Standard Specifications Manual

SERIES 600 - ENVIRONMENTAL ENHANCEMENT

Item No.

ITEM NO. 601
SALVAGING AND PLACING TOPSOIL

601.1 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.

601.2 Submittals

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

601.3 Materials

A. Topsoil

The topsoil shall be a clean, friable, fertile soil with a relatively high erosion resistance, free of objectionable materials including roots and rocks larger than 1 1/2 inches (37.5 millimeters) and readily able to support the growth of planting (Standard Specification Item No. 608), seeding (Standard Specification Item No. 604) and sodding (Standard Specification Item No. 602).

B. Water

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

601.4 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 topsoil may also be obtained from approved sources, which are located outside the right-of-way and have been secured by the Contractor.

601.5 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 approved by the City's Forestry Manager. Topsoil materials shall not be placed within the drip line of trees until tree wells are constructed that conform to Item No. 610, "Preservation of Trees and Other Vegetation" and approved by the City's Forestry Manager. The source and stockpile areas shall be kept drained, insofar as practicable, during the period of topsoil removal.

The existing topsoil to be salvaged shall be removed from areas approved by the Engineer or designated representative, 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 properly 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) 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.

601.6 Measurement and Payment

Salvaging, removal and/or placing topsoil materials will not be measured for payment, but shall be considered subsidiary to other items of work.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 601, “SALVAGING AND PLACING TOPSOIL”

City of Round Rock Standard Specification Items

Designation	Description
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control
Item No. 608	Planting
Item No. 610	Preservation of Trees and Other Vegetation

RELATED CROSS REFERENCE MATERIALS
Specification 601, “SALVAGING AND PLACING TOPSOIL”

City of Round Rock Standard Specification Items

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

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	Description
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

ITEM NO. 602
SODDING FOR EROSION CONTROL

602.1 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.

602.2 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.

602.3 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 root 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. 606, "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.

602.4 Planting Season

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

602.5 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).

Watering shall comply with City Ordinances.

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.

602.6 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. 606, "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.

602.7 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) 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. 606, "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 602.5 (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.

602.8 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.

602.9 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:

Bermuda Block Sodding – Per Square Yard.

St. Augustine Blcok Sodding – Per Square Yard.

Bermuda Mulching Sodding – Per Square Yard.

Grass Sodding – Per Square Yard.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 602, “SODDING FOR EROSION CONTROL”

City of Round Rock Standard Specification Items

Designation	Description
Item No. 606	Fertilizer

RELATED CROSS REFERENCE MATERIALS
Specification 602, “SODDING FOR EROSION CONTROL”

City of Round Rock Standard Specification Items

Designation	Description
Item No. 110	Street Excavation
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 132	Embankment
Item No. 601	Salvaging and Placing Topsoil
Item No. 604	Seeding for Erosion Control
Item No. 608	Planting
Item No. 610	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. 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

ITEM NO. 604
SEEDING FOR EROSION CONTROL

604.1 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.

604.2 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.

604.3 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 604.5 and 604.6.

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. 130, "Borrow".

D. Fertilizer.

The fertilizer shall conform to Standard Specification Item No. 606, "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.

604.4 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 4 inches (100 millimeters) of approved topsoil or 4 inches (100 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.

604.5 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:

<u>From September 15 to March 1</u>, seeding shall be with a combination of unhulled Bermuda Grass at a rate of 2 pounds per 1000 square feet (1.0 kilograms per 100 square meters) and winter rye or cool season cover crop (see Table 4) at a rate of 5 pounds per 1000 square feet (16.6 kilograms per 100 square meters)

<u>From March 1 to September 15</u>, 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. 606, "Fertilizer".

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.

<u>March 1 to September 15</u>

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

Hulled Bermuda Seed (PLS=0.83)	Fiber Mulch		Soil Tackifier
	Cellulose	Wood	
1 Lbs/1000 ft^2 (0.5kgs/100 m^2)	45.9 Lbs/1000 ft^2 (22.5kgs/100 m^2)		1.4 Lbs/1000 ft^2 (0.7kgs/100 m^2)
		57.4 Lbs/1000 ft^2 (28.0kgs/100 m^2)	1.5 Lbs/1000 ft^2 (0.75kgs/100 m^2)

September 15 to March 1

Add 5 pounds per 1000 square feet (2.5 kilograms per 100 square meters) of winter rye or cool season cover crop (see Table 4) to above mixture. The fertilizer shall conform to City of Round Rock Standard Specification Item No. 606, "Fertilizer".

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

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

Table 4: Cool Season Cover Crop			
Common Name	Botanical Name	Application rates	
		Lbs/1000 feet^2	kg/ 100 meter^2
Wheat	Triticum aestivum	1	0.5
Oats	Avena sativa	1	0.5
Cereal Rye Grain	Secale cereale	3	1.5
Total Cool Season Cover Crop Seeding Rate		5	2.5
Total Cool Season Seeding Rate (Grass, Wildflowers, & Cover Crop)		8	4

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 or drill method and shall be distributed evenly over the topsoil areas. Mulching shall immediately follow seed application.

<u>September 15 to March 1</u>

Add 5 pounds per 1000 square feet (2.5 kilograms per 100 square meters) of winter rye or cool season cover crop to grass and wildflower mixture. The fertilizer shall conform to City of Round Rock Standard Specification Item No. 606, "Fertilizer".

604.7 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.

604.8 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 75 percent coverage for the native mix. Bare areas shall not exceed16 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.

604.9 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.

Payment will be made under one of the following:

Non-Native Seeding for Erosion Control Method, _____Mulch Per Square Yard.

Non-Native Seeding for Erosion Control Method, _____Mulch Per Acre.

Native Seeding for Erosion Control Method, _____Mulch Per Square Yard.

Native Seeding for Erosion Control Method, _____ Mulch Per Acre.

Mulch, _____ Per Square Yard.

Mulch, _____ Per Acre.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 604, “SEEDING FOR EROSION CONTROL”

City of Round Rock Technical Specifications

Designation	Description
Item No.130	Borrow
Item No. 606	Fertilizer

RELATED CROSS REFERENCE MATERIALS
Specification 604, “SEEDING FOR EROSION CONTROL”

City of Round Rock Technical Specifications

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

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

Designation	Description
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. 605
SOIL RETENTION BLANKET

605.1 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.

605.2 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.

605.3 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 1. "Flexible Channel Liner"
   - (a) Type E Short-term duration (Up to 2 years)
     Shear Stress (t_d) < 1 pound per square foot [psf] (48 Pa)
   - (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 <5 psf (>96 to <239 Pa)
   - (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.

605.4 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 blanket 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. 604) or sodding (Standard Specification Item No. 602) 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 Round Rock personnel.

605.5 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.

605.6 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 considered as subsidiary to this Item.

Payment will be made under the following:

Soil Retention Blanket Class ____; Type ____- Per Square Yard.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 605, "SOIL RETENTION BLANKET"

City of Round Rock Standard Specification Items

Designation	Description
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control

RELATED CROSS REFERENCE MATERIALS
Specification 605, "SOIL RETENTION BLANKET"

City of Round Rock Standard Specification Items

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 132	Embankment
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	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
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 606
FERTILIZER

606.1 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.

606.2 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).

606.3 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 ($N0_3$). The remaining Nitrogen required may be in the form of Urea Nitrogen [$CO(NH_2)_2$].

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.

606.4 Construction Methods

Unless otherwise specified, the Contractor shall be responsible for determining appropriate fertilizer for any planting/revegetation required under the Contract. Such determination shall be based on recommendations of a reputable nursery or other qualified source and the determination shall be subject to the approval of the Engineer or designated representative.

Pelleted or granulated fertilizer shall be applied uniformly over the area specified on the Drawings to be fertilized and in the manner determined 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.

606.5 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.

606.6 Payment

The work performed and materials furnished and measured as provided under "Measurement" will be considered subsidiary to other bid items in the contract unless specified as a Pay Item.

When fertilizer is specified as a pay item, the work performed and materials furnished and measured as provided under "Measurement" will be paid for at the unit bid price for "Fertilizer". 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:

Fertilizer - Per Ton.

Fertilizer - Per 100 Pounds.

End

RELATED CROSS REFERENCE MATERIALS
Specification 606, “FERTILIZER”

City of Round Rock Technical Specifications

Designation	Description
Item No. 601	Salvaging and Placing Topsoil
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control
Item No. 605	Soil Retention Blanket
Item No. 607	Slope Stabilization
Item No. 608	Planting
Item No. 610	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
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

ITEM NO. 607
SLOPE STABILIZATION APPLICATIONS
FOR EROSION CONTROL

607.1 Description

This item shall govern the construction of slope stabilization devices, where plant growth cannot be readily established or sustained without slope stabilization measures, in conformance with this Specification Item and in accordance with locations, lines and grades indicated on the Drawings or as directed by the Engineer or designated representative.

This Standard Specification Item shall apply to erosion control measures only and shall not apply to structural stabilization of slopes.

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.

607.2 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 the current version of TxDoT/TTI's Approved Products List, one (1) full set of manufacturer's literature and installation recommendations, and any necessary special details.

607.3 Materials

A. Precast Concrete Units.

Concrete units shall be precast concrete blocks with a 12 to 16 inch (300 to 400 mm) module and shall be 4 or 6 inches (100 or 150 mm) thick, as indicated on the Drawings. The concrete shall attain a minimum 28-day compressive strength of 4000 psi (27.5 megaPascals) in conformance to Class S of Standard Specification Item No. 403, "Concrete for Structures". Each precast concrete unit will weigh at least 30 pounds per cubic foot (480 kilograms per cubic meter) and the open void area will range from 20 to 25 percent.

The Filter/carrier fabric shall conform to Item No. 620, "Filter Fabric". The fabric shall be of sufficient strength to support not less than 1 1/2 times the weight (mass) of the mat when slung by lifting at both ends.

B. GeoGrid

GeoGrid shall consist of polypropylene base and shall be: 1) resistant to all natural occurring alkaline and acidic soil conditions, 2) resistant to attack by bacteria and fungi, and 3) ultraviolet stable. The plastic grid shall have a thermal stability range from -60^{o} F to 175^{o} F (-50^{o}C to 80^{o}C) and a Melt Index of 0.2 grams/10 minutes.

Geogrid shall have a density between 75 to 106 pounds per cubic feet (1.2 to 1.7 megagrams per cubic meter) and thickness shall be 0.15 to 0.25 inch (4 to 6 mm). Tensile strength shall be 860 to 1230 pounds per square foot (41 to 59 mPa) across the roll.

C. Earth Reinforcement System

A patented earth reinforcement system shall consist of interlocking precast reinforced concrete units of the size, shape and texture indicated on the Drawings, placed on a concrete foundation. All precast concrete shall be Class S, with a minimum 28 day compressive strength of 4000 psi (27.5 mPa), cast-in-place concrete shall be Class A, conforming to Item No. 403, "Concrete for Structures". All joints shall be caulked and protected with a filter fabric as indicated on the Drawings. All reinforcing steel shall conform to Item No. 406, "Reinforcing Steel". All tie back and reinforcing mesh shall be in accordance with manufacturer's recommendations.

Filter fabric to conform to Item No. 620, "Filter Fabric.

D. Gabions and Revet Mattresses.

Gabions shall be assembled and placed as directed on the Drawings in accordance with Standard Specification Item No. 594, " Gabions and Revet Mattresses".

E. Additional Materials and Methods

In addition to those systems described above, the following items may be used in combinations or separately, as indicated on the Drawings:

Standard Specification Subject	Item No
Concrete for Structures	403
Concrete Structures	410
Riprap for Slope Protection	591
Concrete Retards	593
Sodding for Slope Stabilization	602
Seeding for Slope Stabilization	604
Salvaging and Placing Topsoil	601
Soil Retention Blanket	605
Filter Fabric	620
Dry Stack Wall (DS)	623
Rock Berm (RB)	639
Mortared Rock Wall (RW)	640

Additional Products not mentioned herein may be indicated on the Drawings.

607.4 Construction Methods

A. Precast Concrete Units

1. Subgrade Preparation.

   The slope on which the units are to be placed shall be constructed according to lines and grades indicated on the Drawings. Fill materials shall be placed in lifts, which do not exceed 8 inch (200 mm) loose measure, and compacted to a minimum of 95 percent of maximum dry density as determined in accordance with TxDoT Test Method Tex-114-E or as approved by the Engineer or designated representative.

2. Placing the Units.

   The precast concrete units shall be placed on a concrete foundation in accordance with the manufacturer's recommendations. Filter fabric will be required.

3. Backfill.

   Backfill shall consist of fine granular material or topsoil as indicated on the Drawings or as approved by the Engineer or designated representative. Seeding or sodding, when required, shall be placed directly over topsoil and shall conform to Item No. 604, "Seeding for Erosion Control" and Item No. 602, "Sodding for Erosion Control".

B. GeoGrid

1. Subgrade Preparation.

   The compacted slope on which the plastic grids are to be placed shall be constructed according to the lines and grades indicated on the Drawings. Prior to placement the grid, pieces of wood, rock, concrete, brick or other objects that might damage the plastic grid shall be removed.

2. Placement of the Geo Grid.

   The grid shall be placed directly on the ground surface. Adjacent and adjoining rolls shall be overlapped and tied in accordance with manufacturer's recommendations by a minimum of 1 and 6 feet (0.3 to 1.8 meters) respectively. The grid shall be installed and anchored in accordance with manufacturer's recommendations and details indicated on the Drawings.

   Any damage to the fabric as a result of Contractor's vehicles, equipment or operations shall be repaired at Contractor's own expense.

   The amount of grid placed shall be limited to that which can be covered with backfill within the succeeding 72 hours.

3. Backfill.

   A minimum thickness of 4 inches (100 mm) of fine granular material shall be placed directly over the plastic grid and compacted to a minimum of 95 percent of the maximum dry density as determined in accordance with

TxDoT Test Method Tex-114-E. Seeding or sodding shall be placed on areas backfilled as indicated on the Drawings and shall conform to Item No. 604, "Seeding for Erosion Control" or Item No. 602, "Sodding for Erosion Control".

C. Earth Reinforcement System

1. Excavation.

Excavation shall conform to applicable requirements of Standard Specification Item No. 111, "Excavation" and Standard Specification Item No. 401, "Structural Excavation and Backfill" in accordance with limits and construction stages indicated on the Drawings. Any foundation soils found to be unsuitable shall be removed and replaced with acceptable backfill material.

2. Foundation.

The foundation subbase for the structure, approved by the Engineer or designated representative, shall be graded and then compacted to 95 percent of the maximum dry density as determined in accordance with TxDoT Test Method Tex-114-E. The leveling pad shall be constructed of Class A concrete conforming to Standard Specification Item No. 403, "Concrete for Structures", along the lines and grades indicated on the Drawings.

3. Wall Erection.

The wall modules, joint filler and leveling pads shall be placed as indicated on the Drawings in accordance with the manufacturer's recommendations. Special care shall be taken in setting the bottom course of units to true line and grade.

All modular units above the first course level shall interlock with lower courses. Vertical joints shall be staggered with each successive course. The vertical joints on the front face of the wall shall not exceed 3/4 inch (19 mm) tolerance. Joint filler shall be installed in all joints and filter fabric shall be installed behind the wall as indicated on the Drawings. The overall vertical tolerance of wall plumbness (from top to bottom) shall not exceed 1/2 inch per 10 feet (4 mm per meter) from the dimensions indicated on the Drawings.

