

DIVISION 200**EARTHWORK****SECTION 201 - CLEARING**

201.01 DESCRIPTION. This work shall consist of the performance of all clearing, grubbing, and thinning and trimming operations within the limits of the project.

201.02 CLEARING. Clearing shall consist of cutting and disposing of all trees, stumps, down timber, stubs, brush, bushes, and debris from all areas extending from the centerline to 3 m (10 feet) beyond the top limits of all cut sections or from the centerline to 3 m (10 feet) outside the toes of slopes in all fill sections, but in no case beyond applicable right-of-way limits. Clearing areas shall also include any other areas shown in the Contract Documents.

Where structures are to be constructed, clearing shall include the area within the structure limits. The lateral limits shall provide a clear distance of 6 m (20 feet) beyond the outside of the structure.

Any trees designated for removal under another Contract item are excluded from this work.

Branches of trees extending into and over the roadway shall be carefully trimmed as directed by the Engineer. All branches of trees overhanging the roadbed shall be carefully removed to a minimum height of 6 m (20 feet) above the finished grade.

Clearing operations shall be done in such a manner that the present growth will blend with the limits of construction and a natural appearance will be attained.

The Contractor shall carefully protect and guard all trees, shrubs, and vegetation, within or adjacent to the construction area, that the Engineer directs to be saved. The Contractor shall take every precaution to avoid any damage to public utility lines, buildings, or other property. If it is deemed impractical to fell the tree as a whole, it shall be removed in sections according to standard practices of professional tree removal. No machine or appliance shall be used on any part of the work that may in any manner injure, sear, or kill trees and shrubs, within or adjacent to the construction area, that have been designated to be saved, or are outside the area above described for clearing and grubbing. With the preceding exceptions, all trees and shrubs, down timber, stubs, brush, and other objectionable material shall be removed and disposed of from areas to be cleared before grading operations begin in the areas.

Where trees that are to be left standing have become scarred by the Contractor's operations, the cuts or scars shall be repaired by properly cutting, smoothing the wood if necessary, and treating with a product prepared especially for tree surgery. Any repairing or painting required shall be considered incidental to the lump sum price for Clearing and Grubbing, Including Individual Trees and Stumps.

In areas where embankments are to be constructed more than 1.5 m (5 feet) in depth measured below subgrade, all stumps shall be cut off as close to the ground as is practical. Stumps shall not exceed 150 mm (6 inches) above the ground surface at the base. Stumps located outside of the construction limits of cut and embankment areas shall be cut flush with or below the surface of the ground or as directed by the Engineer. Stumps that cannot be cut flush shall be removed.

201.03 GRUBBING. Grubbing shall consist of removing and disposing of all stumps, roots, duff, grass, turf, debris, or other objectionable material within excavation limits, and within fill limits where the embankments are to be made to a depth less than 1.5 m (5 feet) below subgrade. Grubbing areas shall also include any other areas shown in the Contract Documents. The grubbing shall progress in such a manner to prevent erosion as required in Subsection 105.23.

The excavated section left below the subgrade by removals shall be backfilled with approved excavated material or borrow and compacted to conform to the surrounding area.

201.04 REMOVING SINGLE TREES AND STUMPS. Removing single trees and stumps shall consist of removing and disposing of single trees and stumps as shown in the Contract Documents or as directed by the Engineer. The work shall be in accordance with Subsections 201.02 and 201.03, and shall include backfilling of stump holes with a suitable material as directed by the Engineer.

201.05 THINNING AND TRIMMING.

- (a) General. Thinning and trimming shall consist of selective cutting and trimming beyond the limits of clearing and grubbing to clear brush; remove undesirable growths, dead trees, vegetation, and stumps; thin out trees; trim branches; allow for passage of overhead wires; or improve visibility at locations shown on the Plans or directed by the Engineer.

The methods employed in any of the operations shall conform in all details with approved horticultural practices.

All branches or limbs removed shall be cut flush with the supporting trunk or limb. When directed by the Engineer, all cut surfaces over 25 mm (1 inch) in diameter shall be treated with a standard tree wound dressing.

Trees, stumps, and brush removed shall be cut at least flush with the ground surface.

- (b) For Signs. Thinning and trimming for signs shall consist of selective cutting and trimming to provide full visibility for a sign at a single designated sign location.

The Contractor shall remove all woody stemmed growth including brush, saplings, trees and tree limbs growing within or projecting into the required clear viewing area for the designated sign to the minimum horizontal and vertical dimensions shown on the Plans or as directed by the Engineer. The clearance and removal methods used shall conform to the requirements of Subsection 201.05.

The dimensions are for the standard area of sign visibility, however the Contractor shall not cut, trim or clear any vegetation outside the right-of-way limits. The Resident Engineer will designate the right-of-way limits. All measurements of the area are horizontal measurements.

In performing this work, the Contractor shall not use any chemical growth retardants, poisons, or defoliant.

201.06 DISPOSAL. In the interest of conservation, the Contractor shall salvage all sound wood 100 mm (4 inches) or more in diameter for marketable timber or firewood, or for other acceptable uses. Unless otherwise specified, all marketable timber and wood that are to be removed within the clearing area shall become the property of the Contractor. In general, marketable timber is understood to mean logs 2.4 to 4.8 m (8 to 16 feet) in length plus appropriate trimming allowance and having a diameter of at least 250 mm (10 inches) measured inside the bark at the small end.

All other trees, stumps, logs, branches, protruding roots, brush, duff, weeds, shrubs, debris, rubbish, and other objectionable material shall be disposed of by the Contractor in compliance with applicable laws of the State of Vermont.

Burying of trees, stumps, and debris will be permitted at locations shown on the Plans. Additional areas within the right-of-way will require the Engineer's written permission.

On National Forest Lands, the Contractor shall comply with the requirements set forth in the Forest Service Special Use Permit included in the Contract for the specific project and in accordance with Subsection 107.15.

Before any fires are kindled on or adjacent to the project, the Contractor shall obtain the necessary permits from the State Agency of Natural Resources and the local fire prevention officials. Copies of permits shall be available on the project.

Whenever elm trees are cut or removed, all portions of the trees shall be disposed of by burning, if allowed, or burying. If disposal is by burying, portions shall be covered by at least 300 mm (12 inches) of earth.

201.07 METHOD OF MEASUREMENT. The quantity of Clearing and Grubbing, Including Individual Trees and Stumps will not be measured for payment unless the construction limits are changed. When the designed roadway limits are changed, altering the designed areas to be cleared and grubbed, an adjustment for the increased or decreased area will be measured in hectares (acres). No adjustment will be made for changes involving less than 0.04 ha (0.1 acre).

The quantity of single trees and stumps removed to be measured for payment will be on a unit basis for each for the various classes. The class of the trees will be determined by circumferential measurement at a distance of 1.4 m (4.5 feet) above the ground line. Small trees are classified as trees measuring 1000 mm (40 inches) or less [approximately 300 mm (12 inches) in diameter]. Medium trees are classified as trees measuring more than 1000 mm (40 inches) [approximately 300 mm (12 inches) in diameter] and less than 3000 mm (120 inches) [approximately 900 mm (36 inches) in diameter]. Large trees are classified as trees measuring 3000 mm (120 inches) or more. A stump is designated as that portion of the tree remaining after the trunk has been severed having a circumferential measurement of more than 1000 mm (40 inches) measured at the point of cutoff, and is classified for size the same as a single tree.

The quantity of Thinning and Trimming to be measured for payment will be the number of hectares (acres) thinned and trimmed in the complete and accepted work, as determined by using horizontal measurements.

Thinning and Trimming For Signs will be measured as a unit for each sign's viewing area cleared as designated on the Plans or by the Engineer.

201.08 BASIS OF PAYMENT. The accepted quantity of Clearing and Grubbing, Including Individual Trees and Stumps will be paid for at the Contract lump sum price. Progress payments will be made based on the percentage of total area cleared.

When the designed roadway limits are changed, altering the designed areas to be cleared and grubbed, an adjustment for the increased or decreased area will be made by Change Order/Supplemental Agreement.

The accepted quantity of single trees or stumps removed will be paid for at the Contract unit price for each. Payment for single trees will include removal and disposal of stumps when required. Single small trees and stumps ordered removed, whose circumferential measurement is 1000 mm (40 inches) or less, will not be paid for directly but will be considered incidental to other Contract items. Payment for backfilling for stumps removed shall be incidental to the appropriate removal item. Payment for removal of overhanging branches, blowdowns, and other clearing directed by the Engineer after initial clearing is complete shall be incidental to the unit price bid for Clearing and Grubbing, Including Individual Trees and Stumps.

The accepted quantity of Thinning and Trimming will be paid for at the Contract unit price per hectare (acre).

The accepted quantity of Thinning and Trimming for Signs will be paid for at the Contract unit price for each location designated in the Contract.

If the Contract does not contain a quantity for a Contract item listed in this Section, but such work is required, the work will not be paid for directly but will be considered incidental to all other Contract items.

Payment as indicated will be full compensation for performing the work specified, including disposal, and for furnishing all labor, materials, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
201.10 Clearing and Grubbing, Including Individual Trees and Stumps	Lump Sum
201.11 Clearing and Grubbing, Including Individual Trees and Stumps	Hectare (Acre)
201.15 Removing Medium Trees	Each
201.16 Removing Large Trees	Each
201.20 Removing Medium Stumps	Each
201.21 Removing Large Stumps	Each
201.30 Thinning and Trimming	Hectare (Acre)
201.31 Thinning and Trimming for Signs	Each

SECTION 202 - DEMOLITION AND DISPOSAL OF BUILDINGS

202.01 DESCRIPTION. This work shall consist of the removal, wholly or in part, and the satisfactory disposal of all buildings, including accessories and appurtenances, erosion prevention and sediment control, and the backfilling of holes and pits when required.

202.02 GENERAL CONSTRUCTION REQUIREMENTS. Basements shall be completely cleared of all unsuitable materials debris, partition walls, and supports. Concrete or masonry floors or foundations shall be removed to a depth not less than 600 mm (2 feet) below subgrade or 300 mm (1 foot) below final ground level. Floors below these levels shall be broken or holes approximately 300 by 300 mm (1 × 1 foot) shall be provided at 3 m (10 feet) intervals to provide vertical drainage.

