

## SECTION 5.0 BITUMINOUS CONCRETE PAVEMENT

### 5.01 Description

(a) Bituminous Concrete Base Course (Type HB, Black Base, B-25.0, and B-37.5)

This item shall consist of a base course composed of a mixture of course aggregate, fine aggregate and asphalt cement mixed according to a mix formula and at a plant approved by the City Engineer. The Bituminous Concrete Base Course shall be placed on a prepared subgrade or existing pavement, complete in place, in accordance with the specifications herein contained. This mix shall be placed so as to conform with the lines, grades, thickness, width, and cross-section as shown on the plans or as directed by the City Engineer.

(b) Sand Asphalt Surfaces Course (Type F-1)

This item shall consist of a surface course composed of a mixture of fine aggregate and asphalt cement mixed according to a mix formula and at an asphalt plant approved by the City Engineer. The Sand Asphalt Surface Course shall be placed on a prepared base course or existing pavement, complete in place, in accordance with the specifications herein contained. This mix shall be placed so as to conform with the lines, grades, thickness, widths and cross-section as shown on the plans or as directed by the City Engineer.

(c) Bituminous Concrete Surface Course (Type I-1, I-2, HDS, S-9.5, SF-9.5A,B and S-12.5)

This item shall consist of a surface course composed of a mixture of course aggregate, fine aggregate, and asphalt cement mixed in accordance to a mix formula and at an asphalt plant approved by the City Engineer. The Bituminous Concrete Surface Course shall be placed on a prepared base course or existing pavement, complete in place, in accordance with the specifications herein contained. This mix shall be placed so as to conform with lines, grades, thickness, widths and cross-section as shown on the plans or as directed by the City Engineer.

(d) Bituminous Concrete Binder Course (Type H, HDB, and I-19.0)

This item shall consist of a Binder Course composed of a mixture of course aggregate, fine aggregate, and asphalt cement mixed according to a mix formula and at a plant approved by the City Engineer. The bituminous concrete binder course shall be placed on a prepared base course or existing pavement, complete in place, in accordance with the City of Gastonia Standard Specifications, including but not limited to Section 6.0 thereof. This mix shall be placed so as to conform with lines, grades, thickness, widths, and cross-sections as shown on the plans or as directed by the City Engineer.

5.02 Materials

(a) Bituminous Concrete Base Course

All materials to be used in this mixture shall conform in all respects to the provisions as set forth in Section 630 of the NCDOT Specifications for **Type H-B base course, or Section 610 Superpave of the NCDOT Specifications for Types B-25.0 and B-37.5.**

(b) Sand Asphalt Surface Course

All materials to be used in this mixture shall conform in all respects to the provisions as set forth in Section 635 of the NCDOT Specifications for Class F - Sand Asphalt Base and Surface Course Type F-1.

(c) Bituminous Concrete Surface Course

All materials to be used in this mixture shall conform in all respects to the provisions as set forth in Section 645 of the NCDOT Specifications for **Bituminous Concrete Surface Course Types I-1, I-2, and HDS or Section 610 Superpave of the NCDOT Specifications for Types S-9.5, SF-9.5A,B and S-12.5.**

(d) Bituminous Concrete Binder Course

All materials to be used in this mixture shall conform in all respects to the provisions as set forth in Section 640 of the NCDOT Specifications for **Type H, HDB Binder Course, or Section 610 Superpave of the NCDOT Specifications for Type I-19.0.**

5.03 Composition of Mixture

(a) Bituminous Concrete Base Course

The composition of the mixture shall conform in all respects to the provisions and specifications as set forth in Section 630 of the NCDOT Specifications, for **Type H-B Base Course, or Section 610 Superpave of the NCDOT Specifications for Types B-25.0 and B-37.5.**

(b) Sand Asphalt Surface Course

The composition of the mixture shall conform in all respects to the provisions and specifications as set forth in Section 635 of the NCDOT Specifications, for Type F-1 Surface Course.

(c) Bituminous Concrete Surface Course

The composition of the mixture shall conform in all respects to the provisions and specifications as set forth in Section 645 of the NCDOT Specifications for **Types I-1 and I-2, or Section 610 Superpave of the NCDOT Specifications for Types S-9.5, SF-9.5A,B and S-12.5.**

(d) Bituminous Concrete Binder Course

The composition of the mixture shall conform in all respects to the provisions and specifications as set forth in Section 640 of the NCDOT Specifications for **Type H, HDB Binder Course, or Section 610 Superpave of the NCDOT Specifications for Type I-19.0.**

5.04 Construction Methods

All types of bituminous plant mixtures for bituminous concrete surface course, bituminous concrete binder course and bituminous concrete base course shall conform with Division 6 of the NCDOT Specifications (latest revisions).