4. Drainage. Drainage shall conform to Standard Specification Item No. 551, "Pipe Underdrains" and to the details indicated on the Drawings.

5. Backfill.

The placement of the backfill shall follow closely behind the erection of each lift of panels. The maximum lift thickness shall not exceed 8 inches (200 mm), loose measure. At each reinforcing mesh level, the backfill shall be roughly leveled before placing and attaching mesh. Reinforcing mesh or straps shall be placed normal to the face of the wall. Backfill compaction shall be accomplished without disturbance or distortion of

reinforcing mesh, filter fabric and face panels. All backfill shall be compacted to 95 percent maximum dry density as determined in accordance with TxDoT Test Method Tex-114-E. The Contractor shall decrease the lift thickness, if necessary, to obtain the specified density. During backfill compaction the moisture content may not exceed a value 2 percent greater than maximum dry density (i.e. optimum as determined by TxDoT Test Method Tex-114-E).

Compaction of the backfill shall not be accomplished by sheep foot, grid rollers or any other type of equipment employing a foot, which in the opinion of the Engineer or designated representative could damage the reinforcing mesh. At the end of each day's operation, the Contractor shall shape the backfill to drain away from the face of the wall.

All backfill material used adjacent to the structure shall be crushed stone, that is free from organic or otherwise deleterious materials, and the grading of the backfill material established in accordance with TxDoT Test Method Tex-110-E shall conform to the following gradation limits:

Sieve Size		
US	SI	Percent Passing
6 inches	150 mm	100
3 inches	75 mm	75 -100
No. 200	75µm	0-15

607.5 Measurement

Work and accepted material for "Slope Stabilization" will be measured by the square yard (square meter: 1 square meter is equal to 1.196 square yards), complete in place from the top of the foundation to the top of the slope stabilization erosion control. Foundations will not be measured for payment.

607.6 Payment

Work performed and materials furnished as prescribed by this Specification Item and measured under "Measurement" will be paid for at unit bid price per square yard for "Slope Stabilization for Erosion Control". The unit bid price shall include full compensation for: a) all excavation, foundation installation, subgrade preparation, placement of filter fabric, underdrains, precast blocks and tie backs, and b) all labor, tools, equipment and incidentals necessary to complete the backfilling operations.

Payment will be made under:

Precast Concrete Unit	Per Square Yard.	
GeoGrid, _____	Per Square Yard.	
Earth Reinforcement System	Per Square Yard.	**End**

SPECIFIC CROSS REFERENCE MATERIALS
Specification 607, “SLOPE STABILIZATION APPLICATIONS FOR EROSION CONTROL”

City of Round Rock Standard Specification Items

Designation	Description
Item No. 111	Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 403	Concrete for Structures
Item No. 406	Reinforcing Steel
Item No. 410	Concrete Structures
Item No. 551	Pipe Underdrains
Item No. 591	Riprap for Slope Protection
Item No. 593	Concrete Retards
Item No. 594	Gabions and Revet Mattresses
Item No. 601	Salvaging and Placing Topsoil
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control
Item No. 605	Soil Retention Blanket
Item No. 620	Filter Fabric
Item No. 623	Dry Stack Wall (DS)
Item No. 639	Rock Berm (RB)
Item No. 640	Mortared Rock Wall (RW)

Texas Department of Transportation: Manual of Testing Procedures

Designation	Description
Item No. 110-E	Surveying and Sampling Soils for Highways
Item No.114-E	Laboratory Compaction Characteristics & Moisture-Density Relationship of Subgrade & Embankment Soil

TxDOT/TTI Hydraulics and Erosion Control Laboratory

Designation	Description
Annual Report	Approved Products List

RELATED CROSS REFERENCE MATERIALS
Specification 607, “SLOPE STABILIZATION APPLICATIONS FOR EROSION CONTROL”

City of Round Rock Standard Specification Items

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

RELATED CROSS REFERENCE MATERIALS
Specification 607, “SLOPE STABILIZATION APPLICATIONS FOR EROSION CONTROL”

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
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 608
PLANTING

608.1 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.

608.2 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.

608.3 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

Vascula 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, and animals as required by the Texas Pesticide Laws and Regulations of the Texas Department of Agriculture. The Engineer or designated representative may require documentation of such certification as necessary for his record.

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 require documentation of such certification as necessary for his records.

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 require documentation of such license for his records. The Contractor shall verify and adhere to the requirements and codes of any controlling utility authorities.

608.4 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 have 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 608.5.

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 posses 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.

I. Fertilizer

Fertilizer shall be applied uniformly conforming to City of Round Rock Standard Specification tem No. 606, "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.

608.5 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 608.5.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 properly.

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 608.5.D) or planting soil mixture (608.4.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) lifts 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 his 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 designated 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, he 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".

608.6 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 608.5.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, whichever 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 608.5.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 properly.

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 properly.

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.

608.7 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.

608.8 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.

608.9 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:

Planting Type ___, Size in inches____	Per Each.
Irrigation System	Lump Sum

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 608, “PLANTING”

City of Round Rock Standard Specifications

Designation	Description
Item No. 606	Fertilizer

SPECIFIC CROSS REFERENCE MATERIALS
Specification 608, “PLANTING”

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 111	Excavation
Item No. 601	Salvaging and Placing Topsoil

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. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 170	Irrigation System
Item No. 192	Roadside Planting and Establishment

ITEM NO. 609
NATIVE GRASSLANDS FOR EROSION CONTROL

609.1 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.

609.2 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.

609.3. 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 609.5.

B. Water shall be clean and free of industrial wastes and other substances harmful to the growth of grass in the area irrigated.

C. Top soil shall be a blend of 75% sterile silty clay loam and 25% (by volume) compost.

   1. The silty clay loam shall be from a native deposit in an area where all native composted topsoil has been removed. The loam shall have a plasticity index (PI) between 9 and 16.

   2. The compost shall be Dillo Dirt or an equal approved by the Engineer or designated representative. Dillo dirt is composted sewage sludge as manufactured by the City of Round Rock Water and Wastewater Department.

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 Round Rock 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.

609.4 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	Cnidoscolus 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 609.3.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 Round Rock ordinances. 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.

609.5 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 lbs/1000 sq. ft. (kg/100 sq. m.)	Rooted Plants Size & Spacing
Buffalo Grass	grass	Buchloe dactyloides	0.3 (0.15)	1 - 16” x 24” piece of sod @ 10 FT. (3m) ctrs.
Blue Grama	grass	Bouteloua gracilis	0.2 (0.1)	Not required
Green Srangletop	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

Table 2. Upland Species, Full Sun Areas - continued

Mexican Hat	wildflower	Ratibida columnaris	0.05 (0.025)	Not required
Pink Evening Primrose	wildflower	Oenethera 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) Summer 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 lbs/1000 sq. ft. (kg/100 sq. m.)	Rooted Plants Size & Spacing
Meadow Sedge*	sedge	Carex perdentata	No seed required	1 gal. @ 10 ft (3m) ctrs.
Inland Seaoats**	grass	Chasmanthium latifolium	0.5 (0.25)	
Prairie Wild Rye	grass	Elymus canadensis	0.75 (0.37)	Not required
Sideoats Grama	grass	Bouteloua curtipendula	0.75 (0.37)	1 gal. @ 10 ft. (3m) ctrs.

Table 3. Upland Species, Shade-Dappled Light Areas - continued

Purple Coneflower	wildflower	Echinacea purpurea	0.1 (0.05)	Not required
Coreopsis (Lanceleaf)	wildflower	Coreopsis lanceolata	0.1 (0.05)	Not required
Sage (Scarlet)	wildflower	Salvia coccinea	0.1 (0.05)	Not required
Drummond Phlox	wildflower	Phlox Drummondii	0.1 (0.05)	Not required
Black-Eyed Susan	wildflower	Rudbeckia hirta	0.03 (0.015)	Not required
Cutleaf Daisy	wildflower	Engelmannia pinnatifida	0.2 (0.10)	Not required
Tall Aster	wildflower	Aster praealtus	0.02 (0.01)	Not required
Illinois bundleflower	wildflower	Desmanthus illinoiensis	0.15 (0.075)	Not required
Standing cypress	wildflower	Ipomopsis rubra	0.1 (0.05)	Not required
Winecup	wildflower	Callirhoe involucrata	0.1 (0.05)	Not required
Cereal rye grain***	cool season cover crop	Secale cereale	0.5 (0.25)	Not required
Oats***	cool season cover crop	Avena sativa	0.2 (0.1)	Not required
Wheat***	cool season cover crop	Triticum estivum	0.3 (0.15)	Not required
TOTAL****			Winter: 4.0 (2.0) Summer: 3.0 (1.5)	Rooted species mixed equally @ 10 (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 ofanother 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 lbs/1000 sq. ft. (kg/100 sq. m.)	Rooted Plants Size & Spacing
Big Bluestem	grass	Andropogon gerardii	0.2 (0.1)	1 gal. @ 10 ft (3m) ctrs
Big Muhly (Lindhiemers)	grass	Muhlenbergia lindheimeri	0.2 (0.1)	
Bushy Bluestem	grass	Andropogon glomeratus	0.2 (0.1)	
Eastern Gama Grass	grass	Tripsacum dactyloides	0.3 (0.15)	
Indian Grass	grass	Sorghastrum nutans	0.2 (0.1)	
Inland Seaoats	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 ft (3m) ctrs.
Black-Eyed Susan	wildflower	Rudbeckia hirta	0.06 (0.03)	Not required
Bundleflower (Illinois)	wildflower	Desmanthus illinoiensis	0.35 (0.17)	Not required
Clover (Purple Prairie)	wildflower	Petalostemum purpurea	0.1 (0.05)	Not required
Coneflower (Clasping)	wildflower	Rudbeckia amplexicaulis	0.06 (0.03)	Not required
Coreopsis (Plains)	wildflower	Coreopsis tinctoria	0.05 (0.025)	Not required
Goldenrod	wildflower	Solidago altissima	0.03 (0.015)	Not required
Lazy Daisy	wildflower	Aphanostephus sp.	0.03 (0.015)	Not required

Table 4. Facultative Species, Moderate High Moisture Areas - continued

Lemon Mint	wildflower	Monarda citriodora	0.07 (0.035)	Not required
Sunflower (Common)	wildflower	Helianthus annuus	0.15 (0.075)	Not required
Sunflower (Maximilian)	wildflower	Helianthus maximiliani	0.1 (0.05)	Not required
Cereal rye grain*	cool season cover crop	Secale cereale	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)	
TOTAL**			winter: 4.0 (2.0) summer: 3.0 (1.5)	Rooted species mixed equally @ 10 ft (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.

609.6 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).

609.7 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 75 percent coverage with no bare areas exceeding 32 square feet (3 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.

609.8 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:

Topsoil and Seedbed Preparation	Per Square Yard.
Topsoil and Seedbed Preparation	Per Acre.
Native Grassland Seeding and Planting	Per Square Yard.
Native Grassland Seeding and Planting	Per Acre.
Watering	Per Square Yard.
Watering	Per Acre.
Management Practices	Per Square Yard.
Management Practices	Per Acre.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification Item 609 "NATIVE GRASSLAND FOR EROSION CONTROL"

City of Round Rock Standard Specifications

Designation	Description
Item No. 130	Borrow
Item No. 606	Fertilizer

RELATED CROSS REFERENCE MATERIALS
Specification Item 609 "NATIVE GRASSLAND FOR EROSION CONTROL"

City of Round Rock Standard Specifications

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

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

Designation	Description
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. RR 610
PRESERVATION OF TREES AND OTHER VEGETATION

610.1 - Description and Definitions

Description

This item shall govern the proper care, protection and treatment of trees and other vegetation within the construction area or, in the vicinity of the construction. All work shall be performed in accordance with the City approved drawings and specifications or as approved by the Engineer. Tree pruning and/or treatments shall be performed under the direct supervision of a qualified arborist (as defined below) or as allowed by the Engineer. The City of Round Rock Parks and Recreation Department, Forestry Division, Forestry Manager shall be consulted, in conjunction with the Engineer and Transportation Director for the performance of the Work when preservation of trees and other vegetation is required under the Contract.

Definitions

Forestry Manager - City official designated by the Parks and Recreation Department as the manager responsible for monitoring construction activities where trees and other vegetation are to preserved, or otherwise impacted by construction activities. The Forestry Manager oversees the urban forestry program and all aspects of public tree planting, public tree care, and other duties provided in the City Ordinance.

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 610.4(H) for additional requirements for preventing Oak wilt infection.

Certified Arborist/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).

Engineer – The Transportation Director for transportation projects, the City’s Project Manager, the City’s Forestry Manager, City’s Inspector, Project Arborist/Landscape Architect, or other designated person, as determined by the City of Round Rock.

Protected Trees – Trees of all species that are at least eight (8) inches in diameter, except for Chinaberry, Hackberry, Ashe Juniper, Chinese Tallow, Horse Apple, and exceptions listed in the City Ordinance.

Protective Tree Fencing – a temporary enclosure erected around a tree to be protected at the boundary of the tree protection zone. The fence serves three primary functions 1) to keep the foliage crown, branch structure and trunk clear from direct contact and damage by equipment, materials or disturbances; 2) to preserve roots and soil in an intact and non-compacted state; and 3) to identify the tree protection zone in which no soil disturbance is permitted and activities are restricted.

Critical Root Zone (CRZ) – a radius equal in feet to the number of inches of the tree's trunk diameter, with a minimum of eight (8) feet.

References

City of Round Rock, "Tree Technical Manual: Standards and Specifications"

City of Round Rock, Code of Ordinances, Chapter 43 - Tree Protection and Preservation.

610.2 - 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 Engineer or Forestry Manager, soil and/or foliar analysis for fertilizer applications.

610.3 - Materials

A. Protective Fencing and Signage

Protective fencing is designated as the materials used to protect the root zones of trees as illustrated in the plans and Standard Details. Three basic types of protective fencing materials are allowed by the City. 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 Engineer or Forestry Manager. Type C fencing shall be replaced by Type A or Type B fencing as directed 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 the Standard Details and shall consist of a minimum five-foot 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 the Standard Details and shall consist of any vertical planking attached to 2x4-inch horizontal stringers which are supported by 2x4-inch intermediate vertical supports and a 4x4-inch vertical support 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 Engineer):

   (a) High visibility plastic construction fencing.

   The fabric shall be 4 feet 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 -60°F to 200°F 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..

   The fabric shall have a 4 foot width minimum tensile yield strength (Horizontal) of 2000 psi, ultimate tensile strength of 2680 psi (Horizontal) and a maximum opening no greater than 2 inches.

   (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″ × 4″ timber posts that are a minimum of 5½ feet in height and spaced no more than 8 feet on centers. The fabric shall be secured to post by bands or wire ties.

4. Signage

   A laminated sign, no smaller than 16 X 24 inches, shall be posted on each tree protective device, identifying the following information:

   WARNING – CRITICAL ROOT ZONE – ENCROACHMENT MAY RESULT IN PERMANENT TREE DAMAGE RESULTING IN TREE REPLACEMENT.

B. Trunk Protection (Limited Application)

When indicated on the drawings or directed by the Engineer or Forestry Manager tree trunk protection shall be provided in accordance with Standard Details. Tree trunk protection shall consist of any 2 x 4-inch or 2 x 6-inch planking by 8 foot length and 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 610.4 (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 six (6) inches, the tree root system shall be protected by the installation of tree wells in accordance with the plans and Standard Details. 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

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.

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 Engineer.

610.4 - Construction Methods

Notify the Engineer a minimum of 24 hours in advance of any activity within the CRZ.

