DIVISION 200 EARTHWORK

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SECTION 201 CLEARING AND GRUBBING

201.01 Description. This work consists of clearing, grubbing, removing, and disposing of all vegetation and debris within the limits of construction unless otherwise indicated, except such objects as are designated to remain or are to be

removed in accordance with other Sections of these Specifications. This work also includes the preservation from injury or defacement of all vegetation, trees, and objects designated to remain.

CONSTRUCTION METHODS.

201.02 General. The Contractor shall remove only material herein specified. If the Contractor chooses to do such work with mechanical equipment, and removes and wastes suitable embankment and topsoil material required on the Project, any suitable embankment and topsoil material removed with the cleared and grubbed material shall be replaced by the Contractor.

The Department reserves the right to require the Contractor to use a root rake if large quantities of suitable embankment and topsoil material is being wasted during the grubbing operation.

All arboricultural practices for tree care operations shall be conducted in accordance with ANSI Z133.1 as prepared by the International Society of Arboriculture.

201.03 Trees Designated to Remain. The Engineer shall designate such trees, shrubbery, and plants that are not to be removed, and the Contractor shall protect them from any damage. If any such trees, shrubbery, or plants are damaged, they shall be replaced or repaired by a certified tree surgeon. Branches of trees overhanging the roadbed shall be properly trimmed to maintain a clearance height of 6-m , unless otherwise directed. All pruning shall be performed in accordance with the International Society of Arboriculture's Current Tree Pruning Guidelines, Publication ISBN 1-881956-07-5, and as illustrated on the Standard Construction Details.

201.04 Disposal. All materials removed by the clearing and grubbing operation shall become the property of the Contractor and shall be removed from the Project or otherwise disposed of as specified in Subsection 106.09.

201.05 Preparation of Ground Surface. Grading operations shall not be started in any area until all operations of clearing and grubbing work within the area affected have been completed. In areas where excavation is to be made, the ground shall be cleared of all living or dead trees, stumps, brush, or other objectionable material. All embedded stumps, root mats, etc., shall be removed to a depth of not less than 600-mm below the subgrade or slope surfaces. All depressions made below the subgrade or slope surfaces by the removal of stumps or roots shall be backfilled with approved material and compacted as directed.

In areas where embankment is to be made 1.5-m or more in depth, where depth is measured from the bottom of the fill to the subgrade, trees and stumps shall be cut off as close to the ground as is practicable, but not to exceed 150-mm above the ground surface. In the area from the toe of the embankment slope to 1.5-m inside the embankment, all trees, stumps, roots, brush, root mat, and debris shall be removed.

In areas where embankment is to be made less than 1.5-m in depth, all trees, stumps, roots, brush, root mat, and debris shall be removed, grubbed, or blasted from the ground, in their entirety. Root mat shall be removed to the following depths unless otherwise indicated in the Contract:

(a) Forested areas (within tree line shown on the Plans): 600-mm
(b) Scrub wooded areas: 300-mm
(c) Field areas: vegetation only

Clearing, grubbing, and excavation to permit installation of necessary ditches and sediment controls shall be done prior to clearing and grubbing the remainder of the Contract. Based on soil conditions encountered after completion and acceptance by the Engineer of the applicable clearing and grubbing, topsoil removal, and ditching, the Engineer may direct the Contractor to withhold all earth-moving activities for a maximum of 14 calendar days to allow for drying and solidification of the ground.

201.06 Clearing and Grubbing Limitations. The Engineer reserves the right to limit clearing and grubbing operations in order to ensure compliance with the applicable erosion and sediment control regulations.
The maximum exposed surface area of erodible soil, due to clearing and grubbing operation, shall be 8 ha.

201.07 Clearing Outside the Limits of Construction. All trees that interfere with sight distance, either vertically or horizontally, shall be cleared from the right-of-way and easement areas. If noted in the Contract, right-of-way and

easement areas shall be cleared, flush with the ground, of all trees, brush, shrubs, downed timber, rotten wood, rubbish, and other objectionable debris and vegetation.

201.08 Removal of Other Obstructions. Fences and guardrail upon or within the limits of construction, shall be removed carefully by the Contractor, wholly or in part, as specified or directed, and disposed of as specified or directed, except as otherwise indicated in the Contract. Buildings and other structures shall be removed by the Department or other responsible authority unless otherwise provided. Footings, pipes, conduits, drainage inlets and grates, and similar items, which are located beneath the ground surface, are not to be removed under Section 201.

201.09 Method of Measurement. The quantity of clearing and grubbing will not be measured.

201.10 Basis of Payment. The quantity of clearing and grubbing will be paid for at the Contract lump sum. Price and payment will constitute full compensation for replacement of suitable material that was cleared and grubbed; for furnishing and compacting approved material to fill all depressions; for replacement or repair of damaged trees, shrubbery, or plants designated to remain; for disposal; and for all labor, equipment, tools, and incidentals required to complete the work.

All costs associated with the direction to withhold earth-moving activities will be incidental to the work.

SECTION 202 EXCAVATION AND EMBANKMENT

202.01 Description. This work consists of the removal and final disposal of all materials taken from within the limits of construction as necessary for the preparation and construction of the roadbed, embankments, subgrades, shoulders, slopes, side ditches, approaches, intersecting roads, and private entrances. Flexible pavement shall be removed under this Section. The removal and final disposal of materials specified under other pay items is not included in this work. This work also consists of grading and compacting of the embankment, roadway, and shoulders; construction, shaping, and sloping of side ditches, embankment, and cut slopes; construction and maintenance of temporary edge berms, interceptor berms, and embankment slopes associated with all erosion control methods indicated in Section 261; undercutting, which is the removal of unsuitable material below the grade of a proposed subgrade or embankment foundation; salvaging and stockpiling of topsoil for re-use; backfilling of areas from which unsuitable materials have been removed; and the removal and disposal of all material not otherwise provided for, so that the Project is completed in a neat workmanlike manner.

CONSTRUCTION METHODS.

202.02 Test Rolling. Test rolling shall be performed with self-propelled, pneumatic-tired equipment, which shall be of the size, type, and weight that will reveal any soft, yielding, or spongy areas. The equipment shall be run longitudinally with less than 500-mm of unrolled area between tire strips.

If the test rolling shows the subgrade to be unstable, the Contractor shall scarify, disc, aerate, or add moisture, and recompact the subgrade to the extent necessary to achieve stability.

Acceptance of the test roll by the Engineer will be a requirement prior to placement of subsequent lifts. The test roll shall be performed with a fully loaded, ten-wheel dump truck or other equipment approved by the Engineer. The test roll shall serve to verify the stability of the lift in question, and no compaction tests will be taken until the stability of the lift is determined to be satisfactory by the Engineer.

202.03 Excavation. Excavation shall be made in accordance with these Specifications, the Plans, or as established by the Engineer. No allowance will be made for materials excavated beyond or below the lines and grades shown. All suitable material removed as excavation shall be used in the formation of embankments, shoulders, and slopes, before securing or imputing any borrow, unless specifically approved by the Engineer. No unsuitable material will be allowed in the formation of embankment. Unsuitable materials shall be deposited on slopes as directed or shall be disposed of when directed. All existing ditches and waterways, and all new or existing pipes and culverts, unless noted on the Plans to be abandoned, shall be cleaned and cleared of obstructions and shall be left in a neat and trimmed condition.

(a) *Obstructions.* The Contractor shall remove and properly dispose of pipes, drainage inlets, pole bases, conduits, and any other articles located below existing ground level.
(b) *Disposal.* All waste materials removed by the excavation operation shall become the property of the Contractor and shall be removed from the Project or otherwise disposed of as specified in Subsection 106.09.
(c) *Topsoil.* Topsoil, if present, shall be removed in its entirety from all cut sections and from fill sections where embankment heights are less than 1.5-m when measured from bottom of fill to subgrade.
Sufficient topsoil shall be stockpiled to meet the requirements of Section 733.
For projects where excavation generates excess fill material, remaining topsoil shall be removed from the site and taken to an approved disposal area or shall be retained by the State.
For projects in which embankments are constructed, remaining topsoil shall be incorporated in the outer portions of embankment as shown in the Contract. After all embankment needs have been met, any remaining topsoil shall be removed from the site and taken to an approved disposal area or shall be retained by the State.
The Engineer may claim excess topsoil. In such cases, the Contractor shall load State vehicles for its removal. If the State wishes to claim excess topsoil, such direction will be given to the Contractor prior to the start of earth-moving operations.
(d) *Excess Material Stockpiled for Later Use.* If ordered by the Engineer, excess material that cannot be immediately placed in fill areas shall be stockpiled at a location within the Project limits designated by the Engineer, for later use, thus requiring double handling. At the time when stockpiled excess material is to be used in fill areas or for the formation of embankments, shoulders and slopes, it shall be loaded and hauled by the Contractor and placed and compacted as specified in Subsection 202.05. The requirements of this paragraph also apply to excess materials generated from hot-mix removal, incidental concrete removal, and all construction materials that can be used for fill material.
(e) *Excess Material Generated From Other Pay Items.* If ordered by the Engineer, excess materials generated from other pay items that are suitable for embankment purposes shall be placed in fill areas. If the material being excavated can immediately be moved to fill areas for placement, it shall be placed and compacted in accordance with Subsection 202.05. If the material cannot be immediately placed in fill areas, then it shall be stockpiled, and reused at a later time according to (d) above.
(f) *Excess Material Generated by Others.* Excess material generated by others, including other Contractors or utility companies and their Contractors performing work within the Contract limits shall be separately stockpiled for later use in accordance with Subsection 202.03 (d).

202.04 Removal of Existing Pipe. All obstructions, within the limits of construction, not covered under Section 201, shall be removed as shown on the Plans, or as directed. The removal of pipe is included in this Section. All existing pipe shall be removed with reasonable care. If the removed pipe is re-usable, it will remain the property of the Department and shall be stored at a suitable location on or adjacent to the Project for transport by the Department.
Existing pipe, which is not to be removed and is no longer functional, shall be plugged with concrete block, brick, or masonry, or as otherwise directed.

202.05 Embankment. All embankments shall be formed of material meeting the requirements of Section 209, except that rock, bituminous concrete, or Portland cement concrete, obtained from the excavation, may be used if placed in uniform loose layers of 600-mm or less. Any exposed rebar shall be cut and disposed of. All material, which cannot be readily incorporated into a 600-mm loose layer, shall be reduced in size to meet this requirement. Individual pieces of rock, bituminous concrete, or Portland cement concrete shall not exceed 900-mm in any dimension. No rock, bituminous concrete, or Portland cement concrete shall be placed within 1.5-m of the top of the embankment when measured from the top surface of rock, bituminous concrete, or Portland cement concrete to the bottom of the pavement structure. Embankment materials placed in pile foundation areas where piles are to be placed shall contain no rock, aggregate, broken concrete, or other material that would be retained on a 63-mm sieve. No spongy, wet, or frozen material will be permitted in the embankment. Excessive or insufficient mixture content shall not be criteria for classifying materials as unsuitable for embankment. The Contractor shall make the necessary effort to wet or dry the mixture in order to comply with Subsection 202.05 (f)

(a) *Preparation.* Unless shown otherwise on the Plans or in the Special Provisions, where the embankment height to be constructed is less than 1.5-m, all sod, vegetation,

and topsoil shall be removed from the surface upon which the embankment is to be placed, and the cleared surface shall be completely broken-up to a minimum depth of 150-mm. This area shall then be recompacted. Sod not required to be removed shall be thoroughly diced before construction of embankment.

Existing treated or compacted road surfaces lying within 900-mm of the final grade, or within the pavement structure if the subgrade is more than 900-mm from the final grade, shall be scarified to a depth of at least 150-mm, unless otherwise designated on the Plans. Scarified material shall be recompacted.

Existing paved road surfaces lying within 900-mm of the final grade, or within the pavement structure if the subgrade is more than 900-mm from the final grade, shall be removed, and the underlying base materials scarified to a depth of 150-mm.

Existing roadway surfaces lying more than 900-mm below the final grade, or bottom of pavement structure, shall remain in place and be treated as follows:

(1) Bituminous concrete shall be broken up to a maximum surface area of 0.1 m^2 and recompacted.

(2) Portland cement concrete shall be broken up to a maximum surface area of 0.8 m^2 with a pavement breaker or other approved equipment.

(3) Bituminous surface treated roadways lying beneath an embankment shall be scarified to a depth of 150-mm and recompacted.

(b) *Widening Existing Embankments.* Where new embankments are to be placed against existing embankments or the existing embankment is to be widened, the existing embankment shall be benched in accordance with the details shown on the Plans or as directed.

(c) *Placement.* Material shall be placed in successive layers, and each layer shall be placed in a level, uniform cross-section, not to exceed 200-mm in depth, loose measurement, unless otherwise approved by the Engineer. It shall be deposited and spread parallel to the roadway centerline, and the layers shall extend the full width of the embankment. If so required, each layer shall be diced to ensure uniform distribution of moisture and component materials. Each layer shall be properly compacted, as hereinafter specified, before starting the next layer. No embankment shall be placed on any wet, unstable, or frozen materials.

However, depending on the soil conditions encountered at proposed embankment areas, the Contractor may be directed to place the first lift of embankment to a thickness greater than 200-mm in depth. All subsequent lifts shall be placed as specified herein.

Unless otherwise approved by the Engineer, the Contractor shall be required to test roll all lifts of soil, aggregate, or soil mixtures according to the requirements of Subsection 202.02. Any instability evidenced during the test roll shall be corrected to the satisfaction of the Engineer by dicing, aerating, recompacting, removing, and replacing of material. After corrective measures have been taken, test rolls to verify the stability of the lift shall be required.

At the end of each day during which the Contractor places embankment, the Contractor shall construct edge berms, interceptor berms, and embankment slopes. Temporary slope drains shall be extended to connect to the edge and interceptor berms.

(d) *Compaction Equipment.* There shall be sufficient equipment of the proper type and weight provided to do the work of grading, leveling, and compacting promptly after depositing the material. When this equipment is inadequate for the rate of compacting, the rate of excavation or placing of embankment shall be reduced to a rate not to exceed the capacity of the grading and compacting equipment.

Compaction shall be attained by approved rollers or compactors. The use of other suitable compaction equipment may be approved for work under Section 202 provided such equipment is configured and operated so that the requirements of these Specifications are fully met.

(e) *Compaction Procedure.* Compaction or rolling shall start at the edges, progress toward the center of the embankment, and shall continue until each layer is thoroughly and uniformly compacted to the full width of the embankment and to 95% or more of the maximum density of the same soils as determined by AASHTO T 99 Method C, Modified.

The ordinary use of trucks, carryalls, scrapers, tractors, or other construction equipment may be considered as rolling, but the traffic of such hauling equipment shall be distributed over the fill in such a manner that makes use of the compaction provided by the construction equipment.

All areas of sharp depressions, trench backfills, and around culverts, bridges, and walls, inaccessible to the specified methods of compaction, shall be built in continuous horizontal layers not more than 200-mm in depth, loose measurement, and shall be thoroughly tamped and compacted to the specified density.

Properly broken rock, bituminous material, or Portland cement concrete shall be compacted with a minimum of six passes of an approved roller or as otherwise directed.

(f) *Density and Moisture Control.* The determination of compliance with field compaction requirements, as specified herein, shall be in accordance with the following AASHTO test methods:

(1) AASHTO T 191, T 238, and T 239, Modified. Field density tests shall be expressed as a percentage of the maximum density made on the same soils.

(2) AASHTO T 99 Method C, Modified, for determination of maximum density and optimum moisture content.

(3) AASHTO T 224, Modified, by coarse particle correction method.

The moisture content of the soil at the time of compaction shall be within 2% of the optimum moisture content, as determined by AASHTO T 99 Method C, Modified. If the moisture content is not within 2% of optimum, the soil shall be either moistened or dried and thoroughly mixed to the proper moisture content before compaction.

No compaction or moisture tests shall be taken, unless specifically requested by the Engineer, until the Engineer has approved the stability of the lift to be tested.

202.06 Preparation of Subgrade. The subgrade shall be maintained in such condition that it drains. Prior to the formation of the final subgrade, or of the cutting of any section for the pavement structure in which the subbase or base is to be placed, all side ditches parallel to the centerline of the roadway shall be cut to their plan gradient and vegetatively stabilized to prevent scour and erosion. Temporary ditches permitting drainage from the cut for the pavement structure to the side ditches shall be provided at intervals as required. All facilities necessary for complete

drainage of the construction area shall be provided and maintained by the Contractor. The Contractor shall provide for the control of sediment and erosion for all water drained or pumped from the subgrade in accordance with Section 110. In no case shall vehicles be allowed to travel in a single track and form ruts in the subgrade. If any sharp irregularities are formed, the subgrade shall be scarified and recompacted.

(a) *Cut Section.* The subgrade shall be properly shaped and uniformly and thoroughly compacted, in conformity with the lines and grades shown on the Plans or as established in the field, before any subbase, base, or surfacing material is placed. The subgrade shall be free from boulders, large rocks, muck, vegetation, or other materials that would prove detrimental to the road's stability. Depressions that develop during the rolling shall be filled with suitable material, and the subgrade shall be rolled until no depressions continue to develop.
Where excavation to the finished graded section results in a subgrade or slopes of unsuitable material, the Engineer may require the Contractor to remove the unsuitable material and backfill to the finished graded section with approved material in accordance with Section 212. The Contractor shall conduct its operations in a manner that allows the Engineer to take the necessary cross-sectional measurements before the backfill is placed.
(b) *Fill Section.* Prior to placement of any base material, the subgrade and adjacent shoulder or slope rounding earthwork shall be completed to their finished grade elevation in order to form a box to retain the base material. No base material shall be placed in a section where a box has not been created unless specifically approved by the Engineer.

