to, the excavation, backfill, and compaction of trenches for pipelines, fire hydrants, valves, manholes, vaults and other structures shown on the Plans, and in accordance with the Contract Documents.

B. Related Work Included Elsewhere

1. Test Pits: Section 02012

2. Removal and Abandonment of Existing Utilities: Section 02050

3. Aggregate Backfill: Section 02240

4. Boring and/or Jacking Pipe: Section 02300

5. Tunneling: Section 02400

6. Water Main Installation and Chlorination: Section 02551

7. Water Valves and Appurtenances: Section 02552

8. Water Services, Water Meter Settings and Vaults: Section 02553

9. Fire Hydrants: Section 02554

10. Gravity Sanitary Sewer and House Connections: Section 02561

11. Sanitary Sewer Manholes: Section 02562

12. Sanitary Sewer Force Mains: Section 02563

C. Quality Assurance

1. All materials removed from trench excavations and used for backfill will be subject to test by a geotechnical engineer at the Contractor's expense. Test results shall be submitted to the Commission prior to use of the material for backfill.

2. Soil Laboratory and Field Density Tests

a. The Contractor shall retain a geotechnical engineer, licensed in Maryland as a Professional Engineer, for all soil laboratory and field density testing. The geotechnical engineer, with the concurrence of the Chief Engineer, shall determine the number of samples to be taken, the location of the samples, and the frequency of tests required to confirm compliance with the specifications. The Contractor shall assist the geotechnical engineer in obtaining samples and shall provide a smooth surface for conducting field density testing. The Contractor will not be entitled to any claim for additional compensation due to the testing requirements specified herein.

b. At the start of the trenching operation, the Contractor shall demonstrate to the geotechnical engineer, with the concurrence of the Chief Engineer, that the compaction density specified herein can be attained by the compaction equipment and methods the Contractor intends to use. Once the method and equipment has been approved, no substitutions will be permitted with written concurrence by the geotechnical engineer and written approval of the Chief Engineer. Actual demonstration of the suitability of the compaction equipment and methods will be required whenever there is a change in trench conditions.

c. Should testing determine that the required density is not being met, or the material is outside of the specified moisture range, the Contractor shall, without additional compensation, re-excavate, rework and/or recompact the particular layer or section until the required density and/or moisture content is attained.

3. Submittals

a. The Contractor shall submit for approval a list of the compaction equipment the Contractor intends to use on the project, the recommendations of the equipment manufacturer as to the maximum lift thickness which can be placed, and the method of compaction to be used with this equipment to achieve the required compaction.

b. Submit soil test results on a bi-weekly basis. Prior to Operational Acceptance the Contractor shall submit a certification from the geotechnical engineer certifying that all fill areas have been compacted according to the codes, plans and specifications.

2.0 MATERIALS

A. Materials Furnished by the Commission

The Commission will not furnish any materials for trench backfill other than those materials which are available from the trench excavation limits as shown on the Standard Details and the Contract Documents.

B. Contractor's Options

Not applicable.

C. Detailed Material Requirements

1. Material for backfills may be from on-site excavations (if of proper quality) or from borrow sources. The material shall be free from organic material, sludge, grit, trash, muck, roots, logs, stumps or frozen material and other deleterious substances. Except as otherwise specified or approved, the material shall not contain rocks or lumps larger than six inches in greatest dimension. The material shall not contain mica in quantities which, in the judgement of the Commission are sufficient to affect compaction characteristics. Materials having a maximum dry density of less then 100 pounds per cubic foot (AASHTO T 180) shall not be used unless specifically approved in writing by the Commission. Cinders, ashes, rubble and construction debris shall not be used in the work. The use of any soil additive that in the judgement of the Chief Engineer may adversely affect the proposed utility is strictly prohibited. Materials having moisture content greater

than 6% points above or below the optimum shall not be used as backfill and shall be considered unsuitable material.

