ITEM NO. 591S
RIPRAP FOR SLOPE PROTECTION

09-01-11

591S.1 Description

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

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

591S.2 Submittals

The submittal requirements for this specification item shall include:

A. The type, size, gradation, physical properties and source of rock riprap material. ~~(rock or broken concrete)~~. Test data for specific gravity, absorption, soundness and verification plots with measurements for the gradation of the rock riprap.

B. The type, size, and source of broken concrete riprap material.

~~B~~C. Aggregate types, gradations and physical characteristics for the Portland cement concrete mix,

~~C~~D. Proposed proportioning of materials for the mortar mix,

~~D~~E. Type, details and installation requirements for reinforcement, joint material, tie backs and anchors,

~~E~~F. Description of filter fabric including characteristics, test data and manufacturer's recommendations for installation.

~~F~~G. The type, size, gradation and source of granular filter material.

591S.3 Materials

A. Rock

The rock shall be suitable in all respects for the purpose intended. Rock sources shall be selected well in advance of the time the rock will be required and shall be pre-approved by the Engineer. Rock used for riprap shall be hard, durable, and angular in shape and consist of clean field rock or rough unhewn quarry rock as nearly uniform in section as practicable. Neither the width nor the thickness of a single rock shall be less than one third of its length. The rocks shall be dense, resistant to weathering and water action, and free of overburden, spoils, shale, and organic material~~; and shall meet the gradation requirements for the rock size specified. Neither the width nor the thickness of a single stone should be less than one third of its length.~~ Shale, chalk, and limestone with shale or chalk seams ~~are~~ shall not be acceptable. Rounded rock (river rock) shall not be acceptable. .

The rock durability shall be evaluated by visual inspection and laboratory tests for specific gravity, absorption, and soundness. The ~~M~~minimum ~~density for acceptable dry rock riprap shall be 150 pounds per cubic foot or a~~ specific gravity shall be ~~of~~ 2.4 (150 pounds per cubic foot) and the maximum absorption 4.2% using ASTM D 6473 or Tex-403-A. Soundness shall be tested in accordance with ASTM D 5240 or Tex-411-A and weight loss shall not exceed 18% after 5 cycles of magnesium sulfate solution, nor 14% after 5 cycles of sodium sulfate solution.

The rock riprap material shall be provided as a gradation of larger and smaller rock sizes associated with a rock class or median diameter (D50) as specified in the drawings. Rock diameter for angular material represents the length of the intermediate axis of an individual rock. The material gradation shall conform to table below for the class sizes corresponding to the D50. The D15, D50, D85, and D100 are the rock sizes for which 15%, 50%, 85%, and 100% of the total sample are of equal size or smaller, respectively.

