

DIVISION 2 EARTHWORK

SECTION 200 CLEARING AND GRUBBING

200-1 DESCRIPTION.

Perform the work of clearing and grubbing in all wooded areas between the construction limits and in all non-wooded areas between the construction limits and the limits of the project right of way or in easements shown on the project plans where seeding and mulching, sprigging, sodding, or other work indicated in the plans is to be performed.

- Clearing is defined as the cutting, removal, and satisfactory disposal of all wooded vegetation and debris.
- Grubbing is defined as the complete removal and satisfactory disposal of all grassy vegetative matter, root mat, ball and root, soil material high in organic content, and surface debris.

Perform the following as part of the work of clearing and grubbing:

1. Remove and dispose of crops, weeds, and other annual growth.
2. Remove and dispose of surface debris such as fences, steps, walls, chimneys, column footings, other footings, foundation slabs, basements, other foundation components, signs, junked vehicles, and other rubble and debris.
3. Fill holes and depressions.
4. Cut off and plug at the right of way or construction limits any private water or sewer line intercepted during the construction of the project.
5. Cut off and remove from the right of way or construction area any septic tank or portion thereof intercepted within the right of way or construction area during the construction of the project.
6. Remove materials in wetland areas to a depth of 1' (0.3 m) below existing ground to be measured in accordance with Section 225.

The work covered in this section does not include the clearing and grubbing at structure sites which is required by Articles 410-3, 412-2, and 414-3.

Perform clearing and grubbing operations sufficiently in advance of grading operations to prevent any of the debris from the clearing and grubbing operations from interfering with the excavation or embankment operations.

In environmentally sensitive areas shown on the original plans, perform grubbing operations no more than seven (7) calendar days prior to beginning continuous grading operations.

Perform all work under this section in a manner which will cause a minimum of soil erosion and which will meet the requirements of Article 107-13. Coordinate the work with other operations such that no more than 17 acres (7 hectares) of exposed, erodible surface area will be accumulated at any one given time by the clearing and grubbing operation until erosion control measures are provided unless otherwise increased or decreased by the Engineer. Begin the installation of temporary or permanent erosion control measures as soon as clearing and grubbing or land disturbing activities begin. Perform such erosion control work, temporary or permanent, as may be necessary to satisfactorily minimize erosion resulting from clearing and grubbing operations.

The Contractor may request an increase in the number of accumulated acres exposed by clearing and grubbing. If approved, provide and maintain such erosion control

measures including temporary seeding and mulching as may be directed at no cost to the Department.

Failure on the part of the Contractor to perform the required erosion control measures will be just cause for the Engineer to direct the suspension of clearing and grubbing operations in accordance with Article 108-7. The suspension will be in effect until such time as the Contractor has satisfactorily performed the required erosion control work. In the event the Contractor fails to perform the directed work within a reasonable length of time, the Engineer may have the work performed in accordance with Article 105-16.

200-2 MATERIALS.

Refer to Division 10.

200-3 CLEARING.

Perform clearing within the limits established by the clearing method required by the plans and as directed.

The Engineer will designate all areas of growth or individual trees which are to be preserved due to their desirability for landscape or erosion control purposes. When the trees to be preserved are located within the construction limits, they will be so shown on the plans or designated by the Engineer.

Trim or cut branches of trees which overhang the roadbed or obstruct sight distances and which are less than 16 feet (4.9 m) above the elevation of the finished grade in a manner that will not endanger the health of the tree.

In embankment areas where the depth of the embankment exceeds 6 feet (1.8 m) in height, cut sound trees at a height of not more than 6 inches (150 mm) above natural ground. When trees are to be cut outside the construction limits and the Engineer has designated that the area is not to be grubbed, cut the trees off reasonably close to the natural ground surface. Cut trees off to approximately 6 inches (150 mm) above low water level in swamp areas.

Prevent limb, bark, or root injuries to trees, shrubs, or other types of vegetation that are to remain growing and also prevent damage to adjacent property. Repair scarred areas in accordance with generally accepted horticultural practice. Where plants are damaged by any construction operations to such an extent as to destroy their value for shade or other landscape purposes cut and dispose of same without extra compensation.

200-4 GRUBBING.

Perform grubbing on all areas cleared, with the following exceptions:

1. In embankment areas, when the depth of embankment measured under the roadbed exceeds 6 feet (1.8 m) in height, cut off sound stumps not more than 6 inches (150 mm) above the existing ground level and do not grub. Remove unsound or decayed stumps to a depth of approximately 2 feet (0.6 m) below the natural ground surface.
2. When authorized, leave stumps in place which are outside of construction limits. Cut such stumps off reasonably close to the natural ground surface.
3. Cut off stumps in swamp areas to approximately 6 inches (150 mm) above low water level and do not grub.
4. Do not grub in areas where waste or unsuitable material is to be deposited unless such areas are to become a part of a future roadway.

Grub all areas where piles are to be driven regardless of fill height.

Fill all holes and other depressions within the areas between the construction limits and the limits of clearing and grubbing. Bring all areas where later mowing operations will take place to a uniform contour.

200-5 DISPOSITION OF TIMBER, STUMPS, AND DEBRIS.

All timber, in clearing limits, becomes the property of the contractor after the date of availability.

Do not cut any timber beyond the clearing limits established nor any timber which is to be preserved for landscape or erosion control purposes except at the direction of the Engineer.

Remove from the project and properly dispose of all vegetation, roots, stumps, tree laps, and timber remaining on the project by a satisfactory method.

When vegetation is disposed of by burning, burn in such a manner as to prevent injury to property within or outside of the right of way. Comply with all local, state, and federal laws, ordinances, and regulations when burning. Secure all necessary burning permits. Perform all burning under the constant care of a competent watchmen. Do not allow smoldering or dense smoke to occur during burning.

When the timber and debris is disposed of in locations off the right of way and out of sight of the project, furnish the Engineer verification that the site is permitted if required, an approved reclamation plan is filed and furnish a written release from the property owner, or his authorized agent, granting the servitude of his lands before disposal begins.

If it is not burned, dispose of all debris including vegetation in accordance with Section 802.

200-6 SELECT TREE REMOVAL

When the contract includes the item of "Select Tree Removal", and the work of clearing and grubbing has been completed to the original clearing limits, the engineer may elect to have select trees removed from the project. Trees removed in this manner must have an average cross section diameter of at least 4 inches (100 mm) at a point 2 feet (0.6 m) above the ground level.

Completely remove the select trees including the root ball, and properly backfill unless otherwise directed.

200-7 METHOD OF MEASUREMENT.**(A) General:**

All measurement of clearing and grubbing will be made horizontally.

Work performed in cleaning up non-wooded areas between the construction limits and the limits of the project right of way or easements shown on the project plans as provided in Article 200-1; work performed in the dressing up of areas between the construction limits and the clearing limits as provided in Article 200-4; and the removal of weeds, vines, plant stalks, loose rock, and small scattered trees; will be considered as a minor and incidental part of the work of clearing and grubbing and no measurement will be made of such work.

Once the rootmat is removed, material removed which consists predominately of soils, is work covered by Section 225.

(B) Clearing and Grubbing Along Project:

When the contract includes the item of "Clearing and Grubbing" to be paid for on a lump-sum basis, no measurement will be made of any clearing and grubbing performed within the limits originally staked and within the right of way or easements shown on the original plans.

Clearing and grubbing work that is directed to be performed on areas beyond the limits initially staked and/or on areas outside the limits of the right of way or easements shown on the original plans will be measured by the acre (hectare).

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Clearing and grubbing within the right of way or easements shown on the original plans which was not performed during the initial clearing and grubbing operation due to its environmental sensitivity will be measured by the acre (hectare).

(C) Clearing and Grubbing of Borrow and Material Sources:

When the contract includes the item of "Clearing and Grubbing of Borrow and Materials Sources", and when such sources are furnished by the Department, the areas of clearing and grubbing will be measured and the acreage (hectares) computed by the Engineer.

When the Contractor is required to furnish borrow sources, material sources, or waste areas, or when the Engineer permits the Contractor to obtain borrow or deposit waste on any area within the right of way in lieu of borrow and waste areas which were to have been furnished by the Contractor, no measurement of clearing and grubbing will be made for such areas.

(D) Select Tree Removal:

The quantity of select tree removal to be paid for will be the actual number of select trees satisfactorily removed from the project as described in Article 200-6.

