

311.05. METHOD OF MEASUREMENT.

Processing existing base and surface will be measured by the station or fraction thereof measured along the center line of the roadbed.

311.06. BASIS OF PAYMENT.

Accepted quantities for processing existing base and surface, measured as provided above, will be paid for at the contract unit price as follows:

- (A) PROCESSING EXISTING BASE AND SURFACE, METHOD A STATION
- (B) PROCESSING EXISTING BASE AND SURFACE, METHOD B STATION
- (C) PROCESSING EXISTING BASE AND SURFACE, METHOD C STATION
- (D) PROCESSING EXISTING BASE AND SURFACE, METHOD D STATION

Such payment shall be full compensation for furnishing all equipment, tools, labor, and incidentals necessary to complete the work as specified.

SECTION 317 FLY ASH MODIFIED SUBGRADE

317.01. DESCRIPTION.

This work shall consist of constructing one or more courses of a mixture of soil, fly ash, and water, in accordance with these Specifications and in reasonably close conformity with the lines, grades, and typical cross sections shown on the Plans or established by the Engineer.

317.02. MATERIALS.

Materials shall meet the requirements specified in the following Sections and Subsections of Section 700 - Materials:

Fly Ash	702
Water	701.04

317.03. EQUIPMENT.

- (a) **General.** All equipment necessary for construction of fly ash modified subgrade shall be furnished in accordance with the requirements of Subsection 108.06 and the following:
- (b) **Traveling Plants.** Traveling plants used for soil pulverization and mixing shall be approved in accordance with the requirements of Subsection 301.03(b).
- (c) **Compactors.** Equipment for compaction shall meet the requirements of Subsection 301.03(c).
- (d) **Sprinklers.** Sprinklers shall meet the requirements of Subsection 301.03(d).

317.04. CONSTRUCTION METHODS.

- (a) **General.** It is the primary requirement of these Specifications to secure a completed course or courses of subgrade material containing a fly ash mixture of uniform density and moisture content; it should be free from loose or segregated areas, and well bound for its full depth with

a smooth surface suitable for placing subsequent courses. It shall be the responsibility of the Contractor to regulate the sequence of this work, to use the prescribed amount of fly ash, and to maintain the work as necessary to meet the above requirements.

- (b) **Weather Limitations.** Do not perform fly ash mixing operations when the subgrade is frozen or when the air temperature in the shade is less than 40°F (4°C). Under any weather conditions, protect the quality of the fly-ash-modified subgrade mixture.
- (c) **Preparation of Existing Roadbed.** Prior to the application of fly ash, compact and shape the roadbed to reasonably close conformity with the typical sections, lines, and grades as shown on the Plans or established by the Engineer.

Roll the subgrade, and correct any soft areas that this rolling may reveal.

- (d) **Scarifying and Loosening.** Scarifying and loosening may be required prior to the application of fly ash to achieve the desired results as determined by the Engineer. Take precautions to avoid forming furrows of loosened material below the depth specified for the bottom of the fly-ash-modified subgrade. Except by special permission from the Engineer, the length of roadway scarified and loosened at any time shall not exceed the length in which mixing and compaction can be completed in two calendar days.

In subgrade extents designated on the Plans or by the Engineer as having excessive rock—the dimensions or quantities of which 25 percent or more are greater than 2 1/2 inches (63 mm) in size, making compliance with these Specifications impractical—the Engineer may waive certain portions of the work as described below. The Engineer may require exploratory scarifying by the Contractor before designation of extents for which full compliance of these Specifications is waived.

- (e) **Application of Fly Ash.** The proportion of fly ash indicated on the Plans is approximate. Apply fly ash at the rate prescribed by the Engineer based on tests of the subgrade soil. Provide equipment necessary for proper control of the application rate of fly ash. Where tests indicate a significant change in the subgrade soil, the Engineer will establish a new rate as deemed necessary for the section of road affected, and at the time of placing and spreading the fly ash will advise the Contractor of the final application rate.