202.07 Approval of Subgrades. No subbase or base materials shall be placed until the subgrade has been approved.

202.08 Haul Roads. All haul roads across State owned property or within the limits of the Contract must be proposed by the Contractor to the Engineer and approved prior to their construction. Maintenance of the haul roads includes, but is not limited to, any necessary base materials or hot-mix pavement, or both. Haul roads will not be permitted through wetland areas that fall outside the limits of the construction unless approved by the U.S. Army Corps of Engineers or the DNREC, or both, as applicable.

202.09 Dust Control. Adequate dust control must be maintained by the Contractor at all times during the earth-moving operations. Dust shall be controlled exclusively through the use of water unless otherwise indicated in the Contract documents or authorized by the Engineer.

202.10 Method of Measurement. The quantity of excavation will be measured by the cubic meter (m^3). The volume will be computed by the method of average end areas and will be measured by cross-sections taken at regular intervals and at breaks in grade. All excavation, except topsoil, will be measured in its original position. Topsoil will be measured in its original position or in a stockpile after excavation, at the discretion of the Engineer. Topsoil removed from fill areas may be stockpiled separately for the cross-sectioning or may be measured by cross-sectioning the area of removal before and after topsoil stripping is performed. Excess excavation generated by the Contractor that the Engineer has directed to be stockpiled for use at a later date will not be measured. Excess excavation generated by others will be measured by the cubic meter in the stockpile.

Embankment will not be measured.

202.11 Basis of Payment. The quantity of excavation will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for the removal of all obstructions not covered under other Sections and the removal of all pipe within the limits of the work; for the placement of embankments as specified under Subsection 202.05; for the disposal of all surplus material; for the preparation of subgrade and shoulders; for cleaning and clearing ditches of all obstructions; for stockpiling excess topsoil and loading excess topsoil into State vehicles; for placing and compacting material in fill areas immediately after excavating; for cross-sectioning fill material stockpiled for later usage; for test rolling all lifts of soil and correcting unstable lifts of fill including, but not limited to, furnishing and operating the loaded, ten-wheel dump truck, aerating, dicing, recompacting, removing of material, and furnishing and placing replacement material; for constructing temporary ditches from the cut for the pavement structure; for utilizing excess excavation from utility company work; for constructing, maintaining, and restoring haul roads throughout the limits of the Contract; for dewatering; for controlling dust; and for all labor, equipment, tools, and incidentals required to complete the work. All excavation not included under the other Sections will be paid for under Section 202. Undercutting of unsuitable material, as defined in Section 212, will be paid for at the rate of 150% of the unit price per cubic meter for Section 202 unless Section 212 is a bid item in the Contract. Test holes or test pits will be paid for as shown on the Plans, in the Special Provisions, or as directed.

Cost for stockpiling and double handling excess material as outlined in Subsection 202.03 (d) and (e) shall be incidental to Section 202. Measurement will be made only once, that being at the time of initial excavation.
Material generated and stockpiled by others as outlined in Subsection 202.03 (f) will be paid for at the Contract unit price per cubic meter when it is excavated from the stockpile for use on the Project.

Embankment will not be paid for directly. It will be considered a necessary part of the work paid for as Excavation, Excavation for Structures, or Borrow, as applicable. The construction of edge berms and interceptor berms will be considered incidental to the construction of embankments or erosion control devices, as applicable.

Payment for excavating and stockpiling topsoil will be made only once, at the time of its initial excavation. Any rehandling, disposal, transporting, or other related costs will be paid under Section 733.

If topsoil is stockpiled for sectioning, the piles must be kept separate from those piles generated for cut areas. Failure to properly separate these piles will void payment for topsoil removed in fill areas.
No separate payment will be made for the construction, maintenance, and final restoration of haul roads except for bridges across wetlands as identified in the Special Provisions. No separate payment will be made for materials used for the maintenance of haul roads.

SECTION 203 CHANNEL EXCAVATION

203.01 Description. This work consists of widening and deepening existing stream channels and waterways, reconstructing channel and stream configurations and locations, shaping and finishing channel and streambeds and banks, and backfilling of old channels and streams. This work also consists of the disposal or the approved utilization of the excavated material.

203.02 Construction Methods. Disposal areas shall be either designated by the Department or secured by the Contractor as directed. Work shall be completed in conformance with Subsections 110.15 and 110.16. Excess excavated material suitable for use in embankment or fill areas shall be utilized in accordance with Subsection 202.03 (d). Unsuitable excavated material shall be disposed of as specified in Subsection 106.09.

203.03 Method of Measurement. The quantity of channel excavation will be measured by comparison of original and final cross-sections. The volume will be computed on a cubic meter basis, by the average end area method between the limits shown on the Plans. Measurement will not include material removed outside the payment limits, unless the Engineer authorizes such work.

203.04 Basis of Payment. The quantity of channel excavation will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for excavating; for hauling, depositing, and grading of excavated materials; for shaping and finishing of channel and stream beds and banks; for backfilling of old channels and streams; for disposing of excess and unsuitable materials; and for all labor, equipment, tools, and incidentals required to complete the work.

SECTION 204 MUCK EXCAVATION

204.01 Description. This work consists of the removal and disposal of mixtures of soil and organic matter, commonly called muck. This work also consists of backfilling the area where muck is excavated.

204.02 Construction Methods. Excavation and backfilling shall be carried progressively across the area being excavated. Work shall be coordinated so the open trench between excavation and backfill areas does not exceed the working range of excavation equipment. The length of open trench completely excavated to acceptable foundation material shall be at least 6 m at all times when backfill is being placed. Excavation shall be made to ensure the slopes remain stable until backfill has been satisfactorily placed. Any alternative procedures for excavation and backfilling must be approved in writing.

The depth to which excavation shall be carried will be determined by the Engineer as excavation proceeds. Variations from the estimated depths on the Plans are expected.

Excavation shall be accomplished by dragline or an approved alternate method. Equipment shall operate on the unexcavated soil and shall not operate on the surface of backfill unless approved. The water level in the excavation shall not be lowered by pumping unless approved. The Contractor shall conduct its operations in a manner that will allow the Engineer to determine that all unsuitable material has been removed. Muck excavation shall be conducted and

protected in a manner that will prevent the entry of undesirable material into the excavated area. The Contractor is required to provide access and measuring devices to permit the Department to inspect the work and take measurements or soundings for the purpose of determining quantities for payment. The Contractor shall not place fill in an area where muck has been excavated, until the Engineer has given authorization to proceed. The Engineer will determine when additional muck excavation is required.

The Contractor shall secure approved disposal areas. No disposal shall be made within 30 m of the right-of-way. Materials placed in disposal areas shall be graded to obtain a smooth, free draining surface. The Engineer will determine when the finished condition is proper and complete.

Excavated muck shall be considered unsuitable material. It shall be the Contractor's responsibility to remove all unsuitable material.

204.03 Method of Measurement. The quantity of muck excavation will be measured in cubic meters. The volume will be measured to the limits shown on the Plans, or as directed, computed by the method of average end areas. Areas will be based on cross-sections taken of the original ground prior to muck excavation and cross-sections taken after unsuitable materials have been excavated. Allowance will not be made for excavation beyond the lines, grades, and typical cross-sections shown on the Plans established by the Engineer.

The excavation and removal of slides within the excavation will not be measured.

204.04 Basis of Payment. The quantity of muck excavation will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for excavating and satisfactorily disposing of muck, backfilling of material, and removing and disposing of obstructions and encumbrances not otherwise provided for; for securing disposal areas; for constructing necessary haul roads; for maintaining the work in a finished condition until acceptance; for furnishing water transportation for the inspection; and for all labor, equipment, tools, and incidentals required to complete the work.

SECTION 205 ROCK EXCAVATION FOR ROADWAY

205.01 Description. This work consists of bedrock and ledgerock removal for roadway that cannot be accomplished without either blasting or using rippers. This work also consists of the use or disposal of such excavated material and backfilling the excavation with suitable material.

CONSTRUCTION METHODS.

205.02 Rock Classification. All boulders and other detached stones, having a volume of 0.30 m^3 or more, shall be considered as rock. The classification "Rock Excavation" shall not apply to soft disintegrated rock, bituminous pavements, gravel, broken stone, or concrete pavements. These and other materials are classified as normal excavation and are included under Subsection 202.03.

205.03 Excavation and Backfilling. Rock excavation shall be made in conformity with the lines, grades, and cross-sections shown on the Plans, or as directed.

Excavated rock shall be used in forming embankments wherever the depth of the fill is sufficient to properly contain the rock in accordance with Section 202. All material from rock excavation within the limits of construction, excavated under this Section, shall be used in the formation of embankments and shoulders before using any borrow, unless otherwise approved by the Engineer. Unless otherwise specified, material classified as rock shall be excavated, within the limits of the roadbed, to a minimum depth of 150-mm but not more than 300-mm below the subgrade.

The excavation, regardless of the depth, shall be backfilled with approved material and compacted to the specifications designated on the Plans, the Special Provisions, or by the Engineer. Undrained pockets left in the surface of the rock shall be drained prior to backfilling.

All unsuitable and excess material shall be disposed of as specified in Subsection 106.09, or as directed.

205.04 Blasting. Prior to any blasting, the Department will call a blasting conference at which the Contractor shall submit for approval its blasting methods, schedule, and the required protection it will use to ensure the utmost safety during blasting operations. The Contractor shall be responsible for all damage due either directly or indirectly from the blasting operations.

When rock that is encountered in cuts requires drilling and blasting, all necessary precautions shall be exercised to preserve the rock in the finished slope in a natural undamaged condition. The surfaces shall remain reasonably straight and clean. Excessive blasting or "over shooting" will not be tolerated. Any material outside the limits shown on the Plans which becomes shattered or loosened shall be removed and replaced with approved backfill material. When the results of the blasting do not yield a natural undamaged condition, the Contractor shall adjust its operations to obtain the required slope conditions called for on the Plans. The method of drilling and blasting shall be modified by procedures such as drilling blast holes at the inclination of the finished slope, employing delayed blasting techniques, changing the spacing of blast holes, or reducing the quantity of explosive.

When the presplitting method of excavation is specified, the excavation shall be performed in a manner that will produce a uniform plane of rupture in the rock, and will ensure that the resulting backslope face will be unaffected by subsequent blasting and excavation operations. The Contractor shall presplit the rock along rock slopes at locations, lines, and inclinations shown on the Plans, or as directed. A 30-m test section shall be provided to establish the diameter and spacing of the drill holes and the proper blasting charge to be used in the presplitting operation. The spacing of the drill holes shall not exceed 900-mm, unless approved. Drill holes shall extend to plan grade, or shall extend in lifts of not more than 7.5-m, whichever is less. If drilled in benches, an offset will be permitted to accommodate the head of the drill. Each individual offset shall not exceed 450-mm. Presplitting shall extend a minimum of 6-m ahead of the limits of fragmentation blasting, unless otherwise directed. If the presplitting is determined to be unsatisfactory, adjustments shall be made in the spacing, diameter, and loading of the presplit holes using another 30-m test section.
The Contractor shall schedule its operations so that all rock excavation within a distance of 30-m from bridges or other large structures is completed to the required slope lines and depths before any structure work is started.
All loose and unstable material, breakage, and slices, even if located beyond the payment lines indicated on the Plans, shall be removed as directed, as the excavation for each vertical stage (lift) progresses.

205.05 Method of Measurement. The quantity of rock excavation for roadway will be measured in cubic meters. The volume of rock excavation will be measured to the limits of excavation shown on the Plans or as adjusted by the Engineer, computed by the method of average end areas. Areas shall be based on cross-sections taken before and after rock excavation. When it is impractical to measure rocks or boulders by the cross-section method, three-dimensional measurement using a pre-approved method of calculation may be used. Rock excavated from depths in excess of 300-mm below the subgrade will not be measured.

The material used for backfilling the excavated areas will be measured under the appropriate Section, within the limits established by that Section. In areas where rock was excavated to depths in excess of 300-mm below the subgrade, backfill material placed between 300-mm below the subgrade and the bottom of the excavation will not be measured.

205.06 Basis of Payment. The quantity of rock excavation for roadway will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for drilling, blasting, and presplitting; for excavating, removing, backfilling, and compacting materials within the area between the subgrade as shown on the Plans or adjusted by the Engineer and 300-mm below the subgrade; for disposing of surplus material; for draining undrained pockets in the surface of the rock; for removing shattered or loosened material and replacing it with approved backfill material; and for all labor, equipment, tools, and incidentals required to complete the work.

The material used for backfilling excavated areas will be paid for under the appropriate Section for the materials used, as long as the work is within the area between the subgrade as shown on the Plans or adjusted by the Engineer and 300-mm below the subgrade.

No payment will be made for rock excavated from depths in excess of 300-mm below the subgrade. No payment will be made for backfilling areas from the bottom of the excavation to 300-mm below the subgrade.

SECTION 206 ROCK EXCAVATION AND BACKFILLING FOR STRUCTURES AND TRENCHES

206.01 Description. This work consists of bedrock and ledgerock removal for structures and trenches that cannot be accomplished without either blasting or using rippers. This work also consists of the use or disposal of such excavated material and backfilling the excavation with suitable material.

CONSTRUCTION METHODS

206.02 Definitions. If rock is encountered while performing the work required under Subsection 207.02, 207.03, or 208.03, it shall be excavated as indicated in this Section, and the excavated space shall be backfilled in accordance with

the requirements of either Subsection 207.05 or 208.04. All boulders or other detached stones, having a volume of 0.30 m^3 or more shall be classified according to Subsection 205.02.

206.03 Excavation and Backfilling. Rock excavation shall be made in conformity with the lines, grades, and cross-sections shown on the Plans, or as directed by the Engineer. The Engineer may, during the period of construction, order changes in dimensions or elevations of footings as required to secure a satisfactory foundation.
Excavated rock shall be used in forming embankments wherever the depth of the fill is sufficient to properly contain the rock in accordance with Section 202. The Contractor may be permitted to use excavated rock for purposes other than embankments.

Any blasting shall conform to the requirements of Subsection 205.04. Any loose or fractured rock shall be removed as directed by the Engineer. Any material more than 300-mm below the bottom elevation of trenches and structures or more than 150-mm below the bottom elevation of gutters that becomes shattered or loosened shall be removed.
All unsuitable and excess material shall be disposed of as specified in Subsection 106.09, or as directed.
The excavation, regardless of the depth, shall be backfilled with approved material and compacted to the specifications designated on the Plans, the Special Provisions, or by the Engineer. Undrained pockets left in the surface of the rock shall be drained prior to backfilling.

206.04 Method of Measurement. The quantity of rock excavation and backfill for structures and trenches will be measured in cubic meters. The volume of rock excavation for trenches, gutters, and structures will be measured by the method of average end areas. Areas shall be based on cross-sections taken before and after rock excavation. The end areas of rock excavations will be measured as follows:

(a) The pipe trenches will be measured to a width not to exceed 300-mm on each side of the pipe and to a depth limit not to exceed 300-mm lower than the bottom of the earth cushion for bedding in rock, as shown on the Plans, or as established by the Engineer.
(b) The gutters, if designated for separate payment, will be measured to a width not to exceed 450-mm on each side of the gutter and to a depth limit not to exceed 150-mm below the bottom surface of the gutter as shown on the Plans, or as established by the Engineer.
(c) The headwalls, culverts, bridges, and other structures will be measured to a width of 450-mm outside the neat lines of the structure and to a depth limit not to exceed 300-mm lower than the bottom elevation of the structure as shown on the Plans, or as established by the Engineer.

When it is impractical to measure rocks or boulders by the cross-section method, three-dimensional measurement using a pre-approved method of calculation may be used. Rock excavated from depths in excess the depth limits indicated in (a), (b), and (c) above will not be measured.

The material used for backfilling the excavated areas will be measured under the appropriate Section, within the limits established by that Section. In areas where rock was excavated to depths in excess of the depth limits indicated in (a), (b), and (c) above, backfill material placed between the bottom of the excavation and the depth limits will not be measured.

206.05 Basis of Payment. The quantity of rock excavation and backfilling for structures and trenches will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for drilling, blasting, and presplitting; for excavating, removing, backfilling, and compacting materials within the depth limits indicated in Subsection 206.04 (a), (b), and (c); for disposing of surplus material; for draining undrained pockets in the surface of the rock; for removing shattered or loosened material and replacing it with approved backfill material; and for all labor, equipment, tools, and incidentals required to complete the work.

The material used for backfilling excavated areas will be paid for under the appropriate Section of the materials used as long as the work is within the limits established by that Section.

No payment will be made for rock excavated from depths in excess of the depth limits indicated in Subsection 206.04 (a), (b), and (c). No payment will be made for backfilling areas from the bottom of the excavation to the depth limits indicated in Subsection 206.04 (a), (b), and (c).

All rock excavation performed for structures and trenches required for work in Subsections 207.03 and 208.03 will be paid for at the Contract unit price per cubic meter under this Section.

SECTION 207 EXCAVATION AND BACKFILLING FOR STRUCTURES

207.01 Description. This work consists of the excavation, removal, and replacement or disposal of all materials necessary for the construction of box and pipe culverts, pipe headwalls, bridge structures, bridge approach slabs, and other structures. This work also consists of placing and compacting backfill material; furnishing and placing of shoring, sheeting, bracing, and cofferdams; and dewatering of these areas, unless otherwise specified.