200-8 BASIS OF PAYMENT.

(A) General:

Payment for the work covered by this section will be made on either a lump-sum basis or an acre (hectare) basis in accordance with the pay items hereinafter provided.

Payment for materials used to fill depressions in accordance with Article 200-4 will be made in accordance with Article 225, "Roadway Excavation", or Article 230, "Borrow Excavation", depending on the source of the material.

(B) Clearing and Grubbing Along Project:

Payment for the work of clearing and grubbing performed within the limits originally staked and within the right of way or easements shown on the original plans will be made at the contract lump sum price for "Clearing and Grubbing."

Clearing and grubbing work that is directed by the Engineer is to be performed on areas outside the limits originally staked or beyond the limits of the right of way or easements or within environmentally sensitive areas shown on the original plans will be paid for at the contract unit price per acre (hectare) for "Supplementary Clearing and Grubbing." Where the contract does not include this item, a unit price per acre (hectare) will be established by supplemental agreement.

(C) Clearing and Grubbing of Borrow and Material Sources:

Payment for clearing and grubbing work performed on borrow and material sources furnished by the Department will be made for the number of acres (hectares) determined as provided in Subarticle 200-7(C) at the contract unit price for "Clearing and Grubbing of Borrow and Material Sources."

(D) Select Tree Removal

Payment for select tree removal will be made for the number of trees removed as provided for in Subarticle 200-7(D) at the contract unit price per each for "Select Tree Removal."

(E) Pay Items:

Payment will be made under:

Clearing and Grubbing.....	Lump-Sum
Supplementary Clearing and Grubbing.....	Acre (Hectare)
Clearing and Grubbing of Borrow and Material Sources	Acre (Hectare)
Select Tree Removal	Each

**SECTION 205
SEALING ABANDONED WELLS**

205-1 DESCRIPTION.

Seal abandoned wells at locations shown on the plans or as directed in accordance with the provisions of these specifications. Work includes but is not limited to chlorinating the well prior to sealing; perforating the well casing; filling the well with cement grout, dry clay, sand, or gravel; and furnishing all necessary records. Perform all work in accordance with the current requirements of the North Carolina Department of Natural Resources and Community Development.

205-2 CONSTRUCTION METHODS.

Seal each well prior to clearing and grubbing the well site.

Check the well from land surface to the entire depth of the well before it is sealed to ensure freedom from obstructions that may interfere with sealing operations.

Prior to sealing, place chlorine in the well in sufficient quantities to produce a chlorine residual of at least 100 milligrams per liter in the well.

All casing and screen materials may be salvaged except casing that is cemented in place. In the case of gravel-packed wells in which the casing and screens have not been removed, perforate the casing opposite the gravel pack at intervals not exceeding 10 feet (3 m).

Completely fill "bored" wells with cement grout or dry clay compacted in place.

Completely fill wells constructed in unconsolidated formations with cement grout by introducing it through a pipe extending to the bottom of the well which is raised as the well is filled.

Fill wells constructed in consolidated rock formations or that penetrate zones of consolidated rock to at least 5 feet (1.5 m) below the top of the consolidated rock with sand, gravel, or grout opposite the zones of consolidated rock. Fill the remainder of the well with cement grout.

Complete a certified well abandonment record (Form GW 30) and submit to the Engineer.

205-3 METHOD OF MEASUREMENT.

The quantity of sealing abandoned wells to be paid for will be the actual number of wells which have been acceptably sealed in accordance with the requirements of this provision.

205-4 BASIS OF PAYMENT.

The quantity of sealing abandoned wells, measured as provided in Article 205-3, will be paid for at the contract unit price each for "Sealing Abandoned Wells."

Payment will be made under:

Sealing Abandoned WellsEach

**SECTION 210
DEMOLITION OF BUILDINGS AND
APPURTENANCES**

210-1 DESCRIPTION.

Demolish, remove, and dispose of all buildings, building components, and appurtenances indicated in the contract.

Do not remove any building or portion of a building intact for any use or purpose.

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All material resulting from the demolition work becomes the property of the Contractor. Dispose of or use all materials resulting from the demolition work, except materials which are the property of utility companies providing service to the building. Provide all permits and dispose of all contaminated material encountered in connection with the work.

210-2 GENERAL REQUIREMENTS.

Comply with all Federal, State, and local asbestos regulations.

Demolish and clear from the right of way all buildings, including sheds, outbuildings, or other obstructions indicated in the contract. All shelters, porches, roofed areas, and other appurtenances which are attached to the building are considered a part of the building. Steps, chimneys, column footings, other footings, foundation slabs, basements, or other foundation components will not be required to be removed as such work is part of the work of clearing and grubbing.

Do not disturb any fencing, outbuilding, or other obstruction which are entirely clear of the right of way unless otherwise indicated on the plans or in the contract.

Conform to all applicable safety codes pertaining to the work, and for the securing of all permits that may be required and the payment of all fees in connection therewith.

210-3 UTILITIES.

Make all necessary arrangements with utility companies for the disconnecting of all service and the removal of and recovery by them of all meters, telephones, and any other utility facilities or equipment owned by them. Arrange for and actually effect the disconnecting and closing of water and sewer connections to buildings, including but not limited to any work that must be done in addition to that normally done by the utility company, in conformity with all applicable codes and regulations of the local Boards of Health. Pay for all costs incurred in connection with the above work. All refunds or deposits that may become due as a result of the disconnection of service and the returning of equipment or facilities to any utility company becomes the property of the Department.

210-4 DISPOSAL.

Unless otherwise indicated in the contract, all materials recovered during demolition becomes the property of the Contractor to remove from the project. Disposal by burning is permitted, subject to all other applicable sections of these specifications and all State or local ordinances.

Dispose of materials and debris out of sight of the project as required by Section 802.

210-5 COMPENSATION.

There will be no direct payment for demolishing the buildings listed in the contract. Payment for this work will be included in the contract lump sum price for "Clearing and Grubbing".

As an exception to the above, when the description of the work covered by a particular building demolition item does not contain information concerning the presence of asbestos material and asbestos material is discovered after the opening of bids for the project, the cost of disposing of such asbestos material will be paid for in accordance with the provision of Article 104-7.

**SECTION 215
REMOVAL OF EXISTING BUILDINGS**

215-1 DESCRIPTION

Remove and dispose of all buildings, building components, and appurtenances indicated in the contract.

Buildings may be removed intact, removed in sections, or demolished and the resulting material and debris disposed of.

All materials resulting from the removal of buildings, except such materials as may be the property of utility companies providing service to the building, becomes the property of the Contractor to dispose of or use, or sell by him as his own property.

Provide all permits and disposal of all contaminate material encountered in connection with the work.

215-2 GENERAL REQUIREMENTS.

Comply with all Federal, State, and local asbestos regulations in the removal of items covered by this section.

Completely clear from the right of way all buildings, including sheds, outbuildings, or other obstructions as indicated in the contract. Remove all shelters, porches, roofed areas, and other appurtenances, which are attached to the building. Steps, chimneys, column footings, other footings, foundation slabs, basements, or other foundation components will not be required to be removed as such work is part of the work of clearing and grubbing.

Do not disturb any fencing, outbuildings, or other obstruction, which is entirely clear of the right of way unless otherwise indicated on the plans or in the contract.

Conform to all applicable safety codes pertaining to the work, and secure all permits that may be required and the payment of all fees in connection therewith.

215-3 UTILITIES.

Make all necessary arrangements with utility companies for the disconnecting of service and the removal of and recovery by them of all meters, telephones, or any other utility facilities or equipment owned by them. Arrange for and actually effect the disconnecting and closing of water and sewer connections to the buildings, including but not limited to any work that must be done in addition to that normally done by the utility company, in conformity with all applicable codes and regulations of the local Boards of Health. Pay for all costs incurred in connection with the above work. All refunds or deposits that may become due as a result of the disconnection of service and the returning of equipment or facilities to any utility company becomes the property of the Department.

215-4 DISPOSAL.

Unless otherwise indicated in the contract, all materials recovered during demolition becomes the property of the Contractor to remove from the project. Disposal by burning is permitted, subject to all other applicable sections of these specifications and all State or local ordinances.

Dispose of materials and debris out of sight of the project as required by Section 802.

215-5 COMPENSATION.

There will be no direct payment for removing the buildings listed in the contract. Payment for this work will be included in the contract lump sum price for "Clearing and Grubbing".