Septic tanks, cesspools, or other underground tanks and appurtenant pipes shall be broken down or removed. Contents shall be disposed of in accordance with applicable regulations.

Basements or cavities left by building removal shall be either filled with suitable material to the level of the existing ground and thoroughly compacted, or the area shall be regraded to present a smooth, free-draining surface. A combination of filling and regrading methods may be used. Where filling and regrading operations occur within the limits of construction, manipulation and placement of material shall conform to Subsection 203.11. All regraded areas shall be seeded and mulched in accordance with Section 651 and to the satisfaction of the Engineer.

All fences and debris shall be removed from the parcel, and the area shall be cleaned up and graded to the satisfaction of the Engineer.

All materials resulting from the demolition shall become the property of the Contractor and shall be disposed of or recycled in accordance with all applicable laws, rules, regulations, and protocols.

The Contractor shall provide for the discontinuance of all utility services including, but not limited to, electricity, telephone, sewer, water, and gas lines and utility meters. The Contractor shall be held responsible for any claim arising from failure to provide for the discontinuance of such utility services. If permission has been given to the previous owner to occupy a building until a specified date, the previous owner shall not be required to pay rent to the Contractor or to move on a date earlier than that specified. The Contractor shall provide for the discontinuance of all utility services after the specified date.

The Agency shall not be responsible for any changes in the condition of the buildings, or for loss of fixtures or equipment, at any time.

Once work has commenced, the Contractor shall make every reasonable effort to complete the demolition and disposal of each Contract item in a continuous manner to ensure the safety and well being of the public.

The Contractor shall erect suitable fences around unfilled basements and other dangerous locations created by the work.

The Contractor shall be responsible for finding, opening, and maintaining all disposal areas and shall comply with all environmental rules and regulations, zoning ordinances, development plans, land use plans, and land capability plans.

202.03 METHOD OF MEASUREMENT. The quantity of Demolition and Disposal of Building to be measured for payment will be on a unit basis for each building, as shown on the Plans.

202.04 BASIS OF PAYMENT. The accepted quantity of Demolition and Disposal of Building will be paid for at the Contract unit price for each building specified in the Contract. Payment will be full compensation for removing, disposing and/or recycling of buildings; for excavating, backfilling, and regrading incidental to their removal; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work. When seed, mulch, other turf establishment items, and/or erosion prevention and sediment control items are not part of the Contract, they shall be considered incidental to the Demolition and Disposal of Building item.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
202.10 Demolition and Disposal of Building	Each

SECTION 203 - EXCAVATION AND EMBANKMENTS

203.01 DESCRIPTION. This work shall consist of excavating and grading roadways, runways and railways (including the removal of slides), borrow pits, waterways, channels, intersections, approaches, and steps in hillside embankments; excavating unsuitable material from the construction area and beneath embankment areas, surfaces, and pavements; excavating selected material found in the construction area for specific use in the construction; constructing and removing detours shown on the Plans or directed by the Engineer; trimming and shaping of slopes; and disposing of all unsuitable or surplus excavated material. The work shall also consist of placing material in embankments and the grading of all material placed up to subgrade to the tolerance specified in the Plans.

The work is classified as follows:

- (a) Common Excavation. Common Excavation shall consist of the removal of all material, which can be accomplished with normal excavating machinery, encountered in grading the project and not classified to be removed as Solid Rock Excavation, Muck Excavation, Channel Excavation, Excavation of Surfaces and Pavements, or Excavation for Structures.

Excavation required beyond the finished slope neat lines for slope stabilization, removal of sod and unsuitable material other than muck located in embankment areas, removal and stockpiling of topsoil, and removal of unsuitable material existing at or below subgrade elevation in excavation areas is also classified as Common Excavation.

- (b) Solid Rock Excavation. Solid Rock Excavation shall consist of the removal of hard igneous, metamorphic, or sedimentary rock that requires blasting or the use of rippers; detached rock; boulders; mortared stone masonry; or concrete each having a volume of 1.5 m³ (2 cubic yards) or more; and portland cement concrete pavement including any bituminous surface overlay material, encountered in the limits of excavation.

- (c) Unclassified Excavation. Unclassified Excavation shall consist of Common Excavation and Solid Rock Excavation as classified above and not measured separately.
- (d) Muck Excavation. Muck Excavation shall consist of the removal, disposal, and backfill of a saturated or unsaturated mixture of soils and organic matter encountered below the original ground line in an embankment area that is not suitable to be used as foundation material regardless of its moisture content.
- (e) Channel Excavation of Earth. Channel Excavation of Earth shall consist of the removal of all material, which can be accomplished with normal excavating machinery, encountered in the excavation, except as classified as Channel Excavation of Rock, for widening, deepening, and straightening of existing channels and waterways, or in the construction of new channels; and any other excavation designated to be removed as channel excavation as shown on the Plans or as directed by the Engineer.
- (f) Channel Excavation of Rock. Channel Excavation of Rock shall consist of the removal of rock in definite ledge formation that requires blasting or the use of rippers; and detached rock, boulders, stone masonry, and concrete each having a volume of 1.5 m³ (2 cubic yards) or more encountered in the excavation for widening, deepening, and straightening of existing channels and waterways, or in the construction of new channels.
- (g) Unclassified Channel Excavation. Unclassified Channel Excavation shall consist of Channel Excavation of Earth and Channel Excavation of Rock as classified above and not measured separately.
- (h) Excavation of Surfaces and Pavements. Excavation of Surfaces and Pavements shall consist of the removal and disposal of existing surfaces and pavements that are located outside other excavation and embankment limits.
- (i) Borrow. Borrow shall consist of material required for the construction of embankments or for other portions of the work, and obtained from approved sources located outside the limits of the right-of-way, unless otherwise shown on the Plans or directed by the Engineer.

Borrow is further classified as Earth Borrow, Sand Borrow, Granular Borrow, or Rock Borrow.

- (j) Gravel Backfill for Slope Stabilization. Gravel Backfill for Slope Stabilization shall consist of approved gravel placed against slopes and any other places designated for use of this material.
- (k) Shoulder Berm Removal. The removal of the shoulder berm shall consist of removing the berm of debris and sand resulting from guardrail that is to be retained. The removal may be performed by hand labor or mechanical means. The Contractor shall remove the berm down to the proper line and grade for the shoulder from which the berm is being removed. The removed sand and fine debris may be scattered into the turf on the roadway slope outside the point of shoulder unless otherwise directed by the Engineer. Larger debris such as stones in excess of 50mm (2 inches) in diameter, automobile parts, wood, glass, and other bulky items shall be disposed of properly by the Contractor.

203.02 MATERIALS. Materials shall meet the requirements of the following Subsections:

Classification of Soils.....	703.01
Earth Borrow	703.02
Sand Borrow.....	703.03
Granular Borrow	703.04
Rock Borrow	703.05
Gravel Backfill for Slope Stabilization	704.07
Backfill for Muck Excavation	704.09

203.03 GENERAL CONSTRUCTION REQUIREMENTS. Prior to the beginning of excavation, grading, and embankment operations in any area, all necessary clearing and grubbing in that area shall have been completed in accordance with Section 201.

All slopes in cut and embankment sections, ditches, and waterways, whether old or newly constructed, shall be satisfactorily cleaned and cleared of obstructions and left in a neat and trim condition. Excavation shall be performed in accordance with the Contract or as directed by the Engineer.

The construction area shall be maintained to ensure proper drainage at all times. Where traffic is maintained, care shall be exercised to keep the portion of the roadway or the traveled way open to traffic in a satisfactory condition as per Subsection 104.04.

All suitable material removed by excavating shall be used in the formation of embankments as shown on the Plans or as directed by the Engineer. Any excavation that cannot be incorporated in embankments shall be disposed of as directed by the Engineer. No material shall be wasted without permission of the Engineer.

The Contractor shall be responsible for the stability of all constructed embankments and shall replace, at no cost to the Agency, any portions that have become displaced and that are not attributable to the unavoidable movement of the natural ground upon which the embankment is made or to an Act of God.

Unless directed by the Engineer, borrow material shall not be placed until all suitable material has been excavated and placed in the embankments, except when Sand Borrow or Granular Borrow is shown on the Plans or when Granular Borrow is required by the Engineer for use under embankments or used with material from excavation in making embankments. Should a surplus of excavated material result from the Contractor placing more borrow than required, the amount of this surplus will be measured by the Engineer and 115 percent of the total surplus will be deducted from the total quantity removed from the borrow source.

When not otherwise shown in the Contract Documents, at all bridge approaches in excavation areas excavation for additional subbase shall be made to a depth of 1.2 m (4 feet) below finish grade for a distance not less than 15 m (50 feet) from the end of the bridge. The transition depth from normal subgrade level to any extra depth level shall be at a rate of 1:25 (vertical:horizontal).

All work performed under this Section shall conform to Section 105.

203.04 EXCAVATION. Any loose material resulting from breakage and slides shall be removed and disposed of as directed by the Engineer.

Excavated material shall be sorted so that the best material is placed in embankments beneath the traveled way.

The Contractor shall not excavate or remove any material outside the limits of the excavation slope and grade lines shown on the Plans unless authorized in writing by the Engineer. Grading shall be to full cross-section width at subgrade before placing of any type of subbase or pavement, except that partial-width construction is permissible where necessary for the maintenance of traffic, and shall be done within the allowable tolerances as indicated on the Plans.

The Contractor shall strip ledge and then notify the Engineer that the area is ready for cross-sectioning prior to making any rock excavation. Any ledge removed prior to the taking of cross-sections will be paid for as Common Excavation. The Contractor may use other means of locating the rock line with the approval of the Engineer.

