Amend **Section 203 - Excavation and Embankment** to read as follows:

## "SECTION 203 - EXCAVATION AND EMBANKMENT

**203.01 Description.** This section is for roadway excavation, borrow excavation, embankment construction, and disposal of unsuitable or surplus excavated material.

**(A) Roadway Excavation.** Roadway excavation includes the use or disposal of materials of whatever character encountered in the work. Use the suitable material removed from excavation in the formation of embankment, subgrade, shoulders, slopes, bedding, and backfill for structures, and for other purposes shown on the plans or as specified by the Engineer.

**(B) Borrow Excavation.** Borrow excavation includes using material obtained from acceptable sources outside of the highway rights-of-way for the construction of embankments or for other portions of the work.

**(C) Embankment Construction.** Embankment construction includes:

**(1)** preparing the embankment area;

**(2)** constructing dikes within or outside the right-of-way;

**(3)** placing and compacting acceptable material within the project area where unsuitable material were removed; and

**(4)** placing and compacting of embankment material in holes, pits and other depressions within the project area.

**203.02 Materials.** None specified.

**203.03 Construction Requirements.** Clear and grub all areas requiring excavation, grading, and embankment according to Section 201 - Clearing and Grubbing. Excavate and embank roadways, intersections and entrances to a smooth and uniform surface. Excavate so as not to disturb the material outside the limits of slopes.

**(A) Excavation.**

**(1) General.** Obliterate old roadways according to Section 202 - Removal of Structures and Obstructions.

When encountering remains of prehistoric people's dwelling sites or artifacts of historical or archaeological significance, refer to Subsection 107.17(D) - Archaeological, Historic, and Burial Site Findings.

The Engineer will not allow blasting.

**(2) Widening or Flattening and Steepening Cut Slopes.** The Contractor may widen or flatten the planned cut slopes to obtain material required:

**(a)** for embankment construction;

**(b)** to preclude the opening of unsightly borrow pits;

**(c)** to increase the stability of cut slopes; or

**(d)** when specified by the Engineer.

The Contractor may submit the necessary data to steepen the cut slopes for acceptance by the Engineer, if:

**(a)** the material can stand at a slope steeper than shown in the contract and

**(b)** the Contractor does not need the planned material for roadway construction.

**(3) Cut Slopes.** Round the tops and ends of cut slopes according to the contract or as specified by the Engineer.

Finish cut slopes that are flatter than half horizontal to one vertical (0.5H:1V) true and straight according to the lines and grades of slope shown in the contract.

Finish cut slopes that are half horizontal to one vertical (0.5H:1V) or steeper and slopes in rock excavation in a rough condition with debris and loose material removed. When completed, the average plane of excavation slopes shall conform to the slopes shown on the plans. No points shall vary from the planned slopes by more than 6 inches measured at right angle to the slope.

**(4) Potential Slide Areas.** Excavate and remove the unstable material by:

(a) benching to the lines designated;

(b) excavating the material to a designated slope from an elevation at or near the roadway grade; or

(c) as specified by the Engineer.

Use this material in the construction of the roadway or dispose along the roadway as specified by the Engineer.

**(5) Maintaining Slopes.** The above provisions do not relieve the Contractor of maintaining slopes true and smooth or requiring the redesign of a sound slope.

**(B) Excavated Material.**

**(1) Selected Material.** Selected material is suitable excavated material from areas within the highway right-of-way.

Use the selected material:

(a) for finishing the top portion of the roadbed,

(b) for constructing roadbed shoulders,

(c) for structure backfill,

(d) for constructing berms,

(e) for erosion control,

(f) for landscaping,

(g) for other uses according to the plans, or

(h) as specified by the Engineer.

Place selected material on the roadbed according to Subsection 203.03(c) - Embankment Construction and selected topsoil for erosion control according to Section 209 - Erosion Control.

The selected material shall remain in place until the Contractor can haul, place, and compact it in final position. The Contractor may stockpile the material at specified locations for later placement in final position only if it is according to the contract. The stockpile locations

shall be determined by the Contractor and accepted by the Engineer. The Engineer will not allow additional compensation for any delay or inconvenience in excavation caused by stockpiling the material.

