TABLE OF CONTENTS

DIVISION 200
STABILIZED SUBGRADE, BASE AND SHOULDERS

SECTION 201

CLEARING AND GRUBBING

201.1 DESCRIPTION

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

DO NOT clear and grub areas unless work will actively be performed in the exposed area (or portions of the exposed area) within 7 calendar days on exposed steep slope areas (40% or greater) or within 14 calendar days for all other exposed areas.

BID ITEM	**UNITS**
Clearing and Grubbing	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.

Strip and stockpile the existing topsoil from within the construction limits. To the extent practical, use this material to cap the finished embankment and cut slopes. This work is subsidiary to grading items in the contract.

Where practical, do not store equipment or materials (including soil stockpiles) within 50 feet of rivers, streams or other surface waters. Where such storage is necessary, obtain the Engineer's written approval and include in the project SWPPP appropriate best management practices for the storage area.

Unless requested in writing from the Contractor, and approved in writing by the Engineer, or specified otherwise in the Contract Documents, do not exceed 750,000 square feet of surface area of erodible earth material per equipment spread at one time. The Engineer will limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow (within right-of-way) and embankment operations. Limit the exposed erodible earth material according to the capability and progress, and in keeping with the approved schedule.

Areas will not count toward the 750,000 square feet limit, when the following conditions are met:

For areas that will not be disturbed again due to project phasing:

- Finish grade the completed area;
- Stabilize and maintain stabilization according to **SECTION 902**; and
- Do not disturb the area again without a written request from the Contractor and written approval from the Engineer;

For areas that will be disturbed again due to project phasing:

- Rough grade; and
- Stabilize and maintain stabilization according to **SECTION 902**.

DO NOT clear and grub areas unless work will actively be performed in the exposed area (or portions of the exposed area) within 7 calendar days on exposed steep slope areas (40% or greater) or within 14 calendar days for all other exposed areas. If areas are cleared and grubbed and not finish graded, not part of project phasing and no meaningful work toward the completion of the bid item is performed within the exposed area (or portions of the exposed area) for 7 calendar days on exposed steep slope areas (40% or greater) or 14 calendar days for all other

exposed areas, stabilize and maintain stabilization at these exposed areas according to **SECTION 902** at no cost to KDOT.

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 **DIVISION 900**.

201.4 MEASUREMENT AND PAYMENT

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

Stabilization of finished areas will be measured and paid for under **DIVISION 900** bid items. Exempt areas specified in **subsection 201.3** will not be measured for payment.

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

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.

Inspect all building structures that are scheduled for removal, and determine if asbestos is present.

BID ITEMS	**UNITS**
Removal of Existing Structures	Lump Sum
Removal and Reconstruction of Existing Structures	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 **DIVISION 900**.

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. Designate one Prime Contractor employee as the Removal Supervisor. The Removal Supervisor, or their designee, must be on location any time work is performed on removal of the existing structure.

Before performing any work to remove the deck, schedule a pre-work meeting with the Engineer. Include the Removal Supervisor and key personnel who will be working on the removal item. Discuss a detailed procedure of how removal will be accomplished and how damage to the structure will be avoided.

Remove the deck or any portion of the deck without damaging the girders.

Clearly mark the location of the existing girder top flanges on top of the existing deck concrete. Mark the entire length of all girders before sawing or removing any concrete. Limit concrete sawing to a maximum depth of 3 inches directly above any girder and within 3 inches of either edge of a girder top flange. Do not use drop-type pavement breakers. Do not use a hoe ram directly above any girder or within 1.0 foot of either edge of a girder top flange. Use a jackhammer no heavier than 15 pounds to remove concrete above and within 1.0 foot of either side of a girder top flange.

Also, see **SECTION 737 - CONTROLLED DEMOLITION**.

Damage includes, but is not limited to saw cuts, dents, cracks, distortion or any other damage found by the Engineer. This also includes spalling of prestressed concrete beams that would require repair.

