Section 7 - Roadway Construction

Overview

This section includes specifications regarding all material, equipment, and labor required for road construction, including subgrade, base, asphalt surface, and shoulders as specified, as shown on the Plans, and as directed by the Engineer. All work shall be in accordance with SCDOT, Standard Specifications for Highway Construction, except as modified below. This specification shall also be applied to parking lots, driveways, and other paved areas as applicable.

These specifications are based on minimum subgrade, base course, and surface course requirements. Road designs may vary from these minimum requirements based on site conditions, road type, traffic volume, etc. The design for each road will specify additional subgrade, base and surface course requirements if necessary. These material and thickness requirements will be shown on the Plans.

Chapter 1 – Subgrade

The subgrade shall be prepared for the subsequent installation of base course, pavement, sidewalk, curb and gutter, and shoulders. Prior to the completion of the subgrade, all cuts/fills, sewers, drains, water lines, and structures shall be substantially complete. The compacted subgrade shall conform to the lines, grades and cross sections as specified, as shown on the Plans, and as directed by the Engineer.

1.00 The entire surface of the in-place subgrade shall be plowed, harrowed and thoroughly mixed to a depth of at least twelve inches (12"). After the material is mixed, the subgrade shall be compacted to final line and grade (one hundred percent (100%) of maximum density for the top eight inches (8”) and ninety-five percent (95%) of maximum density below the top eight inches (8”)). Maximum densities will be determined by either AASHTO T99, *Standard Method of Test for Moisture–Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop*, SC T-25, *Field Method of Determining Moisture-Density Relations of Soils,* or SC T-29, *Field Determination of Maximum Dry Density and Optimum Moisture Content of Soils by the One-Point Method*.

1.01 Finished Grading shall be completed as described below.

1.01.0 The surface of the complete subgrade shall be bladed to a smooth and uniform texture. The center line profile shall conform to the established elevations with an acceptable tolerance of ± one tenth of a foot (±0.10’).

1.01.1 The full width between the back of the curb and right-of-way shall be finished, graded to a uniformly smooth surface, free from any abrupt irregularities, and sloping at a ratio not to exceed one half inch (1/2") per foot nor less than one quarter inch (1/4") per foot. The finished grade shall not exceed ± one quarter foot (±0.25’) from the plan cross-section.

1.01.2 No base or curb and gutter shall be placed before the subgrade is inspected, tested, and approved by the Engineer.

1.02 Testing shall be done on all portions of the subgrade underlying the base and curb and gutter, plus an 18-inch width behind each curb.

1.02.0 The contractor will provide the roller with a minimum axle load of fifteen thousand pounds (15,000 lbs or 7-1/2 tons) per rear axle; generally, a fully loaded water distributor, asphalt distributor, loaded twenty-yard truck, or similar approved equipment.

1.02.0.0 Test rolling shall be done parallel to the center line, with the forward speed of the roller between two and three miles per hour (2-3 mph).

1.02.0.1 Test rolling under the curb and gutter shall be done prior to placement of curb and gutter. The surface shall be in a finished condition ready for the placement of curb and gutter.

1.02.0.2 Test rolling under the base material shall be done prior to placement of the base material. The surface shall be in a finished condition ready for the placement of base material. Test rolling of the area under the base material shall be done over the quarter parts of the road, with additional passes at the discretion of the Engineer.

1.02.1 Compaction testing shall be as specified in Section 1.00 of this Chapter.

1.02.1.0 The Contractor shall arrange for an approved, independent testing laboratory, that is certified by AASHTO, to conduct the necessary compaction tests at his own expense. Test results shall be submitted directly from the lab to the Engineer.

1.02.1.1 Test locations will be determined by the Engineer and in no case, will be less than one test per four hundred and fifty feet (450 ft) of road bed.

1.03 Areas that exhibit pumping, soft spots, and low compaction shall be repaired or replaced and re-tested as directed by the Engineer. The repairs may consist of re-mixing in-place material, additional compaction effort, removal of unsatisfactory material and replacement with satisfactory material, or by the strengthening or stabilizing of the material in place.

1.04 Upon submission of passing compaction test results and satisfactory test roll, the Engineer will approve the subgrade for the installation of road base and curb and gutter. However, subgrade approval may be rescinded if significant time passes or inclement weather deteriorates the subgrade. The Contractor will be required to repair and/or replace any subgrade deterioration and seek re-approval from the Engineer.

Chapter 2 – Base Course

Upon approval of the subgrade, the base course shall be installed to the lines, grades and cross sections as specified, as shown on the Plans, and as directed by the Engineer.

Materials listed below are recommended for use as a base course. Alternate materials may be submitted to the City Engineer for review.

Section 2.0 – Aggregate Base Course

2.00 Aggregate base course shall consist of a mixture of crushed stone, gravel, sand, soil, or approved similar material. The mixture shall be in conformance with SCDOT Type 1 or Type 2 Stabilized Aggregate Base Course.