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 construction project or 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 Engineer, shall be protected during construction with temporary fencing as indicated on the drawings or as directed.

Protective fences (section 610.4.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. For Development projects, the fencing shall remain until a certificate of occupancy has been granted. Remove fencing only when approved by the Engineer.

Protective fence locations in close proximity to intersecting streets or drives shall adhere to the sight distance and sight triangle found in the City of Round Rock 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:

   (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 6″ cut or fill] or trenching not reviewed and authorized by the Engineer;

   (c) Damage to exposed roots, trunks or limbs by mechanical equipment; and,

   (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 beyond the area of disturbance unless approved by the Engineer;

   (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, the fence shall be erected up to 10 feet to allow work space between the fence and the structure. Apply organic mulch to a depth of eight (8) inches 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; and,

   (e) When there are severe space constraints due to tract size or other special requirements, the Engineer will approve alternative placement locations of the protective fences.

   When any of the exceptions listed above will result in a fence being located closer than five (5) feet to a tree trunk, the Contractor shall also protect the trunk with strapped-on planking to a height of 8 feet (or to the limits of lower branching) in addition to the fencing requirement.

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 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 is required. Pruning shall provide the minimum clearance needed

to perform the work or remove a hazard unless otherwise directed 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 Engineer. Damage to oak trees shall be treated immediately, with consideration for site safety, to reduce the risk of Oak Wilt infection (See 610.4.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 Engineer, 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.

All trees damaged during construction shall receive an application of fertilizer within the drip line at the rate of 4 pounds per caliper inch.

C. Cutting and Filling Around Trees

When the depth of an excavation or embankment exceeds 6 inches within the critical root zone of any tree with a trunk diameter greater than 8 inches, a tree well shall be constructed to protect the tree as shown in the plans.

D. Paving Around Trees

Where new paving within the dripline of any tree greater than six (6) inches in diameter is necessary, a permeable pavement and aeration system mst be installed as indicated in the plans, except for street construction.

E. Tree Removal

When a tree or shrub is scheduled for removal, cut to a depth of twelve (12) inches below the surrounding ground line. After removal, place soil to a depth matching the existing grade. An approved permit, or an approved site plan is required for removal of trees 8″ and larger (see Code of Ordinances Sec. 43-21 and 43-24).

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 (Section 610.4,(H)). All tree material shall be removed from the site unless directed otherwise, or if it will be used as wood chips or mulch.

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

Removal of any other protected trees not scheduled for removal, or trees damaged beyond repair, shall be replaced in accordance with City Ordinance Section 43-25.

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 three (3) inches depth.

G. Root Zone Aeration and Fertilization

As a component of an effective remedial tree care program, 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 Engineer 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 Engineer prior to application. The owner or general contractor shall select a fertilization contractor and ensure coordination with the Engineer.

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 be limited to, fertilization, aeration, 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. The proposed nutrient mix specifications and soil and/or foliar analysis results need to be provided to and approved by the Engineer prior to application. Construction which will be completed in less than 90 days may use materials at ½ the recommended rates. Alternative organic fertilizer materials are acceptable when approved by the Engineer. Within seven (7) days after fertilization is performed, the contractor shall provide documentation of the work performed to the Engineer. 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 this specification.

   (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.

610.5 - 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 Standard Details.

Removal of existing trees will be measured per each tree.

610.6 - 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:

Protective Fencing Type A Chain Link Fence	Per Lineal Foot
Protective Fencing Type B Wood Fence	Per Lineal Foot
Protective Fencing Type C Other Materials	Per Lineal Foot
Tree Protection	Per Each
Tree Well (Tree Protection)	Per Each
Tree Removal (___" - ___" DIA)	Per Each

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification 610, "Preservation of Trees and Other Vegetation"	
City of Round Rock Standard Specifications	
Designation	Description
RR 101	Preparing The Right of Way
RR 102	Clearing and Grubbing
Specification Item 102, “CLEARING AND GRUBBING”	
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. 160	Topsoil
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering

ITEM NO. 620
FILTER FABRIC

620.1 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.

620.2 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.

620.3 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.

620.4 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 Tex-616-J*	Underdrains/Slope Stabilization 4.0 (135) minimum
		Gabions and Revet Mattresses 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 Tex-616-J*	80 (3,260) minimum
Breaking load in either machine or cross-machine direction, expressed in pounds (newtons)	ASTM D-1682 grab method G**	100 (445) minimum
Equivalent opening size for US Standard (SI) sieves.	CW-02215	70 to 100 (212 to 150µm)
"Apparent elongation" at breaking load in either machine or cross-machine direction, expressed as percent	ASTM D-1682 grab method 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".

620.5 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.

620.6 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:

Filter Fabric	Per Square Yard.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 620, “FILTER FABRIC"

American Society for Testing and Materials (ASTM)

Designation	Description
D 1682	Test Methods for Breaking Load and Elongation of Textile Fabrics

Texas Department of Transportation Manual of Testing Procedures

Designation	Description
Tex-616-J	Testing of Construction Fabrics

RELATED CROSS REFERENCE MATERIALS
Specification 620, “FILTER FABRIC"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control
Item No. 605	Soil Retention Blanket
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	Preservation of Trees and Other Vegetation

RELATED CROSS REFERENCE MATERIALS - continued
Specification 620, “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
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 621
DIVERSION (TEMPORARY)

621.1 Description

This item shall govern providing and placing earthen berms, channels or a combination thereof along such areas as indicated on the Drawings in accordance with these specifications. This method shall only be used during construction and its purpose shall be to temporarily control soil loss by intercepting and conveying the runoff to a stable outlet. This item shall also include the subsequent removal of the diversion device and re-vegetation of the area.

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.

621.2 Submittals

The submittal requirements for this specification item shall include:

A. Characteristics (LL, PI, maximum density, etc.) of proposed embankment material,
B. Identification of the type, source, mixture, pure live seed (PLS) and rate of application of the seeding,
C. Type of mulch,
D. Type of tacking agent, and
E. Type, chemical analysis and rate of application of fertilizer.

621.3 Materials

A. Berm

The berm shall consist of earthen materials conforming to Standard Specification Item No. 130, "Borrow", Class A and shall be free of brush, debris and stones larger than 6 inches (150 mm). The liquid limit (LL) of the borrow material shall not exceed 45 and the plasticity index (PI) shall not exceed 15 (TxDoT Test Methods Tex 103-E, Tex-104-E and Tex-106-E).

B. Seeding

Seeding shall conform to Standard Specification Item No. 604, "Seeding for Erosion Control".

621.4 Construction Methods

Diversion shall not be used where the slope of existing ground exceeds 15 percent.

All brush, stumps and debris shall be removed from the diversion area before construction. Diversion berms shall be constructed to the height and length indicated or as directed by the Engineer or designated representative. The height shall include a minimum of 1-foot (0.3 meter) freeboard above the design high water elevation. The berms shall have a minimum width of 4 feet (1.2 meters) at the top with maximum side slopes of 3:1 unless otherwise specified by the Engineer or designated representative.

The earthen material shall be placed in successive 6-inch (150 mm) layers and compacted by rolling with construction equipment or other approved methods to provide not less than 95 percent of the maximum dry density as determined in accordance with TxDoT Test Methods Tex-114-E and Tex-115-E. The top 4 inches (100 mm) shall only be compacted to 85 percent of the maximum density to facilitate seeding. Berms, channels and any area disturbed shall be seeded. Seeding shall conform to Item No. 604, "Seeding for Erosion Control", except that topsoil will not be required on the berm.

Berms and channels shall be maintained and silt accumulation removed when necessary or as directed by the Engineer or designated representative. After completion of construction or when directed by the Engineer or designated representative, the berm and channel shall be removed and the site restored either to its natural condition, to the lines and grades indicated on the Drawings or as determined by the Engineer or designated representative.

621.5 Measurement

The work performed and the materials furnished as prescribed by this item will be measured by the lineal foot (lineal meter: 1 meter equals 3.281 feet) of diversion, complete in place.

621.6 Payment

The work performed and materials furnished and measured as provided under "Measurement" will be paid for at the unit bid price per lineal foot for Diversion as indicated on the Drawings. The unit bid price shall include: a) full compensation for furnishing, hauling and placing all materials; b) all labor, tools, seeding, equipment and incidentals needed to complete the work, c) any repair, replacement and seeding of materials to maintain the Diversion d) removal and disposal of all materials at the completion of construction and e) reseeding the areas disturbed by the removal of the temporary Diversion.

Payment will be made under:

Diversion - Per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification Item 621 "DIVERSION (Temporary)"

City of Round Rock Standard Specifications

Designation	Description
Item No. 130	Borrow
Item No. 604	Seeding for Erosion Control
Item No. 606	Fertilizer

Texas Department of Transportation: Manual of Testing Procedures

Designation	Description
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

RELATED CROSS REFERENCE MATERIALS
Specification Item 621 "DIVERSION (Temporary)"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 132	Embankment
Item No. 201	Subgrade Preparation
Item No. 601	Salvaging and Placing Topsoil
Item No. 607	Slope Stabilization

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. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket

ITEM NO. 622
DIVERSION DIKE

622.1 Description

This item shall govern furnishing and installing a temporary or permanent ridge of compacted soil that is located immediately above cut or fill slopes. The temporary or permanent ridge shall be constructed with sufficient grade to intercept storm water run-off from small upland areas and to divert the flow from the exposed slopes to an acceptable outlet 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.

622.2 Submittals

The submittal requirements for this specification item shall include:

A. Characteristics (LL, PI, maximum density, etc.) of proposed embankment material;
B. Identification of the type, source, mixture, pure live seed (PLS) and rate of application of the seeding;
C. Identification of the type, source, and mixture of the sodding;
D. Type of mulch;
E. Type of tacking agent;
F. Type, chemical analysis and rate of application of fertilizer;
G. Type, characteristics, gradation, etc. of proposed riprap;
H. Type, characteristics, and application method of proposed soil retention blanket;
I. Type, characteristics, and application method of proposed slope stabilization;
J. The manufacturer, model and description of the proposed dust control equipment,
K. The sprinkling plan including application rate, pattern of sprinkling and scheduled times of application.

622.3 Materials

A. Dikes shall be constructed from suitable embankment material approved by the Engineer or designated representative or from a borrow material meeting the requirements of Standard Specification Item No. 130, "Borrow", Type A.

B. Stone Riprap shall consist of fieldstone, rough unhewn quarry stone or broken concrete conforming to Standard Specification Item No. 591, "Riprap for Slope Protection".

C. Seeding shall conform to Standard Specification Item No. 604, "Seeding for Erosion Control".

D. Sodding shall conform to Standard Specification Item No. 602, "Sodding for Erosion Control".

E. Soil Retention Blanket shall conform to Standard Specification Item No. 605, "Soil Retention Blanket".

F. Stabilization for Erosion Control shall conform to Standard Specification Item No. 607, " Slope Stabilization Applications For Erosion Control ".

G. Water for embankment, erosion control and dust control shall conform to Standard Specification Item Nos. 604, "Seeding for Erosion Control" and 220, "Sprinkling for Dust Control".

622.4 Construction Methods

The Contractor shall minimize the area disturbed by the activity defined by this specification Item. Prior to placement of the Diversion Dike, all clearing and grubbing operations (Standard Specification Item No. 102) shall have been completed on the areas over which the Diversion Dike is to be placed. The surface of the ground, which is to receive the Diversion Dike, shall be loosened by scarifying or plowing to a minimum depth of 4 inches (100 mm), except for the case of solid rock. The material, that has been loosened, shall be re-compacted simultaneously with the Diversion Dike. The Diversion Dike shall be placed in successive 6-inch (150 mm) layers for the full width of the Diversion Dike. Soils shall be sprinkled as required and compacted to the extent necessary to provide not less than 90 percent of the maximum dry density as determined in accordance with TxDoT Test Methods Tex-114-E and Tex 115-E. The top 4 inches (100 mm) shall be compacted to 85 percent of the maximum dry density to facilitate seeding.

Diverted runoff from a protected or stabilized area shall have its outlet flow directed to an undisturbed stabilized area or into a level spreader (Standard Specification Item No. 6340 or grade stabilization structure (Standard Specification Item No. 625. Diverted runoff from a disturbed or exposed area shall have its outlet flow directed to a sediment basin or to an area protected by any of these practices.

The structure shall be inspected monthly and after every rainfall. Repairs shall be made, as needed the Contractor and as directed by the Engineer or designated representative, throughout the duration of the contract or until the Engineer or designated representative gives written permission to remove a temporary structure.

The temporary Diversion Dike shall be removed, when directed by the Engineer or designated representative, and the area shall be leveled off and protected by erosion control measures appropriate for the terrain as indicated on the Drawings. Permanent Diversion Dikes shall be seeded in conformance to Standard Specification Item No. 604, "Seeding for Erosion Control".

622.5 Measurement

Work performed as prescribed by this item will be measured by the lineal foot (lineal meter: 1 meter equals 3.281 feet) along the centerline of the Diversion Dike.

622.6 Payment

This item will be paid for at the contract unit bid price for "Diversion Dike". The price shall include full compensation for: a) all work specified herein, b) furnishing, hauling

and placing of all materials and c) all water required to perform all operations necessary to complete the work.

Payment will be made under one of the following:

Diversion Dike, Temporary	Per Lineal Foot.
Diversion Dike, Permanent	Per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 622 "DIVERSION DIKE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 102	Clearing and Grubbing
Item No. 130	Borrow
Item No. 220	Sprinkling for Dust Control
Item No. 591	Riprap for Slope Protection
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control
Item No. 605	Soil Retention Blanket
Item No. 606	Fertilizer
Item No. 607	Stabilization for Erosion Control
Item No. 625	Grade Stabilization Structure
Item No. 634	Level Spreader

Texas Department of Transportation:Manual of Testing Procedures

Designation	Description
Tex-114-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade & Embankment Soil
Tex-115-E	Field Method for Determination of In-Place DensityofSoils and Base Materials

RELATED CROSS REFERENCE MATERIALS
Specification 622 "DIVERSION DIKE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 132	Embankment
Item No. 201	Subgrade Preparation
Item No. 601	Salvaging and Placing Topsoil
Item No. 605	Soil Retention Blanket

***RELATED* CROSS** REFERENCE MATERIALS - continued
Specification 622 "DIVERSION DIKE"

Designation	Description
Item No. 607	Slope Stabilization
Item No. 621	Diversion (Temporary)

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. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket

ITEM NO. 623
DRY STACK ROCK WALL

623.1 Description

This item shall govern furnishing and placing dry stack gravity rock walls in conformance with the Drawings 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.

623.2 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

623.3 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. 403, "Concrete for Structures".

C. Granular Blanket

Flexible Base aggregate conforming to Standard Specification Item No. 210, "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. 620, "Filter Fabric", shall be used for dry stack rock walls constructed in erodible soils.

623.4 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. 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.

623.5 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 subsidiary to the item bids.