2. Use and Ownership of Excavated Material

   a. All suitable material excavated from utility trenches shall be used, as far as practicable, for backfill in trenches.

   b. The Contractor shall properly store, stockpile and protect all materials that are to be reused in the work. The Contractor shall replace, at his own expense, material that was suitable when excavated, which has subsequently become unsuitable because of careless, neglectful, wasteful, or unprotected storage. The Contractor shall have no property right in any material taken from any excavation and no excavated material shall be wasted or otherwise removed from the project site without permission of the Commission. All unsuitable and surplus suitable material, as determined by the Commission, shall be removed from the excavation and disposed of off-site by and at the expense of the Contractor in accordance with all applicable Federal, State, and local regulations.

   c. If insufficient suitable soils are identified from the excavation on the contract project, the Contractor may obtain suitable soils from sources outlined in the Special Provisions, or from such sources approved by the Chief Engineer and/or the governing regulatory agency. Suitable soils obtained from other sources shall be supplied and placed at the contact unit price or when not provided for in the contract shall be considered incidental to other specified work.

3. Excavation Backfills on rights-of-way, improved easements or supporting pavements or surface loads shall be constructed of Class 1 Soils compacted as herein specified or noted in the Contract Documents. Class 1 Soils shall meet the requirement for materials as classified by AASHTO, A-1, A-2 or A-3, or as classified by the Unified Soil Classification System as GW, GP, GM, SW, SP, SM or SC.

4. Excavation Backfills not supporting surface loads or pavements and in unimproved easements shall be constructed of Class I or Class II Soils placed as herein specified or noted in the Contract Documents. Class II Soils shall include all materials designated in Class 1 Soils and Unified Soil Classifications ML, CL, MH or CH.

5. Aggregate backfill for pipe and structure installation, bedding and trench backfill shall meet the gradation requirements specified in Section 02240.

D. Material Storage Note: Materials shall be stored in order to insure the preservation of their quantity, quality and fitness for Work. The Contractor shall place materials on wooden platforms, or other hard, clean surfaces, and the materials shall be placed under cover when directed by the Owner. Stored materials shall be located in order to facilitate prompt inspection by the Owner. Lawns, grass plots, or other private or public property shall not be used for storage purposes without written permission of the owner or lessee. Unless directed or noted otherwise in the Contract documents, there will be no payment for stored materials.

3.0 EXECUTION

A. Surface Preparation

1. Sediment Control

The Contractor shall install all required sediment control devices in accordance with permits and all applicable Federal, State and local regulations.

2. Clearing and Grubbing

The Contractor shall clear and grub the surface over the line of the trench in accordance with the requirements of Section 02110.

3. Removing Pavement, Sidewalk, Curb, etc.

a. The Contractor shall remove pavement, sidewalk, curb, etc. over the line of the trench in accordance with Standard Details.

b. The Contractor shall remove paving only to the width shown on the Standard Details, noted in the Special Provisions, or as directed by the Commission. When the Contractor removes paving for a greater width than is deemed necessary or disturbs paving, sidewalk, curbs, etc. due to settlement, slides, or cave-ins, or in making excavation outside the limits of the trench without written order of the Commission, the Commission will require the Contractor to replace the excess damaged area and may retain from payments due the Contractor such amounts required to permanently replace the excess material removed. The Contractor shall be responsible for repaving or surfacing roadbeds or replacing sidewalk, curbs, etc. that have failed, settled, or have been damaged at any time before expiration of the Contract maintenance period due to work or any other activities by the Contractor, his subcontractors, or suppliers.

4. Maintaining Traffic

The Contractor shall furnish all labor, tools, equipment, and materials required for the maintenance of traffic during construction in accordance with the traffic control plan or permits.

B. Trench Excavation

1. General

a. Excavation for the installation of utilities shall be unclassified and shall consist of the excavation removal and/or disposition of all material encountered to the lines, grades, and sections shown on the Plans and/or the Standard Details, as specified, or as directed by the Commission.

b. Unless otherwise indicated, excavation shall be by open cut, except that short sections of a trench may be tunneled, or the pipeline jacked, if, in the opinion of the Commission, the pipe can be safely and properly installed.

c. For saw cutting existing pavements refer to MSHA Standard Specifications for Construction and Materials latest revision.

d. Trenches may be excavated and backfilled either by hand or by machinery. The Contractor shall have no claims, nor will extra compensation be allowed, for hand excavation or backfill which may be required by these Specifications or by the Commission for protection of existing utilities or structures.

e. Ground profiles shown on the Plans represent the elevations along the centerline of the trench.

