

100 Items

Earthwork and Landscape

Item 100

Preparing Right of Way



1. DESCRIPTION

Prepare the right of way and designated easements for construction operations by removing and disposing of all obstructions when removal of such obstructions is not specifically shown on the plans to be paid by other Items.

2. MATERIALS

Furnish materials in conformance with the plans and Specifications.

3. CONSTRUCTION

Protect designated features on the right of way and prune trees and shrubs as directed. Do not park equipment, service equipment, store materials, or disturb the root area under the branches of trees designated for preservation. Follow all local and state regulations when burning. Pile and burn brush at approved locations as directed. Spread mulched material at approved locations as directed. Handle hazardous materials in accordance with Article 6.10., "Hazardous Materials."

Clear areas shown on the plans of all obstructions, except those landscape features that are to be preserved. Such obstructions include remains of houses and other structures, foundations, floor slabs, concrete, brick, lumber, plaster, septic tank drain fields, basements, abandoned utility pipes or conduits, equipment, fences, retaining walls, and other items as specified on the plans. Remove vegetation and other landscape features not designated for preservation, curb and gutter, driveways, paved parking areas, miscellaneous stone, sidewalks, drainage structures, manholes, inlets, abandoned railroad tracks, scrap iron, and debris, whether above or below ground. Remove culverts, storm sewers, manholes, and inlets in proper sequence to maintain traffic and drainage. Removal of live utility facilities is not included in this Item.

Perform tree and brush removal and trimming in accordance with Article 752.4, "Work Methods."

Notify the Engineer in writing when items not shown on the plans and not reasonably detectable (buried with no obvious indication of presence) are encountered and required to be removed. These items will be handled in accordance with Article 4.5., "Differing Site Conditions."

Remove obstructions not designated for preservation to 2 ft. below natural ground in areas receiving embankment. Remove obstructions to 2 ft. below the excavation level in areas to be excavated. Remove obstructions to 1 ft. below natural ground in all other areas. Remove trees and stumps to 6 in. below ground level. Plug the remaining ends of abandoned underground structures over 3 in. in diameter using concrete to form a tight closure. Backfill, compact, and restore areas where obstructions have been removed unless otherwise directed. Use approved material for backfilling. Dispose of wells in accordance with Item 103, "Disposal of Wells."

Accept ownership, unless otherwise directed, and dispose of removed materials and debris at locations off the right of way in conformance with local, state, and federal requirements.

- 3.1. **Tree Protection.** Install tree protection for trees designated for preservation. Unless otherwise shown on the plans, install tree protection along the drip line of the trees using 4-ft. tall chain link fencing with line posts no more than 10 ft. apart. Install tree protection before beginning work.

4. MEASUREMENT

This Item will be measured by the acre; by the 100-ft. station, regardless of the width of the right of way; or by each tree removed.

Tree removal diameter will be measured in accordance with Article 752.5, "Measurement."

Tree protection will be measured by the acre of trees protected, by the foot of fencing, or by each tree protected.

5. PAYMENT

For "acre" and "station" measurement, the work performed in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Preparing Right of Way." For "each" measurement, the work performed in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Preparing Right of Way (Tree)" of the diameter specified. This price is full compensation for removal and trimming of designated trees and shrubs; removal and disposal of structures and obstructions; backfilling of holes; furnishing and placing concrete for plugs; and equipment, labor, tools, and incidentals.

Total payment of this Item will not exceed 10% of the original Contract amount until final acceptance. The remainder will be paid on the estimate after final acceptance in accordance with Article 5.12., "Final Acceptance."

5.1. **Tree Protection.** 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 as follows.

5.1.1. **Subsidiary Work.** The following will not be measured or paid for directly, but will be subsidiary to "Tree Protection":

- protection for Contractor project-specific locations inside and outside the right of way;
- repair to areas to be protected that are damaged by Contractor operations;
- removal and re-installation of devices and features needed for the convenience of the Contractor;
- finish grading and dressing upon removal of the protection; and
- minor adjustments, including, but not limited to, plumbing posts and re-attaching protection.

5.1.2. **Installation.** Installation will be paid for as "Tree Protection (Install)." This price is full compensation for furnishing and operating equipment and for labor, materials, tools, and incidentals.

5.1.3. **Removal.** Removal will be paid for as "Tree Protection (Remove)." This price is full compensation for furnishing and operating equipment and for proper disposal, labor, materials, tools, and incidentals.

Item 103

Disposal of Wells



1. DESCRIPTION

Remove and dispose of contaminated and uncontaminated water, petroleum, or sulfur wells. Remove appurtenances, seal and plug wells, and restore the area. Prepare and file required documents with applicable agencies.

2. CONSTRUCTION

Follow legal responsibilities, construction requirements, and methods in accordance with Article 7.3., "Laws to be Observed," and Article 7.4., "Permits, Licenses, and Taxes."

Remove all well casing and pump equipment installed in the well to 3 ft. below the finished subgrade or the existing grade, whichever is lower, and within construction limits. Pump equipment includes pump, piping, motor, housing, well structures, foundations, flumes, windmills, casing, and other projecting objects associated with the well.

All removed items and appurtenances become the property of the Contractor, excluding existing contaminated soil and liquids, after necessary cleaning and disassembling. Dispose of these items in conformance with applicable laws and regulations. Test, remove, and dispose of hazardous materials in accordance with Article 6.10., "Hazardous Materials."

Plug remaining well casing. Submit a plugging report to the appropriate agency when required by TCEQ, TDLR, or RRC. Furnish a copy to the Engineer. Backfill in accordance with Article 100.3., "Construction," after removing all appurtenances and plugging the well casing.

- 2.1. **Water Wells.** Remove all removable casing from water wells, including dry wells and abandoned wells. Pressure-grout the well with a mixture of hydraulic cement and water at a rate of not more than 7 gal. of water per sack of cement from the bottom of the well to the natural ground surface or 3 ft. below the finished subgrade, whichever is lower, in conformance with the requirements of TDLR. Obtain written approval from TDLR and the Engineer for alternative procedures.

Plug any well located in a cut section up to the proposed earthwork elevation before excavating the cut. Backfill the remainder of the well above the proposed earthwork elevation with earth immediately after plugging a well in a cut section.

- 2.2. **Petroleum and Sulfur Wells.** Have a contractor from the RRC-approved list plug the well. Empty the contents of petroleum or sulfur wells into approved containers in conformance with applicable regulations. Transport and dispose of the filled containers at an approved disposal facility or recycling center in conformance with applicable regulations. Approved plugging methods include protecting water-bearing strata with cement plugs when shown on the plans, or completely cementing the well.

3. MEASUREMENT

This Item will be measured by each properly plugged and disposed well.

4. 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 "Disposal of Water Wells" or "Disposal of Petroleum or Sulfur Wells." This price is full compensation for removing and disposing of appurtenances; plugging; furnishing records; furnishing and placing any material or items; site restoration; and equipment, labor, tools, and incidentals.

Item 104

Removing Concrete



1. DESCRIPTION

Break, remove, and salvage or dispose of existing hydraulic cement concrete.

2. CONSTRUCTION

Remove existing hydraulic cement concrete from locations shown on the plans. Avoid damaging concrete that will remain in place. Saw-cut and remove the existing concrete to neat lines. Replace any concrete damaged by the Contractor at no expense to the Department. Accept ownership and properly dispose of broken concrete in conformance with federal, state, and local regulations unless otherwise shown on the plans.

3. MEASUREMENT

Removing concrete pavement, floors, porches, patios, riprap, medians, foundations, sidewalks, driveways, and other appurtenances will be measured by the square yard (regardless of thickness) or by the cubic yard of calculated volume, in its original position.

Removing curb, curb and gutter, and concrete traffic barrier will be measured by the foot in its original position. The removal of monolithic concrete curb or dowelled concrete curb will be included in the concrete pavement measurement.

Removing retaining walls will be measured by the square yard along the front face from the top of the wall to the top of the footing.

This is a plans quantity measurement item. The quantity to be paid is the quantity shown in the proposal, unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

4. 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 "Removing Concrete" of the type specified. This price is full compensation for breaking the concrete; loading, hauling, and salvaging or disposing of the material; and equipment, labor, tools, and incidentals.

Removing retaining wall footings will not be measured or paid for directly but will be subsidiary to this item.

Item 105

Removing Treated and Untreated Base and Asphalt Pavement



1. DESCRIPTION

Break, remove, and store or dispose of existing asphalt pavement, including surface treatments, and treated or untreated base materials.

2. CONSTRUCTION

Break material retained by the Department into pieces not larger than 24 in. unless otherwise shown on the plans. Remove existing asphalt pavement before disturbing stabilized base. Avoid contamination of the asphalt materials and damage to adjacent areas. Repair material damaged by operations outside the designated locations.

Stockpile materials designated salvageable at designated sites when shown on the plans or as directed. Prepare stockpile site by removing vegetation and trash and by providing for proper drainage. Material not designated to be salvaged will become the property of the Contractor. When this material is disposed of, do so in conformance with federal, state, and local regulations.

3. MEASUREMENT

This Item will be measured by the 100-ft. station along the baseline of each roadbed, by the square yard of existing treated or untreated base and asphalt pavement in their original position, or by the cubic yard of existing treated or untreated base and asphalt pavement in their original position, as calculated by the average end area method or as shown on the plans. Square yard and cubic yard measurement will be established by the widths and depths shown on the plans and the lengths measured in the field.

4. PAYMENT

The work performed in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Removing Treated and Untreated Base and Asphalt Pavement" of the depth specified. This price is full compensation for breaking the material, loading, hauling, unloading, and stockpiling or disposing; repair to areas outside designated locations for removal; and equipment, labor, tools, and incidentals.

Item 106

Obliterating Abandoned Roadway



1. DESCRIPTION

Obliterate designated sections of abandoned roadway.

2. CONSTRUCTION

Strip and windrow existing topsoil before shaping operations. Remove asphaltic concrete pavement in conformance with applicable Item. Remove material designated as salvageable in conformance with applicable Items. Remove abandoned structures unless otherwise shown on the plans. Scarify and blend the abandoned roadbed with soil. Break down clods or lumps of material. Fill, cut, and shape the designated sections of the abandoned roadway to blend into the surrounding terrain. Eliminate ditches except where needed to facilitate drainage. Cover disturbed areas with topsoil after shaping operations to facilitate establishment of vegetation.

3. MEASUREMENT

This Item will be measured by the 100-ft. station along the baseline of the abandoned roadway or by the square yard of the roadway in its original position.

4. PAYMENT

The work performed in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Obliterating Abandoned Road." This price is full compensation for salvaging and replacing topsoil; stockpiling or disposing of materials; removing asphaltic concrete pavement; removing abandoned structures; scarifying, blending, and shaping abandoned roadway; furnishing and operating equipment; and labor, tools, and incidentals.

Item 110

Excavation



1. DESCRIPTION

Excavate areas as shown on the plans or as directed. Remove materials encountered to the lines, grades, and typical sections shown on the plans and cross-sections.

2. MATERIALS

Accept ownership of unsuitable or excess material and dispose of material in conformance with local, state, and federal regulations, at locations outside the right of way.

3. CONSTRUCTION

Maintain drainage in the excavated area to avoid damage to the roadway section. Correct any damage to the subgrade caused by weather at no additional cost to the Department.

Shape slopes to avoid loosening material below or outside the proposed grades. Remove and dispose of slides or slope failures as directed.

Excavate to the grade and sections shown on the plans. Manipulate and compact subgrade in accordance with Section 132.3.4., "Compaction Methods," unless excavation is to clean homogenous rock at final grade.

Correct unsuitable material encountered at or below subgrade as directed.

- 3.1. **Rock Cuts.** Use approved embankment material compacted in accordance with Section 132.3.4., "Compaction Methods," to replace undercut material at no additional cost if excavation extends below the grade shown on the plans.
- 3.2. **Earth Cuts.** Scarify remaining material to a depth at least 6 in. below the grade shown on the plans in areas where pavement structure will be placed. Compact subgrade in accordance with Section 132.3.4., "Compaction Methods."
- 3.3. **Acceptance Criteria.**
- 3.3.1. **Grade Tolerances.**
- 3.3.1.1. **Staged Construction.** Grade to within 1.25 in. in the cross-section and 1.25 in. in 16 ft. measured longitudinally.
- 3.3.1.2. **Turnkey Construction.** Grade to within 0.5 in. in the cross-section and 0.5 in. in 16 ft. measured longitudinally.

4. MEASUREMENT

This Item will be measured by the cubic yard in its original position as computed by the method of average end areas or as shown on the plans.

This is a plans quantity measurement item. The quantity to be paid is the quantity shown in the proposal, unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

Limits of measurement for excavation in retaining wall areas will be as shown on the plans.

Shrinkage or swelling factors will not be considered in determining the calculated quantities.

5. 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 "Excavation (Roadway)," "Excavation (Channel)," "Excavation (Special)," or "Excavation (Roadway and Channel)." This price is full compensation for authorized excavation; drying; undercutting subgrade in rock cuts and reworking or replacing the undercut material; hauling; disposal of material not used elsewhere on the project; scarification and compaction; and equipment, labor, materials, tools, and incidentals.

Drying subgrade deeper than 6 in. below grade as shown on the plans will be paid for in accordance with Article 9.7., "Payment for Extra Work and Force Account Method." Excavation and replacement of unsuitable material below grade as shown on the plans will be performed and paid for in conformance with the applicable bid items. However, if Item 132, "Embankment," is not included in the Contract, payment for replacement of unsuitable material will be paid for in accordance with Article 9.7., "Payment for Extra Work and Force Account Method."

Removing, reworking, reshaping, or re-laying existing pavement structure will be paid for in conformance with the appropriate item.

When a slide or slope failure not due to the Contractor's negligence or operation occurs, payment for removal and disposal of the slide material will be in accordance with Article 9.7., "Payment for Extra Work and Force Account Method."

Excavation in backfill areas of retaining walls will not be measured or paid for directly, but will be subsidiary to pertinent items.

Item 112

Subgrade Widening



1. DESCRIPTION

Widen the existing subgrade in conformance with the typical sections.

2. MATERIALS

Furnish water in accordance with Article 204.2., "Materials."

3. CONSTRUCTION

- 3.1. **Preparation of Embankment.** Scarify to a depth of at least 6 in. into existing adjacent embankment slopes before fill is placed.
- 3.2. **Pavement Structure Removal.** Remove material along the edge of the existing pavement. Provide a vertically uniform cut uniformly along the horizontal alignment unless otherwise shown on the plans. Conform to the typical sections for the limits of removal unless directed otherwise. Accept ownership of excess material not used in the construction of the subgrade widening. Dispose of excess material in conformance with federal, state, and local regulations.
- 3.3. **Widening.** Remove material in cut sections and move to fill sections within the project. Use material from cut sections for embankment. Place the material in fill sections in successive lifts to the line and grades shown on the typical sections. Provide additional embankment in accordance with the applicable bid item or Article 9.7., "Payment for Extra Work and Force Account Method," if all excavation has been performed and additional embankment is required to complete the work.
- 3.4. **Compaction.** Manipulate and compact the widened subgrade in accordance with Article 132.3., "Construction."

4. MEASUREMENT

This Item will be measured by the 100-ft. station along the baseline of each roadbed or by the square yard of added subgrade.

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal, unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

5. 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 "Subgrade Widening (Ordinary Compaction)" or "Subgrade Widening (Density Control)." This price is full compensation for excavation; drying; hauling of embankment material from cuts to fills; finishing of the subgrade widening; disposal of material not used elsewhere on the project; furnishing and operating equipment; scarifying; shaping; compaction; and labor, fuel, materials, tools, and incidentals.

No payment will be made for thickness or width exceeding that shown on the typical sections. "Sprinkling" and "Rolling" will not be paid for directly but will be subsidiary to this Item.

Corrections of unstable areas in the widened subgrade and embankment will be at the Contractor's expense.

In a cut section, drying required deeper than 6 in. below subgrade elevation will be paid for in accordance with Article 110.5., "Payment." In a cut section, excavation, and replacement of unsuitable material below subgrade elevations will be performed and paid for in accordance with Article 110.5., "Payment."

Item 132

Embankment



1. DESCRIPTION

Furnish, place, and compact materials for construction of roadways, embankments, levees, dikes, or any designated section of the roadway where additional material is required.

2. MATERIALS

Furnish approved material capable of forming a stable embankment from required excavation in the areas shown on the plans or from sources outside the right of way. Provide one or more of the following types as shown on the plans.