When excavating solid rock by the blasting method, the Contractor shall drill slope holes to the full depth of the rock lift along the line and plane of inclination of the slope, as shown on the Plans or as otherwise directed by the Engineer. Spacing for the slope holes shall not exceed 1 m (3 feet), center to center of holes. The diameter of the slope holes shall be not greater than 75 mm (3 inches). The line of blast holes shall be drilled parallel to the plane of the slope holes. No portion of any blast hole in this line shall be closer than 1.2 m (4 feet) to the proposed finished slope. No portion of any blast hole larger than 75 mm (3 inches) in diameter will be permitted closer than 4 m (12 feet) to the proposed finished slope.

When it is shown on the Plans that concrete shall be placed on or against the limits of rock excavation, care shall be taken to avoid disturbing, shattering, or removing rock outside such limits. Any costs incurred due to the unauthorized removal, shattering, or disturbing of the material outside the indicated limits shall be at the Contractor's expense.

The explosives used in the slope holes along the line of the finished slope and the adjacent slope holes shall be explosives for pre-splitting use only, prepared and packaged by explosives manufacturing firms and approved by the Engineer.

The slope holes along the line of the finished slope shall be loaded with approved explosives containing not more than 750 g of explosive per meter (0.5 pounds per foot) of hole depth. The spaced charges on a detonating cord shall be equal in length to the full depth of the hole. If spacers are used, the holes shall be completely stemmed so that uniform breakage of the rock will result from top to bottom of the hole. A bottom charge of not more than 3.5 kg (8 pounds) of explosive may be used. No explosive charge shall be placed within 750 ± 150 mm (30 ± 6 inches) of the collar of the finished slope holes.

The Contractor shall complete the drilling, loading, stemming, and blasting of the slope holes at least 8 m (25 feet) in advance of any other blasting.

In areas other than along the proposed finished rock cut slopes and adjacent slope holes, the spacing of holes, distribution of explosives, the methods of relief, and fractional second delay blasting shall be adjusted by the Contractor. The Contractor shall make adjustments according to the characteristics and structure of the rock encountered in order to obtain the required finished slopes with a minimum of overbreak.

The depth of the rock lift within any one excavation area will be approved by the Engineer and shall be reduced by the Contractor if the proper alignment of the slope holes cannot be maintained.

203.05 MUCK EXCAVATION. The material shall be excavated to the widths and depths shown on the Plans or as required to give a stable foundation for the placement of necessary backfill, embankment, or subbase material. The excavation of this material shall be handled in a manner that will prevent the entrapment of muck within the backfill.

Unless otherwise specifically shown in the Contract Documents, the material that has been excavated under this Contract item shall be spread on the fill slopes as shown on the Plans or as directed by the Engineer. If provision is not shown in the Contract Documents for the disposition of the muck excavation, or if, in the opinion of the Engineer, its use on the slopes is impractical, then the excavated material shall be disposed of by the Contractor, in accordance with Subsection 203.09.

The backfilling of the excavated area shall immediately follow the excavation of the muck so that any soft material that is pushed ahead of the backfill can be removed.

The material used for backfilling the excavated area up to the ground line or water level, whichever is higher, shall be rock or other granular material selected from the excavation, if available. When this material is not available, it shall be obtained as Granular Borrow from an approved source.

After removal of the muck and prior to backfilling, the Contractor shall allow the Engineer adequate time to take all necessary measurements for determining the volume removed.

203.06 CHANNEL EXCAVATION. The area where the channel is to be excavated shall be cleared and grubbed as required. The work involved shall be considered as incidental work to Channel Excavation when Clearing and Grubbing, Including Individual Trees and Stumps is not a Contract item.

The channel shall be excavated to the lines, grades, and cross-sections shown on the Plans or as ordered by the Engineer. All suitable material excavated shall be used in the formation of roadway embankments or for other construction purposes as shown on the Plans or as directed by the Engineer. Unsuitable material or waste material, when directed by the Engineer, shall be wasted and disposed of by the Contractor at no additional compensation in accordance with Subsection 203.09.

Where any part of an existing bridge, substructure, or other structure is outside the limits of the excavation for the new work, such part shall be removed to 300 mm (1 foot) below the proposed limits or to the elevations shown on the Plans or as directed by the Engineer.

203.07 EXCAVATION OF SURFACES AND PAVEMENTS. All excavation shall be made strictly to the required alignment, grade, and cross-sections shown on the Plans, or as directed by the Engineer for areas located outside of the limits of roadway excavation and embankment.

All suitable materials removed shall be used, as far as practical, in the formation of embankments and at other locations as directed by the Engineer.

The completed excavation shall be properly graded and shaped prior to receiving any cover or top dressing.

203.08 BORROW. Opening, maintaining, and closing borrow pits shall be in accordance with Section 105. The simultaneous extraction of more than one borrow item from a given pit will require the written permission of the Engineer.

203.09 DISPOSAL OF SURPLUS EXCAVATION AND WASTE MATERIAL. All surplus excavation and waste material shall be deposited as shown on the Plans or as authorized in writing by the Engineer. Excavated material shall not be wasted unless authorized by the Engineer. Compaction requirements for surplus or waste material used to flatten slopes outside the embankment limits shown on the Plans may be waived; however, placement procedures shall ensure a stable fill slope.

Disposal of all surplus or waste material shall be in accordance with Section 105.

Disposal of surplus or waste material will not be paid for directly but shall be considered as incidental work pertaining to the grading or excavation Contract item from which the material was obtained.

When sufficient on-site disposal areas are not shown on the Plans, it shall be the responsibility of the Contractor to locate disposal areas in accordance with Section 105 and any applicable permits.

203.10 HAUL ROADS. Particular care shall be taken in the locating of haul roads. In wooded areas, haul road width shall be minimized and placed at approximate right angles or angled away from the view of oncoming traffic and, where feasible, shall incorporate one bend to eliminate the tunnel effect. Large and well-shaped trees shall be preserved.

203.11 EMBANKMENTS.

- (a) Preparation of Embankment Area. When embankments are to be made on a hillside, the slope of the original ground on which the embankments are to be constructed shall be stepped and properly drained as the fill is constructed in accordance with the Plans or as directed by the Engineer.
- (b) Use of Materials. The excavated rock, ledge, boulders, and stone, except where required in the construction of other items or otherwise directed, shall be used in the construction of embankments to the extent of the project requirements and, generally, shall be placed to form the base of an embankment. When shown on the Plans, certain portions of rock excavation may be reserved for special use such as rock fill, for embankment construction at locations below high water, or at locations susceptible to erosion.

Frozen material shall not be used in the construction of embankments. The embankments or successive layers of the embankments shall not be placed upon frozen material. Placement of material other than rock shall stop when the sustained ambient air temperature, below 0 °C (32 °F), prohibits attainment of the required compaction. If the material is otherwise acceptable, it shall be stockpiled and reserved for future use when its condition is acceptable to the Engineer for use in embankments.

The Engineer may require certain select material from excavation or borrow to be used adjacent to structures to obtain the required compaction or to protect them from damage. All material being placed in embankments at locations where piles are to be driven shall pass a 225 mm (9 inch) square screen opening.

- (c) Procedure for Placing and Spreading. When an embankment is to be constructed across open water or across swampy, wet ground, the first layer of the fill shall be rock or material meeting the requirements for Granular Borrow.

The first layer of the embankment may be constructed in one thickness of rock or material meeting the requirements of Granular Borrow, to the minimum elevation at which equipment may be operated, as directed by the Engineer. Above this elevation, the embankment shall be constructed as specified below. Material from excavation on the project shall be used to the extent available and when not available shall be obtained from sources of Granular Borrow or Rock Borrow when authorized in writing by the Engineer.

When trucks are used to place earth from excavation or borrow, the material shall be deposited on the layer of embankment being constructed, bladed or dozed into place, and shaped and compacted. Dumping directly onto previously constructed layers will not be permitted.

Embankments of either earth or rock material shall be placed in horizontal layers of uniform thickness and across the full section width. When it is impractical to construct a full width layer across an embankment, partial width layers may be authorized, provided the full width procedure is resumed as soon as practical. Logs, stumps, waste material, and oversized cobblestones or boulders shall not be placed within the structural embankment area. They may be placed outside the structural embankment area at locations directed by the Engineer or, when authorized, disposed of as surplus material. Initial layers shall begin at the deepest part of the fill. Except for the first layer of fill over swampy ground and cleared areas, the loose layer thickness shall be limited to 200 mm (8 inches). When conditions necessitate, the Engineer may authorize layers in excess of 200 mm (8 inches) but not more than 600 mm (24 inches). The Contractor shall make all necessary excavations up to 600 mm (24 inches) deep so that the Engineer can determine moisture, density, and stability, solely at the Contractor's expense.

Effective spreading equipment shall be used on each layer to obtain uniform thickness. Cobblestones or boulders having their least dimension greater than the loose layer thickness being placed shall be removed prior to compaction. Each layer shall be compacted as specified, and, if necessary, stabilized prior to a successive layer being placed. Each layer shall be kept crowned to shed water. As the compaction of each layer progresses, continuous leveling and manipulating will be required to ensure uniform density, a uniform and satisfactory moisture content, and acceptable stability. The last lift constructed each day shall be graded, crowned, and rolled to ensure adequate drainage.

When A4, A5, A6, or A7 cohesive soils, as identified in table 703.01A, have excess moisture and cannot effectively be air dried or dried by manipulation, the Contractor may layer or mix the material with dry A1, A2, or A3 granular soils in order to obtain acceptable compaction and stability. The Contractor is responsible for making prudent use of available granular excavation from the project prior to being authorized the use of Granular Borrow. The combined loose thickness of mixed or layered materials prior to compaction shall not exceed 400 mm (16 inches).

During the construction of the embankments, if bulging, cracking, or unstable movement occurs, the placing of the fill material shall be stopped, retarded, or corrected to allow the material to stabilize as directed by the Engineer. Rutting, rolling, shoving, or other displacement in excess of 150 mm (6 inches) under the action of construction equipment may be considered evidence of stability problems.

When soft or wet clay or silt excavation is being used between layers of reasonably clean stable rock fill, the rock embankment layers shall not exceed 600 mm (24 inches) in loose measurement. The clay or silt layers shall not exceed 200 mm (8 inches) in loose measurement.

