SECTION 2

SPECIFICATIONS FOR
EXCAVATING, TRENCHING, AND BACKFILLING FOR UTILITIES

2.01 DESCRIPTION OF WORK

The Work shall consist of furnishing all materials, equipment, and labor for excavating, trenching, and backfilling for utilities. The Work also shall include the necessary clearing, sheeting and shoring, boring and jacking, dewatering, pipe embedment, and other appurtenant work.

2.02 CLEARING, BRUSHING AND TREE REMOVAL

2.02.01 General

The Contractor shall perform all clearing, brushing, and tree removal required for the proposed construction. Where indicated on the plans for a specific area, that area shall be completely cleared in accordance with Section 201 and 202 of the 2020 MDOT Standard Specifications. Clearing and brushing shall be confined to the limits of the right-of-way, easements, and project site unless otherwise directed and shall be kept to a practicable minimum.

Trees marked "Remove" on the Plans shall be taken down and removed from the right-of-way in a manner that does not endanger the adjoining property or persons or traffic using the right-of-way. Existing stumps and stumps of trees which are removed shall not be ground down but shall be completely removed.

Selective pruning of trees will be permitted to allow operation of the Contractor's equipment. Trees shall be pruned neatly, and the scars from pruning or other damage by the contractor's equipment shall be covered with a preservative.

2.02.02 Preservation of Trees

Because of the special concern for preservation of trees, all trees six (6″) inches in diameter and larger, measured at a point 4 1/2′ above the ground line at the base of the tree, which are to be removed shall be marked on the plans. All other trees are to be preserved unless written permission for removal is obtained from the Owner and the Township.

Where tunneling is necessary to preserve a tree, it shall be incidental to the construction. Trees that may have to be tunneled may or may not be specified on the plans. Where tunneling is necessary, excavation may have to be done by hand to prevent damage to the tree or to its roots. When tunneling or excavating close to a tree to be preserved, every effort shall be made to preserve the main roots.

2.02.03 Disposal of Debris

All trees, brush, and stumps from clearing and brushing operations shall be disposed of by the Contractor by hauling from the site, or other suitable means approved by the Township. If burning is allowed by the Township, the Contractor shall obtain the necessary burning permits and shall comply with the safety regulations required.

2.03 REMOVAL OF SURFACE IMPROVEMENTS

Surface improvements such as sidewalks, improved lawns, drives, curb and gutter, and all types of pavement shall be removed just prior to excavating or trenching operations. All improvements shall be cut at the expected trench width prior to excavating using suitable equipment, which does not damage the improvement outside of the trench area.

Concrete and bituminous pavement and drives shall be cut with a pavement cutting saw. The depth of the cut shall be the full depth of the pavement. Pavement crushers or breakers of any type are prohibited unless specifically authorized by the Township. Pavement, which is removed, shall not become mixed with backfill material. Power equipment may be used for pavement removal, provided that damage is not caused to improvements which are to remain.

2.04 EXISTING SOIL / SUBSURFACE CONDITIONS

Where provided, soil borings are shown on the drawings only as information for use by the Owner's Engineer in preparing the Contract Documents. The Contractor is solely responsible for confirming actual soil conditions and depth of the water table.

2.05 EXISTING UNDERGROUND UTILITIES AND STRUCTURES

2.05.01 Location

The Contractor shall notify the owners of all underground utilities before starting any Work. House sewer connections, water and gas services, and other utility lines may not be indicated on the plans. However, the Contractor shall make every effort to locate all underground utilities from information obtained from the utility owner or by prospecting in advance of trench excavation.

2.05.02 Replacement

Certain underground utilities, such as sewers, may require removal and subsequent replacement in lieu of supporting or bracing during the proposed construction, or the Contractor may elect this option when temporary provisions to maintain essential services have been previously approved by the Township.

Unless otherwise specified, any utilities removed during the proposed construction shall be replaced by the Contractor. Materials and installation shall be equal to or better than original construction in every way. Salvaged materials may be reused when they are in good condition, and a satisfactory installation can be accomplished in the judgment of the Township.

2.05.03 Relocation

Should any pipe or other existing utility require raising or lowering or moving to another location because of interference with the pipe or structure being constructed under these specifications, such changes, which in the opinion of the Township are necessary, shall be made by the Contractor unless otherwise specified.