- **Type A.** Granular material that is free of vegetation or other objectionable material and meets the requirements shown in Table 1.

Table 1
Testing Requirements

Property	Test Method	Specification Limit
Liquid limit	Tex-104-E	≤45
Plasticity index (PI)	Tex-106-E	≤15
Bar linear shrinkage	Tex-107-E	≥2

Perform the linear shrinkage test only as indicated in [Tex-104-E](#).

- **Type B.** Materials such as rock, loam, clay, or other approved materials.
- **Type C.** Material meeting the specification requirements shown on the plans. Type C may be further designated as Type C1, C2, etc.
- **Type D.** Material from required excavation areas shown on the plans.

Meet the requirements of the pertinent retaining wall Items for retaining wall backfill material.

3. CONSTRUCTION

Meet the requirements of Item 7, "Legal Relations and Responsibilities," when off right of way sources are used. Notify the Engineer before opening a material source to allow for required testing. Complete preparation of the right of way in accordance with Item 100, "Preparing Right of Way," for areas to receive embankment.

Backfill tree-stump holes or other minor excavations with approved material and tamp. Restore the ground surface, including any material disked loose or washed out, to its original slope. Compact the ground surface by sprinkling in accordance with Item 204, "Sprinkling," and by rolling using equipment complying with Item 210, "Rolling," when directed.

Scarify and loosen the unpaved surface areas, except rock, to a depth of at least 6 in. unless otherwise shown on the plans. Bench slopes before placing material. Begin placement of material at the toe of slopes. Do not place trees, stumps, roots, vegetation, or other objectionable material in the embankment. Simultaneously recompact scarified material with the placed embankment material. Do not exceed the layer depth specified in Section 132.3.4., "Compaction Methods."

Construct embankments to the grade and sections shown on the plans. Construct the embankment in layers approximately parallel to the finished grade for the full width of the individual roadway cross-sections unless otherwise shown on the plans. Ensure that each section of the embankment conforms to the detailed sections or slopes. Maintain the finished section, density, and grade until the project is accepted.

- 3.1. **Earth Embankments.** Earth embankment is mainly composed of material other than rock. Construct embankments in successive layers, evenly distributing materials in lengths suited for sprinkling and rolling.

Obtain approval to incorporate rock and broken concrete produced by the construction project in the lower layers of the embankment. Place the rock and concrete outside the limits of the completed roadbed when the size of approved rock or broken concrete exceeds the layer thickness requirements in Section 132.3.4., "Compaction Methods." Cut and remove all exposed reinforcing steel from the broken concrete.

Move the material dumped in piles or windrows by blading or by similar methods and incorporate it into uniform layers. Featheredge or blend abutting layers of dissimilar material for at least 100 ft. to ensure there are no abrupt changes in the material. Break down clods or lumps of material.

Apply water free of industrial wastes and other objectionable matter to achieve the uniform moisture content specified for compaction.

Roll and sprinkle each embankment layer in accordance with Section 132.3.4.1., "Ordinary Compaction," when ordinary compaction is specified. Compact the layer to the required density in accordance with Section 132.3.4.2., "Density and Moisture Control," when density control is specified.

- 3.2. **Rock Embankments.** Rock embankment is mainly composed of rock. Construct rock embankments in successive layers for the full width of the roadway cross-section with a depth of 18 in. or less. Increase the layer depth for large rock sizes as approved. Do not exceed a depth of 2-1/2 ft. in any case. Fill voids created by the large stone matrix with smaller stones during the placement and filling operations.

Ensure the depth of the embankment layer is greater than the maximum dimension of any rock. Do not place rock greater than 2 ft. in its maximum dimension, unless otherwise approved. Construct the final layer with graded material so that the density and uniformity are in accordance with Section 132.3.4., "Compaction Methods." Break up exposed oversized material as approved.

Roll and sprinkle each embankment layer in accordance with Section 132.3.4.1., "Ordinary Compaction," when ordinary compaction is specified. Compact each layer to the required density in accordance with Section 132.3.4.2., "Density and Moisture Control," when density control is specified. Proof-roll each rock layer as directed, where density testing is not possible, in accordance with Item 216, "Proof Rolling," to ensure proper compaction.

- 3.3. **Embankments Adjacent to Culverts and Bridges.** Compact embankments adjacent to culverts and bridges in accordance with Item 400, "Excavation and Backfill for Structures."

- 3.4. **Compaction Methods.** Begin rolling longitudinally at the sides and proceed toward the center, overlapping on successive trips by at least 1/2 the width of the roller. Begin rolling at the lower side and progress toward the high side on superelevated curves. Alternate roller trips to attain slightly different lengths. Compact embankments in accordance with Section 132.3.4.1., "Ordinary Compaction," or Section 132.3.4.2., "Density and Moisture Control," as shown on the plans.

- 3.4.1. **Ordinary Compaction.** Use approved rolling equipment complying with Item 210, "Rolling," to compact each layer. Use specific equipment when required by the Engineer or as shown on the plans. Do not allow the loose depth of any layer to exceed 8 in., unless otherwise approved. Bring each layer to the moisture content directed before and during rolling operations. Compact each layer until there is no evidence of further consolidation. Maintain a level layer to ensure uniform compaction. Recompact and refinish the subgrade at no additional expense to the Department if the required stability or finish is lost for any reason.

3.4.2. **Density and Moisture Control.** Compact each layer to the required density using equipment complying with Item 210. Determine the maximum lift thickness based on the ability of the compacting operation and equipment to meet the required density. Do not exceed layer thickness of 16 in. loose or 12 in. compacted material unless otherwise approved. Maintain a level layer to ensure uniform compaction.

The Engineer will use [Tex-114-E](#) to determine the maximum dry density (D_a) and optimum moisture content (W_{opt}). Meet the requirements for field density and moisture content shown in Table 2 unless otherwise shown on the plans.

Table 2
Field Density Control Requirements

Description	Density	Moisture Content
	Tex-115-E	
PI ≤15	≥98% D_a	–
15 <PI ≤35	≥98% D_a and ≤102% D_a	≥ W_{opt} .
PI > 35	≥ 95% D_a and ≤100% D_a	≥ W_{opt} .

Each layer is subject to testing by the Engineer for density and moisture content. Each layer must be brought to the moisture content necessary to obtain the required density and placed in a manner to ensure uniform compaction over the entire layer. The density and moisture contents for the descriptions shown in Table 2 are illustrated in the Moisture-Density Curve of [Tex-114-E](#).

Provide the Engineer with the beginning and ending station numbers of the area completed for testing. The Engineer will determine roadway density and moisture content of completed sections in accordance with [Tex-115-E](#), Part I. The Engineer will determine random locations for testing in accordance with [Tex-115-E](#), Part IV. When the density is less than the required density shown in Table 2, the Engineer may perform additional testing to determine the extent of the area to correct.

Remove small areas of the layer to allow for density tests as required. Replace the removed material and recompact at no additional expense to the Department. Proof-roll in accordance with Item 216, when shown on the plans or as directed. Correct soft spots as directed.

3.5. **Maintenance of Moisture and Reworking.** Maintain the density and moisture content once all requirements shown in Table 2 are met. Maintain the moisture content no lower than 4% below optimum for soils with a PI greater than 15. Rework the material to obtain the specified compaction when the material loses the required stability, density, moisture, or finish. Alter the compaction methods and procedures on subsequent work to obtain specified density as directed.

3.6. **Acceptance Criteria.**

3.6.1. **Grade Tolerances.**

3.6.1.1. **Staged Construction.** Grade to within 1.25 in. in the cross-section and 1.25 in. in 16 ft. measured longitudinally.

3.6.1.2. **Turnkey Construction.** Grade to within 0.5 in. in the cross-section and 0.5 in. in 16 ft. measured longitudinally.

3.6.2. **Gradation Tolerances.** Ensure no more than one of the five most recent gradation tests is outside the specified limits on any individual sieve by more than 5% when gradation requirements are shown on the plans.

3.6.3. **Density Tolerances.** Ensure no more than one of the five most recent density tests for compaction work is outside the specified density limits and no test is outside the limits by more than 3 pcf.

- 3.6.4. **Plasticity Tolerances.** Ensure no more than one of the five most recent PI tests for material is outside the specified limit by more than 2 points.

4. MEASUREMENT

Shrinkage or swell factors are the Contractor's responsibility. When shown on the plans, factors are for informational purposes only.

Measurement of retaining wall backfill in embankment areas will be paid for as embankment unless otherwise shown on the plans. Limits of measurement for embankment in retaining wall areas are shown on the plans.

Embankment will be measured by the cubic yard. Measurement will be further defined for payment as follows.

- 4.1. **Final.** The cubic yard will be measured in its final position using the average end area method or as shown on the plans. The volume is computed between the original ground surface or the surface upon which the embankment is to be constructed and the lines, grades, and slopes of the embankment. In areas of salvaged topsoil, payment for embankment will be made in accordance with Item 160, "Topsoil." Shrinkage or swell factors will not be considered in determining the calculated quantities.

When measured by the cubic yard in its final position, this is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal, unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

- 4.2. **Original.** The cubic yard will be measured in its original and natural position using the average end area method or as shown on the plans.

- 4.3. **Vehicle.** The cubic yard will be measured in vehicles at the point of delivery.

5. 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 "Embankment (Final)," "Embankment (Original)," or "Embankment (Vehicle)" of the compaction method and type specified. This price is full compensation for furnishing embankment; hauling; placing, compacting, finishing, and reworking; disposal of waste material; and equipment, labor, tools, and incidentals.

When proof rolling is directed, it will be paid for in accordance with Item 216.

All sprinkling and rolling, except proof rolling, will not be paid for directly, but will be subsidiary to this Item, unless otherwise shown on the plans.

In fill sections, excavation and replacement of unsuitable material below existing elevations will be performed and paid for in conformance with the applicable bid items. However, if Item 110, "Excavation," is not included in the Contract, payment for replacement of unsuitable material will be paid for in accordance with Article 9.7., "Payment for Extra Work and Force Account Method."

Where subgrade is constructed under this Contract, correction of soft spots in the subgrade will be at the Contractor's expense. Where subgrade is not constructed under this Contract, correction of soft spots in the subgrade will be paid for in accordance with Article 9.7., "Payment for Extra Work and Force Account Method."

When rework, removal, or scarification is required for existing pavement structure that will remain, it will be measured and paid for as shown on the plans for the appropriate type.

Item 134

Backfilling Pavement Edges



1. DESCRIPTION

Backfill pavement edges in conformance with the typical sections shown on the plans.

2. MATERIALS

- 2.1. **Backfill Materials.** Use backfill material capable of sustaining vegetation unless otherwise specified on the plans. Furnish backfill material of one of the following types.
- 2.1.1. **Type A.** Backfill secured from a source outside the right of way and in accordance with the requirements as shown on the plans.
- 2.1.2. **Type B.** Backfill secured from within the existing right of way as shown on the plans or as directed.
- 2.1.3. **Type C.** Mulch sodding backfill secured from an approved source in accordance with Section 162.2.2., "Mulch Sod."
- 2.2. **Emulsified Asphalt.** Furnish erosion control material in accordance with Article 300.4., "Construction," or as shown on the plans. Furnish material meeting the requirements of Item 300, "Asphalts, Oils, and Emulsions."
- 2.3. **Fertilizer.** Furnish fertilizer in accordance with Article 166.2., "Materials," if specified on the plans.
- 2.4. **Water.** Furnish water required for proper compaction, promotion of plant growth, or emulsion dilution in accordance with Article 168.2., "Materials."

3. CONSTRUCTION

Haul the backfill material to the required location before placing the finish surface course unless directed otherwise. Spread, compact, and shape the backfill material in conformance with the typical sections after placing the finish surface course. Do not drag, push, or scrape material across completed pavement.

- 3.1. **Type A and Type B Backfill.** Bring the backfill material to the approved moisture content. Shape to the lines and grades shown on the plans and compact as directed. Blade the roadway side-slopes to a smooth surface after compacting the backfill.
- 3.2. **Type C Backfill.** Place mulch sod in a uniform windrow and keep moist as directed. Cultivate the area to receive mulch sod to a depth of 4 in. Blade and shape the mulch sod across the area in varying depths as shown on the typical sections to produce a smooth and uniform slope. Roll with a light roller or other suitable equipment. Moisten to the maximum depth of the backfill, after applying fertilizer, as directed.
- 3.3. **Fertilizer.** Distribute fertilizer uniformly in accordance with Article 166.3., "Construction," after final finishing of the backfill material when fertilizer is specified on the plans. Moisten to a depth of 4 in. or to the maximum depth of the backfill, whichever is less, after applying fertilizer.
- 3.4. **Emulsified Asphalt.** Apply the emulsified asphalt in accordance with Item 314, "Emulsified Asphalt Treatment," after backfill material is placed as shown on the plans. Evenly distribute at the rate selected shown on the plans.

4. MEASUREMENT

This Item will be measured by the 100-ft. station along the baseline of each roadbed, the foot along the pavement edge, or the cubic yard in vehicles of uniform capacity at the point of delivery.

5. 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 "Backfill" of the type specified. This price is full compensation for furnishing the emulsified asphalt, water, fertilizer, and backfill material, and for equipment, labor, materials, tools, and incidentals.

Item 150

Blading



1. DESCRIPTION

Blade portions of the project limits as shown on the plans or as directed.

2. EQUIPMENT

Use a dual or four-wheel drive power maintainer equipped with pneumatic tires, a blade at least 12 ft. long, and a wheelbase of no less than 16 ft. when work is measured and paid for by the number of hours of blading. Provide a scarifier if the maintainer is not equipped with a scarifier attachment.

3. CONSTRUCTION

Blade all areas to the section, line, and grade shown on the plans. Use a scarifier when necessary to loosen materials before blading. Use hand methods or other means around structures, trees, and other obstructions if doing the work with a blade is impractical. Do not drag, push, or scrape material along or across completed pavement.

4. MEASUREMENT

This Item will be measured by the 100-ft. station along the base line of each roadbed or by the number of hours of blading, including scarifying.

5. 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 "Blading." This price is full compensation for furnishing and operating equipment and for labor, materials, tools, and incidentals.

Work done by hand labor methods adjacent to structures, trees, and other obstructions will not be measured or paid for directly but will be subsidiary to this Item. Work performed under this Item will not include work specified for payment under other Items.

Item 152

Road Grader Work



1. DESCRIPTION

Construct subgrade and adjacent slopes. Construct portions of the roadway in conformance with the typical sections as shown on the plans where finished grade is uncontrolled.

2. EQUIPMENT

Provide equipment in accordance with Article 150.2., "Equipment."

3. CONSTRUCTION

Move earthwork of minor volumes and for short distances only. Move earthwork within the limits as shown on the plans and in at least 500-ft. sections, except on bridge projects. Remove or rework unsuitable or unstable materials in accordance with Article 110.3., "Construction," or as directed. Grade the roadway and shape to the typical sections shown on the plans. Finish to a profile uniform and consistent with the topography. Scarify existing natural ground or roadbed and compact in accordance with the method shown on the plans and Article 132.3., "Construction." Supplement "Road Grader Work" with Item 154, "Scraper Work"; Item 156, "Bulldozer Work"; or both when shown on the plans. Perform work in conformance with the requirements of the governing Item.

4. MEASUREMENT

This Item will be measured by the 100-ft. station as measured along the baseline of each roadbed or by the square yard.

5. 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 "Road Grader Work (Ordinary Compaction)" or "Road Grader Work (Density Control)." This price is full compensation for furnishing and operating equipment and for labor, materials, tools, and incidentals.

"Sprinkling" and "Rolling" will not be measured or paid for directly but will be subsidiary to this Item.

All work involved in removing and replacing or reworking unsuitable or unstable material will be paid for as specified under Item 110, "Excavation," when the Contract includes bid items governed by that Item; otherwise, the work will be paid for in accordance with Article 9.7., "Payment for Extra Work and Force Account Method." The work performed under this Item will not include work specified for payment under other Items.

Item 154

Scraper Work



1. DESCRIPTION

Excavate, remove, use, or dispose of materials using a scraper. Construct, shape, and rough-in earthwork in conformance with the required lines, grades, and typical sections as shown on the plans, or as directed.

2. EQUIPMENT

Use a scraper with a minimum 7.5-cu. yd. flush capacity. Provide a scraper capable of self-loading or provide power equipment for the scraper to load to capacity. A scraper unit consists of the scraper and any power units necessary.

