IN-PLACE CEMENT STABILIZED BASE COURSE - Section 303

In-place cement stabilized base course is intended for the reconstruction of existing roadways in which the department provides the base material already in-place. This work is defined in Specification Section 303. If insufficient material exists on the roadway to meet grade and cross slope or the existing material will not stabilize, the contractor will be required to provide additional material and construct the base in a manner similar to that required for Class II Base Course. When the contractor must supply additional material to be blended with existing in-place materials, the resulting blend creates unique soil problems that must be considered in base design. It is important to note that materials supplied by the contractor must meet the requirements of Section 302; however, these materials will be paid for under Section 203.
When the existing surface is asphaltic concrete, to construct an in-place cement stabilized base course the contractor shall cold plane the existing surface in accordance with Specification Subsection 303.04, Section 509, and scarify the remaining material. When specified the removed asphaltic concrete will be replaced with approved base material. The material will then be blended and pulverized vertically and for the full width of the area to be stabilized to form a uniform material composite. Once the roadway is properly blended, prior to spreading cement, the contractor is to shape and compact the roadbed, stabilize with cement, compact, and finish to grade and cross slope.

In locations where normal construction practices for in-place cement stabilized base course are seriously impeded, the project engineer may allow the contractor to use asphaltic concrete meeting the requirements of Specification Section 501 or 502, or Portland cement concrete conforming to Specification Section 901 in lieu of the in-place cement stabilized base course type selected for the project. Such concrete construction shall be performed in accordance with the Specification Section 706.

MATERIALS Generally, the base materials to be used for in-place cement stabilized base course will be furnished by the department. They will be reclaimed materials and may have been previously stabilized or treated. They will usually be materials approved by the department under earlier contracts and specifications. They may include raw or treated sand clay gravel, asphaltic concrete/soil blends, aggregate surface courses, embankments, stabilized soil, etc.

In order to be used for in-place cement stabilized base course, the existing material must stabilize with cement. However, if no subgrade survey has been performed, if unusual conditions are encountered, if the resulting blend of materials will not stabilize, or if asphaltic pavement has been removed and specified to be replaced, the contractor shall furnish additional material. When the contractor supplies material for stabilization, either to replace existing materials or to supplement them to meet grade requirements, the materials supplied shall meet the material specifications for Specification Section 302.

Generally, the cement factors for the in-place stabilization of existing material have been predetermined at the time the department was designing the roadway. The design engineer cannot complete an effective design without information on the existing soils,

including their suitability for stabilization. These cement factors may then be placed in the contract. If there are no cement factors in the contract and none have been predetermined, project personnel will sample the in-place material from selected sites after it has been satisfactorily pulverized and blended by the contractor. **If lime treatment is necessary and the percentage of lime additive has not been predetermined samples for lime treatment will be taken at the same time.** Contractor provided materials will require adjustment to the sampling and testing schedule to ensure that all materials are in-place and thoroughly pulverized and blended before sampling for the determination of cement factors. The sample will be delivered to the district laboratory for the determination of cement factor. The cement factor will be determined in accordance with DOTD TR 432. No cement is to be distributed until the cement content has been determined. In order to ensure an effective, timely operation, it is critical that the contractor's operation and project engineer's sampling and delivery to the district laboratory be closely coordinated.

ASPHALTIC CONCRETE AND PORTLAND CEMENT CONCRETE

The materials selected and used for asphaltic concrete and Portland cement concrete must conform to Specification Sections 501, 502, or 901. Sampling, testing, approval or other procedures shall be in accordance with the appropriate *Quality Assurance* manual.

CEMENT

Cement to be used for In-Place Cement Stabilized Base Course shall be delivered in sealed transports. Each transport shall be accompanied by a Cement Certificate of Delivery. It shall be the responsibility of the contractor to verify that the transports are sealed and that the seal number matches that indicated on the Cement Certificate of Delivery. Seals shall be removed and turned over to the project engineer daily.

