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 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 18" (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 impoting 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 5N (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.

Excess topsoil may be claimed by the Engineer. 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 which 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 which 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 24" (600 mm) or less. Any exposed rebar shall be cut and disposed of. All material which cannot be readily incorporated into a 24" (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 36" (900 mm) in any dimension. No rock, bituminous concrete, or portland cement concrete shall be placed within 5N (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 which would be retained on a 2**2**" (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 5' (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 6" (150 mm). This area shall then be re-compacted. Sod not required to be removed shall be thoroughly disced before construction of embankment.

Existing treated or compacted road surfaces lying within 3' (900 mm) of the final grade, or within the pavement structure if the subgrade is more than 3' (900 mm) from the final grade, shall be scarified to a depth of at least 6" (150 mm), unless otherwise designated on the Plans. Scarified material shall be re-compacted.

Existing paved road surfaces lying within 3' (900 mm) of the final grade, or within the pavement structure if the subgrade is more than 3' (900 mm) from the final grade, shall be removed, and the underlying base materials scarified to a depth of 6" (150 mm).

Existing roadway surfaces lying more than 3' (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 1 ft^2 (0.1 m^2) and re-compacted.
2. Portland cement concrete shall be broken up to a maximum surface area of 1 yd^2 (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 6" (150 mm) and re-compacted.

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 8" (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 disced 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 8" (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 discing, 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. *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 8" (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.

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 stability of the lift to be tested has been approved by the Engineer.

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 re-compacted.

1. *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.
2. 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.
3. *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 which 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 yard (cubic meter). 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 yard (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 yard (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, discing, 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 yard (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 yard (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.