CONSTRUCTION STANDARD SPECIFICATION

SECTION 02232

AGGREGATE BASE COURSE (ABC)
RECYCLED ASPHALT BASE COURSE (RABC)
CRUSHED CONCRETE BASE COURSE (CCBC)

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AGGREGATE BASE COURSE (ABC)
RECYCLED ASPHALT BASE COURSE (RABC)
CRUSHED CONCRETE BASE COURSE (CCBC)

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Work provided under this specification shall include the furnishing, placement and compaction of either aggregate base course (ABC), recycled asphalt base course (RABC), or crushed concrete base course (CCBC).

Job mix formulae and gradations shall meet the criteria as set forth in the most current City of Albuquerque approved base course mix designs.

B. Products Installed but not Furnished Under this Section:

1. Prime coat for surface sealing of compacted aggregate base course.

2. Prepared subgrade for a compacted soil foundation prior to placing an aggregate base course in preparation for an asphalt pavement.

C. Related Sections: Refer to the following sections for related work:

1. Section 02200, "Earthwork"

2. Section 02510, "Asphalt Concrete Pavement"

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

C88 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

C131 Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

C136 Method for Sieve Analysis of Fine and Coarse Aggregates

D75 Practice for Sampling Aggregates

D422 Test Method for Particle-Size Analysis of Soils

D1557 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb(4.54-kg) Rammer and 18-in.(457mm) Drop

D2419 Test for Sand Equivalent Value of Soils and Fine Aggregate

D2844 Test Methods for Resistance R-Value and Expansion Pressure of Compacted Soils

D2922 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

D2940 Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports

D3017 Test Method for Water Content of Soil and Rock in-place by Nuclear Methods (Shallow Depth)

D4318 Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

B. City of Albuquerque "Standard Specifications For Public Works Construction"

Section 302 Aggregate Base Course Construction

1.03 DEFINITIONS

A. Emulsified Asphalt: A paving asphalt uniformly suspended with water. The emulsion permits the application of paving grade asphalts at normal atmospheric temperatures to obtain workable fluidity. In the emulsifying process, warm asphalt is mechanically milled into minute droplets or globules and dispersed in water, treated with a small quantity of emulsifying agent, usually some type of soap. By proper selection of an emulsifying agent, emulsified asphalts are produced in several types and grades. By choice of emulsifying agent, the emulsified asphalt may be:

1. Anionic - asphalt globules are electro-negatively charged.

2. Cationic - asphalt globules are electro-positively charged.

B. Prime Coat: An application of emulsified asphalt to an untreated granular base in preparation for a subsequent asphalt course. The prime coat is designed to waterproof the base surface, and provide adhesion between the base and the next course.

C. Base Course: Placed on prepared surfaces to distribute wheel loads, provide a non-frost susceptible material on which to support surface courses.

1.04 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Section 01330, "Submittal Procedures".

B. Product Data: Submit product data for each base course material and prime coat used, including supplier and design mix identification number.

C. Certification of Compliance: Provide certification that mix design complies with the requirements specified in 2.03 "Mixes" of this specification.

D. Test Reports: Provide laboratory test reports to show that materials comply with requirements specified in 2.02 "Materials" of this specification.

1.05 DELIVERY, STORAGE AND HANDLING

A. Delivery: Contractor shall provide to the Sandia Delegated Representative (SDR) with each load of batched material and/or material delivered to the job site, before unloading at the site, a copy of the delivery ticket on which is printed, stamped or written, the information defined in TABLE 02232.A.

DELIVERY TICKET INFORMATION
TABLE 02232.A

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

B. Protection: Base course shall be transported in suitable vehicles with a cover. A load shall be covered immediately after loading and remain covered until unloading.

1.06 PROJECT CONDITIONS

Environmental Requirement: In the event of temporary suspension of the Work or inclement weather, or as directed by the SDR, all of the Work, materials and equipment incorporated therein shall be protected against damage, injury or loss from the weather, whether in storage on or off the site.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

Subject to compliance with requirements, manufacturers of products include, but are not limited to, the following:

Western Mobile, Inc.
Calmat Co. of New Mexico

2.02 MATERIALS

A. General: Provide base course material consisting of fine and coarse aggregate, the combination of materials conforming to the requirements of ASTM D2940.

Base course shall have a resistance value (R-value) not less than 76 as determined by ASTM D2844.

B. Coarse Aggregate: Durable crushed particles of either stone, gravel, asphalt concrete pavement, or portland cement concrete.

1. Aggregates retained on the No. 4 (4.75 mm) sieve shall be capable of withstanding the effects of handling, spreading, and compacting without degradation production or deleterious fines.

2. Coarse aggregates shall comply with the requirements shown in TABLE 02232.B.

C. Fine Aggregate: Aggregates retained on the No. 4 (4.75 mm) sieve shall consist of fines from the operation of crushing course aggregate.

1. Natural sand, or finer mineral matter, or both, may be added where available and suitable.

2. Fine aggregate shall comply with the requirements shown in TABLE 02232.B.

D. Prime Coat: Prime coat for surface sealing of compacted base course shall comply with the requirements of Section 02510, “Asphalt Concrete Pavement”.

