

ATTACHMENT "B"  
STANDARD, SPECIAL, AND PROVISION  
SPECIFICATIONS

187 Pages Including Cover Page

**ITEM NO. 102S  
CLEARING AND GRUBBING**

**102S.1 Description**

This item shall govern the removal and disposal of all trees, stumps, brush, roots, shrubs, vegetation, logs, rubbish and other objectionable material.

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

**102S.2 Submittals**

The submittal requirements of this specification item may include:

- A. A permit when utility adjustments are made in the right-of-way, and
- B. A plan for removal and deposition of all clearing and grubbing materials and debris.

**102S.3 Construction Methods**

Prior to commencement of this work, all required erosion control and tree protection measures indicated on the Drawings shall be in place. The existing utilities shall be located and protected as specified in the Standard Contract Documents, Section 00700, "General Conditions" and/or indicated on the Drawings. A permit shall be required when utility adjustments are to be made in preparation for construction in the right-of-way, as specified in Section 5.2.0 of the City of Austin Utilities Criteria Manual.

Areas within the construction limits indicated on the Drawings shall be cleared of all trees, stumps, brush, etc., as defined in section 102S.1; except trees or shrubs scheduled for preservation which shall be carefully trimmed as directed, in accordance with Item No. 610S, "Preservation of Trees and Other Vegetation" and shall be protected from scarring, barking or other injuries during construction operations. All exposed cuts over 2 inches (50 millimeters) in diameter, exposed ends of pruned limbs or scarred bark shall be treated with an approved asphalt material within 24 hours of the pruning or injury.

Construction equipment shall not be operated nor construction materials stockpiled under the canopies of trees, unless otherwise indicated on the Drawings and/or specified in the Contract Documents. Excavation or embankment materials shall not be placed within the drip line of trees until tree wells are constructed.

Within the construction limits or areas indicated, all obstructions, stumps, roots, vegetation, abandoned structures, rubbish and objectionable material shall be removed to the following depths:

1. In areas to receive 6 inches (150 mm) or more embankment, a minimum of 12 inches

(300 mm) below natural ground.

2. In areas to receive embankment less than 6 inches (150 mm), a minimum of 18 inches (450 mm) below the lower elevation of embankment, structure or excavation.

3. In areas to be excavated a minimum of 18 inches (450 mm) below the lower elevation of the embankment, structure or excavation.

4. In all other areas a minimum of 12 inches (300 mm) below natural ground.

Holes remaining after removal of all obstructions, objectionable material, trees, stumps, etc. shall be backfilled with select embankment material and compacted by approved methods. All cleared and grubbed material shall be disposed of in a manner satisfactory to the Engineer or designated representative. Unless otherwise provided, all materials as described above shall become the property of the Contractor and removed from the site and disposed of at a permitted disposal site.

Burning materials at the site shall conform to Standard Contract Document Section 01550, "Public Safety and Convenience".

**102S.4 Measurement**

"Clearing and Grubbing", when included in the contract as a pay item, will be measured by the acre (hectare: 1 hectare is equal to 2.471 acres), 100 foot (100 feet is equal to 30.5 meters) stations or lump sum, regardless of the width of the right of way.

**102S.5 Payment**

The work and materials presented herein will not be paid for directly, but shall be included in the unit price bid for the item of construction in which this item is used, unless specified as a separate pay item in the contract bid form. When included for payment, it shall be paid for at the unit bid price for "Clearing and Grubbing". This price shall include full compensation for all work herein specified, including the furnishing of all materials, equipment, tools, labor and incidentals necessary to complete the Work.

Payment, when included as a contract pay items, will be made under one of the following:

- Pay Item No. 102S-A:        Clearing and Grubbing        Per Acre.
- Pay Item No. 102S-B:        Clearing and Grubbing        Per 100 foot Station.
- Pay Item No. 102S-C:        Clearing and Grubbing        Lump Sum.

**End**

**SPECIFIC CROSS REFERENCE MATERIALS**  
Specification Item 102S, "CLEARING AND GRUBBING"

**City of Austin Standard Contract Documents**

| <b>Designation</b> | <b>Description</b>            |
|--------------------|-------------------------------|
| 00700              | General Conditions            |
| 01550              | Public Safety and Convenience |

**City of Austin Utilities Criteria Manual**

| <b>Designation</b> | <b>Description</b>                               |
|--------------------|--|
| Section 5.2.0      | Permit for Excavation in the Public Right-of-Way |

**City of Austin Standard Specifications**

| <b>Designation</b> | <b>Description</b>                         |
|--------------------|--|
| Item No. 110S      | Street Excavation                          |
| Item No. 111S      | Excavation                                 |
| Item No. 610S      | Preservation of Trees and Other Vegetation |

RELATED CROSS REFERENCE MATERIALS  
Specification 102S, "CLEARING AND GRUBBING"

**The Code of the City of Austin, Code of Ordinances, Volume 1**

| <b>Designation</b> | <b>Description</b>             |
|--------------------|--------------------------------|
| Article 15-12-166  | Permit Required                |
| Article 15-12-173  | Conditions for Permit Issuance |
| Article 15-12-174  | Permit Term                    |

City of Austin Standard Contract Documents

| <u>Designation</u> | <u>Description</u>   |
|--------------------|----------------------|
| 01500              | Temporary Facilities |

**City of Austin Standard Specifications**

| <b>Designation</b> | <b>Description</b>                               |
|--------------------|--|
| Item No. 101S      | Preparing Right of Way                           |
| Item No. 104S      | Removing Portland Cement Concrete                |
| Item No. 120S      | Channel Excavation                               |
| Item No. 132S      | Embankment                                       |
| Item No. 201S      | Subgrade Preparation                             |
| Item No. 203       | Lime Treatment for Materials In Place            |
| Item No. 204S      | Portland Cement Treatment for Materials In Place |
| Item No. 230S      | Rolling (Flat Wheel)                             |
| Item No. 232S      | Rolling (Pneumatic Tire)                         |
| Item No. 234S      | Rolling (Tamping)                                |
| Item No. 236S      | Rolling (Proof)                                  |
| Item No. 602S      | Sodding for Erosion Control                      |
| Item No. 604S      | Seeding for Erosion Control                      |
| Item No. 622S      | Diversion Dike                                   |
| Item No. 628S      | Sediment Containment Dikes                       |
| Item No. 642S      | Silt Fence                                       |

**City of Austin Standard Details**

| <b>Designation</b> | <b>Description</b>                      |
|--------------------|---|
| 610S-1             | Tree Protection Fence Locations         |
| 610S-2             | Tree Protection Fence, Type B Chainlink |
| 610S-3             | Tree Protection Fence, Type B Wood      |

|        |  |
|--------|--|
| 610S-4 | Tree Protection Fence, Modified Type A |
| 610S-5 | Tree Protection Fence, Modified Type B |
| 621S-1 | Diversion                              |
| 622S-1 | Diversion Dike                         |
| 624S-1 | Earth Outlet Sediment Trap             |
| 625S-1 | Grade Stabilization Structure          |
| 627S-1 | Grass Lined Swale                      |
| 627S-2 | Grass Lined Swale With Stone Center    |
| 628S   | Triangular Sediment Filter Dike        |
| 628S-1 | Hay Bale Dike                          |
| 629S-1 | Brush Berm                             |
| 630S-1 | Interceptor Dike                       |
| 631S-1 | Interceptor Swale                      |
| 632S-1 | Storm Inlet Sediment Trap              |
| 633S-1 | Landgrading                            |
| 634S-1 | Level Spreader                         |
| 635S-1 | Perimeter Dike                         |
| 636S-1 | Perimeter Swale                        |
| 637S-1 | Pipe Slope Drain (Flexible)            |
| 637S-2 | Pipe Slope Drain (Flexible)            |
| 638S-1 | Pipe Outlet Sediment Trap              |
| 639S-1 | Rock Berm                              |
| 641S-1 | Stabilized Construction Entrance       |
| 642S-1 | Silt Fence                             |
| 643S-1 | Stone Outlet Structure                 |
| 644S-1 | Stone Outlet Sediment Trap             |

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

| <b>Designation</b> | <b>Description</b>  |
|--------------------|---|
| Item No. 100       | Preparing Right of Way                                      |
| Item No. 110       | Excavation  |
| Item No. 112       | Subgrade Widening   |
| Item No. 132       | Embankment  |
| Item No. 150       | Blading   |
| Item No. 158       | Specialized Excavation Work                                 |
| Item No. 160       | Furnishing and Placing Topsoil                              |
| Item No. 164       | Seeding for Erosion Control                                 |
| Item No. 204       | Sprinkling  |
| Item No. 210       | Rolling (Flat Wheel)  |
| Item No. 211       | Rolling (Tamping)   |
| Item No. 213       | Rolling (Pneumatic Tire)                                    |
| Item No. 260       | Lime Treatment for Materials Used as Subgrade (Road Mixed)  |
| Item No. 265       | Lime-Fly Ash (LFA) Treatment for Materials Used as Subgrade |

**Texas Department of Transportation: Manual of Testing Procedures**

| <b>Designation</b> | <b>Description</b>                                  |
|--------------------|---|
| Tex-103-E          | Determination of Moisture Content of Soil Materials |
| Tex-105-E          | Determination of Plastic Limit of Soils             |

Current Version: 08-20-07

Previous Versions: 11/18/04, 04/05/99,  
08/17/94 and 08/18/00

Tex-106-E

Method of Calculating the Plasticity Index of Soils  
Laboratory Compaction Characteristics and Moisture  
Density Relationship of Subgrade & Embankment Soil

Tex-114-E

Tex-115-E



**Clearing and Grubbing**

**SPECIAL PROVISION TO**

**Standard Specification Item No. 102S, Clearing and Grubbing (Version 08-20-07)**

For this contract, Item No. 102S Clearing and Grubbing of the City of Austin Standard Technical Specifications is hereby amended with respect to the clauses cited below. No other clauses or requirements of this Section of the City of Austin Standard Specifications are waived or changed.

For this project, Articles 102S.3 Construction Methods, and 102S.5 Payment shall be amended as follows:

**102S.3 Construction Methods**

**ADD** the following to the end of the section:

For the purposes of this contract, "standard" clearing and grubbing shall conform to industry standard practices and conditions. "Premium" clearing and grubbing may involve extraordinary site conditions (e.g., dense thickets of thorny brush) or other unusual conditions as agreed to by the Owner and the Contractor which hinders the use of standard practices, requiring the use of greater than typical amounts of labor or employment of special equipment in this activity. Clearing and grubbing will be assumed to be "standard", unless "premium" clearing and grubbing is agreed to by the Owner before bidding.

**102S.5 Payment**

**ADD** the following pay items:

|   |                        |
|---|------------------------|
| <b>Pay Item SP 102S-D1: Clearing and Grubbing, Standard</b> | <b>Per Square Yard</b> |
| <b>Pay Item SP 102S-D2: Clearing and Grubbing, Premium</b>  | <b>Per Square Yard</b> |



**Item No. 111S  
Excavation**

**111S.1 Description**

This item shall govern: (1) the excavation and proper utilization or satisfactory disposal of all excavated materials, of whatever character, within the limits of the Work and (2) construction, compaction, shaping and finishing of all designated earthwork areas in accordance with the specification requirements outlined herein and in conformity with the required lines, grades and typical cross sections indicated on the Drawings or as directed by the Engineer or designated representative. When not otherwise included in the Contract Documents, this item shall include the work described in Specification Item Nos. 101S, "Preparing Right of Way", No. 102S, "Clearing and Grubbing", No. 104S, "Removing Portland Cement Concrete", No. 132S "Embankment" and No. 201S, "Subgrade Preparation".

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

**111S.2 Submittals**

The submittal requirements of this specification item may include:

- A. A permit when utility adjustments are made in the right-of-way,
- B. A plan for removal and deposition of all 'Waste' materials, and
- C. A Blasting Permit if blasting is required and allowed on the project.

**111S.3 Classification**

All excavation shall be unclassified and shall include all materials encountered regardless of their nature or the manner in which they are removed.

**111S.4 Construction Methods**

Prior to commencement of this work, all required erosion control and tree protection measures shall be in place. The existing utilities shall be located and shall be protected as specified in the Standard Contracts Document Section 00700, "General Conditions" and/or indicated on the Drawings. A permit shall be required when utility adjustments are to be made in preparation for construction in the right-of-way, as specified in Section 5.2.0 of the City of Austin Utilities Criteria Manual.

Construction equipment shall not be operated nor construction materials stockpiled under the canopies of trees, unless otherwise indicated on the Drawings. Excavation or embankment materials shall not be placed within the drip line of trees until tree wells are constructed, that conform to Specification Item No. 610S, "Preservation of Trees and Other Vegetation".

All excavation shall be performed as specified herein and shall conform to the established alignment, grades and cross sections indicated on the Drawings. Suitable excavated

materials shall be utilized, insofar as practical, in constructing required embankments. The construction of all embankments shall conform to Specification Item No. 132S, "Embankment". No material shall be stockpiled within the banks of a waterway.

Unsuitable excavated materials or excavation in excess of that needed for construction shall be known as "Waste" and shall become the property of the Contractor. Unsuitable material encountered below the subgrade elevation in roadway cuts, when declared "Waste" by the Engineer or designated representative, shall be replaced with material from the roadway excavation or with other suitable material as approved by the Engineer. It shall become the Contractor's responsibility to dispose of this material off the limits of the right of way in an environmentally sound manner at a permitted disposal site.

All blasting shall conform to the Provisions of the Standard Contract Document Section 01550, "Public Safety and Convenience". In all cases, a Blasting Permit must be obtained in advance from the City of Austin, Department of Public Works and Transportation.

Adequate dewatering and drainage of excavation shall be maintained throughout the time required to complete the excavation work.

**111S.5 Measurement**

All accepted excavation will be measured by either Method A or B as follows:

(1) Method A

Measurement of the volume of excavation in cubic yards (cubic meters: 1 square meter is equal to 1.306 square yards) by the average end area methods. Cross-sectional areas shall be computed from the existing ground surface to the established line of the subgrade, as shown on typical sections in the Drawings, over the limits of the right of way or other work limits, including parkway slopes and sidewalk areas.

(2) Method B

Measurement of the volume of excavation in cubic yards (cubic meters: 1 square meter is equal to 1.306 square yards), based upon the average end area method taken from pre-construction cross sections and planned grades. The planned quantities for excavation will be used as the measurement for payment for this item.

**111S.6 Payment**

This item will be paid for at the contract unit bid price for "Excavation", as provided under measurement Method A or B as included in the bid. The bid price shall include full compensation for all work herein specified including dewatering, drainage, subgrade preparation, unless otherwise indicated, and the furnishing of all materials, equipment, tools, labor and incidentals necessary to complete the work.

Payment will be made under one of the following:

|  |                 |
|--|-----------------|
| Pay Item No. 111S-A: Excavation                | Per Cubic Yard. |
| Pay Item No. 111S-B: Excavation, Plan Quantity | Per Cubic Yard. |

End

|  |
|--|
| <b><u>SPECIFIC CROSS REFERENCE MATERIALS</u></b> |
| Specification Item 111S, "EXCAVATION"            |

City of Austin Standard Contract Documents

| <u>Designation</u> | <u>Description</u>            |
|--------------------|-------------------------------|
| 00700              | General Conditions            |
| 01550              | Public Safety and Convenience |

City of Austin Utilities Criteria Manual

| <u>Designation</u> | <u>Description</u>                               |
|--------------------|--|
| Section 5.2.0      | Permit for Excavation in the Public Right-of-Way |

City of Austin Technical Specifications

| <u>Designation</u> | <u>Description</u>                         |
|--------------------|--|
| Item No. 101S      | Preparing Right of Way                     |
| Item No. 102S      | Clearing and Grubbing-                     |
| Item No. 104S      | Removing Portland Cement Concrete          |
| Item No. 132S      | Embankment                                 |
| Item No. 201S      | Subgrade Preparation                       |
| Item No. 236S      | Proof Rolling                              |
| Item No. 610S      | Preservation of Trees and Other Vegetation |

|   |
|---|
| <b><u>RELATED CROSS REFERENCE MATERIALS</u></b> |
| Specification Item 111S, "EXCAVATION"           |

City of Austin Standard Contract Documents

| <u>Designation</u> | <u>Description</u>   |
|--------------------|----------------------|
| 01500              | Temporary Facilities |

City of Austin Standard Specifications

| <u>Designation</u> | <u>Description</u>                               |
|--------------------|--|
| Item No. 120S      | Channel Excavation                               |
| Item No. 203       | Lime Treatment for Materials In Place            |
| Item No. 204S      | Portland Cement Treatment for Materials In Place |
| Item No. 230S      | Rolling (Flat Wheel)                             |
| Item No. 232S      | Rolling (Pneumatic Tire)                         |
| Item No. 234S      | Rolling (Tamping)                                |
| Item No. 602S      | Sodding for Erosion Control                      |
| Item No. 604S      | Seeding for Erosion Control                      |
| Item No. 622S      | Diversion Dike                                   |
| Item No. 628S      | Sediment Containment Dikes                       |
| Item No. 642S      | Silt Fence                                       |

City of Austin Standard Details

| <u>Designation</u> | <u>Description</u>                      |
|--------------------|---|
| No. 610S-1         | Tree Protection Fence Locations         |
| No. 610S-2         | Tree Protection Fence, Type B Chainlink |
| No. 610S-3         | Tree Protection Fence, Type B Wood      |
| No. 610S-4         | Tree Protection Fence, Modified Type A  |

|            |  |
|------------|--|
| No. 610S-5 | Tree Protection Fence, Modified Type B |
| No. 621S-1 | Diversion                              |
| No. 622S-1 | Diversion Dike                         |
| No. 624S-1 | Earth Outlet Sediment Trap             |
| No. 625S-1 | Grade Stabilization Structure          |
| No. 627S-1 | Grass Lined Swale                      |
| No. 627S-2 | Grass Lined Swale With Stone Center    |
| No. 628S   | Triangular Sediment Filter Dike        |

City of Austin Standard Details

| <u>Designation</u> | <u>Description</u>               |
|--------------------|----------------------------------|
| No. 628S-1         | Hay Bale Dike                    |
| No. 629S-1         | Brush Berm                       |
| No. 630S-1         | Interceptor Dike                 |
| No. 631S-1         | Interceptor Swale                |
| No. 632S-1         | Storm Inlet Sediment Trap        |
| No. 633S-1         | Landgrading                      |
| No. 634S-1         | Level Spreader                   |
| No. 635S-1         | Perimeter Dike                   |
| No. 636S-1         | Perimeter Swale                  |
| No. 637S-1         | Pipe Slope Drain (Flexible)      |
| No. 637S-2         | Pipe Slope Drain (Flexible)      |
| No. 638S-1         | Pipe Outlet Sediment Trap        |
| No. 639S-1         | Rock Berm                        |
| No. 641S-1         | Stabilized Construction Entrance |
| No. 642S-1         | Silt Fence                       |
| No. 643S-1         | Stone Outlet Structure           |
| No. 644S-1         | Stone Outlet Sediment Trap       |

The Code of the City of Austin, Code of Ordinances, Volume 1

| <u>Designation</u> | <u>Description</u>                  |
|--------------------|-------------------------------------|
| Article 14-11-181  | Permit Required                     |
| Article 14-11-189  | Conditions for Permit Issuance      |
| Article 14-11-190  | Excavation Sequence and Permit Term |

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

| <u>Designation</u> | <u>Description</u>  |
|--------------------|---|
| Item No. 100       | Preparing Right of Way                                      |
| Item No. 110       | Excavation  |
| Item No. 112       | Subgrade Widening   |
| Item No. 132       | Embankment  |
| Item No. 150       | Blading   |
| Item No. 158       | Specialized Excavation Work                                 |
| Item No. 160       | Furnishing and Placing Topsoil                              |
| Item No. 164       | Seeding for Erosion Control                                 |
| Item No. 204       | Sprinkling  |
| Item No. 210       | Rolling (Flat Wheel)  |
| Item No. 211       | Rolling (Tamping)   |
| Item No. 213       | Rolling (Pneumatic Tire)                                    |
| Item No. 260       | Lime Treatment for Materials Used as Subgrade (Road Mixed)  |
| Item No. 265       | Lime-Fly Ash (LFA) Treatment for Materials Used as Subgrade |

**Texas Department of Transportation: Manual of Testing Procedures**

| <b><u>Designation</u></b> | <b><u>Description</u></b>   |
|---------------------------|---|
| Tex-103-E                 | Determination of Moisture Content of Soil Materials   |
| Tex-104-E                 | Determination of Liquid Limit of Soils  |
| Tex-105-E                 | Determination of Plastic Limit of Soils   |
| Tex-106-E                 | Method of Calculating the Plasticity Index of Soils   |
| Tex-114-E                 | Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade & Embankment Soil |
| Tex-115-E                 | Field Method for Determination of In-Place Density of Soils and Base Materials                        |



**SPECIAL PROVISION TO**

**Standard Specification Item No. 111S, Excavation (Version 09-26-12)**

For this contract, Item No. 111S Excavation of the City of Austin Standard Technical Specifications is hereby amended with respect to the clauses cited below. No other clauses or requirements of this Section of the City of Austin Standard Specifications are waived or changed.

For this project, Articles 111S.3 Construction Methods and 111S.6 Payment shall be amended as follows:

**111S.3 Construction Methods**

**ADD** the following to the end of the section:

For the purposes of this contract, "standard" excavation shall conform to industry standard practices and conditions (e.g., soil with minimal rock). "Premium" excavation may involve extraordinary site conditions (e.g., rocky soil) or other unusual conditions as agreed to by the Owner and the Contractor which hinders the use of standard practices, requiring the use of greater than typical amounts of labor or employment of special equipment in this activity. Clearing and grubbing will be assumed to be "standard", unless "premium" clearing and grubbing is agreed to by the Owner before bidding.

**111S.6 Payment**

**ADD** the following pay items:

|  |                       |
|--|-----------------------|
| <b>Pay Item SP 111S-A1: Excavation, Standard</b> | <b>Per Cubic Yard</b> |
| <b>Pay Item SP 111S-A2: Excavation, Premium</b>  | <b>Per Cubic Yard</b> |



**Item No. 591S  
Riprap for Slope Protection****591S.1 Description**

This item shall govern the excavation of all materials encountered for placing riprap, disposal of excess material and backfilling around the completed riprap to the grade indicated on the Drawings. The work shall include all pumping and bailing, furnishing and placing riprap of rock or concrete in accordance with the details and to the dimensions indicated on the Drawings.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses. The work conducted under this item pertains to riprap for features susceptible to erosion.

**591S.2 Submittals**

The submittal requirements for this specification item shall include:

- The type, size, gradation and source of riprap material (rock or broken concrete),
- B. Aggregate types, gradations and physical characteristics for the Portland cement concrete mix,
- C. Proposed proportioning of materials for the mortar mix,
- D. Type, details and installation requirements for reinforcement, joint material, tie backs and anchors,
- E. Geotextile fabric including characteristics, test data and manufacturer's recommendations for installation.
- F. The type, size, gradation and source of granular filter material.

**591S.3 Materials****A. Rock**

Rock used for riprap shall be hard, durable, and angular in shape and consist of clean field rock or rough unhewn quarry rock as nearly uniform in section as practicable. The rocks shall be dense, resistant to weathering and water action, free of overburden, spoils, shale and organic material; and shall meet the gradation requirements for the rock size specified. Neither the width nor the thickness of a single stone should be less than one third of its length. Shale, chalk and limestone with shale or chalk seams are not acceptable. Rounded rock (river rock) shall not be acceptable. Minimum density for acceptable dry rock riprap shall be 150 pounds per cubic foot or a specific gravity of 2.4.

The rock shall be suitable in all respects for the purpose intended. The sources from which the stone will be obtained shall be selected well in advance of the time

when the stone will be required and pre-approved by the Engineer. Control of gradation and material adequacy will be accomplished by visual inspection and field measurement as needed for rock sizes that cannot be analyzed via sieve or mechanical sorting machines. The contractor shall provide two samples of rock meeting the gradation for the size class specified. The samples shall be used as frequent reference for judging the gradation of the riprap supplied. Any difference of opinion between the engineer and the contractor shall be resolved by dumping two random truckloads of stone and performing manual field measurements of individual stones to compute a gradation. Any measured rock size dimension shall be based on the length of the intermediate axis of each stone. Labor, equipment and site location needed to assist in checking gradation shall be provided by the contractor at no additional cost to the owner.

**B. Broken Concrete**

The rock used for mortar riprap may consist of broken concrete removed under the contract or obtained from other approved sources. Broken concrete shall be as nearly uniform in section as practicable and of the sizes indicated in Section 591S.5, "Dry Riprap".

**C. Concrete**

Cast in place concrete shall be Class A Concrete and shall conform to Standard Specification Item No. 403S, "Concrete for Structures".

**D.**

Grout and mortar shall consist of 1 part Portland Cement and 3 parts sand, thoroughly mixed with water. Mortar shall have a consistency such that it can be easily handled and spread by trowel. Grout shall have a consistency such that it will flow into and completely fill all joints.

**E. Reinforcement**

Reinforcement shall conform to Standard Specification Item No. 406S, "Reinforcing Steel".

**F. Joints**

Premolded expansion joint material shall conform to Standard Specification Item No. 408, "Concrete Joint Material".

**G. Tie Backs and Anchors**

Galvanized tie backs and anchors shall be as indicated on the Drawings.

**H. Filter Fabric**

Filter Fabric shall conform to Standard Specification Item No. 620S, "Filter Fabric".

I. Granular Filter

Aggregate used for granular filters shall conform to Standard Specification Item No. 403S "Concrete for Structures".

**591S.4 Construction Methods**

Prior to commencement of this work, all required erosion control and tree protection Item 610S, "Preservation of Trees and Other Located and protected as set forth in the "General Conditions". Construction equipment shall not be operated within the drip line of trees unless indicated on the Drawings. Construction materials shall not be placed under the canopies of trees. No excavation or embankment shall be placed within the drip line of trees until tree wells (Standard Detail Number 610S-6, "Tree Protection, Tree Wells") are constructed. Spalls and small stones used to fill open joints and voids in rock riprap shall be rocked and wedged to provide a tight fit.

Unsuitable excavated materials or excavation in excess of that needed for construction shall be known as "Waste" and shall become the Contractor' property and sole responsibility to dispose of this material in an environmentally sound manner off the limits of the right of way at a permitted disposal site.

All blasting shall conform to 01550, "Public Safety and Convenience." The Contractor shall comply with all laws, ordinances, applicable safety code requirements, International Fire Code Chapter 27 "Hazardous Materials General Provisions" and Chapter 33 "Explosives and Fireworks" and any other regulations relative to handling, storage and use of explosives. In all cases, a Blasting Permit must be obtained in advance from the appropriate City agency.

Areas to be protected by rock riprap shall be free of brush, trees, stumps and other objectionable materials and be graded to a smooth compacted surface. All soft or spongy material shall be removed and replaced with appropriate material to the depths shown on the plans or as directed by the engineer. Fill Areas, unless otherwise - Embankment. Unacceptable subgrade conditions shall be reworked according to the Engineer's recommendations. Excavation areas shall be maintained until the riprap is placed.

**591S.5 Dry Rock Riprap**

The mass of rock riprap shall be placed as to be in conformance with the required gradation mixtures, to the lines, grades and layers thickness that is shown on the drawings. The range of rock sizes for the mixture shall conform to the following recommended gradation requirements relative to the specified median rock size (D50).

| Relative Stone Size (inches) | Percent of Gradation Smaller than | Stone Size Designation |
|------------------------------|-----------------------------------|------------------------|
|------------------------------|-----------------------------------|------------------------|

|                 |     |      |
|-----------------|-----|------|
| 1.7 - 2.0 * D50 | 100 | D100 |
| 1.3 - 1.7 * D50 | 85  | D85  |
| 1.0 - 1.3 * D50 | 50  | D50  |
| 0.5 - 1.0 * D50 | 15  | D15  |

At least 50% of the rocks shall weigh more than the D50 rock size. When the riprap will be placed on an erodible soil, as determined by the Engineer or designated representative, a layer of geotextile filter fabric or a granular filter layer shall be placed, prior to placement of the riprap material. In some cases multiple layers of granular filter material of varying gradations may be required. The median rock riprap size (D50), rock riprap layer thickness, filter type, when applicable the number of granular filter layers, granular filter aggregate gradations (grade/size classification), granular layer thicknesses shall be specified on the plans. The minimum granular filter layer thickness shall be 4 inches (102 mm). Geotextile filter fabric shall conform to Standard Specification No. 620 and be installed with sufficient anchoring and overlap between seams according to the manufacturer's recommendations to ensure full filter barrier protection of the subgrade after riprap installation. When specified on the plans a four (4) inch minimum thickness granular cushion layer of gravel or sand may be placed over the filter fabric to prevent damage the fabric during placement of rock riprap.

Rock riprap shall be machine placed and distributed such that there will be no large accumulations of either larger or smaller sizes. Placing rock riprap by dumping into chutes or similar methods shall not be permitted. The rocks shall be placed in a single layer with close joints. The rock riprap layer thickness shall be no less than the maximum stone size (D100) or 1.5 times the D50, which ever produces the greater thickness. In areas exposed to flowing water the rock riprap layer thickness should be no less than 2.0 times the D50. The upright axis of the rocks shall make an angle of approximately 90 degrees with the embankment slope. The courses shall be placed from the bottom of the embankment upward, with the larger rocks being placed on the lower courses. Open joints shall be filled with spalls. Rocks shall be arranged to present a uniform finished top surface such that the variation between tops of adjacent rocks shall not exceed 3 inches (75 mm). Rocks that project more than the allowable

#### **591S.6 Mortared Rock Riprap**

Rock for this purpose, as far as practicable, shall be selected as to size and shape in order to secure fairly large, flat-surfaced rock which may be laid with a true and even surface and a minimum of voids. Fifty percent of the mass rock shall be broad flat rocks, weighing between 100 and 150 pounds (45 and 69 kilograms) each, placed with e flat surface uppermost and parallel to the slope. The largest rock shall be placed near the base of the slope. The spaces between the larger rocks shall be filled with rocks of suitable size, leaving the surface smooth, reasonably tight and conforming to

the contour required on the Drawings. In general, the rocks shall be placed with a degree of care that will insure plane surfaces with variation from the true plane of no more than 3 inches in 4 feet (no more than 60 mm per meter). Warped and curved surfaces shall have the same general degree of accuracy as indicated for plane surfaces.

Before placing mortar, the rocks shall be wetted thoroughly and as each of the larger rocks is placed, it shall be surrounded by fresh mortar and adjacent rocks shall be shoved into contact. After the larger rocks are in place, all of the spaces or opening(s) between them shall be filled with mortar and the smaller rocks then placed by shoving them into position, forcing excess mortar to the surface and insuring that each rock is carefully and firmly embedded laterally. After the work described above has been completed, all excess mortar forced up shall be spread uniformly to completely fill all surface voids. All surface joints then shall be pointed up roughly, either with flush joints or with shallow, smooth raked joints.

#### **591S.7 Concrete Riprap**

Concrete for riprap shall be placed as indicated on the Drawings or as directed by the Engineer or designated representative. Unless otherwise indicated on the Drawings, concrete riprap shall be reinforced using wire or bar reinforcement.

Concrete shall be Class A or as indicated otherwise on the Drawings and shall conform

When welded wire reinforcement is indicated, it shall be a minimum of 6 x 6 W1.4 x W1.4 (150 x 150 MW9 x MW9) with a minimum lap of 6 inches (150 mm) at all splices. At the edge of the riprap, the wire fabric shall not be less than 1 inch (25 mm) nor more than 3 inches (75 mm) from the edge of the concrete and shall have no wires projecting beyond the last member parallel to the edge of the concrete.

When bar reinforcement is used, the sectional area of steel in each direction shall not be less than the sectional area of the wire fabric described above. The spacing of bar reinforcement shall not exceed 18 inches (450 mm) in each direction and the distance

Reinforcement shall be supported properly throughout the placement to maintain its position approximately equidistant from the top and bottom surface of the slab.

Unless otherwise noted, expansion joints of the size and type indicated on the Drawings shall be provided at intervals not to exceed 40 feet (12.2 meters) and shall extend the full width and depth of the concrete. Marked joints shall be made 3/8 inch (9.5 mm) deep at 10 foot (3 meter) intervals. All joints shall be perpendicular and at right angles to the forms unless otherwise indicated on the Drawings.

Slopes and bottom of the trench for toe walls shall be compacted and the entire area sprinkled before the concrete is placed.

After the concrete has been placed, consolidated and shaped to conform to the dimensions indicated on the Drawings and has set sufficiently to avoid slumping, the surface shall be finished with a wooden float to secure a reasonably smooth surface.

Immediately following the finishing operation, the riprap shall be cured conforming to Standard Specification Item No. 410S, "Concrete Structures".

#### **591S.8 Pneumatically Placed Concrete Riprap, Type I and Type II**

Pneumatically placed concrete for riprap shall be placed as indicated on the Drawings or as established by the Engineer or designated representative. concrete shall conform to Standard Specification Item No. 404S, "Pneumatically Placed Concrete". Reinforcement shall conform to the details indicated on the Drawings and Standard Specification Item No. 406S, "Reinforcing Steel". Reinforcement shall be supported properly throughout placement of concrete. All subgrade surfaces shall be moist when concrete is placed.

The surface shall be given a wood float finish or a gun finish as indicated on the Drawings.

The strength and design of Pneumatically Placed Concrete Riprap shall be either Type I or if indicated, Type II conforming to Standard Specification Item No. 404S,

Immediately following the finishing operation, the riprap shall be cured conforming to Standard Specification Item No. 410S, "Concrete Structures".

#### **591S.9 Measurement**

Measurement of acceptable riprap will be made on the basis of the (a) area in square yards (square meters: 1 square meter equals 1.196 square yards) indicated on the Drawings, complete in place or (b) the volume of concrete placed in cubic yards (cubic meters: 1 cubic meters equals 1.308 cubic yards), complete in place as indicated on the Drawings for the thickness specified.

Concrete toe walls will not be measured separately but shall be included in the unit price bid for riprap of the type with which it is placed.

The riprap quantities, measured as provided above, will be paid for at the unit bid prices per square foot or per cubic yard as indicated for riprap of the various classifications. The Unit Bid Price shall include full compensation for furnishing, hauling and placing all materials, including toe walls, geotextile filter fabric, granular filter material, granular cushion, reinforcement and premolded expansion joint material and for all labor, tools, equipment and incidentals necessary to complete the work.

Payment for excavation of toe wall trenches and for all necessary excavation below natural ground or the bottom of excavated drainage channels will be included in the unit bid price for riprap. Excavation, grading and fill materials required to shape drainage channels shall not be included in the unit bid price for riprap.

Payment for excavation required for shaping of slopes for riprap shall be included in the unit bid price for riprap, except for the situation when the header banks upon which the riprap is to be placed are built by prior contract. In this specific case the excavation for shaping of slopes, will be paid for conforming to Standard Specification Item No. 401,

Payment will be made under one of the following:

|                             |   |                         |
|-----------------------------|---|-------------------------|
| <b>Pay Item No. 591S-A:</b> |   | <b>Per Square Yard.</b> |
| <b>Pay Item No. 591S-B:</b> |   | <b>Per Cubic Yard.</b>  |
| <b>Pay Item No. 591S-D:</b> | <b>Mortared Rock Riprap</b>                     | <b>Per Square Yard.</b> |
|                             | <b>F: Concrete Riprap, ___ In.</b>              |                         |
|                             | <b>G:</b>                                       | <b>Per Cubic Yard.</b>  |
|                             | <b>P: Pneumatically Placed Concrete Riprap,</b> | <b>Per Square Yard.</b> |
|                             | <b>___In.</b>                                   |                         |

**End**

|  |
|--|
| <b><u>SPECIFIC CROSS REFERENCE MATERIALS</u></b>         |
| <b>Specification 591S, "Riprap for Slope Protection"</b> |

**International Fire Code**

| <b>Designation</b> | <b>Description</b>              |
|--------------------|---------------------------------|
| <b>Chapter 27</b>  | <b>Hazardous Materials</b>      |
| <b>Chapter 33</b>  | <b>Explosives and Fireworks</b> |

**City of Austin Standard Contract Documents**

| <b>Designation</b> | <b>Description</b>                   |
|--------------------|--------------------------------------|
| <b>01550</b>       | <b>Public Safety and Convenience</b> |

**City of Austin Standard Specifications**

| <b>Designation</b>   | <b>Description</b>                                |
|----------------------|---|
| <b>Item No. 403S</b> | <b>Concrete for Structures</b>                    |
| <b>Item No. 404S</b> | <b>Pneumatically Placed Concrete</b>              |
| <b>Item No. 406</b>  | <b>Reinforcing Steel</b>                          |
| <b>Item No. 408</b>  | <b>Concrete Joint Material</b>                    |
| <b>o. 410</b>        | <b>Concrete Structures</b>                        |
| <b>Item No. 610S</b> | <b>Preservation of Trees and Other Vegetation</b> |
| <b>Item No. 620S</b> | <b>Filter Fabric</b>                              |

|  |
|--|
| <b><u>RELATED CROSS REFERENCE MATERIALS</u></b>          |
| <b>Specification 591S, "Riprap for Slope Protection"</b> |

**City of Austin Standard Specifications**

| <b>Designation</b>   | <b>Description</b>         |
|----------------------|----------------------------|
| <b>Item No. 623S</b> | <b>Dry Stack Rock Wall</b> |

**Engineering Design Manuals**

Federal Highway Administration, 1989, Design of Riprap Revetment, Hydraulic Engineering Circular HEC-11, FHWA-1P- -016.

ap Design Criteria, Recommended Specifications, and Design Criteria, NCHRP Report 568.

