

CITY OF MEMPHIS – STANDARD CONSTRUCTION SPECIFICATIONS
SECTION 02720 UNBOUND BASE COURSES AND BALLASTS

PART 1 – SCOPE

This work shall consist of furnishing and placing one or more courses of graded aggregate on a prepared subgrade in accordance with these Specifications and in conformity with the lines, grades, thickness, and typical cross-sections shown on the Plans or as directed by the Owner.

PART 2 – MATERIALS AND EQUIPMENT

- 2.01 A. Aggregates for Graded Aggregate Base Course shall be crushed stone or crushed or uncrushed gravel together with such material as manufactured sand or other fine materials naturally contained or added thereto as needed to conform with one of the three gradations shown in the table below, as specified

Grading Table for Graded Aggregate Base Course
Total Percent, by Dry Weight, Passing Each Sieve (U.S. Standard)

<u>Size No.</u>	<u>2 1/2"</u>	<u>2"</u>	<u>1 1/2"</u>	<u>1"</u>	<u>3/8"</u>	<u>No. 40</u>	<u>Clay*</u>
1	100	95-100			35-65	10-30	1-12
2		100	95-100		40-65	10-30	1-12
3			100	90-100	45-65	10-35	2-12

* Clay content shall be determined by the Hydrometer Test – AASHTO T 88 4. Clay content may exceed 12 percent with the written permission of the Owner.

- B. Mineral aggregate for graded aggregate base course shall consist of hard durable particles or fragments of stone or gravel and other finely divided mineral matter. Individual materials shall meet the requirements specified hereinafter.

1. Crushed Stone.

Crushed stone shall be free of silt and clay. The coarse aggregate portion of the stone shall have a percentage of wear of not more than 50, and when subjected to five (5) alternations of the sodium sulfate soundness test, the weighted percentage of loss shall not exceed fifteen (15).

2. Gravel.

Gravel shall be screened and all oversize material may be crushed and fed uniformly back over the screen. The coarse aggregate portion (retained on the No. 4 sieve) shall have a percentage of wear of not more than 50, and when subjected to five (5) alternations of the sodium sulfate soundness test, the weighted percentage of loss shall not exceed fifteen (15). The portion of the material passing the No. 40 sieve shall be nonplastic or shall have a liquid limit of not more than thirty (30) and a plasticity index of not more than eight (8).

- C. If fine aggregate, coarse aggregate, or binder, in addition to that present in the base material, is needed in order to meet the gradation or density requirements or for satisfactory bonding of the material, it shall be uniformly blended with the base course material at the mixing plant by a mechanical feeder to maintain a uniform flow on the belt to the mixer. Blending of materials on the stockpiles or in the pits by bulldozer, clamshell, dragline, or similar equipment will not be permitted. The composite gradation of aggregate shall be the grading specified.

2.02 EQUIPMENT

All equipment necessary for the satisfactory performance of this construction shall be on the Project and approved before work will be permitted to begin. If mixing is required, an approved stationary twin shaft pugmill or a mechanical mixer (for road mixing) shall be included. Pneumatic-tire rollers as described in Specification Section 02335 Part 2 and motor graders shall also be included.

PART 3 – CONSTRUCTION REQUIREMENTS

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3.01 GENERAL

After the subgrade has been completed as specified in Specification Section 02335, aggregate shall be spread in one or more layers for one or more lane widths as directed by the Owner. It shall not be laid on a subgrade that is frozen or contains frost. Hauling over material already placed will not be permitted until it has been spread, mixed, shaped, and compacted.

3.02 MIXING

If mixing of two or more materials is required, one of the following types of mixing operations may be used:

A. Stationary Plant Method.

The base course material shall be mixed in an approved stationary mixing plant. Water shall be added during the mixing operation in the amount necessary to provide a moisture content satisfactory for compaction.

B. Road Mix Method (Mechanical Mixer).

After the material for the base course has been placed by an aggregate spreader or windrow-sizing device, the material shall be mixed by means of an approved mechanical mixer (for road mixing). Water shall be added during mixing in the amount necessary to provide a moisture content satisfactory for compaction.

C. Road Mix Method (Motor Grader).

1. After the material has been thoroughly mixed, it shall be spread while at the required optimum moisture content by means of approved motor graders.
2. If the required compacted depth of the base course exceeds six (6) inches, the base shall be constructed in two or more layers of approximate equal thickness, unless vibrating or other approved types of special compacting equipment is used. In such cases, the compacted depth of a single layer of base course may be increased to eight (8) inches upon approval by the Owner.

3.03 MANHOLE ADJUSTMENTS

Drainage and sanitary sewer manholes owned by the City shall be adjusted and set at final grade by the contractor as necessary for compliance with the Plans. Adjustments of City owned manholes shall be as specified in Specification Sections 02532 (sewer) and 02634 (drain). Manholes, valve boxes, and other utility structures not owned by the City but within the right-of-way of the Project shall be adjusted as necessary by the owner of such facilities. The Contractor shall be responsible for notifying other owners of any required adjustments and for the accomplishment of that work by the owner of such facilities according to the project schedule.

