

## **APPENDIX III**

### **COMPOSITE TYPICAL GRASSING SPECIFICATIONS**

**Adapted from**

### **STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION OF VARIOUS STATE HIGHWAY DEPARTMENTS**

#### **NOTE:**

The main purpose of these preliminary specifications is to serve as a basis in developing "model specifications" to fit the local needs of each district. Comments and suggestions for the improvement of these specifications are invited by the Committee.

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## ITEM\_\_\_\_.—GROUND PREPARATION FOR SEEDING AND SODDING

### DESCRIPTION

--1.1 This item shall consist of plowing, discing, harrowing, and otherwise preparing ground surfaces for seeding or sodding to a depth of not less than 4 to 5 inches below the finished lines and grades shown on the plans. If required by the plans, loamy topsoil will be added to the ground surfaces to the depth shown on plans. During tillage operations, mulch materials, clay, sand, or equivalent soil amending materials, and fertilizers as required by the plans and by these specifications shall be added and incorporated in the original operation. At the close of work here described, the ground surfaces will be at the lines and grades shown on the plans and no further preliminary work shall be required or be necessary for the seeding or sodding to follow.

### MATERIALS

--2.1 All fertilizers or other materials specified shall meet the requirements of State and Federal laws regarding them.

--2.2 *Fertilizers:* Unless otherwise ordered, fertilizers as here specified shall consist of a complete commercial 10-6-4, 10-8-5, or equivalent mixture of standard quality. Nitrogen in such commercial fertilizer shall be supplied in the form of inorganic chemicals to the amount of at least 75 percent of the nitrogen carrying agents or materials.

--2.3 *Lime:* Lime required under these specifications shall consist of ground limestone containing not less than 85 percent of calcium and magnesium carbonates ground to a fineness which will permit 50 percent passage through a screen of 100 meshes per inch and 90 percent through a 20 mesh screen.

--2.4 *Mulch:* Mulch shall conform to the requirements as set out in Item ---"Mulching."

--2.5 *Clay or sand soil:* Clay soil to be used in amending sands or sandy loams shall consist of not less than 30 percent of clay particles. Sand for amending clay or clay loam soils shall consist of not less than 80 percent sand particles.

--2.6 *Loamy topsoil:* Topsoil is defined as a natural workable loamy soil without admixture of subsoil, refuse, or any material toxic to plant growth. Topsoil shall be reasonably free from stumps, roots, sticks, hard clay, weeds, brush, stones larger than 1 inch in diameter, or other litter or waste products. Acceptable loamy topsoil shall be such a mixture of sand, silt, and clay particles as to exhibit sandy and clayey properties in about equal proportions. Acceptable topsoil shall, prior to stripping, have demonstrated by the occurrence upon it of healthy crops, grass, trees, or other vegetative growth that it has been reasonably well drained and does not contain toxic amounts of and/or alkaline elements.

\* Insert desired item number in front of subnumbers; thus, 400--1.1, etc.



## CONSTRUCTION METHODS

--3.1 All equipment necessary for proper tillage of ground surfaces and for handling, transporting, placing, and mixing materials required by the specifications or on plan sheets shall be at hand, in good condition, and shall have been approved by the engineer before ground preparation will be permitted to begin.

Areas shown on the plans, or designated by the engineer, shall be plowed, harrowed, or otherwise completely pulverized to a state of tillage acceptable to the engineer, to a depth of at least 4 to 5 inches below the finished graded lines. All clods, lumps, boulders, rocks, stumps, and other waste materials interfering with final seeding or sodding shall be removed to the satisfaction of the engineer.

Full advantage shall be taken of favorable weather conditions and the contractor shall suspend ground preparation operations when in the judgment of the engineer continuation of same may result in unfavorable "seed bed" conditions.

Fertilizers, mulches, and sand or clay required for soil improvement or amendment shall be delivered to the site and spread or applied at depths, or at the rate per 1,000 square feet, as designated on plan sheets or required by the engineer, and shall as required be well mixed with existing soil or topsoil as the case may be. In no case shall fertilizers or lime be applied to the surface of the finished grade without thorough admixture with underlying seed bed soils.

## METHOD OF MEASUREMENT

--4.1 Ground preparation, complete and accepted will be measured in units of 1,000 square feet.

Fertilizer and lime will be measured in units of 100-pound sacks or by the ton, whichever is called for in the contract, in vehicles at the point of delivery.

Topsoil, sand, clay, or other soil amending materials will be measured by the cubic yard in trucks of measured capacity as delivered to the site of work.

Mulch will be measured as provided under Item\_\_\_\_--"Mulching."

## BASIS OF PAYMENT

--5.1 The 1,000-square-foot units of "Ground Preparation" as above determined will be paid for at the contract unit price bid per 1,000-square-foot unit of "Ground Preparation," which price and payment shall be full compensation for plowing, harrowing, raking, discing, rolling, and cultivation, and for all spreading and mixing of materials and incorporating same with



existing soil or topsoil; and for all labor, equipment, tools, and incidentals necessary to complete the work.

The 100-pound bags or tons of fertilizer and lime, measured as determined above shall be paid for at the contract unit price bid per 100-pound bag or per ton, as the case may be, for fertilizer and lime which price and payment shall be full compensation for furnishing and delivering to the site of work, and for all labor, equipment, tools, and incidentals necessary to complete the work.