CONSTRUCTION METHODS

207.02 Foundation Pits. Foundation pits shall be excavated to the depths shown on the Plans, or to such depth as required to ensure the stability of the structure to be erected, or as directed by the Engineer.

207.03 Excavation. Excavation shall be sufficient in volume to place the full widths, thicknesses, and lengths of footings. Undercutting of edges, ends, corners, and other surfaces will not be permitted. If a sump area is required to keep the excavation dry during construction, it shall be outside the footing line.

All suitable materials removed during excavation shall be used, as far as practicable, in the formation of roadway embankments, or as structure backfill if it meets the requirements of Subsection 207.05. No excavated material shall be wasted without permission. Boulders, logs, structure remnants, or other obstructions shall be considered unsuitable materials. All unsuitable and excess material shall be disposed of as specified in Subsection 106.09, or as directed. When the excavation is completed, the Engineer will make an inspection of the footing area. No concrete shall be placed until the depth and character of the foundation material are approved.

207.04 Cofferdams. All sheeting and bracing shall be carried to sufficient depth to obtain, as nearly as possible, a watertight cofferdam. The cofferdam shall have ample clearance to allow inspection of the forms for the finished structure and to provide sump areas. The forms for concrete shall not be braced against the cofferdam, unless approved.

Cofferdams shall be constructed to protect new concrete against damage from flooding. Cofferdams shall be dewatered in a manner that prevents the loss of concrete materials.

Unless otherwise approved, cofferdams and cribs, including all sheeting and bracing, shall be removed by the Contractor after the completion of the substructure. No timber shall remain in finished concrete structures. Care shall be taken to avoid disturbing or damaging the finished structure during removal operations.

The Contractor shall submit detailed layout, working drawings, and calculations sealed by a Professional Engineer registered in Delaware, showing the proposed method of cofferdam construction. These drawings shall be approved before cofferdam construction begins. Approval of the Contractor’s drawings will not relieve the Contractor of any responsibility for the adequacy and safety of the cofferdam construction.

207.05 Backfilling. All backfilling of structures shall conform to the requirements of Subsection 202.05 (c), (d), and (e). Unless otherwise specified, all backfilling around and over structures shall be performed with material conforming to the requirements of Subsection 209.04, Borrow Type C. Backfill material shall be compacted to 95% or more of the maximum density according to the requirements of Subsection 202.05 (f). When backfilling next to bridges, culverts, or other structures, no heavy mechanical compacting equipment will be permitted over the structure until a minimum of 450-mm of cover has been placed.

Backfill adjacent to rigid frames, arches, timber structures, and other similar structures shall be brought up simultaneously at each abutment, so that no unbalanced stresses are introduced.

207.06 Method of Measurement. The quantity of excavation and backfilling for structures, excluding rock excavation, will be measured in cubic meters based on field measurements. The volume will be computed by taking the difference in elevation between the existing ground surface, or the bottom of roadway excavation, or the bottom of channel excavation, whichever is lower, and the surface of the completed structure excavation at plan grade or at an approved revised plan grade.

Volume measurements will include, between the upper and lower limits defined above, the volume contained inside vertical planes located 450-mm outside of the neat line perimeter of the vertical faces of the footing or structural unit for which the excavation is made. Borrow Type C backfill material placed outside the 450-mm vertical planes just described

will not be measured. For inclined footings or unusual foundation conditions, the method of measurement will be as described in the Contract.

If other than excavated material is used for backfill, the volume measured will not exceed 1.3 times the volume of excavation, less the associated volume of the structure.

The Contractor shall notify the Engineer sufficiently in advance of beginning excavation for structures, so that cross-section measurements of the existing undisturbed ground may be taken. Any material removed by the Contractor before these measurements have been taken will not be measured.

207.07 Basis of Payment. The quantity of excavation and backfilling for structures will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for excavating suitable and unsuitable material; for hauling, storing, and final disposal of excavated material; for placing and compacting backfill; for placing sheeting and shoring; for constructing cribs and cofferdams; for dewatering; and for all labor, equipment, tools, and incidentals required to complete the work.

If directed to leave cofferdam bracing and sheeting in place, the actual cost of the materials left in place will be paid. Borrow material for backfill will be paid for under Section 210.

No payment will be made for Borrow Type C backfill material placed outside vertical planes located 450 mm outside the neat line perimeter of the vertical faces of the footing or structural unit.

Additional structure excavation, directed by the Engineer to establish the foundation below the elevation indicated on the Plans, will be paid for at the Contract unit price per cubic meter plus an additional percentage corresponding to the total depth lowered, as indicated in the following table:

Table 207-A

Depth Lowered (m)		Additional Percent
More Than	Not Over	
0.0	1.5	25.0
1.5	2.5	60.0
2.5	3.0	100.0

The Contract unit price plus the additional percentage shown in Table 207-A shall be accepted by the Contractor as full compensation as defined in this Subsection for excavating to depths below those shown on the Plans.

SECTION 208 EXCAVATION AND BACKFILLING FOR PIPE TRENCHES

208.01 Description. This work consists of the excavation, removal, and replacement or disposal of all materials necessary for the placement of pipes.

This work also consists of placing and compacting backfill for pipe trenches.

CONSTRUCTION METHODS

208.02 Test Holes and Test Pits. All test holes and test pits shall be excavated under this Section. They shall be dug with extreme care, using hand excavation methods where necessary.

208.03 Excavation. Unsuitable foundation material shall be removed from below the bottom of trench elevation shown on the Plans, or as directed.

When a pipe is to be placed either partially or completely in a fill, the embankment shall be compacted to an elevation of 300-mm plus the outside diameter of the pipe above the design invert of the pipe for a minimum of two pipe diameters on each side of the centerline of the pipe. The trench shall then be excavated, as specified in this Subsection.
When rock, hardpan, or other unyielding material is encountered, the trench shall be excavated as shown on the Plans and in accordance with Subsection 206.03.

208.04 Backfilling. All backfilling of pipe trenches shall conform to the requirements of Subsection 202.05 (c), except proof rolling will not be required.

For pipe trenches or utility trenches below the roadway or shoulders, trenches shall be backfilled with material conforming to the requirements of Subsection 209.04, Borrow Type C. If the existing material meets these requirements, it shall be used for pipe or utility backfill. For these areas, backfill material shall be compacted to 95% or more of maximum density according to the requirements of Subsection 202.05 (f). For pipe trenches or utility trenches at locations other than below the roadway and shoulders, trenches shall be backfilled with material conforming to the requirements of Subsection 209.04, Borrow Type C, to a height of 300-mm above the top of the pipe or utility. The remaining depth of these pipe or utility trenches shall be backfilled with existing material. For these areas, backfill material shall be compacted to 90% or more of the maximum density according to the requirements of Subsection 202.05 (f).

Material for backfilling utility trenches shall be furnished by the Contractor. Materials shall be stockpiled at location(s) mutually agreed upon by the Contractor, the utility, and the Engineer.

The operation of backfilling utility trenches shall be performed by the utility organizations involved and shall conform to the requirements of Section 202.05 (c).

Utility companies will be required to remove all excess excavation material from the Project, unless the Engineer directs it to be utilized by the Contractor in the Project.

208.05 Method of Measurement. The quantity of excavation and backfilling for pipe trenches will be measured as the volume of excavation included between a line from the bottom of plan excavation to the bottom of the pipe at the time of pipe placement, and a normal horizontal measurement of outside pipe dimension plus 300-mm each side, unless otherwise designated on the Plans, but exclusive of rock excavation, which will be paid for under Section 206. No allowance will be made for excavation or backfill outside the limits established above. The limits of trench excavation shall extend to the exterior wall of drainage inlets and manholes. When the trench intercepts a "normal" structure, such as a headwall, culvert, etc. (where payment for structure excavation is applicable), the trench payment limit will terminate at the point where structure excavation begins (normally 450-mm outside the structure). For pipe placement in a fill area, the trench payment limit will extend to only 300-mm above the pipe.
If other than excavated material is used for backfill, the volume measured will not exceed 1.3 times the volume of the trench, less the volume of the pipe within the trench.

208.06 Basis of Payment. The quantity of excavation and backfilling for pipe trenches will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for excavating suitable and unsuitable material from the trench within the limits specified; for hauling, storing, and final disposal of excavated material; for placing and compacting backfill; for placing sheeting and shoring; for constructing cribs; for dewatering; and all labor, equipment, tools, and incidentals required to complete the work.

Additional trench excavation, directed by the Engineer to establish the foundation below the elevation indicated on the Plans, will be paid for on the basis of the Contract unit price per cubic meter plus an additional percentage corresponding to the total depth lowered, as indicated in Table 207-A. The Contract unit price plus the additional percentage shown in Table 207-A shall be accepted by the Contractor as full compensation as defined in this

Subsection for excavating to depths below those designated on the Plans.

Rock excavation will be paid for under Section 206.

Borrow for backfill will be paid for under Section 210.

SECTION 209 BORROW

209.01 Description. This work consists of furnishing and placing additional material from approved borrow areas or other approved sources when suitable material available within the right-of-way is not sufficient in quantity for

construction purposes. This work also includes all clearing, grubbing, or stripping required to prepare the borrow area for cross-sectioning and excavating.

MATERIALS

209.02 General Requirements. The uses, classifications, characteristics, and definitions of terms for borrow materials shall be in accordance with the requirements of AASHTO M 57, Modified; M 145, Modified; and M 146 and M 147, Modified.

Unless otherwise directed, all materials having the following properties shall be excluded from use:

(a) Material with a maximum dry weight less than 1440 kg/m^3.
(b) Material with a liquid limit greater than 50.
(c) Material containing frozen material, rubbish, boulders in excess of 150-mm in any direction, or organic matter such as leaves, roots, grass, or sewage.

209.03 Materials Testing. The method of testing materials shall be in accordance with the requirements of AASHTO T 88, Modified; T 89, Modified; T 90, Modified; and T 99 Method C, Modified.

209.04 Borrow Types. The following types of borrow are subject to the requirements of this Section.

(a) *Borrow Type A.* This material shall have between 95 and 100% inclusive, by dry weight, passing a 63-mm sieve and a maximum of 35%, by dry weight, passing a 75 µm sieve.
(b) *Borrow Type B (Special Fill).* This material shall have 100%, by dry weight, passing a 75-mm sieve and a maximum of 10%, by dry weight, passing a 75 µm sieve.
(c) *Borrow Type C (Backfill).* This material shall have between 85 and 100% inclusive, by dry weight, passing a 25.0-mm sieve and a maximum of 25%, by dry weight, passing a 75 µm sieve.
(d) *Borrow Type D (Cement Stabilization).* This material shall have 100%, by dry weight, passing a 75-mm sieve and between 8 and 30% inclusive, by dry weight, passing a 75 µm sieve.
(e) *Borrow Type E (Asphalt Stabilization).* This material shall have 100%, by dry weight, passing a 75-mm sieve and between 6 and 20% inclusive, by dry weight, passing a 75 µm sieve. This material shall be non-plastic.
(f) *Borrow Type F (Common Borrow).* This material shall meet the general requirements as specified in Subsection 209.02.
(g) *Borrow Type G (Select Borrow).* This material shall meet any of the grading requirements listed in the following table:

Table 209-A Type G* (Select Borrow)						
Metric Sieve Designation	Dry Weight Percent Passing Square Mesh Sieves					
	Grading I	Grading II	Grading III	Grading IV	Grading V	Grading VI
50 mm	100	100	95 - 100	95 - 100	95 - 100	95 - 100
25.0 mm	---	75 - 95	85 - 100	85 - 100	85 - 100	85 - 100
9.5 mm	30 - 65	40 - 75	50 - 85	60 - 100	---	---
4.75 mm	25 - 55	30 - 60	35 - 65	50 - 85	55 - 100	70 - 100
2.0 mm	15 - 40	20 - 45	25 - 50	40 - 70	40 - 100	55 - 100
425 µm	8 - 20	15 - 30	15 - 30	25 - 45	20 - 50	30 - 70
75 µm	2 - 8	5 - 20	5 - 15	5 - 20	6 - 20	8 - 25
* The fraction passing a 75 µm sieve shall not be greater than two-thirds of the fraction passing a 425 µm sieve. The fraction passing a 425 µm sieve shall have a liquid limit not greater than 25 and a plasticity index not greater than 6, when tested according to AASHTO T 89, Modified, and AASHTO T 90, Modified.						

CONSTRUCTION METHODS

209.05 Borrow Sources. The Contractor shall notify the Department's Materials and Research Section at least ten working days in advance of material being removed from any borrow source so that samples may be obtained and tested prior to use. The limits of approved material within the borrow source and the method of excavation shall be approved by the Department's Materials and Research Section. The ground surface shall be cleared and grubbed in the manner described under Section 201 and shall be stripped of all unsuitable material, as determined by the Engineer, before the excavation of any borrow. No borrow for the Contract shall be excavated within 30-m of the right-of-way lines except with written permission from the Engineer.

The Contractor shall secure any borrow source that is tested, approved, and cross-sectioned for excavation by means of physical control. The method of control shall be based on conditions at the source, but may consist of complete or partial fencing, earth berms, guardrails, or other physical barriers. A gate, chain, cable, or other acceptable device shall be installed across the entrance to the source and secured by padlock. The key to the padlock will be retained by the Department, once the security method is approved.

The Contractor shall submit a physical control plan to the Engineer after the borrow source has been tested and approved, and the overburden removed. The physical control plan must be implemented and approved before the source is cross-sectioned. After excavation is completed, all borrow areas shall be trimmed and left in a neat condition to permit accurate measurement. Where practicable, water shall not collect or stand therein.

209.06 Source Testing. The Department will assist the Contractor in determining the quality and quantity of material from sources it may proposes to use. The Department will perform soil analysis tests on one test boring for each 400 m^3 of borrow.

209.07 Placing and Compacting. All borrow under this Section shall be placed and compacted in accordance with the requirements of Subsection 202.05. Placing of Type B hydraulic fill must be approved by the Engineer.

209.08 Utility Backfill. For utility trenches within the roadway, trenches shall be backfilled with material conforming to the requirements of Subsection 209.04, Borrow Type C. If the existing material meets these requirements, it shall be used for utility backfill. For these areas, backfill material shall be compacted to 95% or more of the maximum density according to the requirements of Subsection 202.05 (f). For utility trenches outside the roadway, trenches shall be backfilled with material conforming to the requirements of Subsection 209.04, Borrow Type C, to a height of 300-mm above the top of the utility, unless directed otherwise. The remaining depth of these utility trenches shall be backfilled with existing material, unless otherwise directed. For these areas, backfill material shall be compacted to 90% or more of the maximum density according to the requirements of Subsection 202.05 (f).

Material for backfilling utility trenches shall be furnished by the Contractor. Materials shall be stockpiled at location(s) mutually agreed upon by the Contractor, the utility, and the Engineer.

The operation of backfilling utility trenches shall be performed by the utility organizations involved and shall conform to the requirements of Subsection 202.05 (c) and (d), except proof rolling will not be required.

Utility companies will be required to remove all excess excavation material from the Project, unless the Engineer directs it to be utilized by the Contractor in the Project.

209.09 Method of Measurement. The quantity of borrow material will be measured in cubic meters of approved and acceptable borrow material. The volume will be measured by cross-sections and computed by the method of average end areas, exclusive of the volume of overburden or stripping.

When requested by the Contractor and approved by the Department in writing, borrow material, which is specified to be measured in cubic meters, may alternatively be weighed and the weight converted to cubic meters. Factors for conversion from weight measurement to volumetric measurement will be determined by the Engineer and shall be agreed to by the Contractor, before the method is used.

Where the Engineer determines it to be impracticable to obtain weight-volume conversion factors for the borrow types specified, 1900 kg of borrow will be considered equivalent to 1 m^3.

Unless stated otherwise, all borrow material that is to be measured by weight shall be calculated as specified in Subsection 109.01.

If the limits of measurement of pay quantities for borrow are designated on the Plans, the quantity of borrow measured will be the volume of borrow placed within the payment lines and grades shown on the Plans. The computation of volume will be by the method of average end areas, from cross-sections taken after unsuitable materials have been excavated and after the completion of fill. Borrow material placed beyond the designated lines and grades shown on the Plans, due to over excavation or slides, will not be measured.

209.10 Basis of Payment. The quantity of borrow will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for clearing, grubbing, stripping, excavating, hauling, placing, and compacting the borrow material and for all labor, equipment, tools, and incidentals required to complete the work.

SECTION 210 FURNISHING BORROW FOR PIPE TRENCH, UTILITY TRENCH, AND STRUCTURE BACKFILLING

210.01 Description. This work consists of furnishing borrow for use as backfill in pipe and utility trenches, and structure excavations.

210.02 Materials. Material shall conform to the requirements of Subsection 209.04.

210.03 Method of Measurement. The quantity of borrow will be measured in cubic meters in accordance with the requirements of Subsection 209.09.

210.04 Basis of Payment. The quantity of borrow will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for clearing, grubbing, stripping, excavating, and hauling material to locations as directed by the Engineer and for all labor, equipment, tools, materials, and incidentals required to complete the work.

SECTION 211 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

211.01 Description. This work consists of removal, wholly or in part, and satisfactory disposal of all buildings, foundations, fences, structures, and other obstructions which are not designated or permitted to remain within the right-of-way. Not included are items which are to be removed and disposed of under other Sections of these Specifications. This work also includes the salvaging of designated materials and backfilling of resulting cavities.

