

Construction Activities Stormwater Management Plan (SWMP)
North Bay at Lake Woodmoor
El Paso County, Colorado
Latitude: 39.105065, Longitude: -104.856094

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Item 1. Add Qualified Stormwater Manager and Contractor information to cover/title sheet. If unknown, add a placeholder to be updated prior to the pre-construction meeting:

STORMWATER MANAGER

Name: _____

Company: _____

Address: _____

CONTRACTOR

Name: _____

Company: _____

Address: _____

Kiowa Project No. 15073

February 21, 2020

Add PCD File No.
SF-16-021

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STATE STORMWATER DISCHARGE PERMIT REQUIREMENTS

At least ten days prior to the anticipated start of construction activities (i.e. the initial disturbance of soils associated with clearing, grading, excavation activities, installation of structural Best Management Practices, or other activities), for projects that will disturb one (1.0) acre or more, the owner or operator of the construction activity must submit an application as provided by the Colorado Department of Public Health and Environment, Water Quality Control Division (Division). This form may be reproduced and is also available from the Division's web site. Applications received by the Division are processed and a permit certification and other relevant materials will be sent to the attention of the legally responsible person. The application contains certification of completion of a storm water management plan (SWMP). Do not include a copy of the Stormwater Management Plan, unless requested by the Division.

For information or application materials contact:

Colorado Department of Public Health and Environment
Water Quality Control Division
WQCD-P-B2
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530
<https://www.colorado.gov/pacific/cdphe/wq-construction-general-permits>

Electronic Application – CDPHE website:

[https://www.colorado.gov/pacific/cdphe/WQ%20permits%20construction%20electronic%20app
lication](https://www.colorado.gov/pacific/cdphe/WQ%20permits%20construction%20electronic%20application)

I. STORMWATER MANAGEMENT PLAN OBJECTIVES

The objective of the Stormwater Management Plan (SWMP) is “to identify possible pollutant sources that may contribute pollutants to stormwater and identify Best Management Practices (BMPs) that, when implemented, will reduce or eliminate any possible water quality impacts. The SWMP must be completed and implemented at the time the project breaks ground and revised as construction proceeds, to accurately reflect the conditions and practices at the site (CDPHE *Stormwater Management Plan Preparation Guidance*)”. A general schedule or phasing of BMPs will be determined by construction schedule and ground disturbances necessitating required erosion control methods/BMPs. The SWMP shall be implemented until expiration or inactivation of permit coverage. Evaluations of and modifications to this plan may be necessary during the length of the construction project until the site is finally stabilized.

SWMP Plan Availability: A copy of the Stormwater Discharge Permit from the State of Colorado, SWMP Report, SWMP Site Map, SWMP Notes and Details; and inspection reports shall be kept on site by the SWMP Administrator at all times, as to be available for use by the operator/SWMP Administrator and to be available for inspection by federal, state and local agencies. If an office location is not available at the site, the SWMP must be managed so that it is available at the site when construction activities are occurring (for example: by keeping the SWMP in the superintendent’s vehicle). The permittee shall retain copies of the SWMP and all reports required by the Permit and records of all data used to complete the Permit application for three (3) years minimum after expiration or inactivation of permit coverage, unless the community requires a longer period.

This SWMP should be viewed as a “living document” that is continuously being reviewed and modified as a part of the overall process of evaluating and managing stormwater quality issues at the site. The SWMP Administrator shall amend the SWMP when there is a change in design, construction, operation or maintenance of the site which would require the implementation of new or revised BMPs or if the SWMP proves to be ineffective in achieving the general objectives of controlling pollutants in stormwater discharges associated with construction activity or when BMPs are no longer necessary and are removed. If the SWMP Administrator feels that modifications to the BMPs shown on the SWMP are necessary to provide for a more effective plan, the process will include: 1) Evaluate pollutant sources, 2) Select BMPs, 3) Document BMPs, 4) Implement BMPs.

SWMP revisions must be made prior to changes in the site conditions, except for “Responsive SWMP Changes” as follows:

- SWMP revision must be made immediately after changes are made in the field to address BMP installation and/or implementation issues; or
- SWMP revisions must be made as soon as practicable, but in no case more than 72 hours, after change(s) in BMP installation and/or implementation occur at the site that require development of materials to modify the SWMP
 - ◊ A notation must be included in the SWMP prior to the site change(s) that includes the time and date of the change(s) in the field, and identification of the BMP(s) removed or added and the location(s) of the BMP(s). Modifications to the SWMP shall be submitted to the County within seven days.

A Colorado Discharge Permit System (CDPS), Stormwater Discharge Associated with Construction Activities Permit from the Colorado Department of Public Health and Environment is required for this project. The general conditions associated with the permits must be followed through the duration of the land disturbing activities at the site. For additional details or more specific information on the CDPS permit, consult the CDPS General Permit No. COR400000.

A. State Permit Applicant

The State Permit applicant (also referred to as the Permittee) must be a legal entity that meets the definition of the owner and/or operator of the construction site, in order for this application to legally cover the activities occurring at the site. The applicant must have day-to-day supervision and control over activities at the site and implementation of the SWMP. Although it is acceptable for the applicant to meet this requirement through the actions of a contractor, as discussed in the examples below, the applicant remains liable for violations resulting from the actions of their contractor and/or subcontractors. Examples of acceptable applicants include:

Owner or Developer - An owner or developer who is operating as the site manager or otherwise has supervision and control over the site, either directly or through a contract with an entity such as those listed below.

General Contractor or Subcontractor - A contractor with contractual responsibility and operational control (including SWMP implementation) to address the impacts construction activities may have on stormwater quality.

Other Designated Agents/Contractors - Other agents, such as a consultant acting as construction manager under contract with the owner or developer, with contractual responsibility and operational control (including SWMP implementation) to address the impacts construction activities may have on stormwater quality.

Refer to the CDPHE, *Stormwater Management Plan Preparation Guidance* for additional information.

The Permittee shall be legally responsible for compliance with the State Permit.

B. SWMP Terms

Best Management Practices (BMPs): BMPs encompass a wide range of erosion and sediment control practices, both structural and non-structural in nature, that are intended to reduce or eliminate any possible water quality impacts from stormwater leaving a construction site. The individual BMPs appropriate for a particular construction site are largely dependent of the types of potential pollutant sources present, the nature of the construction activity, and specific-site conditions.