#### 5.05 Preparation of Surface

##### Resurfacing

The City will fill any and all voids, holes, cracks, or other depressions or irregularities in the existing pavement or widening strip that are too deep to obtain the proper compaction in the regular one course resurfacing operation to the surface of the existing pavement with **Bituminous Concrete Base Course material, Type H-B, Superpave Types B-25 and B-37.5, or with Bituminous Concrete Surface Course material, Type I-1, I-2 HDS, Superpave Types S-9.5 or S-12.5** and all material shall be thoroughly tamped in advance of the resurfacing operation. The contractor shall remove all grass, dirt, gravel or other foreign materials from existing pavement and the shoulder of the existing pavement the distance necessary to accomplish paving operations prior to resurfacing. The City shall be responsible for backfilling with an approved fill material.

The contractor will be required to clean up immediately after completing the resurfacing of each street. Excess asphalt left in the gutter or behind the curb will be picked up or swept up, and removed from the job site. This will be done prior to beginning work on another street.

##### New Pavement

Any and all voids, holes, cracks, or other depressions or irregularities in the sub-base shall be filled with an approved material and shall be thoroughly compacted prior to surfacing, as may be directed by the City Engineer. The contractor shall remove all grass, roots, or other foreign material from the area to be paved before beginning the paving operations.

#### 5.06 (G) Plant Tickets

Each and every truck load of bituminous concrete materials delivered to the City of Gastonia projects shall be accomplished by a load ticket (in duplicate). This ticket shall bear the signature of the Plant Inspector certifying to the quantity (by weight) of material delivered and to the truck number delivering such material. Both copies of the load tickets accompanying each truck shall be signed by the designated City employee at the job site. One copy of the ticket shall be retained by the City employee and the other copy shall be retained by the contractor. The contractor's copy of the ticket shall accompany his monthly invoice. Any ticket submitted with the monthly invoice which has not been properly signed by the City's inspector shall not be eligible for payment.

5.07 Trucks for Hauling Bituminous Mixtures

All trucks for hauling bituminous mixtures shall have a tight, clean and smooth metal bed that has been sprayed with a minimum amount of lime solution, or a soap and oil solution to prevent the mixture from adhering to the beds. Each truck shall be covered with a canvas of such size as to protect the mixture from the weather. All covers shall extend down over the sides and back of the truck body for a distance of 12 inches and shall be securely fastened. A 3/8 inch diameter hole shall be provided on each side of the truck body near the center of the body and 6 inches above the bed of the truck for the purpose of inserting a thermometer.

5.08 Transportation and Delivery of Mixtures

The mixture shall be transported from the mixing plant to the point of use in vehicles conforming to the requirements of Section 5.07 above. The contractor shall exercise precaution to prevent tracking asphalt cement on the surface of any pavement. No loads shall be sent out so late in the day as to prevent completion of the spreading and compacting of the mixture during daylight, unless artificial light satisfactory to the City Engineer is provided. The mixture shall be delivered at a temperature as required in section 610-8 of the NCDOT Standard Specifications latest revision.

5.09 Bituminous Pavers

Bituminous concrete pavers shall be self-propelled and shall be capable of spreading and finishing all courses to the indicated widths and depths, true to line, grade, and cross-section, with or without the use of forms; and shall be capable of striking a smooth finish uniform in density and texture, without requiring an undue amount of handwork for correcting irregularities. The paver shall be equipped and operated with a fully activated screed plate which is designed to be preheated for the full height whenever necessary.

The screed or strike-off assembly shall be easily adjustable to the required crown, and shall be designed to lay the bituminous mixture in widths from 8 feet to 12 feet in increments of 1 foot or less. When required, satisfactory means shall be provided for heating the screed uniformly throughout its length. At no time shall the heading be accomplished by burning gasoline or other fuels on the screed or by any method that permits a flame in direct contact with the mixture.

The screed or strike-off assembly shall operate by cutting or crowding or by other practical action without tearing, shoving, or gouging, when laid at the workable temperature specified. The screed shall be adjustable to level and shall have an indicating level attached thereto in full view of the operator.