211.02 Construction Methods. The Contractor shall raze, remove, and dispose of all buildings, foundations, structures, fences, and other obstructions, any portions of which are in the right-of-way, except utilities and those other structures and obstructions for which other provisions have been made.

Bridges, culverts, and other drainage structures shall not be removed until satisfactory arrangements have been made to accommodate traffic and the delivery of construction materials.

Blasting and other operations, which may damage new construction, shall be completed prior to placing the new work. Steel and wooden bridges specified for salvage shall be carefully dismantled without unnecessary damage. Steel members shall be match-marked, unless such match marking is waived by the Engineer. All other designated salvable material shall be removed in sections or pieces which may be readily transported. All suitable material shall be stored and protected by the Contractor at specified places within the limits of construction, or as directed.

Portions of existing structures that lie within the limits of a new structure shall be removed, as necessary, to accommodate the new construction.

Unless otherwise directed, structures in streams shall be removed down to the natural stream bottom. Portions of structures outside of the stream shall be removed down to 300-mm below natural ground surface.

Basement and cavities left by structure removal shall be backfilled in accordance with Section 202 to the level of the surrounding ground.

Excess or waste material shall be disposed of as specified in Subsection 106.09.

Unless waived by the Engineer, all concrete removed, which is suitable for riprap, shall be stockpiled, as directed, for use by the Department.

All work performed under this Section must be completed before cross-sections are taken in accordance with Subsection 207.06.

211.03 Method of Measurement. When the Contract stipulates that payment will be made for removal of structures and obstructions on a lump sum basis, the quantity of structures and obstructions removed will not be measured. When the Contract stipulates that payment will be made for the removal of specified items on a unit basis, the quantity of structures and obstructions removed will be measured as the actual number of specified items removed.
Paid removal limits will be limited to vertical and horizontal planes 600-mm outside the neat lines of the existing footing. Areas excavated beyond these limits shall be backfilled with Type C material. Borrow and backfilling operations will not be measured.

211.04 Basis of Payment. When the Contract stipulates that payment will be made for removal of structures and obstructions on a lump sum basis, the quantity of structures and obstructions removed will be paid for at the Contract lump sum price. When the Contract stipulates that payment will be made for the removal of specified items on a unit basis, the quantity of structures and obstructions removed will be paid for at the Contract unit price for each specified item removed. Price and payment will constitute full compensation for removing and disposing of structures and obstructions in accordance with the Contract, including excavation incidental to their removal; for backfilling basement and cavities; for salvaging, storing, and protecting materials in the right-of-way; and for furnishing all labor, equipment, tools, and incidentals required to complete the work.

SECTION 212 UNDERCUT EXCAVATION

212.01 Description. This work consists of excavation to correct unstable subgrades and embankment foundations and the disposal of such excavated material.

212.02 Materials. All material removed in the work of undercut excavation will be classified unsuitable and shall be disposed of, unless otherwise directed.

CONSTRUCTION METHODS

212.03 Equipment. Equipment utilized in undercutting and backfilling operations shall be capable of removing and replacing the material within the area established by the Engineer. Equipment that will displace the underlying or adjacent material will not be permitted.

212.04 Preparation. When unstable subgrade or foundation conditions are encountered, all normal construction preparation procedures shall be performed to correct the unstable situation before undercutting will be considered. After performing these normal preparation procedures, the Contractor shall allow sufficient time to elapse to accurately judge the success of the preparation effort. These normal construction preparation procedures shall include, but are not limited to, cutting channels and ditches in order to lower the water table, grading to prevent excessive surface water from entering the subgrade or foundation materials, performing all reasonable efforts to correct the moisture content to within specifications, and using properly sized equipment in such a way that does not overload the subgrade or foundations. Interpretation of "normal", "sufficient", and "reasonable", shall be made by the Engineer.

In lieu of following the above established preparation requirements, or following the required construction methods, or waiting over a reasonable time for the environmental conditions to improve, the Contractor may elect to replace the subgrade or foundation material as a means of correcting instability.

212.05 Undercutting. When the Engineer determines that undercutting is required, the Engineer will direct the Contractor to remove the material from within defined areas to defined depths. Prior to backfilling, additional depths of undercutting below the original defined depth may be required in some areas as directed by the Engineer.
Upon acceptance of the undercut excavation, the area shall be backfilled and compacted in accordance with Section 202, or as directed. The Contractor shall conduct undercut operations in a manner that will allow the Engineer to take necessary measurements, before any backfill is placed. No backfill material shall be placed in water unless approved. Any area remaining unstable after backfilling shall be reworked in accordance with this Section. When such rework is required, the Contractor shall salvage and reuse as much of the previously placed backfill as possible. If the Engineer determines that an unstable subgrade or embankment foundation exists, the unstable condition within the affected limits shall be satisfactorily corrected.

212.06 Performance Requirements. The correction of an unstable condition shall result in a firm, unyielding foundation.

212.07 Method of Measurement. The quantity of undercut excavation will be measured in cubic meters computed by the average end area method. When directed by the Engineer, the correction of an unstable subgrade or embankment foundation caused by in-place material not meeting the organic, gradation, density, or liquid limit requirement of Borrow Type F as described in Section 209 shall qualify for measurement as undercut excavation. The correction of instability, as directed, not remedied by normal construction procedures nor by improved environmental conditions, both given reasonable time to establish their effect, shall qualify for measurement as undercut excavation. Undercut areas that are re-excavated as directed by the Engineer and are not necessary as a result of the Contractor’s methods of operation, will also be measured. The replacement of subgrade or foundation material, when elected by the Contractor in lieu of following normal construction preparation procedures described in Subsection 212.04, will not qualify for measurement as undercut excavation.

212.08 Basis of Payment. The quantity of undercut excavation will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for performing all preparation excavation; for correcting unstable subgrade or embankment foundation caused by the Contractor’s methods, as determined by the Engineer; and for furnishing all labor, tools, equipment, and incidentals required to complete the work. However, the unit price bid for undercut excavation, as defined herein, shall not exceed 150% of the unit price bid per cubic meter for Section 202.
The material used for backfilling undercut areas will be paid under applicable Sections.
No compensation will be made for the replacement of subgrade or foundation material, when elected by the Contractor in lieu of following the normal construction preparation procedures described in Subsection 212.04.

SECTIONS 213 through 249 RESERVED
SECTION 250 SEDIMENT REMOVAL

250.01 Description. This work consists of the excavation, hauling, and disposal of accumulated sediment from temporary sediment control items, such as sediment traps, sediment basins, silt fences, stone check dams, dewatering basins, dikes, swales, and diversions.

250.02 Construction Methods. Sediment shall be removed using any method of hand tools or mechanized equipment deemed appropriate by the Contractor and acceptable to the Engineer at each location or as required by the Contract documents.

250.03 Method of Measurement. The quantity of sediment removal will be measured in cubic meters in place using averaged dimensions. Length, width, and depth dimensions will be taken at several locations of the accumulated sediment. The average measurement of each dimension will be used to compute the in place volume.

250.04 Basis of Payment. The quantity of sediment removal will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for excavating, hauling, and disposing of accumulated sediment and for all labor, equipment, tools, and incidentals required to complete the work.

SECTION 251 SILT FENCE

251.01 Description. This work consists of furnishing, constructing, maintaining, and ultimately removing, and installing silt filter fences or reinforced silt fences as a temporary measure to control sedimentation within the limits of construction. Silt fences shall be constructed as shown on Standard Construction Detail, Silt Fence, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS

251.02 General. All materials shall be approved prior to use by the Department's Materials and Research Section.

251.03 Posts. Posts shall be constructed of oak timber or steel. Posts shall be a minimum of 1 m long and at least 450 mm longer than the height of the silt fence.

(a) *Oak Timber Posts.* Oak timber posts shall be straight and have a minimum nominal cross-section of 50 by 50 mm.
(b) *Steel Posts.* Steel posts shall be 65 mm diameter Schedule 40 pipe or be standard steel "T" or "U" section of 1.98 kg/m minimum.

251.04 Fasteners. Fasteners shall be either 16-mm long brass or copper staples, or 1.37 mm (17 gage) galvanized or aluminized steel tie wires long enough to securely attach the fabric to the posts.

251.05 Wire Mesh. Wire mesh shall be galvanized welded wire reinforcement 152 by 152 - MW9 by MW9.

251.06 Seed. Seed shall conform to the requirements of Section 734.

251.07 Mulch. Mulch shall conform to the requirements of Section 735.

251.08 Geotextile. Geotextile shall conform to the requirements of Section 827. It shall be a minimum of 900 mm wide.

251.09 Prefabricated Silt Fence. The Contractor shall have an option to use prefabricated silt fence provided it has been constructed with the materials specified in this Section and approved by the Engineer.

CONSTRUCTION METHODS

251.10 Construction of Silt Fence. The Contractor shall excavate the trench along the upstream side of the post line as shown on Standard Construction Detail, Silt Fence. Posts shall be installed on the downstream edge of the trench, along the established fence line.

The geotextile shall be fastened to the upstream side of the posts. The geotextile roll ends shall be overlapped a minimum of 150 mm at post locations.

The geotextile shall be embedded in the excavated trench. The trench shall be backfilled and compacted over the geotextile to prevent water from flowing under the geotextile.

The silt fence shall not be constructed across a ditch, or swale, or area of concentrated flow. On slopes, the terminal ends of silt fence shall be turned upslope a sufficient distance to eliminate flow around the ends of the silt fence.

All geotextile damaged prior to installation, during installation, or during the life of the Contract shall be repaired or replaced to the satisfaction of the Engineer.

251.11 Construction of Reinforced Silt Fence. The Contractor shall construct the reinforced silt fence according to Subsection 251.10. The wire mesh shall be fastened to the posts so that the wire mesh is between the geotextile and the posts. The geotextile shall be fastened to the wire mesh at the required spacing.

251.12 Maintenance of Silt Fence. Throughout the Project construction period, the silt fence shall be maintained by removing trapped sediment. The Contractor shall clean the geotextile of trapped sediment by tapping the geotextile when dry. No trash shall be allowed to accumulate to the height of the fence. Any geotextile that does not function due to clogging or deterioration shall be replaced.

251.13 Sediment Removal. After every heavy rainfall, the Contractor shall check for excessive buildups of sediment which must be removed so that the silt fence can continue to function as intended. Accumulated sediment shall be removed by the Contractor when it reaches 50% of the height of the silt fence.

251.14 Removal of Silt Fence. The silt fence shall be removed when the Engineer determines that it is no longer required. The silt fence and all materials incidental to the silt fence construction shall be removed. All areas affected by the construction of the silt fence shall be restored to the original or plan contours and stabilized with seed and mulch.

251.15 Method of Measurement. The quantity of silt fence will be measured as the actual number of linear meters of silt fence placed and accepted. Reinforced silt fence will be measured using the same method for silt fence.
The quantity of sediment removal will be measured according to Section 250.

251.16 Basis of Payment. The quantity of silt fence and reinforced silt fence will be paid for at the Contract unit price per linear meter for each type of fence. Price and payment will constitute full compensation for furnishing all materials; for excavating and backfilling associated with the construction of the silt fence; for maintaining the silt fence during the Project construction period; for removing the silt fence with all related hardware after completion of the Project; for restoring the site; for seeding and mulching; and for all labor, equipment, tools and incidentals required to complete the work.

The quantity of sediment removal will be paid for according to Section 250.

No payment will be made for any replacement of or repairs to the silt fence or reinforced silt fence damaged prior to installation, during installation, or during the life of the Contract. No payment will be made for the replacement of the silt fence or reinforced silt fence due to clogging or deterioration.

SECTION 252 INLET SEDIMENT CONTROL

252.01 Description. This work consists of furnishing, constructing, maintaining, and ultimately removing sediment control around drainage inlets and curb inlets as a temporary measure to control sedimentation within the limits of construction. Inlet sediment control shall be constructed as shown on Standard Construction Details, Drainage Inlet Sediment Control and Curb Inlet Sediment Control, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS

252.02 Lumber. Lumber shall be construction grade two-by-four measuring 38 by 89 mm and free from warps, checks, splits, and decay.

252.03 Wire Mesh. Wire mesh shall be steel or galvanized welded wire reinforcement with openings 13 by 13 mm and wire diameter of 9.1 µm (19 gage).

252.04 Seed. Seed shall conform to the requirements of Section 734.

252.05 Mulch. Mulch shall conform to the requirements of Section 735.

252.06 Stone. Stone shall be Delaware No. 3 conforming to the requirements of Section 813.

252.07 Geotextile. Geotextile shall conform to the requirements of Section 827.

252.08 Prefabricated Sediment Control. The Contractor shall have an option to use prefabricated sediment control devices provided each has been constructed with the materials specified in this Section and approved by the Engineer. Approval will be based on satisfactory performance at field test locations chosen by the Engineer.

CONSTRUCTION METHODS

252.09 Construction of Drainage Inlet Sediment Control. The Contractor shall excavate completely around the walls of the inlet to the required depth. The corner posts shall be driven to the required depth below the excavated depth. The two-by-four frame shall be assembled and completed using overlapped joints. The lumber frame shall be set at a top elevation that ensures that water ponded by the inlet sediment control will not create a flooding or safety hazard. Wire mesh shall be stretched tightly around the lumber frame and fastened securely. The geotextile shall be stretched tightly over the wire mesh and shall be fastened securely to the lumber frame at the required depth. The ends of the geotextile must meet at the posts, be overlapped and folded, and then fastened to the posts. After the geotextile is fastened to the posts, the Contractor shall backfill the previously excavated trench according to Subsection 207.05. If the inlet is not in a low point, the Contractor shall construct a sediment control earth dike in the ditch line, downstream from the inlet, as shown on Standard Construction Detail, Drainage Inlet Sediment Control. The earth dike shall conform to the requirements of Section 260.

252.10 Construction of Curb Inlet Sediment Control. The Contractor shall assemble the two-by-four weir frame using overlapped joints. The weir frame shall be securely nailed to the vertical spacers as shown on Standard Construction Detail, Curb Inlet Sediment Control.

The Contractor shall place the assembly over the grate and against the inlet throat making sure that the end vertical spacers are at least 300 mm beyond each end of the throat opening and the grate. The two-by-four anchors shall be nailed to the top of the frame at the spacer locations. The anchors shall extend across the curb and be held in place by sandbags or alternate weights.

The Contractor shall lay a continuous piece of wire mesh over the grate, against the weir frame, and extending at least 300 mm from both ends of the weir frame. The wire mesh shall be formed to the concrete gutter and against the face of the curb at both ends of the inlet.

The Contractor shall place a piece of geotextile, of the same dimension as the wire mesh, over the wire mesh and securely attach it to the weir frame. The geotextile shall be formed to the wire mesh at both sides of the inlet. Clean stone shall be placed over the geotextile and the wire mesh to prevent water from entering the inlet from under or around the geotextile.

252.11 Maintenance of Inlet Sediment Control. Throughout the Project construction period, the inlet sediment controls shall be maintained and remain functional. Maintenance shall include cleaning the geotextile of trapped sediment by tapping the geotextile when it is dry. After every rainfall, the Contractor shall inspect the inlet sediment control. The geotextile and, if applicable, the stones shall be replaced when 50% of the voids are clogged. Any geotextile that does not function due to clogging or deterioration shall be replaced.

252.12 Sediment Removal. The Contractor shall remove all accumulated sediment from around the drainage inlet sediment control when the sediment has reached 150 mm from the top of the geotextile. When the sediment has reached 50% of the height of the curb, the Contractor shall remove all accumulated sediment from around the curb inlet sediment control.

252.13 Removal of Inlet Sediment Control. The inlet sediment control shall be removed when the Engineer determines that it is no longer required. The inlet sediment control and all materials incidental to inlet sediment control construction shall be removed and all areas affected by the inlet sediment control shall be restored. Unpaved areas shall be restored to the original or plan contours and, if applicable, stabilized with seed and mulch.

252.14 Method of Measurement. The quantity of drainage inlet sediment controls will be measured as the actual number of drainage inlets for which sediment control is placed and accepted. The quantity of curb inlet sediment controls will be measured as the actual number of curb inlets for which sediment control is placed and accepted. The quantity of sediment removal will be measured according to Section 250.

252.15 Basis of Payment. The quantity of drainage inlet sediment controls will be paid for at the Contract unit price for each. The quantity of curb inlet sediment controls will be paid for at the Contract unit price for each. Price and payment will constitute full compensation for furnishing and installing all required materials, including lumber, wire mesh, geotextile, and stone; for excavating and backfilling; for maintaining the inlet sediment controls, including replacing the

geotextile and stone; for removing the sediment controls and all incidental materials; for restoring the site; for seeding and mulching; and for all labor, tools, equipment, and incidentals required to complete the work.
The quantity of sediment removal will be paid for according to Section 250.

SECTION 253 RESERVED
SECTION 254 STONE CHECK DAM

254.01 Description. This work consists of constructing, maintaining, and ultimately removing small stone check dams across a swale, channel, or any type of ditch as a temporary measure to reduce the velocity of concentrated flows, thereby reducing erosion of the swale, channel, or ditch. Stone check dams shall be constructed as shown on Standard Construction Detail, Stone Check Dam, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS

254.02 Riprap. Riprap shall be R-4 conforming to the requirements of Section 712 with the exception that geotextile will not be required to be placed under the riprap.

