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**DIVISION 200
EARTHWORK**

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201 - CLEARING AND GRUBBING

SECTION 201

CLEARING AND GRUBBING

201.1 DESCRIPTION

Clear and grub the vegetation and debris as specified in the Contract Documents.

BID ITEM

Clearing and Grubbing

UNITS

Lump Sum

201.2 MATERIALS

Backfill stump holes using granular material or loose friable soil from the project. Use material that is free of excess moisture, frozen lumps, roots, sod, rocks greater than 4 inches in diameter or other deleterious material.

The Engineer will accept the backfill material based on visual inspection.

201.3 CONSTRUCTION REQUIREMENTS

Do not damage any vegetation designated to remain. The Engineer will identify any trees, shrubs and other vegetation designated to remain. Remove low hanging, unsound or unsightly branches on trees and shrubs designated to remain as specified in the Contract Documents. Trim the branches according to recognized industry practices.

Within the construction limits, clear and grub all vegetation not designated to remain. Undisturbed stumps and roots no more than 6 inches above the original ground line or low water level may remain, provided they are a minimum of 3 feet below the finished subgrade or embankment slope and approved by the Engineer.

Remove and dispose of the cleared vegetation and debris. If authorized by the Engineer, dispose of the cleared vegetation and debris on the right-of-way.

Backfill and compact all stump holes, except in areas of excavation. Backfill the stump holes to the level of the surrounding ground. If the backfill area is within the limits of the new construction, compact the backfill to the type of compaction and within the moisture range designated in the Contract Documents.

Provide temporary erosion and pollution control according to **SECTION 901**.

201.4 MEASUREMENT AND PAYMENT

The Engineer will measure the clearing and grubbing as a lump sum.

Payment for "Clearing and Grubbing" at the contract unit price is full compensation for the specified work.

202 - REMOVAL OF EXISTING STRUCTURES

SECTION 202

REMOVAL OF EXISTING STRUCTURES

202.1 DESCRIPTION

Remove and dispose of the existing structures as specified in the Contract Documents. Existing structures include the structures identified in the Contract Documents for removal, and man-made structures not specifically identified in the Contract Documents that are in conflict with the new construction and would normally be encountered upon a careful examination of the work site. Excluded are utilities and structures for which other provisions are made for removal.

Protect any structures designated to remain.

Remove, clean and store any materials designated for salvage.

Remove, clean, store and reconstruct any existing structures as designated in the Contract Documents.

BID ITEMS

Removal of Existing Structures

Removal and Reconstruction of Existing Structures

UNITS

Lump Sum

Lump Sum

202.2 MATERIALS

a. Backfill Material. Backfill cavities created by removing existing structures, using granular material or loose friable soil from the project. Use material that is free of excess moisture, frozen lumps, roots, sod, rocks greater than 4 inches in diameter or other deleterious material. The Engineer will accept the backfill material based on visual inspection.

b. Materials to Reconstruct Existing Structures. Provide the specified materials that comply with the materials' divisions (**SECTIONS 1000 – 2500**).

If the existing structure is damaged during the removal operations, replace any damaged materials with new materials matching the originals.

202.3 CONSTRUCTION REQUIREMENTS

a. Removal of Existing Structures. Raze, remove and dispose of all existing man-made structures and debris not designated to remain.

If the substructure of an existing structure lies wholly or partly within the limits of a new structure, remove the existing substructure to accommodate the new structure. Remove the existing substructure to the natural stream bottom, or 12 inches below the natural ground surface or new finished lines, whichever is lower.

Unless the area is excavated during the new construction, backfill to the level of the surrounding ground and compact all cavities left by the structure removals. If the backfill area is within the limits of the new construction, compact the backfill to the type of compaction and within the moisture range designated in the Contract Documents.

Provide temporary erosion and pollution control according to **SECTION 901**.

b. Removal and Reconstruction of Existing Structures. Before removing the existing structures designated for relocation, take sufficient measurements and color photographs of the existing structures so the reconstruction duplicates the original. Provide the Engineer with copies of the measurements and photographs.

Submit for the Engineer's approval, a written plan for the relocation and reconstruction of the existing structures, before beginning any relocation and reconstruction work. Reconstruct the structure according to the details in the Contract Document.

c. Existing Bridge Deck. During bridge deck removal, if the structural steel is damaged by concrete saw cuts, the Contractor will be charged \$100.00 per inch of saw cuts. If damage requires additional design engineering, engineering fees may also be deducted. The Contractor is responsible for repairs to the damaged girders as directed by the Engineer. Monies owed KDOT will be deducted from payments due the Contractor.

202 - REMOVAL OF EXISTING STRUCTURES

d. Salvaged Materials. The salvaged material will remain the property of the State, County or City, as applicable. If not shown in the Contract Documents, the Engineer will designate the storage areas.

Remove the material in sections or pieces that can be transported and stored. Dismantle steel and wood bridges designated in the Contract Documents. Match mark the salvaged steel members, unless the Engineer waives this requirement.

Unless otherwise shown in the Contract Documents, salvage and clean all existing pipe determined usable by the Engineer.

If during the removal and transport to the storage area, the Contractor damages material designated as salvage, the Engineer will deduct 60% of the current quoted price for replacement material delivered to the project from payments due the Contractor.

e. Asbestos Removal. Inspect all building structures that are scheduled for removal, and determine if asbestos is present. Sample, test, remove and dispose of asbestos, while complying with all Federal and State regulations, laws, rules and ordinances pertaining to asbestos removal and waste disposal. File all appropriate notification forms and any required permits with Federal and State authorities, and pay all related fees. Provide the Engineer copies of all notification forms, correspondence, test results, recommendations and other information to document compliance with these requirements.

202.4 MEASUREMENT AND PAYMENT

The Engineer will measure the removal of existing structures and removal and reconstruction of existing structures by the lump sum.

If the Contract Documents identify asbestos in the removal of building structures, asbestos removal is subsidiary to "Removal of Existing Structures". If asbestos removal is not shown in the Contract Documents, but is required after the initial inspection indicates the presence of materials containing asbestos, the asbestos removal will be paid for as Extra Work, **subsection 104.6**.

Payment for "Removal of Existing Structures" and "Removal and Reconstruction of Existing Structures" at the contract unit price is full compensation for the specified work.

203 - RESETTING EXISTING CULVERTS

SECTION 203

RESETTING EXISTING CULVERTS

203.1 DESCRIPTION

Remove and reset the existing culverts and end sections as specified in the Contract Documents.

BID ITEMS

Resetting End Section
Resetting Pipe Culvert

UNITS

Each
Linear Foot

203.2 MATERIALS

Provide the required materials that comply with the materials' divisions (**SECTIONS 1000 – 2500**).

203.3 CONSTRUCTION REQUIREMENTS

Remove the designated structures without damaging. Store and protect the structure from damage, if the structure is not reset immediately. Replace, in kind, any structures or materials damaged or lost.

Clean all structures before resetting.

Reset the structures at the locations shown in the Contract Documents. Excavate for, place and backfill the structures according to **SECTION 204**.

203.4 MEASUREMENT AND PAYMENT

The Engineer will measure each removal and resetting of an existing end section.

The Engineer will measure the removal and resetting of an existing pipe culvert by the linear foot of culvert reset.

Payment for "Resetting End Section" and "Resetting Pipe Culvert" at the contract unit prices is full compensation for the specified work.

If, upon removal, the Engineer determines that the existing culvert or end section is damaged, and the damage is not a result of the Contractor's actions, the Engineer will pay for the replacement of the culvert or end section as "Extra Work", **subsection 104.6**.