If the girder is damaged:

- The Engineer, in coordination with the State Bridge Office (SBO), will determine if the damages require repair. The Engineer will determine what repairs are required for minor nicks, dents, cuts and spalls not affecting the structure capacity.
- If any damage requires additional engineering, hire an independent engineer, licensed in Kansas to develop repair plans, provide structural analysis and stress calculations (including fatigue calculations), and submit sealed calculations to the SBO for review and approval.
- The Contractor's independent engineer shall evaluate the capacity of any damaged members, and submit sealed calculations showing any capacity loss of damaged members.
- Submit a copy of the repair plan, per **SECTION 105**, sealed by a licensed Professional Engineer, to the SBO for approval.
- After repairs have been completed, the Contractor's independent engineer shall evaluate the capacity of any repaired members, and submit sealed calculations showing any capacity loss of repaired members.
- The ideal situation is to repair any damage so there is no structure capacity loss. Structure capacity loss would be a reduction of the controlling load rating capacity for the structure. If there is minor capacity loss, and KDOT deems this loss acceptable, KDOT will assess a Contract Deduct. See **subsection 203.4**. In this case, the Contractor has the option to either accept the deduction or repair to eliminate any capacity loss.

The Contractor is responsible for all repairs to the damaged girders as authorized by the Engineer, plus any materials, equipment, labor, delays and traffic from the damage or repair. If damage is severe, additional engineering and inspection fees incurred by KDOT may also be deducted.

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 shown otherwise 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. The initial inspection of building structures to determine if asbestos is present is subsidiary to these bid items.

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, **SECTION 104**.

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.

When existing bridge deck damage is severe, KDOT inspection and engineering fees will be assessed under the bid item "Contract Deduct".

If after repairs are made, there is a reduced capacity for the structure, KDOT will assess an additional "Contract Deduct". The Contract Deduct will be calculated by multiplying the percent loss of capacity (calculated after repair) times the total contract price of all bridge bid items (reinforcing steel, structural steel, concrete, expansion joints, etc.) for the structure.

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	UNITS
Resetting End Section	Each
Resetting Pipe Culvert	Linear Foot

203.2 MATERIALS

Provide the required materials that comply with **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, **SECTION 104**.

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 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
Granular Backfill (Wingwalls) (Set Price)	Cubic Yard
Water (Grading) (Set Price)	M Gallon

*Class of Excavation

204.2 MATERIALS

Provide materials that comply with the applicable requirements.

Concrete	**SECTIONS 401 & 402**
Aggregates for Concrete Not On Grade	**DIVISION 1102**
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 is 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.

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.

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 **DIVISION 900**.

When a bridge is constructed in conjunction with a new roadway alignment or elevation, construct the roadway embankment (a minimum of 300 feet) at the bridge to approximate grade first, then excavate for the abutments.

(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 to within 6 inches of the bottom of footing elevation. Complete the excavation to the required elevation, using hand equipment. Do not use blasting excavation below the top of footing elevation.

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 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 feet 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 Regional Geologist and a recommended course of action made.

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 to construct 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.

If a concrete seal course is constructed, uniformly consolidate the concrete without voids.

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.

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 suitable for the conditions, and that meets the Engineer's approval. 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.

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

(4) Granular Backfill (Wingwalls). 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, **SECTION 104**.

(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.

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, Granular Backfill (Wingwalls) 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", "Granular Backfill" and "Granular Backfill (Wingwalls)" 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, **SECTION 104**.

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	UNITS
Common Excavation	Cubic Yard
Common Excavation (Contractor-Furnished)	Cubic Yard
Rock Excavation	Cubic Yard
Rock Excavation (Non-Durable Shale)	Cubic Yard
Unclassified Excavation	Cubic Yard
Common Excavation (Unstable)	Cubic Yard
Common Excavation (Unsuitable)	Cubic Yard
Compaction of Earthwork (Type *) (MR-**)	Cubic Yard
Embankment	Cubic Yard
Embankment (Contractor-Furnished)	Cubic Yard
Eradication of Traveled Way	Station
Water (Grading) (Set Price)	M Gallon

*Type of Compaction
**Moisture Range

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.

Provide crushed stone for backfill that complies with **DIVISION 1100**.

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. The following are included in common excavation: hot mix asphalt or concrete sidewalk, concrete ditch lining, concrete or stone wash checks and hot mix 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 materials may not be used for embankment.

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, hot mix asphalt pavement greater than 6 inches in thickness, concrete curb and gutter and any hot mix asphalt 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 in the subgrade or embankment with any of the following characteristics:

- When the material encountered has 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 in the subgrade or embankment 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.

Strip and stockpile the existing topsoil from within the construction limits. To the extent practical use this material to cap the finished embankment and cut slopes. This work is subsidiary to grading items in the contract.