2.05.04 Reconnection

Where lateral services, building connections, or other pipe lines require reconnection to the proposed utility, as is the case when an existing utility is being reconstructed, the Contractor shall make these connections as specified or as shown on the Plans.

2.05.05 Utilities to be Abandoned

When pipes, conduits, sewers, or other structures are removed from the trench leaving dead ends in the ground, such ends shall be fully plugged or sealed with brick and mortar by the Contractor. Abandoned structures such as manholes or chambers shall be entirely removed unless otherwise specified or shown on the Plans.

All materials from abandoned utilities which can be readily salvaged shall be removed from the excavation by the Contractor. All salvageable materials remain the property of the Owner.

2.06 EXCAVATING AND TRENCHING

2.06.01 General

Excavating and trenching operations shall at all times be conducted in a safe, orderly manner using methods and equipment designed and suited to the intended use by personnel experienced in the work being performed.

None of the requirements or provisions specified herein or shown on the Plans shall nullify or restrict any safety provisions required by any regulation or law governing the protection and/or safety of persons or property.

2.06.02 Width of Trench

The width of the trench shall be ample to permit the pipe to be laid and joined properly and the pipe embedment material and backfill to be placed and compacted as specified. Trenches shall be of sufficient extra width when required as will permit the convenient placing of trench supports, sheeting, and bracing.

2.06.02.01 Width of Trench for Rigid Pipe

In order to limit excessive loads on rigid pipe, the maximum width of trench for pipe 36 inches and larger in diameter shall not be more than twice the nominal diameter; for smaller sizes of pipe, the maximum width of trench shall be not more than three (3) feet greater than the nominal diameter of the pipe, except as otherwise specified or directed.

The above limiting restrictions on trench width apply from outside bottom of pipe to outside top of pipe.

Where the width of trench within these limits exceeds the maximum limit specified, the Contractor shall install a heavier class of pipe or use other means to provide additional load-carrying capacity. Any changes in class of pipe or other variation shall be approved in writing by the Township before the Work progresses.

2.06.02.02 Width of Trench for Flexible Pipe

Unless otherwise specified or approved by the Township, a minimum trench width of at least two (2) feet on each side of the pipe for placement of select embedment material will be required.

2.06.03 Excavating to Grade

The trench shall be excavated to a depth required for the proper installation of the pipe and placing of the pipe embedment material as specified.

Any part of the bottom of the trench excavated below the specified subgrade shall be refilled with approved materials compacted to 95% of maximum unit weight in accordance with MDOT procedures. If additional excavation is required to correct unstable foundation conditions, the Contractor shall notify the Owner and agree on the cost prior to commencing work.

2.06.04 Sheeting, Shoring, Bracing, and Shelving

2.06.04.01 General

The Contractor shall brace or slope back the sides of all excavations in accordance with current MIOSHA and OSHA regulations. The Contractor shall be responsible for compliance to such regulations and for the design, installation, and maintenance of all excavation safety measures.

2.06.05 Rock Excavation

2.06.05.01 General

Wherever the word rock is used in these specifications, it shall mean boulders, solid ledge rock, and other minerals geologically placed and of a hardness when first exposed of three (3) or greater in scales of mineral hardness, which in the opinion of the Township Engineer requires continuous use of drilling and blasting or special power equipment for its removal.

Soft disintegrated rock which can be removed with a power-operated excavator or with hand tools and loose, shaken, or previously blasted rock and broken stone in rock fillings shall not be classified as rock.

2.06.05.02 Hardness

The Township Engineer will determine the hardness of the material or minerals in question. The following accepted hardness will be used as a guide in the field for specific situations:

Gypsum - hardness of 2;
Fingernail - hardness of approximately 2-1/2;
Calcite - hardness of 3;
Copper Coin - hardness of approximately 3; and
Brass Pin - hardness of approximately 3.

A mineral with a hardness of 3 will scratch a copper coin and can be scratched with a brass pin. Determinations of hardness which cannot readily be determined in the field shall be resolved by laboratory analysis of the material in question.

2.06.05.03 Blasting

Where blasting is necessary, the Contractor shall obtain the required permits and licenses at the Contractor's own expense. This Work shall be done with due regard to the safety of workers, other people, and public and private property. The method of covering blasts, amounts of charges used, and the general procedure for doing this Work shall conform to the standard practice and shall meet all requirements of local ordinances and other regulations and shall be subject to the approval of the Township.

