SECTION 301

SUBGRADE MODIFICATION

301.1 DESCRIPTION

Modify the subgrade using the materials and methods shown in the Contract Documents.
When the Contract Documents specify, realign the shoulders and clean and reshape the ditches.

BID ITEMS	UNITS
Manipulation for Aggregate Subgrade Modification (*)(**)	Square Yard
Manipulation for In-Place Material Subgrade Modification (**)	Square Yard
Aggregate for Subgrade Modification (*)	Cubic Yard
Calcium Chloride	Ton
Cement	Ton
Fly Ash	Ton
Water (Subgrade Modification) (Set Price)	M Gallon

* Type, typically Rock, Silt or Millings
**Calcium Chloride, Cement or Fly Ash

301.2 MATERIALS

Provide materials that comply with the applicable requirements.

Aggregate for Subgrade Modification…. **DIVISION 1100**
Emulsified Asphalt (SS-1H or CSS-1H) **DIVISION 1200**
Medium Cure Cutback Asphalt (MC-250) **DIVISION 1200**
Calcium Chloride **DIVISION 1700**
Portland Cement / Blended Hydraulic Cement **DIVISION 2000**
Fly Ash **DIVISION 2000**
Water for Subgrade Modification **DIVISION 2400**
Admixtures Retarders **DIVISION 1400**

Provide silt for subgrade modification that complies with **TABLE 301-1**.

TABLE 301-1: SILT FOR SUBGRADE MODIFICATION

% Retained - Square Mesh Sieve		P.I. (maximum)
No. 4	No. 200	
0-5	0-50	12

In-place material may be existing rock surfacing or milled pavement. When pavement millings are provided, the maximum size shall be 1½ inches.

301.3 CONSTRUCTION REQUIREMENTS

a. Aggregate Modified Subgrade.

(1) General. Perform subgrade modification to the depth shown in the Contract Documents. Spread, mix and compact the materials as specified in the Contract Documents. Do not perform subgrade modification on frozen subgrade. Do not incorporate calcium chloride, cement or fly ash if air temperatures are expected below 32ºF during the first 24 hours after compaction.

(2) Subgrade preparation. Scarify the existing roadbed to the depth and width shown in the Contract Documents to provide the binder material. When the Contract Documents specify, provide binder material from the shoulder slopes, ditches and back slopes.

(3) Aggregate. Pulverize and mix the specified binder material and aggregate for subgrade modification until no more than 5% of the material is retained on a 2 inch sieve.

If silt is the specified aggregate, a maximum of 20% by weight, minus No. 200 sieve material, is allowed in the combined mixture.

(4) Calcium Chloride, Cement or Fly Ash (additive) Modified Subgrade. When an additive is specified, use equipment with a recycling or mixing drum and with an automatic water proportioning system to incorporate the additive and water into the subgrade to the specified depth.

The Engineer will conduct laboratory tests on site materials and specified additive content to establish the optimum moisture content.

Before incorporating the additive in the subgrade, blade the roadway to allow uniform distribution of the additive. Distribute the additive in a manner that minimizes loss of the material. Do not apply the additive if conditions are such that the material is lost due to the wind or rain. Do not use an additive that was not properly handled and stored in weatherproof containers. When specified, apply a uniform coverage of a retarder to the additive, immediately following the spreading of the additive. If the moisture content of the pulverized subgrade will accommodate additional moisture, the retarder may be diluted with water to obtain a uniform application.

Mix the subgrade, additive and water. Continue mixing until a homogeneous, friable mixture that complies with **TABLE 301-2** is obtained.

TABLE 301-2: CALCIUM CHLORIDE, CEMENT OR FLY ASH MODIFIED SUBGRADE	
% Retained - Square Mesh Sieves	
1 ½ inch	**½ inch**
0	50, maximum

Complete the mixing within 30 minutes of adding the water to the additive and the subgrade.

The uniform moisture content of the mixture immediately before being compacted shall be within ±3% of the optimum moisture content. If the moisture content of the mixture exceeds the optimum moisture content, add additional cement or fly ash to lower the moisture content. Distribute the mixture as needed to maintain the optimum moisture content during the compaction operations.

(5) Compaction. Use a vibratory roller having a minimum operating weight of 12 tons, with a minimum centrifugal force of 24 tons for the initial compaction of the mixture. Use a rubber-tired or smooth-wheeled roller to complete the compaction of the surface. Compact the modified subgrade to a minimum of 95% of the combined materials dry density, as determined in **DIVISION 2500**. The compacted subgrade shall have uniform density and remain stable under construction traffic. Complete the compaction operations within 2 hours of incorporating the additive into the subgrade. If any of these requirements are not satisfied, reprocess, recompact and refinish the deficient areas.

(6) Trimming. After compacting the modified subgrade, trim the surface 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 compacted modified subgrade. In irregular areas, trim the subgrade by wetting, blading and rolling. Compact the trimmed surface of the modified subgrade with a smooth-wheel or a pneumatic-tire roller. If necessary during the final rolling, lightly scarify and blade the surface to eliminate equipment imprints.

Clean and dress the shoulders and shoulder slopes. Remove all excess material and debris.

(7) Curing and Protection. Protect the finished subgrade against drying for 7 days after completion, or until the subgrade is covered with 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. If this option is chosen, apply SS-1H, CSS-1H 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 run-off.

b. Subgrade Modified with In-Place Materials. Pulverize or process the in-place material as specified in the Contract Documents.

Construct the subgrade modified with in-place materials according to **subsection 301.3a.**, using the specified in-place material for the aggregate.

301.4 MEASUREMENT AND PAYMENT

The Engineer will measure aggregate for subgrade modification and silt for subgrade modification by the cubic yard by vehicle measurement at the place of unloading. If weight is converted to cubic yards for payment, the moisture in the aggregate is not measured for payment.

The Engineer will measure water used for modified subgrade by the M Gallon using calibrated tanks or water meters. The Engineer will measure water used for subgrade preparation and mixing, compacting and curing the modified subgrade. 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 modified subgrade.

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

The Engineer will measure calcium chloride, cement and fly ash by the ton. The Engineer will not measure additional cement or fly ash added to the mixture to reduce moisture content.

The Engineer will measure the various types of subgrade manipulation by the square yard.

Payment for "Manipulation for Aggregate Subgrade Modification", "Manipulation for In-Place Material Subgrade Modification", "Aggregate for Subgrade Modification", "Calcium Chloride", "Cement" and "Fly Ash" at the contract unit prices and "Water (Subgrade Modification) (Set Price)" at the contract set unit price is full compensation for the specified work.