As an exception to the above, when the description of the work covered by a particular building removal item does not contain information concerning the presence of asbestos

material and asbestos material is discovered after the opening of bids for the project, the cost of disposing of such asbestos material will be paid for in accordance with the provisions of Article 104-7.

SECTION 225 ROADWAY EXCAVATION

225-1 DESCRIPTION.

(A) General:

Excavate, place, and compact or satisfactorily dispose of all materials encountered within the limits of the work necessary for the construction of the roadway which are not to be removed under another contract item. The work includes but is not limited to excavation; blasting, hauling anywhere along the project both within and across balance points shown on the plans; removal of undesirable material; removal of sidewalk, driveways, curb and gutter, endwalls, traffic islands and drainage structures; disposal of materials; formation and compaction of embankments, subgrades and shoulders; the cutting off, plugging, and removal of private utility lines and underground tanks and any backfilling required; removing any existing shoulder drain or subdrain pipe and maintaining the work.

Perform all excavation in conformity with the lines, grades, and cross sections shown on the plans or established by the Engineer.

Use care not to cause instability or displacement of the underlying or adjacent materials during construction. The Engineer reserves the right to effect the removal from the grading operation of any equipment that is causing instability or displacement of underlying or adjacent materials to the detriment of the section being constructed.

(B) Unclassified Excavation:

All material excavated under this section, regardless of its nature or composition, is considered Unclassified Excavation, except for the following:

1. Undercut Excavation, as provided in Subarticle 225-1(C).
2. Material directed to be removed beyond the limits of the original slope stakes.

(C) Undercut Excavation:

Undercut Excavation consists of the excavation, placement, and compaction and/or satisfactory disposal of materials removed from a location below the finished grade roadway cross section, except for the following:

1. Rock in the bottom of roadway cuts which has been excavated 1 foot (0.3 m) or less below the roadbed and ditches.
2. In cut areas, excavation removed below the outside slopes of roadway ditches.

225-2 EROSION CONTROL REQUIREMENTS.

Perform the work covered by this section and construct embankments in such a manner that cut and fill slopes are completed to final slopes and graded in a continuous operation. Perform a continuous operation of removing excavation material from any cut and placing the embankment in any fill. Begin the installation of erosion control measures as soon as land disturbing activities begin. Do not accumulate exposed, erodible slope area greater than 17 acres (7 hectares) at any one given time without placing permanent seeding and mulching or other erosion control measures. Failure to comply with these provisions will be grounds for suspension of the work in accordance with Article 108-7. The suspension will be in effect until such time as erosion control measures are in place. Failure to perform the directed work, may result in the Engineer having the work performed in accordance with Article 105-16.

If grading operations are suspended for any reason whatsoever, bring partially completed cut and fill slopes to the required slope and perform the work of seeding and mulching or other required erosion control operations.

225-3 UNCLASSIFIED EXCAVATION.

Use all suitable material removed from the excavation as far as practicable in the formation of embankments, subgrades, and shoulders and at such other places as may be indicated on the plans or directed.

The wasting of suitable material removed as part of unclassified excavation prior to the completion of embankments is permitted where the Contractor executes a supplemental agreement documenting that he agrees to the f

ollowing:

1. Provide and incorporate into the project any material required to complete the project up to the volume wasted. Bear all additional costs for providing and incorporating this material into the work, including engineering costs, and
2. Provide suitable replacement material either wasted from the project or approved borrow material, at the Contractor's option, and
3. Present no claim for any time arising from the wasting of excess unclassified excavation or for having to replace material wasted from the project which the Department may require to complete the work, and
4. Waive rights to request additional compensation with regard to wasting unclassified excavation under the compensation provisions of Section 104 as a result of wasting suitable unclassified excavation and providing replacement material required to complete the work except when unclassified excavation is a major contract item, as defined in Article 101-53, and when unclassified excavation underruns by more than 25%.

Where the work required to complete the project is so phased by the plans to preclude utilizing suitable unclassified excavation, the Contractor will be permitted to waste suitable unclassified excavation without having to execute the above required supplemental agreement.

Furnish disposal areas for the unsuitable material except where the Engineer permits or directs the use of such material in the widening or flattening of fill slopes. The Engineer will designate materials that are unsuitable.

Where suitable materials containing excessive moisture are encountered above grade in cuts, construct above grade ditch drains prior to the excavation of the cut material when such measures are necessary to provide proper drainage.

Upon execution of a supplemental agreement containing conditions listed below, the Contractor may waste suitable unclassified excavation and replace it with approved borrow material.

1. Replace with approved borrow material all suitable unclassified excavation which was wasted.
2. Bear all additional costs associated with the wasting of the unsuitable unclassified excavation and the replacing of it with borrow material, including any additional engineering costs to the Department.
3. The execution of a supplemental agreement allowing the Contractor to waste suitable unclassified excavation and replace it with approved borrow material bars the Contractor from any claim for any time extensions related to the wasting and replacement operation described in the agreement.
4. The Contractor specifically waives his rights to request additional compensation with regard to wasting unclassified excavation under the compensation provisions

of Section 104 as result of substituting suitable borrow material and wasting suitable unclassified excavation.

Where the contract includes earth shoulder construction, stockpile suitable surplus material for use in the shoulders. To the extent possible, salvage topsoil from within the limits of the slope stake lines and store in stockpiles. Before the topsoil is removed, clear the areas of all weeds, brush, stumps, stones and other debris. Remove the topsoil from only such areas and to only such depths as required by the plans and specifications or as directed. Exercise care to avoid mixing subsoil or other unsuitable material with the topsoil. Stockpile an adequate quantity of material to construct the proposed shoulder before wasting any suitable surplus material. Locate the stockpiles along the project at approved locations. Neatly dress each stockpile, when completed. Perform temporary or permanent seeding on the stockpiles where directed or when necessary to prevent erosion. Remove and dispose of any surplus material remaining in the stockpile after the shoulders are completed as provided below for waste matter.

Dispose of waste material in accordance with Section 802.

Uniformly round the intersection of slopes with natural ground surfaces, including the beginning and ending of cut slopes, as shown on the plans. Concurrent with the excavation of cuts, construct intercepting berm ditches or earth berms along and on top of the cut slopes at locations shown on the plans or as designated. Finish all slopes to reasonably uniform surfaces acceptable for seeding and mulching operations. Leave no rock or boulders in place which protrude more than 1 foot (0.3 m) within the typical section cut slope lines. Clean all rock cuts of loose and overhanging material. Remove all protruding roots and other objectionable vegetation from the slopes.

Where a cut has been finished and the slopes dressed in accordance with the plans and slope stakes, the Contractor will not be required to flatten or widen the slopes of a completed cut unless the order is given in writing by the Engineer prior to the Contractor beginning the work. When rock is unexpectedly encountered, transition any widening or flattening already begun to leave the cut with a pleasing appearance.

If required, investigate the top 12 inches (300 mm) of the subgrade in cut sections to determine the necessity for rock undercut. This investigative work will be paid for in accordance with Article 104-7.

Unless otherwise directed, excavate rock in the bottom of roadway cuts to a depth of 1 foot (0.3 m) below the roadbed and ditches. Lower ditches if necessary so that water will drain from the rock surface to the ditches. Upon completion of the rock excavation below the level of the roadbed and ditches, backfill the areas where such rock has been removed with suitable material, compact, and shape to the required grade and cross section.

Excavate all rock under and adjacent to structure sites to limits directed prior to any work being begun on the structure.

Bring all cuts to the grade and cross section shown on the plans, prior to final inspection and acceptance .

Remove and dispose of slides and overbreaks which occur prior to final acceptance of the project. Where slides and overbreaks occur due to negligence or carelessness on the part of the Contractor, the removal and disposal of said slides and overbreaks will be at no cost to the Department.

All excavation done in the shaping of old roadways to produce a pleasing appearance in accordance with the provisions of Section 808 is paid for as Unclassified Excavation.

Conduct earthwork operations in a manner which will not disturb staking, utility poles or guy wires required to remain in their original location.

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Cut off and plug all private utility lines, remove existing shoulder drain and subdrain pipe and remove all underground tanks intercepted within the typical section or in conflict with construction.

Where it is necessary to remove existing sidewalks or driveways, furnish a neat edge along the pavement retained by sawing a neat line approximately 2 inches (50 mm) deep with a concrete saw before breaking the adjacent pavement away.