United States Bureau of Reclamation, 1983, Hydraulic Design of Stilling Basins and Energy Dissipators, Engineering Monograph No. 25.

Current Version: September 26, 2012

PREVIOUS VERSIONS: 9/1/2011, 3/26/08, 2/17/00,  
8/17/94

U.S Department of Agriculture, 1983, Soil Conservation Service, Riprap for Slope Protection Against Wave Action, Technical Release No. 69, February.

US Army Corps of Engineers, 1994. Hydraulic Design of Flood Control Channels, US Army Corps of Engineers Engineer Manual EM 1110-2-1601.

Federal Highway Administration, 1998. "Geosynthetic Design and Construction Guidelines," FHWA-HI-95-038.



**ITEM NO. 601S  
SALVAGING AND PLACING TOPSOIL**

**601S.1 Description**

This item shall govern the removal, storage and placement of approved topsoil to the depths and area shown on 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 and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

**601S.2 Submittals**

The submittal requirements of this specification item shall include the test results and soil classification necessary for approval of material as suitable topsoil.

**601S.3 Materials**

**A. Topsoil**

1. The topsoil shall be composed of 4 parts of soil mixed with 1 part compost, by volume. The compost shall meet TxDOT Specification Item 161. The soil shall be locally available native soil that meets the following specifications:

- Shall be free of trash, weeds, deleterious materials, rocks and debris.
- 100% shall pass through a 1.5-inch (38-mm) screen.
- Soil to be a loamy material that meets the requirements of the table below in a accordance with the USDA textural triangle. Soil known locally as "red death" is not an allowable soil. Textural composition shall meet the following criteria:

| Textural Class | Minimum | Maximum |
|----------------|---------|---------|
| Clay           | 5%      | 50%     |
| Silt           | 10%     | 50%     |
| Sand           | 15%     | 67%     |

- An owner/engineer may propose use of onsite salvaged topsoil which does not meet the soil texture class required above by providing a soil analysis and a written statement from a qualified professional in soils, landscape architecture, or agronomy indicating the onsite topsoil will provide an equivalent growth media and specifying what, if any, soil amendments are required.

- Soil amendments shall be worked into the existing onsite topsoil with a disc or tiller to create a well-blended material.

2. All disturbed areas to be revegetated are required to provide a minimum of six (6) inches of topsoil. The topsoil shall be able to support the growth of planting (Standard Specification Item No. 608S), seeding (Standard Specification Item No. 604S), sodding (Standard Specification Item No. 602S) and native grassland seeding and planting (Standard Specification Item No. 609S).

#### B. Water

Water shall be furnished by the Contractor and shall be clean and free from industrial wastes and other objectionable matter.

#### 601S.4 Sources

The topsoil may be obtained from the right-of-way at sites of proposed excavation or embankment when shown on the Drawings or identified by the Engineer or designated representative. The approximate quantity of acceptable topsoil to be salvaged from the project will be shown on the Drawings. The topsoil may also be obtained from approved sources, which are located outside the right-of-way and have been secured by the Contractor.

#### 601S.5 Construction Methods

Precautions will be maintained at all times to protect all trees in the area of construction. Where removal of trees is indicated on the Drawings, they shall be marked as directed by the Engineer or designated representative.

Construction equipment shall not be operated nor construction materials stockpiled under the canopies of trees, unless otherwise indicated on the Drawings and/or specified in the Contract Documents. Topsoil materials shall not be placed within the drip line of trees until tree wells are constructed that conform to Item No. 610S, "Preservation of Trees and Other Vegetation " and Standard Details 591S-1 and 610S-6. The source and stockpile areas shall be kept drained, insofar as practicable, during the period of topsoil removal

The existing topsoil shall be removed from the area indicated on the Drawings, stockpiled in a windrow along the right of way or spread over an area that is ready for topsoil application in accordance with the Drawings or as directed by the Engineer or designated representative.

Trash, wood, brush, stumps, rocks over 1 1/2 inches (37.5 mm) in size and other objectionable material encountered shall be removed and disposed of as directed by the Engineer or designated representative prior to beginning of work required by this item. Grass and other herbaceous plant materials may remain. Large clumps shall be broken up.

After the grading has been completed to the required alignment, grades and cross-sections and prior to the spreading of the salvaged topsoil, any clay or tight soil surfaces shall be scarified by plowing furrows approximately 4 inches (100 mm) deep along horizontal slope lines at 2 foot (600 mm) vertical intervals. The spreading of the salvaged topsoil shall be undertaken as soon as the grading has been completed. The topsoil shall be spread so as to form a cover of

uniform thickness indicated. After the topsoil has been placed and shaped, it shall be sprinkled and rolled to provide a suitable seed bed.

**601S.6 Measurement and Payment**

Salvaging, removal and/or placing topsoil materials will not be measured for payment, but shall be included in the unit price bid for the item of construction in which these activities are used.

End

**SPECIFIC CROSS REFERENCE MATERIALS**

**Specification 601S, "Salvaging and Placing Topsoil"**

**City of Austin Standard Specification Items**

| Designation   | Description   |
|---------------|---|
| Item No. 602S | Sodding for Erosion Control                               |
| Item No. 604S | Seeding for Erosion Control                               |
| Item No. 608S | Planting  |
| Item No. 609S | Native Grassland Seeding and Planting For Erosion Control |
| Item No. 610S | Preservation of Trees and Other Vegetation                |

**City of Austin Standard Details**

| Designation | Description                    |
|-------------|--------------------------------|
| 591S-1      | Dry Stack Rock Wall            |
| 610S-6      | Typical Tree Well Applications |

**RELATED CROSS REFERENCE MATERIALS**

**Specification 601S, "Salvaging and Placing Topsoil"**

**City of Austin Standard Specification Items**

| Designation   | Description           |
|---------------|-----------------------|
| Item No. 102S | Clearing and Grubbing |
| Item No. 104S | Removing Concrete     |
| Item No. 110S | Street Excavation     |
| Item No. 111S | Excavation            |
| Item No. 120S | Channel Excavation    |
| Item No. 132S | Embankment            |
| Item No. 606S | Fertilizer            |

**City of Austin Standard Details**

| Designation | Description                             |
|-------------|---|
| 610S-1      | Tree Protection Fence Locations         |
| 610S-2      | Tree Protection Fence, Type B Chainlink |
| 610S-3      | Tree Protection Fence, Type B Wood      |
| 610S-4      | Tree Protection Fence, Modified Type A  |
| 610S-5      | Tree Protection Fence, Modified Type B  |

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

| Designation  | Description                    |
|--------------|--------------------------------|
| Item No. 100 | Preparing Right of Way         |
| Item No. 110 | Excavation                     |
| Item No. 160 | Furnishing and Placing Topsoil |
| Item No. 164 | Seeding for Erosion Control    |
| Item No. 204 | Sprinkling                     |

**Texas Department of Transportation: Manual of Testing Procedures**

**Designation**

Tex-103-E  
Tex-104-E  
Tex-105-E  
Tex-106-E

**Description**

Determination of Moisture Content of Soil Materials  
Determination of Liquid Limit of Soils  
Determination of Plastic Limit of Soils  
Method of Calculating the Plasticity Index of Soils

**SPECIAL PROVISION TO  
Standard Specification Item 601S (Version 09-01-11)  
Salvaging and Placing Topsoil**

These special provisions serve to modify, add to, and/or delete from the City of Austin Standard Technical Specification Item No. 601S: Salvaging and Placing Topsoil, dated 9/1/2011, incorporated into this Project Manual. Any item, paragraph, article, or work contained therein unless specifically modified, added to or deleted herein shall apply where applicable.

**Article 601S.1 Description**

**DELETE** the first paragraph in its entirety and replace with the following:

This item shall govern the salvage, removal (only on direction of owner), storage and placement of existing and/or approved topsoil to the depths and areas shown on the plans or as directed by the Owner.

**ADD** the following after the first paragraph:

To restore ecological structure to a stream restoration project, the goal is to salvage and stockpile existing soil to preserve its original quantity and quality. Salvaged soil may require amendment depending on results of a soil analysis. Amendment will be specified per SP606S.

Soil preparation methods will be subsidiary to the applicable sod, seed, or planting specifications.

**Article 601S.2 Submittals**

**DELETE** the paragraph in its entirety and replace with the following:

The submittal requirements of this specification item shall include the test results and soil classification necessary for approval of material as suitable topsoil, including the following:

**A. Activities Before Construction**

1. Preconstruction meeting to discuss the soil striping and stockpiling, and reinstallation of soils.
2. Soil Test to assess nature of the soil and requirement for amendment.
3. Cut sheets for erosion control matting used to keep soil stockpiles in place.
4. Seed tickets for "living" stabilization of stockpiled soil, if required.

**B. Submittals Required During Construction**

1. Delivery tickets to indicate quantities of all soil amendments recommended by the soil analysis, including compost delivered to the site (reference SP606S). Delivery ticket shall indicate source of materials and brand names.

2. Topsoil stockpiles should be monitored weekly for excessive temperature (above 80°) using a soil thermometer. If high soil temperature is observed, the pile turned. Contractor shall provide a weekly report of recorded temperature of salvaged topsoil pile(s) to the Owner (e-mail is sufficient).
  3. Soil test shall be done after stockpiled soil is in place and has been amended to ensure sufficient amendment per recommendations of the original soil test.
- C. Activities During Construction
1. Owner to verify proper excavation and stockpiling of topsoil and other materials.
  2. After rough grading Owner to inspect subsoil and subgrade areas to ensure:
    - (a) they are free of debris;
    - (b) Proper compaction rates are met;
    - (c) Subgrade is excavated to proper depth and to proper slopes per grading plans;
    - (d) Scalped per Figure 1.
  3. During topsoil placement Owner to inspect for:
    - (a) Soil placement procedures: proper depths, layering, and transitioning;
    - (b) Proper compaction;
    - (c) Proper amendment type and procedures.

For Items 1 – 3, Owner to be notified at least 48 hours in advance to schedule an inspection or on-site meeting.

**Article 601S.3 Materials**

*(Changes to the paragraph are underlined or stricken)*

Delete the following from Item A. Topsoil, 1:

**A. Topsoil, #1.**

**DELETE** the first paragraph in its entirety and replace with the following:

All imported topsoil mixes shall be locally available native soil that meets the specifications in SS612.

**DELETE** the first three bullet points in their entirety.

**Article 601S.5 Construction Methods**

**ADD** the following:

**Topsoil Salvage and Stockpiling:**

1. Pre-salvage vegetation removal
  - a. Existing vegetation should be mowed short and scalped to remove as much vegetation as possible while leaving as much salvageable soil as possible.
2. Timing

- a. It is best not to undertake topsoil salvage when the soil contains excessive moisture; optimal moisture content is 10% to 15%.
3. Handling
    - a. To preserve overall quality of the soil and preclude compaction, minimize vehicular traffic on soils to be stripped. Keep vehicular and pedestrian traffic off soil stockpiles. Loaders shall load and unload from the bottom of the pile.
    - b. Topsoil Stockpiles shall be clearly labeled with signs on site.
    - c. Topsoil stockpiles shall be monitored for excessive temperature above 80 degrees.
    - d. Stockpiled Topsoil should be covered several days before reuse to limit additional soil moisture from precipitation.
  4. Duration
    - a. Stockpiles up to approximately five (5) feet high (1.5 m) maximum will stay healthy for up to a year, after which the structure and chemical composition markedly decreases, as will the viability of seeds and soil flora and fauna. Wide, shallow stockpiles are optimal for retention of microbes, viable seeds, etc.
    - b. For soil health, minimize the amount of time that topsoil remains stockpiled.
  5. Erosion and Flooding Protection
    - a. Stockpiles should be seeded for stabilization and to maintain soil health. Vegetating the stockpile may help maintain viability of the soil's fungi and microbial communities. If the stockpiles are expected to be kept for longer than 30 days, soil stockpiles may be seeded and done within 10 days of forming the stockpile. Refer to ECM 1.4.7A for *Temporary Vegetative Stabilization of Disturbed Areas*. Consult with City before adding any fertilizer to temporary vegetation on stockpiled soil.
    - b. From September 15 to March 1, seeding shall be a cool season cover crop: Wheat (*Triticum aestivum*), Oats (*Avena sativa*), or Cereal Rye Grain (*Secale cereal*). From March 2 to September 14, seeding shall be vegetated with native seed per SP-609S. The cover crop will act as a "green manure" soil amendment once the topsoil is replaced.
    - c. Implement appropriate weed control strategies.
    - d. Erosion control matting or geotextiles can be used to temporarily protect stockpiles, not plastic.
    - e. Use erosion protection measures to prevent stockpiled topsoil from leaving the stockpile area.
    - f. Stockpile area shall be outside the floodplain.
  6. Placement
    - a. Install stockpiled topsoil on top of rough subgrade to achieve finished grades, reestablishing a natural, healthy soil profile.
    - b. Transitioning between the subsoil and salvaged topsoil can be accomplished by applying two to three inches of topsoil, tilling it into the underlying soil, and then applying the remaining soil on top.

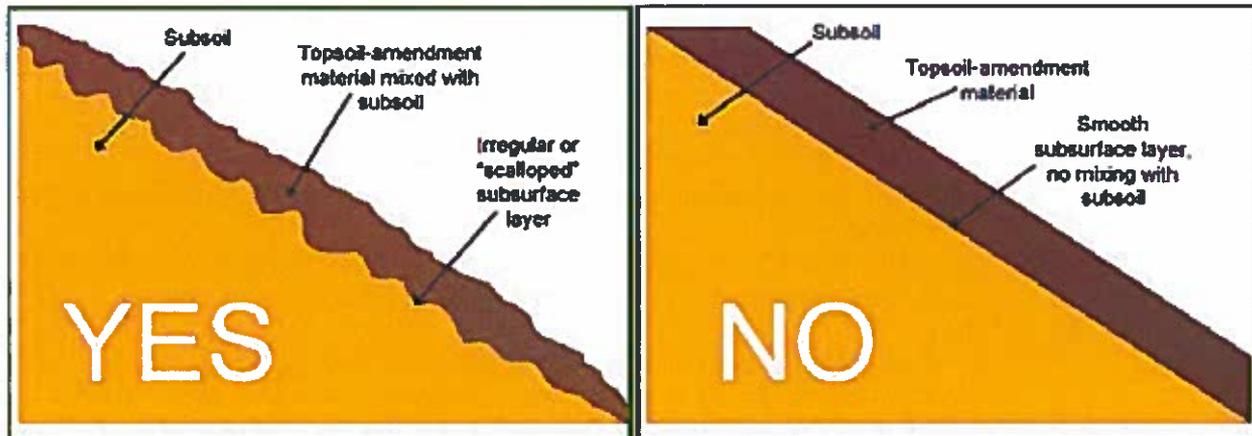


Figure 1 Topsoil amendment applied and mixed with subsoil, creating a scalloped subsurface layer (left). Typical topsoil amendment application without mixing with subsoil (right). Source: Watershed Management Guidebook (Drake & Hogan, 2013).<sup>1</sup>

**DELETE** the third paragraph in its entirety and replace with the following:

The existing topsoil shall be removed from the area indicated on the Drawings, stockpiled in windrows for ease of loading and hauling and to promote seed stock and plant viability. Native soil salvaged from the site shall be stockpiled in locations shown on the drawings or as agreed on between Contractor and City.

**ADD** the following to the end of the section:

To prevent the compaction of salvaged topsoil, the Contractor shall properly sequence all construction activities, including landscape and irrigation installation, before soil placement. The following activities, among others, shall occur before placing salvaged topsoil:

- Excavation of all tree / large shrub pits;
- Installation of trees and shrubs larger the 5-gallon size;
- Trenching and installation of subsurface irrigation components;
- Avoid travel across areas of placed topsoil or minimize the number of travel routes, to the extent possible. Heavy vehicles shall not be permitted in these areas.

<sup>1</sup> Drake, K., & Hogan, M. (2013). *Watershed Management Guidebook*. An Integrated Environmental Restoration Services, Inc. Publication.

**SPECIAL PROVISION**

**SP601S  
Salvaging and Placing Topsoil**

**Article 601S.6 Measurement and Payment**

**ADD** the following:

Topsoil Salvage and Place is paid for at the contract bid price per cubic yard. Payment includes all labor, materials, and equipment necessary to complete this bid item including salvaging, special handling, stockpiling, storage, soil testing, re-handling of material, and placement.

**Pay Item SP 601S-A Salvage and Place Topsoil – per Cubic Yard.**

**End**



**ITEM NO. 602S  
SODDING FOR EROSION CONTROL**

**602S.1 Description**

This item shall govern planting of Bermuda grass; St. Augustine or other acceptable grass sod at locations indicated on the Drawings or as directed by the Engineer or designated representative in accordance with this Standard Specification Item.

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

**602S.2 Submittals**

The submittal requirements for this specification item shall include the identification of the type and source of sodding, the type of mulch, type of tacking agent and type and rate of application of fertilizer.

**602S.3 Materials**

**A. Block and Mulch Sod**

The sod shall consist of live, growing Bermuda Grass, St. Augustine grass, when shown on the Drawings, or other acceptable grass sod indicated on the Drawings secured from sources that are approved by the Engineer or designated representative. Bermuda Grass sod, St. Augustine sod or other grass sod as shown on the Drawings shall have a healthy, virile system of dense, thickly matted roots throughout the soil of the sod for a minimum thickness of 1 inch (25 millimeters). The thickness measure does not include grass. The sod shall be cut in rectangular pieces with its shortest side not less than 12 inches (300 mm). The Contractor shall not use sod from areas where the grass is thinned out nor where the grass roots have been dried out by exposure to the air and sun to such an extent as to damage its ability to grow when transplanted.

The sod shall be substantially free from noxious weeds, Johnson grass or other grasses and shall not contain any matter deleterious to its growth or which might affect its subsistence or hardiness when transplanted. Unless the area has been closely pastured, it shall be closely mowed and raked to remove all weeds and long standing stems. Sources from which sod is to be secured shall be approved by the Engineer or designated representative.

Care shall be taken at all times to retain the native soil of the roots of the sod during the process of excavating, hauling and planting. Sod material shall be kept moist from the time it is dug until it is planted. The sod existing at the source shall be watered to the extent required by the Engineer or designated representative prior to excavating.

**B. Fertilizer**

Fertilizer and the rate of application shall conform to the requirements of Standard Specification Item No. 606S, "Fertilizer".

#### C. Mulch

Straw mulch shall be oat, wheat or rice straw. Hay mulch may be substituted for straw mulch and shall be Prairie Grass, Bermuda grass or other hay approved by the Engineer or designated representative. The hay or straw mulch 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.

#### D. Water

Water shall be furnished by the Contractor and shall be clean and free of industrial wastes and other substances harmful to the growth of sod or to the area irrigated.

#### E. Tacking Agents

Tacking agents for straw or hay mulch shall be as shown on the Drawings.

### 602S.4 Planting Season

All planting shall be done between April and November except as specifically authorized in writing by the Engineer or designated representative.

### 602S.5 Construction Methods

#### A. General

After the designated areas have been completed to the lines, grade and cross sections indicated on the Drawings, the surface shall be worked to a depth of not less than 4 inches (100 mm) with a disc, tiller or other equipment approved by the Engineer or designated representative. Fertilizer nutrients shall be applied and tilled. Areas that become crusted shall be reworked to an acceptable condition before sodding. Sodding of the type specified shall conform to the requirements of this Specification Item. The Contractor shall give continuous care to the sodded area until the sod is accepted.

#### B. Placement

The sod shall be placed on the prepared surface with the edges in close contact and alternate courses staggered. In ditches the sod shall be placed with the longer dimension perpendicular to the flow of water in the ditch. On slopes, starting at the bottom of the slope, the sod shall be placed with the longer dimension parallel to the contours of the ground. The exposed edges of sod shall be buried flush with the adjacent soil. On slopes exceeding 3:1 or where the sod may be displaced, the sod shall be pegged with not less than 4 stakes or ground staples per square yard (square meter) with at least 1 stake or ground staple for each piece of sod.

Pegs shall be of wood lath or similar material, pointed and driven with the flat side against the slope, 6 inches (150 mm) into the ground, leaving approximately 1/2 inch (12.5 mm) of the

top above the ground. Ground staples shall not be less than 13 inches (330 mm) in length and shall be constructed of No. 11 gage (3 mm) wire that is bent to form a "U" approximately 1 inch (25 mm) in width.

### C. Watering

Immediately after the area is sodded, it shall be watered with a minimum of 5 gallons of water per square yard (22.5 liters per square meter) and at 10 day intervals as needed and as directed by the Engineer or designated representative. Subsequent to the initial application water shall be applied at a minimum rate of 3 gallons per square yard (13.5 liters per square meter), as required on the Drawings or as directed by the Engineer or designated representative until final acceptance by the City or until the grass uniformly reaches a height of 2 1/2 inches (62.5 mm).

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).

### D. Finishing

Where applicable, the shoulders, slopes and ditches shall be smoothed after planting has been completed and shaped to conform to the desired cross sections shown on the Drawings. Any excess soil from planting operations shall be spread uniformly over adjacent areas or disposed of as directed by the Engineer or designated representative so that the completed surfaces will present a neat appearance. All sodded areas shall be rolled after the initial watering application, when sufficiently dry.

## 602S.6 Block Sodding

At locations indicated on the Drawings or where directed by the Engineer or designated representative, sod blocks shall be carefully placed on the prepared areas. The fertilizer shall then be applied in accordance with the applicable provisions of Item No. 606S, "Fertilizer" and thoroughly watered. When sufficiently dry, the sodded area shall be rolled or tamped to form a thoroughly compacted, solid mat. Any voids left in the block sodding shall be filled with additional sod and tamped. Surfaces of block sod which, in the opinion of the Engineer or designated representative may slide due to the height and slope of the surface or nature of the soil, shall be pegged with wooden pegs driven through the sod blocks into firm earth sufficiently close to hold the block sod firmly in place. Edges along curbs and drives, walkways, etc., shall be carefully trimmed and maintained until the sodding is accepted.

## 602S.7 Mulch Sodding

The sod source shall be disked in 2 directions cutting the sod thoroughly to a depth of not less than 4 inches (100 mm). Sod material shall be excavated to a depth of not more than 2 inches (50 mm) below the existing root system, being careful to avoid having soil containing no grass roots. The disked sod may be windrowed or otherwise handled in a manner satisfactory to the

Engineer or designated representative. The material shall be rejected if not kept in a moist condition.

Prior to placement of mulch sod, the cut slopes shall be scarified by plowing furrows 4 inches (100 mm) to 6 inches (150 mm) deep along horizontal slope lines at 2 foot (600 mm) vertical intervals. Excavated material from the furrows shall not protrude more than 3 inches (75 mm) above the original surface of the cut. Fertilizer shall be distributed uniformly over the area in accordance with the applicable provisions of Item No. 606S, "Fertilizer". The sod shall then be deposited upon the prepared area and spread uniformly to the thickness indicated on the Drawings.

Any section that is not true to lines and cross sections shall be remedied by the addition of sod material or by reshaping the material to meet the requirements of "Finishing" [Section 602S.5 (4)]. After the sod material has been spread and shaped, it shall be thoroughly wetted and compacted with a corrugated roller of the "Cultipacker" type. All rolling of slope areas shall be on the contour.

**602S.8 Measurement**

Work and acceptable material for "Sodding for Erosion Control" will be measured by the square yard (square meter: 1 square meter is equal to 1.196 square yards) complete in place with a minimum of 95 percent growth with a 2 1/2 inch (62.5 mm) stand of grass.

**602S.9 Payment**

The work performed and materials furnished and measured as provided under "Measurement" will be paid for at the unit bid price for Bermuda Block Sodding", "St. Augustine Block Sodding", "Bermuda Mulch Sodding" or "Other Approved Grass Sodding". The prices shall each represent full compensation for completion of the work including all water applications, rolling, pegging and fertilizer as indicated on the Drawings.

Payment will be made under one of the following:

|                             |                             |                  |
|-----------------------------|-----------------------------|------------------|
| <b>Pay Item No. 602S-A:</b> | Bermuda Block Sodding       | Per Square Yard. |
| <b>Pay Item No. 602S-B:</b> | St. Augustine Block Sodding | Per Square Yard. |
| <b>Pay Item No. 602S-C:</b> | Bermuda Mulch Sodding       | Per Square Yard. |
| <b>Pay Item No. 602S-D:</b> | Grass Sodding               | Per Square Yard. |

End

|   |
|---|
| <b>SPECIFIC CROSS REFERENCE MATERIALS</b>         |
| Specification 602S, "Sodding for Erosion Control" |

**City of Austin Land Development Code**

| <b>Designation</b>                                 | <b>Description</b>                          |
|--|---|
| Chapter 4-2, Art. II                               | Emergency and Peak Day Water Use Management |
| <b>City of Austin Standard Specification Items</b> |   |

| <b>Designation</b>                          | <b>Description</b>                       |
|---|--|
| Item No. 606S                               | Fertilizer                               |
| <b>City of Austin Land Development Code</b> |  |
| <b>Designation</b>                          | <b>Description</b>                       |
| 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         |

|  |
|--|
| <b>RELATED CROSS REFERENCE MATERIALS</b> |
|--|

|   |
|---|
| Specification 602S, "Sodding for Erosion Control" |
|---|

**City of Austin Standard Specification Items**

| <b>Designation</b> | <b>Description</b>                         |
|--------------------|--|
| Item No. 110S      | Street Excavation                          |
| Item No. 111S      | Excavation                                 |
| Item No. 120S      | Channel Excavation                         |
| Item No. 132S      | Embankment                                 |
| Item No. 601S      | Salvaging and Placing Topsoil              |
| Item No. 604S      | Seeding for Erosion Control                |
| Item No. 608S      | Planting                                   |
| Item No. 610S      | Preservation of Trees and Other Vegetation |

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

| <b>Designation</b> | <b>Description</b>             |
|--------------------|--------------------------------|
| Item No. 100       | Preparing Right of Way         |
| Item No. 110       | Excavation                     |
| 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. 204       | Sprinkling                     |



**Sodding for Erosion Control**

**SPECIAL PROVISION To  
Standard Specification Item No. 602S (Version 06-16-08)  
Sodding for Erosion Control**

These special provisions serve to modify, add to, and/or delete from the City of Austin Standard Technical Specification Item No. 602S: Sodding for Erosion Control, dated 6-16-2008. Any item, paragraph, article, or work contained therein unless specifically modified, added to or deleted herein shall apply where applicable.

**Article 602.2 Submittals**

**DELETE** the existing paragraph in its entirety and replace with the following:

The submittal requirements for this specification item shall include the identification of the type and source of sodding and type and rate of application of fertilizer and soil amendment, including the following:

- A. Required Submittals Before Construction
  - a. Source of sod and certification of variety.
  - b. Installation and maintenance requirements as provided by supplying sod farm.
  - c. Sample of sod stake proposed for use.
  
- B. Required Inspections During Construction
  - a. After fine grading is complete and all soil amendments (if any) have been added, before sod is placed. Contact Owner to schedule inspection.
  - b. After sod installation.

**Article 602.3 Materials**

**ADD** the following to item A. Block and Mulch Sod:

- a. Buffalo grass sod.
- b. Hybrid Bermuda grass sod.
- c. Zoysia sod.

**ADD** the following:

**F. Topsoil**

Topsoil shall meet Standard Specification 601S or Topsoil Mix SS-612.

**G. Landscape Stakes**

Biodegradable landscape stakes (6"), such as GreenStake® or similar, shall be used to anchor sod in areas where slopes are 3:1 or greater.

**Sodding for Erosion Control****Article 602.5 Construction Methods****A. General**

**ADD** the following:

- a. If compacted, soil in planting area shall be tilled to a maximum depth of six inches. In the critical root zone of trees, limit scarification to one inch.
- b. After tilling or scarification, add required amendment per soil test or install approved topsoil (601S) or topsoil mix (SS612) to four (4) inch depth minimum. The planting area should be smooth with no rocks or other materials over one inch.
- c. Turfgrass sod shall be harvested, delivered and installed within a 24-hour period, unless a suitable preservation method is approved before delivery.

**B. Placement**

**ADD** the following:

- a. Turfgrass sod shall be delivered to the site specified by Owner and off-loaded using equipment provided by the Contractor or turfgrass sod supplier. Palletized or large-roll turfgrass sod shall be off-loaded at the designated location at the installation site.
- b. Any sod used in areas subject to concentrated water flow, regardless of slope, shall be staked with biodegradable landscape stakes installed per manufacturer's specification. Sod on all slopes exceeding 3:1 shall be staked.
- c. Roll prepared planting bed with hand roller to approximately 80% compaction before placement of sod.
- d. All sod shall be installed the day it is delivered.

**602.6 Block Sodding**

**DELETE** the fifth sentence in its entirety and replace with the following:

Each piece of sod should be pegged/staked at the ends of the strips and in the center, or every 3-4 feet if the sod strips are long with "biodegradable landscape stakes" driven through the sod blocks into firm earth sufficiently close to hold the block sod firmly in place.

**Article 602.8 Measurement****A. Block and Mulch Sod:**

**ADD** the following item:

- a. 4" stand of buffalo grass in accordance with sod supplier's recommendation.

**Sodding for Erosion Control**

**Article 602.9 Payment**

Add the following:

**Pay Item SP 602S-B** Buffalo grass sod – per Square Yard

**Pay Item SP 602S-C** Hybrid Bermuda Grass sod – per Square Yard

**Pay Item SP 602S-D** Zoysia grass sod – per Square Yard

**End**



**SPECIAL SPECIFICATION 603  
Irrigation System (Temporary)****603.1 Description**

This item shall consist of all materials, labor, equipment, tools, and incidentals necessary to perform the work of irrigation system installation as specified in this section and related documents. These specifications relate to the installation phase (described in Items No. 602S, 604S and 608S, 609S, and their Special Provisions), and to the following maintenance phase as required.

The Specifications indicate and specify a complete and efficient landscape irrigation system which will operate in accordance with the specified equipment manufacturer's recommendations and with state and local codes and regulations. Items not specified, but found to be necessary for a complete system, shall be furnished under this Contract.

The irrigation system will be temporary. Equipment may be installed above or below ground depending on the jurisdiction of the City land where the system will be installed. City of Austin Parks and Recreation Department (PARD) policy requires subsurface installation in City of Austin Parkland, with in-place abandonment after the need for supplemental water ends. In Watershed Protection jurisdiction, irrigation installation shall be above-ground (unless otherwise directed) and equipment completely removed after one (1) year or when instructed to do so by the City of Austin project manager. In some cases, supplemental water may be provided by truck watering or hand watering (e.g., hose, gator bag), etc.

**A. Scope of Work**

Install a complete and efficient landscape irrigation system which will operate in accordance with the specified equipment manufacturer's recommendations and with state and local codes and regulations. Above ground piping is acceptable except on City of Austin Parkland where all pipes must be buried and left in place after the termination of temporary irrigation. The Contractor shall contact the Owner to verify the nature of the installation (i.e., surface or subsurface).

**B. Qualification of Installer**

A Texas-licensed landscape irrigator in good standing, approved by the Owner or his agent, with a minimum of 5 years continuous experience in installing systems of this type, and who is regularly engaged in installing landscape irrigation systems shall be employed for this Work.

**603.2 Permits and Inspections**

The Contractor shall obtain necessary permits, tests, and inspections, and pay any related fees and taxes required by governing agencies.

**604.3 Submittals**

A. The submittal requirements for this specification item shall include:

1. Copy of Irrigator's license issued by the Texas Commission on Environmental Quality (TCEQ).

2. Watering schedule comprising a chart listing zone number, zone flow (gpm), run time (minutes/month), type of vegetation irrigated per zone (e.g., trees, bunch grasses), and type of emission device per zone (e.g., bubblers, rotors).
3. In the event of mandated watering restrictions, provide a completed variance request approved by Austin Water Utility.
4. As-built irrigation plan showing all emission devices, valves, controller, backflow prevention device, and sized pipes.
5. Completed irrigation system maintenance checklist (Attachment A).

**603.4 Damage to Property**

- A. Repair or replace any property damage inflicted in the course of the irrigation installation, without additional charge and before final payment. Included are damages to building, paving, structures, equipment, piping, pipe covering, utilities, sewers, walls, signs, sidewalks and landscaping.
- B. The Irrigation Installer is responsible for damage caused by leaks in the piping systems and shall make repairs without charge.
- C. The Irrigation Installer is not responsible for damage to the system caused by others but all such damage must be repaired so the system is fully functioning at all times.

**603.5 Existing Conditions**

- A. Field verify all existing site conditions. By bidding this Work, the Contractor acknowledges that they have satisfied themselves as to the nature of the Work and to the quality of surface and subsurface materials and obstacles insofar as this data is reasonably ascertainable from a site inspection. Failure of the Contractor to acquaint themselves with the available information will not relieve their responsibility of proper estimation of the difficulty or cost of successful performance of the Work.
- B. Contractor shall locate all utilities in work area before installation. Any damage to existing utilities occurring during irrigation installation requiring repair or replacement shall be the Contractor's responsibility. This replacement clause extends to existing trees and other landscape materials proposed for preservation.
- C. Verify water supply static pressure and volume as adequate before system installation. Report inadequacies immediately to the Owner or Irrigation Designer of record for resolution. In cases of high pressure, pressure reduction equipment shall be used.
- D. The irrigation installation shall account for elevation changes on the site as part of pressure considerations.
- E. Irrigation layout shall account for slope on a site. Pipes should run perpendicular to a slope where possible. For temporary irrigation systems, above ground pipes should be secured to slopes every 10 feet in a manner that does not create a safety hazard. Stake temporary, above ground lateral pipes at end points.
- F. Determine and verify the location and size of the irrigation meter to be used for this project. Contractor is responsible for the tap, for following state and municipal regulations regarding connection to the water supply, and for obtaining all required permits and inspections.

**603.6 Materials**

Provide all equipment and materials necessary to complete work. All materials and equipment shall be new and unused, except for Yelomine pipe which is manufactured for reuse.

**A. Pipe and Tube**

1. Irrigation lines: Polyvinyl chloride pipe (PVC): rigid, un-plasticized PVC pipe, extruded from virgin parent material. Provide pipe that is homogenous throughout and free from visible cracks, holes, foreign materials, blisters, wrinkles and dents. Purple pipe shall be used when non-potable water is used to irrigate a site.
  - (a) Lateral: Class 200 (SDR 21).
  - (b) Mainline: Schedule 40 PVC; Yelomine (ASTM D2241); or C900/RJ PVC.
  - (c) Sleeves: Schedule 40 PVC (4"); SDR Class 200 (<4").
  - (d) Reference Standards: ASTM 1785-99, ASTM D2241-09, ASTM D2564-12, ASTM D2855-96(2010).
2. Velocity: The irrigation system must be designed and installed so that the flow of water in the pipe will not exceed a velocity of five (5) feet per second.

**B. Connections**

1. PVC Fittings: Use PVC molded fittings of the same material and pressure rating or schedule as the adjoining PVC pipe. Use fittings suitable for solvent weld, slip-joint ring tight seal, or screwed connections, as required, to properly join PVC pipe.
2. Use PVC solvent primer (color-treated) on all PVC joints in preparation for of the solvent weld.
3. Use solvent cement of a type approved by the pipe manufacturer on all PVC connections. Cement must be National Sanitation Foundation (NSF) approved and meet ASTM D2564-12 specifications.

**C. Swing Joints**

1. All risers and swing joint nipples shall be unplasticized polyvinyl-chloride, Schedule 80, threaded pipe.

**D. Valves**

1. Isolation Valves – threaded or bolted flange attachments:
  - (a) Install isolation valve between the water meter and backflow prevention device. This valve shall be iron body gate valve with resilient seat, non-rising stem with square key on 2-inch or larger.
  - (b) Where required, install an isolation valve upstream of each remote control valve. Isolation valves upstream of remote control valves can be plastic ball valve construction.
2. Remote Control Valves:
  - (a) Electric control valves shall be electrically operated, normally closed, diaphragm type, and be installed following published recommendations of the manufacturer.
  - (b) Valves shall be slow closing and opening.
  - (c) Valves shall have manual flow control and manual bleed.

**3. Quick Coupling Valves:**

- (a) Where required, provide a quick coupler valve with 2-piece heavy cast bronze body and rubber cover. Provide single-lug bronze keys with compatible swivel hose ends.
- (b) Coupler shall be in a covered purple valve box.
- (c) Install an isolation valve immediately upstream of each quick coupler.

