310-R-803 CEMENT TREATED PERMEABLE BASE

(Adopted 08-21-25)

The Standard Specifications are revised as follows:

SECTION 309, AFTER LINE 2, INSERT AS FOLLOWS:

SECTION 310 – CEMENT TREATED PERMEABLE BASE

310.01 Description

This work shall consist of constructing a cement treated permeable base, CTPB, on a prepared subgrade in accordance with 105.03.

310.02 Quality Control

The mixture for CTPB shall be produced by a plant in accordance with ITM 405 and transported and placed in accordance with the QCP prepared and submitted by the Contractor in accordance with ITM 803. The QCP shall be submitted to the Engineer for approval at least 15 calendar days prior to commencing production. The QCP shall also include, but not be limited to, details concerning the following critical aspects of CTPB placement and paving:

(a) All equipment shall be listed by type and manufacturer used to deliver, place, and spread the CTPB material. The procedures to control segregation of the material during this operation shall be identified.

(b) All equipment shall be listed by type and manufacturer used to compact and finish the CTPB. Each roller shall be identified by type and weight. The rolling operation shall be described. Test methods and frequencies used to monitor and control compaction shall be identified.

(c) Field procedures and test methods, including frequencies to monitor, control, and correct the thickness and finished surface grading of the CTPB.

MATERIALS

310.03 Materials

Materials shall be in accordance with the following:

Admixtures	*912.03*
Coarse Aggregate, Class B or Higher, Size No. 8	*904*
Fine Aggregate, Size No. 23	*904*
Geotextile, Type 2A, non-woven	*918.02(a)*
Portland Cement, Type I or IL	*901.01(b)*
Water	*913.01*

310.04 Recycled Concrete Aggregate

The Contractor may elect to salvage PCCP and superstructure concrete from within the project limits and process the concrete into recycled concrete aggregates for use in CTPB. The Contractor shall identify any salvaged stockpiled concrete material by the State Route, US Highway, or Interstate Route along with what the concrete is from, such as:

(a) Portland Cement Concrete Pavement and Approaches

(b) Structures

(c) Other applications not identified here, shall be as approved by the Engineer.

The Contractor may remove the salvaged concrete from within the project limits and process the recycled concrete aggregate at an established CAPP source, or the Contractor has the following options for processing the salvaged concrete into recycled concrete aggregate from a local site:

(a) the establishment of a CAPP Producer Yard at the local site in accordance with 917; or

(b) use a CAPP Certified Aggregate Technician or a consultant on the list of Qualified Geotechnical Consultants for Gradation Control Testing.

The QCP shall include how the recycled concrete will be stored, crushed, stockpiled, and segregated from other materials. Identify what processes shall be used to ensure that no contamination will occur with other materials. The Engineer may visit these locations to ensure operations are following the approved QCP.

Recycled concrete aggregate processed from routes not maintained by the Agency shall not be used. Recycled concrete aggregates processed from adjacent or nearby contracts may be permitted if approved by the Engineer and documented in the QCP. If insufficient recycled concrete aggregate is produced to complete the work, the Contractor shall supplement with new materials in sufficient quantities to complete the work in accordance with the specifications. Foreign materials such as reinforcement and other steel materials, asphalt, and joint materials shall not be included in the recycled concrete aggregate. Waste materials from recycling operations shall remain the property of the Contractor. Final disposal of the surplus material shall be in accordance with 104.07 and 203.08.

Recycled concrete aggregate for CTPB shall be in accordance with the following criteria:

Gradation Requirements						
Sieve Analysis						
Sieve Size	*1 1/2 in.*	*1 in.*	*1/2 in.*	*No. 4*	*No. 8*	*No. 200*
Percent Passing	*100*	*90 – 100*	*25 – 60*	*0 – 20*	*0 – 12*	*6 max.*
Physical Requirements						

Los Angeles Abrasion, % max.	*45*

Los Angeles Abrasion shall be tested once for each different stockpiled source of material processed for recycled concrete aggregate. All Los Angeles Abrasion tests shall be performed by the Contractor. The Contractor shall report the results of the tests to the Engineer in writing within one day after completion of the test.

For material processed within the project limits, gradation control testing shall be performed by the Contractor. The frequency of gradation control testing shall be one test per 2,000 t based on production samples into a stockpile or by over the scales measurement, with a minimum of two tests per contract, one in the beginning and one near the mid-point. The sampling and testing of these materials shall be in accordance with the applicable requirements of 904 for coarse aggregates. The Contractor shall report the results of the tests to the Engineer in writing within one day after completion of the test.