623.6 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:

Dry Stack Rock Wall - Per Square Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 623 "DRY STACK ROCK WALL"

City of Round Rock Standard Specifications

Designation	Description
Item No. 403	Concrete for Structures
Item No. 210	Flexible Base
Item No. 620	Filter Fabric

Texas Department of Transportation: Manual of Testing Procedures

Designation	Description
410-A	Abrasion of Coarse Aggregate Using The Los Angeles Machine
411-A	Soundness of Aggregate By Use of Sodium Sulfate or Magnesium Sulfate

SPECIFIC CROSS REFERENCE MATERIALS - continued
Specification 623 "DRY STACK ROCK WALL"

American Society for Testing and Materials (ASTM)

Designation	Description
C-535	Standard Test Method for Resistance of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

RELATED CROSS REFERENCE MATERIALS
Specification 623 "DRY STACK ROCK WALL"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 132	Embankment
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	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. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 624
EARTH OUTLET SEDIMENT TRAP

624.1 Description

This item shall govern the trap formed by either an excavation and/or embankment. The trap shall have a discharge point over or cut into natural ground. The outlet shall be free of any restriction to flow. The removal of the entire structure, re-grading and re-vegetation of the area shall be included in this Standard Specification Item.

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.

624.2 Submittals

The submittal requirements for this specification item shall include:

A Identification of the type, source, mixture, pure live seed (PLS) and rate of application of the seeding;
B. Type of mulch;
C. Type of tacking agent;
D. Type and rate of application of fertilizer.

624.3 Materials

Seeding shall conform to Item No. 604, "Seeding for Erosion Control".

624.4 Construction Methods

All excavation operations shall be carried out in such a manner that erosion and water pollution shall be minimal. Any excavated portion of the sediment trap shall have 2:1 or flatter slopes.

Area under the embankment and the pool area shall be cleared, grubbed or stripped of all vegetation and root mat in conformance with Standard Specification Item No. 120, "Clearing and Grubbing".

The fill material for the embankment shall be free of roots or other woody vegetation, as well as oversized stones, rocks, organic material or other objectionable material. The embankment shall conform to Standard Specification Item No. 132, "Embankment".

Outlet crest elevation shall be at least 1 foot (300 mm) below the top of the embankment.

Sediment shall be removed and the trap restored to its original dimensions when the sediment has accumulated to 1/2 the design depth of the trap or 1 foot (300 mm), whichever is less. The sediment that is removed from the trap shall be deposited in an approved spoils area and in such a manner that it will not cause additional siltation.

The structure shall be inspected after each rain and repairs made as needed by the Contractor throughout the duration of this contract or until the Engineer or designated representative gives permission in writing to remove the structure.

The structure shall be removed and the area graded and re-seeded in conformance with Standard Specification Item No. 604, "Seeding for Erosion Control", when the drainage area has been properly stabilized.

624.5 Measurement

Acceptable work, that is performed as prescribed by this Standard Specification item, will be measured by the square yards (square meters: 1 square meter is equal to 1.196 square yards) of sediment trap constructed, removed and re-vegetated.

624.6 Payment

Work performed and materials furnished for this item will be paid at the unit bid price per square yard of sediment trap.

Payment will be made under:

Earth Outlet Sediment Trap	Per Square Yard.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 624, “EARTH OUTLET SEDIMENT TRAP”

City of Round Rock Standard Specifications

Designation	Description
Item No. 120	Clearing and Grubbing
Item No. 132	Embankment
Item No. 604	Seeding for Erosion Control

RELATED CROSS REFERENCE MATERIALS
Specification 624, “EARTH OUTLET SEDIMENT TRAP”

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	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. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 625
TEMPORARY GRADE STABILIZATION STRUCTURE

625.1 Description

This item shall govern the construction of a temporary channel lined with Hot Mix Asphaltic Concrete, Portland Cement concrete or comparable non-erodable material. The lining shall be placed to extend from the top of a slope to the bottom of a slope and to convey surface runoff safely down-slopes without causing erosion. The removal of the entire structure and the revegetation of the area after the permanent facilities are in place shall also be included in this item.

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.

625.2 Submittals

The submittal requirements for this specification item shall include:

A. Aggregate types, gradations and physical characteristics for the Portland cement concrete mix,
B. Aggregate types, gradations and physical characteristics for the Hot Mix Asphaltic Concrete mix,
C. Submittal items required in Standard Specification Item 591, "Riprap for Slope Protection".

625.3 Materials

A. Concrete

Portland Cement concrete shall conform to Class A, Item No. 403, "Concrete for Structures".

B. Hot Mix Asphaltic Concrete

Asphaltic concrete shall conform to Item No. 340, "Hot Mix Asphaltic Concrete Pavement".

C. Riprap

Rock or broken concrete riprap for energy dissipation shall not exceed 5 pounds each and shall conform to Item No. 591, "Riprap for Slope Protection".

D. Seeding

Seeding shall conform to Item No. 604, "Seeding for Erosion Control".

625.4 Construction Methods

The Contractor shall minimize the area disturbed during construction. Prior to placement of the Grade Stabilization Structure, all clearing, grubbing and subgrade preparation operations shall be completed conforming to Item No. 111, "Excavation".

Hot Mix Asphaltic Concrete work shall conform to Item No. 340, "Hot Mix Asphaltic Concrete".

Concrete work shall conform to Item No. 403, "Concrete for Structures" and to Item No. 591, "Riprap for Slope Protection".

At such time as the structure is no longer needed and with the approval of the Engineer or designated representative, the Contractor shall remove the entire structure and revegetate the disturbed area.

625.5 Measurement

Acceptable work performed as prescribed by this Standard Specification Item will be measured along the channel in lineal feet (lineal meters: a lineal meter is equal to 3.281 lineal feet).

625.6 Payment

Work performed and materials furnished for this item will be paid at the unit bid price per linear foot of channel. The unit bid price shall include all clearing, excavation, materials, placement, maintenance, removal and revegetation of disturbed areas.

Payment will be made under:

Grade Stabilization Structure	Per Linear Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 625 "TEMPORARY GRADE STABILIZATIN STRUCTURE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 111	Excavation
Item No. 340	Hot Mix Asphaltic Concrete Pavement
Item No. 403	Concrete for Structures
Item No. 591	Riprap for Slope Protection
Item No. 604	Seeding for Erosion Control

RELATED CROSS REFERENCE MATERIALS
Specification 625 "TEMPORARY GRADE STABILIZATIN STRUCTURE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 120	Channel Excavation
Item No. 132	Embankment
Item No. 401	Structural Excavation and Backfill
Item No. 404	Pneumatically Placed Concrete
Item No. 406	Reinforcing Steel
Item No. 408	Concrete Joint Material
Item No. 410	Concrete Structures
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	Preservation of Trees and Other Vegetation
Item No. 620	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
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 627
GRASS-LINED SWALE AND GRASS-LINED SWALE WITH STONE CENTER

627.1 Description

This item governs natural or man-made drainageways of parabolic or trapezoidal cross section that are located below adjacent ground level and are stabilized by suitable vegetation. 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.

627.2 Submittals

The submittal requirements for this specification item shall include:

A. The submittal requirements (if necessary) for Standard Specification Item Numbers 594, “Gabions and Revet Mattresses", 602, "Sodding for Erosion Control", 604, "Seeding for Erosion Control" and 605, "Soil Retention Blanket".

B. Aggregate types, gradations and physical characteristics for the Portland Cement Concrete mix,

627.3 Materials

A. Grass-lined Swale

1. Seed and Mulch

   Seed and mulch shall conform to Item No. 604, "Seeding for Erosion Control".

2. Sod

   Sodding shall conform to Item No. 602, "Sodding for Erosion Control".

3. Soil Retention Blanket

   The soil retention blanket shall conform to Standard Specification Item No. 605, "Soil Retention Blanket".

B. Stone Center

1. Concrete

   Concrete shall conform to Class A, Item No. 403, "Concrete for Structures".

2. Stone

   Stone shall be locally obtained with a weight (mass) range of 5 to 50 pounds (2.3 to 22.7 kilograms).

3. Revet Mattress

   The Revet Mattress shall meet the requirements for a Revet Mattress of Standard Specification Item No. 594, "Gabions and Revet Mattresses".

627.4 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. 132, "Embankment".

All soil and materials not needed to complete the swale shall be removed.

627.5 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 channel.

627.6 Payment

Work performed and materials furnished for this item shall be paid at the unit bid price per linear foot.

Payment will be made under:

Grass-Lined Swale	Per Lineal Foot
Grass-Lined Swale with Stone Center	Per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 627 "GRASS-LINED SWALE AND GRASS-LINED SWALE WITH STONE CENTER"

City of Round Rock Standard Specifications

Designation	Description
Item No. 132	Embankment
Item No. 403	Concrete for Structures
Item No. 594	Gabions and Revet Mattresses
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control
Item No. 605	Soil Retention Blanket

RELATAED CROSS REFERENCE MATERIALS
Specification 627 "GRASS-LINED SWALE AND GRASS-LINED SWALE WITH STONE CENTER"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 404	Pneumatically Placed Concrete
Item No. 406	Reinforcing Steel
Item No. 408	Concrete Joint Material
Item No. 410	Concrete Structures
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	Preservation of Trees and Other Vegetation
Item No. 620	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
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 628
SEDIMENT CONTAINMENT DIKES

628.1 Description

This item shall govern the provision and placement of temporary filtration dikes along or across such areas as indicated on the Drawings. This method shall be used during construction only and its purpose shall be to temporarily control erosion by intercepting and retaining sediment.

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.

628.2 Submittals

The submittal requirements for this specification item shall include:

A. Locations and Types of containment dikes (hay Bales, Triangular Sediment Filter Dike or Filter CurbInlet Protection).

B. Seeding
   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.
   4. Type and rate of application of fertilizer.

628.3 Materials

A. Hay Bales

"Hay Bales" shall be free of Johnson Grass or other noxious weeds. The bales shall consist of either hay or straw in good condition and be securely tied with wire. Stakes for anchoring bales shall be #4 (10M) reinforcing bars, 1/2 inch (12.5 mm) steel pickets or 2 x 2 inch (50 x 50 mm) wooden stakes. Hay bales shall be limited to drainage areas less than 1/2 acre (0.2 hectares).

B. Filter Dike

"Filter Dike" shall be prefabricated from 6x6-D2.9xD2.9 (150x150-MW19xMW19) WWF and 4.5 oz. (127 grams) non-woven polyester filter fabric securely fastened to WWF with galvanized shoat rings or j-clips. A 12-inch (300-mm) skirt shall be a continuous extension of the filter fabric on the upstream face.

The filter fabric shall extend beyond the dike joints to provide a 3-inch (75-mm) overlap. Ends of dike not lapped with filter fabric shall be plugged with filter fabric.

C. Filter Curb Inlet Protection

"Filter Curb Inlet Protection" shall be prefabricated from 4x4-W1.4xW1.4 (200x200-MW9xMW9) WWF and 4.5 oz. (127 grams) non-woven polyester filter fabric securely fastened to WWF with galvanized shoat rings or j-clips.

628.4 Construction Methods

The Contractor may select the material for the dikes, unless otherwise indicated, conforming to the details on the Drawings.

Bales shall be placed with ends tightly abutting adjacent bales. Each bale shall be embedded in the soil a minimum of 4 inches (100 mm) and a maximum of 6 inches (150 mm). Bales shall be securely anchored in place by a minimum of 2 stakes per bale. The first stake in each bale shall be angled toward the previously placed bale to force the bales together. Stakes shall be embedded in the soil a minimum of 1 1/2 feet (0.45 meters). Bales shall be replaced every 3 months or more often during wet periods.

For filter dikes the filters shall be placed with ends tightly abutting the adjacent filter. Each filter and skirt shall be securely anchored in place using 6 inch (150 mm) staples at a maximum spacing of 12 inches (300 mm) on center. Anchoring on impervious areas shall be accomplished with sand/gravel bags placed at 18 inches (450 mm) on center or with a nominal 1 inch by 4 inch (25 mm by 100 mm) board nailed at 18 inches (450 mm) on center.

For curb inlet protection a 12-inch (300-mm) skirt shall provide a continuous extension of the filter fabric beyond the front face of inlet opening and the filter fabric shall be continuously extended a minimum of 24-inch (600 mm) beyond each end of the inlet opening. A portion of the filter fabric shall be removed as shown on the Drawings or as directed by the Engineer or designated representative. The skirt and filter fabric extensions areas shall be anchored in place with sand/gravel bags placed at a maximum spacing of 36 inches (900 mm) on center.

Silt accumulation behind hay bales and triangular sediment filter dikes shall be removed at a maximum depth of 6 inches (150 mm) or when, in the opinion of the Engineer or designated representative, the structure ceases to function as intended. Silt accumulation behind filter dikes for curb inlet protection shall be removed at a maximum depth of 2 inches (50 mm).

All dikes shall be inspected by the Contractor at least monthly and after each rainfall. Dikes shall be repaired or replaced when necessary or as directed by the Engineer or designated representative.

After completion of construction or when directed by the Engineer or designated representative the dike shall be removed and the site re-graded to the final grades. Any depression shall be filled and any accumulations of silt shall be spread or removed to a permitted disposal area. After removal of the dike the area shall be graded and seeded conforming to Item No. 604, "Seeding for Erosion Control".

628.5 Measurement

The work performed and the materials furnished as prescribed by this item will be measured by the lineal foot (lineal meter: 1 lineal meter equals 3.281 lineal feet) of "Sediment Containment Dikes", complete in place.

Curb Inlet protection shall be considered subsidiary to a newly completed inlet unit, unless a Pay Item is included and identified in Contract Bid Form.

628.6 Payment

The work performed and materials furnished and measured as provided under "Measurement" will be paid for at the unit bid price per lineal foot of "Sediment Containment Dikes" indicated on the Drawings. The Unit bid price shall include full compensation for: (a) furnishing, hauling and placing all materials including all labor, tools, equipment and incidentals needed to complete the work, (b) the repair and/or replacement of materials, (c) the removal and disposal of all silt and debris and (d) the removal of all dikes, silt and debris after completion of construction or when directed by the Engineer or designated representative.

When indicated, payment for sediment containment will be made under:

Sediment Containment Dikes with hay bales	Per Lineal Foot.
Sediment Containment Dikes with filter fabric	Per Lineal Foot.
Filter Curb Inlet Protection (New Inlet)	Per each.
Filter Curb Inlet Protection (Existing Inlet)	Per each.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 628 "SEDIMENT CONTAINMENT DIKE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 604	Seeding for Erosion Control

RELATED CROSS REFERENCE MATERIALS
Specification 628 "SEDIMENT CONTAINMENT DIKE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 406	Reinforcing Steel
Item No. 602	Sodding for Erosion Control
Item No. 605	Soil Retention Blanket
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	Preservation of Trees and Other Vegetation
Item No. 620	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
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 629
BRUSH BERM BARRIER FOR EROSION CONTROL

629.1 Description

This item shall govern the provision and placement of brush along or across such areas as indicated on the Drawings. This method shall be used during construction only and its purpose shall be to temporarily control erosion by intercepting and retaining sediment. Included in this item is the maintenance, silt removal and removal of the entire structure and re-vegetation of the area.

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.

629.2 Submittals

The submittal requirements for this specification item shall include:

A. Identification of the type, source, mixture, pure live seed (PLS) and rate of application of the seeding,
B. Type of mulch,
C. Type of tacking agent, and
D. Type and rate of application of fertilizer.

629.3 Materials

A. Berm

The brush berm shall consist of freshly cut tree and shrub materials. Freshly cut tree branches, fully leaved are preferred. Dried materials or logs greater than 4 inches (100 mm) in diameter are not acceptable.

B. Anchorage

Reinforcement Bars: No. 5 (15M) conforming to Item No. 406, "Reinforcing Steel".

Stakes: wooden stakes or railroad spikes

Rope: 1/4 inch (6.25 mm) jute

C. Re-vegetation

Seeding shall conform to Item No. 604, "Seeding for Erosion Control".

