SECTION 307

PLANT MIXED BITUMINOUS TREATED BASE CONSTRUCTION

307.1 GENERAL: The work provided under this specification shall include the furnishing, placement and compaction of one or more courses of hot plant mixed bituminous treated base course (BTB) to the lines, grades, dimensions and typical sections as specified in the plans and specifications, as directed by the Engineer. The Contractor shall be solely responsible for the BTB either batched at and/or delivered to the site. A job mix formula used for BTB shall be certified in accordance with the requirements of Section 13 of these specifications. Each job mix formula submitted and authorized for use under this specification shall be identified by a number, unique to that job mix formula and production plant. If a change in material(s) from that specified in the job mix formula occur during a project, the Contractor shall submit a new job mix formula to include the changed materials for approval by the Engineer. A job mix formula shall not be used on a project without written approval of the Engineer. A job mix formula, upon request by a supplier, may be authorized by the Public Works Department Construction Division for use on City and City related projects for a period of 14 months, from the date of sampling of aggregates used in the job mix formula.

307.2 REFERENCES.

307.2.1 American Society for Testing and Materials (ASTM), Latest Edition:

C117 Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
C136 Standard Test Method for Sieve Analysis of Fine and Course Aggregates
C150 Standard Specification for Portland Cement
C207 Standard Specification for Hydrated Lime for Masonry Purposes
D979 Standard Practice for Sampling Bituminous Paving Mixtures
D995 Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
D1075 Standard Test Method for Effect of Water on Compressive Strength of Compacted Bituminous Mixtures
D1559 Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
D2172 Standard Test Method for Quantitative Extraction of Bitumen From Bituminous Paving Mixtures
D2493 Standard Viscosity-Temperature Chart for Asphalts
D2726 Standard Test Method for Bulk Specific Gravity and Density of Non Absorptive Compacted Bituminous Mixtures
D2950 Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
D3515 Standard Specifications for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures

307.2.2 American Association of State Highway and Transportation Officials AASHTO:

T245 Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus

307.2.3 This Specification:

SECTION 112 ASPHALT BINDER
SECTION 302 AGGREGATE BASE COARSE CONSTRUCTION
SECTION 336 ASPHALT CONCRETE PAVEMENT

307.3 MATERIALS.

307.3.1 Aggregate for plant mixed bituminous base course (BTB) shall consist of a combination of crushed "stone, crushed gravel, crushed asphalt concrete, crushed portland cement concrete, and natural or manufactured sand conforming to the requirements of sub section 302.3, SECTION 302, AGGREGATE BASE COURSE CONSTRUCTION.

307.3.2 The asphalt binder shall conform to the requirements of either SECTION 112 ASPHALT BINDER, and TABLE 307.A, the Supplemental Technical Specifications, and/or as authorized by the Engineer. The Contractor shall submit laboratory analysis of the asphalt binder used in the design development of the job mix formula, certification of compliance, identifying the grade and source (plant location), temperature viscosity relationship reported in accordance with ASTM O 2493, and the minimum mixing and compaction temperature ranges. The certification shall state the asphalt binder to be furnished to the project, and/or used in the bituminous treated base course delivered to the project complies with this specification. Certification of the asphalt binder used for each day's placement, shall be submitted to the Engineer, upon request, for each grade and each job mix formula used on the project.

TABLE 307.A ASPHALT BINDER GRADE

Application	Grade		
	Penetration	Viscosity	Performance Grade (PG)
All	60 70	AC 20	70 -22

307.3.3 Admixtures shall be proportioned as a percent (%) by weight or liquid ounces per unit weight, of dry aggregate shall be used in BTB provided under this specification. Antistrip admixtures shall be either hydrated lime, or portland cement, or a liquid admixture, or modified asphalt proportioned as a percent (%) by weight or liquid ounces per unit weight, of dry aggregate, as approved by the Engineer.

307.4 PROPORTIONING.

307.4.1 The Contractor shall be solely responsible for the bituminous treated base job mix formula proportions and material batched and delivered to the site under this specification.