Nonstructural BMPs, such as preserving natural vegetation, preventive maintenance and spill response procedures, schedules of activities, prohibition of specific practices, education, and other management practices are mainly operational or managerial techniques.

Structural BMPs include treatment processes and practices ranging from diversion structures and silt fences, to retention ponds and inlet protection.

Construction Start Date: This is the day when ground disturbing activities are expected to begin, including grubbing, stockpiling, excavating, demolition, and grading activities.

Disturbance Area Determination: Aside from clearing, grading and excavation activities, disturbed areas also include areas receiving overburden (e.g., stockpiles), demolition areas, and areas with heavy equipment/vehicle traffic and storage that disturb existing vegetative cover.

Final Stabilization Date: In terms of permit coverage, this is when the site is finally stabilized. This means that all ground surface disturbing activities at the site have been completed, and all disturbed areas have been either built on, paved, or a uniform vegetative cover has been

established with an individual plant density of at least 70 percent of pre-disturbance levels (refer to Final Stabilization Section). Permit coverage must be maintained until the site has reached Final Stabilization. Even if only one part of the project is being done, the estimated final stabilization date must be for the overall project. If permit coverage is still required once your part is completed, the permit certification may be transferred or reassigned to a new responsible entity(s).

SWMP Drawings: Also known as the SWMP Site Map and Erosion Control Plans.

C. Contractor Required Items

The Contractor shall include and/or provide the following items prior to beginning land disturbing activities:

- Add the SWMP Administrator and Alternate with phone numbers to this plan.
- Construction Dates – Verify the construction dates indicated in this report. Update as necessary to reflect the planned schedule.
- Material Handling and Spill Prevention procedures – See Section IV-4. Review and modify as necessary.
- Application - Insert Application for CDPS Stormwater Discharge Associated with Construction Activities Permit into Appendix.
- Permit - Insert Permit for CDPS Stormwater Discharge Associated with Construction Activities into Appendix.

II. SITE DESCRIPTION

A. Nature of the Construction Activity

North Bay at Lake Woodmoor will be a multi-family residential development of 28 lots. This development will include construction of the buildings, private alleys, sidewalks, landscaping around the buildings; installation of water, gas and electric mains; and water, sanitary sewer, gas, electric and communication services for the buildings.

i. Site Location

North Bay at Lake Woodmoor is located in the Woodmoor area of El Paso County near Monument, Colorado. The subject property is located to the south of Deer Creek Road and approximately 400 feet east of Woodmoor Drive. The site is located in the southeast portion of Section 11, Township 11 South, Range 67 West of the 6th Principal Meridian, in El Paso County, Colorado. The location of the site is shown on the Vicinity Map (Figure 1).

ii. Adjacent Areas

The site is bounded to the north by Deer Creek Road, to the west by the Cove at Woodmoor Condominiums, to the east by single family residences of the Woodmoor development and to the south by Lake Woodmoor.

B. Sequence of Major Activities

The major construction activities associated with this project are shown in the table below along with an approximate timing of the sequence. In general, the SWMP Administrator and the Contractor will identify the precise schedule to be used during the term of this project and modify this schedule as needed. Minimal clearing and grubbing may be necessary to install the initial erosion control features.

Approximate Sequence of Major Construction Activities:

Installation of Initial BMPs	September 2020
Clearing, grubbing and demolition	September 2020
Site Grading, Building and Utility Construction	October 2020 – June 2021
Paving, curb & gutter construction	July – August 2021
Landscaping	September 2021
End Construction (refer to <i>Final Stabilization...</i> section)	September 2021

The temporary erosion control measures can be removed when Final Stabilization has occurred. Refer to the Final Stabilization section for a description of the requirements.

C. Estimate of Area and Volume Disturbed

The project area totals 7.23 acres of which approximately 4.6 acres will be subject to disturbance. The estimated disturbance area corresponds to that necessary to install access roads, buildings, building pads, driveways, landscaping, stormwater facilities, and utilities. Locations of disturbed areas are as shown on the SWMP Site Map. All other areas are planned to remain undisturbed. Earthwork cut and fill operations are more than 500 cubic yards.

D. Soil Data

Soil within the property is classified within Hydrologic Soils Groups B and D as shown in the El Paso County Soils Survey. The predominant soil types on the site are Pring course sandy loam and Alamosa loam. Pring course sandy loam is characterized as a deep, noncalcareous, well-drained soil formed in sandy sediment with rapid permeability and blowing soil hazard. Alamosa loam is characterized as a deep poorly drained soil formed in alluvium on flood plains with moderately slow permeability and a slight erosion hazard.

The pre construction and the post construction run-off coefficients are 0.53 and 0.57 respectively
Item 9. Include method used to determine ground cover (i.e., visual, aerial inspection, ...)

E. Existing Vegetation and Ground Cover

The existing overall site is undeveloped and the vegetative cover within the property consists primarily of smooth brome (*Bromus inermis*), a non-native grass commonly used for re-vegetation in good condition throughout the site. The existing ground slopes within the property range from 2 to 8 percent with the steepest slopes occurring along the south and west property line. The site vegetation was evaluated according to protocol recommended in the "Erosion Control and Stormwater Quality Guide" by the Colorado Department of Transportation (Section 4.11.1). Also, several visits to the site have been conducted at different times of the year. The existing vegetative cover consistently appears to be in good condition, is mowed somewhat regularly with an average stem height of 12 inches, and there is no evidence of instability or surface erosion. The existing average vegetation cover is estimated to be about 75%. There are a few coniferous trees scattered across the site, with a denser tree cover along the south and east property boundaries. There are riparian shrubs within the creek in the northeast corner of the property and deciduous trees and wetlands along the south property boundary at Lake Woodmoor.

It is recommended that the contractor take pictures of the existing vegetative cover prior to construction and any calculations they feel necessary to make the Final Stabilization comparison (refer to Final Stabilization section for additional information). The contractor will be responsible for providing the documentation to make this comparison to El Paso County and the State of Colorado, Water Quality Control Division.