ENGINEERING REQUIREMENTS
TABLE 02232.B

CHARACTERISTIC	Fine	Course
Los Angeles Abrasion Wear (ASTM C131)		40% max.
Soundness (5 cycles ASTM C88)	15% max.	15% max.
Crushed Aggregate (% Material Retained on 3/8 inch sieve (9.5 mm) by wt., having at least two (2) fractured faces)		50% max.
Maximum % passing No. 200 (75 μm)	60% of No. 30 (600 μm)	
Plasticity Index (Material finer than No. 40 sieve) (425 μm)	4.0 max.	
Sand Equivalent Value	35 min.	

2.03 MIXES

A. Job mix formula gradation shall comply with the requirements for gradation ranges and tolerances shown in TABLE 02232.C.

B. Job mix formulas required in this specification are the same as those required by the City of Albuquerque's Public Works Department. Job mix formulas pre-approved by the City of Albuquerque Materials Engineer are on file with the manufacturers listed in 2.01 "Manufacturers" and shall comply with the latest edition of the City of Albuquerque Standard Specification for Public Works Construction, Section 3.02 - "Aggregate Base Course Construction."

GRADATION RANGES AND TOLERANCES
TABLE 02232.C

Sieve Size/Type	Production Range	Percent Passing	Production Tolerances (+/-%)
1-1/2 inch (38.1 mm)	100	100	
1 inch (25.4 mm)	95 - 100	100	
3/4 inch (19.1 mm)		90 - 100	8
1/2 inch (12.7 mm)	65 - 75		8
3/8 inch (9.5 mm)		65 - 80	8
No. 4 (4.75 mm)	34 - 46	48 - 55	8
No. 30 (600 μm)	12 - 18	18 - 25	5
No. 200 (600 μm)	5 - 12	6 - 15	3

2.04 SOURCE QUALITY CONTROL

A. Tests: A sample of material delivered to the project shall be taken for each 300 tons (270 metric tons) placed or each day's placement, whichever is greater, and tested for gradation and moisture density relationship.

1. Average value of individual gradation tests, for all sieve size determinations, shall comply with the job mix formula within the tolerances specified in TABLE 02232.C.

2. Noncompliant material shall be resampled and retested for compliance. Material not in compliance after the initial and follow-up testing shall be removed and replaced by the Contractor at no cost to the SNL.

PART 3 - EXECUTION

3.01 PREPARATION

Immediately upon completion of compaction, Contractor shall seal the surface of the compacted base course with a prime coat according to the requirements of Section 02510, "Asphalt Concrete Pavement."

A. Prime coat shall be applied as required to provide a uniform coverage of the surface.

B. If final surfacing is to be placed within twenty-four (24) hours after completion of compaction, the prime coat may be waived as authorized by the SDR.

C. Traffic on compacted base course shall be limited to only final surfacing traffic and vehicles applying moisture control, as authorized by the SDR.

3.02 INSTALLATION

A. General: Each base course shall be placed in lifts which will provide not less than four (4) inches (102 mm) and not more than 6 inches (152 mm) compacted thickness. Work shall be to the lines, grades, dimensions, moisture, density and typical sections as specified in contract documents.

B. Spreading: Aggregate bases shall be delivered to the roadbed as uniform mixtures and each layer shall be spread in one operation.

1. Aggregate bases shall be delivered to the roadbed at a uniform quantity without resorting to picking up, or otherwise shifting the aggregate base material.

2. Use of motor graders will be permitted during depositing, spreading and compacting operations.

3. Segregation of aggregates shall be avoided and the material as spread shall be free from pockets of coarse or fine material.

C. Tolerances: Material shall be moisture conditioned within a range of optimum moisture plus or minus two percent (+/-2%), and compacted to a dry density greater than ninety-five (95) percent of maximum dry density as determined in accordance under the procedures specified in ASTM D1557. Such moisture shall be uniformly distributed throughout the material.

D. Finished Surface: Finished surface of the compacted aggregate base course shall not deviate from finished grade in excess of 1/2 inch (12.7 mm) in 10 feet (3 m) when tested with a 10-foot (3 m) straight edge in any direction. All deviations in excess of the specified shall be corrected by the Contractor prior to authorization for placement of the next lift of material.

3.03 FIELD QUALITY CONTROL

A. Field testing of only locally processed or produced material directly incorporated into the Work, including but not limited to the establishment of density curves representative of materials to be used in the compliance test, will be paid by SNL.

In the event the initial testing shows defective work, materials, supplies or equipment, all subsequent testing shall be at Contractor's sole expense. Contractor shall pay for such subsequent retesting directly to the testing agency.

B. Tests: Compaction tests will be taken at the rate of one test for each 500 SY (420 m^2) per lift placed, or as directed by the SDR, in accordance with the requirements of ASTM D2922 and D3017. Areas represented by noncompliant tests shall be reworked and retested for compliance by SNL.

Test reports will include but not be limited to the requirements of TABLE 02232.D .

TEST REPORT INFORMATION
TABLE 02232.D

FIELD DATA
Date of Sampling/Field Test
Project Number
Project Title
Location of sample/field test as defined by the project plans and specifications
Time of Sampling/Field Testing
Field test results with reference specification limits
LABORATORY DATA
Base Course Classification
Gradation
Plasticity Index
Liquid Limit
Optimum moisture/maximum dry density relationship and graph
Estimated Soil Resistance R-Value

3.04 CLEANING

Contractor shall keep the premises free from accumulations of waste materials, rubbish, and other debris resulting from the Work.

A. Remove all waste materials, rubbish, and debris from and about the premises.

B. Remove all tools, construction equipment and machinery, and surplus materials.

C. Contractor shall restore to their original condition those portions of the site not designated for alteration by the Contract documents.

END OF SECTION