Section 306

CEMENT MODIFIED RECYCLED BASE

306.1 Description

1 This section contains specifications for the materials, equipment, construction, measurement, and payment for the modification of an existing paved roadway or shoulder by scarifying the existing pavement structure, mixing it with Portland cement, and constructing the base course in conformance with the lines, grades, dimensions, and cross-sections shown on the Plans or as directed by the RCE.

306.2 Materials

306.2.1 Portland Cement

1 Use Portland cement that conforms to the requirements of **Subsection 301.2.1**.

306.2.2 Water

1 Use water conforming to the requirements of **Subsection 701.2.11**.

306.2.3 Asphalt Material

1 Use asphalt material conforming to the requirements of **Subsection 301.2.4**.

306.3 Equipment

1 Ensure that the equipment necessary for the proper construction of the work is on site and in acceptable working condition. Provide sufficient equipment to enable prosecution of the work in accordance with the project schedule and completion of the work in the specified time.

2 Construct the base with any machine or combination of machines and auxiliary equipment that will produce results as outlined in this specification. Use only experienced and capable workers to operate the mixing equipment.

306.4 Construction

306.4.1 General

1 Regulate the sequence of work to process the necessary quantity of material to provide the full depth of modification as shown on the Plans:

- Use the proper amount of Portland cement.
- Maintain the work.
- Rework the courses as necessary to meet the requirements of this specification.
- Incorporate appropriate material as specified in the plans for drainage correction, cross slope correction or roadway strengthening.

306.4.2 Shoulders

Remove all excess vegetation generated from the cleaning of shoulders prior to performing the mixing operations from the roadway.

306.4.3 Pulverization and Scarification

1 Pulverize the pavement so that at the completion of moist-mixing 100% (by weight) passes a 1½-inch sieve. Carefully control the depth of scarification and conduct blading operations in a manner to ensure that the surface of the roadbed below the scarified and pulverized material remains undisturbed and conforms to the required cross-section.

306.4.4 Application of Cement

1 The rate of cement will be determined by the Geotechnical Materials Engineer (GME) based on test results supplied by the Contractor to the GME. Obtain material from the roadway necessary for the mix design process taking care to sample no deeper than the depth of reclamation and to keep the ratio of asphalt to soil representative. Do not obtain materials for mix design testing from areas of the roadway that have been full-depth patched. The roadway sampling and mix design testing will be conducted according to SC-T-26 by an AASHTO-accredited laboratory. Allow four to six weeks for these results. Submit the mix design test results in writing and obtain the cement spread rate from the GME before starting reclaiming work. Allow two weeks for review of test results and selection of appropriate cement spread rate.

Spread Portland cement uniformly on the roadway at the rate (in pounds per square yard) established by the GME. Spread the cement with equipment that can be calibrated and adjusted so that the established rate is attained uniformly throughout the length and width of the roadway. Use spreading equipment that has adjustable openings or gate headers and that is not solely dependent on vehicle speed to obtain the required spread rate. A tolerance of 5% will be allowed in the spread rate for individual sections of roadway; however, adjustments should be made in order to keep the actual spread rate as close to that established by the GME. Only apply cement to such an area that all the operations can be continuous and completed in daylight, unless adequate artificial light is provided, within 6 hours of such application.

Do not allow the percentage of moisture in the soil at the time of cement application to exceed the quantity that permits uniform and thorough mixture of soil and cement during dry mixing operations and do not exceed the specified optimum moisture content for the soil-cement mixture. Do not allow equipment, except that used in spreading and mixing, to pass over the freshly spread cement until it is mixed with the soil.

Apply cement only when the temperature is above 40°F in the shade and rising. Do not perform work on a frozen or excessively wet roadway.

306.4.5 Mixing and Processing

1 Unless otherwise provided in the Special Provisions or shown on the Plans, mix and process the soil-pavement material as specified in **Subsection 301.4.5**. Select the single pass or multiple pass method based on the required depth of reclamation and the equipment capabilities. Excess material generated from the mixing process after final grading operations have been completed shall be removed from the roadway.

