

## **SECTION 161 PREDESIGNED STABILIZED SUBGRADE**

### **161-1 Description.**

Design and construct a stabilized subgrade composed of roadbed soil stabilized with commercial stabilizing material.

### **161-2 Stabilizing Material.**

Use commercial material meeting the requirements of 914-3.1, and the plasticity requirements of 914-3.2.

Proportion the stabilizing material in accordance with FM 5-560, Section 9.2. Design the subgrade using the minimum required Limerock Bearing Ratio (LBR) shown in the plans.

### **161-3 Determination of Rate of Spread for Stabilizing Material.**

Determine the spread rate for stabilizing material. Base the spread rate on tests performed by a testing laboratory approved by the Engineer.

Furnish copies of reports for all tests and calculations used in determining the spread rate to the Engineer at least 14 days prior to beginning stabilizing operations in the section of the project covered by that information. The Engineer may request samples of the subgrade soil and the stabilizing material for verification tests.

Make a separate determination of the spread rate for each source of stabilizing material and whenever significant variations occur in the characteristics of the soil in the subgrade portion of the roadbed.

The Engineer will approve the actual spread rate of stabilizing material used, based on test data and calculations submitted by the Contractor and any verification tests or independent calculations the Engineer deems necessary.

### **161-4 Trial Section.**

Construct a trial section at the beginning of stabilizing operations, approximately 200 feet [60 m] long, using the designated stabilizing material and spread rate. The Engineer will evaluate this section by visual observation, LBR testing and other tests as appropriate. The Engineer may require a modification to the Contractor's construction operations or an increase in the spread rate of stabilizing material, if this evaluation indicates the subgrade is not firm and unyielding or does not have the specified LBR value. After the Engineer approves the trial section, no further acceptance LBR testing is required.

The Engineer may waive construction of a trial section in areas to be stabilized where traffic conditions or the configuration would cause a hazardous or impractical situation.

### **161-5 Preparation of Roadbed.**

Prior to the beginning of stabilizing operations, construct the area to be stabilized to an elevation such that, upon completion of stabilizing operations, the completed stabilized subgrade will conform to the lines, grades, and cross-section shown in the plans. Prior to spreading any additive stabilizing material, bring the surface of the roadbed to a plane approximately parallel to the plane of the proposed finished surface. Dispose of any surplus excavated materials resulting from this work as specified in 120-5.

As an exception to the above, if the typical section is new construction and does not include curb and gutter construction, the Engineer will authorize raising the finished elevation of the stabilized subgrade 1 inch [25 mm] to allow for excess bulking caused by incorporation of commercial material. Raise the overlaying base and pavement course a corresponding distance. The pay quantity for Embankment will not be adjusted when the finished elevation of the completed roadway is raised.

## **161-6 Incorporation of Stabilizing Material and Mixing-In.**

**161-6.1 Spreading Stabilizing Material:** Place and spread the stabilizing material uniformly at the rate determined in 161-3. Use mechanical spreaders, except in those areas where the Engineer deems that it is not practical.

Take five measurements of the depth of the stabilizing material at random locations within each 200 foot [60 m] section of Stabilized Subgrade, if the average of these five measurements is less than the rate of spread as determined in accordance with 161-3. Spread additional stabilizing material over the entire limits of that section and remeasure the depth. The Engineer may verify the depth measurements of any 200 foot [60 m] section.

**161-6.2 Mixing:** After the Engineer has approved the spreading of the stabilizing material, thoroughly mix the material with the roadbed soil using rotary tillers or other approved equipment which is capable of achieving a satisfactory blend. Cross blading and rolling of the mixture using graders will not be considered satisfactory. Mix the material as soon as practical, but not later than two working days after the material is placed on the road. Thoroughly mix the area throughout the entire depth and width of the stabilized subgrade as shown in the plans.

**161-6.3 Maximum Particle Size and Plasticity of Mixed Materials:** At completion of the mixing, ensure that the gradation of the material within the limits of the area being stabilized is such that 97% will pass a 3 1/2 inch [90 mm] screen and does not have a plasticity index greater than eight or liquid limit greater than 30. Clay balls or lumps are aggregation of clay size particles (2 microns or less) [(2µm or less)] and cannot be considered as individual particle sizes. Remove materials not meeting the plasticity requirements from the stabilized area. Materials not meeting the gradation requirements may be broken down or removed from the stabilized area.