If embankments are to be constructed by using rock excavation, all reasonable precaution must be taken to ensure a solid embankment. The fill shall be made in uniform layers consistent with the size of the rock being used, but not to exceed 600 mm (24 inches) in thickness. Individual pieces of rock or boulders with their least dimension exceeding the thickness of the layer being placed shall either be reduced to an acceptable size or placed outside the structural embankment area in such a manner that all voids are filled.

Rock shall not be dumped over the end of a fill. Rock shall be deposited on the fill and distributed by blading or dozing to ensure proper placement in the embankment so that voids, pockets, and bridging are reduced to a minimum.

If embankment material must be deposited on only one side of abutments, wingwalls, piers, or culvert headwalls, care shall be taken that the area immediately adjacent to the structure is not compacted to the extent that it will cause overturning of, or excessive pressure against, the structure. Unless otherwise specified, the fill adjacent to bridge abutments shall not be placed higher than the bridge seat elevations until the superstructure is in place. When an embankment is to be placed on both sides of a concrete wall or box type structure, operations shall be conducted so that the embankment is always at approximately the same elevation on both sides of the structure.

For structures that can displace longitudinally as a result of unequal horizontal loading against their ends, such as a cantilever designed superstructure supported by piers only, backfill shall be placed on both ends of the structure simultaneously, with the lift differential between opposite ends limited to 150 mm (6 inches). Should the backfilling operation cause any undesired displacement, the Contractor shall remove and replace the fill in a manner that will not adversely affect the structure's position, solely at the Contractor's expense.

- (d) Compaction. Each layer between the design embankment limits shown on the Plans shall be uniformly compacted by the use of compaction equipment to not less than 90 percent of the material's maximum dry density as determined by AASHTO T 99, Method C. The material in the top 600 mm (24 inches) of any embankment, immediately below the subgrade, shall be compacted to not less than 95 percent of the maximum dry density. Field density determination will be made in accordance with AASHTO T 191, Sand Cone Method; AASHTO T 310, Nuclear Method; or other approved procedures. Field moisture determination will be made in accordance with AASHTO T 99 or measured in accordance with AASHTO T 310, Nuclear Method. Locations within the embankment limits where waste materials have been placed shall be compacted to the extent that stability is ensured.

All fill material shall be compacted at a moisture content determined by the Engineer to be suitable for obtaining the required density. The moisture content in each layer under construction shall not exceed 2 percent above the optimum moisture content, and it shall be less than that quantity that will cause the embankment to become unstable during compaction. The Engineer will consider sponginess, shoving, or other displacement under heavy equipment sufficient evidence of a lack of stability under this requirement, and the Contractor shall stop or retard further placement of material in the area affected to allow the material to stabilize.

When the moisture content of the material in the layer under construction is less than the amount necessary to obtain the required compaction by mechanical compaction methods, water shall be added by pressure distributors or other approved equipment. Water may also be added in excavation or borrow pits. The water shall be uniformly and thoroughly incorporated into the soil by disking, harrowing, blading, or other approved methods. This manipulation may be omitted for sand and gravel. When the moisture content of the material is in excess of 2 percent above the optimum moisture content, dry material shall be thoroughly incorporated into the wet material, or the wet material shall be aerated by disking, harrowing, blading, rotary mixing, or other approved method; or compaction of the layer of wet material shall be deferred until the layer has dried to the required moisture content by evaporation.

The density requirements do not apply to those portions of embankments constructed of material so coarse that it cannot be properly tested with a conventional density testing apparatus. Instead, the material shall be compacted to the satisfaction of the Engineer.

In areas inaccessible to power rolling, the embankment material shall be placed in uniform horizontal layers of not more than 150 mm (6 inches) in depth and compacted by means of approved mechanical tampers to the density requirements specified above. The use of hand tamps will not be permitted.

Additionally, the following requirements apply to airport compaction:

- (1) Rolling operations shall continue until the embankment is compacted to not less than 90 percent of maximum density for cohesive soils, and 95 percent of maximum density for noncohesive soils.
- (2) Under all areas to be paved, the top 225 mm (9 inches) of the embankment shall be compacted to a density of not less than 95 percent of maximum density for cohesive soils, and 100 percent for noncohesive soils, unless otherwise shown in the Contract Documents.
- (3) In areas designed for the use of aircraft, the determination of maximum density and optimum moisture content will be performed according to AASHTO T 180, Method D, with correction for coarse particles in accordance with AASHTO T 224.
- (4) The determination of in-place density and in-place moisture content will be performed according to AASHTO T 191, T 310, or other methods approved by the Engineer.

203.12 SUBGRADE. The subgrade shall be constructed to the lines, grades, and cross-sections shown on the Plans. After all drainage structures have been installed and the subgrade has been shaped correctly, the subgrade shall be brought to a firm, unyielding surface compacted to attain at least 95 percent of the maximum dry density. This density will be determined by AASHTO T 99, Method C.

A power grader or other approved equipment shall be used during the placement and compaction to obtain the specified cross-section.

Areas of soft, yielding, or otherwise unsuitable material that will not compact readily shall be removed, replaced with a suitable material, and properly compacted as directed by the Engineer.

All loose rock or boulders encountered at subgrade in the earth excavation shall be removed or broken off to a depth not less than 300 mm (12 inches) below the subgrade.

In excavation areas, the ground shall not be excavated or disturbed below the subgrade except as shown in the Contract Documents or as directed by the Engineer. All ditches and drains shall be constructed so they will effectively drain the construction area before the placement of any subbase or surface course material. In handling materials, tools, and equipment, the Contractor shall protect the subgrade from damage. Vehicles should not travel in a single track and form ruts. If ruts are formed, the subgrade shall be reshaped and compacted. Any pockets of clay, sand, or soft material that may have been left in the subgrade shall be removed and replaced with approved material and properly compacted at the Contractor's expense. The subgrade shall be kept in a condition that it will drain. Subbase, base, or surface material shall not be deposited on the subgrade until the subgrade has been checked and approved by the Engineer. After the subgrade has been approved, the Contractor shall not perform hauling or move equipment that will distort the cross-section over the subgrade.

A tolerance of 15 mm (1/2 inch) above or below the finished subgrade will be allowed provided that this tolerance is not maintained for a distance longer than 20 m (50 feet) and that the required cross-section is maintained. Grading shall be done with a power grader or other approved equipment to conform to the requirements as specified above.

For airport construction, the field density will be determined in accordance with Subsection 203.11(d). In fill sections, stones or rock fragments larger than 100 mm (4 inches) in their greatest dimension will not be permitted in the top 150 mm (6 inches) below subgrade.

203.13 METHOD OF MEASUREMENT.

- (a) Excavation. The quantity of all excavation items to be measured for payment will be the number of cubic meters (cubic yards) of the material removed from the areas shown on the Plans or as directed by the Engineer. The quantity will be measured in its original position by cross-sections and computed by the method of average end areas. When impractical, other acceptable methods involving three-dimensional measurement may be used to determine the quantity. The limits shall not exceed those shown on the Plans or authorized in writing by the Engineer. The method of mass centers for computing volumes will be allowed only when the method has been used in the original design computations. Excavation requiring more than one handling prior to final placement in embankments will not be measured for payment for the additional handling unless specifically stated in the Contract.
- (1) Common Excavation. Excavation for stepping of original ground under hillside embankments will not be measured for payment.

Excavation for removal of soft spots in the subgrade of embankment areas and the material required for replacement will not be measured for payment. Any costs will be considered included in the Contract items involved.

However, where the embankments were constructed as part of another contract, the quantities of excavation for removal of soft spots and the material for replacement will be measured for payment.

- (2) Solid Rock Excavation. The measurement limits for solid rock excavation will coincide with the depth shown on the Plans or as directed by the Engineer. Excavation below subgrade will not be measured. Measurement limits for determining the amount of solid rock excavation will be that amount actually removed up to a limit 300 mm (12 inches) outside of and parallel to the slope lines shown on the Plans or as directed by the Engineer. Measurement for payment will not be made for rock removed beyond these limits unless authorized. If natural fissures or faults exist making removal of rock beyond these limits necessary, the Engineer will authorize removal in writing, and the limits of excavation will be adjusted accordingly.
- (3) Unclassified Excavation. The quantity of Unclassified Excavation to be measured for payment will be the number of cubic meters (cubic yards) of material excavated as shown on the Plans or as directed by the Engineer. There shall be no differentiation made between common or solid rock excavation for this item.
- (4) Muck Excavation. The quantity of Muck Excavation to be measured for payment will be the number of cubic meters (cubic yards) of material excavated as shown on the Plans or as directed by the Engineer.
- (5) Channel Excavation of Earth. The quantity of Channel Excavation of Earth to be measured for payment will be the number of cubic meters (cubic yards) of material excavated from its original position. No differentiation will be made between the channel excavation of dry or wet material.

Where Excavation (Common, Solid Rock, or Unclassified) and Channel Excavation occur jointly or separately at the same location, measurement for Channel Excavation will be made only below the lower limits of Common, Solid Rock, or Unclassified Excavation.

- (6) Channel Excavation of Rock. Measurement limits for determining the amount of Channel Excavation of Rock will be as specified in Subsection 203.13(a) (2).

Where Excavation (Common, Solid Rock, or Unclassified) and Channel Excavation occur jointly or separately at the same location, measurement for Channel Excavation will be made only below the lower limits of Common, Solid Rock, or Unclassified Excavation.

- (7) Excavation of Surfaces and Pavements. The quantity of Excavation of Surfaces and Pavements to be measured for payment will be the number of cubic meters (cubic yards) of material removed and disposed of, measured in its original position. The measurement limits of excavation will not exceed those shown on the Plans or directed by the Engineer.

- (b) Borrow. The quantity of borrow to be measured for payment of the type indicated, except Sand Borrow, will be the number of cubic meters (cubic yards) of the material removed and used in the complete and accepted work from approved borrow sources measured in its original position. The quantity of Granular Borrow used to replace solid rock excavated below subgrade will be allowed and measured for payment to a depth not to exceed 75 mm (3 inches). Any solid rock excavated below this depth shall be replaced by the Contractor with material from Solid Rock Excavation or Granular Borrow, furnished and placed at the Contractor's expense.