254.03 Seed. Seed shall conform to the requirements of Section 734.

254.04 Mulch. Mulch shall conform to the requirements of Section 735.

CONSTRUCTION METHODS

254.05 Construction of Stone Check Dam. The stone check dam shall be constructed in reasonably straight sections of the swale or channel. The Contractor shall place the riprap so that it completely covers the width of the channel. The top of the stone check dam shall be constructed so that the center is lower than the outer edges, forming a spillway across which the water can flow as shown on Standard Construction Detail, Stone Check Dam.

254.06 Maintenance of Stone Check Dam. After each rainfall, the Contractor shall inspect the stone check dam for sediment accumulation or washout. The Contractor shall replace the riprap whenever washout, construction traffic damage, or silt accumulation among the riprap occurs and whenever the stone check dam ceases to function as intended.

254.07 Sediment Removal. Sediment shall be removed from behind the check dams when it has accumulated to one-half of the original height of the stone check dam at the spillway.

254.08 Removal of Stone Check Dam. Temporary stone check dams shall be removed only when directed by the Engineer. If stone check dams are used in grass-lined swales or channels which are mowed, the Contractor shall ensure that all riprap is removed when the stone check dam is removed. In temporary swales and channels, check dams should be removed and the ditch filled in when it is no longer needed. In permanent swales or channels, check dams may be removed when a permanent non-erodible lining can be installed. In the case of grass-lined ditches, check dams may be removed when the grass has matured sufficiently to protect the swale or channel. The area beneath the check dams should be seeded and mulched immediately after the check dams are removed.

254.09 Method of Measurement. The quantity of stone check dams will be measured as the actual number of metric tons of riprap placed and accepted.

The quantity of sediment removal will be measured according to Section 250.

254.10 Basis of Payment. The quantity of stone check dams will be paid for at the Contract unit price per metric ton. Price and payment will constitute full compensation for furnishing and placing all material; for maintaining the stone check dam; for removing stone check dams; for restoring the site; for seeding and mulching; and for all labor, equipment, tools, and incidentals required to complete the work.

The quantity of sediment removal will be paid for according to Section 250.

No payment will be made for any replacement of riprap during the Project construction period.

SECTION 255 SEDIMENT TRAP

255.01 Description. This work consists of constructing, maintaining, and ultimately removing sediment traps as a temporary measure to intercept sediment-laden runoff and to retain the sediment. Sediment traps shall be constructed as shown on Standard Construction Detail, Sediment Trap, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS.

255.02 Seed. Seed shall conform to the requirements of Section 734.

255.03. Mulch. Mulch shall conform to the requirements of Section 735.

CONSTRUCTION METHODS

255.04 Construction of Sediment Trap. The Contractor shall construct sediment traps by excavating to the dimensions and elevations indicated on the Plans and Standard Construction Detail, Sediment Trap. Upon completion of the initial excavation for the trap, the side slopes shall be stabilized with seed and straw mulch or by using a method approved by the Engineer. The Engineer will approve the utilization and disposal of all excavated materials.
If any sediment trap conflicts with the placement of permanent drainage pipes or ditch lines, the Contractor shall first excavate the sediment trap to the dimensions and elevations shown on the Plans. Then, when the sediment trap is no longer needed, the proposed pipes and/or ditches shall be placed.

Sediment traps shall not be excavated in excess of 1.2 m deep. Sediment traps having proposed bottom elevations greater than 1.2 m lower than the original grade shall be excavated in stages concurrent with the roadway excavation.

255.05 Maintenance of Sediment Trap. Throughout the phases of construction that require erosion and sediment control, the Contractor shall maintain the sediment trap to the original dimensions and function of the sediment trap. Immediately after every rainfall, the Contractor shall inspect the sediment trap and make repairs as needed.

255.06 Sediment Removal. When sediment has accumulated to one-half the design depth of the trap, the sediment shall be removed and the trap restored to its plan dimensions and elevations. The Contractor shall clearly mark the cleanout elevation on a stake driven into the ground at the bottom of the trap. Sediment removed from the trap shall be disposed of in a manner suitable to the Engineer.

255.07 Removal of Sediment Trap. After all areas draining to the trap are permanently stabilized and the Engineer has approved its removal, the sediment trap shall be backfilled and the area restored to the original or plan contours and stabilized with seed and mulch.

255.08 Method of Measurement. The quantity of sediment traps will be measured as the actual number of cubic meters of material excavated to construct the sediment traps. The volume of excavated material will be computed from the actual dimensions and elevations of the sediment traps constructed as shown on the Plans.
The quantity of sediment removal will be measured according to Section 250.

255.09 Basis of Payment. The quantity of sediment traps will be paid for at the Contract unit price per cubic meter of excavated material. Price and payment will constitute full compensation for excavating and backfilling; for removing the sediment traps; for restoring the site; for seeding and mulching; and for all labor, equipment, tools, and incidentals required to complete the work. Sediment trap outlet devices will be paid for separately under the appropriate item for the type of outlet device required.

The quantity of sediment removal will be paid for according to Section 250.

SECTION 256 RISER PIPE ASSEMBLY FOR SEDIMENT TRAP

256.01 Description. This work consists of constructing, maintaining, and ultimately removing sediment trap outlets using outfall pipes, riser pipes, and trash hoods as shown on Standard Construction Detail, Riser Pipe Assembly For Sediment Trap, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS

256.02 Wire Mesh. Wire mesh shall be steel or galvanized welded wire reinforcement with openings 6 by 6-mm and wire diameter of 5.7 µm (23 gage).

256.03 Metal Base Plate. Metal base plate shall have a minimum thickness of 6-mm. The length and width of the plate shall be equal to the diameter of the riser pipe plus 600 mm.

256.04 Trash Hood. Trash hood shall conform to the trash hood detail as shown on Standard Construction Detail, Riser Pipe Assembly for Sediment Trap Outlet.

256.05 Pipe. Pipe shall be constructed of corrugated metal for both the perforated riser pipe and the non-perforated outfall pipe and shall conform to the requirements of Section 614.

256.06 Riprap. Riprap shall be R-4 conforming to the requirements of Section 712.

256.07 Stone. Stone shall be Delaware No. 57 conforming to the requirements of Section 813.

256.08 Geotextile. Geotextile shall conform to the requirements of Section 827.

CONSTRUCTION METHODS

256.09 Construction of the Riser Pipe Assembly. The Contractor shall install the riser pipe assembly for sediment trap in reasonably close conformity with the lines and grades shown on the Plans. The subgrade shall be smooth and firm. The Contractor shall remove any protruding objects and fill any voids in the subgrade that may affect proper placement of the assembly. The outfall pipe shall be bedded according to Section 614.

A pipe stub shall be welded to the riser pipe to make up the riser pipe assembly. The riser pipe assembly shall be welded to the base plate. All welds shall be continuous to form watertight connections and shall be performed according to the requirements of Section 605. The outfall pipe shall be attached to the riser pipe assembly pipe stub using a banded, gasketed connection which shall be made watertight. The riser pipe shall be wrapped first with the wire mesh and then with the geotextile. The geotextile shall extend a minimum of 150 mm above the highest perforation and 150 mm below the lowest perforation. Where the ends of the geotextile come together, the ends shall be overlapped and folded. The wire mesh and the geotextile shall be securely fastened to the riser pipe at the top, center, and bottom of the cloth by bands secured around the riser pipe. The top of the riser pipe shall not be covered with geotextile.
As shown on Standard Construction Detail, Riser Pipe Assembly for Sediment Trap, the Contractor shall place stone around the riser pipe assembly and a 3 m long section of riprap at the end of the outfall pipe. The width of the riprap section shall be a minimum of 1.5 times the diameter of the outfall pipe or 600 mm, whichever is greater. The riprap shall be placed to a minimum depth of 360 mm.

256.10 Maintenance of Riser Pipe Assembly. Throughout the Project construction period, the Contractor shall maintain the assembly by replacing any clogged geotextile and cleaning any clogged pipe and stone.

256.11 Removal of Riser Pipe Assembly. At the end of the Project construction period or when directed by the Engineer, the Contractor shall remove the riser pipe assembly and all materials incidental to the construction of the riser pipe assembly. All areas affected by the construction of the riser pipe assembly shall be restored to the original or plan contours and stabilized with seed and mulch.

256.12 Method of Measurement. The quantity of riser pipe assembly for sediment trap will be measured as the actual number of each placed and accepted.

256.13 Basis of Payment. The quantity of riser pipe assembly for sediment trap will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing and placing all materials; for excavating and backfilling around the riser pipe assembly; for welding; for maintaining the riser pipe assembly, including replacing clogged geotextile; for cleaning clogged pipe and stone; for removing the riser pipe assembly; for restoring the site; for seeding and mulching; and for all labor, equipment, tools, and incidentals required to complete the work.
The quantity of clearing and grubbing required for the riser pipe assembly for sediment trap construction will be paid for according to Section 201.

SECTION 257 RIPRAP DITCH

257.01 Description. This work consists of constructing and maintaining trapezoidal riprap ditches with supporting toe walls to convey concentrated flow without damage from erosion and where grassed ditches would be inadequate due to a high flow velocity. Riprap ditches shall be constructed as shown on Standard Construction Detail, Riprap Ditch, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS

257.02 Pins. Pins shall be steel, 450 mm long, 4.7 mm in diameter, and have a head or steel washer that is 38 mm in diameter.

257.03 Riprap. Riprap shall be the type indicated on the Plans and shall conform to the requirements of Section 712.

257.04 Seed. Seed shall conform to the requirements of Section 734.

257.05 Mulch. Mulch shall conform to the requirements of Section 735.

257.06 Stone. Stone for bedding shall be Delaware No. 57 conforming to the requirements of Section 813.

257.07 Geotextile. Geotextile shall conform to the requirements of Section 827.

CONSTRUCTION METHODS

257.08 Construction of Riprap Ditch. The Contractor shall excavate the riprap ditch according to the dimensions shown on the Plans. All debris shall be removed from the ditch. The ditch sides and bottom shall be smooth so that the geotextile rests flush with the ditch at all points of contact. The width of the geotextile shall be sufficient to cover the total width of the ditch and completely line the toe walls without any longitudinal joints. The geotextile shall be placed flat, loose, and without wrinkles against all surfaces. The geotextile shall be secured in place with pins as shown on the Standard Construction Details.

After placement of the geotextile and pins on the ditch banks, stone bedding, if required, and riprap in the ditch, the Contractor shall backfill, grade, compact, and restore the ditch banks and any other area affected by the construction of the riprap ditch to the original or plan contours. The restored areas shall be stabilized with seed and mulch.
The Contractor shall not perform any grading of the ditch after placement of the riprap.

257.09 Maintenance of Riprap Ditch. Throughout the Project construction period, the Contractor shall maintain the original dimensions and function of the riprap ditch.

257.10 Method of Measurement. The quantity of riprap ditch will be measured as the actual number of cubic meters of riprap ditch excavated and accepted. The quantity of riprap will be measured as the actual number of metric tons placed and accepted. The quantity of stone will be measured as the actual number of metric tons placed and accepted.

257.11 Basis of Payment. The quantity of riprap ditch will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for furnishing and placing all material, except for riprap and, if required, stone bedding; for excavating the riprap ditch; for restoring the ditch banks and any area affected by the construction of the riprap ditch, including backfilling, compacting, grading, seeding, and mulching; and for all labor, equipment, tools, and incidentals required to complete the work.

The quantity of riprap will be paid for according to Section 712. The quantity of stone bedding will be paid for according to instructions in the Special Provisions.

SECTION 258 TEMPORARY SWALE

258.01 Description. This work consists of constructing, maintaining, and ultimately removing six temporary swales Types A-1, A-2, A-3, B-1, B-2, and B-3 as a temporary measure to prevent clean runoff from entering disturbed areas by intercepting and diverting the runoff to a stabilized outlet or to intercept sediment-laden runoff and divert it to a sediment trapping device. The types of temporary swales shall be constructed as shown on Standard Construction Detail, Temporary Swale, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS.

258.02 Seed. Seed shall conform to the requirements of Section 734.

258.03 Mulch. Mulch shall be straw and conform to the requirements of Section 735.

258.04 Erosion Control Blanket. Erosion control blanket shall conform to the requirements of Subsection 735.02 (c).

CONSTRUCTION METHODS

258.05 Construction of Temporary Swale. The Contractor shall construct the temporary swale based upon the type of swale indicated on the Plans. The temporary swale shall be graded to drain. With approval from the Engineer, the location of the temporary swale may be adjusted to meet field conditions and use the most suitable outlet.
The Contractor shall remove and dispose of all brush, stumps, obstructions, and other materials that interfere with the functioning of the swale. The Engineer will approve the removal of any trees that interfere with the functioning of the swale. The swale shall be free of bank projections or other irregularities which may impede the normal flow within the swale. The Contractor shall backfill any depressions or voids in the swale. Backfilled areas shall be compacted with earth moving equipment or tamps.

The Contractor shall place all previously excavated material in areas approved by the Engineer and where the material does not interfere with the functioning of the swale or downstream traps.

258.06 Stabilization of Temporary Swale. Within seven days of the start of construction on the temporary swale, the Contractor shall stabilize all areas affected by the temporary swale with seed and straw mulch. If the operation of the temporary swale is required immediately as a clean water diversion, the Contractor shall stabilize the swale prior to the temporary swale becoming operational using a geotextile liner in accordance with Standard Construction Detail, Geotextile-Lined Channel Diversion.

The Contractor shall place erosion control blankets as shown on Standard Construction Detail, Erosion Control Blanket, and according to Section 735.

258.07 Temporary Swale Drainage. The temporary swale shall have uninterrupted, positive drainage to an outlet. The outlet shall function with a minimum of erosion and reduce runoff velocity prior to discharge.
Diverted runoff from an undisturbed area shall outlet directly into an undisturbed stabilized area at non-erosive velocity. Diverted runoff from a disturbed area shall outlet into a sediment trapping device.

258.08 Maintenance of Temporary Swale. Throughout the Project construction period, the Contractor shall maintain the temporary swale to the original dimensions and function of the temporary swale.

258.09 Sediment Removal. After each rainfall, the Contractor shall check for excessive buildups of sediment which must be removed so that the temporary swale continues to function as intended. The Contractor shall remove all accumulated sediment when it reaches 50% of the height of the swale or when the accumulated sediment impedes drainage of the temporary swale, whichever comes first.

258.10 Removal of Temporary Swale. The temporary swale shall be removed at the end of the construction period or when directed by the Engineer. The Contractor shall not remove a temporary swale which collects runoff from disturbed areas until the disturbed areas are stabilized. The temporary swale and all materials incidental to the temporary swale construction shall be removed. All areas affected by the construction of the temporary swale shall be restored to the original or plan contours and stabilized with seed and mulch.

258.11 Method of Measurement. The quantity of temporary swale Type A-1 will be measured as the actual number of linear meters of temporary swale excavated and accepted. Temporary swale Types A-2, A-3, B-1, B-2, and B-3 will be measured using the same method for measuring temporary swale Type A-1.
The quantity of sediment removal will be measured according to Section 250.

258.12 Basis of Payment. The quantity of temporary swale Types A-1, A-2, A-3, B-1, B-2, and B-3 will be paid for at the Contract unit price per linear meter. Price and payment will constitute full compensation for furnishing and placing all materials; for maintaining the temporary swale; for removing all materials incidental to the temporary swale; for excavating and backfilling; for restoring the site; for seeding and mulching; and for all labor, equipment, tools, and incidentals required to complete the work.

The quantity of clearing and grubbing required for the temporary swale construction will be paid for according to Section 201. The quantity of sediment removal will be paid for according to Section 250.

SECTION 259 PERIMETER DIKE/SWALE

259.01 Description. This work consists of constructing, maintaining, and ultimately removing perimeter dike/swales Types A-1, A-2, and A-3 as a temporary measure to prevent clean runoff from entering disturbed areas by intercepting and diverting it to a stabilized outlet or to intercept sediment-laden runoff and divert it to a sediment trapping device. The types of perimeter dike/swales shall be constructed as shown on Standard Construction Detail, Perimeter Dike/Swale, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS.

259.02 Riprap. Riprap shall be R-4 conforming to the requirements of Section 712.

259.03 Seed. Seed shall conform to the requirements of Section 734.

259.04 Mulch. Mulch shall be straw conforming to the requirements of Section 735.

259.05 Erosion Control Blanket. Erosion control blanket shall conform to the requirements of Subsection 735.02 (c).

259.06 Geotextile. Geotextile shall conform to the requirements of Section 827.

CONSTRUCTION METHODS

259.07 Construction of Perimeter Dike/Swale. The length of the perimeter dike/swale shall be as indicated on the Plans. With approval from the Engineer, the location of the perimeter dike/swale may be adjusted to meet field conditions and use the most suitable outlet. The swale shall be shaped to the line, grade, and cross-section indicated on the Plans and Standard Construction Detail, Perimeter Dike/Swale. The Contractor shall construct the dike from the material excavated during the construction of the swale.

259.08 Stabilization of Perimeter Dike/Swale. Within seven days of the start of construction on the perimeter dike/swale, the Contractor shall stabilize the dike and all areas affected by the construction of the perimeter dike/swale with seed and mulch.

If riprap is required for swale stabilization, the Contractor shall place a minimum of 350 mm of riprap over the geotextile. If erosion control blanket is required for swale stabilization, the Contractor shall place the erosion control blanket as shown on Standard Construction Detail, Erosion Control Blanket, and according to Section 735.

259.09 Perimeter Dike/Swale Drainage. The perimeter dike/swale shall have uninterrupted, positive drainage to an outlet. The outlet shall function with a minimum of erosion.