2. Protection of Property and Structures

The Contractor shall, at his own expense, sustain in place and protect from direct or indirect injury all existing facilities in the vicinity of the excavation, whether above or below the ground, or that may appear in the trench. The Contractor shall be responsible for the implementation of protective measures associated with the presence or proximity of pipes, poles, tracks, walls, buildings, property markers, and other structures and property of every kind and description in or over his trenches or in the vicinity of his work whether above or below the surface of the ground. The Contractor shall repair or replace damaged facilities at his expense.

3. Utility Adjustments

a. All adjustments to utilities other than those owned by the Commission shall be performed by the utility owner.

b. Adjustments to water services between the property line and the water main shall be performed by qualified utility contractors. Adjustments between the property line and the house shall be performed in accordance with the County Plumbing Code. It shall be the Contractor’s responsibility to obtain all permits necessary for the performance of this work.

c. Adjustments to sanitary sewers within the Commission Easement or right-of-way shall be accomplished by a qualified utility contractor. Adjustments to sanitary sewers outside the Commission Easement or right-of-way shall be performed in accordance with the County Plumbing Code. It shall be the Contractor's responsibility to obtain all permits necessary for the performance of this work.

4. Obstructions Shown on Plans

a. Certain information regarding the reputed presence, size, character, and location of existing underground utilities and structures has been shown on the Plans based upon available records. There is no certainty of the accuracy of this information, and it shall be considered by the Contractor in this light. If test pit data is not shown on the Plans, the Contractor shall excavate test pits in advance of his work in accordance with Section 02012 to locate existing utilities. The Contractor shall hereby distinctly understand that the Commission is not responsible for the correctness or sufficiency of the information given. The Contractor shall have no claim for delay or extra compensation on account of incorrectness of information given, or on account of the insufficiency or absence of information regarding obstructions. The Contractor shall have no claim for relief from any obligation or responsibility under the Contract in case

the location, size, or character of any underground facility is encountered that is not shown on the Plans.

b. It shall be the responsibility of the Contractor to notify "MISS UTILITY," all municipal utilities, all utility line owners, and any other parties affected prior to the beginning of work. It is the Contractor's responsibility to reference and maintain the location markings during the construction of the project. In the event that a utility location needs to be re-established by the Commission, the cost to provide this shall be borne by the Contractor.

5. Removing Obstruction

a. Should the position of any pipe, conduit, or other structure above or below ground be such as, in the opinion of the Commission, to require its removal, realignment, or change due to the work to be done under the Contract, the work of removal, realignment, or change will be done as extra work, or will be done by the owner of the obstructions without cost to the Contractor; but the Contractor shall uncover and support the structures in the limits of his trench at his own expense before such removal, and before and after such realignment or change. Whether the obstruction is shown on the Plans or not, the Contractor shall not be entitled to any claim for damage or extra compensation on account of the presence of said structure or on account of any delay in the removal or rearrangement of the same; however, if said structure is not shown on the Plans, time extension will be allowed if deemed to be warranted by the Commission.

b. In the event that obstructions would delay the work of pipe installation, the Contractor may, with Commission approval, be permitted to leave a gap in the work and return to fill the gap after the obstructions have been removed. The installation shall be completed by laying full pipe lengths and appropriate closure pieces.

c. The Contractor shall not interfere with any persons, firms, or corporations or with the Commission in protecting, removing, changing or replacing pipes, conduits, poles, or other structures.

d. In the event that the Commission has entered into any agreement with an affected utility owner or owners which will have an effect on the operations or financial responsibilities of the Contractor, the requirements of these agreements will be included in the Special Provisions of the Contract.