629.4 Construction Methods

The brush shall be placed in lifts not exceeding 5 feet (1.5 meters) in height with the longitudinal axis of the brush placed perpendicular to the flow of water. The material shall be placed so that the brush overlaps to provide a uniform section for the entire length of the berm. Each lift shall be compacted by rolling with construction equipment or other approved methods until reduced to approximately 1/3 its original height or as directed by the Engineer or designated representative.

Brush berms will be securely anchored using 36 inch (0.9 meter) long reinforcement bars driven into the ground and rope tied across the berm on soft material or material with stones. When in rock, railroad spikes will be driven into the rock on 4 foot (1.2 meter) centers and rope tied across the berm. In stiff clay soil, 18 inch (450 mm) wooden stakes shall be driven into the ground on 4 foot (1.2 meter) centers and rope tied across the berm to anchor the brush berm. When directed by the Engineer or designated representative, the brush shall be placed in a trench, a minimum of 6 inches (150 mm) deep and/or reinforcing bars placed 5 feet (1.5 meter) on centers embedded a minimum of 18 inches (450 mm) in the ground to secure the berm from movement.

Inspections will be made by Contractor following each rainfall and necessary repairs will be made to assure the berm will function as intended. When silt reaches a depth equal to 1/3 the height of the berm or 1 foot (300 mm) whichever is less, the silt shall be removed and disposed of on an approved site and in such a manner as to not create a siltation problem.

When the site is completely stabilized, the brush will be removed and disposed of in a manner approved by the Engineer or designated representative and the disturbed areas seeded.

629.5 Measurement

The work performed and the materials furnished as prescribed in this item will be measured by the lineal foot (lineal meter: 1 lineal meter equals 3.281 lineal feet) of "Brush Berm Barrier for Erosion Control", complete in place.

629.6 Payment

The work performed and materials furnished and measured as provided under "Measurement" will be paid for at the unit bid price per lineal foot of brush berm barrier as indicated on the Drawings. The Unit Bid Price shall include full compensation for: (a) furnishing, hauling and placing all materials including all labor, tools, equipment and incidentals needed to complete the work, (b) maintaining the berm, (c) removing silt accumulations, (d) removing and disposing of all materials when the berm is no longer required and (e) re-vegetating the site upon removal of the berm.

Payment will be made under:

Brush Berm Barrier for Erosion Control	Per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 629, “BRUSH BERM BARRIER FOR EROSION CONTROL"

City of Round Rock Standard Specifications

Designation	Description
Item No. 406	Reinforcing Steel
Item No. 604	Seeding for Erosion Control

RELATED CROSS REFERENCE MATERIALS
Specification 629, “BRUSH BERM BARRIER FOR EROSION CONTROL"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 602	Sodding for Erosion Control
Item No. 605	Soil Retention Blanket
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	Preservation of Trees and Other Vegetation
Item No. 620	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
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 630
INTERCEPTOR DIKE

630.1 Description

This item shall consist of a temporary ridge of compacted soil, located across disturbed areas or rights of way. The purpose of an interceptor dike is to shorten the length of exposed slopes, thereby reducing the potential for erosion, by intercepting storm runoff and diverting it to a stabilized outlet or sediment trapping device The removal of the entire structure and re-vegetation of the area are also included in this item.

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.

630.2 Submittals

The submittal requirements for this specification item shall include:

A. Characteristics (LL, PI, maximum density, etc.) of proposed embankment material;
B. Identification of the type, source, mixture, pure live seed (PLS) and rate of application of the seeding;
C. Type, chemical analysis and rate of application of fertilizer;
D. The sprinkling plan including application rate, pattern of sprinkling and scheduled times of application.

630.3 Materials

Seeding for re-vegetation shall conform to Item No. 604, "Seeding for Erosion Control".

630.4 Construction Methods

Interceptor dikes are constructed across disturbed rights of way such as for utility lines and streets or disturbed areas such as graded parking lots or landfills. The dikes shall remain in place until the disturbed areas are permanently stabilized.

All trees, brush, stumps, obstructions and other objectionable material shall be removed and disposed in such a manner that will not interfere with the excavation and construction of the dike as indicated on the Drawings. The dike shall not drain onto public right of way.

Interceptor Dikes will be constructed in the following method:

A. Dikes shall be machine compacted.
B. Diversion dikes shall have positive drainage to an outlet.
C. Top width may be wider and side slopes may be flatter than the slopes indicated on the Drawings to facilitate crossing by construction traffic.
D. Field location may be adjusted as needed to utilize a stabilized safe outlet.

Interceptor Dikes shall have an outlet that functions with a minimum of erosion. Runoff shall be conveyed to a sediment-trapping device, such as a sediment trap or a sediment

basin, when either the Interceptor Dike channel or the drainage area above the dike are not adequately stabilized.

Unless otherwise indicated on the Drawings, stabilization shall conform to Item No. 591, "Riprap for Slope Protection" and/or Item No. 627, "Grass-Lined Swales and Grass-Lined Swales with Stone Center". Riprap, when used, shall be placed in a 3-inch (75 mm) thick layer and embedded into the soil as indicated on the Drawings.

The structure shall be inspected monthly and after every rainfall. Repairs shall be made by the Contractor as needed throughout the duration of this contract or until the Engineer or designated representative issues written permission to remove the structure.

630.5 Measurement

Acceptable work performed as prescribed by this item will be measured by the lineal foot along the 2-foot (0.6 meter) minimum top width, complete in place.

630.6 Payment

The work performed and material furnished for this item as provided under "Measurement" will be paid for at the unit bid price per lineal foot. The Unit Bid Price shall include full compensation for (a) furnishing, hauling and placing all materials including all labor, tools, equipment and incidentals needed to complete the work, (b) maintaining the dike, removing any silt accumulations; (c) removing, regrading and disposing of all materials when the dike is no longer required and (d) re-vegetating the site upon removal of the dike.

Payment will be made under:

Interceptor Dike	Per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 630 "INTERCEPTOR DIKE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 606	Fertilizer
Item No. 627	Grass-Lined Swales and Grass-Lined Swales with Stone Center

RELATED CROSS REFERENCE MATERIALS
Specification 630 "INTERCEPTOR DIKE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 132	Embankment
Item No. 201	Subgrade Preparation
Item No. 601	Salvaging and Placing Topsoil
Item No. 605	Soil Retention Blanket
Item No. 607	Slope Stabilization
Item No. 621	Diversion (Temporary)

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. 166	Fertilizer
Item No. 168	Vegetative Watering

ITEM NO. 631
INTERCEPTOR SWALE

631.1 Description

This Standard Specification Item governs a temporary excavated drainage way that is located across disturbed areas or rights or way. The purpose of an interceptor swale is to shorten the length of exposed slopes, thereby reducing the potential for erosion, by intercepting storm runoff and diverting it to a stabilized outlet or sediment-trapping device. This item shall also include removal of the "Interceptor Swale" and re-vegetation of the area.

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.

631.2 Submittals

The submittal requirements for this specification item shall include:

A. The dry riprap submittal shall include:

1. Type, size and source of rock,
2. Filter fabric, and
3. Construction details.

B. The seeding submittal shall include:

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.

631.3 Materials

A. Stabilization

Dry riprap shall conform to the requirements for Dry Riprap (Section 591S.5) of Standard Specification Item No. 591, "Riprap for Slope Protection".

B. Seeding

Seeding shall conform to Item No. 604, "Seeding for Erosion Control".

631.4 Construction Methods

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 swale, as indicated on the Drawings.

The swale shall be excavated or shaped to line, grade and cross section as required to meet the criteria specified herein and on the Drawings, and shall be free of bank projections or other irregularities which could impede normal flow.

All earth, that is removed and not needed in construction, shall be disposed of at an approved spoils site so that it will not interfere with the function of the swale.

"Interceptor Swale" shall have a level bottom and shall have an outlet that functions with a minimum of erosion.

Runoff shall be conveyed to a sediment-trapping device, as indicated on the Drawings.

Stabilization, when required, shall conform to Standard Specification Item No. 591, "Riprap for Slope Protection" and/or Standard Specification Item No. 627, "Grass-Lined Swale and Grass-Lined Swale with Stone Center".

The structure shall be inspected monthly and after each rainfall. Repairs shall be made by the Contractor, as needed throughout the duration of this Contract or until the Engineer or designated representative issues written permission to remove the structure.

631.5 Measurement

Acceptable work performed as prescribed by this Standard Specification item will be measured by the lineal foot (lineal meter: 1 lineal meter equals 3.281 lineal feet) along the 2-foot (0.6 meter) minimum top width, complete in place.

631.6 Payment

Work performed and materials furnished for this item as provided under "Measurement" will be paid for at the unit bid price per lineal foot. The Unit Bid Price shall include full compensation for: (a) furnishing, hauling and placing all materials including all labor, toots, equipment and the incidentals needed to complete the work, (b) maintaining the dike, (c) removing any silt accumulations; (d) removing, regrading and disposing of all materials when the dike is no longer required and (e) re-vegetating the area upon removal of the dike.

Payment will be made under:

Interceptor Swale - Per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 631, “INTERCEPTOR SWALE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 591	Riprap for Slope Protection
Item No. 604	Seeding for Erosion Control

RELATED CROSS REFERENCE MATERIALS
Specification 631, “INTERCEPTOR SWALE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 602	Sodding for Erosion Control
Item No. 605	Soil Retention Blanket
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	Preservation of Trees and Other Vegetation
Item No. 620	Filter Fabric
Item No. 621	Diversion
Item No. 627	Grass-Lined Swale and Grass-Lined Swale With Stone Center
Item No. 636	Perimeter Swale

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. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

TEM NO. 632
STORM INLET SEDIMENT TRAP

632.1 Description

This item governs the construction of a temporary silt basin around a drainage structure, the maintenance of the trap, the removal of silt accumulations until the trap is no longer required, the restoration of the area to the final grade and the re-vegetation of the disturbed area.

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.

632.2 Submittals

The submittal requirements for this specification item shall include:

A. Locations and Types of inlet traps (yard or curb drain).

B. Seeding

1. Identification of the type, source, mixture, pure Live Seed (PLS) and rate of application,
2. Type of mulch,
3. Type of tacking agent, and
4. Type and rate of application of fertilizer.

632.3 Materials

A. Seeding

Seeding for re-vegetation shall conform to Standard Specification Item No. 604, "Seeding for Erosion Control".

B. Embankment

Embankment shall conform to Standard Specification Item No. 132, "Embankment".

632.4 Construction Methods

The area under the embankment shall be cleared, grubbed and stripped of any vegetation and root material in conformance with Standard Specification Item 102, "Clearing and Grubbing".

Construction operations shall be carried out in such a manner that erosion and water pollution shall be minimized.

Sediment shall be removed and the trap shall be restored to its original dimensions when the sediment has accumulated to 1/2 the design depth of the trap. The sediment, that is removed, shall be deposited in an approved area and in such a manner that it will not erode.

The structure shall be inspected monthly and after each rain and repairs made as needed by the Contractor throughout the duration of this contract or until the Engineer or designated representative provides written permission to remove the structure.

When the trap is no longer required, the Contractor shall remove the silt accumulation and backfill the trap in accordance with Standard Specification Item No. 130, "Borrow" or Standard Specification Item No. 132, "Embankment". Any material placed shall be compacted in 8-inch (200 mm) lifts, loose measure and compacted to the required density by mechanical means.

The temporary Storm Inlet Sediment Trap shall be removed, when directed by the Engineer or designated representative, and the area leveled off and protected by erosion control measures appropriate for the terrain as indicated on the Drawings. Permanent Storm Inlet Sediment Traps shall be seeded and comply with all the requirements for Item No. 604, "Seeding for Erosion Control".

632.5 Measurement

Acceptable work performed as prescribed by this item will be measured by the cubic foot (cubic meter: 1 cubic meter equals 35.31 cubic feet) of sediment trap complete in place.

632.6 Payment

The Work performed and the materials furnished for this item as provided under "Measurement" will be paid for at the unit bid price per cubic foot of sediment trap constructed. The Unit Bid Price shall include full compensation for: (a) furnishing, hauling and placing all materials including all labor, tools, equipment and the incidentals needed to complete the work, (b) maintaining the trap, (c) removing any silt accumulations, (d) removing, regrading and disposing of all silt and debris, (e) regrading and placing embankment and (f) re-vegetation of area upon removal of the trap.

Payment will be made under:

Storm Inlet Sediment Trap - Per Cubic Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 632, “STORM INLET SEDIMENT TRAP"

City of Round Rock Standard Specifications

Designation	Description
Item No. 102	Clearing and Grubbing
Item No. 130	Borrow
Item No. 132	Embankment
Item No. 604	Seeding for Erosion Control

RELATED CROSS REFERENCE MATERIALS
Specification 632, “STORM INLET SEDIMENT TRAP"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 602	Sodding for Erosion Control
Item No. 605	Soil Retention Blanket
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	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. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 633
LANDGRADING

633.1 Description

This item shall govern reshaping the existing topography in accordance with the Drawings. 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.

633.2 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.

633.3 Materials

A. Seeding

Seeding shall conform to Item No. 604, "Seeding for Erosion Control".

B. Pipe Underdrains

Pipe underdrains shall conform to Item No. 551, "Pipe Underdrains".

633.4 Construction Methods

ll 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 (except for trees shown to remain), vegetation, roots and other objectionable material as required by Standard Specification Item No. 102, "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".

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 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. 132, "Embankment". All graded areas shall be permanently stabilized and seeded immediately following finished grading.

633.5 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.

633.6 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 one of the following:

Landgrading -	Per Square Foot.
Landgrading -	Per Acre.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 633, “LANDGRADING (LG) "

City of Round Rock Standard Specifications

Designation	Description
Item No. 102	Clearing and Grubbing
Item No. 132	Embankment
Item No. 551	Pipe Underdrains
Item No. 604	Seeding for Erosion Control

RELATED CROSS REFERENCE MATERIALS
Specification 633, “LANDGRADING (LG) "

City of Round Rock Standard Details

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 602	Sodding for Erosion Control
Item No. 605	Soil Retention Blanket

RELATED CROSS REFERENCE MATERIALS - continued
Specification 633, “LANDGRADING (LG) "

Designation	Description
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	Preservation of Trees and Other Vegetation
Item No. 620	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
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 634
LEVEL SPREADER

634.1 Description

This item governs furnishing and installing an entrance channel conversion to sheet flow without causing erosion to existing vegetation.

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.

634.2 Submittals

The submittal requirements for this specification item shall include:

A. The source, material type and classification, density and moisture requirements of the embankment materials

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

634.3 Materials

A. Filter Fabric

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

B. Backfill

Fill shall conform to Item No. 132, "Embankment".

634.4 Construction Methods

Level Spreader shall be constructed level to insure uniform spreading of sediment-free runoff. The Level Spreader shall be constructed on undisturbed soil. A filter fabric erosion stop shall be placed vertically at least 6 inches (150 mm) deep in a silt trench 1 foot (300 mm) back from the level lip and parallel to the lip. The entire level lip area shall be protected by 2 strips of "Soil Retention Blanket" (Standard Specification Item 605). The entrance channel shall not exceed a 1 percent grade before extending the spreader. All groundcover shall be re-established and construction areas stabilized.

The structure shall be inspected monthly and after each rainfall. Repairs shall be made by the Contractor, as needed, throughout the duration of the contract or until the Engineer or designated representative provides written permission to remove the structure.

634.5 Measurement

Measurement of the Level Spreader as prescribed by this item will be by the square foot (square meters: 1 square meter equals 10.764 square feet) of the bottom channel.