F. Potential Pollution Sources

The potential pollution sources for the site that may have an impact to stormwater include the following items:

1. Ground disturbing activities and grading - Sediment
2. Demolition work – Sediment, asphalt, concrete, aggregate
3. Off-site vehicle tracking - Sediment
4. Vehicle maintenance or fueling – Fuel, oil, chemicals
5. Storage of demolition and disposal items – Sediment, asphalt, concrete
6. Soil, aggregate and sand stockpiling - Sediment
7. Storage of fertilizers, materials or chemicals - Chemicals
8. Concrete washouts – Concrete, slurry
9. Concrete work – Forms, form oil, curing compound
10. Paving operations – Asphalt, concrete, forms
11. Building construction – Wood, concrete, roofing products, insulation, fiberglass, trash, grout, drywall, other building materials
12. Haul routes – Sediment, fuel, oil
13. Landscaping – Fertilizers, sediment, over-watering, pesticides
14. Portolet – Chemicals, human waste

G. Non-stormwater Discharges

In the existing condition there are no known non-stormwater discharges from the project site, such as springs and landscape irrigation return flows. During construction, the following non-stormwater discharges from the project site could occur.

1. Construction dewatering - Not anticipated. If dewatering is required during construction, the SWMP Administrator shall update the SWMP and determine whether a CDPHE construction dewatering permit is required prior to performing the dewatering activities. A dewatering bag or other approved BMP shall be used if dewatering is required.
2. Release of concrete washout water – Not anticipated. The washout water should be contained within the concrete washout BMP.
3. Runoff from water used for dust control – Not anticipated. The contractor should limit the amount of water used for dust control to an amount less than would result in runoff. Perimeter control BMPs are planned to filter water that may runoff.

If any other non-stormwater discharges from the site become apparent during the term of construction, the occurrence and mitigation shall be addressed by the SWMP Administrator.

H. Receiving Waters

The project area will drain centrally to the Upper Lake Fork of Dirty Woman Creek and then to Lake Woodmoor. Lake Woodmoor discharges to Dirty Woman Creek which then outfalls to Monument Creek, and ultimately to the Arkansas River.

Immediate Receiving water(s): Dirty Woman Creek

Ultimate Receiving Water(s): Lake Woodmoor

There is a major drainageway that runs through the middle of the site, but there are no irrigation canals or ditches within the site. The subject property is located within a FEMA regulated floodplain based on Flood Insurance Rate Map 08041C0276G, dated December 7, 2018.

III. SWMP SITE MAP CONTENTS

The SWMP Site Map and SWMP Drawings are considered a part of this plan. It identifies the following:

1. Construction site boundaries;
2. All areas of ground disturbance;
3. Areas of cut and fill;
4. Areas used for storage of building materials, equipment, soil, or waste;
5. Locations of all structural BMPs;
6. Locations of non-structural BMPs where applicable;
7. Locations of springs, streams, wetlands, detention basins, irrigation canals, roadside ditches and other surface waters.

The SWMP Site Map must be updated/red lined by the SWMP Administrator on a regular basis to reflect current conditions of the site at all times.

IV. STORMWATER MANAGEMENT CONTROLS

A. SWMP Administrator

The Permittee shall designate the SWMP Administrator. The SWMP Administrator is typically the Contractor or his/her designated representative and is responsible for developing, implementing, maintaining and revising the SWMP. The SWMP Administrator is the contact person with the County and State for all matter pertaining to the SWMP. The SWMP Administrator is the person responsible for the SWMP accuracy, completeness and implementation. Therefore the SWMP Administrator should be a person with authority to adequately manage and direct day to day stormwater quality management activities at the site. The SWMP Administrator shall have the authority to act on behalf of the Permittee(s) to ensure the site remains in compliance with the CDPS Stormwater Discharge Associated with Construction Activities Permit. An Alternate SWMP Administrator who is able to serve in the same capacity as the SWMP Administrator shall also be selected.

The SWMP Administrator shall be present at the project site a majority of the time and (along with the Alternate SWMP Administrator) shall provide the County with a 24-hour emergency contact number.

If the SWMP Administrator or Alternate changes for any reason, it shall be noted/redlined on this Plan. The County shall be notified in writing of any change.

SWMP Administrator: _____

Phone: _____

Alternate SWMP Administrator: _____

Phone: _____

B. Identification of Potential Pollutant Sources:

At a minimum, the following sources and activities shall be evaluated for the potential to contribute pollutants to stormwater discharges and identified in the SWMP if found to have such potential. The sources of any potential pollutants must be controlled through BMP selection and implementation. Each pollutant source recognized through this process as having the potential to contribute pollutants to stormwater, must be identified in the SWMP along with the specific stormwater management control (BMPs) that will be implemented to adequately control the source. (Note: the actual evaluation of the potential pollutant sources does NOT need to be included in the SWMP – just the resultant pollutant sources and their associated BMPs.). The SWMP Administrator shall determine the need for and locations of each of the following potential pollutant sources during the course of the construction project.

Could it Contribute?	Potential Pollutant Source	BMP Implemented to Control Source
Yes	All disturbed and stored soils	Silt fence, sediment control logs, sediment basin, inlet protection, rock socks, seed and mulch
Yes	Vehicle tracking of sediments	Vehicle tracking control, street sweeping
No	Management of contaminated soils	
Yes	Loading and unloading operations	Stabilized staging area, materials storage area, vehicle tracking control, silt fence
Yes	Outdoor storage activities (building materials, fertilizers, chemicals, etc.)	Stabilized staging area, materials storage area, silt fence
Yes	Vehicle and equipment maintenance and fueling	Stabilized staging area, materials storage area, silt fence
Not expected	Significant dust or particulate generating processes	Control by sprinkling with water and other appropriate means.
Yes	Routine maintenance activities involving fertilizers, pesticides, detergents, fuels, solvents, oils, etc	Use as recommended by manufacturer and in areas specified, inlet protection
Yes	On-site waste management practices (waste piles, liquid wastes, dumpsters, etc)	Stabilized staging area, silt fence, inlet protection, sediment basin, non-structural BMPs
Yes	Concrete truck/equipment washing, including the concrete truck chute and associated fixtures and equipment	Concrete washout area, stabilized staging area, vehicle tracking control, silt fence
No	Dedicated asphalt and concrete batch plants	
Yes	Non-industrial waste sources such as worker trash and portable toilets	Stabilized staging area, construction fence, non-structural BMPs
Yes	Other areas or procedures where potential spills can occur	Non-structural BMPs, construction fence

C. Best Management Practices (BMPs) for Pollution Prevention

1. A list of some of the Structural BMPs for erosion and sediment control that may be implemented on the site to minimize erosion and sediment are as follows. Refer to the SWMP Drawings for installation and maintenance

requirements for each structural BMP and refer to the SWMP drawings for the location of the BMPs.

