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PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Preparation of Sub-grade for new and existing streets, alleys, driveways, parking lots, or other public places, upon which surfacing is to be placed.

B. Preparation of the surfaced Roadbed, either new or existing, upon which the Pavement Structure is to be placed.

1.02 RELATED SECTIONS:

Section 31 00 00 - Earthwork

Section 32 11 23 - Mineral Aggregates

Section 32 11 26.23- Asphalt Plants & Equipment

Section 32 12 16.13 - Asphalt Paving

Section 32 23 13.16 - Grade Adjustment for Utility Structures

PART 2 - PRODUCTS

2.01 GEO-TEXTILE:

A. The material shall be a geo-textile consisting only of long chain polymeric fibers or yarns formed into a stable network such that the fibers or yarns retain their position relative to each other during handling, placement, and design service life. At least 95 percent by weight of the material shall be polyolefins or polyesters. The material shall be free from defects or tears.

B. The geo-textile shall also be free of any treatment or coating which might adversely alter its hydraulic or physical properties after installation.

C. Thread used for sewing shall consist of high strength polypropylene, polyester, or polyamide.

1. Nylon threads will not be allowed.

2. The thread shall be of contrasting color to that of the geo-textile itself.

		Geotextile Property Requirements[1]	
Geotextile Property	Test Method[2]	Separation Woven/Nonwoven	Soil Stabilization Woven/Nonwoven
AOS	ASTM D 4751	0.60 mm max. (No. 30 sieve)	0.43 mm max. (No. 40 sieve)
Water Permittivity	ASTM D 4491	0.02 sec^{-1} min.	0.10 sec^{-1} min.
Grab Tensile Strength, min. in machine and x-machine direction	ASTM D 4632	250 lbs. / 160 lbs. min.	315 lbs./200 lbs. Min.
Grab Failure Strain, in machine and x-machine direction	ASTM D 4632	<50% / /50%	<50% / /50%
Seam Breaking Strength	ASTM D 4632[2]	220 lbs. / 140 lbs. min.	270 lbs./180 lbs. Min.
Puncture Resistance	ASTM D 4833	80 lbs. / 50 lbs. min.	112 lbs./79 lbs. Min.
Tear Strength, min. in machine and x-machine direction	ASTM D 4533	80 lbs. / 50 lbs. min.	112 lbs./79 lbs. Min.
Ultraviolet (UV) Radiation stability	ASTM D 4355	50% strength retained min., after 500 hrs. in weatherometer	50% strength retained min., after 500 hrs. in weatherometer

3. Notes.

[1] All geo-textile properties are minimum average roll values (i.e., the test result for any sampled roll in a lot shall meet or exceed the values shown in the table).

[2] The test procedures used are essentially in conformance with the most recently approved ASTM geo-textile test procedures, except for geo-textile sampling and specimen conditioning, which are in accordance with WSDOT Test Methods 914 and 915, respectively.

PART 3 - EXECUTION

3.01 SUB-GRADE FOR SURFACING:

A. Remove from the Roadbed, immediately before placing surfacing Materials, all brush, weeds, vegetation, grass and other debris.

B. Dispose of all debris.

C. Drain water from all low spots or ruts.

D. Shape the entire Sub-grade to a uniform surface running reasonably true to the line, grade, and cross-section staked by the Engineer.

E. If necessary, the Contractor shall process the Sub-grade in cut areas to remove materials too coarse for mechanical trimming and recompaction.

F. Compact the Sub-grade to a depth of 6 inches.

1. Compaction shall achieve 95 percent of maximum density determined by tests described in "Compaction Control Tests" Article of this Section.

2. All portions of the surface on the Sub-grade which are inaccessible to large compactor units shall be thoroughly compacted with smaller compactor units or mechanical tampers.

G. Remove excess Material that does not drift to low spots during blading and shaping. The Contractor shall dispose of this excess by placing it where the Sub-grade lacks Material or by wasting it.

H. Add Materials where the Sub-grade needs more to bring it up to grade. The Contractor shall water and compact these added Materials as needed to produce a true finished Sub-grade.