634.6 Payment

Work performed and material furnished or prescribed by this item and measured as provided under "Measurement" will be paid for at the unit bid price per square foot of the bottom channel.

Payment will be made under:

Level Spreader	Per Square Foot of Bottom Channel.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 634, “LEVEL SPREADER "

City of Round Rock Standard Specifications

Designation	Description
Item No. 132	Embankment
Item No. 605	Soil Retention Blanket
Item No. 620	Filter Fabric

RELATED CROSS REFERENCE MATERIALS
Specification 633, “LANDGRADING (LG) "

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	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. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 635
PERIMETER DIKE

635.1 Description

This item shall govern construction of a temporary ridge of compacted soil located along the perimeter of the site or disturbed area. The purpose of a perimeter dike is to prevent offsite storm runoff from entering the disturbed area and to prevent sediment-laden storm runoff from leaving the construction site or disturbed area.

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.

635.2 Submittals

The submittal requirements for this specification item shall include:

A. The Dry Riprap submittal shall include:

1. Type, size and source of rock,
2. Filter fabric, and
3. Construction details.

B. The seeding submittal shall include:

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.

635.3 Materials

A. Riprap

Riprap for stabilization shall conform to Dry Riprap, Item No. 591, "Riprap for Slope Protection".

B. Seeding

Seeding shall conform to Item No. 604, "Seeding for Erosion Control".

635.4 Construction Methods

All trees, brush, stumps, obstructions and other objectionable material shall be removed and disposed of in a manner that will not interfere with the excavation and construction of the dike as indicated on the Drawings. The dike shall not drain onto public right of way.

All perimeter dikes shall be machine compacted to the extent necessary to provide not less than 95 percent density conforming to TxDoT Test Method Tex-114-E and shall have positive drainage to an outlet. Diverted runoff from a protected or stabilized upland area shall flow directly onto an undisturbed stabilized area or into a level

spreader (Standard Specification Item No. 634) or grade stabilization structure (Standard Specification Item No. 625).

Diverted runoff from a disturbed or exposed upland area shall be conveyed to a sediment-trapping device such as sediment trap, a sediment basin or to an area protected by any of these practices. Unless otherwise indicated on the Drawings, stabilization shall conform to Item No. 591, "Riprap for Slope Protection" and/or Item No. 627, "Grass-Lined Swale and Grass-Lined Swale with Stone Center". Riprap, when used, shall be placed in a uniform layer embedded in the soil.

The structure shall be inspected monthly and after each rainfall. Repairs shall be made by the Contractor, as needed, throughout the duration of the contract or until the Engineer or designated representative provides written permission to remove the structure.

635.5 Measurement

Acceptable work performed as prescribed by this item will be measured by the lineal foot (lineal meter: 1 lineal meter equals 3.281 lineal feet) along the centerline of the 2-foot (0.6 meter) minimum top width.

635.6 Payment

Work performed and material furnished for this item will be paid for at the unit bid price per lineal foot.

Payment will be made under:

Perimeter Dike - Per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 635, “PERIMETER DIKE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 591	Riprap for Slope Protection
Item No. 604	Seeding for Erosion Control
Item No. 625	Grade Stabilization Structure
Item No. 627	Grass-Lined Swale and Grass-Lined Swale with Stone Center
Item No. 634	Level Spreader

Texas Department of Transportation: Manual of Testing Procedures

Designation	Description
Test Method Tex-114-E	Laboratory Compaction Characteristics And Moisture-Density Relationship of Subgrade and Embankment Soils

RELATED CROSS REFERENCE MATERIALS

Specification 635, “PERIMETER DIKE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 602	Sodding for Erosion Control
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	Preservation of Trees and Other Vegetation
Item No. 622	Diversion Dike (DD)
Item No. 630	Interceptor Dike (ID)
Item No. 636	Perimeter Swale (PS)

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. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 636
PERIMETER SWALE

636.1 Description

This item shall govern construction of a temporary excavated drainageway located along the perimeter of the site or disturbed area. The purpose of a perimeter swale is to prevent offsite runoff from entering the disturbed area and to prevent sediment-laden runoff from leaving the construction site or disturbed area. This item shall also include removal of the "Perimeter Swale" and re-vegetation of the area.

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.

636.2 Submittals

The submittal requirements for this specification item shall include:

A. Coarse Aggregate, Grade 1 shall include source, gradation and characteristics of the proposed aggregate [Section 403.2 (3) of Standard Specification Item 403].

B. The Dry Riprap submittal shall include:

1. Type, size and source of rock,
2. Filter fabric, and
3. Construction details.

C. The seeding submittal shall include:

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.
4. Type and rate of application of fertilizer.

636.3 Materials

A. Stabilization

Stabilization shall conform to Coarse Aggregate, Grade 1, under Standard Specification Item No. 403, "Concrete for Structures". Riprap for vehicle crossings shall conform to the requirements for Dry Riprap (Section 591.5) of Standard Specification Item No. 591, "Riprap for Slope Protection".

B. Seeding

Seeding shall conform to Item No. 604, "Seeding for Erosion Control".

636.4 Construction Methods

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 swale.

The swale shall be excavated or shaped to lines, grades and cross sections indicated on the Drawings and shall be free of bank projections or other irregularities which will impede normal flow.

All earth that is removed and not needed in construction shall be disposed of at an approved spoils site so that it will not interfere with the functioning of the swale.

Stabilization shall conform to Coarse Aggregates, Grade 1, (Standard Specification Item No. 403, "Concrete for Structures") in a layer at least 3 inches (75 mm) in thickness and embedded into the soil. The lining shall extend across the bottom and up both sides of the channel to a height of at least 8 inches (200 mm) vertically above the bottom.

At all points where several vehicle crossings will be made per day, the swale shall be stabilized in accordance with Standard Specification Item No. 591, "Dry Riprap", except the stone lining shall be at least 6 inches (150 mm) in thickness for the full width of the traffic crossing roadway.

The structure shall be inspected monthly and after each rainfall. Repairs shall be made by the Contractor, as needed, throughout the duration of the contract or until the Engineer or designated representative provides written permission to remove the structure.

636.5 Measurement

Acceptable work performed as prescribed in this item shall be measured by the lineal foot (lineal meter: 1 lineal meter equals 3.281 lineal feet) along the 4-foot (1.2 meter) minimum bottom width.

636.6 Payment

Work performed and material furnished for this item will be paid for at the unit bid price per lineal foot. The Unit Bid Price shall include full compensation for: (a) furnishing, hauling and placing all materials including all labor, toots, equipment and the incidentals needed to complete the work, (b) maintaining the dike, (c) removing any silt accumulations; (d) removing, re-grading and disposing of all materials when the dike is no longer required and (e) re-vegetating the area upon removal of the dike.

Payment will be made under:

Perimeter Swale - Per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 636, “PERIMTER SWALE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 403	Concrete for Structures
Item No. 591	Riprap for Slope Protection
Item No. 604	Seeding for Erosion Control

RELATED CROSS REFERENCE MATERIALS
Specification 636, “PERIMTER SWALE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 602	Sodding for Erosion Control
Item No. 605	Soil Retention Blanket
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	Preservation of Trees and Other Vegetation
Item No. 620	Filter Fabric
Item No. 621	Diversion
Item No. 627	Grass-Lined Swale and Grass-Lined Swale With Stone Center
Item No. 631	Interceptor Swale

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. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 637
PIPE SLOPE DRAIN

637.1 Description

This item governs the installation of a flexible tubing and/or rigid pipe with a prefabricated entrance section that is temporarily placed to extend from the top to the bottom of a slope. The purpose of the pipe slope drain is to convey surface runoff safely down slopes without causing erosion.

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.

637.2 Submittals

The submittal requirements for this specification item shall include:

A. The Dry Riprap submittal shall include:

1. Type, size and source of rock,
2. Filter fabric, and
3. Construction details.

B. The pipe and inlet pipe submittal shall include:

1. Size, properties, banding, etc for the Corrugated Metal Pipe.
2. Size, properties, and installation details and instructions.

637.3 Materials

A. Pipe and Inlet Pipe

The pipe and inlet pipe shall be corrugated metal pipe (Standard Specification Item 510, "Pipe") with watertight connecting bands of the size indicated on the Drawings.

B. Flexible Tubing

The flexible tubing shall be the same diameter as the inlet pipe and shall be constructed of a durable material with hold-down grommets spaced 10 feet (3 meters) on centers.

C. Riprap

Riprap area shall consist of 6 inch (150 mm) stone and shall meet the requirements for Dry Riprap (Section 591.5) of Standard Specification Item No. 591, "Riprap for Slope Protection" .

637.4 Construction Methods - Flexible

All trees, brush, stumps, obstructions and other objectionable material shall be removed and disposed in a manner that will not interfere with the excavation and construction of the drain as indicated on the Drawings. The drain shall not drain onto the public right of way.

The top of the earth dike over the inlet pipe and those dikes carrying water to the pipe shall be at least 1 foot higher at all points than the top of the inlet pipe.

The pipe slope drain shall be of the type indicated on the Drawings and constructed to the details indicated on the Drawings.

The flexible tubing shall be securely fastened to the corrugated metal pipe with metal strapping or watertight connecting collars. The flexible tubing shall be securely anchored to the slope by staking at the grommets provided.

A riprap apron shall be provided at the outlet, as indicated on the Drawings and/or Standard Details.

The structure shall be inspected monthly and after each rainfall. Sediment buildup shall be removed and repairs shall be made by the Contractor, as needed, throughout the duration of the contract or until the Engineer or designated representative provides written permission to remove the structure.

637.5 Measurement

Acceptable work performed as prescribed by this item will be measured per each.

637.6 Payment

Work performed and materials furnished for this item will be paid for at the unit price per each.

Payment will be made under:

Pipe Slope Drain	Per Each.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 637, “PIPE SLOPE DRAIN"

City of Round Rock Standard Specifications

Designation	Description
Item No. 591	Riprap for Slope Protection
Item No. 510	Pipe
Item No. 604	Seeding for Erosion Control

RELATED CROSS REFERENCE MATERIALS
Specification 637, “PIPE SLOPE DRAIN"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 602	Sodding for Erosion Control

RELATED CROSS REFERENCE MATERIALS - continued
Specification 637, “PIPE SLOPE DRAIN"

Designation	Description
Item No. 605	Soil Retention Blanket
Item No. 606	Planting
Item No. 610	Preservation of Trees and Other Vegetation
Item No. 620	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
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 638
PIPE OUTLET SEDIMENT TRAP

638.1 Description

This item shall govern construction of a basin formed by an embankment or excavation along with an embankment at the point of discharge of the pipe. The outlet for the trap shall be through a perforated riser and a pipe through the embankment.

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.

638.2 Submittals

The submittal requirements for this specification item shall include the Size, properties, banding, installation details and instructions for the corrugated metal pipe for the pipe and pipe riser.

638.3 Materials

Corrugated metal pipe shall be used with diameter selected from the following table:

Minimum Pipe Diameter		Maximum Drainage Area	
Inches	millimeters	Acres	Hectares
12	300	1	0.4
18	450	2	0.8
21	525	3	1.2
24	600	4	1.6
30	750	5	2.0

638.4 Construction Methods

All trees, brush, stumps, obstructions and other objectionable material shall be removed and disposed of in a manner that will not interfere with the excavation and construction of the trap as indicated on the Drawings. The trap shall not drain onto public right of way.

All excavation operations shall be carried out in such a manner that erosion and water pollution shall be minimal. Any excavated portion of sediment trap shall have 2:1 or flatter slopes.

All pipe connections shall be watertight.

At least the top 2/3 of the riser shall be perforated with 1/2 inch (12.5 mm) diameter holes spaced 8 inches (200 mm) vertically and 10 to 12 inches (250 to 300 mm) horizontally.

Fill material around the pipe spillway shall be compacted in 4 inch (100 mm) layers. A minimum of 2 feet (0.6 meter) of compacted backfill shall be placed over the pipe spillway before crossing it with construction equipment.

The fill material for the embankment shall be free of roots or other woody vegetation, as well as oversized stones, rocks, organic material or other objectionable material. The embankment shall be compacted by traversing with mechanical equipment while it is being constructed.

The structure shall be inspected monthly and after each rainfall. Repairs shall be made by the Contractor, as needed, throughout the duration of the contract or until the Engineer or designated representative provides written permission to remove the structure.

Sediment shall be removed and trap restored to its original dimensions when the sediment has accumulated to 1/2 the design depth of the trap or 1 foot (300 mm), whichever is less. The sediment that is removed shall be deposited in an approved area and in such a manner that it will not erode.

The structure shall be removed and area restored and vegetated when the drainage area has been properly stabilized.

638.5 Measurement

Acceptable work performed as prescribed by this item will be measured by the square yard (square meter: 1 square meter equals 1.196 square yards) of sediment trap constructed.

638.6 Payment

Work performed and materials furnished for this structure will be paid for at the unit bid price per square yard of sediment trap constructed.

Payment will be made under:

Pipe Outlet Sediment Trap - Per Square Yard.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 638, “PIPE OUTLET SEDIMENT TRAP"

City of Round Rock Standard Specifications

Designation	Description
Item No. 510	Pipe

RELATED CROSS REFERENCE MATERIALS
Specification 638, “PIPE OUTLET SEDIMENT TRAP"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 602	Sodding for Erosion Control
Item No. 605	Soil Retention Blanket
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	Preservation of Trees and Other Vegetation
Item No. 620	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
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 639
ROCK BERM

639.1 Description

This item shall govern the construction of a temporary berm of open graded rock that is installed at the toe of a slope on the perimeter of a developing area. The purpose of a rock berm is to intercept sediment-laden water from unprotected areas, to retain the sediment and to release the water in sheet flow. This item shall also govern the removal of the "Rock Berm" and re-vegetation of the area.

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.

639.2 Submittals

The submittal requirements for this specification item shall include:

A. Function (stream flow or other) and dimensions of the rock berm

B. Source, type and gradation of rock

C. Re-vegetation program, 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.
4. Type and rate of application of fertilizer.

639.3 Design Criteria

A rock berm shall be constructed near the perimeter of a disturbed site within the development area. It is not to be constructed outside the property lines without obtaining an easement or written permission from the affected adjacent property owners.

A detailed design is not required for the installation of a rock berm; however, the following criteria shall be observed:

Drainage area	-	less than 5 acres (2 hectares).
Height	-	18 inches (450 mm) minimum height, measured vertically from the top of the existing ground at the upslope toe to the top of the berm.
Top width	-	2 feet (0.6 meter) minimum.
Side slopes	-	2:1 or flatter.
Grade	-	Berms will be built along a contour as near possible to a 0 percent grade.

639.4 Materials

Surplus rock excavated from utility trenches or from other excavations may be used in

construction of these berms. In general, the rocks shall be sound with a minimum of 3 inches (75 mm) in smallest dimension and shall weigh between 10 and 30 pounds (4.5 to 13.6 kilograms) each. Seeding for re-vegetation shall conform to Item No. 604, "Seeding for Erosion Control".

Use only open-graded rock of the size indicated on the Drawings, with most of the fines removed.

639.5 Construction Methods

All trees, brush, stumps and objectionable material shall be removed and disposed in a manner that will not interfere with the construction of the berm.

A trench shall be excavated to a minimum depth of 4 inches (100 mm) below existing grade for placement of the rock as indicated the Drawings. The rocks shall be placed in interlocking layers with close joints starting at the base. Open joints shall be filled with rock-spalled materials as required to stabilize the berm.