204 - EXCAVATION AND BACKFILL FOR STRUCTURES

SECTION 204

EXCAVATION AND BACKFILL FOR STRUCTURES

204.1 DESCRIPTION

Excavate for the structures as shown in the Contract Documents. Unless specified otherwise, backfill the completed structures to the original ground line.

BID ITEMS

UNITS

Class * Excavation	Cubic Yard
Concrete (Grade **)(***)	Cubic Yard
Concrete for Seal Course (Set Price)	Cubic Yard
Foundation Stabilization	Cubic Yard
Foundation Stabilization (Set Price)	Cubic Yard
Granular Backfill	Cubic Yard
Granular Backfill (Wingwalls) (Set Price)	Cubic Yard
Water (Grading) (Set Price)	M Gallon
*Class of Excavation	
**Grade of Concrete	
***AE (air-entrained), if specified	

204.2 MATERIALS

Provide materials that comply with the applicable requirements.

Concrete	DIVISION 400
Aggregates for Backfill	DIVISION 1100
Water	DIVISION 2400

Provide sand, or other aggregate that contains sufficient binder to allow compaction and limit the flow of water through the material, as granular material for culvert bedding. Provide material with enough moisture to allow compaction. The Engineer will accept the granular bedding material based on visual inspection of the material placed on the project.

204.3 CONSTRUCTION REQUIREMENTS

a. Classification of Excavation.

(1) Class I Excavation and Class II Excavation. Excavation for bridges is normally classified as Class I and Class II Excavation. Class I and Class II Excavation are referenced to the Excavation Boundary Plane (a horizontal plane at a given elevation) shown in the Contract Documents.

(a) Class I Excavation is the entire volume of whatever nature, except water, found above the Excavation Boundary Plane, within the limits specified.

(b) Class II Excavation is the entire volume of whatever nature, including water, found below the Excavation Boundary Plane, within the limits specified.

(2) Class III Excavation. Bridge excavation not classified as Class I or Class II, is classified as Class III Excavation. Excavation for structures other than bridges is also classified as Class III Excavation.

(a) Class III Excavation is the entire volume of whatever nature encountered, including water, within the limits specified. The water level for determining quantities is the water level during construction at which pumping or bailing is necessary to continue excavation.

b. Excavation Requirements.

(1) General. Allow the Engineer to define the limits of the excavation and cross-section the original ground before beginning the excavation for the structure.

204 - EXCAVATION AND BACKFILL FOR STRUCTURES

Excavate all foundations to the elevations and dimensions shown in the Contract Documents. If rock of the quality that will not erode is encountered in the toe wall excavation, the Engineer may allow the toe wall to be keyed into the rock.

Follow OSHA safety regulations for sloping the sides of excavations, using shoring and bracing as required.

If material encountered below the foundation elevation will not support the structure, remove such material and replace with stable backfill material approved by the Engineer.

Save excavated material for structure backfill. Dispose of surplus excavated material and excavated material unsuitable as backfill material.

Provide temporary erosion and pollution control according to **SECTION 901**.

(2) Cofferdams. Use watertight cofferdams if excavating in water, or if the excavation is affected by groundwater. Construct and shore the cofferdams according to OSHA safety regulations. The minimum size of the cofferdams shall be greater than the limits for pay excavation. Extend the cofferdams below the bottom of the footing, or at least to an elevation as near the bottom of the excavation as foundation conditions will allow. If necessary, dewater the cofferdams.

(3) Foundations with Piling. Complete the foundation excavation before driving any piling. After driving all piling, remove the loose and displaced material in the foundation pit. If necessary, reshape and recompact the bottom of the excavation according to the Contract Documents.

(4) Spread Footing Bridge Foundations. From the elevation that rock or shale is encountered or from the top elevation of the footing, whichever is lower, excavate the footing as shown in the Contract Documents. No side forming is allowed below the top elevation of rock or shale, or below the top of the footing, whichever is lower. Cut spread footing bridge foundations in rock, using hand equipment. Do not use blasting or machine rock excavation below the top of the footing.

If the bottom elevation of the spread footing excavation is in shale, minimize the time the shale is exposed to the elements before placing the concrete footing. Place the concrete footing within the time limits designated in the Contract Documents. Contact the KDOT Regional Geologist if the shale exposure exceeds the maximum time specified. Mitigate the effects of the shale exposure by excavating a minimum of 4 inches below the over-exposed shale to expose sound material. The Contractor has the option (at own expense) to negate the time limits imposed for exposure of the shale by placing a 4 inch (minimum) concrete seal of Grade 4.0 concrete over the exposed shale before the specified time limits expire. If the Contractor chooses this option, excavate to 4 inches below the plan bottom of footing elevation so the bottom of footing elevation remains at the elevation designated by the Contract Documents.

After the excavation is completed, and all loose material is removed from the footing, drill exploratory borings 1½ to 2 inches in diameter and 5 foot deep to verify the quality and soundness of the material below the bottom of the footing. Notify the Engineer before starting the exploratory borings.

- For footings with an area of less than 12 square yards, drill the boring in the center of the footing.
- For footings with an area of 12 square yards or greater, drill a boring within 3 feet of each corner of the footing.

If an exploratory boring encounters unsound material, or if the material at the bottom of the footing does not match the material shown on the geology sheet in the Contract Documents, do not proceed with the construction of the spread footing until the site is reviewed by the Geologist and a recommended course of action made.

(5) Excavation for Metal Pipe, Reinforced Concrete Pipe and Structural Plate Structures.

- Pipes and Culverts less than 3 feet in diameter. Excavate the bottom of the channel to the elevation shown in the Contract Documents. While excavating, use a template to shape the bottom of the channel so that at least 10% of the overall height of the pipe or culvert is in contact with the bottom of the channel. Excavate recesses into the channel to accept all protrusions from the perimeter of the pipe or culvert. Alternate methods of bedding the pipe or culvert: (1) Place and compact a bed of granular material (4 inch minimum thickness) on the bottom of the channel, and then use a template to shape the granular material to accept the culvert. (2) Place the pipe or culvert on the bottom of the channel, then place and tamp granular material (4 inch minimum thickness) under the haunch area of the pipe or culvert.
- Pipes and Culverts greater than 3 feet in diameter. Excavate the bottom of the channel to the elevation shown in the Contract Documents. Excavate recesses into the channel to accept all protrusions from the perimeter of the pipe or culvert. After the pipe or culvert is placed on the bottom of the channel,

204 - EXCAVATION AND BACKFILL FOR STRUCTURES

place and tamp granular material under the haunch area of the pipe or culvert so that 20% of the overall height of the pipe or culvert is bedded in the granular material. An alternate method of bedding the pipe or culvert is to place and compact a bed of granular material (approximately half the total quantity needed) on the bottom of the channel, then use a template to shape the granular material to accept the pipe or culvert. Place and tamp the remainder of the granular material after the pipe or culvert is placed so that 20% of the overall height of the pipe or culvert is bedded in the granular material.

- If rock is encountered, remove the rock to an elevation 12 inches below the elevation shown in the Contract Documents for the bottom of the channel. If blasting is used to remove rock, take the precautions to protect the previously placed portions of the structure. Backfill and compact the bottom 12 inches of the excavation with soil from the roadway excavation.