Where practical, do not store equipment or materials (including soil stockpiles) within 50 feet of rivers, streams or other surface waters. Where such storage is necessary, obtain the Engineer's written approval and include in the project SWPPP appropriate best management practices for the storage area.

Unless requested in writing from the Contractor, and approved in writing by the Engineer, or specified otherwise in the Contract Documents, do not exceed 750,000 square feet of surface area of erodible earth material per equipment spread at one time. The Engineer will limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow (within right-of-way) and embankment operations. Limit the exposed erodible earth material according to the capability and progress, and in keeping with the approved schedule.

Areas will not count toward the 750,000 square feet limit, when the following conditions are met:

For areas that will not be disturbed again due to project phasing:

- Finish grade the completed area;
- Stabilize and maintain stabilization according to **SECTION 902**; and

- Do not disturb the area again without a written request from the Contractor and written approval from the Engineer;

For areas that will be disturbed again due to project phasing:

- Rough grade; and
- Stabilize and maintain stabilization according to **SECTION 902**.

DO NOT clear and grub areas unless work will actively be performed in the exposed area (or portions of the exposed area) within 7 calendar days on exposed steep slope areas (40% or greater) or within 14 calendar days for all other exposed areas. If areas are cleared and grubbed and not finish graded, not part of project phasing and no meaningful work toward the completion of the bid item is performed within the exposed area (or portions of the exposed area) for 7 calendar days on exposed steep slope areas (40% or greater) or 14 calendar days for all other exposed areas, stabilize and maintain stabilization at these exposed areas according to **SECTION 902** at no cost to KDOT.

Before beginning excavation or depositing waste at the Contractor-Furnished site, obtain all permits and clearances required for compliance as shown in **SECTION 107**, (which most commonly includes wildlife and archaeological clearances). See **SECTION 106** for requirements for use of private property.

Before incorporating any material from these areas into the project, the Engineer shall require a copy of the KDWP clearance and the KSHS clearance. Before depositing any project waste onto these waste sites, the Engineer shall require a copy of the KDWP clearance, the KSHS clearance, and when required, the KDHE waste disposal permit.

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 **SECTION 107**.

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.

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.

Before beginning excavation, allow the Engineer to define the limits and cross-section the borrow areas shown in the Contract Documents. The Contractor shall 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 **DIVISION 900**.

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 blasting 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 is prohibited 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. Backfill the area where the unstable material was removed 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.

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: • 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 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.

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. The Engineer shall 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). Make no more than 10% of the rock embankment material larger than 7 feet in circumference measured in any direction and no more than 10% passing the 1-inch sieve as determined by visual inspection. The maximum size of rock placed will be limited by the thickness of rock to be placed, as shown on the plans.

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 compacted to Type B, MR-90, **SECTION 204**. 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. Do not place rocks larger than 3 inches (in any dimension) in the top 12 inches of the embankment.

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.

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 the 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.

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.

SECTION 206

SELECT SOIL

206.1 DESCRIPTION

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

BID ITEMS	UNITS
Select Soil	Cubic Yard
Select Soil (Contractor-Furnished)	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 **SECTION 107**. 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.

Provide temporary erosion and pollution control according to **DIVISION 900**.

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.

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	**UNITS**
Overhaul	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.

SECTION 208

LINEAR GRADING

208.1 DESCRIPTION

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

BID ITEMS	UNITS
Linear Grading (*) (**)	Station
Water (Grading) (Set Price)	M Gallon

*Type of Compaction, if specified
**Moisture Range, if specified

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 disk 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 in grade. 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 **DIVISION 900**.

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.

SECTION 209

SPECIAL FILL

209.1 DESCRIPTION

Provide and place special fill (foundation) for the foundation for the MSE system as shown in the Contract Documents.

Provide and place special fill (retained soil) behind the MSE wall as shown in the Contract Documents.

BID ITEMS	**UNITS**
Special Fill (*)	Cubic Yard

* Foundation or Retained Soil

209.2 MATERIALS

a. General. Provide soil meeting the requirements specified in the Contract Documents.

Material will be accepted under this specification with the receipt and approval by the KDOT Geotechnical Unit of laboratory test reports detailing the test results in accordance with the appropriate ASTM standards as performed by an AMRL certified and KDOT Geotechnical Unit approved laboratory.