The Engineer will not consider selected topsoil placed in windrows along the tops of roadway slopes for erosion control work as stockpiled material.

**(2) Borrow Material.** Borrow material shall conform to the size and quality requirements specified in the contract. When the contract does not specify size or quality, the material shall be of a quality suitable for the purpose intended. The sand equivalent (SE) value as determined by AASHTO T 176 for the top three feet of the embankment, excluding the pavement structure, shall not be less than the filled area and less than two.

Arrange to obtain borrow material and pay the costs involved. Notify the Engineer 20 working days before opening borrow areas. Allow sufficient time for testing the borrow by the Engineer.

Control of borrow material shall be according to Section 106 - Control of Materials.

Do not excavate beyond the dimensions and elevations established for the borrow pit. Do not remove the borrow material until after the Engineer completes the staking out and cross sectioning of the site. Establish and specify the finished borrow areas approximately true to line and grade. Complete the finished borrow areas so no water may collect or stand therein. Blade and leave borrow areas in shape as to permit accurate measurements after completing the excavation.

Do not place borrow material until after placing the selected material in fill. When there is more borrow material than is required, the Engineer will deduct the excess quantity from the borrow volume as measured in the borrow area.

When necessary to remove an existing fence, replace it to as good condition as the existing fence. The Contractor shall be responsible for the confinement of livestock when removing part of the fence. Provide and maintain temporary fencing, when required for security purpose, at no cost to the State. Furnish and install permanent fencing after the temporary fence is no longer needed at no cost to the State.

**(3) Surplus Selected Material.** Use surplus excavated material to uniformly widen the embankments, flatten the slopes, or dispose along the locations specified by the Engineer. Do not dispose surplus material above the grade of the adjacent roadbed. Complete the embankments before arranging the disposal of surplus excavation. Do not dispose material unless authorized by the Engineer.

The quantity of surplus material, when shown, is only approximate. When disposing the surplus excavated material prematurely, replace the shortage of material at no cost to the State.

Unused surplus excavated material shall become the Contractor's property. Level or free the disposal area from depressions and humps upon completion of disposal operations.

**(4) Unsuitable Material.** Where excavation to the finished grade results in a subgrade or slopes of unsuitable soil, the Engineer will require:

**(a)** removing of the unsuitable material and

**(b)** backfilling to the finished grade with acceptable material according to Subsection 203.03(c) - Embankment Construction.

The Engineer may designate as unsuitable those soils that cannot be properly compacted in embankment. Unsuitable material may include vegetable matter, garbage and junk piles, on the surface or buried. Unsuitable material shall become the property of the Contractor.

Conduct the operations so that the Engineer can take the necessary cross-sectional measurement before placing the backfill.

When the relative compaction of the original ground is less than the compaction shown in Subsection 203.03(C)(2)- Compaction of Embankment with Moisture and Density Control and Subsection 203.03(C)(3) - Compaction of Embankment without Moisture and Density Control, compact the upper 6 inches of the exposed original ground according to the contract.

**(5) Highly Sensitive Soil.** When soil, having a high moisture content, loses its stability and becomes plastic or muddy, the Engineer will allow such equipment and methods in excavating the material that will result in the least possible manipulation or churning

of this material. The Engineer will not permit cable operated scrapers of the Sauerman type.

**(C) Embankment Construction.**

**(1) General.** Use only acceptable material in the construction of embankments. Do not place rocks, broken concrete, or other solid materials in embankment areas where driving piles.

When:

**(a)** placing and compacting material for embankment on hillsides and existing embankments, or

**(b)** building embankment half width at a time,

the Contractor shall continuously bench the slopes that are steeper than four horizontal to one vertical (4H:1V) while bringing the work up in layers.

Benching shall be of sufficient width to permit construction equipment to operate. Begin each horizontal cut at the intersection of the original ground and the vertical sides of the previous cuts. Recompact the material thus cut along the new embankment material at no cost to the State unless the width of excavation required exceeds 6 feet. The Engineer will measure and pay the excavated material over 6 feet as roadway excavation.