For small quantities of borrow, with the written permission of the Engineer, the quantity to be measured for payment of the type of borrow indicated will be the number of cubic meters (cubic yards) of material used in the complete and accepted work, as determined by the vehicle loads using three-dimensional measurements. A load ticket including truck identification and date of delivery shall be furnished to the Engineer upon delivery for each load delivered to the site. All vehicles shall be loaded to at least their water level capacity, and any load designated shall be leveled at the point of delivery when directed by the Engineer. All quantities computed from vehicle load measurement will be divided by a factor of 1.15 and the resulting volume paid at the Contract unit price for those Contract items.

Stripping of pits to obtain borrow will not be paid for separately but will be considered incidental to the various borrow Contract items.

Any material removed or excavated from a borrow pit before cross-sections and measurements have been taken will not be paid for. No borrow quantity will be allowed that is not taken from measured borrow pits, unless otherwise agreed upon in writing by the Engineer and the Contractor.

Should more borrow be placed than required, resulting in a waste of excavated material, or should embankments be constructed beyond the neat lines shown on the Plans, unless otherwise authorized in writing by the Engineer, 115 percent of the amount of such waste or excess will be deducted from the total amount of specified borrow being used.

When requested by the Contractor and authorized in writing by the Engineer, material specified to be measured by the cubic meter (cubic yard) may be measured by mass (weighed) and the mass (weight) converted to cubic meters (cubic yards) for payment purposes. Factors for conversion from mass (weight) measurement to volume measurement will be determined by the Engineer and shall be agreed to by the Contractor before the method of measurement of pay quantities is used.

The simultaneous extraction of more than one borrow item from a given pit will require the written permission of the Engineer, and the method of measurement shall be as specified by the Engineer.

- (1) Earth Borrow. With the written permission of the Engineer, the method of measurement for Earth Borrow may be changed to the number of cubic meters (cubic yards) in place in the complete and accepted work multiplied by a factor of 1.15.

When material from excavation is removed and either used for payment under another Contract item or diverted for the Contractor's use, such as the construction of haul roads, the quantity measured for these uses will be multiplied by a factor of 1.15. The resulting quantity will be deducted from the total quantity of Earth Borrow.

- (2) Sand Borrow. The quantity of Sand Borrow to be measured for payment will be the number of cubic meters (cubic yards) placed in the complete and accepted work, as determined by the plan dimensions of the compacted material. No allowance will be made for material placed to a greater depth or width than that shown on the Plans unless authorized in writing by the Engineer.
- (3) Granular Borrow. With the written permission of the Engineer, the method of measurement for Granular Borrow may be changed to the number of cubic meters (cubic yards) in place in the complete and accepted work multiplied by a factor of 1.15.
- (4) Rock Borrow. When obtained from previously blasted or stockpiled sources, the quantity of Rock Borrow to be measured for payment will be the number of cubic meters (cubic yards) of blasted material measured in the pile before removal divided by a factor of 1.35.
- (c) Gravel Backfill for Slope Stabilization. The quantity of Gravel Backfill for Slope Stabilization to be measured for payment will be the number of cubic meters (cubic yards) placed in the complete and accepted work. Measurements will be confined to the limits shown on the Plans or as directed by the Engineer.
- (d) Shoulder Berm Removal. The quantity of Shoulder Berm Removal to be measured for payment shall be the number of meters (linear feet) of shoulder from which the berm was properly removed, measured from the beginning point of removal to the end point of removal.

203.14 BASIS OF PAYMENT. The accepted quantities as measured will be paid for at the Contract unit price per cubic meter (cubic yard) for the specified Contract items except for Shoulder Berm Removal, which will be paid for at the Contract unit price per meter (linear foot). Payment will be full compensation for performing the work specified, including any drilling and blasting required, and for furnishing all labor, materials, tools, equipment, and incidentals necessary to complete the work.

No added compensation will be made for any special manipulation or delay resulting in the drying or wetting of soils necessary to obtain the required compaction. The entire cost of such manipulation and delay will be considered included in the Contract unit price for the excavation Contract item involved.

Compensation for the construction of embankments, as defined in Subsection 203.11, shall be considered incidental to the various excavation items. Water added to embankment material to aid in compaction will not be paid for directly but will be considered incidental to the Contract items involved.

All work and material required to grade, loam, seed, and mulch waste areas, borrow pits, and haul roads, as specified, to eliminate unsightly conditions and prevent erosion will not be paid for directly but will be considered incidental to the various types of excavation and borrow.

Material used for backfilling voids created by the removal of unsuitable material below subgrade and on slopes will be paid for at the Contract unit price per cubic meter (cubic yard) for the particular Contract item used in making the backfill. If the particular Contract item required for backfill is not included in the Contract, a Change Order/Supplemental Agreement for this Contract item will be negotiated, with the exception of backfilling for Muck Excavation, which shall be incidental to the item.

The work specified in Subsection 203.12 will not be paid for directly but will be considered as incidental work pertaining to the excavation and borrow Contract items

On borrow projects, solid rock removed beyond the authorized limit, as specified for solid rock measurement, may be paid at the Contract unit price for other excavation or borrow items in the Contract, whichever unit price is the least, provided the material is used in constructing approved embankments.

When the subgrade has been prepared by others under another contract, the excavation necessary to bring the subgrade to the required grade and cross-section or for the removal of soft spots in the subgrade will be paid for as Common Excavation.

All grading and shaping required after removing material paid for as Excavation of Surfaces and Pavements will not be paid for directly but will be considered incidental to this Contract item.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
203.15 Common Excavation	Cubic Meter (Cubic Yard)
203.16 Solid Rock Excavation	Cubic Meter (Cubic Yard)
203.17 Unclassified Excavation	Cubic Meter (Cubic Yard)
203.20 Muck Excavation	Cubic Meter (Cubic Yard)
203.25 Channel Excavation of Earth	Cubic Meter (Cubic Yard)
203.26 Channel Excavation of Rock	Cubic Meter (Cubic Yard)
203.27 Unclassified Channel Excavation	Cubic Meter (Cubic Yard)
203.28 Excavation of Surfaces and Pavements	Cubic Meter (Cubic Yard)
203.30 Earth Borrow	Cubic Meter (Cubic Yard)
203.31 Sand Borrow	Cubic Meter (Cubic Yard)
203.32 Granular Borrow	Cubic Meter (Cubic Yard)
203.33 Rock Borrow	Cubic Meter (Cubic Yard)
203.35 Gravel Backfill for Slope Stabilization	Cubic Meter (Cubic Yard)
203.40 Shoulder Berm Removal	Meter (Linear Foot)

SECTION 204 - EXCAVATION FOR STRUCTURES

204.01 DESCRIPTION. This work shall consist of the excavation and backfill or disposal of all material removed.

All excavation for structures below the designated slope or subgrade line as shown on the Plans shall be included in this work.

The work is classified as follows:

- (a) Trench Excavation. Trench Excavation shall consist of excavation for the construction of new culverts and pipes of 1.2 m (4 foot) clear span and under, conduits, culvert headwalls, drop inlets, manholes, catch basins, leaching basins, underdrains, concrete steps, and other minor structures, and drainage ditches at the inlet and outlet of drainage structures 1.2 m (4 foot) clear span and under; excavation for the removal of all existing drainage structures; exploratory excavation for locating underground utility services and/or other structures; and any other excavation designated to be removed under this Contract item.

- (1) Trench Excavation of Earth. Trench Excavation of Earth shall consist of all material excavated within the limits shown in the Contract Documents, except boulders measuring 0.5 m³ (18 cubic feet) or more, solid rock, mortared stone masonry, and concrete; and the removal of all existing pipes 1.2 m (4 foot) and under, regardless of material.
 - (2) Trench Excavation of Earth, Exploratory. Exploratory excavation to locate underground utility services and/or other structures shall be conducted where directed by the Engineer and shall be classified as Trench Excavation of Earth, Exploratory. The Contractor shall utilize protective measures during this excavation to avoid damage to any underground service or structure. When necessary, the Contractor shall cooperate with representatives of the utility company(ies) in order to avoid damage to the utilities by permitting the utility company(ies) to erect suitable supports, props, shoring, or other means of protection.
 - (3) Trench Excavation of Rock. Trench Excavation of Rock shall consist of all solid rock in formation, or boulders measuring 0.5 m³ (18 cubic feet) or more, excavated within the limits shown in the Contract Documents. All mortared stone masonry and concrete irrespective of the size of its components, excavated within the above limits, shall likewise be considered as rock.
- (b) Structure Excavation. Structure Excavation shall consist of excavation for the construction of foundations and substructures of all structures over 1.2 m (4 foot) clear span, pipe culverts and storm sewers of over 1.2 m (4 foot) clear span, grade separation structures, retaining walls, cribs, and any other excavation designated to be removed under this Contract item. If temporary bracing, sheeting, or other means of supporting the excavation is required, Construction Drawings shall be submitted in accordance with Section 105.
- (c) Granular Backfill for Structures. Granular Backfill for Structures shall consist of approved material placed within the limits shown on the Plans or directed by the Engineer.

204.02 MATERIALS. Materials shall meet the requirements of the following Subsections:

- Coarse Aggregate for Concrete 704.02(a)
- Crushed Gravel for Subbase, Fine Graded 704.05(a)
- Granular Backfill for Structures 704.08

Concrete shall have a minimum 28 day compressive strength of 20 MPa (3000 psi) and shall conform to the requirements of Section 541.

When approved in writing by the Engineer, material meeting the gradation requirements for Coarse Aggregate for Concrete may be substituted for Granular Backfill for Structures under footings.

When approved in writing by the Engineer, material meeting the gradation requirements for Crushed Gravel for Subbase, Fine Graded may be substituted for Granular Backfill for Structures.

