

1.01 GENERAL

- A. The Contractor shall perform all excavation, backfilling, grubbing and grading required for construction and installation of pipelines, structures and appurtenances. Excavation shall include removal of pavement, concrete, rock, earth and debris, regardless of character. Trenches and excavations shall be sheeted, shored and braced by the Contractor, as necessary to allow construction and provide safe working conditions. Additionally, the Contractor shall be responsible for maintaining a dry excavation by dewatering. He shall also locate, support and protect existing utilities and structures encountered in the work, provide traffic control, dispose of surplus and unsuitable excavated materials and restore backfilled areas to original condition or as required by the respective contract drawings and specifications. All backfilled and restored areas shall be maintained by the Contractor, in a proper condition, for the duration of the project.
- B. The Contractor is responsible for direct or indirect damage to existing structures, pipelines, conduits, poles, wires of every description in the vicinity of his work whether above or below ground, or that may be encountered in trench or structure excavation. This responsibility shall include the cost of protection by sheeting, bracing, hand excavation, when warranted, and the expense to repair or replace any existing facility damaged directly or indirectly by construction activities, whether such facility is or is not shown on the drawings.
- C. The Contractor shall verify the location size and elevations of all existing utilities at the various points of connection and/or crossings prior to starting any work. Any discrepancies in locations or inverts shall be brought to the attention of the Engineer or the Owner in order that the designs may be adjusted accordingly. Damages suffered or additional costs incurred by the Contractor, as a result of his failure to conform to the requirements of this paragraph, shall be the sole responsibility of the Contractor. Connections to existing utilities shall be made by the Contractor at such a time and in such a manner as the Engineer or Owner may direct.
- D. Excavation and backfill, within an area where a state agency has jurisdiction, shall be done in accordance with requirements and provisions of the permits issued by the agencies for the construction within their respective rights-of-way. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these specifications.

1.02 PIPELINE TRENCH EXCAVATION

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- A. The Contractor shall excavate, maintain and backfill all excavation necessary for completing the work under the contract. Unless otherwise specified or approved, excavation shall be open cut.
- B. Trenches shall be excavated to the necessary width and depth, as shown on the drawings and as required for the safe installation of the utility, etc.
- C. The sides of the trenches shall be practically plumb and shall not be sloped unless approved in writing by the Engineer. Trench sides shall be supported or sheeted as required to protect pavement surfaces, curbing, utilities, etc., and required for safety. Safety regulations shall be as required by State safety codes and OSHA.
- D. In paved areas, the Contractor shall remove the paving only as necessary for the excavation of the trench or as detailed. Pavement edges at the trench shall be saw cut neat and straight prior to the start of any excavation. Should the pavement damage result from cave-ins, settlement, etc., he shall replace such paving at his own expense.
- E. The excavation of all trenches shall be fully completed at least twenty (20) feet in advance of pipe laying, unless otherwise authorized or directed. The Engineer or Owner may require the backfilling of open trench, over completed pipelines, or ahead of the pipe laying operation, if in his judgement, such action is necessary.
- F. Should work be stopped for any reason and any excavation is left open for an unreasonable length of time, the Contractor shall refill the excavation at his own expense if so directed, and shall not reopen the excavation until he is ready to complete the facility. Should the Contractor refuse or fail to refill any excavation completely within eight (8) hours after a proper notice, the Owner shall be authorized to do the work and expenses resulting shall be paid by the Contractor.
- G. The Contractor shall complete excavation as nearly as practicable to the lines of the utility to be installed as detailed. All cavities in the bottom of the trench shall be filled to the required level with compacted crushed stone or gravel.
- H. Excavated materials shall be graded, hauled, stored and protected as such material found suitable will be required for backfilling, repaving or other purposes. Material classified as unsuitable shall be disposed of by the Contractor.
- I. Excavated materials shall not be placed on private property, unless written permission is obtained from the property Owner.

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- J. The Contractor shall be responsible for any damage to curb, gutter, sidewalk, traffic control devices, pavement material. Any damage resulting directly or indirectly shall be replaced in kind by the Contractor. The reuse of disturbed curb, gutter or sidewalk is prohibited. New sections shall be installed to the nearest undisturbed control joint.