All test results and responses to test results shall be maintained during the duration of the contract and made available to the Engineer upon request. Failure to meet any of the requirements for recycled concrete aggregate may result in the rejection of the material, as directed by the Engineer.

310.05 Concrete Mix Design

A CMD shall be as specified herein. The CMD shall be submitted to the DTE a minimum of seven calendar days prior to production. The CMDS shall include the information shown in 502.03. Use of the Department provided spreadsheet is not required. Production shall not commence until the DTE has assigned a mix number to the CMDS. The mix design will henceforth be identified as a concrete mix design for production, CMDP.

Any changes or adjustments to the CMDP shall be in accordance with 502.03.

A CMDP developed in accordance with the requirements specified herein from a previous contract may be submitted for review for the current contract to the DTE. The DTE will notify the Contractor when the review is complete and whether or not the previously used CMDP can be used on the current contract.

310.06 Concrete Mix Criteria

The CMD shall produce workable concrete mixtures, with the minimum amount of water, and having the following properties.

Minimum portland cement content..... 235 lbs/cu yd
Maximum portland cement content..... 329 lbs/cu yd
Maximum water/cement ratio 0.40
Compressive Strength..... 400 psi min. at 7 days
Coefficient of Permeability..... 350 to 1,500 ft/day

The mix design and all associated testing shall be performed by a laboratory that is CCRL accredited for concrete and AASHTO re:source accredited for soil and aggregates. Compressive strength testing shall be performed in accordance with AASHTO

T 22. All cylinders for compressive strength shall be 6 in. diameter by 12 in., molded and standard cured in accordance with AASHTO T 23. Coefficient of permeability testing shall be performed in accordance with AASHTO T 215. The Contractor shall submit with the mix design the specifications use and test results, the name of the testing laboratory, the date of the tests, and accreditations of the lab running the specified tests. Tests shall be representative of the material to be used for the project.

Absorption tests shall be performed on the fine aggregate in accordance with AASHTO T 84 and on the coarse aggregate in accordance with AASHTO T 85. Absorption test results for a particular size of aggregate that differ by more than 1.0 percentage point from the Department's source value shall be investigated. The Contractor shall report any differences that exceed 1.0% to the Department. The Contractor's results shall be used when calculating the water/cementitious ratio.

No coal ash or other pozzolans shall be used. Crushed stone shall be used. Chemical admixtures Type A, Type B, Type C, Type D, Type E, Type F, and Type G may be allowed with prior written approval.

310.07 Acceptance

Acceptance of CTPB for field permeability, compressive strength, and thickness will be determined on the basis of tests performed by the Contractor in the presence of the Engineer. The Engineer will randomly select the location for sampling in accordance with ITM 802.

The random sample shall be of sufficient quantity to perform all required tests and obtained in accordance with AASHTO R 60. The compressive strength test results of for each test will be averaged and shall be in accordance with 310.05. Test results will be shared in a timely manner.

Test or Determination	*Frequency*	*Test Method*	*Precision*
Field Permeability	*one per 5,000 sq yds*	*ASTM C1701*	*1 sec*
Thickness	*one per 2,500 sq yds*	*ITM 404*	*0.1 in.*
Compressive Strength	*one per 5,000 sq yds*	*AASHTO T 22*	*1 psi*

Rounding will be in accordance with 109.01(a).

CONSTRUCTION REQUIREMENTS

310.08 Preparation of Grade

The subgrade shall be prepared and proofrolled in accordance with 207.04. When shown on the plans, geosynthetics shall be placed in accordance with 214.03 or as directed. Proofrolling will not be required in trench sections and other areas where proofrolling equipment cannot be used.

310.09 Control Strip

The first day of production, where at least 500 ft has been constructed, shall be considered the control strip. The Contractor shall demonstrate, in the presence of the

Engineer, that the materials, equipment, and construction processes meet the requirements of the specification. A control strip that does not meet construction requirements shall be removed and replaced at no additional cost to the Department. Production shall not continue until the control strip has been accepted by the Engineer. The control strip shall be considered acceptable when aggregate is completely coated with cement paste with no evidence of crushing; the surface is firm, unyielding and stable under compaction equipment, and the layer meets the field permeability in accordance with 310.19.

A new control strip shall be constructed if changes are made to the mix design, equipment, or construction methods.

