

ITEM 220

LIME STABILIZED SUBGRADE

- 220.1 Description. Mix and compact lime, water and subgrade in the roadway.
- 220.2 Materials. Furnish uncontaminated lime of uniform quality that meets the requirements of the plans and specifications. Notify the Engineer in writing of the proposed lime source and of any proposed change in lime source. The Contractor shall obtain verification from the Engineer that the specification requirements are met before using the lime source. The Engineer may sample and test lime or lime/subgrade mixture at any time before compaction.
- A. Lime. Furnish lime that meets the requirements of TxDOT's DMS-6350 "Lime and Lime Slurry," and DMS-6330, "Lime Sources Prequalification of Hydrated Lime and Quicklime." Use hydrated lime slurry as shown on the plans.
 - B. Water. Furnish water free of industrial wastes and other objectionable material.
 - C. Asphalt. When permitted for curing purposes, furnish asphalt or emulsion in accordance with TxDOT's Item 300, "Asphalts, Oils, and Emulsions," as shown on the plans or as directed.
 - D. Mix Design. The Engineer shall determine the target lime content and optimum moisture content in accordance with ASTM D698 or based upon prior experience with the project materials. The Contractor may propose an alternative mix design developed in accordance with ASTM D698. The Engineer shall use ASTM D698 to verify the Contractor's proposed mix design before accepting it. The Contractor shall reimburse the County for any and all expenses incurred due to a request by the Contractor to change of mix designs or partial designs, material sources, etc. whether they are approved or not.
- 220.3 Equipment. Provide machinery, tools, and equipment necessary for proper execution of the work. Provide rollers in accordance with TxDOT's Item 210 "Rolling." Provide proof rollers in accordance with TxDOT's Item 216 "Proof Rolling" when directed.

- A. Slurry Equipment. Use slurry tanks equipped with agitation devices to slurry hydrated lime at the jobsite or any other approved location. The Engineer may approve other slurring methods. Provide a pump for agitating the slurry when the distributor truck is not equipped with an agitator. Equip the distributor truck with a sampling device in accordance with Tex-600-J, Part I, when using commercial lime slurry.
- B. Pulverization Equipment. Provide pulverization equipment that:
- cuts and pulverizes material uniformly to the proper depth with cutters that plane to a uniform surface over the entire width of the cut,
 - shows a visible indication of the depth of cut at all times, and
 - mixes the materials uniformly.

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Construction. Construct each layer uniformly, free of loose or segregated areas, and with the required density and moisture content. Provide a smooth surface that conforms to the typical sections, lines, and grades shown on the plans or as directed.

- A. Preparation of Subgrade for Treatment. Shape the subgrade in accordance with Item 205 "Subgrade", and applicable bid items to conform to typical sections shown on the plans and as directed.
- B. Pulverization. The Contractor shall pulverize or scarify the existing raw subgrade to allow penetration of the lime to the required depth.
- C. Application of Lime. Uniformly apply lime using slurry placement as shown on the plans or as directed. Add lime at the percentage determined in Section 220.2.D, "Mix Design" above. Apply lime only on an area where mixing can be completed during the same working day.

Start lime application only when the air temperature is at least 35°F and rising or is at least 40°F. The temperature shall be taken in the shade and away from artificial heat. Suspend application when the Engineer determines that weather conditions are unsuitable.

Slurry Placement. Provide slurry free of objectionable materials, at or above the approved minimum dry solids content, and with

a uniform consistency that shall allow ease of handling and uniform application. Deliver commercial lime slurry to the jobsite or prepare lime slurry at the jobsite, or other approved location, by using hydrated lime as specified.

Distribute slurry uniformly by making successive passes over a measured section of subgrade until the specified lime content is reached.

- D. Mixing. Begin mixing within 6 hours of application of lime. Hydrated lime exposed to the open air for 6 hours or more between application and mixing, or that experiences excessive loss due to washing or blowing, shall not be accepted for payment.

Thoroughly mix the subgrade and lime using approved equipment. Allow the mixture to mellow for 1 to 4 days, as directed. Sprinkle the treated materials during the mixing and mellowing operation, as directed, to achieve adequate hydration and proper moisture content. After mellowing, resume mixing until a homogeneous, friable treated subgrade is obtained.

After mixing, the Engineer shall sample the mixture at roadway moisture and test in accordance with Tex-101-E, Part III to determine compliance with the gradation requirements in Table 1.

Table 1
Gradation Requirements (Minimum % Passing)

Sieve Size	Treated Subgrade
1-3/4 in.	100
3/4 in.	85
No. 4	60

- E. Compaction. Compact the treated subgrade using density control. Multiple lifts are permitted when shown on the plans or approved. Bring each layer to the moisture content directed. When necessary, sprinkle the treated subgrade as directed. Determine the moisture content of the treated subgrade at the beginning and during compaction in accordance with ASTM D698.