204.03 GENERAL CONSTRUCTION REQUIREMENTS. The locations and elevations for excavation shown on the Plans shall be considered as approximate only. The Engineer may order removal of poor foundation material below the designed elevation and replacement with an approved material.

All suitable excess excavated material shall be used in the formation of embankments, at other locations shown on the Plans, or as directed by the Engineer. The Contractor shall haul and dispose of the material at no additional compensation.

All work performed under this Section shall conform to Section 105.

204.04 PRESERVATION OF CHANNEL. Unless otherwise shown on the Plans or directed by the Engineer, the Contractor shall confine excavation operations to the site of the proposed structure. The natural streambed shall not be disturbed without permission of the Engineer. Materials from foundation or other excavation shall not be deposited within a stream area.

204.05 FOOTING MODIFICATIONS. When it is necessary to modify the designed footings as shown on the Plans, the Engineer will issue a written order for such changes in elevations or dimensions required to provide a satisfactory foundation.

204.06 PREPARATION OF FOUNDATION. The foundation pits shall be excavated so that the footings are the full lengths and widths shown on the Plans. The footings shall be constructed with full horizontal beds. Unless otherwise specified or authorized in writing, foundations shall be constructed in the dry. The site shall be dewatered to or below the footing elevation or lowest elevation of a structural component.

The excavation shall be carried to either ledge or a solid foundation, unless otherwise specified. If sloping ledge is encountered, the foundation shall be stepped as directed by the Engineer. All loose material shall be removed, and all seams in the rock shall be cleaned out and filled with concrete or as directed by the Engineer. No excavation shall be done below the elevations shown on the Plans unless authorized in writing by the Engineer. Any material excavated without authority shall be replaced with concrete or as directed by the Engineer at the Contractor's expense.

When the footing is to be constructed on an excavated surface other than rock, particular care shall be taken not to disturb the bottom of the excavation. No excavation shall be done below the elevations shown on the Plans, unless authorized in writing by the Engineer. Any material excavated without authority shall be replaced with approved backfill and thoroughly compacted in accordance with Subsection 204.08(a) at the Contractor's expense.

When poor foundation material is encountered at the designed foundation level, it shall be removed as Structure Excavation or Trench Excavation and replaced with Granular Backfill for Structures or other suitable material as shown on the Plans or as directed by the Engineer, and thoroughly compacted in accordance with Subsection 204.08(a).

204.07 BEDDING FOR STRUCTURES. Excavation and preparation of the bed for a structure shall conform to the specification for the specific structure being installed.

204.08 BACKFILL.

- (a) General. All spaces excavated and not occupied by structures or select backfill shall be backfilled with material from excavation, unless otherwise specified. The Contractor shall backfill up to the elevation of existing ground or 600 mm (2 feet) over the pipe, whichever is less, as shown on the Plans or as directed by the Engineer.

All backfill material shall be placed in 150 mm (6 inch) maximum (loose measure) horizontal layers, and each layer shall be thoroughly compacted by means of air or mechanical tampers. Backfill material placed within the limits of Trench Excavation or Structure Excavation shall have a maximum stone size less than 75 mm (3 inches).

Compaction by means of hand tamping will not be permitted.

Where backfill is to be placed on both sides of a structure, the layers on both sides shall be brought up simultaneously and at approximately the same level to avoid unbalanced pressure. Care shall be taken to prevent wedging action against the structure.

- (b) Backfill of Trenches. The backfill shall be carried to the uppermost level of the trench or subgrade. No stones or blasted ledge exceeding 75 mm (3 inches) in diameter shall come in contact with pipes during backfill operations.
- (c) Backfill of Structures. No backfill material shall be placed against a newly completed structure until the concrete has cured for seven days or until it has obtained 85 percent of the designed compressive strength, and then only with the permission of the Engineer.

Evidence of satisfactory compaction of the backfill adjacent to structures will consist of the attainment of the density required for the adjacent embankment material by testing at least every third layer in accordance with Subsection 203.11(d).

204.09 METHOD OF MEASUREMENT.

- (a) Trench Excavation. The quantity of Trench Excavation of Earth, Trench Excavation of Earth, Exploratory, or Trench Excavation of Rock to be measured for payment will be the actual number of cubic meters (cubic yards) excavated up to the maximum dimensions as follows:
 - (1) The horizontal dimensions for excavation for culverts and pipes (excluding underdrain and carrier pipe) shall be the distance between vertical planes 500 mm (18 inches) outside of the interior lines of the culvert or pipe.

- (2) The horizontal dimensions for drop inlets, manholes, end sections, and other minor structures shall be 500 mm (18 inches) outside the exterior lines of the structure.
- (3) The width dimensions for underdrain shall be shown on the Plans.
- (4) The depth dimension for culverts, pipes, underdrain, drop inlets, manholes, and other minor structures shall be the vertical dimension from the original ground surface or bottom limits of other excavation to the bottom of authorized excavation.
- (5) When culverts, pipes, underdrains, drop inlets, manholes, and other minor structures are in embankment areas, the natural ground line as cross-sectioned shall be the uppermost level of computation, unless otherwise specified. Vertical measurements will be used for the depth in making computations of Trench Excavation as follows:
 - a. 100 percent of the volume for the first 1.5 m (5 feet) of vertical depth.
 - b. 150 percent of the volume below the first 1.5 m (5 feet) of vertical depth.
- (6) When Trench Excavation of Rock and Drilling and Blasting of Solid Rock Subgrade occur at the same location, the quantity of Trench Excavation of Rock will be measured for payment below the subgrade.
- (7) The quantity of any material that the Engineer directs to be removed after the embankments have been placed will be included in the total amount for Trench Excavation.
- (8) In measuring masonry or concrete as Trench Excavation of Rock, for all openings having cross-sectional areas of 0.5 m² (4 square feet) or less, the volume will be included as part of the rock. For all openings having cross-sectional areas greater than 0.5 m² (4 square feet), the volume will be deducted and not allowed as either Trench Excavation of Rock or Trench Excavation of Earth.

(9) The quantity of Trench Excavation of Earth, Exploratory to be measured for payment will be the number of cubic meters (cubic yards) of excavation, regardless of depth, for locating underground utility services and/or other structures where directed by the Engineer.

(b) Structure Excavation. The quantity of Structure Excavation to be measured for payment will be the number of cubic meters (cubic yards) measured and computed by average end area method whenever practical, as follows:

(1) Vertically. Between the original ground surface or the bottom limits of any other excavation item, whichever is the lower elevation, and the bottom of the structure excavation;

or

Between the original ground surface or the bottom limits of any other excavation item, whichever is the lower elevation, to 500 mm (18 inches) below the bottom neat lines of any part of a structural component falling outside any horizontal pay limits established for its footings.

Where Excavation (Common, Solid Rock, or Unclassified), Channel Excavation, and Structure Excavation occur at the same location, measurement for Channel Excavation will be made only below the lower limits of Excavation and measurement for Structure Excavation will be made only below the lower limits of Channel Excavation.

The removal of authorized material below the elevation of the bottom of the excavation as shown on the Plans will be measured in accordance with the following table:

Vertical Depth Below Bottom of Excavation Indicated on the Plans		Volume of Structure Excavation Multiplied by:
Meters	feet	
0 to 0.5	0 to 1	100%
Over 0.5 to 2.0	Over 1 to 5	150%
Over 2.0 to 3.0	Over 5 to 10	450%
Over 3.0 to 5.0	Over 10 to 15	750%
Over 5.0	Over 15	(paid as Extra Work)

Where a foundation or component of a structure is designed or directed to be placed on ledge, an average 150 mm (6 inches) maximum allowance for overbreakage will be allowed for measurement. Additional overbreakage shall be at the Contractor's expense.

- (2) Horizontally. Between vertical planes 500 mm (18 inches) outside the neat lines of footings, beams, or other structural components, and parallel thereto except for the following:

The horizontal measurements of the Structure Excavation for reinforced concrete boxes shall be the overall width of the box, plus 500 mm (18 inches) on each side, and the length of the structure, plus 500 mm (18 inches) on each end.

The horizontal measurements for corrugated plate arches shall be the width of each abutment, plus 500 mm (18 inches) on each side, and the length of the arch, plus 500 mm (18 inches) on each end.

The horizontal measurements for pipes and pipe arches having a diameter or span over 1200 mm (48 inches) shall be between vertical planes 1 m (3 feet) outside the exteriors of each side, and the length of the pipes or pipe arches plus 500 mm (18 inches) on each end.

When footings are not used, the neat lines shall be the junction line between the new concrete and the old masonry or ledge.

- (c) Granular Backfill for Structures. The quantity of Granular Backfill for Structures to be measured for payment will be the number of cubic meters (cubic yards) placed in the complete and accepted work within the confines of the limits shown on the Plans or as directed by the Engineer.

When Coarse Aggregate for Concrete or Crushed Gravel for Subbase, Fine Graded is substituted for Granular Backfill for Structures, it will be measured and paid for as Granular Backfill for Structures.

204.10 BASIS OF PAYMENT. The accepted quantities for Trench Excavation, Trench Excavation of Earth, Exploratory, Structure Excavation, and Granular Backfill for Structures will be paid for at the Contract unit price per cubic meter (cubic yard) for each of the Contract items specified in the Contract. Payment will be full compensation for performing the work specified, including placement and compaction of backfill, disposal or placement in embankments of all surplus material, and the cleaning up of the site following completion of construction operations, and for furnishing all labor, materials, tools, equipment, sheeting, bracing, and incidentals necessary to complete the work.

Unless otherwise specified, Structure Excavation will include all sheeting, bracing, dewatering, siltation control, preparing and submitting Construction Drawings where required, and incidentals necessary for properly constructing, in the dry, a foundation or structural component.

All material removed beneath a vertical depth of 5 m (15 feet) below the bottom of Structure Excavation limits shown on the Plans, or changes in sheeting, bracing, or dewatering necessitated by excavating below the 5 m (15 foot) limit, will be paid for as Extra Work.

No differentiation will be made in Structure Excavation between the excavation of wet or dry material, earth, gravel, boulders, rock, old masonry, or reinforced concrete.