3. CONSTRUCTION

Perform "Scraper Work" on the areas shown on the plans or as directed. Use suitable excavated materials, including topsoil, for constructing the required roadway sections. Compact embankment in accordance with methods shown on the plans and Article 132.3., "Construction." All excavated material becomes the property of the Contractor unless otherwise shown on the plans. Properly dispose of excess excavated material in conformance with federal, state, and local requirements at locations outside the right of way.

Rough-in with "Scraper Work." Finish in accordance with Item 150, "Blading," or Item 152, "Road Grader Work," where plans designate "Scraper Work" and either "Blading" or "Road Grader Work" within the same limits.

4. MEASUREMENT

This Item will be measured by the cubic yard hour. A scraper unit cubic yard hour is the flush capacity of the scraper in cubic yards or 70% of the manufacturer's heaped capacity, whichever is less, multiplied by the actual number of hours of scraper work performed.

5. 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 "Scraper Work (Ordinary Compaction)" or "Scraper Work (Density Control)." This price is full compensation for equipment, material removal and disposal, hauling, labor, materials, tools, and incidentals.

"Sprinkling" and "Rolling" will not be measured or paid for directly but will be subsidiary to this Item. The work performed under this Item will not include work specified for payment under other Items.

Item 156

Bulldozer Work



1. DESCRIPTION

Excavate, remove, use, or dispose of materials using a bulldozer. Construct, shape, and finish earthwork in conformance with the required lines, grades, and typical cross-sections as shown on the plans, or as directed.

2. EQUIPMENT

Use a tractor, crawler, or rubber-tired type equipment with a blade attachment at least 8 ft. long. Use a scarifier or ripper with the required tractor when necessary. Use equipment of the type specified on the plans, in conformance with the following requirements.

2.1. **Type A.** Manufacturer's rated net flywheel power of less than 150 horsepower based on Society of Automotive Engineers (SAE) standard J1349.

2.2. **Type B.** Manufacturer's rated net flywheel power of 150 or greater horsepower based on SAE standard J1349.

3. CONSTRUCTION

Perform bulldozer work on the areas as specified on the plans, using equipment as specified above. Rough-in with bulldozer work where plans designate "Bulldozer Work" and "Blading," or "Road Grader Work," within the same limits. Finish in conformance with specifications for "Blading" or "Road Grader Work." Compact embankment to ordinary compaction in accordance with Item 132, "Embankment," unless otherwise shown on the plans.

4. MEASUREMENT

This Item will be measured by the actual number of hours of use of the specified type of equipment operated.

5. 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 "Bulldozer Work." This price is full compensation for furnishing and operating equipment, labor, materials, tools, and incidentals.

"Sprinkling" and "Rolling" will not be measured or paid for directly but will be subsidiary to this Item. Work performed under this Item will not include work specified for payment under other Items.

Item 158

Specialized Excavation Work



1. DESCRIPTION

Excavate, remove, use, or dispose of materials for erosion control or other specialized needs. Construct, shape, and rough-in earthwork as shown on the plans, or as directed.

2. EQUIPMENT

Use equipment of the type shown on the plans unless otherwise approved. Use equipment that can consistently and efficiently produce the desired results.

- 2.1. **Dragline.** Self-propelled dragline with a minimum 1/2-cu. yd. bucket.
- 2.2. **Backhoe.** Tractor-mounted backhoe capable of excavating a trench at least 12 in. wide in one pass.
- 2.3. **Hydraulic Excavator.** Hydraulic excavator with a retractable, telescoping, rotatable boom attached to an interchangeable excavating or grading bucket at least 36 in. wide. The entire excavating mechanism must be mounted on a platform that rotates on a turntable assembly.
- 2.4. **Front-End Loader.** Tractor-mounted front-end loader with a minimum bucket capacity of 1-1/4 cu. yd.

3. CONSTRUCTION

Perform "Specialized Excavation Work" on the areas shown on the plans or as directed. Use suitable excavated materials, including topsoil, for constructing the required roadway sections. Compact material placed in embankment to ordinary compaction in accordance with Article 132.3., "Construction," unless otherwise shown on the plans. Accept ownership of all excavated material unless otherwise shown on the plans. Stockpile materials designated salvageable at designated sites. Properly dispose of excess excavated material in conformance with local, state, and federal requirements at locations outside the right of way.

4. MEASUREMENT

This Item will be measured by the hour of work performed for specified equipment or by the cubic yard. Measurement by the cubic yard will be further defined as follows.

- 4.1. **Original.** The cubic yard will be measured in its original position as computed by the method of average end areas or as shown on the plans.
- 4.2. **Vehicle.** The cubic yard will be measured in vehicles at the point of excavation.

5. PAYMENT

The work performed in accordance with this Item and measured by the hour as provided under "Measurement" will be paid for at the unit price bid for "Specialized Excavation Work" of the equipment type specified, or, for cubic yard measurement, payment will be made at the unit price bid for "Specialized Excavation Work (Original)" or "Specialized Excavation Work (Vehicle)." This price is full compensation for hauling and disposing or stockpiling of excess materials and for equipment, labor, materials, tools, and incidentals.

"Sprinkling" and "Rolling" will not be paid for directly but will be subsidiary to this Item. Work performed under this Item will not include work specified for payment under other Items.

Item 160

Topsoil



1. DESCRIPTION

Furnish and place topsoil to the depths and on the areas shown on the plans.

2. MATERIALS

Use easily cultivated, fertile topsoil that is free of objectionable material and resists erosion. Obtain topsoil from the right of way at sites of proposed excavation or embankment when specified on the plans, or as directed. Secure additional topsoil, if necessary, from approved sources outside the right of way in accordance with Article 7.7., "Preservation of Cultural and Natural Resources and the Environment." Ensure that the topsoil obtained from sites outside the right of way has a pH of 5.5–8.5, per [Tex-128-E](#). Topsoil is subject to testing by the Engineer. Furnish water in accordance with Article 168.2., "Materials."

3. CONSTRUCTION

Remove and dispose of objectionable material from the topsoil source before beginning the work. Stockpile topsoil, when necessary, in a windrow at designated locations along the right of way line or as directed. Keep source and stockpile areas drained during topsoil removal and leave them in a neat condition when removal is complete. Scarify the area to a depth of 4 in. before placing topsoil. Spread the topsoil to a uniform loose cover at the thickness specified. Place and shape the topsoil as directed. Water and roll the topsoil using a light roller or other suitable equipment.

4. MEASUREMENT

This Item will be measured by the 100-ft. station along the baseline of each roadbed, by the square yard, or by the cubic yard in vehicles at the point of delivery.

5. 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 "Furnishing and Placing Topsoil" of the depth specified on the plans (except for measurement by the cubic yard). This price is full compensation for securing necessary sources and royalties; furnishing topsoil; excavation, loading, hauling, stockpiling, and placing; watering; rolling; and equipment, labor, materials, tools, and incidentals. Limits of excavation and embankment for payment are shown in Figure 1.

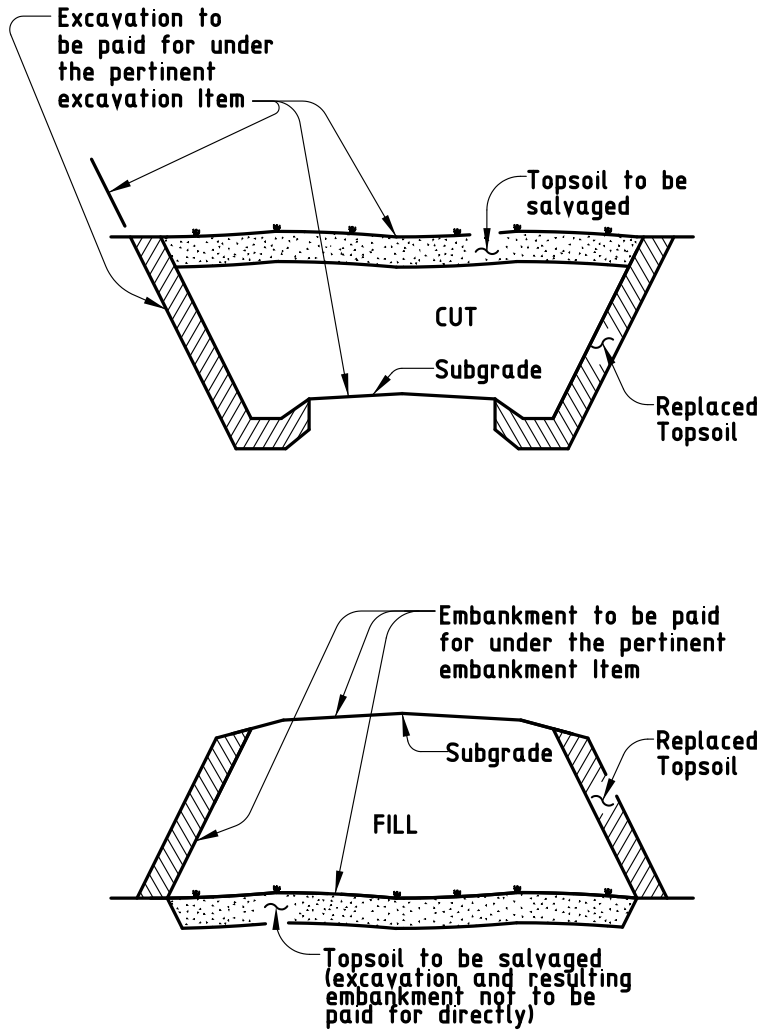


Figure 1
Roadway Cross-Sections Showing Payment for Excavation and Embankment

Item 161

Compost



1. DESCRIPTION

Furnish and place compost as shown on the plans.

2. MATERIALS

Furnish compost that has been produced by aerobic (biological) decomposition of organic matter and meets the requirements shown in Table 1. Compost feedstock may include, but is not limited to, leaves and yard trimmings, biosolids, food scraps, food-processing residuals, manure or other agricultural residuals, forest residues, bark, and paper. Ensure compost and wood chips do not contain any visible refuse, other physical contaminants, or any substance considered harmful to plant growth. Do not use materials that have been treated with chemical preservatives as a compost feedstock or as wood chips. Do not use mixed municipal solid waste compost. Provide compost in accordance with 40 CFR 503 for Class A biosolids and TCEQ health and safety regulations as defined in the TAC, Chapter 332, including the time and temperature standards in Subchapter B, Part 23. Meet the requirements of the United States Composting Council (USCC) Seal of Testing Assurance (STA) program.

Before delivery of the compost, provide quality control documentation that includes the following:

- the feedstock by percentage in the final compost product,
- a statement that the compost meets federal and state health and safety regulations,
- a statement that the composting process has met time and temperature requirements,
- a copy of the producer's STA certification, and
- a copy of the lab analysis, performed by an STA-certified lab, verifying that the compost meets the requirements shown in Table 1.

Provide a copy of the current TCEQ compliance statement signed by the facility manager when furnishing biosolids compost.

Table 1
Physical Requirements for Compost

Property	Test Method	Requirement
Particle Size	TMECC ¹ 02.02-B, "Sample Sieving for Aggregate Size Classification"	95% passing 5/8" 70% passing 3/8"
Heavy Metals Content	TMECC 04.06, "Heavy Metals and Hazardous Elements": 04.06-As, Arsenic 04.06-Cd, Cadmium 04.06-Cu, Copper 04.06-Pb, Lead 04.06-Hg, Mercury 04.06-Mo, Molybdenum 04.06-Ni, Nickel 04.06-Se, Selenium 04.06-Zn, Zinc	Pass
Salinity	TMECC 04.10-A, "1:5 Slurry Method, Mass Basis"	5.0 dS/m Max ²
pH	TMECC 04.11-A, "1:5 Slurry pH"	5.5–8.5
Maturity	TMECC 05.05-A, "% Emergence and Relative Seedling Vigor"	>80%
Organic Matter Content	TMECC 05.07-A, "Loss-On-Ignition Organic Matter Method"	25–65% (dry mass)
Stability	TMECC 05.08-B, "Carbon Dioxide Evolution Rate"	≤8
Fecal Coliform	TMECC 07.01-B, "Fecal Coliforms"	1,000 MPN/g Max

1. *Test Methods for the Examination of Composting and Compost*, published by the United States Department of Agriculture and USCC.
2. A soluble salt content up to 10.0 dS/m for compost used in compost-manufactured topsoil will be acceptable.

Maintain compost in designated stockpiles at the producer's site. The Department reserves the right to sample compost at the jobsite. Material may be tested to verify compliance with this Specification by an STA-certified laboratory. Make payment to the STA-certified laboratory approved by the Department. Submit laboratory invoices for passing tests to the Department for reimbursement. Maintain a complete record of all test reports for the previous and current calendar years.

- 2.1. **Compost Manufactured Topsoil (CMT).** Use CMT consisting of 75% topsoil blended with 25% compost measured by volume. Use topsoil in accordance with Article 160.2., "Materials."
- 2.2. **Erosion Control Compost (ECC).** Use ECC consisting of 50% untreated wood chips blended with 50% compost measured by volume. Use wood chips less than or equal to 5 in. in length with 95% passing a 2-in. screen and less than 30% passing a 1-in. screen.
- 2.3. **General Use Compost (GUC).** Use GUC consisting of 100% compost.

3. CONSTRUCTION

Prepare the types of compost for use on the project, and stockpile at the jobsite.

- 3.1. **Compost Manufactured Topsoil (CMT).** After excavation and embankment work is complete, remove and dispose of objectionable material from the topsoil before blending. Use equipment capable of blending CMT uniformly to the full depth as specified. Roll the CMT using a light corrugated drum.
- 3.2. **Erosion Control Compost (ECC).** Use only on slopes 3:1 or flatter. Apply a 2-in. uniform layer after excavation and embankment work is complete unless otherwise shown on the plans or directed. Use a light roller or other suitable equipment when rolling is specified.
- 3.3. **General Use Compost (GUC).** Apply in a uniform layer as a top dressing on established vegetation to the depth shown on the plans. Do not bury existing vegetation. Apply GUC as a backfill ingredient, in a planting soil mixture, for planting bed preparation, or as mulch, when shown on the plans.

4. MEASUREMENT

This Item will be measured by the 100-ft. station along the baseline of each roadbed, by the square yard, or by the cubic yard in vehicles at the point of delivery.

For ECC cubic yard measurement, the quantity will be the composite material, compost and topsoil or wood chips.

5. 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 "Compost Manufactured Topsoil," "Erosion Control Compost," and "General Use Compost" as follows.

- For measurement by the station and square yard, payment will be for the depth specified.
- For measurement by the cubic yard, payment will be made for material measured in vehicles.

This price is full compensation for loading, hauling, stockpiling, blending, placing, rolling, sprinkling, equipment, labor, materials (including topsoil for CMT and wood chips for ECC), tools, and incidentals. Costs associated with passing quality assurance testing will be paid for in accordance with Article 9.7., "Payment for Extra Work and Force Account Method," at invoice price with no markups.

Item 162

Sodding for Erosion Control



1. DESCRIPTION

Provide and install grass sod as shown on the plans or as directed.

2. MATERIALS

Use live, growing grass sod of the type specified on the plans. Use grass sod with a healthy root system and dense matted roots throughout the soil of the sod for a minimum thickness of 1 in. Do not use sod from areas where the grass is thinned out. Keep sod material moist from the time it is dug until it is planted. Grass sod with dried roots is unacceptable.

- 2.1. **Block Sod.** Use block, rolled, or solid sod free of noxious weeds, Johnson grass, other grasses, or any matter deleterious to the growth and subsistence of the sod.
- 2.2. **Mulch Sod.** Use mulch sod from an approved source, free of noxious weeds, Johnson grass, other grasses, or any matter deleterious to the growth and subsistence of the sod.
- 2.3. **Fertilizer.** Furnish fertilizer in accordance with Article 166.2., "Materials."
- 2.4. **Water.** Furnish water in accordance with Article 168.2., "Materials."
- 2.5. **Mulch.** Use straw mulch consisting of oat, wheat, or rice straw or hay mulch of either Bermudagrass or prairie grasses. Use straw or hay mulch free of Johnson grass and other noxious and foreign materials. Keep the mulch dry and do not use molded or rotted material.
- 2.6. **Tacking Methods.** Use a tacking agent applied in conformance with the manufacturer's recommendations or by a crimping method on all straw or hay mulch operations. Use tacking agents as approved or as specified on the plans.