The yardage of topsoil, sand, clay, or similar amending materials, measured as determined above, will be paid for at the contract unit price bid per cubic yard for topsoil, sand, clay, or other amending materials, which price and payment shall be full compensation for furnishing and delivering to the site of work, and for all labor, equipment, tools, and incidentals necessary to complete the work.

Mulching will be paid for as provided under the Item\_\_\_\_--"Mulching."

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In some States, many of the landscape features "demonstrated" through the expenditure of 1-percent landscape funds have proved effective and desirable, such as improved cross-section design, conservation of topsoil and ground cover, attractive turn-outs, parking areas, vantage points, etc., that these features are now becoming a part of the basic design in modern highway construction.

## ITEM\_\_\_\_.—SEEDING

### DESCRIPTION

\*--1.1 This item shall consist of the furnishing and delivering of grass seeds of designated kinds, and the sowing of seed on ground surfaces prepared as per Item\_\_\_\_.--"Ground Preparation for Seeding and Sodding." These operations together with the necessary watering, raking, harrowing, and rolling will be done at the locations shown on plans or designated by the engineer, all in accordance with these specifications.

### MATERIALS

--2.1 *Seed:* The varieties of grass and legumes or other seeds shall be furnished and delivered in separate bags. Seed in accordance with the plans and with these specifications will be mixed in the desired formulas on the job or elsewhere, after delivery, as directed by the engineer. All seed shall meet the requirements of State and Federal law and the requirements of the plans and specifications as to <sup>1</sup>pure live seed and minimum weed content. When and as requested by the engineer, the contractor shall furnish one-pint samples of each kind of seed to be used. Such samples if desired by the engineer will be tested in accordance with directions given in U. S. Department of Agriculture Circular No. 480, July 1938.

--2.2 Topsoil, lime, and fertilizers where required will be furnished and placed in accordance with Item\_\_\_\_.--"Ground Preparation for Seeding and Sodding."

--2.3 *Mulch:* Mulch shall conform to the requirements as set out in Item\_\_\_\_.--"Mulching."

### CONSTRUCTION METHODS

--3.1 Seeding operations shall be performed as indicated on the plans and at the seasons and seeding periods stated in special provisions or on the plans.

The contractor shall notify the engineer at least 48 hours in advance of the time he intends to begin sowing seed and shall not proceed with such work until permission to do so has been granted in writing by the engineer.

--3.2 *Advance preparation of seed bed:* Prior to the sowing of seed, topsoil, sand, clay, fertilizers, or manures, lime, and other materials as required on the plans shall be distributed, spread, and incorporated in the seed bed soil as required under Item\_\_\_\_.--"Ground Preparation for Seeding and Sodding."

If the soil has become crusted over since ground preparation has been performed, additional light raking or disking shall be done to loosen the surface.

--3.3 *Sowing:* Grass, legume, or other seeds shall be sown at the rate required on the plans preferably by means of rotary or other mechanical seeders. No seeding shall be done during windy weather or when the ground is wet.

\* Insert desired item number: thus 401--1.1, etc.

1. Pure live seed = Percentage of germination X percent of purity



frozen, or in otherwise untillable condition. Leguminous seed shall be inoculated before sowing unless otherwise ordered in writing by the engineer. After sowing, seed shall be covered lightly by raking, brush or chain harrowing, or if directed by the engineer, rollers or culti-packer equipment shall be used to cover the seed and firm the seed bed.

The contractor shall water,<sup>1</sup> mow, or otherwise maintain seeded areas to the satisfaction of the engineer until final acceptance of the contract.

#### METHOD OF MEASUREMENT

--4.1 Seeding, complete in place and accepted, will be measured in 1,000-square-foot units. Seeding units will be measured horizontally along the center line at one-quarter station intervals.

Fertilizer, lime, and topsoil will be measured as provided under Item\_\_\_\_  
--"Ground Preparation for Seeding and Sodding."

Mulching will be measured as provided under Item\_\_\_\_. --"Mulching."

#### BASIS OF PAYMENT

--5.1 The 1,000-square-foot units of seeding, as above determined, will be paid for at the contract unit price bid for "Seeding," which price and payment shall be full compensation for furnishing and delivering seed, incidental preparation of seed bed; sowing, raking, and rolling of seed; and all watering, mowing, and maintenance of the seeded areas; and for all labor, equipment, tools, and incidentals necessary to complete the work.

Fertilizers, topsoil, and lime will be paid for as provided under Item\_\_\_\_  
--"Ground Preparation for Seeding and Sodding."

Mulching will be paid for as provided under Item\_\_\_\_. --"Mulching."

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"Speaking before the Virginia assembly in 1777, Patrick Henry said, 'Since the achievement of our Independence, he is the greatest patriot who stops the most gullies.'"

1. Watering by tank truck is frequently done on areas of limited size (i.e., road shoulders, triangles, etc.). Tank truck watering is not practicable on extended areas such as airfields.



ITEM-----TOPSOIL PLANTING  
(BROADCAST SODDING)

DESCRIPTION

\*--1.1 This item shall consist of procuring, hauling, and placing plant topsoil (shredded grass sod and soil) as a cover material on shoulders, slopes, berms, and other designated areas within the roadway, in accordance with these specifications and in conformity with the lines, grades, and cross section indicated on the plans or established by the engineer.