**E. Gate Valves**

1. As manufactured by Nibco, or approved equal.

**F. Check Valves:**

1. In-head check valves shall be installed next to paved areas where elevation differences may cause low head drainage.

**G. Backflow Prevention Devices**

1. Provide a Double Check Backflow Prevention (DCA) or Reduced Pressure Backflow Prevention Device (RPZ) as noted in the plans.
2. Backflow prevention assembly shall consist of a bronze body, 909 Celcon check seats, stainless steel relief valve seats and bronze test cocks. All internal parts are of corrosion resistant materials.
3. Backflow prevention assembly will be constructed so that all internal parts can be serviced without removing the device from the line. These assemblies are rated to 175 psi water working pressure and water temperatures from 32°F to 140°F.
4. All backflow devices must be tested by a Licensed Backflow Prevention Device Tester.
5. Backflow device may be in an enclosure, appropriately located and sized to ensure accessibility for testing.

**H. Valve Boxes**

1. Provide plastic valve box for enclosure of all valves, ten (10) inch minimum or larger.

**I. Gravel**

1. Provide gravel as noted in plans and details.

**J. Emission Devices**

1. Provide new heads and nozzle assemblies as manufactured by Rainbird, Hunter, or approved equal.
2. Provide drip tubing by Netafim or Rainbird, or approved equal, or as specified in the plans.
3. All emission devices within a zone must irrigate at the same precipitation rate (matched precipitation rate). Emission devices of different types (i.e., spray head, bubblers, drip tubing) shall not be used together within the same zone.

**K. Controller**

1. A weather-based ET controller is typically required per City of Austin code for irrigation systems, although for temporary irrigation systems, a battery operated controller such as the Hunter Node is acceptable.

2. An automatic rain shut-off device (wired or wire-less) shall be associated with the controller. It must terminate operation of the irrigation system after not more than one-half inch rainfall. This sensor must be mounted in an open location, not obscured by tree branches, roofs, and other overhead obstructions.
3. The controller must be in a secure, weather and vandal resistant enclosure mounted in a location approved by the Owner.
4. Seasonal Water Schedule: one copy of the schedule shall be placed in a plastic sleeve inside the controller enclosure and one copy shall be provided to the Owner. Where there is no controller enclosure on site, the schedule shall be provided to the City of Austin project manager. In the event of mandated water restrictions, the controller shall be set according to the restrictions mandated by the regulatory agency and kept in compliance until the restrictions change. It may be possible to water outside the mandated schedule providing that the appropriate variance is obtained from the City of Austin Water Utility.

#### L. Pressure Regulation

1. The irrigation system shall be designed and installed to operate within adequate pressure conditions. Available static pressure shall be determined by the Contractor before installation.
2. If available static pressure is excessive, the Contractor shall install pressure reducing valve.
3. Pressure reducing valves must be installed in valve boxes.

#### 603.7 Construction/Maintenance Methods

Provide all construction equipment and methods required to complete work.

##### A. System Design and Layout

1. Water Supply: Verify location and source of the water meter or tap for irrigation. Perform tests as needed to verify the pressure and volume are adequate to run the system as designed and with full, even and complete coverage. If volume and pressure are less than 50 gpm and 60 psi respectively, notify the Owner or Irrigation designer immediately before proceeding with the work. When necessary, supplemental water, in addition to the permanent and/or temporary sources, can be provided via water truck or other. This may be needed during times of mandatory water restrictions to provide sufficient water to the landscape.
2. Mainline: For purposes of this contract, a pay item called "P.O.C. (point of connection) to irrigation field is included. This is primarily related to temporary irrigation where the water source is a fire hydrant, especially where the hydrant is located some distance from the field of irrigation.
3. Standard Installation: Perform all Work and provide material in accordance with the local codes and ordinances in force at the job site. Where provisions of these Specifications exceed such requirements, these specifications shall govern.

##### B. Layout

1. Installer is responsible for locating valves, piping and fittings relative to existing conditions as the Drawings may show schematic layout only.
2. If a discrepancy in the size and shape of areas to be watered becomes apparent in the Drawings at the time of installation, such discrepancy shall be discussed with the Irrigation designer before commencement of the installation.
3. Work shall not proceed until design changes have been approved.

4. Should such changes create extra cost, a Change Order for extra compensation shall be obtained in writing from the Owner before commencing Work.
5. Should such changes create a savings in cost, a written reduction in the contract price shall be approved by the Owner in writing before commencing Work.
6. All materials shall be installed in strict accordance to the manufacturer's installation specifications.
7. All layout is to be based on final locations of planting beds, tree locations, etc. Coordinate with landscape contractor before installing these areas.
8. Hydrozoning is required. Plants of different water requirement, and those irrigated with different emission devices (e.g., spray heads vs. rotors) shall be on separate zones, including tree bubblers. Drip and spray irrigation must not be on common zones.
9. The maximum spacing between emission devices must not exceed the radius of throw recommended by the manufacturer.
10. **The Contractor shall install required irrigation before placement of all plant materials and before installation of salvaged or imported topsoil.**

### C. Excavation

Excavate as necessary to meet local codes and to complete work.

1. Trenches
  - (a) Hand trench only in the critical root zone<sup>1</sup> of large (>18 caliper inches) existing trees and their root systems, taking care to work piping around roots where possible rather than cutting. Do not cut any roots larger than one inch diameter.
  - (b) Dig trenches no wider than necessary to lay pipe.
  - (c) Provide trenches of sufficient depth to provide minimum cover above the top of pipe according to manufacturer's specification. If no published specification minimum depth, coverage of 12 inches over lateral lines and 15 inches over main lines. Clearly and visibly flag all open trenches, hole and depressions until adequately filled or repaired.
  - (d) A minimum of two inches of sand bedding may be installed completely around the pipe. Fill to match adjacent grade elevations with approved sandy loam backfill free from rocks and debris in layers not greater than six inches depth.

### D. Pipe Fitting and Assembly

1. Keep ends of pipe securely closed when Work is not in operation to prevent water and other matter from entering the lines.
2. The routing of the pressure supply lines shall avoid large tree roots and other existing items. Deviate where necessary and install lines to provide coverage without off-setting assemblies from pressure supply lines.
3. Piping Erection:
  - (a) General. The Installer is responsible for being familiar with any and all methods of assemblage, joining and installation of various types of pipe to be used. Adhere in strict accordance with the manufacturer's recommendations.
  - (b) Polyvinyl chloride (PVC) pipe:
    - (1) Exercise care in handling, loading, unloading and storing plastic pipe and fittings.

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<sup>1</sup> A tree's critical root zone roughly corresponds to the edge of its dripline.

(2) Make all changes in direction of pipe with fittings, not by bending pipe.

(3) Solvent joints. Make sure pipe is cut square and all connecting surfaces are properly cleaned and dry. Apply an even coat of solvent to the outside and inside of the fitting. Insert the pipe quickly into the fitting and turn pipe approximately 1/4 turn to distribute the solvent and remove air bubbles. Hold the joint for approximately 15 seconds so the fitting does not push off the pipe. Using a clean rag, wipe off all excessive solvent to prevent weakening at joint. Exercise care in going to the next joint so that the pipe is not twisted, thereby disturbing the last completed joint. Allow at least 15 minutes set-up time for each solvent welded joint before moving.

**E. Valves**

1. Install valves in 10-inch minimum size plastic valve boxes.
2. Isolation valves shall be set vertically.
3. Remote control valves should be adjusted to provide the proper pressure at the emission device.

**F. Backflow Prevention Devices**

1. Install backflow prevention device as per requirements of City of Austin Uniform Plumbing Code and Austin Water Utility at location determined by Owner and shown on Drawings.
2. Provide testing and coordinate inspection of the backflow preventer as required by state statute and as per City of Austin requirements.

**G. Sleeves**

1. Provide new sleeves for all locations as needed at pavement or walls before their installation. Install sleeves before the installation of pavement or walls. Extend sleeve pipes 12 inches beyond edges of pavement and cap. Mark locations of sleeves with paint of the pavement or other approved marking.
2. For areas of existing pavement, install sleeves by boring under the hardscape. Where boring is unfeasible, pavement can be cut and patched in a method acceptable to the Owner.
3. Sleeves shall be at least twice the diameter of the pipe or wire to be encased.

**H. Emission Devices**

1. Spray heads shall be set back at least six (6) inches from impervious surfaces. In the City of Austin right-of-way, sprays heads shall be set back two (2) feet from the back of curb.
2. No spray irrigation heads shall be installed on areas less than six (6) feet wide. Instead, drip irrigation is permitted.
3. Sprinklers shall not directly overspray onto non-irrigated areas (e.g., parking lots, sidewalks).
4. Tree bubblers shall be placed at the edge of the tree root ball.
5. All emission devices shall be installed, where applicable, in plumb position, with proper spacing and in locations shown on the plans.

**I. Controller**

1. A weather-based ET controller and associated rain shut-off sensor shall be mounted in locations approved by the Owner.
2. The controller must be in a secure, weather and vandal resistant, lockable enclosure mounted in a location approved by the Owner.
3. Contract shall put a sticker on the controller with their company contact information.
4. For temporary irrigation system where access to electricity is a limiting factor, a battery operated controller such as the Hunter Node is acceptable.

**J. Control Wiring**

1. Control wire shall be of the size and type recommended by the valve manufacturer, with a minimum gauge of 14 AWG.
2. Waterproof connectors shall be used at each splice and placed in a sufficiently-sized valve box.

**K. Watering Schedule**

1. Contractor shall provide the Owner with a chart listing information for each zone, including precipitation rate, gallons per minute (gpm), and run time for each season.

**L. Inspection, Testing and Approval**

1. Do not enclose or cover any Work until it has been inspected, tested and approved per local codes. Where required, contact the Owner Architect to arrange an inspection.
2. Hydrostatic Piping Test:
  - (a) In the presence of the Owner, hydrostatically test the mainline piping system. Test to a minimum psi of 100. Test period shall not be less than 4 hours. Pipe may be tested in sections to expedite the work.
  - (b) Test is acceptable if no leakage occurs during test period.
  - (c) Repair all leaks and retest system for another 4-hour period if necessary. Continue this procedure until all leaks are repaired.
3. Operation Test:
  - (a) After all equipment is installed, test the system for coverage, flow and pressure in the presence of the Owner.
  - (b) Test is acceptable if system operates satisfactorily, with adequate pressure and flow and if all irrigated areas are receiving proper coverage with no overspray onto pavement or buildings.
  - (c) After all required adjustments are made, coordinate with Owner to obtain an inspection by a City of Austin Irrigation Inspector, if required.
4. Final Acceptance:
  - (a) Final Acceptance may be given when all punchlist items are satisfactorily completed and, if required, a City of Austin Irrigation Inspector has approved the job (with all comments acceptable addressed).

**M. Cleanup**

1. Maintain a clean work area during the progress of the Work within reasonable limits of the installation area. Periodically remove all rubbish, debris, etc., from Work site and dispose legally.

- 2. Upon completion of the Work, remove all construction and installation equipment from the premises; make ground surface level where it has been affected by irrigation system installation; and remove excess materials, rubbish and debris.
- 3. Immediately replace and thoroughly hand water any plant material and groundcover which may be displaced during installation.

**603.4 Measurement**

Work and acceptable material for "Irrigation System" will be measured as a complete system in working order with all the elements necessary to fulfill the landscape design intent.

**603.5 Payment**

The work performed will be paid for at the unit price bid for "Irrigation System", which price shall be full compensation for furnishing and installing all components; flushing and testing waterlines; furnishing and operating equipment; and labor, tools, and incidentals.

Payment will be made under:

|  |             |
|--|-------------|
| <b>Pay Item No. 603-A1:</b> Temporary Irrigation System, above-ground installation                   | Per SF      |
| <b>Pay Item No. 603-A2:</b> Temporary Irrigation System, above-ground removal                        | Per SF      |
| <b>Pay Item No. 603-B:</b> Temporary Irrigation System, subsurface installation                      | Per SF      |
| <b>Pay Item No. 603-C:</b> Temporary Irrigation System - Maintenance & Repair                        | Per HR      |
| <b>Pay Item No. 603-D:</b> Temporary Irrigation - Hand-watering with water truck, filling gator bags | Per HR      |
| <b>Pay Item No. 603-E:</b> Point of Connection to Irrigation Field, subsurface                       | Per LF      |
| <b>Pay Item No. 603-F:</b> Point of Connection to Irrigation Field, above-ground                     | Per LF      |
| <b>Pay Item No. 603-G:</b> Water   | Per Kgal/yr |

**END**

**ATTACHMENT A to SS603—IRRIGATION SYSTEM MAINTENANCE CHECKLIST**

Installation Completion Date: \_\_\_\_\_

Project Name: \_\_\_\_\_

CIP/SP No.: \_\_\_\_\_

Address: \_\_\_\_\_

The following items have been provided and explained to the irrigation system owner or system owner's representative.

- The manufacturer's manual for the controller.
- A seasonal watering schedule.
- A list of components that require maintenance and the recommended frequency of maintenance is attached.
- A permanent sticker has been attached to the controller indicating the warranty period for the irrigation system and contact information.
- The corrected or re-drawn design plans indicating the actual installation and components of the system.
- Location and operation of the isolation valve.

\_\_\_\_\_  
Irrigation system owner/representative

\_\_\_\_\_  
Date

This irrigation system has been installed in accordance with all applicable state and local laws, ordinances, rules, regulations or orders. I have tested the system and determined that it has been installed according to the Irrigation Plan and is properly adjusted for the most efficient application of water at this time.

\_\_\_\_\_  
Irrigator's Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Irrigation Technician Signature

\_\_\_\_\_  
Date



Irrigation in Texas is regulated by the Texas Commission on Environmental Quality (TCEQ) (MC-178), P.O. Box 13087, Austin, Texas 78711-3087. TCEQ's web site is: [www.tceq.state.tx.us](http://www.tceq.state.tx.us)

**ATTACHMENT A to SS603—IRRIGATION SYSTEM MAINTENANCE CHECKLIST (continued)****Components Requiring Maintenance****Irrigation System:**

- Winterization
- Return to normal service

**Sprinkler Heads:**

- Missing heads
- Broken heads
- Clogged heads
- Tilted heads
- Heads spraying in wrong direction
- Heads too far in or above the ground or vegetation
- Water constantly seeping from head(s)
- Water spraying in a fine mist
- Uneven and incomplete sprinkler coverage
- Blocked or misdirected spray pattern
- Water spray onto sidewalks, decks, buildings, driveways or the street

**Controller:**

- Controller cabinet lock broken
- Loose wires (Take care with wires of 110 volt)
- Worn wires (Take care with wires of 110 volt)
- Dead or old battery
- Run time(s) and day incorrect
- Rain or moisture sensor (or other technology) disconnected from the controller or ground wire
- Controller not programmed for the appropriate season

**Valves:**

- Broken or missing valve boxes and covers
- Faulty valve electrical connections or dead batteries

**Back Flow Prevention Device:**

- Not tested per requirements

**Drip/Micro Irrigation:**

- Emitters unconnected from flex line
- Flex line unconnected from riser
- Micro adjustment nozzle unconnected from flex line and nozzle not intact
- Filter strainer clogged
- Automatic flush valves not operating properly
- Operational pressure is too high



**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.

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<br>(PLS=0.83)                          | Fiber Mulch  |  | Soil<br>Tackifier   |
|--|--|--|---|
|  | Cellulose  | Wood   |   |
| 1 Lbs/1000 ft <sup>2</sup><br>(0.5kgs/100 m <sup>2</sup> ) | 45.9 Lbs/1000 ft <sup>2</sup><br>(22.5kgs/100 m <sup>2</sup> ) |  | 1.4 Lbs/1000 ft <sup>2</sup><br>(0.7kgs/100 m <sup>2</sup> )  |
|  |  | 57.4 Lbs/1000 ft <sup>2</sup><br>(28.0kgs/100 m <sup>2</sup> ) | 1.5 Lbs/1000 ft <sup>2</sup><br>(0.75kgs/100 m <sup>2</sup> ) |

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:

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

| Table 3: Native Wildflowers             |                                |                            |                            |
|---|--------------------------------|----------------------------|----------------------------|
| Common Name                             | Botanical Name                 | Application rates          |                            |
|   |                                | Lbs/1000 feet <sup>2</sup> | kg/ 100 meter <sup>2</sup> |
| Black-Eyed Susan                        | <i>Rudbeckia hirta</i>         | 0.05                       | 0.025                      |
| Bundleflower                            | <i>Desmanthus illinoensis</i>  | 0.05                       | 0.025                      |
| Scarlet Sage                            | <i>Salvia coccinea</i>         | 0.10                       | 0.05                       |
| Pink Evening Primrose                   | <i>Oenothera speciosa</i>      | 0.05                       | 0.025                      |
| Phlox                                   | <i>Phlox Drummondii</i>        | 0.05                       | 0.025                      |
| Coreopsis                               | <i>Coreopsis tinctoria</i>     | 0.05                       | 0.025                      |
| Greenthread                             | <i>Thelesperma filifolium</i>  | 0.05                       | 0.025                      |
| Purple Prairie Clover                   | <i>Petalostemum purpurea</i>   | 0.05                       | 0.025                      |
| Cutleaf Daisy                           | <i>Engelmannia pinnatifida</i> | 0.05                       | 0.025                      |
| Partridge Pea                           | <i>Cassia fasciculata</i>      | 0.1                        | 0.05                       |
| Indian Blanket                          | <i>Gaillardia pulchella</i>    | 0.1                        | 0.05                       |
| Bluebonnet                              | <i>Lupinus texensis</i>        | 0.15                       | 0.075                      |
| Mexican Hat                             | <i>Ratibida columnaris</i>     | 0.05                       | 0.025                      |
| Maximilian Sunflower                    | <i>Helianthus maximiliani</i>  | 0.1                        | 0.05                       |
| Total Wildflower Seeding Rate           |                                | 1.0                        | 0.5                        |
| Total Warm Season Seeding Rate (Grass & |                                | 3.0                        | 1.5                        |

|              |  |  |  |
|--------------|--|--|--|
| Wildflowers) |  |  |  |
|--------------|--|--|--|

| Table 4: Cool Season Cover Crop                                   |                   |                            |                            |
|---|-------------------|----------------------------|----------------------------|
| Common Name   | Botanical Name    | Application rates          |                            |
|   |                   | Lbs/1000 feet <sup>2</sup> | kg/ 100 meter <sup>2</sup> |
| 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

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

| City of Austin Technical Specifications | Description |
|---|-------------|
| Designation                             | Description |

|   |  |
|---|--|
| Item No. 130S                               | Borrow                                   |
| Item No. 606S                               | Fertilizer                               |
| <b>City of Austin Land Development Code</b> |  |
| <b>Designation</b>                          | <b>Description</b>                       |
| 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         |

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

**City of Austin Technical Specifications**

|                    |                               |
|--------------------|-------------------------------|
| <b>Designation</b> | <b>Description</b>            |
| 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)**

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

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

|                    |                                     |
|--------------------|-------------------------------------|
| <b>Designation</b> | <b>Description</b>                  |
| 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 |



**SPECIAL PROVISION To  
Standard Specification Item 604S (Version 08-18-10)  
Seeding for Erosion Control**

These special provisions serve to modify, add to, and/or delete from the City of Austin Standard Technical Specification Item No. 604S: Seeding for Erosion Control, dated 08/18/2010. Any item, paragraph, article, or work contained therein unless specifically modified, added to or deleted herein shall apply where applicable.

**Article 604S.2 Submittals**

**604S.2 Submittals**

**A.**

**ADD** the following sentence:

Provide delivery tickets indicating the quantity of each type of seed delivered to the site.

**B.**

**ADD** the following sentence:

Submit an invoice showing certification of Hydromulch/seed mix as Bonded Fiber Matrix (BFM) or Fiber Reinforced Matrix (FRM).

**ADD** the following item:

**E.** List of types of seeding equipment proposed for use.

**604S.3 Materials**

**C. Top Soil.**

**ADD** the following to the end of the sentence:

And/or Special Specification 612, Topsoil Mix, as directed by the Landscape Architect.

**ADD** the following item:

**I. Hydromulch.** Hydromulch for permanent vegetative stabilization materials may include:

- a. Bonded Fiber Matrix (BFM): organic defibrated fibers and cross-linked hydro-colloidal tackifiers. Refer to ECM Table 1.4.7-C
- b. Fiber Reinforced Matrix (FRM): organic defibrated fibers produced from grinding clean, whole wood chips, crimped interlocking fibers, cross-linked insoluble hydro-colloidal tackifiers and reinforced natural and/or synthetic fibers.

**Article 604S.4 Construction Methods**

**Add** the following sections:

**C. Seeding.**

Apply seed uniformly with a seed spreader, drill, cultipacker seeder or hydroseeder.

**D. Protection of Seed Bed with Hydromulch or Soil Retention Blanket.**

Newly-installed seeding for permanent re-vegetation must be protected by Hydromulch or soil retention blanket (refer to Standard Specification 605S Soil Retention Blanket) immediately after seeding.

**1. Hydromulch**

Permanent vegetative stabilization with Hydromulch shall comply with the requirements of ECM Table 1.4.7-C using either:

- (a) Bonded Fiber Matrix (BFM): 80% organic defibrated fibers and 10% tackifier (Refer to ECM Table 1.4.7-D for BFM properties), or
- (b) Fiber Reinforced Matrix (FRM): 65% organic defibrated fibers, 25% reinforcing fibers or less, and 10% tackifier (Refer to ECM Table 1.4.7-E for FRM properties).

**604S.5 Non-Native Seeding****A. Method A. Broadcast Seeding.**

**ADD** the following sentence:

Apply seed uniformly at the specified rate with a seed spreader, drill, cultipacker seeder or hydroseeder.

Seed Mixture and Rate of Application for Broadcast Seeding:

**DELETE** the paragraph in its entirety and replace with the following:

From September 15...The cool season cover crops shall be mowed (scalped) as short as possible to suppress growth. Rake and remove excess thatch as required and install native seed mix (see SP609S for mix) directly into remaining cover crop stubble. For areas receiving Bermuda grass seed, 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 1 pounds per 1000 square feet with a PLS = 0.83 and purity of 95%. Bermuda Grass seed shall only be planted where shown on the Drawings.

**B. Method B - Hydraulic Planting.**

**ADD** the following sentence at the end of the first paragraph:

For native seed applications, the Contractor shall rinse the hydroseed slurry tank with water three times to insure that no seed contamination occurs to the specified seed mixes.

**DELETE** the Table for Fiber Mulch and Soil Tackifier and replace with the following:

March 1 to September 15

For permanent vegetation, newly-installed seeding must be protected by hydromulch or soil retention blanket (refer to Standard Specification 605S Soil Retention Blanket) immediately after seeding. Protection of the seed bed shall occur in a manner that will allow seed germination and that encourage effective vegetative growth. Hydromulching shall comply with requirements of City of Austin, Environmental Criteria Manual (ECM) Section 1.4.0.

1. Hydromulch

Permanent vegetative stabilization with Hydromulch shall comply with the requirements of ECM Table 1.4.7-C using either:

- (a) Bonded Fiber Matrix (BFM): 80% organic defibrated fibers and 10% tackifier (Refer to ECM Table 1.4.7-D for BFM properties), or
- (b) Fiber Reinforced Matrix (FRM): 65% organic defibrated fibers, 25% reinforcing.

**604S.6 Native Grass Seeding**

**REMOVE** this section in its entirety – all native seeding will conform to SP-609S.

**604S.7 Mulch**

**ADD** the following items:

**E. Bonded Fiber Matrix (BFM).**

BFM shall be 80% organic defibrated fibers and 10% tackifier (Refer to ECM Table 1.4.7-D for BFM properties). It shall be spread uniformly over the area indicated in the Plans, to the manufacturer's recommended application rate and coverage.

**F. Fiber Reinforced Matrix (FRM).**

FRM shall be 65% organic defibrated fibers, 25% reinforcing fibers or less, and 10% tackifier (Refer to ECM Table 1.4.7-E for FRM properties). It shall be spread uniformly over the area indicated in the Plans, to the manufacturer's recommended application rate and coverage.

**604S.9 Payment**

**ADD** the following pay items:

**Pay Item No. SP-604S-A1:** Non-Native Seeding for Erosion Control Method, Seed Spreader, Per Square Yard.

**Pay Item No. SP-604S-A2:** Non-Native Seeding for Erosion Control Method, Drill or Cultipacker, Per Square Yard.

**Pay Item No. SP-604S-A3:** Non-Native Seeding for Erosion Control Method, Bonded Fiber Matrix Hydromulch or Fiber Reinforced Matrix, Per Square Yard.

**SPECIAL PROVISION**

**SP604S  
Seeding for Erosion Control**

**REMOVE** the following pay items:

**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**

**ITEM NO. 605S  
SOIL RETENTION BLANKET****605S.1 Description**

This item shall govern the provision and placement of wood, straw or coconut fiber mat, synthetic mat, paper mat, jute mesh or other material as a soil retention blanket for erosion control on slopes or ditches or short-term or long-term protection of seeded or sodded areas indicated on the Drawings or as specified 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.

**605S.2 Submittals**

The submittal requirements for this specification item shall include the soil retention blanket material type and sample, evidence that the material is listed on TxDOT/TTI Approved Products List, one (1) full set of Manufacturer's literature and installation recommendations, and any special details necessary for the proposed application.

**605S.3 Materials****A. Soil Retention Blankets**

All soil retention blankets must be listed on TxDOT Approved Products List or approved by the Engineer or designated representative.

The soil retention blanket shall be one (1) of the following classes and types as shown on the Drawings:

1. Class 1. "Slope Protection"
  - (a) Type A. Slopes 1:3 or flatter - Clay soils
  - (b) Type B. Slopes 1:3 or flatter - Sandy soils
  - (c) Type C Slopes steeper than 1:3 - Clay soils
  - (d) Type D Slopes steeper than 1:3 - Sandy soils
2. Class 2. "Flexible Channel Liner"
  - (a) Type E Short-term duration (Up to 2 years)  
Shear Stress ( $t_d$ )
  - (b) Type F Short-term duration (Up to 2 years)

Shear Stress ( $t_d$ ) 1 to 2 psf (48 to 96 Pa)

(c) Type G Long-term duration (Longer than 2 years)

Shear Stress ( $t_d$ ) >2 to 96 to

(d) Type H Long-term duration (Longer than 2 years)

Shear Stress ( $t_d$ ) 5 psf ( 239 Pa)

## B. Fasteners

The fasteners shall conform to the recommendations of the manufacturer for the selected soil retention blanket.

## 605S.4 Construction Methods

### A. General

The soil retention blanket shall conform to the class and type shown on the Drawings. The Contractor has the option of selecting an approved soil retention blanket conforming to the class and type shown on the Drawings which is included on the Approved Products List published by TxDOT/TTI Hydraulics and Erosion Control Laboratory.

### B. Site Preparation

Prior to placement of the soil retention blanket, the seedbed area to be covered shall be relatively free of all clods and rocks over 1 1/2 inches (37.5 mm) in maximum dimension and all sticks or other foreign matter that will prevent close contact of the preparation mat with the soil surface. The area shall be smooth and free of ruts and other depressions. If the prepared seedbed becomes crusted or eroded as a result of rain or if any eroded places, ruts or depressions exist for any reason, the Contractor shall be required to rework the soil until it is smooth and to reseed or resod the area at the Contractor's own expense. After the area has been properly prepared, the blanket shall be laid out flat, even and smooth, without stretching or crimping the material.

### C. Installation

The Soil Retention Blanket, whether installed as slope protection or as flexible channel liner in accordance with the TxDOT/TTI Approved Products List, shall be placed within 24 hours after seeding (Standard Specification Item No. 604S), sodding (Standard Specification Item No. 602S) or native grassland seeding and planting (Standard Specification Item No. 609S) erosion control operations have been completed, or as approved by the Engineer or designated representative. The soil retention blanket shall be installed and anchored in accordance with the Manufacturer's recommendations. The Contractor shall contact the Engineer or designated representative three (3) days prior to the installation of the soil retention blanket to allow for inspection of the installation by City of Austin personnel.

## 605S.5 Measurement

This work and acceptable material for "Soil Retention Blanket" will be measured by the square yard (square meter: 1 square meter is equal to 1.196 square yards) of surface area covered, complete in place.

**605S.6 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 bid price for "Soil Retention Blanket" of the class shown on the Drawings or approved by the Engineer or designated representative. The unit price shall include full compensation for furnishing all materials, labor, tools, equipment and incidentals necessary to complete the work. Anchors, checks, terminal and wire staples will not be paid for directly, but will be included in the unit price bid for this specification item.

Payment will be made under the following:

Pay Item No. 605S-A: Soil Retention Blanket Class \_\_\_\_; Type \_\_\_\_ Per Square Yard.

End

**SPECIFIC CROSS REFERENCE MATERIALS**

Specification 605S, "Soil Retention Blanket"

**City of Austin Standard Specification Items**

| Designation   | Description   |
|---------------|---|
| Item No. 602S | Sodding for Erosion Control                               |
| Item No. 604S | Seeding for Erosion Control                               |
| Item No. 609S | Native Grassland Seeding and Planting for Erosion Control |

**RELATED CROSS REFERENCE MATERIALS**

Specification 605S, "Soil Retention Blanket"

**City of Austin Standard Specification Items**

| Designation   | Description                                |
|---------------|--|
| Item No. 101S | Preparing Right-of-Way                     |
| Item No. 102S | Clearing and Grubbing                      |
| Item No. 111S | Excavation                                 |
| Item No. 120S | Channel Excavation                         |
| Item No. 132S | Embankment                                 |
| Item No. 606S | Fertilizer                                 |
| Item No. 608S | Planting                                   |
| Item No. 610S | Preservation of Trees and Other Vegetation |

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

| Designation  | Description                    |
|--------------|--------------------------------|
| Item No. 100 | Preparing Right-of-Way         |
| Item No. 110 | Excavation                     |
| Item No. 132 | Embankment                     |
| Item No. 158 | Specialized Excavation Work    |
| 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                     |

Current Version: 6/21/07

Previous Versions: 11/15/99 and 4/17/86

Item No. 168  
Item No. 169  
Item No. 204

Vegetative Watering  
Soil Retention Blanket  
Sprinkling

**ITEM NO. 606S  
FERTILIZER**

**606S.1 Description**

This item shall govern the provision and distribution of fertilizer over the areas indicated on the Drawings and in accordance with these specifications.

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.

**606S.2 Submittals**

The submittal requirements for this specification item shall include:

- A. Type of soil(s) at the site.
- B. Type(s) of re-vegetation (seeding, sodding, etc).
- C. Type(s) of fertilizer.
- D. Rate(s) of application of fertilizer.
- E. Chemical analysis of the fertilizer(s).

**606S.3 Materials**

All fertilizer used on site shall be delivered in bags or containers, which are clearly labeled and show the analysis. The figures in the analysis shall represent the percent of nitrogen, phosphoric acid and potash nutrients, respectively, as determined by the methods of the Association of Official Agricultural Chemists. The fertilizer may be subject to testing by the State Chemist in accordance with the Texas Fertilizer Law. A pelleted or granulated fertilizer shall be used. Fifty percent or greater of the Nitrogen required shall be in the form of Nitrate Nitrogen (NO<sub>3</sub>). The remaining Nitrogen required may be in the form of Urea Nitrogen [CO(NH<sub>2</sub>)<sub>2</sub>].

The total amount of nutrients furnished and applied per acre (hectare: 1 hectare equals 2.471 acres) shall equal or exceed that specified for each nutrient.

**606S.4 Construction Methods**

General requirements and criterion for vegetative activities, including fertilizing, for the City of Austin are presented in Section 1.4.4, "Vegetative Practice", and Section 1.5.4, "Revegetation Criteria" of the City of Austin Environmental Criteria Manual.

The fertilizer type and rate of application should be based on chemical tests of representative

soil samples taken after completion of construction and ground work. Appropriate initial fertilizer application rates for the Austin area (in lieu of recommendations from soil testing) are provided in the sections of the City of Austin Environmental Criteria Manual identified below:

- A. Permanent seeding. - [Section 1.4.4.B.4].
- B. Restoring Climax Grasses - [Section 1.5.5.E].
- C. Sod - [Section 1.4.4.E.5].
- D. Maintenance of Mulch Sod - [Section 1.4.4.C.4].

Pelleted or granulated fertilizer shall be applied uniformly into the soil to a depth of 4 inches (100 mm) over the area specified on the Drawings to be fertilized and in the manner directed for the particular item of work. The fertilizer shall be dry and in good physical condition. Fertilizer that is powdered or caked will be rejected. Distribution of the fertilizer for the particular item of work shall meet the approval of the Engineer or Designated Representative.

Maintenance fertilizing shall be applied every 6 months after the new sod or grass is placed or until the work is accepted by the City.

The fertilizer may also be applied with the hydromulch

**606S.5 Measurement**

Work and acceptable material for "Fertilizer" will be measured by the normal ton of 2,000 pounds (megagrams: 1 megagram equals 1.1023 tons) or by the 100 pounds (50 kilograms: 1 kilogram equals 2.205 pounds) as determined by approved scales or guaranteed weight of sacks shown by the manufacturer.

**606S.6 Payment**

The work performed and materials furnished and measured as provided under "Measurement" shall be included in the unit price bid for the item of construction in which fertilizer is used, unless specified in the Drawings as a Pay Item.

When fertilizer is specified on the Drawings as a pay item or included as a pay item in the contract bid form, the work performed and materials furnished and measured as provided under "Measurement" will be paid for at the unit bid price for "Fertilizer" of the analysis specified on the Drawings. The unit bid price shall include full compensation for furnishing all materials and performing all operations necessary to complete the work.

Payment, when specified, will be made under one of the following:

|                             |            |                 |
|-----------------------------|------------|-----------------|
| <b>Pay Item No. 606S-A:</b> | Fertilizer | Per Ton.        |
| <b>Pay Item No. 606S-B:</b> | Fertilizer | Per 100 Pounds. |

End

**SPECIFIC CROSS REFERENCE MATERIALS**  
**Specification Item 606S "Fertilizer"**

**City of Austin Environmental Criteria Manual**

| <b>Designation</b> | <b>Description</b>   |
|--------------------|--|
| Section 1.4.4.B.4  | Design Criteria of Section B. Critical Area Stabilization (with Permanent Seeding) |
| Section 1.4.4.C.4  | Design Criteria of Section C. Critical Area Stabilization (with Mulch Sod)         |
| Section 1.4.4.E.5  | Site Preparation of Section E. Critical Area Stabilization (with Sod)              |
| Section 1.5.5.E    | Fertilizer, Section E of 1.5.5, "Restoring Climax Grasses"                         |

**RELATED CROSS REFERENCE MATERIALS**  
**Specification Item 606S "Fertilizer"**

**City of Austin Technical Specifications**

| <b>Designation</b> | <b>Description</b>  |
|--------------------|---|
| Item No. 601S      | Salvaging and Placing Topsoil                             |
| Item No. 602S      | Sodding for Erosion Control                               |
| Item No. 604S      | Seeding for Erosion Control                               |
| Item No. 605S      | Soil Retention Blanket                                    |
| Item No. 607S      | Slope Stabilization                                       |
| Item No. 608S      | Planting  |
| Item No. 609S      | Native Grassland Seeding and Planting For Erosion Control |
| Item No. 610S      | Preservation of Trees and Other Vegetation                |

**City of Austin Standard Details**

| <b>Standard No.</b> | <b>Description</b>                |
|---------------------|-----------------------------------|
| 626S-1              | Grass Lined Swale                 |
| 627S-1              | Grass Lined Swale W/ Stone Center |
| 633S-1              | Landgrading                       |

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

| <b>Designation</b> | <b>Description</b>                  |
|--------------------|-------------------------------------|
| Item No. 100       | Preparing Right of Way              |
| Item No. 110       | Excavation                          |
| Item No. 132       | Embankment                          |
| Item No. 158       | Specialized Excavation Work         |
| 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 |
| Item No. 204       | Sprinkling                          |



**SPECIAL PROVISION TO  
Standard Specification Item No. 606S Fertilizer (Version 06/21/2007)**

These special provisions serve to modify, add to, and/or delete from the City of Austin Standard Technical Specification Item No. 606S: Fertilizer, dated 6/21/2007, incorporated into this Project Manual. Any item, paragraph, article, or work contained therein unless specifically modified, added to or deleted herein shall apply where applicable.

**606S.1 Description**

**DELETE** the first sentence in its entirety and replace with the following:

This item shall govern the provision and distribution of fertilizer and other soil amendments over the areas indicated on the Drawings and in accordance with these specifications.

**606S.2 Submittals**

**ADD** the following items:

- F. Bills of lading for compost or compost tea and all other soil amendments required by the soil analysis described in SS612S shall be submitted indicating quantities that have been incorporated into the soil.
- G. Analysis of compost or compost tea to establish that it meets the requirements identified below. Current test results (within 6 months of application) shall be provided to the Owner for review and approval.
- H. Results of Solvita Compost Maturity Test for proposed compost, including both carbon dioxide and ammonia tests.
- I. Description of compost or compost tea source materials, by percentage of volume.
- J. Identification of compost or compost tea source including supplier's name, address, phone number, and website address.
- K. Compost tea manufacturer's instructions for mixing and application rates.
- L. Length of composting period.
- M. One quart sample of compost material(s).