Pavers shall be equipped with hoppers and independently operated distributing screws that will place the material evenly in front of the screeds. Hoppers shall be designed to receive material from trucks without spillage.

Mechanical devices, such as equalizing runners, straight-edge runners, even arms, or other compensating devices shall be provided that will confine the edges to true lines and adjust the grade line so that minor changes in grade elevations will not be reflected in the finished surface of the course being placed.

The pavers shall also be equipped with blending or joint leveling devices for smoothing and adjusting all longitudinal joints between adjacent lanes of bituminous mixture.

The paver shall be designed to operate at variable forward speeds consistent with the satisfactory laying of the mixture and shall be varied to minimize the stopping time between loads.

#### 5.10 Rollers

**Rollers shall be tandem 8-12 tons and self propelled pneumatic tired rollers capable of having tire pressure of 60 to 90 psi.**

Self-propelled rubber-tired rollers shall contain two axles on which are mounted not less than seven pneumatic-tired wheels in such manner that the rear group of tires will not follow in the tracks of the forward group and will be centered between the forward wheels. The axles shall be mounted in a rigid frame provided with a loading platform or body suitable for ballast loading. The rollers shall be weighted with not less than 4.5 tons of ballast.

The tires shall be smooth and of a type that will not mark a warm asphalt pavement during rolling operations and shall be uniformly inflated.

The rollers shall be equipped with devices for keeping the wheels sufficiently wet to prevent materials being rolled sticking to them.

All rollers shall be in good condition, and capable of reversing without back lash and shall weigh not less than 250 pounds to the inch width of roller tread. The speed of the roller shall not exceed 3 miles per hour and shall at all times be slow enough to avoid displacement of the bituminous mixture . Trench rollers shall weigh not less than 320 pounds to the inch width of rear roller tread and shall be of type approved by the City Engineer.

#### 5.11 Spreading and Finishing

The mixture shall be laid only upon a base or existing surface which is dry and when the weather conditions are otherwise suitable.

Upon arrival at the point of use, the mixture shall be dumped in the hopper and spread by a bituminous mechanical paver conforming to the requirements of 5.09 above, true to the line, grade, and cross-section stipulated, and to the loose depth as will secure the compacted thickness, or the specified weight of mixture per square yard. The hot - mixture shall be free from lumps and shall be spread while in a workable condition. The exact edge of the bituminous plant mix shall be established by a string line for a distance of at least 500 feet ahead of the spreading of the mixture.

If during construction, it is found that the spreading and finishing equipment in operation leaves the new course tracks or indented areas that are not satisfactorily corrected by the scheduled operations, or if it produces other permanent blemishes, the use of such equipment shall be discontinued and other satisfactory spreading and finishing equipment shall be provided by the contractor.

When necessary to obtain a satisfactory surface texture, an approved broom drag will be required on the surface course. The broom drag shall be attached to the finishing machine.

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable, in the judgment of the City Engineer, the mixture shall be spread and screeded by hand.

The contractor shall provide suitable means for keeping all small tools clean and free from an accumulation of bituminous material.

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

#### 5.12 Compaction

After spreading and while still hot, the mixture shall be compacted thoroughly and uniformly by rolling. Each roller shall be operated by a competent, experienced roller operator and must be kept as nearly as practicable in continuous operation. Rolling shall begin at the sides and progress gradually toward the center of the pavement, except that on superelevated curves rolling shall progress from the lower to the upper edge parallel to the center line of the pavement and uniformly tapping each preceding tract until the entire surface has been rolled and all the roller marks are eliminated. The motion of the roller shall at all times be slow enough to avoid displacement of the hot mixture. Any displacement occurring as a result of reversing the direction of the roller, or from any other causes, shall be corrected at once by the use of rakes or lutes and of fresh mixture when required. A minimum of two rollers shall be used. **For bituminous concrete, Base Types H-B, Binder Types H, HDB, Surface Types I-1, I-2, HDS, and Superpave B-25.0, B-37.5, S-9.5, SF-9.5A,B, S-12.5, and I-19.0, a minimum of two 8-12 ton tandem rollers shall be used. For Types F-1 a minimum of two 8-12 ton tandem rollers shall also be used. When three rollers are required or used the first rolling shall be done with an 8-12 ton tandem roller followed by a self-propelled pneumatic tired roller and the final rolling shall be done with an 8-12 ton tandem roller.** Additional rollers shall be used as may be required to obtain the specified density.