The plant topsoil required shall consist of cuttings and root systems of Bermuda grass, carpet grass, or other grasses approved by the engineer and locally available, in combination with the layer of topsoil in which it is growing.

MATERIALS

--2.1 *Source:* Plant topsoil shall be obtained from approved sources.

--2.2 *Plant topsoil:* This material shall consist of topsoil and live growing grass, native to the locality of the work, and shall be procured from areas where the soil is reasonably fertile as indicated by vigorous growth. The grass shall have a healthy virile root system of dense, thickly matted roots. The plant topsoil shall be reasonably free from obnoxious weeds or other grasses, and shall not contain any matter deleterious to the growth or hardness of the grass.

--2.3 *Fertilizer and lime:* The material used, unless otherwise indicated, shall conform to the requirements as set out in Item----"Ground Preparation for Seeding and Sodding."

--2.4 *Mulch:* Mulch shall conform to the requirements as set out in Item----"Mulching."

CONSTRUCTION METHODS

--3.1 *Procuring plant topsoil:* The material to be applied shall be disced and stripped only when the soil is in a moist, friable condition or when provision is made for watering. The area from which the plant topsoil is to be secured first shall be closely mowed and raked to remove all weeds and long standing stems. This operation may be omitted, at the discretion of the engineer, when the grass source has been pastured, or for any other reason is free of weeds, long standing stems, or other debris. After mowing and raking, the area shall be disced thoroughly in two directions until the sod has been well shredded and the topsoil loosened to a depth of from 3 to 5 inches.

--3.2 *Windrowing:* After discing, the mixed grass and soil shall be cast into windrows by an approved tractor-drawn or motor-powered blade grader. Plant topsoil which has been disced, but not windrowed, more than 6 hours, or which has been windrowed more than 6 hours, shall be considered unfit for use unless the material has been thoroughly wetted by rain; in this case periods of time similar to the above will be allowed after the rain has ceased.

--3.3 *Preparation of planting site:* Before placing the plant topsoil upon any area, all shaping, dressing, and ground preparation of such areas shall have been completed in accordance with Item----"Ground Preparation for Seeding and Sodding," unless otherwise directed by the engineer.

\* Insert desired item number; thus 402--1.1, etc.



--3.4 *Placing of plant topsoil:* The prepared material shall be spread uniformly to the depth indicated on plans or directed by the engineer (usually from 1½ to 3 inches). It shall then be harrowed and cultivated into the subsoil in order to obtain proper mixture of the grass, topsoil, and subsoil.

--3.5 *Compacting:* After the placing has been completed, the entire area shall be compacted to the satisfaction of the engineer. Rollers, culti-packers, or other approved equipment may be used for this purpose. Where clay soils occur overcompaction must be carefully avoided.

--3.6 *Mulching:* If required, mulch shall be furnished and applied as described under Item\_\_\_\_--"Mulching."

--3.7 *Watering:*<sup>1</sup> If the topsoil planting is done in dry weather, or if the ground is not moist, the material shall be thoroughly watered immediately after being placed and shall be watered, during the subsequent 2-week period at such times, and in the manner and quantity directed by the engineer.

--3.8 *Seasonal limitations:* Topsoil planting shall be done during the period April 1 to August 1 (for Mississippi latitudes) unless written permission is given by the engineer to extend the planting season.

--3.9 *Maintenance:* The contractor shall maintain topsoil planted areas at his own expense, until final completion and acceptance of the project. Maintenance shall consist of mowing, watering, replacement, and such other work as may be necessary to keep the work in a satisfactory condition.

#### METHOD OF MEASUREMENT

--4.1 Plant topsoil of the depth indicated on the plans, complete in place and accepted, will be measured by the cubic yard at the point of delivery, loose vehicle measurement, or in 1,000-square-foot units, whichever is called for in the contract.

Ground preparation including fertilizing and liming will be measured as provided under Item\_\_\_\_--"Ground Preparation for Seeding and Planting."

Mulching will be measured as provided under the Item\_\_\_\_--"Mulching."

#### BASIS OF PAYMENT

--5.1 The yardage of topsoil planting, as above measured, will be paid for at the contract unit price bid per cubic yard or per 1,000-square-foot unit, as the case may be, for "Topsoil Planting," which price and payment shall be full compensation for mowing, raking, discing, windrowing, hauling, placing, compacting, and maintaining, and for all labor, equipment, tools, and incidentals necessary to complete the work.

Ground preparation including fertilizing and liming will be paid for under Item\_\_\_\_--"Ground Preparation for Seeding and Sodding."

Mulching will be paid for under Item\_\_\_\_--"Mulching."

1. Artificial watering may be practicable in areas of limited size, such as road shoulders, triangles, and traffic circles. Watering is not practicable in most large areas such as airfields. This point should be considered in specifications.

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## ITEM\_\_\_\_—SPRIGGING

### DESCRIPTION

--1.1 This item shall consist of furnishing and planting approved live tufts or sprigs of Bermuda grass or other acceptable native grasses on slopes and other areas, within the roadway, where called for on the plans or directed by the engineer, in accordance with these specifications.