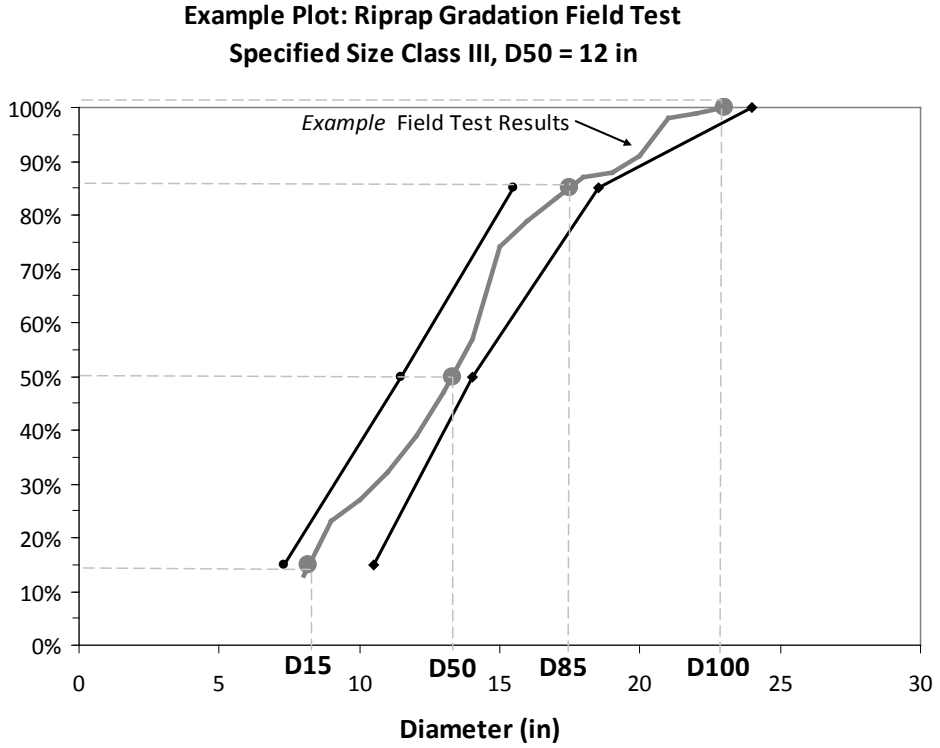
Rock Riprap Gradation Table

Rock Riprap Class by Median Particle Diameter (D50)		**D15 (in)**		**D50 (in)**		**D85 (in)**		**D100 (in)**
Class	**Diameter (in)**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Max**
I	**6**	3.7	5.2	5.7	6.9	7.8	9.2	12.0
II	**9**	5.5	7.8	8.5	10.5	11.5	14.0	18.0
III	**12**	7.3	10.5	11.5	14.0	15.5	18.5	24.0
IV	**15**	9.2	13.0	14.5	17.5	19.5	23.0	30.0
V	**18**	11.0	15.5	17.0	20.5	23.5	27.5	36.0
VI	**21**	13.0	18.5	20.0	24.0	27.5	32.5	42.0
VII	**24**	14.5	21.0	23.0	27.5	31.0	37.0	48.0
VIII	**30**	18.5	26.0	28.5	34.5	39.0	46.0	60.0
IX	**36**	22.0	31.5	34.0	41.5	47.0	55.5	72.0
X	**42**	25.5	36.5	40.0	48.5	54.5	64.5	84.0

1. Reference: NCHRP Report 568

2. Conversion to weight-based gradation: $W = 0.0275D^3S_g$ where W is rock size in lbs, D is diameter in inches and S_g is the specific gravity of the rock.

~~The rock shall be suitable in all respects for the purpose intended. The sources from which the stone will be obtained shall be selected well in advance of the time when the stone will be required and pre-approved by the Engineer.~~ ~~Control~~ Conformance of rock riprap to the gradation requirements ~~and material adequacy will~~ shall be accomplished by ~~visual inspection and~~ field tests ~~measurement as needed~~ for rock sizes that cannot be analyzed via sieve or mechanical sorting machines. Gradation field tests shall follow the equal interval test procedure in NCHRP Report 568, Section 3.2.3 or ASTM D 5519. Gradation test results shall be plotted with the acceptable range values for the specified rock class (example below):



The contractor shall provide a ~~at least one two~~ sample~~s~~ of the rock riprap material meeting the gradation for the size class specified. ~~The~~ An approved sample~~s~~ shall be stored onsite ~~used~~ as a ~~frequent~~ reference for ongoing visual inspection of ~~judging the~~ additional materials supplied. ~~gradation of the riprap supplied.~~ Supplementary tests may be required for supply materials where visual inspection determines their may be a deviation from the required gradation. ~~Any difference of opinion between the engineer and the contractor shall be resolved by dumping two random truckloads of stone and performing manual field measurements of individual stones to compute a gradation~~. ~~Any measured rock size dimensions shall be based on the length of the intermediate axis of~~

~~each stone.~~ Labor, equipment and site location needed to assist in checking gradation shall be provided by the contractor at no additional cost to the owner.

B. Broken Concrete

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

C. Concrete

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

D. Grout and Mortar

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

E. Reinforcement

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

F. Joints

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

G. Tie Backs and Anchors

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

H. Filter Fabric

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

I. Granular Filter

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

591S.4 Construction Methods

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

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

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

Areas to be protected by rock riprap shall be free of brush, trees, stumps and other objectionable materials and be graded to a smooth compacted surface. All soft or spongy material shall be removed and replaced with appropriate material to the depths shown on the plans or as directed by the engineer. Fill Areas, unless otherwise specified will be compacted in accordance with 132S - Embankment. Unacceptable subgrade conditions shall be reworked according to the Engineer's recommendations. Excavation areas shall be maintained until the riprap is placed.