Diverted runoff from an undisturbed area shall outlet directly into an undisturbed stabilized area at non-erosive velocity. Diverted runoff from a disturbed area shall outlet into a sediment trapping device.

259.10 Maintenance of Perimeter Dike/Swale. Throughout the Project construction period, the Contractor shall maintain the perimeter dike/swale to the original dimensions and function of the swale and of the dike.

259.11 Sediment Removal. After each rainfall, the Contractor shall check for excessive buildup of sediment that must be removed so that the perimeter dike/swale continues to function as intended. The Contractor shall remove all accumulated sediment when it reaches 50% of the height of the swale.

259.12 Removal of Perimeter Dike/Swale. The perimeter dike/swale and all materials incidental to the perimeter dike/swale construction shall be removed at the end of the construction period or when directed by the Engineer. All areas affected by the construction of the perimeter dike/swale shall be restored to the original or plan contours and stabilized with seed and mulch.

259.13 Method of Measurement. The quantity of perimeter dike/swale Type A-1 will be measured as the actual number of linear meters of perimeter dike/swale constructed and accepted. Perimeter dike/swale Types A-2 and A-3 will be measured using the same method for measuring perimeter dike/swale Type A-1.

The quantity of sediment removal will be measured according to Section 250.

259.14 Basis of Payment. The quantity of perimeter dike/swale Types A-1, A-2, and A-3 will be paid for at the Contract unit price per linear meter. Price and payment will constitute full compensation for furnishing all materials; for excavating and placing the materials; for maintaining the perimeter dike/swale; for removing the perimeter dike/swale and all incidental materials; for restoring the area; for seeding and mulching; and for all labor, equipment, tools, and incidentals required to complete the work.

The quantity of sediment removal will be paid for according to Section 250.

SECTION 260 EARTH DIKE

260.01 Description. This work consists of constructing, maintaining, and ultimately removing temporary earth dikes Types A-1, A-2, A-3, B-1, B-2, and B-3 of compacted soil as a temporary measure to prevent clean runoff from entering disturbed areas by intercepting and diverting it to a stabilized outlet or to intercept sediment-laden runoff and divert it to a sediment trapping device. The types of earth dikes shall be constructed as shown on Standard Construction Detail, Earth Dike, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS

260.02 General. The Engineer may approve the substitution of any material required in the construction of the earth dike.

260.03 Borrow. Borrow shall be Type F conforming to the requirements of Section 209.

260.04 Riprap. Riprap shall be R-4 conforming to the requirements of Section 712.

260.05 Seed. Seed shall conform to the requirements of Section 734.

260.06 Mulch. Mulch shall be straw conforming to the requirements of Section 735.

260.07 Erosion Control Blanket. Erosion control blanket shall conform to the requirements of Subsection 735.02 (c).

260.08 Geotextile. Geotextile shall conform to the requirements of Section 827.

CONSTRUCTION METHODS

260.09 Construction of Earth Dike. With approval from the Engineer, the location of the earth dike may be adjusted to ensure a stabilized outfall. The earth dike shall be compacted by earth-moving equipment or tamps. The Contractor shall perform any excavation required to provide the required flow width at the flow depth.

260.10 Stabilization of Earth Dike. Within seven days of the start of construction on the earth dike or prior to the earth dike becoming operational as a clean water diversion dike or a sediment control dike, whichever is sooner, the Contractor shall stabilize the earth dike. The side of the earth dike that does not accommodate water flow shall be stabilized with seed and straw mulch. The side of the earth dike that accommodates the water flow shall be stabilized as shown on Standard Construction Detail, Earth Dike.

If the required stabilization is riprap, the Contractor shall place the riprap over geotextile at the thickness required for the specified size riprap as shown on Standard Construction Detail, Riprap Ditch. If the required stabilization is erosion control blanket, the Contractor shall place the erosion control blanket as shown on Standard Construction Detail, Erosion Control Blanket Applications, and according to Section 735.

260.11 Earth Dike Drainage. The earth dike shall have positive drainage to an outlet. The outlet shall function with a minimum of erosion.

Diverted runoff from an undisturbed area shall outlet into an undisturbed stabilized area at non-erosive velocity. Diverted runoff from a disturbed area shall outlet into a sediment trapping device.

260.12 Maintenance of Earth Dike. Throughout the Project construction period, the Contractor shall maintain the earth dike to the original dimensions and function of the channel and the dike.

260.13 Sediment Removal. After each rainfall, the Contractor shall check for excessive buildups of sediment which must be removed so that the earth dike can continue to function as intended. The Contractor shall remove all accumulated sediment when it reaches 50% of the height of the earth dike.

260.14 Removal of Earth Dike. The earth dike shall be removed at the end of the construction period or when directed by the Engineer. The earth dike and all materials incidental to the earth dike construction shall be removed, and all areas affected by the earth dike shall be restored to the original or plan contours and stabilized with seed and mulch.

260.15 Method of Measurement. The quantity of earth dike Type A-1 will be measured as the actual number of linear meters of earth dike placed and accepted. Earth dike Types A-2, A-3, B-1, B-2, and B-3 will be measured using the same method for measuring earth dike Type A-1.

The quantity of sediment removal will be measured according to Section 250.

260.16 Basis of Payment. The quantity of earth dike Types A-1, A-2, A-3, B-1, B-2, and B-3 will be paid for at the Contract unit price per linear meter. Price and payment will constitute full compensation for furnishing all materials; for excavating, placing and compacting the embankment material; for maintaining the earth dike; for removing the earth dike and all incidental materials; for restoring the site; for seeding and mulching; and for all labor, equipment, tools, and incidentals required to complete the work.

The quantity of sediment removal will be paid for according to Section 250.

SECTION 261 TEMPORARY SLOPE DRAIN

261.01 Description. This work consists of furnishing, installing, maintaining, and ultimately removing pipe slope drains to convey surface runoff down slopes without causing erosion. Temporary slope drains shall be constructed according to Standard Construction Detail, Temporary Slope Drain, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS

261.02 Pipe. Pipe shall be flexible corrugated polyethylene pipe conforming to AASHTO M 294, Type C, unless otherwise indicated on the Plans.

261.03 Plywood. Plywood shall be 1200 by 1200 mm and have a nominal thickness of 13 mm with marine treatment conforming to AWPA Standard C9.

261.04 Lumber. Lumber shall be construction grade two-by-four made from southern yellow pine or Douglas fir treated with chromated copper arsenate (CCA) solution applied at a retention rate of 6.4 kg/m^3 and certified for ground contact.

The two-by-four shall measure 38 by 89 mm.

261.05 Borrow Excavation. Material for construction and maintenance of embankment slopes, interceptor berms, and edge berms shall be approved materials obtained from the Project excavation or, if required, borrow material conforming to Section 209.

261.06 Riprap. Riprap shall conform to the requirements of Section 712.

261.07 Seed. Seed shall conform to the requirements of Section 734.

261.08 Mulch. Mulch shall conform to the requirements of Section 735.

261.09 Geotextile. Geotextile shall conform to the requirements of Section 827.

CONSTRUCTION METHODS

261.10 Construction of the Temporary Slope Drain. Excavation, grading, shaping and preparation of embankment slopes, edge berms, and interceptor berms shall be as indicated on the Plans, Standard Construction Detail, Temporary

Slope Drain, and Section 202.

The Contractor shall install the appropriate size pipe according to the following table:

Table 621-A	
Pipe Diameter (mm)	Maximum Drainage Area (ha)
300	0.2
450	0.6
525	1.0
600	1.4
750	2.0

Construction methods for flexible pipe drains shall conform to Section 614. The slope drains shall have the flexibility and potential for length change to adjust to the interim elevations. Slope drains shall be fastened to the slope by a method approved by the Engineer. The Contractor shall construct and install a plywood anti-seep collar as shown on Standard Construction Detail, Temporary Slope Drain. The temporary slope drain shall discharge into the back of sediment traps, into sediment basins, or into ditches discharging into sediment traps or basins. When a temporary slope drain outlets into a sediment trap or basin, the temporary slope drain shall discharge at the riser crest or weir elevation.

Construction methods for riprap aprons shall conform to the requirements of Section 712. A riprap apron, with geotextile, shall be installed below the pipe outlet. The riprap apron shall be a minimum of 3 m^2.

If directed by the Engineer, the Contractor shall adjust the elevations of and reconstruct the slope drains so that the slope drains remain functional as the embankment elevation rises.

261.11 Maintenance of the Temporary Slope Drain. Maintenance of embankment slopes, edge berms, and interceptor berms shall conform to the requirements of Section 202.

The drain system shall be inspected for clogging and rips or breaks and shall be cleaned and repaired as required to remain functional.

261.12 Removal of the Temporary Slope Drain. When the Engineer determines that the temporary slope drain is no longer required, the Contractor shall remove the temporary slope drain and all materials incidental to the construction of the temporary slope drain. All areas affected by the construction of the temporary slope drain shall be restored to the original or plan contours, and stabilized with seed and mulch.

261.13 Method of Measurement. The quantity of temporary slope drain will be measured as the actual number of linear meters of temporary slope drain pipe, measured from end to end of pipe, installed and accepted.

The quantity of edge berm constructed will be measured according to Section 202.

261.14 Basis of Payment. The quantity of temporary slope drain will be paid for at the Contract unit price per linear meter of temporary slope drain pipe. Price and payment will constitute full compensation for furnishing and installing all materials, including pipe, anti-seep collars, riprap, geotextile, seed, mulch, and, if required, borrow excavation; for readjusting or relocating drains; for removing the temporary slope drain; for restoring the site; for seeding and mulching; and for all labor, equipment, tools, and incidentals required to complete the work.

If the Contractor is required to add a piece of slope drain pipe to an existing temporary slope drain, the additional piece of slope drain pipe will be paid for separately and on the same basis as that for the existing temporary slope drain. The Contractor shall submit a unit price cost breakdown for this work when more than one size of pipe is used.
The quantity of edge berm will be paid for according to Section 202.

SECTION 262 STILLING WELL

262.01 Description. This work consists of constructing, maintaining, and ultimately removing stilling wells as a temporary measure to pump clean water around a disturbed construction area to a stabilized outfall. Stilling wells shall be constructed as shown on Standard Construction Detail, Stilling Well, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS

262.02 Riprap. Riprap shall be R-4 conforming to the requirements of Section 712.

262.03 Seed. Seed shall conform to the requirements of Section 734.

262.04 Mulch. Mulch shall conform to the requirements of Section 735.

262.05 Geotextile. Geotextile shall conform to the requirements of Section 827.

CONSTRUCTION METHODS

262.06 Construction of Stilling Well. The Contractor shall excavate to the dimensions shown on the Plans or as directed by the Engineer. The Contractor shall remove all debris from the excavated area.

The Contractor shall line all surfaces of the stilling well with the geotextile prior to placing the riprap. The geotextile and riprap shall be placed as indicated on the Plans, Standard Construction Detail, Stilling Well, and Section 712.

262.07 Maintenance of Stilling Well. Throughout the Project construction period, the Contractor shall maintain the stilling well to the original dimensions and function of the stilling well. The Contractor shall remove and dispose of all trash and debris that enters the stilling well and interferes with the functioning of the stilling well.

262.08 Removal of Stilling Well. The stilling well shall be removed when the Engineer determines that it is no longer required. All materials incidental to the construction of the stilling well shall be removed, and all areas affected by the stilling well shall be restored to the original or plan contours and stabilized as required.

262.09 Method of Measurement. The quantity of stilling wells will be measured as the actual number of cubic meters of stilling well excavated and accepted. The quantity of riprap will be measured according to Section 712.

262.10 Basis of Payment. The quantity of stilling well will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for furnishing all materials; for excavating; for maintaining the stilling well; for removing all stilling well materials; for restoring the site, including backfilling, seeding, and mulching; and for all labor, equipment, tools, and incidentals required to complete the work.

The quantity of riprap will be paid for according to Section 712.

SECTION 263 SUMP PIT

263.01 Description. This work consists of constructing, maintaining, and ultimately removing sump pits for the purpose of trapping and filtering excess water from excavations prior to pumping the water to a suitable discharge area. Sump pits shall be constructed as shown on Standard Construction Detail, Sump Pit, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS

263.02 Pipe. Pipes shall be perforated corrugated aluminum with a perforated cap on the bottom conforming to the requirements of Section 615.

263.03 Stone. Stone shall be Delaware No. 57 conforming to the requirements of Section 813.

263.04 Geotextile. Geotextile shall conform to the requirements of Section 827.

CONSTRUCTION METHODS

263.05 Excavation for Sump Pit. The Contractor shall excavate the sump pit according to the dimensions on Standard Construction Detail, Sump Pit, and at the location shown on the Plans.

263.06 Construction of Sump Pit. The Contractor shall place the layer of stone in the bottom of the sump pit as shown on Standard Construction Detail, Sump Pit. The stationary pipe with bottom cap shall be placed on top of the bottom layer of stone. The removable pipe shall be placed inside of the stationary pipe as shown on Standard Construction Detail, Sump Pit. Both pipes shall extend to the same height and be a minimum of 600 mm above the lip of the sump pit. The Contractor shall backfill the sump pit with stone. The stone shall be sloped up to meet the height of the pipes.

263.07 Maintenance of Sump Pit. When clogged with sediment, the Contractor shall replace the geotextile and, if applicable, the wire mesh on the removable pipe and bottom cap.

263.08 Removal of Sump Pit. When permitted by the Engineer, the Contractor shall remove the sump pit and all materials incidental to the construction of the sump pit. All areas affected by the sump pit shall be restored to the original or plan contours.

263.09 Method of Measurement. The quantity of sump pits will be measured as the actual number of each constructed and accepted.

263.10 Basis of Payment. The quantity of sump pits will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing and placing all materials, including perforated metal pipes with bottom caps, stone, geotextile, and wire mesh; for excavating the sump pit; for maintaining the sump pit, including replacing all clogged geotextile and wire mesh; for removing the sump pit and all incidental materials; for restoring the sump pit area; and for all labor, equipment, tools, and incidentals required to complete the work.

SECTION 264 DEWATERING BASIN

264.01 Description. This work consists of constructing, maintaining, and ultimately removing dewatering basins as shown on Standard Construction Detail, Dewatering Basin, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS

264.02 Borrow. Borrow for fill material for the berm shall be clean mineral soil free of roots, woody vegetation, stones greater than 100 mm in diameter, or other objectionable materials. Sandy or gravely soils classified as GW, GP, SW, and SP under the Unified Soil Classification System shall not be used in the embankment.

264.03 Geotextile. Geotextile shall conform to the requirements of Section 827.

264.04 Riprap. Riprap shall be R-4 conforming to the requirements of Section 712.

264.05 Seed. Seed shall conform to the requirements of Section 734.

264.06 Mulch. Mulch shall conform to the requirements of Section 735.

CONSTRUCTION METHODS

264.07 Construction of the Dewatering Basin. The area under the berm shall be cleared, grubbed, and stripped of topsoil. In order to facilitate clean out and restoration, the pool area will be cleared of all brush, trees, and other objectionable materials.

The fill material for the berm and the area on which the fill material for the berm is to be placed shall have sufficient moisture so that it can be formed by hand into a ball without crumbling. If water can be squeezed out of the ball, it is too wet for proper compaction. The fill material shall be placed in 300 mm thick lifts over the entire length of the fill. Compaction shall be obtained by tamping the berm with the flat side of the backhoe bucket used to excavate the dewatering basin.

264.08 Vegetative Treatment. The berm top and side slopes shall be stabilized immediately after construction with seed and mulch.

264.09 Maintenance of the Dewatering Basin. Throughout the Project construction period, the Contractor shall maintain the dewatering basin to its original dimensions and function.

264.10 Sediment Removal. The Contractor shall remove all accumulated sediment when the basin is filled to one-half of its original basin.

264.11 Removal of Dewatering Basin. The dewatering basin shall be removed at the end of the construction period or when directed by the Engineer. The dewatering basin and all materials incidental to its construction shall be removed. All areas affected by the construction, use, and removal of the dewatering basin shall be restored to the original or plan contours and stabilized with seed and mulch.

264.12 Method of Measurement. The quantity of dewatering basins will be measured as the actual number of dewatering basins constructed and accepted. The quantity of sediment removal will be measured according to Section 250.

264.13 Basis of Payment. The quantity of dewatering basins will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for excavating; for furnishing and placing all materials, including the berm; for maintaining the dewatering basin; for removing the dewatering basin and all incidental materials; for restoring the area; for seeding and mulching and for all labor, equipment, tools, and incidentals required to complete the work. The quantity of sediment removal will be paid for according to Section 250.

SECTION 265 GEOTEXTILE LINED CHANNEL DIVERSION

265.01 Description. This work consists of constructing, maintaining, and ultimately removing a geotextile lined channel diversion as a temporary drainage way to allow the Contractor to work in the existing channel by redirecting the water flow of the existing channel around the intended work area. Geotextile lined channel diversion shall be constructed as shown on Standard Construction Detail, Geotextile-Lined Channel Diversion, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS

265.02 Fasteners. Fasteners shall be steel pins, 4.7 mm in diameter, and a minimum of 450 mm long. Washers shall be steel and 38 mm in diameter.