**606S.3 Materials**

**ADD** the following:

- A. Additional organic material shall be added to raise soil organic matter content of the stockpiled topsoil as indicated by a soil analysis. A methodology for calculating compost application rate based on fertilizer needs is
  - a. Compost: Well-composted, stable, and weed-free organic matter meeting the following parameters.  
**Manure, sewage sludge, or kitchen waste based composts are prohibited.**

| <b>Parameters</b>          | <b>Units of Measure</b>                         | <b>Range</b>                    |
|----------------------------|---|---------------------------------|
| pH                         | pH units  | 6 - 8 <sup>1</sup>              |
| Soluble Salt Concentration | dS/m (mmhos/cm)                                 | 5 - 10 <sup>1</sup>             |
| Organic Content            | % (dry mass)                                    | 30-60%                          |
| Moisture Content           | Content %, net weight basis                     | 40-50%                          |
| Particle Size              | % passing a selected mesh size dry weight basis | 98% thru 3/4" screen or smaller |
| Bulk Density               | ---   | 800-1,000 lbs/cy                |
| Nutrient Contents          | Dry weight basis                                | N: 1-2.5%, P: 1-2%, K: 0.5-1.5% |
| Contaminants               | Mg/kg (ppm)                                     | <1                              |
| Maturity (Solvita®)        |   | >5                              |

- b. Compost will be rototilled into the stockpiled topsoil after it is placed back in the stream restoration area.
- c. Rototilling shall not be done below the drip line of existing trees.

B. Additional amendments shall follow the "Fertilizer Guidelines" provided by a soil lab. Contractor shall get approval on additional amendments from the Owner beforehand and submit manufacturer's data on amendments.

- a. Compost Tea: aerated compost tea shall be produced by a recognized and experienced producer of commercial aerated compost tea, meeting the following parameters:

| <b>Parameters</b>    |                      |
|----------------------|----------------------|
| Active bacteria      | 150 ug/ml            |
| Total bacteria       | 300 ug/ml            |
| Active fungi         | 10 ug/ml             |
| Total fungi          | 20 ug/ml             |
| Beneficial nematodes | 10/ml                |
| Ciliates             | Not more than 100/ml |

**606S.5 Measurement**

ADD the following pay item:

Pay Item No. 606S-C: Soil amendment: Compost per CY  
 Pay Item No. 606S-D: Soil amendment: Compost tea per GAL

**End**

<sup>1</sup> pH and soluble salt content is more relevant to the establishment and growth of a particular plant, than is the pH or soluble salt content of a specific compost used to amend the soil.

**ATTACHMENT A TO SP606S  
CALCULATING COMPOST APPLICATION RATE BASED ON FERTILIZER NEEDS<sup>i</sup>**

- 1) First, you need a fertilizer recommendation based on a soil test. For more information on soil sampling, see CSU factsheet 0.500. For more information on selecting a laboratory, see CSU factsheet 0.520. These factsheets are available at: <http://www.ext.colostate.edu/pubs/crops/pubcrop.html#soil>
- 2) Fertilizer recommendations are typically made as lbs N, P<sub>2</sub>O<sub>5</sub>, or K<sub>2</sub>O per acre. Be sure to use the corresponding analysis from your compost test report. Convert these figures to lbs/ton by multiplying % by 20.
- 3) Since compost is like a slow-release fertilizer, we assume only 20% of the N in the compost will be plant-available the first year after it is applied. For phosphorus, we assume 40%. For potassium, we assume 60%. These are rough estimates of availability. Multiply your compost analysis by these availability factors.
- 4) Then step-by-step, calculate your N, P<sub>2</sub>O<sub>5</sub>, and K<sub>2</sub>O needs by dividing the lbs/acre required by the lbs/ton in the compost. The result will be in tons of compost to apply per acre.

**Example:**

The soils lab recommends 100 lbs N/acre and 40 lbs P<sub>2</sub>O<sub>5</sub>/acre. The compost results show 1.7% N, 1.3% P<sub>2</sub>O<sub>5</sub>, and 1.5% K<sub>2</sub>O. How much compost should you apply?

First, convert compost results to lbs/ton.

$$1.7\% \text{ N} \times 20 = 34 \text{ lbs N/ton}$$

$$1.3\% \text{ P}_2\text{O}_5 \times 20 = 26 \text{ lbs P}_2\text{O}_5\text{/ton}$$

$$1.5\% \text{ K}_2\text{O} \times 20 = 30 \text{ lbs K}_2\text{O/ton}$$

Then, correct for availability.

$$34 \text{ lbs N/ton} \times 0.20 = 7 \text{ lbs available N/ton}$$

$$26 \text{ lbs P}_2\text{O}_5\text{/ton} \times 0.40 = 10 \text{ lbs available P}_2\text{O}_5\text{/ton}$$

$$30 \text{ lbs K}_2\text{O/ton} \times 0.60 = 18 \text{ lbs available K}_2\text{O/ton}$$

Finally, divide the fertilizer recommendations by the available nutrients.

$$\frac{100 \text{ lbs N/acre}}{\text{N/ton}} = 14 \text{ tons/acre } 7 \text{ lb av.}$$

$$\frac{40 \text{ lbs P}_2\text{O}_5\text{/acre}}{\text{P}_2\text{O}_5\text{/ton}} = 4 \text{ tons/acre } 10 \text{ lb av.}$$

<sup>i</sup>Source: [http://www.extsoilcrop.colostate.edu/Soils/powerpoint/compost/Calculating\\_compost\\_application\\_rate.pdf](http://www.extsoilcrop.colostate.edu/Soils/powerpoint/compost/Calculating_compost_application_rate.pdf)



**Item No. 608S  
Planting**

**608S.1 Description**

This item shall govern the provision of the specified plants and other materials, the initial installation of plants and other materials, the maintenance of plantings, transplanting and any replacement of trees, plants and ground cover which are damaged, diseased or otherwise unhealthy during the warranty period 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, the inch-pound units are given preference followed by SI units shown within parentheses.

**608S.2 Submittals**

The submittal requirements for this specification item shall include:

- A. A listing of each type of planting (tree, shrubs, plants, etc.), type of stock (containerized, ball and burlapped, bare root, bag grown, etc.), name (common and botanical) and size of planting (root diameter, height and spread);
- B. A request, if necessary, for use by Contractor of collected stock on the site;
- C. Specific information for each pesticide (including herbicide) associated with the listing including:
  - manufacturer,
  - product name,
  - description of chemical composition,
  - handling, storage and mixing requirements
  - application recommendations
  - documentation of licensed applicator(s), and
  - MSDS Sheets
- D. Type, chemical analysis and rate of application of fertilizer
- E. Proposed tree dressing, trunk wrapping and flagging tape;
- F. Type, chemical analysis and rate of application of proposed transpirants
- G. Documentation of irrigator license, if irrigation is required at the site.

**608S.3 General**

**A. Plant Standards**

Unless shown otherwise on the Drawings, the following published standards will apply. Standards for nursery stock will be as stated in the "American Standard for Nursery Stock", as published by the American Association of Nurserymen, Incorporated. Botanical names as shown on the Drawings will be as stated in the "Standardized Plant Names" as identified by the American Joint Committee on Horticultural Nomenclature or other referenced text including the "Manual of the

Vascular Plants of Texas for Native Flora". Pruning standards will be as established by the National Arborist Association in the "Pruning Standards for Shade Trees".

**B. License Requirements**

**1. Pesticide.**

The Contractor shall be a licensed pesticide applicator or shall employ a licensed pesticide applicator for the treatment of insects, diseases, animals as required by the Texas Pesticide Laws and Regulations of the Texas Department of Agriculture. The Engineer or designated representative may request documentation of such certification.

**2. Herbicide.**

The Contractor shall possess a permit or employ a person who possesses a permit to apply herbicide as required by the Texas Herbicide Law of the Texas Department of Agriculture. The Engineer or designated representative may request documentation of such certification.

**3. Irrigation.**

The Contractor shall possess an irrigator's license issued by the State of Texas and the Texas Board of Irrigators or employ such a licensed irrigator to perform the irrigation system maintenance. The irrigation system shall be maintained under the supervision of the licensed irrigator who shall be available on the site as required by the Engineer or designated representative.

The Engineer may request documentation of such license. The Contractor shall verify and adhere to the requirements and codes of any controlling utility authorities.

**608S.4 Materials**

**A. Plant Material**

Plant material shall be first class grade, true to name and of the size indicated on the Drawings. All plants shall be healthy nursery grown unless otherwise indicated on the Drawings. When the Engineer or designated representative is furnished sufficient evidence that a specified plant cannot practically be obtained, the Engineer or designated representative may approve in writing the use of collected native material.

Nursery grown stock, either in containers or in the field, shall be nursery grown in accordance with accepted horticultural practices and under climatic conditions similar to those of the work site for at least twelve (12) months, unless specifically authorized otherwise by the Engineer or designated representative.

**1. Container plants.**

Soil volume for containers shall be three-fourths (3/4) the depth of the container or greater and contain roots of the plants throughout the root ball.

**(a) Containerized Stock.**

This stock will be defined as nursery plant stock transplanted from a growing site with a ball of soil, containing an intact root system, and placed in a container and grown in that container continuously long enough for the new fibrous roots to have developed so that the root mass retains its shape and holds together after removal from the container. Containerized stock shall

have been grown in the delivered containers for at least six (6) months, but not over two (2) years.

(b) Container Grown Stock.

This stock will be defined as nursery plant stock, which has been planted in a container as a liner, seed or by other propagation method, and that:

- (1) has been systematically replanted or stepped up in larger containers as required,
- (2) has developed a root system in a planting medium capable of sustaining acceptable plant growth, and
- (3) has become established in the container and exhibits a well-rooted condition as evidenced by the soil ball remaining intact when removed from its container.

2. Balled and Burlapped Stock.

This stock will be defined as nursery plant stock which has been removed from the growing site with a ball of soil, containing the intact root system, and encased in burlap (or other approved similar material) to hold the soil in place. Ball sizes for balled and burlapped stock shall be as shown on the Drawings.

3. Bare Root Stock.

This stock will be defined as nursery plant stock, which has been removed from the growing site with the root system substantially free of soil. The approved minimum root spread and condition shall be as shown on the Drawings.

4. Collected Stock.

This stock will be defined as nursery plant stock, which has been removed from its original native habitat. All collected stock shall specific approval of the Engineer or designated representative before it can be removed from its existing habitat. Ball sizes for collected stock shall be as shown on the Drawings and shall have sufficient diameter and depth to encompass enough fibrous and feeding root system as necessary for the full recovery of the plant. Collection may be by hand or mechanical method. For balled and burlapped or mechanical transplanting of collected plant material refer to article 608S.5.

5. Bag Grown Stock.

This stock will be defined as nursery plant stock which has been transplanted into a nonwoven fabric container which has been placed in the ground and the plant grown under nursery field conditions continuously long enough [normally one (1) month for each inch (25 mm) of bag diameter i.e., a plant with a 24 inch (600 mm) diameter bag, grown in its original planted location for 24 months] for the fibrous roots to have developed so that the root mass retains its shape and holds together after removal of the bag. The root ball shall be flat bottomed and straight sided. Ball sizes for bag grown stock shall be as shown on the Drawings. Bag grown stock shall not be pruned before delivery.

6. Other Plant Materials.

Other plant materials shall be as shown on the Drawings.

B. Rejection of Plants.

Plant material having any of the following features will be subject to rejection:

1. Undue or excessive abrasions of the bark.
2. Dried or damaged root system.
3. Dried or damaged top wood of deciduous plants or dried or damaged foliage and top woods of evergreens.
4. Prematurely opened or damaged buds or buds stripped off.
5. Disease or insect infestation, including eggs or larvae.
6. Dry, loose, cracked, broken and/or undersized balls or containers, which do not conform to sizes indicated on the Drawings.
7. Evidence of heating, molding, wind burn, sunscald, freezing, etc.
8. Container plants that are overgrown or root bound.
9. Plants with bench balls (roots repacked with soil).
10. Plant balls encased in non-bio-degradeable plastic or other impervious material.
11. Field grown or collected plants transplanted into containers less than six (6) months or more than two (2) years.
12. Trees that have been damaged, pruned, crooked or multiple leaders, unless multiple leaders are specified or are normal for the species.
13. Plants with disfiguring knots or fresh cuts of limbs over 3/4 inch (20 mm) that have not completely callused.
14. Plants that do not possess a normal balance between height and spread for the species.
15. Plant containers that are not structurally sound (tracked, bent, etc.).
16. Plants in containers less than three-fourths (3/4) planting medium depth;
17. Any endangered or threatened plants; or plants of historical significance that have been collected;
18. Any other physical damage or adverse conditions that would prevent thriving growth or cause an unacceptable appearance; or
19. Plants that do not meet the standards shown on the Drawings.

#### C. Delivery and Receipt of Plants

Material shall not be delivered to the project until ordered to do so in writing by the Engineer or designated representative. When the delivery order is issued, the Engineer or designated representative shall be notified of a proposed delivery of plant material at least 48 hours prior to its arrival at the project. The entire plant shall be properly protected from sun and air damage during the time period from initiation of digging until delivery on the project

Each plant material shipment shall be accompanied by an invoice indicating the number, size and name (common and botanical) of each of the kinds of plant material included in the shipment. Each kind of plant in the shipment shall be adequately identified by tags. All plants shall be individually tagged with nursery name tags designating the genus, species and variety of the plant.

No shipment of plant material shall be accepted, planted and/or heeled-in by the Contractor until such material has been inspected and accepted by the Engineer or designated representative. The Contractor shall assist the Engineer or designated representative in the inspection of material. Any plants rejected shall be immediately removed from the project and replaced.

Unless plants are placed in predug holes and planted as specified herein, they shall be heeled-in and inspected again prior to planting. If delivered to predug planting holes, balled and burlapped plants shall be planted within 1 to 6 hours depending upon the drying effect of the wind and sun. No bare rooted plants shall be placed in predug holes from the delivery truck unless actual planting occurs immediately after removal from its moist packing.

#### D. Plant Size

Plants will be measured when branches are in their normal position. Height and spread dimensions shown on the Drawings refer to the main body of the plant and not branch tip to tip. Plants with a spreading or semi-spreading habit will be measured by the average diameter of the spread. Plant heights will be measured by the mean height from the ground line to the top of the canopy. Caliper measurements will be taken at a point on the trunk six (6) inches [150 mm] above natural ground for trees up to four (4) inches [100 mm] in caliper and at a point twelve (12) inches [300 mm] above natural ground for trees over four (4) inches [100 mm] in caliper. The caliper size for multi-trunked plants will be determined by adding the calipers of the largest cane and one-half (1/2) the caliper(s) of the second and third largest cane(s).

When a range of size is shown on the Drawings, no plant shall be less than the minimum size and at least 40% of the plants shall be as large as the maximum size shown on the Drawings. The required measurements are the minimum sizes acceptable and are the measurements after pruning, when pruning is required.

Sizes of plants or plant types such as palms, roses, vines, groundcovers, seedings, bulbs, corms, tubers, young plants, understock, etc., will be measured in accordance with the plant standards or as indicated on the Drawings.

Container-grown plants which are well established in adequate size containers and are of equal quality and size to the specified balled plants may be accepted in lieu of balled plants; likewise, balled plants of equal quality and size may be substituted for container-grown plants when permitted by the Engineer or designated representative. Soil shall be approximately 3/4 depth of container and contain roots of the plant throughout the soil.

The ball size for a balled and burlapped plant shall be firm natural balls equal to or in excess of the ball sizes indicated on the Drawings. Collected plant material substituted for a nursery-grown plant shall have a ball or root system 1/4 greater in both diameter and depth than the nursery-grown plant for which it is substituted. The ball size shall be the average of the diameters measured 90 degrees apart.

#### E. Mulch

Unless indicated otherwise on the Drawings, mulch material shall consist of loose organic residue derived from plants or other granular material approved by the Engineer or designated representative. It shall be of such nature that adequate protection is provided against sun baking and quick drying out of the soil and shall not impede aeration or water penetration nor deplete the soil nitrogen. Mulch material shall be free of excess amounts of large leaves and sticks that would prevent proper dressing of the mulched surface, free of harmful substances and free of detrimental amounts of soil or other foreign matter that would promote early compaction, matting or deterioration of the mulch.

#### F. Peat Moss

Peat Moss shall be of sphagnum origin of commercial quality.

**G. Planting Soil Mixture**

The planting soil mixture shall consist of a soil mixture of 3/4 fine sandy loam, 1/8 peat moss and 1/8 leaf mold. The sandy loam shall be taken from a well drained, arable site. It shall be free of subsoil, stones, clay, roots, weeds, grass or other objectionable debris, matter or toxic wastes.

**H. Water**

Water shall be furnished by the Contractor and shall be clean and free of industrial wastes and other substances harmful to the growth of plants and the areas irrigated.

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).

**I. Fertilizer**

Fertilizer shall be applied uniformly conforming to City of Austin Standard Specification tem No. 606S, "Fertilizer" at the rate indicated.

**J. Pesticides including Herbicides**

Pesticides including herbicides shall be of the types that are commercially available selected for the species planted or as indicated on the Drawings and shall be applied in accordance with the manufacturer's recommendations upon approval of the Engineer or designated representative.

**K. Stakes and Guys**

Stakes shall be 2 x 2 x 18 inch (50 x 50 x 450 mm) sound hardwood or treated pine with tapered point and chamfered tops. Guys wires shall be 2 strand 12 ga. (2.7 mm) galvanized steel wire with 1/2 inch (12.5 mm) diameter reinforced plastic or rubber hose trunk bushings and yellow plastic flagging.

**L. Bracing**

Bracing shall be 2 x 4 inch (50x100 mm) hardwood or metal fence posts, 6 ft. (1.8 meters) in length with guys and bushings.

**M. Flagging Tape**

Flagging tape shall be highly reflective, visible at night, and approved by the Engineer or designated representative.

**N. Trunk Wrapping**

Trunk wrapping shall be 4 inch (100 mm) wide commercial trees wrapping paper with asphalt core or the type shown on the Drawings.

**O. Anti-transpirants**

Anti-transpirants, intended to prevent evaporation, shall be of the types that are commercially available and approved by the Engineer or designated representative.

## 608S.5 Construction Methods

Immediately following delivery and acceptance at the job, all plants shall be planted or heeled-in in properly moistened material. All plants heeled-in shall be properly maintained by the Contractor until planted. The utmost care shall be exercised in handling plants to prevent injuries to the plants. The solidity of the ball or balled and burlapped plants shall be carefully preserved and such plants shall not be handled by the stems.

Plants with exposed roots shall be protected from drying out during the time the plants are removed from the heeling-in bed and until actually planted.

### A. Staking of Planting Locations.

All locations of trees, shrubs and beds shall be staked in the field by the Contractor. All locations will be approved by the Engineer or designated representative prior to any excavation of plant beds or bed preparation. Stakes shall be placed and coded to denote the type of plant material.

### B. Excavation of Planting Pits

#### 1. General.

The Contractor shall not excavate plant pits more than 24 hours in advance of planting operations. Any plant pits left unattended for any length of time which may present a hazard shall be covered and/or clearly flagged as approved by the Engineer or designated representative. The walls and bottoms of all plant pits shall be scarified immediately prior to the placement of plants.

#### 2 Pit Sizes.

Planting holes may be dug by hand or by mechanical means and shall be circular or square (according to the shape of the root ball) with vertical sides, unless otherwise indicated on the Drawings. Trimming of the sides or bottom of the hole to uniform shape will not be required. Planting pit sizes shall be as follows, unless indicated otherwise on the Drawings:

- (a) A minimum horizontal dimension of twelve (12) inches [300 mm] between the root ball and the sides of the planting pit for the following plant specifications:
  - (1) Containers of fifteen (15) gallons or larger [56 liters or larger],
  - (2) Boxes of fourteen (14) inches or larger [350 mm or larger] and
  - (3) Root ball diameter of Balled and burlapped or bag grown plants larger than fourteen (14) inches [350 mm].
- (b) A minimum horizontal dimension of two (2) times the diameter of the root ball for the following plant specifications:
  - (1) Containers less than fifteen (15) gallons [less than 56 liters]
  - (2) Root ball diameter of Balled and burlapped or bag grown plants fourteen (14) inches or less [350 mm or less]
- (c) A minimum diameter for bare-root plants to permit the roots to spread without crowding or curving around the walls of the pit.
- (d) Planting pits shall be excavated to a depth of at least 4 inches (100 mm) but not more than 8 inches (200 mm) greater than the depth of the root ball of balled and burlapped, containerized, container grown or bag grown plants; or the depth of the root system of bare-root plants. Pits dug to excess depths shall be backfilled and compacted to bring the pits to the specified depth. The depth of pits on slopes shall be measured at the lower side.

- (e) When performing mechanical transplanting, the receiving plant pit shall be excavated with the same type of equipment used to remove the plant material or as approved by the Engineer or designated representative.
- (f) Special sized holes shall be shown on Drawings.
- (g) Where holes are dug with an augur and the sides of the holes become plastered or glazed, this plastered or glazed surface shall be scarified.

**C. Planting Season**

All planting shall be performed as shown below, indicated on the Drawings or as approved by the Engineer or designated representative.

| Planting Stock                   | Planting dates   |
|----------------------------------|--|
| Containerized or Container grown | None specified   |
| Balled and burlapped             | November 15 to March 15  |
| Bare root                        | January 15 to March 15   |
| Bag grown                        | September 15 to April 15   |
| Collected                        | As shown on the Drawings or as approved by the Engineer or designated representative |

**D. Backfilling**

Topsoil from the planting hole may be used for backfilling provided it is kept separate from subsoil and rendered loose and friable. Additional topsoil required to backfill the holes shall be furnished in the amount directed in Subarticle 608S.4.G, 'Planting Soil Mixture' and from a source approved by the Engineer or designated representative.

**E. Pruning Roots**

Root pruning shall be limited to the amount necessary to prune away broken and badly damaged roots.

**F. Pruning of Tops**

Pruning of plants shall conform to the best horticultural practice and shall be appropriate to the various types of plants and the special requirements of each. Deciduous (non-evergreen) shrubs and trees with heavy tops shall have about 1/3 to 1/2 of the top growth removed. Plants otherwise acceptable, but with broken or badly bruised branches, shall have such branches removed with a clean cut. All cut surfaces over 1 inch (25 mm) in diameter shall be painted with an approved tree pruning compound.

**G. Planting and Backfilling**

In general the top of root ball shall stand after settlement of the backfill approximately level with the finish grade. When shown on the Drawings, fertilizer of the type and quantity specified shall be added on the backfill material prior to backfilling. Unless indicated otherwise on the Drawings or approved otherwise by the Engineer or designated representative, planting and backfilling shall be as follows:

**1. Plant Basin**

A basin, 8 to 10 inches (200 to 250 mm) deep, shall be formed by constructing a neat levee around the planting pit. The inside measurement of the basin shall be

at least the diameter of the growing plant, unless noted otherwise on the Drawings. On slopes the backfill on the lower side shall be graded in such a manner that an adequate basin will be provided.

As shown on the Drawings, either material excavated from the planting pit (excluding any rocks) or Backfill, as specified in Subarticle 608S.5.D may be used to form a basin around the plant. Excess excavated material may be scattered thinly and leveled off provided it is of such consistency and character that it can be readily scattered in an acceptable manner. If scattering of the material may interfere with drainage or mowing, all such material shall be removed and disposed of as approved by the Engineer or designated representative.

## 2. Depth of Transplanting

In general, plants shall be installed and covered with top soil approximately one (1) inch (25 mm) above the top of the root ball or container soil surface.

## 3. Bare Root Plants

After the backfill in the bottom of the planting pit has been firmed and the plant placed in the proper position, as shown on the Drawings, loose friable backfill (Subarticle 608S.5.D) or planting soil mixture (608S.4.G) shall be worked about the roots and thoroughly settled with water as the backfill is made. Care shall be taken to avoid bruising or breaking the roots. Sticks, sod, clods or other material which may form large air pockets in the soil or backfill shall not be included in the backfill.

## 4. Balled and Burlapped Plants

Plants of this type shall not be handled by the stems nor in such manner that the soil of the ball may be loosened. A saddle around the ball should be used for lifting. The burlap shall not be removed from the ball. After the backfill in the bottom of the pit has been firmed and the plant placed in the proper position, as shown on the Drawings, loose friable backfill shall be worked about the ball in 12 inch (300 mm) until the pit is two-thirds (2/3 full). The burlap shall then be opened on top of the root ball to expose the top one-third (1/3) of the root ball. The pit shall then be filled with water and the backfilling completed, working the backfill and water well to prevent any air pockets.

For ball supporting devices such as wire baskets, the basket shall not be removed. The plant shall be placed in the prepared planting pit in the proper position and backfill shall be placed around the ball until the pit is about one-third (1/3) full. The basket shall be carefully removed to just above the backfill, leaving the bottom portion intact. Backfilling shall be completed as described above.

## 5. Containerized or Container Grown Plants

At the time of planting the root ball and plant shall be carefully removed from the container to prevent damage to the plant and root ball. If in the opinion of the Engineer or designated representative a sufficient amount of soil has fallen off or the ball has been broken to such an extent as to reduce the chances of the plant to grow, the plant will be rejected. Container plants shall be acclimated to outside growing conditions. Container plants shall be placed and backfilled in the same manner as balled and burlapped plants.

## 6. Bag Grown Plants

Prior to planting, the fabric bag shall be removed by using a knife to cut the side of the bag from top to bottom in three or four places of equidistant around the root

ball. The bag shall be carefully peeled down and roots that do not easily peel away from the bag shall be pruned. The plastic bag shall then be pulled from under the root ball. Bag grown plants shall be placed and backfilled in the same manner as balled and burlapped plants.

#### H. Vegetative Watering

During the planting operations, the Contractor shall keep the ground and backfill material moist to at least 12 inches (300 mm) around the root ball. The Contractor shall be required to meet the minimum watering requirements shown on the Drawings for all circumstances by a method approved by the Engineer or designated representative. When an irrigation system is shown on the Drawings, the Contractor shall coordinate all work to insure that the irrigation system is operational as the plants are installed.

#### I. Anti-transpirants

When shown on the Drawings, the Contractor shall apply anti-transpirants in accordance with the manufacturer's recommendations and as approved by the Engineer or designated representative.

#### J. Pruning

Plants shall not be pruned immediately before delivery to the work site, unless shown otherwise on the Drawings or as approved by the Engineer or designated representative. Common nursery pruning practices are acceptable. Any necessary pruning shall be done at the time of planting as approved by the Engineer or designated representative and shall be appropriate to the various types of plants and the special requirements of each.

From 20 to 40 percent of all foliage of mechanically transplanted plants shall be removed by pruning interior branching, entangled limbs and small branches. Structural branching shall not be removed prior to planting. Branch tips shall not be removed to attain the above percentage.

#### K. Plant Supports and Bracing Trees

Plant supports such as staking, guying and bracing shall be as shown on the Drawings or as required by the Engineer or designated representative.

Trees shall be staked, guyed or braced for support during the same day as planted. Unless shown otherwise on the Drawings, the plants shall stand approximately vertical after staking, guying or bracing. The Contractor shall be responsible for material remaining approximately vertical and straight for all given conditions and shall repair plant supports as often as required until final acceptance of the work.

All trees 1 1/4 inches (38 mm) and greater in caliper shall be adequately braced immediately after the plants have settled. Unless otherwise indicated on the Drawings, trees 1 1/4 to 2 inches (38 to 50 mm) in diameter shall be braced with 1 brace of sawed lumber, 2 x 2 inches (50 x 50 mm), nominal size, firmly fastened to the tree at a point 5 to 6 feet (1.5 to 1.8 meters) above ground or as directed by the Engineer or designated representative. Fastening shall not be accomplished by nails, staples, wire or other materials that may damage tree. Braces shall be of sufficient length to provide bracing when firmly driven into the ground. The tree trunk shall be adequately padded with a section of flexible hose at the point of attachment with a figure 8 tie. Trees, that are 2 inches to 4 inches (50 to 100 mm) in diameter, shall be

braced with wires at a height of 6 to 8 feet (1.8 to 2.4 meters) above ground. The wires shall be firmly attached to 3 equally spaced concentric stakes that are firmly driven into the ground. The trunk of the tree shall be adequately and securely padded with rubber at the point of attachment of the wire to prevent damage. Wire shall be number 16 gauge (1.5 mm) galvanized.

Trees larger than 4 inches (100 mm) in diameter shall be braced in accordance with notes on Drawings. The Contractor shall repair braces as often as required until acceptance of the project for "Plant Establishment".

**L. Safety Flagging Tape**

Staking, guying or bracing, which present a hazard shall be clearly flagged as shown on the Drawings or directed by the Engineer or designate representative.

**M. Tree Trunk Protection**

All trees indicated on the Drawings to be wrapped shall be neatly and securely wrapped with a commercial tree wrapping material approved by the Engineer or designated representative. The tree wrapping shall begin at the base of the trunk and extend upward with a 50 percent overlap to the second whorl of branches. The tree wrapping material shall be secured at the top of wrap with soft twine or weatherproof type tape or any suitable method, approved by the Engineer or designated representative. Wire, metal bands or other material for this purpose that may cause injury or damage to plants shall not be used.

**N. Mulching**

All plants shall receive mulching to a depth of 2 to 3 inches (50 to 75 mm) within the water basin or across the beds unless indicated otherwise on the Drawings. A small amount of backfill shall be sprinkled on top of organic mulch to hold it in place if directed by the Engineer or designated representative. If hay is used, the depth shall be 4 inches (100 mm) loose measurement.

**O. Plant Material Removal and Replacement**

A plant shall be removed and replaced as directed by the Engineer or designated representative at any time during execution of the work under this Item including the Establishment Period if, in the judgement of the Engineer or designated representative, a plant is found to be in any of the following conditions:

1. Dead;
2. Dying;
3. Wilted for 48 hours or more; or
4. Any other signs of detrimental consequence.

All replacement plants shall be the same species, size and quality as originally specified. The Contractor shall make every effort to ensure that the replacement material receives any additional care and maintenance required for the replacement plants to become well established. The Engineer will require replacement of plant material until satisfied that all of the plants on the work are in a healthy, vigorous condition.

**P. Maintenance and Initial Plant Replacement**

The Contractor shall water the plants as often as necessary, cut the weeds and grass around the planted area including the plant basin and bracing, prune the plants, treat the plants in accordance with approved methods of horticultural practice where

insects or disease affect the plants after planting and repair or replace the bracing as may be required or as ordered by the Engineer or designated representative until the planting project has been accepted for "Plant Establishment".

If the Contractor completes the initial planting prior to March 1 for balled and burlapped and bare root plants or April 1 for bag grown plants, the Contractor will be required to replant all material found to be missing, damaged or dead during this time. This replanting shall be done between March 1 and March 15 for balled and burlapped and bare root plants, between April 1 and April 15 for bag grown plants or as directed by the Engineer or designated representative.

In the event that the planting project is not completed by March 15 for balled and burlapped and bare root plants, or by April 15 for bag grown plants and no further planting is permitted until the following "Planting Season", the partial planting will be cared for as prescribed under "Plant Establishment".

#### **608S.6 Plant Establishment**

"Plant Establishment" shall commence with the notice of substantial completion and shall extend to the following November 15 for those plantings that are completed in accordance with Subarticle 608S.5.P, ' Maintenance and Initial Plant Replacement'. In those instances where planting 'out of season' is allowed in writing by the Engineer or designated representative, "Plant Establishment" shall commence with notice of substantial completion and shall extend for a minimum of six (6) months or to the following November 15, which ever results in a later date.

For the work of "Plant Establishment", all possible means shall be employed to preserve the plants in a healthy and vigorous growing condition to insure their successful establishment. The Contractor shall perform all of the activities listed below during placement of all the plants. After the completion of the installation, as shown on the Drawings and as approved by the Engineer or designated representative, the Contractor shall perform the following activities for a period of 90 calendar days:

##### **A. Mulching, Plant Basin and Bed Maintenance**

The Contractor shall reshape or reform the existing plant basins and beds as necessary to conform to the Drawings, and as approved by the Engineer or designated representative. As a part of the plant basin and bed maintenance, weeds and grass shall be removed prior to the application of mulch. Unless otherwise shown the Drawings, the mulch shall be maintained to a minimum depth of 2 to 3 inches (50 to 75 mm).

The Contractor shall maintain the plant basins, beds and site fixtures generally free of weeds and grass or other materials detrimental to the growth of the plants or the appearance of the site. Herbicides, if approved by the Engineer or designated representative and used by the Contractor, shall be limited to the plant basin and perimeter thereof or around site fixtures as approved by the Engineer or designated representative. Extreme care shall be taken to insure that the herbicide does not come into contact with any part of the desirable plants. Under no circumstances shall the herbicide be used on days where the wind could cause drift hazard to desirable plants. The Contractor shall also follow the manufacturer's instruction for the use and application of any herbicide.

##### **B. Plant Irrigation**

The Contractor shall be required to meet the minimum watering requirements for all circumstances by a method approved by the Engineer or designated representative as stated under Subarticle 608S.5.H and/or as shown on the Drawings.

Watering equipment other than an existing irrigation system shall have adequate and accurate measuring devices as approved by the Engineer or designated representative.

**C. Mowing and Trimming**

The Contractor shall mow and trim the areas identified on the Drawings. The work shall be performed at the frequency as shown on the Drawings. The initial cycle shall begin when directed by the Engineer or designated representative. Mowing heights shall be as shown on the Drawings or approved by the Engineer or designated representative.

The Contractor shall use power equipment as approved by the Engineer or designated representative. Nylon cord trimmers shall not be used inside the plant basins or beds around plant material.

**D. Restaking, Reguying and Rebracing of Plants.**

Any damaged or destroyed stakes, guys or braces shall be replaced by the Contractor in accordance with the details shown on the Drawings. This shall include any adjustment to the staking or guying to prevent girdling of plants.

**E. Pruning**

When directed by the Engineer or designated representative or shown on the Drawings, plants shall be pruned by the Contractor to the satisfaction of the Engineer or designated representative. Dead or damaged limbs on trees and shrubs, including suckergrowth on trunks of trees, shall be removed. All pruning shall be accomplished with tools specifically designed for this purpose. All pruned material shall become the property of the Contractor and shall be disposed of in a manner approved by the Engineer or designated representative.

**F. Insect, Disease and Animal Control**

The Contractor shall treat the plants and/or the planted areas in accordance with accepted methods of horticultural practices and the Texas Department of Agriculture guidelines regarding the use of pesticides. The Contractor shall also follow the manufacturer's instructions for the use and application of any pesticides.

**G. Litter Pick-Up**

Unless shown otherwise on the Drawings, the Contractor shall collect and dispose of all litter within the landscaped areas. The work shall be performed at the frequency shown on the Drawings or as directed by the Engineer or designated representative.

All litter shall become the property of the Contractor and shall be disposed of in a manner acceptable to the Engineer or designated representative.

**H. Fertilization**

During the 90-day establishment period, the Contractor shall furnish and apply fertilizer only to those plants as shown on the Drawings. The analysis, times and rates of application shall be as shown on the Drawings. The type of fertilizer and method of application shall be as shown on the Drawings or as approved by the Engineer or designated representative.

**I. Plant Removal**

In the judgement of the Engineer or designated representative, any plant that is dead or dying for reasons beyond the control of the Contractor and is not to be replaced shall be removed by the Contractor to the satisfaction of the Engineer or designated representative. This shall include repair of the plant pit and the surrounding area.

**608S.7 Acceptability of Plants**

Between 90 to 100 days following the initial planting and initial plant replacement, the Engineer or designated representative will make an inspection of the project to determine the acceptability of the plant material. At this time, an inventory of missing, dead or rejected plant material will be made and the Contractor notified that the plants on the inventory are to be replanted the following planting season between November 15 and December 15 or as specifically permitted by the Engineer or designated representative. Plant material for the replacement planting shall meet all the requirements specified for the original plant material and shall be planted in accordance with the planting instructions listed under "Construction Methods", except that no further plant replacement will be required. Working days stated in the Contract shall apply to the initial construction period only and will not include the time necessary for replanting. A final inspection shall be made within 10 days after the replacement planting is completed.

**608S.8 Measurement**

Work and accepted material as prescribed for this item including "Plant Establishment" will be measured as each plant of the type and size complete and in place.

**608S.9 Payment**

Work performed and accepted material as prescribed by this item, measured as provided under "Measurement", will be paid for at the unit bid price bid for each plant of the type and size specified, complete and in place. The unit bid price shall include full compensation for furnishing all labor, pruning, mowing, insect control, disease control, animal control, watering, fertilizing, herbiciding, litter pickup, maintenance, tools, equipment, materials, supplies and incidentals necessary to complete the work.