- a) Concrete Washout Area (CWA): A shallow excavation with a small perimeter berm to isolate concrete truck washout operations.
- b) Construction Fence (CF): Installed to delineate the perimeter of the site.
- c) Dewatering (DW): Dewatering controls consist of a gravel filter provided on the suction end of a pump to reduce the pumping of sediment, a riprap pad at the discharge end of the pump for erosion protection and a sediment basin to provide for settling before the water is discharged into receiving waters.
- d) Erosion Control Blanket (ECB): Slopes equal to greater than the steepness indicated on the plans shall be protected with an erosion control blanket.
- e) Inlet Protection (IP): Installed to filter stormwater before entering any watercourses
- f) Sediment Control Log (SCL): Consists of a cylindrical bundle of wood, coconut, compost, excelsior, or straw fiber designed to form a semi-porous filter able to withstand overtopping.
- g) Stabilized Staging Area (SSA): Consists of stripping topsoil and spreading a layer of granular material in the area to be used for a trailer, parking, storage, unloading and loading.
- h) Vehicle Tracking Control (VTC): Consists of a rock pad that is intended to help strip mud from tires prior to vehicles leaving the construction site. Installed at all entrance/exit points to the site. The number of access points shall be minimized.

Minimal clearing and grubbing may be necessary prior to installing the initial erosion control features.

No clearing, grading, excavation, filling or other land disturbing activities shall be permitted until approval of the Erosion Control Plan is received from the County. Once approval is received, the erosion and sediment control measures must be installed before land-disturbing activities are initiated so that no adverse effect of site alteration will impact surrounding property.

2. Non-structural practices for erosion and sediment control to be used to minimize erosion and sediment transport are:

Seeding and mulching and landscape installation in areas that will not be hard surfaced. Minimize the amount of existing vegetation to be removed during construction, leaving native vegetation in place when possible. Only the existing vegetation that is specified or requiring removal shall be disturbed or removed. If possible, leave existing ground cover, including asphalt in place or remove just prior to grading to minimize the length of soil exposure.

3. Phased BMP Implementation:

The SWMP Administrator shall update the BMP Implementation if necessary to meet and/or address the Contractor's schedule. The SWMP shall be updated as necessary to reflect the BMPs installed.

a) Installation of Initial BMPs

This stage includes BMPs that shall be installed at the outset of construction, prior to land-disturbing activities. These BMPs are

identified on the Initial SWMP Plan. Prior to any construction activities, erosion control facilities shall be installed. Minimal demolition, clearing and grubbing may be necessary prior to installing the initial erosion control features. Following is a list of the BMPs included in this stage along with a description of their intended use:

- Construction Fence: To be installed in areas where sediment control log is not used as a perimeter control
- Sediment Basins: To be installed prior to one acre of disturbance, including clearing and grubbing.
- Stabilized staging area: Placed near construction access.
- Vehicle tracking control: Placed at construction access points.

Designate areas for construction trailer (if used), trash container, portolets, vehicle and equipment parking and material storage. If these areas are not indicated on the plan, the contractor must "red line" the plan with the locations and obtain approval of the County Erosion Control Inspector prior to proceeding. If not using a detail contained in the plans a detail will need to be included in the plans. Provide a confined area for maintenance and fueling of equipment from which runoff will be contained and filtered. BMP / Erosion Control facility waste shall be disposed of properly.

b) Clearing, grubbing and demolition (Site Clearing)

The measures included in the previous phase shall be maintained and continue. Removed soil, curb, concrete, utilities and demolished items shall be disposed of properly. If a soil stockpile area is needed, the area shall have perimeter control and no slopes greater than 3:1. Existing vegetation to remain shall be protected. Existing vegetation should be left in place until it needs to be removed as part of the construction progress (to the extent possible); to minimize the disturbed area and erosion potential, see Item 2 above. Wind erosion shall be controlled on the site by sprinkling and other appropriate means.

c) Site Grading, Building and Utility Construction

The measures included in the previous phase (Initial Stage) shall be maintained and continue, unless noted below. Following is a list of the BMPs included in this stage along with a description of their intended use:

- Concrete Washout Area: Install prior to any concrete work on the site. Located adjacent to VTC.
- Construction Fence: Maintain.
- Erosion Control Blanket: Place on disturbed slopes steeper than 4:1 after the work is completed on that slope.
- Inlet protection: Maintain. Add around new inlets as they are constructed.
- Sediment Basins: Maintain.
- Sediment control log: Add along the downstream end of disturbed slopes and where called out on plans.
- Stabilized staging area: Maintain.

- Vehicle tracking control: Maintain.

Excess and removed concrete, asphalt millings or pavement shall be disposed of properly. Materials associated with utility and building construction shall be stored in the designated Stabilized Staging Areas delineated on the plan. If an area is not indicated on the plan, the contractor must “red line” the plan with the locations and obtain approval of the County Erosion Control Inspector prior to proceeding. If not using a detail contained in the Plans, a detail will need to be included in the plans. Material waste from utility, pavement or building construction shall be disposed of properly. Solvents, paints and chemicals shall be stored and disposed properly. Off-site flows enter the site from the north conveyed by Dirty Woman Creek. Dirty Woman Creek continues through the center of the site towards lake Woodmoor.

d) Paving, curb & gutter and sidewalk construction

The measures included in the previous phase shall be maintained and continue, unless otherwise noted below.

- Concrete Washout Area: Maintain. Remove at end of paving and building construction phases.
- Construction Fence: Maintain.
- Erosion control blanket: Maintain. Place on disturbed slopes steeper than 4:1 after the work is completed on that slope.
- Inlet protection: Maintain. Add around new inlets as they are constructed.
- Reinforced rock berms: Maintain.
- Sediment Basins: Remove after curb and gutter and paving is installed.
- Sediment control log: Maintain.
- Stabilized staging area: Maintain. Remove at end of paving.
- Vehicle tracking control: Maintain.

Excess and removed concrete or asphalt shall be disposed of properly. Concrete sawcutting slurry shall not be allowed to enter the storm sewer system. Material waste from pavement shall be disposed of properly.

e) Landscaping

The measures included in the previous phase shall be maintained and continue, unless noted below or the work requiring the measure is completed. Removal of BMPs shall not occur without the approval of the County Erosion Control Inspector.