306.4.6 Compaction

1 Compact the base as specified in **Subsection 307.4.5**. The moisture content of the reclaimed roadway must be verified within 30 minutes of the initial watering application to ensure that the moisture is within 2% of optimum moisture prior to beginning grading and compaction efforts.

306.4.7 Construction Limitations

1 Perform work in daylight hours unless adequate artificial light is provided. Limit the area over which the cement-pavement mixture is spread so that all operations specified in **Subsections 306.4.3** and **306.4.4** are performed continuously until completion of a section. Complete all work on a section within 2 hours after the application of water to the aggregate and cement mixture unless the RCE approves a longer period.

2 If operations are interrupted for a continuous period of greater than 1 hour after the cement has been mixed with the aggregate, reconstruct the entire affected section in accordance with these specifications. When the un-compacted mixture of aggregate and cement is wetted so that the moisture content exceeds that specified, manipulate and aerate the mixture to reduce the moisture to the specified content provided the base course is completed within the time limits of these specifications.

306.4.8 Weather Limitations

1 Apply cement only when the temperature is 40ºF in the shade and rising. Do not perform work on frozen or excessively wet subgrade. The temperature restrictions for single treatment, when used as a curing option, shall meet the requirements of the successive HMA course to be placed. If the successive course is a surface course, the seasonal restrictions of December, January and February apply unless otherwise approved by the DOC.

306.4.9 Curing

1 After the cement modified recycled base has been finished as specified, cure the surface using the following methods as specified in the plans or contract.

Curing Method 1: Wet Cure

After the cement modified recycled base has been finished as specified, protect the surface from rapid drying by keeping the base continuously moist for 3 days. This cost is to be included in the Cement Modified Recycled Base price.

Curing Method 2: Surface Treatment

After the cement modified recycled base has been finished as specified, protect the base from rapid drying and traffic by placing Asphalt Surface Treatment (Single Treatment) as specified in section 406, with the exception that lightweight aggregate is not required, on the recycled base. This operation must be performed daily to protect the newly recycled base, unless otherwise directed by the Engineer. This cost is to be included in the Cement Modified Recycled Base price.

Curing Method 3: Wet Cure and Surface Planing

After the cement modified recycled base has been finished as specified, protect the surface from rapid drying by keeping the base continuously moist for 3 days. Prior to placement of the HMA course, the recycled base course surface shall be milled to obtain a true and level finish for the asphalt placement. This cost is to be included in the Cement Modified Recycled Base price.

Curing Method 4: Surface Treatment and Surface Planing

After the cement modified recycled base has been finished as specified, protect the base from rapid drying and traffic by placing Asphalt Surface Treatment (Single Treatment) as specified in section 406, with the exception that lightweight aggregate is not required, on the recycled base. This operation must be performed daily to protect the newly recycled base, unless otherwise directed by the Engineer. Prior to placement of the HMA course, the recycled base course surface shall be milled to obtain a true and level finish for the asphalt placement. This cost is to be included in the Cement Modified Recycled Base price

306.4.10 Construction Joints

1 At the end of each day's construction, form a straight construction joint as specified in **Subsection 301.4.9**.

306.4.11 Surface Smoothness

1 Ensure that the finished surface of the recycled base meets the requirements of **Subsection 301.4.10**. The grade of the road will be based on existing conditions of the roadway. The cross slope will be graded to obtain positive drainage as well as smooth transitions from crown to superelevated sections of the roadway. Roads with a pre-existing cross slope of 2% or greater shall be re-graded to the same cross slope. On roads with a pre-existing cross slope of less than 2%, the Contractor and RCE shall determine the measures required to obtain positive drainage and the final cross slope.

306.4.12 Rideability

The final asphalt surface placed on cement modified recycled base course shall meet the Rideability requirements of SC-M 403 for either New Construction or Resurfacing, whichever is applicable based on the specified pavement structure.