**161-6.4 Depth of Mixing Stabilizing Material:** Immediately after mixing has been completed and prior to beginning of compaction, take nine measurements of the depth to which the subgrade has been mixed at random locations within each 200 foot [60 m] section of the stabilized subgrade. The Engineer may verify the depth of mixing for any 200 foot [60 m] section.

The following tolerances over or under the specified depth are allowed:

Plan Depth	Tolerance
8 inches [200 mm] or less	1 inch [25 mm]
over 8 inches [200 mm]	2 inches [50 mm]

When any measured depth of mixing within a 200 foot [60 m] section is less than the plan depth minus the tolerance specified above, remix the stabilized subgrade over the entire section and take a new set of depth measurements, randomly located, to verify that the mixing criteria has been accomplished.

When any measured depth of mixing within a 200 foot [60 m] section exceeds the plan depth plus the tolerance specified above, add 1 inch [25 mm], loose measure, of stabilizing material for each 1 inch [25 mm] of mixing depth in excess of the allowable depth (but in no case less than 1 inch [25 mm] of material) over the entire section and mix this additional stabilizing material into the top 6 inches [150 mm] of the subgrade. Compensation will not be made for any work or material required to correct the above deficiency.

## **161-7 Plant Mixing.**

Proportioning of stabilizing materials with roadbed soil and mixing operations may be accomplished by the central plant-mixed method. Central plant mixing shall achieve a uniform blend of the materials meeting maximum particle size as specified in 161-6.3 and containing the proper amount of water for compaction.

Submit to the Engineer for approval prior to beginning this operation, a description of the equipment and technique to be used.

Spread the premixed subgrade material with a mechanical material spreader, except in areas where the Engineer deems that it is not practicable. Use other satisfactory means of achieving uniform spreading in such cases. Take thickness measurements within each 200 foot [60 m] section of the subgrade and take appropriate corrective action if the thickness of the subgrade fails to meet the plan depth within the tolerances set out in 161-6.4.

### **161-8 Compaction.**

When mixing operations are completed and accepted, shape and compact the subgrade. The minimum density acceptable at any location within the limits of the subgrade will be 98% of the maximum density in accordance with FM 5-521. In areas to be grassed, density in the upper 6 inches [150 mm] as specified above is not required.

Compact the material at a moisture content permitting the specified density to be attained.

### **161-9 Finish Grading.**

Shape the completed stabilized subgrade to conform with the finished lines, grades and cross-section indicated in the plans. Check the subgrade by use of elevation stakes, or other means approved by the Engineer.

Surplus excavated materials from stabilizing operations may be disposed of under shoulders that are to be grassed or sodded.

### **161-10 Requirements for Condition of Completed Subgrade.**

Ensure that the subgrade is firm and substantially unyielding to the extent that it will support construction equipment.

### **161-11 Maintenance of Completed Subgrade.**

Maintain the completed subgrade free from ruts, depressions and damage resulting from the hauling or handling of materials, equipment, tools, etc. Maintain the required density of the subgrade until subsequent base is in place. Work required for recompaction will be at no expense to the Department. The Engineer may confirm that the required density is being maintained at any time.

### **161-12 Method of Measurement.**

The quantity to be paid for will be the plan quantity, in square yards [square meters] of Stabilized Subgrade, completed and accepted, and the volume, in cubic yards [cubic meters] of commercial stabilizing material, applied on the road and accepted.

The quantity of Commercial Stabilized Material will be determined by measurement in a loose condition in truck bodies at the point of proportioning with roadbed soil. Level the material in the truck bodies to facilitate measurement.

### **161-13 Basis of Payment.**

Prices and payments will be full compensation for all the work specified in this Section, including laboratory testing, furnishing and hauling, placing and spreading all stabilizing material, mixing, compacting, finishing and maintaining the subgrade below the finished grade of the stabilizing material and the disposal of surplus excavation and all quality control measurements required.

No additional compensation will be made for work or material which may be required to correct over or under depth mixing as specified in 161-6.4.

Payment will be made under:

Item No. 161-70-	Predesigned Stabilized Subgrade - per square yard.
Item No. 2161-70-	Predesigned Stabilized Subgrade - per square meter.
Item No. 160- 3-	Commercial Stabilizing Material - per cubic yard.

Item No. 2160- 3- Commercial Stabilizing Material - per cubic meter.