Use soil for the special fill exhibiting a minimum drained friction angle and minimum undrained cohesion, as shown on the plans. Determine the strength properties of the soil in CIŪ single stage triaxial tests with pore pressure measurements (ASTM D 4767) if the soil is defined as fine grained by ASTM D 2487. If the soil is fine-grained, it must be of low plasticity as defined by ASTM D 2487. Use effective consolidation stresses as shown on the plans. Multi-stage tests will not be acceptable.

If the soil is a coarse-grained soil as defined by ASTM D 2487, it must be classed as low plasticity. Determine the strength properties of the soil in Consolidated - Drained Direct Shear (ASTM D 3080) testing. These soils similarly must exhibit a minimum drained friction angle as shown on the plans. Do not use these soils in areas prone to flooding. Use normal stresses as shown on the plans.

b. Shear Testing. Perform all shear testing on samples compacted to Type AA compaction standards (**SECTION 205**) for cohesive soils; or at 75% Relative Density for granular soils at optimum moisture content.

209.3 CONSTRUCTION REQUIREMENTS

Compact the fill to Type AA, MR-3-3 (**SECTION 205)** unless specified otherwise in the Contract Documents. Do not exceed 8-inch loose, lift thickness. Each lift will have a minimum of 2 density and moisture tests performed. Fill material different from that specifically approved for use will not be accepted until the testing requirements as set forth in **subsection 209.2** are met.

209.40 MEASUREMENT AND PAYMENT

The Engineer will measure the special fill by the cubic yard.

Payment for "Special Fill" at the contract unit price is full compensation for the specified work.

SECTION 210

SALVAGING, STOCKPILING AND PLACING TOPSOIL

210.1 DESCRIPTION

Within the construction limits, excavate existing topsoil from cut areas and areas to be covered by embankments. Haul and stockpile the salvaged topsoil to a location approved by the Engineer. Place the salvaged topsoil on backslopes, foreslopes and ditches or as directed by the Engineer. Do not place topsoil in areas of rock that are on a 3:1 slope or steeper in rock ditches or other areas listed in the plans. Leave stockpile areas in a neat condition.

BID ITEM	**UNITS**
Salvaged Topsoil	Square Yard

210.2 MATERIALS

Use the existing topsoil (available natural topsoil) from within the project construction limits. The topsoil may contain organic matter.

Do not use topsoil containing toxic matter.

210.3 CONSTRUCTION REQUIREMENTS

Before excavating the topsoil from the locations shown in the Contract Documents, remove all trees, shrubs, stumps, and other objectionable material as directed by the Engineer, from the areas. Unless specified otherwise in the Contract Documents, salvage the topsoil to a depth of 6 inches.

Stockpile topsoil or place topsoil at completed locations. Locate stockpiles within the right-of-way where topsoil will not run off into any waterway due to a rain event and where it will not impair drainage. Obtain the Engineer's approval of any stockpile site.

Finish all excavations and embankments before placing the topsoil. Place the topsoil to the finish elevation. Adjust the cut and fill sections to accommodate the placement of the salvaged topsoil such that after placement the cross section will be at the final grade as shown on the Plans. Note: If a cut section is rock, do not undercut.

After placing the topsoil, 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 in equal portions. Manipulate and roll the topsoil 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.

Provide temporary erosion and pollution control according to **DIVISION 900**.

210.4 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 topsoil in any balance, either party may request measurement of the quantities involved.

The quantity of roadway excavation to be measured for payment will not include excavation made below embankment areas to obtain topsoil or excavation made in undercutting slopes, ditches and shoulders in preparing such areas for topsoil placement. This excavation is subsidiary to salvaged topsoil.

Topsoil quantities shall not be deducted from the excavation quantities.

b. Measured Quantities. The Engineer will measure salvaged topsoil excavated by the square yard.

c. Payment. Payment for "Salvaged Topsoil" at the contract unit price is full compensation for the specified work.

SECTION 211

GEOFOAM LIGHTWEIGHT EMBANKMENT FILL

211.1 DESCRIPTION

Provide and install the geofoam lightweight expanded polystyrene (EPS) fill at the embankment locations shown in the Contract Documents.

BID ITEM	UNITS
Geofoam-Fill	Cubic Yard

211.2 MATERIALS

Provide materials that comply with the applicable requirements.