Begin rolling longitudinally at the sides and proceed toward the center, overlapping on successive trips by at least one-half the width of the roller unit. Offset alternate trips of the roller. Operate rollers at a speed between 2 and 6 MPH, as directed.

Rework, recompact, and refinish treated subgrade that fails to meet or that loses required moisture, density, stability, or finish before the next layer is placed or the project is accepted. Continue work until specification requirements are met. Rework in accordance with Section 220.4.F, "Reworking a Section" below. Perform the work at no additional expense to the County.

The Testing Laboratory shall determine treated subgrade density of completed sections in accordance with ASTM 6398. The minimum level of testing shall consist of the following:

- at least one test per station per lane of roadway.
- a lane is defined as 12' wide section of pavement regardless of its use.

Compact to at least 95% of the maximum density as determined in accordance with ASTM D698, unless otherwise shown on the plans.

- F. Reworking a Section. When a section of lime treated subgrade is reworked within 72 hours after completion of compaction, rework the section to provide the required density. When a section is reworked more than 72 hours after completion of compaction, add additional lime at 25% of the percentage determined in Section 220.2.D, "Mix Design" at no additional cost to the County. Reworking includes loosening, adding lime or removing unacceptable treated subgrade if necessary, mixing as directed, compacting, and finishing. Determine a new maximum density of the reworked treated subgrade in accordance with ASTM D698, and compact to at least 95% of this density.
- G. Finishing. Immediately after completing compaction of the final layer of lime treated subgrade, clip, skin, or tight-blade The surface to a depth of approximately ¼ in. Remove the clipped material and dispose of it at an approved location. Roll the clipped surface immediately with a pneumatic tire roller until a smooth surface is attained. Add small amounts of water as needed during rolling. Shape and maintain the layer and surface in conformity with the typical sections, lines, and grades shown on the plans or as directed. The treated subgrade shall be finished within the tolerances required by TxDOT's Section 132.3. F.1, "Grade Tolerances."

- H. Curing. Cure for the minimum number of days shown in Table 2 by sprinkling as per TxDOT's Item 204 "Sprinkling", or by applying an asphalt material at a rate of 0.05 to 0.20 gal. per square yard as directed. Maintain moisture content during curing. Upon completion of curing, maintain the moisture content in accordance with TxDOT's Article 132.3.E, "Maintenance of Moisture and Reworking" for treated subgrade prior to placing subsequent courses. Do not allow equipment on the finished layer during curing except as required for sprinkling, unless otherwise approved. Apply seals or additional layers or surface course within 14 calendar days of final compaction.

Table 2
Minimum Curing Requirements Before Placing Subsequent
Layers¹

Original (Untreated) Subgrade PI	Curing (Days)
PI ≤ 35	2
PI > 35	5

¹ Subject to the approval of the Engineer. Proof rolling may be required as an indicator of adequate curing.

220.5 Measurement.

- A. Lime. When lime is furnished in trucks, the weight of lime shall be determined on certified scales.

When lime is furnished in bags, indicate the manufacturer's certified weight. Bags varying more than 5% from that weight may be rejected. The average weight of bags in any shipment, as determined by weighing 10 bags taken at random, must be at least the manufacturer's certified weight.

Hydrated Lime slurry shall be measured as per Item 221 "Hydrated Lime and Lime Slurry".

- B. Lime Treatment. Lime treatment shall be measured by the square yard of surface area at the specified depth. The dimensions for determining the surface area are established by the widths shown on the plans and the lengths measured at placement.

220.6 Payment.

Lime Treatment. Lime treatment shall be paid for at the unit price bid for "Lime Treatment" by the square yard for the depth specified. This price is full compensation for shaping existing material, loosening, mixing, pulverizing, spreading, applying lime, compacting, finishing, curing, blading, shaping and maintaining, replacing, disposing of loosened materials, processing, hauling, preparing secondary subgrade, water, equipment, labor, tools, and incidentals.

Water for sprinkling, sprinkling and rolling shall not be paid for directly, but shall be subsidiary to this Item, unless otherwise shown on the plans. Amendment of treated subgrade to correct soft spots shall be at the Contractor's expense.

Asphalt used solely for curing will not be paid for directly, but will be subsidiary to this Item. Asphalt placed for curing and priming will be paid for under Item 310, "Prime Coat."

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications

Item 205 "Subgrade"

Item 221 "Hydrated Lime and Lime Slurry"

Item 130 "Borrow"

Item 310 "Prime Coat"

END OF ITEM 220