### MATERIALS

--2.1 *Sprigs:* The sprigs or tufts of sod shall be of (an accepted)\_\_\_\_ grass, native to the locality of the work and shall be live, fresh, vigorous, and uninjured at the time of planting and until completion and acceptance of the work. They shall have well-formed and developed root systems and shall be in clusters or tufts at least one inch in diameter unless otherwise stipulated. Sprigs containing Johnson grass, crab grass, or other objectionable grasses or weeds will not be accepted.

--2.2 *Fertilizer:* Fertilizer used in this construction, unless otherwise specified, shall conform to the requirements as set out in Item\_\_\_\_-- "Ground Preparation for Seeding and Sodding."

--2.3 *Mulch:* Mulch shall conform to the requirements as set out in Item\_\_\_\_-- "Mulching."

### CONSTRUCTION METHODS

--3.1 *Procuring and handling sprigs:* Unless the grass area has been grazed closely, it shall be mowed before harvesting. The sprigs, or sods, shall be harvested with a sod-cutter, turning plow, or other implements approved by the engineer in such manner that at least 2 inches of the root system will be lifted intact. The sod so harvested shall be loaded immediately and transported to its destination where it shall be planted immediately or temporarily stock piled in a satisfactory manner. In the event the sod is stock piled, it shall be planted within three days after it is harvested. In no event shall the sod be allowed to dry out or freeze. When large pieces of sod are to be broken down into smaller pieces for sprig planting, this operation shall be done by hand or by such other means that will avoid severing the roots from the tops of the plants.

--3.2 *Preparation of planting site:* The ground shall be prepared including liming and fertilizing in accordance with Item\_\_\_\_-- "Ground Preparation for Seeding and Sodding," to a depth of not less than 4 inches for shoulders and fill slopes, and not less than 6 inches for front and back slopes of cuts and borrow pits. The engineer may, at his discretion, authorize elimination of ground preparation on shoulders and fill slopes, or other areas where the soil is sufficiently loose and pulverized.

After ground preparation as described above has been completed furrows shall be plowed on approximate contour lines spaced not more than 8 inches apart. The furrow may be made with a small straight shovel, opener plow, turning plow, or other appropriate tool, but must be approximately 4 inches deep and reasonably true to line.

--3.3 *Planting:* Unless otherwise stipulated, sprigs shall be spaced not more than 6 inches apart in the furrows. The sprigs shall be set as promptly as possible after being broken from the larger blocks of sod.

\* Insert desired item number; thus 403--1.1, etc.



If the soil is not moist when the sprigs are being set, watering may be required as directed by the engineer.

Immediately after being placed in the furrows, the sprigs shall be covered with 1 to 3 inches, as directed, of suitable pulverized soil. Clods or hard particles shall not be placed over the plants.

--3.4 *Compacting*: After planting has been completed, the entire area shall then be compacted to the satisfaction of the engineer. Rollers, culti-packers, or other approved equipment may be used for this purpose. Under heavy clay soil conditions compaction may be omitted when and as directed by the engineer.

--3.5 *Mulching*: Acceptable mulch shall be applied to sprigged areas, if required, at the rate indicated on plans and in accordance with Item\_\_\_\_.--"Mulching."

--3.6 *Seasonal limitations*: Sprigging shall be done during the period indicated on specifications unless written permission is given by the engineer to extend the planting season.

--3.7 *Maintenance*: The contractor shall maintain the sprigging at his own expense, until final acceptance of the project. Maintenance shall consist of preserving, protecting, replacing, and such other work as may be necessary to keep the work in a satisfactory condition.

The contractor shall be responsible for satisfactory growth of grass, and until final acceptance, he will be required to water and mow the grass at such intervals as will insure a living and growing sod at the time of acceptance. A living and growing sod shall be interpreted to include sod that is seasonably dormant during the cold or dry season with roots that have taken hold on the soil and capable of renewing growth after the dormant period.

#### METHOD OF MEASUREMENT

--4.1 Sprigging, complete in place and accepted will be measured in units of 1,000 square feet.

Fertilizer will be measured as provided in Item\_\_\_\_.--"Ground Preparation for Seeding and Sodding."

Mulching, will be measured as provided in Item\_\_\_\_.--"Mulching."

#### BASIS OF PAYMENT

--5.1 The units of sprigging, as above determined, will be paid for at the contract unit price bid per 1,000 square feet for "Sprigging," which price and payment shall be full compensation for furnishing, planting, and maintaining the sprigs until acceptance of the contract, watering, and for all labor, equipment, tools, and incidentals necessary to complete the work.

Ground preparation including fertilizing and liming will be paid for under Item\_\_\_\_.--"Ground Preparation for Seeding and Sodding."

Mulching will be paid for under Item\_\_\_\_.--"Mulching."

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ITEM\_\_\_\_.—CHECK SODDING  
(BLOCK SODDING)

DESCRIPTION

\*--1.1 This item shall consist of furnishing and planting blocks or spots of Kentucky bluegrass, Bermuda, or other grass sod on shoulders, embankment slopes, and other areas within the roadway where called for on the plans or directed by the engineer, in accordance with these specifications and in conformity with the spacing and block dimensions indicated on plans.

MATERIALS

--2.1 *Grass sod:* Grass sod shall be native to the locality of the work and shall, when placed be live fresh growing grass with at least 2 inches of soil adhering firmly to the roots. The sod shall be reasonably free from obnoxious weeds or other grasses, and shall not contain any matter deleterious to its growth or which might affect its subsistence or hardness when transplanted.