306.4.13 Thickness Tolerance of Base Course

1 Measure and calculate the thickness of the recycled base in accordance with **Subsection 301.4.11**.

306.4.14 Opening to Traffic

1 Local traffic may use completed portions of the recycled base provided the base has hardened sufficiently to prevent marring or damaging of the surface by such usage. Ensure that no damage occurs to the curing coat. With approval of the District Office, temporary detours may be utilized during the reclamation process to reduce the traffic on the reclaimed roadway. Use the subgrade shoulders or completed pavement, when available, for transporting materials, workers, and equipment throughout the project. Do not place construction equipment on the base without the approval of the RCE unless it is being used in the subsequent construction operation.

306.4.15 Maintenance

1 Maintain the cement modified recycled base in accordance with **Subsection 301.4.13**.

306.5 Measurement

1 Measurement of quantity for Cement Modified Recycled Base (of the uniform required thickness) or Portland Cement for Cement Modified Recycled Base is made using the methods specified in **Subsection 301.5** for the applicable items.

306.6 Payment

1 Payment for the accepted quantity of Cement Modified Recycled Base (of the uniform required thickness) or Portland Cement for Cement Recycled Base, measured in accordance with **Subsection 306.5**, is determined using the contract unit bid price for the applicable item.

2 Payment for Cement Modified Recycled Base (of the uniform required thickness) is full compensation for constructing the cement modified recycled base course as specified or directed and includes pulverizing and scarifying the existing pavement; applying and spreading cement; watering and maintaining proper moisture content; curing, processing and mixing base course material; compacting, finishing, hauling and disposing of excess shoulder material and curing base course (unless asphalt surfacing is used); forming construction joints; and all other materials, labor, equipment, tools, transportation, and incidentals necessary to complete the work in accordance with the Plans, the Specifications, and other terms of the Contract.

3 Base course that is deficient in thickness is paid for at the adjusted unit price specified in **Subsection 306.4.12**.

4 Payment for Portland Cement for Cement Modified Recycled Base is full compensation for furnishing and weighing the cement as specified or directed and includes all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to complete the work in accordance with the Plans, the Specifications, and other terms of the Contract.

5 Payment for excess reclaimed material generated from the roadway (excluding shoulder material) shall be paid for as unclassified excavation.

Payment for each item includes all direct and indirect costs or expenses required to complete the work.

6 Pay items under this section include the following:

Item No.	Pay Item	Unit
3063404	Cement Mod. Rec. Base (4” Uniform) – Curing Method 1	SY
3063406	Cement Mod. Rec. Base (6” Uniform) – Curing Method 1	SY
3063408	Cement Mod. Rec. Base (8” Uniform) – Curing Method 1	SY
3063410	Cement Mod. Rec. Base (10” Uniform) – Curing Method 1	SY
3063412	Cement Mod. Rec. Base (12” Uniform) – Curing Method 1	SY
3063424	Cement Mod. Rec. Base (4” Uniform) – Curing Method 2	SY
3063426	Cement Mod. Rec. Base (6” Uniform) – Curing Method 2	SY
3063428	Cement Mod. Rec. Base (8” Uniform) – Curing Method 2	SY
3063430	Cement Mod. Rec. Base (10” Uniform) – Curing Method 2	SY
3063432	Cement Mod. Rec. Base (12” Uniform) – Curing Method 2	SY
3063444	Cement Mod. Rec. Base (4” Uniform) – Curing Method 3	SY
3063446	Cement Mod. Rec. Base (6” Uniform) – Curing Method 3	SY
3063448	Cement Mod. Rec. Base (8” Uniform) – Curing Method 3	SY
3063450	Cement Mod. Rec. Base (10” Uniform) – Curing Method 3	SY
3063452	Cement Mod. Rec. Base (12” Uniform) – Curing Method 3	SY
3063464	Cement Mod. Rec. Base (4” Uniform) – Curing Method 4	SY
3063466	Cement Mod. Rec. Base (6” Uniform) – Curing Method 4	SY
3063468	Cement Mod. Rec. Base (8” Uniform) – Curing Method 4	SY
3063470	Cement Mod. Rec. Base (10” Uniform) – Curing Method 4	SY
3063472	Cement Mod. Rec. Base (12” Uniform) – Curing Method 4	SY
3064000	Portland Cement for Cement Modified Recycled Base	TON