Concrete	**SECTIONS 401 & 402**
Aggregates for Concrete Not On Grade	**SECTIONS 1102**
Geofoam Lightweight Embankment Fill	**DIVISION 1700**

211.3 CONSTRUCTION REQUIREMENTS

Fabricate the expanded polystyrene in standard sizes that are typically 4-foot wide by 2.5-foot thick by 8 to 16-foot long blocks. Trim the blocks prior to arriving at the job site with a uniformly even surface with a tolerance of ¼ inch in 10 feet.

Cut the blocks using a saw unless alternative cutting methods have been approved by the Engineer. Provide temporary weighting and guying down of the lightweight material as required until all blocks are built into a homogeneous mass.

Construct the geofoam-fill in successive layers of blocks with the block's long axis alternating by 90° and offsetting blocks by half their widths to prevent the continuation of joints within the polystyrene mass.

Connect the polystyrene blocks with gripper plates. Place gripper plates between horizontal layers of geofoam as required.

Do not damage the EPS during construction or storage. Protect the EPS from petroleum based solvents, flame, and other ignition sources. Do not expose the EPS to direct sunlight. Keep the expanded polystyrene covered with a light-colored opaque tarp.

211.4 MEASURMENT AND PAYMENT

The geofoam-fill will be measured by the cubic yard.

Payment for "Geofoam-Fill" at the contract unit price is full compensation for the specified work.

SECTION 212

GEOFOAM LIGHTWEIGHT EMBANKMENT FOR VOID FILL

212.1 DESCRIPTION

Construct the geofoam lightweight expanded polystyrene (EPS) fill at the locations designated in the Contract Documents. This work is to fill voids in the embankment behind the abutment.

BID ITEM	**UNITS**
Geofoam-Void Fill	Cubic Yard

Note: If this bid item is not included in the Contract Documents, this work is subsidiary to other items in the contract.

212.2 MATERIALS

Provide geofoam that complies with **DIVISION 1700**.

212.3 CONSTRUCTION REQUIREMENT

Construct the embankment if required in successive layers of geofoam with the block's long axis alternating by 90° and offsetting blocks by half their widths to prevent the continuation of joints within the polystyrene mass.

Trim the blocks so the surface is uniform and even with a tolerance of ¼ inch in 10 feet.

Cut the EPS blocks using a saw unless alternative cutting methods have been approved by the Engineer.

Provide temporary weighting and guying down of the geofoam material as required until all blocks are built into a homogeneous mass.

Connect the EPS blocks with gripper plates. Place gripper plates between horizontal layers of geofoam as required.

Do not damage the EPS during construction or storage. Protect the EPS from petroleum based solvents, flame, and other ignition sources. Do not expose the EPS to direct sunlight. Keep the EPS covered with a light-colored opaque tarp.

212.4 MEASUREMENT AND PAYMENT

The Engineer will measure the geofoam-void fill by the cubic yard.

Payment for "Geofoam-Void Fill" at the contract unit price is full compensation for the specified work.

When the bid item is not included in the Contract Documents, geofoam-void fill will not be measured for payment, but will be subsidiary to other bid items in the contract.

SECTION 213

PREFABRICATED VERTICAL DRAIN

213.1 DESCRIPTION

Excavate for and place geosynthetics to provide a drainage pathway for consolidating embankments and foundation soils as shown in the Contract Documents.

BID ITEM	UNITS
Prefabricated Vertical Drain	Linear Foot

213.2 MATERIALS

Provide prefabricated vertical drain that complies with **DIVISION 1700**.

213.3 CONSTRUCTION REQUIREMENTS

a. Qualification of the Prefabricated Vertical Drain Contractor. At least 1 month before the construction of the prefabricated vertical drains, provide KDOT's Bureau of Structures and Geotechnical Services, Geotechnical Unit with evidence of successful installation of prefabricated vertical drains on 3 or more projects under similar conditions using the same installation technique. For the completed projects, include the location, description, size, the owner's name, address and telephone number, and the project engineer's name.

KDOT's Bureau of Structures and Geotechnical Services, Geotechnical Unit will approve (or deny) the Contractor's qualifications. No adjustment in contract price will be allowed if the submittal is rejected.