When placing and compacting the embankment and the Engineer permits end dumping, plow or cut into the slope of the original ground or embankment before starting the end dumping. The Engineer will permit end dumping until the width of the embankment, including benching, becomes great enough to permit the use of compacting equipment. Place the remainder of the embankment in layers and compact as specified.

When embankments across low swampy ground cannot support the weight of trucks or other hauling equipment, the Contractor may construct the lower part of the fill by dumping successive loads in a uniformly distributed layer of a thickness not greater than necessary to support the vehicle placing the layers. Construct the remainder of the embankment as specified.

When depositing embankment material on only one side of abutments, wingwalls, piers, or culvert headwalls, do not

overcompact the area next to the structure. Do not place the fill next to the end bent of a bridge higher than the bottom of the backwall of the bent until after the superstructure is in place. Conduct operations so that the embankment is at approximately the same elevation on both sides of the structure when placing embankment material on both sides of a structure.

Finish the slope embankment true and straight from the shoulder line in conformity with the lines and grades established. Finish the slopes below an elevation 4 feet below the shoulder line to the approximate lines and grades established so that the slopes contain no unsightly or undue irregularities.

The Contractor may place excess material outside the embankment slopes and within the right-of-way provided the Engineer accepts such material and its location. Place the material to maintain a distance below the finished shoulder elevation. The Engineer will consider not placing excess material as specified above as surplus material. Refer to Subsection 203.03(B)(3) - Surplus Selected Material.

Place embankment material in horizontal layers not exceeding 8 inches in loose thickness. Compact as specified before placing the next layer. Spread each lift to get uniform thickness before compacting. Level and manipulate continuously to assure uniform density as the compaction of each layer progresses. Add or remove water to get the required density. Route construction equipment uniformly over the entire surface of each layer.

When embankment material:

**(a)** consists predominantly of rock fragments, hardpan or cemented gravel that cannot be broken readily and

**(b)** includes 25% or more of materials larger than 6 inches in greatest dimension,

the Contractor may place such material in the embankment in layers not exceeding three feet and shall uniformly distribute such material throughout the embankment. Do not construct the lifts above an elevation two and a half feet below the finished grade. Compose the balance of the embankment of suitable material smoothed and placed in layers not exceeding 8 inches in loose thickness. Compact as specified for embankments.

While depositing the embankment material to fill the interstices, place sufficient earth or other fine material around the large material. Produce a dense compact embankment. When earth or other fine material to fill the interstices is not available in excavation, the furnishing of such material shall be at no cost to the State.

Processing of embankment material to reduce maximum size of particles so that the Contractor can place the material in the specified lifts shall be at no cost to the State.

Whenever possible, deposit embankment material having an SE value of less than 10 in the lower portions of embankments. Do not place such material within three feet of planned finished grade. Break up clods or hard lumps of earth over 6 inches in greatest dimension before compacting material in embankment except as provided above.

Construct the center of embankment layers higher than the sides. Construct sidehill embankments with the intersection with original ground as the high point of the layer. Uniformly slope the embankment to the outer side. Do not exceed the cross fall of layers one foot in 20 feet.

Caves are often present in lava formations. The Engineer will decide if the caves are too close to the road surface. If too close, the Contractor shall open their tops. Fill and compact the cave and the hole formed in the top as required.

Until the Engineer makes final acceptance of the contract, the Contractor shall be responsible for the stability of the constructed embankments. Maintain the embankments to the grade and cross section shown in the contract. Replace portions that become displaced or damaged at no cost to the State.

The Engineer will consider shutting down the operation during heavy rain.

**(2) Compaction of Embankment With Moisture And Density Control.** When the original ground surface in embankment sections is within three feet of the finished profile grade, the original ground contained in the prism within three feet of the finished grade and within the width of the traveled way plus three feet on each side, shall have a relative compaction of 95% or more.

When the original ground within the three feet depth does not conform to the compaction requirements specified, the Contractor shall excavate the material.

When the next 6 inches of material below this excavation does not have a relative compaction of at least 90%, compact the material until 90% or more relative compaction is attained. After compacting the lower 6 inches to a relative compaction of 90%, backfill the excavated material or other material designated in the excavated area. Place the backfill material in layers not exceeding 8 inches in loose thickness before compaction. Compact each layer to a relative compaction of 95% or more.