NOTE: Fly ash shall not be applied by the slurry method; fly ash shall not be placed on wet subgrade or otherwise allowed to become wet during application; and fly ash shall not be applied when wind conditions are such that blowing fly ash becomes objectionable to traffic or adjacent property owners.

Use dry methods of application for placement of the fly ash onto the subgrade. Equipment for spreading shall be approved types which demonstrate the ability to distribute fly ash uniformly.

Fly ash shall be placed only on that area of roadway where mixing, compaction, and finishing can be completed in the same day.

NOTE: During the interval of time between application and completion of the first mixing operations, fly ash that has been exposed to weather conditions resulting in wetting or excessive loss by blowing will not be accepted for payment, and fly ash unacceptable as the result of wetting shall be removed from the roadway.

(f) **Mixing.**

(1) **General.** Mixing of the fly ash with the subgrade soil shall follow application and spreading as a continuous construction operation. Work areas for mixing shall not exceed 5,000 square yards (4000 m²) unless otherwise authorized by the Engineer. The mixing procedure shall be as hereinafter described:

1.1 *First Mixing.* At the time of first mixing, the moisture content of the subgrade soil shall not exceed 80 percent of optimum as determined by AASHTO T 99. Mix the soil and fly ash until a uniform mixture is obtained in which all clods and non-aggregate lumps are reduced to a maximum of 2 1/2 inches (63 mm) diameter size.

NOTE: The addition of water will not be permitted during the first mixing, which shall begin no later than four hours after application of the fly ash.

When deemed necessary by the Engineer, rescarify any portion of the work area and add fly ash as needed to ensure adequate soil modification.

Thoroughly mix the fly ash and soil prior to the beginning of final mixing operations.

1.2 *Final Mixing.* After the dry soil and fly ash have been satisfactorily mixed, add water to initiate soil-fly ash reaction. The method of mixing shall be an approved procedure using a traveling mixing plant which demonstrates uniform dispersion of fly ash and water throughout the soil materials. The quantity of water necessary for the final mixing operations will vary with the nature of the materials—normally 2 to 5 percentage points above the optimum moisture content of the compacted modified soil. In any case, add sufficient water in the final mixing process to insure chemical action between the fly ash and soil.

Reduce all clods in size by mixing until the soil-fly ash mixture meets the following size requirements when tested with laboratory sieves:

SIEVE SIZE	PERCENT PASSING
1 1/2 inch (37.5 mm)	100
3/4 inch (19.0 mm)	50 minimum

(2) **Lime Alternative.** Alternately, specific extents of the subgrade may require a pretreatment with lime—at a depth and rate of application as shown on the plans or as directed by the Engineer—to lower the plasticity index of the subgrade soils (to below 20) prior to the application of fly ash.

Blend the lime thoroughly into the soil with a pulvi-mixer at the proper moisture content—tight bladed, but not compacted. Sprinkle the lime with water daily during the mellowing stage (typically a minimum of four days) or a period of time as determined by the Engineer; this is needed to allow the lime to chemically react with the clay soils.

Thereafter, the mixing of subgrade soils with fly ash, compaction, finishing and curing shall be as described in (g) and (h) below.

(g) **Compaction.** Perform compaction of the soil-fly ash mixture immediately after final mixing, so that the compaction operation is a continuation of the final mixing operation. The target density shall be determined in the field by moisture density tests on representative samples of the soil-fly ash mixture obtained from the roadway when compaction is started. The test method for

the target density will be as specified in Subsection 202.02(b)(2), modified to provide one compacted specimen of the soil-fly ash mixture as obtained from the roadway; separate portions of the sample will be used for additional specimens with the moisture reduced or increased.

Compact the soil-fly ash mixture without delay and before any appreciable loss of mixing moisture occurs. Perform mixing and compaction operations so that the mixture will be compacted within plus or minus 2 percentage points of optimum moisture content. However, during the course of construction, changes or adjustments in the specified moisture requirements to meet field conditions may be authorized by the Engineer.

