SECTION 02202 – EXCAVATION AND EMBANKMENT

PART 1 – GENERAL

1.1 DESCRIPTION

A. The WORK under this Section includes providing all labor, materials, tools and equipment necessary for excavation and embankment construction to the lines, grades and cross sections indicated in the Drawings or as directed by the ENGINEER.

1.2 SUBMITTALS

A. Select Borrow – sample for gradation analysis.

B. Subbase Grading A – samples for gradation analysis.

C. Shot Rock Borrow – samples for gradation and/or visual analysis.

PART 2 – PRODUCTS

2.1 EXCAVATION

A. All excavation shall be unclassified excavation, and shall consist of excavation and disposal of all materials, of whatever character, encountered in the WORK.

2.2 EMBANKMENT

A. Material for embankment construction shall consist of non-frost-susceptible earth, sand, gravel, fractured rock or combination thereof containing no muck, peat, frozen materials, roots, sod or other deleterious materials, and shall be compactable to the density required by the Specifications.

2.3 SELECTED EMBANKMENT

A. Selected Embankment shall meet all the requirements for Embankment Material, and in addition, shall have a plasticity index not greater than 6 as determined by AASHTO T 90 and shall contain no more than 6% by weight of material passing the 200 mesh sieve. The percentage of material passing the 200 mesh sieve shall be determined using only the material which passes a 3 inch sieve.

2.4 SUBBASE, GRADING A

A. Subbase, Grading A shall conform to the following gradation:

SIEVE DESIGNATION	PERCENT PASSING BY WEIGHT
4-Inch	100
2-Inch	85 - 100
No. 4	30-70
No. 200*	6 Max.

**Gradation shall be determined on that portion passing the 3-inch screen*

B. The amount of No. 200 material shall have no more than 3% by weight less than the 0.02 mm size.

C. Subbase, Grading A, shall contain no muck, frozen material, roots, sod or other deleterious matter. It shall have a liquid limit not greater than 25 and plasticity index not greater than 6 as determined by AASHTO T 89 and T 90.

D. Subbase, Grading A, shall meet the quality requirements of AASHTO M 147 except that ATM T-1 and T-7 will be substituted for AASHTO T 11, T 27, and T 88.

2.5 BORROW

A. Borrow shall meet the requirements for Embankment above.

2.6 SELECTED BORROW

A. Selected Borrow shall meet the requirements for Selected Embankment above.

2.7 SHOT ROCK BORROW

A. Shot Rock Borrow shall conform to the following gradation:

SIEVE DESIGNATION	PERCENT PASSING BY WEIGHT
6 Inch	100
4 Inch	85 - 100
3 Inch	10 - 50
No. 200*	0 - 3

**Gradation shall be determined on that portion passing the 3-inch screen*

B. At least 50% by weight of the particles retained on the 3/8-inch sieve shall have at least two fractured faces as determined by ATM T-4.

C. Elongation Specification
The length of the crushed stone backfill shall not be more than twice the designated screed diameters.

D. Sodium Sulfate Loss
Aggregate shall pass the percent sodium sulfate loss per AASHTO T 104 with 9% maximum.

E. LA Abrasion
Percent of wear per AASHTO T 96 shall be 45% maximum.

PART 3 – EXECUTION

3.1 EXCAVATION

A. Clearing and grubbing in excavation areas must be completed prior to beginning excavation operations.

B. Excavations shall be reasonably smooth and uniform to the lines, grades and cross sections shown in the Drawings or as directed by the ENGINEER. Excavations shall be conducted to ensure that material outside of excavation limits remains undisturbed.

C. Excavations shall be protected from erosion and maintained to drain freely at all times.

D. Excavation in rock shall be to a minimum depth of 12 inches below the top of the finished surface within the limits, unless otherwise shown in the Contract Documents. Undrained pockets shall not be left in the excavated surface of the rock.

E. When excavation to the limits indicated on the Drawings encounters unsuitable underlying material, the ENGINEER may require the CONTRACTOR to remove the unsuitable material and backfill with approved material. The CONTRACTOR shall take the necessary cross section measurements before backfill is placed in order to measure the amount of unsuitable material removed.

F. Excavated soils that do not meet the requirements for embankment material and surplus suitable excavation shall be disposed of by the CONTRACTOR at a location and in a manner approved by the ENGINEER. No material may be wasted without the prior approval of the ENGINEER.

G. The CONTRACTOR is responsible for securing a waste disposal site if none is indicated on the Drawings. The CONTRACTOR shall obtain the written permission of the landowner for use of all disposal sites, and shall either obtain any required permits or assure that they have been obtained by others. If required by the ENGINEER, the CONTRACTOR shall furnish the permit numbers of all required permits for the disposal sites. The costs of securing such sites shall be borne by the CONTRACTOR.

H. Waste areas shall be uniformly graded to drain, with the outer limits feathered to blend with the existing ground. Waste areas shall be seeded, capped with suitable material, or otherwise protected from long-term erosion.

I. All excavated soils that meet the requirements for embankment material shall be placed in the embankment up to a distance of 300-feet from the point of excavation, prior to importing borrow. If the CONTRACTOR places more borrow, or selected borrow than is required and thereby causes a waste of useable excavation, the amount of such waste shall be deducted from the borrow quantity for purposes of payment.

J. Temporary storage of useable or suitable excavation is the responsibility of the CONTRACTOR, and no additional payment will be made.

K. The CONTRACTOR shall conduct all operations to prevent contaminating useable excavation with unsuitable material.

L. When frozen material is excavated and meets all other requirements for embankment material, it shall be allowed to thaw and drain prior to placing in the embankment. This material will be considered useable excavation and no additional payment will be made.