Each sod shall consist of square pieces of turf and grass not less than 4 x 4 inches in area and at least 2 inches in thickness.

--2.2 *Fertilizer and lime:* The fertilizer and lime used shall, unless otherwise stipulated, conform to the requirements in Item\_\_\_\_.--"Ground Preparation for Seeding and Sodding."

--2.3 *Mulch:* Mulch shall conform to the requirements as set out in Item\_\_\_\_.--"Mulching."

CONSTRUCTION METHODS

--3.1 *Procuring and handling sod:* All sod shall be procured from areas where the soil is reasonably fertile and contains a high percentage of loamy topsoil, and from areas that have been grazed or mowed sufficiently to form a dense turf.

Mechanical devices, such as sod cutters, may be used for cutting the sod into strips or blocks. Care shall be exercised at all times to retain the native soil on the roots of the sod during the process of excavating, hauling, and planting.

The sods shall be transplanted within 24 hours from the time it is harvested, unless they are stacked at their destination in a manner satisfactory to the engineer. All sod in stacks shall be kept moist and protected from exposure to the air and sun, and from freezing.

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\* Insert desired item number; thus 404--1.1, etc.



In no event shall more than 48 hours elapse between the cutting and planting of the sod.

--3.2 *Preparation of planting site:* Before placing or depositing sodding upon any areas, all shaping and dressing of such areas shall have been completed, unless otherwise directed by the engineer.

The surface of the area designated for check sodding shall receive ground preparation, including fertilizing and liming, if so required and as described in Item\_\_\_\_. --"Ground Preparation for Seeding and Sodding," to a depth of not less than 4 inches. The engineer may at his discretion, authorize elimination of ground preparation on shoulders and fill slopes, or other areas where the soil is sufficiently loose and pulverized.

If the soil is not moist, it shall be watered until it is in workable condition.

--3.3 *Planting sod:* The sod blocks shall be planted 12 inches apart in each direction (measured between the edge of the sod blocks) so as to form a checker-board pattern over the area to be sodded. Such planting may be accomplished by placing the sods in furrows so spaced as to meet the above requirements.

The entire sodded area shall then be compacted to the satisfaction of the engineer. Rollers, culti-packers, or other approved equipment may be used for this purpose.

--3.4 *Mulching:* Any required mulch shall be furnished and applied as described under Item\_\_\_\_. --"Mulching."

--3.5 *Seasonal limitations:* Check sodding shall be done during the period stated in the specifications unless written permission is given by the engineer to extend the planting season.

--3.6 *Maintenance:* The contractor shall maintain the check sodding, at his own expense, until final acceptance of the project. Maintenance shall consist of preserving, protecting, replacing, and such other work as may be necessary to keep the work in a satisfactory condition.

The contractor shall be responsible for satisfactory growth of the grass and until final acceptance, he will be required to water and mow the grass at such intervals as will insure a living and growing sod at the time of acceptance. A "living and growing sod" shall be interpreted to include sod that is seasonably dormant during the cold or dry season with roots that have taken hold on the sod and capable of renewing growth after the dormant period.



## METHOD OF MEASUREMENT

--4.1 Check sodding, complete in place and accepted, will be measured in square yards or in 1,000-square-foot units, whichever is called for in the contract. Measurement will be made over the entire area indicated for check sodding including the area between the sod blocks.

Ground preparation including fertilizing and liming will be measured as provided under Item\_\_\_\_.--"Ground Preparation for Seeding and Sodding."

Mulching will be measured as provided under Item\_\_\_\_.--"Mulching."

## BASIS OF PAYMENT

--5.1 The yardage or the number of 1,000-square-foot units determined as provided above will be paid for at the contract unit price bid per square yard or per unit, as the case may be, for "Check Sodding," which price and payment shall be full compensation for furnishing, planting, and maintaining the sod until acceptance of the contract, watering, and for all labor, equipment, tools, and incidentals necessary to complete the work.

Ground preparation including fertilizing and liming will be paid for under Item\_\_\_\_.--"Ground Preparation for Seeding and Sodding."

Mulching will be paid for under Item\_\_\_\_.--"Mulching."

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When dealing with grasses which may be established by any of the different methods, such factors as cost and the requirements of the turf, as well as the speed with which it is necessary to establish the turf should determine the method to be used.

ITEM\_\_\_\_.—STRIP SODDING  
(TRENCH SODDING)

DESCRIPTION

--1.1 This item shall consist of furnishing and planting grass sod on slopes or other areas where called for on the plans or directed by the engineer, in accordance with these specifications, in solid strips conforming to the width and spacing indicated on the plans.

MATERIALS

--2.1 *Grass sod:* This material shall be native to the locality of the work and shall, when placed, be live fresh, growing grass with at least 2 inches of soil adhering firmly to the roots. The sod shall be reasonably free from obnoxious weeds of other grasses, and shall not contain any matter deleterious to its growth or which might affect its survival when transplanted.

The sods shall be in strips or blocks of the width indicated on the plans, but in no case less than 12 inches wide.

--2.2 *Fertilizer and lime:* The fertilizer and lime used unless otherwise stipulated, shall conform to the requirements set out in Item\_\_\_\_.--"Ground Preparation for Seeding and Sodding."