(6) Excavation for PE and PVC Pipes. Excavate and form a bed for PE and PVC pipes according to AASHTO LRFD Bridge Design Specifications, Section 12, with these alterations:

- The minimum trench width = (1½ times the pipe diameter) + 12 inches.
- The space between the pipe and the trench wall shall be wider than the compaction equipment used in the pipe zone.
- The trench width in unsupported, unstable soils will depend on the size of the pipe, the stiffness of the backfill and insitu soil, and the depth of cover.

c. Foundation Stabilization. When designated in the Contract Documents, the Contractor has the option to construct the foundation stabilization 6 inches thick, according to the details shown, or underrun the item when deemed unnecessary. When conditions require, the Engineer may approve a depth greater than 6 inches.

d. Foundation Stabilization (Set Price). If the Contract Documents do not designate foundation stabilization and a firm foundation is not encountered at the established grade for boxes or pipe culverts, the Engineer may approve the removal of unsound material and installation of suitable foundation stabilization material. Before this work is done, the Engineer will determine the limits of excavation for the material removal.

e. Concrete Seal Course (Set Price). When designated in the Contract Documents, construct the concrete seal course according to the details shown.

When the Contract Documents do not show a concrete seal course, but the bottom of the excavation can not be pumped free of water, the Engineer may approve the placement of a concrete seal course. When approved by the Engineer, construct a 3 inch seal course of commercial grade concrete below the bottom of footing elevation. If the Contract Documents call for foundation stabilization, and the Engineer determines the conditions require a concrete seal course as specified above, underrun the foundation stabilization. The Engineer will consider alternate methods of sealing out the water. The burden of proof regarding an alternate method of sealing out the water will be on the Contractor.

If a concrete seal course is not shown in the Contract Documents, or the Engineer does not approve one, the Contractor may still place one at own expense.

When the Contract Documents show constructing foundation stabilization, the Contractor has the option of constructing a concrete seal course in its place. However, the concrete seal course will be paid for as foundation stabilization at the contract quantity and unit price.

f. Backfill for Structures.

(1) General. Do not place backfill against any structure without the Engineer's approval.

Remove all shoring, bracing and cofferdams before backfilling a structure.

Use material from the structure excavation or material from the roadway excavation for the backfill of structures. If necessary, adjust the moisture content of the soil by adding water to or aerating the material.

Do not use hydraulic methods of backfill.

After the designated cure period for a concrete structure expires, wait at least 3 days before subjecting the structure to the pressures of backfilling or to live loads. If adverse curing conditions exist, the Engineer may extend this period.

Provide for drainage at all weep holes in concrete structures. Unless drainage is provided for otherwise in the Contract Documents, place approximately 2 cubic feet of crushed stone or sand gravel at each weep hole.

204 - EXCAVATION AND BACKFILL FOR STRUCTURES

Place granular backfill as detailed in the Contract Documents. If the area for granular backfill is excavated beyond the theoretical limits of the granular backfill, fill the over-excavation with granular backfill material.

Place the backfill in horizontal layers evenly on all sides of the structure, a maximum of 8 inches thick (loose measurement). If the backfill is placed on only one side of a structure (such as abutments, piers, wingwalls), do not put excessive pressure against the structure. Prevent wedging action against the structure during the backfill. Bench the slopes bounding the excavation.

Extend each layer of the backfill to the limits of the excavation or to the original ground line. Continuously level and manipulate the material during the placing and compacting of each layer of the backfill. Use a motorgrader where possible. Compact each layer as specified before placing the next layer.

Drain all water from areas before backfilling. If backfill compaction is not required for piers, it is not necessary to drain the water from the pier excavations before backfilling.

If it is impossible to drain the water, deposit thin layers of backfill material into the water. When placing backfill material into water, the compaction requirements do not apply until the backfill progresses to the point that all water is absorbed by the backfill material.

Unless otherwise shown in the Contract Documents, backfill compaction is not required around piers, except piers adjacent to railroad tracks, roadways or in the toe slopes of embankments.

If the Contract Documents provide for "Compaction of Earthwork", compact the backfill according to **SECTION 205**. If the Contract Documents do not provide for compaction, compact the backfill according to Type B compaction in **SECTION 205**.

If the Contract Documents designate a moisture range for the embankment adjacent to the structure, use backfill material with uniform moisture content within the specified range according to **SECTION 205**. If the Contract Documents do not designate a moisture range, use backfill material with uniform moisture content adequate to produce the specified density.

(2) Backfill of Reinforced Concrete Box. If the top of a reinforced concrete box extends above the original ground line, continue the compacted backfill to the top of the reinforced concrete box. Place the backfill 10 feet wide on each side of the culvert for the full width of the roadway embankment.

(3) Backfill of Metal Pipe, Reinforced Concrete Pipe and Structural Plate Structures. If the top of a pipe or culvert extends above the original ground line, continue the compacted backfill to the top of the pipe culvert. Place the backfill 1½ times the external diameter of the pipe on each side of the culvert for the full width of the roadway embankment. Take the necessary precautions to prevent distortion of the pipe or culvert while backfilling.

Backfill structural plate structures and metal pipes greater than 60 inches in diameter with granular backfill. Use deflection control measures, including hand tamping, to maintain the original shape of the structure.

If the height of fill over the top of a reinforced concrete pipe is greater than 27.5 feet, place the backfill using the imperfect trench method in this manner:

- Place the reinforced concrete pipe in the excavation, as specified.
- Place and compact the earthen backfill to a height above the top of the pipe equal to the external width of the pipe.
- After the backfill is placed and compacted as specified, excavate the compacted earth from the prism directly over the pipe.
- Backfill the resulting trench with earth placed in the loosest possible condition.
- After the trench is filled with loose earth, construct the remainder of the embankment as specified in the Contract Documents.

If it is necessary for construction equipment to travel over a corrugated metal pipe culvert before the backfill is completed above the top of the culvert, place additional backfill over the top of the pipe. Use **TABLE 204-1** as a guide.

TABLE 204-1: APPROXIMATE MINIMUM COVER OVER THE TOP OF THE PIPE				
CMP Size (inches)	Approx. Min. Cover Required for Axle Load of 18 to 50 Kip (feet)	Approx. Min. Cover Required for Axle Load of 50 to 75 Kip (feet)	Approx. Min. Cover Required for Axle Load of 75 to 110 Kip (feet)	Approx. Min. Cover Required for Axle Load of 110 to 150 Kip (feet)
12 to 42	2.0	2.5	3.0	3.0
48 to 72	3.0	3.0	3.5	4.0
78 to 120	3.0	3.5	4.0	4.0

204 - EXCAVATION AND BACKFILL FOR STRUCTURES

(4) Backfill of PE and PVC Pipe. Backfill PE and PVC pipe according to the AASHTO LRFD Bridge Design Specifications, Section 12, with these alterations:

- If the fill to the top of the subgrade is 3 feet or less, backfill with granular material to the top of the subgrade.
- If the fill to the top of the subgrade is greater than 3 feet, backfill with granular material to a point 12 inches above the top of the pipe.
- Prevent floating the pipe during the backfilling operations. Do not deform or damage the pipe while compacting the granular backfill. Hand tamping may be necessary adjacent to the pipe to prevent distortion.
- The maximum barrel deflection of the pipe (reduction of the barrel nominal base inside diameter) shall not exceed 5%. Use a mandrel to measure the barrel deflection of the pipe. Take the measurement at least 30 days after the installation and backfilling. If oversized diameter pipes are installed, actual inside pipe diameters may need to be considered. Remove, reinstall or replace any pipes deformed more than 5%.

(5) Granular Backfill (Wingwalls) (Set Price). When designated in the Contract Documents, construct the granular backfill for wingwalls according to the details shown.

204.4 MEASUREMENT AND PAYMENT

a. Contract Quantities. Provided the project is constructed essentially to the lines and grades shown in the Contract Documents, the quantities shown in the Contract Documents for the various balances will be the quantities for which payment is made.