When excavation operations encounter graves, temporarily discontinue operations in the vicinity of the graves and do not resume until directed.

When excavation operations encounter contaminated soils, temporarily discontinue operations in the vicinity of the contamination and do not resume until directed.

When excavation operations encounter artifacts of historical or archeological significance, temporarily discontinue operations in the vicinity of the artifacts and do not resume until directed. Dispose of the artifacts in accordance with the requirements of the Division of Archives and History.

225-4 UNDERCUT EXCAVATION.

When the Engineer determines that the natural soil materials in areas where fills are to be placed are undesirable in their location or condition, the Engineer may require the Contractor to remove the undesirable material and backfill with approved material properly compacted.

When the Engineer determines that the finished graded roadway cross section contains materials which are undesirable in their location or condition, the Engineer may require the Contractor to remove the materials and backfill with approved properly compacted material to the finished graded section.

At locations where unstable soil is shown on the plans, remove and replace such soil as directed on the plans or by the Engineer.

Where undercutting is required adjacent to or beneath the location of the proposed drainage structure, perform undercut and backfill a sufficient distance adjacent to the installation to prevent future operations from disturbing the completed drainage structure.

Utilize equipment in undercutting and backfilling operations of such weight, size, and capability to efficiently remove and replace the material within the limits established. Use equipment of a size and weight which will not displace the underlying or adjacent material.

All material removed in the work of undercut excavation will be classified by the Engineer as either suitable for other use without excessive manipulation and utilized elsewhere in the work, or unsuitable for further use and disposed of by the Contractor as directed.

Conduct undercut operations in such a way that the Engineer can take the necessary measurements before any backfill is placed.

Place backfill in undercut areas in a continuous operation concurrent with the undercutting operation. Do not place backfill material in water unless otherwise permitted by the Engineer.

225-5 TOLERANCES.

A tolerance of plus or minus 0.10 foot (30 mm) from the established grade will be permitted in the roadbed after it has been graded to a uniform surface.

225-6 MAINTENANCE.

Maintain all work covered by this section during construction until final acceptance.

Provide the drainage of surface runoff along and throughout the length of the cut, construct temporary ditches, and use any other methods necessary to control excessive soil erosion during construction and until final acceptance of the project.

225-7 METHOD OF MEASUREMENT.

The quantity of excavation to be paid for will be the actual number of cubic yards (cubic meters) of materials, measured in their original position and computed by the average end area method, which have been acceptably excavated in accordance with the plans and specifications. The Engineer may also elect to use Digital Terrain Modeling (DTM's) or other new technology for determining the earthwork quantities, which has been proven accurate. Original cross sections for the determination of excavation quantities will be taken before any grading begins. Final cross sections will be taken after the excavation has been completed except that the plan typical sections will be used for the final cross sections where, in the opinion of the Engineer, the work has been constructed in reasonably close conformity to the plan typical section.

Original and final cross sections will be taken by either ground or aerial survey methods, as determined by the Engineer.

All materials excavated from a location below the graded roadway cross section are classified as undercut excavation and will be measured separately except for the following:

1. Rock in the bottom of roadway cuts excavated 1 foot (0.3 m) or less below the roadbed and ditches.
2. In cut areas, undercut excavation is limited to excavation removed below the roadbed sub-grade, removed below the inside slopes of roadway ditches, and removed below the bottom of flat bottom roadway ditches.

When the contract does not include the item of "Drainage Ditch Excavation," measurement of drainage ditch excavation will be made under this section in accordance with the methods prescribed in Subarticle 240-4(A).

Measurement of materials excavated from overbreaks or slides will be made except where the overbreaks or slides were due to the negligence or carelessness of the Contractor.

No measurement will be made of any materials excavated outside of authorized excavation limits established by the Engineer, or any materials excavated before slope stakes were set.

225-8 BASIS OF PAYMENT.

The quantities of excavation, measured as provided for in Article 225-7, will be paid for at the contract unit prices per cubic yard (cubic meter) for "Unclassified Excavation" or "Undercut Excavation."

Where the contract does not include the item of "Drainage Ditch Excavation," payment for this class of excavation will be made at the contract unit price per cubic yard (cubic meter) for "Unclassified Excavation."

Construction of berm ditches will be paid for as "Berm Ditch Construction" as provided in Article 240-5.

Materials excavated from stockpiles and used to construct earth shoulders will be paid for as "Shoulder Borrow" as provided for in Article 560-5. No payment will be made for the removal and disposal of any surplus material remaining in the stockpile after the shoulders have been completed.

Rock in the bottom of roadway cuts which has been excavated 1 foot (0.3 m) or less below the roadbed and ditches will be paid for at the contract unit price per cubic yard (cubic meter) for "Unclassified Excavation."

Payment for material that the Engineer directs to be removed beyond the limits of the original slope stakes will be made in accordance with Article 104-3.

Payment will be made under:

Unclassified Excavation.....	Cubic Yard (Cubic Meter)
Undercut Excavation.....	Cubic Yard (Cubic Meter)

**SECTION 226
COMPREHENSIVE GRADING**

226-1 DESCRIPTION.

The work covered by this section consists of all elements of work covered by Section 200, "Clearing and Grubbing"; Section 225, "Roadway Excavation"; Section 230; "Borrow Excavation"; Section 235, "Embankments"; Section 250, "Removal of Existing Pavement"; Section 500, "Fine Grading Subgrade, Shoulders, and Ditches"; and Section 560, "Shoulder Construction"; except that the provisions of the above-referenced sections pertaining to method of measurement, basis of payment, or compensation will not apply unless specific reference is made to such provisions.

226-2 CONSTRUCTION METHODS.

Perform the work in accordance with the provisions of Sections 200, 225, 230, 235, 250, 500, and 560.

226-3 METHOD OF MEASUREMENT.

Clearing and grubbing work that is directed by the Engineer to be performed on areas beyond the limits initially staked and/or areas outside the limits of right of way or easements shown in the original plans will be measured by the acre (hectare). All measurements will be made horizontally.

All materials excavated from the location below the finished graded roadway section are classified as undercut excavation and will be measured separately in accordance with Article 225-7 except for the following:

1. Rock in the bottom of cuts excavated 1foot (0.3 m) or less below the roadbed and ditches.
2. In cut areas, undercut excavation is limited to excavation removed below the roadbed, removed below the inside slopes of roadway ditches, and removed below the bottom of flat bottom roadway ditches.

226-4 BASIS OF PAYMENT

All work covered by this section will be paid for at the contract lump-sum price for "Grading" except as otherwise provided below.

Clearing and grubbing work that is directed by the Engineer to be performed on areas outside the limits originally staked or beyond the limits of the right of way or easements shown on the original plans will be paid for at the contract unit price per acre (hectare) for "Supplementary Clearing and Grubbing". Where the contract does not include this item, a unit price per acre (hectare) will be established by supplemental agreement.

The quantity of undercut excavation, measured as provided in Article 226-3, will be paid for at the contract unit price per cubic yard (cubic meter) for "Undercut Excavation". No separate payment will be made for materials utilized in backfilling the undercut areas as payment at the contract unit price per cubic yard for "Undercut Excavation" will be full compensation for furnishing such material. Where the contract does not include an item of "Undercut Excavation", payment for such excavation will be made in accordance with Article 104-7.

Section 226

Payment for material that the Engineer directs to be removed beyond the limits of the original slope stakes will be made in accordance with Article 104-3.

Payment for material that the Engineer directs the Contractor to obtain from borrow sources to backfill pipe culverts, box culverts, drainage structures, or structure bents will be made in accordance with Article 104-7.

No separate payment will be made for clearing and grubbing or draining borrow sources as such work will be considered incidental to the work covered by this section.

Payment for the work of seeding and mulching all borrow sources will be made at the contract unit prices for the items established in the contract as payment for the work of seeding and mulching.

Partial payments for the item of "Grading" will be made as follows:

The aggregate amount to be paid on each partial payment estimate will be equal to the percentage that the item of "Grading" is complete as estimated by the Engineer.

Payment will be made under:

Grading.....	Lump-Sum
Supplementary Clearing and Grubbing.....	Acre (Hectare)
Undercut Excavation.....	Cubic Yard (Cubic Meter)

**SECTION 228
PRE-SPLITTING OF ROCK**

228-1 DESCRIPTION.