- Construction Fence: Maintain.
- Erosion Control Blanket: Place on disturbed slopes steeper than 4:1 after the work is completed on that slope.
- Inlet protection: Maintain.
- Sediment control log: Maintain.
- Vehicle tracking control: Remove, if not removed in Paving phase.

f) Final Stabilization

The following erosion control measures from the previous stages shall be maintained and continue until Final Stabilization is reached. At that time, with the approval of the County Erosion Control Inspector these BMPs may be removed. Refer to Final Stabilization section for requirements.

- Inlet protection
- Sediment control log

The site is planned to be permanently stabilized with either pavement, buildings, permanent landscaping, seed & mulch and sod in areas.

The SWMP Administrator shall amend the SWMP if necessary and as required, refer to Section I.

4. Materials handling and spill prevention:

The SWMP Administrator will inspect daily to ensure proper use and disposal of materials on-site including building materials, paints, solvents, fertilizers, chemicals, waste materials and equipment maintenance or fueling procedures. All materials stored on-site will be stored in a neat and orderly manner in the original containers with the original manufacturer's label, and if possible under a roof or other enclosure to prevent contact with stormwater. Chemicals should be stored within berms or other secondary containment devices to prevent leaks and spills from contacting stormwater runoff. Before disposing of the container, all of a product will be used up whenever possible and manufacturer's recommendations for proper disposal will be followed according to state and local regulations.

Material and equipment necessary for spill cleanup will be kept in the material storage area on-site. Manufacturer's recommendations for spill cleanup will be posted and site personnel will be made aware of the procedures along with the location of the information and cleanup supplies.

The contractor shall have spill prevention and response procedures that include the following:

- a) Notification procedures to be used in the event of an accident. At the very least, the SWMP Administrator should be notified. Depending on the nature of the spill and the material involved, the Colorado Department of Public Health and Environment (24-hour spill reporting line – 877-518-5608), downstream water users or other agencies may also need to be notified.
- b) Instructions for clean-up procedures and identification of spill kit location(s).
- c) Provisions for absorbents to be made available for use in fuel areas and for containers to be available for used absorbents
- d) Procedures for properly washing out concrete truck chutes and other equipment in a manner and location so that the materials and wash water cannot discharge from the site and never into a storm drain system or stream.

5. Dedicated concrete or asphalt batch plants:

No dedicated concrete or asphalt batch plants will be used.

6. Vehicle tracking control:

Off-site vehicle tracking of sediment shall be minimized and is as shown on the SWMP Site Map. Vehicle Tracking Control shall be installed at the construction access points. The contractor shall minimize the number of construction access points to reduce the amount of sediment tracked from the site. Streets shall be kept clean and free of mud, soil and construction waste. Street sweeping or other acceptable methods shall be used to prevent sediment from being washed from the project site. Streets shall not be washed down with water. Street cleaning operations shall occur if necessary or as directed by the County.

7. Waste management and disposal including concrete washout:

A concrete washout area is specified on the SWMP. Concrete wash water shall not be discharged to state waters, to storm sewer systems or from the site as surface runoff. The washout area shall be a shallow excavation with a small perimeter berm to isolate concrete truck washout operations. At the end of construction, all concrete shall be removed from the site and disposed of at an approved waste site. Signs shall be placed at the washout to clearly indicate the concrete washout area to operators of concrete trucks and pump rigs. Refer to the standard detail for requirements.

All construction site waste both liquid and solid must be contained in approved waste containers and disposed of off-site according to state and local regulations. Portable sanitary facilities shall be provided at the site throughout the construction phase and must comply with state and local sanitary or septic system.

8. Groundwater and stormwater dewatering:

Groundwater dewatering is not anticipated on the site. Stormwater dewatering may be required on the site during construction of structure foundations. If groundwater or stormwater dewatering is required, locations and practices to be implemented to control stormwater pollution from excavations, etc. must be noted on the SWMP. A separate CDPHE construction discharge (dewatering) permit may be required for groundwater dewatering and shall be obtained by the SWMP Administrator. Construction dewatering water cannot be discharged to surface water or to storm sewer systems without separate permit coverage. The discharge of Construction Dewatering water to the ground, under specific conditions, may be allowed by the Stormwater Construction Permit when appropriate BMPs are implemented. Refer to USDCM Volume III (UDFCD) for County acceptable means of dewatering.

V. FINAL STABILIZATION AND LONG TERM STORMWATER MANAGEMENT

“Final stabilization is reached when all ground surface disturbing activities at the site have been completed and uniform vegetative cover has been established with an individual plant density of at least 70 percent of pre-disturbance levels, or equivalent permanent, physical erosion reduction methods have been employed.” When vegetation is used to achieve final stabilization, the 70% vegetation requirement applies to a uniform plant density, which means that all areas of the site that rely on a vegetative cover to achieve stabilization must be uniformly vegetated. The contractor will be responsible for providing the documentation to make this comparison to the County and the State of Colorado, Water Quality Control Division. The stormwater permit allows the permittee to use alternatives to vegetation to achieve final stabilization. All alternatives to vegetation must meet specific criteria to be considered equivalent to vegetation, specifically: stabilization must be permanent, all disturbed areas must be stabilized and alternatives must follow good practices.

Temporary seeding for the project site shall include seeding and mulching. For the application methods, soil preparation and seeding and mulching requirements, refer to SWMP Drawings.

Management of storm water after completion of construction will be accomplished by utilizing the practices listed below.

- Upon completion of construction, the site shall be inspected to ensure that all equipment, waste materials and debris have been removed.
- The site will be inspected to make certain that all graded surfaces have been paved, landscaped or seeded with an appropriate ground cover.
- All silt fence, inlet protection, sediment logs, rock socks, etc. and all other control practices and measures that are to remain after completion of construction will be inspected to ensure their proper functioning.
- The contractor shall remove erosion control measures that are not required to remain.

After all construction activities are completed on the site, but final stabilization has not been achieved, the contractor shall make a thorough inspection of the stormwater management system at least once every month.

The contractor shall be responsible for maintaining the BMPs and stormwater controls in good working order and shall also be responsible for the costs incurred until such time as final stabilization is reached. Once final stabilization has been achieved the contractor shall be responsible for removal of the erosion control measures.

Should any of the erosion control facilities (BMPs) become in disrepair prior to the establishment of the native or natural erosion control measures, the Contractor is responsible for the cost of such maintenance. The Contractor is also responsible for the clean-up of offsite areas affected by any sediment that may leave the site. Control of erosion from areas disturbed by utility or building construction will be the responsibility of the respective contractor. All erosion control measures shown on the plan shall be installed and maintained in accordance with Best Management Practices.