6. Change of Trench Location

a. In the event the Commission directs that the location of a trench be changed to a reasonable extent from that proposed on the drawing on account of the presence of an obstruction, or from other cause, or if a changed location shall be authorized upon the Contractor's request, the Contractor shall not be entitled to extra compensation or to a claim for damages; provided that the change is made before the excavation is begun. If, however, such change, made at the direction of the Commission involves the abandonment of excavation already made, such abandoned excavation together with the necessary backfill, will be considered extra work and the Contractor shall be compensated

accordingly. In the event that the trench is abandoned in favor of a new location, at the Contractor's request, the abandoned excavation and backfill shall be at the Contractor's expense.

b. If an obstruction shall lie within the trench in such manner that the trench has to be excavated to extra width in order that sheeting or bracing may be properly placed, or in order that a structure to be placed in the trench may be properly built, such extra width of trench shall be considered as miscellaneous excavation. No sloping of sides of excavation, however, for the purpose of avoiding the necessity of placing sheeting or bracing, either in the presence or absence of obstructions, will be considered as excavation beyond pay limits.

7. Trench Width and Depth

a. Trenches shall be excavated to the necessary width and to the necessary depth to allow for installation of the pipe. This width and depth may be shown on the Plans or Standard Details, as specified in the Special Provisions, or as directed. The trench subgrade shall be such as to provide a uniform and continuous bearing and support for the pipe on solid undisturbed earth for the full length of each pipe, except for that portion at the bell hole. Any part of the bottom of the trench excavated below subgrade shall be backfilled with approved material and compacted in accordance with Contract Documents.

b. Subgrade, in the case of pipe lines, shall be six (6) inches below the underside of the pipe barrel, where the pipe is laid on a granular bedding. Where the pipe is laid on a natural foundation, subgrade shall be four (4) inches below the underside of the pipe barrel.

c. The sides of the trenches shall be practically plumb and under no circumstances will they be permitted to be sloped except with the written approval of the Commission. Should the Contractor elect to slope or cut-back the sides of the trench, no additional payment will be made for extra excavation, backfill, restoration, or contingent items beyond the limits indicated on the Standard Details.

d. Bell holes shall be excavated in the bottom of the trench to ensure that pipe has continuous bearing.

e. Where sheeting or trench boxes are used, the maximum width shall be as noted on the Contract Drawings.

8. Length of Open Trench

a. The Contractor shall keep the backfill operation to the top of trench for offsite and existing areas and to road subgrade in areas of new construction, within 100 feet of excavation and pipe laying operations. The Commission reserves the right to require the backfilling of open trenches over completed pipe lines if, in its judgment, such action is necessary; and the Contractor shall thereby have no claim for extra compensation, even though to accomplish said backfilling, it are compelled to temporarily to stop excavation or other work at any place.

b. All trenches shall be closed at the end of each work day.

c. The excavation of all trenches shall be fully completed at least one full pipe length in advance of pipe installation, unless otherwise authorized.

9. Responsibility for Condition of Excavation

The Contractor shall be responsible for the condition of all excavations made by him.

10. Trench Support

a. The support of the trench shall be the sole responsibility of the Contractor.

b. The Contractor shall support the sides and ends of all excavations wherever necessary with braces, sheeting, shoring or stringers, trench boxes, or other acceptable excavation support systems. All trench support systems shall be installed by men skilled in such work and shall be so arranged that they may be withdrawn as backfilling proceeds, without injury to the utility or structure constructed or to any roadbed, adjacent structure or property.

c. All timbering in excavations, trench boxes, or excavation support systems shall be withdrawn as the backfilling is being done, except where and to such extent as the Commission shall order in writing that said timbering or excavation support system be left in place or where the Commission permits the trench support to be left in place at the Contractor's expense and upon his request. The Contractor shall cut off any sheeting left in place 2 feet below finished grade and shall remove the material cut off without compensation therefore.

d. Wherever necessary, in running sand, or soft ground, or for the protection of any structure or property, sheeting shall be driven without extra compensation to such a depth below the bottom of the trench as may be required or directed. Where directed by the Commission to leave sheeting in place, payment will be made under the appropriate contingent item.

e. All work shall be performed in accordance with the latest applicable Federal, State, and local safety and health regulations.