Perform the blasting technique of pre-splitting preparatory to the excavation of rock material in cut areas. Pre-splitting is defined as the establishment of a free surface or shear plane in rock by the controlled usage of explosive and blasting accessories in appropriately aligned and spaced drill holes. The work includes but is not limited to drilling, explosives, loading of drill holes, and blasting.

Perform pre-splitting of rock in accordance with the details on the plans and at locations as directed.

228-2 CONSTRUCTION REQUIREMENTS.

Space drill holes for the pre-split face no more than 3 feet (0.9 m) apart. Keep drill holes parallel and in the same plane as the proposed slope. When more than one lift is necessary for a pre-split face the drill angle may be steepened to allow a 1 foot (0.3 m) offset at the bottom of the holes for drilling equipment to drill the holes for the next lift.

Do not exceed 4 inches (100 mm) in diameter and 25 feet (7.6 m) in depth for pre-split drill holes. If satisfactory drill hole alignment is not achieved, reduce the allowable drill hole depth as directed on all subsequent shots in order to minimize divergence.

Provide drilling equipment to drill the pre-split holes which has mechanical devices affixed to the equipment to accurately determine the angle at which the drill steel enters the rock. Pre-split hole drilling will not be permitted if these devices are either missing or inoperative.

Use only manufactured cartridge-type explosives with a maximum charge of 3/4 pounds per linear foot (0.51 kgs per linear meter) of drill hole in pre-split holes. Evenly space the charge by stemming or other approved methods. The bottom 2 feet (0.6 m) of the hole may have a charge rate that is double the charge rate for the rest of the hole. Do not place charge in the top 3 feet (0.9 m) of the drill hole, and stem that part of the hole with sand or 3/8 inch (10 mm) maximum size clean stone.

Section 228

Place production blast holes no closer than 4 feet (1.2 m) from the line of pre-splitting. Place the bottom of production drill holes at least 2 feet (0.3 m) higher than the bottom of pre-split drill holes.

Extend pre-split shots at least 50 feet (15.2 m) ahead of production shots. Fire all of the holes in a pre-split shot simultaneously and precede the production blasting by at least 25 milliseconds.

Provide a pre-split face that does not deviate more than 1 foot (0.3 m) from the line of drill holes except where pre-existing cracks, pockets of soil, seams of soft rock, or the character of rock will unavoidably result in irregularities. Scale and remove any material from the face remaining behind the pre-split line which is loosened by overblast. If deviation from the drill line or overblast occurs, alter all subsequent shots by changing the hole spacing, changing the diameter of holes, changing the rate of charge in the holes, or any combination of these or other measures approved by the Engineer.

228-3 METHOD OF MEASUREMENT.

The quantity of pre-splitting to be paid for will be the actual number of square yards (square meters) of rock face which has been pre-split, measured along the finished face of the rock. Deductions for unsatisfactory results will not be made where pre-splitting was performed as directed, provided results were caused by pre-existing conditions of the rock or were not caused by blasting methods.

228-4 BASIS OF PAYMENT.

The quantity of pre-splitting, measured as provided in Article 228-3, will be paid for at the contract unit price per square yard (square meter) for "Pre-Splitting of Rock." Such price and payment will be full compensation for all work covered by this section.

Payment will be made under:

Pre-Splitting of Rock..... Square Yard (Square Meter)

**SECTION 230
BORROW EXCAVATION.**

230-1 DESCRIPTION.

Excavate approved material from borrow sources. Haul and utilize such material as required on the plans or as directed. Work includes but is not limited to: furnishing the source of the borrow; providing and implementing a development, use, and reclamation plan; building, maintaining, and obliterating haul roads; clearing and grubbing the borrow source; removing, stockpiling, and replacing topsoil; removing and disposing of overburden and other unsuitable material; excavation; hauling; formation of roadway embankments, subgrades, and shoulders; restoration of the source and haul roads to an acceptable condition; obtaining permits and/or certifications; and maintaining the work.

Do not use borrow excavation until all available suitable unclassified excavation has been incorporated into the embankments, subgrades, and shoulders except by execution of a supplemental agreement documenting the conditions prescribed below.

1. All suitable unclassified excavation wasted as a result of the previous utilization of borrow material will be deducted from the total volume of borrow excavation paid under the contract.
2. Reimburse the Department for all additional costs, including additional engineering cost, associated with the wasting of suitable unclassified excavation.
3. Any claim for contract time extensions related to the early utilization of borrow is waived should the Contractor utilize borrow material prior to all suitable unclassified excavation being incorporated into the project pursuant to a supplemental agreement.

- 4. Rights to request additional compensation with regard to the early utilization of borrow under the compensation provisions of Section 104 except when unclassified excavation is a major contract item, as defined in Article 101-53, and that unclassified excavation overruns by more than 25%.

Where the work required to complete the project is so phased by the plans to preclude utilizing suitable unclassified excavation, the Contractor will be permitted to construct the required embankments, subgrades, or shoulders so controlled by the phasing from approved borrow materials without having to execute the above required supplemental agreement.

230-2 COORDINATION WITH SEEDING OPERATIONS.

Coordinate the work in this section with the construction of embankments so that the requirements of Article 225-2 are met.

230-3 MATERIALS.

Refer to Division 10:

Borrow MaterialSection 1018

230-4 CONSTRUCTION METHODS.

(A) General:

Thoroughly clear and grub and clean the surface of the borrow area of all unsuitable material before beginning the excavation and, where applicable, before cross-sections are taken. Dispose of material resulting from clearing and grubbing in accordance with Article 200-5. Remove and dispose of overburden in accordance with Section 802.

Do not accumulate exposed, erodible slope area in each borrow operation in excess of 1 acre (0.4 hectares) at any one given time without beginning permanent seeding and mulching of the borrow source or installing other erosion control measures as may be approved.

Remove and stockpile topsoil at locations that will not interfere with the borrow operations and that meet the approval of the Engineer. Install temporary erosion control measures as may be necessary to prevent the erosion of the stockpile material. Once all borrow has been removed from the source or portion thereof, uniformly spread the stockpiled topsoil over the area and permanently seed and mulch the area.

Where payment is made by cross-section, notify the Engineer sufficiently in advance of beginning excavation of the borrow material so that the area may be staked and cross-sectioned. No payment will be allowed for any material excavated prior to cross-sections being taken. Excavate the material to the lines and slopes as staked in an orderly manner to facilitate measurement at any time.

Where payment is to be made by truck measurement, furnish trucks with bodies suitable for accurate measurement. Load trucks uniformly and in such a manner as to prevent spillage.

When necessary to haul borrow material over existing roads or streets, the provisions of Article 105-15 apply. Use all necessary precautions to prevent damage to the existing structures or pavement. Conduct hauling operations in such a manner as to not interfere with the normal flow of traffic and keep the traffic lanes free from spillage at all times.

Furnish borrow sources except where otherwise indicated by the plans or special provisions.

(B) Department Furnished Sources:

The location of Department furnished borrow sources will be as designated on the plans or as directed.

Section 230

The Department will furnish the necessary haul road right of way at locations designated by the Engineer. Build, maintain, and when directed, obliterate all haul roads, at no cost to the Department. Where the haul road is to be reclaimed for cultivation plow or scarify the area to a minimum depth of 8 inches (200 mm).

Drain the borrow source when necessary in accordance with Section 240.

Leave the borrow sources in a neat and presentable condition after use. Smooth, round, and construct all slopes no steeper than 2:1. Where the source is to be reclaimed for cultivation, plow or scarify to a minimum depth of 8 inches (200 mm).

Seed and mulch all sources in accordance with Sections 1620, 1660, 1661, or 1662 unless otherwise directed.

(C) Contractor Furnished Sources:

Prior to the approval of any borrow source(s) developed for use on this project, obtain certification from the State Historic Preservation Officer of the State Department of Cultural Resources certifying that the removal of the borrow material from the borrow source(s) will have no effect on any known district, site building, structure, or object that is included or eligible for inclusion in the National Register of Historic Places. Furnish a copy of this certification to the Engineer prior to performing any work on the proposed borrow source.

Borrow sources will not be allowed in any area under the Corps of Engineers regulatory jurisdiction until the Contractor has obtained a permit for such borrow sources from the Corps District Engineer having jurisdiction and has furnished a copy of this permit to the Engineer. Requests for additional contract time, additional compensation, or for work stoppage due to permit violations will not be considered.