3. CONSTRUCTION

Scarify the area to a depth of 4 in. before placing the sod. Plant the sod specified and mulch, if required, after the area has been completed to lines and grades as shown on the plans. Apply fertilizer uniformly over the entire area in accordance with Article 166.3., "Construction," and water in accordance with Article 168.3., "Construction." Plant between the average date of the last freeze in the spring and 6 weeks before the average date for the first freeze in the fall in accordance with the *Texas Almanac* for the project area.

- 3.1. **Sodding Types.**
 - 3.1.1. **Spot Sodding.** Use only Bermudagrass sod. Create furrows parallel to the roadway, approximately 5 in. deep and on 18-in. centers. Sod a continuous row not less than 3 in. wide in the two furrows adjacent to the roadway. Place 3-in. squares of sod on 15-in. centers in the remaining furrows. Place sod so that the root system will be completely covered by the soil. Firm all sides of the sod with the soil without covering the sod with soil.
 - 3.1.2. **Block Sodding.** Place sod over the prepared area. Roll or tamp the sodded area to form a thoroughly compacted, solid mat filling all voids in the sodded area with additional sod. Trim and remove all visible netting and backing materials. Keep sod along edges of curbs, driveways, and walkways trimmed until acceptance.

- 3.1.3. **Mulch Sodding.** Mow sod source to no shorter than 4 in., and rake and remove cuttings. Disk the sod in two directions, cutting the sod to a minimum of 4 in. Excavate the sod material to a depth of no more than 6 in. Keep excavated material moist, or it will be rejected. Distribute the mulch sod uniformly over the area to a depth of 6 in. loose, unless otherwise shown on the plans, and roll using a light roller or other suitable equipment.
- Add or reshape the mulch sod to meet the requirements of Section 162.3.2., "Finishing."
- 3.2. **Finishing.** Smooth and shape the area after planting to conform to the desired cross-sections. Spread any excess soil uniformly over adjacent areas or dispose of the excess soil as directed.
- 3.3. **Straw or Hay Mulch.** Apply straw or hay mulch for "Spot Sodding" and "Mulch Sodding" uniformly over the area as shown on the plans. Apply straw or hay mulch in accordance with Section 164.3.6., "Straw or Hay Mulching." Apply tack in accordance with Section 162.2.6., "Tacking Methods."

4. MEASUREMENT

"Spot Sodding," "Block Sodding," and "Straw or Hay Mulch" will be measured by the square yard in its final position. "Mulch Sodding" will be measured by the square yard in its final position or by the cubic yard in vehicles as delivered to the planting site.

5. 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 "Spot Sodding," "Block Sodding," "Straw or Hay Mulch," or "Mulch Sodding." This price is full compensation for securing a source, excavation, loading, hauling, placing, rolling, finishing, furnishing materials, equipment, labor, tools, supplies, and incidentals.

Fertilizer will not be paid for directly but will be subsidiary to this Item.

Water for irrigating the sodded area, when specified, will be paid for in accordance with Item 168, "Vegetative Watering." Water for maintaining and preparing the sod before planting will not be paid for directly but will be subsidiary to this Item.

Item 164

Seeding for Erosion Control



1. DESCRIPTION

Prepare the surface and provide and distribute temporary or permanent seeding for erosion control as shown on the plans or as directed.

2. MATERIALS

2.1. **Seed.** Provide seed from the previous season's crop meeting the requirements of the Texas Seed Law, including the testing and labeling for pure live seed (PLS = Purity × Germination). Furnish seed of the designated species in labeled unopened bags or containers to the Engineer before planting. Use within 12 mo. from the date of the analysis. When Buffalograss is specified, use seed that is treated with potassium nitrate (KNO₃) to overcome dormancy.

Use Tables 1–5 to determine the appropriate seeding mix and rates as shown on the plans. Include flower seeding mix in accordance with Table 5 with seeding mix shown in Table 1 and Table 2.

If a grass plant species is not available by the producers, the other grass plant species in the seeding mix will be increased proportionally by the percentage of the missing plant grass species. If a flower plant species is not available by the producers, the other flower species in the seeding mix will be increased proportionally by the percentage of the missing flower species. Substitute species and rates require approval of the Engineer before being incorporated into the seeding mx. The rates listed in the tables are for drill seeding. All other methods of placing seed will require a 25% increase in rate.

Table 1
Permanent Rural Seeding Mix

District	Clay Soils		Sandy Soils	
	Species, Percent, and Rate (lb. PLS per acre)		Species, Percent, and Rate (lb. PLS per acre)	
1 (Paris)	Hooded Windmillgrass (Burnet)	15% 0.3	Hooded Windmillgrass (Burnet)	15% 0.3
	White Tridens (Guadalupe)	20% 0.4	Sand Dropseed (Taylor)	15% 0.3
	Little Bluestem (Coastal Plains)	20% 2.0	Little Bluestem (Coastal Plains)	20% 2.0
	Florida Paspalum (Harrison)	15% 2.25	Florida Paspalum (Harrison)	15% 2.25
	Sideoats Grama (Haskell)	05% 0.5	Splitbeard Bluestem (Neches)	10% 1.0
	Splitbeard Bluestem (Neches)	05% 0.5	Sand Lovegrass (Mason)	10% 0.4
	Sand Dropseed (Taylor)	05% 0.1	Green Sprangletop (Van Horn)	15% 0.6
	Canada Wildrye (Lavaca)	10% 2.0		
	Green Sprangletop (Van Horn)	05% 0.2		
2 (Fort Worth)	Hooded Windmillgrass (Burnet)	15% 0.3	Sand Dropseed (Taylor)	15% 0.3
	White Tridens (Guadalupe)	15% 0.3	Sideoats Grama (Haskell)	15% 1.5
	Sideoats Grama (Haskell)	10% 1.0	Little Bluestem (OK Select)	15% 1.05
	Little Bluestem (OK Select)	10% 0.7	Hairy Grama (Chaparral)	15% 0.6
	Buffalograss (Texoka)	10% 1.5	Green Sprangletop (Van Horn)	10% 0.2
	Silver Bluestem (Santiago)	10% 0.4	Hooded Windmillgrass (Burnet)	10% 0.2
	Green Sprangletop (Van Horn)	10% 0.4	Shortspike Windmillgrass (Welder)	10% 0.2
	Sand Dropseed (Taylor)	10% 0.2	Silver Bluestem (Santiago)	10% 0.4
	Canada Wildrye (Lavaca)	10% 2.0		

Table 1 (continued)
Permanent Rural Seeding Mix

District	Clay Soils		Sandy Soils	
	Species, Percent, and Rate (lb. PLS per acre)		Species, Percent, and Rate (lb. PLS per acre)	
3 (Wichita Falls)	Sideoats Grama (Haskell)	15% 1.5	Hooded Windmillgrass (Burnet)	10% 0.2
	Green Sprangletop (Van Horn)	10% 0.4	Sand Dropseed (Taylor)	15% 0.3
	Hooded Windmillgrass (Burnet)	10% 0.2	Green Sprangletop (Van Horn)	15% 0.6
	White Tridens (Guadalupe)	10% 0.2	Sideoats Grama (Haskell)	10% 1.0
	Little Bluestem (OK Select)	15% 1.05	Little Bluestem (OK Select)	10% 0.7
	Silver Bluestem (Santiago)	10% 0.4	Silver Bluestem (Santiago)	10% 0.4
	Buffalograss (Texoka)	10% 1.5	Hairy Grama (Chaparral)	10% 0.4
	Blue Grama (Hachita)	05% 0.2	Arizona Cottontop (La Salle)	10% 0.4
	Sand Dropseed (Taylor)	05% 0.1	Blue Grama (Hachita)	10% 0.4
	Canada Wildrye (Lavaca)	10% 2.0		
4 (Amarillo)	Sideoats Grama (Haskell)	15% 1.5	Green Sprangletop (Van Horn)	15% 0.6
	Silver Bluestem (Santiago)	15% 0.6	Sideoats Grama (Haskell)	10% 1.0
	Buffalograss (Texoka)	15% 2.25	Sand Dropseed (Taylor)	10% 0.2
	Green Sprangletop (Van Horn)	10% 0.4	Silver Bluestem (Santiago)	10% 0.4
	Blue Grama (Hachita)	15% 0.6	Little Bluestem (OK Select)	15% 1.05
	Hooded Windmillgrass (Burnet)	05% 0.1	Arizona Cottontop (La Salle)	10% 0.4
	White Tridens (Guadalupe)	10% 0.2	Blue Grama (Hachita)	10% 0.4
	Western Wheatgrass (Barton)	10% 3.0	Sand Lovegrass (Mason)	10% 0.3
	Canada Wildrye (Lavaca)	05% 1.0	Hooded Windmillgrass (Burnet)	10% 0.2
5 (Lubbock)	Sideoats Grama (Haskell)	15% 1.5	Green Sprangletop (Van Horn)	15% 0.6
	Blue Grama (Hachita)	15% 0.6	Blue Grama (Hachita)	15% 0.6
	Silver Bluestem (Santiago)	15% 0.6	Sideoats Grama (Haskell)	10% 1.0
	Buffalograss (Texoka)	10% 1.5	Little Bluestem (OK Select)	10% 0.7
	White Tridens (Guadalupe)	10% 0.2	Hooded Windmillgrass (Burnet)	10% 0.2
	Green Sprangletop (Van Horn)	10% 0.4	Sand Dropseed (Taylor)	10% 0.2
	Hooded Windmillgrass (Burnet)	05% 0.1	Silver Bluestem (Santiago)	10% 0.4
	Galleta Grass (Viva)	05% 0.3	Arizona Cottontop (La Salle)	10% 0.4
	Western Wheatgrass (Barton)	10% 3.0	Sand Lovegrass (Mason)	10% 0.3
	Canada Wildrye (Lavaca)	05% 1.0		
6 (Odessa)	Whiplash Pappusgrass (Permian)	15% 0.9	Sand Dropseed (Taylor)	15% 0.3
	Green Sprangletop (Van Horn)	10% 0.4	Green Sprangletop (Van Horn)	10% 0.4
	Silver Bluestem (Santiago)	15% 0.6	Sideoats Grama (Brewster)	15% 1.5
	Sideoats Grama (Brewster)	10% 1.0	Whiplash Pappusgrass (Permian)	10% 0.6
	Sand Dropseed (Taylor)	10% 0.2	Hooded Windmillgrass (Burnet)	10% 0.2
	Alkali Sacaton (Saltalk)	10% 0.2	Blue Grama (Hachita)	10% 0.4
	Arizona Cottontop (La Salle)	10% 0.4	Hairy Grama (Chaparral)	10% 0.4
	Blue Grama (Hachita)	10% 0.4	Sand Lovegrass (Mason)	10% 0.3
	Galleta Grass (Viva)	10% 0.6	Little Bluestem (Pastura)	05% 0.5
			Galleta Grass (Viva)	05% 0.3
7 (San Angelo)	Sideoats Grama (Brewster)	15% 1.5	Sand Dropseed (Taylor)	15% 0.3
	Hooded Windmillgrass (Burnet)	10% 0.2	Green Sprangletop (Van Horn)	15% 0.6
	Silver Bluestem (Santiago)	10% 0.4	Hooded Windmillgrass (Burnet)	15% 0.3
	Sand Dropseed (Taylor)	10% 0.2	Shortspike Windmillgrass (Welder)	10% 0.2
	White Tridens (Guadalupe)	10% 0.2	Hairy Grama (Chaparral)	10% 0.4
	Whiplash Pappusgrass (Permian)	15% 0.9	Sand Lovegrass (Mason)	10% 0.3
	Texas Grama (Atascosa)	05% 0.5	Sideoats Grama (Brewster)	10% 1.0
	Green Sprangletop (Van Horn)	10% 0.4	Little Bluestem (OK Select)	10% 0.7
	Little Bluestem (OK Select)	05% 0.35	Whiplash Pappusgrass (Permian)	05% 0.3
	Blue Grama (Hachita)	05% 0.2		
Galleta Grass (Viva)	05% 0.3			

Table 1 (continued)
Permanent Rural Seeding Mix

District	Clay Soils		Sandy Soils	
	Species, Percent, and Rate (lb. PLS per acre)		Species, Percent, and Rate (lb. PLS per acre)	
8 (Abilene)	Sideoats Grama (Haskell)	10% 1.0	Sand Dropseed (Taylor)	15% 0.3
	Hooded Windmillgrass (Burnet)	10% 0.2	Green Sprangletop (Van Horn)	10% 0.4
	Buffalograss (Texoka)	10% 1.5	Hooded Windmillgrass (Burnet)	15% 0.3
	Blue Grama (Hachita)	10% 0.4	Silver Bluestem (Santiago)	10% 0.4
	Silver Bluestem (Santiago)	10% 0.4	Little Bluestem (OK Select)	10% 0.7
	White Tridens (Guadalupe)	15% 0.2	Shortspike Windmillgrass (Welder)	10% 0.2
	Little Bluestem (OK Select)	10% 0.7	Hairy Grama (Chaparral)	10% 0.4
	Green Sprangletop (Van Horn)	10% 0.4	Sand Lovegrass (Mason)	10% 0.3
	Whiplash Pappusgrass (Permian)	10% 0.6	Arizona Cottontop (La Salle)	10% 0.4
	Galleta Grass (Viva)	10% 0.6		
9 (Waco)	Sideoats Grama (Haskell)	15% 1.5	Hooded Windmillgrass (Burnet)	15% 0.3
	White Tridens (Guadalupe)	15% 0.3	Shortspike Windmillgrass (Welder)	10% 0.2
	Hooded Windmillgrass (Burnet)	10% 0.2	Hairy Grama (Chaparral)	10% 0.4
	Little Bluestem (OK Select)	10% 0.7	Sand Dropseed (Taylor)	15% 0.3
	Buffalograss (Texoka)	10% 1.6	Sideoats Grama (Haskell)	10% 1.0
	Halls Panicum (Oso)	05% 0.1	Little Bluestem (OK Select)	10% 0.7
	Silver Bluestem (Santiago)	10% 0.4	Green Sprangletop (Van Horn)	10% 0.4
	Sand Dropseed (Taylor)	05% 0.1	Texas Grama (Atascosa)	05% 0.15
	Green Sprangletop (Van Horn)	10% 0.4	Silver Bluestem (Santiago)	10% 0.4
	Canada Wildrye (Lavaca)	05% 1.0	Canada Wildrye (Lavaca)	05% 1.0
	Texas Grama (Atascosa)	05% 0.5		
10 (Tyler)	Hooded Windmillgrass (Burnet)	15% 0.3	Hooded Windmillgrass (Burnet)	15% 0.3
	White Tridens (Guadalupe)	15% 0.3	Sand Dropseed (Taylor)	10% 0.2
	Sand Dropseed (Taylor)	05% 0.1	Little Bluestem (Coastal Plains)	20% 2.0
	Little Bluestem (Coastal Plains)	20% 2.0	Florida Paspalum (Harrison)	15% 2.25
	Florida Paspalum (Harrison)	15% 2.25	Splitbeard Bluestem (Neches)	10% 1.0
	Splitbeard Bluestem (Neches)	10% 1.0	Green Sprangletop (Van Horn)	05% 0.2
	Green Sprangletop (Van Horn)	05% 0.2	Sand Lovegrass (Mason)	10% 0.4
	Sideoats Grama (Haskell)	05% 0.5	Red Lovegrass (Duval)	10% 0.2
	Canada Wildrye (Lavaca)	10% 2.0	Hairy Grama (Chaparral)	05% 0.2
11 (Lufkin)	Hooded Windmillgrass (Burnet)	15% 0.3	Hooded Windmillgrass (Burnet)	15% 0.3
	White Tridens (Guadalupe)	15% 0.3	Sand Dropseed (Taylor)	10% 0.2
	Little Bluestem (Coastal Plains)	20% 2.0	Little Bluestem (Coastal Plains)	20% 2.0
	Florida Paspalum (Harrison)	15% 2.25	Florida Paspalum (Harrison)	15% 2.25
	Green Sprangletop (Van Horn)	05% 0.2	Splitbeard Bluestem (Neches)	10% 1.0
	Sideoats Grama (Haskell)	05% 0.5	Green Sprangletop (Van Horn)	05% 0.2
	Splitbeard Bluestem (Neches)	10% 1.0	Red Lovegrass (Duval)	10% 0.2
	Sand Dropseed (Taylor)	05% 0.1	Sand Lovegrass (Mason)	10% 0.4
	Canada Wildrye (Lavaca)	10% 2.0	Hairy Grama (Chaparral)	05% 0.2
12 (Houston)	White Tridens (Guadalupe)	10% 0.2	Hooded Windmillgrass (Mariah)	15% 0.3
	Hooded Windmillgrass (Mariah)	10% 0.2	Sand Dropseed (Nueces)	15% 0.3
	Shortspike Windmillgrass (Welder)	15% 0.3	Shortspike Windmillgrass (Welder)	10% 0.2
	Little Bluestem (Coastal Plains)	15% 1.5	Little Bluestem (Coastal Plains)	15% 1.5
	Florida Paspalum (Harrison)	15% 2.25	Red Lovegrass (Duval)	10% 0.2
	Red Lovegrass (Duval)	05% 0.1	Florida Paspalum (Harrison)	15% 2.25
	Halls Panicum (Oso)	10% 0.2	Splitbeard Bluestem (Neches)	10% 1.0
	Splitbeard Bluestem (Neches)	05% 0.5	Hairy Grama (Chaparral)	05% 0.2
	Sand Dropseed (Nueces)	05% 0.1	Green Sprangletop (Van Horn)	05% 0.2
	Canada Wildrye (Lavaca)	10% 2.0		
13 (Yoakum)	White Tridens (Guadalupe)	15% 0.3	Hairy Grama (Chaparral)	15% 0.6
	Shortspike Windmillgrass (Welder)	15% 0.3	Hooded Windmillgrass (Mariah)	15% 0.3
	Halls Panicum (Oso)	10% 0.2	Shortspike Windmillgrass (Welder)	10% 0.2
	Plains Bristleggrass (Catarina Blend)	10% 0.6	Sand Dropseed (Nueces)	10% 0.2
	Little Bluestem (Coastal Plains)	15% 1.5	Little Bluestem (Carrizo)	10% 1.5
	Sideoats Grama (South Texas)	05% 0.75	Red Lovegrass (Duval)	10% 0.2
	Texas Grama (Atascosa)	10% 1.0	Slender Grama (Dilley)	10% 1.0
	Hooded Windmillgrass (Mariah)	05% 0.1	Plains Bristleggrass (Catarina)	10% 0.4
	Sand Dropseed (Nueces)	05% 0.1	Green Sprangletop (Van Horn)	10% 0.4
	Canada Wildrye (Lavaca)	10% 2.0		