11. Drainage and Dewatering

a. The Contractor shall grade the site as necessary to prevent surface water ponding or from flowing into the trench or other utility excavations and shall provide all necessary temporary surface drainage and keep the same operating to the satisfaction of the Commission until permanent drainage or finished grading and permanent surface stabilization has been completed.

b. It shall be the Contractor's responsibility to adequately control water that may be present in the excavation. He shall provide for the disposal of water removed from excavations in such a manner not to cause damage to public or private property or to any portion of the work completed or in progress or cause any impediment to the use of any area by the public; nor shall the Contractor discharge any flushing or ground water or any material of any nature into existing sanitary sewer system during the

construction of the facilities. All water shall be discharged through an approved sediment control device. The costs of dewatering trench excavations will not be paid for directly, but will be included in prices bid for other related items.

12. Excavation Below Subgrade

a. The Contractor shall, without additional compensation, before any pipe or appurtenance is installed, fill all unauthorized depressions or irregularities in the bottom of the trench or tunnel with aggregate fill.

b. Where the bottom of the trench, at subgrade, is in unstable or unsuitable material, excavation shall be carried a minimum of six additional inches or to such depth as ordered by the Commission. The trench bottom shall be restored to subgrade with aggregate fill or a concrete foundation may be constructed. The specifications for the concrete foundation shall be approved by the Chief Engineer. Excavation and backfill for removal of unsuitable material will be paid for under the appropriate contingent item.

C. Backfill

1. The Contractor shall backfill all trenches as rapidly as practicable after the installation of the utility therein, or after the excavation has served its purpose.

2. Subgrade to 2'-0" above top of pipe: Suitable material, defined as gravel or bank run gravel that will pass through a one-inch (1") sieve, shall be carefully placed around and to a depth of two feet over the pipe. These initial lifts shall be carefully placed and hand-tamped in 6 inch layers. Care shall be exercised in this operation to ensure that the alignment of the utility is not disturbed.

3. 2'-0" above top of pipe to top of trench: The remainder of the trench may be backfilled in layers of 6 to 12 inch lift depths. However, if lift thickness is followed and the specified compaction is not obtained based on the testing during backfilling, the Contractor shall, at his own expense, remove, replace, and retest as many times as is required to obtain the specified compactions. In backfilling the remainder of the trench, stones of not more than 6 inches in largest dimension which have been taken out in excavating may be mixed with earth in an amount not exceeding 25% of the backfill volume. Stones of larger size or in greater quantities shall not be used, unless directed by the Commission. The Contractor shall not permit excavations to be used for the disposal of refuse.

4. In paved areas, the Contractor shall furnish and backfill the trench as per the requirements of the governing regulatory agency, and/or Contract Documents.

5. Should additional material be required for backfilling in excess of that obtained from excavation, the Contractor shall obtain Borrow material from off-site sources, to complete the trench backfill.

6. No layer of soil shall be placed on a frozen surface of a preceding layer or on a frozen subgrade.

D. Compaction

2. In unimproved areas where full trench compaction is not specified on the plans, compaction shall be accomplished as follows for the remaining depth of trench: Backfill material shall be placed in maximum 1 foot layers or as approved by the

Commission and compacted in such a manner that a completely dense refill is obtained which is free of voids and not susceptible to undue settlement or depression.

3. Full trench compaction as described below will be required within all improved easements or rights-of-way except as noted on the contract drawings.

   a. Rights-of-Way, Commercial/Industrial Zoned Property and Trenches in Easements Supporting Driveways and Sidewalks. The remaining trench depth less any thickness left for crusher run, paving, or concrete specified hereinafter shall be backfilled with suitable material and mechanically tamped in layers not to exceed twelve inches to not less than 92% of the maximum density at optimum moisture content as determined by the Modified Proctor Method, AASHTO Designation T-180 to within the top foot of subgrade which shall be compacted to 97% of the maximum density determined as noted above. All compaction must comply with the aforementioned or the latest edition of the governing applicable road code or permit whichever is most stringent.

   b. Residentially Zoned Property (Areas not in Rights-of-Way or supporting driveways or sidewalks)

      The remaining trench depth shall be backfilled with suitable material and mechanically tamped in layers not to exceed twelve inches to not less than 85% of the maximum density at optimum moisture content as determined by the Modified Proctor Method, AASHTO Designation T-180.

   c. The Contractor shall be responsible for adjusting the moisture of suitable backfill as necessary to meet the specified compaction requirements.

