RULE NO.: R161-20.04

JAN 24 2020 AM 7:58

NOTICE OF PROPOSED RULE **POSTING DATE: January 24, 2020**

The Director of the Department of Development Services proposes to adopt the following rule after February 25, 2020.

Comments on the proposed rule are requested from the public. Comments should be submitted to David Gonzalez, 505 Barton Springs Road, Suite 750, Austin Texas, 78704, 512-974-9243 or via email at david.gonzalez2@austintexas.gov. To be considered, comments must be submitted before February 25, 2020, the 32nd day after the date this notice is posted. A summary of the written comments received will be included in the notice of rule adoption that must be posted for the rule to become effective.

An affordability impact statement regarding the proposed rule has been obtained, it is available for inspection or copying at the address noted in the preceding paragraph

EFFECTIVE DATE OF PROPOSED RULE

A rule proposed in this notice may not become effective before the effective date established by a separate notice of rule adoption. A notice of rule adoption may not be posted before February 25, 2020 (the 32nd day after the date of this notice) or not after April 7, 2020 (the 70th day after the date of this notice).

If a proposed rule is not adopted on or before April 7, 2020, it is automatically withdrawn and cannot be adopted without first posting a new notice of a proposed rule.

REQUEST FOR COMMENTS ON PROPOSED RULES

The City requests comments from the public with respect to the proposed rules included in this Notice. Comments must be submitted in writing to the contact person below no later than February 24, 2020 (the 31st day after the date of this notice).

Contact Person:
David Gonzalez, Single point of contact (Spoc), Development Services Department
Email: david.gonzalez2@austintexas.gov
Phone: 512.974-9243

U.S. Mail
Name: David Gonzalez
Department: Development Services Department (DSD)
Address: 505 Barton Springs Rd., Ste. 750, Austin TX, 78704

Hand Delivery
David Gonzalez
Development Services Department (DSD)
505 Barton Springs Rd., Austin TX, 78704

TEXT OF PROPOSED RULES

A copy of the complete text of the proposed rule is available for public inspection and copying at the following locations. Copies may be purchased at the locations at a cost of ten cents per page:

Department of Development Services, located at 505 Barton Springs Road, Suite 750, Austin TX, 78704 and

Office of the City Clerk, City Hall, located at 301 West 2nd Street, Austin, Texas.

BRIEF EXPLANATION OF PROPOSED RULE

R161-20.04: Proposed revisions to the Environmental Criteria Manual

Sections 1.4.2, 1.4.3, 1.4.4 and 1.4.5 of the Environmental Criteria Manual are being revised to align with the Land Development Code and inspections procedures for residential construction projects. In addition, State requirements for stormwater control are being clarified as to when they apply and what the requirements are for construction sites with disturbance of one acre or larger.

AUTHORITY FOR ADOPTION OF PROPOSED RULE

The authority and procedure for adoption of a rule to assist in the implementation, administration, or enforcement of a provision of the City Code is provided in Chapter 1-2 of the City Code. The authority to regulate construction requirements is established in Section 25-8-181 and Section 25-8-182 of the City Code.

CERTIFICATION BY CITY ATTORNEY

By signing this Notice of Proposed Rule (R161-20.04), the City Attorney certifies the City Attorney has reviewed the rule and finds that adoption of the rule is a valid exercise of the Director's administrative authority.

REVIEWED AND APPROVED

Denise Lucas, Director Development Services Department

Date: 1/10/2020

Anne L. Morgan
City Attorney

Date: 1/21/2020

1.4.1 - Introduction

The purpose of this section is to provide a resource document and policy for the protection of land and water resources, so as to minimize the adverse effects of erosion and sedimentation per the City of Austin's Land Development Code. Additionally, the criteria have been fashioned to complement the language of the Texas Pollution Discharge Elimination System (TPDES) Construction General Permit.

The conversion of land from its natural state or agricultural use to urban use accelerates the processes of erosion and sedimentation. These negatively impact the city's drinking water supply, aquatic life and the recreational resource provided by them.

Construction related sediment can be a significant pollutant of streams, lakes, ponds and reservoirs. Not only does sediment reduce the quality of water for boating, fishing, swimming and other water-oriented recreation, it also creates maintenance problems due to excessive wear on pumps and due to the reduced capacity of streams, lakes and other waterways. Another problem associated with sediment is the affinity of pesticides, phosphates and many other chemical pollutants for soil particles. These pollutants are carried to the waterway on the sediment and further reduce the quality of the water.

Mankind accelerates the erosion process by modifying the topography, soil conditions, vegetative cover and drainage patterns during construction to suit its needs. The clearing and grading of land to convert it from a natural state to cultivated row crops greatly increases the potential for erosion. The magnitude of this increase can be as much as 200 times. In addition, earth moving and construction to convert agricultural land to urban uses such as roads, houses, shopping centers, schools and airports increases the erosion potential another ten (10) times (Erosion and Sedimentation Control Guidelines for Developing Areas in Texas, U.S.D.A., S.C.S., Temple, Texas, 1976). After full urbanization takes place in a watershed, however, erosion usually decreases several fold from that experienced during the period of construction (Virginia Erosion and Sedimentation Control Handbook, Second Edition, 1980) and may decrease from that occurring before construction.

As additional development and urban growth takes place in Austin, the value of all land and water resources increases. The conservation of these resources is easier and less expensive than their restoration.

On most development projects, the major period for erosion potential exists between the time when the existing vegetation is removed to begin site work and the completion of construction and revegetation. There are numerous activities associated with construction and land development that accelerate the rate of erosion. Virtually all of these actions involve the removal of vegetation and/or the movement of the native geologic structure to provide a construction site. The adverse impact upon the site and the environment in general can be reduced if these actions are taken with some thought to the resultant erosion.

The control criteria included in this manual provide several methods to address the dual problems of erosion and sedimentation, but are in no way a complete outline of the possible actions to provide adequate reductions. We therefore encourage innovation and suggestions to improve or expand on these concepts. Any questions concerning the criteria or the use of

measures not included in the manual should be directed to the Watershed Protection and Development Review Department.

The Erosion and Sedimentation Control Criteria are established and reviewed by the Environmental Resource Management Division of the Watershed Protection Department. Development permit review is conducted by the Development Services Department and construction inspection oversight by the Environmental Inspection Division. ~~Section of the Site and Subdivision Inspection Division~~.

Source: Rule No. R161-17.12 , 6-13-2017.

1.4.2 - City of Austin Erosion and Sedimentation Control Policy

A. **Purpose and Application.**

The City of Austin Erosion and Sedimentation Control policy shall govern the planning, design, installation, maintenance and inspection of temporary and permanent erosion and sedimentation controls associated with commercial and residential development within the City of Austin and all areas subject to its extraterritorial jurisdiction. Finally, this policy is the official criteria manual required by the TPDES MS4 permit, and as such strives to comply with all federal and state mandates updating the permit. At this time, neither the NPDES nor the TPDES General Permits require Effluent Limit Guidelines (ELG). However, as of November, 2008, EPA has sent notice that it will impose ELG upon Construction General Permits. At such time, COA will update ECM 1.4 to comply with EPA mandates.

B. **Policy.**

It shall be the policy of the City of Austin that erosion and sedimentation controls are required for all construction and development, conducted with or without a permit, including without limitation commercial, multi-family, single-family, and duplex construction, demolition, the construction of all roads, utilities, parks, golf courses, water quality basins, detention basins, and all other activities utilizing clearing, trenching, grading or other construction techniques. It is the intent of City of Austin policy to closely parallel the requirements set forth in the Texas Pollution Discharge Elimination System (TPDES) Construction General Permit, the City of Austin's MS4 permit and any applicable updates to NPDES or TPDES, and shall be enforced on any construction or development project resulting in land disturbance.

The objectives of this policy are to:

- Minimize the erosion and transport of soil resulting from development activities.

- Prevent sedimentation in streams, creeks, lakes, waterways, storm drains, etc. by ensuring no off-site transport of disturbed sediment for the 2-year 24-hour storm during construction and through establishment of permanent controls.

• Protect and improve the quality of surface water in the Austin environment and maintain and improve the quality and quantity of recharge to groundwater supplies, especially the Edwards aquifer.

• Minimize flooding hazards and silt removal cost associated with excessive sediment accumulation in storm drains and waterways.

• Preserve and protect existing vegetation to the greatest extent possible, particularly native plant and wildlife habitats.

The following sections present the minimum requirements for the planning, design, construction, operation and maintenance of erosion and sedimentation control facilities and should be used as a resource document to help developers, homebuilders, demolition contractors and engineers plan and implement their projects to provide protection from erosion or sedimentation. The adequacy of the plan to meet the letter and intent of this section will be determined by the Development Services Department. Please note that projects that require a building permit, but not a site plan permit, are required to complete the TPDES Construction Site Notice (Small or large depending on size. See Appendix V, Figures 1- 2, 1-3, 1-4, 1-5. Or click on TCEQ link at:

http://www.tceq.state.tx.us/assets/public/permitting/waterquality/attachments/stormwater/txr150 000.pdf

Figure 1-1.1 (Appendix V) outlines the general sequence of events that take place in the planning, review, approval, construction and inspection of an Erosion and Sedimentation Control Plan. See Section 1.4.4(B)3 for the E&S control plan submittal requirements. The City of Austin and the Watershed Protection and Development Review Department shall not be responsible to anyone for the use or reliance on any portion of this manual and shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation, or reliance on any specification or guidelines contained herein.

D. **Ordinance Authority.**

The information in the following sections is intended to define the technical design criteria needed to achieve the policy goals identified in the Land Development Code relating to erosion and sedimentation control and final revegetation. A brief summary of specific code sections relating to the requirements for erosion and sedimentation control and revegetation is included below, but may not be limited to:

Title 6-5-51: Discharges into Storm Sewers or Watercourses.

25-1-441: Cease and desist order ~~("Red Tag"~~ Stop Work Order).

25-1-288: Inspection of Erosion and Sedimentation Controls and Tree Protection Measures. Requirements for a pre-construction inspection; owner's demonstration of compliance; modifications to controls and plans.

25-7-61 and 25-7-65: Adequate temporary and permanent erosion and sedimentation control plans required for final plat, subdivision construction plan, or site plan approval; estimated cost of fiscal security; fiscal security insures no cost to the city.

25-8-181 to 25-8-184: Erosion and sedimentation control required for all construction; restoration required for a complete project; modifications to plans allowed. Additional requirements in the Barton Springs Zone.

25-8-321 to 25-8-323: Clearing of vegetation, clearing for roadways, and temporary storage areas. Topsoil to be protected against erosion; existing vegetation to be left in place where possible; limitation of time between rough cutting and final surfacing of roadways.

25-8-341 and 25-8-342: Cuts and fills to be restored and stabilized.

25-8-343: Restoration and revegetation of spoil disposal sites required.

25-8-281 and 25-8-282: Special erosion controls required to protect critical environmental features and wetlands.

Work done under this policy is subject to all provisions of the Land Development Code. No work shall be done by the contractor until all required permits have been obtained. To find out exactly what permits are required, an inquiry should be made to the Development Services Department.

Source: Rule No. R161-17.12 , 6-13-2017.

1.4.3 - Definitions (in accordance with TPDES General Permit and COA technical manuals)

Arid Areas - Areas with an average annual rainfall of 0 to 10 inches.

Baseflow - The discharge in a channel that is relatively constant, occurring between storm runoff events. That flow which can be expected on a daily basis without storm flows.

Best Management Practices (BMPs) - Schedules of activities, prohibitions of practices, maintenance procedures, structural controls, local ordinances, and other management practices to prevent or reduce the discharge of pollutants. BMPs also include treatment requirements, operating procedures, and practices to control construction site runoff, spills or leaks, waste disposal, or drainage from raw material storage areas.

Bonded Fiber Matrix (BFM) - Bonded Fiber Matrix shall consist of long thermally refined wood fibers produced from grinding clean, whole wood chips and cross-linked hydro-colloidal tackifiers.

Certified Inspector - A person who has received training and is licensed by CPESC, CESSWI or CISEC to inspect and maintain erosion and sediment control practices.

Clearing - Any activity that removes the vegetative surface cover. Mass clearing is defined as the practice of clearing the entire site of all vegetation (except protected trees) to prepare

for final grading. This is opposed to Selective clearing, which only disturbs the soil and vegetation where a road or infrastructure will be placed.

Commencement of Construction - The initial disturbance of soils associated with clearing, grading, or excavation activities, as well as other construction-related activities (e.g., stockpiling of fill material, demolition).

Common Plan of Development - A construction activity that is completed in separate stages, separate phases, or in combination with other construction activities. A common plan of development (also known as a "common plan of development or sale") is identified by the documentation for the construction project that identifies the scope of the project, and may include plats, blueprints, marketing plans, contracts, building permits, a public notice or hearing, zoning requests, or other similar documentation and activities. A common plan of development does not necessarily include all construction projects within the jurisdiction of a public entity (e.g., a city or university). Construction of roads or buildings in different parts of the jurisdiction would be considered separate "common plans," with only the interconnected parts of a project being considered part of a "common plan" (e.g., a building and its associated parking lot and driveways, airport runway and associated taxiways, a building complex, etc.). Where discrete construction projects occur within a larger common plan of development or sale but are located ¼ mile or more apart, and the area between the projects is not being disturbed, each individual project can be treated as a separate plan of development or sale, provided that any interconnecting road, pipeline or utility project that is part of the same "common plan" is not included in the area to be disturbed.

Control Plan - indicating the specific measures and sequencing to be used to control sediment and erosion on a development site during and after construction.

Discharge - For the purposes of this permit, the drainage, release, or disposal of pollutants in storm water and certain non-storm water from areas where soil disturbing activities (e.g., clearing, grading, excavation, stockpiling of fill material, and demolition), construction materials or equipment storage or maintenance(e.g., fill piles, borrow area, concrete truck washout, fueling), or other industrial storm water directly related to the construction process (e.g., concrete or asphalt batch plants) are located.

Drainage Way - Any channel that conveys surface runoff throughout the site.

Edwards Aquifer - As defined under Texas Administrative Code § 213.3 of this title (relating to the Edwards Aquifer), that portion of an arcuate belt of porous, water-bearing, predominantly carbonate rocks known as the Edwards and Associated Limestones in the Balcones Fault Zone trending from west to east to northeast in Kinney, Uvalde, Medina, Bexar, Comal, Hays, Travis, and Williamson Counties; and composed of the Salmon Peak Limestone, McKnight Formation, West Nueces Formation, Devil's River Limestone, Person Formation, Kainer Formation, Edwards Formation, and Georgetown Formation. The permeable aquifer units generally overlie the less-permeable Glen Rose Formation to the south, overlie the less permeable Comanche Peak and Walnut Formations north of the Colorado River, and underlie the less permeable Del Rio Clay regionally.

Edwards Aquifer Contributing Zone - The area or watershed where runoff from precipitation flows downgradient to the recharge zone of the Edwards Aquifer. The contributing zone is located upstream (upgradient) and generally north and northwest of the recharge zone for the following counties: all areas within Kinney County, except the area within the watershed draining to Segment 2304 of the Rio Grande Basin; all areas within Uvalde, Medina, Bexar, and Comal Counties; all areas within Hays and Travis Counties, except the area within the watersheds draining to the Colorado River above a point 1.3 miles upstream from Tom Miller Dam, Lake Austin at the confluence of Barrow Brook Cove, Segment 1403 of the Colorado River Basin; and all areas within Williamson County, except the area within the watersheds draining to the Lampasas River above the dam at Stillhouse Hollow reservoir, Segment 1216 of the Brazos River Basin. The contributing zone is illustrated on the Edwards Aquifer map viewer at
http://www.tceq.state.tx.us/compliance/field_ops/eapp/mapdisclaimer.html

Edwards Aquifer Recharge Zone - Generally, that area where the stratigraphic units constituting the Edwards Aquifer crop out, including the outcrops of other geologic formations in proximity to the Edwards Aquifer, where caves, sinkholes, faults, fractures, or other permeable features would create a potential for recharge of surface waters into the Edwards Aquifer. The recharge zone is identified as that area designated as such on official maps located in the offices of the Texas Commission on Environmental Quality and the Construction General Permit TPDES General Permit TXR150000 The Edwards Aquifer Map Viewer, located at
http://www.tceq.state.tx.us/compliance/field_ops/eapp/mapdisclaimer.html

can be used to determine where the recharge zone is located.

Erosion Control - A measure that prevents erosion.

Erosion and Sediment Control Plan - A set of plans prepared by or under the direction of a certified professional

Facility or Activity - For the purpose of this permit, a construction site or construction support activity that is regulated under this general permit, including all contiguous land and fixtures (e.g., ponds and materials stockpiles), structures, or appurtances used at a construction site or industrial site described by this general permit.

Fiber Reinforced Matrix (FRM) - Fiber Reinforced Matrix shall consist of long thermally refined wood fibers produced from grinding clean, whole wood chips, crimped interlocking fibers, cross-linked hydro-colloidal tackifiers and performance enhancing additives.

Final Stabilization - A construction site status where any of the following conditions are met:

(a) All soil disturbing activities at the site have been completed and a uniform (i.e., evenly distributed, without large bare areas exceeding ten square feet) perennial vegetative cover with a density of at least 95% of the vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

(b) For individual lots in a residential construction site by either:

(1) the homebuilder, demolition contractor, or other designated responsible party completing final stabilization as specified in condition by establishing a uniform (i.e., evenly distributed, without large bare areas exceeding ten square feet) perennial vegetative cover with a density of at least 95% of the vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures. ~~(a) above~~; or

~~(2) the homebuilder establishing temporary stabilization for an individual lot prior to the time of transfer of the ownership of the home to the buyer and after informing the homeowner of the need for, and benefits of, final stabilization. If temporary stabilization is not feasible, then the homebuilder may fulfill this requirement by retaining perimeter controls or other best management practices, and informing the homeowner of the need for removal of temporary controls and the establishment of final stabilization.~~

(2) The option to landscape and deviate from straight vegetative cover is available within the following parameters:

- The use of mulch, aggregate or other inorganic materials cannot predominate over the use of plants, per LDC 25-1-21

- The general use of mulch for permanent stabilization is prohibited, however can be placed in flower, garden or plant beds, and can be used under trees but cannot extend beyond the drip line.

- Any materials/ liners installed beneath rock aggregate or other landscaped areas must be permeable.