M. All organic material shall be removed to a depth of five (5) feet within the road prism and pavement structure, unless otherwise shown in the Contract Documents, or as directed by the ENGINEER.

N. The CONTRACTOR shall provide added care when excavating adjacent to existing retaining walls, fences and houses. Damage caused to existing walls, fences and houses by the CONTRACTOR shall be repaired at the CONTRACTOR's expense.

O. After excavation to the subcut limit is complete and prior to placing separation and reinforcement fabric, if required, and backfilling with Borrow, Selected Borrow or Shot Rock Borrow, the bottom of the subcut shall be compacted with an excavator or backhoe-mounted vibrating compactor until a firm base for the backfill material is obtained.

3.2 EMBANKMENT

A. Embankments shall be constructed to a reasonably smooth and uniform shape conforming to the lines, grades and cross sections indicated on the Drawings or as directed by the ENGINEER.

B. The underlying ground shall be properly prepared prior to placing embankment material. Clearing and Grubbing in embankment areas must be completed prior to embankment operations. Debris shall be removed and surface depressions or holes shall be filled with suitable material to a level uniform surface and compacted before the embankment is constructed.

C. When embankment is to be placed on hillsides steeper than a 4:1 slope, new embankment is to be placed alongside existing embankments, or embankments are to be built half width at a time; the foundation shall first be prepared by constructing benches of sufficient width to accommodate placing and compacting equipment. Each bench shall begin at the intersection of the original ground and the vertical side of the pervious cut. Material so excavated and suitable for embankment construction shall be incorporated into the new embankment. Benching is incidental to other items in the contract and no direct payment will be made therefor.

D. Wherever an existing compacted roadway surface containing granular material lies within three (3) feet of the new embankment surface, such existing roadway shall be scarified to a depth of six (6) inches and incorporated into the first layer of embankment.

E. Rocks, broken concrete or other solid materials shall not be placed in embankment areas where piling is to be placed or driven, or where culvert placement is required.

F. When frozen soils are encountered in clearing or stripping operations preparatory to the placement of embankment, or in the excavation, or in undercuts in excavation areas, the ENGINEER shall require timely placement of the backfill or embankment materials, if such action is deemed essential to minimize deterioration or degradation of the

foundation material. Embankment shall not be placed over seasonally frozen ground except when written permission is received.

G. When excavation is performed at a season of the year when freezing weather is imminent, the CONTRACTOR shall place the specified backfill promptly, following the excavation WORK, at least up to a level which will allow the surface to adequately drain. In order to assume compliance, the ENGINEER may require that arrangements be made for the timely availability of such embankment or backfill materials prior to commencement of the stripping or excavation operations.

H. If embankment can be deposited on only one side of abutments, wing walls, piers or culvert headwalls, care shall be taken that the area immediately adjacent to the structure is not compacted to the extent that it will cause the overturning of, or excessive pressure against the structure.

I. When embankment is to be placed on both sides of a concrete wall or box-type structure, operations shall be so conduced that the embankment is always at approximately the same elevation on both sides of the structure.

J. The finish subgrade surface (bottom of base course level) shall not vary more than 0.05-foot when tested using a ten foot straightedge, nor vary more than 0.05-foot from the established grade. The bottom of subgrade surface shall not vary more than 0.10-foot from the established grade.

K. If continued hauling over a completed or partially completed embankment causes loss of stability as evidenced by pumping or rutting, or other damage, the CONTRACTOR shall repair the damaged embankment at its own expense and adjust its hauling equipment and procedures so as to avoid further damage.

3.3 EMBANKMENTS CONSTRUCTED WITH MOISTURE DENSITY CONTROL

A. Except for embankments constructed predominantly of rock fragments or boulders, all embankments shall be constructed with moisture density control. Embankments shall be placed in horizontal layers not to exceed eight inches in depth, loose measurement, for the full width of the embankment, except as required for traffic, and shall be compacted before the next layer is placed. A smaller depth will be required if the compaction equipment is considered by the ENGINEER to be insufficient to obtain the required densities. Embankments shall be compacted at the approximate optimum moisture content to not less than 95% of the maximum density as determined by AASHTO T 180 D or Alaska T-12. Embankment materials may require drying or moistening to bring the moisture content near to optimum. In place field densities will be determined by Alaska T-3 or T-11. Sufficient time shall be allowed between placement of layers to allow for field density tests.

3.4 EMBANKMENTS CONSTRUCTED FROM ROCK FRAGMENTS

A. When embankment material consists predominantly of rock fragments or boulders too large to be contained in the lift thickness specified without crushing or further fracturing, such material may be placed in lifts not exceeding in thickness the approximate average size of the larger rocks, or two feet, whichever is less.

B. This material shall not be dumped in final position but shall be deposited on the fill and distributed by blading or dozing so that voids, packets and bridging will be reduced to a minimum. Intervening spaces and interstices shall be filled with smaller stones and earth to form a dense, well compacted embankment. Hauling equipment shall be uniformly routed over the entire width of the embankment, and compaction equipment shall be utilized if necessary to assure that a well-compacted embankment is obtained.

3.5 OBLITERATION OF ROADWAYS

A. Obliteration of roadways shall include all grading operations necessary to incorporate the roadway into the new roadway and surroundings in order to provide a pleasing appearance from the new roadway. Ditches not required for drainage courses shall be filled and the roadway shall be rough graded so as to restore approximately the original contour of the ground.

END OF SECTION