4. Insofar as the specifications for mechanical tamping equipment or methods are concerned, no specific requirements are included in these Specifications other than that the use of any particular type of equipment is subject to the approval of the Commission and that the Commission has sole right to judge what equipment is suitable for the uses intended.

E. Maintenance of Backfilled Trench

1. All backfilled trenches shall be maintained in an acceptable condition by and at the expense of the Contractor for a period of twelve (12) months following the date of conditional acceptance of the work.

2. If the Contractor fails to fill depressions in the backfilled trench within 24 hours after the receipt of notice from the Commission, the Commission may refill said depressions and the cost thereof shall be retained from any monies due the Contractor, under the Contract. In case of emergency, the Commission may refill any dangerous depression or protect with lights wherever necessary without giving previous notice to the Contractor; and the cost of so doing shall be retained from any monies due to become due the Contractor under the contract.

3. The Contractor shall be responsible for any injury or damage that may result from lack of maintenance of any refilled excavation at any time prior to final acceptance of the Project.

4.0 METHOD OF MEASUREMENT

A. Trench Excavation, Backfill and Compaction

Except when shown as a bid item or noted otherwise, trench excavation, backfill, and compaction will not be measured as a separate item, but will be included with other items of work contained in the Bid Documents.

When shown as a bid item, measurement for borrow backfill material will be based on the section computed as follows:

Length will be the entire horizontal distance on a linear-foot basis measured along the centerline of the trench, deducting volume measurement for pipe, conduits, fittings, couplings, manholes, structures, bedding materials, any existing facilities, overlap of prior paid utility trenches, and measurement through any items in the proposal that contains a separate provision for payment.

Width for calculating backfill payment for utilities shall be the actual trench width or the outside diameter of the pipe plus 12 inches, whichever is less.

Trenches that exceed 4 feet in depth will be allowed one extra foot in width for shoring box, should shoring be required. No allowance will be made for over-width trenches when in the opinion of the Engineer adequate shoring would have prevented sloughing of the trench walls beyond the designed width. Contractor shall immediately notify Engineer when encountering unstable material that will not stand under normal shoring practices. Failure to notify Engineer will result in loss of any allowance for over-excavation or backfill.

Depth will be the vertical measurement from the top of the pipe or pipe bedding material (whichever is greater elevation) to the original ground or subgrade (whichever is lesser in elevation), deducting volume measurement for pipe, conduits, fittings, couplings, manholes, structures, bedding materials, any existing facilities, overlap of prior paid utility trenches, and measurement through any items in the proposal that contains a separate provision for payment. Depth of trench will be measured at minimum intervals of 20 feet along the centerline of trench between linear pay limits as specified herein, unless physical conditions necessitate a change that is mutually acceptable to both Engineer and Contractor. Trench depth will be the average depth between measuring points. Pay depth shall not exceed depth shown on the Plans unless authorized by Engineer.

5.0 BASIS OF PAYMENT

A. General

1. Except when shown as a bid item or noted otherwise, no separate payment will be made for trench excavation, backfill, and compaction. The cost shall be included in the price bid for installing pipe, or constructing the various appurtenances included in the Contract. The bid prices shall include furnishing all labor, tools, equipment, and materials necessary to complete the work as shown and specified in strict accordance with the Contract Documents.

2. Payment will be made when approved by the Commission.

B. Trench Excavation, Backfill and Compaction

The price(s) shall be as shown on the bid form and shall include the furnishing borrow material, providing an approved spoil site, and disposing of all spoil or excess materials; all environmental and erosion or sediment control work including off-site requirements at spoil storage or borrow sites; restoration of all disturbed areas temporary stockpiling, placing, compaction and all incidentals required to complete this work.

In addition to the work listed above, trench excavation, backfill, and compaction shall also include the traffic control, removing, storing, and rehandling of surface materials over the trench, including paving; the scoring of existing paving in a straight and uniform line; the excavation of all materials encountered in the trench including excavation at manholes, structures, vaults, and other appurtenances that may be shown or required, and any extra excavation necessary for sheeting or bracing or installation of other excavation support systems; the backfilling and compaction of trenches; the removal and disposal of unsuitable and/or surplus material; and all other incidental items to complete the work.

****END OF SECTION 02250****