Each of the mixtures shown below shall be compacted to the density as indicated:

- (a) Sand Asphalt Surface Course used for resurfacing 92% of laboratory density as determined by the 2" Marshall method of test.
- (b) Bituminous Concrete Base Course, **Type H-B, B-25.0, and B-37.5**, 92%. of maximum theoretical density.



- (c) Bituminous Concrete Binder, **Type H, HDB, and I-19.0**, 95% of laboratory density as determined by the Marshall Method of Test.
- (d) Bituminous Concrete Surface Course, **Type I-1, I-2, HDS, S-9.5, and S-12.5**, 95% of laboratory density as determined by the Marshall Method of Test.

To prevent adhesion of the mixture to the roller, the wheels shall be kept moistened. Rubber tired rollers shall be kept moistened with a detergent or parting agent which will prevent adhesion of the asphalt without causing stripping of the surface aggregate.

Along forms, curbs, headers, and walls and at other places not accessible to the roller, the mixture shall be thoroughly compacted with hot hand tampers, smoothing irons or with mechanical tampers. On widened areas, a trench roller shall be used to obtain proper compaction. All exposed edges shall be tamped with a lute to produce a smooth leveled edge.

If at any time a thickness of more than three inches of binder, base, or surface is required for superelevated curves, etc., said mixture shall be spread in separate courses not exceeding three inches. A tack coat shall be used between each course as well as between the binder and surface.

#### 5.13 Tack Coat/Prime Coat

The contractor shall apply a tack coat as set forth in Section 605 of the NCDOT Specifications. Asphalt cement Grade AC-20, RS-1H, or as specified in Section 605 of NCDOT Specifications shall be used for tack coat materials.

The contractor, only when required by the Special Provisions or when required by the Project Plans, shall apply a prime coat as set forth in Section 600 of the NCDOT Specifications. Asphalt grade MC-30 or RC-30 shall be used as specified in Section 600 of the NCDOT Specifications.

#### 5.14 Tests

At the Pre-Construction meeting, the Contractor shall be required to submit a job mix formula (JMF) to the City Engineer for his review and approval. The JMF must meet North Carolina Department of Transportation

Specifications and City of Gastonia Specifications and be approved by the City of Gastonia. This will be done at the Contractor's expense, and if required by the City of Gastonia, be certified by an approved engineering testing laboratory showing the exact composition of a sample of the mixture to be delivered to the City.

After the contract has been awarded and the Contractor has begun to work, the following are required:

1. An extraction and gradation test will be made by the Contractor as directed in the following paragraphs. The City Inspector will also take an asphalt sample from the same truck, logging the truck number and location on the street. This will be done at least once each day
2. The City Inspector will continue to take a minimum of one sample per day. These samples will be stored and randomly sent to an independent laboratory for testing. These results will be compared with the Contractor's test results. All costs of the tests incurred will be at the City's expense.
3. Density tests will be performed a minimum of four times per day by the City Inspector using a Nuclear Density Gauge.
4. The temperature will be checked on every truck load of asphalt while still in the truck, noting the truck number, time of day, and approximate location on the street.

Recycled Bituminous Plant Mix Pavements will be allowed under this contract. All recycled asphalt pavement (RAP) materials shall conform to NCDOT Specification Section 611. The job mix shall consist of no more than 15% RAP, unless otherwise approved by the City Engineer. RAP shall only be used in H Binder and HB Binder. The Stockpile of RAP used shall meet NCDOT and City requirements.

The Contractor shall furnish the City Engineer a materials analysis report, at the Contractor's expense, showing the exact compaction of a representative sample of the mixture being delivered to the City. Percent (%) RAP should also be indicated in this report. At least one (1) test is to be performed for each 400 tons of plant mix material delivered to the City. These tests are to be performed in a testing laboratory designed for that purpose and furnished by the Contractor. The Contractor shall employ a materials testing consulting firm, subject to approval by the City, for the purpose of performing the required asphalt testing. All costs for performing each extraction test shall be paid at the contract unit price for each test. A representative of the City, as designated by the City Engineer, shall observe these tests on a random basis. All test results shall be mailed from the laboratory

to the City Inspector upon completion of each test. The Contractor shall remove, at his expense, any material which is not found to be in complete conformance with the specifications. The City reserves the right to perform any tests on the material as may be deemed necessary or desirable.