--2.3 *Mulch:* Mulch shall conform to the requirements as set out in Item\_\_\_\_.--"Mulching."

CONSTRUCTION METHODS

--3.1 *Procuring and handling sod:* All sod shall be procured from areas where the soil is fertile and contains a high percentage of loamy topsoil, and from areas that have been grazed or mowed sufficiently to form a dense turf.

Mechanical devices, such as sod cutters, may be used for cutting the sod into strips or blocks. Care shall be exercised at all times to retain the native soil on the roots of the sod during the process of excavating, hauling, and planting.

The sods shall be transplanted within 24 hours from the time it is harvested, unless they are stacked at their destination in a manner satisfactory to the engineer. All sod in stacks shall be kept moist and protected from exposure to the air and sun, and from freezing.

In no event shall more than 3 days elapse between the cutting and planting of the sod.

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\* Insert desired item number; thus 405--1.1, etc.



--3.2 *Preparation of planting site:* Before placing sod upon any areas, all shaping and dressing of such areas shall have been completed, unless otherwise directed by the engineer.

The surface of the area designated or directed by the engineer for strip sodding shall receive ground preparation, including fertilizing and liming, as described in Item..... --"Ground Preparation for Seeding and Sodding" to a depth of not less than 4 inches. The engineer may, at his discretion, authorize elimination of ground preparation on shoulders and fill slopes, or other areas where the soil is sufficiently loose and pulverized, or where topsoiling has been done.

Furrows or trenches shall then be prepared on approximate contour lines spaced at the intervals indicated on the plans (usually 3 to 5 feet apart). Such furrows or trenches shall be approximately 4 inches deep and reasonably true to line.

--3.3 *Placing sod:* The sod shall be placed in the prepared furrows with the edges in close contact. The entire sodded area shall then be compacted to the satisfaction of the engineer. Rollers, culti-packers, or other approved equipment may be used for this purpose.

The surface of strip sodding which, in the opinion of the engineer, may slide due to the grade of sodded gutters or channels, the height and slope of the surface, or the nature of the soil, shall, upon direction of the engineer, be "pegged" with wooden pegs driven through the sod blocks into firm earth, sufficiently close to hold the sod in place.

--3.4 *Mulching:* Mulch shall be furnished and applied to conform to the requirements in Item..... --"Mulching."

--3.5 *Seasonal limitations:* Strip sodding shall be done during the period stated on the specifications unless written permission is given by the engineer to extend the planting season.

--3.6 *Maintenance:* The contractor shall maintain the strip sodding, at his own expense, until final acceptance of the project. Maintenance shall consist of preserving, protecting, replacing, and such other work as may be necessary to keep the work in a satisfactory condition.

The contractor shall be responsible for satisfactory growth of the grass and until final acceptance he will be required to water and mow the grass at such intervals as will insure a living and growing sod at the time of acceptance. A "living and growing sod" shall be interpreted to include sod that is seasonably dormant during the cold or dry season with roots that have taken hold on the sod and capable of renewing growth after the dormant period.



## METHOD OF MEASUREMENT

--4.1 Strip sodding, complete in place and accepted will be measured in square yards or in 1,000-square-foot units, whichever is called for in the contract. Measurement will be made over the entire area indicated for strip sodding including the area between the strips.

Ground preparation including fertilizing and liming will be measured as provided under Item\_\_\_\_.--"Ground Preparation for Seeding and Sodding."

Mulching will be measured as provided under Item\_\_\_\_.--"Mulching."

## BASIS OF PAYMENT

--5.1 The yardage or the number of 1,000-square-foot units determined as provided above will be paid for at the contract unit price bid per square yard or per unit, as the case may be, for "Strip Sodding," which price and payment shall be full compensation for furnishing, planting, pegging, and maintaining the sod until acceptance of the contract, watering, and for all labor, equipment, tools, and incidentals necessary to complete the work.

Ground preparation including fertilizing and liming will be paid for under Item\_\_\_\_.--"Ground Preparation for Seeding and Sodding."

Mulching will be paid for under Item\_\_\_\_.--"Mulching."

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The safety advantages of the streamlined section without guardrails is improving in recognition. Cases where guardrails have been removed and slopes flattened have resulted in added appearance and safety and enabled better and more efficient maintenance operations. Again each project is an individual case where specific conditions and economics must be considered.

ITEM\_\_\_\_—SOLID SODDING  
(BLOCK SODDING)

DESCRIPTION

\*--1.1 This item shall consist of furnishing and planting Bermuda grass sod, bluegrass sod, or other approved grass sod, so as to provide a complete cover on the areas designated on the plans or directed by the engineer to be sodded solid, in accordance with these specifications. Such areas may include side slopes, backslopes, gutters, shoulders, berms, islands, or other designated areas within the right-of-way.

MATERIALS

--2.1 *Grass sod:* Grass sod shall be native to the locality of the work and shall, when placed, be live growing grass with at least 2 inches of soil adhering firmly to the roots. The sod and adhering soil shall be reasonably free from obnoxious weeds or other undesirable grasses, and shall not contain substances deleterious to growth, or which might affect survival or hardiness of sod when transplanted.

The sods shall be in rectangular blocks or strips at least 2"x12"x12", and reasonably free from ragged edges.