The approval of borrow sources furnished by the Contractor is subject to the following conditions:

1. Provide written proof of the right to take the material and any rights of access that may be necessary; for locating and developing the source; and any clearing and grubbing and drainage ditches necessary. The proof must include an agreement with the owner that the borrow source be dressed, shaped, seeded, mulched, and drained as required by these specifications after all borrow has been removed.
2. Sampling and testing of Contractor furnished borrow material will be in accordance with procedures set forth in the "Procedures for Sampling and Approving Contractor Furnished Borrow Sources" in effect on the date of advertisement for the project. Copies of this document are available from the Materials and Tests Unit. The criteria for acceptance of the proposed contractor furnished borrow material is shown in Section 1018.
3. Except where borrow is to be obtained from a commercial source, jointly submit with the property owner a borrow source development, use, and reclamation plan to the Engineer for his approval prior to engaging in any land disturbing activity on the proposed source other than material sampling that may be necessary. Address the following in the plan:

a. Topography

Detail the existing topography and locations of the proposed access and egress haul roads. Detail the proposed final topography of the waste or disposal area showing any proposed drainage systems. Excavate the source according to the plan and dress and shape it in a continuous manner to contours which are comparable to and blend in with the adjacent topography. Grade the source to drain such that no water will collect or stand. Provide a functioning drainage system for the source. If drainage is not practical, and the source is to serve as a pond, the minimum depth must be a least 4 feet (1.2 meters) as determined from

the water table at the time the reclamation plan is executed. The slope of the soil below the water must be between 5:1 and 2:1. The slope of the sides above the water line must be 2:1 or flatter.

b. Erosion Control

Detail the temporary and permanent erosion control measures, along with design calculations, that are intended during use of the site and as part of the reclamation. Unless considered impractical due to special circumstances, provide in the plan for the use of staged permanent seeding and mulching and appropriate fertilizer topdressing on a continual basis during site use and the immediate total reclamation of the site when the site is no longer needed. Define the seed mixture proposed for establishing temporary and/or permanent vegetation. Establish permanent stand of vegetation prior to acceptance of the project.

c. Buffer Zones:

Allocate sufficient area between the nearest property line and the tie-in of the slope to natural ground to allow for the operation of excavation, hauling, and seeding equipment and for the installation of any and all erosion control devices required. Leave additional undisturbed area between the source and any water course or body to prevent siltation of the water course or body and the movement of the shore line either into the water course or body or into the waste areas. Determine if any additional buffer zones are required by the adjoining property owners or other government agencies and comply with those requirements. [Suggested minimum distances are 10' (3 m) from property lines and 50' (15.2 m) from water bodies or water courses.] Where it is necessary to drain the borrow source, perform this work in accordance with Section 240.

d. Evaluation for Potential Wetlands and Endangered Species

Hire an experienced environmental consultant to perform an assessment of the Borrow site for potential conflicts with wetlands, Areas of Environmental Concern (CAMA), and federally protected species. This evaluation will not be required for permitted commercial sites.

Delineate the boundaries of any wetlands or jurisdictional surface waters (streams) encountered. Follow the standard practice for documenting the wetland delineation including completion of the Army Corps of Engineer's approved "wetland data form". Document information including data regarding soil, vegetation and hydrology. Maintain a minimum 25 foot (7.6 meter) buffer adjacent to all sides of the wetland boundary and a minimum 50 foot (15.2 m) buffer adjacent to any stream. Depict the limits of the delineated wetland and surrounding buffer on the Reclamation Plan. Do not remove borrow material in any area under the Corps of Engineers' or any other environmental agencies' regulatory jurisdiction unless and until the NCDOT permit has been modified to allow such disposal activity in the jurisdictional area.

Perform a site assessment for federally listed threatened or endangered species to include habitats which may support these species. Provide a detailed technical report on the assessment findings. If federally listed threatened or endangered species or habitat which may support such species exist on the proposed borrow site, notify the Engineer prior to continued pursuit of such site.

e. Approval

Obtain written approval from the Engineer prior to excavating any material within the proposed borrow source area.

Submit a revised or additional reclamation plan if the non-permitted waste or disposal area is expanded by more than one acre (0.4 hectare) or is significantly changed from the previously approved submittal.

(D) Maintenance:

During construction and until final acceptance, use any methods approved by the Engineer which are necessary to maintain the work covered by this section so that the work will not contribute to excessive soil erosion.

230-5 METHOD OF MEASUREMENT.

(A) General

Borrow excavation will be measured by in place measurement in its original or final position as provided by Subarticle 230-5(B) as determined below, except that truck measurement as provided in Subarticle 230-5(C) will be made where called for by the contract.

If the quantity of borrow excavation used is excessive as evidenced by the presence of surplus suitable material from the roadway excavation, the measured quantity of borrow excavation will be reduced by the quantity of such surplus suitable material.

The quantity of topsoil which is stockpiled and placed back on the source as a part of the reclamation effort will be measured in the stockpile by cross sectioning and computed by the average end area method. No in place measurement will be made of the topsoil.

(B) In Place Measurement:

The quantity of borrow excavation to be paid for will be the actual number of cubic yards (cubic meters) of approved material, measured in its original position by cross sectioning and computed by the average end area method, which has been excavated from the borrow source and incorporated into the completed and accepted work. No measurement will be made of any overburden or unsuitable material removed from the source, nor of any material excavated prior to cross sections being taken.

(C) Truck Measurement:

The quantity of borrow excavation to be paid for will be the actual number of cubic yards (cubic meters) of approved material, measured in trucks, which has been excavated from the borrow source and incorporated into the completed and accepted work. Each truck will be measured and must have a legible identification mark indicating its capacity. Load each truck to at least its measured capacity at the time it arrives at the point of delivery. The recorded capacity will be adjusted by making a 25 percent deduction to allow for shrinkage, and the adjusted capacity will be the quantity to be paid for.

230-6 BASIS OF PAYMENT.

The quantity of borrow excavation, measured as provided in Article 230-5, will be paid for at the contract unit price per cubic yard (cubic meter) for "Borrow Excavation".

The quantity of topsoil which is stockpiled and placed back on the source as a part of the reclamation effort and measured in accordance with Subarticle 230-5(A) will be paid for at the contract unit price per cubic yard (cubic meter) for "Borrow Excavation".

Where the borrow source has been furnished by the Department, payment for clearing and grubbing the source will be made as provided in Article 200-7 and payment for draining the source will be made as provided in Article 240-5. Where the borrow source has been furnished by the Contractor, no separate payment will be made for clearing and grubbing or draining the source as such work will be considered as incidental to the work covered by this section.

Payment for seeding and mulching and establishment of temporary erosion control for all borrow sources will be made at the contract unit prices for the items established in the contract as payment for the work of seeding and mulching.

Payment will be made under:

Borrow Excavation..... Cubic Yard (Cubic Meter)

**SECTION 235
EMBANKMENTS**

235-1 DESCRIPTION.

Place suitable material excavated under Sections 225, 226, 230, and 240 in embankments, backfills, and earth berms, to conform with the lines, grades, and typical cross sections shown on the plans. Fill and compact holes, pits, and other depressions when unsuitable material has been removed. Work includes preparation, formation, compaction, and maintenance of the embankment area as well as the formation of benches in the existing ground with rises less than 60 inches (1500 mm).

235-2 COORDINATION WITH SEEDING OPERATIONS.

Coordinate work with excavation operations to meet the requirements of Article 225- 2.

235-3 MATERIALS.

Use soil consisting of loose, friable, sandy material free of subsoil admixtures, refuse, stumps, rocks, roots, root mats, or other unsatisfactory material.

Wet, dry, or frozen material may be suitable when dried, wetted, or thawed, respectively. Waste suitable material only with written authorization.

Use Select Material defined in Section 1016 when called for on the plans or specifications.

235-4 CONSTRUCTION METHODS.

(A) Preparation for Embankment:

- Finish clearing and grubbing within an area before starting embankment per Section 200.
- Remove and waste organic or other unsuitable material.
- Plow mowed sod and leave in place where the height of embankment to be constructed is greater than six feet (1.8 m) measured under the roadbed.
- Plow or scarify and break up cleavage planes of all underlying road surfaces.
- Remove or break up existing pavement as instructed in Section 250.
- Bench existing slopes steeper than 4:1 measured at right angles to the roadway.
 - Provide rises of not less than 12 inches (300 mm) nor greater than 60 inches (1500 mm) as embankment is brought up in layers.
 - Provide sufficient width for the operation of placing and compaction equipment.
 - Begin bench cut at the intersection of the original ground and the vertical side of the previous cut.
 - Construct benches greater than 60 inches (1500 mm) in height only when shown on the plans. Such benches will be paid for in accordance with the project special provisions.

