

CITY OF SAN ANGELO**ITEM 275****PORTLAND CEMENT TREATED MATERIALS (ROAD MIXED)****275.1 DESCRIPTION.**

This Item shall govern for treating subgrade, new and/or existing base (with or without asphaltic concrete pavement (ACP)), or combinations as shown on the Plans, by the addition of Portland cement and for road mixing and compacting the treated material to the required density, as herein specified and in conformity with the typical sections, lines, grades and thickness as shown on the Plans or as established by the City. Portland Cement treatment may be required for all materials used on subgrade with a Plasticity Index (PI) less than six (6) or another alternative method approved by the City.

275.2 MATERIALS.

Materials shall conform to the requirements shown on the Plans and to the following requirements.

(1) Flexible Base. New base material shall conform to the material requirements of Item 247, "Flexible Base" and shall be of the type and grade as shown on the Plans.

(2) Portland Cement. Portland cement shall be either Type I, IP, or II conforming to the requirements of TxDOT Item 524, "Hydraulic Cement".

(3) Water. Water shall conform to the material requirements for Item 421, "Portland Cement Concrete".

(4) Asphalt. Asphalt shall conform to the material requirements of Item 300, "Asphalts, Oils and Emulsions".

275.3 EQUIPMENT.

(1) General. The machinery, tools, and equipment necessary for proper prosecution of the work shall be on the project and approved by the City prior to beginning work on this Item.

All machinery, tools, and equipment used shall be maintained in a satisfactory working condition.

275.4 MIX DESIGN.

Cement content will be selected by the City based on compressive strength tests provided by the Contractor so as to meet the strength as shown on the Plans. When Strength L, M or N is shown on the Plans, compressive strength conforming to the requirements in Table 1 will be determined by mix design tests provided by the Contractor on laboratory prepared samples in accordance with Test Method Tex-120-E / ASTM D 1633.

When material properties or sources change, the City may require the Contractor to provide additional mix design tests and adjust the cement content as required.

**TABLE 1
STRENGTH REQUIREMENTS**

Strength	Minimum Design Compressive Strength	Allowable Cement Content %
Strength L	750 psi	4 - 9
Strength M	500 psi	3 - 9
Strength N	As shown on Plans	---
Strength 0	No strength specified	As shown on the Plans

275.5 CONSTRUCTION METHODS.

(1) General. The completed course shall be uniformly treated, free from loose or segregated areas, of uniform density and moisture content, well bound for its full depth and shall have a smooth surface.

(2) Preparation of Subgrade or Existing Base. Prior to scarifying or pulverizing existing material, the subgrade or existing base shall be shaped to conform to the typical sections as shown on the Plans or as established by the City. This work shall be done in accordance with the provisions of the applicable bid Items. When shown on the Plans, any existing asphaltic concrete pavement shall be removed and paid for in accordance with the applicable bid Items.

When proofrolling is shown on the Plans and directed by the City, it will be considered subsidiary to this bid Item. The Contractor shall proofroll the road bed in accordance with Item 216, "Rolling (Proof)", before pulverizing or scarifying existing material. Soft spots shall be corrected as directed by the City.

When the Contractor elects to use a cutting and pulverizing machine that will process the material to the plan depth, the Contractor will not be required to excavate to the secondary grade or windrow the material. This method will be permitted only if a machine is provided which will insure that the material is cut uniformly to the proper depth and which has cutters that will plane the secondary grade to a smooth surface over the entire width of the cut. The machine shall be of such design that a visible indication is given at all times that the machine is cutting to the proper depth.

In lieu of using the cutting and pulverizing machine, the Contractor shall excavate and windrow the material to expose the secondary grade to the typical sections, lines and grades as shown on

the Plans or as established by the City. Then the windrowed material shall be uniformly replaced before cement is applied.

(3) Pulverization. The existing material as shown on the typical section, shall be pulverized or scarified as follows:

(a) Existing Subgrade. A minimum of 80 percent shall pass the No. 4 sieve.

NOTE: When shown on the Plans or approved by the City, this pulverization requirement may be waived when the material contains a substantial amount of aggregate.

(b) Subbase, Base and/or Surfacing. A minimum of 100 percent shall pass the 2 inch sieve.

(4) Application of Cement. The percent of cement to be added will be shown on the Plans or determined in accordance with Article 275.4.

Cement shall be spread only in that area where the mixing, compacting, and finishing operations can be completed during the same working day.

Unless otherwise approved by the City, the cement treatment operation shall not be started when the air temperature is below 40 F and falling, but may be placed when the air temperature is above 35° and rising. The temperature will be taken in the shade and away from artificial heat. Cement shall not be placed when weather conditions in the opinion of the City are unsuitable.

The cement shall be spread by an approved spreader or by bag distribution. It shall be distributed at a uniform rate and in such a manner as to reduce to a minimum the scattering of cement by wind. Cement shall not be applied when wind conditions, in the opinion of the City, are such that blowing cement becomes objectionable to adjacent property owners or dangerous to traffic.