--2.2 *Fertilizer and lime:* The fertilizer and lime used, unless otherwise stipulated, shall conform to the requirements set out in Item\_\_\_\_. --"Ground Preparation for Seeding and Sodding."

CONSTRUCTION METHODS

--3.1 *Procuring and handling sod:* All sod shall be procured from areas where the soil is reasonably fertile and contains a high percentage of loamy topsoil, and from areas that have been grazed or mowed sufficiently to form a dense turf.

Mechanical devices, such as sod cutters, may be used for cutting the sod into strips or blocks of convenient size for handling. Care shall be exercised at all times to retain the native soil on the roots of the sod during the process of excavating, hauling, and planting. Sod shall not be cut on sandy, gravelly, or other soils which tend to break up or crumble during normal careful cutting, loading, or transportation operations. Sod after cutting shall be at least 2 inches in thickness, and shall contain the major part of the grass root system.

The sod shall be transplanted within 24 hours from the time it is harvested, unless they are stacked at their destination in a manner satisfactory to the engineer. All sod in stacks shall be kept moist and protected from exposure to the air and sun, and from freezing.

In no event shall more than 48 hours elapse between the cutting and planting of the sod.

--3.2 *Preparation of planting site:* Before placing or depositing solid sodding upon any areas, all shaping and dressing of such areas shall have been completed, unless otherwise directed by the engineer.

• Insert desired item number; thus 406--1.1, etc.



The area to be sodded shall then receive, if required, standard ground preparation including fertilizing and liming, as described in Item\_\_\_\_--"Ground Preparation for Seeding and Sodding" to a depth of at least 4 inches.

If the soil is not moist, it shall be watered until it is in workable condition.

The completed area to be sodded shall present a smooth, uniform well tilled surface true to line and cross section. Sodding shall follow immediately upon completion of ground preparation.

--3.3 *Planting sod:* The sod shall be placed on the prepared surface with the edges in close contact. All cracks between blocks of sod shall be closed with small pieces of sod. The entire sodded area shall then be compacted to the satisfaction of the engineer. Rollers, tampers, or other approved equipment may be used for this purpose.

Surfaces of solid sodding which, in the opinion of the engineer, may slide due to the height and slope of the surface or nature of the soil, or may be disturbed by surface water in sodded gutters or channels shall, upon direction of the engineer, be "pegged" with wooden pegs driven, through the sod blocks into firm earth, sufficiently close together to hold the sod in place.

--3.4 *Seasonal limitations:* Solid sodding shall be done during the period stated in the specifications unless written permission is given by the engineer to extend the planting season.

--3.5 *Maintenance:* The contractor shall maintain the solid sodding, at his own expense, until final acceptance of the project. Maintenance shall consist of watering, mowing, and replacing sod in place and such other work as may be necessary to keep the work in a satisfactory condition.

The contractor shall be responsible for satisfactory growth of the grass and until final acceptance he will be required to water and mow the grass at such intervals as will insure a living and growing sod at the time of acceptance. A "living and growing sod" shall be interpreted to include sod that is seasonably dormant during the cold or dry season with roots that have taken hold on the sod and capable of renewing growth after the dormant period.

#### METHOD OF MEASUREMENT

--4.1 Solid sodding, complete in place and accepted, will be measured in 1,000-square-foot units.

Ground preparation including fertilizing and liming will be measured as provided in Item\_\_\_\_--"Ground Preparation for Seeding and Sodding."

#### BASIS OF PAYMENT

--5.1 The yardage determined as provided above will be paid for at the contract unit price bid per square yard for "Solid Sodding," which price and payment shall be full compensation for furnishing, planting, pegging, and maintaining the sod until acceptance of the contract, watering, and for all labor, equipment, tools, and incidentals necessary to complete the work.

Ground preparation including fertilizing and liming will be paid for as provided under Item\_\_\_\_--"Ground Preparation for Seeding and Sodding."

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## DESCRIPTION

\*--1.1 This item shall consist of mulching (covering) with pine straw, hay, straw, grass clippings, manure, cottonseed hulls, or motes, decomposed sawdust, peat moss, or other suitable materials in accordance with these specifications on those areas of the shoulders, ditches, and slopes of the roadway, or elsewhere within the right-of-way, as indicated on plans or directed by the engineer.

## MATERIALS

--2.1 All materials used in this construction, in addition to the general requirements of these specifications, unless otherwise indicated, shall conform to the following:

- (1) Pine straw, or hardwood leaf litter shall be selected from forest areas having the least possible amount of trash, dead branches, etc., and shall be reasonably dry and well decomposed.
- (2) Hay shall be obtained from pastures, broom sedge fields, or other approved sources. It shall be reasonably dry and reasonably free from obnoxious weeds. Partially decomposed hay of a previous year's crop will be preferred to fresh new hay or other fodder crops.
- (3) Straw shall be stalks of rye, oats, or other approved straw and shall be reasonably dry. Partially decomposed straw of a previous year's crop will be preferred to fresh new straw.
- (4) Grass clippings shall be what is commonly known as right-of-way cuttings of Bermuda grass, bluegrass, Indian grass, or broom sedge, as the case may be.
- (5) Manure shall be coarse well decomposed stable manure with straw content not to exceed 50 percent by volume.
- (6) Cottonseed hulls and motes shall be approved material. Tobacco stems, potato vines, or other local crop residues will be acceptable equivalents.
- (7) Peat moss or sedge peat, where available near the site, may be considered approved mulching materials, care being taken that the pH value be modified by use of lime where necessary to avoid harmful effects on grass growth.
- (8) Decomposed sawdust shall be air dry hardwood or soft wood material aged or composted until of a dark brown or black color. No odors of resin, tannin, or other toxic compounds shall be present. Decomposed sawdust showing pH values of less than 6.0 shall not be used on other than acid requiring grasses, or vine or shrub ground covered areas unless corrected by the addition of lime.