310.10 Weather Limitation

The CTPB material shall not be mixed or placed while the ambient temperature is below 40°F or when conditions indicate that the temperature may fall below 35°F within 24 h of placement. The CTPB shall not be placed on frozen underlying courses or mixed when aggregate is frozen.

310.11 Mixing and Transportation

The CTPB shall be produced at a mixing plant in accordance with 508.02. The CTPB shall be completely mixed in a central or stationary mixer and transported from the plant to the job site in trucks or other hauling equipment having beds that are smooth and clean. Shrink or transit mixing shall not be used for CTPB.

Discharge from the hauling equipment shall be completed within 45 minutes from the start of mixing the CTPB.

The batch ticket for contract dedicated plants and delivery tickets for ready mix plants shall include the CMDP number. The tickets shall be delivered to the Engineer.

The CTPB material shall not be re-tempered by adding water or by other means.

310.12 Placing

The CTPB material shall be placed using a mechanical spreader, or a conventional HMA paver in accordance with 409.03. The CTPB shall be installed in a single lift at the compacted thickness shown on the plans. Mechanical spreaders shall be capable of placing a uniform, full-depth layer of material across the full lane width in one pass. The batches shall be deposited to have a uniform mix and require as little rehandling as possible. The CTPB shall not segregate during placement.

CTPB shall not be mixed, placed, or finished when the natural light is insufficient unless an adequate and approved artificial lighting system is operated.

The Contractor shall have available at all times sufficient materials for the protection of uncured CTPB from the effects of rain. Covering material such as burlap or polyethylene sheeting shall be provided. When rain appears imminent, paving operations shall stop. All available personnel shall be used to cover the CTPB.

310.13 Compaction

The Contractor shall compact the CTPB by completing one to three passes of the entire width of the material with a steel-wheeled, two-axle tandem roller weighing between 5 and 12 tons in static mode. The Contractor shall initiate compaction within 30 minutes following the placement. If the rolling pattern results in undue displacement of the surface, or causes crushing of the aggregate, work shall be stopped until the cause can be determined and corrections are made.

In all places not accessible to the rollers, the CTPB material shall be compacted with approved mechanical hand-operated tampers.

310.14 Joints

Longitudinal joints shall be located within 12 in. of the lane lines of the overlying PCCP. All joints shall be made in such a manner as to ensure a continuous bond between old and new material and shall present the same texture and smoothness as other sections of the course.

All contact surfaces of previously constructed courses shall be cleaned of all dirt or other objectionable material and thoroughly moistened with water prior to placing new material.

310.15 Curing

The Contractor shall moist cure the CTPB by spraying the CTPB surface with a fine spray of water every two hours for a period of eight hours. The curing process shall begin the morning after placement of the base. The CTPB shall remain in place for a minimum of three days before placing the subsequent PCCP course.

310.16 Surface Requirements

The Contractor shall check that the finished surface of the CTPB after trimming and compaction is within ± 1/4 in. longitudinally and transversely, as measured with a 16 ft rolling straightedge in the presence of the Engineer. When the finished surface is more than ± 1/4 in. from the planned value, the surface shall be corrected to an elevation that falls within ± 1/4 in. of the planned value. All out-of-tolerance surface corrections shall be performed at no additional cost to the Department. The Engineer may approve the removal of high spots to within the specified tolerance by a method which does not produce contamination of the CTPB. Neither grinding nor milling will be allowed.

310.17 Protection of Surface

The CTPB shall not be used as a haul road or storage area. Construction vehicles or equipment shall not be allowed on the CTPB, except for equipment required to place the next course. The Contractor shall remove and replace areas damaged or contaminated at no cost to the Department. The CTPB shall be constructed only in areas where the subsequent course will be paved during the same construction season.

310.18 Bond Breaker

Prior to placing the overlaying PCCP, a geotextile bond breaker shall be placed on the surface to prevent bonding with the CTPB. There shall be a minimum of 3 in. of overlap where adjoining sections of geotextile come together.

310.19 Field Permeability

Field permeability testing shall be performed by the Contractor in the presence of the Engineer. The permeability of the CTPB will be determined in accordance with ASTM C1701. The field permeability will be considered acceptable if the time it takes to pour 40 lbs of water into the ring, while maintaining an acceptable head level, until no free water is on the surface is less than or equal to 8 minutes.