The area upstream from the rock berm shall be maintained in a condition which will allow sediment to be removed following the runoff from a rainfall event. After each rainfall event of 1 inch (25 mm) or more, an inspection of the rock berm will be made by the Contractor and the stone shall be replaced when the structure ceases to function as intended because of silt accumulation among the rocks, washout, construction traffic damage, etc.

When the silt reaches a depth equal to 1/3 the height of the berm or 6 inches (150 mm), whichever is less, the Contractor will remove the accumulated silt and dispose of it at an approved disposal site in a manner that will not contribute to additional siltation. The berm will be reshaped as needed during construction.

When the site is completely stabilized, the berm will be removed and disposed of in a manner approved by the Engineer or designated representative.

The area will be re-vegetated as required by Item No. 604, "Seeding for Erosion Control".

639.6 Measurement

Acceptable work performed and prescribed in this item will be measured by the linear foot (lineal meter: 1 lineal meter equals 3.281 lineal feet) along the centerline of top of berm.

639.7 Payment

The work performed and material furnished and measured as provided under "Measurement" to construct this item will be paid for at the unit bid price per linear foot of rock berm barrier as indicated on the Drawings. The Unit Bid Price shall include full compensation for: (a) furnishing, hauling and placing all materials including all labor, tools, equipment and incidentals needed to complete the work, (b) maintaining the berm, (c) removing silt accumulations, (d) rock replacement, (e) removing and disposing of all materials when the berm is no longer required and (f) re-vegetating the site upon removal of the berm.

Payment will be made under:

Rock Berm	Per Lineal Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 639, “ROCK BERM"

City of Round Rock Standard Specifications

Designation	Description
Item No. 604	Seeding for Erosion Control

RELATED CROSS REFERENCE MATERIALS
Specification 639, “ROCK BERM"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 602	Sodding for Erosion Control
Item No. 605	Soil Retention Blanket
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	Preservation of Trees and Other Vegetation
Item No. 620	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
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket
Item No. 204	Sprinkling

ITEM NO. 640
MOTARED ROCK WALL

640.1 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 of 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.

640.2 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.

640.3 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.

640.4 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 40ºF (4ºC) 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 considered subsidiary to 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.

640.5 Measurement

Mortared rock wall will be measured by the square foot (square meter: 1 square meter equals 10.76 square feet) of the exposed face of wall. No measurement will be made for concrete footing and shall be considered subsidiary to the rock wall construction.

640.6 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:

Mortared Rock Wall	Per Square Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 640, “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

RELATED CROSS REFERENCE MATERIALS
Specification 640, “MORTARED ROCK WALL"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 403	Concrete for Structures
Item No. 405	Concrete Admixtures
Item No. 406	Reinforcing Steel
Item No. 606	Fertilizer
Item No. 608	Planting
Item No. 610	Preservation of Trees and Other Vegetation
Item No. 620	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

ITEM NO. 641
STABILIZED CONSTRUCTION ENTRANCE

641.1 Description

This item governs the construction of a stabilized pad of crushed stone located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking or deposition of sediment onto public right of way or paved areas.

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.

641.2 Submittals

The submittal requirements for this specification item shall include:

A. Source, type and gradation of rock

B. Drainage technique (i.e. drainage swale or entrance grading) proposed to prevent runoff from exiting the construction site.

641.3 Materials

Aggregate for construction shall conform to the following gradation:

Table 1: Aggregate Gradation Chart (TEX 401-A, % Retained per sieve)	
US 5 inch (SI 125 mm)	US 2 inch (SI 50 mm)
0	100

641.4 Construction Methods

All trees, brush, stumps, obstructions and other objectionable material shall be removed and disposed of in a manner that will not interfere with the excavation and construction of the entrance as indicated on the Drawings. The entrance shall not drain onto public right of way or shall not allow surface water runoff to exit the construction site.

When necessary, vehicle wheels shall be cleaned to remove sediment prior to entrance onto paved areas or public right of way. When vehicle washing is required, it shall be done on an area stabilized with crushed stone, which drains into an approved sediment trap or sediment basin. All sediment shall be prevented from entering any storm drain, ditch or watercourse through use of sand bags, gravel, boards, silt fence (Standard Specification Item No 642) or other methods approved by the Engineer or designated representative.

The entrance shall be maintained in a condition that will prevent tracking or disposition of sediment onto paved areas or public right of way. This restriction may require

periodic top dressing with additional stone as conditions demand, as well as the repair and/or cleanout of any measures used to trap sediment. All sediment that is spilled, dropped, washed or tracked onto paved areas or public right of way must be removed immediately.

641.5 Measurement

Acceptable work performed as prescribed in this item will be measured by unit of each stabilized construction entrance installed.

641.6 Payment

Work performed and materials furnished under this item shall be paid for at the unit bid price per each.

Payment, when included as a contract pay item, will be made under:

Stabilized Construction Entrance — Per Each.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 641, “STABILIZATION CONTRUCTION ENTRANCE (SCE)"

City of Round Rock Standard Specifications

Designation	Description
Item No. 642	Silt Fence (SF)

RELATED CROSS REFERENCE MATERIALS
Specification 641, “STABILIZATION CONTRUCTION ENTRANCE (SCE)"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 610	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. 168	Vegetative Watering

ITEM NO. 642
SILT FENCE

642.1 Description

This item shall govern the provision and placement of a filter fabric fence including maintenance of the fence, removal of accumulated silt and removal of the silt fence upon completion of the project.

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.

642.2 Submittals

The submittal requirements for this specification item shall include:

A. Source, manufacturer, characteristics and test data for the filter fabric,
B. Manufacturer, characteristics and test data for the posts and wire fence.

642.3 Materials

A. Fabric

1. General:

The filter fabric shall be of nonwoven polypropylene, polyethylene or polyamide thermoplastic fibers with non-raveling edges. The fabric shall be non-biodegradable, inert to most soil chemicals, ultraviolet resistant, unaffected by moisture or other weather conditions, and permeable to water while retaining sediment. The filter fabric shall be supplied in rolls a minimum of 36 inches (0.9 meter) wide.

2. Physical Requirements:

The fabric shall meet the requirements presented in Table 1, when sampled and tested in accordance with the methods indicated herein, and/or on the Drawings.

B. Posts:

Posts shall be painted or galvanized steel Tee or Y-posts with anchor plates, not less than 5 feet (1.5 meters) in length with a minimum weight of 1.3 pounds per foot (1.9 kilograms per meter) with a minimum Brinell Hardness of 143. Hangers shall be adequate to secure fence and fabric to posts. Posts and anchor plates shall conform to ASTM A-702.

C. Wire Fence:

Wire fence shall be welded wire fabric 2 x 4 - W1.0 x W1.0 (50 x 100 - MW7 x MW7) and shall conform to Standard Specification Item No. 406, "Reinforcing Steel".

TABLE 1. Filter Fabric Requirements		
Physical Properties	Method	Requirements
Fabric Weight in ounces per square yard (grams/square meter)	TEX-616-J[1]	4.5 minimum (150 minimum)
Water Flow Rate in gallons/sq. foot/ minute (liters/square meter/minute)	TEX-616-J[1]	40 maximum (1630 maximum)
Equivalent Sieve Opening Size: US Standard (SI Standard sieve size)	CW-02215[2]	40 to 100 (425 to 150 mm)
Mullen Burst Strength: lbs. per sq. inch (psi) megaPascal (mPa)	ASTM D-3786[3]	300 minimum (2 minimum)
Ultraviolet Resistance; % Strength Retention	ASTM D-1682[4]	70 minimum

1 TxDoT Test Method Tex-616-J, "Testing of Construction Fabrics".

2 US Army Corps of Engineers Civil Works Construction Guide Specification CW-02215, "Plastic Filter Fabric".

3 ASTM D-3786, "Test Method for Hydraulic Bursting Strength of Knitting Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method".

4 ASTM D-1682, "Test Methods for Breaking Load and Elongation of Textile Fabrics ".

642.4 Construction Methods

The silt fence fabric shall be securely attached to the posts and the wire support fence with the bottom 12 inches (300 mm) of the filter material buried in a trench a minimum of 6 inches (150 mm) deep and 6 inches (150 mm) wide to prevent sediment from passing under the fence. When the silt fence is constructed on impervious material, a 12-inch (300-mm) flap of fabric shall be extended upstream from the bottom of the silt fence and weighted to limit particulate loss. No horizontal joints will be allowed in the filter fabric. Vertical joints shall be overlapped a minimum of 12 inches (300 mm) with the ends sewn or otherwise securely tied.

The silt fence shall be a minimum of 24 inches (0.6 meter) high. Posts shall be embedded a minimum of 12 inches (300 mm) in the ground, placed a maximum of 8 feet (2.4 meters) apart and set on a slight angle toward the anticipated runoff source. When directed by the Engineer or designated representative, posts shall be set at specified intervals to support concentrated loads.

The silt fence shall be repaired, replaced, and/or relocated when necessary or as directed by the Engineer or designated representative. Accumulated silt shall be

removed when it reaches a depth of 6 inches (150 mm), or lesser depth if the integrity of the silt fence has been jeopardized.

642. 5 Measurement

The work performed and the materials furnished under this item will be measured by the lineal foot of "Silt Fence", complete in place.

642.6 Payment

The work performed and materials furnished and measured as provided under "Measurement" will be paid for at the unit bid price per lineal foot of "Silt Fence". The price shall include full compensation for furnishing, hauling and placing all materials, labor, tools, equipment and incidentals necessary to complete the work including inspecting, repairing, replacing and relocating the fence, removal of silt and removal and disposal of all materials at the completion of construction and re-vegetation of disturbed areas.

Payment will be made under:

Silt Fence for Erosion Control	Per Lineal Foot.

END

SPECIFIC CROSS REFERENCE MATERIALS
Specification 642 “SILT FENCE”

City of Round Rock Technical Specifications

Designation	Description
Item No. 406	Reinforcing Steel

American Society For Testing and Materials (ASTM)

Designation	Description
A-702	Specification for Steel Fence Posts and Assemblies, Hot Wrought
D-1682	Test Methods for Breaking Load and Elongation of Textile Fabrics
D-3786	Test Method for Hydraulic Bursting Strength of Knitting Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method

Texas Department of Transportation Manual of Testing Procedures

Designation	Description
Tex-616-J	Testing of Construction Fabrics

U.S. Army Corps of Engineers

Designation	Description
CW-02215	Civil Works Construction Guide Specification "Plastic Filter Fabric"

RELATED CROSS REFERENCE MATERIALS
Specification 642 “SILT FENCE”

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 40	Structural Excavation and Backfill
Item No. 610	Preservation of Trees and Other Vegetation

ITEM NO. 643
STONE OUTLET STRUCTURE

643.1 Description

This item shall consist of a temporary crushed stone dike installed in conjunction with and as part of a diversion dike, interceptor dike or perimeter swale. The purpose of this stone outlet structure is to provide a protected outlet for a diversion dike, interceptor dike or perimeter dike, to provide for diffusion of concentrated flow and to allow the area behind the dike to de-water. This item shall include removal of the "Stone Outlet Structure" and re-vegetation of the area.

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.

643.2 Submittals

The submittal requirements for this specification item shall include:

A. Source, manufacturer, characteristics and test data for the filter fabric,

B. Source, type and gradation of stone,

C. Re-vegetation program, 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.
4. Type and rate of application of fertilizer.

643.3 Materials

A. Stone

The stone used in construction of this stone outlet dike shall be crushed stone at least 3 inches (75 mm) in diameter but not over 6 inches (150 mm) in diameter or 1/2 cubic foot (.014 cubic meter) in volume.

B. Seeding

Seeding for re-vegetation shall conform to Standard Specification Item No. 604, "Seeding for Erosion Control".

C. Fabric Core

1. General:

The filter fabric shall be of non-woven polypropylene, polyethylene or polyamide geo-textile with non-raveling edges. The fabric shall be non-biodegradable, inert to most soil chemicals, ultraviolet resistant, unaffected by moisture or other weather conditions, and permeable to

water while retaining sediment. The filter fabric shall be supplied in rolls a minimum of 36 inches (0.9 meter) wide.

2. Physical Requirements:

The fabric shall meet the requirements presented in TABLE 1, when sampled and tested in accordance with the methods indicated herein and/or on the Drawings.

TABLE 1. Filter Fabric Requirements

Physical Properties	Method	Requirements
Fabric Weight in ounces per square yard (grams/square meter)	TEX-616-J[1]	4.5 minimum (150 minimum)
Water Flow Rate in gallons/sq. foot/ minute (liters/square meter/minute)	TEX-616-J[1]	40 maximum (1630 maximum)
Equivalent Sieve Opening Size: US Standard (SI Standard sieve size)	CW-02215[2]	40 minimum (425 mm minimum)
Mullen Burst Strength: lbs. per sq. inch (psi) megaPascal (mPa)	ASTM D-3786[3]	250 minimum (1.7 minimum)
Ultraviolet Resistance; % Strength Retention	ASTM D-1682[4]	70 minimum

1 TxDoT Test Method Tex-616-J, "Testing of Construction Fabrics".

2 US Army Corps of Engineers Civil Works Construction Guide Specification CW-02215, "Plastic Filter Fabric".

3 ASTM D-3786, "Test Method for Hydraulic Bursting Strength of Knitting Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method".

4 ASTM D-1682, "Test Methods for Breaking Load and Elongation of Textile Fabrics ".

643.4 Construction Methods

On the area over which the Stone Outlet Structure is to be placed, all clearing, grubbing and excavation operations shall be completed before placing the Stone Outlet Structure. The Stone Outlet Structure foundation soil shall be compacted to the extent necessary to provide an inplace density (TxDoT Test Method Tex-115E) not less than 90 percent of the laboratory density as determined in accordance with TxDoT Test Method Tex-114-E. The stone shall be placed, spread and shaped to the grades indicated on the Drawings. All disturbed areas shall be graded and compacted to an in place density (TxDoT Test Method Tex-115E) not less than 85 percent of the maximum laboratory density (TxDoT Test Method Tex-114-E) and then seeded in accordance with Standard Specification Item 604.

The stone outlet structure shall be inspected by the Contractor monthly and after each rainfall event of 1 inch (25 mm) or more. Stone shall be replaced when the structure ceases to function as intended due to silt accumulation among the stone, washout, construction traffic damage, etc. When the silt reaches a depth equal to 1/3 the height of the structure or six inches (150 mm), whichever is less, the Contractor will remove the accumulated silt and dispose of it at a disposal site, approved by the Engineer or designated representative, in a manner that will insure that additional siltation will not occur.

When indicated on the Drawings, the Stone Outlet Structure shall be removed when directed by the Engineer or designated representative and the area leveled off and protected by erosion control measures appropriate for the terrain. Stabilization shall consist of complete vegetation cover, sufficiently established to be erosion resistant.

643.5 Measurement

Acceptable work performed as prescribed by this item shall be measured by the cubic foot (cubic meter: 1 cubic meter equals 35.315 cubic feet) of the outlet.

643.6 Payment

Work performed and material furnished for this item will be paid for at the unit bid price per cubic foot. Aggregate will not be a separate pay item, but will be included in this cost.