1.03 PIPELINE TRENCH BACKFILL

- A. Materials excavated from the trench shall be used for trench backfill, provided that, in the opinion of the Engineer or Owner, the excavated material is suitable for this purpose. Backfill material shall be free from large lumps and stones having any dimension greater than two (2)-inches.
- B. Suitable material, as approved by the Engineer, shall be carefully deposited in the trench by methods which will not damage or disturb the pipe or structure. Backfill material shall be placed in eight (8)-inch loose layers. Care shall be taken in the use of mechanical tampers not to injure or move the pipe or to cause the pipe to be supported unevenly.
- C. All backfill material shall be compacted to 95% of maximum density between minus two (2) to plus two (2) percent of optimum moisture content as determined by the Modified Proctor Test, ASTM D1557. Materials containing an excess of moisture shall be permitted to dry until the moisture content is within the specified range. Materials too dry shall be wetted uniformly until the moisture content is in the specified range.
- D. No compacting shall be done when the material is too wet to be compacted properly. At such times the work shall be suspended until the backfill materials have dried out sufficiently to, permit proper compaction or such other precautions shall be taken as may be necessary to obtain proper compaction. The Contractor is responsible for hauling, storing and drying of excavated material to be used in backfill operations.
- E. The Engineer may request compaction tests of the backfilled trenches at any time during construction or upon completion of the backfill operations. Such testing shall be arranged by the Contractor and performed by an independent testing agency approved by the Engineer. The Contractor shall pay the testing laboratory for all tests performed inclusive of sample collection, preparation and transportation. If the results of any tests show that backfills do not meet the specified compaction, the Contractor shall, at his own expense, correct the condition as directed by the Engineer.
- F. The Contractor shall, at his own expense, maintain all refilled excavations in proper condition. Trench surfaces shall be reshaped when necessary. If the Contractor fails to

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make repairs within forty-eight (48) hours after receipt of written notice from the Owner, the Owner may refill said depression wherever necessary and the cost of so doing will be paid by the Contractor. 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.

- G. All unauthorized excavations made by the Contractor shall be immediately backfilled in accordance with the requirements of the specifications for trench backfill, at the Contractor's expense.
- H. After completion of backfilling, all material not used, shall be disposed of, and all places on the line of the work shall be left clean and in good condition. This cleaning up shall be done by the Contractor. If he fails to do this work within a reasonable time after receipt of notice, it will be performed by the Owner, and the cost will be assessed to the Contractor.
- I. No backfill shall be placed against new concrete or masonry structures until properly cured. In the case of concrete, test reports must indicate that a 2500 psi compressive strength exists.
- J. The Contractor shall exercise caution in backfill and compaction to prevent damage to structures.

1.04 EXCAVATION BELOW SUBGRADE AND GRAVEL REFILL

Materials below the excavation limit for pipelines and structures (below subgrade) , which in the judgement of the Engineer or Owner should be removed, shall be removed as directed. All spaces created by the removal of unsuitable material below subgrade, shall be refilled and compacted with crushed stone or gravel.

1.05 DEWATERING

- A. All excavations below the subgrade of the work, must be kept free of water while work is in progress. This may be accomplished by ordinary pumping methods or by well points, whichever will produce the required results. Upon removal of dewatering equipment, the Contractor shall backfill all holes and restore disturbed areas to their original condition.
- B. Dewatering for the structures and pipelines shall commence when groundwater is first encountered and shall be continued until such time as backfill has been completed. No

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concrete footings shall be laid in water nor shall water be allowed to rise over them until the concrete or mortar has set at least eight (8) hours. Groundwater shall not be allowed to rise around the pipe until the trench is backfilled.

- C. The Contractor shall dispose of the water from the work in a suitable manner without damage to adjacent property. No water shall be drained into work built or under construction without prior consent of the Engineer. Water shall be disposed of in such a manner as not to be a menace to the public health.
- D. The Contractor shall remove any siltation deposits in storm sewer systems, resulting from his dewatering or construction operations. He shall also be responsible for conveyance of dewatering flows and for erosion and sediment control.

1.06 SHEETING, SHORING AND BRACING

- A. The Contractor shall furnish and install all sheeting, shoring and bracing necessary to insure safe working conditions and to prevent damage to public and private property and structures. If, in the opinion of the Engineer, the sheeting, shoring, or bracing is not of proper quality or is not properly placed to insure safe working conditions and to prevent property damage, the Contractor shall remedy such inadequacy at his own expense as may be directed by the Engineer. Sheeting, shoring, and bracing shall be removed as backfilling progresses, except at such locations as the Engineer may direct or approve it to be left in place.
- B. The Contractor shall cut off any sheeting left in place, at least eighteen (18)-inches below finished grade, and shall remove the material cut off without compensation.
- C. Where necessary for the protection of any structure of property, sheeting shall be driven to such depth below the bottom of the trench as may be required to protect all existing and/or proposed work.
- D. A trench box is an acceptable alternative to sheeting, shoring or bracing, providing, such boxes conform to safety codes in effect for the project.

1.07 SELECT BACKFILL

- A. Should the Contractor encounter unsuitable material during excavation, he shall remove and dispose of such material.