If results from the field permeability test do not meet the requirements, additional tests shall be completed at 100 ft intervals on each side of the original test. These additional testing locations shall be on a line which passes through the original testing location and parallel to the centerline of the CTPB. The testing shall continue in both directions at 100 ft intervals until two successive testing locations meet the requirements, or where testing can no longer be completed on the CTPB.

Where two failed adjacent permeability tests occur, the CTPB shall be removed and replaced at no additional cost to the Department. The limits of removal and replacement shall extend from the original failed testing location to the first additional passing testing location in every direction.

310.20 Thickness

Cores, 4 in. inside diameter, shall be taken in the presence of the Engineer for the full depth of the CTPB. The Engineer will take immediate possession of the cores. Cores shall not be taken within 6 in. of the edge of the CTPB, within 3 in. of longitudinal joints, or within 5 ft of a transverse construction joint. Cores shall be taken and measured in accordance with ITM 404. If the intact core cannot be recovered, the Engineer will measure the thickness of the CTPB based on the depth of the core hole.

All core holes shall be filled with cement grout or rapid setting patch material within 24 h of coring.

If a core measurement reveals that the CTPB is more than 1 in. deficient in thickness, additional cores shall be drilled at 20 ft intervals from the original core. These additional cores shall be on a line which passes through the original core and parallel to the centerline of the CTPB. The drilling shall continue in both directions at 20 ft intervals until two successive cores indicate a thickness deficiency of 1 in. or less, or where cores can no longer be drilled in the CTPB.

When a single core indicates a thickness deficiency of more than 1 1/2 in., or if two or more adjacent cores indicate a thickness deficiency of more than 1 in., the investigation will be expanded to include adjoining CTPB. The additional cores shall be taken from the adjoining traffic lanes or shoulders at the same station at which the first core or cores indicated the deficiency, whether the lane was paved at the same time or not.

The width of adjudicated CTPB shall be the full width of the lane in which the deficiency occurs. CTPB that has been replaced shall be investigated for thickness.

When test results for CTPB thickness do not meet the specified thickness, Department action will be assessed as follows:

Where two adjacent cores indicate a thickness deficiency of more than 1 in., no payment will be made unless the CTPB is removed and replaced. The limits of non-payment shall extend in every direction from the deficient core to the first additional core indicating a thickness deficiency of less than 1 in.

Where two adjacent cores indicate a thickness deficiency of more than 1 1/2 in. the CTPB shall be removed and replaced. The limits of removal and replacement shall extend in every direction from the deficient core to the first additional core indicating a thickness deficiency of less than 1 in.

310.21 Compressive Strength

Compressive strength testing shall be performed by the Contractor in the presence of the Engineer. One sample of CTPB shall be taken for compressive strength testing in accordance with AASHTO R 60. Two test cylinders shall be made and standard cured from the sample in accordance with AASHTO T 23 and the 7-day compressive strength of each cylinder determined in accordance with AASHTO T 22. The compressive strength will be computed by averaging the two 7-day compressive strengths.

If the compressive strength of one or more cylinders in a strength test is below 75% of the required strength, the entire test will be considered as failed. Failure to meet the strength requirements in accordance with 310.06 will be cause for rejection of the quantity of concrete represented by the cylinders. All molds, facilities, and materials necessary to prepare and cure the specimens shall be furnished with no additional payment.

310.22 Method of Measurement

CTPB will be measured by the square yard for the thickness specified. The width of the CTPB will be as shown on the plans and will not include any additional width for the safety edge. The length of the CTPB will be measured parallel to the CTPB along the centerline of the roadway or ramp, excluding paving exceptions as shown on the plans.

310.23 Basis of Payment

The accepted quantities of CTPB will be paid for at the contract unit price per square yard for the thickness specified, complete in place.

Payment will be made under:

Pay Item	***Pay Unit Symbol***
Cement Treated Permeable Base	*SYS*

No direct payment will be made for the production of recycled concrete aggregate.

The cost of mixing, transporting, placing, compacting, curing, testing, geotextile, and necessary incidentals shall be included in the cost of the CTPB.

The cost of corrections for the surface requirements shall be included in the cost of the CTPB.

Furnishing and operating a 16 ft straightedge shall be included in the cost of other pay items within this section.

The cost of coring and refilling of the CTPB holes for disputes caused by deficient thickness shall be included in the cost of CTPB.

Traffic control for disputes caused by deficient thickness shall be supplied with no additional payment.

Removal and replacement of CTPB damaged by freezing shall be completed with no additional payment.

Removal and replacement of CTPB determined to be deficient in thickness shall be completed with no additional payment.