Payment will be made under:

|                             |   |           |
|-----------------------------|---|-----------|
| <b>Pay Item No. 608S-1:</b> | Planting Type _____, Size in inches _____ | Per Each. |
| <b>Pay Item No. 608S-2:</b> | Irrigation System                         | Lump Sum  |

**End**

**SPECIFIC CROSS REFERENCE MATERIALS**

City of Austin Standard Specifications

| <u>Designation</u> | <u>Description</u> |
|--------------------|--------------------|
| 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         |

**RELATED CROSS REFERENCE MATERIALS**

City of Austin Environmental Criteria Manual

| <u>Designation</u> | <u>Description</u>                                   |
|--------------------|--|
| Section 1          | Water Quality Management                             |
| Section 1.4.4      | Vegetative Practices                                 |
| Section 1.5.0      | Vegetation Criteria                                  |
| Section 1.5.3      | Impact Minimization and Restoration Planning         |
| Section 1.5.3.D.6  | Discussion-Plant Protection                          |
| Section 1.5.3.D.8  | Salvaging Trees and Shrubs                           |
| Section 1.5.3.D.9  | Transplanting Procedure                              |
| Section 2          | Landscape  |
| Section 2.4.1      | Street Yard  |
| Section 2.4.1.D    | Street Yard Trees                                    |
| Section 2.4.6      | Irrigation of Landscape Areas                        |
| Section 2.4.6.A.1  | 'Owner responsibility for irrigation .....           |
| Section 2.7.0      | Hill Country Roadway Landscape Criteria              |
| Section 2.7.2      | Design Criteria                                      |
| Section 2.7.2.G    | Irrigation   |
| Section 3          | Tree and Natural Area Preservation                   |
| Section 3.3.2      | General Tree Survey Standards                        |
| Section 3.3.2.A.1  | Diameter   |
| Section 3.5.4.A.6  | Mitigation Measures-Enforcement Criteria             |
| Section 3.5.0      | Design Criteria                                      |
| Section 3.5.4      | Mitigative Measures                                  |
| Section 3.5.4.E    | Transplanting  |
| Section 5          | Construction in Parks                                |
| Section 5.3.0      | Route Selection                                      |
| Section 5.3.1      | Tree Survey  |
| Appendix K         | Arboricultural Practices - Parks                     |
| Appendix K, I      | Tree Protection                                      |
| Appendix K, II     | Treatment of Minor Wounds or Breakage                |
| Appendix N         | Professional Plant List                              |
| Appendix O         | Site Development Permit-Irrigation Notes             |
| Appendix P-2       | Standard Notes for Trees and Natural Area Protection |
| Figure 1-27        | Grasses  |
| Figure 1-33        | Rare Plants in the Austin Area                       |

City of Austin Transportation Criteria Manual

| <u>Designation</u> | <u>Description</u>                      |
|--------------------|---|
| Section 1.4.3      | Classification Design Criteria-         |
| Section 6.2.3      | Transportation Criteria for Landscaping |

City of Austin Standard Specifications

| <u>Designation</u> | <u>Description</u>            |
|--------------------|-------------------------------|
| Item No. 101S      | Preparing Right of Way        |
| Item No. 111S      | Excavation                    |
| Item No. 601S      | Salvaging and Placing Topsoil |

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

| <u>Designation</u> | <u>Description</u>                  |
|--------------------|-------------------------------------|
| Item No. 100       | Preparing Right of Way              |
| Item No. 110       | Excavation                          |
| Item No. 160       | Furnishing and Placing Topsoil      |
| Item No. 166       | Fertilizer                          |
| Item No. 168       | Vegetative Watering                 |
| Item No. 170       | Irrigation System                   |
| Item No. 192       | Roadside Planting and Establishment |

**SPECIAL PROVISION TO  
Standard Specification Item No. 608S Planting (dated 06-16-08)**

These special provisions serve to modify, add to, and/or delete from the City of Austin Standard Technical Specification Item No. 608S: Planting, dated 06/16/2008. Any item, paragraph, article, or work contained therein unless specifically modified, added to or deleted herein shall apply where applicable.

**608S.2 Submittals**

**ADD** the following after item **G**:

H. Photographs of specimens of all plants shall be provided to Owner for approval at least seven days before requesting permission for delivery to the site. Photographs, taken at the nursery, shall be of the actual plants to be supplied, and shall include scale figures for reference. The Owner may visit the nursery to approve and tag particular plants, as appropriate.

I. One gallon samples of each type of mulch and each component of the planting as specified in SP601S and SS613 (topsoil mix), and one quart sample of each fertilizer component as described in SP606S.

J. Copy of current Licensed Pesticide Applicator's certificate shall be provided to Owner annually.

K. Copy of pesticide application record per Attachment A with each invoice.

L. Receipts for accredited compost / recycling facility or other City-approved facility should turfgrass clipping disposal be necessary.

M. Rhizome barrier sheet: submit sample (6"x6") and; manufacturer's product data, installation instructions and warranty.

**608S.3 General**

B. License Requirements

3. Irrigation.

**REVISE** licensing entity as follows:  
Texas Commission on Environmental Quality (TCEQ)

**ADD** the following before "maintained" in the second sentence:  
Installed and

**608S.4 Materials**

**A. Plant Material**

## 1. Container Plants

**ADD** the following before to the beginning of the section:

All containers plants will be priced according to the nature of their usage and availability on the market; the term "standard" is a commonly used plant that is widely available on the market (e.g., lantana, salvias, muhly grasses, Mexican feathergrass) and thus, is of lower price than a "premium" plant (e.g., horsetail reed, some rushes, some agaves, etc.) that is less widely use and/or available for various reasons (e.g., slower growing). Plant availability is highly dependent on the market and weather, and may change annually.

**ADD** the following to the end of the section:

## 6. Seedlings

This stock will be defined as nursery plant stock—evergreen and deciduous tree and shrubs—sold as plugs in plastic "conetainers", or similar, or that are bareroot. Seedlings are typically 12 to 18 inches tall at time of planting, depending on species.

**RENUMBER 6. *Other Plant Materials*** to be item 7

## 7. Other Plant Materials

**E. Mulch**

**DELETE** the paragraph in its entirety and **ADD** the following:

Contractor shall install hardwood mulch consisting primarily of organic material (shredded bark, stump grindings, composted bark) and produced from a 3 (three) inch minus screening process. The material shall be a well-graded mixture of particle sizes and must be free of refuse, ground construction debris, biosolids, and manure. It may be manufactured on or off the project site. Three inches of mulch should be installed and maintained in non-turf areas.

Gravel can be used for soil stabilization in rain gardens and biofiltration ponds ONLY. The gravel should be ¾"- to 1"-diameter washed, rounded river gravel. Crushed limestone and granite (i.e., "decomposed" granite) are not acceptable due to fines that cause clogging. Placement of gravel relative to plant materials should follow the guidelines for organic mulch.

**F. Peat Moss**

**DELETE** this item in its entirety.

**G. Planting Soil Mixture**

**DELETE** the paragraph in its entirety and **ADD** the following:

The planting soil mixture shall follow that in SP601S or SS612 (Topsoil Mix) as directed by the Owner. For turf and landscape areas, four (4) and six (6) inches minimum of soil is required, respectively, and 12 inches for tree planting.

**ADD** the following to the end of the section:

**7. Seedlings**

Seedlings should be planted as soon as possible. All stored seedlings shall be kept in a cool shaded area or unheated building, and the roots kept moist and covered (e.g., wet burlap) for no longer than two weeks. Plug seedlings should be gently removed from their containers without pulling the plants by their stems. Gently loosen any “pot-bound” roots with fingers. The planting hole should be at least six inches wide and a couple inches deeper than the plant’s container. Holding the seedling in place, fill the hole about two-thirds full with soil, watering the soil thoroughly to eliminate air pockets and ensure good root to soil contact. Once the water has drained, add the rest of the soil, and gently hand pack the soil. Form a ridge of soil around the seedling large enough to catch and hold at least two gallons of water.

For a bare-root seedling, the planting hole shall be six inches deeper than the root length and at least two feet wide. Clean cut any broken or damaged roots and/or trim any extremely long roots before planting. When properly planted, a bare-root seedling’s root collar shall be level with the ground, with its roots spread around the planting hole without wrapping or turning. Follow the same installation procedure for plug seedlings.

Seedling watering frequency and duration is dependent on the weather and soil type. Following Texas Forest Service recommendations, newly planted seedlings should be watered eight to ten gallons per week for every inch of stem diameter for at least the first two years after planting until establishment. Watering can be achieved with an irrigation system, truck watering, hand watering, or other techniques acceptable to the Owner, and in some cases supplemental watering may not be feasible.

Seedlings may require protection with tree shelter tubes, per the Owner’s instructions. If required, payment for the tubes shall be included in the pay item for the seedlings.

**H. Water**

**ADD** the following after the first paragraph:

Refer to SS603 for specifics of the work of Temporary Landscape Irrigation.

**J. Pesticides including Herbicides**

**ADD** the following after the first paragraph:

If chemical treatment is necessary to eradicate perennial weeds, a non-selective herbicide containing Glyphosate (e.g. Roundup) is preferred for herbaceous plants. For woody plants an herbicide with the appropriate formulation of the active ingredient Triclopyr is usually preferred. Sedges (e.g. nutsedge) may be managed with a product that selectively controls plants in the genus Cyperus (e.g. Sedgehammer, Manage, etc.). The Contractor shall submit a pesticide application record per Attachment A with each invoice.

The City's pre-approved primary herbicide ingredients are listed below. The Contractor's Licensed Pesticide Applicator shall not use an herbicide or pesticide whose primary ingredient is not on the following list without prior written consent.

- (1) Imazamox,
- (2) Glyphosate, and
- (3) Triclopyr.

In riparian areas, use a surfactant-free glyphosate, labeled safe for aquatic use.

Organic herbicides, including acetic acid (20% vinegar) and essential oils are permitted in biofiltration ponds and rain gardens.

Herbicides should have a photosensitive dye that produces a contrasting color when sprayed on the ground. The color must disappear between two to three days after being applied. The dye must not stain surfaces, or injure plants or wildlife when applied at the manufacturer's recommended rate.

Fire ants frequently invade sites with disturbed soils. Pest management materials shall include the use of bait formulated to eliminate the entire colony, including the queen.

Example of acceptable bait materials include:

- |     |                |                                |
|-----|----------------|--------------------------------|
| (1) | Hydramethylnon | product names: Amdro®, Combat® |
| (2) | Spinosad       | product name: Eliminator®      |
| (3) | Methoprene     | product name: Extinguish™      |
| (4) | Abamectin      | product name: Ascend™, Raid®   |
| (5) | Pyriproxyfen   | product name: Spectracide®     |

#### **K & L. Stakes and Guys; Bracing**

**ADD** the following after the first paragraph:

Stakes shall be metal "T" or wood posts driven outside the rootball and connected to the tree with a web fabric tape (e.g., Arbor Tie). The tape should be tied to form a figure eight twist that is not tied to the trunk, just attached to the posts. The point of contact should be only about halfway up the trunk. All stakes and web tape shall be removed after one year.

For root stapling tree stabilization, use untreated pine two-inch by two-inch wood stakes or equivalent. One-inch by one-inch wood stakes are acceptable to small trees.

**ADD** the following:

#### **P. Mowing and Trimming Equipment**

Turf will be maintained, where possible, with professional quality mulching mower and trimming equipment complying with City of Austin Resolution No. 040115-31 on air emissions reductions.

**ADD** the following:

**Q. Rhizome Barrier**

Barrier may be: High Density Polyethylene (HDPE), 40 mil thickness; high-impact polystyrene (HIPS) with rubberizer added and UV inhibitor, 0.040"-0.060" thickness (min).

**608S.5 Construction Methods**

**B. Excavation of Planting Pits**

**2. Pit Sizes (a)**

**DELETE** the first sentence in its entirety and replace with the following:

The planting pit should be a minimum horizontal dimension of three (3) times the width of the rootball for the following plant specifications:

**2. Pit Sizes (d)**

**DELETE** the first sentence entirety and replace with the following:

Pits shall not be excavated deeper than the depth of the plant rootball.

**ADD** this sentence to the end of the paragraph:

Plants larger than 1 gallon size shall be placed on firm soil at the base of the planting pit.

**C. Planting Season**

**DELETE** the first sentence of this section in its entirety and **REPLACE** it with the following:

All plantings shall be performed during the periods listed below, although vagaries of the weather require flexibility. If special conditions exist that warrant a variance in the specified planting dates, a written request shall be submitted to the Owner stating the special conditions and the proposed variance. Permission for the variance will be given if warranted in the opinion of the Owner. Any variance in the planting season will not affect the guarantee period.

**DELETE** the table and **REPLACE** with the following

| <b>PLANTING STOCK</b>            | <b>PLANTING DATES</b>      |
|----------------------------------|----------------------------|
| Containerized or container grown | September 15 to April 30   |
| Balled and burlapped             | November 15 to March 15*   |
| Bare root                        | January 15 to March 15     |
| Bag grown                        | September 15 to April 15   |
| Collected/Salvaged               | As designated by the Owner |
| Seedling – bareroot / container  | November 15 to April 1*    |

\* plants must be dormant when installed

**E. Pruning Roots**

**ADD** this sentence to the end of the paragraph:

Root pruning shall be done at the time of planting to remove damaged or undesirable roots, i.e., those that will become a detriment to future growth of the root system.

**F. Pruning of Tops**

**ADD** this sentence to the end of the paragraph:

No pruning of tops shall be done without approval of the Landscape Architect for specific cuts.

**G. Planting and Backfilling**

**2. Depth of Transplanting**

**ADD** this paragraph:

A tree’s root flare shall be at or slightly above the finished grade. Determine how deep the root flare is in the ball before placing it in the planting hole.

- a. Determine the elevation of the root flare and ensure that it is planted at grade. This may require that the tree be set higher than the grade in the nursery.
- b. If the root flare is less than 2 inches below the soil level of the root ball, plant the tree so that the flare is even with the grade. If the flare is more than 2 inches at the center of the root ball the tree shall be rejected.

**3. Balled and Burlapped Plants**

**REMOVE** the third sentence in its entirety and **REPLACE** with the following:

All burlap and twice materials shall be completely removed from the root ball.

**REMOVE** the second paragraph in its entirety and **REPLACE** with the following:  
For ball supporting devices such as wire baskets, the basket shall be cut off to six (6) inches below the shoulder of the root ball before backfilling to eliminate root – wire conflicts potentially resulting in girdling (ANSI A300 Part 6).

#### H. Vegetative Watering

**DELETE** the paragraph in its entirety and **ADD** the following:

All plants – including, but not limited to trees, shrubs, sod, seed – shall be watered immediately after installation and thereafter until establishment to maintain plants in healthy and vigorous condition. Supplemental water may also be required during drought.

Vegetative watering via a temporary irrigation system shall conform to the City's The City's Special Specification 603. When required, the irrigation system shall be fully functional before installation of plant materials.

#### J. Pruning

**ADD** this sentence to the end of the paragraph:

Bunchgrasses may require annual clipping in late winter to retain plant health but shall be cut no shorter than 18 inches.

#### K. Plant Supports and Bracing Trees

**REMOVE** the third paragraph about bracing and **REPLACE** with the following:

The Owner or their representative shall determine the need for tree support and bracing, and the type of stabilization (above ground or stapling) used.

#### M. Tree Trunk Protection

**REMOVE** the paragraph in its entirety and replace with the following:

- a. All trees required to be wrapped shall be neatly and securely wrapped with a commercial tree wrapping material approved by the Owner. If no wrapping requirements appear on the drawings, submit a drawing of the wrapping method to be used for approval.
- b. Wrapping material shall be applied from the base of the tree to the first branch.
- c. Wrapping material shall be fastened with biodegradable tape loosely wrapped in a single layer around the wrapping material. The wrap shall not be stapled nor shall it be tied with non- or slowly biodegradable tape, any synthetic tape, any synthetic or natural fiber string, or wire.
- d. All wrapping material shall be removed no later than one year after planting.

#### N. Mulching

**REMOVE** the paragraph in its entirety and replace with the following:

New plant installations shall receive mulching to a depth of three (3) inches within their water-basin, in a three-foot-diameter ring around newly planted trees or, for shrubs, a small area commensurate with their size, and across the entire landscape bed, unless otherwise indicated by the Owner. Unless otherwise stated, the Contractor shall use shredded, hardwood mulch.

**P. Maintenance and Initial Plant Replacement**

**REMOVE** "Plant Establishment" from this section and replace with "Substantial Completion".

**ADD** this paragraph to the end of the section:

The Contractor shall be responsible for replacement of any turfgrass under this contract when, in the opinion of the Owner, such damage or destruction has resulted from the Contractor's own action or neglect during the execution of this contract. Replacement shall be done to the satisfaction of the Owner at the Contractor's expense. Turfgrass shall be replaced as directed by the Owner with the same species, size, and quality (or better) as was originally present.

**ADD** the following item to the end of the section:

**Q. Rhizome Barrier**

Install barrier sheet material in accordance with manufacturer's instructions at locations indicated on the Drawings or per instructions from the Contract Manager.

Trench shall be dug around entire perimeter of the containment area and to depth specified by manufacturer. It shall be at least two inches shallower than height of barrier and protrude above the surface at least two inches to minimize likelihood of rhizomes escaping over the barrier. Any seam or break in the barrier shall be overlapped and fastened or extrusion welded. The trench shall be backfilled and compacted sufficiently to prevent substantial subsidence.

Revise section heading with the following:

**608S.6 Plant Establishment Management Practices**

**ADD** the following to the first paragraph:

For the purposes of this contract, the following activities will apply to the periods of both plant establishment and post-establishment maintenance. The duration of the post-establishment period shall be defined by the Contract Manager, not to exceed five years.

**C. Mowing and Trimming**

**REMOVE** the paragraphs in their entirety and replace with the following:

Contractor will mow all turf areas at least four times from March 1 through October 31. Mowing height shall be no lower than 4 inches and no higher than 6 inches. Mowing is not preferred in Vegetative Filter Strips (VFS). Clippings can be left on the turf as long

as no readily visible clumps remain on the grass surface after mowing. Otherwise, Contractor shall remove and dispose of excessive clippings at an accredited compost / recycling or other City-approved facility, and provide proof by attaching receipt to invoice. Clippings must be physically removed from hardscapes. Blowing of clippings and leaves from landscape to hardscape areas such as roadways is not permitted.

Edges along hardscapes (e.g., sidewalks, driveways) and fixed objects shall be trimmed during each mowing event. Turf around sprinkler heads shall be trimmed to prevent grass from interfering with irrigation spray. String trimmers may not be used around tree trunks.

Revise section heading with the following:

**F Pest Management: Insect, Disease, Weed and Animal Control**

**REMOVE** the paragraphs in their entirety and replace with the following:

All pesticide use shall follow the IPM standards and protocols outlined in the City of Austin Grow Green website. (Note: the term pesticides is inclusive of herbicides, fungicides, insecticides and related terms)

Common noxious woody and herbaceous weeds are listed in Tables 1 and 2 of Special Specification 609S, although the Owner may ask the Contractor to remove any plant deemed undesirable by the City. Pesticide use is generally prohibited in green stormwater facilities, but may be allowed in specific circumstances. Where permitted, pesticide use shall follow the guidelines in this specification and those stated in City of Austin's ECM 1.6.3. Contractor shall consult with and obtain prior written approval from the City when the use of an herbicide is anticipated.

The circumstances wherein herbicides may be considered for weeds (both woody and herbaceous) include the following:

- Physical, mechanical and other non-chemical methods are unlikely to be successful
- Perennial species exist (use non-chemical methods for annual weeds)
- Weeds are too numerous to be removed manually

Noxious weeds shall be removed before they set seed. Various acceptable removal techniques include hand pulling, weed wrench, hoe, weed popper, or other forked instrument. When hand weeding, remove enough of the root system to prevent resprouting. Contractor shall promptly fill any holes resulting from weed removal.

Herbicides may be considered for woody weeds (trees and shrubs) that meet the criteria noted above. A cut-stump method is often used, wherein the trunk and branches are lopped at the base and removed from the site. Many species have the ability to re-sprout after cutting. For these species, the Contractor shall apply an herbicide to the exposed trunk immediately after cutting. Other herbicide application methods may also be considered.

Herbicides may also be considered for herbaceous weeds that meet the criteria noted above. Acceptable application methods include broadcast spray and wick application to foliage. Follow-up applications of herbicide may be necessary to eradicate certain well established plants. Generally, a non-selective herbicide containing glyphosate (e.g.

Roundup) shall be used (or approved equal). In riparian areas and near water resources, use only surfactant-free glyphosate, one labeled safe for aquatic use.

Insect pests that must be managed include fire ants. Monitor the site at each maintenance visit for fire ant activity. Pest management materials shall include the use of bait formulated to eliminate the entire colony (including the queen). Refer to City of Austin IPM standards for examples of acceptable fire ant bait products. When active ant mounds are present the Contractor shall use fire ant bait, according to label directions. It is anticipated that a bait treatment will need to occur once in the spring and once in the fall.

**H. Fertilization**

**REMOVE** the paragraph in its entirety and replace with the following:

As the nutrients in fertilizer have the potential to become a water pollutant, this activity shall generally not occur in stormwater facilities. However at times there is a need to provide additional nutrients to enhance vegetative growth. This need shall be based on a soil analysis and professional expertise. If fertilization is being considered, the Contractor must first contact the City representative for consent. Fertilizer may be used during the establishment period only. Fertilizer must be slow-release, with no more than 1lb of nitrogen/1000 s.f. allowed per year, and no more than ½ lb per application. After establishment, stormwater facilities are to be maintained without fertilizers.

**ADD** the following sections:

**J. Aeration**

On direction of the Owner, Contractor shall aerate turfgrass in the fall. Aerate to six-inch depth with standard aeration equipment.

**K. Reporting of Maintenance Visits**

Records shall be kept of maintenance tasks, including watering and IPM activities. A written list of site visits noting the action taken, time, date, and personnel shall be provided to the Contract Manager on a quarterly basis.

**608S.7 Acceptability of Plants**

**ADD** the following:

**Progress inspections** are required before planting begins and after completion of specified work. Contractor shall also schedule inspection once a month during the plant establishment period. Please contact the Owner to schedule an inspection 72 hours before scheduled event.

**Article 608.9 Payment**

**ADD** the following pay items:

**SPECIAL PROVISION****SP608S  
Planting**

|                            |   |    |
|----------------------------|---|----|
| Pay Item No. SP 608S-1Ai:  | Planting, 4" container, standard                                | EA |
| Pay Item No. SP 608S-1Aii: | Planting, 4" container, premium                                 | EA |
| Pay Item No. SP 608S-1Bi:  | Planting, 1 gal. container, standard                            | EA |
| Pay Item No. SP 608S-1Bii: | Planting, 1 gal. container, premium                             | EA |
| Pay Item No. SP 608S-1Ci:  | Planting, 3 gal. container, standard                            | EA |
| Pay Item No. SP 608S-1Cii: | Planting, 3 gal. container, premium                             | EA |
| Pay Item No. SP 608S-1Di:  | Planting, 5 gal. container, standard                            | EA |
| Pay Item No. SP 608S-1Dii: | Planting, 5 gal. container, premium                             | EA |
| Pay Item No. SP 608S-1Ei:  | Planting, 10 gal. container, standard                           | EA |
| Pay Item No. SP 608S-1Eii: | Planting, 10 gal. container, premium                            | EA |
| Pay Item No. SP 608S-1Fi:  | Planting, 15 gal. container, standard                           | EA |
| Pay Item No. SP 608S-1Fii: | Planting, 15 gal. container, premium                            | EA |
| Pay Item No. SP 608S-1Gi:  | Planting, 30 gal. container, standard                           | EA |
| Pay Item No. SP 608S-1Gii: | Planting, 30 gal. container, premium                            | EA |
| Pay Item No. SP 608S-1Hi:  | Planting, 1.5" caliper tree, standard                           | EA |
| Pay Item No. SP 608S-1Hii: | Planting, 1.5" caliper tree, premium                            | EA |
| Pay Item No. SP 608S-1Ii:  | Planting, 2" caliper tree, standard                             | EA |
| Pay Item No. SP 608S-1Iii: | Planting, 2" caliper tree, premium                              | EA |
| Pay Item No. SP 608S-1Ji:  | Planting, 3" caliper tree, standard                             | EA |
| Pay Item No. SP 608S-1Jii: | Planting, 3" caliper tree, premium                              | EA |
| Pay Item No. SP 608S-1Ki:  | Planting, tree/shrub seedling - bareroot                        | EA |
| Pay Item No. SP 608S-1Kii: | Planting, tree/shrub seedling - container                       | EA |
| Pay Item No. SP 608S-3A:   | Hardwood Mulch  | CY |
| Pay Item No. SP 608S-3B:   | Gravel Soil Stabilization for Stormwater Facilities             | CY |
| Pay Item No. SP 608S-4A:   | Tree Support System, per tree                                   | EA |
| Pay Item No. SP 608S-4B:   | Seedling Shelter Tubes  | EA |
| Pay Item No. SP 608S-5A:   | Turfgrass Maintenance, Mowing and Edging                        | SY |
| Pay Item No. SP 608S-5B:   | Turfgrass Maintenance, Aeration                                 | SY |
| Pay Item No. SP 608S-6:    | Herbaceous and Woody (non-tree) Plant Pruning                   | HR |
| Pay Item No. SP 608S-7A:   | Management Practices, Weeding, Physical<br>Removal and Disposal | HR |
| Pay Item No. SP 608S-7B:   | Management Practices, Weeding, Chemical Treatment               | HR |
| Pay Item No. SP 608S-7C:   | Management Practices, Fire Ant Management                       | SY |
| Pay Item No. SP 608S-7D:   | Rhizome Barrier   | LF |
| Pay Item No. SP 608S-8:    | Debris and Litter Removal                                       | SY |

**End**



**Item No. 609S**

**Native Grassland Seeding and Planting for Erosion Control**

**609S.1 Description**

This item shall govern the preparation of a seeding and planting area to the lines and grades indicated on the Drawings. This may include seedbed preparation, sowing of seeds, planting of rooted plants, watering, hydromulch, compost and other management practices, 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.

**609S.2 Submittals**

The submittal requirements for this specification item shall include:

- A. Identification of the species, source, mixture and rate of application of the seeding.
- B. Type of mulch or compost.
- C. Watering frequency and amount.
- D. Type of management practices.

**609S.3. Materials**

- A. The seed furnished shall be of the previous season's crop and the date of analysis shown on each bag shall be within twelve 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 1000 square feet (93 square meters) shall be of the type specified in section 609S.5.

- B. Water shall be clean and free of industrial wastes and other substances harmful to the growth of grass in the area irrigated.
- C. Topsoil see Standard Specification Item No. 601S.3(A)
- D. A least toxic, integrated pest management (IPM) approach shall be used to control weeds. A written request for approval of weed control product(s) and/or materials shall be submitted to the City of Austin IPM program coordinator (499-2550) for approval.

- E. Rooted plants must be healthy and free of pests. The root system should be well established and in proportion to the top growth.

**609S.4 Construction Methods**

**A. General.**

The Contractor shall limit preparation to areas that will be immediately seeded. All noxious weeds shall be eliminated by application of a herbicide and/or by physical removal (by the roots) prior to and/or during the seeding operation. The following list of plants are considered noxious weeds:

Table 1: Weed List

| Weed Type | Botanical Name         | Common Name                 |
|-----------|------------------------|-----------------------------|
| Herb      | Ambrosia spp.          | Ragweed                     |
| Grass     | Bothriochloa ischaemum | K.R. Bluestem               |
| Grass     | Bromus unioloides      | Rescue Grass                |
| Herb      | Cenchrus spp.          | Sandbur                     |
| Herb      | Cnidocolus texanus     | Bull Nettle                 |
| Herb      | Convolvulus spp.       | Bindweed                    |
| Grass     | Cynodon dactylon       | Bermudagrass*               |
| Herb      | Cyperus esculentus     | Yellow Nutsedge (Nut-grass) |
| Herb      | Cyperus rotundus       | Purple Nutsedge (Nut-grass) |
| Grass     | Digitaria spp.         | Crab Grass                  |
| Herb      | Medicago sp.           | Bur-Clover                  |
| Grass     | Paspalum dilatatum     | Dallis Grass                |
| Grass     | Sorghum halapense      | Johnson Grass               |
| Herb      | Torilis arvensis       | Beggar's-tick               |
| Vine      | Toxicodendron radicans | Poison Ivy                  |
| Herb      | Urtica spp.            | Stinging Nettle             |

**B. Seed Bed Preparation.**

After the designated areas have been rough graded, a suitable seedbed shall be prepared. In areas where cut or fill is required, a minimum of 6 inches (150 mm) of topsoil (see Section 609S.3.C) shall be placed or existing soil (that is not infested with weeds or weed rootstock) stockpiled over the entire planting area.

In areas with no soil disturbance, the weeds shall be eliminated and a minimum of 2 inches (50 mm) of topsoil, if none currently exists, shall be placed. An even seedbed shall be prepared with limited irregularities, lumps or soil clods and the surface shall be raked to facilitate seed to soil contact.

**C. Watering.**

All watering shall comply with City of Austin Land Development Code requirements. 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.

Watering applications shall insure that the seedbed is maintained in a moist condition favorable for the growth of grass. Watering shall continue until minimum coverage is achieved and accepted by the Engineer or designated representative. Watering may 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.

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).

#### **609S.5 Native Grassland Seeding and Planting**

All areas require both seed and rooted plants. Seeding and planting shall be performed in accordance with the requirements hereinafter described. The optimum depth for seeding shall be from 1/16 inch (1 1/2 millimeters) to 1/8 inch (3 millimeters). Seed shall be applied by a method that achieves consistent distribution and proper seed to soil contact (i.e. hand broadcasting, hydromulch, or drill method). Mulching is not required.

Species substitution, when necessary due to availability, shall be approved by the Engineer or designated representative. Only native species adapted for the designated environmental conditions shall be allowed as substitutes. Shorter growing natives such as Buffalograss should be sodded around manholes or other structures requiring higher visibility for access.

If the native grassland is being installed during the cool season (November 1 to February 15), the cool season cover crop species (as listed) shall be included in the mix.

The seed and rooted plant mixtures shall be applied in accordance with appropriate 'growing environments' (Upland Full Sun—Table 2, Upland Shade-Dappled—Table 3 and Facultative Moderate to High Moisture—Table 4).

Table 2. Upland Species, Full Sun Areas

| Common Name             | Comments               | Botanical Name          | Seed application rate<br>lbs/1000 sq. ft.<br>(kg/100 sq. m.) | Rooted Plants<br>Size & Spacing                   |
|-------------------------|------------------------|-------------------------|--|---|
| Buffalo Grass           | grass                  | Buchloe dactyloides     | 0.3 (0.15)   | 1 - 16" x 24" piece of sod @ 10' (3m) ctrs.       |
| Blue Grama              | grass                  | Bouteloua gracilis      | 0.2 (0.1)  | Not required                                      |
| Green Srrangletop       | grass                  | Leptochloa dubia        | 0.4 (0.2)  |   |
| Indian Grass            | grass                  | Sorghastrum nutans      | 0.2 (0.1)  | 1 gal @ 10 ft.' (3m) ctrs.                        |
| Little Bluestem         | grass                  | Schizachyrium scoparium | 0.2 (0.1)  |   |
| Prairie Wild Rye        | grass                  | Elymus canadensis       | 0.2 (0.1)  | Not required                                      |
| Purple Threeawn         | grass                  | Aristida purpurea       | 0.2 (0.1)  |   |
| Sideoats Grama          | grass                  | Bouteloua curtipendula  | 0.3 (0.15)   |   |
| Bluebonnet              | wildflower             | Lupinus texensis        | 0.4 (0.2)  | Not required                                      |
| Clover (Purple Prairie) | wildflower             | Petalostemum purpurea   | 0.1 (0.05)   | Not required                                      |
| Coreopsis (Plains)      | wildflower             | Coreopsis tinctoria     | 0.05 (0.025)   | Not required                                      |
| Goldenrod               | wildflower             | Solidago altissima      | 0.02 (0.01)  | Not required                                      |
| Greenthread             | wildflower             | Thelesperma filifolium  | 0.075 (0.037)  | Not required                                      |
| Indian Blanket          | wildflower             | Gaillardia pulchella    | 0.15 (0.075)   | Not required                                      |
| Lemon Mint              | wildflower             | Monarda citriodora      | 0.06 (0.03)  | Not required                                      |
| Mexican Hat             | wildflower             | Ratibida columnaris     | 0.05 (0.025)   | Not required                                      |
| Pink Evening Primrose   | wildflower             | Oenothera speciosa      | 0.02 (0.01)  | Not required                                      |
| Sunflower (Common)      | wildflower             | Helianthus annus        | 0.075 (0.037)  | Not required                                      |
| Cereal rye grain*       | cool season cover crop | Elymus                  | 0.5 (0.25)   | Not required                                      |
| Oats*                   | cool season cover crop | Avena sativa            | 0.2 (0.10)   | Not required                                      |
| Wheat*                  | cool season cover crop | Triticum aestivum       | 0.3 (0.15)   | Not required                                      |
|                         |                        |                         |  |   |
| TOTAL**                 |                        |                         | Winter: 4.0 (2.0)<br>Summer<br>3.0 (1.5)                     | Rooted species mixed equally @ 10 ft. (3 m) ctrs. |

- \* Plant only between Oct. 1 and Jan. 31. Non-persistent winter cover crop for erosion control.
- \*\* Any unavailable species can be substituted with the same quantity of another species from this list or another species approved by the Engineer or designated representative.

Table 3. Upland Species, Shade-Dappled Light Areas

| Common Name              | Comments                  | Botanical Name             | Seed Application Rate<br>lbs/1000 sq. ft.<br>(kg/100 sq. m.) | Rooted Plants<br>Size & Spacing                     |
|--------------------------|---------------------------|----------------------------|--|---|
| Meadow Sedge*            | sedge                     | Carex perdentata           | No seed required   | 1 gal. @ 10' (3m)<br>ctrs.                          |
| Inland Seoats**          | grass                     | Chasmanthium<br>latifolium | 0.5 (0.25)   |   |
| Prairie Wild Rye         | grass                     | Elymus<br>canadensis       | 0.75 (0.37)  | Not required  |
| Sideoats Grama           | grass                     | Bouteloua<br>curtipendula  | 0.75 (0.37)  | 1 gal. @ 10' (3m)<br>ctrs.                          |
| Purple<br>Coneflower     | wildflower                | Echinacea<br>purpurea      | 0.1 (0.05)   | Not required  |
| Coreopsis<br>(Lanceleaf) | wildflower                | Coreopsis<br>lanceolata    | 0.1 (0.05)   | Not required  |
| Sage<br>(Scarlet)        | wildflower                | Salvia coccinea            | 0.1 (0.05)   | Not required  |
| Drummond Phlox           | wildflower                | Phlox<br>Drummondii        | 0.1 (0.05)   | Not required  |
| Black-Eyed<br>Susan      | wildflower                | Rudbeckia<br>hirta         | 0.03 (0.015)   | Not required  |
| Cutleaf<br>Daisy         | wildflower                | Engelmannia<br>pinnatifida | 0.2 (0.10)   | Not required  |
| Tall Aster               | wildflower                | Aster praealtus            | 0.02 (0.01)  | Not required  |
| Illinois<br>bundleflower | wildflower                | Desmanthus<br>illinoensis  | 0.15 (0.075)   | Not required  |
| Standing cypress         | wildflower                | Ipomopsis rubra            | 0.1 (0.05)   | Not required  |
| Winecup                  | wildflower                | Callirhoe<br>involucrata   | 0.1 (0.05)   | Not required  |
| Cereal rye<br>grain***   | cool season<br>cover crop | Secale cereale             | 0.5 (0.25)   | Not required  |
| Oats***                  | cool season<br>cover crop | Avena sativa               | 0.2 (0.1)  | Not required  |
| Wheat***                 | cool season<br>cover crop | Triticum aestivum          | 0.3 (0.15)   | Not required  |
|                          |                           |                            |  |   |
| TOTAL****                |                           |                            | Winter: 4.0 (2.0)<br>Summer: 3.0 (1.5)                       | Rooted species<br>mixed equally @ 10'<br>(3m) ctrs. |

- \* If unavailable replace with other shade and drought-tolerant sedge species.
- \*\* If unavailable replace with Prairie Wild Rye.
- \*\*\* Plant only between Oct. 1 and Jan. 31. Non-persistent winter cover crop for erosion control.
- \*\*\*\* Any unavailable species can be substituted with the same quantity of another species from this list or another species approved by the Engineer or designated representative.