2.06.05.04 Clearance

Rock shall be removed to provide a clearance for all pipes, appurtenances, or structures of at least eight (8) inches below, and a minimum of eight (8) inches on each side of the pipe, appurtenance, or structure.

The specified minimum clearances are the minimum clear distance which will be permitted between any part of the pipe or appurtenances being laid and any part, point, or projection of the rock.

2.06.06 Dewatering

The Contractor shall provide and maintain adequate dewatering equipment to remove and dispose of all surface and ground water, including water or sewage from exposed sewers or water mains, from all excavations and trenches, or other parts of the Work. Each excavation shall be kept dry during the preparation of the subgrade and continually thereafter until the structure to be built or the installation of the pipe line is completed to such extent that no damage from hydrostatic pressure, flotation, or other cause will result.

Where Work is in soil containing an excessive amount of water, the Contractor shall provide, install, and maintain suitable well points or wells connected to manifolds or reliable pumping equipment, or other suitable dewatering methods, and shall so operate the dewatering system to insure proper construction of the work. If the Contractor elects to use a trench underdrain or similar dewatering system, the Contractor shall receive prior

approval of the Township as to location and installation methods for this type of system. The Contractor shall make every effort to prevent sand, sediment, or debris from entering any existing pipe line or conduit which may be used for drainage purposes. The repair or cleaning of drainage structures made necessary by the Contractor's operations shall be performed by and at the expense of the Contractor.

Arrangements for discharge of ground water into any public storm sewer shall be previously approved by the Township and/or Ottawa County Water Resources Commissioner.

2.07 TRENCHLESS CONSTRUCTION

2.07.01 General

Where so specified on the drawings, railroad tracks, streets, or other obstructions to be crossed by utilities shall be bored and/or jacked as hereinafter specified. These specifications describe the general method of conducting the boring and/or jacking operations and set forth minimum conditions. The location and details of the proposed installation will be shown on the Plans.

Unless otherwise specified, the Contractor shall be responsible for obtaining any permits and insurance required for the work under the right-of-way or other facility to be crossed, and shall carry out the details of the work in a manner that will fully meet the requirements of the authority having jurisdiction over the facility affected. No interruption of traffic will be permitted, and the Contractor shall take all precautions to that effect.

2.07.02 Casing Method

When the casing method is specified, a casing pipe shall be jacked into place and a carrier pipe shall then be installed in the casing pipe. The casing pipe shall be jacked into place by approved methods that will provide accurate alignment and grade and that will allow the carrier pipe to be installed within the casing at the specified alignment and grade.

The carrier pipe shall be joined together to form a continuous run through the casing. It shall be supported on wooden or plastic shoes or blocks which shall be securely fastened to each piece of pipe. The carrier pipe shall then be drawn or shoved through the casing.

Junction with pipes of other materials at each end shall be made as shown on the Plans. After the pipe has been inspected and accepted, the annular space between the pipe and the casing shall be filled with materials approved by the Township, such as peastone, or flowable fill. After the casing has been filled, the ends of the casing shall be sealed as shown on the plans or in the specifications.

2.07.03 Jacking Pipe Method

When specified or indicated on the Plans, the pipe to be jacked shall also be utilized as the carrier pipe. The pipe shall be jacked into place by approved methods that will provide accurate alignment and grade. Excavation shall be performed ahead of the pipe by working inside the pipe or shall be performed by boring with approved equipment suitable for the intended use.

2.07.04 Directional Bore

For directional drilling, the Contractor shall utilize a guidance system and tracking system during the pilot drill operation. These systems shall provide a continuous stream of data that will be converted to determine depth, pitch, and azimuth of the drill stem on the real-time basis. The Contractor shall also utilize equipment to correct for local magnetic anomalies, whether natural or induced by manmade structures.

Final installation of the pipe shall be accurate to within ± 2% of the vertical depth shown on the drawings at any given location. Horizontal accuracy shall be within two (2) feet of the proposed alignment. A detailed set of as-built drawings shall be provided to the Township Engineer upon the completion of the directional drilling process.

During the drilling process the Contractor shall readily account for all drilling fluid. If in any instance it is suspected that drilling fluid is being lost to the greater environment, the Contractor shall cease the operation, determine the situation, and make any corrections as necessary to assure that no fluid is affecting utility, drainage ditch, waterway, etc.