Inactivation of permit coverage: Coverage under the Stormwater Construction Permit may be inactivated by the permittee when the site has attained final stabilization, all temporary erosion and sediment control measures have been removed, and all components of the SWMP are complete.

VI. RECOMMENDED INSPECTION AND MAINTENANCE PROCEDURES

A. Minimum Inspection Schedule

1. Frequency. Contractor should inspect and document Construction BMP's at the following times and intervals.
 - a) After installation of any Construction BMP;
 - b) At least once every 14 days, but a more frequent inspection schedule may be necessary to ensure that BMPs continue to operate as needed to comply with the permit.
 - c) A more frequent inspection schedule may be necessary to ensure that BMPs continue to operate as needed to comply with the permit.
 - d) Within 24 hours after a precipitation or snowmelt event that produces runoff or causes surface erosion.
2. Consult State Permit No. COR-400000 for alternate inspection requirements at temporarily idle sites, at completed sites or for winter conditions.
3. Refer to the BMP Details for the maintenance procedures associated with each BMP.
4. Inspection Procedures. The inspection must include observation of:
 - a) The construction site perimeter and discharge points (including discharges into a storm sewer system);
 - b) All disturbed areas;

- c) Areas used for material/waste storage that are exposed to precipitation
- d) Other areas determined to have a significant potential for stormwater pollution, such as demolition areas or concrete washout locations, or locations where vehicles enter or leave the site;
- e) Erosion and sediment control measures identified in the SWMP; and any other structural BMPs that may require maintenance, such as secondary containment around fuel tanks, or the condition of spill response kits.

The inspection must determine if there is evidence of, or the potential for, pollutants entering the drainage system. BMPs should be reviewed to determine if they still meet the design and operational criteria in the SWMP, and if they continue to adequately control pollutants at the site. Any BMPs not operating in accordance with the SWMP must be addressed as soon as possible, immediately in most cases, to minimize the discharge of pollutants, and the SWMP must be updated as described.

- 5. Inspection Checklist/Report. The Permittee must document inspection results and maintain a record of the results for a period of 3 years following expiration or inactivation of permit coverage. These records must be made available to CDPHE, the County or EPA upon request. The SWMP Administrator should record the inspection results on a site-specific standardized inspection report to be maintained and kept on the construction site. The CDPHE Construction Stormwater Site Inspection Report form is provided in the Appendix. Descriptions of corrective actions for any item, date(s) of corrective actions taken, and measures taken to prevent future violations, including requisite changes to the SWMP, as necessary.

B. BMP Operation and Maintenance.

The SWMP Administrator is responsible for operation and maintenance of construction BMPs. The SWMP Administrator will inspect the site per inspection and monitoring protocol outlined above and in the BMP details and will make any necessary repairs to construction BMPs immediately after a defect or other need for repair is discovered. The project site and the adjacent streets impacted by the construction shall be kept neat, clean and free of debris. The erosion control measures and facilities will be maintained in good working order until final stabilization. Any items that are not functioning properly or are inadequate will be promptly repaired or upgraded. Records of inspections must be kept and be available for review by the State of Colorado Water Quality Control Division or the County.

VII. REFERENCES

- 1) *CDPS General Permit: Stormwater Discharges Associated with Construction Activity Permit No. COR-400000*. Colorado Department of Public Health and Environment.
- 2) *CDPHE, Stormwater Discharges Associated with Construction Activity, Stormwater Management Plan Preparation Guidance*, prepared by CDPHE.
- 3) Final Drainage Report North Bay at Lake Woodmoor. Kiowa Engineering Corporation. 2016.
- 4) Erosion Control and Stormwater Quality Guide. Colorado Department of Transportation. 1995.
- 5) Dirty Woman Creek and Crystal Creek Drainage Basin Planning Study. Kiowa Engineering Corporation. 1993.
- 6) City of Colorado Springs and El Paso County Drainage Criteria Manual. October 1997.
- 7) City of Colorado Springs Drainage Criteria Manual Volume 2. November 2002.
- 8) *Soil Survey of El Paso County Area, Colorado*, prepared by United States Department of Agriculture Soil Conservation Service. June 1981.
- 9) *FIRM Flood Insurance Rate Map Number 08041C0276G*. Federal Emergency Management Agency. December 7, 2018.
- 10) Geologic Hazards Evaluation & Preliminary Geotechnical Investigation for North Bay at Lake Woodmoor Subdivision, Woodmoor Drive & Willow Park Way, Monument Colorado. CTL Thompson, Inc. 2013.
- 11) U.S.G.S. 7.5-minute Monument Quadrangle Map. El Paso County, Colorado. 1981. U. S. Department of the Interior. 1981.

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APPENDIX C

County Stormwater Field Inspection Form

APPENDIX D

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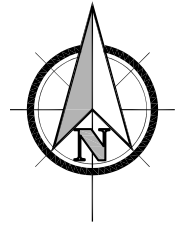
APPENDIX E

Soils Borings and Testing

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Operations and Maintenance Manuals for Permanent Stormwater Quality BMPs
Sand Filter Basins
Stormceptor