I. Underground work in the area of the Sub-grade shall be completed and properly backfilled and compacted before Sub-grade work is started. This shall include the Work and work performed by the Owner or others.

J. If the underlying Sub-grade is soft, spongy, or yielding and does not permit proper compaction, the Contractor shall stabilize the Sub-grade per "Sub-grade Stabilization" Article of this Section.

K. Where normal crown sections are being constructed, stakes will be set at convenient offsets at intervals not to exceed 50 feet and at closer intervals where necessary, such as at street and alley intersections. It shall be the responsibility of the Contractor to set centerline grades which may be needed except in cases where the street grades are warped or otherwise do not conform to the typical section, in which case the Engineer will set the stakes.

L. The full width of the Roadway shall be kept well sprinkled with water before and during process of rolling the Sub-grade.

M. Grade and line, throughout the stages of constructing the Sub-grade, shall be secured from the reference stakes. The Sub-grade shall be maintained in the finished condition until the first course of surfacing is placed upon it.

N. If the Contract requires a trimming machine, it shall:

1. Maintain the grade and transverse slopes automatically through sensors that respond to reference lines on both edges of each Roadway.

2. Create a smooth, uniform surface free from chatter and ripples.

3. Shall be subject to the Engineer's approval.

3.02 SUB-GRADE FOR PAVEMENT:

A. When Drawings call for concrete pavement to be placed directly on the Sub-grade, the Contractor shall prepare the Sub-grade as outlined in "Sub-grade for Surfacing" Article of this Section. This work shall include:

1. Removal of Sub-grade for increased thickness of pavement, for pavement headers, and for increased thickness at pavement edges. This may be done just before the concrete is placed.
2. When the pavement is to be constructed over an old Roadbed composed of gravel and macadam, the old gravel or macadam shall be scarified and the Material shall be uniformly spread and thoroughly compacted.
3. Compaction of Sub-grade shall extend to at least 1 foot beyond the pavement edge or to a width that accommodates the paving machine without visible distortion of the Sub-grade.
4. Thoroughly wetting the Sub-grade with water from 12 to 48 hours before the concrete is to be placed and maintaining this wet condition until the concrete is placed.
5. The Sub-grade shall be compacted both before and after the forms are set.

3.03 SUB-GRADE STABILIZATION:

A. When the density of the native earth in a Roadway section is determined by the Engineer to be less than that required for the method of compaction specified for the earth embankment, or where the nature or condition of the earth below the designated Sub-grade is such that it may impair the stability of the Sub-grade, the Contractor shall stabilize the Sub-grade by the method selected by the Engineer from among the following:

1. Method A:

   a. Thoroughly loosen the earth to a depth of 6 inches by scarifying, aerating or watering as applicable, and compact to the required density.

2. Method B:

   a. Excavate below grade to the limits and depth designated by the Engineer and by whose direction the excavated Material shall be temporarily stockpiled for use as backfill, placed in adjacent embankments, or, if unsuitable, wasted and replaced with selected Material or other designated backfill Material.

   b. If deemed necessary by the Engineer, the earth at the bottom of the excavation shall be loosened to a depth of 6 inches by scarifying, aerating or watering, as applicable, and compacted to the required density.

   c. The excavated area shall then be backfilled with the previously excavated and stockpiled, or selected, Material or with such other Mineral Aggregate backfill as may be ordered by the Engineer.

   d. Backfill shall be placed and compacted in successive layers in accordance with the compaction method required for embankments under the provisions of the Contract.

e. Excavation below finish grade as set forth above shall be classified the same as the excavation above final grade.

3. Method C:

a. Bring the exposed soil surface to the required line, grade and cross section. All protruding objects (rocks, sticks, debris) shall be removed and all holes and depressions filled.

1) The Engineer may require additional depth of excavation and shaping the soil to the required line, grade and cross section.

b. The geo-textile shall be placed as shown on the Drawings and shall extend a minimum of 2 feet beyond the placement of the fill Material.

1) The geo-textile sheets shall overlap a minimum of 2 feet and shall be placed in a manner such that the preceding roll overlaps the following roll in the direction of fill Material placement.