Table 1 (continued)
Permanent Rural Seeding Mix

District	Clay Soils		Sandy Soils	
	Species, Percent, and Rate (lb. PLS per acre)		Species, Percent, and Rate (lb. PLS per acre)	
14 (Austin)	Hooded Windmillgrass (Burnet)	20% 0.4	Hairy Grama (Chaparral)	15% 0.6
	White Tridens (Guadalupe)	10% 0.2	Shortspike Windmillgrass (Welder)	10% 0.2
	Sideoats Grama (South Texas)	10% 1.5	Hooded Windmillgrass (Burnet)	10% 0.2
	Shortspike Windmillgrass (Welder)	10% 0.2	Red Lovegrass (Duval)	10% 0.2
	Plains Bristlegrass (Catarina Blend)	10% 0.6	Sand Dropseed (Nueces)	10% 0.2
	Silver Bluestem (Santiago)	10% 0.4	Little Bluestem (Carrizo)	10% 1.5
	Little Bluestem (OK Select)	10% 0.7	Sideoats Grama (South Texas)	10% 1.5
	Halls Panicum (Oso)	05% 0.1	Silver Bluestem (Santiago)	10% 0.4
	Texas Grama (Atascosa)	05% 0.5	Plains Bristlegrass (Catarina)	10% 0.4
	Canada Wildrye (Lavaca)	10% 2.0	Arizona Cottontop (La Salle)	05% 0.2
15 (San Antonio)	Sideoats Grama (South Texas)	15% 2.25	Slender Grama (Dilley)	15% 1.5
	White Tridens (Guadalupe)	15% 0.3	Hairy Grama (Chaparral)	15% 0.6
	Shortspike Windmillgrass (Welder)	10% 0.2	Shortspike Windmillgrass (Welder)	10% 0.2
	Halls Panicum (Oso)	10% 0.2	Hooded Windmillgrass (Mariah)	10% 0.2
	Plains Bristlegrass (Catarina Blend)	10% 0.6	Red Lovegrass (Duval)	10% 0.2
	False Rhodes Grass (Kinney)	05% 0.1	Sand Dropseed (Nueces)	10% 0.2
	Hooded Windmillgrass (Mariah)	05% 0.1	Pink Pappusgrass (Maverick)	05% 0.3
	Pink Pappusgrass (Maverick)	10% 0.6	Little Bluestem (Carrizo)	10% 1.5
	Texas Grama (Atascosa)	05% 0.5	Arizona Cottontop (La Salle)	05% 0.2
	Multiflower False Rhodes Grass (Hidalgo)	10% 0.2	Multiflower False Rhodes Grass (Hidalgo)	05% 0.1
Arizona Cottontop (La Salle)	05% 0.2	Plains Bristlegrass (Catarina)	05% 0.2	
16 (Corpus Christi)	Shortspike Windmillgrass (Welder)	15% 0.3	Slender Grama (Dilley)	15% 1.5
	Pink Pappusgrass (Maverick)	10% 0.6	Hairy Grama (Chaparral)	15% 0.6
	Halls Panicum (Oso)	10% 0.2	Hooded Windmillgrass (Mariah)	10% 0.2
	Plains Bristlegrass (Catarina Blend)	10% 0.6	Red Lovegrass (Duval)	10% 0.2
	White Tridens (Guadalupe)	10% 0.2	Sand Dropseed (Nueces)	10% 0.2
	Multiflower False Rhodes Grass (Hidalgo)	10% 0.2	Shortspike Windmillgrass (Welder)	10% 0.2
	Hooded Windmillgrass (Mariah)	10% 0.2	Pink Pappusgrass (Maverick)	10% 0.6
	Arizona Cottontop (La Salle)	05% 0.2	Multiflower False Rhodes Grass (Hidalgo)	10% 0.2
	Sand Dropseed (Nueces)	05% 0.1	Arizona Cottontop (La Salle)	05% 0.2
	Sideoats Grama (South Texas)	10% 1.5	Little Bluestem (Carrizo)	05% 0.75
Texas Grama (Atascosa)	05% 0.5			
17 (Bryan)	White Tridens (Guadalupe)	15% 0.3	Sand Dropseed (Taylor)	10% 0.2
	Hooded Windmillgrass (Burnet)	15% 0.3	Shortspike Windmillgrass (Welder)	10% 0.2
	Little Bluestem (Coastal Plains)	15% 1.5	Little Bluestem (Coastal Plains)	15% 1.5
	Florida Paspalum (Harrison)	15% 2.25	Green Sprangletop (Van Horn)	05% 0.2
	Shortspike Windmillgrass (Welder)	10% 0.2	Florida Paspalum (Harrison)	15% 2.25
	Splitbeard Bluestem (Neches)	05% 0.5	Splitbeard Bluestem (Neches)	10% 1.0
	Green Sprangletop (Van Horn)	05% 0.2	Hooded Windmillgrass (Burnet)	15% 0.3
	Halls Panicum (Oso)	05% 0.1	Red Lovegrass (Duval)	10% 0.2
	Sand Dropseed (Taylor)	05% 0.1	Hairy Grama (Chaparral)	10% 0.4
	Canada Wildrye (Lavaca)	10% 2.0		
18 (Dallas)	Sideoats Grama (Haskell)	15% 1.5	Shortspike Windmillgrass (Welder)	10% 0.2
	Hooded Windmillgrass (Burnet)	15% 0.3	Hairy Grama (Chaparral)	15% 0.6
	White Tridens (Guadalupe)	15% 0.3	Sand Dropseed (Taylor)	10% 0.2
	Little Bluestem (OK Select)	15% 1.05	Little Bluestem (OK Select)	15% 1.05
	Buffalograss (Texoka)	10% 1.5	Sideoats Grama (Haskell)	10% 1.0
	Silver Bluestem (Santiago)	05% 0.2	Green Sprangletop (Van Horn)	10% 0.4
	Green Sprangletop (Van Horn)	05% 0.2	Hooded Windmillgrass (Burnet)	10% 0.2
	Shortspike Windmillgrass (Welder)	05% 0.1	Sand Lovegrass (Mason)	10% 0.4
	Canada Wildrye (Lavaca)	10% 2.0	Silver Bluestem (Santiago)	10% 0.4
	Sand Dropseed (Taylor)	05% 0.1		

Table 1 (continued)
Permanent Rural Seeding Mix

District	Clay Soils		Sandy Soils	
	Species, Percent, and Rate (lb. PLS per acre)		Species, Percent, and Rate (lb. PLS per acre)	
19 (Atlanta)	White Tridens (Guadalupe)	15% 0.3	Hooded Windmillgrass (Burnet)	15% 0.3
	Hooded Windmillgrass (Burnet)	15% 0.3	Sand Dropseed (Taylor)	10% 0.2
	Little Bluestem (Coastal Plains)	20% 2.0	Little Bluestem (Coastal Plains)	20% 2.0
	Florida Paspalum (Harrison)	15% 2.25	Florida Paspalum (Harrison)	15% 2.25
	Sideoats Grama (Haskell)	10% 1.0	Splitbeard Bluestem (Neches)	10% 1.0
	Splitbeard Bluestem (Neches)	05% 0.5	Sand Lovegrass (Mason)	10% 0.4
	Green Sprangletop (Van Horn)	05% 0.2	Red Lovegrass (Duval)	10% 0.2
	Sand Dropseed (Taylor)	05% 0.1	Hairy Grama (Chaparral)	10% 0.4
	Canada Wildrye (Lavaca)	10% 2.0		
20 (Beaumont)	White Tridens (Guadalupe)	10% 0.2	Hooded Windmillgrass (Mariah)	15% 0.3
	Hooded Windmillgrass (Mariah)	10% 0.2	Sand Dropseed (Nueces)	15% 0.3
	Shortspike Windmillgrass (Welder)	15% 0.3	Shortspike Windmillgrass (Welder)	10% 0.2
	Little Bluestem (Coastal Plains)	15% 1.5	Little Bluestem (Coastal Plains)	15% 1.5
	Florida Paspalum (Harrison)	15% 2.25	Red Lovegrass (Duval)	10% 0.2
	Red Lovegrass (Duval)	05% 0.1	Florida Paspalum (Harrison)	15% 2.25
	Halls Panicum (Oso)	10% 0.2	Splitbeard Bluestem (Neches)	10% 1.0
	Splitbeard Bluestem (Neches)	05% 0.5	Hairy Grama (Chaparral)	05% 0.2
	Sand Dropseed (Nueces)	05% 0.1	Green Sprangletop (Van Horn)	05% 0.2
	Canada Wildrye (Lavaca)	10% 2.0		
	21 (Pharr)	Shortspike Windmillgrass (Welder)	10% 0.2	Slender Grama (Dille)
Halls Panicum (Oso)		10% 0.2	Hairy Grama (Chaparral)	10% 0.4
White Tridens (Guadalupe)		10% 0.2	Shortspike Windmillgrass (Welder)	10% 0.2
Plains Bristlegrass (Catarina Blend)		10% 0.6	Red Lovegrass (Duval)	10% 0.2
Pink Pappusgrass (Maverick)		10% 0.6	Sand Dropseed (Nueces)	10% 0.2
Texas Grama (Atascosa)		10% 1.0	Hooded Windmillgrass (Mariah)	10% 0.2
Multiflower False Rhodes Grass (Hidalgo)		05% 0.1	Pink Pappusgrass (Maverick)	10% 0.6
Hooded Windmillgrass (Mariah)		10% 0.2	Whiplash Pappusgrass (Webb)	10% 0.6
Arizona Cottontop (La Salle)		10% 0.4	Multiflower False Rhodes Grass (Hidalgo)	10% 0.2
Sand Dropseed (Nueces)		05% 0.1	Arizona Cottontop (La Salle)	10% 0.4
Whiplash Pappusgrass (Webb)		10% 0.6		
22 (Laredo)		Sideoats Grama (South Texas)	15% 2.25	Slender Grama (Dille)
	Pink Pappusgrass (Maverick)	10% 0.6	Hairy Grama (Chaparral)	15% 0.6
	Halls Panicum (Oso)	10% 0.2	Hooded Windmillgrass (Mariah)	10% 0.2
	Plains Bristlegrass (Catarina Blend)	10% 0.6	Red Lovegrass (Duval)	10% 0.2
	White Tridens (Guadalupe)	10% 0.2	Sand Dropseed (Nueces)	10% 0.2
	Whiplash Pappusgrass (Webb)	10% 0.6	Pink Pappusgrass (Maverick)	10% 0.6
	Shortspike Windmillgrass (Welder)	05% 0.1	Arizona Cottontop (La Salle)	10% 0.4
	Texas Grama (Atascosa)	10% 1.0	Little Bluestem (Carrizo)	05% 0.75
	False Rhodes Grass (Kinney)	10% 0.2	Sideoats Grama (South Texas)	10% 1.5
	Hooded Windmillgrass (Mariah)	10% 0.2	Shortspike Windmillgrass (Welder)	05% 0.1
23 (Brownwood)	Sideoats Grama (Haskell)	15% 1.5	Green Sprangletop (Van Horn)	15% 0.6
	Hooded Windmillgrass (Burnet)	15% 0.3	Sand Dropseed (Taylor)	15% 0.3
	White Tridens (Guadalupe)	15% 0.3	Sideoats Grama (Haskell)	10% 1.0
	Texas Grama (Atascosa)	10% 1.0	Little Bluestem (OK Select)	15% 1.05
	Little Bluestem (OK Select)	10% 0.7	Silver Bluestem (Santiago)	10% 0.4
	Buffalograss (Texoka)	10% 1.5	Hooded Windmillgrass (Burnet)	10% 0.2
	Silver Bluestem (Santiago)	10% 0.4	Shortspike Windmillgrass (Welder)	10% 0.2
	Shortspike Windmillgrass (Welder)	05% 0.1	Hairy Grama (Chaparral)	10% 0.4
	Sand Dropseed (Taylor)	05% 0.1	Sand Lovegrass (Mason)	05% 0.2
	Green Sprangletop (Van Horn)	05% 0.2		

Table 1 (continued)
Permanent Rural Seeding Mix

District	Clay Soils		Sandy Soils	
	Species, Percent, and Rate (lb. PLS per acre)		Species, Percent, and Rate (lb. PLS per acre)	
24 (El Paso)	Green Sprangletop (Van Horn)	10% 0.4	Sand Dropseed (Taylor)	20% 0.4
	Sideoats Grama (Brewster)	10% 1.0	Sideoats Grama (Brewster)	15% 1.5
	Whiplash Pappusgrass (Permian)	10% 0.6	Green Sprangletop (Van Horn)	15% 0.6
	Silver Bluestem (Santiago)	10% 0.4	Hooded Windmillgrass (Burnet)	10% 0.2
	Blue Grama (Hachita)	10% 0.4	Blue Grama (Hachita)	10% 0.4
	Galleta Grass (Viva)	10% 0.6	Hairy Grama (Chaparral)	05% 0.2
	Alkali Sacaton (Saltalk)	10% 0.2	Spike Dropseed (Potter)	10% 0.1
	Arizona Cottontop (La Salle)	10% 0.4	Little Bluestem (Pastura)	05% 0.5
	Plains Bristlegrass (Catarina Blend)	10% 0.4	Galleta grass (Viva)	10% 0.6
	False Rhodes Grass (Kinney)	10% 0.2		
25 (Childress)	Sideoats Grama (Haskell)	15% 1.5	Sideoats Grama (Haskell)	15% 1.5
	Hooded Windmillgrass (Burnet)	15% 0.3	Green Sprangletop (Van Horn)	10% 0.4
	Blue Grama (Hachita)	10% 0.4	Sand Dropseed (Taylor)	10% 0.2
	Buffalograss (Texoka)	10% 1.5	Hooded Windmillgrass (Burnet)	10% 0.2
	Galleta Grass (Viva)	10% 0.6	Arizona Cottontop (La Salle)	10% 0.4
	Silver Bluestem (Santiago)	15% 0.6	Blue Grama (Hachita)	10% 0.4
	White Tridens (Guadalupe)	10% 0.2	Little Bluestem (OK select)	10% 1.0
	Green Sprangletop (Van Horn)	05% 0.2	Galleta Grass (Viva)	10% 0.6
	Western Wheatgrass (Barton)	05% 1.5	Sand Lovegrass (Mason)	05% 0.15
	Canada Wildrye (Lavaca)	05% 1.0	Canada Wildrye (Lavaca)	10% 2.0