Table 4. Facultative Species, Moderate – High Moisture Areas

| Common Name                | Comments   | Botanical Name           | Seed application rate<br>lbs/1000 sq. ft.<br>(kg/100 sq. m.) | Rooted Plants<br>Size & Spacing |
|----------------------------|------------|--------------------------|--|---------------------------------|
| Big Bluestem               | grass      | Andropogon gerardii      | 0.2 (0.1)  | 1 gal. @ 10' (3m)<br>ctrs       |
| Big Muhly<br>(Lindheimers) | grass      | Muhlenbergia lindheimeri | 0.2 (0.1)  |                                 |
| Bushy Bluestem             | grass      | Andropogon glomeratus    | 0.2 (0.1)  |                                 |
| Eastern Gama<br>Grass      | grass      | Tripsacum dactyloides    | 0.3 (0.15)   |                                 |
| Indian Grass               | grass      | Sorghastrum nutans       | 0.2 (0.1)  |                                 |
| Inland Seoats              | grass      | Chasmanthium latifolium  | 0.3 (0.15)   |                                 |
| Prairie Wild Rye           | grass      | Elymus canadensis        | 0.3 (0.15)   | Not required                    |
| Sand Lovegrass             | grass      | Eragrostis trichodes     | 0.2 (0.1)  |                                 |
| Switchgrass                | grass      | Panicum virgatum         | 0.1 (0.05)   | 1 gal. @ 10' (3m)<br>ctrs       |
| Black-Eyed<br>Susan        | wildflower | Rudbeckia hirta          | 0.06 (0.03)  | Not required                    |
| Bundleflower<br>(Illinois) | wildflower | Desmanthus illinoensis   | 0.35 (0.17)  | Not required                    |
| Clover (Purple<br>Prairie) | wildflower | Petalostemum purpurea    | 0.1 (0.05)   | Not required                    |
| Coneflower<br>(Clasping)   | wildflower | Rudbeckia amplexicaulis  | 0.06 (0.03)  | Not required                    |
| Coreopsis<br>(Plains)      | wildflower | Coreopsis tinctoria      | 0.05 (0.025)   | Not required                    |
| Goldenrod                  | wildflower | Solidago altissima       | 0.03 (0.015)   | Not required                    |
| Lazy Daisy                 | wildflower | Aphanostephus<br>sp.     | 0.03 (0.015)   | Not required                    |
| Lemon Mint                 | wildflower | Monarda citriodora       | 0.07 (0.035)   | Not required                    |

|                           |                           |                           |  |   |
|---------------------------|---------------------------|---------------------------|--|---|
| Sunflower<br>(Common)     | wildflower                | Helianthus<br>annuus      | 0.15 (0.075)                           | Not required  |
| Sunflower<br>(Maximilian) | wildflower                | Helianthus<br>maximiliani | 0.1 (0.05)                             | Not required  |
| Cereal rye grain*         | cool season<br>cover crop | Secale cereale            | 0.5 (0.25)                             | Not required  |
| Oats*                     | cool season<br>cover crop | Avena sativa              | 0.2 (0.10)                             | Not required  |
| Wheat*                    | cool season<br>cover crop | Triticum aestivum         | 0.3 (0.15)                             |   |
|                           |                           |                           |  |   |
| TOTAL**                   |                           |                           | winter: 4.0 (2.0)<br>summer: 3.0 (1.5) | Rooted species<br>mixed equally @ 10'<br>(3m) ctrs. |

\* Plant only between Oct. 1 and Jan. 31. Non-persistent winter cover crop for erosion control.

\*\* Any unavailable species can be substituted with the same quantity of another species from this list or another species approved by the Engineer or designated representative.

#### 609S.6 Management Practices

Weeds, as defined in the Weed List (Table 1), shall be controlled in the most efficient manner possible. The timing of weed control may occur prior to soil disturbance, just before the installation of seed, and/or during the period of grassland establishment. Weed control shall be introduced at one or all of these times, so that the greatest control is achieved. The preferred method of control is to remove weeds, either by physical or mechanical means, when the site is conducive (e.g. when the ground is moist) to this approach.

The entire root system of perennial weeds shall be removed to prevent re-sprouting. Weeds may be controlled with an approved contact, systemic herbicide, provided the product is used with appropriate care and is applied in accordance with label instructions and the following guidelines:

1. Herbicide shall not be applied when the wind is greater than 8 mph (12.9 kph),
2. Herbicide shall not be applied when rainfall is expected within 24 hours,
3. Herbicide shall not contact surface water, i.e. creeks, rivers, and lakes,
4. Herbicide shall not contact desirable vegetation (a wicking method shall be used, if necessary, to accurately contact target weed only during application).

The Engineer or designated representative shall be consulted to determine appropriate weed control management when weeds are located in an environmentally sensitive location (e.g. near water or adjacent to a critical environmental feature).

### **609S.7 Measurement**

Work and acceptable material for "Native Grasslands for Erosion Control" will be measured by the square yard (square meter: 1 square 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 with no bare areas exceeding 16 square feet (1.5 square meters) and a 1 1/2 inch (40 millimeters) stand of grass. Bare areas shall be reprepared and reseeded as required by the Engineer or designated representative in order to develop an acceptable stand of grass.

### **609S.8 Payment**

The work performed and materials furnished and measured will be paid for at the unit bid price for "Native Grasslands For Erosion Control" of the method specified on the Drawings.

The unit bid price shall include full compensation for furnishing all materials, including all topsoil, water, seed, or fertilizer or mulch and for performing all operations necessary to complete the work.

Payment will be made under one or more of the following pay items:

|                             |                                       |                  |
|-----------------------------|---------------------------------------|------------------|
| <b>Pay Item No. 609S-A:</b> | Topsoil and Seedbed Preparation       | Per Square Yard. |
| <b>Pay Item No. 609S-B:</b> | Topsoil and Seedbed Preparation       | Per Acre.        |
| <b>Pay Item No. 609S-C:</b> | Native Grassland Seeding and Planting | Per Square Yard. |
| <b>Pay Item No. 609S-D:</b> | Native Grassland Seeding and Planting | Per Acre.        |
| <b>Pay Item No. 609S-E:</b> | Watering                              | Per Square Yard  |
| <b>Pay Item No. 609S-F:</b> | Watering                              | Per Acre         |
| <b>Pay Item No. 609S-G:</b> | Management Practices                  | Per Square Yard  |
| <b>Pay Item No. 609S-H:</b> | Management Practices                  | Per Acre         |

**End**

|  |
|--|
| <b><u>SPECIFIC CROSS REFERENCE MATERIALS</u></b>   |
| <b>Specification Item 609S "Native Grassland Seeding and Planting for Erosion Control"</b> |

City of Austin Standard 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         |

|  |
|--|
| <b><u>RELATED CROSS REFERENCE MATERIALS</u></b>  |
| <b>Specification Item 609S "Native Grassland Seeding and Planting for Erosion Control"</b> |

City of Austin Standard Specifications

| <u>Designation</u> | <u>Description</u>                       |
|--------------------|--|
| Item No. 601S      | Salvaging and Placing Topsoil            |
| Item No. 602S      | Sodding for Erosion Control              |
| Item No. 604S      | Seeding (Non-Native) for Erosion Control |
| Item No. 605S      | Soil Retention Blanket                   |
| Item No. 607S      | Slope Stabilization                      |
| Item No. 608S      | Planting                                 |

City of Austin Standards (Details)

| <u>Standard No.</u> | <u>Description</u>                |
|---------------------|-----------------------------------|
| 627S-1              | Grass Lined Swale                 |
| 62S7-2              | Grass Lined Swale W/ Stone Center |
| 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 |

**SPECIAL PROVISION TO  
Standard Specification Item No. 609S Native Grassland Seeding and Planting for  
Erosion Control (Version 08/18/10)**

These special provisions serve to modify, add to, and/or delete from the City of Austin Standard Technical Specification Item No. 609S: Native Grassland Seeding and Planting for Erosion Control, dated 8/18/2010. Any item, paragraph, article, or work contained therein unless specifically modified, added to or deleted herein shall apply where applicable.

**Article 609S.2 Submittals**

Add the following:

- E. All components of hydroseed slurry, including tacking agent, fertilizers, and proposed mulch
- F. Type of hydraulic seeding equipment and nozzles proposed for use.
- G. Delivery tickets indicating the quantity of each type of seed delivered to the site.
- H. Invoice showing certification of Hydromulch/seed mix as Bonded Fiber Matrix (BFM) or Fiber Reinforced Matrix (FRM).

**Article 609S.3 Materials**

Add the following:

- F. Hydromulch for permanent vegetative stabilization materials may include:
  - (1) Bonded Fiber Matrix (BFM): organic defibrated fibers and cross-linked hydro-colloidal tackifiers. Refer to ECM Table 1.4.7-C
  - (2) Fiber Reinforced Matrix (FRM): organic defibrated fibers produced from grinding clean, whole wood chips, crimped interlocking fibers, cross-linked insoluble hydro-colloidal tackifiers and reinforced natural and/or synthetic fibers.

**Article 609S.4 Construction Methods, Table 1: Weed List**

Add the following to Table 1, Weed List:

| <b>Weed Type</b> | <b>Botanical Name</b> | <b>Common Name</b> |
|------------------|-----------------------|--------------------|
| Tree             | <i>Acacia</i> spp.    | Acacia             |
| Tree             | <i>Salix nigra</i>    | Willow             |

Add the following

Table 2, Invasive Species List

**SPECIAL PROVISION**

*does not conform to table in 609§.4 SP609S*

| Common Name                | Botanical Name                      |
|----------------------------|-------------------------------------|
| Giant reed                 | <i>Arundo donax</i>                 |
| Common water hyacinth      | <i>Eichhornia crassipes</i>         |
| Hydrilla                   | <i>Hydrilla verticillata</i>        |
| Glossy privet              | <i>Ligustrum lucidum</i>            |
| Chinaberry tree            | <i>Melia azedarach</i>              |
| Golden bamboo              | <i>Phyllostachys aurea</i>          |
| Kudzu                      | <i>Pueraria montana var. lobata</i> |
| Bastard cabbage            | <i>Rapistrum rugosum</i>            |
| Johnson grass              | <i>Sorghum halepense</i>            |
| Salt cedar                 | <i>Tamarix ramosissima</i>          |
| Tree of heaven             | <i>Ailanthus altissima</i>          |
| Paper mulberry             | <i>Broussonetia papyrifera</i>      |
| Malta star-thistle         | <i>Centaurea melitensis</i>         |
| Elephant ears              | <i>Colocasia esculenta</i>          |
| Bermudagrass               | <i>Cynodon dactylon</i>             |
| Chinese parasoltree        | <i>Firmiana simplex</i>             |
| Japanese honeysuckle       | <i>Lonicera japonica</i>            |
| Catclawvine                | <i>Macfadyena unguis-cati</i>       |
| Sacred bamboo              | <i>Nandina domestica</i>            |
| Chinese pistache           | <i>Pistacia chinensis</i>           |
| Scarlet firethorn          | <i>Pyracantha coccinea</i>          |
| Japanese netvein hollyfern | <i>Cyrtomium falcatum</i>           |
| Bluestem, King Ranch       | <i>Bothriochloa ischaemum</i>       |

**Add the following:**

**D. Seeding**

Apply seed uniformly with a seed spreader, drill, cultipacker seeder or hydroseeder.

**E. Protection of Seed Bed with Hydromulch or Soil Retention Blanket.**

Newly-installed seeding must be protected by hydromulch or soil retention blanket (refer to Standard Specification 605S Soil Retention Blanket) immediately after seeding.

Protection of the seed bed shall occur in a manner that will allow seed germination and that encourage effective vegetative growth. Hydromulching shall comply with requirements of City of Austin, Environmental Criteria Manual (ECM) Section 1.4.0.

**1. Hydromulch**

Permanent vegetative stabilization with Hydromulch shall comply with the requirements of ECM Table 1.4.7-C using either:

- (a) Bonded Fiber Matrix (BFM): 80% organic defibrated fibers and 10% tackifier (Refer to ECM Table 1.4.7-D for BFM properties), or  
(b) Fiber Reinforced Matrix (FRM): 65% organic defibrated fibers, 25% reinforcing fibers or less, and 10% tackifier (Refer to ECM Table 1.4.7-E for FRM properties).

### Article 609S.5 Native Grassland Seeding and Planting

Revise the first paragraph, last sentence:

Seed shall be applied by a method that achieves consistent distribution and proper seed to soil contact (i.e., hand broadcasting, seed spreader, cultipacker seeder, hydromulch, or drill method). Mulching is not required.

### Article 609S.6 Management Practices

Add the following:

Common noxious weeds are in Table 1 and City of Austin-defined Invasive Species are in Table 2, although the Contract Manager may ask the Contractor to remove any plant deemed undesirable by the City. Herbicide and pesticide use is prohibited in certain green stormwater infrastructure facilities, including vegetated filter strips. Where permitted, herbicide and pesticide should follow the guidelines in this specification and those stated in City of Austin's ECM 1.6.3.

Noxious woody vegetation shall be removed before they set seed. Various acceptable removal techniques include hand pulling, weed wrench, hoe, weed popper, or other forked instrument. When hand weeding, the entire root system of the weed shall be removed. Woody weeds that cannot be removed completely shall be lopped at the base and removed from the site. To prevent re-sprouting, Contractor shall apply an herbicide on the exposed trunk immediately after cutting. Contractor shall promptly fill any holes resulting from weed removal.

In areas where herbaceous weeds are too numerous to be removed manually, the Contractor may use an herbicide (refer to Special Specification 608S.4, J for list of pre-approved herbicides). Acceptable application methods include broadcast spray, wipe on foliage, and cut-stump treatment. Follow-up applications of herbicide may be necessary to eradicate certain well established plants. Contractor shall consult with and obtain prior written approval from the City when they anticipate use of an herbicide.

When fire ant mounds are present, Contractor shall use fire ant bait according to label directions. Refer to Special Specification 608S.4, J for list of acceptable fire ant bait. It is anticipated that a bait treatment will need to occur once in the Spring and once in the Fall.

**Article 609S.8 Payment**

**Add the following:**

**Pay Item No. SP 609S-C1:** Native Grassland Seeding and planting, seed spreader & hand plant container plants, per Square Yard

**Pay Item No. SP 609S-C2:** Native Grassland Seeding, Drill or Cultipacker Seeder & hand plant container plants, per Square Yard

**Pay Item No. SP 609S-C3:** Native Grassland Seeding, Bonded Fiber Matrix or Fiber Reinforced Matrix Hydromulch & hand plant container plants, per Square Yard

**End**

**Native Grassland Seeding and Planting for Erosion Control**

**SPECIAL PROVISION To  
Standard Specification Item 609S (Version 08/18/10)  
Native Grassland Seeding and Planting for Erosion Control**

These special provisions serve to modify, add to, and/or delete from the City of Austin Standard Technical Specification Item No. 609S: Native Grassland Seeding and Planting for Erosion Control, dated 8/18/2010. Any item, paragraph, article, or work contained therein unless specifically modified, added to or deleted herein shall apply where applicable.

**609S.2 Submittals**

**ADD** the following to the end of the section:

- E. All components of hydroseed slurry, including tacking agent, fertilizers, and proposed mulch
- F. Type of hydraulic seeding equipment and nozzles proposed for use.
- G. Delivery tickets indicating the quantity of each type of seed delivered to the site.
- H. Invoice showing certification of Hydromulch/seed mix as Bonded Fiber Matrix (BFM) or Fiber Reinforced Matrix (FRM). Required Inspections
- I. Meetings / Inspections Required During Construction:
  - a. After rough grading is complete, before topsoil (per SP601S or SS603) is spread for fine grading. Notify Owner in advance to schedule inspection.
  - b. After topsoil is placed but before plants are installed. Notify Owner in advance to schedule inspection.
  - c. After plant installation is complete. Notify Owner in advance to schedule inspection.

**609S.3 Materials**

**ADD** the following:

- F. Hydromulch for permanent vegetative stabilization materials may include:
  - (1) Bonded Fiber Matrix (BFM): organic defibrated fibers and cross-linked hydro-colloidal tackifiers. Refer to ECM Table 1.4.7-C
  - (2) Fiber Reinforced Matrix (FRM): organic defibrated fibers produced from grinding clean, whole wood chips, crimped interlocking fibers, cross-linked insoluble hydro-colloidal tackifiers and reinforced natural and/or synthetic fibers.

## Native Grassland Seeding and Planting for Erosion Control

## 609S.4 Construction Methods, Table 1: Weed List

ADD the following after Table 1:

Table 2, Invasive Species List

| Type    | Botanical Name                               | Common Name                      |
|---------|--|----------------------------------|
| Aquatic | <i>Eichhornia crassipes</i>                  | Water hyacinth                   |
| Aquatic | <i>Hydrilla verticillata</i>                 | Hydrilla                         |
| Aquatic | <i>Myriophyllum spicatum</i>                 | Eurasian watermilfoil            |
| Grass   | <i>Arundo donax</i>                          | Giant reed                       |
| Grass   | <i>Bothriochloa ischaemum var. songarica</i> | Bluestem, King Ranch             |
| Grass   | <i>Cynodon dactylon</i>                      | Bermudagrass (common)            |
| Grass   | <i>Phyllostachys aurea</i>                   | Golden bamboo                    |
| Grass   | <i>Sorghum halepense</i>                     | Johnson grass                    |
| Herb    | <i>Centaurea melitensis</i>                  | Maltese star thistle             |
| Herb    | <i>Colocasia esculenta</i>                   | Elephant ear                     |
| Herb    | <i>Cyrtomium falcatum</i>                    | Japanese netvein hollyfern       |
| Herb    | <i>Rapistrum rugosum</i>                     | Bastard cabbage                  |
| Herb    | <i>Verbena brasiliensis</i>                  | Brazilian verbain                |
| Shrub   | <i>Ligustrum quihuei, sinense</i>            | Privets, small leaf              |
| Shrub   | <i>Nandina domestica</i>                     | Sacred bamboo                    |
| Shrub   | <i>Photinia serratifolia &amp; x frazeri</i> | Photinia, Taiwanese & red tipped |
| Shrub   | <i>Pyracantha coccinea</i>                   | Scarlet firethorn                |
| Shrub   | <i>Tamarix spp.</i>                          | Salt cedar                       |
| Shrub   | <i>Vitex agnus-castus</i>                    | Lilac chaste-tree                |
| Tree    | <i>Ailanthus altissima</i>                   | Tree of heaven                   |
| Tree    | <i>Albizia julibrissin</i>                   | Mimosa, Silk tree                |
| Tree    | <i>Broussonetia papyrifera</i>               | Paper mulberry                   |
| Tree    | <i>Firmiana simplex</i>                      | Chinese parasol tree             |
| Tree    | <i>Ligustrum lucidum, japonicum, vulgare</i> | Privets, large leaf              |
| Tree    | <i>Melia azedarach</i>                       | Chinaberry tree                  |
| Tree    | <i>Pistacia chinensis</i>                    | Chinese pistache                 |
| Tree    | <i>Triadica sebifera</i>                     | Chinese tallow tree              |
| Vine    | <i>Lonicera japonica</i>                     | Japanese honeysuckle             |
| Vine    | <i>Macfadyena unguis-cati</i>                | Catclaw vine                     |
| Vine    | <i>Pueraria montana var. lobata</i>          | Kudzu                            |
| Vine    | <i>Wisteria sinensis</i>                     | Chinese wisteria                 |

**Native Grassland Seeding and Planting for Erosion Control**

**ADD** the following items:

**D. Seeding**

Apply seed uniformly with a seed spreader, drill, cultipacker seeder or hydroseeder.

**E. Protection of Seed Bed with Hydromulch or Soil Retention Blanket**

Newly-installed seeding must be protected by hydromulch or soil retention blanket (refer to Standard Specification 605S Soil Retention Blanket) immediately after seeding. Protection of the seed bed shall occur in a manner that will allow seed germination and that encourage effective vegetative growth. Hydromulching shall comply with requirements of City of Austin, Environmental Criteria Manual (ECM) Section 1.4.0.

**1. Hydromulch**

Permanent vegetative stabilization with Hydromulch shall comply with the requirements of ECM Table 1.4.7-C using either:

- (a) Bonded Fiber Matrix (BFM): 80% organic defibrated fibers and 10% tackifier (Refer to ECM Table 1.4.7-D for BFM properties), or
- (b) Fiber Reinforced Matrix (FRM): 65% organic defibrated fibers, 25% reinforcing fibers or less, and 10% tackifier (Refer to ECM Table 1.4.7-E for FRM properties).

**609S.5 Native Grassland Seeding and Planting**

**ADD** items to the parenthesis in the first paragraph, second last sentence:

seed spreader, cultipacker seeder

**609S.6 Management Practices**

**ADD** the following paragraphs to the end of the section:

Common noxious weeds are in Table 1 and City of Austin-defined Invasive Species are in Table 2, although the Contract Manager may ask the Contractor to remove any plant deemed undesirable by the City. Herbicide and pesticide use is prohibited in certain green stormwater infrastructure facilities, including vegetated filter strips. Where permitted, herbicide and pesticide should follow the guidelines in this specification and those stated in City of Austin's ECM 1.6.3.

Noxious woody vegetation shall be removed before they set seed. Various acceptable removal techniques include hand pulling, weed wrench, hoe, weed popper, or other forked instrument. When hand weeding, the entire root system of the weed shall be removed. Woody weeds that cannot be removed completely shall be lopped at the base and removed from the site. To prevent re-sprouting, Contractor shall apply an herbicide on the exposed trunk immediately after cutting. Contractor shall promptly fill any holes resulting from weed removal.

**Native Grassland Seeding and Planting for Erosion Control**

In areas where herbaceous weeds are too numerous to be removed manually, the Contractor may use an herbicide (refer to Special Specification 608S.4, J for list of pre-approved herbicides). Acceptable application methods include broadcast spray, wipe on foliage, and cut-stump treatment. Follow-up applications of herbicide may be necessary to eradicate certain well established plants. Contractor shall consult with and obtain prior written approval from the City when they anticipate use of an herbicide.

When fire ant mounds are present, Contractor shall use fire ant bait according to label directions. Refer to Special Specification 608S.4, J for list of acceptable fire ant bait. It is anticipated that a bait treatment will need to occur once in the spring and once in the fall.

**609S.8 Payment**

**DELETE** the following pay items:

- Pay Item No. SP 609S-A:** Topsoil and Seedbed Preparation Per Square Yard.
- Pay Item No. SP 609S-B:** Topsoil and Seedbed Preparation Acre.
- Pay Item No. SP 609S-C:** Native Grassland Seeding and Planting Per Square Yard.
- Pay Item No. SP 609S-D:** Native Grassland Seeding and Planting Per Acre.
- Pay Item No. SP 609S-E:** Watering Per Square Yard.
- Pay Item No. SP 609S-F:** Watering Per Acre.
- Pay Item No. SP 609S-G:** Management Practices Per Square Yard.
- Pay Item No. SP 609S-H:** Management Practices Per Acre.

**ADD** the following:

- Refer to SP601S and SS612 for topsoil and seed bed preparation.
- Refer to SP608S for management practices.
- Refer to SS603 for irrigation system.

**ADD** the following pay items:

- Pay Item No. SP 609S-C1:** Native Grassland Seeding, seed spreader, per Square Yard
- Pay Item No. SP 609S-C2:** Native Grassland Seeding, Drill or Cultipacker Seeder, per Square Yard
- Pay Item No. SP 609S-C3:** Native Grassland Seeding, Bonded Fiber Matrix or Fiber Reinforced Matrix Hydromulch, per Square Yard

**End**

**Item No. 610S**  
**Preservation of Trees and Other Vegetation**

**610S.1 Description and Definitions**

This item shall govern the proper care, protection and treatment of trees and other vegetation in the vicinity of the permitted development activity (as defined in Land Development Code 25-1-21(27)). All work shall be performed in accordance with the City approved drawings and specifications (e.g. Standard Series 600) or as approved by the City Arborist (as defined below). Tree pruning and/or treatments shall be performed under the direct supervision of a qualified arborist (as defined below) or as allowed by the City Arborist.

Definitions

**City Arborist** – City official designated by the Director of the Planning and Development Review Department (Land Development Code 25-8-603) or as designated by the City Arborist.

**Oak wilt** - a tree disease caused by a fungus "Ceratocystis fagacearum" that infects the vascular system of Oak "genus Quercus" trees and prevents water transport through the trunk and canopy of the tree. This usually fatal tree disease can be spread by certain insects that come into contact with tree wounds or by interconnected tree roots. February through June is a high risk period due to the stage of the fungus and insect activity. See section 610S.4(H) for additional requirements for preventing Oak wilt infection.

**Qualified Arborist** – an individual engaged in the profession of arboriculture or closely related field who, through experience, education, and related training, possesses the competence to provide for, or supervise, the management of trees and other woody plants (as defined in the most current version of ANSI A300 (Part 1)-2001, section 4.1).

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

**610S.2 Submittals**

The following is a list of the minimum submittal requirements for this specification item shall include:

- A. Identification of the location, type of protective fencing (i.e. A, B or C), materials of construction and installation details;
- B. Qualified Arborist credentials (i.e. proof of certification from the International Society of Arboriculture, licenses, resume and/or references);
- C. Type, location and construction details for proposed tree wells;

- D. Location, type, materials of construction and installation details for permeable paving;
- E. Proposed nutrient mix specifications and when required by the City Arborist, soil and/or foliar analysis for fertilizer applications.

### 610S.3 Materials

#### A. Protective Fencing and Signage

Protective fencing is designated as the materials used to protect the root zones of trees as illustrated in City of Austin Standard Detail 610S-1. Three basic types of protective fencing materials are allowed by the City of Austin. Type A and Type B are typical applications and shall be installed where damage potential to a tree root system is high, while Type C shall be installed where damage potential is minimal. The specific type of protective fencing for the work shall be as indicated on the drawings. Type C fence materials shall be subject to approval by the City Arborist. Type C fencing shall be replaced by Type A or Type B fencing as directed by the City Arborist if it fails to perform the necessary function.

##### 1. Type A Chain Link fence (Typical Application-high potential damage)

Type A protective fencing shall be installed in accordance with City of Austin Standard Details 610S-2 and 610S-4 and shall consist of a minimum five-foot (1.5 meters) high chain link fencing with tubular steel support poles or "T" posts.

##### 2. Type B Wood Fence (Typical Application-high potential damage)

Type B protective fencing shall be installed in accordance with City of Austin Standard Details 610S-3 and 610S-5 and shall consist of any vertical planking attached to 2x4-inch (50 x 100 mm) horizontal stringers which are supported by 2x4-inch (50 x 100 mm) intermediate vertical supports and a 4x4-inch (100 x 100 mm) at every fourth vertical support .

##### 3. Type C Other Materials (Limited Application-minimal potential damage)

The following materials may be permitted as alternates for limited or temporary applications (3 days or less) where tree damage potential is minimal (as determined by the City Arborist):

###### (a) High visibility plastic construction fencing.

The fabric shall be 4 feet (1.2 meters) in width and made of high density polyethylene resin, extruded and stretched to provide a highly visible international orange, non-fading fence. The fabric shall remain flexible from -60oF to 200oF (-16oC to 93oC) and shall be inert to most chemicals and acid. The fabric pattern may vary from diamond to circular with a minimum unit weight of 0.4 lbs./Ft. (0.6 kilograms per meter).

The fabric shall have a 4 foot (1.2 meters) width minimum tensile yield strength (Horizontal) of 2000 psi [13.9 megaPascals], ultimate tensile

strength of 2680 psi [18.5 megaPascals] (Horizontal) and a maximum opening no greater than 2 inches (50 mm).

- (b) Other approved equivalent restraining material.

The fencing materials, identified in (a) and (b) above, shall be supported by steel pipe, tee posts, U posts or 2" x 4" (50 mm x 100 mm) timber posts that are a minimum of 5-1/2 feet (1.68 meters) in height and spaced no more than 8 feet (2.44 meters) on centers. The fabric shall be secured to post by bands or wire ties.

#### 4. Signage

A laminated sign, no smaller than 8.5 X 11 inches, shall be posted on each tree protective device, and at least every 100 linear feet on protective fencing, identifying the following information: Tree & Root Protection Zone, Per City of Austin code (Chapter 25-8, Subchapter B, Article 1) this protective device is to remain in place for the entirety of the development project and illegal removal is subject to fines and work suspensions. Additional information can be obtained at the City Arborist (512-974-1876) web site (<http://www.ci.austin.tx.us/trees>). Zona de Protección del Árbol y las Raíces: el dispositivo protector debe quedarse en el lugar para la totalidad del proyecto de la construcción. Para información adicional, contacta la Arborista Municipal (512) 974-1876 o [http://www.ci.austin.tx.us/trees/trees\\_spanish.htm](http://www.ci.austin.tx.us/trees/trees_spanish.htm).

#### B. Trunk Protection (Limited Application)

When indicated on the drawings or directed by the City Arborist tree trunk protection shall be provided in accordance with City of Austin Standard Details 610S-4 and 610S-5. Tree trunk protection shall consist of any 2 x 4-inch (50 x 100 mm) or 2 x 6-inch (50 x 150 mm) planking or plastic strapping and shall be attached in a manner that does not damage the tree.

#### C. Tree Dressing

Wound treatments should not be used to cover wounds or pruning cuts, except when recommended for disease (see section 610S.4 (H)), insect, mistletoe, or sprout control (from ANSI A300 (Part 1)-2001, section 5.4.1).

#### D. Tree Wells for Raised Grades

When existing grades are raised by more than 4 inches (10.16 cm), the tree root system shall be protected by the installation of tree wells in accordance with City of Austin Standard Detail 610S-6. Native stone or non-toxic timber shall be used for the separator wall of the well and PVC conforming to ASTM D-2729, SDR-35 shall be used for the aeration systems in fill areas.

#### E. Permeable Paving (Environmental Criteria Manual Section 3.5.A.1)

Permeable segmented pavers in conjunction with PVC pipe aeration system or concrete on gravel base with cored holes shall be used to protect existing tree root zones when indicated on the drawings or directed by the City Arborist.

#### F. Fertilizer

Humate/nutrient solutions with mycorrhizae components or soil injection at recommended rates are to be used when appropriate. Construction which will be completed in less than 90 days may use materials at half the recommended rates. Alternative organic fertilizer materials are acceptable when approved by the City Arborist.

#### **610S.4 Construction Methods**

##### **A. Protective Fencing**

All trees and shrubs in the proximity of the construction site shall be carefully checked for damage prior to initiation of the permitted development activity.

All individual or groups of trees, shrubs, and natural areas shown to be protected on the drawings or identified to be protected by the City Arborist, shall be protected during construction with temporary fencing as indicated on the drawings or as directed by the City Arborist.

Protective fences (section 610S.4.A) shall be installed prior to the start of any site preparation work (clearing, grubbing, or grading), and shall be maintained in functioning condition throughout all phases of the construction project.

Protective fence locations in close proximity to intersecting streets or drives shall adhere to the sight distance (Section 1.3.1.C.6) and desirable sight triangle (Figure 1-6 criteria found in the City of Austin Transportation Criteria Manual).

1. Protective fences shall be constructed at the locations (typically the outer limits of the critical root zone) and with materials indicated on the drawings to prevent the following (Environment Criteria Manual, Appendix P-2, Note 6):
  - (a) Soil compaction in the root zone area resulting from vehicular traffic or storage of equipment or materials.
  - (b) Critical root zone disturbances due to grade changes [greater than 4" (10.16 cm) cut or fill] or trenching not reviewed and authorized by the City Arborist.
  - (c) Damage to exposed roots, trunks or limbs by mechanical equipment.
  - (d) Other activities detrimental to trees such as chemical storage, concrete truck cleaning, and fires.
2. Exceptions to the installation of protective fences at the tree drip lines may be permitted in the following cases:
  - (a) Where there is to be an approved grade change, impermeable paving surface, tree well, or other such site development, the fence shall be erected no more than 2 feet (0.6 meters) beyond the area of disturbance unless approved by the City Arborist;
  - (b) When permeable paving is to be installed within a tree's critical root zone, the fence shall be erected at the outer limits of the permeable paving area (prior to any site grading so that this enclosed area is graded separately to minimize root damage);

- (c) When trees are located close to a proposed building or other construction activity (Environment Criteria Manual, Appendix P-2, Note 6.c), the fence shall be erected up to 10 feet (3 meters) to allow work space between the fence and the structure. Apply organic mulch to a depth of 8 inches [30.48 cm] in the unprotected root zone area;
- (d) When there are street-side pedestrian walkways, fences shall be constructed in a manner that does not obstruct safe passage;
- (e) When there are severe space constraints due to tract size or other special requirements, the Contractor shall contact the City Arborist to discuss alternatives.

When any of the exceptions listed above will result in a fence being located closer than five (5) feet (1.5 meters) to a tree trunk, the Contractor shall also protect the trunk with strapped-on planking to a height of 8 feet [2.4 meters] (or to the limits of lower branching) in addition to the fencing requirement (City of Austin Standard Details 610S-4 and 610S-5).

#### B. Pruning and Repair of Damage

Tree pruning, to provide clearance for the work and/or to remove hazards, shall be performed under the direct supervision of a qualified arborist and shall follow standards identified in ANSI A300 (Part 1), "Pruning". A minimum clearance height of eight (8) feet (2.4 meters) above the street level must be provided and maintained for all existing trees if adjacent to a sidewalk. However, if the limbs of trees overhang the curb line or edge of travel lane of any street, a minimum clearance height of fourteen (14) feet (4.2 meters) is required (Transportation Criteria manual section 6.2.3,A, 4, "Clearance Height"). Pruning shall provide the minimum clearance needed to perform the work or remove a hazard unless otherwise directed by the City Arborist to comply with transportation criteria or to mitigate for damage.

If tree damage compromises a tree's structural integrity then the area shall be adequately secured until a qualified arborist makes an assessment of the tree and corrective actions are completed with approval from the City Arborist. Damage to oak trees shall be treated immediately, with consideration for site safety, to reduce the risk of Oak Wilt infection (See 610S.4.H, "Oak Wilt Prevention"). Tree root wounds shall be treated to remove loose, damaged tissue from in and around the wound or if necessary the root shall be cut cleanly and covered with topsoil, or other material approved by the City Arborist, to prevent drying of root tissue and to create a favorable environment for root sprouting. Trunk wounds shall also be treated to remove loose, damaged tissue around the wound. Tree canopy repairs shall be performed in accordance with the most current version of ANSI A300 (Part 1), "Pruning", to prevent further damage to the tree and to promote recovery of the tree to sound condition. The ANSI standard describes proper pruning methods for limb removal and for making finish pruning cuts.

Trees damaged or removed without prior approval or where minimum design criteria is exceeded due to failure to maintain approved tree protection shall be mitigated (Environmental Criteria Manual section 3.5.4, "Mitigation Measures") in accordance with Land Development Code Chapter 25-8, Subchapter B, Article 1.

All trees damaged during construction shall receive an application of fertilizer within the drip line conforming to Standard Specification Item No. 606S, "Fertilizer" at the rate of 4 pounds per caliper inch (.07 kilograms per caliper mm).

C. Cutting and Filling Around Trees

When the depth of an excavation or embankment exceeds 4 inches (10.16 cm) within the critical root zone of any tree with a trunk diameter greater than 8 inches (200 mm), the City Arborist may require a tree well to be constructed per the City of Austin approved specifications and details (Section 610S.3.D and City of Austin Standard Detail 610S-6).

D. Paving Around Trees

Where new paving within the ½ critical root zone of any tree greater than a 8 inches (10.16 cm) diameter is approved, a permeable pavement and aeration system may be required by the City Arborist per the City of Austin Standard Detail (Section 610S.3.E, Environmental Criteria Manual Section 3.5.3.A.1 and Figure 3-8) must be installed as indicated on the Drawings, except for street construction.

E. Tree Removal

Tree removal shall comply with Land Development Code Chapter 25-8, Subchapter B, Article 1. An approved permit, or an approved site plan is required for removal of trees 8" and larger (see Environmental Criteria manual section 3.3.2.A.2 and figure 3-1 for measurement standards) with additional requirements for City Parkland properties and for Hill Country Roadway Corridor sites. Trees 19 inches in diameter and greater are defined as protected trees and require specific review from the City Arborist to approve a permit or site plan for removal. In addition heritage trees require a more extensive evaluation by the City Arborist and may require rulings from boards and commissions.

All trees to be removed shall be performed in a manner that does not damage the canopies, trunks or root systems of remaining trees and that protects all existing facilities, improvements and vegetation. Removal of oak trees shall follow the Oak Wilt Prevention procedures per the City of Austin Standards (Section 610S.4.(H)). All tree material shall be removed from the site unless authorized by the City Arborist or if it will be used as wood chips or mulch.

When a tree or shrub is scheduled for removal, it shall be cut to a maximum depth of 12 inches (30.5 cm) below the surrounding grade (the tree(s) should be removed at grade, and with hand saws, in situations where other tree root systems are present which are to be preserved). When applicable, after tree removal, soil shall be placed in the hole to a depth matching the existing grade.

All damage resulting from tree removal or pruning shall be repaired at the Contractor's own expense and shall follow guidelines in this specification.

F. Final Cleanup

All temporary tree and shrub preservation and protection measures shall be removed when the construction has been completed and any mulch applications shall be removed or reduced to no more than 3 inches (7.62 cm) depth.

G. Root Zone Aeration and Fertilization

As a component of an effective remedial tree care program per Environmental Criteria Manual section 3.5.4, preserved trees within the limits of construction may require soil aeration and supplemental nutrients. Soil and/or foliar analysis should be used to determine the need for supplemental nutrients. The City Arborist may require these analyses as part of a comprehensive tree care plan. Soil pH shall be considered when determining the fertilization composition as soil pH influences the tree's ability to uptake nutrients from the soil. If analyses indicate the need for supplemental nutrients, then humate/nutrient solutions with mycorrhizae components are highly recommended. In addition, soil analysis may be needed to determine if organic material or beneficial microorganisms are needed to improve soil health. Materials and methods are to be approved by the City Arborist (512-974-1876) prior to application. The owner or general contractor shall select a fertilization contractor and ensure coordination with the City Arborist.

Pre-construction treatment should be applied in the appropriate season; ideally the season preceding the proposed construction. Minimally, areas to be treated include the entire critical root zone of trees as depicted on the City approved plans. Treatment should include, but not limited to, fertilization, soil treatment, mulching, and proper pruning.

