

Item No. 604S
Seeding for Erosion Control

604S.1 Description

This item shall govern the preparation of a seed bed to the lines and grades indicated on the Drawings, sowing of seeds, fertilizing, mulching with straw, cellulose fiber wood chips, recycled paper mulch and other management practices along and across such areas as indicated in the Drawings or as directed by the Engineer or designated representative.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, inch-pound units are given preference with SI units shown within parentheses.

604S.2 Submittals

The submittal requirements for this specification item shall include:

- A. Identification of the type, source, mixture, PLS and rate of application of the seed.
- B. type of mulch.
- C. type of tacking agent.
- D. type and rate of application of fertilizer.

604S.3. Materials

- A. Seed. All seed must meet the requirements of the Texas Seed Law including the labeling requirements for showing pure live seed (PLS), name and type of seed. The seed furnished shall be of the previous season's crop and the date of analysis shown on each bag shall be within nine months of the time of delivery to the project. Each variety of seed shall be furnished and delivered in separate bags or containers. A sample of each variety of seed shall be furnished for analysis and testing when directed by the Engineer or designated representative.

The amount of seed planted per acre (hectare) shall be of the type specified in sections 604S.5 and 604S.6.

- B. Water. Water shall be clean and free of industrial wastes and other substances harmful to the growth of grass or the area irrigated.
- C. Top soil. Top soil shall conform to Standard Specification Item No. 601S.3(A).
- D. Fertilizer. The fertilizer shall conform to Standard Specification Item No. 606S, "Fertilizer".
- E. Straw Mulch or Hay Mulch. Straw Mulch shall be oat, wheat or rice straw. Hay mulch shall be prairie grass, Bermuda grass, or other hay approved by the

- Engineer or designated representative. The straw or hay shall be free of Johnson grass or other noxious weeds and foreign materials. It shall be kept in a dry condition and shall not be molded or rotted.
- F. Tacking Agents. The tacking agent shall be a biodegradable tacking agent, approved by the Engineer or designated representative.
 - G. Cellulose Fiber Mulch (Natural Wood). Cellulose Fiber Mulch shall be natural cellulose fiber mulch produced from grinding clean whole wood chips. The mulch shall be designed for use in conventional mechanical planting, hydraulic planting of seed or hydraulic mulching of grass seed, either alone or with fertilizers and other additives. The mulch shall be such, that when applied, the material shall form a strong, moisture-retaining mat without the need of an asphalt binder.
 - H. Recycled Paper Mulch. Recycled paper mulch shall be specifically manufactured from post-consumer paper and shall contain a minimum of 85% recycled paper content by weight, shall contain no more than 15% moisture and 1.6% ash, and shall contain no growth inhibiting material or weed seeds. The recycled paper mulch shall be mixed with grass seed and fertilizer for hydro-seeding/mulching, erosion control, and a binder over straw mulch. The mulch, when applied, shall form a strong, moisture-retaining mat of a green color without the need of an asphalt binder.

604S.4 Construction Methods

- A. Preparing Seed Bed. After the designated areas have been rough graded to the lines, grades and typical sections indicated in the Drawings or as provided for in other items of this contract and for any other soil area disturbed by the construction, a suitable seedbed shall be prepared. The seedbed shall consist of a minimum of either 6 inches (150 millimeters) of approved topsoil or 6 inches (150 millimeters) of approved salvaged topsoil, cultivated and rolled sufficiently to reduce the soil to a state of good tilth, when the soil particles on the surface are small enough and lie closely enough together to prevent the seed from being covered too deeply for optimum germination. The optimum depth for seeding shall be 1/4 inch (6 millimeters). Water shall be gently applied as required to prepare the seedbed prior to the planting operation either by broadcast seeding or hydraulic planting. Seeding shall be performed in accordance with the requirements hereinafter described.
- B. Watering. All watering shall comply with City Ordinances. Broadcast seeded areas shall immediately be watered with a minimum of 5 gallons of water per square yard (22.5 liters of water per square meter) or as needed and in the manner and quantity as directed by the Engineer or designated representative. Hydraulic seeded areas and native grass seeded areas shall be watered commencing after the tackifier has dried with a minimum of 5 gallons of water per square yard (22.5 liters of water per square meter) or as needed to keep the seedbed in a wet condition favorable for the growth of grass.