If the Contract Documents have been altered, or if the Engineer or Contractor questions the accuracy of the contract quantities at any location, either party may request the quantities involved be measured.

b. Measured Quantities. The Engineer will measure quantities for the various classes of excavation by cross-sectioning the area. The Engineer will compute the quantities (volume) by the average end area method. Where it is impractical to measure material by the cross-section method, the Engineer will use 3-dimensional measurements. Measurement will not include additional excavation required to mitigate the effects of over-exposed shale in foundations.

(1) Bridge Excavation. The Engineer will measure the various classes of excavation by the cubic yard. If the Contract Documents show excavation dimensions, the measured quantity is limited to the volume bounded by vertical planes at the contract dimensions. When excavation dimensions are not shown in the Contract Documents, the quantity measured for payment is the quantity removed, limited to the volume bounded by vertical planes 2 feet outside the footings and tie beams.

(2) Excavation for Structures Other Than Bridges. If shown as a bid item in the Contract Documents, the Engineer will measure Class III excavation by the cubic yard. If not shown as a bid item in the Contract Documents, Class III excavation for structures other than bridges is subsidiary to other items of work.

If the Contract Documents show excavation dimensions, the measured quantity is limited to the volume bounded by vertical planes at the contract dimensions. When excavation dimensions are not shown in the Contract Documents, the quantity measured for payment is the quantity removed, limited to the volume bounded by vertical planes 2 feet outside the footings.

Excavation for reinforced concrete box culverts, pipe culverts or headwalls for culverts is not measured for payment. Excavation over the culvert necessitated by the imperfect trench method of backfill is not measured for payment. If rock is not shown in the Contract Documents and is encountered during the excavation for reinforced concrete box culverts, pipe culverts or headwalls for culverts, the rock excavation is paid for as Extra Work, **subsection 104.6.**

(3) Concrete for Seal Course (Set Price). The Engineer will measure concrete placed for a seal course (either shown in the Contract Documents or approved by the Engineer) by the cubic yard. The quantity measured for payment is the quantity placed, limited to the volume bounded by vertical planes at the limits of the pay excavation for the structure. If the excavation for the structure is subsidiary, the quantity of concrete measured for payment is the quantity placed, limited to the volume bounded by vertical planes 2 feet outside the footings.

204 - EXCAVATION AND BACKFILL FOR STRUCTURES

If the Contractor elects to use a concrete seal course in place of the foundation stabilization shown in the Contract Documents, the Engineer will measure and pay for the concrete seal course as the foundation stabilization at the contract quantity and at the contract unit price.

The excavation necessary to place the concrete seal course is not measured for payment.

(4) Foundation Stabilization. When designated in the Contract Documents and the Contractor opts to construct it, the Engineer will measure the foundation stabilization for box and pipe culverts by the cubic yard to the volume bounded by vertical planes at the contract dimensions to a depth of 6 inches, or greater depth approved by the Engineer.

If the Contractor deems the foundation stabilization unnecessary, the Engineer will underrun the item.

The Engineer will not measure excavation necessary to place the foundation stabilization.

(5) Foundation Stabilization (Set Price). The Engineer will measure the foundation stabilization (Set Price) by the cubic yard. The quantity measured for payment is the quantity placed, limited to the volume bounded by vertical planes at the limits of the pay excavation for the structure. If the excavation for the structure is subsidiary, the quantity of foundation stabilization measured for payment is the quantity placed, limited to the volume bounded by vertical planes 2 feet outside the footings.

The excavation necessary to place the foundation stabilization (Set Price) is not measured for payment.

(6) Granular Backfill and Granular Backfill (Wingwalls) (Set Price). The Engineer will measure granular backfill by the cubic yard. The Engineer will measure to the neat lines shown in the Contract Documents. The Engineer will not measure for payment the excavation required to place the granular backfill or any granular backfill material placed beyond the limits shown in the Contract Documents (over-excavated areas).

(7) Water (Grading) (Set Price). The Engineer will measure water used for earthwork compaction by the M gallon, by means of calibrated tanks or water meters. Water used for dust control, water wasted through the Contractor's negligence, water in excess of the quantity required to obtain the proper moisture content or water used for compaction of earthwork (backfill) around structures classified as bridges is not measured for payment.

c. Payment. Payment for the various classes of "Excavation", the various grades of "Concrete", "Foundation Stabilization" and "Granular Backfill" at the contract unit prices is full compensation for the specified work.

Payment for "Concrete for Seal Course (Set Price)", "Foundation Stabilization (Set Price)", "Granular Backfill (Wingwalls) (Set Price)" and "Water (Grading) (Set Price)" at the contract set unit prices is full compensation for the specified work.

If the Engineer determines it is necessary to lower a footing below the elevation shown in the Contract Documents, the additional excavation is paid as follows:

- Additional excavation up to and including 2 feet below the contract elevation is paid at the contract unit price.
- Additional excavation from more than 2 feet up to and including 6 feet below the contract elevation is paid at 1½ times the contract unit price.
- Additional excavation more than 6 feet below the contract elevation is paid as Extra Work, **subsection 104.6.**

205 - EXCAVATION AND EMBANKMENT FOR HIGHWAYS

SECTION 205

EXCAVATION AND EMBANKMENT FOR HIGHWAYS

205.1 DESCRIPTION

Excavate, haul, place, remove and dispose of the specified materials. Construct the embankments as specified in the Contract Documents. Compact the earthwork according to the requirements for the type of compaction and moisture range specified in the Contract Documents.

BID ITEMS

Common Excavation
Common Excavation (Contractor-Furnished)
Rock Excavation
Rock Excavation (Non-Durable Shale)
Unclassified Excavation
Common Excavation (Unstable)
Common Excavation (Unsuitable)
Compaction of Earthwork (Type *) (MR-**)
Embankment
Embankment (Contractor-Furnished)
Eradication of Traveled Way
Water (Grading) (Set Price)
*Type of Compaction
**Moisture Range

UNITS

Cubic Yard
Station
M Gallon

205.2 MATERIALS

Provide water for earthwork compaction that complies with **DIVISION 2400**.

If "Common Excavation (Contractor-Furnished)" is specified, provide soil or a mixture of soil and gravel, stone or other acceptable material. Provide material that is similar to the material shown in the Contract Documents or found in the Report of Soil Survey. Provide material with a quality satisfactory for the purpose intended. Do not use material that has sod, roots, stumps and other perishable and deleterious matter. Provide soil that complies with the requirements shown in the Contract Documents for the material used in the top 18 inches of the embankment. The Engineer will accept the material based on compliance with these requirements and visual inspection of the material placed on the project.

205.3 CLASSIFICATION OF EXCAVATION

The geological information shown in the Contract Documents is based on studies made in the field, and represents the best information available to KDOT. The classification of embankment and drainage excavation as "Common Excavation", "Rock Excavation" or "Rock Excavation (Non-Durable Shale)", which classifications shall include all materials of whatever nature encountered, is shown in the Contract Documents. As the work is performed, the Engineer in conjunction with the Regional Geologist will determine if the classification of embankment and drainage excavation requires adjustment. The Engineer has the authority to identify and define the physical characteristics that determine the classification. The classification of materials for excavation is based on the materials in an unfrozen condition.

a. Common Excavation. Common excavation is all excavation not included as rock excavation or excavation otherwise classified. Included in common excavation is asphalt or concrete sidewalk, concrete ditch lining, concrete or stone wash checks and asphalt pavement 6 inches or less in thickness.

Depending on the makeup and characteristics of the common excavation, some material may or may not be used for embankment. The Engineer will identify which material may not be used for embankment.