Post-construction treatment should occur during final revegetation or as determined by a qualified arborist after construction. Construction activities often result in a reduction in soil macro and micro pores and an increase in soil bulk density. To ameliorate the degraded soil conditions, aeration via water and/or air injected into the soil is needed or by other methods as approved by the City Arborist. The proposed nutrient mix specifications and soil and/or foliar analysis results need to be provided to and approved by the City Arborist prior to application (Fax # 512-974-3010). Construction which will be completed in less than 90 days may use materials at ½ recommended rates. Alternative organic fertilizer materials are acceptable when approved by the City Arborist. Within 7 days after fertilization is performed, the contractor shall provide documentation of the work performed to the City Arborist, Planning and Development Review Department, P.O. Box 1088, Austin, TX 78767. This note should be referenced as item #1 in the Sequence of Construction.

#### H. Oak Wilt Prevention Policy

##### 1. Purpose and Scope

The purpose of this Oak Wilt Prevention Policy is to identify measures that city staff and city-hired contractors and their sub-contractors, who perform the services of removing or trimming trees, will take to prevent the spread of oak wilt.

##### 2. Definitions

**Oak Wilt Disease:** A tree disease caused by the fungus, *Ceratocystis fagacearum*. The fungus infects the vascular system of a tree. The vascular system contains vessels which transport moisture throughout the tree. The vessels of an infected tree effectively become blocked by the infection of the fungus, and cannot transport adequate moisture to sustain a healthy or living tree. In most cases, the end result is tree mortality.

##### 3. Prevention Policy

- (a) Prior to beginning field work, all city staff associated with projects involving potential contact with oak trees shall be made aware of the city's official Oak Wilt Policy by receiving and reading a written copy of this policy. Staff receiving a written copy of the policy shall include, but not limited to, project managers, equipment operators responsible for removing or trimming trees, or operators using heavy equipment which could cause wounding of susceptible oaks in the use of the equipment. In addition, individual city departments will provide a written copy of the Oak Wilt Policy to contractors participating in city projects in areas where oak trees are present before initiating field work.
- (b) When possible, city staff and contractors should avoid trimming, pruning, or wounding Live Oaks and Red Oaks (Spanish, Shumard, Texas Red, and Blackjack oaks) from February through June.
- (c) At all times and irrespective of limb size, all cuts and wounds to oak trees shall be dressed immediately using a non-phytotoxic tree wound dressing. Stump cuts and damaged roots (both above and below ground) shall also be dressed.
- (d) Disinfection of pruning tools, saws, and related equipment is mandatory during the trimming or pruning of oak trees. Disinfection of tree removal and trimming equipment shall occur before work begins in a project area, between work in individual oak trees, and again prior to leaving a project area. Acceptable disinfectants include either aerosol disinfectant or a 10 percent bleach-water solution.

\*NOTE: Although this policy would require the disinfection of pruning equipment before and between oak trees as a precaution, research does not substantiate disinfection as a means of preventing the transmission of the oak wilt disease.

#### 4. Disposal Policy

- (a) Chipping or shredding the wood from infected trees to use as mulch is an acceptable means of recycling the wood. Chipping or shredding allows the wood to dry out quickly, thereby killing the fungus.
- (b) Burning diseased wood is an acceptable means of disposal. Burning diseased logs will kill the fungus, and the fungus will not spread with the smoke.
- (c) Logs from diseased Red Oaks, that are not chipped, shredded, or burned shall be disposed of at a landfill.
- (d) Firewood from diseased Red Oak trees shall not be stored near healthy trees where fungal spores or insects that carry the spores have the potential to spread the fungus to healthy trees. It is recommended to store oak firewood under a sheet of clear plastic, tightly sealing the edges of plastic with soil or bricks. Doing so will prevent any spore carrying beetles from escaping and will solarize and heat the stored firewood to speed the drying process. It is also recommended to use

clear plastic, as black plastic will reveal any escape holes to the beetles.

- (e) In situations where diseased Red Oak trees are identified and are not accessible for chipping, shredding, or removal, the trunk of the diseased tree should be girdled, and the stem treated with an appropriate herbicide to deaden the tree and hasten the desiccation and drying of the wood below the minimum moisture content that could support the development of fungal spores.

**610S.5 Measurement**

Tree and shrub pruning, fencing, drains, fertilization, etc. will not be measured for payment unless included as a contract pay item. Tree wells for tree protection will be measured by the units, complete in place, conforming to the Drawings and City of Austin Standard Detail 610S-6, "Tree Protection, Tree Wells".

Removal of existing trees will be measured per each tree.

**610S.6 Payment**

The work and materials prescribed herein with the exception of the Protective Fencing and Tree Well (Tree Protection) will not be paid for directly but shall be included in the unit price bid for the item of construction in which this activity is used, unless a payment item is included as a contract pay item.

Payment will be made under:

|                         |   |                 |
|-------------------------|---|-----------------|
| <b>Pay Item 610S-A:</b> | Protective Fencing Type A Chain Link fence<br>(Typical Application-high damage potential)   | Per Lineal Foot |
| <b>Pay Item 610S-B:</b> | Protective Fencing Type B Wood Fence<br>(Typical Application-high damage potential)         | Per Lineal Foot |
| <b>Pay Item 610S-C:</b> | Protective Fencing Type C Other Materials<br>(Limited Application-minimal damage potential) | Per Lineal Foot |
| <b>Pay Item 610S-D:</b> | Tree Well (Tree Protection)   | Per Each        |
| <b>Pay Item 610S-E:</b> | Tree Trunk Protection, Wood Planking  | Per Each        |
| <b>Pay Item 610S-R:</b> | Removal of Existing Trees   | Per Each        |

**End**

|   |
|---|
| <b>SPECIFIC CROSS REFERENCE MATERIALS</b> |
|---|

|  |
|--|
| <b>Specification Item 610S, "Preservation of Trees and Other Vegetation"</b> |
|--|

City of Austin Standard Specification Items

| <u>Designation</u> | <u>Description</u> |
|--------------------|--------------------|
| Item No. 606S      | Fertilizer         |

City of Austin Standard Details

| <u>Designation</u> | <u>Description</u>                                |
|--------------------|---|
| Item No. 610S-1    | Tree Protection Fence Locations                   |
| Item No. 610S-2    | Tree Protection Fence, Type A, Chainlink          |
| Item No. 610S-3    | Tree Protection Fence, Type B, Wood               |
| Item No. 610S-4    | Tree Protection Fence, Modified Type A, Chainlink |
| Item No. 610S-5    | Tree Protection Fence, Modified Type B, Wood      |
| Item No. 610S-6    | Tree Protection, Tree Wells                       |

City of Austin Transportation Criteria Manual

| <u>Designation</u> | <u>Description</u>       |
|--------------------|--------------------------|
| Section 1.3.1.C.6  | Sight Distance           |
| Section 6.2.3.A.4  | Clearance Height         |
| Figure 1-6         | Desirable Sight Triangle |

City of Austin Environmental Criteria Manual

| <u>Designation</u>    | <u>Description</u>  |
|-----------------------|---|
| Appendix P-2, Note 6  | Exceptions to Installing Fences                                 |
| Appendix P-2, Note 6c | Trees close to proposed buildings-----                          |
| Appendix P-6          | Remedial Tree Care Notes  |
| Section 3.3.2.A.2     | Diameter of trees-----  |
| Section 3.5.0         | Design Criteria   |
| Section 3.5.3.A.1     | Permeable Paving  |
| Figure 3-8            | Example of Minimum Design Criteria Applied to Permeable Parking |

City of Austin Land Development Code

| <u>Designation</u> | <u>Description</u>             |
|--------------------|--------------------------------|
| Section 25-8-603   | Tree Protection Administration |
| Section 25-8-623   | Inspection by City Arborist    |

ASTM, American Society for Testing and Materials

| <u>Designation</u> | <u>Description</u>   |
|--------------------|--|
| D-2729             | Specification for Poly (Vinyl Chloride)<br>(PVC) Sewer Pipe and Fittings |

|  |
|--|
| <b><i>RELATED CROSS REFERENCE MATERIALS</i></b>                  |
| Specification 610S, "Preservation of Trees and Other Vegetation" |

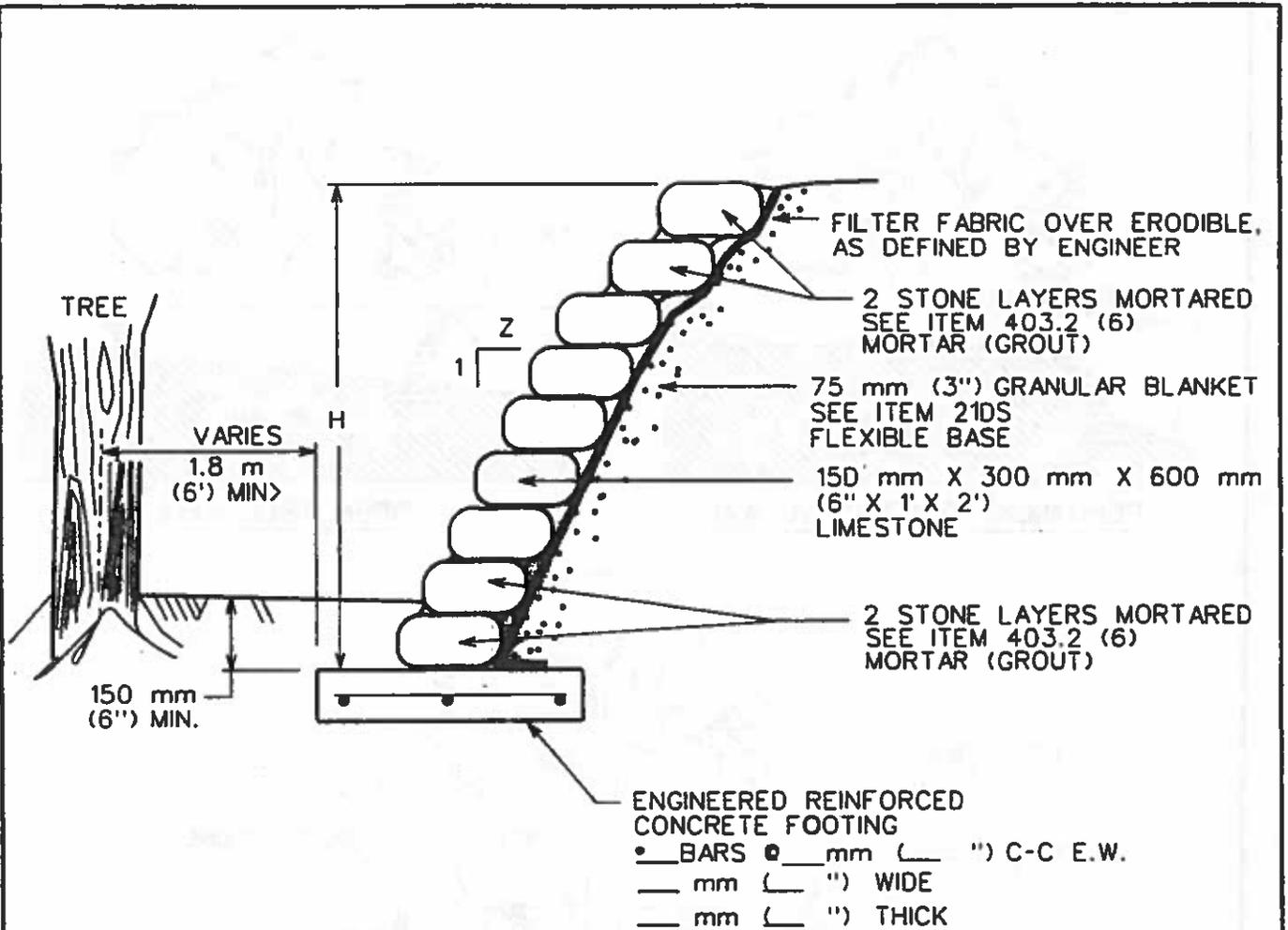
City of Austin Standard Specification Items

| <u>Designation</u> | <u>Description</u>     |
|--------------------|------------------------|
| Item No. 101S      | Preparing Right of Way |
| Item No. 102S      | Clearing and Grubbing  |
| Item No. 111S      | Excavation             |
| Item No. 120S      | Channel Excavation     |
| Item No. 132S      | Embankment             |
| Item No. 608S      | Planting               |

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

| <u>Designation</u> | <u>Description</u>             |
|--------------------|--------------------------------|
| Item No. 100       | Preparing Right of Way         |
| Item No. 110       | Excavation                     |
| Item No. 132       | Embankment                     |
| Item No. 158       | Specialized Excavation Work    |
| Item No. 160       | Furnishing and Placing Topsoil |
| Item No. 166       | Fertilizer                     |
| Item No. 168       | Vegetative Watering            |





THIS STANDARD APPLIES ONLY UNDER THE FOLLOWING CONDITIONS:

- H AND Z ARE SPECIFIED ON THE DRAWING.
- GROUNDWATER IS NO HIGHER THAN THE BOTTOM OF THE FOOTING.
- THE MATERIAL BELOW THE FOOTING IS FIRM AND STABLE.
- THE MATERIAL BEHIND THE WALL HAS A LEVEL SURFACE.
- THE MATERIAL IN FRONT OF THE WALL HAS A SLOPE NO STEEPER THAN 4 HORIZONTAL TO 1 VERTICAL.
- THE FACE OF THE WALL IS NO STEEPER THAN 1 HORIZONTAL TO 2 VERTICAL.
- SURCHARGE LOADS BEHIND THE WALL ARE NO CLOSER THAN DISTANCE H FROM THE TOP OF WALL.

NOTES:

- DESIGN AND CONSTRUCTION OF ROCK WALL SHALL CONFORM TO THE REQUIREMENTS OF CITY CODE 16-7-2, PLACEMENT OF FENCES IN STREET CORNER AREAS, AND THE CITY OF AUSTIN TRANSPORTATION CRITERIA MANUAL FOR MINIMUM SIGHT DISTANCE.
- CONCRETE SHALL CONFORM TO ITEM 4D3S, "CONCRETE FOR STRUCTURES".

CITY OF AUSTIN  
DEPARTMENT OF WATERSHED PROTECTION AND DEVELOPMENT REVIEW

SLOPE PROTECTION AND TREE WELLS

*APRIL 14*

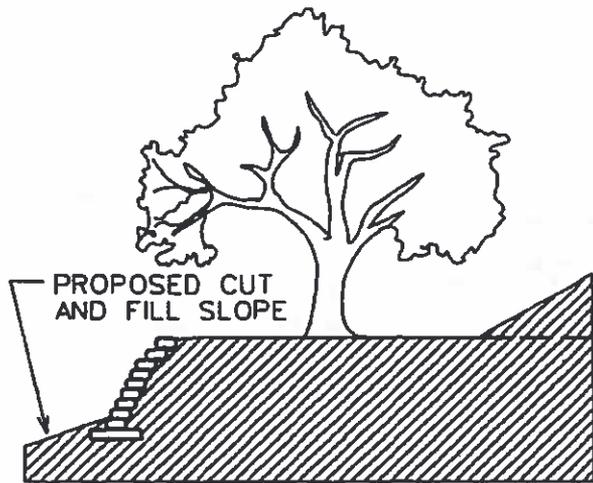
3/13/09  
ADOPTED

THE ARCHITECT/ENGINEER ASSUMES  
RESPONSIBILITY FOR APPROPRIATE USE  
OF THIS STANDARD.

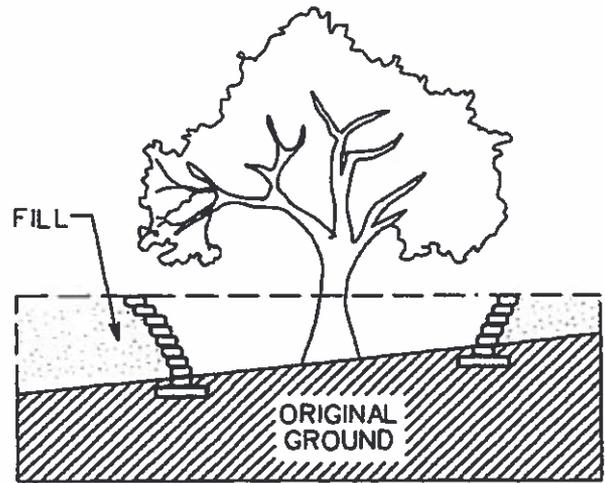
STANDARD NO.

610S-6

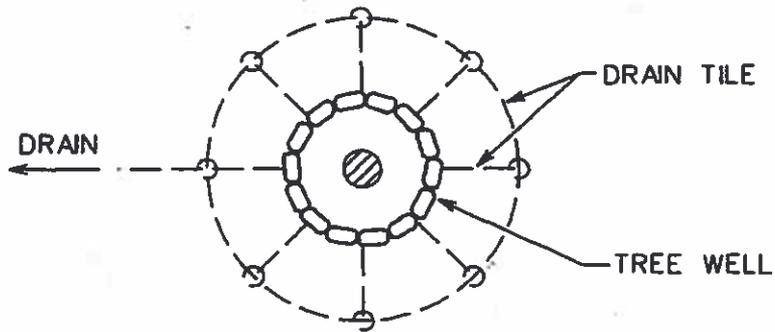
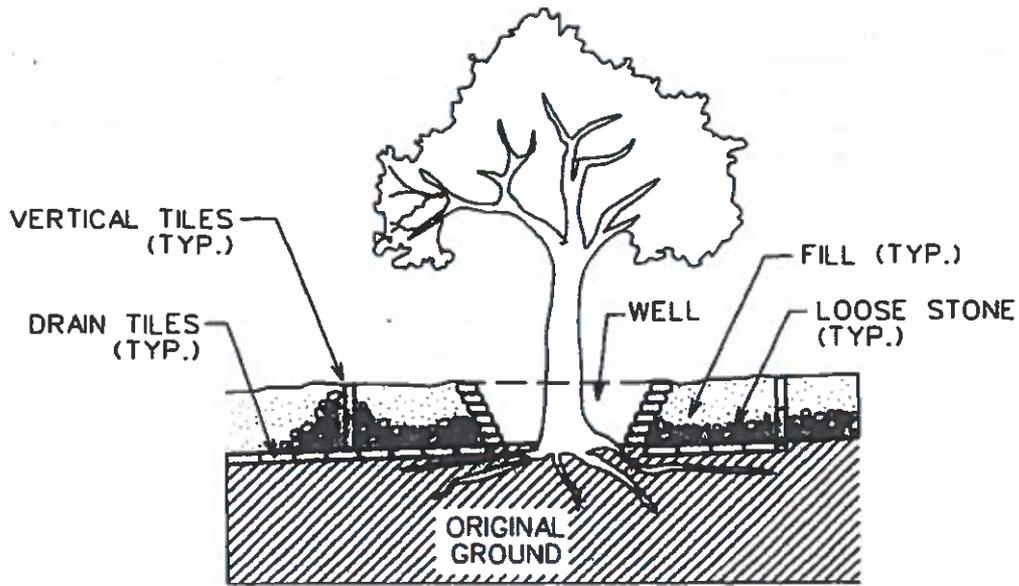
1 OF 2



PERMANENT PROTECTIVE WALL



OPEN TREE WELL



TREE WELL WITH RAISED GRADE

CITY OF AUSTIN  
DEPARTMENT OF WATERSHED PROTECTION AND DEVELOPMENT REVIEW

SLOPE PROTECTION AND TREE WELLS

*A.P.E.I.N. / J.S.*  
3/12/06  
ADOPTED

THE ARCHITECT/ENGINEER ASSUMES  
RESPONSIBILITY FOR APPROPRIATE USE  
OF THIS STANDARD.

STANDARD NO.  
**610S-6**  
2 OF 2

**SPECIAL PROVISION To  
Standard Specification Item 610S (Version 01/04/11)  
Preservation of Trees and Other Vegetation**

These special provisions serve to modify, add to, and/or delete from the City of Austin Standard Technical Specification Item No. 610S: Preservation of trees and other vegetation, dated 1/4/2011. Any item, paragraph, article, or work contained therein unless specifically modified, added to or deleted herein shall apply where applicable.

**610S.3 Materials****D. Tree Wells for Raised Grades**

**ADD** the following sentence to the end of the paragraph:

Installation of tree wells in rocky conditions is considered a premium installation.

**ADD** the following items to the end of the section:

**G. Mulch**

1. Mulch for placement in access routes, storage / staging, and other areas for protection of trees and prevention of rutting, shall be coarsely ground native hardwood mulch.
2. Fresh or partially composted, coarse [greater than ¾ inch (18 mm) average wood particle size] wood-chip mulch from trees is preferred when the objective is to improve soil structure and enhance soil biological activity.
3. Depth and location of mulch should follow ECM: Appendix K, 3.5.2, and 3.5.4.

**610S.4 Construction Methods, B: Pruning and Repair of Damage****B: Pruning and Repair of Damage**

**ADD** the following to the end of the first paragraph:

Trees shall be pruned immediately after installation to remove limbs with the following characteristics: broken, split, dead, dying, diseased, or those causing structural problems. The intent of pruning is to select a central leader. In no case shall more than one-quarter of the branching structure be removed. The normal or natural shape of the plant shall be retained.

**610S.5 Measurement**

**ADD** the following paragraph to the end of the section:

Placement and maintenance of mulch in access roads and storage/staging areas, and removal and re-vegetation post-construction, will not be measured; all work, labor,

**Preservation of Trees and Other Vegetation**

materials and equipment related to placement, maintenance, and removal of mulch will be based on lump sum price bid for the completed installation of mulch. Contractor shall submit a schedule of values related to this pay item.

**610S.6 Pay Items**

ADD the following pay items:

|                              |                                       |          |
|------------------------------|---------------------------------------|----------|
| <b>Pay Item SP 610S-D1</b>   | Tree Well (Tree Protection) Standard  | per each |
| <b>Pay Item SP 610S-D2</b>   | Tree Well (Tree Protection) Premium   | per each |
| <b>Pay Item SP 610S-E:</b>   | Tree Dressing                         | per each |
| <b>Pay Item SP 610S-G:</b>   | Tree Pruning and Damage Repair        | per each |
| <b>Pay Item SP 610S-H:</b>   | Root Zone Aeration for Existing Trees | per S.F. |
| <b>Pay Item SP 610S-R-1:</b> | Removal of trees 4"- 8" caliper       | per each |
| <b>Pay Item SP 610S-R-2:</b> | Removal of trees 9"- 15" caliper      | per each |
| <b>Pay Item SP 610S-R-3:</b> | Removal of trees 16"-20 caliper       | per each |
| <b>Pay Item SP 610S-R-4:</b> | Removal of trees 21"-25" caliper      | per each |
| <b>Pay Item SP 610S-R-5:</b> | Removal of trees 26"+ caliper         | per each |

**End**

**SPECIAL SPECIFICATION 612****Topsoil Mix****612.1 Description**

This item shall govern the furnishing and placing of landscape-grade topsoil mix to depths and areas shown on the Drawings or as directed by the Engineer or designated representative.

**612.2 Submittals**

The submittal requirements of this specification item shall include the test results and soil classification necessary for approval of material as suitable growing medium.

**A. Submittals Required Before Construction**

1. Current (no more than 90 calendar days before date of submittal) lab analysis report from a State of Texas qualified soil analytical laboratory that clearly demonstrates the proposed material is suitable topsoil mix for plant growth as described below. The tests shall include a particle-size analysis (soil texture), percentage of organic matter, pH, nutrient and micronutrient content, as well as indication of deleterious material, and recommendations on amendments. The Owner may also request Solvita® CO<sub>2</sub> burst test and Earthfort Labs tests for bacteria and fungi count.
2. A notarized statement from the producer of the soil attesting that the mix conforms to this specification.
3. A sample (2-gallon) of proposed planting mix shall be submitted to the Owner or their representative 30 calendar days before installation and be approved before installation. Sample should be labeled including type of material, specification number; name, address, and telephone number of manufacturer or supplier; and address of the location of the source or material stockpile.
4. A description of the location, equipment, and method proposed to mix the material.
5. The samples and analysis reports shall be submitted at the same time.

**B. Submittals Required During Construction**

1. Delivery tickets indicating type/product name, source and quantities of imported topsoil mix.
2. Written documentation regarding the soil mixing process, including techniques.

**612.3 Materials**

- A. Topsoil shall consist of material that is clean and friable soil capable of supporting plant life, and is free of stones, weeds, roots, and any other deleterious materials.

- B. Topsoil mix shall be a dark brown to black composted mix with moderate moisture content (40-50% of total weight) of approximately equal proportions of mineral soil and composted yard waste, and inoculated with leaf mold. The topsoil mix shall have been composted together in a static pile for at least 12 months, reaching a temperature of at least 150 degrees for at least 15 days. After composting, the topsoil mix shall be passed through a 3/8-inch screen to remove larger particles.
- C. The mineral soil component of the topsoil shall be an acceptable agricultural, homogeneous material meeting the USDA texture of a loam to sandy loam, with no particles greater than 1/8 inch. High clay content subsoils or soils with redoximorphic features (mottled) are not acceptable.
- D. The compost component shall be well decomposed, stable to very stable, weed-free organic matter source derived from yard trimmings or City approved alternate source. The Carbon/Nitrogen (C/N) ratio shall be less than 25:1 and trace metals test results should "pass". It shall not contain substances toxic to plants and shall not have objectionable odors. It shall not resemble the raw material from which it was derived, and shall be reasonably free of man-made foreign matter.
- E. Mix Parameters:

| Parameters                                 | Optimal Range   | Reported Units      |
|--|---|---------------------|
| pH   | 6.1 – 7.9   | pH units            |
| % O.M. Humus                               | 4.5 – 7.0   | %, dry weight basis |
| EC Salts                                   | < 6.00*   | mmhos/cm            |
| Nitrate (NO <sub>3</sub> )                 | 35 - 90   | lbs/AC              |
| Phosphate (P <sub>2</sub> O <sub>5</sub> ) | 50 - 100  | lbs/AC              |
| Potassium (K) H <sub>2</sub> O             | 75-100 (H <sub>2</sub> O); 80-125 (CO <sub>2</sub> )  | ppm                 |
| Sodium (Na)                                | < 100 (H <sub>2</sub> O); < 175 (CO <sub>2</sub> )    | ppm                 |
| Calcium (Ca) H <sub>2</sub> O              | 60-120 (H <sub>2</sub> O); 300-800 (CO <sub>2</sub> ) | ppm                 |
| Magnesium (Mg) H <sub>2</sub> O            | 13-20 (H <sub>2</sub> O); 60-100 (CO <sub>2</sub> )   | ppm                 |
| Zinc (Zn)                                  | 3-6   | ppm                 |
| Iron (Fe)                                  | 11-21   | ppm                 |
| Manganese (Mn)                             | 10-20   | ppm                 |
| Copper (Cu)                                | 1.2 – 2.4   | ppm                 |

\* Compost-rich soil mixes should have EC Salts <3.00 mmhos/cm when used as topsoil substitute.

**612.4 Construction Methods**

- A. The topsoil mix shall be protected from all sources of contamination, including weed seeds, from the supplier's yard to the project site.
- B. Areas to receive topsoil mix shall be free of construction debris, refuse, and rocks and earth clods over three inches.
- C. The material shall be placed in loose lifts, not to exceed eight inches each lift, and shall be compacted with a water-filled landscape roller. During installation the material shall be protected from other forms of compaction, including equipment and pedestrian traffic, to the extent possible. Storage of construction materials on top of the topsoil mix is prohibited.
- D. Where the proposed planting area is compacted the existing soil shall be tilled to a minimum depth of six inches before installation of the topsoil mix. For compacted areas in the critical root zone of trees, scarify to one inch maximum.
- E. The topsoil mix should not be placed if the ground is muddy, saturated, or frozen.
- F. For work in critical root zones of trees, all work must be done with hand tools (e.g., shovels, rakes).
- G. After placing and grading the soil mix, planting should commence as soon as possible to minimize possibility of erosion or further compaction. Erosion and sedimentation control devices following City of Austin guidelines are required until permanent stabilization is achieved.
- H. To prevent the compaction of salvaged topsoil, the Contractor shall properly sequence all construction activities, including landscape and irrigation installation, before soil placement. The following activities, among others, shall occur before placing salvaged topsoil:
  - Excavation of all tree pits;
    - a. Excavation of all tree, large shrub pits;
    - b. Installation of trees and shrubs larger the 5-gallon size;
    - c. Trenching and installation of subsurface irrigation components;
    - d. Avoid travel across areas of placed topsoil or minimize the number of travel routes, to the extent possible. Heavy vehicles shall not be permitted in these areas.

**612.5 Measurement**

"Topsoil Mix " will be measured by the cubic yard (cubic meter: 1 cubic meter equals 1.196 cubic yards), complete in place, as indicated in the Contract Documents.

**612.6 Payment**

This item will be paid for at the contract unit bid price for "Topsoil Mix." The unit bid price shall include full compensation for all work specified herein, including the furnishing, hauling, placing of all materials; and for all equipment, tools, labor and incidentals necessary to complete the Work.

**Pay Item No. 612-A: Topsoil Mix**

Per Cubic Yard (CY)

**End**



**SPECIAL SPECIFICATION 613****Fencing and Terracing: Protection of soil and vegetation using landscape timber  
(Cedar/Juniper logs)****613.1 Description**

This item shall consist of all materials, labor, and incidentals necessary to perform the work of fence and terrace installation using natural timbers as specified in this section and related documents. These specifications relate to the installation phase, and to the following maintenance phase, as required.

The Specifications indicate and specify a linear based fencing and terracing method, installed as detailed, that will withstand normal weather and overland flow conditions for at least 2 years. Items not specified, but found to be necessary for a complete system, shall be furnished under this Contract.

**A. Scope of Work**

Install a complete fence or terrace system, which will function to hold soil and/or limit human access to restoration areas.

**613.2 Submittals**

The submittal requirements for this specification item shall include:

1. Photograph of timber material to be used for this installation.
2. Letter documenting source of material within 100 mile radius of Austin, TX.

**613.3 Existing Conditions**

- A. Field verify all existing site conditions. By bidding this Work, the Contractor acknowledges that they have satisfied themselves as to the nature of the Work and to the quality of surface and subsurface materials and obstacles insofar as this data is reasonably ascertainable from a site inspection. For example, bedrock and rock present below grade needs to be incorporated into the design so that fence posts are still stable and adequately support the fence. Failure of the Contractor to acquaint themselves with the available information will not relieve their responsibility of proper estimation of the difficulty or cost of successful performance of the Work.
- B. Contractor shall locate all utilities in work area before installation. Any damage to existing utilities occurring during irrigation installation requiring repair or replacement shall be the Contractor's responsibility. This replacement clause extends to existing trees and other landscape materials proposed for preservation.
- C. Fence and terrace layout shall account for slope on a site. Berm timber and fencing should run parallel to (along) slope where possible to avoid aggregating/concentrating flow.

**613.4 Materials**

Provide all equipment and materials necessary to complete work.

**A. Fencing Materials**

1. Fence posts
  - (a) Post material must be either "mountain cedar" (*Juniperus ashei*) or Eastern Red Cedar (*Juniperus virginiana*), native to and collected in Central Texas. It must be approximately 6" in diameter at base and between 6 and 8 feet in length.
2. Fence Rails
  - (a) Rail (cross bar) materials are the same as fence posts but generally span 8 feet between posts.
3. Fasteners
  - (a) Rails are bolted to posts via 10" carriage bolt/washer/nut combinations, depending on material and conditions (thickness, stability, etc). Other methods may be used if they are proposed to and accepted by the project manager.

**B. Timber terraces**

1. Timber soil terrace
  - (a) Same as Fence posts (item 613.4 A1, above).
2. Ground Fasteners
  - (a) Timbers are fastened to the ground material every 3-4' using 1/2" rebar, pounded into the ground at least 12" below grade. If local conditions don't allow for a depth of 12", 1/2" rebar can be used for at least 6" below grade or some other fastening device that affixes the timber terraces to the ground for at least 1 year and can withstand overland flow and submersion in water.

**613.5 Construction/Maintenance Methods**

Provide all construction equipment and methods required to complete work.

**A. System Design and Layout – Timber Fences (See Photos 1-3)**

1. Six foot posts will be placed on 8' centers with diagonal braces every 16' and/or where necessary to support a straight line fence. Holes should be dug with a post-hole digger, as narrow as possible, to fit base of 6" posts, to a depth of 18-24" depending on local conditions, soil, slope, etc. Back fill and tamp with local material not more than 6" at a time. There are two rails between each post, one at 2' above grade the other at the top or 4' above grade, attached by notching the rail and/or the post to fit snugly, and using a 1/2" x 8-10" carriage bolt (with washers and nuts).

**B. System Design and Layout – Single Rail Trail Fences (See Photos 4)**

1. Four foot posts will be placed on 8' centers. Holes should be dug with a post-hole digger, as narrow as possible, to fit base of 6" posts, to a depth of 18-24" depending on local conditions, soil, slope, etc. Back fill and tamp with local material not more than 6" at a time. There is one rail, notched flush with the top of each post, approximately 2 feet above grade. The rail and post are attached by notching one or both to fit snugly, and using a 1/2" x 8-10" carriage bolt (with washers and nuts).

**C. System Design and Layout – Timber Terrace (See Photo 5-6).**

1. Timber terraces are nominally 8' in length X 6' in diameter but can vary depending on application, slope, etc. They are trenched to 1/3 the nominal diameter, and attached to the ground using ½" rebar every 3-4' and at termination of each timber end. Terraces are primarily to hold soil, resist sheet flow, rutting, rills and surface erosion and to limit foot access to restoration areas or beds.

**C. Cleanup**

1. Maintain a clean work area during the progress of the Work within reasonable limits of the installation area. Periodically remove all rubbish, debris, etc., from Work site and dispose of legally.
2. Upon completion of the Work, remove all construction and installation equipment from the premises; make ground surface level where it has been affected and remove excess materials, rubbish and debris.
3. Immediately replace and thoroughly hand water any plant material and groundcover which may be displaced during installation.

**613.6 Measurement**

Work and acceptable material for "Cedar Post Fence/Terrace" will be measured by linear extent (Linear Feet) with all the elements necessary to fulfill the landscape design intent.

**613.7 Payment**

The work performed will be paid for at the unit price bid for "Cedar Post Fence/Terrace", which price shall be full compensation for furnishing all materials and for performing all operations necessary to complete the work.

**613.8 Pay Items**

|   |               |
|---|---------------|
| <b>Pay Item SP 613S-A1: Cedar Log Fence, 6-ft-tall, complete and in place</b> | <b>Per LF</b> |
| <b>Pay Item SP 613S-A2: Cedar Log Fence, 4-ft-tall, complete and in place</b> | <b>Per LF</b> |
| <b>Pay Item SP 613S-A1: Cedar Log Fence, 2-ft-tall, complete and in place</b> | <b>Per LF</b> |
| <b>Pay Item SP 613S-B: Single Rail Trail Fence, complete and in place</b>     | <b>Per LF</b> |
| <b>Pay Item SP 613S-C: Cedar Log Terrace, complete and in place</b>           | <b>Per LF</b> |

Photo 1. Example of Timber cedar fence. Photos used with permission from American Youth Works, Austin, TX (AYW).



Photo 2 and 3. Installation of a top rail, showing notch, join and carriage bolt. Photos used with permission from AYW.



Photo 4. Example of a Single Rail Trail fence. Photo used with permission from AYW.



Photo 4, 5 Installation of Timber/Cedar terrace. Photos used with permission from American YouthWorks, Austin, TX.



END



### 620S.1 Description

This item shall govern the furnishing of materials and for placement of filter fabric as indicated on the Drawings or directed by the Engineer or designated representative. Filter Fabric shall have the capability for allowing the passage of ground water through it without transporting the soil placed around the filter fabric.

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

### 620S.2 Submittals

The submittal requirements of this specification item include:

- A. catalog cuts,
- B. samples of material selected,
- C. testing results,
- D. manufacturer's recommended installation procedures, and
- E. manufacturer certification of compliance with this specification.

### 620S.3 Materials

#### A. General

The fabric shall be constructed exclusively of synthetic thermoplastic fibers and may be either woven or non-woven to form a mat of uniform quality. Fabric fibers may be either continuous or discontinuous and oriented in either a random or an aligned pattern throughout the fabric. The fabric shall be mildew resistant, rot proof and shall be satisfactory for use in a wet soil and aggregate environment. The fabric shall contain ultraviolet stabilizers and shall have non-raveling edges.

#### B. Physical Requirements

The fabric shall meet the requirements of table 1, when sampled and tested in accordance with the methods indicated in the table below.

All material shall be shipped with suitable wrapping to protect the fabric during shipping and storage at the job site.

### 620S.4 Construction Methods

The submittal requirements shall be completed before any materials are ordered.