Following pipe installation by directional drilling, the Contractor shall remove all drilling fluid and excess soil from the site, and dispose of it properly, accordance to all State and Local ordinances or requirements. A frac-out contingency/mitigation plan detailing the Contractor's procedures shall be submitted to the Township Engineer and MDOT.

Material, testing, and other Project specific information shall be provided in the Project specifications and provided to the Township for review and approval.

2.08 SUBGRADE

The subgrade for pipe and/or structures shall be firm, dense, and thoroughly compacted and consolidated, free from mud and muck, and sufficiently stable to remain firm and intact under the feet of the workers.

2.08.01 Unstable Foundation

When the soil beneath the normal pipe embedment area is soft or unstable, even with adequate dewatering, or in the opinion of the Township cannot support the pipe or utility, further depth shall be excavated and refilled to the proposed grade with MDOT Class II granular material (for plastic pipe the material must comply with ASTM D2321) compacted in twelve (12) inch layers as specified in Section 2.09.05, or other approved means shall be employed to assure a firm foundation for the utility.

The volume of unstable foundation removed and replaced with approved materials for which payment will be allowed shall be determined in cubic yards unless otherwise specified on the Plan or in the proposal. Said volume shall be computed by assuming that the cross section area of the unstable foundation takes the form of a trapezoid as shown on the Standard Detail for Unstable Soil Removal for Utility.

2.08.02 Special Foundations

Where the subgrade at the bottom of the excavation consists of soil which is unstable or yielding to such a degree that, in the opinion of the Township, it cannot properly support the pipe or structure, the Contractor shall construct such additional foundation or reinforcement of the subgrade as may be specified, such as timber piling, geotextiles, or other means as approved by the Township to provide a proper foundation.

2.09 PIPE EMBEDMENT

2.09.01 General

Pipe embedment shall include the furnishing and placing of approved materials as specified or as directed from four (4) inches under the outside bottom of the pipe to twelve (12) inches over the outside top of the pipe. Various classes of pipe embedment may be specified or shown on the Plans or Standard details in which case the limits of the various types will also be specified.

2.09.02 Flexible Pipe Embedment

Flexible pipe is any pipe having a pipe stiffness of less than 60 psi. as defined under the requirements of ASTM Designation D-2412 (this includes all plastic pipe except Composite (Truss) pipe, and may include corrugated metal pipe, ductile iron pipe, and steel pipe, depending on pipe diameter and wall thickness).

Pipe embedment for flexible pipe shall be Class B. For pipes less than fifteen (15) inches in diameter, bedding material meeting the requirements of Section 902.07 of the 2020 MDOT Standard Specifications for Construction for granular materials Class II, modified to 100% passing a 1" sieve shall be used. If stone is used for bedding it shall meet the requirements of ASTM D2321 (Table 1) for Class 1A crushed stone.

A Township Engineer approved geotextile filter fabric shall be placed around all areas where Class 1A crushed stone pipe embedment is used as shown on the Standard details. Transition zones between crushed stone and sand embedment shall be separated by a geotextile fabric. For pipes fifteen (15) inches in diameter and larger, bedding material meeting the requirements of Section 902.07 of the 2020 MDOT Standard Specifications for Construction for granular materials Class II, modified to 100% passing a 1 sieve shall be used.

2.09.03 Class B Pipe Embedment

Unless otherwise specified or shown on the Plans, all pipe embedment shall be Class B pipe embedment as shown on the Standard details. When the soil in the bottom of the trench at pipe subgrade meets all the requirements for Granular Material Class II as specified in the 2020 MDOT Standard Specifications Section 902.07 and in the opinion of the Township will provide suitable bedding for the pipe, such soil may be utilized as bedding material and prepared to receive the pipe as specified without undercutting and subsequent replacement.

Plastic pipe embedment shall comply with ASTM D2321.

2.09.04 Special Pipe Embedment

Various types of special pipe embedment may be specified or shown on the Plans in locations where special conditions require their use. The Contractor shall perform all the work of constructing special pipe embedment where specified.

2.09.05 Placing Pipe Embedment Material

Pipe embedment material shall be placed in the bottom of the trench and shaped by hand to provide a firm and uniform bearing for the barrel of the pipe with additional shaping to accommodate the bells on bell and spigot pipe.