Table 2
Permanent Urban Seeding Mix

District	Clay Soils		Sandy Soils	
	Species and Rates (lb. PLS per acre)		Species and Rates (lb. PLS per acre)	
1 (Paris)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Bermudagrass	2.4	Bermudagrass	5.4
	Sideoats Grama (Haskell)	4.5		
2 (Fort Worth)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (El Reno)	3.6	Sideoats Grama (El Reno)	3.6
	Bermudagrass	2.4	Bermudagrass	2.1
	Buffalograss (Texoka)	1.6	Sand Dropseed (Borden Co.)	0.3
3 (Wichita Falls)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (El Reno)	4.5	Sideoats Grama (El Reno)	3.6
	Bermudagrass	1.8	Bermudagrass	1.8
	Buffalograss (Texoka)	1.6	Sand Dropseed (Borden Co.)	0.4
4 (Amarillo)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (El Reno)	3.6	Sideoats Grama (El Reno)	2.7
	Blue Grama (Hachita)	1.2	Blue Grama (Hachita)	0.9
	Buffalograss (Texoka)	1.6	Sand Dropseed (Borden Co.)	0.4
5 (Lubbock)			Buffalograss (Texoka)	1.6
	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (El Reno)	3.6	Sideoats Grama (El Reno)	2.7
	Blue Grama (Hachita)	1.2	Blue Grama (Hachita)	0.9
	Buffalograss (Texoka)	1.6	Sand Dropseed (Borden Co.)	0.4
6 (Odessa)			Buffalograss (Texoka)	1.6
	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (Haskell)	3.6	Sideoats Grama (Haskell)	2.7
	Blue Grama (Hachita)	1.2	Sand Dropseed (Borden Co.)	0.4
	Buffalograss (Texoka)	1.6	Blue Grama (Hachita)	0.9
7 (San Angelo)			Buffalograss (Texoka)	1.6
	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (Haskell)	7.2	Sideoats Grama (Haskell)	3.2
	Buffalograss (Texoka)	1.6	Sand Dropseed (Borden Co.)	0.3
		Blue Grama (Hachita)	0.9	
		Buffalograss (Texoka)	1.6	

Table 2 (continued)
Permanent Urban Seeding Mix

District	Clay Soils Species and Rates (lb. PLS per acre)		Sandy Soils Species and Rates (lb. PLS per acre)	
8 (Abilene)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (Haskell)	3.6	Sand Dropseed (Borden Co.)	0.3
	Blue Grama (Hachita)	1.2	Sideoats Grama (Haskell)	3.6
	Buffalograss (Texoka)	1.6	Blue Grama (Hachita)	0.8
			Buffalograss (Texoka)	1.6
9 (Waco)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Bermudagrass	1.8	Buffalograss (Texoka)	1.6
	Buffalograss (Texoka)	1.6	Bermudagrass	3.6
	Sideoats Grama (Haskell)	4.5	Sand Dropseed (Borden Co.)	0.4
10 (Tyler)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Bermudagrass	2.4	Bermudagrass	5.4
	Sideoats Grama (Haskell)	4.5		
11 (Lufkin)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Bermudagrass	2.4	Bermudagrass	5.4
	Sideoats Grama (Haskell)	4.5		
12 (Houston)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (Haskell)	4.5	Bermudagrass	5.4
	Bermudagrass	2.4		
13 (Yoakum)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (South Texas)	4.5	Bermudagrass	5.4
	Bermudagrass	2.4		
14 (Austin)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Bermudagrass	2.4	Bermudagrass	4.8
	Sideoats Grama (South Texas)	3.6	Buffalograss (Texoka)	1.6
	Buffalograss (Texoka)	1.6		
15 (San Antonio)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (South Texas)	3.6	Bermudagrass	4.8
	Bermudagrass	2.4	Buffalograss (Texoka)	1.6
	Buffalograss (Texoka)	1.6		
16 (Corpus Christi)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (South Texas)	3.6	Bermudagrass	4.8
	Bermudagrass	2.4	Buffalograss (Texoka)	1.6
	Buffalograss (Texoka)	1.6		
17 (Bryan)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Bermudagrass	2.4	Bermudagrass	5.4
	Sideoats Grama (Haskell)	4.5		
18 (Dallas)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (El Reno)	3.6	Buffalograss (Texoka)	1.6
	Buffalograss (Texoka)	1.6	Bermudagrass	3.6
	Bermudagrass	2.4	Sand Dropseed (Borden Co.)	0.4
19 (Atlanta)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Bermudagrass	2.4	Bermudagrass	5.4
	Sideoats Grama (Haskell)	4.5		
20 (Beaumont)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Bermudagrass	2.4	Bermudagrass	5.4
	Sideoats Grama (Haskell)	4.5		
21 (Pharr)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (South Texas)	3.6	Buffalograss (Texoka)	1.6
	Buffalograss (Texoka)	1.6	Bermudagrass	3.6
	Bermudagrass	2.4	Sand Dropseed (Borden Co.)	0.4
22 (Laredo)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (South Texas)	4.5	Buffalograss (Texoka)	1.6
	Buffalograss (Texoka)	1.6	Bermudagrass	3.6
	Bermudagrass	1.8	Sand Dropseed	0.4
23 (Brownwood)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (Haskell)	3.6	Buffalograss (Texoka)	1.6
	Bermudagrass	1.2	Bermudagrass	3.6
	Blue Grama (Hachita)	0.9	Sand Dropseed (Borden Co.)	0.4

Table 2 (continued)
Permanent Urban Seeding Mix

District	Clay Soils		Sandy Soils	
	Species and Rates (lb. PLS per acre)		Species and Rates (lb. PLS per acre)	
24 (El Paso)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (South Texas)	3.6	Buffalograss (Texoka)	1.6
	Blue Grama (Hachita)	1.2	Sand Dropseed (Borden Co.)	0.4
	Buffalograss (Texoka)	1.6	Blue Grama (Hachita)	1.8
25 (Childress)	Green Sprangletop	0.3	Green Sprangletop	0.3
	Sideoats Grama (El Reno)	3.6	Sand Dropseed (Borden Co.)	0.4
	Blue Grama (Hachita)	1.2	Buffalograss (Texoka)	1.6
	Buffalograss (Texoka)	1.6	Bermudagrass	1.8

Table 3
Temporary Cool Seeding Mix

District	All Soils Species and Rates (lb. PLS per acre)
1 (Paris), 2 (Fort Worth), 3 (Wichita Falls), 4 (Amarillo), 5 (Lubbock), 6 (Odessa), 7 (San Angelo), 8 (Abilene), 18 (Dallas), 19 (Atlanta), 23 (Brownwood), 24 (El Paso), 25 (Childress)	Oats 30.0 Wheat 30.0 Little Barley 5.0 Western Wheatgrass 5.0
9 (Waco), 10 (Tyler), 11 (Lufkin), 12 (Houston), 13 (Yoakum), 14 (Austin), 15 (San Antonio), 16 (Corpus Christi), 17 (Bryan), 20 (Beaumont), 21 (Pharr), 22 (Laredo)	Oats 40.0 Little Barley 5.0

Table 4
Temporary Warm Seeding Mix

District	All Soils Species and Rates (lb. PLS per acre)
All	Brownton Millet 20.0

Table 5
Flower Seeding Mix

District	All Soils Species and Rates (lb. PLS per acre)
1 (Paris), 10 (Tyler), 11 (Lufkin), 12 (Houston), 17 (Bryan), 19 (Atlanta), 20 (Beaumont)	Herbaceous Mimosa (Crockett) 1.5 Illinois Bundleflower (Sabine) 1.5 Thickspike Gayfeather (Pineywoods) 1.5 Purple Prairie Clover (Kaneb) 0.6 Rio Grange Clammyweed (Zapata) 2.0
2 (Fort Worth), 3 (Wichita Falls), 4 (Amarillo), 5 (Lubbock), 6 (Odessa), 7 (San Angelo), 8 (Abilene), 9 (Waco), 18 (Dallas), 23 (Brownwood), 25 (Childress)	Engelmann Daisy (Eldorado) 1.5 Awnless Bushsunflower (Plateau) 1.5 Partridge Pea 1.5 Illinois Bundleflower (Sabine) 1.5 Rio Grande Clammyweed (Zapata) 2.0
13 (Yoakum), 14 (Austin), 15 (San Antonio), 16 (Corpus Christi), 21 (Pharr), 22 (Laredo), 24 (El Paso)	Indian Blanket (Fuego) 1.0 Awnless Bushsunflower (Venado) 0.4 Prostrate Bundleflower (Balli) 1.5 Orange Zexmenia (Goliad) 0.4 Rio Grande Clammyweed (Zapata) 2.0

- 2.2. **Fertilizer.** Use fertilizer in accordance with Article 166.2., "Materials."
- 2.3. **Water.** Use water in accordance with Article 168.2, "Materials."
- 2.4. **Highly Erodible Land (HEL).** Add Bermudagrass to the mix shown in Table 1 at 1.0 PLS per acre if shown on the plans.

- 2.5. **Mulch.**
- 2.5.1. **Straw or Hay Mulch.** Use straw or hay mulch in accordance with Section 162.2.5., “Mulch.”
- 2.5.2. **Hydro Mulch.** Use mulches that are on the Approved Products List. Submit one full set of manufacturer’s literature for the selected material. Keep mulch dry until applied. Do not use molded or rotted material.
- 2.6. **Tacking Methods.** Use a tacking agent applied in conformance with the manufacturer’s recommendations or by a crimping method on all straw or hay mulch operations. Use tacking agents as approved or as shown on the plans.

3. CONSTRUCTION

Scarify the area to a depth of 4 in. before placing the seed, unless otherwise directed. Use approved equipment to vertically track the seedbed as shown on the plans or as directed. Scarify the seedbed to a depth of 4 in. or mow the area before placement of the permanent seed mix when performing permanent seeding after an established temporary seeding. Plant the seed mix specified and mulch, if required, after the area has been completed to lines and grades as shown on the plans.

Apply fertilizer in accordance with Article 166.3., “Construction.” Grass seed, flower seed, and fertilizer may be distributed simultaneously during dry seeding operations, provided each component is applied at the specified rate. Do not combine fertilizer and seed in the same slurry during hydro mulch seeding operations. Apply half of the required fertilizer during the temporary seeding operation and the other half during the permanent seeding operation when temporary and permanent seeding are both specified for the same area.

Water the seeded areas at the rates and frequencies as shown on the plans or as directed.

Distribute the seed or seed mixture uniformly over the areas shown on the plans. Provide equipment with an agitator or method to maintain a uniform seed mixture during distribution.

- 3.1. **Planting Season.**
- 3.1.1. **Temporary Seed.** Plant cool seeding mix September 1–January 31. Plant warm seeding mix February 1–August 30.
- 3.1.2. **Permanent Seed.** End planting season for all Districts by May 15. Begin planting season for each District based on the following.
- **January 15.** 1 (Paris), 10 (Tyler), 11 (Lufkin), 12 (Houston), 13 (Yoakum), 15 (San Antonio), 16 (Corpus Christi), 17 (Bryan), 19 (Atlanta), 20 (Beaumont), 21 (Pharr), and 22 (Laredo).
 - **February 1.** 2 (Fort Worth), 3 (Wichita Falls), 6 (Odessa), 7 (San Angelo), 8 (Abilene), 9 (Waco), 14 (Austin), 18 (Dallas), 23 (Brownwood), 24 (El Paso), and 25 (Childress).
 - **February 15.** 4 (Amarillo) and 5 (Lubbock).
- 3.2. **Broadcast Seeding.** Use hand or mechanical distribution or hydro-seeding on top of the soil unless otherwise directed. Apply the mixture to the area to be seeded within 30 min. of placement of components in the equipment when seed and water are to be distributed as a slurry during hydro-seeding. Roll the planted area using a light roller or other suitable equipment. Roll sloped areas along the contour of the slopes.
- 3.3. **Straw or Hay Mulch Seeding.** Plant seed in accordance with Section 164.3.2., “Broadcast Seeding.” Apply straw or hay mulch uniformly over the seeded area immediately after planting the seed or seed mixture. Apply straw or hay mulch in accordance with Section 164.3.6., “Straw or Hay Mulching.” Apply tack in accordance with Section 164.2.6., “Tacking Methods.”

- 3.4. **Hydro Mulch Seeding.** Plant seed in accordance with Section 164.3.2, "Broadcast Seeding," before placing mulch. Apply mulch uniformly over the seeded area immediately after planting the seed or seed mixture at the following rates.
- **Sandy Soils with Slopes of 3:1 or Less.** 2,500 lb. per acre.
 - **Sandy Soils with Slopes Greater than 3:1.** 3,000 lb. per acre.
 - **Clay Soils with Slopes of 3:1 or Less.** 2,000 lb. per acre.
 - **Clay Soils with Slopes Greater than 3:1.** 2,300 lb. per acre.
- Mulch rates are based on dry weight of mulch per acre. Mix mulch and water to make a slurry and apply uniformly over the seeded area using suitable equipment.
- 3.5. **Drill Seeding.** Plant at a depth of 1/4–1/3 in. using a pasture- or rangeland-type drill unless otherwise directed. Plant seed along the contour of the slopes.
- 3.6. **Straw or Hay Mulching.** Apply straw or hay mulch uniformly over the area as shown on the plans. Apply straw mulch at 2–2.5 ton per acre. Apply hay mulch at 1.5–2 ton per acre. Use a tacking method over the mulched area in accordance with Section 164.2.6., "Tacking Methods."

4. MEASUREMENT

This Item will be measured by the square yard or by the acre.

5. 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 "Broadcast Seeding (Perm)" of the rural or urban seed mixture and sandy or clay soil specified, "Broadcast Seeding (Temp)" of warm or cool season specified, "Straw or Hay Mulch Seeding (Perm)" of the rural or urban seed mixture and sandy or clay soil specified, "Straw or Hay Mulch Seeding (Temp)" of warm or cool season specified, "Hydro Mulch Seeding (Perm)" of the rural or urban seed mixture and sandy or clay soil specified, "Hydro Mulch Seeding (Temp)" of warm or cool season specified, "Drill Seeding (Perm)" of the rural or urban seed mixture and sandy or clay soil specified, "Drill Seeding (Temp)" of warm or cool season specified, and "Straw or Hay Mulching." This price is full compensation for furnishing materials, seeding mix, flower seeding mix, HEL seeding mix, water for hydro-seeding and hydro-mulching operations, mowing, tacking, labor, equipment, tools, supplies, and incidentals.

Fertilizer will not be paid for directly, but will be subsidiary to this Item.

Water for irrigating the seeded area, when specified, will be paid for under Item 168, "Vegetative Watering."

Item 166

Fertilizer



1. DESCRIPTION

Furnish and distribute fertilizer over areas specified on the plans.

2. MATERIALS

Use straight fertilizers or fertilizer-mixture containing nitrogen (N), phosphorus (P_2O_5), and potash (K_2O) nutrients unless otherwise specified on the plans. Ensure at least 50% of the nitrogen component is a slow-release granulated, sulfur-coated, or plastic-covered urea. Ensure that fertilizer-mixture or straight fertilizers are in an acceptable condition for distribution in containers labeled with the analysis data. The materials are subject to testing by the Texas A&M University Feed and Fertilizer Control Service in accordance with the Texas Commercial Fertilizer Control Act.

3. CONSTRUCTION

Furnish and distribute the fertilizer uniformly at a rate equal to 60 lb. of nitrogen per acre or at the analysis and rate specified on the plans.

Apply fertilizer as a dry material, and do not mix with water to form a slurry.

Incorporate fertilizer during seedbed preparation as specified on the plans.

4. MEASUREMENT

When fertilizer is specified on the plans to be a pay item, measurement will be by the acre of surface area covered or by the ton (2,000 lb.). Measurement by the ton will use guaranteed weight of bags or containers as shown by the manufacturer or certified scales meeting the requirements of Item 520, "Weighing and Measuring Equipment," unless otherwise approved.

5. PAYMENT

Unless otherwise specified on the plans, the work performed, materials furnished, equipment, labor, tools, and incidentals will not be measured or paid for directly but will be subsidiary to pertinent bid items.