265.03 Seed. Seed shall conform to the requirements of Section 734.

265.04 Mulch. Mulch shall conform to the requirements of Section 735.

265.05 Stone. Stone shall be Delaware No. 3 conforming to the requirements of Section 813.

265.06 Geotextile. Geotextile shall conform to the requirements of Section 827.

CONSTRUCTION METHODS

265.07 Construction of Geotextile Lined Channel Diversion. The Contractor shall have all required materials on site prior to starting construction on the geotextile lined channel diversion. The process of excavation shall be a continuous and uninterrupted operation. The cross-section of the diversion channel shall replicate the cross-section of the natural channel, unless otherwise specified. The Contractor shall begin excavation for the geotextile lined channel diversion at the downstream end of the proposed channel and proceed upstream. Excavation, including the downstream and upstream connection to the natural channel, shall be constructed under dry conditions. Sandbags shall be used to contain the stream. The Contractor shall excavate 600 by 600 mm trenches at the points of tie-in to the existing channel and at 300 mm beyond the top of the bank of the diversion channel for keying-in the geotextile as shown on Standard Construction Detail, Geotextile-Lined Channel Diversion.

All excavated materials shall be stockpiled outside of the floodplain. The Contractor shall temporarily stabilize the stockpiles according to the Engineer’s directions to prevent reentry of any of the previously excavated materials into the natural channel. All disturbance resulting from construction of the geotextile lined channel diversion shall be contained by appropriate sediment control measures as indicated on the Plans or as determined by the Engineer.

All debris shall be removed and the channel diversion surfaces made smooth so that the geotextile will rest flush with the channel at all points of contact. The geotextile shall be placed such that one piece will line the entire channel. If the diversion channel is larger than the geotextile, the geotextile shall be placed with longitudinal overlapping. The Contractor shall be required to use sewn longitudinal overlaps. The Contractor shall overlap the upstream sections over the downstream sections. The geotextile sections shall be secured with pins and washers as shown on Standard Construction Detail, Geotextile-Lined Channel Diversion.

The Contractor shall key-in and anchor the geotextile along the entire length of the diversion channel by completely lining the trenches with the geotextile. After the geotextile is in place in the trenches, the Contractor shall carefully place the stone into the trench from a zero drop height.

The Contractor shall construct berms or swales to prevent sediment from surrounding areas of disturbance from entering the geotextile lined channel diversion. The Contractor shall stabilize the points of tie-in between the geotextile lined channel diversion and the natural channel according to the Plans.

265.08 Maintenance of Geotextile Lined Channel Diversion. Throughout the Project construction period, the Contractor shall maintain the geotextile lined channel diversion to the original dimensions and function of the geotextile lined channel diversion.

265.09 Removal of Geotextile Lined Channel Diversion. When directed by the Engineer and when all construction is completed in and around the existing stream, the Contractor shall redirect the stream back through the natural stream bed and remove the geotextile lined channel diversion. All materials incidental to the construction of the geotextile lined channel diversion shall be removed and the area shall be backfilled according to Subsection 207.05. The Contractor shall restore the area of the geotextile lined channel diversion to the original or plan contours and shall stabilize the area with seed and mulch.

265.10 Method of Measurement. The quantity of geotextile lined channel diversion will be measured as the actual number of cubic meters excavated for the geotextile lined channel diversion and accepted.

265.11 Basis of Payment. The quantity of geotextile lined channel diversion will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for excavating; for furnishing and placing all material, including geotextile, stone, washers, pins, seed, and mulch; for maintaining the geotextile lined channel diversion during the Project construction period; for removing the geotextile lined channel diversion and all incidental materials; for restoring the site; for seeding and mulching; and for all labor, equipment, tools and incidentals required to complete the work.

SECTION 266 SANDBAG DIKES/SANDBAG DIVERSIONS

266.01 Description. This work consists of constructing, maintaining, and ultimately removing sandbag dikes and sandbag diversions for the purpose of erosion control when construction activities such as bank stabilization or bridge construction take place within a stream channel. Sandbag dikes and sandbag diversions shall be constructed as shown on Standard Construction Details, Sandbag Diversion and Sandbag Dike, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS

266.02 Sand. Sand shall conform to the requirements of Section 804.

266.03 Sheeting. Sheeting shall consist of polyethylene, or other material approved by the Department’s Materials and Research Section, 150 µm thick, impervious, and resistant to puncture and tearing.

266.04 Pipe. Pipe shall be flexible with watertight bands and of the size and material indicated on the Plans.

266.05 Seed. Seed shall conform to the requirements of Section 734.

266.06 Mulch. Mulch shall conform to the requirements of Section 735.

266.07 Prefabricated Sandbags. Sandbags shall be of jute, woven polyester, or polypropylene mesh resistant to ultra-violet radiation, and of sufficient strength to contain the sand without failure or leakage. The size of the sack shall be

approximately 400 by 625 mm measured inside the seam when the sack is laid flat and each sack will be filled with 0.03 m^3 of unwashed sand.

CONSTRUCTION METHODS

266.08 Construction of Sandbag Dike. The Contractor shall construct the sandbag dike as shown on Standard Construction Detail, Sandbag Dike. If excavation is required by the Plans, all excavated materials shall be disposed of in an approved disposal area outside of the 100 year floodplain. The Contractor shall begin placing the sandbags at the upstream location and continue downstream. When it is necessary to overlap the sheeting, the upstream portion shall cover the downstream potion, and the overlap shall be a minimum of 600 mm.

266.09 Construction of Sandbag Diversion. The Contractor shall construct the sandbag diversion as shown on Standard Construction Detail, Sandbag Diversion. Placement of the sandbags shall begin at the upstream location and continue downstream. When it is necessary to overlap the sheeting, the upstream portion shall cover the downstream potion, and the overlap shall be a minimum of 600 mm.

266.10 Maintenance of Sandbag Dike and Sandbag Diversion. The Contractor shall maintain the original dimensions of the accepted sandbag dikes and sandbag diversions.

266.11 Removal of Sandbag Dike and Sandbag Diversion. The sandbag dikes and sandbag diversions shall remain in place until all disturbed areas are stabilized and the Engineer approves their removal. All sandbags and all materials incidental to the construction of the sandbag dike or sandbag diversion shall be removed and the area restored to the original or plan contours and stabilized with seed and mulch.

266.12 Method of Measurement. The quantity of sandbag dikes will be measured as the actual number of cubic meters of sandbags placed and accepted. The quantity of sandbag diversions will be measured as the actual number of cubic meters of sandbags placed and accepted. All measurements will be based on one sandbag being 0.03 m^3.
The quantity of pipe will be measured as the actual number of linear meters of pipe placed and accepted.

266.13 Basis of Payment. The quantity of sandbag dikes will be paid for at the Contract unit price per cubic meter. The quantity of sandbag diversions will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for furnishing and placing all materials, excluding the pipe; for constructing the sandbags; for maintaining the sandbag dikes and sandbag diversions; for removing and disposing of the sandbag dikes and sandbag diversions and all incidental materials; for restoring the area; for seeding and mulching; and for all labor, tools, equipment, and incidentals required to complete the work.

The quantity of pipe will be paid for according to the appropriate Section for the pipe installed.

SECTION 267 RESERVED

SECTION 268 STABILIZED CONSTRUCTION ENTRANCE

268.01 Description. This work consists of constructing, maintaining, and ultimately removing stabilized pads of aggregate on a filter cloth base at each entrance to and exit from a construction site so that construction vehicles and equipment do not track mud off-site. The stabilized construction entrance shall be constructed according to Standard Construction Detail, Stabilized Construction Entrance, at the locations shown on the Plans, and as directed by the Engineer.

MATERIALS

268.02 Pipe. Pipe shall be as specified in the Plans.

268.03 Seed. Seed shall conform to the requirements of Section 734.

268.04 Mulch. Mulch shall conform to the requirements of Section 735.

268.05 Stone. Stone shall be Delaware No. 3 conforming to the requirements of Section 813.

268.06 Geotextile. Geotextile shall conform to the requirements of Section 827.

CONSTRUCTION METHODS

268.07 Construction of Stabilized Construction Entrance. Any addition, deletion, or change in location of a stabilized construction entrance shall be approved in advance by the Engineer.

The entrance pipe, if required, shall be placed in Class C bedding and graded to drain. The pipe shall be installed prior to the placement of the geotextile or stone. The stabilized construction entrance location shall be excavated to the required dimensions and the subgrade compacted. The geotextile shall be placed on the compacted subgrade and the stone placed on top to the required depth.

It is intended that the entire width at points where ingress and egress occur shall be stabilized as described above. The Engineer may direct the Contractor to widen the entrance as required to prevent the entrance location from becoming a source of sediment.

268.08 Maintenance of Stabilized Construction Entrance. The Contractor shall leave all paved surfaces adjoining the Project limits free of accumulated sediment at the end of each workday. The Contractor may utilize any means and methods available to remove sediment provided the cleaning operation itself does not violate water or air pollution laws of the State.

After heavy use and after each rain, the Contractor shall inspect the stabilized construction entrance to ensure proper functioning. When the voids in the stone pad are filled, the Contractor may rake the surface to reestablish the voids in the stone pad. If sedimentation of the entrance is severe, the raking is unsuccessful in restoring void space, the Contractor shall replace the top 50 mm of the stone with 50 mm of clean Delaware No. 3 stone.

If the Contractor chooses to clean construction vehicle wheels to remove sediment prior to entering public rights-of-way, the cleaning shall be done in aggregate stabilized areas that drain into approved sediment trapping devices. All sediment shall be prevented from entering storm drains, ditches, or watercourses.

268.09 Removal of Stabilized Construction Entrance. When no longer needed for access to the Project and when directed by the Engineer, the stabilized construction entrance and all materials incidental to the construction of the stabilized construction entrance shall be removed. All areas affected by the stabilized construction entrance shall be restored to the original or plan contours. If required by the Engineer, the restored areas shall be stabilized with seed and mulch.

268.10 Method of Measurement. The quantity of stabilized construction entrances will be measured as the actual number of metric tons of stone placed and accepted. The quantity of stone used for topdressing will be measured as the actual number of metric tons of stone placed and accepted. The quantity of drainage pipe, if used, will be measured as the actual number of linear meters of pipe placed and accepted.

268.11 Basis of Payment. The quantity of stabilized construction entrances, including topdressing, will be paid for at the Contract unit price per metric ton of stone. The quantity of stone used for topdressing will be paid for separately from the quantity of stabilized construction entrances but at the same price per metric ton of stone. Price and payment will constitute full compensation for furnishing and placing all material, including the geotextile; for maintaining the stabilized construction entrance during the Project construction period, excluding topdressing; for removing the stabilized construction entrance after completion of the Project; for restoring the site, including any required seeding and mulching; and for all labor, equipment, tools, and incidentals required to complete the work.

The quantity of drainage pipe will be paid for separately.

SECTION 269 TURBIDITY CURTAIN

269.01 Description. This work consists of furnishing, constructing, installing, maintaining, and ultimately removing a turbidity curtain from a body of water to minimize the drift of suspended sediment in the water body during construction of the Project. Construction of the turbidity curtains shall be as shown on Standard Construction Detail, Turbidity Curtain, at the locations shown on the Plans, and as directed by the manufacturer and the Engineer.

269.02 General. Prior to the installation of the turbidity curtain and its accessories, the Contractor shall submit the manufacturer’s drawings and technical specifications to the Engineer for approval.

MATERIALS

269.03 Curtain. The curtain shall be a synthetic material coated with suitable elastomeric or polymeric compound and have a high resistance to weathering, hydrocarbons, fresh and salt water, and temperature extremes. The material shall

have a tensile strength of not less than 890 N when measured lengthwise or crosswise. Seams, if required, shall be either vulcanized welded or sewn and shall develop the full strength of the material.

269.04 Flotation Units. Flotation units shall be flexible, buoyant units contained in a flotation sleeve or collar attached to the turbidity curtain. Buoyancy provided by the flotation units shall be sufficient to support the required width of the turbidity curtain and maintain a freeboard of at least 75 mm above the water surface level.

269.05 Load Lines. Load lines shall be fabricated into the top and bottom of the turbidity curtain. The top load line shall consist of woven webbing or vinyl sheathed steel cable and shall have a minimum breaking strength of 44.6 kN. The bottom loadline shall consist of a 6-mm galvanized steel chain incorporated into the bottom hem of the turbidity curtain to act as ballast. The load lines shall have suitable devices which develop the full breaking strength for connecting to load lines in adjacent sections.

269.06 Stakes. Stakes shall be constructed of oak timber or steel. Posts shall be a minimum of 2 m long and at least 450 mm longer that the height of the turbidity curtain.

(a) *Oak Timber Posts.* Oak timber posts shall be straight and have a minimum nominal cross-section of 50 by 100 mm.

(b) *Steel Posts.* Steel posts shall be 65 mm diameter Schedule 40 pipe or be standard steel "T" or "U" section of 1.98 kg/m minimum.

269.07 Fasteners. Fasteners shall be either 16-mm long brass or copper staples, or 1.37 mm (17 gage) galvanized or aluminized steel tie wires long enough to securely attach the fabric to the posts.

269.08 Anchors. Anchors shall be standard marine type boat anchors. The Contractor shall use Danforth type anchors for sandy bottoms, or kedge or mushroom type anchors for mud bottoms. The size, weight, and overall number of the anchors shall be sufficient to hold the turbidity curtain in its intended location. Alternate anchoring methods such as heavy concrete weights or driven pilings may be used if approved, prior to use, by the Engineer.

269.09 Rope. Rope shall be polypropelene, 16 mm diameter, with a minimum breaking strength of 3.6 kN.

CONSTRUCTION METHODS

269.10 General. When assembling and installing a turbidity curtain, the Contractor shall follow all the directions of the turbidity curtain manufacturer.

The turbidity curtain shall not be installed perpendicular to the direction of streamflow, such as across a river. The turbidity curtain shall be installed parallel to the flow of water only, such as along a river bank. All construction activities which generate any sediment or turbidity into the waterway shall be contained within the turbidity curtain. Unless otherwise directed by the Engineer, the Contractor shall begin installation at high tide from a shoreline anchorage and work along with the current in a downstream direction.

The turbidity curtain shall form a continuous vertical and horizontal barrier to suspended sediment. The bottom of the turbidity curtain shall rest in contact with the bottom of the waterway for the entire length of the turbidity curtain. The top of the turbidity curtain shall extend above the water surface with at least a 75 mm freeboard for all stages of water levels.

269.11 Installation of Floating Turbidity Curtain. The turbidity curtain shall be floated into position, attached to the anchor lines, and then unfurled. The Contractor shall securely attach curtain panel ends together using rope lashings. The top lashing shall be securely tied to the anchor line. The Contractor shall place the anchors such that the turbidity curtain remains in the Plan location and none of the flotation devices are pulled under the water surface. If directed by the Engineer, the Contractor shall supply and place additional anchorage.

269.12 Installation of Staked Turbidity Curtain. Stakes shall be installed along the turbidity curtain alignment as shown on the Plans. The stakes shall be driven into the ground to the depth and spacing as shown on Standard Construction Detail, Turbidity Curtain.

The curtain shall be securely fastened to the side of the stakes facing the work area generating the sediment and turbidity. At curtain panel ends, the two panels shall be overlapped a minimum of 150 mm and rolled and fastened together around a common stake to ensure a sediment-tight seam.

269.13 Maintenance of Turbidity Curtain. Throughout the Project construction period, the Contractor shall maintain the turbidity curtain so that no sediment caused by the Project enters the waterway beyond the turbidity curtain. All turbidity curtain damaged prior to installation, during installation, or during the life of the Contract shall be repaired or replaced to the satisfaction of the Engineer.

269.14 Removal of Turbidity Curtain. The turbidity curtain shall remain in place until the Project is complete and the turbidity has settled to no more than what existed prior to the start of construction. When directed by the Engineer, the turbidity curtain shall be furled in place, then released from its anchors and towed out of the water. The turbidity curtain and all materials incidental to the construction of the turbidity curtain shall be removed in such a manner as to minimize turbidity to adjacent waters. The turbidity curtain and related components shall become the property of the Contractor and shall be removed from the Project.

269.15 Method of Measurement. The quantity of floating and staked turbidity curtain will be measured, from edge to edge of the turbidity curtain along the support cable, as the actual number of linear meters of turbidity curtain placed and accepted.

269.16 Basis of Payment. The quantity of floating turbidity curtain and staked turbidity curtain will be paid for at the Contract unit price per linear meter for each type of curtain. Price and payment will constitute full compensation for furnishing, assembling, installing, maintaining, and removing the turbidity curtain and all materials incidental to the construction and installation of the turbidity curtain, and for all labor, tools, equipment, and incidentals required to complete the work.

SECTION 270 PORTABLE SEDIMENT TANK

270.01 Description. This work consists of constructing, installing, maintaining, and ultimately removing portable sediment tanks to trap and retain sediment prior to pumping water back to the watercourse. Construction of the portable sediment tanks shall be as shown on Standard Construction Detail, Dewatering Basin, or an approved alternate design, at the locations shown on the Plans, and as directed by the Engineer.

270.02. Alternate Design. If the storage volume is adequate and approval is obtained from the Stormwater Engineer, the Contractor may use an alternate design for the portable sediment tank. The storage volume of the portable sediment tank shall be either 7.48×10^{-3} m^3 of storage for each liter per minute of pump discharge capacity or 28.3 m^3, whichever is greater.

270.03 Submittal. Prior to the actual use of the portable sediment tank, the Contractor shall submit the hydraulic design of the portable sediment tank to the Engineer for approval.

MATERIALS

270.04 Materials for Standard Construction Detail, Portable Sediment Tank. The materials that follow are specific to the portable sediment tank design shown on Standard Construction Detail, Portable Sediment Tank.