After each pipe has been graded, aligned, and placed in final position on the bedding material and jointing is complete, additional embedment material shall be carefully placed and compacted under and around each side of the pipe and over the pipe until it is completely covered by 12 inches of embedment material. Said material shall be distributed along both sides of the pipe uniformly and simultaneously to prevent lateral displacement of the pipe. All granular embedment material shall be compacted to 95% of maximum unit weight in accordance with MDOT procedures.

All of the work of placing pipe embedment shall be considered an integral part of installing the pipe and shall be completed immediately after the pipe is laid to the correct alignment and grade.

2.10 BACKFILLING ABOVE PIPE EMBEDMENT

2.10.01 General

All backfill material shall be free from cinders, pavement, ashes, refuse, sod, organic material, boulders, rocks larger than three (3) inches in diameter, frozen material, or other material which in the opinion of the Township is unsuitable. The soil excavated from the trenches shall be used for backfilling when it is classified as suitable by the Township and the Ottawa County Road Commission. If all or a portion of the excavated material is classified unsuitable for backfilling, the Contractor shall remove and dispose of the unsuitable material and shall furnish and place granular material meeting the requirements of Section 902.07 of the 2020 MDOT Specifications for Granular Material Class II.

All backfilling and compaction shall be performed by the Contractor using methods and equipment approved by the Township.

2.10.02 Trenches Requiring Compacted Granular Backfill

Trenches and excavations in the following locations shall be backfilled with approved granular material meeting the requirements of Section 902.07 of the 2020 MDOT Standard Specifications for Granular Material Class II:

a. Improved areas, including drives, sidewalks, parking areas, areas around structures, etc.;
b. Within the limits of the roadway (within a 1 on 1 slope beginning two (2) feet from the edge of pavement or back of curb towards the right-of-way line);

c. Within the limits of future improvements (shown on Plans);

d. Within limits specified on Plans; and

e. All sanitary sewer lateral trenches within the limits of the right-of-way.

All backfill within these areas shall be placed in layers not exceeding twelve (12) inches thick, and shall be compacted to 95% of maximum unit weight in accordance with MDOT procedures. Tests for compaction will be made by the Owner or other representative designated by the Owner at no cost to the Township. When tests indicate a density which is less than that required, the methods or equipment being used shall be modified to obtain the density specified, and the section in question shall be recompacted until the required density is obtained. The cost of retesting shall be borne by the Contractor. Density testing shall be in accordance with Ottawa County Road Commission requirements.

2.10.03 Trenches Not Requiring Compacted Granular Backfill

Where not otherwise specified or directed, backfilling above the pipe embedment shall be made with material which is originally excavated, which is suitable. Backfill materials shall be consolidated by mechanical equipment working longitudinally in the trench, or by other approved methods, so as to be free of large voids with any excess material mounded over the trench or removed as directed by the Township. The trench shall be graded to a reasonable uniformity and left in a neat condition.

2.11 INTENTIONALLY OMITTED

2.12 DISPOSAL OF EXCESS EXCAVATION

All excavated material in excess of that needed for backfill or that material classified as unsuitable by the Township shall be disposed of by the Contractor and shall be incidental to the major items of Work.

2.13 LIMITATIONS ON OPERATIONS

The Contractor shall at all times conduct Work so that there is a minimum of inconvenience to the residents and businesses in the vicinity of the Project. To this end, the Contractor shall complete backfill and remove all debris and unsuitable backfill to a point as close to the actual pipe installation as is practical and keep the area where the pipe construction and backfill has been completed in a neat condition. Open excavations shall be protected by signs, lights, barricades, and/or fences at all times when Work is not actually taking place at that excavation. The placement of excavated earth along the line of the trench shall be controlled by the use made of the street or right-of-way by the public and shall always be confined to approved limits. Not more than 300 consecutive feet of street shall be closed at one time, and vehicular traffic through any street shall not be stopped for a period longer than two weeks without the written permission of the Township. Not more than one cross street shall be closed to vehicular traffic at the same time except by permission of the or appropriate controlling agency.

2.14 SOIL EROSION AND SEDIMENTATION CONTROL

The Contractor shall conduct operations in such a manner that all soil is confined within the Project limits and prevented from entering storm sewers, water courses, rivers, lakes, reservoirs, or wetlands.

