

**ITEM 7  
AGGREGATE BASE COURSE**

**7.1 DESCRIPTION**

This work shall consist of furnishing, placing and compacting aggregate base courses constructed in accordance with this specification and conformity with the lines, grades, thickness and cross sections shown on the plans or established by the **AGENCY**.

**7.2 MATERIALS**

The base material shall be crushed to meet the requirements herein and shall consist of durable coarse aggregate particles and binding material. The aggregates shall conform to the following requirements:

TABLE 7.2

3/4 inch	100
No. 4	35 to 65
No. 8	25 to 55
No.200	3 to 15
R-Value * AASHTO T 190	Min. 78 at 300 psi
Plastic Index AASHTO T 90	15 Max.
Liquid Limit AASHTO T 89	30 Max.
Resilient Modulus, psi AASHTO T 294	20,000 Min.

\* Must have less than a 10 point difference between 100 psi and 300 psi exudation pressure. The aggregate base material shall be pre-qualified on an annual basis by an independent laboratory capable of performing the tests listed in this section. The annual report shall be prepared under the supervision of, stamped and signed by a Colorado registered Professional Engineer. Supplier must certify the material meets the requirements listed above.

**7.3 EQUIPMENT**

The **CONTRACTOR** shall provide equipment in good operating condition that is specifically designed and manufactured for the purpose of excavating, hauling, leveling and compacting base course materials. Compaction equipment shall be adequately designed to obtain compaction requirements without adverse shoving, rutting, displacement or loosening of base course material. The equipment shall be available to perform the work specified within the time frames required and to be coordinated with the other work activities. The equipment shall be operated by skilled workman at a normal production rate for the specified type of work. Equipment shall be approved by

the **AGENCY**. All equipment and machinery shall be kept in good working order, free of leaks and properly muffled. All taxes, licenses and fees shall have been paid and proper licenses and permits shall be posted as required by law.

## **7.4 CONSTRUCTION METHODS**

### **7.4.1 Subgrade Preparation**

Any ruts, holes, defects or soft yielding areas which occur in the subgrade for any cause whatsoever shall be corrected and compacted to require density and stability before an aggregate base course is placed. These repairs shall be made at the expense of the **CONTRACTOR**. Subsequent pavement layers shall be placed within 24 hours of the approval of the subgrade or moisture and density shall be reconfirmed at no cost. A stabilization fabric (Item 8) shall be placed after A-6 and A-7 subgrades have been approved, but before placement of any base as shown on the plans.

### **7.4.2 Spreading and Moisture Conditioning**

The aggregate shall be uniformly deposited on the approved subgrade by means of the hauling vehicle with or without spreading devices. Aggregate shall be distributed over the surface to the depth specified on the plans or established by the **AGENCY**. The maximum loose lift thickness shall be no thicker than 8 inches.

After base course material has been deposited, it shall be thoroughly blade-mixed to full depth of the layer by alternately blading the entire layer to the center and back to the edges of the road. It shall then be spread and finished to the required cross section by means of a self-propelled pneumatic tired motor grader.

Water shall be applied prior to and during all blading and processing operations to moisten the material sufficiently to prevent segregation of the fine and coarse particles. Water shall be applied during the compaction in sufficient amounts to assist in compaction and prevent raveling.

#### 7.4.3 Compaction

Compaction shall be immediately following the spreading operation. If the compacted depth of the base exceeds 6 inches, the course shall be constructed in two or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 6 inches.

Each layer shall be compacted to a density of not less than 95 percent of maximum density in accordance with AASHTO T 180. Field in-place density tests will be in accordance with schedule of testing in Section 7.8. The finished surface of each layer shall have a uniform texture. Water shall be uniformly applied over the materials during compaction in the quantity necessary for compaction. Moisture conditions shall be within 1 percent of optimum moisture content. It is to be expected that a loss of density in the upper portions of the material may occur due to a lapse in time, elements or other reasons. Moisture conditioning and recompaction to the specified density will be required prior to placement of any subsequent layer and no additional compensation will be allowed for such work. Testing shall be completed within 24 hours of the placement of the next paving course. Base shall be retested if the next paving course is delayed beyond 24 hours.

#### 7.4.4 Proof Roll

The **CONTRACTOR** shall proof roll the completed base course material to determine any soft, yielding or otherwise unacceptable areas. These areas shall be removed and replaced without additional payment. The proof roller shall be a pneumatic tired roller or pneumatic tired compactor weighing not less than 45 tons and capable of applying ground loads of not less than 18,000 pounds per axle. All tires shall be of equal size and diameter and shall have a tire pressure of at least 100 pounds per square inch. They shall be kept uniformly inflated so that the difference in the pressure in any two tires shall never exceed 5 pounds per square inch and means shall be provided by the **CONTRACTOR** for checking the tire pressure on the job at any time.