When fertilizer is specified on the plans to be a pay item, 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 "Fertilizer." This price is full compensation for furnishing materials and performing operations.

Item 168

Vegetative Watering



1. DESCRIPTION

Provide and distribute water to promote growth of vegetation as directed.

2. MATERIALS

Use water that is clean and free of industrial wastes and other substances harmful to the growth of vegetation.

3. CONSTRUCTION

Apply water when directed. Furnish and operate equipment to distribute water at a uniform and controllable rate. Ensure that watering does not erode soil or plantings. Apply water in the required quantity where shown on the plans or as directed.

4. MEASUREMENT

This Item will be measured by the 1,000 gal. (TGL) of water as applied.

5. 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 "Vegetative Watering." This price is full compensation for furnishing and operating watering equipment and measuring devices and for furnishing and applying water, including hauling, equipment, labor, and incidentals.

Item 169

Soil Retention Blankets



1. DESCRIPTION

Provide and install soil retention blankets (SRB) as shown on the plans or as directed.

2. MATERIALS

Provide only SRB in accordance with [DMS-6370](#), "Soil Retention Blankets," and on the Approved Products List. Use material of the following product type as shown on the plans and provide a copy of the manufacturer's label for the selected product.

Provide an approved wildlife-friendly or spray-on SRB as shown on the plans.

2.1. Slope Protection Categories.

2.1.1. Slope Type.

2.1.1.1. **Moderate.** Slopes 3:1 or flatter.

2.1.1.2. **Steep.** Slopes steeper than 3:1.

2.1.2. **Soil Type.** Clay or sandy soils as shown on the plans.

2.1.3. **Application Type.** Unless otherwise shown on the plans, use rolled SRB or sprayed SRB.

2.1.4. Duration.

2.1.4.1. **Rolled SRB.** Short-term SRB lasting up to 12 mo. and long-term SRB lasting 12 mo. to 35 mo.

2.1.4.2. **Sprayed SRB.** Short-term SRB lasting up to 6 mo. and long-term SRB lasting 6 mo. or more.

2.2. Channel Protection Categories.

2.2.1. **Duration.** Temporary or permanent as shown on the plans.

2.2.2. **Shear Stress Condition.** 2, 4, 6, or 8 lb. per square foot as shown on the plans.

3. CONSTRUCTION

Provide a copy of the manufacturer's installation instructions to the Engineer before placement of the material. Place the SRB within 24 hr. after the seeding or sodding operation, or when directed. Install and anchor the SRB in conformance with the manufacturer's published literature. Before placement, mow the area to a maximum height of 4 in. or in conformance with the manufacturer's instructions. Installation includes the repair of ruts, reseeding or resodding, and the removal of rocks, clods, and other foreign materials that may prevent contact of the blanket with the soil.

4. MEASUREMENT

This Item will be measured by the square yard of surface area covered.

5. 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 "Soil Retention Blanket" of the product type shown on the plans. This price is full compensation for equipment, materials, labor, tools, mowing, and incidentals.

Item 170

Irrigation System



1. DESCRIPTION

Furnish and install an irrigation system as shown on the plans or as directed.

2. MATERIALS

Unless otherwise shown on the plans, use materials that meet the following:

- 2.1. **Irrigation Pipe.** Use polyvinyl chloride (PVC) pipe meeting ASTM D2241, SDR 13.5, SDR 17, SDR 21; or ASTM D1785, Schedule 40.
- 2.2. **Fittings.** Furnish fittings as shown on the plans. PVC fittings must be in accordance with ASTM D2466.
- 2.3. **Encasement Pipe.** Use PVC pipe in accordance with ASTM D1785, Schedule 40, with an inside diameter at least 1 in. larger than the outside diameter of the irrigation pipe, unless otherwise shown on the plans.
- 2.4. **Low-Voltage Wire.** Use minimum 14-gauge UL-approved wire for direct burial.
- 2.5. **Bentonite Slurry.** Use a viscous mixture of commercial bentonite and fresh water containing 2–8% bentonite by weight.
- 2.6. **Accessories.** Use valves, sprinkler heads, and controllers that meet the requirements shown on the plans. Use backflow preventers in conformance with the controlling water utility authority.
- 2.7. **Electrical Service.** Use materials meeting the requirements of Section 170.3.2., "Electrical Service," for installations requiring over 100 V.

3. CONSTRUCTION

Perform irrigation system work under the supervision of a person possessing an irrigator's license issued by TCEQ. Provide documentation of this license. Follow the codes of the utility service owner for irrigation system design, water and electrical connection, and service.

Coordinate irrigation system installation with plant installation, when plant installation is specified, to ensure that watering requirements are met. Prevent damage to vegetation, slopes, utilities, structures, and other amenities. Repair any damage within the right of way caused by the Contractor. Perform the following activities as required.

- 3.1. **Design.** Provide an irrigation system designed by an irrigator licensed by TCEQ. Provide a system as shown on the plans and in conformance with utility service owner and TCEQ requirements.
- 3.2. **Electrical Service.** Construct installations requiring more than 100V as shown on the plans and in accordance with the following.
 - Item 618, "Conduit"
 - Item 620, "Electrical Conductors"
 - Special Specification, "Duct Cable"
 - Item 624, "Ground Boxes"
 - Item 628, "Electrical Services."

- 3.3. **Water Service.** Construct and maintain installations shown on the plans and in conformance with the utility service owner requirements.
- 3.4. **Excavation and Trenching.** Excavate and trench deep enough to provide for at least 12 in. of soil cover for all lines, or as shown on the plans. Use common trenches for irrigation lines and wire runs where feasible. Protect trenches and boring pits less than 5 ft. deep using approved methods. Protect trenches and boring pits 5 ft. deep or deeper in accordance with Item 402, "Trench Excavation Protection," and Item 403, "Temporary Special Shoring."
- 3.5. **Boring.** Bore at the locations shown on the plans or as directed. Avoid weakening or damaging roadways or other facilities. Bore the lengths in one direction only. Maintain horizontal and vertical alignment to an accuracy of 1 in. in 10 ft. Use water or other approved fluids for boring operations only to lubricate cuttings.
- Bentonite slurry may be used in unconsolidated soil formations to consolidate cuttings for the bit, seal the walls of the hole, and furnish lubrication for subsequent removal of cuttings and installation of the pipe immediately thereafter.
- 3.6. **Water Jetting.** Use water jetting only when shown on the plans or approved in writing. Water jet the lengths in one direction only. Cease operations and complete all necessary work by boring when jetting operations fail to produce a smooth stable hole.
- 3.7. **Encasement.** Provide at least 12 in. of cover over encasement pipe. Cover is measured to the top of the subgrade for roadways and paved areas and to the bottom of the structure for sidewalks, riprap, or non-load bearing slabs.
- 3.8. **Pipe and Valve Assembly.** Assemble pipe and fittings as recommended by the manufacturers. Clean pipe and fittings of dust, dirt, and moisture before assembly. Make connections between plastic pipe and metal valves with threaded fittings and plastic adapters. Install backflow preventers as required by ordinances of the controlling water utility authority. Install pipe, valves, and valve boxes at least 12 in. from sidewalks, buildings, walls, and other objects.
- 3.9. **Sprinkler Heads and Drip Tubing.** Install sprinkler heads and drip tubing in conformance with the manufacturer's recommendations.
- 3.10. **Controller.** Install controllers in conformance with the manufacturer's recommendations.
- 3.11. **Low-Voltage Wire.** Install wire in trenches below the pipe or in a minimum 1-in. PVC pipe with at least 12 in. of cover over its entire run. Install wire in continuous lengths. Splice wire, if required, in valve boxes using waterproof materials.
- 3.12. **Closing and Flushing of PVC Pipe.** Cap or plug pipe after installation to prevent entry of foreign materials that would obstruct the flow of water. Leave caps or plugs in place until removal is necessary for completion of the installation. Thoroughly flush all water lines.
- 3.13. **Hydrostatic Tests.** Notify the Engineer in writing at least 48 hr. before testing. Center-load all pipe with enough backfill to prevent arching or slipping while under pressure. After all welded joints have cured for at least 24 hr., test the main lines from the meter to the valves, with all valves closed, for at least 2 consecutive hours by applying a continuous and static minimum 80-psi water pressure. Repair leaks if necessary, and retest. Maintain the lines under static pressure for 24 hr. without leaks before final approval.
- 3.14. **Backfill and Compaction.** Backfill trenches and other excavations with soil free of objectionable material after the irrigation system is fully operational, all tests and inspections have been performed, and the results are approved. Backfill and compact in 8-in. layers. Smooth and shape disturbed soil to final grade.
- 3.15. **Performance Period.** Operate and maintain each system for 30 days after plant installation is complete. Repair and maintain in accordance with Section 193.3.6., "Irrigation System Operation and Maintenance." This period will extend until repairs are completed.

- 3.16. **Operation.** Begin operation of each system after plant installation has begun. Operate the system until work is completed on the project. Inspect the system for proper operation, damage, and leaks every 3 mo. Adjust the irrigation schedule during inspection to provide proper soil moisture. Shut down the system and notify the Department if the system requires repairs.

4. MEASUREMENT

This Item will be measured by the lump sum or by each complete system.

5. PAYMENT

For "lump sum" measurement, 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 "Irrigation System" and "Irrigation System Design." For "each" measurement, 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 "Irrigation System" of the design specified. This price is full compensation for furnishing and installing all components; flushing and testing water lines; furnishing and operating equipment; and maintenance, repairs, design, labor, tools, and incidentals.

Protection methods for excavations 5 ft. deep or deeper will be measured and paid for as required under Item 402 or Item 403.

Water service work required will not be paid for directly but will be subsidiary to pertinent Items. This includes all fees, testing, certifications, reoccurring test or certifications, permits, utility service owner inspections, connection or meter installation charges, and other costs; making arrangements with the utility service owner for all work, testing, certifications, and materials provided by the utility service owner; furnishing, installing, and connecting all components, including lines and service supports; and materials, equipment, labor, tools, and incidentals. Applications for a utility service must designate the Department as the service owner, unless otherwise shown on the plans.

Water service costs for utility-owned service line extensions and consumption charges will be paid for by the Department. The Department will reimburse the Contractor the amount billed by the utility service owner, and an additional 5% of the invoice cost will be paid for labor, equipment, administrative costs, superintendence, and profit.

Electrical work, fees, and power consumption will be measured and paid for in accordance with Item 628.

Payment for "Irrigation System" will be executed in the following manner.

- 5.1. **Initial Payment.** When the installation is completed, 95% of the unit price bid for each system will be paid.
- 5.2. **Final Payment.** When performance period of the system is completed, the remaining portion of the unit price bid for the system will be paid.

Repair or replace system parts damaged by the Contractor's operations at the Contractor's expense. Upon completion of performance period and when Item 193, "Landscape Establishment," is not included, repair or replacement of system parts not damaged by the Contractor's operations will be paid for in accordance with Article 9.7., "Payment for Extra Work and Force Account Method."

Item 180

Wildflower Seeding



1. DESCRIPTION

Prepare the surface and provide and distribute wildflower seed as shown on the plans or as directed.

2. MATERIALS

Provide seed from the previous season's crop meeting the requirements of the Texas Seed Law, including the testing and labeling for pure live seed (PLS = Purity × Germination). Furnish seed of the designated species, in labeled unopened bags or containers, to the Engineer before planting. Use within 12 mo. from the date of the analysis.

3. EQUIPMENT

Use equipment shown on the plans or as directed that will evenly distribute the seed over the area. Provide equipment with an agitator or method to maintain a uniform seed mixture during distribution.

4. CONSTRUCTION

Mow locations designated for wildflower planting to an approximate height of 4 in. Distribute the seed or seed mixture uniformly. Distribute seed between September 1 and November 30.

If approved, seed may be distributed simultaneously in accordance with Item 164, "Seeding for Erosion Control," provided each component is applied at the specified rate.

5. MEASUREMENT

This Item will be measured by the acre.

6. PAYMENT

The work performed in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Wildflower Seeding." This price is full compensation for seed, equipment, labor, mowing, tools, and incidentals.

Item 192

Landscape Planting



1. DESCRIPTION

Provide and install plants and related materials at designated locations. Transplant plant material, including trees, shrubs, palms, and grasses as shown on the plans. Maintain plants, related materials, and landscaped areas at the specified frequency.

2. MATERIALS

Comply with the following, unless otherwise shown on the plans.

- ANSI Z60.1, "American Standard for Nursery Stock"
- American Joint Committee on Horticultural Nomenclature, *Standardized Plant Names*
- Additional requirements for plants and related materials as shown on the plans.

Use materials in conformance with the following unless otherwise shown on the plans.

2.1. **Plants.** Provide nursery-grown plants unless otherwise shown on the plans. Provide vigorous, healthy, well-rooted plants with well-formed crowns, true to sizes, and of typical shape and characteristics of the species. Provide plants with nametags attached showing the genus, species, and specified variety.

2.1.1. **Rejection of Plants.** Plants with any of the following characteristics are subject to rejection:

- disease or insect infestation, including eggs and larvae;
- dried or damaged root system or crown;
- excessive abrasion of the bark;
- prematurely opened or damaged buds;
- disfiguring knots;
- evidence of heat, freeze, or wind burn, mold, sun scald, or similar conditions;
- damaged, pruned, crooked, or multiple leaders, unless multiple leaders are specified or are normal for the species;
- cut limbs more than 3/4 in. in diameter that have not completely callused;
- dry, soggy, loose, cracked, broken, misshapen, or undersized root balls;
- processed balled roots (bench-balled);
- root balls encased in impervious material;
- overgrown or root-bound plants;
- undersized or unsound containers;
- stock not well established in containers;
- containers with less than 3/4 planting medium depth;
- abnormal balance between height and spread for the species;
- missing or broken serialized locking tags, when specified;
- any condition that is not as shown on the plans or not in conformance with nursery stock standards; or
- conditions that would prevent thriving growth or cause an unacceptable appearance.

2.2. **Backfill and Plant Soil Mix.** Use soil excavated from the plant pits or beds, or provide a loose, friable soil mix as shown on the plans. Provide a soil mix free of reproductive parts of weeds and grasses, harmful substances, and detrimental amounts of foreign matter.

2.3. **Compost.** Use compost in accordance with Section 161.2.3., "General Use Compost (GUC)."

- 2.4. **Mulch.** Provide loose, organic mulch derived from plants unless other types are shown on the plans. Use mulch free of excessive amounts of leaves, sticks, harmful substances, and detrimental amounts of soil or other foreign matter.
- 2.5. **Loose Aggregate for Ground Cover.** Furnish loose aggregate using a blend of 1–3-in. local river rock or as shown on the plans.
- 2.6. **Water.** Use water in accordance with Article 168.2., “Materials.”
- 2.7. **Fertilizer.** Use fertilizer in accordance with Article 166.2., “Materials.”
- 2.8. **Other Materials.** Provide additional incidental materials associated with landscape planting that meet the requirements shown on the plans.

3. CONSTRUCTION

Prevent damage to vegetation, slopes, utilities, structures, and other amenities. Repair any damage within the right of way caused by the Contractor at no additional expense to the Department. Provide and document a licensed pesticide applicator for the treatment of insects, diseases, animals, and vegetation in conformance with the Texas Department of Agriculture (TDA) in the appropriate use category.

- 3.1. **Plant Inspection Before Delivery.** Plants are subject to inspection at the nursery or location of collection. Provide and use serialized locking tags on plants selected by the Engineer as directed.
- 3.2. **Plant Delivery.** Notify the Engineer at least 48 hr. before delivering plants to the worksite. Coordinate with the Engineer for inspection and approval of materials upon delivery. Remove rejected plants from the worksite and replace as directed.
- 3.3. **Mark Plant Locations and Bed Outlines.** Provide and install coded markings, such as wooden stakes, to mark the locations, type of plants, and outline of planting beds. Obtain approval of the plant and bed locations before excavation begins.
- 3.4. **Transplant Plant Material.** Transplant material using approved mechanical tree spade, or hand dig, as directed. Size rootballs for hand dug material to a diameter of 12 in. per every inch of plant trunk caliper or as directed.
- 3.5. **Plant Pit Excavation.** Excavate pits for transplant, container, balled and burlapped (B&B), and fabric bag grown stock to the depth shown on the plans or at least the depth of the root ball. Excavate pits for bare root plants equal to the depth of the root system. Excavate pits on slopes using measurements shown on the plans or at least the depth of the root ball based on the uphill side of the pit. Excavate the receiving pits for mechanically transplanted plants with the same type and size of equipment used to dig the plants.