- Metal landscaping borders, or other approved materials equivalent in nature, must be installed in all areas that are stabilized using materials other than vegetation to contain aggregate and other landscaped materials from runoff.

- Materials other than vegetation will not be accepted in areas in or along drainage pathways, on sloped areas (15% or steeper), or in areas where materials can migrate into the streets, sidewalks, or onto adjacent properties.

- Any disturbance in the Right-of-Way (ROW) must be restored by way of revegetation (seeding or sod).

(c) For construction activities on land used for agricultural purposes (e.g. pipelines across crop or range land), final stabilization may be accomplished by returning the disturbed land to its preconstruction agricultural use. Areas disturbed that were not previously used for agricultural activities, such as buffer strips immediately

adjacent to surface water and areas that are not being returned to their preconstruction agricultural use must meet the final stabilization conditions of condition (a) above.

Fugitive sediment - Sediment resulting from earth disturbing activities that is mobilized by wind or water and transported from the construction site to any point outside the limits of construction.

Grading - Excavation or fill of material, including the resulting conditions thereof.

Hyperchlorination of Waterlines - Treatment of potable water lines or tanks with chlorine for disinfection purposes, typically following repair or partial replacement of the waterline or tank, and subsequently flushing the contents.

Indian Country Land - (from 40 CFR 122.2) (1) all land within the limits of any Indian reservation under the jurisdiction of the United States government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation; (2) all dependent Indian communities with the borders of the United States whether within the originally or subsequently acquired territory thereof, and whether within or without the limits of a state; and (3) all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.

Indian Tribe - (from 40 CFR 122.2) any Indian Tribe, band, group, or community recognized by the Secretary of the Interior and exercising governmental authority over a Federal Indian Reservation.

Large Construction Activity - Construction activities including clearing, grading, and excavating that result in land disturbance of equal to or greater than five (5) acres of land. Large construction activity also includes the disturbance of less than five (5) acres of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than five (5) acres of land. Large construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site (e.g., the routine grading of existing dirt roads, asphalt overlays of existing roads, the routine clearing of existing right-of-ways, and similar maintenance activities.)

Municipal Separate Storm Sewer System (MS4) - A separate storm sewer system owned or operated by the United States, a state, city, town, county, district, association, or other public body (created by or pursuant to state law) having jurisdiction over the disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under state law such as a sewer district, flood control or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, that discharges to surface water in the state.

Notice of Change (NOC) - Written notification to the executive director from a discharger authorized under this permit, providing changes to information that was previously provided to the agency in a notice of intent form.

Notice of Intent (NOI) - A written submission to the executive director from an applicant requesting coverage under this general permit.

Notice of Termination (NOT) - A written submission to the executive director from a discharger authorized under a general permit requesting termination of coverage.

Operator - The person or persons associated with a large or small construction activity that is either a primary or secondary operator as defined below:

Primary Operator - the person or persons associated with a large or small construction activity that meets either of the following two criteria:

(a) the person or persons have operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or

(b) the person or persons have day-to-day operational control of those activities at a construction site that are necessary to ensure compliance with a storm water pollution prevention plan (SWP3) for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWP3 or comply with other permit conditions).

Secondary Operator - The person whose operational control is limited to the employment of other operators or to the ability to approve or disapprove changes to plans and specifications. A secondary operator is also defined as a primary operator and must comply with the permit requirements for primary operators if there are no other operators at the construction site.

Outfall - For the purpose of this permit, a point source at the point where storm water runoff associated with construction activity discharges to surface water in the state and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels, or other conveyances that connect segments of the same stream or other water of the U.S. and are used to convey waters of the U.S.

Perimeter Control - A barrier that prevents sediment from leaving a site by detaining sediment-laden runoff or diverting it to a sediment trap or basin.

Permanent Stabilization - The use of practices that prevent exposed soil from eroding upon achieving final grade. Permanent stabilization includes a broad range of items such as vegetation, structures which cover the soil to protect, paving, and post development stormwater controls that shall be implemented within 7 calendar days after completion of construction activities or each phase of construction. For the purposes of this section, commercial construction activities are considered complete upon submittal of the engineer's concurrence letter per LDC 25-1-332 and 25-8-182. Residential development is considered complete as outlined in Section 1.4.4 B. Section 6 V of this manual, and per 25-8-182 of the Land Development Code.

Permittee - An operator authorized under this general permit. The authorization may be gained through submission of a notice of intent, by waiver, or by meeting the requirements

for automatic coverage to discharge storm water runoff and certain non-storm water discharges.

Phasing - Clearing a parcel of land in distinct phases, with the stabilization of each phase completed before the clearing of the next.

Point Source - (from 40 CFR §122.2) Any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are, or may be, discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollutant - Dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, filter backwash, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into any surface water in the state. The term "pollutant" does not include tail water or runoff water from irrigation or rainwater runoff from cultivated or uncultivated rangeland, pastureland, and farmland. For the purpose of this permit, the term "pollutant" includes sediment.

Pollution - (from Texas Water Code §26.001(14)) The alteration of the physical, thermal, chemical, or biological quality of, or the contamination of, any surface water in the state that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property or to public health, safety, or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.

Rainfall Erosivity Factor (R factor) - the total annual erosive potential that is due to climatic effects, and is part of the Revised Universal Soil Loss Equation (RUSLE).

Sediment Control - Measures that prevent eroded sediment from leaving the site.

Semiarid Areas - areas with an average annual rainfall of 10 to 20 inches.

Separate Storm Sewer System - A conveyance or system of conveyances (including roads with drainage systems, streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), designed or used for collecting or conveying storm water; that is not a combined sewer, and that is not part of a publicly owned treatment works (POTW).

Site Development - The construction or reconstruction of a building or road; the placement of a structure on land; the excavation, mining, dredging, grading or filling of land; the removal of vegetation from land; or the deposit of refuse or waste on land.

Small Construction Activity - Construction activities including clearing, grading, and excavating that result in land disturbance of equal to or greater than one (1) acre and less than five (5) acres of land. Small construction activity also includes the disturbance of less than one (1) acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than one (1) and less than five (5) acres of land. Small construction activity does not include routine

maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site. (e.g., the routine grading of existing dirt roads, asphalt overlays of existing roads, the routine clearing of existing right-of-ways, and similar maintenance activities.)

Start of Construction - The first land-disturbing activity associated with a development, including land preparation such as clearing, grading, and filling and demolition; installation of streets and walkways; excavation for basements, footings, piers, or foundations; erection of temporary forms; and installation of accessory buildings such as garages.

Storm Water (or Storm Water Runoff) - Rainfall runoff, snow melt runoff, and surface runoff and drainage.

Storm Water Associated with Construction Activity - Storm water runoff resulting from ~~a~~ construction ~~activity~~ activities causing ~~where~~ soil/ land disturbance ~~disturbing activities (including clearing, grading, excavating) result in the disturbance of one (1) or more acres of total land area, or are part of a larger common plan of development or sale that will result in disturbance of one (1) or more acres of total land area.~~

Structural Control (or Practice) - A pollution prevention practice that requires the construction of a device, or the use of a device, to capture or prevent pollution in storm water runoff. Structural controls and practices may include but are not limited to: silt fences, earthen dikes, drainage swales, sediment traps, check dams, subsurface drains, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins.

Surface Water in the State - Lakes, bays, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, wetlands, marshes, inlets, canals, the Gulf of Mexico inside the territorial limits of the state (from the mean high water mark (MHWM) out 10.36 miles into the Gulf), and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, navigable or nonnavigable, and including the beds and banks of all water-courses and bodies of surface water, that are wholly or partially inside or bordering the state or subject to the jurisdiction of the state; except that waters in treatment systems which are authorized by state or federal law, regulation, or permit, and which are created for the purpose of waste treatment are not considered to be water in the state.

Temporary Stabilization - A condition where exposed soils or disturbed areas which are dormant for 14 days or longer are provided a protective cover or other structural control to prevent the mobilization and migration of pollutants. Use of bark mulch, Fiber Reinforced Matrix (FRM), Bonded Fiber Matrix (BFM), soil retention blanket, Turf Reinforcement Mat (TRM), sod, rock rip rap, or other cover that prevents the detachment of soil particles until final stabilization is achieved.

Waters of the United States - (from 40 CFR, Part122, Section 2) Waters of the United States or waters of the U.S. means:

(a) all waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

(b) all interstate waters, including interstate wetlands;

(c) all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds that the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

(1) which are or could be used by interstate or foreign travelers for recreational or other purposes;

(2) from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

(3) which are used or could be used for industrial purposes by industries in interstate commerce;

(d) all impoundments of waters otherwise defined as waters of the United States under this definition;

(e) tributaries of waters identified in paragraphs (a) through (d) of this definition;

(f) the territorial sea; and

(g) wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR '423.11(m) which also meet the criteria of this definition) are not waters of the United States. This exclusion applies only to manmade bodies of water which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA.

Watercourse - Any body of water, including, but not limited to lakes, ponds, rivers, streams, and bodies of water delineated by City of Austin, USGS, USACE or TCEQ.

Waterway - A channel that directs surface runoff to a watercourse or to the public storm drain.

Source: Rule No. R161-15.12, 1-4-2016

1.4.4 - Plan Development and Implementation

B. **Construction Phase Controls.**

1. General Concepts.

The goal of erosion and sedimentation control is to limit as much as possible the detachment and transport of sediment from construction sites and the finished projects they eventually become. Sediment is transported off-site through one of four means:

- Stormwater runoff,
- Water discharges (e.g. pumping of water out of trenches, open channels (creeks, rivers, ditches) or foundation and basement excavations),
- Vehicles, and
- Wind.

Stormwater runoff and water discharges are the primary means by which sediment is transported from construction sites.

Sediment becomes suspended in runoff as it flows over or out of disturbed areas seeking the lowest path of least resistance. It is very important to realize that in order to control this suspended sediment, the means by which it is transported, water, and must first be successfully controlled. The principal tasks are to keep the sediment from entering the runoff or, once in it, to separate and trap the suspended sediment before it can leave the site. The techniques to accomplish this consist of two basic types: site management practices and structural controls.

Site management practices focus on the prevention of erosion and include methods such as minimizing the area of the site that is disturbed at any one time during construction, preserving the existing natural vegetation to the greatest extent feasible, covering exposed soils with temporary stabilization soon after disturbance and restoring vegetation as rapidly as possible in disturbed areas. A related method would be to revegetate between phases of a project, when there will be a delay between these phases. Additional site management techniques include keeping the velocity of stormwater below the erosive level, promoting sheet flow rather than concentrated flow, and protecting and maintaining stable slopes.

Structural controls utilize engineered devices (such as channels, berms, silt fences, ponds, etc.) to keep sediment on-site. This is accomplished in a two-stage process consisting of drainage control followed by sediment removal.

Drainage Control .

The control of on-site drainage is essential to the process, as this must be accomplished first in order to successfully separate and trap suspended sediment. Drainage control is accomplished by strategically placing structural controls at locations where they will intercept stormwater runoff as it flows towards the lower portions of a site. These control devices must be substantial enough to withstand the anticipated runoff velocity and either must direct the flow to another control device or must be shaped to temporarily pool the runoff behind the structure. At this point in the process, trapping of sediment can occur. If the drainage control stage is unsuccessful or only partially successful, it will

correspondingly limit the amount of sediment that will be trapped. Reviewers shall require calculations to demonstrate that drainage controls have the capacity to withstand the velocity of the 10-year 24-hour storm and all detention sedimentation controls shall be shown to have capture volume for the two-year 24-hour storm as well as the volume of sediment generated from a two-year 24-hour storm. Drainage controls shall have a drawdown time of 72 hours.

Sediment Control.

Sediment trapping, i.e. the separation of the sediment from the runoff, occurs primarily by sedimentation: when suspended materials settle out as runoff velocity is decreased, and the sediment is trapped and left behind to be removed later, while the runoff is released to drain off-site.

The other methods by which sediment leaves a site, vehicles and wind, can be controlled in a manner similar to runoff. The first step is to control the mechanism that moves the sediment and the second step is to capture the sediment. For vehicles this entails directing them to a limited number of stabilized exits where most of the attached soil or mud can fall or be washed off. Wind-blown dust, although generally not a major problem, can be controlled with barriers that slow velocity and prevent transport. In addition, excessive dust can be controlled with regular wetting of the dust source. Special additives to the water used for dust control (i.e. dust palliatives) will assist in preventing the resuspension of dust when the moisture has evaporated. Article V, Chapter 4-3 of the City Code of 1981, however, does not allow the use of oil, diesel fuel or other pollutants which may wash into streams and watercourses for the control of dust.

The previous paragraphs describe the basic process that occurs in implementing successful structural erosion and sedimentation controls. Variations of this process can be employed, depending on the type, number, and location of structural control devices used. However, the basic concepts and engineering functions involved in successful erosion and sedimentation control applications remain the same regardless of which specific structural devices or techniques are employed. Whether or not a plan is judged to be able to adequately meet the letter and intent of the policy in section 1.4.2 (B) will be determined by the Development Services Department Staff. Because each site is unique, this volume cannot prescribe an upfront pre-approved recipe that will ensure site plan approval. However, following the submittal requirements in section 3 will demonstrate to the reviewer that a thoughtful, rigorous analysis of the potential pollutants, runoff pathways, and methods for control have been considered.

In the following sections, design of temporary and permanent controls for sites will be more fully examined.

2. Design Guidelines

There are several methods available to reduce erosion and sedimentation problems at construction sites. Site management methods are one of the most economical ways to accomplish this control. This section introduces several new or underutilized methods that will be required as part of the Plan Submittals. Phasing, limiting the extent of existing vegetation that is disturbed, planning the necessary locations of the disturbance,

restricting construction traffic to those locations, and revegetating or otherwise stabilizing any disturbed area are examples of this type of planning, hereafter referred to as Prevention.

More common methods, however, use structural controls to take advantage of the reduced ability of water to carry sediment when its velocity is reduced. Temporary structural control devices can be grouped into one or more functional categories, defined by its particular application on a site. Recognition of the function of each control at the point where it is to be used is critical in choosing the most effective measure for each location. Three functional categories have been identified and are described below:

• Diversion - A control device used for diversion is strategically placed on a site to intercept runoff and divert it to another location. A diversion may be installed to keep clean water from crossing and eroding a disturbed area or to move runoff with silt to a location where it can be treated more effectively. (see COA Standards 621S-1 and 622 S-1) All sites that receive off-site runoff must install flow diversion devices designed to handle the concentrated flow and divert it around the disturbed area in a non-erosive manner to the receiving drainage system downstream of the site. Diversion capacity shall be the runoff volume of the 10-year, 24-hour storm. All diversions shall be designed to withstand erosion from the velocity of the 10-year, 24-hour storm.

• Flow Spreading/Velocity Reduction - This category of control applies to smaller flow amounts which may be diverted onto undisturbed ground while at the same time allowing a small amount of flow to pass over and through the device. The control device can also function as a grade control to reduce the length and steepness of a slope to prevent rills and gullies. These controls are normally situated at a right angle to the flow path and are spaced to ensure not erosive velocities. This form of control attempts to restore a sheet flow condition such that the velocity and depth of flow are so low that sediment cannot be effectively carried by the runoff. (See Figure 1.6.7 B.3 level spreader or rock berm)

• Detention/Sedimentation - Runoff is ponded behind a structure allowing the sediment to drop out of suspension and be trapped in the detention pool because of the reduction in runoff velocity.

Previously, silt fences were classified as detention/filtration devices. Recent research by the University of Texas and Texas Department of Transportation demonstrated that silt fences function primarily as detention/sedimentation due to clogging of the pores. They were found often to be undersized and improperly installed as detention/sedimentation devices. Therefore, silt fence criteria in section 1.4 have been updated to reflect the actual function of silt fences under field conditions.

Detention/sedimentation structures must be designed to withstand the force and velocity from a 10-year frequency storm without failing. Larger storms shall be bypassed via stabilized conveyances. Those devices that employ sedimentation must provide the storage volume for the runoff from a 2-year, 24-hour storm under compacted site conditions. The sedimentation basins must be designed such that drawdown time is 72 hours via surface skimmers. The design must include considerations for overflows to

ensure that the device and its detention pool remain intact. Detention/sedimentation structures shall not be sited in natural drainage channels, draws or ravines that are directly connected to off-site drainage features like creeks, rivers, ponds or recharge features. In particular, this means that silt fences shall not be used to control concentrated or channelized flow and sedimentation basins shall not be constructed in natural draws because failures of the earthen retaining system are often catastrophic to the downstream receiving waters.

The procedure for developing an effective erosion and sedimentation control plan (henceforth adopting the NPDES nomenclature of Erosion and Sedimentation Control Plan (ESCP)) for a construction project involves several required steps, as indicated below. During plan review, the City of Austin Plan reviewer shall have final authority regarding the proper implementation of the ESCP. The submittals must demonstrate to the satisfaction of the reviewer that all potential sources of sediment and other construction related pollution have been identified and minimized. The plan shall not move forward until the reviewer has been satisfied that the letter and intent of this section have been satisfied.

3. Submittal Requirements

Submittals to satisfy the requirements for Erosion & Sedimentation control plans consist of two parts:

a. Completed Erosion and Sedimentation Control Plan template.

b. Plan sheets that include the graphics necessary to illustrate, review and construct the systems outlined in the ESCP (specific submittal requirements enumerated and explained below). Plan sheets shall clearly show the following:

- Existing conditions.
- Demolition plan, as required.
- Site preparation and grading operation.
- Tree Preservation, as required.
- BMP layout.
- Sequence of construction/phasing.
- Final grades.
- Permanent stabilization.
- Details and notes.

The ESCP must be signed and certified by a Licensed Professional Engineer (TX) or a Certified Professional in Erosion and Sedimentation Control (CPESC). If the ESCP includes engineering calculations, then ESCP must be sealed and signed by Licensed Professional Engineer.

Section 1 - Existing Conditions Site Evaluation, Assessment and Planning

- Project Site Information (e.g. name, location).

- Contact Information/Responsible Parties (Owner, ESCP designer, Construction Phase ESCP contact).

- Representative photograph of site that shows the designer on-site.

- Description of Soils-Use NRCS Soil Survey, USGS or Bureau of Economic Geology Geologic maps. Geotechnical reports are acceptable to define subsurface soil properties.

- Delineation of existing topography and drainage patterns, including overland and concentrated flow; contributing drainage area for flow paths that drain at least 1 acre, presence or absence of baseflow, USGS stream type (ephemeral, intermittent or perennial).