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b. Common Excavation (Contractor-Furnished). Common excavation (Contractor-Furnished) is material provided by the Contractor that complies with the material requirements of this specification.

Non-durable shale provided as common excavation (Contractor-Furnished) shall be manipulated (sized) with equipment and water as required for non-durable shale excavation.

c. Rock Excavation. Rock excavation includes firm, rigid and unweathered sedimentary, igneous and metamorphic rock that is naturally in-place. Boulders or detached stones with a volume of 2 cubic yards or more are classified as rock excavation.

Portland cement concrete pavement, portland cement concrete base, cement treated base, asphalt pavement greater than 6 inches in thickness, concrete curb and gutter and any asphalt mixtures placed upon these structures is classified as rock excavation.

When common excavation is interlayered with the rock excavation, and the common excavation makes up 25% or less of the volume, the entire volume is classified as rock excavation.

d. Rock Excavation (Non-Durable Shale). Rock excavation (Non-Durable Shale) is non-durable rock shale that if used in embankments is required to be manipulated with construction equipment and water added until it is broken down to particle sizes shown in **subsection 205.4c**.

e. Unclassified Excavation. Unclassified excavation includes all excavation, regardless of type, nature or condition of materials encountered. When excavation is unclassified, the Contractor assumes full responsibility to estimate the kind and extent of the various materials to be encountered in order to accomplish the work. Unclassified excavation includes materials which, if classified, would be included in **subsections 205.3a., b., c. and d.**

f. Common Excavation (Unstable). Common excavation (Unstable) is considered to be material with any of the following characteristics:

- The excavation is unstable material encountered with a moisture content above the plastic limit of the soil.
- When the plastic limit of the soil is at or less than the optimum moisture content, the soil is not capable of being compacted at the optimum moisture content.

Suitable material with excess moisture caused by the Contractor's negligent operations is not classified as unstable excavation.

g. Common Excavation (Unsuitable). Common excavation (Unsuitable) is material encountered that contains a high organic content (such as peat or A-horizon soils).

205.4 CONSTRUCTION REQUIREMENTS

a. General Excavation Requirements. Before beginning the excavation, clear and grub all vegetation according to the Contract Documents. Remove existing structures as shown in the Contract Documents.

Before beginning excavation at the Contractor-Furnished site, obtain all permits and clearances required for compliance as shown in **subsection 107.2**, (which most commonly includes wildlife and archaeological clearances). See **subsection 106.2** for requirements for use of private property. The Contractor may request an investigation of the proposed site through the Engineer. The Engineer will forward the request to KDOT's Bureau of Design, Environmental Services Section (ESS). If there is a charge for the investigation, the Engineer will inform the Contractor of the required payment before the investigation is conducted.

If the Contractor's excavation operations expose potentially historical or archaeological significant sites, discontinue the excavation of such sites until the Engineer determines the disposition of the discovery. The Engineer will contact the ESS to determine the proper course of action, according to **subsection 107.9**.

Obtain the Engineer's approval before wasting surplus excavation material. Use approved surplus excavated material to widen embankments, flatten slopes or as directed by the Engineer. If surplus excavation material is wasted on the project, place the material to provide a neat appearance. Do not place waste materials in a manner that is detrimental to the abutting property.

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If the Contract Documents designate certain materials to be excavated and stockpiled for future use, do not contaminate these materials in the process. Stockpile the materials neatly and compactly at locations approved by the Engineer.

Allow the Engineer to define the limits and cross-section the borrow areas shown in the Contract Documents before beginning excavation. The Contractor will define the limits and cross-section Contractor-Furnished sites before beginning excavation. Do not remove any material beyond the dimensions and elevations established. When borrow excavation is complete, grade the site uniformly to drain. Comply with any permit requirements.

The Engineer may allow the use of borrow pits or waste areas other than those shown in the Contract Documents, provided the change does not increase the cost for KDOT.

If rock, shale or unsuitable material is encountered in cuts, excavate this material to the cross-section or limits shown in the Contract Documents.

Do not overbreak rock excavation below the cross-section shown in the Contract Documents. If overbreakage occurs, backfill the overbreakage with material designated in the Contract Documents. If the designated backfill is material obtained through normal excavation, compact the backfill to the density requirements shown in the Contract Documents. If the designated backfill is crushed aggregate or other special aggregate, make sure that there are no layers of earth or shale between the backfill material and the surface of the rock. Before backfilling overbreakage areas with crushed stone for backfill or other specified material, shape the rock overbreakage area to drain.

Trim all slopes to the lines shown on the cross-sections. When warranted, the Engineer may approve a modified slope in rock or other material. Remove rock so that the resulting rock slope has a uniform face. Do not disturb any materials beyond the limits of the excavation.

Excavate all side ditches as shown in the Contract Documents.

Provide temporary erosion and pollution control according to **SECTION 901**.

b. Presplit Rock Excavation. If designated in the Contract Documents, use a presplitting technique to split the face of the rock along the designated backslope. Presplit along the backslope before shooting the interior portion of the rock cut.

Devise a plan for the diameter, spacing and loading of the presplit holes. Drill the presplit holes the full depth of the rock ledge. Demonstrate to the Engineer with a 100 foot test section that the presplitting plan will produce an acceptable backslope. If the backslope of the test section is unacceptable, establish additional test sections until satisfactory results are obtained.

c. Shale Excavation. Shale will be classified as durable or non-durable in the Contract Documents. Durable and non-durable shale will not be permitted in the top 18 inches of the embankment, unless specified in the Contract Documents.

- Durable Shale. Durable shale may be used as any other rock in a fill.
- Non-Durable Shale. Manipulate non-durable shale with equipment and water until 100% of the material is smaller than 6 inches in all dimensions, and until a minimum of 90% of the material is smaller than 3 inches in all dimensions. The Engineer will verify manipulation requirements with a visual inspection (e.g. have the Contractor scarify a known area to a known depth, calculate theoretical volume scarified, calculate an average volume for the stones between 3 and 6 inches and if the volume for the stones exceeds 10%, the test fails). Continue manipulation and retest until the above requirements are met. Compact and adjust the moisture content of this material as specified in the Contract Documents.

The Contractor will determine whether to manipulate and use the non-durable shale on the project, or waste the non-durable shale and replace it with other suitable material.

d. Common Excavation (Unstable). Excavate unstable material encountered during construction to the limits designated by the Engineer. Allow the Engineer to measure the area before the backfill is placed. Where the unstable material was removed, backfill with suitable material from the project.

Aerate the unstable material until the moisture content is acceptable. Use this material in the construction of the project.