591S.5 Dry Rock Riprap

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

~~**Relative Stone Size (inches)**~~	~~**Percent of Gradation Smaller than**~~	~~**Stone Size Designation**~~
~~1.7 - 2.0 * D50~~	~~100~~	~~D100~~
~~1.3 - 1.7 * D50~~	~~85~~	~~D85~~
~~1.0 - 1.3 * D50~~	~~50~~	~~D50~~
~~0.5 - 1.0 * D50~~	~~15~~	~~D15~~

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

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

591S.6 Mortared Rock Riprap

Rock for this purpose, as far as practicable, shall be selected as to size and shape in order to secure fairly large, flat-surfaced rock which may be laid with a true and even surface and a minimum of voids. Fifty percent of the mass rock shall be broad flat rocks, weighing between 100 and 150 pounds (45 and 69 kilograms) each, placed with the flat surface uppermost and parallel to the slope. The largest rock shall be placed near the base of the slope. The spaces between the larger rocks shall be filled with rocks of suitable size, leaving the surface smooth, reasonably tight and conforming to the contour required on the Drawings. In general, the rocks shall be placed with a degree of care that will insure plane surfaces with variation from the true plane of no more than 3 inches in 4 feet (no more than 60 mm per meter). Warped and curved surfaces shall have the same general degree of accuracy as indicated for plane surfaces.

Before placing mortar, the rocks shall be wetted thoroughly and as each of the larger rocks is placed, it shall be surrounded by fresh mortar and adjacent rocks shall be shoved into contact. After the larger rocks are in place, all of the spaces or opening(s) between

them shall be filled with mortar and the smaller rocks then placed by shoving them into position, forcing excess mortar to the surface and insuring that each rock is carefully and firmly embedded laterally. After the work described above has been completed, all excess mortar forced up shall be spread uniformly to completely fill all surface voids. All surface joints then shall be pointed up roughly, either with flush joints or with shallow, smooth raked joints.

591S.7 Concrete Riprap

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

Concrete shall be Class A or as indicated otherwise on the Drawings and shall conform to Standard Specification Item No. 403S, "Concrete for Structures".

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

When bar reinforcement is used, the sectional area of steel in each direction shall not be less than the sectional area of the wire fabric described above. The spacing of bar reinforcement shall not exceed 18 inches (450 mm) in each direction and the distance from the edge of concrete to the first parallel bar shall not exceed 6 inches (150 mm).

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

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

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

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

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

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

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

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

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

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

591S.9 Measurement

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

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

591S.10 Payment

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

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

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

Payment will be made under one of the following:

Pay Item No. 591S-A:	Dry Rock Riprap	Per Square Yard.
Pay Item No. 591S-B:	Dry Rock Riprap	Per Cubic Yard.
Pay Item No. 591S-D:	Mortared Rock Riprap	Per Square Yard.
Pay Item No. 591S-F:	Concrete Riprap, ___ In.	Per Square Yard.
Pay Item No. 591S-G:	Concrete Riprap	Per Cubic Yard.
Pay Item No. 591S-P:	Pneumatically Placed Concrete Riprap, __In.	Per Square Yard.

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 591S, “Riprap for Slope Protection"

International Fire Code

Designation	Description
Chapter 27	Hazardous Materials
Chapter 33	Explosives and Fireworks

City of Austin Standard Contract Documents

Designation	Description
01550	Public Safety and Convenience

City of Austin Standard Specifications

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

American Society for Testing and Materials, ASTM

Designation	Description
ASTM D 5240	Standard Test Method for Evaluation of Durability of Rock for Erosion Control Using Sodium Sulfate or Magnesium Sulfate
ASTM D 5519	Standard Test Methods for Particle Size Analysis of Natural and Man-Made Riprap Materials
ASTM D 6473	Standard Test Method for Specific Gravity and Absorption of Rock for Erosion Control

Texas Department of Transportation: Manual of Testing Procedures

Designation	Description
Tex-403-A	Test Procedure for Saturated Surface-Dry Specific Gravity and Absorption of Aggregates
Tex-411-A	Soundness of Aggregate Using Sodium Sulfate or Magnesium Sulfate

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

Designation	Description
Item No. 432	Riprap

RELATED CROSS REFERENCE MATERIALS
Specification 591S, “Riprap for Slope Protection"

City of Austin Standard Specifications

Designation	Description
Item No. 623S	Dry Stack Rock Wall

Engineering Design Manuals

Federal Highway Administration, 1989, Design of Riprap Revetment, Hydraulic Engineering Circular HEC-11, FHWA-1P-89-016.