- Slope steepness.

- List the receiving water to which the site drains; if receiving water is impaired or subject to Total Maximum Daily Loads, list pollutants causing impairment and requirements in TMDL applicable to construction sites. State how ESCP prevents discharge of these pollutants.

- Description and location of Critical Environmental Features.

- Photos and description of predominant vegetation.

Section 2 - Construction Activities and Site Management Practices (see http://www.epa.gov/npdes/pubs/exampleswppp_residential.pdf for examples)

- Nature of Construction Activity (e.g. residential, commercial, utility, etc.).

- Phasing and construction sequence plan- maps and schedules of disturbances, phasing, temporary and permanent stabilization. Phasing is a preventive measure defined as: One portion of the site is disturbed at any one time to construct the infrastructure necessary to complete that phase. Subsequent phases are not started until earlier phases are substantially complete and exposed soils are stabilized. In the case of subdivision construction, it is defined that the activities associated with ROW construction (including utilities) are distinct phases from the activities associated with mass clearing and grading for subdivisions, which are also distinct from the activities associated with individual lot construction. If the permit allows for all three activities, then the ESCP must address the

sequence, timing, appropriate BMPs, installation and maintenance for all three phases. In addition, ROW construction must be accepted prior to beginning the phase of clearing and grading or individual lot construction. If the application for subdivision development anticipates clearing and grading of individual lots, then the ESCP must show the interior and perimeter controls that will be in place and maintained until final stabilization of individual lots. ROW and utility construction will not be accepted by the City of Austin if any mass grading on lots has occurred without an approved ESCP that anticipates construction through permanent stabilization of individual lots. Stormwater ponds are accepted separate from other utilities and ROW.

• For site plan review purposes, the construction sequence must show the duration of each activity, as opposed to specific start and end dates. Prior to the start of construction, though, the ESCP must be updated with actual dates of start/finish for each activity outlined in the sequence. The ESCP must be kept updated to reflect any changes, or the inspector may red tag the site. Environmental Inspection will make the determination regarding the level of submittal needed for ESCP updates. The determination will follow these general guidelines:

1) If the changes do not require a site plan revision or correction (certain changes like changes to LOC require revisions) and the EV Inspector, PE and/or CPESC all agree on a revision to planned E&S controls, then the ESCP update log can be used to document the updates. Any graphics that are necessary for documentation shall be physically added to the ESCP file. The construction sequence shall include at a minimum, the following:

a. Length of time to install construction phase E&S controls.

b. Length of time for each identified phase of construction from initial groundbreaking to final grade and any intermediate steps that would require modification of E&S controls (temporary and permanent storm water ponds, clearing and grubbing, rough grade, final grade, utilities, roads, etc.).

c. Identification of areas within the LOC that will require temporary stabilization and the times of installation, modification, removal. Sequencing of grading and cut and fill activities will be required to show how disturbed and stockpiled sediment is accounted for each time it is transported from initial disturbance to permanent stabilization. For subdivisions, the sequence must show when construction of utilities and ROW construction ends, when grading of lots begins and ends, and when the individual lot construction phase begins.

d. Identify schedule for permanent stabilization.

e. Identify schedule for converting temporary controls to permanent functions (e.g. basins).

f. Identify schedule for removal of E&S controls.

• Maintenance schedule for Construction Phase BMPs.

• Calculations of cut/fill volumes per phase; include description of how spoils will be handled during construction (e.g. kept on site, hauled off; if on-site how will spoils be protected from erosion?).

• Identify all potential sources of pollution during construction (not just sediment); describe pollution control procedures and devices.

Section 3 - Grading & Erosion/Sediment Control BMPs

• Plan sheets that show:

a. Direction of flow during grading operations.

b. Location, description and calculations for off-site flow diversion structures.

c. Areas that will not be disturbed; natural features to be preserved.

d. Delineation of and contributing drainage area to each proposed BMP (e.g. silt fence, sediment basin, etc.).

e. Location and type of E&S BMPs for each phase of disturbance.

f. Calculations for BMPs as required.

g. Location and description of temporary stabilization measures.

h. Location of on-site spoils; description of handling and disposal of borrow materials; On- site permanent spoils disposal areas, including size, depth of fill and revegetation procedures. (Off-site disposal requires a separate site development permit. A note shall be made on the plan to specify that "the contractor shall notify the city's inspector about the location and permit number of the disposal site 48 hours prior to the removal.")

i. Location of vehicle entrance, description of stabilization measures and procedures for removing accumulated sediment to prevent off-site transport.

Section 4 - Permanent Stabilization

It is required that submittals for permanent stabilization contain the same level of detail as that stated above for temporary controls. Permanent stabilization should occur within seven (7) days after completion of construction activities or each phase of construction. It is given that some of the language is only applicable to temporary controls, but when it is appropriate for the word "permanent" to be substituted for the word "temporary" in sections 1—3 above, it is the reviewer's prerogative to require such submittals without them being individually itemized again in section 4.

Additional requirements for permanent stabilization submittals include, but are not limited to:

a. Location and type of permanent stabilization (e.g. vegetation, slope stabilization, sodding, seed/soil retention blanket, Fiber Reinforced Matrix, Bonded Fiber Matrix, or rock rip rap).

b. Establishment irrigation and maintenance plan for permanent vegetation. Revegetation plans for all disturbed areas on the site in accordance with the vegetative practices section of this manual. Information provided by the engineer should include any of the following which are applicable:

• Topsoil requirements, see Standard Specification 601S.3.A, Salvaging and Placing Topsoil, as well as ECM 1.4.7,

• Seed, sod, and mulch type and rate of application (see section 1.4.7),

• If seed is used to revegetate, include the soil retention blanket, FRM or BFM to be used until establishment,

• Irrigation schedule for permanent vegetative establishment, (see Special Specification for 609S),

• Application technique,

• Maintenance requirements for each specific area,

• If vegetation is to be temporary,

• If vegetation is to be permanent,

• A clear definition of criteria to be utilized in determining when acceptable revegetation has taken place (minimum requirements are 95 percent coverage with no bare areas exceeding 10 square feet with a 1½ inch stand of grass).

Landscape installation and natural area restoration requirements may be applicable to certain developments. To find out what regulations may apply, an inquiry should be made to the Development Services Department.

c. Specific locations shall be noted for the following:

• Where special slope stabilization techniques are to be utilized and the extent of stabilization to be achieved.

• Location and type of permanent Stormwater management facilities (e.g. detention ponds, water quality ponds, outlet protection/velocity dissipaters).

• A schematic representation of each control measure for each phase of construction, with adequate specifications for the measure, such as dimensions and length (or size) and references to the City of Austin Standards and Standard Specifications, so that the feature can be built and maintained as intended.

• For detention/diversion/sedimentation control devices, a summary of calculations for runoff from the ten-year, 24-hour storm. Calculations shall

include velocity for each of the drainage sub basins to a control in the pre-disturbance, under construction, and permanently stabilized conditions.

Section 5 - Additional Considerations and Further Discussion on Submittal Requirements and Design Guidelines

This section describes in more detail practices and BMPs noted above to guide the applicant in developing appropriate ESCP submittals. The reviewers may require demonstration that the following have been considered:

I. **Site Management**

a. Phasing - Phasing is a preventive measure defined as: One portion of the site is disturbed at any one time to construct the infrastructure necessary to complete that phase. Subsequent phases are not started until earlier phases are substantially complete and exposed soils are stabilized. The plan reviewers will not allow a site plan to proceed without the applicant demonstrating that all feasible opportunities for phasing have been implemented. Construction sites greater than 25 acres are required to show phasing of disturbance tailored to the specific site conditions. Items that shall be considered to determine the effectiveness in phasing include: size of disturbed area, compatibility with construction sequence (e.g. Stormwater controls, then utilities, then roads, then pads), proximity to CEFs or waterways, slope steepness. Sites less than 25 acres must demonstrate on the grading plan the areas to be disturbed and how it was minimized.

b. Temporary Stabilization - The designer must anticipate the construction process and identify times when disturbed areas will be dormant (i.e. not making progress toward a benchmark phase) for 14 days or longer. These areas must be identified on the ESCP and the temporary stabilization practices described. Inspectors will make note of length of time of dormant disturbed areas and require coverage on Day 15. Approved practices include: rock rip rap for concentrated flow areas and vehicle access; Fiber Reinforced Matrix (FRM), Bonded Fiber Matrix (BFM), Turf Reinforcement Mat or Rolled Erosion Control Product for Slopes steeper than 4:1, and bark or wood chip mulch or sod for areas flatter than 2:1 slopes. Spoil piles will require daily cover or demonstration of adequate perimeter containment to prevent the migration of spoils outside of the defined spoil pile footprint. Unacceptable practices include broadcasting seed, paper based hydromulch, and wood fiber based hydromulch without a tackifier. Inspectors will require invoice from applicator showing certification of mix as FRM or BFM. Inspectors have authority to require additional application of temporary stabilizer if visual inspection shows inadequate coverage.

c. No offsite flow can flow onto the Limits of Construction of the disturbed phase. ESCP must show locations where pass-through flows may be safely diverted around disturbed areas and routed at a properly stabilized

discharge point to downstream drainage conveyance. Proper stabilization shall be determined by the Environmental Inspector.

d. ESCP must show all designated construction access points and equipment travel paths. In particular, if there are any CEFs, protected water ways or trees, the ESCP must demonstrate that construction access is diverted at least 25 feet from such features. In addition to temporary stabilization measures for construction access, plans must demonstrate methods for ensuring that construction vehicles do not track sediment onto roadways.

e. Spoils may not be located in the 100-year flood plain, Critical Water Quality Zone, within 150 feet of a CEF or within 25 feet of a concentrated flow path with more than 5 acres contributing drainage area.

II. **Drainage Control Points and Sediment Control BMPs**

Using the information gathered in the above analysis, the designer must determine the most practical and effective locations for controls to be installed. These controls should be located:

- As close to the source of sediment as possible, but sufficiently distant from areas under construction or from site traffic in order to avoid constant disturbance,
- In areas that permit access for maintenance to remove sediment build-up,
- Where they will not cause flooding of adjacent properties due to diversion or ponding of stormwater, and
- In areas where they will not be removed and replaced frequently.

III. **Determining the Function of the Control**

The designer must determine which functional category of control (diversion, flow spreading, detention/filtration, or detention/ sedimentation see section 1.4.4 B.2. Design Guidelines) will be appropriate at each location. In addition, the designer should be able to recognize which controls must be removed or relocated and which ones can remain in place throughout the entire construction period.

Using the base information developed previously, the designer can identify the location and function of controls and where phasing in the installation of controls is to occur. Phasing of the temporary controls is particularly important for construction projects that take significant periods of time to complete or where the construction work itself is divided into distinct phases. Such projects include major utility installations, large sites, and street and drainage improvements and subdivisions.

Perimeter controls are placed at the edge of a project's disturbed area prior to the beginning of construction. All perimeters downslope from the construction site and any existing channels draining the site should be protected by temporary erosion and sedimentation controls. These control measures generally remain in

place throughout the construction period since they are located outside the construction zone and should need only small adjustments. It should not be assumed that perimeter controls by themselves are adequate to control erosion and sedimentation. In all cases, perimeter controls shall be the secondary failsafe controls installed in conjunction with interior controls. For example, silt fence along the contours of the Limits of Construction (LOC) may be used as perimeter control in conjunction with interior controls such as site management practices, rock berms, mulch berms and sedimentation controls around spoils.

Interior controls are added inside the project perimeters during and after clearing, rough cut and fill operations when the site topography is rapidly changing. They are dynamic controls that, generally, must be modified to accommodate the changing conditions on the site in order to achieve optimum results. Examples of these types of controls would be temporary stabilization measures as outlined in previous sections, silt fence located below roadway fill sections, mulch berms on contour, protection of detention pond outlets and controls across backfilled utility trenches.

In addition, work in a channel that drains more than five acres shall employ a dewatering system that bypasses channel base flow around the site. At no time shall construction be permitted in any channel that does not have an approved bypass system. The most common and effective system consists of a temporary dam (not earthen) upstream of the construction site with a sump pump with the capacity to handle the flow rate of the baseflow. Plans will need to show details of the berm/pump system to ensure pump/pipe capacity and that discharge is in a non-erosive manner downstream of the construction activity.

Where temporary channel crossings are required, compacted earth is not allowed. The designer must demonstrate that the proposed crossing is capable of withstanding a 25-year storm and that failure would not result in a discharge of construction materials.

IV. **Choosing the Control Device**

At this point the designer must determine which specific structural device will be effective at each location where control is needed. Choice of the specific control device for each location is dependent on the function to be accomplished (i.e. diversion, flow/spreading, or detention/sedimentation), the amount of flow, and the type of flow (i.e. sheet or concentrated flow) to be controlled. The designer may use any of the approved practices shown in this manual which are appropriate (see Figure 1-1 in Appendix V). Figures 1-1.1 through 1-1.5 in Appendix V of this manual shows the example site plan with specific control devices, anticipated phasing, and associated runoff flow direction.

Sedimentation basins shall not be allowed as stand-alone BMPs. Applicant must demonstrate appropriate site management practices, temporary stabilization measures, perimeter and internal controls instead of just relying on a sediment basin at the outlet of the project. Temporary sediment basins and traps are not

allowed to be constructed where concentrated flow paths, draws, creeks or other drainage features exist that have contributing drainage areas greater than 10 acres.

Each control device must be able to function as designed when controlling the peak runoff resulting from the two-year, 24-hour storm. Flow calculations must be provided to reviewer and they should be based upon the methods presented in the City of Austin Drainage Criteria Manual. Calculations must assume a precondition of maximum allowable sediment accumulation. Therefore, the control devices must be designed for capacity of both the water flowing through as well as the sediment that could accumulate over normal operations. The designer must demonstrate that each device will be able to detain the water, and contain the volume of sediment that may be mobilized during the 10-year storm (use Modified Universal Soil Loss Equation to quantify soil loss for 10-year storm). Mobilization includes sheet, rill and gully erosion as well as mass failures of cuts and stockpiles. Care must be taken to determine the location of any low points in control devices when assessing the flow capacity of the barrier. Table 1-1 summarizes the characteristics of several typical temporary controls, including recommended maximum drainage area and maximum flow-through rate.

Summary Check List

Upon completing the design of the temporary controls the engineer should check the design for compliance with the following list of guidelines:

- Control devices shall be located as close as possible to the source of sediment.

- They shall be situated to catch runoff prior to its entering drainage ways.

- Controls shall be located approximately perpendicular to the direction of runoff flow for effective interception.

- Controls shall be used within their drainage acreage limits.

- Controls shaped to create detention areas shall have adequate space behind them for ponding of water and sediment accumulation including the volume of soil that can be transported by the 10-year, 24-hour storm (using MUSLE procedures).

- Perimeter controls shall be installed along the contour, if possible, to evenly spread the detained runoff. When their function is to divert water to another location, the control should gently slope downhill and the design shall include additional controls to slow velocity and prevent erosion along the flow path of the diversion.

- Detention controls that cannot be installed along the contour shall have reinforced low points to protect against washouts from concentrated flow.

- Controls shall be located in areas that allow access for removal of sediment accumulations.

- Controls shall not be located in areas where they will be frequently disturbed during construction.

- Controls shall not be located where they will cause a flooding problem to adjacent property or rights-of-way.

- When controls must be removed to accommodate equipment, they shall be restored at the end of each working day.

It is recommended that the designer also review site management practices (as stated in section 1.4.4 B) in conjunction with the final temporary erosion and sedimentation control design.

4. Permanent Erosion and Sedimentation Control.

The design of effective permanent erosion and sedimentation controls and their installation as a part of the construction process is an obvious and necessary final step. Without adequate permanent controls, exposed or disturbed soil may erode, stream banks may become unstable, and sedimentation will occur in streams and lakes decreasing the recreational and aesthetic potential, reducing the diversity of plant and animal life, and potentially, threatening the quality of drinking water. Permanent controls include a broad range of items such as vegetation to hold soil in place, structures which cover the soil to protect it, and water quality improvement devices (e.g. sedimentation/ filtration basins) which remove sediment once it is being carried by runoff.

Permanent controls shall be designed for less frequent (i.e. larger) storm flows than temporary controls, in order to maintain long-term effectiveness. The City of Austin Drainage Criteria Manual requires all drainage facilities, including channels, storm sewers inlets, detention ponds and water quality facilities, to be designed to intercept and transport runoff from a 25-year frequency storm. Flows greater than a 25-year frequency up to and including a 100-year frequency storm must be contained within defined rights-of-way or drainage easements. The project engineer, therefore, shall design these facilities such that velocities are below erosive values for the particular soil conditions and the 25-year, 24-hour storm event, and that all structures can withstand the forces generated by the expected flows of the 25-year, 24-hour storm event. Likewise, on-site, privately owned drainage facilities and other areas subject to runoff shall be designed to withstand the maximum projected flows and velocities.

Permanent vegetation for minimizing erosion and sedimentation should be selected for its suitability in the general area, proposed land uses, and desired aesthetic, or landscaping, effect. In general, revegetation of disturbed areas using species of plants found naturally in the area of the site will have the best long-term success, especially in locations where care is likely to be minimal (e.g. in utility easements and road right-of-way). Using a mixture of grasses, forbs, shrubs and trees will maximize the ability of the vegetation to hold and protect the soil, by providing a variety of root structures at varying depths.

Anytime that revegetation is achieved by seeding, it shall be accompanied by the appropriate soil retention blanket from Standard Specification 605 or with a FRM or BFM. Broadcasting of seed is not acceptable, nor is paper-based hydromulch or wood-fiber based with no tackifier acceptable. Additional information regarding revegetation can be found in Section 2, Landscape, and Section 5, Construction in Parks, in this Manual.

Care should be taken to avoid introducing aggressive species of non-native plants in sensitive environmental areas where they may supplant natives. Top soil imported from outside the site area often is source on undesirable weeds and grasses. See COA Standard Specifications 130S and 601S and 609S.

Similar to the design of temporary controls, the design of permanent facilities must assess the expected permanent drainage characteristics of the site. Factors to be investigated include:

- Patterns of flow on the site, including locations of sheet or channelized flow, with calculated depths and velocities.

- Off-site flows that must be passed through the site.

- Discharge characteristics of all proposed structures that intercept drainage - e.g. culverts, streets and drives, detention ponds, sedimentation/filtration basins, storm sewers, etc.