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Remove and dry unstable material caused by the Contractor’s negligence to an acceptable moisture content and use in the project.

e. Common Excavation (Unsuitable). If excavation to the finished graded section results in subgrade or slopes of unsuitable material, excavate the unsuitable material to the limits designated by the Engineer. Remove the unsuitable material from the project. Allow the Engineer to measure the area before placing the backfill. Backfill with suitable material from the project.

f. Eradication of Traveled Way. Remove the surfacing, if any, excavate the embankment and fill the ditches. Grade the traveled way to approximately the original ground contour, or as shown in the Contract Documents. Stockpile any materials designated for salvage at the locations shown in the Contract Documents. Do not contaminate the salvaged material. Dispose of excess excavation, base materials and surfacing not designated for salvage.

g. Compaction Requirements. Requirements for the various types of compaction are shown in **TABLE 205-1.**

TABLE 205-1: SOIL COMPACTION REQUIREMENTS	
Type	Minimum Compacted Soil Density
Type AAA	100% of Standard Density
Type AA	95% of Standard Density
Type A	90% of Standard Density
Type B	Such that no further consolidation is gained by additional rolling. The Engineer will visually determine acceptable Type B compaction based on the following: <ul style="list-style-type: none"> • Acceptable Type B compaction is demonstrated if the tamping feet of a tamping (sheepsfoot) roller “walks out” of the soil and rides on top of the lift being compacted. • In soil with low plasticity or nonplastic fine-grained materials, the tamping feet may not “walk out” of the material being compacted. With these materials, acceptable Type B compaction is demonstrated if the tamping feet support the weight of the roller (without the drum of the roller contacting the lift being compacted). • In sand and gravel, where the use of a tamping roller produces unacceptable results, use other types of rollers (such as a pneumatic-tired) to compact this type of material. With these materials, acceptable Type B compaction is demonstrated if no further consolidation is evident after additional passes of the roller. • In small irregular areas where the use of conventional compaction equipment is impracticable, use other equipment and methods to obtain compaction. The Engineer will determine by visual inspection if Type B compaction is obtained. • If the Engineer is unable to visually determine that Type B compaction is obtained, the Engineer may conduct density tests on the compacted soil. If tested, the compacted soil density shall be at least 90% of the standard density.

h. Moisture Control Requirements. At the time of compaction, use soil with uniform moisture content within the moisture range designated in the Contract Documents.

Adjust the moisture content of the soil by adding water to or aerating the material to bring soil within the required moisture content.

If the soil is unstable within the designated moisture range, the DME will adjust the moisture range.

Water may be added to the soil in borrow and cut areas (before hauling) or on the embankment (after hauling). Use methods and equipment that will prevent undue loss of moisture. Add only the quantity of water

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necessary to provide a moisture content within the required moisture range plus a reasonable quantity to compensate for evaporation and other unavoidable losses.

Excavation areas may be pre-watered to provide uniform moisture content. Submit sketches of the areas with details of the proposed methods and equipment for the pre-watering for approval by the Engineer. Provide drilling equipment to obtain samples for moisture determination before, during and after the pre-watering. Using the results of the moisture samples, the Contractor and Engineer will jointly determine the quantities of water necessary to bring the soils to optimum moisture. The Engineer will allow sufficient water to bring the full depth and width of the excavation to optimum moisture plus up to 20% for evaporation.

In areas to be pre-watered, leave the vegetation in place until the watering is completed. If runoff is observed during the pre-watering, rip the area on the contour to a depth of approximately 2 feet at 4 foot intervals. To permit penetration to the full depth of the excavation (for uniform moisture content), allow a curing period after the pre-watering is completed. The Contractor and Engineer will use the moisture samples obtained by the Contractor (at locations and depth agreed to by the Contractor and Engineer) to determine moisture content and uniformity for the pre-watered areas. Strip the vegetation from the areas after the water has penetrated the soils.

Requirements for the various moisture ranges are shown in **TABLE 205-2**.

TABLE 205-2: SOIL MOISTURE CONTENT REQUIREMENTS	
Moisture Range	Moisture Content
0-5 (MR-0-5)	A maximum of 5 percentage points above optimum, nor less than optimum.
3-3 (MR-3-3)	A maximum of 3 percentage points above optimum, and a maximum of 3 percentage points below optimum.
5-5 (MR-5-5)	A maximum of 5 percentage points above optimum, and a maximum of 5 percentage points below optimum.
90 (MR-90)	Sufficient to allow the type of compaction specified in the Contract Documents. If Type B compaction is specified, the Engineer will determine by visual inspection if satisfactory moisture control and compaction are obtained.

i. Foundation Treatment. If an embankment is started less than 4 feet below the finished subgrade, remove all vegetation from the surface where the embankment will be placed. Plow, scarify or break up the cleared surface to a minimum depth of 6 inches (foundation area). Adjust the foundation area to a moisture content within the specified moisture range. Compact the foundation area as specified in the Contract Documents for the embankment.

If an embankment is placed over an existing surface (PCCP, HMA, gravel), plow, scarify or break up the full depth of the existing surface regardless of the height of the embankment.

j. Embankment Requirements. Construct the embankment from material classified as Soil, Rock/Soil or Rock, as defined in **TABLE 205-3**.

TABLE 205-3: EMBANKMENT GRADATION CLASSIFICATION	
Classification	Gradation Criteria
Soil	< 20% retained on the ¾ inch sieve
Rock/Soil	> 20%, but < 80% retained on the ¾ inch sieve
Rock*	>80% retained on the ¾ inch sieve

*Could include concrete pavement.

If frozen soil is encountered in the surface of the original ground or in the surface of a partially constructed embankment, remove the frozen material or allow the frozen material to thaw before continuing construction of the embankment.

Unless shown otherwise in the Contract Documents, if shale (all shale classified as non-durable or common excavation) is used as embankment material, manipulate the shale with equipment and water until it complies with **subsection 205.4c**. Adjust the moisture content and compact the shale as specified in the Contract Documents.

Construct and backfill culverts and other structures below the embankment surface before the embankment is constructed.

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When the embankment is placed against a hillside or an existing embankment with slopes steeper than 4:1, bench the existing slope with each lift of the embankment. Cut the benches wide enough to accommodate the hauling and compacting equipment. Begin cutting (horizontally) each new bench at the intersection of the original ground and the vertical side of the previous bench. Use the material excavated from the benches in the embankment.

Exercise care placing and compacting the embankment, when placed on only one side of a structure (such as abutments, piers and wingwalls). Do not put excessive pressure against the structure.

Place soil embankment material in horizontal lifts approximately 8 inches thick (loose measurement). Compact the earthen material as specified in the Contract Documents before placing the next lift. Compact manipulated (sized) non-durable shale to the compaction requirement in the Contract Documents and adjust the moisture content of the manipulated non-durable shale to MR-5-5. Use compaction equipment as specified in **DIVISION 150**. Provide sufficient motorgraders and tamping rollers to adequately blade and compact the material delivered to the embankment. Route the construction equipment uniformly over the entire surface of each lift. Continuously use a motorgrader to level and manipulate the material during the placing and compacting of each lift of the embankment. If the material delivered to the embankment is not properly placed and compacted, suspend delivery of materials to the embankment until the problem is corrected.

Where it is impracticable to use a roller, use a mechanical tamper. Place the embankment material in horizontal lifts not to exceed 8 inches (loose measurement) capable of being compacted by the mechanical tampers. Compact the earthen material as specified in the Contract Documents before placing the next lift.

If the Contract Documents do not specify a compaction requirement for the earthwork, place the embankment in uniform lifts not to exceed approximately 8 inches thick (loose measurement). Compact the earthen material to the requirements of Type B, MR-90.

Place rock/soil embankment material in horizontal lifts approximately 10 inches thick (loose measurement). Compact the embankment by making consecutive passes of a vibratory roller, with a minimum weight of 16 tons, until no further increase in density is achieved by successive passes. Verify the density by using the nuclear moisture/density gauge.

Place rock embankment material in horizontal lifts approximately the average size of the larger rocks, a maximum of 2 feet thick (loose measurement). An embankment made up largely of rock consists of rock in interparticle contact with itself, with no intervening layers of soil. Distribute the large stones uniformly and fill the voids with smaller stones, earth, sand or gravel. Level and manipulate each lift with a motorgrader, bulldozer or similar equipment capable of shifting and shaping the material. Compact each lift by routing construction traffic over the lift until no further consolidation under the traffic is visible. When shown in the Contract Documents to construct the top 12 inches with rock excavation, finish the grade with crushed stone for backfill. No shale is allowed in the top 12 inches.