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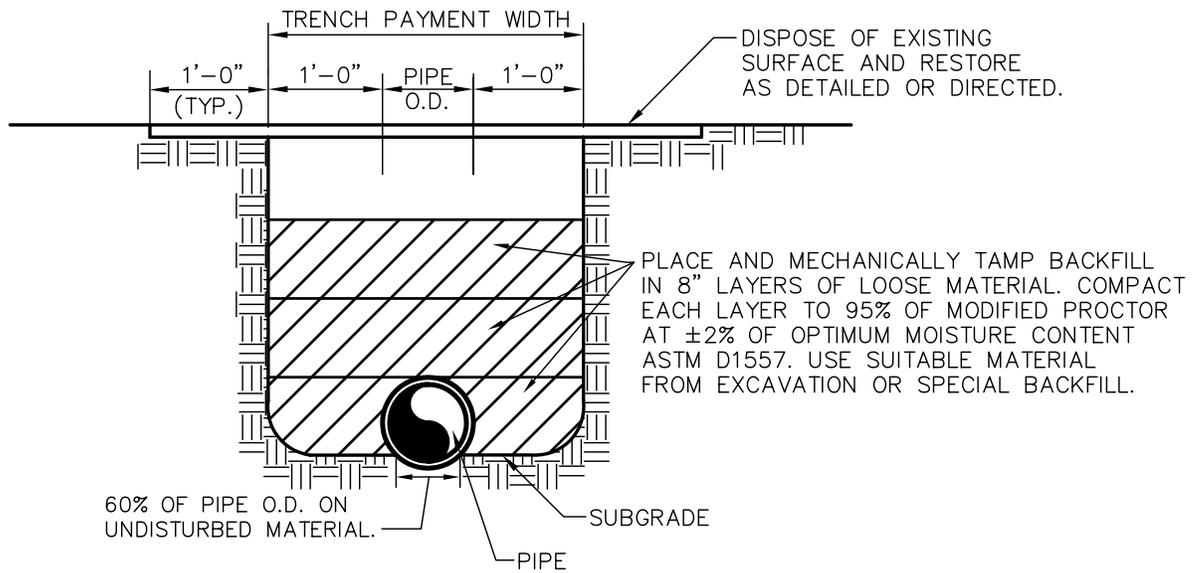
- B. Should sufficient suitable material from excavations of the project not be available for backfill, the Contractor shall furnish Select Backfill upon approval of the Engineer. Special backfill shall conform to Delaware Department of Transportation Type "c" borrow.
- C. The Contractor shall furnish certification that his borrow is from a Delaware DOT approved source.

1.08 TEMPORARY REPAVING

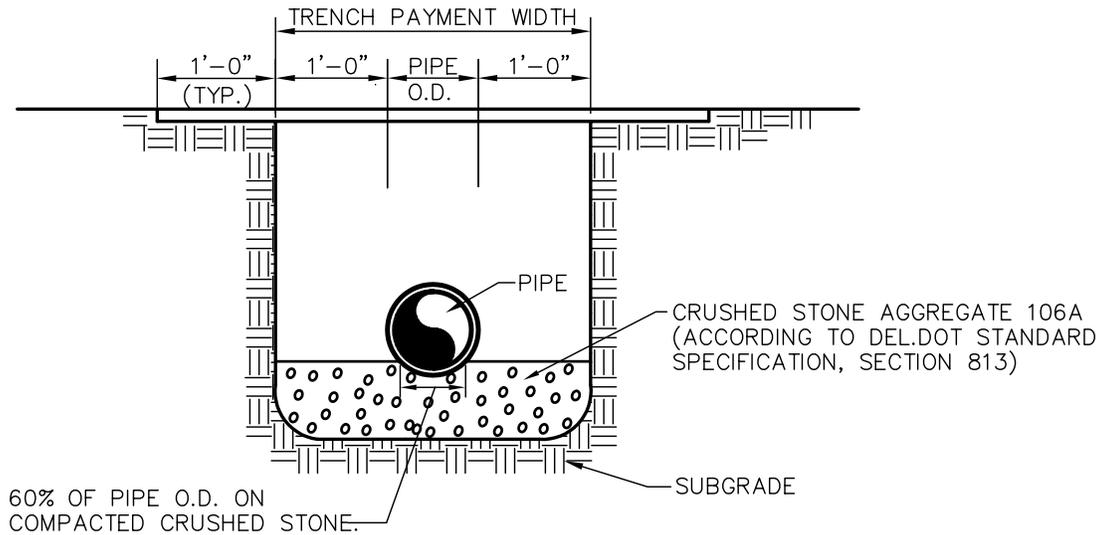
- A. The Contractor shall furnish, place and compact two (2)-inches of cold patch as temporary pavement surface over all backfill areas created for pipeline and structure installation located in roadways or driveways. This surface shall be maintained by the Contractor until permanent surface restoration has been performed.
- B. Should the Contractor remove existing pavement beyond the width specified or detailed on the plans, or should pavement be disturbed from settlement, slides or other construction activities, he shall saw cut back the pavement and provide temporary paving in these areas.
- C. On state highways and all other areas over which the Delaware Department of Transportation exercises jurisdiction, all pavement restoration shall be done in accordance with the permit requirements of the Division of Highways.

END OF SECTION

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TRENCH BACKFILL



CRUSHED STONE BEDDING

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CITY OF MILFORD DEPARTMENT OF PUBLIC WORKS WATER & WASTEWATER DIVISION CONSTRUCTION STANDARDS		TRENCH BACKFILL & PIPE BEDDING DETAIL NO SCALE
		SECTION - 1 DRAWING: D1-1