With this information, the designer can determine the type and extent of permanent controls that will be required.

Where runoff is concentrated the engineer should attempt to return the flow to a sheet flow condition. This will generally result in much lower velocity with less erosion. In addition, flow will encourage vegetative filtration of the runoff to remove sediment and other pollutants, including those originating on adjacent impervious surfaces. When flow occurs over vegetated ground, the type of plants and their ability to withstand the expected velocity should be investigated.

If velocities are high, it should be determined if the rate of flow can be decreased without causing significant flooding. This might be done by reducing the slope, roughening the surface or modifying the shape of the channel. Where velocities are too high to permit vegetation, structural methods to protect the surface should be investigated. In general, the most "natural" technique should be used commensurate with the degree of protection needed and any risks involved - i.e. stone rip-rap would be preferable to concrete rip-rap; stacked stone walls would be preferred over formed concrete walls.

In those locations where it is feasible, flows should be released onto undisturbed well-vegetated areas. If it is necessary, permanent structural devices may be utilized to spread flow and reduce velocity.

Where flows are released into channels, erosion shall be prevented by assuring adequate vegetative cover, using appropriate protective materials or reducing velocity. Channel transitions, cuts, and fills without structural protection shall be smooth and natural to avoid unstable banks or slopes that might erode or collapse.

Whatever the site conditions, it is incumbent upon the designer to demonstrate to the reviewer, via accepted scientific and engineering methodology, that the permanent conditions are sufficient to withstand the erosive forces (shears and velocities) of the 25 year, 24 hour storm event. Use the DCM for acceptable calculations.

Good site management techniques will also benefit permanent erosion and sedimentation control. Proper land grading to achieve stable, maintainable slopes, the use of terraces in steeper cut areas, and vigorous stands of mixed vegetation (grasses, forbs, and trees) will retard stormwater flow, prevent erosion of soil, and capture sediment and pollutants from upslope areas.

Submittal requirements for permanent stabilization controls are the same as for the temporary construction phase controls. Refer to section 1.4.4(B).

- All detention, sedimentation, or sedimentation/filtration ponds.

Section 6 - Additional Considerations Specific to Residential Construction and Demolition

I. Erosion and Sediment Controls for Projects Exempt from a Site and ESC Plan

a. The following controls must be installed on site and approved by the Environmental Inspector prior to the commencement of construction activities (including, but not limited to, clearing, grading and forming for building layout).

- Perimeter silt fencing or mulch socks shall be used to establish the Limits of Construction (LOC).

    - Alternate methods or materials may be used to define the LOC if approved by the Environmental Inspector.

- Additional silt fencing or mulch socks (or other approved controls) may be required along low spots that may be subject to off-site discharges.

- When installing either silt fence or mulch socks, apply J-Hooks to help contain eroded sediments on site, where feasible.

- Tree Protection shall be installed around any protected or heritage trees, or other trees as indicated on approved Plot Plan.

- Stabilized Construction Entrance (SCE) shall be installed using either mulch or rock materials

- Triangular Filter Dike may be used in conjunction with the SCE, or as alternative to the SCE if approved by the Environmental Inspector

b. Refer to the following Standard Specifications for the installation of the above referenced erosion and sediment controls:

- Materials/ installation of silt fencing shall meet the criteria as outlined in 642S of the Standard Specification Manual & Standard Specifications item 642S-1, including the addition of safety caps on any steel posts exposed to the public

- Materials/ installation of mulch socks shall meet the criteria as outlined in Standard Specifications item 648S-1, including the addition of safety caps on any steel posts exposed to the public

- Materials/ installation of mulch shall meet the criteria as outlined in Standard Specifications item 645S-1.

- Materials/ Installation of a Stabilized Construction Entrance shall meet the criteria as outlined in Standard Specifications items 641S and 641S-1, however, the required length of the entrance may be subject to field modifications due to lot size limitations.

- Materials/ Installation of a Triangular Filter Dike shall meet the criteria as outlined in Standard Specifications item 628S

c. Environmental Inspector has the right to require additional controls, or modifications to existing and standard controls, as deemed necessary or dictated by site conditions.

e. Alternate methods or materials may be used for sediment and erosion controls if approved and outlined in Section 1.4.0 of this manual.

II. Pre-Construction Inspection and Sequence of Construction for Projects Exempt from a Site and ESC Plan

a. All applicable permits must be approved and released

b. Erosion and Sediment Controls and Tree Protection must be installed on site prior to any ground disturbance or construction activities taking place

c. Once ESCs and Tree Protection are in place, the responsible party shall contact their Environmental Inspector to schedule a pre-construction meeting before beginning work on site

- Environmental Inspector will have up to three (3) business days to perform the pre-construction meeting from the time of request

d. Pre-construction tree meeting will be coordinated with the building layout inspection

e. For further guidance, refer to the Sequence of Construction as outlined and provided with the release of the Building Permit

III. Best Management Practices for Projects Exempt from a Site and ESC Plan

The following Best Management Practices shall be required if deemed necessary by the Environmental Inspector or as dictated by site conditions

a. General Housekeeping

- Containment of trash, litter and debris in a trash receptacle
  - Stagnant, standing water is not permitted to pool in, or drain from the receptacle

b. Concrete truck wash-out pit installed on site

- Materials/ Installation of the concrete truck wash-out pit shall meet the criteria as outlined in Standard Specification item 663S-1, however, the required dimensions of the pit may be subject to field modifications due to lot size limitations.
- Alternate forms of concrete truck wash-out pits may be approved by the Environmental Inspector

c. Streets and sidewalks swept daily, or to the maximum extent practicable, to keep clear of construction debris and sediment

d. Oil, hazardous material, and other liquids labeled, covered, and stored on secondary containment

e. Contact Environmental Inspector before any dewatering activities begin

- Dewatering Plan may be required

f. Practice dust control, as necessary

g. Initiate temporary/ permanent stabilization when construction ceases in a disturbed area for more than fourteen (14) days

h. Alternate best management practices may be considered in some cases if deemed necessary and approved by the Environmental Inspector

IV. Other Construction Practices for Projects Exempt from a Site and ESC Plan

a. All applicable permits, state notices, and Stormwater Pollution Prevention Plan (SWPPP) information must be posted near the site entrance and visible to the public

b. Access and construction activities must stay within the permitted plan set and/ or property boundaries

c. Work in Right-of-Way, floodplain, drainage pathways/ easements, or setbacks is prohibited unless authorized and permitted by the appropriate City of Austin Department

- Modifications to any drainage pathways are also prohibited without review and may require additional permitting

d. Material stockpiles and portable toilets must be stored outside of Right-of-Way, floodplain, drainage pathways/ easements, setbacks, and critical root zones, and cannot encroach on ESC

- Environmental Inspector may deem it necessary for materials to be stock piled in a designated staging area

- Portable toilets must be stored on level ground

e. Construction in or adjacent to creeks and natural waterways shall comply with requirements for construction in waterways, and must be permitted by the appropriate City of Austin department (refer to LDC 25-8-261, and Sections 1.5.3 and 1.5.4 of the ECM)

f. Any spoil/ fill material disposed off-site within the city limits out to the 5 mile ETJ of Austin must be disposed of at a permitted site

g. All on-site temporary and permanent fill areas must comply with permit terms

h. Cut & Fill over four feet (4') (including those associated with swimming pools), and retaining walls over four feet (4') must be permitted independently or receive an exemption from site plan requirements

i. All water quality facilities must be constructed per approved plans, if applicable

j. Spills less than five (5) gallons is the site operator's responsibility

- Contact City of Austin Spill Response (and TCEQ if applicable) for spills that are five (5) gallons or more

V. Final Stabilization Practices for Projects Exempt from a Site and ESC Plan

a. Final stabilization must begin no later than seven (7) days after construction activities are complete

b. Erosion and Sediment Controls must stay in place until permanent vegetation is established

c. Refer to definitions for 'Final Stabilization' and 'Permanent Stabilization' in Section 1.4.3 of this manual

d. The following warm weather seed or sod options will be accepted as permanent vegetation between March 2nd and September 14th: Bermuda, St. Augustine, Zoysia, or Buffalo

- Must utilize appropriate top soil to establish vegetative cover, per Standard Specification 601S.3(A)
- Install temporary irrigation, utilize a water truck or other equivalent means if necessary to establish vegetation
- Installing cool/ winter season and annual grasses such as Winter Oats, Winter Wheatgrass, and Cereal Rye Grain between September 15th and March 1st will serve only as temporary stabilization methods and will not be accepted as permanent vegetation

e. Site and surrounding areas must be free of sediment

f. Trash and construction debris must be contained and removed from site

g. All outstanding fees must be paid and violations cleared

h. All water quality structures must be complete and fully functional, if applicable

i. Temporary ESC and accumulated sediment must be removed from site once final stabilization has been achieved

j. Routine Environmental Inspections will continue and a Certificate of Occupancy (CO) will not be issued until all requirements have been met and the final 602 inspection has been passed

- Environmental Inspector will have up to three (3) business days to conduct the 602 inspection from the time of request

k. If the site is not ready to pass the final 602 and the responsible party is requesting occupancy, or temporary stabilization methods must be utilized until the appropriate

growing season, the following options may be available if there are no fees or non-compliance issues pending on site:

- Responsible party may apply for a Temporary Certificate of Occupancy (TCO) which will require the site to pass an environmental inspection in addition to other applicable building inspections.

VI. Enforcement and Violation Procedures for Projects Exempt from a Site and ESC Plan

a. Non-compliance on projects exempt from a site plan will be subject to penalties similar to those on commercial development including fees, Stop Work Order (SWO), hold on building permits, and citation.

b. If non-compliant issues are found on a site and a violation is issued, the responsible party will have forty-eight (48) hours to complete all corrective actions

c. If a violation observed on site warrants a Stop Work Order, corrective actions shall begin immediately and shall be completed within twenty-four (24) hours.

d. At the discretion of the Environmental Inspector, the allowable time given to complete corrective actions may be reduced if deemed necessary due to the significance of the violation

D. **Procedures During Construction.**

Proper installation, maintenance, and inspection of the approved control methods during the construction of a project are the final steps in assuring effective control of erosion and sedimentation. Implementation requires the combined efforts of the project engineer, contractor, owner, city inspectors, and, when needed, reviewers working together to achieve the best feasible control. The following sections highlight specific areas of individual and shared responsibility during the construction phase.

1. Project Management.

Knowledgeable and committed on-site management is important for the successful implementation of erosion and sedimentation controls, especially temporary control measures during construction. To accomplish this, it is required that the owner designate a "project manager" or "site supervisor". This requirement takes effect October 4, 2010. The designated city inspector(s) responsible for the inspection and enforcement of erosion and sedimentation regulations can work with this individual to ensure that these requirements are met. The design engineer and the project manager working with a knowledgeable and involved city inspector will help to assure that effective controls are properly implemented and maintained.

2. On-site Pre-construction Meeting

Prior to the beginning of any development activities, the erosion/sedimentation controls (per the ESCP) and tree and natural area protection specified in the

approved plan must be in place. For residential homebuilding and demolition, minimum controls and tree protection must be in place per Section 1.4.4 B. Section 6. As required by Section 25-1-288 of the code, the owner will request the appropriate city department to schedule a preconstruction conference to assure that controls are in compliance with this manual and the approved plan and to correct any inadequacies in the plan that are identified during the inspection. This inspection will be held within ~~five (5)~~ three (3) business days of notification and will be attended by the permit holder, design engineer, ESCP designer, contractor and representatives from all relevant city departments. The general contractor must attend for residential pre-construction meetings, in addition to representatives from relevant city departments. No construction activities other than those required for installation of the erosion sedimentation control plan can proceed until this inspection is completed. Subsequent to this inspection and completion of any necessary corrections, the contractor may begin construction activity.

At a minimum, the following items should be discussed at this meeting, where applicable:

• The first phase of temporary controls (i.e. all perimeter controls installed at the edge of the disturbed area) and tree protection measures and all installation and maintenance specifications, adjustments, and additions (such as interior controls after rough cut and fill operations) necessary during upcoming stages of construction.

• The site management requirements for the project, including sequence of construction, phasing, temporary stabilization, temporary and permanent spoil disposal areas (on and off site), haul roads and site access, designated construction storage and staging areas, limits of clearing and disturbance, and requirements for construction in and around stream channels or other critical environmental areas.

• Permanent controls, such as detention and filtration ponds, related grading and drainage, revegetation schedule, seed mixes and special requirements.

• City inspection and inspection-related administrative procedures, such as duties and responsibilities of individual Departments' inspectors, coordination between inspectors, requirements for final project release, Certificates of Occupancy, etc.

At this stage the inspector should assure himself that the erosion and sedimentation control plan appears adequate. The following guidelines should be used in determining the adequacy of the plan:

• Controls should be located such that they will intercept and capture or divert the intended flow without bypassing runoff from the 2-year storm.

• All control devices should be used within specified contributing drainage acreage limits and in appropriate site applications.

• All disturbed areas that could cause sedimentation should be protected by at least one temporary control in addition to the Limits of Construction perimeter controls.

• All disturbed areas such as fills, steep slopes and channels must have control measures that will remain in place and trap sediment resulting from at least the two-year storm.

• The plan must be adequately phased to be effective during all stages of construction.

In addition, it is recommended that the city inspector and other involved personnel inspect and note existing natural conditions adjacent to and downstream of the controls prior to construction. Reinspection of these areas during construction can reveal evidence of disturbance or sedimentation resulting from inadequate control measures on the project.

3. Inspection by the Contractor.

To assure continued effective operation of each methodology, a licensed engineer (or EIT ~~person directly supervised by the licensed engineer~~) or certified inspector (CPESC, CPESC - IT, CISEC, CISEC - IT, CESSWI, or CESSWI - IT), (hereafter referred to as owner's representative) shall conduct ongoing inspections of all erosion/sedimentation controls and direct the person or firm responsible for maintenance to make any repairs or modifications necessary, within forty-eight (48) hours of the initial notification. The owner's representative shall inspect the controls daily and must keep on the job site an inspection log with updated entries at a minimum of once every seven (7) calendar days, or once every fourteen (14) calendar days and within twenty-four (24) hours after a significant rainfall event (of half inch or greater). Appendix P-8 contains a template of an acceptable inspection log. The log shall contain at a minimum the following information: date and time of inspection, recording of previous days weather conditions, including rainfall, a list of all controls and a map of the contributing sub-basins to each control; condition of controls for each sub-basin; required maintenance; date that maintenance was performed; construction sequence for temporary stabilization, phasing and movable BMPs. Signature of owner's representative. The City inspector shall have the right to request and review the inspection log at the job site.

Controls installed on any site exempt from a site plan and an ESC plan, with ground disturbance under one acre, shall be inspected daily or to the maximum extent practicable, and shall be maintained as necessary. The requirements for the inspector to be certified and keep an inspection log will not apply.

Any project exempt from a site plan and an ESC plan, with ground disturbance of one acre or more, will be required to have a Stormwater Pollution Prevention Plan (SWPPP), shall have a certified representative conducting the inspections, and will keep an inspection log per the State rules and regulations.

Daily inspections shall be made by the contractor and silt accumulation upstream of temporary control measures must be removed when depth reaches six (6) inches or one-third (⅓) of the installed height of the control whichever is less. Prior to acceptance or approval of the project by the City, haul roads and waterway crossings constructed for temporary access must be removed, accumulated sediment removed from the waterway and any basins that will be used as permanent stormwater controls and the area returned to original grade and revegetated. All land clearing debris shall be disposed of prior to acceptance of the project by the City.

4. Compliance Inspection by the City.

The Development Services Department is primarily responsible for the inspection and enforcement of erosion and sedimentation control requirements on site developments, residential homebuilding and demolition sites, and subdivisions. The City will monitor compliance with plan requirements and judge the effectiveness of the controls according to the site conditions during different stages of construction ~~and before~~ and after significant rainfall events.

Compliance Criteria

The criteria used to determine the compliance or non-compliance of a project's temporary erosion and sedimentation controls include the following:

• The project must have a valid, current city development permit or site plan, or an approved plot plan for residential homebuilding or demolition.

• The project must be in substantial compliance with the approved plans and specifications (ESCP) for the development permit. For residential homebuilding or demolition, the project must be in substantial compliance with Section 1.4.4 B. Section 6 and all other applicable sections of the Land Development Code and Environmental Criteria Manual. This is determined by inspection of various items at the site.

Structural control practices which should be inspected are the following:

• Controls must be installed in all required areas in accordance with approved plans and specifications, as outlined in Section 1.4.4 B. Section 6, or as indicated by the Environmental Inspector.

• Materials must meet minimum requirements.

• Maintenance must be performed when trapped sediment exceeds allowed limits.

• Disturbances to erosion and sedimentation controls by construction activity or runoff must be repaired within forty-eight (48) hours of discovery (as determined by the owner representative, the inspection log or by the City inspector).

• Temporary removal of portions of controls during necessary construction activities is allowed if the controls are replaced by the end of the work day. Additions or adjustments to the ESCP are necessary if the controls cannot be replaced in their original location.

Site Management practices which should be reviewed include the following:

• Construction sequence and phasing must follow approved plans.

• Disturbed areas cannot be outside the LOC as shown on the approved plans, including fill areas, haul roads, and storage areas.

• All temporary and permanent spoil disposal areas, both on and off-site, must comply with approved plans and ordinances.

• All disturbed areas which are dormant for 14 days or longer shall be temporarily stabilized during construction to prevent soil detachment from wind or rain.

• Construction in creek channels requires that upstream flows be impounded upstream of the work site and routed around the construction area anytime there is equipment in the channel. Spoils must be removed from the channel of any creek or drainage way and its associated floodplain at the end of each work day.

The installed controls must prevent sedimentation in off-site or undisturbed areas.

If the installed erosion and sedimentation controls are in compliance with the approved plans but are not adequate to prevent the transport of sediment from the disturbed areas, plan adjustments or a plan revision must be made.

Inspection ~~Before and~~ After Rainfall

Controls and adjacent downstream areas should be carefully inspected within twenty-four (24) hours ~~just prior to expected significant (> one-half inch) rainfall and inspected~~ following significant rainfall events (half inch or greater) to assess the effectiveness of the controls and any adjustments, repair, or maintenance necessary. Inspection of the erosion and sedimentation controls this time is the most effective way to determine whether the plan is adequate.