2) If a geo-textile is torn or damaged during construction, the damaged area shall be repaired by placing a large enough piece of geo-textile to cover the damaged area and meet the overlap requirement in a manner acceptable to the Engineer.

3) Wrinkles, folds or creases shall be kept to a minimum.

4) The Engineer will approve the geo-textile installation before it is covered with fill.

c. Fill Material shall be placed first on the top layer of geo-textile to prevent Material from entering between and separating the overlapping geo-textile layers.

d. Construction vehicles shall be limited in size and weight such that the rutting depth in the initial lift of fill above the geo-textile is not greater than 2 inches.

e. Compaction of the overlying fill shall be done in the static or non-vibratory mode.

B. There are other alternate methods of Sub-grade stabilization which include the addition of lime or Portland cement mixed into Sub-grade material. The Contractor may propose an alternate method by submitting the alternate method to the Engineer for approval at least 3 Working Days in advance.

3.04 MAINTENANCE AND PROTECTION OF SUB-GRADE:

A. Once prepared, the Sub-grade for surfacing shall be maintained in a finished condition until the first course of crushed rock base or the finish pavement surface is ready to be placed.

1. The Contractor shall maintain the Sub-grade by blading and compacting as frequently as may be necessary.

2. All cuts, ruts, and breaks in the surface of the Sub-grade shall be repaired in a manner acceptable to the Engineer prior to placing surfacing, treated base, or paving Materials.

B. The Contractor shall take steps necessary to protect the prepared Sub-grade from inclement weather, the Contractor's operations, and public traffic prior to the placement of crushed surfacing, gravel base, pavement, etc.

1. These steps shall include, but are not limited to, the use of plastic sheeting to protect the Sub-grade from inclement weather, planking to protect the Sub-grade from the Contractor's Equipment, and the placing of paving Materials or base Materials from an adjacent lane in lieu of operating Equipment over the prepared Sub-grade.

C. Hauling over the finished Sub-grade shall be limited to that which is essential for construction purposes. Equipment used for transporting Materials over the prepared Sub-grade shall be equipped with pneumatic tires.

1. Equipment used for hauling over the prepared Sub-grade which, in the opinion of the Engineer, causes undue damage to the Sub-grade or to the underlying Materials shall be removed from the Work upon request of the Engineer.

2. If approved by the Engineer, the Contractor may plank the Sub-grade before hauling Materials or operating Equipment over it.

D. During extended periods of seasonal inclement weather in which the Engineer deems it impractical or infeasible to protect the prepared Sub-grade with plastic sheeting or planking and where the Contractor is required to operate Equipment over the prepared Sub-grade in order to construct a crushed surfacing base course, treated base, or finished pavement, the Engineer may order the use of a ballast Material to stabilize and protect the Sub-grade prior to paving.

1. Stabilization shall be by Method B of "Sub-grade Stabilization" Article of this Section except the Roadway ballast shall be either Mineral Aggregate Type 2 or Type 14, whichever is designated by the Engineer.

2. Roadway ballast shall be used for Sub-grade stabilization only when designated by the Engineer.

3.05 COMPACTION CONTROL TESTS:

A. In-place density will be determined by one or more of the following methods:

1. ASTM D 1556, Test for Density of Soil In-place by the sand cone method.

2. ASTM D 2167, Test for Density of Soil In-place by the rubber balloon method.

3. ASTM D 2922, Test for Density of Soil In-place by the nuclear method.

B. Laboratory densities may be determined by one of the following methods:

1. ASTM D 698, Moisture-Density Relations of Soils and Soil-Aggregate Mixtures.

2. ASTM D 4253, Maximum Index Density of Soils using a Vibratory Table.

    a. ASTM D 698 will be used for computing the maximum density of all fill soils except for those granular soils yielding, in the opinion of the Engineer, an unsatisfactory moisture-density curve. In that case the maximum density will be determined by the method specified in ASTM D 4253.

C. The Contractor shall excavate pits for density sampling at locations designated by the Engineer. Density sampling will be performed by Owner forces.

END OF SECTION