If the embankment is constructed of rock mixed with enough compactable material to make rolling feasible, and if the Contract Documents specify compaction, compact the embankment to meet Type B compaction requirements (regardless of the type of compaction specified).

If possible, use rock embankment material to form the base (full width) of the embankment. If rock and other embankment material are delivered to the embankment at the same time, place the rock in the outer portions of the embankment and the other material in the center of the embankment. Adjust the hauling and compacting operations (for both materials) as necessary to construct the embankment in level lifts.

Before rock embankment material is placed on compacted embankment constructed of other material, shape the top of the compacted embankment to slope from centerline to the outside. Do not build undrained pockets of rocks into the embankment.

Do not place rocks, broken concrete or other solid materials in embankment areas where piling will be driven or where culverts will be installed.

Where a grass median is constructed, do not place any rock excavation material or shale in the top 18 inches of the median area. Construct the top 18 inches of medians with earthen material suitable for growth of vegetation.

Dispose of all loose rocks within the right-of-way that will interfere with mechanical mowing.

Apply water as needed to control dust on the project.

k. Compaction in Cuts. Plow, scarify or break up the soil 6 inches below the grade line in cut sections. If necessary to obtain compaction, adjust the soil to a moisture content within the specified moisture range. Compact the soil as specified in the Contract Documents.

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If the depth of compaction in cut sections is greater than 6 inches, excavate all material to within 6 inches of the lower limit of compaction. Plow, scarify or break up the material left in place. If necessary to obtain compaction, adjust the soil to a moisture content within the specified moisture range. Compact the soil as specified in the Contract Documents. Replace and compact (as embankment) the excavated material until the cut is compacted to the grade line shown in the Contract Documents.

205.5 MEASUREMENT AND PAYMENT

a. Contract Quantities. Provided the project is constructed essentially to the lines and grades shown in the Contract Documents, the quantities shown in the Contract Documents for the various balances will be the quantities for which payment is made.

If the Contract Documents are altered, or if the Engineer or Contractor questions the accuracy of the contract quantities in any balance, either party may request the quantities involved be measured by the cross-section method. Unless errors are noted or the original ground was disturbed before the work started, the cross-sections shown in the Contract Documents will be used as the original field cross-sections. Additional original cross-sections may be interpolated, or determined by other approved methods, at points necessary to accurately determine the quantities.

If the Contractor elects to waste the non-durable shale, or fraction thereof, and provide Common Excavation (Contractor-Furnished) in lieu of manipulating the non-durable shale, payment will be made for "Rock Excavation (Non-Durable Shale)," as though it was not wasted, not "Common Excavation (Contractor-Furnished)" actually used.

b. Measured Quantities. The Engineer will measure excavation and borrow (including rock, shale, unstable and unsuitable) by the cubic yard. The Engineer will measure quantities for the various types of excavation by cross-sectioning the area. The Engineer will compute the quantities (volume) by the average end area method. Where it is not possible to measure material by the cross-section method, the Engineer may use 3-dimensional measurements. If the depth of compaction through cut areas is greater than 6 inches, the material excavated to gain access to the lower 6 inch layer will be measured for payment. The excavation of unstable and unsuitable material necessary to obtain compaction in cut sections and in foundations for fill sections will be measured for payment. The Engineer will not measure rock overbreakage (below the depth shown in the Contract Documents) for payment. Excavation required for benching into an existing slope will not be measured for payment. The excavation required to remove unstable material caused by the Contractor's negligent operations will not be measured for payment.

If either the Contractor or Engineer questions the accuracy of the plan quantity for non-durable shale excavation, contact KDOT's Regional Geologist for guidance.

The Engineer will measure compaction of earthwork (in place after the rolling or tamping is complete) by the cubic yard. The Engineer will measure compaction of earthwork by cross-sectioning the area. The Engineer will compute the quantities (volume) by the average end area method. Where it is impractical to measure material by the cross-section method, the Engineer may use 3-dimensional measurements. The Engineer will not measure for payment the compaction of foundation area under a fill or the bottom 6 inch layer in a cut section.

The Engineer will measure water used for earthwork compaction and non-durable shale manipulation and compaction by the M Gallon by means of calibrated tanks or water meters.

If the Contractor uses non-durable shale for "Common Excavation (Contractor-Furnished)", the Engineer will not measure the manipulation water for payment. However, the Engineer will measure the water required to meet moisture requirements for compaction.

The Engineer will not measure water used for dust control, water wasted through the Contractor's negligence or water in excess of the quantity required to obtain the proper moisture content.

If the Contract Documents include the bid items "Embankment" or "Embankment (Contractor-Furnished)", the Engineer will not measure excavation, compaction and water separately for payment. The Engineer will measure the embankment in place by the cubic yard. The Engineer will measure quantities for the embankment by cross-sectioning the area. The Engineer will compute the quantities (volume) by the average end area method. Where it is impractical to measure material by the cross-section method, the Engineer may use 3-dimensional measurements. No payment will be made for quantities beyond the limits of the Contract Documents.

If the Contract Documents include the bid item "Eradication of Traveled Way", the Engineer will measure this item by the Station along the centerline of the traveled way being eradicated. If the Contract Documents do not include the bid item "Eradication of Traveled Way", excavation required for this activity is measured for payment.

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c. Payment.

(1) General. Payment for "Common Excavation", "Common Excavation (Contractor-Furnished)", "Rock Excavation", "Rock Excavation (Non-Durable Shale)", "Unclassified Excavation", "Compaction of Earthwork", "Embankment", "Embankment (Contractor-Furnished)" and "Eradication of Traveled Way" at the contract unit prices is full compensation for the specified work. Deduct any measured quantities placed beyond the limits of the Contract Documents, unless the placement was authorized by the Engineer.

Payment for "Water (Grading) (Set Price)" at the contract set unit price is full compensation for the specified work. Payment for water used for pre-watering excavation areas at 75% of the contract set unit price for Water (Grading) (Set Price) is full compensation for the specified work. The contract set unit price will govern regardless of the accepted quantity provided.

(2) Common Excavation (Unstable). Payment for "Common Excavation (Unstable)", as provided below, is full compensation for the specified work to remove, manipulate and replace material, including any additional material needed to fill the created void.

Compaction for backfill of areas removed as Common Excavation (Unstable) will be paid for at the appropriate contract unit prices.

- Rural Projects (outside incorporated city limits): 1½ times the contract unit price for "Common Excavation", up to a maximum of \$6.00 per cubic yard. If the contract unit price for "Common Excavation" is greater than \$6.00 per cubic yard, the contract unit price is the maximum paid per cubic yard for this item.

If the Contract Documents have the bid item of "Embankment" instead of "Common Excavation," the Engineer will pay for Common Excavation (Unstable) at 1½ times the contract unit price for "Embankment", up to a maximum of \$6.00 per cubic yard.

- Urban Projects (inside incorporated city limits): 1½ times the contract unit price for "Common Excavation", up to a maximum of \$10.00 per cubic yard. If the contract unit price for "Common Excavation" is greater than \$10.00 per cubic yard, the contract unit price is the maximum paid per cubic yard for this item.

If the Contract Documents have the bid item of "Embankment" instead of "Common Excavation," the Engineer will pay for Common Excavation (Unstable) at 1½ times the contract unit price for "Embankment", up to a maximum of \$10.00 per cubic yard.

(3) Common Excavation (Unsuitable). Payment for the "Common Excavation (Unsuitable)", as provided below, is full compensation for the specified work.

Compaction for backfill of areas removed as Common Excavation (Unsuitable) will be paid for at the appropriate contract unit prices.

Excavation to replace unsuitable material removed from the project will be paid for at the appropriate contract unit price.