The following guidelines can be used to determine the adequacy of controls after a rainfall:

• All visible drainage patterns left on-site after rainfall, especially areas of channelized flow (e.g. rills and gullies), should be carefully noted and the resulting effects of these on the structural controls should be observed. Concentrated flow areas, low points in perimeters, and channels adjacent to the

project will usually be the critical areas where off-site sedimentation will be most likely to occur.

- Overtopping, undermining, or bypassing of the structural controls will require repairs, adjustments, relocation, or additional controls. Before taking these actions, determine if failures were due to inadequate installation, improper location, or greater runoff than the control was designed to handle.

- Above all, note where sediment has been carried on or off site. If controls appear to be intact and contain visible, significant amounts of sediment build up, this is evidence that they are working correctly. Visible amounts of sediment carried off of the project site is evidence that the temporary controls are not working as intended and that adjustments are needed. Any sediment carried off-site shall be retrieved by the contractor and returned to the site and stabilized. Any off-site damages that occur from fugitive sediment that exits a site shall be mitigated by the contractor per a mitigation plan approved by COA. If contractor refuses to remediate, COA may retain fiscal surety deposited to cover remediation.

The inspector and site personnel can recognize sediment that has been carried off of a particular project site by noting similarities in color, texture, and grain size to the soil existing on the site. It is recommended that existing off-site conditions be noted or documented before construction in order to help assess the effectiveness of the erosion and sedimentation controls during construction. Inspectors should also note the condition and operating characteristics of detention and water quality ponds under inspection after rainfall events in order to assess their performance prior to acceptance of a project.

Revisions to Controls

Most erosion and sedimentation controls will normally require some minor adjustments or additions during construction. These are known as "field revisions" and will not require a plan revision if approved by the Engineer and the inspector. Significant modifications to the controls or the ESCP, however, may require a plan correction or revision and resubmittal to COA.

Enforcement of Non-compliance by the City

The city inspector responsible for environmental regulations can take enforcement action under Section 25-1-441 of the city's Land Development Code for non-compliance with erosion and sedimentation requirement on a project site. Enforcement action can be by way of the issuance of a Stop Work Order. Issuance of a Stop Work Order stops all city inspection services and utility connections from all departments until the deficiencies are corrected and the Stop Work Order is released by the City. Violations of environmental regulations may also be enforced by the City through the suspension of the site plan, building permits, or through the court system.

On projects that have obtained the required development permit/site plan, or building permit from the city and where routine inspections reveal inadequacies in the controls,

the inspector will give a verbal warning to the responsible personnel at the site if ~~of~~ any inadequacies are noted and what corrective action is necessary. If, after a minimum period of ~~24~~ forty-eight (48) hours from this verbal warning, the deficiencies are not corrected, the inspector may deliver a written notice of non-compliance to the responsible on-site personnel. If, after an additional minimum period of ~~24~~ forty-eight (48) hours, the deficiencies are not corrected, the inspector can issue a Stop Work Order to stop work on the project until the deficiencies are corrected. A period of twenty-four (24) hours is given to correct deficiencies for any site issued a Stop Work Order. The Environmental Inspector shall reduce the allowable amount of time given to complete corrective actions at any level in this process if deemed necessary due to the significance of the violation.

If the temporary or permanent controls fail such that construction sediment migrates off the site, it shall be the responsibility of the Contractor to: 1) retrieve the fugitive sediment to the satisfaction of the City of Austin inspector 2) restore the off-site areas impacted by fugitive sediment to pre- disturbance conditions (determined by the City inspector, pre-disturbance photos and the impacted landowner(s)); 3) revise or repair erosion and sedimentation controls within 48 hours of failure to the satisfaction of City Inspector.

Enforcement action can proceed immediately without a 48-hour warning period by the city inspector in some situations. These include the following:

- Project is within the jurisdiction of the city but has started construction without obtaining the required development permit or site plan.

- Project has a valid permit but work was initiated without the required preconstruction meeting and without installation of temporary controls.

- When significant or irreparable damage is judged to be occurring on a permitted site, the inspector may first ask the contractor to cease all work in the area of the violation. If the contractor complies with the verbal stop-work order and immediately institutes corrective measures in the area of the job violation, the inspector will not issue a Stop Work Order. If the work in violation is not stopped and corrective measures are not taken, the inspector may issue a Citation or Stop Work Order for the entire project.

5. Project Release or Acceptance by the City.

Upon completion of the site construction and revegetation of a project site, the design engineer shall submit an engineer's letter of concurrence bearing the engineer's seal, signature, and date to the Development Services Department indicating that construction, including revegetation, is complete and in substantial conformity with the approved plans. The letter shall conform to the format in the Figure below:

Figure 1.4.4.D.5 Engineer's Concurrence Letter

SAMPLE GUIDELINES FOR

ENGINEER'S CONCURRENCE LETTER

FOR FINAL INSPECTION AND

ENGINEERING RELEASE

Date

Project Name

Address

Site Plan Number

Building Permit Number

On this day I, _____, the undersigned professional engineer, made a final visual inspection of the above referenced project. I also have visited the site during construction and observed that the grading, drainage structures, and filtration pond(s) were constructed per the approved plans with insignificant deviation. I, therefore, verify the adequate completion of the following items:

All berms, curbs, storm sewers, detention/sedimentation/filtration ponds, weirs, inlets, splitter boxes, outlet flow structures, parking areas, driveways, permanent erosion controls, and similar construction items.

Signature

By: _Name of Engineer

Note: The attached rule explains what is expected. Since every project is different, the engineer may need more (or less) than these guidelines show. But, be very specific or the letter may be turned down.

After receiving this letter, a final inspection will be scheduled by the appropriate city inspector.

As part of the final inspection, the city will inspect for the following environmental requirements:

• Determine that grass coverage and revegetation, including type of grasses, topsoil, temporary and permanent stabilization, are complete and in accordance with the plan requirements.

• Determine that all drainage facilities, including water quality facilities and permanent structural controls, are installed in accordance with the plans. Any water quality facilities with sediment deposits will not be accepted until the contractor cleans the facilities and re-installs the appropriate media such that it is per specifications of ECM 1.6.7.

• Note any unauthorized disturbance of the site or vegetation and ensure that all disturbed areas, including haul roads and spoil sites are revegetated.

• Determine that all special environmentally related requirements, such as replacement trees and buffer zone restoration, are complete.

• Note all temporary erosion and sedimentation control measures that will still be required due to incomplete revegetation. All controls and sediment must be removed upon the completion of revegetation and before the full fiscal deposit for erosion and sedimentation controls is released through the Development Services Department.

• Refer to Section 1.4.4. B. Section 6, V for project close-out on sites exempt from a site plan. Sites exempt from a site development permit typically do not require engineering drawings, thus eliminating the need for an Engineer's Concurrence Letter.

When all revegetation is completed as required by the plans and specifications the project can be certified for acceptance.

Developer's ~~Contracts~~ Agreement

Section ~~25-8-181~~ 25-8-182 of the Land Development Code requires that a separate and enforceable agreement to ensure revegetation be signed by the city and the developer of a project if maintenance responsibility for constructed facilities is accepted, or a ~~temporary~~ certificate of occupancy is issued, by the city before the required revegetation coverage is complete. Residential one and two family construction exempt from a site development permit will not require an agreement as specifically outlined in this section.

This agreement is in the form of a standard Developer's Contract in which the developer agrees to complete the required revegetation within a specified period of time, normally a 4-month period. The contract is tied to a fiscal surety in the form of a letter of credit, a cash deposit, or a bond. The amount of this fiscal surety is determined by the amount of disturbed area that will be required to be revegetated for the project. All areas disturbed

as part of the project and any adjacent areas that were disturbed by the construction of the project will be required to be revegetated. The Contract states that if the required revegetation is not completed within the specified period of time, the city will use the deposited funds to ensure revegetation is completed.

The city can consider longer Developer's Contract periods for projects accomplishing revegetation with native grasses. The factors that will be considered for approval of longer revegetation periods than four months will be: (a) the erosion and sedimentation potential of a particular project area which will be exposed to erosion for a longer period of time (temporary erosion and sedimentation measures must be constantly maintained until completion), (b) the use of only minimum amounts of topsoil to reduce erosion potential, (c) postponement of initial seeding until a more suitable seasonal time, (d) the good faith effort on the part of the developer/owner to accomplish project completion and revegetation as soon as practically possible.

Upon satisfactory completion of any outstanding items identified by the inspector, final release or acceptance of the project can occur.

F. **Maintenance Responsibilities After Construction.**

Following release or acceptance of a project (and termination of the development or building permit) the property owner is responsible for maintaining the project site. The release of excessive amounts of sediment, rock aggregate, or other materials and pollutants in stormwater runoff is prohibited by the Environmental Control and Conservation Code (6-5-12, 6-5-14, and 6-5-53). Any person causing obstruction, siltation, or pollution to ~~stoppage, damage or restriction of flow in~~ any storm sewer or watercourse may be liable to the city for repairs to these waterways.

G. **Additional Recommendations and Requirements for Selected Projects.**

It has been recognized that particular types of construction projects or projects in particular areas have common problems that are less frequently experienced in other circumstances. This section provides additional guidance for the engineer, reviewer, contractor, and inspector in order to better design, install and maintain effective temporary erosion and sedimentation controls.

1. Major Utility Projects.

Major water and waste water line installations can be challenging projects in which to accomplish effective temporary controls because of the limited working space and easements often involved. The location of waste water lines along creeks and in flood plains can create additional problems. Maintenance and access roads are frequently added after construction is complete, rather than being designed into the project.

Silt fence can be an effective perimeter control along the route of the pipeline. Rock berms and reinforced rock berms are appropriate for use as flow diverters, energy dissipators, grade control, and level spreaders. Hay bales dikes generally are not recommended for use. Triangular filter dikes can be used in short sections

across the disturbed area. The triangular dikes must be placed such that the bottom of the dike is in full contact with the ground.

A two-phased plan should be implemented for these type of projects. Prior to construction, perimeter controls should be required parallel to the line installation and to provide protection at channels, spoil areas, and haul roads. These controls should not be directly disturbed by the trenching activity. In the second phase, after the pipe is installed and backfilled, interior controls may be located perpendicular to or diagonally over the pipe installation area. These will control runoff and sediment in areas which do not drain into the parallel controls to the side. These controls are especially necessary on steep slopes which drain parallel to the line installation. These interior controls should be installed as soon after the backfilling of the trench as possible and should be situated to still allow access to the rest of the project by the contractor.

Site Management Practices

Site management is crucial to the success of temporary erosion and sedimentation controls on this type of project. Especially important are temporary and permanent spoil disposal areas which must be adequate to handle the amount of material generated by the project, or the spoil material can overwhelm the easements, erosion controls, and tree protection.

Projects should follow the recommendations for construction adjacent to creeks and waterways and water discharges from construction sites discussed later in this section. This is especially true if any boring or tunneling operations will be performed as part of the job. In addition, there must be adequate accessways and haul roads approved for the project beforehand to allow access and equipment passage while keeping the limits of disturbance as small as possible.

Utility installations along or within existing paved roadways should follow the guidelines for protection of existing drainage facilities with temporary erosion and sedimentation controls.

2. Construction in Creeks and Channels (> 5 Acres).

Projects in this category include some utilities, creek and channel improvements, regional detention ponds, bridges and culverts. In general, a two phase plan should be implemented for these drainage improvements. Construction in creek channels requires that upstream flows be impounded upstream of the work site and routed around the construction area anytime there is equipment in the channel. Spoils must be removed from the channel of any creek or drainage way and its associated floodplain at the end of each work day. It shall be the responsibility of the Engineer of Record or the ESCP preparer to designate on the ESCP and construction plans the method of dewatering the drainage feature. The ESCP shall include the sequence of construction and the temporary and permanent stabilization of the drainage feature after disturbance. If significant areas adjacent to but above the channel are disturbed, silt fence should be installed parallel to the top of the bank to

prevent from entering the waterway from the sides. All erosion and sedimentation controls for upland areas shall be located outside of concentrated flow paths.

Bridge construction, which has localized impact on the channel, may require only a single phase plan with appropriate field adjustments. These silt fences should be adjusted as necessary as the bridge construction progresses.

When constructing detention ponds, a perimeter control, typically of silt fence, should be placed first along the downslope sides of the pond beyond the limits of the proposed grading work. After the pond is graded and the outlet is complete, the silt fence should be adjusted such that it passes over the top of the outlet pipe on the outside of the pond. A semi-circular section of reinforced rock berm or silt fence can be added inside the pond at the outlet to improve sedimentation inside the pond. Figure 1-1.6 in Appendix V of this manual indicates how these controls might be installed.

Site Management Practices

Good site management practices are essential to the success of erosion and sedimentation controls for projects in larger waterways. Examples of several practices are provided below:

• Fill Material Storage - At the end of each work day the contractor should remove all loose excavated material from the channel and 100-year floodplain as delineated on the approved plan. No construction or fill materials can be stored within the limits of the channel or 100-year floodplain.

• Temporary Creek Crossings - Temporary crossings composed of soil may not be used. They must be removed entirely from the stream bed as soon as possible.

• **Flow Across construction Operations in a Channel**

Water-filled channels should always be de-watered if possible rather than attempting to conduct construction operations directly in them. This prevents the water from coming in contact with the disturbed soil and becoming silted. In larger channels de-watering can be done in one-half of the stream at a time. The design of dikes or berms to direct flow in channels should consider the possibility of these structures increasing flood levels during high flow conditions or eroding and contributing to increased downstream sedimentation. These structures and all associated construction should remain in the channel for the shortest time possible.

Dewatering or Diversion of Stream Flow - The temporary damming and diversion (by pumping or gravity) of base flow around construction activities under way in a channel is required. This flow is then safely discharged further downstream and prevented from coming in contact with areas disturbed by the construction activity. Any time construction equipment or activity is placed in the channel, the flow at that time shall

be diverted around the construction site and discharged in a non-erosive manner downstream of the channel construction. Sandbags are not an acceptable diversion structure in channels.

• Stream flow that does become silted from construction activity must not be discharged directly back into the stream, but must be temporarily detained until the sediment has settled out. All water discharges should comply with the recommendations for Water Discharges from Construction Sites.

• Bore Pit Locations - Bore pits should be located as far as possible from the main channel of any waterway. Bore pits located near stream beds greatly increase sedimentation into the waterway and are susceptible to frequent flooding.

• Frequent removal of sediment collected in treatment devices will reduce the risk of sediment release due to a sudden failure of an overloaded control.

3. General Permit Utilities and Maintenance Activities.

Work which is considered under permits for general utility installation and maintenance includes:

• Natural gas main service/repair for pipelines less than 200 feet in length.

• TV cable installation/repair within subdivisions and right-of-way.

• Telephone cable installation/repair within subdivisions and right-of-way.

• City of Austin water or waste water extensions less than 300 feet in length and routine and emergency repairs of existing facilities.

• City of Austin Parks Department installation, repair or landscaping of minor park facilities.

• City of Austin street and drainage maintenance and repair.

• City of Austin Electric Utility Department routine installation and maintenance of overhead electric distribution system facilities.

For small utilities projects, the two-phase erosion and sedimentation control plan used for major utilities can also be implemented. The first phase would include perimeter controls parallel to the line installation. The second phase would include interior controls installed perpendicular and diagonally over the trenched line after it is backfilled. Often, few temporary controls are necessary in flat areas for these types of small projects. Key areas for temporary control are roadside ditches or drainage swales, stream crossings, and steep slopes. Silt fences, rock berms, and small lengths of triangular filter dikes are recommended controls.

Site Management Practices

For these projects, close on-site supervision and management of the fill material generated by the construction and timely removal of the excess spoil can often be more effective than temporary controls. In addition, appropriate protection of existing drainage facilities and revegetation after construction should be considered during design and installation phases.

4. Water Discharges from Construction Sites.

A common erosion and sedimentation control problem other than stormwater runoff that can cause significant off-site sedimentation problems from construction sites is the discharge of silted water during certain construction operations. Title 6, Article V of the Austin City Code, entitled "Discharges to Storm Sewers and Watercourses", contains the minimum water quality compliance requirements for any water discharges into city storm sewers or waterways. Section 6-5-53 specifically includes water discharges from construction site excavations. Pump and Filter Press systems are acceptable and appropriate for removing sediment from water prior to discharging into surface water or storm drain. Mobile filter presses that have capacity to remove up to -400 mesh particle size are recommended and acceptable. The following list contains the five most common types of water discharges from construction sites that can cause significant off-site sedimentation problems and the recommended control techniques used in these situations.

Boring or Tunneling Operations That Discharge Sediment Laden Water.

All silted water and slurry generated by the construction can be pumped into one or more temporary earthen pits or metal tanks to allow the sediment to settle before discharging the clean water. These temporary sedimentation facilities must be adequately sized to be most effective and may be constructed in series to improve sediment removal.

Groundwater or Channel Flow Seepage into Trenches or Excavations.

Settling or removing of the silt laden water can be done as described in the item above. In addition, the work area can be de-watered by temporarily damming the flow and pumping the flow around the construction, to prevent it from entering the trench or excavation. Innovative or alternative methods, such as end-of-pipe socks, may also be proposed.

Accumulated Stormwater in Trenches or Excavations After Rainfall.

Recommended solutions are as described above.

Flushing Water From Water and Wastewater Utility Lines or Storage Tanks.

Prior to placing the utility lines in service, they must be flushed to remove accumulated debris or to sterilize the pipelines. If this water does not contain silt, use a hose extension to allow the water to be discharged to an undisturbed, vegetated area. Discharging clean water over an unvegetated area may create an erosion and sedimentation problem if velocities are high enough to erode the disturbed earth. If the water to be discharged

contains silt, it should be treated using the techniques described above: detention/sedimentation or removal off-site.

5. Protection of Existing Drainage Facilities.

Construction projects located in or adjacent to developed areas with existing drainage facilities often require partial protection of these drainage facilities for effective erosion and sedimentation control. This must be done in a manner that will effectively trap sediment without impeding the stormwater drainage flow and function of the facility. Inlets should never be completely sealed.

~~**Curb Inlets. (see 1.4.5P)**~~

Area Inlets.

Surround the inlet with reinforced silt fencing or reinforced rock berms. Sediment will be trapped mainly by detention/ sedimentation with some filtration.

Detention Pond Outlets.