When exploratory excavation is conducted exclusively for the purpose of locating existing underground utility services and/or other structures when directed by the Engineer, the costs of such excavation, regardless of depth, will be paid for at the Contract unit price bid per cubic meter (cubic yard) for Trench Excavation of Earth, Exploratory. Payment will be full compensation for all labor, materials, tools, equipment and incidentals necessary to complete the work, including locating and protecting existing underground utility services and/or other structures, and for restoring the work area to the satisfaction of the Engineer.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
204.20 Trench Excavation of Earth	Cubic Meter (Cubic Yard)
204.21 Trench Excavation of Rock	Cubic Meter (Cubic Yard)
204.22 Trench Excavation of Earth, Exploratory	Cubic Meter (Cubic Yard)
204.25 Structure Excavation	Cubic Meter (Cubic Yard)
204.30 Granular Backfill for Structures	Cubic Meter (Cubic Yard)

SECTION 205 - DRILLING AND BLASTING

205.01 DESCRIPTION. Except as otherwise specified, this work shall consist of the drilling and blasting of rock to remain in place.

205.02 DRILLING AND BLASTING OF SOLID ROCK. Holes shall be drilled to the approximate depth and at the approximate spacing shown on the Plans or as directed by the Engineer.

Following the drilling, explosives shall be placed in each hole and then detonated. The amount of explosive shall be sufficient to shatter and rearrange the rock for the full depth of the drill holes. Blasting shall be done progressively from the lower level to the top level. The removal of the blasted rock is not required under the work in this Section.

205.03 DRILLING AND BLASTING OF SOLID ROCK SUBGRADE. Subgrade areas shall be shattered to the dimensions shown on the Plans or directed by the Engineer.

The area of blasted rock subgrade shall extend sufficiently beyond the beginning and end of cut areas to ensure the shattering of all rock to a depth of 1.2 m (4 feet) below the bottom of subbase material elevation to eliminate water pockets.

After detonation, any rock protruding above the bottom of subbase shall be removed. When directed by the Engineer, the Contractor shall excavate a trench across the blasted rock to determine if the rock is broken and rearranged to a depth of 1.2 m (4 feet) below the bottom of subbase. Afterwards, the trench shall be backfilled with the rock removed.

205.04 METHOD OF MEASUREMENT. The quantity of Drilling and Blasting of Solid Rock to be measured for payment will be the number of meters (linear feet) of drill holes drilled and detonated in accordance with this Section.

The quantity of Drilling and Blasting of Solid Rock Subgrade to be measured for payment will be the number of square meters (square yards) of subgrade plan area drilled and detonated in accordance with this Section, measured at the bottom of subbase.

The number of cubic meters (cubic yards) of excavation required by the Engineer to inspect the depth of shattered and rearranged rock, computed at a maximum width of 750 mm (30 inches), will be measured for payment as Trench Excavation of Earth.

Any area designated as Trench Excavation of Rock will not be included in the measurement and payment for Drilling and Blasting of Solid Rock Subgrade.

205.05 BASIS OF PAYMENT. The accepted quantities as measured will be paid for at the Contract unit price per meter (linear foot) or square meter (square yard), as applicable, for the specified Contract items. Payment will be full compensation for performing the work specified including any necessary stripping of rock below the bottom of subbase and refilling with approved material to the bottom of subbase, the removal of blasted subgrade rock that may swell above subgrade, and its disposition on the project as shown in the Plans or as directed by the Engineer.

Excavation and backfill required to inspect the depth of broken rock below subgrade will be paid for at the Contract unit price per cubic meter (cubic yard) for Trench Excavation of Earth.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
205.10 Drilling and Blasting of Solid Rock	Meter (Linear Foot)
205.20 Drilling and Blasting of Solid Rock Subgrade	Square Meter (Square Yard)

SECTION 208 – COFFERDAMS

208.01 DESCRIPTION. This work shall consist of the construction, material excavation within, dewatering, maintenance and removal of cofferdams in accordance with the Contract Documents.

The work will be classified as follows:

- (a) Cofferdam. This item shall consist of providing a method for the purpose of constructing, in the dry, a specific foundation or other component of a structure in accordance with Contract requirements. This may involve the design, construction, maintenance, and removal of a watertight structure or may involve alternate methods of de-watering and stabilizing the specific site. Construction of foundation seals per Contract or as required per Contractor plans and schedule of operations is also within the scope of work for the Cofferdam item. The Contractor shall obtain any and all necessary permits or clearances for alternate methods.

A cofferdam may have only two or three sides depending upon the particular location and the Contractor's design.

Cofferdam Excavation, Earth. This item shall consist of all material excavated within the pay limits as set forth in these specifications or indicated on the Plans except solid rock, mortared stone masonry, concrete, and boulders measuring 0.5 cubic meters (cubic yards) or more.

Cofferdam Excavation, Rock. This item shall consist of all solid rock material excavated within the pay limits as set forth in these specifications or indicated on the Plans, including all solid rock, mortared stone masonry, concrete, and boulders measuring 0.5 cubic meters (cubic yards) or more.

208.02 MATERIALS. Concrete used in a cofferdam foundation seal or for replacing overbreakage shall have a minimum 28 day compressive strength of 20 MPa (3000 psi) and shall conform to the requirements of Section 501 or Section 541.

208.03 GENERAL CONSTRUCTION REQUIREMENTS. The locations and elevations for excavation shall be as indicated on the Plans. The Engineer may order removal of poor foundation material below the normal designated elevation and replacement with an approved material.

All suitable excess excavated material shall be used in the formation of embankments as indicated on the Plans, or as directed by the Engineer. The material shall be hauled and disposed of with no additional compensation to the Contractor.

208.04 PRESERVATION OF CHANNEL. Unless otherwise indicated on the Plans or ordered by the Engineer, the Contractor, in performing the excavation, shall confine excavating operations to the site of the proposed structure and to the limits of the cofferdam. The natural stream bed shall not be disturbed without permission of the Engineer.

208.05 FOOTING MODIFICATIONS. When it is necessary to modify a footing from the detail shown on the Plans in order to provide a satisfactory foundation, the Engineer shall issue a written order for such changes in elevations or dimensions.

208.06 PREPARATION OF FOUNDATION. The foundation pits shall be excavated so that the footings will be the full lengths and widths indicated on the Plans. The footings shall be constructed with full horizontal beds. Unless otherwise specified or authorized by written order, foundations shall be constructed in the dry. In the dry means foundations and other structural components being constructed are not in or under water. The site shall be dewatered to, or below, the bottom of footing elevation or lowest elevation of a structural component.

The excavation shall continue to either ledge or a solid foundation, unless otherwise specified. If sloping ledge is encountered, the foundation shall be stepped as directed by the Engineer. All loose material shall be removed and all seams in the rock shall be cleaned out and filled with concrete or as directed by the Engineer. No excavation shall be done below the elevations indicated on the Plans unless directed by the Engineer in writing. Any material so excavated without authority shall be replaced with concrete or as directed by the Engineer at the Contractor's expense.

When the footing is to be constructed on an excavated surface other than rock, particular care shall be taken not to disturb the bottom of the excavation. No excavation shall be performed below the elevations indicated on the Plans unless directed by the Engineer in writing. Any material excavated without authority shall be replaced with approved backfill, which shall be thoroughly compacted in accordance with Section 204, at the Contractor's expense.

When poor foundation material is encountered at the foundation design elevation, it shall be removed as Cofferdam Excavation, Earth or Cofferdam Excavation, Rock and replaced with Granular Backfill for Structures or other suitable material, as indicated on the Plans or as directed by the Engineer, and thoroughly compacted in accordance with Section 204.

208.07 COFFERDAMS. The Contractor shall prepare detailed plans and a schedule of operations for each cofferdam specified in the Contract. Construction Drawings shall be submitted in accordance with Section 105.

The Professional Engineer is responsible for ensuring that the proposed cofferdam meets the following criteria:

- (a) the design is structurally stable for all conditions to be encountered (e.g., soils, water, forces, and loadings);
- (b) the design and details conform with the Contract and the applicable AASHTO requirements in the *Standard Specifications for Highway Bridges*;
- (c) the design and details are in conformance with applicable safety codes;
- (d) the size and shape are adequate to construct the foundation and structural components specified;
- (e) the cofferdam is adequately watertight for proper performance of the work; and
- (f) any foundation seal is adequate to achieve its design function.

One copy of the plans and schedule of operations shall be submitted to the Resident Engineer for Agency use.

The submittal shall include plan, elevation and section details indicating the following:

- (a) the waterway;
- (b) information regarding the cofferdam and any foundation seal - indicate if a seal is required to ensure the structural integrity of the cofferdam during dewatering and foundation construction and inspection;

- (c) substructure location;
- (d) dimensions of any temporary restrictions that are to be placed in the waterway, e.g. barges, lines, earth dams, causeways, temporary diversion channels and access bridging;
- (e) the location, dimensions, clearances, and other relevant information for any temporary scaffolding or netting;
- (f) dewatered heads, taking into consideration fluctuations of water levels;
- (g) details for screening, pumping and filtering discharge;
- (h) a statement as to whether or not any equipment will be removed at night; and
- (i) a schedule or sequence of operations - include placement of the foundation seal, time from placement to dewatering, and foundation construction and inspection.

The Contractor will be responsible for performing the work in accordance with the submitted details and schedule of operations. All welding shall be performed in accordance with Subsection 506.10.

Cofferdam construction shall conform to AASHTO Standard Specifications for Highway and Bridge Construction, Division II, Section 1.4.

Cofferdams shall be constructed so as to protect freshly placed concrete against damage from sudden rising of the water level and to prevent damage to the foundation or other structural component by erosion. The cofferdam shall be constructed so that no timber, bracing, or forms will extend into the foundation or other structural component.

In the event the Contractor elects to place fill material in the stream to facilitate access to, or be part of, a cofferdam operation, it shall be clean stone fill.

208.08 PUMPING. Pumping from or dewatering of the interior of any cofferdam enclosure shall be performed so that disturbance of the subsoil or freshly placed concrete will not occur. Dewatering of a sealed cofferdam will be in conformance with the Contractor's sequence or schedule of operations. Pumping during the construction of a foundation or other structural component shall be from a suitable sump separated from the concrete work.