Before installing drains, satisfactorily install 3 test prefabricated vertical drains to the maximum anticipated depth shown in the Contract Documents at locations designated by the Engineer.

b. Construction of Prefabricated Vertical Drain. Survey, number and stake the drains within 6 inches of the locations indicated in the Contract Documents, or as directed by the Engineer.

Install drains from the working surface to the depth shown in the Contract Documents, or as specified by the Engineer.

Do not vary the installed drains from the vertical by more than 1 inch per 4 feet.

Provide a suitable means of determining the quantity of prefabricated vertical drain material used, and the depth of the drain.

Splice or connect the drain material in a workmanlike manner for continuity of drain material. Leave a 4 to 8-inch length of drain material protruding above the natural ground surface at each drain location. Cut the drain material neatly at its upper end.

If obstructions are encountered below the working surface that cannot be penetrated using normal and accepted procedures, complete the drain from the elevation of the obstruction to the working surface and notify the Engineer. At the direction of the Engineer, install a new drain within 2 feet from the obstructed drain. The injection of limited amounts of water will be allowed to facilitate the anchoring of drains. Make a maximum of 2 attempts to install the replacement prefabricated vertical drain as directed by the Engineer. If the drain still cannot be installed to the design tip elevation, abandon the drain location.

213.4 MEASUREMENT AND PAYMENT

The Engineer will measure prefabricated vertical drains by the linear foot.

The Engineer will pay for "Prefabricated Vertical Drain" at the contract unit price which is full compensation for the specified work.

Satisfactory test drain installations will be paid for at the contract unit price per foot for "Prefabricated Vertical Drain". The Contractor will be paid for all obstructed drains properly completed at the contract unit price.

SECTION 214

MECHANICALLY STABILIZED EARTH FILL

214.1 DESCRIPTION

Provide and install the complete mechanically stabilized earth (MSE) fill system as specified in the Contract Documents. This includes at a minimum: excavation, grading, and compaction of the MSE Fill foundation, general and local dewatering as required for proper execution of the work, erection of welded wire facing elements, placement of soil reinforcing, and placement and compaction of select backfill material within the reinforced soil volume.

BID ITEM	UNITS
MSE Fill	Cubic Yard

214.2 MATERIALS

a. General. Provide the complete MSE fill system (engineering design, geogrid, welded wire facing, and all necessary accessories) from an approved manufacturer in accordance with the acceptable alternates for each particular MSE fill as listed in the Contract Documents.

The Bureau of Construction and Materials will maintain a list of approved systems in the Retaining Wall Systems prequalified list. Products will remain on the prequalified list as long as field performance is satisfactory.

b. Welded Wire Fabric. Use welded wire fabric complying with **SECTION 1603** and the approved shop drawings. Galvanize the welded wire fabric in conformance with the requirements of ASTM A123.

c. Backfill. Provide aggregates for backfill that meet the requirements of MSE wall backfill, **SECTION 1107**.

d. Soil Reinforcing.

(1) Soil Reinforcing Geogrid. Use soil reinforcing geogrid of oriented, drawn, long chain high density polyethylene or polypropylene containing stabilizers and inhibitors added to the base plastic for resistance to ultraviolet and heat degradation. Use the geogrid material as designated in the approved wall system. The designated soil reinforcing geogrid will be accepted on the basis of a Type A Certification.

(2) Soil Reinforcing Geosynthetic. Use soil reinforcing of woven, high tenacity polyester yarns coated with polyvinyl chloride to maintain the integrity of the geosynthetic during handling and placement and to protect it during construction. Use the geosynthetic material as designated in the approved wall system. The designated soil reinforcing geosynthetic will be accepted on the basis of a Type A Certification.

e. Attachment Devices.

(1) Connectors. Use clevis connectors and connector rods fabricated of cold drawn steel wire complying with ASTM A82 and welded in accordance with ASTM A185 and galvanized in accordance with ASTM A153, or approved equal.

(2) Tie Bar. Use tie bars fabricated of cold drawn steel wire complying with ASTM A82 and galvanized in accordance with ASTM A153.

(3) Connection Pins. Use connection pins fabricated of cold drawn steel wire complying with ASTM A82 and galvanized in accordance with ASTM A153.

(4) Devices will be accepted on the basis of receipt and approval of a Type A Certification and visual inspection.

f. Facing Geotextile. Use a minimum Class 2 nonwoven geotextile that complies with **DIVISION 1700**.