5.15 Safety Requirements

The contractor shall be responsible to erect and maintain all barricades, signs or other protective devices as may be necessary to insure the safety and welfare of the public. Where streets are temporarily closed to permit construction, the contractor shall be responsible to erect and maintain all detour routes as may be necessary. The contractor shall erect such devices upon taking over the job and maintain these devices until such improvements have been completed and accepted by the City. Also, see Section 2.06 of these specifications.

5.16 (G) Overhaul

No overhaul will be allowed. The contract unit price shall include the necessary compensation for delivery to any point within the service area of Gastonia.

5.17 (G) Measurement of Quantity

The quantity of bituminous concrete pavement to be paid for shall be measured as specified in Section 630-5, Section 635-5, Section 640-5, or Section 645-5 of the NCDOT Specifications, as may apply.

5.18 (G) Basis of Payment

The quantity, measured as provided in Section 5.06 and 5.17 above, shall be paid for at the appropriate contract unit price bid per ton for bituminous concrete surface or base course, complete in place, which price and payment shall be full compensation for furnishing mixing, hauling, placing, and rolling all materials including and applying a tack coat or prime coat application and filling all holes and irregularities, for all labor, form, equipment, tools, and other incidentals necessary to complete the work.

5.19 Adjusting Street Structures

This item shall include adjustment of existing manholes, valve boxes, etc. , to the new street grade. This shall be done by removing the casting and rebuilding that part of the masonry necessary to make the top of the structure to conform with the new street grade, or by other methods approved by the City Engineer. In most cases, this adjustment will be one (1) to two (2) inches. After the castings are adjusted to proper grade, any material required to be excavated adjacent to the structure shall be replaced with plain 3000 psi concrete. This work shall be done well in advance of the surface operation.

**Ductile Iron Risers (DIR)**

Ductile Iron Risers (DIR) may be used on resurfacing projects, to adjust manhole rings and valve boxes that have been evaluated and found to be structurally sound. DIRs as produced by Andrews Metal Products have been approved as of the date of this printing. If for any reason any adjusted MH or VB cannot be paved flush the same day of installation, said DIRs shall be removed and reinstalled during the next paving day. Each MH or VB to be so adjusted shall be evaluated as to it's structural integrity and if it is a candidate for such type of adjustment, if not a candidate it shall be conventually adjusted.

5.20 (G) Basis of Payment for Adjusting Structures

The basis of payment for adjusting street structures shall be contract unit price bid for manholes or valve boxes adjusted to the proper grade, complete in place. Such unit price and payment shall be full compensation for cutting and replacing existing pavement, removing and resetting casting or manhole, for all materials, tools, equipment, labor and other incidental work that may be necessary to complete the adjustment.

5.21 (G) Monthly Estimates

Payment will be made once a month and shall be the full compensation for all work done (as approximately estimated by the City Engineer) during the preceding month, less the percentage retained. The contractor shall by the fifth (5th) day of the month submit to the City Engineer an invoice for all work performed during the preceding month. Upon receiving the invoice, the City Engineer shall review it for payment. The City shall have thirty (30) days after receiving an approved invoice from the contractor, to make payment due to contractor for work done during the preceding month.

The City Engineer may withhold any payment due which in his opinion shall amount to \$5,000.00 or less.

5.22 (G) Final Payment

Upon the completion of the work the City Engineer shall proceed to determine the total quantities of work done by the contractor for which payment is due. He shall present this final estimate to the Public Works Director for his approval and forwarding to the City Finance Department for payment. The City shall within thirty (30) days from the completion date of this contract, make such payment less payments previously made. All monthly estimates are subject to correction in the final estimate and payment.

5.23 Seasonal Limitations

The seasonal limitations for asphalt paving shall be left to the discretion of the City Engineer.

Prime coat or tack coat shall not be applied when the weather is foggy or rainy or when rain is threatening. Prime coat shall not be applied when the air temperature in the shade is less than 50 degrees Fahrenheit, while tack coat shall not be applied when the temperature is less than 40 degrees Fahrenheit, unless otherwise approved by the City Engineer. Bituminous concrete mixture shall not be produced or placed during rainy weather, when the subgrade or base course is frozen or shows any evidence of excess moisture, or when the moisture on the surface to be treated would prevent the proper bond, or when the air temperature is less than 40 degrees Fahrenheit in the shade away from artificial heat. Before paving operations may begin the air temperature as specified above shall be obtained prior to 11:00 A.M. and shall be rising. The air temperature shall be determined by the City Engineer.