Payment will be made under:

Stone Outlet Structure	Per Cubic Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 643, “STONE OUTLET STRUCTURE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 604	Seeding for Erosion Control

American Society For Testing and Materials (ASTM)

Designation	Description
D-1682	Test Methods for Breaking Load and Elongation of Textile Fabrics
D-3786	Test Method for Hydraulic Bursting Strength of Knitting Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method

Texas Department of Transportation Manual of Testing Procedures

Designation	Description
Tex-114-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade & Embankment Soils
Tex-115-E	Field Method For Determination of In-Place Density of Soils and Base Materials

SPECIFIC CROSS REFERENCE MATERIALS - continued
Specification 643, “STONE OUTLET STRUCTURE"

Designation	Description
Tex-616-J	Testing of Construction Fabrics

U.S. Army Corps of Engineers

Designation	Description
CW-02215	Civil Works Construction Guide Specification, "Plastic Filter Fabric".

RELATED CROSS REFERENCE MATERIALS
Specification 643, “STONE OUTLET STRUCTURE"

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 610	Preservation of Trees and Other Vegetation

ITEM NO. 644
STONE OUTLET SEDIMENT TRAP

644.1 Description

This item governs the construction of a temporary Stone Outlet Sediment Trap consisting of a basin formed by an embankment or excavation and an embankment. The outlet for the trap is over a level stone section. The stone outlet for a sediment trap differs from that for a stone outlet structure because of the intentional ponding of water behind the stone. To provide for a ponding area, a relatively impervious core (e.g., timber, concrete block or straw bales wrapped in three layers of geo-textile fabric) with a nominal diameter of 12 inches (300 mm) is placed in the stone enclosure. The core shall be covered by a minimum of 6 inches (150 mm) of stone.

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.

644.2 Submittals

The submittal requirements for this specification item shall include:

A. Source, manufacturer, characteristics and test data for the filter fabric,

B. Source, type and gradation of stone,

C. Sediment Plan Details including type of trap, size of outlet, trap dimensions, embankment height and excavation depth, along with the drainage area.

644.3 Materials

A. Core

The impervious inner core shall be constructed of timber, concrete block or straw bales.

B. Rock

The rock shall be at least 3 inches (75 mm) in diameter and not exceed 6 inches (150 mm) or 1/2 cubic foot (.012 cubic meter) in volume.

C. Embankment Fill

Fill material for the embankment shall be free of roots or other woody vegetation, as well as oversized stones, rocks, organic material or other objectionable material.

D. Fabric Core

1. General:

The filter fabric shall be of non-woven polypropylene, polyethylene or polyamide geo-textile with non-raveling edges. The fabric shall be non-biodegradable, inert to most soil chemicals, ultraviolet resistant, unaffected by moisture or other weather conditions, and permeable to

water while retaining sediment. The filter fabric shall be supplied in rolls a minimum of 36 inches (0.9 meter) wide.

2. Physical Requirements:

The fabric shall meet the requirements presented in TABLE 1, when sampled and tested in accordance with the methods indicated herein, and/or on the Drawings.

TABLE 1. Filter Fabric Requirements

Physical Properties	Method	Requirements
Fabric Weight in ounces per square yard (grams/square meter)	TEX-616-J[1]	4.5 minimum (150 minimum)
Water Flow Rate in gallons/sq. foot/ minute (liters/square meter/minute)	TEX-616-J[1]	40 maximum (1630 maximum)
Equivalent Sieve Opening Size: US Standard (SI Standard sieve size)	CW-02215[2]	40 minimum (425 mm minimum)
Mullen Burst Strength: lbs. per sq. inch (psi) megaPascal (mPa)	ASTM D-3786[3]	250 minimum (1.7 minimum)
Ultraviolet Resistance; % Strength Retention	ASTM D-1682[4]	70 minimum

1 TxDoT Test Method Tex-616-J, "Testing of Construction Fabrics".

2 US Army Corps of Engineers Civil Works Construction Guide Specification CW-02215, "Plastic Filter Fabric".

3 ASTM D-3786, "Test Method for Hydraulic Bursting Strength of Knitting Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method".

4 ASTM D-1682, "Test Methods for Breaking Load and Elongation of Textile Fabrics ".

644.4 Construction Methods

Area under embankment shall be cleared, grubbed and stripped of any vegetation and root mat. The pool area shall be cleared.

All excavation operations shall be carried out in such a manner that erosion and water pollution shall be minimal. Any excavated portion of sediment trap shall have 2:1 or flatter slopes.

The embankment shall be mechanically compacted while it is being constructed. All fill slopes shall have a 2:1 slope or flatter.

The structure shall be inspected monthly and after each rainfall event of 1 inch (25 mm) or more. Repairs shall be made by the Contractor, as needed, throughout the duration of this contract or until the Engineer or designated representative issues written permission to remove the structure.

Sediment shall be removed and trap restored to its original dimensions when the sediment has accumulated to 1/2 the design depth of the trap or six inches (150 mm), whichever is less. The sediment that is removed shall be deposited in an area approved by the Engineer or designated representative in a manner that will insure that it will not erode.

The structure shall be removed and the area stabilized when the drainage area has been properly stabilized.

644.5 Measurement

Acceptable work performed as prescribed by this item will be measured by cubic feet (cubic meter: 1 cubic meter equals 10.764 cubic feet) of sediment trap constructed.

644.6 Payment

Work performed and materials furnished for this item will be paid for at the unit bid price per cubic foot of sediment trap constructed.

Payment will be made under:

Stone Outlet Sediment Trap	Per Cubic Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 644, “STONE OUTLET SEDIMENT TRAP (SST)"

American Society For Testing and Materials (ASTM)

Designation	Description
D-1682	Test Methods for Breaking Load and Elongation of Textile Fabrics
D-3786	Test Method for Hydraulic Bursting Strength of Knitting Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method

Texas Department of Transportation Manual of Testing Procedures

Designation	Description
Tex-616-J	Testing of Construction Fabrics

U.S. Army Corps of Engineers

Designation	Description
CW-02215	Civil Works Construction Guide Specification, "Plastic Filter Fabric"

City of Round Rock Technical Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing

SPECIFIC CROSS REFERENCE MATERIALS - continued
Specification 644, “STONE OUTLET SEDIMENT TRAP (SST)"

Designation	Description
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 610	Preservation of Trees and Other Vegetation

ITEM NO. 646
TIED PRECAST CONCRETE REVETMENT

646.1 Description

This item shall govern the materials and construction of an Erosion Control System in accordance with these specifications and with the lines, grades, design and dimension 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.

646.2 Submittals

The submittal requirements for this specification item shall include:

A. Source, manufacturer, characteristics and test data for the revetment rope,

B. PC Concrete mix design information, including mix composition, source, type and gradation of aggregates, sand etc. and proposed admixtures,

C. Source, manufacturer, characteristics and test data for the filter fabric

646.3 Materials

A. Portland Cement (p.c.) Concrete

The Portland cement concrete shall be Class B and shall conform to Standard Specification Item No. 403, "Concrete for Structures".

Air entrainment admixtures shall be used in the p.c. concrete mix and shall conform to Standard Specification Item No. 405, "Concrete Admixtures". With prior approval of the Engineer or designated representative, retarding admixtures may be used. Concrete sand and crushed stone or gravel passing 3/8 inch US Standard (SI sieve designation of 9.5 mm) sieve shall be used for the concrete mix design.

B. Revetment Rope

Revetment Rope shall be constructed of high tenacity, low elongation, continuous filament polyester fibers, consisting of parallel core fibers, which are contained within an outer braid jacket or cover.

The outer cover shall consist of an 8, 10, 12 or 16 strand braid covering the core fibers.

The weight (mass) of the core shall be between 65 percent and 75 percent of the total weight (mass) of the rope.

Construction of the rope shall be such that the cover braid is non-load bearing and the rope is torque free.

Mininum average breaking strengths for new, dry rope and the minimum and maximum weights (mass) for the rope are as follows:

Rope Diameter			Circumference		Minimum		Minimum	
Nominal	Actual				Weight, lbs. Per 100 ft.	Mass, kgs. per 100 m	Breaking Strength	
inches	Ins.	mm	Ins.	mm			lbs.	kNs.
3/16			.589	15	1.3	1.9	1,600	7.1
1/4		6.1	.754	19	2.1	4.1	2,750	12.2
1/4	.255	6.5	.801	20	2.6	5.0	3,300	14.7
1/4	.280	7.1	.880	22	2.9	5.6	4,000	17.8
1/4	.295	7.5	.927	24	3.1	6.0	4,500	20.0
5/16	.32	8.1	1.005	27	4.2	8.1	6,000	26.7
3/8	.380	9.6	1.194	30	5.0	9.7	8,800	39.1
1/2	.5	12.7	1.571	40	9.4	18.2	14,000	62.3

Elongation requirements specified below are based upon stabilized new, dry rope. Stabilization refers to a process in which the rope is cycled 50 times between a load corresponding to 200D square and a load equal to 10 percent, 20 percent or 30 percent of the rope's approximate average breaking strength. Relevant elongation values are as shown in the table below. The tolerance on these values is plus or minus 5 percent.

	Percent Breaking Strength		
	10%	20%	30%
Permanent Elongation While Working	0.7%	1.8%	2.6%
Elastic Elongation	0.6%	1.4%	2.2%
Total Stretch	1.3%	3.2%	4.8%

The critical temperature, defined as the point at which degradation of the rope occurs due to temperature alone, shall be a minimum of 350˚F (177˚C). The melting point of the rope materials shall be a minimum of 480˚F(249˚C).

C. Anchors and Miscellaneous Hardware

Anchors shall be screw type helix anchors and shall conform to ASTM A-36. Anchor size, length and spacing shall produce a direct pull equivalent to the dead weight (mass) of the mats. The anchors shall be galvanized in accordance with ASTM A-123. Clips, sleeves and other miscellaneous hardware shall be aluminum.

Filter fabric shall be placed below the revetment conforming to Item No. 620, "Filter Fabric".

D. Blocks and Mats

Cellular concrete blocks shall be cast to the dimensions of 4 inches (100 mm) by 11 7/8 (300 mm) inches by 23 7/8 inches (600 mm) nominal, with a minimum weight of 35 to 40 pounds per square foot (170 to 195 kilograms per square meter). (OPTIONAL: Each mattress shall contain a nonabrasive plastic tubing incorporated into the system continuously longitudinally and laterally.) The blocks shall have cells and outer recesses in the vertical direction. (OPTIONAL: Vertical cells may be eliminated in certain specified projects.)

The blocks shall be assembled into mats of length and width to fit the proposed work. The blocks shall be bound into mats by the use of the revetment rope. Two strands of rope shall extend through each block in a longitudinal direction and 1 strand of rope shall extend through each block in a lateral direction.

Each longitudinal rope will be looped at one end of each row of blocks and the ends bound together at the opposite end of each row. The binding of the rope ends shall be by sleeves. Lateral rope shall extend approximately 6 inches (150 mm) past the outer recesses of the mat and shall be held in place by buttons or similar devices.

Longitudinal ropes shall be a minimum 1/4 inch (6.3 mm) diameter for mats up to 50 feet (15 meters) in length and 5/16 inch (7.8 mm) for mat lengths in excess of 50 feet (15 meters). Rope used in the transverse direction shall be 1/4 inch (6.3 mm) in diameter.

646.4 Construction Methods

The slope on which the mats are to be placed shall be constructed according to the lines and grades indicated on the Drawings. Fills shall be placed by pushing embankment material into place with a bulldozer or similar equipment. When the material is high enough above water level to support compaction equipment, the fill shall be compacted by this equipment to an in-place density (TxDoT Test Method Tex-115-E) not less than 95 percent of the maximum density conforming to TxDoT Test Method Tex-114-E.

Additional height of fill will be obtained by adding thin layers of embankment material and walking it down with compaction equipment. The depth of layers and amount of compaction shall be varied to obtain a density equal to or greater than the adjoining natural soil.

An anchor trench shall be constructed at the top of the mat system according to the lines, grades and dimensions indicated on the Drawings. Toe trenches and side trenches, if indicated on the Drawings, will also be constructed.

Woven and/or non-woven filter fabric shall be placed on the slope and in the anchor and trench as indicated on the Drawings.

Prior to placement of the fabric, pieces of wood, rock, concrete, brick or other objects that might puncture the fabric shall be removed.

Fabric shall be placed directly on the ground surface. Longitudinal and transverse joints shall be overlapped at least 3 feet (0.9 meter). Workmen placing the fabric may walk on the fabric. However, equipment shall be prohibited from operating on it.

The fabric shall be kept in its protective wrapping until ready for use. Any fabric that has been out of its protective cover for over 72 hours without being covered shall be considered unsatisfactory and shall be removed and replaced with satisfactory fabric.

Torn, punctured or separated sections of fabric shall be repaired by placing a fabric patch over the hole prior to placing the mats. The patch shall be large enough to overlap a minimum of 3 feet (0.9 meter) in all directions.

The mats shall then be attached to a spreader bar or other type device and placed in their proper positions by the use of a crane or other equipment approved by the Engineer or designated representative.

Mats shall be anchored at the top by fastening the rope loop to anchors driven into the anchor trench as indicated on the Drawings. Enough anchors shall be used to support the entire weight (mass) of the mat.

As adjacent mats are placed, they shall be secured to each other from the top down to the water line by fastening the protruding transverse ropes together along each side of the mats. The fastening shall be done with sleeves or clips.

Anchor trenches and side trenches shall be backfilled and compacted flush with the top of the mats from the water line up.

Mats shall be custom fabricated at the plant or cut on the job site to fit irregular configurations.

The entire surface specified for erosion control shall be covered by mats without any vacancies, gaps or holes.

646.5 Measurement

Work and accepted material as prescribed for this item will be measured by the square foot (square meter: 1 square meter equals 10.764 square feet) of surface area and toe trenches covered by mats.

646.6 Payment

Work performed and materials furnished as prescribed by this specification item and measured under "Measurement" will be paid for at the unit bid price per square foot for "Tied Precast Concrete Revetment". This unit bid price shall include full compensation for all surface preparation, furnishing and placing all filter fabric, for furnishing and placing all blocks, rope, anchors, sleeves, clips and buttons and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

Tied Precast Concrete Revetment	Per Square Foot.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 646, “TIED PRECAST CONCRETE REVETMENT"

City of Round Rock Standard Specifications

Designation	Description
Item No. 403	Concrete For Structures
Item No. 406	Concrete Admixtures
Item No. 620	Filter Fabric

American Society For Testing and Materials (ASTM)

Designation	Description
A-36	Specifications for Structural Steel
A-123	Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

Texas Department of Transportation Manual of Testing Procedures

Designation	Description
Tex-114-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade & Embankment Soils
Tex-115-E	Field Method For Determination of In-Place Density of Soils and Base Materials
Tex-616-J	Testing of Construction Fabrics

RELATED CROSS REFERENCE MATERIALS
Specification 646, “TIED PRECAST CONCRETE REVETMENT"

Texas Department of Transportation Manual of Testing Procedures

Designation	Description
Tex-616-J	Testing of Construction Fabrics

American Society For Testing and Materials (ASTM)

Designation	Description
D-1682	Test Methods for Breaking Load and Elongation of Textile Fabrics
D-3786	Test Method for Hydraulic Bursting Strength of Knitting Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method

City of Round Rock Standard Specifications

Designation	Description
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 401	Structural Excavation and Backfill
Item No. 610	Preservation of Trees and Other Vegetation

Standard Specifications Manual Change Control Record

SERIES 600 – Environmental Enhancement

CoRR Item	Title	Revision	Status	TxDOT Item	Title
RR 610	Preservation of Trees and Other Vegetation	5/1/2018	Revised	-	-

Note:
Series 600 not revised at this time. CoRR No. 610 revised to cross reference to RR 101 and RR 102.