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\* Insert desired item number; thus 407--1.1, etc.



## CONSTRUCTION METHODS

--3.1 After the area to be mulched has received suitable ground preparation with fertilizer incorporated, and the specified grassing item performed thereon (if required in the contract) it shall be covered with any of the above types of mulching material approved by the engineer.

The mulching shall begin at the upper side of the slope and shall be scattered downward taking care to cover all portions of the slopes to a uniform depth of loose mulching material. On areas where seeding is called for on plans the thickness of loose mulch shall vary between  $\frac{1}{4}$  inch and 1 inch, depending on the type of mulching material. On slopes to be planted with vines as shown on plans, mulch shall be 3 inches or more in depth as indicated.

It is the intent of these specifications that mulch used with grassing operations shall be loose enough to allow sunlight to penetrate and air to slowly circulate, but thick enough to shade the ground and reduce erosion.

Where and as, indicated on plans anchorage shall be provided to hold mulch in place. A shallow covering of earth over the mulch may be satisfactory, or anchoring material may consist of wire and stakes, wire netting, pine or cedar brush, or cotton webbing, all of which may require staking or other fastening in place at suitable intervals.

--3.2 *Maintenance:* Maintenance shall consist of maintaining the mulch in a condition satisfactory to the engineer and shall include replacements due to erosion, fire, or other causes, until final acceptance of the project.

## METHOD OF MEASUREMENT

--4.1 Mulching, complete in place and accepted, will be measured in 1,000-square-foot units.

## BASIS OF PAYMENT

--5.1 The number of units determined as provided above will be paid for at the contract unit price bid per unit for "Mulching," which price and payment shall be full compensation for furnishing, placing and anchoring mulch, and for all labor equipment, tools, and incidentals necessary to complete the work.

### ED. NOTE:

Alternate types of mulching have been developed under different climatic conditions:

- (1) In the Plains Region, for example, mulch materials are placed on the seedbed and are disced into the soil before seeding or sodding begins; or,
- (2) In a cool humid region, as in Connecticut, mulches are placed on slopes to depths of from 3 to 6 inches and are covered with from 1 to 2 inches of soil. Seeding is then done on the soil cover above the mulch. Field investigation is needed in these methods in all regions.

## PROPOSED GRASSING SPECIFICATION ITEMS

The United States Department of Agriculture has worked out the following list of terms, applicable to various seeding, sodding, and sprigging practices.

### *Seeding:*

Broadcast seeding  
Drill seeding  
Row seeding  
Hay mulch seeding (mulch seeding)

### *Sprigging:*

Check sprigging  
Row sprigging  
Broadcast sprigging

### *Sodding:*

Topsoil planting	(broadcast sodding) (grass mulching) (mulch sodding)
Check sodding	(block sodding) (spot sodding) (tuft sodding)
Strip sodding	(trench sodding)
Solid sodding	(block sodding)

Alternate terms used are listed in parentheses.

These terms have been carefully considered and discussed with members of the Committee on Roadside Development of the Highway Research Board, and with various workers in the Bureau of Plant Industry, and others interested in terminology.



## APPENDIX IV

### APPLICATION OF ROADSIDE DEVELOPMENT EXPERIENCE TO THE WAR EFFORT

The annual reports of the Roadside Development Committee during the past few years have contained the latest results of research and experiment, combined with the lessons of experience. These studies are still important and should be continued, especially where full information is lacking, but there is immediate need for the practical application of available knowledge to critical problems.

The experience of the State highway departments in the development of improved graded earth cross section, and of methods to protect soil surfaces can be of great value in the general war effort.

Basic roadside improvement adds to the safety, appearance, utility, and economy of the highway. Flat slopes from the shoulder to the drainage way and on fills of less than eight or ten feet permit seeding and are less dangerous to traffic than steep slopes. By using flat slopes on these fills, guardrail and subsequent maintenance can be eliminated together with the usual hand work required to control weeds and snow. With the modern cross section, hand finishing is eliminated as grading can be accomplished entirely by machinery.

Present priorities on the use of materials should accelerate the use of flatter embankment slopes in wartime construction projects in order to eliminate as far as possible the need for guardrail.

Slope erosion control and use of suitable grasses or ground covers best adapted to conditions in various parts of the country have been two of the major studies of this Committee.

Part II of the 1939 Report of the Committee summarizes information relating to the protection of slopes and additional practical data on grass and ground covers are contained in the papers given at the last annual meeting by Gordon and Monteith. The complete text of these papers appear in the fore part of this bulletin.

Most of the State highway departments have had considerable experience, on a large-scale basis, in integrating topsoiling, seeding, sodding, and mulching with regular construction operations. Information from this experience is especially useful now not only in war emergency highway construction but also in application to flight strips, airfields, cantonments, and similar military construction areas where large-scale operations are required.