Reinforced rock berms or reinforced silt fencing should be placed around the outlet on the inside of the pond to enhance sedimentation, especially during low flow events and when the pond is not fully revegetated. Temporary controls preferably should be placed inside the pond outlet rather than outside. If placed outside, a semicircular rock berm or reinforced rock berm should be placed immediately below the outlet headwall.

Source: Rule No. R161-15.12, 1-4-16 ; Rule No. R161-16.19, 11-14-2016 ; Rule No. R161-17.03 , 3-2-2017; Rule No. R161-17.12 , 6-13-2017.

1.4.5 - Temporary Structural Practices

A. **Mulching** (See Specifications manual item 645S-1 for detail)

1. Description.

Mulching is the process of applying wood mulch, wood chips, or other organic material to the exposed soil surface to protect it from erosive forces (wind, water, etc.) and to conserve soil moisture until plants can become established. Mulching shall not be considered a primary erosion control, but shall be used in conjunction with other approved controls. Mulching is not an acceptable form of permanent stabilization, unless within the parameters as defined by 'Final Stabilization' in Section 1.4.3 of this manual. Mulching as an erosion control, as a stabilized construction entrance on residential sites, or as temporary stabilization must follow the specifications as outlined in 645S-1, and as outlined below.

The effectiveness of using Mulching as an erosion control technique depends on:

- The type of mulch used
- Mulch morphology

• Application rate

• Method of application: the mulching material can be placed mechanically or by hand.

• Soil type

• Slope

• Climatic characteristics

• Proper preparation of application area (uniform application surface to ensure optimal mulch to soil contact)

2. Materials.

Mulching material can be manufactured on or off the project site. It consists primarily of organic material, separated at the point of generation, and may include: shredded bark, stump grindings, or composted bark

The mulching shall have the following composition:

• Use wood chips produced from a 3 (three) inch minus screening process (equivalent to TXDOT Item 161 Section 1.6.2.B Wood Chip requirements).

• Large portions of silts, clays, or fine sands are not acceptable in the mix.

Mulching material is composed of a well-graded mixture of particle sizes and may contain rocks less than 2" in diameter. Mulching material must be free of refuse, physical contaminants, and material toxic to plant growth. It is not acceptable for the mulching material to contain ground construction debris, biosolids, or manure.

Prior to placement a representative sample of the mulching material must be accepted by the project engineer or his/her designee and by the city inspector.

3. Installation.

Mulching is performed after grading and soil surface preparation is completed.

• Mulching is not recommended on 2:1 slopes or steeper.

• Mulching on slopes of 3:1 or flatter use a minimum depth of 4 inches. Apply mulching material a minimum of three (3) feet over the shoulder and beyond the base of the slope or into existing vegetation where possible to prevent rill formation and transport of the material (Figure 1.4.5.A).

• The mulch may be placed with a hydraulic bucket, a pneumatic blower, or by hand.

- The effectiveness of the mulching material depends on good contact between the soil and mulching material. Maximum contact with the soil promotes increased infiltration and sediment trap formations. If the mulching material does not make full contact with the soil, is perched above the soil by clods, or stays suspended above depressed areas, severe rill erosion can occur beneath it. Therefore mulching material must be placed to ensure maximum contact with the soil. Provide a smooth application surface by tracking, rolling, raking, etc. to ensure an optimal mulch to soil contact.

- The mulching material shall be placed evenly and uniformly to provide 100% coverage.

4. Where mulching is not allowed as an erosion control:

   - On slopes with groundwater seepage;

   - At low points with concentrated flows and in gullies;

   - On slopes equal to or steeper than 2:1;

   - At the bottom of steep perimeter slopes exceeding 100 feet in length (large up-gradient watershed);

   - Below culvert outlet aprons, and

   - Around catch basins and closed storm system outlets.

   - Within a stormwater control structure.

   - No mulching material shall be placed within 100 feet of any source of surface water or drinking water supply.

   - Mulching shall not be used as a primary perimeter site erosion control.

5. Inspection and Maintenance.

   - The mulched area shall be inspected regularly and after each large rainfall. Any required repairs shall be made immediately, with additional mulching material placed on top of the mulch to reach the recommended thickness.

   - When the mix is decomposed, clogged with sediment, eroded or ineffective, it must be replaced or repaired.

   - Vegetation adds stability and should be promoted.

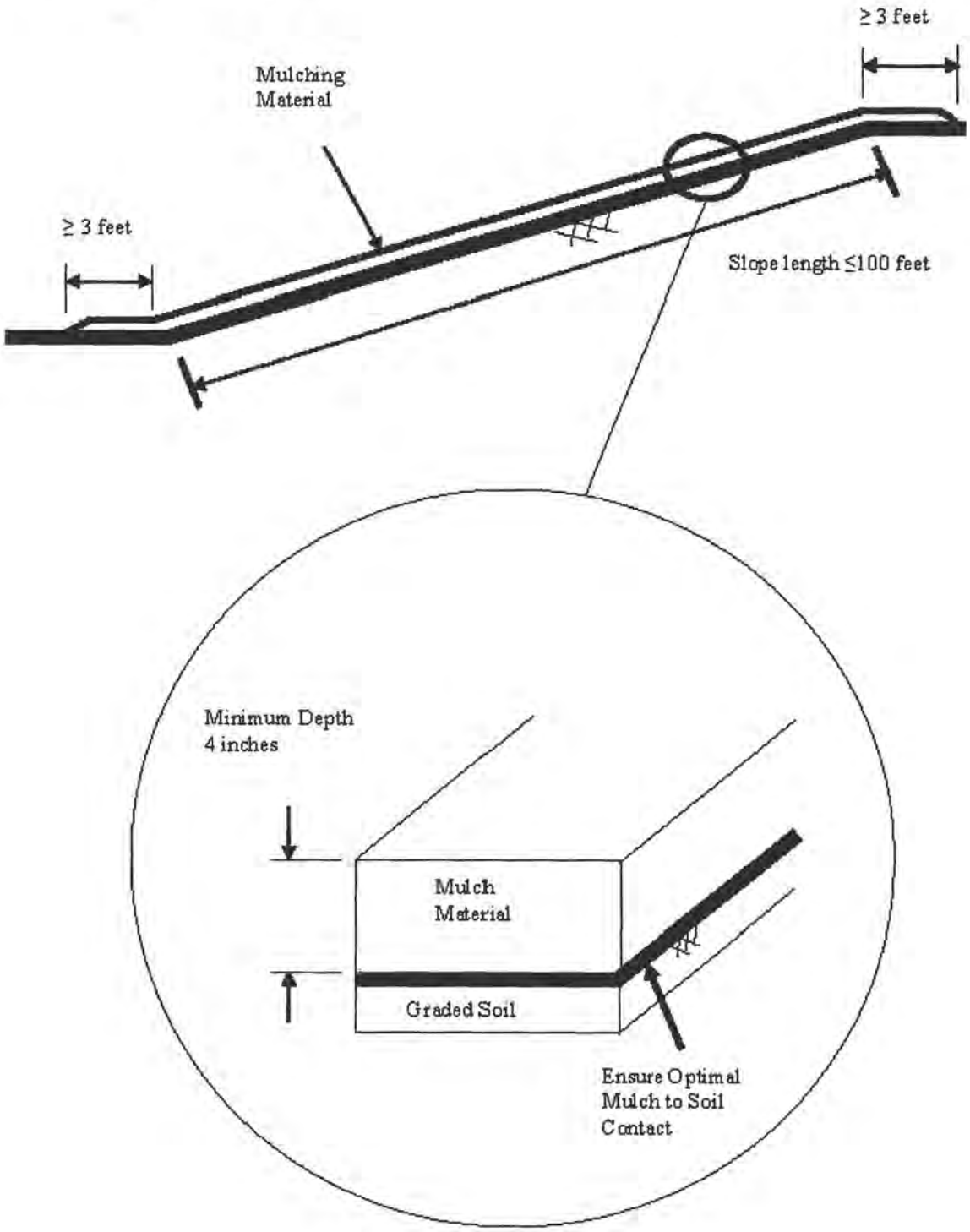
- If the mulch is not removed prior to revegetation, it should be spread out into the landscape to a depth that will not prevent seed germination and will encourage effective revegetation of the site.

References:

1. Foltz, Dooley (2003), Comparison of Erosion Reduction Between Wood Strand and Agricultural Straw, Trans. ASAE 46(5): 1389-1396.
2. Demars, Long, and Ives (2000), Use of Wood Waste Materials for Erosion Control, NETCR 20
3. McCoy and Noble (2002), Use of Compost & Mulch for Storm Water Management, Erosion & Sediment Control, TCEQ
4. Wischmeier, W.H. and D.D. Smith (1978), "Predicting Rainfall Erosion Losses - A Guide to Conservation Planning" U.S. Department of Agriculture, Agriculture Handbook No. 537

NOTE: THIS METHOD IS NOT A PRIMARY EROSION CONTROL AND SHOULD BE USED IN CONJUNCTION WITH MULCH SOCKS, SILT FENCES, MULCH BERMS, AND OTHER APPROVED METHODS OF SEDIMENTATION AND EROSION CONTROL.

Figure 1.4.5.A.1 Mulching Detail



F. **Mulch Socks.** (See Specifications manual item 648S-1 and Standard Specifications manual item 648S for details)

1. Description.

A mulch sock is mulch material encased in mesh to form a tube/roll. A technique used to intercept sheet flow and pond runoff, allowing sediment to fall out of suspension, and often filtering sediment as well. Mulch socks provide an environmentally-sensitive and cost-effective alternative to sediment fence.

2. Material.

Mulching material can be manufactured on or off the project site. It consists primarily of organic material, separated at the point of generation, and may include: shredded bark, stump grindings, or composted bark.

The mulch shall have the following composition:

• Use untreated wood chips produced from a 3 (three) inch minus screening process (equivalent to TxDOT Item 161, Compost, Section 1.6.2.B, Wood Chip requirements).

• Large portions of silts, clays, or fine sands are not acceptable in the mix.

• The pH should fall between 5.5 and 8.5.

• The organic matter content is ≥25%, dry weight basis.

Mulch material must be free of refuse, physical contaminants, and material toxic to plant growth. It is not acceptable for the mulch material to contain ground construction debris, biosolids, or manure.

The sock material mesh opening shall be equal to or less than 3/8 inch (10 mm) and the material tensile strength shall be equal to or greater than 202 psi (14.2 kg/cm ^{2}).

Prior to placement, a representative sample of the mulching material must be accepted by the project engineer or his/her designee and by the city inspector.

3. Installation.

• Use 12 or 18 inch diameter mulch socks for all sediment control applications. The 18 inch diameter sock material has proven to be the most consistent for all sediment control applications (TxDOT, April 2006).

• Mulch socks should be used at the base of slopes no steeper than 2:1 and should not exceed the maximum spacing criteria provide in Table 1.4.5.F.1 for a given slope category. The spacing criteria are based on the maximum drainage area, in square feet, above a 100 feet wide section of mulch sock.

• Place mulch socks at a 5' or greater distance away from the toe of slopes to maximize space available for sediment deposition.

• When placed on level contours sheet flow of water should be perpendicular to the mulch sock at impact and un-concentrated.

• Install mulch socks using rebar stakes with a minimum 3/8 inch diameter and a minimum length of ~~48~~ 24-inches, wood stakes with a minimum dimensions of 1 inch by 2 inch and a minimum length of ~~48~~ 24 inches, or earth anchors placed behind the mulch sock on 4-foot centers. Drive the stakes in the ground to a minimum depth of ~~24~~ 12-inches leaving less than 12-inches of post above the exposed mulch socks. It is preferable to cut the post flush with the top of the mulch sock.

• In order to prevent the movement or floating of the mulch log during rain events or construction operations, install stakes on the front side placed on 4-foot centers.

• In order to prevent water flowing around the ends of mulch socks, point the ends upslope to place them at a higher elevation.

• In order to prevent water flowing between the gaps between the joints of adjacent ends of mulch socks lap the ends of adjacent mulch socks a minimum of 12 inches. Never stack mulch socks on top of one another.

• Mulch socks can be placed around the perimeter of affected areas, if the area is flat or the perimeter is on contour. Socks should be placed using 'smiles' and j-hooks. (See Section 1.4.5.G., Silt Fence for proper placement and J hook details.)

• Do not place socks where they cannot pond water.

• For steeper slopes, an additional sock can be constructed on the top of the slope and within the slope area as determined by specific field conditions. Multiple socks are recommended on steeper slopes.

• Do not use mulch socks in areas of concentrated flow, as they are intended to control sheet flow only.

4. Where mulch socks are not allowed as a sediment control:

• On slopes with groundwater seepage;

• In concentrated flow situations or in runoff channels;

• On slopes equal to or steeper than 2:1;

• At the bottom of steep perimeter slopes exceeding 100 feet in length (large up-gradient watershed);

• Below culvert outlet aprons, and

• Around catch basins and closed storm system outlets.

• Within a stormwater control structure.

5. Inspection and Maintenance

• Inspect mulch socks after installation for gaps under the mulch socks and for gaps between the joints of adjacent ends of mulch socks.

• Inspect daily and log inspections every seven (7) calendar days or every fourteen (14) calendar days and within 24-hours after ~~of~~ a significant rainfall event of half inch ~~0.5 inches~~ or greater ~~event~~ and replace or repair if necessary.

• Sediment retained by the sock shall be removed when it has reached six (6) inches or 1/3 of the exposed height of the sock, whichever is less. Alternatively, the sediment and sock can be stabilized with vegetation at the end of construction.

• Mulch socks can be vegetated or unvegetated. Vegetated mulch socks can be left in place. The vegetation grows into the slope, further anchoring the filter sock. Unvegetated filter socks are often cut open when the project is completed, and the mulch is spread around the site as soil amendment. The mulch should be spread out into the landscape to a depth that will not prevent seed germination and encourage effective revegetation of the site.

References:

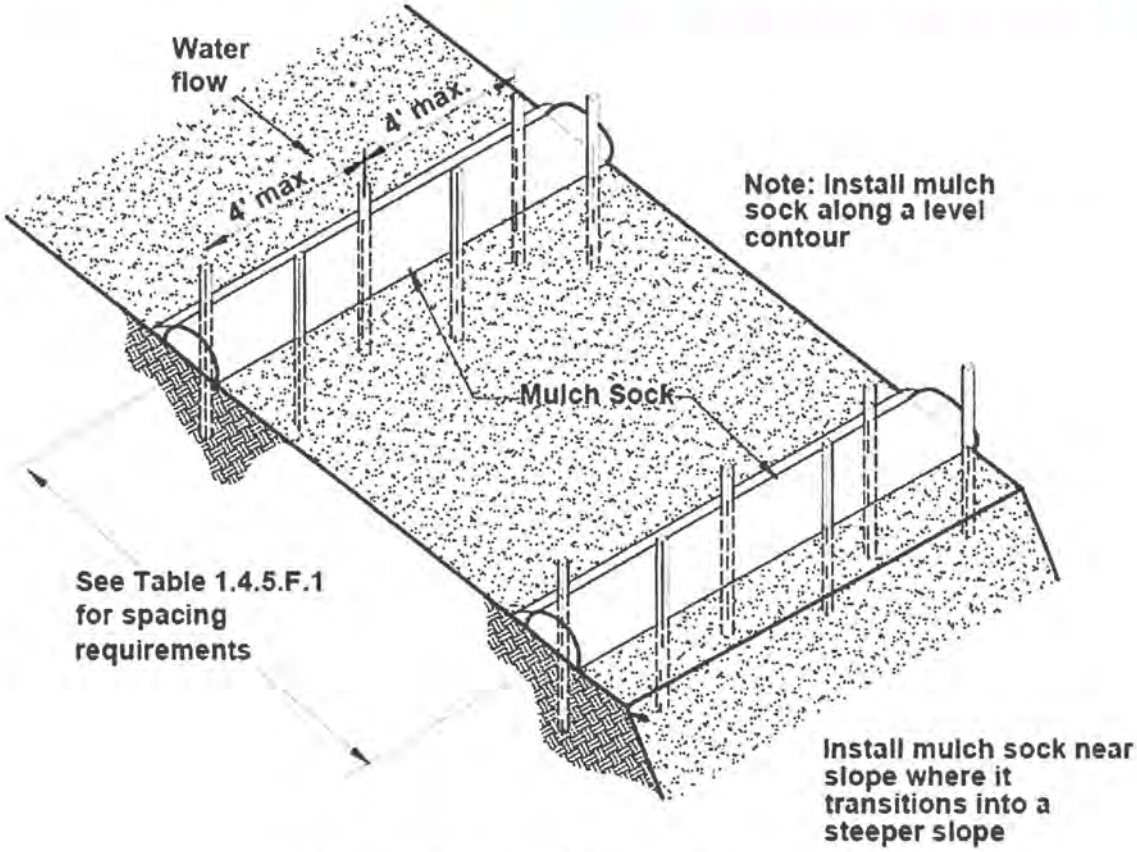
1. Demars, Long, and Ives (2001), Performance Specifications for Wood Waste Materials As An Erosion Control Mulch And As A Filter Berm, NETCR 25.
2. City of Austin, Mabel Davis Park Site Remediation, Standard Technical Specifications, Compost/Mulch Filter Berm - Section 02273 (2004), Volume 2.
3. Storey, et al. (2006), Water Quality Characteristics and Performance of Compost Filter Berms, Report 0-4572-1, Texas Department of Transportation.

Table 1.4.5.F.1 Mulch Socks and Maximum Slope Lengths for 12" and 18" Sock Diameters.

