SPECIAL SPECIFICATION

2043

Fly Ash Treatment of Materials

1. **Description.** This Item applies to fly ash (FA) treatment of embankment, subgrade or reworked base material and shall be constructed as specified herein and in conformity with the typical sections, lines and grades as shown on the plans or as established by the Engineer.

2. **Types of Work.** Fly ash treatment of materials shall consist of one (1) of the following types of work.

   **Type A.** Fly ash treatment of in place subgrade or embankment as specified herein.

   **Type B.** Fly ash treatment of existing base material. This will include scarifying and reshaping the existing material in accordance with Item 251 (Type D) and fly ash treating the material as specified herein. This Item shall also govern the incorporation of new base material when shown on the plans.

   **Type C.** Fly ash treatment of reworked base material. This will include reworking the existing base material by scarifying, salvaging, and replacing the material in accordance with Item 251 (Type B) and fly ash treating the material on the prepared roadbed as specified herein. This Item shall also govern the incorporation of new base material when shown on the plans.

3. **Materials.**

   (1) **Fly Ash.** Fly ash may be either Type A or B and shall meet the requirements of "Departmental Materials Specification D-9-8900, Fly Ash".

   (2) **Water.** Water shall meet the material requirements of Item 204, "Sprinkling".

   (3) **Mix Design.** The percent of fly ash to be added will be as shown on the plans. The percent used will be determined by preliminary tests performed in accordance with Test Method Tex-127-E. This percent may be varied by the Engineer, if conditions warrant.

4. **Equipment.**

   (1) **General.** The machinery, tools and equipment necessary for proper prosecution of the work shall be on the project and approved by the Engineer prior to the beginning of construction operations for this Item. All machinery, tools and equipment used shall be maintained in a satisfactory working condition.

   (2) **Material Storage.** Fly ash shall be suitably stored and handled in closed, weatherproof containers until immediately before distribution on the road.
(3) **Material Weight Verification.** When Fly ash is furnished in trucks, each truck shall have the mass of fly ash certified on public scales or the Contractor shall place a set of standard platform truck scales or hopper scales at a location approved by the Engineer. Scales shall conform to the requirements of Item 520, "Weighing and Measuring Equipment".

5. **Construction Methods.**

(1) **General.** It is the primary requirement of this specification to secure a completed course of treated material containing a uniform fly ash mixture free from loose or segregated areas, of uniform density and moisture content, well bound for its full depth and with a smooth surface suitable for placing subsequent courses. It shall be the responsibility of the Contractor to regulate the sequence of his work, to process a sufficient quantity of material to provide full depth as shown on the plans, to use the proper amounts of fly ash, maintain the work and rework the courses as necessary to meet these requirements.

(2) **Preparation of Roadbed.** Before other operations are begun, the roadbed shall be graded and shaped as required to construct the fly ash treatment for materials in place in conformance with the lines, grades, thickness and typical cross section shown on the plans. When proof rolling is shown on the plans and when directed by the Engineer, it will be paid for in accordance with Item 216, "Rolling Proof". Soil or other material deemed unsuitable by the Engineer shall be removed and replaced with acceptable material using applicable bid items.

(3) **Mixing.**

(i) **Pulverization.** The raw material shall be thoroughly pulverized by road mixers or other equipment approved by the Engineer so that when all non slaking aggregates retained on the No. 4 sieve (for subgrade materials) and on the 3/4" sieve (base materials) are removed, the remainder of the material shall meet the following requirements when tested by Test Method Tex-101-E, part III:

<table>
<thead>
<tr>
<th>Material</th>
<th>Sieve Size</th>
<th>Minimum Passing Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subgrade Materials</td>
<td>1-1/4 inch sieve</td>
<td>100 Percent</td>
</tr>
<tr>
<td></td>
<td>No. 4 sieve</td>
<td>60 Percent</td>
</tr>
<tr>
<td>Base Materials</td>
<td>1-1/4 inch sieve</td>
<td>100 Percent</td>
</tr>
<tr>
<td></td>
<td>3/4 inch sieve</td>
<td>85 Percent</td>
</tr>
</tbody>
</table>

(ii) **Application.** The fly ash shall be distributed at a uniform rate and in such manner as to reduce to a minimum the scattering of fly ash by wind. Fly ash shall not be applied when wind conditions, in the opinion of the Engineer, are such that blowing fly ash becomes objectionable to adjacent property owners or dangerous to traffic. A motor grader shall not be used to spread fly ash.
(iii) **Mixing.** The material and fly ash shall be thoroughly mixed by road mixers or other equipment approved by the Engineer, and the mixing continued until, in the opinion of the Engineer, a homogeneous, friable mixture of material is obtained.

Fly ash shall be applied only to such an area that all the operations can be continuous and completed during daylight and within six (6) hours after fly ash has been added.

During the interval of time between application and mixing, fly ash that has been exposed to the open air for a period of six (6) hours or more, or has excessive loss due to washing or blowing will not be accepted for payment.

Mixing after the addition of fly ash will be accomplished dry or with a minimum of water to prevent fly ash balls.

(iv) **Temperature Requirements.** Unless otherwise approved in writing by the Engineer, the fly ash operation shall not be started when the air temperature is below 41°F and falling, but may be started when the air temperature is above 36°F and rising. The temperature will be taken in the shade and away from artificial heat. The fly ash operation shall not be started when the temperature within 24 hours is expected to be below 32°F.