Complete coverage of the proof roller will be required. Rollers shall be operated at between 2 and 6 miles per hour.

## 7.5 TOLERANCES

The tolerances shall be as follows:

### 7.5.1 Grade Tolerances

Any deviation in excess of ½ inch in cross section and 1/2 inch in 16 feet measured longitudinally shall be corrected by loosening, adding or removing the material, reshaping and recompacting by sprinkling and rolling. Deviations in excess of this tolerance shall be corrected by the **CONTRACTOR**, at the **CONTRACTOR's** expense, in a manner satisfactory to the **AGENCY**.

### 7.5.2 Density Tolerances

Density below the specified minimum set in Item 7.4.3 shall be corrected by loosening, reshaping, moisture conditioning and recompacting. Inadequate compaction shall be corrected by the **CONTRACTOR**, at the **CONTRACTOR's** expense, in a manner satisfactory to the **AGENCY**.

### 7.5.3 Thickness Tolerances

In any areas where the thickness is deficient by more than ½ inch in thickness, the deficiency shall be corrected by scarifying, adding material as required, reshaping, recompacting and refinishing by the **CONTRACTOR**, at the **CONTRACTOR's** expense, in a manner satisfactory to the **AGENCY**.

### 7.5.4 Material Properties

Gradation and Atterberg Limits shall be performed on random samples taken from each lift placed at the project. The aggregate base course shall conform to the following range of tolerances from the approved gradation.

TABLE 7.5.4

Passing No. 8 and larger sieves	± 8%
Passing No. 30 sieve	± 6%
Passing No. 200 sieve	± 2%
Plastic Index	± 3

Should there be a change in source of materials or material placed at the project is not in conformance with the tolerances in Table 7.5.4, the **AGENCY** shall suspend the use of such material until laboratory tests indicate the resilient modulus is acceptable. Material, which exceeds the tolerances, shall be removed and replaced by the **CONTRACTOR** at no expense to the **AGENCY**.

## 7.6 PRICE REDUCTIONS

Resilient modulus values less than 20,000 psi shall be price reduced in accordance with fatigue life reductions based upon a 20-year design as calculated using CHEVPC, MICHPAVE, DAMA or TTIPAVE. Values less than 15,000 psi shall be cause for removal and replacement. Insufficient thickness shall be for a lot size of 1,000 yd<sup>2</sup> and shall be priced reduced at the following rates:

TABLE 7.6

> 1 inch thickness	6%
> 2 inch thickness	8%
> 3 inch thickness	remove and replace

Price Reduction is equal to the full price of the entire pavement system. Price Reductions reflect reduced fatigue life as a result of the deficiency.

## 7.7 MEASUREMENT

Aggregate base course will be measured by the ton based upon plan quantities and density measurements at 95 percent modified Proctor density per Table 7.8.

## 7.8 TESTING AND INSPECTION

Testing aggregate base course shall be performed in accordance with Table 7.6

**TABLE 7.8  
SCHEDULE FOR MINIMUM MATERIALS SAMPLING AND TESTING**

In Place Soil Density and Moisture Content	AASHTO T 191 ASTM D 2167	One test for each 1,000 square yards (not less than one test per day).
	AASHTO T 239 AASHTO T 238 ASTM D 2216 AASHTO T 191 and ASTM D 2216	Shall be performed every tenth nuclear method density test.
Atterberg Limits	AASHTO T89 & T90	One test per 2,000 tons
Moisture-Density	AASHTO T180	One test per soil type Relationships
Gradation	AASHTO T27 and T11	One test per 2,000 tons
Thickness		One test per 5,000 square yards
Resilient Modulus	AASHTO T 294	Upon request by the Agency

## 7.9 PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under Measurement" will be paid for at the unit bid price for Aggregate Base Course". This price will be full compensation for shaping and fine grading the roadbed, for spreading, mixing, blading, compacting, shaping and finishing the base material and for all labor, tools, equipment and incidentals necessary to complete the work. Proof rolling will be considered part to this Item. When base is constructed under this item, correction of soft spots in the base will be at the **CONTRACTOR'S** expense.

<u>Item</u>	<u>Description</u>	<u>Payment</u>
7.1	Aggregate Base Course	\$/ton