The discharge from any pumping operation, filtration system, or settling basin shall conform to the requirements of Section 105 and the Contract.

208.09 INSPECTION OF FOUNDATION PIT. Immediately following the completion of each foundation pit, the Contractor shall notify the Engineer, who shall approve the depth of the pit and the nature of the foundation before the placement of the concrete.

208.10 BEDDING FOR STRUCTURES. Excavation and preparation of the bed for a structure shall conform to the specifications for the specific structure being installed.

208.11 METHOD OF MEASUREMENT.

- (a) Cofferdam. The quantity to be measured for payment will be on a lump sum basis for each cofferdam specified on the Plans or in the Contract.
- (b) Cofferdam Excavation, Earth. The quantity to be measured for payment will be the number of cubic meters (cubic yards) of earth excavated from within the pay limits of the cofferdam as set forth in these specifications or as shown on the Plans.

The removal of earth excavation authorized by the Engineer below the elevation of the bottom of the excavation, as indicated on the Plans, will be factored in accordance with the appropriate table:

METRIC

Vertical Depth Below Bottom of Excavation indicated on the Plans	Volume of Excavation Multiplied by:
0 to 300 mm	100 percent
Over 300 to 1500 mm	150 percent
Over 1500 to 3000 mm	450 percent
Over 3000 to 4500 mm	750 percent
Over 4500 mm	(Paid by Supplemental Agreement)

ENGLISH

Vertical Depth Below Bottom of Excavation indicated on the Plans	Volume of Excavation Multiplied by:
0 to 1 foot	100 percent
Over 1 to 5 feet	150 percent
Over 5 to 10 feet	450 percent
Over 10 to 15 feet	750 percent
Over 15 feet	(Paid by Supplemental Agreement)

- (c) Cofferdam Excavation, Rock. The quantity to be measured for payment will be the number of cubic meters (cubic yards) of rock excavated from within the pay limits of the cofferdam as set forth in these specifications or as shown on the Plans.

The removal of rock excavation authorized by the Engineer below the elevation of the bottom of the excavation, as indicated on the Plans, will be factored in accordance with the table shown above.

Where a foundation or component of a structure is designed or directed to be placed on ledge, a maximum of 150 mm (6 inches) average allowance for overbreakage will be allowed. Additional overbreakage will be at the Contractor's expense.

- (d) Bottom of Excavation. The bottom of excavation shall be as indicated on the Plans.

When a foundation seal is specified in the Contract, the bottom of excavation shall be considered to be the bottom of the excavation required for the foundation seal. For a seal proposed by the Contractor, no excavation shall be measured for payment below the bottom of excavation as indicated on the Plans.

208.12 BASIS OF PAYMENT. The accepted quantity of Cofferdam will be paid for at the Contract lump sum price, which price shall be full compensation for the preparation of detailed plans and schedule of operations, performing the work specified, and the furnishing of all labor, tools, equipment, materials, and incidentals necessary to complete the work, including the cost of altering the cofferdam, foundation seals, sheeting, bracing, dewatering, installation and maintenance of siltation and sedimentation control measures for treating cofferdam discharge, incidentals necessary for properly constructing the foundation or structural component, maintaining the cofferdam in a dewatered condition, and removing the cofferdam when no longer required.

The accepted quantities of Cofferdam Excavation, Earth and Cofferdam Excavation, Rock will be paid for at the Contract unit price per cubic meter (cubic yard) for each of the pay items in the Contract, which price shall be full compensation for performing the work specified and the furnishing of all labor, materials, tools, equipment, disposal of surplus material, and any other incidentals necessary to complete the work.

Payment for Cofferdam will be made as follows:

A payment of 75% of the lump sum bid price will be made when excavation within the limits of the structural unit is completed, and the cofferdam has been successfully dewatered.

The remaining 25% of the lump sum price will be paid:

- (a) When the cofferdam is completely removed; or
- (b) If the Contract Documents require the cofferdam to be left in place, when the associated foundation or other component of a structure is completed.

If the Engineer (by written order) requires that the cofferdam be left in place and this requirement is not specified in the Contract Documents, a Supplemental Agreement will be processed in accordance with Section 109.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
208.30 Cofferdam Excavation, Earth	Cubic Meter (Cubic Yard)
208.35 Cofferdam Excavation, Rock	Cubic Meter (Cubic Yard)
208.40 Cofferdam	Lump Sum

SECTION 210 - COLD PLANING

210.01 DESCRIPTION. This work shall consist of the removal and the satisfactory disposal and clean up of road, airport, or bridge pavements by cold planing.

210.02 EQUIPMENT AND OPERATION. The equipment shall consist of a power operated planing machine or grinder capable of accurately establishing profile grades by referencing from both the existing pavement and from an independent grade control. The equipment shall have a positive means for controlling cross slope elevations. The planer shall have sufficient mass (weight) to perform all types of planing without lifting. Sufficient and positive down pressure is to be provided on the drum assembly at all times when planing. The cutting head shall be maintained so that the depth of cut is within a tolerance of 3 mm (1/8 inch) throughout the width of the head. The equipment shall also have an effective means of preventing dust from escaping into the air.

210.03 GENERAL CONSTRUCTION REQUIREMENTS. The bituminous surface shall be removed to the depth, width, grade, and typical cross-section as shown on the Plans or as directed by the Engineer. No variation from the typical cross-section of more than 3 mm (1/8 inch) will be allowed. Any bituminous surfaces adjacent to objects such as scuppers, expansion joints, drop inlets, and curbs that are inaccessible to the cold planer shall be removed by means of other approved equipment.

Unless otherwise specified, the planed material shall become the property of the Contractor and shall be removed from the project and disposed of properly. All dust and other remaining material shall be immediately removed with a power vacuum sweeper to the satisfaction of the Engineer. The resulting surface on bridges shall be left in a condition to receive tar emulsion or, if shown on the Plans, a membrane, or as directed by the Engineer. The Contractor shall exercise reasonable care to ensure no damage occurs to the portland cement concrete deck when removing pavement from bridges.

When traffic shall be maintained for any period of time on a cold planed area, the following conditions apply:

- (a) All planed and sawed cross roadway butt joints of 19 mm (3/4 inch) depth or greater shall have a temporary wedge of bituminous concrete pavement installed as directed by the Engineer.
- (b) The Contractor shall repave any cold planed areas within 14 calendar days of planing or when directed by the Engineer, provided that any cold planed area that is not repaved the same day as it is cold planed has proper and adequate tapers installed before the end of the working day in which the cold planing is performed. Should the area remain unpaved for a period of more than 14 calendar days without the approval of the Engineer, no payment whatsoever will be made for the cold planing. If the Contractor lays down temporary pavement to avoid the above non-payment for cold planing, temporary pavement and subsequent cold planing shall be at the Contractor's expense. Traffic cones will be placed along the longitudinal drop-off as directed by the Engineer.
- (c) The temporary pavement wedge and taper shall be totally removed prior to placing the permanent final pavement at cold planed locations. All costs involved with installing and removing a temporary pavement wedge and/or taper will not be paid for directly, but will be considered incidental to the Contract item Cold Planing, Bituminous Pavement.
- (d) Cold planed areas susceptible to ponding of water shall be drained by cutting slots through the adjoining non-milled area. The slots shall then be filled with materials satisfactory to the Engineer. All costs of cutting and filling the slots will not be paid for directly but will be considered incidental to the Contract item Cold Planing, Bituminous Pavement.

210.04 METHOD OF MEASUREMENT. The quantity of Cold Planing, Bituminous Pavement to be measured for payment will be the number of square meters (square yards) of surface from which bituminous pavement has been removed to the depth shown on the Plans.

210.05 BASIS OF PAYMENT. The accepted quantity of Cold Planing, Bituminous Pavement will be paid for at the Contract unit price per square meter (square yard). Payment will be full compensation for furnishing all labor, tools, and equipment, including the vacuum sweeper, necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
210.10 Cold Planing, Bituminous Pavement	Square Meter (Square Yard)

SECTION 213 - MILLED RUMBLE STRIPS

213.01 DESCRIPTION. This work shall consist of texturing bituminous concrete pavement to construct rumble strips, disposing of waste millings, and cleaning up the pavement to the satisfaction of the Engineer.

213.02 EQUIPMENT. The equipment for milling rumble strips shall consist of a power operated machine with a rotary type cutting head of a size that will provide milled depressions as shown on the Plans. The cutting head(s) shall have cutting tips arranged to provide a smooth cut.

The cutting head(s) shall be on a suspension independent from that of the power unit to allow the tool to self align with the slope, and/or any irregularities, of the surface being milled. The cutting tool shall be equipped with guides to provide consistent alignment of each cut in relation to the roadway and to provide uniformity and consistency throughout the project. Equipment that tears, distorts, or otherwise damages the pavement adjacent to the milled depressions will not be allowed.

213.03 GENERAL CONSTRUCTION REQUIREMENTS. Rumble strips shall be milled to the finished dimensions, locations, and tolerances shown on the Plans in accordance with these specifications or as directed by the Engineer.

Unless otherwise specified, the milled material shall become the property of the Contractor. This material shall be removed from the project and properly disposed of by the Contractor. All dust and other remaining material shall be immediately removed with a power vacuum sweeper to the satisfaction of the Engineer.

213.04 METHOD OF MEASUREMENT. The quantity of Milled Rumble Strips to be measured for payment will be the longitudinal length in meters (linear feet) of treated surface measured on the pavement marking line adjacent to or within the installed rumble strip. The measurement will reflect the limits of rumble strip slots placed per Plan spacing and will include the non-milled lengths between adjacent slots.

213.05 BASIS OF PAYMENT. The accepted quantity of Milled Rumble Strips will be paid for at the Contract unit price per meter (linear foot). Payment shall be full compensation for furnishing all labor, tools, and equipment, including the vacuum sweeper, necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
213.10 Milled Rumble Strips	Meter (Linear Foot)