Watering applications shall constantly maintain the seedbed in a wet condition favorable for the growth of grass. Watering shall continue until the grass is uniformly 1 1/2 inches (40 mm) in height and accepted by the Engineer or

designated representative. Watering can be postponed immediately after a 1/2 inch (12.5 mm) or greater rainfall on the site but shall be resumed before the soil dries out.

*** See Modifications for additional information**

~~Availability of water from the Austin Water Utility will be limited as stated under the Water Conservation Standard, City of Austin Land Development Code Chapter 6-2, Article II, "Water Use Management Plan Established".~~

~~The use of potable water will be restricted as stated in City of Austin Land Development Code Sections 6-4-73, 6-4-54, 6-4-63, 6-4-64, 6-4-65, 6-4-81, 6-4-92, 15-9-37(D) and 15-9-101(B).~~

604S.5 Non-Native Seeding

- A. Method A - Broadcast Seeding. The seed or seed mixture in the quantity specified shall be uniformly distributed over the prepared seed bed areas indicated on the Drawings or where directed by the Engineer or designated representative. If the sowing of seed is by hand, rather than by mechanical methods, the seed shall be sown in two directions at right angles to each other. If mechanical equipment is used, all varieties of seed, as well as fertilizer, may be distributed at the same time, provided that each component is uniformly applied at the specified rate. After planting, the planted area shall be rolled with a corrugated roller of the "Cultipacker" type. All rolling of the slope areas shall be on the contour.

Seed Mixture and Rate of Application for Broadcast Seeding:

From September 15 to March 1, seeding shall be with a cool season cover crop (see Table 4) at a rate of 1.5 pounds per 1000 square feet (0.75 kilograms per 100 square meters). Cool season cover crops are not permanent erosion control. The cool season cover crops shall be mowed (scalped) to a height of less than one (1) inch after March 1, and the area shall be re-seeded in accordance with the seeding rate for March 1 to September 15, below.

From March 1 to September 15, seeding shall be with hulled Bermuda Grass at a rate of 2 pounds per 1000 square feet (1.0 kilograms per 100 square meters) with a PLS = 0.83. Fertilizer shall be applied and shall conform to Item No. 606S, "Fertilizer". Bermuda grass is a warm season grass and is therefore considered permanent erosion control once established.

- B. Method B - Hydraulic Planting. The seedbed shall be prepared as specified above and hydraulic planting equipment, which is capable of placing all materials in a single operation, shall be used.

March 1 to September 15

Hydraulic planting mixture and minimum rate of application pounds per 1000 square feet (kilograms per 100 square meters):

Hulled Bermuda Seed (PLS=0.83)	Fiber Mulch		Soil Tackifier
	Cellulose	Wood	
1 Lbs/1000 ft2 (0.5kgs/100 m2)	45.9 Lbs/1000 ft2 (22.5kgs/100 m2)		1.4 Lbs/1000 ft2 (0.7kgs/100 m2)
		57.4 Lbs/1000 ft2 (28.0kgs/100 m2)	1.5 Lbs/1000 ft2 (0.75kgs/100 m2)

September 15 to March 1

Use 1.5 pounds per 1000 square feet (0.75 kilograms per 100 square meters) of cool season cover crop (see Table 4). Cool season cover crops are not permanent erosion control. The cool season cover crops shall be mowed to a height of less than one (1) inch after March 1, and the area shall be re-seeded in accordance with the seeding rate for March 1 to September 15, above.