(B) Embankment Formation:

- Uniformly spread material in successive, approximately horizontal layers of not more than 10 inches (250 mm) in depth, loose measurement, for the full width of the cross section.
- Compact each layer in accordance with Subarticle 235-4(C).
- Shape embankment surface to properly drain at all times.
- Route construction equipment uniformly over the full width of the embankment and prevent deep rutting.
- May construct the first layer of embankments across saturated or unstable material, which does not support the weight of hauling equipment, by successively dumping a uniformly distributed layer of a thickness not greater than necessary to support hauling equipment while placing subsequent layers.
- When placing material in swamp or in water, keep unsuitable surge material in a fluid state or remove to prevent trapping in or under embankment.
- When shown on the plans or allowed by the project special provisions, form a satisfactory base by end or side dumping, in valleys, ravines, and at the foot of slopes on side hills.
- Where embankments are being constructed principally of rock or broken pavement, place in uniform layers with a maximum depth of 36 inches (900 mm).
 - Place rock or broken pavement so larger pieces are evenly distributed.
 - Fill all voids.
 - Place rock or broken pavement lifts a minimum of two feet (0.6 m) below subgrade.
- Do not place rock or broken pavement greater than two inches (50 mm) in diameter within 12 inches (300 mm) of the subgrade.
- Do not place rock or broken pavement in areas where piles are to be placed.
- Place Select Material where indicated on the plans or in the Specifications.
- Construct stabilized embankment when required by the plans and specifications.
- Install pipe culverts as specified in Section 300.
- Construct subsurface drains adjacent to structures as required by Article 414-9 for box culverts and Article 410-10 for other structures, except for that portion of the drain located below the elevation of the original ground.
- Do not disturb existing utilities within the project construction limits until released by the Engineer.

(C) Embankment Compaction:

- Compact each layer for its full width to a density equal to at least 95 percent that obtained by compacting a sample of the material in accordance AASHTO T99 as modified by the Department. Copies of these modified procedures are available upon request from the Department's Materials and Tests Unit.
- Uniformly bond all layers to preceding layers.
- Compact all surfaces on embankment slopes, principally constructed of soil, which are flatter than 1 1/2 : 1 using tracked equipment or other approved methods.
- Increase or decrease moisture content of the material before compacting to produce the maximum density that will provide a stable grade.
- Exempt portions of rock embankments, which cannot be tested by approved methods, from density requirements.

(D) Maintenance:

- Maintain all embankments made under the contract until final acceptance.
- Construct and maintain adequate drainage of surface runoff to prevent soil erosion.
- Replace damaged or displaced embankment caused by Contractor carelessness or negligence at no cost to the Department.
- Replace damaged or displaced embankment as a result of natural causes. Payment for this repair work will be at the contract unit price for the excavated material required to make the necessary repairs.
- Bring all embankments to the grade and cross section shown on the plans prior to final inspection and acceptance .

235-5 TOLERANCES.

Finish subgrade surface within plus or minus 0.10 foot (30 mm) from the established grade after it has been graded to a uniform surface.

235-6 COMPENSATION.

Payment will not be made for embankment construction. Payment is made under material supply.

SECTION 240 DITCH EXCAVATION

240-1 DESCRIPTION.**(A) General:**

Excavate and satisfactorily dispose of all materials excavated in the construction of ditches except silt ditches. Work includes but is not limited to excavation, shaping of the ditches, disposal of all materials, construction of earth berms, and the maintenance of the work in an acceptable condition until final acceptance.

(B) Drainage Ditches:

Drainage ditches will be defined as inlet and outlet ditches for pipe culverts and structures, changes in channels of streams, ditches draining borrow and material sources, and parallel or lateral ditches when such ditches are separated from the roadway slope by an area of natural ground or berm.

Unless otherwise classified on the plans, parallel or lateral ditches constructed as an integral part of the graded roadbed, having a continuous slope from the outer limit of the shoulder to the bottom of the ditch, will be considered to be within the roadway grading limits and will be part of the work covered by Section 225.

(C) Berm Ditches:

Berm ditches will be defined as ditches constructed by either excavation or the construction of earth berms along the top of the cut slopes. The location of berm ditches will be as shown on the plans or as directed.

240-2 GENERAL

Excavate to the lines, grades, typical sections, and details shown on the plans or established. Coordinate all work covered by this section with the grading, construction of drainage structures, excavation of borrow and material sources, and other work along the project, and maintain in a satisfactory condition so that adequate drainage is provided at all times. Maintain the ditches until the final acceptance of the project. Trim flush with the sides of the ditch any roots which protrude into the ditch. Complete inlet and outlet ditches for pipe lines before the pipe is installed unless otherwise permitted.

240-3 DISPOSAL OF MATERIALS.

Utilize all excavated materials in the construction of roadway embankments except where otherwise directed. Deposit materials which are excess to the needs of the project alongside the ditch, and spread to form a low, flat, inconspicuous spoil bank of sufficient regular contour to permit seeding and mowing, provided no drainage into the ditch is blocked.

240-4 METHOD OF MEASUREMENT.

(A) Drainage Ditch Excavation:

The quantity of drainage ditch excavation to be paid for will be the volume in cubic yards (cubic meters), measured in their original position by the average end area method, of all materials excavated within the limits established by the plans or directed.

Where excavation has been performed beyond the above limits, no measurement will be made of such excavation.

(B) Berm Ditch Construction:

The quantity of berm ditch construction to be paid for will be the actual number of linear feet (linear meters) of berm ditch, measured along the flow line of the ditch within the pay limits shown on the plans, which has been completed and accepted.

240-5 BASIS OF PAYMENT

(A) Drainage Ditch Excavation:

The quantity of drainage ditch excavation, measured as provided in Subarticle 240-4(A), will be paid for at the contract unit price per cubic yard (cubic meter) for "Drainage Ditch Excavation." Where the contract does not include the item of "Drainage Ditch Excavation," all work of drainage ditch excavation will be treated as unclassified excavation for pay purposes and will be paid for at the appropriate contract unit price per cubic yard (cubic meter).

(B) Berm Ditch Construction:

The quantity of berm ditch construction, measured as provided in Subarticle 240-4(B), will be paid for at the contract unit price per linear foot (linear meter) for "Berm Ditch Construction."

(C) Compensation:

Payment will not be made for any over excavation beyond the lines established; nor for any drainage ditch excavation made solely for the convenience of the Contractor or for temporary drainage of the project; or for any excavation to provide drainage of borrow or material sources furnished by the Contractor.

(D) Pay Items:

Payment will be made under:

Drainage Ditch Excavation	Cubic Yard (Cubic Meter)
Berm Ditch Construction	Linear Foot (Linear Meter)

SECTION 250 REMOVAL OF EXISTING PAVEMENT

250-1 DESCRIPTION.

Break up, remove and satisfactorily dispose of the portland cement concrete or asphalt components of an existing roadway pavement structure, including paved shoulders, within the limits shown on the plans or as directed. This work includes the removal of any temporary roadway pavement structure placed during construction to serve as a detour. This work does not include the removal and disposal of sidewalks, driveways, curb and gutter, traffic islands, and parking areas, or any other incidental paved structures which are not part of a roadway pavement structure.

250-2 PAVEMENT REMOVAL AND DISPOSAL.

Break up and remove the pavement for its entire depth. Where concrete or asphalt pavement is to be removed, provide a neat edge along the pavement being retained by sawing the pavement approximately 2 inches (50 mm) deep before breaking the adjacent pavement away. Dispose of all materials resulting from the pavement removal as provided herein.

When existing pavement is located where embankment is to be constructed, and the depth of the embankment is greater than 1 foot (0.3 m) exclusive of base and pavement, do not remove existing pavement, but break up the existing pavement into pieces with the longest dimension no larger than 3 feet (0.9 m).

Use all materials in the construction of embankments, unless otherwise directed. Stockpile materials, which the Department desires to use, as indicated on the plans at approved locations.

Where the Contractor requests permission to use salvageable material in other parts of the work and such material has been intended for use in the construction of embankments, the Engineer may permit such use provided the Contractor furnishes at no cost to the Department an adequate quantity of material for embankment construction to replace the material used in all other parts of the work.