2.00.0 Aggregate base course shall consist of a six inch (6”) minimum compacted thickness, as shown on the Plans, or as directed by the Engineer.

2.00.1 The material shall be free from lumps or balls of clay, weeds, roots, or other objectionable matter.

2.00.2 No in-place mixing of aggregate base course will be permitted.

2.01 The base material shall be spread evenly on the approved subgrade and brought to line, grade, and cross-section as shown on the Plans or as directed by the Engineer. The material shall then be bladed, wetted, and rolled to achieve a dense, smooth, unyielding, well bonded base course compacted to one hundred percent (100%) maximum density.

2.02 The Contractor shall finish the base course to a smooth and uniform surface, free from abrupt changes, and sloping to the edges at a rate of one quarter inch (1/4") per foot. The surface shall vary from profile and cross section at any given point by no more than ±one half inch (±1/2”). There shall be no roots, organic matter, trash or any other deleterious material on or protruding from the surface.

Section 2.1 – Asphalt Base Course

2.10 Asphalt base course shall be in conformance with SCDOT Hot-Mix Asphalt Aggregate Base Course or other asphalt mix approved by the Engineer.

2.11 The base material shall be spread by a mechanical spreader on the approved subgrade, struck to the line, grade, and cross-section as shown on the Plans or as directed by the Engineer, then compacted by rolling to

achieve a dense, smooth, uniform surface. A tack coat shall be applied to the asphalt base prior to laying the asphalt surface course.

2.12 The Contractor shall finish the base course to a smooth and uniform surface, free from abrupt changes, and sloping to the edges at a rate of one quarter inch (1/4") per foot. The surface shall vary from profile and cross section at any given point by no more than ±one half inch (±1/2”). There shall be no roots, organic matter, trash or any other deleterious material on or protruding from the surface.

Section 2.2 – Testing and Maintenance

Testing on the base course shall conform to the testing requirements outlined in Section 1.02, in Chapter 1 of these specifications.

The base course shall be maintained by repeated machining throughout its entire length for such length of time as necessary to provide an adequate base course conforming to the required cross section, grade, thickness and proper compaction. Maintenance shall also include the correction of any defects which may develop due to traffic, erosion, or other cause; and shall include watering, machining, rolling, and other operations necessary to condition and preserve the base course. Any lack of uniformity in the base course mixture, unevenness in the surface, or other irregularities shall be corrected by adding or replacing base materials and re-mixing, reshaping, and re-compacting as necessary and as required. The base shall be properly drained at all times.

Chapter 3 – Bituminous Pavement

The prime coat and hot laid asphalt concrete surface course shall be installed on the approved base course to the lines, grades, and cross-sections as specified, as shown on the Plans, and as directed by the Engineer.

3.00 All bituminous mixtures shall not be produced or placed during rainy weather, when the subgrade or base course is frozen or shows any evidence of excess moisture, when the moisture on the surface to be paved would prevent proper bond, or when the air temperature is less than forty degrees Fahrenheit (40°F) in the shade away from artificial heat. In addition, hot laid asphalt concrete surface courses, which are to be placed at a rate of one hundred pounds per square yard or less, shall not be placed when the air temperature measured in the shade, away from artificial heat, is less than fifty degrees Fahrenheit (50ºF).

3.01 When a prime coat is required, it shall be uniformly applied to the base course by use of the distributor spray bars at the rate of 0.25 to 0.28 gallons per square yard. The prime coat shall be applied when the atmospheric temperature is above fifty-five degrees Fahrenheit (55°F). The material for the prime coat shall be one of the following:

3.01.0 Cutback Asphalt (Rapid Curing Type) material shall be grade RC-30 and shall conform to the requirements of the SCDOT Standard Specifications. RC-30 shall be sprayed between fifty degrees (50°) and one hundred twenty degrees Fahrenheit (120°F).

3.01.1 Cutback Asphalt (Medium Curing Type) material shall be Grade MC-30 and shall conform to the requirements of AASHTO M 82, *Standard Specification for Cutback Asphalt (Medium-Curing Type)*, except that the penetration of the residue shall be 80-250. The Saybolt-Furol viscosity shall apply. MC-30 shall be sprayed between fifty degrees (50°) and one hundred twenty degrees Fahrenheit (120°F).

3.01.2 Anionic emulsified asphalt shall be Grade EA-P and shall meet the requirements of AASHTO M 140, *Standard Specification for Emulsified Asphalt*. EA-P shall be sprayed between fifty degrees (50°) and one hundred sixty degrees Fahrenheit (160°F).

3.02 The following shall be required of surface course.

3.02.0 Asphalt concrete mixture shall be composed of mineral aggregate and asphalt cement, mixed in an approved plant

and shall conform to SCDOT Standard Specifications for Highway Construction for the type specified on the plans or elsewhere in these specifications. The job mix shall be approved by the Engineer prior to installation.