604S.6 Native Grass Seeding

The seedbed shall be prepared as specified above. The seed mixture and the rate of application shall be as follows:

Common Name	Botanical Name	Application rates	
		Lbs/1000 feet ²	kg/ 100 meter ²
Indiangrass	Sorghastrum nutans	0.15	0.075
Sideoats grama	Bouteloua curtipendula	0.2	0.10
Green sprangletop	Leptochloa dubia	0.15	0.075
Buffalo Grass	Buchloe dactyloides	0.25	0.125
Little Bluestem	Schizachyrium scoparium	0.2	0.10
Blue Grama Grass	Bouteloua gracilis	0.15	0.075
Canada Wild Rye	Elymus canadensis	0.2	0.10
Eastern gamagrass	Tripsacum dactyloides	0.25	0.125
Purple Three-Awn	Aristida purpurea	0.15	0.075
Switchgrass	Panicum virgatum	0.1	0.05
Bushy Bluestem	Andropogon glomeratus	0.1	0.05
Big Bluestem	Andropogon gerardii	0.1	0.05
Total Grass Seeding Rate		2.0	1.0

*** See Modifications for additional information**

Common Name	Botanical Name	Application rates
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		Lbs/1000 feet 2	kg/ 100 meter2
Black-Eyed Susan	Rudbeckia hirta	0.05	0.025
Bundleflower	Desmanthus illinoensis	0.05	0.025
Scarlet Sage	Salvia coccinea	0.10	0.05
Pink Evening Primrose	Oenothera speciosa	0.05	0.025
Phlox	Phlox Drummondii	0.05	0.025
Coreopsis	Coreopsis tinctoria	0.05	0.025
Greenthread	Thelesperma filifolium	0.05	0.025
Purple Prairie Clover	Petalostemum purpurea	0.05	0.025
Cutleaf Daisy	Engelmannia pinnatifida	0.05	0.025
Partridge Pea	Cassia fasciculata	0.1	0.05
Indian Blanket	Gaillardia pulchella	0.1	0.05
Bluebonnet	Lupinus texensis	0.15	0.075
Mexican Hat	Ratibida columnaris	0.05	0.025
Maximilian Sunflower	Helianthus maximiliani	0.1	0.05
Total Wildflower Seeding Rate		1.0	0.5
Total Warm Season Seeding Rate (Grass & Wildflowers)		3.0	1.5

Table 4: Cool Season Cover Crop			
Common Name	Botanical Name	Application rates	
		Lbs/1000 feet 2	kg/ 100 meter2
Wheat	Triticum aestivum	0.5	0.25
Oats	Avena sativa	0.5	0.25
Cereal Rye Grain	Secale cereale	0.5	0.25
Total Cool Season Cover Crop Seeding Rate		1.5	0.75
Total Cool Season Seeding Rate (Grass, Wildflowers, & Cover Crop)		4.5	2.25

Species substitution as necessary due to availability shall be approved by the Engineer or designated representative. Watering and fertilizer application shall follow procedures outlined above or as otherwise specified on the Drawings.

Seed shall be applied by broadcast, hydromulch, blown compost, or drill method and shall be distributed evenly over the topsoil areas. Mulching shall immediately follow seed application for broadcast and hydromulch applications.

September 15 to March 1

Add 1.5 pounds per 1000 square feet (0.75 kilograms per 100 square meters) of cool season cover crop (see Table 4) to grass and wildflower mixture.

604S.7 Mulch

A. Straw Mulch.

Straw mulch shall be spread uniformly over the area indicated or as designated by the Engineer or designated representative at the rate of 2 to 2 1/2 tons of straw per acre (4.5 to 5.6 megagrams of straw per hectare). The actual rate of application will be designated by the Engineer or designated representative. Straw may be hand or machine placed and adequately secured.

B. Fiber Mulch.

Cellulose and wood fiber mulch shall be spread uniformly over the area indicated or as designated by the Engineer or designated representative at the rate of 45 to 80 lbs. per 1000 square feet (22.5 to 40 kilograms per 100 square meters).