(4) **Compaction.** Compaction of the mixture shall begin immediately after adding and uniformly mixing of all required stabilizing agents. Compaction shall be completed within six (6) hours after fly ash has been added or the section shall be reworked at the Contractor's expense. The material shall be aerated or sprinkled as necessary to provide the optimum moisture. Compaction shall begin at the bottom six (6) inch layer and shall continue until the entire depth of mixture is uniformly compacted by the method of compaction hereinafter specified as the "Ordinary Compaction" method or the "Density Control" method as indicated on the plans.

When the "Ordinary Compaction" method is indicated on the plans the following provisions shall apply:

The material shall be sprinkled and rolled as directed by the Engineer. All irregularities, depressions or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding or removing material as required and reshaping and recompacting by sprinkling and rolling. The surface of the course shall be maintained in a smooth condition, free from undulations and ruts, until other material is placed thereon or the work is accepted.

When the "Density Control" method of compaction is specified, the density requirement will be 97 percent unless otherwise shown on the plans.

The laboratory density testing will be as outlined in Test Method Tex-120-E, Part II or other approved methods. Roadway density testing will be as outlined in Test Method Tex-115-E or other methods approved by the Engineer. In addition to the requirements specified for density, the full depth of the material shown on the plans shall be compacted to the extent necessary to remain firm and stable under construction equipment. After each section is completed, tests as necessary will be made by the
Engineer. If the material fails to meet the density requirements, the Engineer may require it to be reworked as necessary to meet these requirements and require the Contractor to change his construction methods to obtain required density on the next section.

Throughout this entire operation the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and in conformity with the typical section shown on the plans and to the established lines and grades. 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 reworked at the sole expense of the Contractor in accordance with Subarticle 5.(6).

(5) **Reworking a Section.** When a section is reworked, the Contractor shall add 25 percent of the specified rate of fly ash. Reworking shall include loosening, road mixing as approved by the Engineer, compacting and finishing. When a section is reworked, a new optimum density will be determined from the reworked material in accordance with Test Method Tex-120-E, Part II using fly ash.

(6) **Finishing, Curing and Preparation for Surfacing.** After the final layer or course of the fly ash treated subgrade or base has been compacted, it shall be brought to the required lines and grades in accordance with the typical sections.

The resulting surface shall be thoroughly rolled with a pneumatic-tire roller and "tight bladed" by a power grader to a depth of approximately 1/4 inch removing all loosened stabilized material from the section. The surface shall then be thoroughly compacted with the pneumatic-tire roller, adding small increments of moisture as needed during rolling. If plus No. 4 aggregate is present in the mixture, one complete coverage of the section with the flat wheel roller shall be made immediately after the "tight blading" operation. When directed by the Engineer, surface finishing methods may be varied from this procedure provided a dense, uniform surface, free of surface compaction planes, is produced. The moisture content of the surface material shall be maintained at its specified optimum during all finishing operations. Surface compaction and finishing shall proceed in such a manner as to produce a smooth, closely knit surface, free of cracks, ridges or loose material conforming to the crown, grade and line shown on the plans.

If the surface is not finished the same day as the section is processed and compacted, the Contractor shall cure the section for 72 hours before completing the finishing process.

After the fly ash treated course has been finished as specified herein, the surface shall be protected against rapid drying by either of the following curing methods for a period of not less than three (3) days or until subsequent courses are placed:

(a) Maintain in a thorough and continuously moist condition by sprinkling.

(b) Apply a two (2) inch layer of material on the completed course and maintain in a moist condition, however, the finished surface shall not be damaged during this process.
After the FA treated material has been finished and cured as specified herein, the treated course shall be allowed to dry for a minimum of 48 hours before being primed.

Completed sections of FA treated material shall not be opened to roadway or construction traffic during the curing period except as directed by the Engineer.

6. **Measurement.** Fly ash will be measured by the ton, dry mass of the fly ash actually delivered on the road.

   Fly ash treatment of the subgrade, existing and/or new base will be measured by the square yard of the surface area in the completed and accepted position.

   Fly Ash treatment of materials is a plans quantity measurement and the quantity to be paid for will be that quantity shown in the proposal and on the "Estimate and Quantity" sheet of the contract plans, except as may be modified by Article 9.8. If no adjustment of quantities is required, additional measurements or calculations will not be required. No payment will be made for thickness or width exceeding that shown on the typical sections or provided on the plans.

7. **Payment.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Fly Ash" and "Fly Ash Treatment of Materials" of the type, at the proposed depth and compaction method shown on the plans, together with the following conditions:

   Payment for Fly Ash Treatment of Materials (Type A) (Type B)(Type C) shall be by the square yard.

   The unit price bid shall be full compensation for furnishing all labor, tools, equipment, materials, supplies, and incidentals necessary to complete the work, except as follows:

   When new base material is mixed with the existing base material, furnishing and delivery of the new base will be paid for as "Flexible Base (Roadway Delivery)" for the type, grade, and class shown on the plans, in accordance with Article 247.5. All manipulation including mixing, spreading, blading, shaping and finishing of the new and existing base material will not be paid for directly, but shall be considered subsidiary to this Item.

   When "Ordinary Compaction" is shown on the plans, all sprinkling and rolling, except proof rolling, performed as required will not be paid for directly, but shall be considered subsidiary to this Item, unless otherwise shown on the plans.

   When "Density Control" is shown on the plans, all sprinkling and rolling, except proof rolling, will not be paid for directly, but shall be considered subsidiary to this Item.