DESIGN

The cement content to be used will be determined by the district laboratory and will be based on strength. In-place materials to be stabilized under this section do not naturally occur as soil, are usually modified chemically, have a long history of manipulation and weathering, and have no predictable strength gain when mixed with cement. The EDSM I. 1. 1. 11 directs the district laboratory engineer, as part of the district design procedure, to make recommendations for the redesign of existing roadways to be upgraded under the district overlay program. Prior to plan development, the district laboratory engineer is to determine the type, depth and width of the pavement, overlay (if applicable), base, and subbase (if applicable), and the thickness and type of material in the top layer of embankment for both roadway and shoulders. It is the responsibility of the district laboratory engineer to determine if in-place stabilization of existing material is an effective construction option. When reaching this determination, the district laboratory engineer is to consider that all but one inch of surfacing will be removed. If in-place stabilization (Specification Section 303) is recommended by the district laboratory engineer, the laboratory is to determine how much material is available for stabilization, if the material will stabilize, if lime treatment of any material to be stabilized is necessary, and if it will be necessary for the contractor to furnish additional material. Approximately

twelve inches of suitable material are needed for stabilization to accommodate grade, cross slope, depth of cut, and other factors of construction operations. These design recommendations are made far in advance of the contract letting date. The district laboratory engineer is to establish that in-place stabilization under Specification Section 303 will be viable and an option in the final typical section. This determination requires coordination with the District Design and Water Resources Engineer with respect to the final design. When the district laboratory engineer makes recommendation for in-place stabilization on Attachment 6, laboratory personnel are to identify the design percent cement in accordance with DOTD TR 432 for the various soils identified under the existing pavement. When lime treatment of the base is recommended, tests are to be performed on soils with the addition of lime at the recommended percentage.

When specified and the contractor provides additional material to adjust grade, the process for determining cement factors will need modification. If the laboratory engineer determines that a full design is required, samples will have to be taken from the roadway after the new material has been added, pulverized, and blended. Otherwise the cement factor will not be representative of the blend being stabilized. Predetermined cement factors do not apply to this situation. This process may require the maximum time allowed by DOTD TR 432 to determine the percent cement.

TRAFFIC CONTROL

When local or through traffic is allowed, the contractor shall develop a system of control that will minimize the movement of cement on the surface prior to mixing. This proposal will require the approval of the project engineer. When possible, traffic is not to be allowed to traverse the unmixed cement. Traffic will create nonuniformity in cement application, excessive dusting and material loss, thus affecting the required cement factor. If traffic displaces cement, a uniform spread shall be redeveloped prior to blending with the in-place mixer. When traffic is maintained, the contractor shall control the operation to maintain the free flow of traffic through the project. Equipment shall not obstruct the steady flow of traffic.

EQUIPMENT

All equipment for the spreading, in-place mixing, compaction, and finishing of in-place stabilized base course shall be approved prior to use. Project personnel shall inspect equipment daily prior to use. Equipment shall be in good working condition and shall not leak fluids onto the grade or roadway. Equipment initially approved for use shall continue to conform to the standards upon which this approval is based. When approved equipment fails to meet these requirements, it shall be removed from the project until repairs are made and approval reinstated. Back-up equipment required by the specifications is to be inspected and is to meet the same requirements as the primary equipment or is not to be approved. Operations shall not begin until both primary and back-up equipment have been approved.

CEMENT SPREADER

The cement spreader shall have a mechanically adjustable, calibrated spreader box. The box shall be calibrated to distribute cement at the required cement factor. Equipment that adjusts the rate of spread solely by means of adjusting forward speed is not to be used. The spreader shall be operated to distribute cement over the prepared surface at a uniform rate for the full length and width of the spread, without excessive dusting. The spreader shall be mechanically adjustable for variable spread widths. Excessive dusting also indicates that the minimum cement factor is not being met due to material loss. If the equipment cannot be recalibrated and adjusted properly, replacement will be required. Back-up equipment must meet the same requirements as the primary equipment. If the primary equipment is replaced with the backup equipment and the spreading problem is not corrected, operations will be discontinued until additional equipment is provided, inspected and approved.

IN-PLACE MIXER

The in-place mixer is used to blend and pulverize the base material prior to the incorporation of cement. The equipment used for preliminary blending shall be capable of achieving specification requirements for the pulverization of the untreated base material.

The in-place mixer shall be designed for soil cement construction, shall have sufficient tines, arranged in a configuration which will result in a uniform blend of base material, cement, and water, across the full width of the roadway. It will be equipped with a spray bar system adjustable across the width of the stabilizer box and on each end to prevent overlapping of water from one path to an adjacent path. The spray nozzles shall be equipped with individual cutoffs to block nozzles as necessary to prevent excessive moisture content and overlap of water. Any overlap of water spray leads to excessive moisture in narrow strips, resulting in density problems and early roadway failure. Clogged nozzles shall be immediately cleaned and restored to normal function before operations are continued.

COMPACTION EQUIPMENT

Compaction equipment shall be conventional sheepsfoot-type roller or a self-propelled tamping foot compactor-type roller for initial compaction. The spikes shall be sufficient in size and number to provide uniform compaction for the full width and depth of the base course. **Compaction equipment with waffle-type or similarly styled drums will not be permitted for initial compaction. Vibratory compaction is prohibited by specification.**

The compacted material shall be finished with pneumatic tire rollers. The pneumatic roller shall have an odd number of tires, arranged so that the spaces between one row of tires are covered by the tires of the other row. All tires shall be in place and shall be in good condition and properly inflated. Tires shall be smooth tread, of the same size and ply, and inflated to within □5 psi of each other.

In-place cement stabilized base course shall be finished to a tight, uniformly smooth surface meeting the grade and cross slope requirements of the specifications.

WATER TRUCKS

Water trucks may be used to spray water over the surface of the completed base during finishing operations and to maintain moisture content only. **They are not to be used to apply water directly to the base prior to or during the mixing process.** Water trucks are to be equipped with spray bars which uniformly spray water across the surface and do not apply water in streams or cause water to puddle on on the surface. Water trucks are used to supply water to the in-place mixer. The tank or connections with the in-place mixer are not to leak allowing water to fall directly onto the base course. All spray nozzles must be clean and functioning properly.

FINISHING EQUIPMENT

In-place Stabilized Base Course shall be finished with approved equipment. When a motor patrol is used, the blade shall be adjustable to finish the surface to a smooth, uniform grade and cross slope, without undulations, humps, dips or waves.

ASPHALT DISTRIBUTOR

Asphalt distributors used to spray asphaltic curing membrane over the completed base shall be equipped with a spray bar that uniformly sprays the curing membrane across the surface and does not apply the curing membrane in streams or cause it to puddle on the surface. Clogged nozzles shall not be allowed.

PREPARATION OF ROADBED

SURFACE REMOVAL

When the asphalt surfacing is to be replaced, the contractor shall remove existing pavement as specified before performing any other preparation. Asphaltic concrete surfacing shall be removed using standard cold planing operations in accordance with Specification Section 509. For additional information regarding cold planing operations, refer to the *Application of Quality Assurance Specifications for Asphaltic Concrete Mixtures*. Other types of pavement shall be removed in accordance with contract requirements. The removal of aggregate surfacing may not be required.

When the asphalt surfacing is to be replaced, it shall be replaced with base material meeting the requirements of Specification Section 302. The minimum loose quantity required shall be equal to the thickness of the surfacing removed multiplied by 1.30. (For example: Four inches of removed asphaltic concrete shall be replaced with a minimum of 5.20 inches [132.08 mm] of base material [4.0 x 1.30 = 5.20 in.] {1016 x 1.30 = 132.08 mm}.) This adjustment factor ensures that the compacted thickness of the completed in-place stabilized base course, when the replacement material is combined with the existing base material, will result in the compacted thickness shown on the plans.
Without approval, removal operations shall not be conducted more than 2 miles in advance of base course stabilization. Weather conditions or the speed and sequence of construction operations may limit the removal of surfacing to less than two miles. This restriction will minimize the difficulties that arise in maintaining public and/or construction traffic through the unsurfaced area. It minimizes the deterioration of the stability of the remaining base and embankment materials. It minimizes traffic hazards to the traveling public and the accompanying liability to both the contractor and the department. It provides the contractor with a moving construction section for the hauling and placement of additional material to replace the surfacing that has been removed.

The remnants of asphaltic concrete surfacing which remain after the cold planing operation shall be thoroughly pulverized and blended with the existing base material during the preparation of the roadbed. Pieces of surfacing or patches that cannot be adequately pulverized for inclusion in the new base course are to be identified by the contractor and project engineer jointly, then removed and disposed of in accordance with Specification Section 202.

SCARIFICATION, BLENDING AND PULVERIZATION

The existing base material (with new material, if required) shall be scarified to its full depth for the total width of the section to be stabilized. **It is imperative that materials for stabilization be blended vertically and horizontally for the full width and depth to be stabilized. Without proper blending the cement factor established by design will not be appropriate. This is especially critical when widening, shoulders, or other areas of dissimilar materials are incorporated. Without proper blending, non-uniform base materials are created that will not stabilize as designed. In-place mixers are very effective, but only blend vertically. Therefore, to achieve horizontal blending across the full width of the base, motor patrols or other approved equipment must be used. Blending processes shall be approved by the project engineer and continued until all the varying materials have been completely mixed.** Specification requirements for pulverization shall be achieved prior to spreading any cement.

SHAPING AND INITIAL COMPACTION

After specification pulverization requirements and a uniform blend of existing base materials have been achieved, the contractor shall shape the roadway to a rough grade and cross slope. The shaped roadway shall then be compacted, using a conventional sheepsfoot roller, to at least 93% of maximum dry density. The roadbed will then be finished to ensure that after stabilization there will be sufficient material to achieve final grade and cross slope meeting plan requirements. All deficient areas shall be corrected.

MOISTURE CONTENT AFTER INITIAL COMPACTION AND PRIOR TO SPREADING CEMENT

QUALITY CONTROL

The contractor shall determine the moisture content of the base prior to spreading cement. This moisture content may be used to plan construction activities to complete preparation of base material to receive cement. If there is a delay between the moisture content test and cement placement, additional moisture tests may be required to determine if the moisture content of the prepared base has been altered during the delay. The moisture content of the base material prior to spreading cement must be within a range that will ensure that the material will be within the □2% of optimum at compaction after mixing with cement. When the moisture content is greater than 2% above optimum, the base material may be too wet for spreading cement. The moisture content determined during density testing may not reflect the moisture content throughout the base course; therefore, additional moisture tests may be required to ensure that the base material is within the □2% tolerance of optimum.

STABILIZATION

WEATHER LIMITATIONS

Both contractor and department personnel are to be constantly aware of predicted weather conditions. Cement shall not be placed in preparation for mixing when the base is frozen, ambient temperature is below 35^{O}F (1.7^{O}C), temperature from the nearest weather forecasting station is to be 25^{0}F or less within the 24 hour period following placement, or during rain. Ambient air temperature shall be determined in the area of operations, out of direct sunlight, and away from artificial heat. If the base is too wet to effectively get the base uniformly within the □2% moisture content tolerance, no cement shall be placed. The project engineer will determine if the base is too wet to begin placement. It is imperative that operations be scheduled and monitored to ensure that these conditions do not occur during production. When inclement weather is predicted, the contractor is to monitor operations to prevent operations from being interrupted by weather conditions. If the base material cannot be maintained within the specification range of optimum moisture content due to weather conditions, placement of cement will not be permitted. Additionally, the contractor should not produce mixture during borderline weather conditions that may have a detrimental effect on construction operations or materials. When scheduling operations, the contractor and the

department's representative are to consider such factors as speed of cement placement, mixing time, compaction and finishing, current temperature and weather, past weather conditions (e.g., standing water, wet subgrade, excessively dry conditions, etc.), predicted weather changes (e.g., approaching weather fronts, winds, temperature changes, rain, changes in humidity, etc.).

If despite precautions for inclement weather, rain falls on freshly spread cement prior to the completion of compaction, the inspector will document the affected area. If a reduction in percent cement occurs, the area shall be restabilized in accordance with the specifications at no direct pay. Immediately after completion of compaction, new moisture content tests will be taken after rain to determine if the material is within the □2% specification tolerance of optimum. After 7 days the area will be cored and tested for percent cement and strength. If the area does not meet design requirements, the area shall be restabilized in accordance with the specifications at no direct pay.

SPREADING CEMENT

Cement shall be spread from transports through an approved, calibrated, mechanically adjustable spreader box that is in good working condition. A calibrated spreader box is one that is capable of consistently spreading cement within the tolerance allowed by the specifications, when verified by application of DOTD TR 436. The spreader box shall be adjusted to provide a uniform coverage at the cement spread rate determined in accordance with DOTD TR 436. In addition to a stringline for guidance, the contractor shall lay a stringline to define the edge of cement spread on each side of the roadway or other approved edgeline control methods or as directed by the project engineer. The coverage shall be uniform for the full width of the roadway and the full length of spread for a transport. The appropriate length of spread for a transport will be determined in accordance with DOTD TR 436. If traffic displaces cement, a uniform spread shall be redeveloped prior to blending by the in-place mixer. In no case shall less than the minimum required percent cement be spread.

CEMENT SPREAD RATE AND LENGTH

QUALITY CONTROL

It shall be the responsibility of the contractor to check the spread rate and length of spread for each transport to be certain that at least the minimum cement factor is being met. The contractor is to provide these values to the project engineer for approval. No cement is to be placed until the spread rate and length of spread have been approved.

INSPECTION AND ACCEPTANCE

It will be the responsibility of the inspector to check the spread rate in accordance with the minimum frequency in the *Materials Sampling Manual*. The inspector will independently determine spread rate and length of spread. The calculations for spread rate and length of spread are to be performed and documented in accordance with DOTD TR 436.

IN-PLACE MIXING

The cement is to be mixed with the base material for the full depth and width of the course at the appropriate moisture content. No water is to be added during the first pass, which will accomplish blending and pulverization. The blend is to be uniform in terms of cement content; moisture content is to be within the □2% range of optimum. The moisture content should be on the high side of the □2% range to be sure the base is within the proper range at compaction. When water is added to the base during mixing, it shall be added through the spray bar on the in-place mixer. Water spray shall be uniform at all times; no clogged nozzles will be allowed. There shall be no overlap of water spray between passes. Spray nozzles shall be blocked if necessary. There are to be no dry areas between side-by-side passes of the in-place mixer. The cutting operation is to be slightly overlapped. Specification pulverization obtained prior to spreading cement shall be uniformly maintained throughout the mixing process.

MOISTURE CONTENT AFTER MIXING WITH CEMENT

QUALITY CONTROL

The contractor shall determine the moisture content of the individual base course section prior to spreading cement. The moisture content of the section is to be adjusted before stabilization to ensure that the material will remain within the □2% of optimum at the time of compaction. If the moisture content of the section is excessive after mixing cement and water, the base is to be aerated until the material will meet these requirements. The three-hour time limit for the completion of placement, spreading, mixing and compacting the base must be considered when planning operations. Specifications require that compaction be completed within three hours of initial soil-cement contact; therefore, the time for aeration is limited. When the contractor must adjust the moisture content of the material to bring it into specification tolerances, the contractor shall back up operations and adjust the moisture content to meet specifications in deficient areas. It shall be the responsibility of the contractor to conduct additional moisture tests to determine the effectiveness of aeration. If the moisture content is too low, water shall be added through the in-place mixer to bring the base within the □2% tolerance. When there is a question about moisture content, DOTD TR 403 will be used as the standard.

THICKNESS AND WIDTH

QUALITY CONTROL

The contractor is to check the thickness and width of the base. It is recommended that the contractor check the depth of cut immediately behind the in-place mixer to ensure that it is correct. Too deep or too shallow a cut may cause the area to be rejected by the department.

INSPECTION AND ACCEPTANCE

The project engineer will inspect the base in accordance with the frequency requirements of the *Materials Sampling Manual* and will monitor the contractor's quality control measurements.

COMPACTING AND FINISHING

QUALITY CONTOL

The contractor shall use a conventional sheepsfoot roller or a self-propelled tamping foot compactor-type roller for initial compaction of the blended base material and cement. The prongs of the roller are to reach the full depth of the base for complete and uniform compaction. Compaction shall be performed efficiently and quickly, beginning immediately after in-place mixing of material with cement, with a minimum of drying of the base. The base shall remain within the □2% range of optimum moisture content during compaction and finishing. Final compaction shall be with a pneumatic roller.

The contractor shall check the moisture content of the material being compacted in each section at the time of compaction in accordance with DOTD TR 403. If the material is not within the specification tolerance, immediate correction will be required. Deficiencies shall be corrected when they can be completed within the same three-hour time limit. The contractor will be required to modify the QC program to ensure that additional failing tests do not occur. **If the material does not remain within the 2% of optimum moisture content, the density of the material will be determined for acceptance by comparison against maximum dry density determined in accordance with TR 415 or DOTD TR 418.** If the moisture content of the material deviates from optimum and failing density occurs when tested for acceptance, the contractor may be required to remove and replace the entire section or payment must be made at an adjusted price. The deviation of moisture content from optimum can also cause nonuniform areas (wet spots, yielding areas, etc.). The contractor will be required to correct these areas.

Compaction and finishing of the in-place stabilized base shall be completed within three hours of initial placement of cement. **The time that the cement comes in contact with the base material is the beginning point of the three-hour time limit.** It is the contractor's responsibility when establishing the QC program for the project to ensure that the sequence of construction can be accomplished and completed without exceeding this three-hour limitation. If the three-hour limitation is exceeded, the contractor will be required to make immediate adjustment to operations to prevent a recurrence. **Material that was not compacted and finished within three hours of initial cement placement will not be accepted. The contractor will be required to reconstruct the entire section.** When reconstruction is required, the district laboratory will provide a new cement content.

Once the three-hour time limit has expired, only tight blading will be permitted. The purpose of tight blading is to remove only loose uncompacted material from the surface of the base. Blading to bring an overthick or overwide base into specification tolerances will not be permitted. The removal of excessive material can cause the base to be underthick. Blading is to leave the base at a uniform grade and cross slope, with a tight-knit surface having no undulations. When grade has been established, achieving uniform grade at station markers with varying elevation between stations will not be accepted. The contractor will be required to correct this type of deficiency to produce a surface at uniform elevation at no direct pay.

The base course contractor is to be aware of the type of surfacing to be placed over the base. The base shall be finished so that variances in cross slope or longitudinal grade shall not be reflected in the surface of the surface course.

PROTECTION AND CURING

Immediately after finishing the base course, an asphalt curing membrane shall be sprayed over the finished section in accordance with Specification Section 506. The asphaltic curing membrane is to be placed on the same day the area is stabilized. When the base is wet cured and with the approval of the project engineer, the last two sections may be tight bladed and covered with curing membrane the following morning if the base is kept uniformly moist. This membrane shall completely cover the finished base course and complete coverage shall be maintained until the placement of the next course. Unless required by the department, no traffic, including construction traffic, shall be allowed on the base course for at least 72 hours after the application of the curing membrane. When traffic, including construction traffic, is allowed on the base course, and the surfacing is to be asphaltic concrete, the first lift of surfacing shall be placed within thirty calendar days of the completion of the base course section. If there is any delay between sealing the base and applying the curing membrane, the surface shall be kept uniformly moist by the application of water by fog spray.

MAINTENANCE OF THE BASE COURSE

The contractor shall be responsible for the completed base course. It shall be protected from damage from public or construction traffic or construction operations. The contractor shall maintain the base course in the condition in which it was accepted until the next lift is placed. The contractor shall make any necessary repairs, including patching or reconstruction, and reapplication of the protective coating. For the first 72 hours after the completion of the base course, unless required by the department, no traffic, including construction traffic, shall be allowed on the base course. This period is designed to allow the base course to develop adequate strength to support axle loads without structural damage. All correction of deficiencies shall be completed at least 24 hours prior to the placement of the subsequent lift over the base course. The contractor shall correct raveled areas immediately and take steps to ensure that additional raveling will not occur.

INSPECTION AND ACCEPTANCE

It is the responsibility of the department to inspect the project for conformance to specifications and good construction techniques. The department will observe the contractor's QC program as part of the inspection process. **When deficiencies in the QC program are found, the inspector will require immediate correction or construction operations will be discontinued**. The department will independently inspect the project and perform tests as needed to ensure that the final project meets specifications.

Project personnel will determine the percent pulverization of the base material prior to the spreading of cement in accordance with DOTD TR 431. The percent pulverization must be at least 60% passing the No. 4 sieve uniformly throughout the project. Project personnel will determine the percent compaction of the material during initial compaction in accordance with DOTD TR 401. The percent compaction must be at least 93% before the contractor is allowed to proceed with stabilization. Maximum dry density may be determined in accordance with either DOTD TR 415 or DOTD TR 418.
The 93% density requirement is very important in locating any areas under the material to be stabilized that are subject to cause density problems during compaction and finishing of the base. Materials that are soft, even at depth, have high moisture contents, high organic contents, or objects such as logs or stumps may cause the soil to be unstable. If 93% is unobtainable these conditions can be located and repaired prior to spreading cement. These density tests provide insurance that construction effort and cement are not wasted.

When the contractor supplies material for grade adjustment, samples for determining cement factor will be obtained after the hauled in materials are thoroughly pulverized and blended with the in-place materials across the roadway for the full depth to be stabilized

Prior to allowing the contractor to spread cement, project personnel will inspect the section for cross slope, grade, thickness, width, and uniformity of material. The contractor will be required to correct any soft spots prior to being allowed to spread cement. Deviations in dimensional tolerances and alignment problems shall also be corrected prior to the spreading of cement.

Project personnel will inspect the mixing process for uniformity, continued adequate pulverization, uniform coating of soil particles with cement, and uniform moisture without wet or dry streaks or puddles.

The project engineer will approve the length of spread and verify spread rate determined by the contractor. The spread rate must result in at least the minimum cement content specified by the district laboratory being applied. During cement placement, project personnel will check the spread rate in accordance with the frequency in the *Materials Sampling Manual* and the length of spread several times per day. The length of spread is also to be checked whenever the spread rate is not correct. If the spread rate is not correct or is not uniform, the inspector is to require the contractor to make immediate corrections to ensure that the minimum cement factor is uniformly met. Continuous placement of cement is not to be allowed until it has been established by the department that the minimum cement factor is being uniformly met.
Project personnel will determine the moisture content of the base being compacted after mixing with cement at least twice each day in accordance with DOTD TR 403. If the material is not within the specification tolerance, immediate correction will be required.

The contractor will be required to modify the QC program to ensure that additional failing acceptance tests do not occur. The department will evaluate the section that is not within □2% of optimum moisture.

Project personnel will determine the density of the completed base course in accordance with DOTD TR 401 once per each 1000 linear feet of roadway and once per each 2000 linear feet of shoulder. If the moisture content is within the □2% of optimum tolerance, maximum dry density and optimum moisture may be determined in accordance with DOTD TR 415. Density testing is to be performed at the same location where the sample was taken for the determination of optimum moisture and maximum dry density to ensure that the material is representative of the material tested.

Project personnel will randomly check the cross slope with a 10-foot metal, static straightedge. Cross slope must meet specification requirements. If the cross slope does not meet specification requirements, the contractor will be required to make corrections and to adjust the operation to ensure that subsequent sections do not fail to meet specifications. The area that is out of tolerance is to be isolated up and down station and correction required.

DOTD TR 602 MEASUREMENTS

Project personnel will perform thickness and width measurements in accordance with DOTD TR 602 to verify the contractor's QC prior to requesting acceptance measurements by the district laboratory. The district laboratory will determine thickness and width for final acceptance in accordance with DOTD TR 602. The district laboratory engineer will notify the project engineer of areas that do not meet specification requirements. Deficient areas must be corrected for the entire width of the roadway. To isolate an area, move up and down station five feet and retest. Then, retest at 25-foot intervals until the limits of deviation from specifications are found. The project engineer will require the contractor to correct deficient areas prior to final acceptance. Additional thickness and width measurements will be performed on corrected areas by the district laboratory prior to final acceptance.

VISUAL INSPECTION

Deficiencies identified by visual inspection, such as inadequate pulverization, laminations, dimensional deficiencies, soft areas, etc., shall be corrected before the section will be accepted. Project personnel will inspect the entire completed base regularly and daily when the base is open to traffic for damage to the curing membrane or to the base. The contractor is to repair deficiencies that develop prior to the placement of the next course at no direct pay.

QUALITY ASSURANCE DOCUMENTATION

When in-place mixing is used to produce a stabilized base course, the documentation requirements for Class II Base Course Specification Section 302 will apply.

When asphaltic concrete base course is used, the documentation requirements for Part V of the specifications will apply.

When Portland cement concrete is used for base course, the documentation requirements for Part IX of the specifications will apply.