The "Filter Fabric" shall be installed in accordance with the manufacturer's recommendations, as indicated on the Drawings or as directed by the Engineer or designated representative. When lapping is required, it shall be in accordance with the manufacturer's recommendations. Backfilling around the Filter Fabric shall be done in such a manner that the Filter Fabric material will not be damaged during the placement.

| TABLE 1: FILTER FABRIC REQUIREMENTS   |                                   |  |
|---|-----------------------------------|--|
| Original Physical Properties  | Test Method                       | Requirements   |
| Fabric weight (mass), on an ambient temperature air-dried tension free sample, expressed in oz/ sq. yd (grams/ square meter)  | TxDoT<br>Tex-616-J*               | Underdrains/Slope Stabilization<br>4.0 (135) minimum |
|   |                                   | Gabions and Revet Mattresses<br>6.0 (200) minimum    |
| Water flow rate by falling head method, 7.9 inches (20 cm) to 3.9 inches (10 cm) on 2 inch (50 mm) ID cylinder with 1 inch (25 mm) diameter orifice, with flow rate expressed in gal/sq.ft/minute (liters/square meter/minute). | TxDoT<br>Tex-616-J*               | 80 (3,260) minimum                                   |
| Breaking load in either machine or cross-machine direction, expressed in pounds (newtons)   | ASTM D-1682<br>grab method<br>G** | 100 (445) minimum                                    |
| Equivalent opening size for US Standard (SI) sieves.  | CW-02215                          | 70 to 100<br>(212 to 150 $\mu$ m)                    |
| "Apparent elongation" at breaking load in either machine or cross-machine direction, expressed as percent   | ASTM D-1682<br>grab method<br>G** | 100 maximum  |

\* TxDoT Tex-616-J, "Testing of Construction Fibers"

\*\* ASTM D 1682 grab method G, "Test Methods for Breaking Load and Elongation of Textile Fabrics" as modified by TxDoT Test Method Tex-616-J

\*\*\* CW-02215, US Army Corps of Engineers, Civil Works Construction Guide Specification "Plastic Filter Fabric".

#### 620S.5 Measurement

Work and acceptable material for "Filter Fabric" will be measured by the square yard (square meter: 1 square meter equals 1.196 square yards), complete in place.

#### 620S.6 Payment

The work performed and the materials furnished and measured as provided under "Measurement" will be paid at the unit bid price for "Filter Fabric". The unit bid price, when included in the contract as a pay item, shall include full compensation for all materials, excavation and backfilling and all manipulations, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

Pay Item No. 620S: Filter Fabric

Per Square Yard.

End

#### **SPECIFIC CROSS REFERENCE MATERIALS**

|                                     |
|-------------------------------------|
| Specification 620S, "Filter Fabric" |
|-------------------------------------|

American Society for Testing and Materials (ASTM)

| <u>Designation</u> | <u>Description</u>   |
|--------------------|--|
| D 1682             | Test Methods for Breaking Load and Elongation of Textile Fabrics |

Texas Department of Transportation Manual of Testing Procedures

| <u>Designation</u> | <u>Description</u>              |
|--------------------|---------------------------------|
| Tex-616-J          | Testing of Construction Fabrics |

|  |
|--|
| <b>RELATED CROSS REFERENCE MATERIALS</b> |
|--|

City of Austin Environmental Criteria Manual

| <u>Designation</u> | <u>Description</u> |
|--------------------|--------------------|
| Section 1.4.2.E    | Rock Berm          |

City of Austin Standard Details

| <u>Designation</u> | <u>Description</u> |
|--------------------|--------------------|
| Number 639S-1      | Rock Berm          |

City of Austin Standard Specifications

| <u>Designation</u> | <u>Description</u>                         |
|--------------------|--|
| Item No. 101S      | Preparing Right of Way                     |
| Item No. 102S      | Clearing and Grubbing                      |
| Item No. 111S      | Excavation                                 |
| Item No. 120S      | Channel Excavation                         |
| Item No. 401       | Structural Excavation and Backfill         |
| Item No. 602S      | Sodding for Erosion Control                |
| Item No. 604S      | Seeding for Erosion Control                |
| Item No. 605S      | Soil Retention Blanket                     |
| Item No. 606S      | Fertilizer                                 |
| Item No. 608S      | Planting                                   |
| Item No. 610S      | Preservation of Trees and Other Vegetation |

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

| <u>Designation</u> | <u>Description</u>          |
|--------------------|-----------------------------|
| Item No. 100       | Preparing Right of Way      |
| Item No. 110       | Excavation                  |
| Item No. 132       | Embankment                  |
| Item No. 158       | Specialized Excavation Work |
| Item No. 166       | Fertilizer                  |
| Item No. 168       | Vegetative Watering         |
| Item No. 169       | Soil Retention Blanket      |
| Item No. 204       | Sprinkling                  |



**Item No. 623S**  
**Dry Stack Rock Wall**

**623S.1 Description**

This item shall govern furnishing and placing dry stack gravity rock walls (Environmental Criteria Manual Section 1.8.2.B.6) in conformance with Standard Detail 623S.1 and as herein specified on a prepared subgrade, including the excavation and backfilling for the wall, to the height, lines, grades, details and locations indicated on the Drawings or as established by the Engineer or designated representative.

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

**623S.2 Submittals**

The submittal requirements for this specification item shall include:

- A. Aggregate types, gradations and physical characteristics for the Portland cement concrete mix,
- B. Proposed proportioning of materials for the mortar mix,
- C. Test results for the weathered field limestone,
- D. Aggregate type and gradation scheduled for granular blanket,
- E. Description of filter fabric including characteristics, test data and manufacturer's recommendations for installation

**623S.3 Materials****A. Rock**

Native Rock shall be durable weathered field limestone of suitable quality to ensure permanence in the structure. The stone shall have a wearing loss less than 35 percent when the stone is tested with the Los Angeles Abrasion Machine in accordance with ASTM Test Method C535 (TxDOT Test Method Tex-410A). The loss of material experienced during five cycles of magnesium sulfate exposure conducted in accordance with TxDOT Test Method Tex-411A for Rock RipRap shall not exceed 18 percent.

**B. Concrete**

Concrete for footings shall be Class A Concrete and conform to Standard Specification Item No. 403S, "Concrete for Structures".

**C. Granular Blanket**

Flexible Base aggregate conforming to Standard Specification Item No. 210S, "Flexible Base", shall be used for the granular blanket.

**D. Mortar**

Mortar shall consist of 1 part masonry cement to 3 parts sand by volume, based on dry materials. Mortar which has been mixed longer than 30 minutes or which has developed its initial set shall not be used.

**E. Filter Fabric**

Filter Fabric conforming to Standard Specification Item No. 620S, "Filter Fabric", shall be used for dry stack rock walls constructed in erodible soils.

**623S.4 Construction Methods**

Dry Stack Rock Wall shall be constructed in horizontal courses, on the prepared and compacted subgrade, granular blanket or concrete foundation as indicated on the Drawings and Standard Detail 623S.1. The horizontal and vertical joints of the two lower and upper stone layers shall be mortared. The remaining horizontal and vertical joints shall be dry or mortared as indicated on the Drawings.

**623S.5 Measurement**

Acceptable work performed as prescribed by this item will be measured by the square foot (square meter: 1 square meter is equal to 10.764 square feet) of finished sloping face. Separate measurement will not be made for backfill, footing or the removal of existing mortared rock walls, and these items shall be included in the unit price bid for the item bids.

**623S.6 Payment**

Work performed and materials furnished or prescribed by this item and measured as provided under "Measurement" will be paid for at the unit bid price per square foot for "Dry Stack Rock Wall". The unit bid price shall include full compensation for: furnishing all materials, completing all excavation including existing mortared rock walls, constructing the footings, backfilling behind the wall and providing all equipment, tools, labor and incidentals necessary to complete the work.

Payment will be made under:

**Pay Item No. 623S: Dry Stack Rock Wall - Per Square Foot.**

**End**

|   |
|---|
| <b>SPECIFIC CROSS REFERENCE MATERIALS</b> |
| Specification 623S, "Dry Stack Rock Wall" |

City of Austin Environmental Criteria Manual

| <u>Designation</u> | <u>Description</u>     |
|--------------------|------------------------|
| Section 1.8.2.B.6  | Construction on Slopes |

City of Austin Standard Specifications

| <u>Designation</u> | <u>Description</u>      |
|--------------------|-------------------------|
| Item No. 403S      | Concrete for Structures |
| Item No. 210S      | Flexible Base           |
| Item No. 620S      | Filter Fabric           |

Texas Department of Transportation: Manual of Testing Procedures

| <u>Designation</u> | <u>Description</u>   |
|--------------------|--|
| 410-A              | Abrasion of Coarse Aggregate Using The Los Angeles Machine           |
| 411-A              | Soundness of Aggregate By Use of Sodium Sulfate or Magnesium Sulfate |

American Society for Testing and Materials (ASTM)

| <u>Designation</u> | <u>Description</u>   |
|--------------------|--|
| C-535              | Standard Test Method for Resistance of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine |

|  |
|--|
| <b>RELATED CROSS REFERENCE MATERIALS</b> |
|--|

City of Austin Standard Specifications

| <u>Designation</u> | <u>Description</u>                         |
|--------------------|--|
| Item No. 101S      | Preparing Right of Way                     |
| Item No. 102S      | Clearing and Grubbing                      |
| Item No. 111S      | Excavation                                 |
| Item No. 120S      | Channel Excavation                         |
| Item No. 132S      | Embankment                                 |
| Item No. 606S      | Fertilizer                                 |
| Item No. 608S      | Planting                                   |
| Item No. 610S      | Preservation of Trees and Other Vegetation |

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

| <u>Designation</u> | <u>Description</u>          |
|--------------------|-----------------------------|
| Item No. 100       | Preparing Right of Way      |
| Item No. 110       | Excavation                  |
| Item No. 132       | Embankment                  |
| Item No. 158       | Specialized Excavation Work |
| Item No. 166       | Fertilizer                  |
| Item No. 168       | Vegetative Watering         |
| Item No. 169       | Soil Retention Blanket      |
| Item No. 204       | Sprinkling                  |



**SPECIAL PROVISION TO**

**Standard Specification Item No. 623S, Dry Stack Rock Wall (Version 02-24-10)**

For this contract, Item No. 623S Dry Stack Rock Wall of the City of Austin Standard Technical Specifications is hereby amended with respect to the clauses cited below. No other clauses or requirements of this Section of the City of Austin Standard Specifications are waived or changed.

For this project, Articles 623S.2 Submittals, 623S.3 Materials, 623S.4 Construction Methods, and 623S.6 Payment shall be amended as follows:

**623S.2 Submittals**

**DELETE** this section in its entirety and **REPLACE** with the following:

The Owner shall provide the Contractor with all details for any concrete footing, rock, and mortar mix. Rock walls shall not exceed four feet in height.

**A. Rock:** Contractor shall provide the source and photos of rock specified by Owner. Photos shall clearly and accurately characterize the size, shape, and colors of the rocks. Owner may request a sample for approval of quality assurance.

**623S.3 Materials**

**A. Rock**

**ADD** the following to the beginning of the paragraph:

For the purposes of this contract, the size of limestone rock to be used for construction is assumed to range from six inches to eight inches in depth and height, and is flat on top and bottom allowing for easy mortar-less stacking.

**623S.4 Construction Methods**

**ADD** the following to the end of the section:

For the purposes of this contract, a "standard" installation shall conform to industry standard practices and conditions (e.g., soil with minimal rock) per City Standard Specification 623S and Standard Detail 623S.1. "Premium" installation may involve extraordinary site conditions (e.g., rocky soil) or other unusual conditions as agreed to by the Owner and the Contractor which hinders the use of standard practices, requiring the use of greater than typical amounts of labor or employment of special equipment in this activity.

**Dry Stack Rock Wall**

**623S.6 Payment**

**DELETE** the following pay items:

**Pay Item No. 623S:** Dry Stack Rock Wall

Per Square Foot.

**ADD** the following pay items:

**Pay Item SP 623S-A:** Dry Stack Rock Wall, Standard

Per Square Foot.

**Pay Item SP 623S-B:** Dry Stack Rock Wall, Premium

Per Square Foot.

**Item No. 627S**  
**Grass-Lined Swale**

**627S.1 Description**

This item governs natural or constructed drainage ways of parabolic or trapezoidal cross section that are located below adjacent ground level and is stabilized by suitable vegetation (Environmental Criteria Manual Section 1.4.3.B). The flow is normally wide and shallow and conveys the runoff down the slope.

A grass-lined swale shall be used when it is necessary to convey runoff only without causing erosion. In cases where there is base flow involved, it shall be handled by the addition of a subsurface drain or a stone or gabion mattress lined low flow channel to the grass-lined swale.

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

**627S.2 Submittals**

The submittal requirements for this specification item shall include:

- A. The submittal requirements (if necessary) for Standard Specification Item Numbers 594S, "Gabions and Revet Mattresses", 602S, "Sodding for Erosion Control", 604S, "Seeding for Erosion Control" and 605S, "Soil retention Blanket".
- B. Aggregate types, gradations, and physical characteristics for the Portland Cement Concrete mix,

**627S.3 Materials**

A. Grass-lined Swale

1 Seed and Mulch

Seed and mulch shall conform to Item No. 604S, "Seeding for Erosion Control".

2 Sod

Sodding shall conform to Item No. 602S, "Sodding for Erosion Control".

3 Soil Retention Blanket

The soil retention blanket shall conform to Standard Specification Item No. 605S, "Soil Retention Blanket".

**627S.4 Construction Methods**

Except as indicated on the Drawings or directed by the Engineer or designated representative, all trees, brush, stumps, obstructions and other objectionable material shall be removed and disposed of so as not to interfere with the proper functioning of the waterway.

The waterway shall be excavated or shaped to line, grade, typical sections, and cross-section indicated on the Drawings and shall be free of bank projections or other irregularities, which could impede normal flow.

Fill shall conform to Standard Specification Item No. 132S, "Embankment".

All soil and materials not needed to complete the swale shall be removed.

**627S.5 Measurement**

Acceptable work performed as prescribed by this item shall be measured by lineal feet (lineal meters: 1 lineal meter equals 3.281 lineal feet) along the centerline of the stone center "pilot" channel.

**627S.6 Payment**

Work performed and materials furnished for this item shall be paid at the unit bid price per lineal foot.

Payment will be made under:

|   |            |
|---|------------|
| <b>Pay Item No. 627S-GSS: Grass-Lined Swale</b> | <b>Per</b> |
| Lineal Foot                                     |            |

**End**

|   |
|---|
| <b>SPECIFIC CROSS REFERENCE MATERIALS</b>                                       |
| Specification 627S, "Grass-Lined Swale and Grass-Lined Swale with Stone Center" |

**City of Austin Environmental Criteria Manual**

| Designation       | Description                                 |
|-------------------|---|
| Section 1.4.4.B.4 | Permanent Erosion and Sedimentation Control |
| Section 1.4.6.B   | Standards for Grass-Lined Swales            |

**City of Austin Standard Specifications**

| Designation   | Description                  |
|---------------|------------------------------|
| Item No. 132S | Embankment                   |
| Item No. 403S | Concrete for Structures      |
| Item No. 594S | Gabions and Revet Mattresses |
| Item No. 602S | Sodding for Erosion Control  |
| Item No. 604S | Seeding for Erosion Control  |
| Item No. 605S | Soil Retention Blanket       |

**City of Austin Standard Details**

| Designation | Description       |
|-------------|-------------------|
| No. 627S-1  | Grass-Lined Swale |

**RELATED CROSS REFERENCE MATERIALS****Specification 627S, "Grass-Lined Swale "****City of Austin Standard Specifications**

| <b>Designation</b> | <b>Description</b>     |
|--------------------|------------------------|
| Item No. 101S      | Preparing Right of Way |
| Item No. 102S      | Clearing and Grubbing  |
| Item No. 111S      | Excavation             |

*Item No. 120S                      Channel Excavation*

|               |  |
|---------------|--|
| Item No. 401  | Structural Excavation and Backfill         |
| Item No. 404S | Pneumatically Placed Concrete              |
| Item No. 406  | Reinforcing Steel                          |
| Item No. 408  | Concrete Joint Material                    |
| Item No. 410  | Concrete Structures                        |
| Item No. 606S | Fertilizer                                 |
| Item No. 608S | Planting                                   |
| Item No. 610S | Preservation of Trees and Other Vegetation |
| Item No. 620S | Filter Fabric                              |

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

| <b><u>Designation</u></b> | <b><u>Description</u></b>   |
|---------------------------|-----------------------------|
| Item No. 100              | Preparing Right of Way      |
| Item No. 110              | Excavation                  |
| Item No. 132              | Embankment                  |
| Item No. 158              | Specialized Excavation Work |
| Item No. 166              | Fertilizer                  |
| Item No. 168              | Vegetative Watering         |
| Item No. 169              | Soil Retention Blanket      |
| Item No. 204              | Sprinkling                  |



Item No. 633S  
Landgrading

**633S.1 Description**

This item shall govern reshaping the existing topography in accordance with the Drawings and Standard Detail 633S-1, "Landgrading". The purpose of landgrading is to provide for erosion control and vegetation establishment on those areas where the existing topography is to be reshaped by grading.

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

**633S.2 Submittals**

The submittal requirements for this specification item shall include:

- A. Sediment control plan
- B. Seeding plan including:
  - 1. Identification of the type, source, mixture, pure live seed (PLS) and rate of application of the seeding,
  - 2. Type of mulch,
  - 3. Type of tacking agent, and
  - 4. Type and rate of application of fertilizer.

**633S.3 Materials**

- A. Seeding
  - Seeding shall conform to Item No. 604S, "Seeding for Erosion Control".
- B. Pipe Underdrains
  - Pipe underdrains shall conform to Item No. 551, "Pipe Underdrains".

**633S.4 Construction Methods**

All sediment control practices and measures shall be constructed and in place before proceeding with the construction of "Landgrading". The sediment control practices and measures shall be maintained in accordance with the sediment control plan. Topsoil and fill materials, which are stripped for the establishment of vegetation, shall be stockpiled in amounts necessary to complete finished grading of all exposed areas. Temporary stockpiles, borrow areas and permitted spoil areas shall be shown on the Drawings and no other areas shall be used for these purposes. Cleared areas, that are to receive fill materials, shall be grubbed to remove trees, vegetation, roots and other objectionable material as required by Standard Specification Item No. 102S, "Clearing and Grubbing". Seeps or springs encountered during construction shall be intercepted and diverted to a

pipe underdrain conforming to Standard Specification Item No. 551, "Pipe Underdrains" and Standard Detail No. 551-1.

Except for approved landfills, fill material shall be free of brush, rubbish, rocks, logs, stumps, building debris and other objectionable materials that would interfere with or prevent construction of satisfactory fills. All fills shall be compacted as required by the Drawings and Standard Detail 633S-1 to reduce erosion, slippage, settlement, subsidence or other related problems. Fill intended to support buildings, structures and conduits, etc., shall be compacted in accordance with Standard Specification Item No. 132S, "Embankment". All graded areas shall be permanently stabilized and seeded immediately following finished grading.

**633S.5 Measurement**

Acceptable work performed as prescribed by this item will be measured by either square feet (square meters: 1 square meter equals 1.196 square feet) or acres (hectares; 1 hectare equals 2.471 acres) of the area to be graded, which will include stabilization and groundcover re-establishment.

**633S.6 Payment**

Work performed and material furnished for this item will be paid for at the unit bid price per square foot or acre of the area graded. Pipe Underdrains, when required, will be paid for in accordance with Item No. 551, "Pipe Underdrains".

Payment will be made under:

|                             |             |                  |
|-----------------------------|-------------|------------------|
| <b>Pay Item No. 633S-A:</b> | Landgrading | Per Square Foot. |
| <b>Pay Item No. 633S-B:</b> | Landgrading | Per Acre.        |

End

|  |
|--|
| <b><i>SPECIFIC CROSS REFERENCE MATERIALS</i></b> |
| Specification 633S, "Landgrading (LG) "          |

City of Austin Standard Details

| <u>Designation</u> | <u>Description</u> |
|--------------------|--------------------|
| Number 633S-1      | Landgrading        |

City of Austin Standard Specifications

| <u>Designation</u> | <u>Description</u>          |
|--------------------|-----------------------------|
| Item No. 102S      | Clearing and Grubbing       |
| Item No. 132S      | Embankment                  |
| Item No. 551       | Pipe Underdrains            |
| Item No. 604S      | Seeding for Erosion Control |

|   |
|---|
| <b><i>RELATED</i> CROSS REFERENCE MATERIALS</b> |
| Specification 633S, "Landgrading (LG) "         |

City of Austin Standard Specifications

| <u>Designation</u> | <u>Description</u>                         |
|--------------------|--|
| Item No. 101S      | Preparing Right of Way                     |
| Item No. 111S      | Excavation                                 |
| Item No. 120S      | Channel Excavation                         |
| Item No. 602S      | Sodding for Erosion Control                |
| Item No. 605S      | Soil Retention Blanket                     |
| Item No. 606S      | Fertilizer                                 |
| Item No. 608S      | Planting                                   |
| Item No. 610S      | Preservation of Trees and Other Vegetation |
| Item No. 620S      | Filter Fabric                              |

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

| <u>Designation</u> | <u>Description</u>          |
|--------------------|-----------------------------|
| Item No. 100       | Preparing Right of Way      |
| Item No. 110       | Excavation                  |
| Item No. 132       | Embankment                  |
| Item No. 158       | Specialized Excavation Work |
| Item No. 166       | Fertilizer                  |
| Item No. 168       | Vegetative Watering         |
| Item No. 169       | Soil Retention Blanket      |
| Item No. 204       | Sprinkling                  |



**ITEM NO. 640S  
MORTARED ROCK WALL****640S.1 Description**

This item shall govern the construction of mortared rock walls, as herein specified, on a prepared subgrade, including furnishing the stone, mortar and other related materials to construct walls, the excavation and backfilling the wall, removal of any old structure or portions thereof encountered, disposal of surplus excavated material and the completion Mortared Rock Walls as indicated on 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, the inch-pound units are given preference followed by SI units shown within parentheses.

**640S.2 Submittals**

The submittal requirements for this specification item shall include:

- A. Details concerning the p.c. concrete footing including dimensions of the footing, the p.c. concrete mix design, steel reinforcement, etc.
- B. Source, type and gradation of rock
- C. Mortar mix design.

**640S.3 Materials****A. Rock:**

All types used shall be native limestone suitable for horizontal course type construction. The size of rock to be used for construction shall be as indicated on the Drawings, but may vary as approved by the Engineer or designated representative.

- B. Portland Cement: ASTM C 150, Type I
- C. Masonry Cement: ASTM C 91
- D. Sand: ASTM C 144, Natural
- E. Water: Free from matter that could impair suitability for use in mortar
- F. Hydrated Lime: ASTM C 207, Type S
- G. Mortar:

Mortar shall be composed of 1 part Portland Cement, 1 part hydrated lime and 6 parts sand (by volume) and water. Mortar shall have a consistency that insures that it can be easily spread by a trowel. An alternate mix composed of 1 part masonry cement and 3 parts sand may be used. The sand shall be measured damp and loose.

**640S.4 Construction Methods**

Stone shall be laid plumb, level or true to a line. All stone shall be laid in a full bed of mortar with head joints and edge joints completely filled. The face shall be aligned or exposed as

indicated on the Drawings. Exterior joints that will remain exposed shall be finished in a manner approved by the Engineer or designated representative.

In hot weather, stone work shall be kept moist until the mortar has set. No mortar work will be done when the temperature is below 40°F (4°C) in the shade and all work may be suspended during freezing or undesirable weather. The mortar materials shall be mixed mechanically for not less than 5 minutes after all ingredients are in the mixer. Mortar that has begun to set or that has been mixed for more than 2 hours shall not be used.

Spalls may be used in partially filling the large voids, provided they are keyed in properly and are well coated with mortar. All finished rockwork shall be protected from damage. Chipped rockwork, that will remain exposed, shall be satisfactorily repaired or replaced.

Mortared rock walls shall consist of courses or layers of rock with the spaces between them filled with mortar and shall be constructed at such places as indicated on the Drawings or as directed by the Engineer or designated representative, in accordance with these specifications and in conformity with the lines, grades, height, depth and other details shown on the pertinent typical sections.

Excavation and concrete footings for mortared rock walls shall not be paid for directly, but shall be included in the unit price bid for mortared rock wall construction.

Prior to placing any material, the footings shall have been placed by the Contractor as part of this contract to the approved line and grade and allowed at least 36 hours curing time. The rock shall then be thoroughly wet and bedded in 1 inch (25 mm) of mortar placed on the footings, one against the other, with the resulting voids being completely filled with mortar. The finished surface shall be even and level.

**640S.5 Measurement**

Mortared rock wall will be measured by the square foot (square meter: 1 square meter equals 10.76 square feet) of the outside, vertical face of wall. No measurement will be made for concrete footing and shall be included in the unit price bid for the rock wall construction.

**640S.6 Payment**

Mortared rock wall acceptably completed will be paid for at the contract unit bid price per square foot. The unit bid price shall include full compensation for furnishing all materials, for excavation, and backfill, for all forming, transporting, placing, finishing and for all equipment, tools, labor and incidentals necessary to place mortared rock wall on concrete footing as specified and indicated on the Drawings.

Payment will be made under:

**Pay Item No. 640S: Mortared Rock Wall Per Square Foot.**

End

|  |  |
|--|--|
| <b><u>SPECIFIC</u> CROSS REFERENCE MATERIALS</b> |  |
| Specification 640S, "Mortared Rock Wall"         |  |

**American Society for Testing and Materials, ASTM**

**Designation**

**Description**

- C 91 Specification for Masonry Cement
- C 144 Specification for Aggregate for Masonry
- C 150 Specification for Portland Cement
- C 207 Specification for Hydrated Lime for Masonry

|   |
|---|
| <b><u>RELATED</u> CROSS REFERENCE MATERIALS</b> |
| Specification 640S, "Mortared Rock Wall"        |

**City of Austin Standard Specifications**

| Designation   | Description                                |
|---------------|--|
| Item No. 101S | Preparing Right-of-Way                     |
| Item No. 102S | Clearing and Grubbing                      |
| Item No. 111S | Excavation                                 |
| Item No. 401  | Structural Excavation and Backfill         |
| Item No. 403S | Concrete for Structures                    |
| Item No. 405  | Concrete Admixtures                        |
| Item No. 406  | Reinforcing Steel                          |
| Item No. 606S | Fertilizer                                 |
| Item No. 608S | Planting                                   |
| Item No. 610S | Preservation of Trees and Other Vegetation |
| Item No. 620S | Filter Fabric                              |

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

| Designation  | Description                 |
|--------------|-----------------------------|
| Item No. 100 | Preparing Right-of-Way      |
| Item No. 110 | Excavation                  |
| Item No. 132 | Embankment                  |
| Item No. 158 | Specialized Excavation Work |



**Mortared Rock Wall**

**SPECIAL PROVISION TO**

**Standard Specification Item No. 640S, Mortared Rock Wall (Version 02/24/10)**

For this contract, Item No. 640S Mortared Rock Wall of the City of Austin Standard Technical Specifications is hereby amended with respect to the clauses cited below. No other clauses or requirements of this Section of the City of Austin Standard Specifications are waived or changed.

For this project, Articles 640S.2 Submittals, 640S.3 Materials, 640S.4 Construction Methods, and 640S.6 Payment shall be amended as follows:

**640S.2 Submittals**

**DELETE** this section in its entirety and **REPLACE** with the following:

The Owner shall provide the Contractor with all details for any concrete footing, rock, and mortar mix. Rock walls shall not exceed four feet in height.

**A. Rock:** Contractor shall provide the source and photos of rock specified by Owner. Photos shall clearly and accurately characterize the size, shape, and colors of the rocks. Owner may request a sample for approval of quality assurance.

**640S.3 Materials**

**A. Rock**

**DELETE** the second sentence and **REPLACE** with the following:

For the purposes of this contract, the size of limestone rock to be used for construction is assumed to be six inches to eight inches in depth and height.

**640S.4 Construction Methods**

**ADD** the following to the end of the section:

For the purposes of this contract, a "standard" installation shall conform to industry standard practices and conditions (e.g., soil with minimal rock) per City Standard Specification 640S. "Premium" installation may involve extraordinary site conditions (e.g., rocky soil) or other unusual conditions as agreed to by the Owner and the Contractor which hinders the use of standard practices, requiring the use of greater than typical amounts of labor or employment of special equipment in this activity.

**SPECIAL PROVISION**

**SP640S**

**Mortared Rock Wall**

**640S.6 Payment**

**DELETE** the following pay items:

**Pay Item 640S: Mortared Rock Wall**

**Per Square Foot.**

**ADD** the following pay items:

**Pay Item SP 640S-A: Mortared Rock Wall, Standard**

**Per Square Foot.**

**Pay Item SP 640S-B: Mortared Rock Wall, Premium**

**Per Square Foot.**

**ITEM NO. 648S  
MULCH SOCK**

**648S.1 Description**

A Mulch sock consists of material encased in a tube of mesh. It is used to intercept, settle, and filter sheet flow and pond runoff. Mulch socks provide an environmentally sensitive and cost-effective alternative to sediment fences.

**648S.2 Submittals**

The submittal requirements for this specification item shall include the following:

**A. Mulch Material**

1. A small sample of mulch material proposed to be used on the site will be provided to the engineer.
2. Provide a designated project stockpile of mulch for sampling and testing at the producer's site.
3. A copy of the lab analysis, performed by an STA-certified lab, verifying that the mulch material meets the requirements of Table 1.

| Table 1                |                            |  |
|------------------------|----------------------------|--|
| Item                   | Requirement                | Reference Specification  |
| Particle Size          | 3" minus screening process | Equivalent to TXDOT item 161, Compost, Section 1.6.2.B, Wood Chip requirements |
| pH                     | 5.5 – 8.5                  | TMECC 04. 11-A, "1.5 Slurry pH"  |
| Organic Matter Content | 25%, dry weight basis      | TMECC 05.07-A, "Loss-On-Ignition Organic Matter Method"                        |

**B. Tube Material**

The CONTRACTOR shall submit a sample of the material that the CONTRACTOR proposes to use on the project. A sample of the material should be accompanied by material data sheet identifying composition, ability of the material to biodegrade, and size of openings in tube at a minimum.

### **648S.3 Materials**

- A. Mulching material can be manufactured on or off the project site and may consist of:
  - 1. Shredded bark
  - 2. Stump grindings
  - 3. Composted bark
- B. The mulch shall have the following composition:
  - 1. Wood chips shall be produced from a 3-inch minus screening process (equivalent to TxDOT item 161, Compost, Section 1.6.2.B Wood Chip Requirements).
  - 2. Large portions of silts, clays, or fine sands are not acceptable.
  - 3. The pH of the mulch shall be between 5.5 and 8.5.
  - 4. The organic matter content shall be greater than or equal to 25% on a dry weight basis.
- C. Mulch material must be free of refuse, physical contaminants, and material toxic to plant growth. It is not acceptable for the mulch material to contain ground construction debris, biosolids, manure, or recyclable material.
- D. Prior to placement, a representative sample of the mulching material must be tested and certified by the project engineer or his/her designee and accepted by the city inspector.
- E. "Sock" material will be 100% biodegradable, photodegradable, or recyclable such as burlap, twine, UV photodegradable plastic, polyester, or any other acceptable material. The material mesh opening should be equal to or less than 3/8 inch (10 mm) and the material tensile strength should be equal to or greater than 44 psi (3.09 kg/cm<sup>2</sup>).

### **648S.4 Installation**

- A. Use 12 or 18 inch diameter mulch socks for all sediment control applications. This diameter of mulch sock material has proven to be the most consistent for all sediment control applications (TxDOT, April 2006).
- B. Install mulch socks per Figure 1.4.5.F in the City of Austin Environmental Criteria Manual.

- C. Mulch socks should be used at the base of slopes no steeper than 2:1 and should not exceed the maximum spacing criteria provided in the following table.

| Slope        | Max. Slope Length Between<br>18 in. Dia. Sock (ft) | Max. Drainage Area (sf)<br>per 100ft of Sock |
|--------------|--|--|
| 100:1 - 50:1 | 100  | 10,000                                       |
| 50:1 - 30:1  | 75   | 7,500  |
| 30:1 - 25:1  | 65   | 6,500  |
| 25:1 - 20:1  | 50   | 4,800  |
| 20:1 - 10:1  | 25   | 2,600  |
| 10:1 - 5:1   | 15   | 1,300  |
| 5:1 - 2:1    | 10   | 1,000  |

| Slope        | Max. Slope Length Between<br>12 in. Dia. Sock (ft) | Max. Drainage Area (sf)<br>per 100ft of Sock |
|--------------|--|--|
| 100:1 - 50:1 | 100  | 6,000  |
| 50:1 - 30:1  | 40   | 4,000  |
| 30:1 - 25:1  | 30   | 3,000  |
| 25:1 - 20:1  | 25   | 2,600  |
| 20:1 - 10:1  | 15   | 1,300  |
| 10:1 - 5:1   | 10   | 1,000  |
| 5:1 - 2:1    | 5  | 500  |

- D. Place mulch socks at a 5 ft or greater distance away from the toe of the slopes to maximize space available for sediment deposition.
- E. When placed on level contours, sheet flow of water should be perpendicular to the mulch sock at impact and unconcentrated.
- F. Install mulch socks using rebar (#5 minimum with safety caps) a minimum of 48 inches in length placed on 2-ft centers. In order to prevent the movement or floating of the mulch sock during rain events or construction operations, install steel posts on alternating sides of the sock. Drive the posts into the ground to a minimum depth of 24 inches, leaving less than 12 inches of post above the exposed mulch sock.
- G. In order to prevent water flowing around the ends of the mulch socks, point the ends of the socks up slope.
- H. In order to prevent water from flowing between the gaps at adjacent ends of mulch socks, overlap the ends of adjacent mulch socks a minimum of 12 inches. Never stack mulch socks on top of one another.
- I. Mulch Socks should be placed using 'smiles' and 'j-hooks'. See ECM Section 1.4.5 G (Silt Fence)
- J. For steeper slopes, an additional mulch sock can be constructed on the top of the slope and within the slope area as determined by specific field conditions. Multiple mulch socks are recommended on steeper slopes.

- K. Do not use mulch socks in areas of concentrated flow as they are intended to control sheet flow only.

**648S.5 Inspection and Maintenance**

- A. Inspect mulch socks after installation for gaps under the mulch socks and for gaps between the joints of adjacent ends of mulch socks. Contractor shall repair gaps such that no water flows under or around sock.
- B. Inspect every seven days and within 24 hours of a rainfall event of 0.5 inches or greater. Replace and repair mulch socks as necessary.
- C. Sediment retained by the mulch socks shall be removed when it has reached one third of the exposed height of the mulch socks.
- D. Mulch socks can be vegetated or un-vegetated. Vegetated mulch socks can be left in place. The vegetation will grow in the slope, further anchoring the sock.

**648S.6 Payment**

The work performed and the materials furnished as prescribed by this item shall be paid for by the linear foot of mulch sock installed.

Payment will be made under:

|                           |                   |                         |
|---------------------------|-------------------|-------------------------|
| <b>Pay Item No. 648S:</b> | <b>Mulch Sock</b> | <b>Per Lineal Foot.</b> |
|---------------------------|-------------------|-------------------------|

**END**

|  |
|--|
| <b><i>SPECIFIC CROSS REFERENCE MATERIALS</i></b> |
| Specification Item No. 648S, "Mulch Sock"        |

City of Austin Environmental Criteria Manual

| <u>Designation</u> | <u>Description</u> |
|--------------------|--------------------|
| 1.4.5.F            | Mulch Sock         |
| 1.4.5.G            | Silt Fence         |

City of Austin Standard Details

| <u>Designation</u> | <u>Description</u> |
|--------------------|--------------------|
| 648S-1             | Mulch Sock         |



**Item 703  
Fencing for Excavations**

**703.1 Description**

This item to consist of temporary safety fencing supported on posts and constructed of materials as indicated and removed when excavation is backfilled.

**703.2 Materials**

**(1) Fabric**

- (a) Fabric to be 4 feet in width, made of high density polyethylene resin, extruded and stretched to provide a highly visible international orange, non-fading fence which will remain flexible from -60 F to 200 F, and be inert to most chemicals and acid. Pattern may vary from diamond to circular with a minimum weight per foot of 0.4 lbs./Ft., a 4 foot width minimum tensile yield strength (Horiz.) of 2000 psi, ultimate tensile strength of 2680 psi (Horiz.) and a maximum opening no greater than 2 inches.

**(2) Metal Posts**

Steel pipe, tee posts, U posts or 2" x 4' timber posts, 5-1/2 feet in length minimum, spaced no more than 8 feet on centers. Fabric to be secured to post by bands or wire ties.

**703.3 Construction Methods**

Prior to commencing construction suitable "Barricades, signs and traffic handling" devices to be installed to protect workers and public. Safety fencing to be erected to lines and grades indicated. Excavations within 750 ft. of schools or day care centers require special attention by Contractor to secure entry while work is in progress. Fence to be installed prior to excavation and maintained until excavation is backfilled. Fence to be placed a minimum of 4 feet from edge of excavation. Posts to be driven in ground a minimum of 18 inches. At completion of each day's work, safety fencing to be pulled taut, and entry secured. When safety fence is no longer needed, Contractor to remove fence and posts and patch any damage to surfaces.

**703.4 Measurement**

Safety fencing to be measured by linear foot of fence measured along ground; gates will not be measured separately.

**703.5 Payment**

Work performed and materials furnished as prescribed by this item, measured as provided under "Measurement", to be paid for at the unit price bid for "Safety Fencing" which price to be full compensation for furnishing, installing and removing safety fencing and gates, including posts, bands or ties, and for manipulations, labor, tools, equipment and incidentals necessary to complete the work, removal and patching damaged surfaces.

Payment will be made under:

|                      |                       |                        |
|----------------------|-----------------------|------------------------|
| <b>Pay Item 703:</b> | <b>Safety Fencing</b> | <b>Per Linear Foot</b> |
|----------------------|-----------------------|------------------------|

**END**