214.3 CONSTRUCTION REQUIREMENTS

a. MSE Fill Excavation. Remove all materials encountered without regard to classification. Coordinate excavation for the wall with the underdrain construction so that drainage pipes will be constructed as specified. Maintain stable sides at all excavations by providing reasonable cut back slopes or shoring, where necessary.

b. Foundation Preparation. Grade the foundation for the retained earth volume, for a width equal to or exceeding the length of the geogrid plus 6 inches, or to the limits shown in the Contract Documents. Prior to MSE fill construction, compact the foundations to Type AA, MR 3-3 according to **SECTION 205**. Remove and replace any foundation soils found to be unstable or unsatisfactory.

c. MSE Fill Erection. Check the plumbness and tolerances of each facing row prior to erection of the next facing row. Should any row be out of tolerance, remove the fill and reset the section to the proper tolerance.

Vertical and horizontal alignment of the MSE fill face shall not vary by more than 2 inches when measured along a 10-foot straightedge, or as shown in the plans and specifications. The overall vertical tolerance (plumbness) of the MSE Fill shall not exceed 1 inch per 10 feet of wall height. Negative (outward leaning) batter is not acceptable. The offset limit between consecutive rows of facing shall not exceed 1 inch from planned offset.

Place connectors within 1/2 inch from the dimensions shown on the Contract Documents or approved shop drawings.

d. Backfill Placement. Closely follow the erection of each lift of facing with backfill. At each reinforcing level, roughly level backfill before placing and or attaching the reinforcement. Place reinforcing as shown in the Contract Documents normal to the face of the MSE fill. For geosynthetic reinforcing, the end of the geogrid sheet will terminate with a transverse element at the retained soil limit to prevent curling of the sheet and aid in construction. Tightly draw the reinforcing against the connections at the connectors and stake the end of the geogrid sheet at the retained soil limit before backfilling is allowed, and maintain tautness during backfilling operations. Place backfill in maximum loose lift thickness of 10 inches or less as may be necessary to obtain the specified density.

Compact the entire retained earth volume to 95% of maximum laboratory dry density at a moisture requirement of MR 3-3, **SECTION 205**. For backfills containing more than 30% retained on the ¾-inch sieve, use a method of compaction consisting of at least 4 passes of a roller. Accomplish compaction without disturbance or displacement of reinforcing and facing. Begin compaction from the area nearest the MSE fill face to the back of the reinforcing, except for a strip 3 feet wide adjacent to the backside of the facing. Compact this 3-foot strip with light mechanical tampers after compaction of the remainder of the layer. Soil density tests will not be required within this 3-foot area.

At the end of each day's operations, shape the last level of backfill to permit runoff of rainwater away from the wall face.

Remove and replace any wall materials that become damaged during backfill placement at the Contractor's expense.

214.4 MEASUREMENT AND PAYMENT

The Engineer will measure MSE Fill by the cubic yard. The Engineer will use the neat lines shown in the Contract Documents to compute the quantities.

Payment for "MSE Fill" at the contract unit price is full compensation for the specified work.

SECTION 215

GRANULAR DRAINAGE BLANKET

215.1 DESCRIPTION

Excavate for, and place aggregate to provide a drainage pathway for consolidating embankments and foundation soil as detailed in the Contract Documents.

BID ITEM	**UNITS**
Granular Drainage Blanket (*)	Square Yard
*Thickness	

215.2 MATERIALS

Provide aggregate for granular drainage blanket that complies with **SECTION 1114**.

215.3 CONSTRUCTION REQUIREMENTS

After clearing and grubbing, and any required foundation treatment of the embankment, bring the embankment to grade at the bottom of the granular drainage blanket. Place the granular material to prevent excessive debris from being introduced into the drainage blanket. Place the drainage blanket in 24-inch (maximum) lifts. Extend the drainage blanket under the embankment footprint behind the abutment to the end slope face and across the width of the embankment or as shown in the Contract Documents for drainage. Compact the drainage blanket by routing construction equipment across the drainage blanket until no further consolidation is evident. The nominal thickness of the drainage blanket at each location is specified in the Contract Documents.

215.4 MEASUREMENT AND PAYMENT

The Engineer will measure granular drainage blanket by the square yard.

Payment for the various thicknesses of "Granular Drainage Blanket" at the contract unit price is full compensation for the specified work.