3.04 SHAPING AND COMPACTION

A. Except where mechanical aggregate spreading equipment is used to place the base material, final shaping of each layer prior to compaction shall be accomplished by motor grader. In the event that mechanical spreading equipment fails to shape the base material properly, final shaping shall be done by motor grader or other approved means.

B. Immediately following spreading and final shaping, each successive layer shall be compacted with pneumatic-tire rollers described under Specification Section 02335 Part 2 and any other types of compacting equipment provided the required density and the required degree of uniformity and smoothness are attained. Compaction shall progress gradually from the edges of the base to the center, parallel with the centerline of the road, and shall continue until the base layer has been compacted to its full width. Where lifts of shoulder materials are placed to confine the base material, the initial pass of the compacting equipment shall overlap the shoulder to a width of not less than twelve (12) inches. In areas where rollers or other standard types of

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compacting equipment cannot be used to compact the base due to surface interference of structures or other obstructions, hand operated vibratory equipment shall be used to obtain the required density.

C. Compaction of each layer shall continue until an average dry density of not less than 100 percent of theoretical density based upon 83 percent of a solid volume has been achieved. Further, no individual test shall be less than 97 percent of theoretical density. The density determination will be based on the bulk specific gravity, AASHTO T 84 and T 85 and the dry weight of the aggregate. The compaction of each layer shall be approved before material for the next successive layer is placed. Placing and compacting areas shall be kept separate.

D. Unless otherwise specified, the above described density requirements will not apply to base construction on projects that do not include the construction of a surface upon the base, nor to projects which have a specified total base thickness less than four (4) inches. When the specified density requirements do not apply, the desired degree of compaction will be considered to have been reached when the surface is tightly bound and shows no rutting or displacement under operation of the roller or other construction equipment.

E. At the direction of the Owner, the desired degree of compaction may be considered to have been reached for any graded aggregate base construction when the surface is tightly bound and does not show evidence of pumping under operation of a motor grader and/or there is no rutting or displacement under operation of a roller or other selected construction equipment. The other selected construction equipment used to check the desired degree of compaction for any graded aggregate base shall be a loaded tandem dump truck, with a minimum of ten (10) tons weight. The degree of compaction may be considered to be reached when aggregate base does not show evidence of pumping, rutting or displacement, under the weight of said truck, when driven over the base at slow speed. This is to be done in the presence of the inspector prior to the placement of finished surface.

F. The surface of each layer shall be so constructed that the aggregates become firmly keyed and a uniform texture produced and shall be maintained in that condition until covered by the following stage of construction or until final acceptance of the project. Any irregularities that develop shall be corrected by loosening the material at those places and adding or removing material as required.

G. Approved distributors shall be used to apply water uniformly over the base materials during compaction in sufficient quantity for proper compaction. Softening of the underlying subgrade resulting from use of excess water is to be avoided.

3.05 MAINTENANCE

After construction of the base has been completed satisfactorily, it shall be maintained, under traffic if required, smooth and uniform until covered by the following stage of construction or until the project has been completed and accepted.

3.06 THICKNESS REQUIREMENTS

The thickness of the completed base shall be in conformity with the thickness shown on the Plans. The thickness shall be measured at such frequency as established by the Owner by means of test holes or other approved methods.

3.07 SURFACE REQUIREMENTS

The surface of the finished base shall conform to the lines, grades and cross-sections shown on the Plans or established by the Owner and shall have a satisfactorily smooth riding quality.

PART 4 – MEASUREMENT

4.01 GRADED AGGREGATE BASE COURSE

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Measurement will be by the square yard, compacted in place at specified thickness.

4.02 GENERAL

A. Subgrade preparation for the placing of base courses will be considered a part of the work for providing Graded Aggregate Base Course except where gravel for backfill or subgrade stabilization or cement for back fill or subgrade stabilization is required. In such cases, payment will be made in accordance with Specification Section 02335, Payment Items 02335-03 or 02335- 04.

B. Water used for compaction will not be measured for payment since it is considered incidental to the completion of the work.

C. Water for dust control when ordered by the Owner will be measured and paid for in accordance with Specification Section 02335, Payment Item 02335-05

D. Manhole adjustments will be measured and paid for in accordance with Specification Section 02532 (sewer), Payment Item 02532-01 or Specification Section 02634 (drain), Payment Item 02634-01.

PART 5 – PAYMENT

5.01 GRADED AGGREGATE BASE COURSE

The accepted quantities will be paid for at the contract unit price per square yard for the specified thickness, which price will be full compensation for furnishing, mixing, spreading, and compacting the aggregate, complete in place.

5.02 PAYMENT WILL BE MADE UNDER:

<u>Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
02720-01	Graded Aggregate Base Course,	Square Yard
02720-01. _____	_____ “ Thickness	Square Yard

END OF SECTION 02720