The Contractor shall place a filter or barrier composed of straw, stone, or other approved material around all catch basins or other inlets to the storm sewer or drainage courses to prevent sedimentation in these structures. After the construction operations are completed, the Contractor shall remove these filters and clean all the sediment and debris from the catch basins, ditches, or other storm sewer structures.

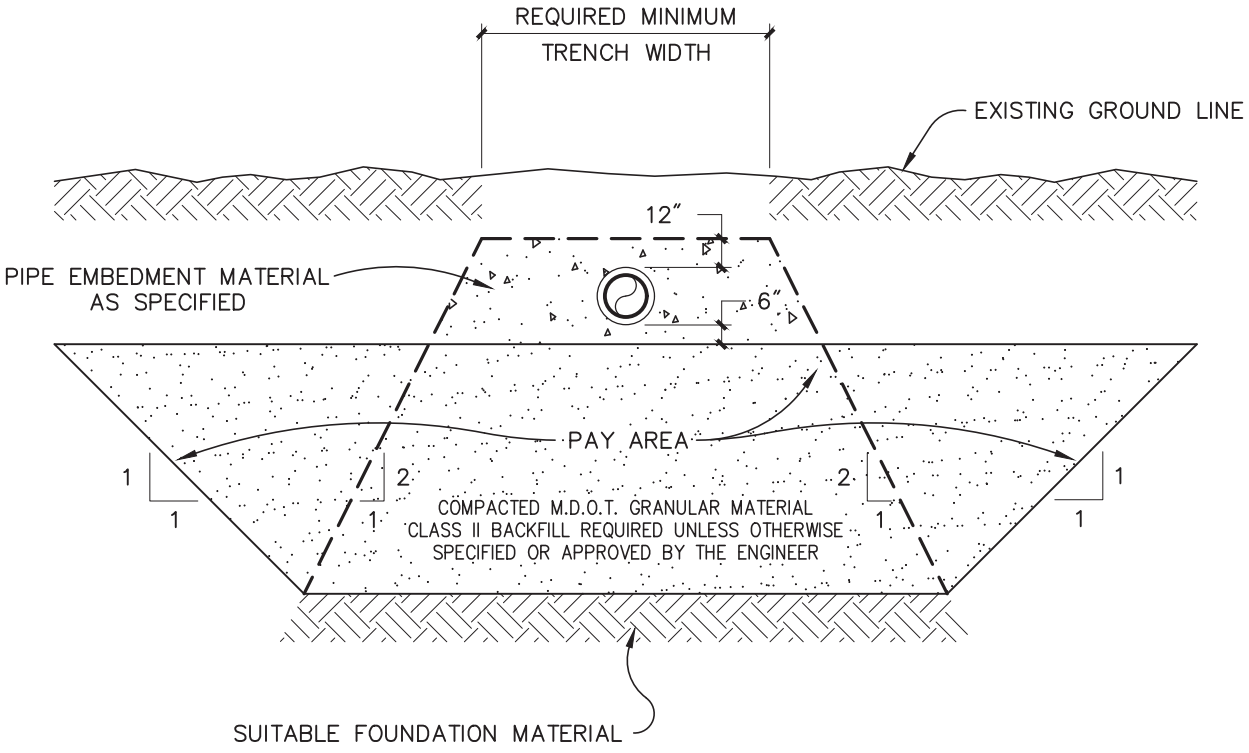
Soil erosion and sedimentation control measures if indicated on the Plans are considered as minimum requirements and are not to be considered as complete and all-inclusive. Additional control measures as may be required due to circumstances or conditions at the time of construction or as directed by the Township, or the designated Soil Erosion Control agency, shall be placed as required to insure conformance with Part 91 of PA 451 of 1994. Deviations from or additions to the erosion control measures shown on the Plan shall be subject to the approval of the Township or enforcing agency.

The cost of this Work and other control measures which may be required or directed by the Township shall be incidental to the cost of the Project unless specific items have been provided in the proposal.

The Contractor shall have a certified storm water operator and shall be responsible for all reporting as is required by the regulatory agencies. Copies of these reports shall be submitted to the Owner. The Contractor shall submit a dewatering plan to the Soil Erosion and Sedimentation Control Agency and shall be responsible to complete the items as outlined in the permit conditions.