Provide a minimum horizontal dimension of 12 in. between the root ball and pit walls for the following, unless otherwise shown on the plans:

- 15-gal. or larger pots,
- 14-in. or larger boxes, and
- larger than 14-in. root balls of B&B and fabric bag grown plants.

Provide a minimum horizontal dimension of two times the root ball diameter across the pit for the following, unless otherwise shown on the plans:

- less than 15-gal. pots, and
- 14-in. or smaller root balls of B&B and fabric bag grown plants.

Provide a minimum pit diameter for bare root plants that permits the roots to spread without crowding or curving around the walls of the pit.

- 3.6. **Plant Installation.** Install plants within 24 hr. of excavating plant pits. Install transplant within 1 hr. of transplant excavation. Scarify the walls of pits as plant installation begins. Center all plants in a pit, except those mechanically collected, backfill in lifts, each lift 1/3 of the depth of the root ball, and fill the pit with water after each lift to remove air pockets. Prune protruding roots, from the root ball, for mechanically collected plants, to a point even with the cutting blades. Place the plant in the pit and work sand between the pit walls and the root ball with water until the sand fills all the cavities.
- Apply fertilizer as shown on the plans. Ensure that the top of the root ball remains at the grade shown on the plans after final settlement.
- 3.7. **Plant Basin Construction.** Construct a basin at least 8 in. deep with an inside diameter equal to the pit diameter and with a level top around the plant unless otherwise shown on the plans. Use excavated soil from the plant pits or beds, backfill material, or other approved material for the basin. Spread excess excavated materials over the right of way as directed or remove and dispose of material in conformance with local, state, and federal requirements at locations outside the right of way.
- Perform a percolation test as shown on the plans.
- 3.8. **Watering.** Coordinate the planting work to ensure that an irrigation system, when specified, operates properly to meet the watering requirements. Apply water to plants or planting areas at the rate and frequency specified for an irrigation system or for the application method shown on the plans. Keep the ground and backfill moist at least 12 in. around the entire root ball if a watering rate and frequency are not specified.
- 3.9. **Using Antitranspirants.** Apply antitranspirants, when shown on the plans, in conformance with the manufacturer's instructions.
- 3.10. **Pruning.** Accomplish pruning in accordance with ANSI A300 (Part 1) pruning standards. Retain the natural shape of plants according to the species. Limit pruning to removal of dead and broken branches, and an additional amount as specified or directed to improve the appearance and health of plants.
- Prune B&B and collected plants to reduce the original crown by approximately 20% by removing interior branches, entangled limbs, and small branches, unless otherwise shown on the plans. Prune to develop the central leader or leaders. Remove and dispose of pruning debris.
- Trim, prune, or remove existing tree limbs and brush as shown on the plans and to allow performance of the work in this Item.
- Treat exposed cuts in accordance with Item 752, "Tree and Brush Removal."
- 3.11. **Plant Support.** Install plant supports such as staking, guying, and bracing as shown on the plans. Support and keep plants in a vertical position. Use metal stakes and posts. Use protection guards to avoid damage to the plant.
- 3.12. **Tree Trunk Protection.** Install tree trunk protection guards when shown on the plans and in conformance with the manufacturer's instructions.
- 3.13. **Landscape Edge Installation.** Install landscape edging when shown on the plans and in conformance with the manufacturer's instructions.
- 3.14. **Plant Bed Preparation.** Prepare the bed and install the planting soil mix, soil amendments, vegetation barrier, and other materials as shown on the plans. Amend soil to a depth of 4 in. or as shown on the plans. Blend in 25% GUC measured by volume or as shown on the plans.
- 3.15. **Mulching.** Mulch plant basins and beds to a depth of 3 in. unless otherwise shown on the plans.

- 3.16. **Loose Aggregate for Ground Cover.** Install loose aggregate for ground cover to a depth of 4 in. or as shown on the plans. Install a commercial grade vegetation barrier fabric under the aggregate in conformance with manufacturer's instructions. The fabric must be tear- and ultraviolet-resistant.
- 3.17. **Maintenance.** Begin maintenance of each plant in accordance with this Item when the installation is completed and approved. Perform maintenance until final acceptance of the project, or for at least 90 days should the final acceptance occur less than 90 days after the plant installation is completed and approved, by following the work schedule and frequencies shown on the plans. Perform the minimum requirements in accordance with the following Sections if a work schedule and frequency are not shown on the plans.
- 3.17.1. **Watering.** Water in accordance with Section 192.3.8., "Watering."
- 3.17.2. **Mowing, Trimming, and Edging.** Mow, trim, and edge the designated locations. Remove and dispose of litter within the designated areas before mowing, trimming, and edging. Mow, trim, and edge every 15 days during the growing season or as directed, mowing at a 3-in.-4-in. height. Keep cord trimmers at least 1 ft. from plants to prevent damage to the plants. Plants damaged during the maintenance work are subject to rejection and replacement in accordance with Section 192.3.17.9., "Plant Replacement."
- 3.17.3. **Plant Basin, Bed, and Worksite Maintenance.** Chemically control weeds and unwanted grasses in plant basins, in beds, along and in structures, and around existing plants every 15 days, unless otherwise directed. Reshape plant basins and beds every 30 days as shown on the plans. Maintain mulch in accordance with Section 192.3.15., "Mulching." Ensure that herbicides do not contact desirable plants. Follow the manufacturer's instructions for handling and applying herbicides.
- 3.17.4. **Plant Supports.** Replace, repair, and adjust supports as shown on the plans and in accordance with Section 192.3.11., "Plant Support." Adjust staking and guying to prevent girdling of plant trunks. Remove or dispose of support material.
- 3.17.5. **Pruning.** Prune as shown on the plans and in accordance with Section 192.3.10., "Pruning."
- 3.17.6. **Insect, Disease, and Animal Inspection and Pesticide Treatment.** Inspect plants and planted areas at least every 15 days. Notify the Engineer of concerns and problems and recommend corrective measures in writing for approval. Treat the plants and planted areas in conformance with TDA or Texas Structural Pest Control Board laws and regulations. Follow the manufacturer's instructions for handling and applying pesticides.
- 3.17.7. **Litter Removal.** Remove litter and debris within the worksite at least every 15 days or as shown on the plans. Dispose of litter from the right of way in accordance with Item 734, "Litter Removal."
- 3.17.8. **Tree Trunk Protection.** Remove and dispose of tree trunk wrapping material and protection guards as directed.
- 3.17.9. **Plant Replacement.** Remove and dispose of dead and damaged plants from the worksite as directed. Replace plants as originally specified within 10 days of notification. Plant replacement must be completed and approved before payment is approved when notification is made between the starting date and day 30 of the maintenance work, in accordance with Section 192.5.2., "30-Day Payment." Plant replacement must be completed and approved before payment is approved when notification is made between days 31 and 60 of the maintenance work, in accordance with Section 192.5.3., "60-Day Payment." Plant replacement must be completed and approved before payment is approved when notification is made between days 61 and either the date of project final acceptance or day 90 of the maintenance work, whichever occurs later, in accordance with Section 192.5.4., "Final Payment."

4. MEASUREMENT

This Item will be measured by each plant. When mulch is specified as a separate pay item, it will be measured by the cubic yard or the square yard. When plant soil mix is specified as a separate pay item, it will be measured by the cubic yard. When landscape edge is specified as a separate pay item, it will be

measured by the foot. When soil amendment is specified as a separate pay item, it will be measured by the square yard. When loose aggregate for ground cover is specified as a separate pay item, it will be measured by the cubic yard or square yard. When plant bed preparation is specified as a separate pay item, it will be measured by the square yard. When vegetation barrier is specified as a separate pay item, it will be measured by the square yard.

When mulch, plant bed preparation, loose aggregate, soil amendment, and vegetation barrier are specified as separate pay items and measured by the square yard, they are plans quantity measurement items. The quantity to be paid is the quantity shown in the proposal, unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

5. 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 "Plant Material" of the size or "Plant Material" of the size and type specified. This price is full compensation for furnishing the plant, compost, fertilizer, mulch, plant soil mix, landscape edge, soil amendment, loose aggregate for ground cover, plant bed preparation, vegetation barrier, and maintenance.

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 "Transplant Plant Material" or "Transplant Plant Material" of the type specified. This price is full compensation to transplant the plant, compost, fertilizer, mulch, plant soil mix, landscape edge, soil amendment, loose aggregate for ground cover, plant bed preparation, and vegetation barrier. Transplant plant materials are not subject to Section 192.3.17., "Maintenance," unless shown on the plans.

When mulch, plant soil mix, landscape edge, soil amendment, loose aggregate for ground cover, plant bed preparation, and vegetation barrier are specified as separate on the plans to be pay items, 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 "Mulch" or "Mulch" of the type specified, "Plant Soil Mix" or "Plant Soil Mix" of the type specified, "Landscape Edge" or "Landscape Edge" of the type specified, "Soil Amendment" or "Soil Amendment" of the type specified, "Loose Aggregate for Ground Cover" of the type specified, "Plant Bed Preparation" or "Plant Bed Preparation" of the type specified, and "Vegetation Barrier" or "Vegetation Barrier" of the type specified. The price is full compensation for materials, equipment, labor, tools, and incidentals.

Payment for "Plant Material" will be addressed in the following manner.

- 5.1. **Initial Payment.** When the planting and installation of related materials are completed and approved, 70% of the unit price bid for each related plant will be paid.
- 5.2. **30-Day Payment.** When the first 30 days of the plant maintenance (in accordance with Section 192.3.17., "Maintenance.") are completed and approved, an additional 10% of the unit price bid for each related plant will be paid, but if the maintenance is not completed and approved, this portion of the payment will be forfeited.
- 5.3. **60-Day Payment.** When the second 30 days of the plant maintenance are completed and approved, an additional 10% of the unit price bid for each related plant will be paid, but if the maintenance is not completed and approved, this portion of the payment will be forfeited.
- 5.4. **Final Payment.** After the final inspection and acceptance of the project or the completion of the 90-day maintenance, whichever occurs later, an additional 10% of the unit price bid for all plants will be paid, but if the maintenance is not completed and approved, this portion of the payment will be forfeited.

Item 193

Landscape Establishment



1. DESCRIPTION

Establish landscape plantings and maintain landscaped areas at designated locations. If used with Item 192, "Landscape Planting," begin this Item after the final payment is approved in accordance with Section 192.5.4., "Final Payment."

2. MATERIALS

Use materials in accordance with the following unless otherwise shown on the plans:

- **Fertilizer.** Use fertilizer in accordance with Article 166.2., "Materials";
- **Mulch.** Use mulch in accordance with Article 192.2., "Materials";
- **Water.** Use water in accordance with Article 168.2., "Materials";
- **Herbicide.** Use herbicide in accordance with Article 731.2., "Materials";
- replacement plants as originally installed;
- pesticides conforming to the requirements of Section 193.3.1., "Plant Maintenance;"
- plant supports of the same type as originally installed;
- irrigation system replacement parts of the same type and manufacturer as originally installed; and
- other materials associated with landscape planting that meet the requirements shown on the plans.

3. WORK METHODS

Inspect the site at least every 2 weeks and perform the required maintenance when "Plant Maintenance" or "Irrigation System Operation and Maintenance" are measured by the month. Perform the following maintenance activities and conform to requirements shown on the plans.

- 3.1. **Plant Maintenance.** Maintain vegetation within the site in a healthy and vigorous growing condition. Apply pesticides, when required, under the supervision of a person possessing a license in the appropriate use category issued by the Texas Department of Agriculture. Provide documentation of this license and obtain approval of the pesticides before applications. Ensure pesticide applications conform to label directions and all pertinent laws and regulations.
- 3.1.1. **Pruning.** Prune as shown on the plans and in accordance with Section 192.3.10., "Pruning." Remove sucker-growth on trunks of trees.
- 3.1.2. **Insect, Disease, and Animal Control.** Notify the Engineer in writing of problems with insects, diseases, or animals as such problems arise. Treat the plants or planted areas as directed.
- 3.1.3. **Fertilization.** Apply fertilizer uniformly to all plants designated to receive fertilizer.
- 3.1.4. **Mulching, Plant Basin, and Plant Bed Maintenance.** Physically remove or apply herbicide to weeds and grasses within plant basins and plant beds before placing additional mulch. Apply and maintain mulch at a depth of 2 in. Maintain plant basins, loose aggregate areas, and plant beds free of weeds and grasses, except those that have been treated with herbicides may remain in place until removal is directed. Reshape plant basins and plant beds as necessary to conform to plan details.
- 3.1.5. **Mowing, Trimming, and Edging.** Remove and dispose of litter within the designated areas before mowing. Mow and trim grassed areas at the designated height and frequency. Edge where required. Do not use nylon

cord trimmers inside plant basins or inside beds containing plant material. Trim vegetation and remove debris from curbs, sidewalks, and other hardscape features.

- 3.1.6. **Plant Supports.** Replace, repair, and adjust supports to meet the requirements of the plans and in accordance with Section 192.3.11., "Plant Support." Adjust staking and guying to prevent girdling of plant trunks. Remove or dispose of support material.
- 3.1.7. **Tree Trunk Protection.** Maintain tree trunk protection guards. Replace damaged guards.
- 3.2. **Plant Replacement.** Remove plants selected by the Engineer and replace with plants of the original species, size, and characteristics or with approved substitutes, if required on the plans. Replace plants that have been damaged or killed due to the actions or negligence of the Contractor at no additional cost to the Department. Replace plants within the next scheduled work period following notification to begin replacement unless otherwise directed. Backfill in conformance with the plans or as directed.
- 3.3. **Watering.** Apply water at the designated rate and frequency to plants or planting areas not serviced by an existing irrigation system. Apply water as directed, adjusting rate and frequency to provide adequate moisture to plant material.
- 3.4. **Litter Removal.** Remove litter and debris within the worksite at least every 15 days or as shown on the plans. Dispose of litter from the right of way in accordance with Item 734, "Litter Removal."
- 3.5. **Landscape Treatments.** Perform landscape treatments using methods and materials described in the plans.
- 3.6. **Irrigation System Operation and Maintenance.** Repair and maintain the system under the supervision of a person possessing an irrigator's license issued by TCEQ and provide documentation of this license. Verify and adhere to all local, state, and federal regulations. Coordinate and obtain required backflow preventer testing at no cost to the Department. Operate the system using water provided by the Department unless otherwise shown on the plans. Ensure that all zones are functioning properly and providing adequate moisture to plant material using an approved watering schedule. Winterize the system, when required, to prevent freeze damage in locations where temperatures fall below 32°F. Provide plant irrigation by an approved alternate method at no cost to the Department if the system fails due to the Contractor's actions or neglect.

4. MEASUREMENT

"Landscape Establishment" will be measured by the month or by the cycle. "Plant Replacement" will be measured by each plant. "Vegetative Watering" will be measured by the 1,000 gal. (TGL) of water as applied. "Landscape Treatments" will be measured by each treatment or by the cycle. "Irrigation System Operation and Maintenance" will be measured by the month.

5. 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 "Landscape Establishment," "Plant Replacement" of the size specified, "Plant Replacement" of the size and type specified, "Plant Replacement" of the group specified, "Vegetative Watering," "Landscape Treatment" or "Landscape Treatment" of the type specified, and "Irrigation System Operation and Maintenance." This price is full compensation for furnishing and operating equipment and for litter removal, mowing, trimming, edging, pruning, fertilizer, herbicide, pesticides, tree trunk protection, plant supports, labor, materials, tools, and incidentals. Plant replacement needed due to Contractor negligence will be at no additional cost to the Department.

Costs for utility-owned water line consumption charges will be paid for by the Department. The Department will reimburse the Contractor the amount billed by the utility, and an additional 5% of the invoice cost will be paid for labor, equipment, administrative costs, superintendence, and profit.

Item 194

Roadside Amenity



1. DESCRIPTION

Install the amenity as shown on the plans or as directed.

2. MATERIALS

Furnish materials in conformance with the plans.

3. CONSTRUCTION

Use construction methods in conformance with the plans.

4. MEASUREMENT

This Item will be measured by the each.

5. 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 "Roadside Amenity" or "Roadside Amenity" of the type specified. This price is full compensation for furnishing all materials, equipment, labor, and incidentals.