Slope	Max. Slope Length Between 18 in. Dia. Sock (ft)	Max. Drainage Area (sf) per 100 ft of Sock
100:1-50:1	100	10000
50:1-30:1	75	7500
30:1-25:1	65	6500
25:1-20:1	50	4800
20:1-10:1	25	2600
10:1-5:1	15	1300
5:1-2:1	10	1000

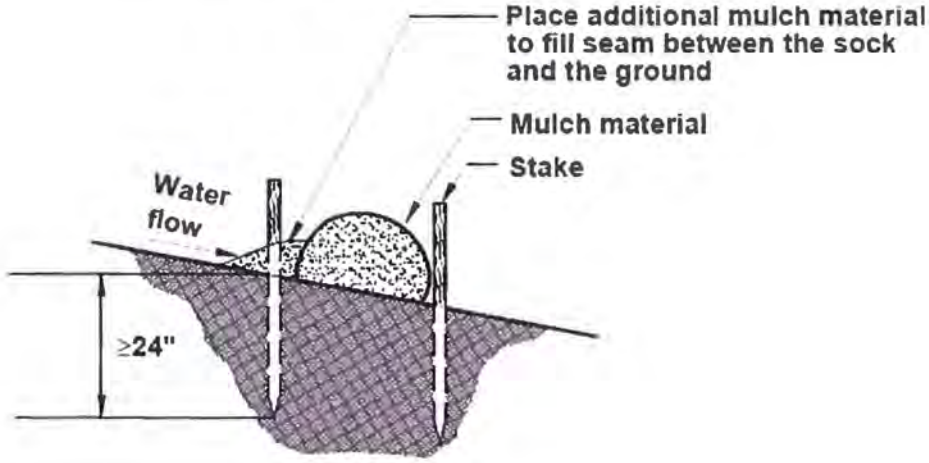
Slope	Max. Slope Length Between 12 in. Dia. Sock (ft)	Max. Drainage Area (sf) per 100 ft of Sock
100:1-50:1	100	6000
50:1-30:1	40	4000
30:1-25:1	30	3000
25:1-20:1	25	2600
20-1:10-1	15	1300
10:1-5:1	10	1000
5:1-2:1	5	500

Figure 1.4.5.F Typical Mulch Sock Detail **(change min. depth below from 24" to 12")**



TYPICAL MULCH SOCK INSTALLATION

N.T.S.



MULCH SOCK

N.T.S.

G. **Silt Fence.** (See Standard Specifications manual item 642S and Standards manual 642S-1 for details)

1. **Description.**

Silt Fence is a temporary barrier made of non-woven polypropylene, polyethylene, or polyamide material that is trenched or sliced into the ground and supported by posts on the downstream side of the fabric. Silt fence works by intercepting sheet flow from slopes, causing the runoff to pond behind the fence, thereby promoting deposition of sediment on the uphill side of the fence. They are most effective when designed to provide comprehensive water and sediment control throughout a construction site and if used in conjunction with erosion control practices.

A common misconception among many designers is that the silt fence actually "filters" suspended particles from runoff. The effectiveness of silt fence is primarily derived from its ability to pond water behind the fence. This ponding action allows suspended particles to settle out on the uphill side of the fence. Particles are not removed by filtering the runoff through the fabric.

2. **Purpose.**

Used to control sheet flow runoff from disturbed land, silt fencing may also be used to create a sediment trap for removal of suspended particles from low volume concentrated flows. The removal efficiency of silt fencing depends mainly on the detention time of the runoff behind the control. The detention time is controlled by the geometry of the upstream pond, hydraulic properties of the fabric, and maintenance of the control (Barrett et al., 1998).

3. **Conditions Where Practice Applies.**

Silt fence is used during the period of construction near the perimeter of a disturbed area to intercept sediment. This fence shall remain in place until the disturbed area is permanently stabilized. Silt fence should not be used where there is a concentration of water in a channel or drainage way or where soil conditions prevent a minimum toe-in depth of six (6) inches or installation of support post to a minimum depth of 12 inches. If concentrated flow occurs after installation, corrective action must be taken such as placing rock berms in the areas of concentrated flow.

4. **Design Criteria.**

Silt fence is typically constructed near the perimeter of a disturbed site within the developing area. It is not to be constructed outside the property lines without obtaining a legal easement from the affected adjacent property owners.

The following criteria shall be observed:

• Drainage Area - Consult Table 1.4.5.G.1 for maximum drainage area allowed for a specific slope category. If the drainage area to the silt fence exceeds this value, additional silt fence should be installed to break up the runoff into multiple storage areas.

• Height - 24 inch minimum height measured from the existing or graded ground.

For Design purposes use the following criteria:

• Assume a construction Total Suspended Solids (TSS) concentration = 3000 mg/L.

• Use a target removal of sediment particle equal to or greater than diameter (d) = 20 microns.

• Use the Influent Particle size distribution of the solids suspended in runoff shown in Figure 1.4.5.G (Barrett et al., 1998).

A. Overland flow:

1. General guidelines. Silt fence for sediment and slope control should be installed along the contour of the slope (i.e. the entire length should be at the same elevation). The maximum drainage area to the silt fence should not exceed those shown on Table 1.4.5.G.1. The spacing criterion is based on the maximum drainage area, in square feet, above a 100 feet wide section of silt fencing. At each end of the silt fence, a minimum 20-foot segment shall be turned uphill to create a "J" hook (see "J"-hook detail) to prevent ponded water from flowing around the ends of the silt fence. Individual sections of silt fence should be limited to 200-foot lengths. This limits the impact if a failure occurs, and prevents large volumes of water from accumulating and flowing to one end of the installation, which may cause damage to the fence.

2. Sediment control. When used for sediment control, silt fence should be located to provide the storage volume behind the fence that will contain the runoff from the 2 year storm. Table 1.4.5.G.1 provides the spacing on uniform slopes necessary to achieve this storage volume. If the designer proposed an alternative configuration, it must be demonstrated that 2 year storm runoff volume is contained and released in a manner such that the effluent concentration does not exceed effluent standards of City of Austin Code Title 6, Article 5 as well as the baseline TSS conditions in ECM 1.6.9.3 Table 1-10. The design presumptions are stated above.

   Larger storage volumes increase the sediment removal efficiency of the silt fence, and decrease the required replacement/clean-out intervals.

   A common location to place silt fence for sediment control is at the toe of a slope. When used for this application, the silt fence should be located at least five (5) feet from the toe of the slope to ensure that a large storage volume is available for runoff and sediment.

For sediment control applications, the maximum drainage area to the silt fence should not exceed those shown on Table 1.4.5.G.1. If the contributing area exceeds this value, additional silt fence should be installed to break up the runoff into multiple storage areas. When used as a velocity control measure for sheet flow on long slopes of disturbed ground, silt fence should be placed at the spacing interval and not exceed the drainage area to the fence stated in the table below:

3. Slope control. Silt fence can be installed on a slope to reduce the effective slope length and limit the velocity of runoff flowing down the slope (see Table 1.4.5.G.1). Silt fence also helps prevent concentrated flows from developing, which can cause rill and gully erosion. As a secondary benefit, silt fence installed on slopes can remove suspended sediment from runoff that results from any erosion that has occurred. For slopes that receive runoff from above, a silt fence should be placed at the top of the slope to control the velocity of the flow running onto the slope, and to spread the runoff out into sheet flow.

Table 1.4.5.G.1: Maximum spacing between silt fences on slopes

Slope	Spacing Interval (ft)	Max. Drainage Area (sf)
100:1 to 50:1 (1-2%)	500	25,000
50:1 to 30:1 (2-3.3%)	250	15,000
30:1 to 25:1 (3.3-4%)	150	12,000
25:1 to 20:1 (4-5%)	120	10,000
20:1 to 10:1 (5-10%)	100	5,000
10:1 to 5:1 (10-20%)	50	2,500
5:1 to 2:1 (20-50%)	10	1,000

4. Perimeter control. Silt fence is commonly used as a perimeter control along streets or adjacent to water bodies to prevent polluted water from leaving the site. When a diversion or perimeter control silt fence is installed in the direction of a slope, a 20-foot length of fence should be turned in, across the slope, at regular intervals (100 feet) to create a "J"-hook (see "J" hook detail).

   These "J"-hooks act as check dams, controlling the velocity of the diverted runoff as it travels along the fence.

B. Concentrated flow. Not allowed

C. Diversion. Silt fence can also be utilized as a synthetic diversion structure to redirect clean water around a site and intercept sediment-laden runoff and transport it to a sediment removal practice. Must demonstrate additional BMPs designed to prevent rill/gully erosion due to concentrated flow along the perimeter of the silt fence.

5. Materials Specifications.

See City of Austin Standard Specifications 642Sfor material specification and installation details.

6. Troubleshooting

• ~~Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.~~ Inspect BMPs daily, log inspection information once every seven (7) calendar days or once every fourteen (14) calendar days and within twenty-four (24) hour after a significant rain event of half inch or greater.

• Repair undercut silt fences.

• Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months.

• Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed of, and replaced with new silt fence barriers.

• Sediment that accumulates in the silt fence must be periodically removed in order to maintain silt fence effectiveness. Sediment should be removed when the sediment accumulation reaches approximately one-half of the fence height (one foot) on the silt fence. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location. Upon removal of silt fence, accumulated sediment must also be removed and disposed of properly.

• Silt fences should be left in place until the upstream area is permanently stabilized. Until then, the silt fence must be inspected and maintained.

• Holes, depressions, or other ground disturbance caused by the removal of the silt fences should be backfilled and repaired.

Figure 1.4.5.G Influent Particle Size Distribution of the Suspended Solids in Runoff.

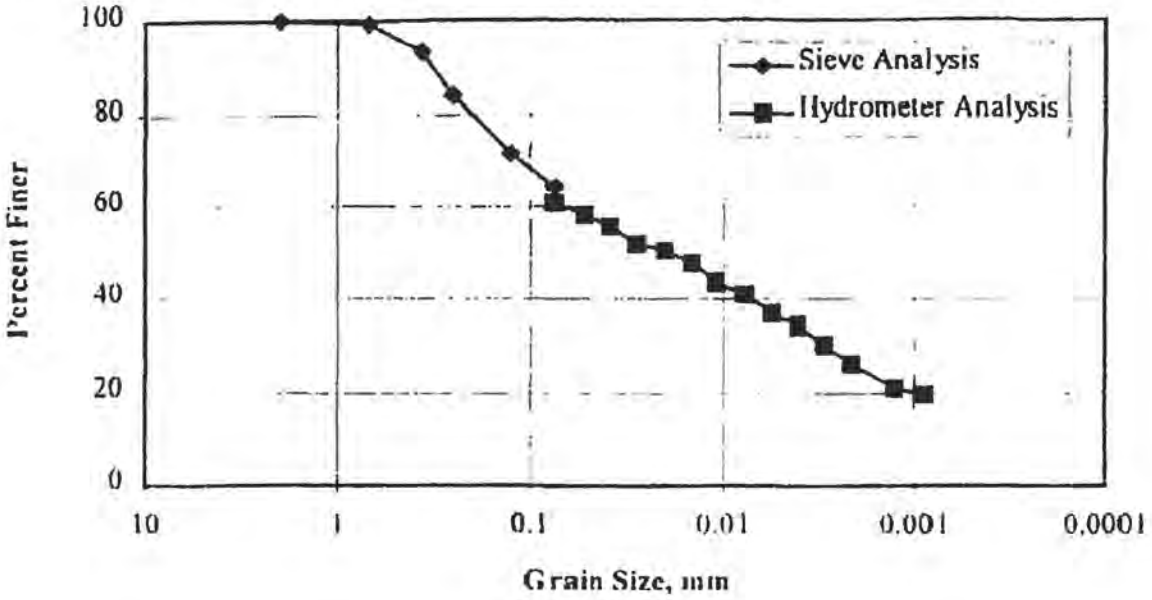


Figure 1.4.5.G.1 Silt Fence Installation **(remove option to use wooden posts from image)**