307.4.2 A bituminous treated base (BTB) job mix formula shall be a blend of asphalt binder, graded aggregate base and anti strip admixture proportioned in accordance with the requirements of this specification. The job mix formula shall be prepared in a laboratory under the direct supervision of a New Mexico Registered Professional Engineer. The testing equipment used in the design development shall be calibrated annually with calibration standards traceable to the National Bureau of Standards. Certificates of calibration shall be maintained at the laboratory for review by the Engineer. A copy of the certifications shall be provided to the Engineer upon his request.

307.4.3 A job mix formula shall be determined based on a minimum of five (5) asphalt binder contents reference points, with a minimum of two reference points bracketing the recommended asphalt content, containing only that portion of a mix that passes a one inch sieve. Job mix formula submittals shall include all information required to verify the proposed job mix formula complies with the production ranges and/or variations specified.

307.4.4 Asphalt binder shall be proportioned by percent of dry weight of aggregates. The amount of binder shall be the minimum cement content that will provide an asphalt aggregate anti strip mixture, when compacted in accordance with ASTM D1559, that will comply with the requirements of TABLE 307.B.

TABLE 307.B BITUMINOUS TREATED BASE PROPERTIES

PROPERTY	SPECIFICATION
Unconfined Compressive Strength	250 psi

307.4.5 The asphalt content shall be selected, based on laboratory testing such that the job mix formula physical properties do not exceed the tabulated limits for a variation in asphalt content of ± 0.5%.

307.4.6 Anti strip admixture shall be proportioned to provide a minimum compressive strength of 85% or greater retained strength as determined by ASTM D1075. BTB prepared with an anti strip admixture shall have an unconfined compressive strength at least equal to the BTB without the anti strip admixture.

307.5 SUBMITTALS.

307.5.1 A job mix formula submittal shall include but not be limited to that defined in TABLE 307.C, as directed by the Engineer. A submittal shall be rejected if it does not include the information specified.

TABLE 307.C
SUBMITTAL REQUIREMENTS

A. Name of Supplier
B. Date of submittal
C. Job mix formula identification number
D. Date of sampling of aggregates
E. Certification of compliance of materials
F. Temperature viscosity curve with recommended mixing and compaction temperatures for proposed asphalt binder
G. Proposed job mix formula target proportions of materials
H. Certification of compliance of proposed job mix formula by the NM Registered Professional Engineer
J. Job mix formula performance target characteristics and specification limits
K. Tabulation of laboratory design development test results
L. Graphical representation of the following test results:
   I. Unconfined compressive strength vs. Asphalt Content
   ii. Marshall Density (pcf) vs. Asphalt Content (%)
   iii. Voids In Mineral Aggregate (%VMA) vs. Asphalt Content (%)
M. Specific gravity of asphalt cement
N. Bulk Specific Gravity of aggregate

307.6 BATCHING.

307.6.1 BTB shall be batched in accordance with the requirements of ASTM D3515, the requirements of this specification, and/or as approved by the Engineer. Batching facilities shall comply with the requirements of ASTM D 995, and this specification. A batch plant shall be certified annually by an independent New Mexico Registered Professional Engineer, to comply with the requirements of this specification and Section 13. Certification shall be completed within 12 months prior to submittal of a job mix formula to be produced at the plant. The batch plant shall be calibrated annually with calibration standards traceable to the National Bureau of Standards. Certificates of calibration and production certifications shall be maintained at the plant for review by the Engineer. A copy of the certifications shall be submitted to the Engineer upon request.

307.7 TRANSPORTATION AND PLACEMENT.

307.7.1 Material shall be transported in suitable vehicles with a cover. Material shall be covered immediately after loading and remain covered until unloading. Diesel fuel or other petroleum based solvents shall not be used in the bed of transport vehicles as a release agent to prevent build up of material.

307.7.1.1 The Contractor shall provide to the Engineer with each load of asphalt concrete batched at and/or delivered to the job site, before unloading at the site, a copy of the delivery ticket on which is either printed, stamped or written, the information defined in TABLE 307.D.

TABLE 307.D
DELIVERY TICKET REQUIREMENTS

A. Name of Supplier
B. Date of Delivery
C. Delivery Ticket Number
D. Name of Contractor
E. Project Name (optional)
F. Job mix formula identification number
G. Weight of load
H. Time loaded

307.7.2 Bituminous treated base shall be placed in uniform layers/lifts in accordance with the requirements of Section 336. The thickness of a layer/lift shall not less than 4 inches, be at least equal to three (3) times the nominal maximum size aggregate of the job mix formula used but not greater than 8 inches.