Construct embankments in layers not to exceed 8 inches in loose thickness except as specified in Subsection 203.03(D)(3) - Compaction of Embankment Without Moisture and Density Control. Compact each layer within three feet of finished grade to 95% or more relative compaction. Compact material below a plane three feet below the finished grade to 90% or more relative compaction.

When the above conflicts with Subsection 203.03(D) - Subgrade Preparation, the requirements of that subsection shall apply.

Test methods to determine maximum densities and relative compaction shall be according to Subsection 106.03 - Samples, Tests, Cited Specifications.

When the Contractor cannot reduce the natural moisture content of the excavated material from the roadway sufficiently to obtain a relative compaction of 90% of maximum dry density, obtain a compaction equivalent to 100% of the dry density of that material at the equivalent moisture content. Use the wet method of sample preparation (Hawaii Test Method 5) in figuring out the maximum dry unit mass according to Section 106.09(A)(1) - Maximum Dry Unit Mass. Moisture increase due to rain and other external conditions or causes are not acceptable reasons for using this method in determining relative compaction.

Do not apply density requirements to the portions of embankments constructed which the Engineer cannot test according to the methods specified.

**(3) Compaction Of Embankment Without Moisture And Density Control.** Deposit embankment materials in layers not

exceeding 8 inches in loose thickness before compaction except rock fills and the first layer of fills over swampy ground.

Compact rock embankments to the maximum compaction obtainable by routing the loaded hauling equipment over the entire width of the layer, supplemented by using acceptable rollers. Do not use rollers equipped with tamping studs or tamping rollers to compact rock fills.

Keep dumping and rolling areas separately. Do not cover the lift by another until securing compaction according to this subsection.

**(4) Proof Rolling.** When specified, the Contractor shall proof roll. The Engineer will pay according to the methods and equipment set forth.

**(D) Subgrade Preparation.** Subgrade preparation includes preparing the subgrade to the required density, cross section and grade.

**(1) General.** Prepare the subgrade after compacting the earthwork and completing and backfilling drainage facilities and structures. Compact the subgrade by power rollers equipped with smooth steel-tired wheels.

When choosing to remove rocks or lumps including filling of voids with acceptable materials, the Contractor may do such work at no cost to the State. The material shall conform to the requirements of the specified material to be placed on the subgrade.

**(2) Density Requirement.** The finished subgrade immediately before placing of subsequent material thereon shall have a relative compaction of 95% or more for a depth of 6 inches.

**(3) Surface Tolerances of Subgrade.** The finished subgrade upon which the subbase course is placed shall not vary more than 0.10 foot above or below the theoretical grade.

The finished subgrade upon which the base course is placed shall not vary more than 0.05 foot above or below the planned grade.

The finished subgrade upon which the final wearing surface is placed shall not vary more than 0.04 foot above or below the planned grade. Reshape, water, and recompact the subgrade that does not conform to the specified tolerances at no cost to the State.

When the Engineer pays the subbase or base course on a cubic yard basis, the Contractor may waive the lower finish surface tolerance if acceptable by the Engineer.

**203.04 Method of Measurement.**

**(A) Roadway Excavation.** The Engineer will measure roadway excavation per cubic yard.

The Engineer will compute the quantities of roadway excavation by the average end area method and centerline distances. The Engineer will not apply correction for curvature to the quantities within the roadway prism shown on the cross sections. The Engineer will make correction for curvature having a centerline radius of 1,000 feet or less in computing excavation quantities from outside the roadway prism where using the roadway centerline as a base.

When the Engineer cannot measure the roadway excavation quantities by the average end area method due to the nature of a particular operation or changed conditions, the Engineer will determine the method to get an accurate quantity estimate.

The Engineer will not measure for payment excavation that is more than the planned or authorized cross section except as provided in Subsections 203.03(A)(4) - Potential Slide Area, 203.03(A)(2) - Widening or Flattening and Steepening Cut Slopes, and 203.03(B)(3) - Surplus Selected Material. Backfill and compact unauthorized excavated areas to the original ground elevation at no cost to the State.