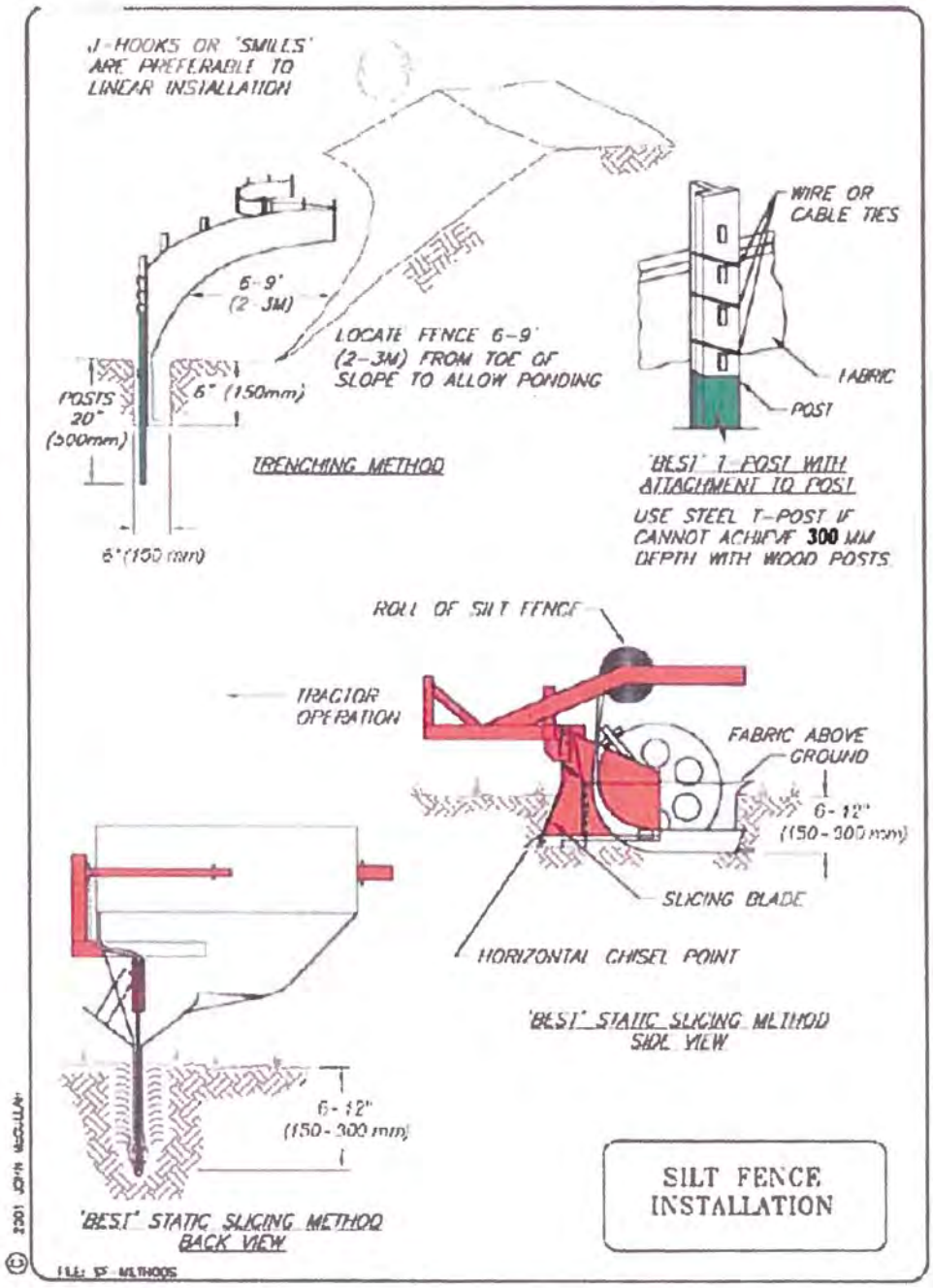


Figure 1.4.5.G.2 Silt Fence Placement — One Slope

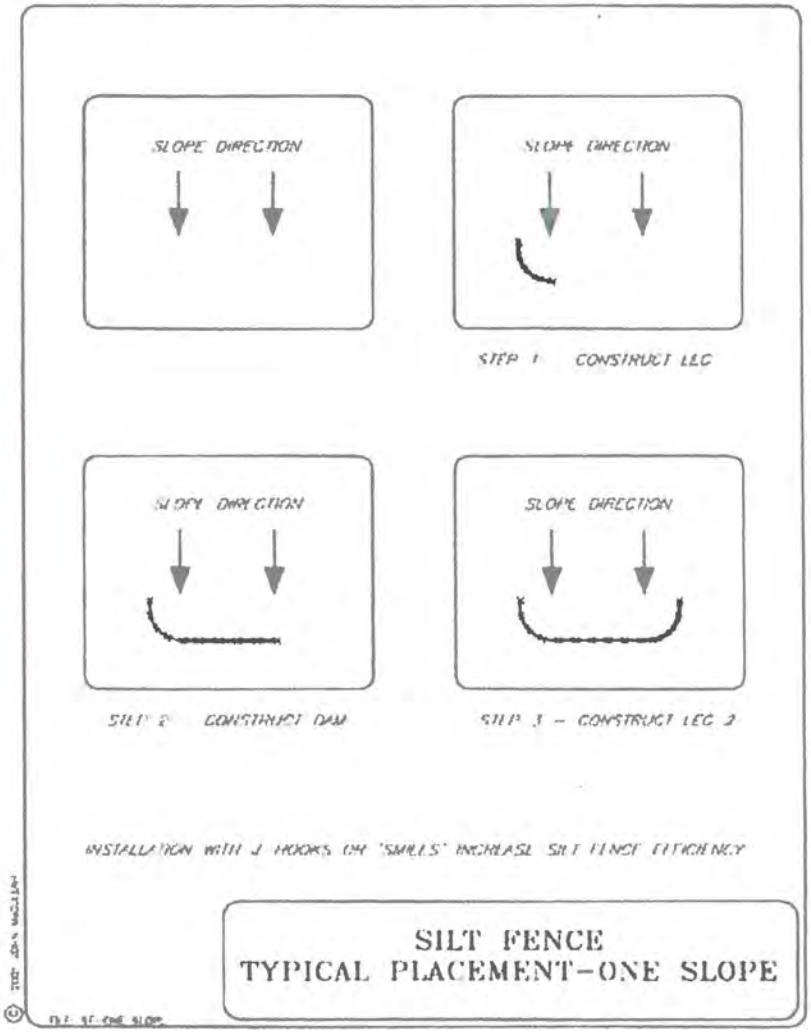


Figure 1.4.5.G.3 Silt Fence Placement for Perimeter Control

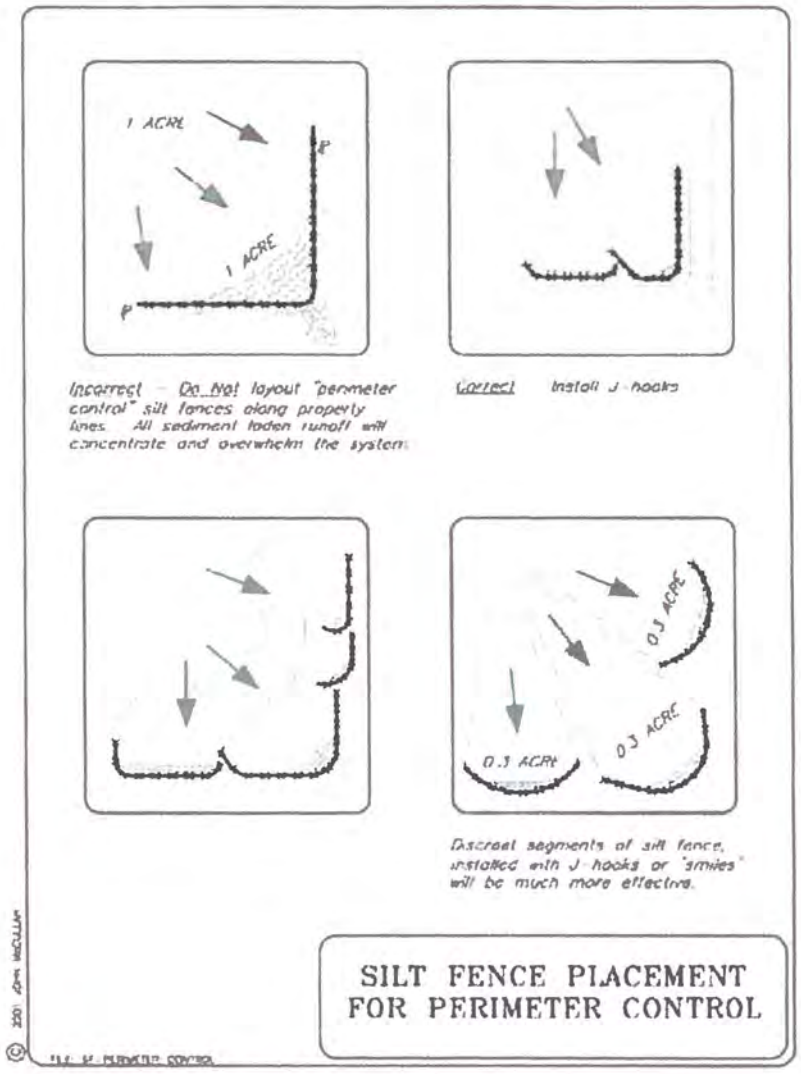
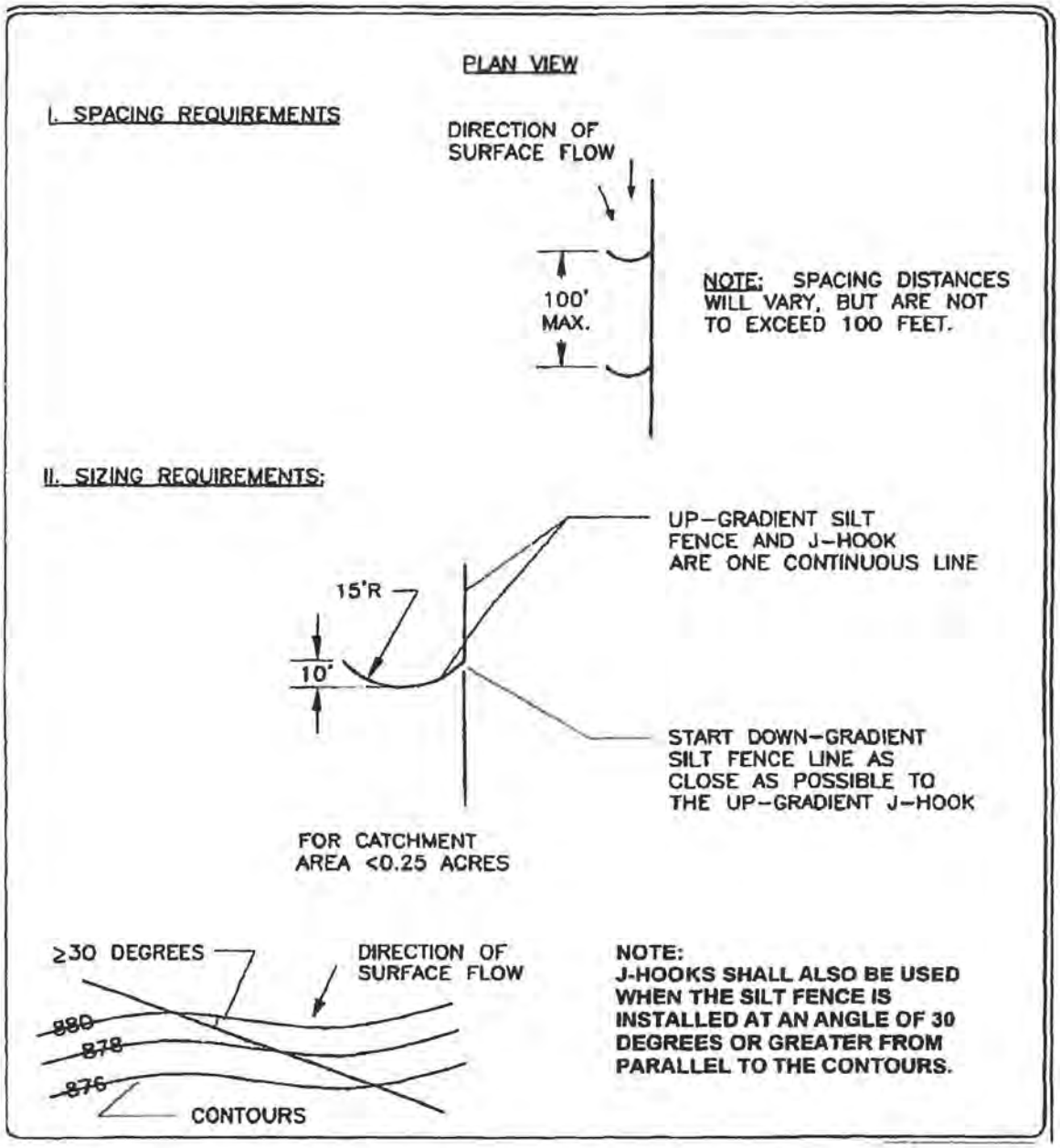


Figure 1.4.5.G.4 Silt Fence J - Hook Detail



H. **Triangular Sediment Filter Dikes.** (See Standard Specifications manual item 648S and Standards manual item 648S for detail)

1. Description.

   A temporary barrier constructed of wire mesh and non-woven geotextile fabric, installed along a flat area.

2. Purpose.

   The purpose of a triangular sediment filter dike is to intercept and detain water-borne sediment from a stabilized construction entrance, roadway utility work, small utility repairs, underground storage tank removals, or minor redevelopment projects.

3. Conditions Where Practice Applies.

   The triangle sediment filter dike is used where:

   • There is no concentration of water in a channel or other drainage way above the barrier, and

   • If concentrated flow occurs after installation, corrective action must be taken such as placing rock berms in the areas of concentrated flow.

   • Contributing drainage area is limited to sheetflow from the stabilized construction entrance. Additionally, the triangle sediment filter dike should be placed across the construction entrance(s) at the end of the day to form a continuous perimeter sedimentation control in conjunction with other approved perimeter controls.

   • There is work within a parking lot covered with asphalt, the dike should be placed on the asphalt and the skirt weighed down with rock or a continuous wood strip nailed to the asphalt.

   • There is roadway or small utility work. The dike should be placed to intercept stormwater prior to entering the inlet.

   • There is underground storage tank removal or installation.

   • There is minor redevelopment on a site and no other types of sediment control are feasible.

4. Design Criteria.

   • See City of Austin Standard Specification 628S.

APPENDIX P-1 - EROSION CONTROL NOTES

1. The contractor shall install erosion/sedimentation controls, tree/natural area protective fencing, and conduct "Pre-Construction" tree fertilization (if applicable) prior to any site preparation work (clearing, grubbing or excavation).

2. The placement of erosion/sedimentation controls shall be in accordance with the Environmental Criteria Manual and the approved Erosion and Sedimentation Control Plan. The COA ESC Plan shall be consulted and used as the basis for a TPDES required SWPPP. If a SWPPP is required, it shall be available for review by the City of Austin Environmental Inspector at all times during construction, including at the Pre-Construction meeting. The checklist below contains the basic elements that shall be reviewed for permit approval by COA EV Plan Reviewers as well as COA EV Inspectors.

— Plan sheets submitted to the City of Austin MUST show the following:

✓ Direction of flow during grading operations.

✓ Location, description, and calculations for off-site flow diversion structures.

✓ Areas that will not be disturbed; natural features to be preserved.

✓ Delineation of contributing drainage area to each proposed BMP (e.g., silt fence, sediment basin, etc.).

✓ Location and type of E&S BMPs for each phase of disturbance.

✓ Calculations for BMPs as required.

✓ Location and description of temporary stabilization measures.

✓ Location of on-site spoils, description of handling and disposal of borrow materials, and description of on-site permanent spoils disposal areas, including size, depth of fill and revegetation procedures.

✓ Describe sequence of construction as it pertains to ESC including the following elements:

1. Installation sequence of controls (e.g. perimeter controls, then sediment basins, then temporary stabilization, then permanent, etc.)
2. Project phasing if required (LOC greater than 25 acres)
3. Sequence of grading operations and notation of temporary stabilization measures to be used
4. Schedule for converting temporary basins to permanent WQ controls
5. Schedule for removal of temporary controls
6. Anticipated maintenance schedule for temporary controls

— Categorize each BMP under one of the following areas of BMP activity as described below:

3.1 Minimize disturbed area and protect natural features and soil

3.2 Control Stormwater flowing onto and through the project

3.3 Stabilize Soils

3.4 Protect Slopes

3.5 Protect Storm Drain Inlets

3.6 Establish Perimeter Controls and Sediment Barriers

3.7 Retain Sediment On-Site and Control Dewatering Practices

3.8 Establish Stabilized Construction Exits

3.9 Any Additional BMPs

— Note the location of each BMP on your site map(s).

— For any structural BMPs, you should provide design specifications and details and refer to them.

— For more information, see City of Austin Environmental Criteria Manual 1.4.

3. The Placement of tree/natural area protective fencing shall be in accordance with the City of Austin standard Notes for Tree and Natural Area Protection and the approved Grading/Tree and Natural Area Plan.

4. A pre-construction conference shall be held on-site with the contractor, design Engineer/permit applicant, and ~~Environmental Inspector~~ representatives from all relevant city departments after installation of the erosion/sedimentation controls, tree/natural area protection measures and "Pre-Construction" tree fertilization (if applicable) prior to beginning any site preparation work. The owner or owner's representative shall notify the Development Services Department, 512-974-2278 or by email at environmental.inspections@austintexas.gov, at least three (3) business days prior to the meeting date. COA approved ESC Plan and TPDES SWPPP (if required) should be reviewed by COA EV Inspector at this time. The general contractor must attend for residential pre-construction meetings, in addition to representatives from relevant city departments.

5. Any major variation in materials or locations of controls or fences from those shown on the approved plans will require a revision and must be approved by the reviewing Engineer, Environmental Specialist or City Arborist as appropriate. Major revisions must be approved by authorized COA staff. Minor changes to be made as field revisions to the Erosion and Sedimentation Control Plan may be required by the Environmental Inspector during the course of construction to correct control inadequacies.

6. The contractor is required to provide a certified inspector that is either a licensed engineer (or EIT ~~person directly supervised by the licensed engineer~~) or Certified Professional in Erosion and Sediment Control (CPESC or CPESC - IT), Certified Erosion, Sediment and Stormwater - Inspector (CESSWI or CESSWI - IT) or Certified Inspector of Sedimentation and Erosion Controls (CISEC or CISEC - IT) certification to inspect the controls and fences once daily and log inspection entries every seven (7) calendar ~~five (5) business~~ days, or once every fourteen (14) calendar days and within twenty-four (24) hours ~~at weekly or bi-weekly intervals and~~ after one-half (½) inch or greater rainfall events to insure that they are functioning properly. The person(s) responsible for maintenance of controls and fences shall ~~immediately~~ make any necessary repairs to damaged areas within forty-eight (48) hours of notification. Silt accumulation at controls must be removed when the depth reaches six (6) inches or one-third (⅓) of the installed height of the control whichever is less.

7. Prior to final acceptance by the City, haul roads and waterway crossings constructed for temporary contractor access must be removed, accumulated sediment removed from the waterway and the area restored to the original grade and revegetated. All land clearing debris shall be disposed of in approved spoil disposal sites.

8. All work must stop if a void in the rock substrate is discovered which is; one square foot in total area; blows air from within the substrate and/or consistently receives water during any rain event. At this time it is the responsibility of the Project Manager to immediately contact a City of Austin Environmental Inspector for further investigation. In addition, if the project site is located within the Edwards Aquifer, the Project Manager must notify the Travis County Balcones Canyonlands Conservation Preserve (BCCP) by email at bccp@traviscountytx.gov. Construction activities within 50 feet of the void must stop.

9. Temporary and Permanent Erosion Control: All disturbed areas shall be restored as noted below:

   A. All disturbed areas to be revegetated are required to place a minimum of six (6) inches of topsoil [see Standard Specification Item No. 601S.3(A)]. Do not add topsoil within the critical root zone of existing trees.

• Topsoil salvaged from the existing site is encouraged for use, but it should meet the standards set forth in 601S.

An owner/engineer may propose use of onsite salvaged topsoil which does not meet the criteria of Standard Specification 601S by providing a soil analysis and a written statement from a qualified professional in soils, landscape architecture, or agronomy indicating the onsite topsoil will provide an equivalent growth media and specifying what, if any, soil amendments are required.

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

The vegetative stabilization of areas disturbed by construction shall be as follows:

TEMPORARY VEGETATIVE STABILIZATION:

1. From September 15 to March 1, seeding shall be with or include a cool season cover crop: (Western Wheatgrass (*Pascopyrum smithii*) at 5.6 pounds per acre, Oats (*Avena sativa*) at 4.0 pounds per acre, Cereal Rye Grain (*Secale cereale*) at 45 pounds per acre. Contractor must ensure that any seed application requiring a cool season cover crop does not utilize annual ryegrass (*Lolium multiflorum*) or perennial ryegrass (*Lolium perenne*). Cool season cover crops are not permanent erosion control.
2. From March 2 to September 14, seeding shall be with hulled Bermuda at a rate of 45 pounds per acre or a native plant seed mix conforming to Item 604S or 609S.
   A. Fertilizer shall be applied only if warranted by a soil test and shall conform to Item No. 606S, Fertilizer. Fertilization should not occur when rainfall is expected or during slow plant growth or dormancy. Chemical fertilizer may not be applied in the Critical Water Quality Zone.
   B. Hydromulch shall comply with Table 1, below.
   C. Temporary erosion control shall be acceptable when the grass has grown at least 1½ inches high with a minimum of 95% total coverage so that all areas of a site that rely on vegetation for temporary stabilization are uniformly vegetated, and provided there are no bare spots larger than 10 square feet.
   D. When required, native plant seeding shall comply with requirements of the City of Austin Environmental Criteria Manual, and Standard Specification 604S or 609S.

Table 1: Hydromulching for Temporary Vegetative Stabilization

Material	Description	Longevity	Typical Applications	Application Rates
100% or any blend of wood, cellulose, straw, and/or cotton plant material (except no mulch shall exceed 30% paper)	70% or greater Wood/Straw 30% or less Paper or Natural Fibers	0—3 months	Moderate slopes; from flat to 3:1	1,500 to 2,000 lbs per acre

PERMANENT VEGETATIVE STABILIZATION:

1. From September 15 to March 1, seeding is considered to be temporary stabilization only. If cool season cover crops exist where permanent vegetative stabilization is desired, the grasses shall be mowed to a height of less than one-half (½) inch and the area shall be re-seeded in accordance with Table 2 below. Alternatively, the cool season cover crop can be mixed with Bermuda grass or native seed and installed together, understanding that germination of warm-season seed typically requires soil temperatures of 60 to 70 degrees.
2. From March 2 to September 14, seeding shall be with hulled Bermuda at a rate of 45 pounds per acre with a purity of 95% and a minimum pure live seed (PLS) of 0.83. Bermuda

grass is a warm season grass and is considered permanent erosion control. Permanent vegetative stabilization can also be accomplished with a native plant seed mix conforming to Item 604S or 609S.

A. Fertilizer use shall follow the recommendation of a soil test. See Item 606S, Fertilizer. Applications of fertilizer (and pesticide) on City-owned and managed property requires the yearly submittal of a Pesticide and Fertilizer Application Record, along with a current copy of the applicator's license. For current copy of the record template contact the City of Austin's IPM Coordinator.

B. Hydromulch shall comply with Table 2, below.

C. Water the seeded areas immediately after installation to achieve germination and a healthy stand of plants that can ultimately survive without supplemental water. Apply the water uniformly to the planted areas without causing displacement or erosion of the materials or soil. Maintain the seedbed in a moist condition favorable for plant growth. All watering shall comply with City Code Chapter 6-4 (Water Conservation), at rates and frequencies determined by a licensed irrigator or other qualified professional, and as allowed by the Austin Water Utility and current water restrictions and water conservation initiatives.

D. Permanent erosion control shall be acceptable when the grass has grown at least 1½ inches high with a minimum of 95 percent for the non-native mix, and 95 percent coverage for the native mix so that all areas of a site that rely on vegetation for stability must be uniformly vegetated, and provided there are no bare spots larger than 10 square feet.

E. When required, native plant seeding shall comply with requirements of the City of Austin Environmental Criteria Manual, Items 604S and 609S.

Table 2: Hydromulching for Permanent Vegetative Stabilization

Material	Description	Longevity	Typical Applications	Application Rates
Bonded Fiber Matrix (BFM)	80% Organic defibrated fibers			
10% Tackifier	6 months	On slopes up to 2:1 and erosive soil conditions	2,500 to 4,000 lbs per acre (see manufacturers recommendations)	
Fiber Reinforced Matrix (FRM)	65% Organic defibrated fibers 25% Reinforcing	Up to 12 months	On slopes up to 1:1 and erosive soil conditions	3,000 to 4,500 lbs per acre (see manufacturers recommendations)

	Fibers or less 10% Tackifier			

10. Developer Information:

Owner _____

Phone # _____

Address _____

Owner's representative responsible for plan alterations: _____

Phone # _____

Person or firm responsible for erosion/sedimentation control maintenance: _____

Phone # _____

Person or firm responsible for tree/natural area protection Maintenance: _____

Phone # _____

11. The contractor shall not dispose of surplus excavated material from the site without notifying the Development Services Department at 512-974-2278 at least 48 hours prior with the location and a copy of the permit issued to receive the material.

Source: Rule No. R161-15.13, 1-4-2016 ; Rule No. R161-17.03 , 3-2-2017; Rule No. R161-19.02 , 3-14-2019.