307.7.3 The material shall be compacted when the material temperature is in the range specified by the asphalt cement supplier's temperature viscosity curve in the approved job mix formula. Compaction shall be completed before the temperature of the material cools to 200 °F. Compaction shall not be allowed when the material temperature is equal to or less than 200 °F. The materials shall be compacted to a density greater than 96% of laboratory Marshall density. At the direction of the Engineer, core samples may be taken to verify constructed asphalt concrete properties. The Contractor shall be responsible for patching core holes with the same or similar material as the adjacent asphalt concrete. Diesel fuel or other petroleum based solvents shall not be used as a release agent to clean equipment used to place and compact asphalt concrete.

307.8 TESTS.

307.8.1 Construction quality control tests shall performed in accordance with the requirements of this specification, the supplemental technical specifications, or as required by the Engineer. Testing equipment used in the performance of specified testing shall be calibrated annually with calibration standards traceable to the National Bureau of Standards. Certification records shall be maintained at the laboratory for review by the Engineer. A copy of the certifications shall be submitted upon request to the Engineer.

307.8.2 A field sample shall be taken in accordance with the requirements of ASTM D979, either for each 300 tons delivered per day to a project, or 2 samples per day, or as directed by the Engineer. The sample shall be of such size to provide material for all tests specified.

307.8.3 A sample shall be tested for but not limited to the properties specified in TABLE 307.E.

TABLE 307.E BTB SAMPLE TESTS [1]

A. Marshall Density (75 blows/face) [2,3]
B. Marshall Bulk Specific Gravity/Density
C. Unconfined compressive strength of Marshall Briquettes (average of 3)
D. Asphalt binder content
E. Extracted aggregate gradation

[1] Material used for an individual test shall be split from the same sample
[2] Compaction temperature for material can be five (5) °F less but not more than five (5)°F greater than the median compaction temperature recommended in the temperature viscosity curve in the authorized submittal
[3] A minimum of three (3) standard briquettes shall be molded

307.8.4 Field compaction tests shall be conducted in accordance with the requirements of ASTM D2950, at the rate of one test per lift per 500(+/- 50) sy of asphalt material placed, or fraction thereof placed, per day, or as directed by the Engineer. Samples of the compacted asphalt pavement may be taken and tested to determine conformance of the finished BTB with the specified requirements either as requested by the Contractor, or as directed by the Engineer. The Contractor shall be responsible for all sampling and material replacement at no cost to the Owner where samples are removed. Three (3) six (6") inch diameter cores shall be taken to represent a Lot, as directed by the Engineer and tested for compaction in accordance with the requirements of ASTM D2726. Test results shall be reported as specified.

307.8.5 Test reports shall include but not be limited to the information defined in TABLE 307.F.

TABLE 307.F
TEST REPORT REQUIREMENTS

A. Date of Sampling/Field Test
B. Project Number or Permit Number
C. Project Title
D. Supplier
E. Delivery Ticket Number (sample only)
G. Job Mix Formula Identification Number H. Location of sample/test as defined by the project plans and specifications
J. Time of Sampling/Field Test
K. Material temperature at time of sampling, °F
L. Material
M. Ambient temperature at time of sampling, °F
N. Test results with reference specification limits

307.8.6 Test results shall be reported to the Engineer, Contractor, supplier and Materials and Testing Laboratory, Construction Division, Public Works Department, in writing, within 7 working days of completion of the sampling and/or field test. Noncomplying test shall be reported to the Engineer, Contractor, supplier and Materials and Testing Laboratory, Construction Division, Public Works Department, within 1 working day of completion of the test.

307.8.7 The testing shall be certified to have been performed in compliance with the specifications by the NM Registered Professional Engineer in direct charge of the testing program.

307.9 MEASUREMENT AND PAYMENT.

307.9.1 Measurement of Plant Mixed Bituminous Treated Base Course shall be by the square yard per each thickness required, complete in place.

307.9.2 Payment shall be at the contract unit price per square yard per each thickness required, complete in place which shall include all material, labor and equipment required in placing, grading and compacting the Plant Mix Bituminous Treated Base Course. Payment will be made for material and placement/compaction that complies with the requirements of the specifications, as authorized by the Engineer.