3.02.1 The mixture shall be transported from the mixing plant to the point of use in approved vehicles. Loads shall not be of such size or weight as to interfere with the efficient operation of the spreader. Loads shall not be sent out so late in the day as to prevent the completion of spreading and completion of the mixture during daylight, unless artificial light is provided. The mixture shall be delivered at a temperature between two hundred and fifty degrees (250°) and three hundred twenty-five degrees Fahrenheit (325°F) and within ± twenty degrees Fahrenheit (±20°F) of the temperature set at the mixing plant.

3.02.2 Upon arrival at the point of dumping, the mixture shall be dumped into the spreader and immediately spread true to line, grade and cross section specified and to the loose depth that will secure a minimum compacted thickness of as specified on the plans. The hot mixture shall be free from lumps and shall be spread while it is in a workable condition.

After the mixture has been spread and before roller compaction is started, the surface shall be checked, all fat spots and irregular areas removed and replaced with satisfactory material. All irregularities in alignment and grade along the outside edge shall also be corrected by the addition or removal of mixture before the edge is rolled.

Immediately after the asphalt mixture is placed and struck off and surface irregularities are corrected, the mixture shall be thoroughly and uniformly compacted by rolling.

During compaction of asphalt concrete asphalt, the roller shall not pass over the end of freshly placed material except when a construction joint is to be formed. Edges shall be finished true and uniform.

The surface shall be rolled when the mixture is in the proper condition. Rolling shall not cause undue displacement, cracking, or shoving.

The number, weight, and type of rollers furnished shall be sufficient to obtain the required compaction while the mixture is in a workable condition. The sequence of rolling operations

and the selection of roller types shall provide the specified pavement density.

Immediately after the hot mixture is placed, it shall be sealed with rollers. Thereafter, rolling shall be a continuous process, insofar as practicable, and all parts of the pavement shall receive uniform compaction.

Rolling shall begin at the sides and proceed longitudinally parallel to the center of the pavement, each trip overlapping at least ½ the roller width, gradually progressing to the crown of the pavement. When abutting a previously placed lane, the longitudinal joint shall be rolled first, followed by the regular rolling procedure. On superelevated curves, rolling shall begin at the low side and progress to the high side by overlapping of longitudinal trips parallel to the centerline.

Displacements occurring as a result of reversing the direction of a roller, or from other causes, shall be corrected at once by the use of rakes or lutes and addition of fresh mixture when required. Care shall be taken in rolling not to displace the line and grade of the edges of the asphalt mixture. All roller marks shall be eliminated.

To prevent adhesion of the mixture to the rollers, the wheels shall be kept properly moistened with water or water mixed with a very small quantity of detergent or other approved material. Excess liquid will not be permitted.

Along forms, curbs, headers, walls, and other places not accessible to rollers, the mixture shall be thoroughly compacted with hot hand tampers, smoothing irons, or mechanical tampers. On depressed areas, a trench roller may be used or cleated compression strips may be used under the roller to transmit compression to the depressed area.

Edges of asphalt pavement surfaces shall be true curves or tangents. Irregularities shall be corrected.

The surface of the compacted course shall be protected until the material has cooled sufficiently to support normal traffic without marring.

3.02.3 The newly finished pavement shall be protected from vehicular traffic of any kind until the pavement has cooled and hardened and for a minimum of six hours.

3.02.4 The surface will be tested by using a ten-foot (10') straightedge. The variation of the surface from the testing edge of the straightedge between any two contacts with the surface shall not be more than one quarter inch (1/4"). Humps and depressions exceeding the specified tolerance shall be corrected, or the defective work shall be removed and replaced with new material.

3.03 The above work will be subject to thickness and compaction tests as deemed necessary by the Engineer. Such tests will be at the expense of the Contractor.

Chapter 4 – Protection of Existing Improvements

Streets, sidewalks, driveways, power/ cable/telephone lines, gas lines, water lines, sewers, storm drains and other existing improvements shall be maintained and protected from damage. Any aerial, surface or subsurface improvements damaged during the course of the work shall be repaired to the satisfaction of the Engineer. Satisfactory provisions shall be made for the maintenance of traffic on streets, driveways, and walkways.

Prior to any excavation, the Contractor shall notify all utilities and utility locating services to provide locations for buried utilities. The contractor shall obtain all necessary permits (grading, building, water, sewer, encroachment, etc.) prior to beginning work.

Section 4.0 – Restoration of Property

The Contractor shall restore all property and facilities disturbed by this construction as specified in Section 3 - Restoration of these specifications.

Section 4.1 – Adjustment of Existing Facilities

All manholes, valve boxes, catch basins, traps, fire hydrants, etc. shall be adjusted flush to the finished pavement surface or grade along the road shoulder. The Contractor will be required to raise, lower, and/or reconstruct such facilities at his expense. Adjustments may be made as specified elsewhere herein with brick/mortar, concrete, manhole riser sections, or other materials as required. Manhole adjustment rings shall be submitted for approval to the Engineer prior to use.

Section 4.2 – Maintenance

Unless otherwise specifically noted, the contractor shall maintain the roadway throughout the warranty period.