Continue compaction until the entire depth of the mixture is uniformly compacted to not less than 95 percent of target density. Field density will be determined in accordance with Subsection of 202.02(b)(2). The rate of operation and the number of rollers shall be sufficient to uniformly compact the section of roadway being processed within two hours of the final mixing.

Sprinkle and roll the material, and immediately correct any/all irregularities, depressions, or weak spots which develop by scarifying the areas affected, adding or removing material as required, and reshaping and recompacting by sprinkling and rolling.

In addition to complying with the requirements specified for density, uniformly compact the full depth of the material shown on the Plans to the extent necessary for it to remain firm and stable under construction equipment. After each section is completed, density tests, as necessary, will be made by the Engineer for acceptance. Throughout this entire operation maintain the shape of the course; upon completion, make the surface smooth and in conformity with the typical section shown on the Plans and to the established lines and grades.

NOTE: Should the material, due to any reason or cause, lose the required stability, density, or finish before the next course is placed or the work is accepted, it shall be replaced and refinished at the sole expense of the Contractor.

In areas designated by the Engineer as excessive rock areas, it is the intent that compaction be in substantial compliance with these Specifications. However, it is recognized that the soil-fly ash mixture may not be uniform and some variation is to be expected in both the target density and optimum moisture, depending on the fly ash content of a given sample. In the event the in-place density tests are not practical because of rock in the soil-fly ash mixture, the Engineer may waive the density and moisture content requirements and approve compacting by visual observation in lieu of such tests.

- (h) **Finishing and Curing.** After the final layer of the fly-ash-modified subgrade has been compacted, bring it within reasonable compliance to the lines, grades, and typical sections. Then, finish the completed section with a suitable roller sufficiently light to prevent hair cracking. The modified material shall be maintained at a moisture content satisfactory for proper curing by sprinkling or until a prime, seal, or succeeding course is placed, whichever occurs first.
- (i) **Surface Tolerance.** The finished surface tolerance shall be in conformity with Section 301.

317.05. METHOD OF MEASUREMENT.

Fly ash will be measured by the ton (metric ton).

Fly ash modified subgrade will be measured by the square yards (square meters) of subgrade modification completed in place.

Lime will be measured by the ton (metric ton).

Scarifying, mixing, and blading of the subgrade with lime pretreatment will be measured by the square yards (square meters) of subgrade modification completed in place.

Prime coat will be measured and paid for in accordance with Section 408.

Water will *not* be measured for payment.

317.06. BASIS OF PAYMENT.

Accepted quantities for fly-ash-modified subgrade, measured as provided above, will be paid for at the contract unit price as follows:

- (A) FLY ASH..... TON (METRIC TON)
- (B) SUBGRADE MODIFICATION SQUARE YARD (SQUARE METER)
- (C) LIME TON (METRIC TON)
- (D) SCARIFYING, MIXING BLADE OF SUBGRADE
WITH LIME TREATMENT SQUARE YARD (SQUARE METER)

Such payment shall be full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.

**SECTION 31
ECONOCRETE BASE**

318.01. DESCRIPTION.

The work covered by this Section consists of the construction of an Econocrete Base in accordance with these Specifications and with the lines, grades, and dimensions shown on the Plans.

318.02. MATERIALS.

- (a) **General.** All materials shall meet the requirements specified in the following Subsections of Section 700 of the Standard Specifications for Highway Construction shown below:

Aggregate	701.15
Portland Cement	701.02
Water	701.04
Air Entraining Agent	701.03
Fly Ash	702
Chemical Admixtures	701.03
Curing Agents	701.07(d)

- (b) **Mix Design and Proportioning.** Design the mix proportions for the econocrete base, basing them on the absolute volume method for a cubic yard (cubic meter). At least 40 days prior to placement of the Econocrete Base, submit the design mix to the Engineer for approval. The design shall identify the source of materials proposed for use, the proportions of the materials,