(a) *Wire Mesh.* Wire mesh shall be steel or galvanized welded wire reinforcement with openings 6 by 6 mm and wire diameter of 5.7 µm (23 gage).
(b) *Pipe.* Pipes shall be corrugated metal, either steel or aluminum, conforming to the requirements of Section 614 or 615, respectively.
(c) *Fasteners.* Eye bolts conforming to the requirements of ASTM F 541, Type 1 or Type 2, and shall be of sufficient strength to lift the portable sediment tank filled with sediment to a depth of 600 mm.
(d) *Metal Plate.* Metal plate shall conform to the same material requirements as the pipe.
(e) *Geotextile.* Geotextile shall conform to the requirements of Section 827.

270.05 Materials for an Alternate Design. The Contractor shall submit a detailed list of materials to the Engineer. All materials shall not contribute to any contamination of the outflow. The materials list shall be submitted with the hydraulic design submittal required in Subsection 270.03.

270.06 Seed. Seed shall conform to the requirements of Section 734.

270.07 Mulch. Mulch shall conform to the requirements of Section 735.

CONSTRUCTION METHODS

270.08 General. With approval from the Engineer, the Contractor may install the portable sediment tank at a different location than is shown on the Plans. The portable sediment tank shall be located for ease of clean-out and disposal of the trapped sediment and to minimize the interference with the construction activities and pedestrian traffic.

270.09 Construction of Portable Sediment Tank According to Standard Construction Detail, Portable Sediment Tank. All welds shall be watertight. The Contractor shall line the inside of the perforated pipe with a layer of wire mesh first, and then with a layer of geotextile. The wire mesh and geotextile shall be securely fastened to the pipe.

270.10 Construction of Portable Sediment Tank According to an Alternate Design. The Contractor shall submit a detailed sketch of the alternate design with notes describing the planned construction methods. The detailed sketch shall be submitted with the hydraulic design submittal in Subsection 270.03.

270.11 Maintenance of Portable Sediment Tank. The Contractor shall make any required repairs to the portable sediment tank to ensure that the portable sediment tank functions as intended.

270.12 Sediment Removal. The Contractor shall remove the sediment when it accumulates to a depth of 600 mm in a tank designed according to Standard Construction Detail, Portable Sediment Tank, and when it accumulates to one-third of the portable sediment tank height for an alternate design. All sediment collected in the portable sediment tank shall be disposed of in an approved disposal area or as approved by the Engineer.

270.13 Removal of Portable Sediment Tank. The portable sediment tank and all materials incidental to the construction of the portable sediment tank shall be removed and all areas affected by the portable sediment tank shall be restored to the original or plan contours and stabilized with seed and mulch.

270.14 Method of Measurement. The quantity of portable sediment tanks will be measured as the actual number of each portable sediment tank placed and accepted. Sediment removal will be measured according to Section 250.

270.15 Basis of Payment. The quantity of portable sediment tanks will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing, fabricating, and installing the portable sediment tank; for maintaining the portable sediment tank; for disposing of the portable sediment tank and all incidental materials; for restoring the portable sediment tank area; for seeding and mulching; and for all labor, equipment, tools, and incidentals required to complete the work.

The quantity of sediment removal will be paid for according to Section 250.

SECTION 271 STORMWATER MANAGEMENT POND

271.01 Description. This work consists of constructing the foundation, dam, reservoir, and emergency spillway for a stormwater management pond at the location shown on the Plans and as directed by the Engineer.

271.02 Materials. Borrow for stormwater management pond construction shall conform to the requirements of Subsection 274.02. The types of soil required are as follows:

Foundation Cutoff - Clay Borrow, Type 1

Dam - Clay Borrow, Type 2

CONSTRUCTION METHODS

271.03 Excavation. The Contractor shall excavate for the stormwater management pond in reasonably close conformity with the lines and grades shown on the Plans or as directed by the Engineer. All suitable material removed as excavation shall be used in constructing the dam foundation and embankment before securing or hauling any borrow, or unless directed by the Engineer. Materials determined by the Engineer to be unsuitable for use in the dam foundation and embankment shall be deposited on slopes as directed by the Engineer or removed from the Project site and disposed.

271.04 Dam Foundation and Reservoir Preparation. The dam foundation and reservoir shall be cleared of trees, logs, stumps, roots, brush, boulders, sod, topsoil and rubbish. All surfaces under the foundation shall be graded to remove irregularities and shall be scarified parallel to the axis of the fill to loosen the soil a minimum of 50 mm in depth. The moisture content of the loosened material shall be controlled as specified in Subsection 271.06.

The foundation area shall be kept free of standing water during placement of the material for the dam by approved dewatering methods. Exposed rock surfaces under the foundation shall be cleaned of all loosened earth material. Test pits and other cavities shall be filled with compacted soil conforming to Section 210.

Topsoil shall be stockpiled and used in the completed embankment and other areas as directed by the Engineer.

271.05 Foundation Cutoff Trench. The foundation cutoff trench shall be located under the dam centerline or as shown on the Plans. The foundation cutoff trench shall be keyed into the original ground extending down to a relatively impervious layer and up the abutment slope to at least the ten-year pool elevation. The foundation cutoff trench shall be excavated prior to placing the dam embankment. The cutoff trench shall extend a minimum of 1.22 m below the original ground surface or as indicated on the Plans. The trench shall have a minimum 1.22 m bottom width or be wide enough to accommodate the equipment used for excavation, backfill, and compaction. The side slopes of the cutoff trench shall be no steeper than 1:1.

271.06 Dam Foundation and Embankment Placement and Compaction. Fill shall not be placed until the required foundation preparation has been completed and the foundation excavation has been inspected and approved by the Engineer. Fill shall not be placed on frozen surfaces nor shall frozen materials be used in the fill.
If the surface of any layer becomes too hard, smooth or dry for proper bond with the next layer, it shall be scarified parallel to the axis of the dam to a depth of not less than 50 mm and brought to the optimum moisture content before the next layer is placed.

Fill material shall contain the optimum moisture to obtain the required density. If the material is too wet, it shall be allowed to dry or be removed. If the material is too dry, water shall be added and mixed with the soil until the optimum moisture content is met.

Fill material shall be placed beginning at the lowest area of the foundation and shall be brought up in 200 mm to 300 mm thick continuous, horizontal layers over the entire length of the fill. Compaction shall be obtained by approved rollers or compactors. Compaction or rolling shall start at the edges and progress towards the center of the embankment. Compaction shall continue until each layer of the full width is thoroughly and uniformly compacted to at least 90% of the laboratory maximum density on the same soil.

271.07 Method of Measurement. The quantity of stormwater management ponds will be measured as the actual number of cubic meters of material excavated to construct stormwater management ponds. The volume will be computed by the method of average end areas and will be measured by cross-sections taken at regular intervals and at breaks in grade. All excavation, except topsoil, will be measured in its original position. Topsoil will be measured in its original position or in a stockpile excavation, at the discretion of the Engineer. Topsoil removed from fill areas may be stockpiled separately for the cross-sectioning or may be measured by cross-sectioning the area of removal before and after topsoil stripping is performed. No measurement will be made for materials excavated beyond or below the lines and grades shown on the Plans.

271.08 Basis of Payment. The quantity of stormwater management ponds will be paid for at the Contract unit price per cubic meter of excavation. Price and payment will constitute full compensation for clearing, grubbing, and disposing of all obstructions, including all pipes within the limits of the work, not covered under any other Section; for excavating the foundation cutoff trench; for placing and compacting the foundation; for grading and compacting the dam; for excavating, grading, and shaping the reservoir and emergency spillway; for removing and disposing of all unsuitable material; for backfilling all areas from which unsuitable materials have been removed; for salvaging and stock piling topsoil for re-use; for removing and disposing of all material not otherwise provided for so that the stormwater management pond is completed in a neat and clean manner; for dewatering; and for all labor, equipment, tools, and incidentals required to complete the work.

The removal and final disposal of materials specified under other pay items is not included in this work.

SECTION 272 POND OUTLET STRUCTURE, CONCRETE

272.01 Description. This work consists of furnishing, fabricating, and constructing a pond outlet structure at the locations shown on the Plans and as directed by the Engineer.

MATERIALS

272.02 Borrow. Borrow for backfill material shall be Clay Borrow, Type 2 and shall conform to the requirements of Subsection 274.02.

272.03 Concrete. Concrete used in risers may be precast or cast-in-place. Concrete used in anti-seep collars shall be cast-in-place only. Concrete used in risers and anti-seep collars shall be Class A conforming to the requirements of Section 812

272.04 Reinforcing Steel. Reinforcing steel shall be Grade 60 and conform to the requirements of Section 603.

272.05 Grout. Grout shall be non-shrink conforming to the requirements of ASTM C 1107.

272.06 Pipe. Reinforced concrete pipe used for the principal spillway shall conform to Section 612.

272.07 Gaskets. Gaskets for reinforced concrete pipe shall be flexible rubber and form watertight joints conforming to the requirements of AASHTO M 198 75.

272.08 Steps. Steps shall be molded plastic with a reinforcing bar core, and shall conform to the requirements of ASTM A 615, ASTM A 478, and ASTM D 4101.

CONSTRUCTION METHODS

272.09 Excavation. The Contractor shall excavate to the required depth. The foundation upon which the structure is to be placed shall be compacted to a firm and level surface.
272.10 Outlet Structure.

(a) *Riser.* Concrete risers shall be poured in place or pre-cast. If the concrete risers are pre-cast, the Contractor shall design the lifting lugs, and all hardware required to transport and install the structure. The top slab shall not be used to lift the riser structure. Any space between pipes and the walls of the pre-cast riser shall be filled with grout. The largest dimension of the opening in the riser of connection of the outfall pipe shall be no greater than the outfall pipe diameter plus 100 mm.
(b) *Anti-Seep Collars.* The subgrade soil shall be excavated to the dimensions of the bottom half of the collars. Concrete forming the bottom half of the anti-seep collars shall be poured into the excavation using the adjacent soil as the form. Concrete formwork shall be used to form the top half of the anti-seep collars.
(c) *Principal Spillway Outfall Pipe.* The principal spillway pipe shall have Class A pipe bedding. Shims used to establish grade and alignment of the pipe shall be made of concrete. Lumber or bricks shall not be used for shims. Care shall be exercised during backfill to prevent any pipe movement from its horizontal and vertical alignment.
When the principal spillway outfall pipe is to be place partially or completely in fill, the fill embankment shall be constructed 600 mm above the proposed top of pipe. A trench shall then be excavated to the required grade with side slopes no steeper than 1:1.
The Contractor shall place bell and spigot pipes with the bell end upstream. The pipe trench shall be kept free of standing water during pipe placement and backfilling using an approved dewatering method.

272.11 Backfill. The backfill material next to pipes and other structures shall be placed to the required elevation in 100 mm horizontal loose-thickness lifts at the same rate on all sides to prevent damage from unequal loading. Each lift shall be compacted by a manually directed power tamper under and around the pipe and other structures to 90% or more of

maximum dry density. Compaction next to cast-in-place concrete structures will not begin until the concrete has reached enough strength to support the load.

A minimum depth of 600 mm of hand compacted backfill shall be placed over the pipe before crossing it with construction equipment.

272.12 Method of Measurement. The quantity of pond outlet structure, concrete will be measured as the actual number of each pond outlet structure, concrete installed and accepted.

272.13 Basis of Payment. The quantity of pond outlet structure, concrete will be paid for at the Contract unit price for each pond outlet structure, concrete. Price and payment will constitute full compensation for excavating; for dewatering; for all ground preparation; for furnishing and placing all materials, reinforcing steel, concrete, concrete pipes, gaskets, grout, pipe bedding, steps, backfill, and all other materials required for pond outlet structure, concrete; for welding; and for all labor, equipment, tools, and incidentals necessary to complete the work.

SECTION 273 TEMPORARY SEDIMENT BASIN OUTLET STRUCTURE, CORRUGATED METAL

273.01 Description. This work consists of furnishing, fabricating, and constructing a corrugated metal sediment-basin outlet structure at the locations shown on the Plans and as directed by the Engineer. The structure will include riser pipe, principal spillway pipe, trash racks, outlet drains, sediment filters and any anti-seep collar as shown on the Plans.

MATERIALS

273.02 Borrow. Borrow for backfill shall be Clay Borrow, Type 1 and conform to the requirements of Subsection 274.02.

273.03 Concrete. Concrete shall be Class C and conform to the requirements of Section 812.

273.04 Geotextile. Geotextile shall conform to the requirements of Section 827.

273.05 Stone. Stone shall be Delaware No. 57 and conform to the requirements of Section 813.

273.06 Corrugated Metal. Corrugated metal pipe, anti-seep collars, base metal, and fabrication of all pipes and assemblies shall conform to the requirements of Section 614. Minimum steel plate corrugations shall be 68 by 13 mm. Minimum thickness of corrugated metal shall be 1.83 mm except that base plates shall have a minimum thickness of 6 mm.

273.07 Seed. Seed shall conform to the requirements of Section 734.

273.08 Mulch. Mulch shall conform to the requirements of Section 735.

CONSTRUCTION METHODS

273.09 Excavation. The Contractor shall excavate for the sediment basin outlet structure in reasonably close conformity with the lines and grades shown on the Plans. The subgrade upon which the structure is to be placed shall be compacted to a firm and even surface. The Contractor shall remove any protruding objects and fill any voids in the subgrade that may affect proper placement of the outlet structure.

273.10 Outlet Structure. The outlet pipe shall be bedded according to Section 612. Installation of the anti-seep collar, the metal base plate, stone, and the geotextile shall be in accordance with the details shown on the Plans. The anti-seep collar and base plate shall be welded to the pipe and riser. Where the ends of the geotextile come together, the ends shall be overlapped, folded, and stapled to prevent bypass. The geotextile shall be securely fastened to the pipe at the top and bottom of the geotextile.

The concrete base of the riser shall be constructed according to the requirements of Section 602. Reinforcement of the concrete base is not required. Unless otherwise ordered by the Engineer, curing requirements may be reduced to three days.

Connections of the riser pipe to the outlet pipe shall be made watertight by welding the full circumference of the joint. All connections between pipe sections shall be made using approved watertight band assemblies. Welding shall be performed according to the requirements of Section 605.

273.11 Backfill. The backfill conforming to Subsection 273.02 shall be placed to the required elevation in 100 mm horizontal loose-thickness lifts at the same rate on all sides to prevent damage from unequal loading. Each lift shall be compacted by a manually directed power tamper under and around the pipe and other structures to 90% or more of maximum dry density.

A minimum depth of 600 mm of hand compacted backfill shall be placed over the pipe before crossing it with construction equipment.

273.12 Maintenance. Throughout the Project construction period, the Contractor shall maintain the sediment basin outlet structure by replacing all clogged geotextile and cleaning all clogged pipes and stones.

273.13 Removal of the Outlet Structure. At the end of the Project construction period or when directed by the Engineer, the Contractor shall remove the outlet structure and all materials incidental to the construction of the sediment basin outlet structure. All areas affected by the construction of the outlet structure shall be restored to the natural or plan contours and stabilized with seed and mulch.

273.14 Method of Measurement. The quantity of corrugated metal sediment basin outlet structures, will be measured as the actual number of each corrugated metal sediment basin outlet structure installed and accepted.

273.15 Basis of Payment. The quantity of corrugated metal sediment basin outlet structures will be paid for at the Contract unit price for each sediment basin outlet structure, corrugated metal. Price and payment will constitute full compensation for excavating; for dewatering; for all ground preparation; for furnishing and placing all materials including stones, concrete, corrugated metal pipes, connections, and bedding, trash racks, anti-seep collars, backfill, and all other materials required for the corrugated metal sediment basin outlet structure; for restoring the site; for seeding and mulching; for disposing of excess materials; and for all labor, equipment, tools, and incidentals necessary to complete the work.

SECTION 274 CLAY BORROW, STORMWATER MANAGEMENT POND

274.01 Description. This work consists of furnishing and placing additional material from approved borrow areas when suitable material available within the right-of-way is not sufficient in quantity to construct the foundation cutoff, the pond embankment, and other pond features. This work also includes all clearing, grubbing, or stripping required to prepare the borrow area for cross-sectioning and excavating.

274.02 Materials. Borrow for stormwater management pond construction shall conform to the following criteria:

(a) *Clay Borrow, Type 1.* Clay borrow, Type 1 shall conform to the Unified Soil Classification System designation GC, SC, CL or CH and shall be free of rubbish; organic matter such as leaves, roots, grass, or sewage; and stones larger than 150 mm and other objectionable material.
(b) *Clay Borrow, Type 2.* Clay borrow, Type 2 shall conform to the Unified Soil Classification System designation GC, SC, or CL and shall be free of rubbish; organic matter such as leaves, roots, grass, or sewage; and stones larger than 150 mm and other objectionable material.

CONSTRUCTION METHODS

274.03 Borrow Sources. Prior to removing material from a borrow source, the Contractor shall comply with the requirements of Subsection 209.05.

274.04 Borrow Source Testing. The Department will assist the Contractor in verifying a source as detailed in Subsection 209.06.

274.05 Placement and Compaction. Clay borrow shall be placed and compacted in accordance with the requirements of Subsection 271.06 and as directed by the Engineer.

274.06 Method of Measurement. The quantity of clay borrow for stormwater management ponds will be measured in accordance with Subsection 209.09.

274.07 Basis of Payment. The quantity of clay borrow, stormwater management pond will be paid for at the Contract unit price per cubic meter. Price and payment will constitute full compensation for clearing, grubbing, stripping, excavating, hauling, placing, and compacting the borrow material and for all labor, equipment, tools, and incidentals required to complete the work.