- Common Excavation (Unsuitable) not designated in the Contract Documents and encountered during construction is paid for at 3 times the contract unit price for "Common Excavation", up to a maximum of \$12.00 per cubic yard, which price shall include the disposal of materials. If the contract unit price for "Common Excavation" is greater than \$12.00 per cubic yard, the contract unit price will be the maximum paid per cubic yard for this item, which price shall include the disposal of materials.

If the Contract Documents have the bid item of "Embankment" instead of "Common Excavation", the Engineer will pay for Common Excavation (Unsuitable) at \$12.00 per cubic yard.

206 - SELECT SOIL

SECTION 206

SELECT SOIL

206.1 DESCRIPTION

Place select soil on the finished slopes at the locations shown in the Contract Documents.

BID ITEMS

Select Soil
Select Soil (Contractor-Furnished)

UNITS

Cubic Yard
Cubic Yard

206.2 MATERIALS

Use the topsoil designated in the Contract Documents for select soil. The topsoil may contain organic matter.

If "Select Soil (Contractor-Furnished)" is specified, provide topsoil with a quality suitable for the purpose intended. The topsoil may contain organic matter. The Contractor-Furnished site (for excavation of the topsoil) is subject to the environmental clearance provisions noted in **subsection 107.2**. The Engineer will accept the select soil based on visual inspection of the material placed.

Do not use topsoil containing toxic matter.

206.3 CONSTRUCTION REQUIREMENTS

Before excavating the select soil from the locations shown in the Contract Documents, remove all weeds, tall grass and other objectionable material from the areas. Unless specified otherwise in the Contract Documents, excavate the select soil to a depth of 6 inches.

Stockpile or place the select soil at completed locations. Obtain the Engineer's approval of any stockpile site.

Before placing the select soil, finish all embankments as shown in the Contract Documents. Scarify the locations that will receive the select soil.

Cover the designated locations with the thickness of select soil as shown in the Contract Documents. After placing the select soil, use harrows or disks to break down clods and lumps. If placing heavy clay-bearing soil (Plastic Index greater than 25) on top of light sandy soil (Plastic Index less than 8), disk to a depth that will uniformly mix the two soils. Manipulate and roll the select soil with placing and spreading equipment to consolidate the material. If necessary, adjust the moisture content of the soil by adding water to or aerating the material.

206.4 MEASUREMENT AND PAYMENT

a. Contract Quantities. Provided the project is constructed essentially to the lines and grades shown in the Contract Documents, the quantities shown in the Contract Documents for the various balances will be the quantities for which payment is made.

If the Contract Documents are altered, or if the Engineer or the Contractor questions the accuracy of the contract quantities for select soil in any balance, either party may request measurement of the quantities involved.

b. Measured Quantities. The Engineer will measure (by cross-sectioning) quantities of select soil by the cubic yard. The Engineer will compute the quantities (volume) by the average end area method. Where it is impractical to measure material by the cross-section method, the Engineer may use 3-dimensional measurements.

c. Payment. Payment for "Select Soil" and "Select Soil (Contractor-Furnished)" at the contract unit prices is full compensation for the specified work.

207 - OVERHAUL

SECTION 207

OVERHAUL

207.1 DESCRIPTION

Overhaul is authorized hauling beyond the free-haul limit.

The free-haul limit is the specified distance the excavated material is hauled without additional compensation. Unless otherwise provided in the Contract Documents, the free-haul limit is 2,000 feet.

Excavated material that is hauled and deposited according to the Contract Documents, regardless of the length of the haul, is eliminated from consideration as overhaul.

BID ITEM

Overhaul

UNITS

Cubic Yard/Station

207.2 MATERIALS – None specified.

207.3 CONSTRUCTION REQUIREMENTS

Haul the excavated material beyond the free-haul limit to the location authorized by the Engineer.

207.4 MEASUREMENT AND PAYMENT

The Engineer will determine the limit of free-haul from a mass diagram by fixing 2 points on the volume curve, one on each side of the neutral grade point. One point is fixed in excavation and the other in embankment (the included quantity of excavation and embankment are in balance); the distance between them is the free-haul distance. All materials within the free-haul limit are eliminated from consideration as overhaul. The overhaul distance is determined by deducting the free-haul distance from the distance between the center of gravity of the remaining mass of excavation and the remaining mass of embankment.

The Engineer will compute the overhaul quantity by multiplying the overhaul distance in Stations by the number of units of excavation in cubic yards hauled.

The Engineer may use an analytical method in lieu of the mass diagram method to determine the overhaul. The Engineer may use vehicle measurement to determine the quantity of material hauled.

If required, the Engineer will add the item of "Overhaul" to the contract.

The Engineer will pay for the completed and accepted "Overhaul" at the contract set unit price of \$0.03 per cubic yard per station.

208 - LINEAR GRADING

SECTION 208

LINEAR GRADING

208.1 DESCRIPTION

Construct the roadway to the approximate uniform section shown in the Contract Documents.

BID ITEMS

Linear Grading (*) (**)

Water (Grading) (Set Price)

*Type of Compaction, if specified

**Moisture Range, if specified

UNITS

Station

M Gallon

208.2 MATERIALS

Use the existing soil.

Provide water for earthwork compaction that complies with **DIVISION 2400**.

208.3 CONSTRUCTION REQUIREMENTS

Before placing an embankment of less than 4 feet on an existing surface, scarify or plow the existing surface to a depth of 6 inches. Thoroughly disc the non-surfaced area and remove the existing vegetation. Recompact the disked area before placing the embankment.

Before placing an embankment on a hillside or an existing embankment slope, scarify, plow or step the existing slope to a depth of 6 inches.

Use earthen materials that will produce a dense, well-compacted embankment. Obtain the embankment material from the locations provided in the Contract Documents.

If compaction of the earthwork is not specified, construct the embankment in horizontal layers a maximum of 8 inches thick (loose measurement). Place each layer the full-width of the embankment. Blade each layer until it is level and uniform, and compact to Type B, MR-90, **SECTION 205**.

If compaction of the earthwork is specified, construct the embankment in horizontal layers a maximum of 8 inches thick (loose measurement). Place each layer the full-width of the embankment. Blade each layer until it is level and uniform. Compact each layer as specified in the Contract Documents.

Construct the embankment to the grade lines, profiles and tolerances shown in the Contract Documents.

The Contractor may adjust the grade lines within the specified tolerances, except for bridges and other locations when the grade line shall match existing conditions. If required to adjust the grade line, maintain a minimum of 15 inches of earth cover (at the centerline of the project) on top of over-filled structures.

After the embankment is constructed, finish blade the surface until the embankment is consolidated, smooth and free of clods and other unsatisfactory materials. Finish the embankment within centerline grade and shoulder alignment tolerances. Do not construct abrupt changes. Construct the roadway, slopes and ditches to the specified profiles, and construct all ditches to drain properly.

Remove and dispose of all surface rocks that would interfere with mechanical mowing.

Provide an adequate water supply for compaction, and apply water as needed to control dust on the project.

Provide temporary erosion and pollution control according to **SECTION 901**.

208.4 MEASUREMENT AND PAYMENT

The Engineer will measure linear grading by the Station, horizontally along the centerline of the roadway.

The Engineer will measure water used for earthwork compaction by M Gallons by means of calibrated tanks or water meters. The Engineer will not measure water used for dust control, water wasted through the Contractor's negligence or water in excess of the quantity required to obtain the proper moisture content.

Payment for "Linear Grading" at the contract unit price is full compensation for the specified work.

Payment for the quantity of "Water (Grading) (Set Price)" at the contract set unit price is full compensation for the specified work.