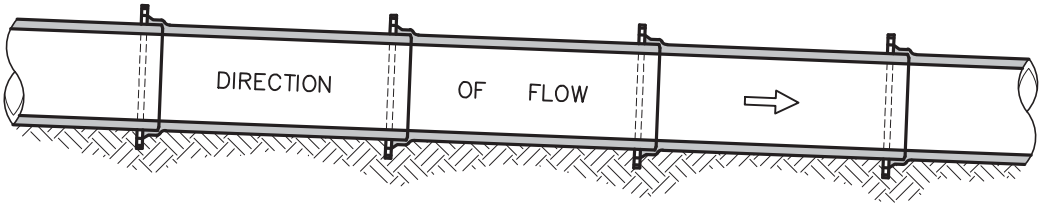
2.15 STREAM CROSSINGS

The rules and regulations concerning Inland Lakes and Streams, Part 301 of Act 451, shall govern all stream and river crossings. Minimum of Five (5) feet of cover to top of pipe (depth below firm bottom) shall be required.

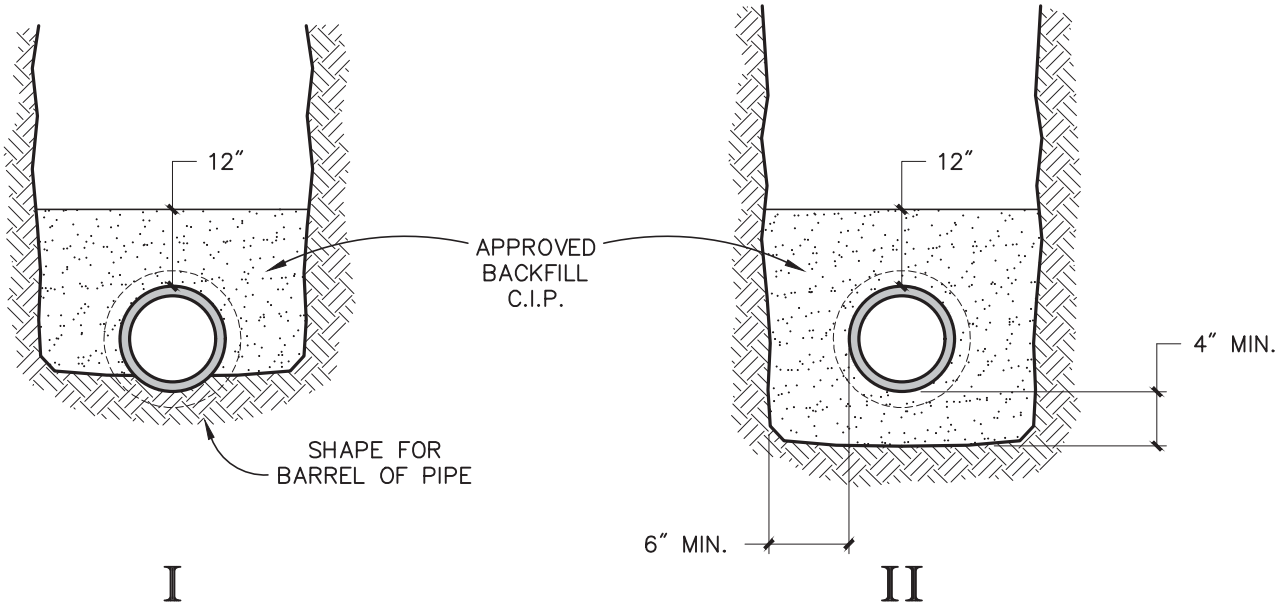


UNSTABLE SOIL REMOVAL FOR UTILITY

04/2022



EXCAVATION FOR BELLS



CLASS B PIPE EMBEDMENT

NOTES

1. ALL BACKFILL INDICATED SHALL BE COMPACTED TO 95% OF MAXIMUM DENSITY IN ACCORDANCE WITH M.D.O.T. PROCEDURES.
2. METHOD I SHALL BE USED IN AREAS OF UNCONSOLIDATED SOILS. (e.g. SAND, GRAVEL)
3. METHOD II SHALL BE USED IN AREAS OF CONSOLIDATED SOILS (e.g. CLAY, HARDPAN, ROCK)

04/2022