C. Recycled Paper Mulch.

Recycled paper mulch shall be spread over the area indicated on the Drawings or as designated by the Engineer or designated representative at a rate that will provide 100% coverage.

D. Shredded Brush Mulch.

Small brush or tree limbs except Juniper, which have been shredded, may be used for mulching Native Grass seeding.

604S.8 Measurement

Work and acceptable material for "Seeding for Erosion Control" will be measured by the square yard (meter: 1 meter equals 1.196 square yards) or by the acre (hectare: 1 hectare equals 2.471 acres), complete in place, with a minimum of 95 percent coverage for the non-native mix, and 95 percent coverage for the native mix. Bare areas shall not exceed 16 square feet (1.5 square meters), and the height of vegetation shall stand at a minimum of 1 1/2 inch (40 millimeters). Bare areas shall be re-prepared and reseeded as required to develop an acceptable stand of grass.

604S.9 Payment

The work performed and materials furnished and measured will be paid for at the unit bid price for "Seeding for Erosion Control" of the method specified on the Drawings and type of mulch. The unit bid price shall include full compensation for furnishing all materials, including all topsoil, water, seed, tackifier, fertilizer or mulch and for performing all operations necessary to complete the work.

All fertilizer will be measured and paid for conforming to Item No. 606S, "Fertilizer".

Payment will be made under one of the following:

Pay Item No. 604S-A:	Non-Native Seeding for Erosion Control Method, _____ Mulch	Per Square Yard
Pay Item No. 604S-B:	Non-Native Seeding for Erosion Control Method, _____ Mulch	Per Acre
Pay Item No. 604S-C:	Native Seeding for Erosion Control Method, _____ Mulch	Per Square Yard
Pay Item No. 604S-D:	Native Seeding for Erosion Control Method, _____ Mulch	Per Acre
Pay Item No. 604S-E:	Mulch, _____	Per Square Yard
Pay Item No. 604S-F:	Mulch, _____	Per Acre

End

<u>SPECIFIC</u> CROSS REFERENCE MATERIALS
Specification Item 604S "Seeding for Erosion Control"

City of Austin Technical Specifications

<u>Designation</u>	<u>Description</u>
Item No. 130S	Borrow
Item No. 606S	Fertilizer

City of Austin Land Development Code

<u>Designation</u>	<u>Description</u>
Section 6-4-52	Water Use Management Plan Established
Section 6-4-53	Applicability
Section 6-4-54	Compliance Required
Section 6-4-63	Permanent Water Use Restrictions
Section 6-4-64	Water Conservation Stage One Regulations
Section 6-4-65	Water Conservation Stage Two Regulations
Section 6-4-81	Variance
Section 6-4-92	Penalty
Section 15-9-37(D)	Customer's Responsibilities
Section 15-9-101(B)	Basis for Termination of Service

<u>RELATED</u> CROSS REFERENCE MATERIALS
Specification Item 604S "Seeding for Erosion Control"

City of Austin Technical Specifications

<u>Designation</u>	<u>Description</u>
Item No. 601S	Salvaging and Placing Topsoil
Item No. 602S	Sodding for Erosion Control
Item No. 605S	Soil Retention Blanket
Item No. 607S	Slope Stabilization
Item No. 608S	Planting

City of Austin Standards (Details)

<u>Designation</u>	<u>Description</u>
627S-1	Grass Lined Swale
633S-1	Landgrading

**Texas Department of Transportation: Standard Specifications for
Construction and Maintenance of Highways, Streets, and Bridges**

<u>Designation</u>	<u>Description</u>
Item No. 160	Furnishing and Placing Topsoil
Item No. 162	Sodding for Erosion Control
Item No. 164	Seeding for Erosion Control
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 180	Wildflower Seeding
Item No. 192	Roadside Planting and Establishment