National Cooperative Highway Research Program, 2006, Riprap Design Criteria, Recommended Specifications, and Design Criteria, NCHRP Report 568.

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

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

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

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

ITEM NO. 628S
SEDIMENT CONTAINMENT DIKES

628S.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.

628S.2 Submittals

The submittal requirements for this specification item shall include:

A. Locations and Types of containment dikes (hay Bales~~,~~ or Triangular Sediment Filter Dike ~~or Filter Curb Inlet 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.

628S.3 Materials

A. Hay Bales

"Hay Bales" shall be free of Johnson Grass or other nocuous 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 2,500 square feet (0.02 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~~

~~The fabric must correspond to the following requirements:~~

~~ASTM~~		
~~Property~~	~~Test Method~~	~~Requirements~~
~~Fabric Weight~~	~~D 3776~~	~~≥ 3.0 ounces/square yard~~
~~Ultraviolet (UV) Radiation Stability~~	~~D 4355~~	~~70% strength retained min., after 500 hours in xenon arc device~~
~~Mullen Burst Strength~~	~~D 3786~~	~~≥ 120 pounds per square inch~~
~~Water Flow Rate~~	~~D 4491~~	~~> 275 gallons/minute/square feet~~

628S.4 Construction Methods

The Contractor may select the material for the dikes, unless otherwise indicated, conforming to the details on the Drawings and Standard Detail Numbers 628S~~,~~ and 628S-1 ~~and 628S-2~~.

Bales shall be placed with ends tightly abutting the 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 that are not able to be imbedded and are placed on impervious cover should be placed level with the concrete and have all bales butted end to end with no voids or gaps between them. Bales shall be bound by either wire or nylon string. Bales shall be replaced every 2 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 the fabric/wire should completely cover the opening of the inlet and devices should be installed without protruding parts that could be a traffic, worker, or pedestrian hazard. Where sections of the fabric overlap, they shall overlap at least three (3) inches. The inlet filter shall be attached in a way that they can easily be removed and are not secured or attached by the use of sand bags.~~

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. 604S, "Seeding for Erosion Control".

628S.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.

~~The work and materials prescribed for curb inlet protection (Standard Detail 628S-2, "Filter Curb Inlet Protection") shall be included in the unit price bid for the item of construction in which this activity is used, unless Pay Item No. 628S-C is indicated on the Drawings and identified in Standard Contract Bid Form 00300U.~~

628S.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 on the Drawings, payment for sediment containment will be made under:

Pay Item No. 628S-A:	Sediment Containment Dikes with hay bales	Per Lineal Foot.
Pay Item No. 628S-B:	Sediment Containment Dikes with filter fabric	Per Lineal Foot.
~~**Pay Item No. 628S-C**:~~	~~Filter Curb Inlet Protection (New Inlet)~~	~~Per each.~~
~~**Pay Item No. 628S-D**:~~	~~Filter Curb Inlet Protection (Existing Inlet)~~	~~Per each.~~

End

SPECIFIC CROSS REFERENCE MATERIALS
Specification 628S, “Sediment Containment Dike"

City of Austin Standard Details

Designation	Description
Number 628S	Triangular Sediment Filter Dike
Number 628S-1	Hay Bale Dike
~~Number 628S-2~~	~~Filter Curb Inlet Protection~~

City of Austin Standard Specifications

Designation	Description
Item No. 604S	Seeding for Erosion Control

City of Austin Standard Contract

Section	Description
00300U	Bid Form (Unit Prices)

RELATED CROSS REFERENCE MATERIALS
Specification 628S, “Sediment Containment Dike"

City of Austin Standard Specifications

Designation	Description
Item No. 101S	Preparing Right of Way
Item No. 102S	Clearing and Grubbing
Item No. 111S	Excavation
Item No. 120S	Channel Excavation
Item No. 401S	Structural Excavation and Backfill
Item No. 406S	Reinforcing Steel
Item No. 602S	Sodding for Erosion Control
Item No. 605S	Soil Retention Blanket
Item No. 606S	Fertilizer

Item No. 608S	Planting
Item No. 610S	Preservation of Trees and Other Vegetation
Item No. 620S	Filter Fabric

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

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