(5) Mixing. Only single or multiple soil stabilizer mixers shall be used.

When delivered flexible base is shown on the Plans, the base materials shall be uniformly spread and premixed prior to the addition of cement or water, unless otherwise approved by the City.

After any required mixing of the material(s), the cement shall be dry mixed with the material(s), prior to the addition of water. Immediately after dry mixing, water shall be uniformly applied. After mixing, the mixture shall be in a loose, evenly spread state ready for compaction. The mixture shall be mixed and compacted in one lift.

(6) Compaction Methods. Compaction shall continue until the entire thickness of the mixture is uniformly compacted by “Ordinary Compaction” or “Density Control” as shown on the Plans.

Compaction shall be completed within two (2) hours of the addition of water to the dry mixed material.

(a) Ordinary Compaction. When “Ordinary Compaction” is shown on the Plans, the following provisions shall apply:

The treated material shall be sprinkled and rolled as directed by the City. All irregularities, depressions or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding or removing treated material as required, reshaping, and recompacting at the Contractor's expense.

Should the material lose the required stability, compaction or finish before the next course is placed or the project is accepted, it shall be removed and replaced, unless otherwise approved by the City. Removal and replacement will be at the Contractor's expense.

(b) Density Control. When “Density Control” is shown on the Plans, the following provisions shall apply.

Unless otherwise shown on the Plans, the course shall be sprinkled as required herein and compacted to the extent necessary to provide not less than 95 percent of the density as determined by Test Method Tex-120-E, Part II / ASTM D 1633. Roadway density will be determined by Test Method Tex-115-E / ASTM D 2922 & ASTM D 3017.

(7) Finishing. Immediately after compaction, the surface of the mixture shall be clipped, skinned, or tight bladed by a maintainer or subgrade trimmer to a depth of approximately 1/4”, removing all loosened materials. The loosened materials shall be disposed of at the Contractor's expense and at a location approved by the City. The surface shall then be rolled with a pneumatic tire roller, adding small increments of moisture as needed during rolling.

Throughout this operation, the shape of the course shall be maintained and the surface upon completion shall be smooth and in conformity with the typical sections, lines and grades as shown on the Plans or as established by the City.

(8) Curing. The completed section shall be moist cured for three days or prevented from drying by addition of an asphalt material at the rate of 0.05 to 0.20 gallon per square yard as determined by the City. The asphalt used shall be of the type and grade shown as on the Plans or as approved by the City.

275.6 TOLERANCES.

Tolerances shall conform to the following:

(1) Density Tolerances. The City may accept the work providing not more than one (1) out of the most recent five (5) density tests performed is below the specified density, provided the failing test is no more than three (3) pounds per cubic foot below the specified density.

(2) Moisture Tolerances. The percentage of moisture in the mixture at the beginning of compaction shall be within plus or minus two (2) percentage points of optimum as determined by Test Method Tex-120-E, Part II / ASTM D 1633, unless otherwise approved by the City. The percent of moisture will be determined in accordance with Test Method Tex-103-E / ASTM D

2216. If the percentage of moisture is outside the allowable tolerance, the Contractor shall adjust operations to meet this requirement.

(3) Grade Tolerances. In areas on which pavement is to be placed, any deviation in excess of 1/4 inch in cross section and 1/4 inch in 16 feet measured longitudinally shall be corrected by loosening, adding, or removing material, reshaping, and compacting by sprinkling and rolling.

275.7 MEASUREMENT.

This Item will be measured as follows:

Cement Treatment will be measured by the square yard of the surface area to the lines and grades shown on the typical sections.

Cement will be measured by the ton of 2,000 pounds, dry weight.

275.8 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 price bid for "Cement Treatment (Existing Material)", "Cement Treatment (New Base)", or "Cement Treatment (Mixing Existing Material and New Base)" of the strength, thickness and compaction method specified and for "Cement" at the unit price bid per ton of 2,000 pounds, dry weight. This price shall be full compensation for shaping existing material, loosening, pulverizing, providing cement, spreading, road mixing, compacting, blading, shaping, finishing, curing including curing materials, replacing if required, and for all mixing water, labor, tools and incidentals necessary to complete the work except as otherwise provided for in this Item.

When new base material is shown on the Plans, furnishing and delivery of the new base will be paid for as "Flexible Base (Roadway Delivery)", of the type, grade and class shown on the Plans in accordance with Item 247.5.

When "Ordinary Compaction" is shown on the Plans, all sprinkling and rolling, and proofrolling will be considered subsidiary to this Item, unless otherwise shown on the Plans.

When "Density Control" is shown on the Plans, all sprinkling and rolling, and proofrolling will be considered subsidiary to this Item.

When proofrolling is specified by the City and shown on the Plans, it will be considered subsidiary to this bid Item.

When subgrade is constructed under this project, correction of soft spots in the subgrade or existing base will be at the Contractor's expense.