Dispose of all materials which cannot be used in the work in accordance with Section 802.

250-3 METHOD OF MEASUREMENT.

The quantity of pavement removed will be measured as the area of square yards (square meters) of existing asphalt or concrete pavement actually removed and disposed of in accordance with the requirements of this section. The quantity will be determined by actual surface measurement of the asphalt or concrete pavement prior to its removal. The quantity of pavement broken up and left in place to be paid for will be the area of square yards (square meters) of existing concrete or asphalt pavement actually broken up and left in place in accordance with the requirements of this section. The quantity will be determined by actual surface measurement of the pavement prior to breaking it up.

250-4 BASIS OF PAYMENT

The quantity of pavement removal, measured as provided in Article 250-3, will be paid for at the contract unit price per square yard (square meter) for "Removal of Existing Asphalt Pavement" or "Removal of Existing Concrete Pavement" depending upon the type of pavement removed.

The quantity of breaking up existing pavement and leaving in place, measured as provided in Article 250-3, will be paid for at the contract unit price per square yard (square meter) for "Breaking of Existing Concrete Pavement" or "Breaking of Existing Asphalt Pavement" depending on the type of pavement broken up.

Section 250

Where the pavement removed or broken up is a combination of layers of both asphalt and concrete pavement, payment will be made at the contract unit price per square yard (square meter) for “Removal of Existing Concrete Pavement” or at the contract unit price for “Breaking of Existing Concrete Pavement”.

Where the pavement removed is a combination of layers of both asphalt and concrete pavement and an item is not established for concrete pavement removal, the cost of removing the combination of layers of asphalt and concrete will be made in accordance with Article 104-7 of the specifications.

Payment will be made under:

Removal of Existing Asphalt Pavement	Square Yard (Square Meter)
Removal of Existing Concrete Pavement	Square Yard (Square Meter)
Breaking of Existing Concrete Pavement	Square Yard (Square Meter)
Breaking of Existing Asphalt Pavement	Square Yard (Square Meter)

**SECTION 260
PROOF ROLLING**

260-1 DESCRIPTION.

The work covered by this section consists of furnishing and operating, at the direction of the Engineer, heavy pneumatic tired compaction equipment for compacting the roadbed and testing the roadbed for stability and uniformity of compaction. This work includes furnishing all labor, equipment, fuel, and ballast for loading; loading and unloading ballast as directed; and increasing and decreasing tire pressure as directed.

260-2 EQUIPMENT.

Provide equipment with the following features:

- Four rubber tired wheels mounted on a rigid steel frame.
- Wheels evenly spaced in one line across the width of the roller and arranged so that all wheels will carry approximately equal loads when operated over an uneven surface.
- Maximum center to center spacing between adjacent wheels is 32 inches (812.8 mm).
- Load capacity from 48 to 50 tons (43.6 to 45.5 metric tons) unless otherwise permitted in writing.
- The loaded roller must be covered or constructed so that it will not trap water which will add weight to the ballast.
- Other equipment of equal or better effectiveness may be substituted with written permission.
- Tires operated at inflation pressures between 68 to 72 psi (468.8 to 496.4 kPa) unless otherwise permitted in writing. Inflate tires with air only; use no liquid.

Provide ballasts consisting of bulk sand, bulk stone, bags of sand, stone, or other materials of known unit weight such that the total weight of the ballast used can be readily determined at all times. Provide a sufficient amount of ballast to load the equipment to a maximum gross weight of 50 tons (45.5 metric tons).

Use rubber tired or other types of tractive equipment for operation of this equipment on the roadbed. The entire assembly including motivating equipment must be capable of executing a 180 degree turn on a 27 foot (8.2 m) wide area.

260-3 CONSTRUCTION METHODS.

After the roadbed has been completed within 0.50 foot (0.15 m) of final grade, compact and test the roadbed with 1 foot (0.3 m) coverage, unless otherwise directed, with a heavy pneumatic tired roller meeting the requirements of Article 260-2. A coverage is considered that stage in the rolling procedure when the entire width of the area being proof rolled has been in contact with the pneumatic tires of the roller. Operate the roll in a systematic manner so that the number of coverages over all areas to be proof rolled can be readily determined and recorded.

Operate the equipment at a speed between 225 and 300 feet (68.6 to 91.4 m) per minute.

Perform proof rolling only in the presence of an inspector.

Proof roll areas again following the completion of the necessary corrections. Perform proof rolling at no cost to the Department if the corrections are necessary due to the negligence of the Contractor or weather.

Protect all structural facilities on the project, such as but not limited to bridges, box culverts, pipe culverts, and utilities, from damage by the proof rolling equipment. Protection may include unloading and reloading of the roller, detouring, protective earth pads, or other suitable measure to avoid damage.

260-4 METHOD OF MEASUREMENT

The quantity of proof rolling to be paid for will be the actual number of hours, measured to the nearest 0.1 hour, during which the heavy pneumatic tired roller has been engaged in proof rolling in the presence of an inspector exclusive of hours of proof rolling performed following corrective action made necessary by the negligence of the Contractor or by weather.

260-5 BASIS OF PAYMENT

The number of hours of actual rolling time, measured as provided in Article 260-4, will be paid for at the contract unit price per hour for "Proof Rolling".

Corrective work necessary, as determined by proof rolling, and not due to negligence or the Contractor or to weather, will be paid for at the applicable contract unit prices or as extra work, whichever may be applicable.

Payment will be made under:

Proof Rolling Hour

**SECTION 265
SELECT GRANULAR MATERIAL**

265-1 DESCRIPTION.

Furnish and place select granular material over the previously placed fabric for soil stabilization as shown in the plans and as directed. Work includes but is not limited to furnishing, hauling, placing and all incidentals necessary to complete the work satisfactorily.

265-2 MATERIALS.

Refer to Division 10:

Class II Select Material Article 1016-3
Class III Select Material Article 1016-3

265-3 CONSTRUCTION METHODS.

Select granular material used over the soil stabilization fabric and/or backfill below ground water level must be either Class II or Class III Select Material.

Place Select Granular Material 3 feet (0.9 m) above the fabric and/or backfill in water.

265-4 METHOD OF MEASUREMENT.

The quantity of select granular material to be paid for will be the actual number of cubic yards (cubic meters) of select granular material which has been incorporated into the completed and accepted work.

265-5 BASIS OF PAYMENT.

The quantity of select granular material measured as provided in Article 265-4, will be paid for at the contract unit price per cubic yard (cubic meter) for "Select Granular Material".

Payment will be made under:

Select Granular Material Cubic Yard (Cubic Meter)

**SECTION 270
FABRIC FOR SOIL STABILIZATION**

270-1 DESCRIPTION.

Furnish and install synthetic fabric for stabilizing soil in accordance with this specification, at locations shown on the plans, or as directed. Work includes but is not limited to furnishing, hauling, placing, and sewing the fabric and furnishing and placing wire staples.

270-2 MATERIALS.

Refer to Division 10:

Fabric for Soil Stabilization Section 1056

270-3 CONSTRUCTION METHODS.

Place the fabric at locations as directed. Make sure that the surface of the fabric is free of obstructions, debris and pockets. At the time of installation, the fabric will be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation, or storage.

Place the fabric with the long dimension parallel to the centerline of the roadway and lay it smooth and free from tension, stress, folds, wrinkles or creases. Overlap all transverse and longitudinal joints a minimum of 18 inches (457.2 mm) or sew together using techniques and thread which are recommended by the manufacturer and approved by the Engineer. Use a standard installation procedure of overlapping unless otherwise directed to sew in areas where the foundation soils are extremely soft and unstable. Use wire staples as needed to hold the fabric in place until it is covered. No equipment will be allowed to operate on the fabric until it is covered with material as directed. Unless otherwise stipulated, provide backfill material meeting the requirements Section 265 and/or of the project special provision entitled "Shallow Undercut" contained in the proposal form.

270-4 METHOD OF MEASUREMENT.

The quantity of fabric to be paid for will be the number of square yards (square meters) of fabric, measured along the surface of the ground, which has been acceptably placed. No separate measurement will be made of overlapping fabric.

270-5 BASIS OF PAYMENT.

The quantity of fabric, measured as provided in Article 270-4, will be paid for at the contract unit price per square yard (square meter) for "Fabric for Soil Stabilization".

Payment will be made under:

Fabric for Soil Stabilization Square Yard (Square Meter)

NOTES:

