

303 – CEMENT OR FLY ASH TREATED SUBGRADE

SECTION 303

CEMENT OR FLY ASH TREATED SUBGRADE

303.1 DESCRIPTION

Mix subgrade soil, cement or fly ash and water to construct a uniform treated subgrade as shown in the Contract Documents.

BID ITEMS

Cement
Fly Ash
Manipulation for Treated Subgrade (*)
Water (Treated Subgrade) (Set Price)
*Cement or Fly Ash

UNITS

Ton
Ton
Square Yard
M Gallon

303.2 MATERIALS

Provide materials that comply with the applicable requirements.

Emulsified Asphalt (SS-1 or CSS-1)	DIVISION 1200
Medium Cure Cutback Asphalt (MC-250)	DIVISION 1200
Concrete Admixtures & Curing Materials	DIVISION 1400
Portland Cement & Blended Hydraulic Cement	DIVISION 2000
Fly Ash	DIVISION 2000
Water for Treated Subgrade	DIVISION 2400

303.3 CONSTRUCTION REQUIREMENTS

a. Subgrade Preparation. Prepare the subgrade to the lines and grades shown in the Contract Documents.

Scarify the prepared subgrade to the depth of treatment designated in the Contract Document prior to applying the cement or fly-ash. Perform the scarification with positive depth control equipment. Do not use a plow or disc for the scarification. Based on performance, the Engineer may approve the use of an automatic grade control motor grader scarifier. Bring the scarified subgrade to within the specified moisture content of the previous moisture range before adding cement or fly ash.

b. Application. On projects having more than 20,000 square yards of manipulation, apply cement or fly ash using a controlled application system. This system may be pressurized or mechanical in nature, utilizing vane or augers feeding cement or fly ash through a funnel or hood at a controlled rate.

On projects having less than 20,000 square yards of manipulation, and in irregular areas, submit a plan to the Engineer for approval that includes equipment and procedures that address subgrade preparation and application process to spread the cement or fly ash at the specified rate.

On projects having more than 20,000 square yards of manipulation, and consisting of multi-phased construction, contact the District Office for approval to waive the use of the controlled application system. Consideration will be based on the Contractors proposed alternate method of applying the cement or fly ash, the square yards of manipulation in each phase, and the size of individual areas within each phase.

Do not apply the cement or fly ash when conditions are such that the material is lost due to the wind. Do not use cement or fly ash that was not properly handled and not stored in weatherproof containers.

The Engineer will check the application rate of cement or fly ash by having the Contractor blade a flat area in the path of the cement or fly ash application, place a planar surface with a minimum surface area of 1 square foot (e.g. a straight-sided pan) and of sufficient height to contain the admixture on the prepared area and allow the train to pass over the surface. Weigh the test surface before and after the cement or fly ash application and calculate the application rate. Other methods to check the application rate may be used.

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c. Mixing. Mix the scarified subgrade and cement or fly ash. Continue mixing and adding water until a homogeneous, friable mixture that complies with **TABLE 303-1** is obtained. Use equipment with a recycling or mixing drum, and with an automatic water proportioning system to pulverize the subgrade to the specified depth.

Do not perform treated subgrade operations when the ambient air temperature is below 40°F, or the soil is frozen.

TABLE 303-1: PERCENT RETAINED - SQUARE MESH SIEVES*	
1½-inch	½-inch
0	50 maximum

*The Engineer will determine the percent retained on the specified sieves according to KT-42.

Complete the mixing within 30 minutes of adding the cement or fly ash to the pulverized subgrade.

The uniform moisture content of the mixture immediately before being compacted shall be ±3 percentage points of the optimum moisture content. If the moisture content of the mixture exceeds the specified moisture content, add additional cement or fly ash to lower the moisture content. Spray the mixture with water, as necessary, to maintain the specified moisture content during the compaction operations.

d. Compaction. For the initial compaction of the mixture, use a vibratory roller having a minimum operating weight of 12 tons, with a minimum centrifugal force of 24 tons. Use a rubber-tired or smooth-wheeled roller to complete the compaction of the surface. When the thickness is greater than 6 inches, compact multiple lifts of equal thickness with a maximum lift thickness of 6 inches. Compact the treated subgrade to a minimum of 95% of the combined materials dry density. Complete the compaction operations within 2 hours of incorporating the cement or fly ash into the subgrade. If any of these requirements are not satisfied, reprocess, recompact and refinish the deficient areas.

e. Trimming. After compaction of the treated subgrade, trim and recompact the treated subgrade to the specified lines and grades. On projects having more than 20,000 square yards of manipulation, use automatic grade controlled equipment to trim the subgrade. In irregular areas, trim the subgrade by wetting, blading and rolling.

(1) Option 1. After compaction is complete, trim and recompact the subgrade within 2 ½ hours of the time the water and cementing agent is added to the subgrade. Recompact the trimmed surface of the treated subgrade with a smooth-wheel or a pneumatic-tire roller. Lightly scarify and blade the surface to eliminate equipment imprints while performing final rolling.

(2) Option 2. After compaction is complete, trim the treated subgrade after 2 ½ hours of the time the water and cementing agent is added to the subgrade. After curing according to **subsection 303.3f.**, recompact the trimmed surface of the treated subgrade with a smooth-wheel or a pneumatic-tire roller. Remove loose trimmed material from any low spots and fill with the next course of material at the Contractor’s expense.

f. Curing. Protect the finished subgrade against drying for 7 days after completion (Option 1-after compaction, Option 2-after trimming), or until the subgrade is covered with a base or surfacing if covered before 7 days. Protect the finished subgrade from drying by spraying with water to maintain a continuous moist condition. The Contractor may apply an asphalt prime coat instead of keeping the finished surface moist with water during the curing period. If this option is chosen, apply SS-1, CSS-1 or MC-250 at the rate of 0.22 gallons per square yard to achieve a minimum of 0.13 gallons per square yard residue. Multiple light applications may be necessary to obtain the specified rate of application without runoff.

g. Construction Traffic. Avoid placing construction loads or operating equipment until the treated subgrade has cured and can withstand the loads without damaging the subgrade. If the subgrade deforms under the construction loads and cannot return back to its original condition, or if it deflects more than 1 inch, allow the subgrade additional curing time before operating equipment on the subgrade. Repair any damaged subgrade.

h. Succeeding Course. Cover the finished treated subgrade with the specified lift of HMA or aggregate base before it is subjected to freezing. If the finished treated subgrade is not covered with a lift of HMA or aggregate base and is subjected to freezing, the Engineer will determine when the subgrade needs to be reworked. KDOT will not pay for the replacement and refinishing of the treated subgrade if the material loses the required stability, density or finish before the next course is placed.

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303.4 MEASUREMENT AND PAYMENT

The Engineer will measure cement or fly ash used in the mixture by the ton. The Engineer will not measure additional cement or fly ash added to the mixture to reduce the moisture content.

The Engineer will measure the manipulation for treated subgrade by the square yard.

The Engineer will measure water used for cement treated subgrade by the M Gallon using calibrated tanks or water meters. The Engineer will measure water used for preparation of the subgrade, mixing subgrade and cement or fly ash, and the 7-day protection from drying period. The Engineer will not measure water used for dust control, water wasted through the Contractor's negligence or water in excess of the quantity required for mixing and compacting the cement subgrade.

If the Contractor opts to use asphalt material to cure the treated subgrade, the Engineer will not measure the asphalt material for payment.

Payment for "Cement", "Fly Ash" and "Manipulation for Treated Subgrade" at the contract unit prices and "Water (Treated Subgrade) (Set Price)" at the contract set unit price is full compensation for the specified work.