The Engineer will not measure stockpiling of selected material for payment.

**(B) Borrow Excavation.** The Engineer will not measure borrow excavation for payment.

The Engineer will determine the quantities of materials to be paid for by the cubic yard by converting the weight measurement to volume as provided in Subsection 109.01 - Measurement of Quantities. When the Engineer cannot exercise the control of measurements of pits as supplying the materials, the Engineer will decide the weight-volume ratio from the material in its natural state. The Engineer will use the maximum dry density of the material obtained by the method specified in Subsection 106.09(A)(1) - Maximum Dry Unit Weight when the Engineer cannot determine the weight-volume ratio of the material in its natural state.

When selecting the borrow pit, the Contractor shall be responsible for the weighing of the material loads.

When the Contractor chooses to use pits other than those designated, the Engineer will estimate the difference in the swell and shrinkage factors involved. When these factors increase or decrease by more than two percentage points, the Engineer will apply a suitable correction to the measured quantities taken from the pit when calculating pay quantities.

**(C) Overhaul.** The Engineer will not measure overhaul for payment.

**(D) Embankment.** The Engineer will not measure embankment for payment.

**203.05 Basis of Payment.**

**(A) Roadway Excavation.** The Engineer will pay for the accepted roadway excavation at the contract unit price per cubic yard.

The price includes full compensation for obliterating old roadways; preparing the subgrade; placing selected material in final position; disposing surplus excavation material; rounding of slopes; using water for compaction; and furnishing labor, materials, tools, equipment, and incidentals necessary to complete the work.

The Engineer will not pay for stockpiling selected material or subsequently placing it in final position. The Engineer will consider payment for this work to be included in the contract unit price for roadway excavation.

The Engineer will pay for removing and disposing of slide material as roadway excavation:

**(1)** that slides from outside the planned roadway slopes and into the planned roadway prism, and

**(2)** the removal and disposal of unstable material in natural position outside the planned roadway slopes.

The Engineer will consider full compensation to be included in the contract price for roadway excavation within the authorized lines and elevations for removing and disposing of material that may come into excavations for structures and drainage facilities.

The Engineer will not include slide material quantities that slide across the roadway prism in the roadway excavation quantities unless the Contractor rehandles and reuses the material. The Engineer will only pay for the quantities rehandled.

When choosing to remove the rocks and lumps or break up hardened material and the contract specifies the source of the selected material, such work shall be at no cost to the State. When the contract does not specify the source of the selected material, the Engineer will pay this work as extra work as specified in Subsection 104.03 - Extra Work.

When specified, the Engineer will pay for:

(1) removing of the unsuitable material below the subgrade and

(2) backfilling and compacting to the finished grade with acceptable material.

The Engineer will pay the following excavation for unlined gutters as roadway excavation:

(1) within the median area of a divided highway; and

(2) between the roadbed shoulder and an adjacent cut slope.

**(B) Borrow Excavation.** The Engineer will not pay for borrow excavation separately. The Engineer will consider the cost for borrow excavation as included in the bid price of the various contract items.

The price includes full compensation for staking out and cross sectioning the site; establishing the borrow area; providing, replacing, and maintaining temporary and permanent fencing; confining livestock; watering; and furnishing labor, materials, tools, equipment, and incidentals necessary to complete the work.

The Engineer will not pay for selected material from ditch and channel or structure excavations, when used, instead of borrow.

**(C) Overhaul.** The Engineer will not pay for overhaul separately. The Engineer will consider the cost for overhaul as included in the bid price of the various contract items.

**(D) Embankment.** The Engineer will not pay for embankments separately. The Engineer will consider the cost for constructing embankments included in the contract price for roadway excavation.

The price includes full compensation for drying embankment material; constructing earth dikes for roadway protection within or outside the highway right-of-way; placing and compacting acceptable material within the roadway area where the Contractor removed unsuitable fill foundation material; and furnishing labor, materials, tools, equipment, and incidentals necessary to complete the work.

The Engineer will make payment under:

| Pay Item | Pay Unit |
|---|---|
| Roadway Excavation | Cubic Yard" |

**END OF SECTION**