APPENDIX
Vicinity Map



SCALE: NTS

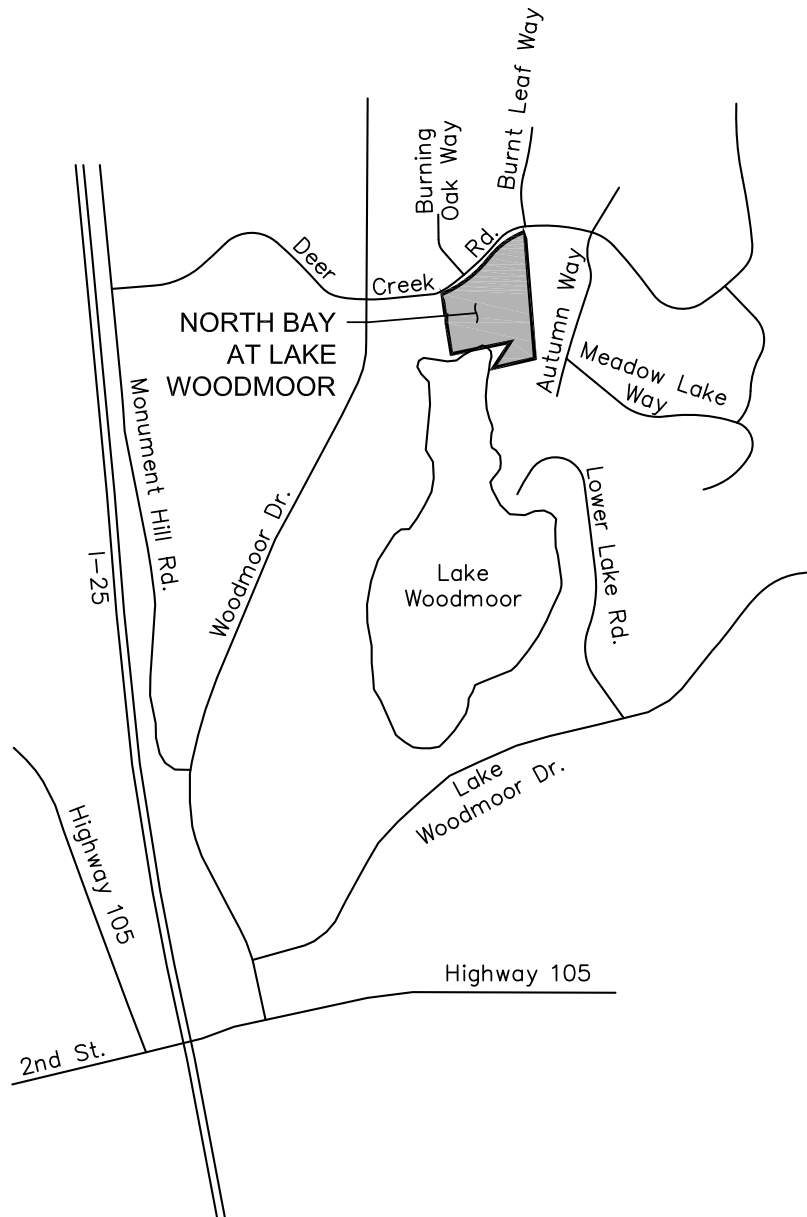


FIGURE 1

North Bay at Lake Woodmoor
Vicinity Map
El Paso County, Colorado

PROJECT NO. 15073

Kiowa
Engineering Corporation

1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

APPENDIX A

****Permittee Provided: Application for CDPS Stormwater Discharge Associated
with Construction Activities Permit**

APPENDIX B

****Permittee Provided: CDPS Stormwater Discharge Associated with Construction Activities Permit**

APPENDIX C
County Stormwater Field Inspection Form

Stormwater Field Inspection Form (Construction Projects)

El Paso County Colorado Stormwater Management Program

Phone (719) 520-6826 Fax (719) 520-6879

Email: johnchavez@elpasoco.com

General Information

Name of Project/Site: _____ ESQCP#: _____

Address/Directions: _____

Name(s) of Onsite Representative(s): _____ phone: _____

Permit Holder (If not permitted, Owner or Operator)

Owner Name: _____ Name of Responsible Person: _____

Title of Responsible Person: _____ Phone: _____

Address: _____

ECS Name: _____ ECS Phone Number: _____

Inspector(s): _____ Inspecting Agency: _____

Persons present: _____

Type of Inspection: Self Monitoring Initial Compliance Recon Other: _____

Date conducted: _____ Pictures Taken? Yes No

Construction start date? _____

Records Review

Copy of SWMP confirmed on site? Yes No

SWMP Review:

1. Site description as required in the permit? Yes No

Notes: _____

2. Site map as required in the permit? Yes No

Notes: _____

3. BMPs for stormwater pollution prevention:

a. Erosion and sediment controls as required in the permit? Yes No

Notes: _____

b. Materials handling and spill prevention? Yes No

Notes: _____

4. Final Stabilization and long term stormwater management as required in the permit Yes No

Notes: _____

5. Other controls as required in the permit? Yes No

Notes: _____

6. Inspection and maintenance as required in the permit? Yes No

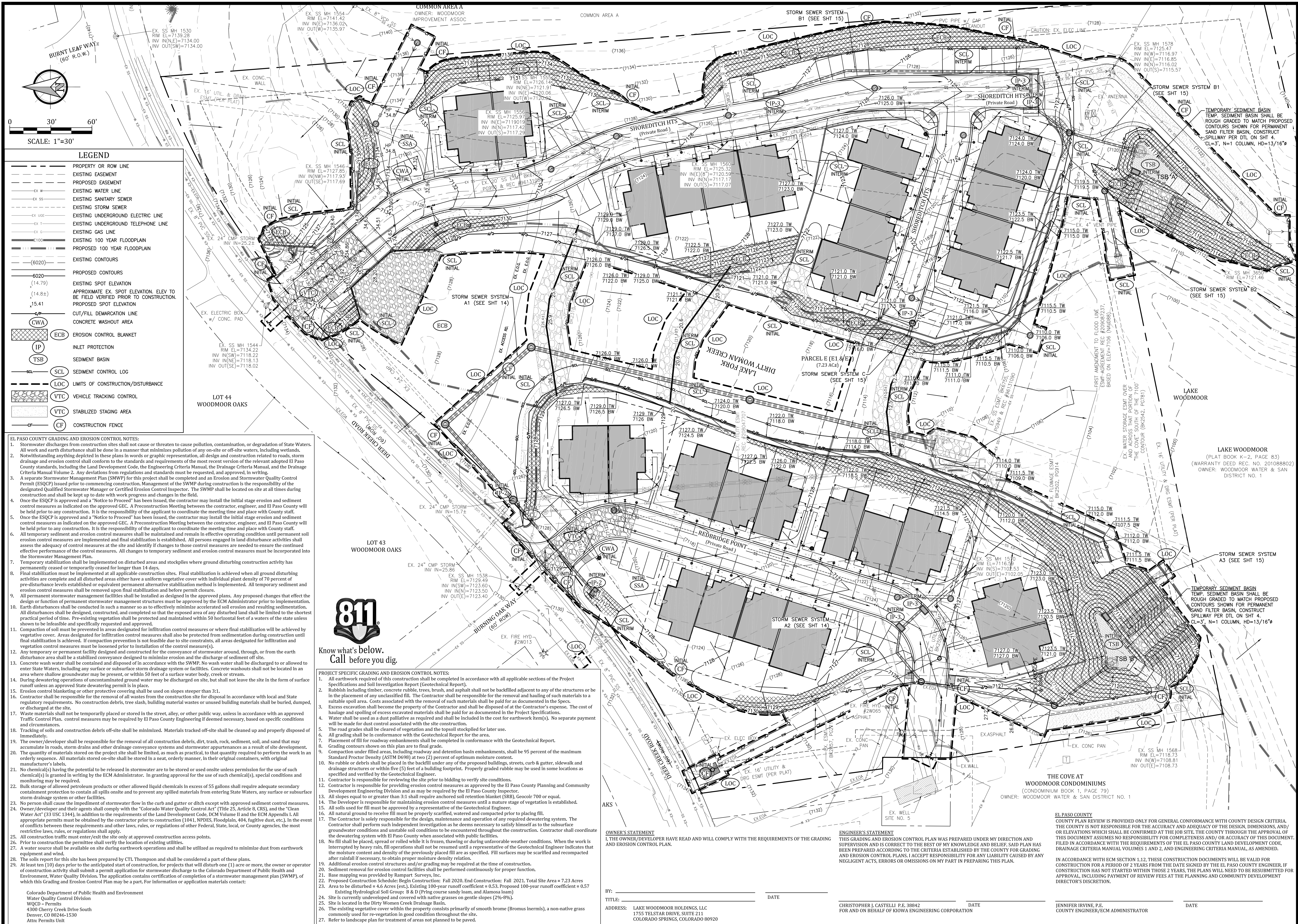
Notes: _____

Inspection records kept? Yes No

Inspections conducted as required in the permit? Yes No

Notes: _____

APPENDIX D
Stormwater Management Plan and Details
Figures 2 through 5



LEGEND

- PROPERTY OR ROW LINE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- EXISTING WATER LINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND ELECTRIC LINE
- EXISTING UNDERGROUND TELEPHONE LINE
- EXISTING GAS LINE
- EXISTING 100 YEAR FLOODPLAIN
- PROPOSED 100 YEAR FLOODPLAIN
- EXISTING CONTOURS
- PROPOSED CONTOURS
- EXISTING SPOT ELEVATION
- APPROXIMATE EX. SPOT ELEVATION. ELEV TO BE FIELD VERIFIED PRIOR TO CONSTRUCTION.
- PROPOSED SPOT ELEVATION
- CUT/FILL DEMARCATION LINE
- CONCRETE WASHOUT AREA
- ECB EROSION CONTROL BLANKET
- IP INLET PROTECTION
- TSB SEDIMENT BASIN
- SCL SEDIMENT CONTROL LOG
- LOC LIMITS OF CONSTRUCTION/DISTURBANCE
- VTC VEHICLE TRACKING CONTROL
- VTC STABILIZED STAGING AREA
- CF CONSTRUCTION FENCE

EL PASO COUNTY GRADING AND EROSION CONTROL NOTES:

- Stormwater discharges from construction sites shall not cause or threaten to cause pollution, contamination, or degradation of State Waters. All work and earth disturbance shall be done in a manner that minimizes pollution of any on-site or off-site waters, including wetlands.
- Notwithstanding anything depicted in these plans in words or graphic representation, all design and construction related to roads, storm drainage and erosion control shall conform to the standards and requirements of the most recent version of the relevant adopted El Paso County standards, including the Land Development Code, the Engineering Criteria Manual, the Drainage Criteria Manual, and the Drainage Criteria Manual Volume 2. Any deviations from regulations and standards must be requested and approved in writing.
- A separate Stormwater Management Plan (SMWP) for this project shall be completed and an Erosion and Stormwater Quality Control Permit (ESQCP) issued prior to commencing construction. Management of the SMWP during construction is the responsibility of the designated Qualified Stormwater Manager or Certified Erosion Control Inspector. The SMWP shall be located on site at all times during construction and shall be kept up to date with work progress and changes in the field.
- Once the ESQCP is approved and a "Notice to Proceed" has been issued, the contractor may install the initial stage erosion and sediment control measures as indicated on the approved GEC. A Preconstruction Meeting between the contractor, engineer, and El Paso County will be held prior to any construction. It is the responsibility of the applicant to coordinate the meeting time and place with County staff.
- Once the ESQCP is approved and a "Notice to Proceed" has been issued, the contractor may install the initial stage erosion and sediment control measures as indicated on the approved GEC. A Preconstruction Meeting between the contractor, engineer, and El Paso County will be held prior to any construction. It is the responsibility of the applicant to coordinate the meeting time and place with County staff.
- All temporary sediment and erosion control measures shall be maintained and remain in effective operating condition until permanent soil erosion control measures are implemented and final stabilization is established. All persons engaged in land disturbance activities shall assess the adequacy of control measures at the site and identify if changes to those control measures are needed to ensure the continued effective performance of the control measures. All changes to temporary sediment and erosion control measures must be incorporated into the Stormwater Management Plan.
- Temporary stabilization shall be implemented on disturbed areas and stockpiles where ground disturbing construction activity has permanently ceased or temporarily ceased for longer than 14 days.
- Final stabilization shall be implemented at all applicable construction sites. Final stabilization is achieved when all ground disturbing activities are complete and all disturbed areas either have a uniform vegetative cover with individual plant density of 70 percent of pre-disturbance levels established or equivalent permanent alternative stabilization method is implemented. All temporary sediment and erosion control measures shall be removed upon final stabilization and before permit closure.
- All permanent stormwater management facilities shall be installed as designed in the approved plans. Any proposed changes that affect the design or function of permanent stormwater management structures must be approved by the ERM Administrator prior to implementation.
- Earth disturbances shall be conducted in such a manner as to effectively minimize accelerated soil erosion and resulting sedimentation. All disturbances shall be designed, constructed, and completed so that the exposed area of any disturbed land shall be limited to the shortest practical period of time. Pre-existing vegetation shall be protected and maintained within 50 horizontal feet of a waters of the state unless shown to be infeasible and specifically requested and approved.
- Compaction of soil must be prevented in areas designated for infiltration control measures or where final stabilization will be achieved by vegetative cover. Areas designated for infiltration control measures shall also be protected from sedimentation during construction until final stabilization is achieved. If compaction prevention is not feasible due to site constraints, all areas designated for infiltration and vegetation control measures must be loosened prior to installation of the control measure(s).
- Any temporary or permanent facility designed and constructed for the conveyance of stormwater around, through, or from the earth disturbance area shall be stabilized and designed to minimize erosion and the discharge of sediment off-site.
- Concrete wash water shall be contained and disposed of in accordance with the SWMP. No wash water shall be discharged to or allowed to enter State Waters, including any surface or subsurface storm drainage system or facilities. Concrete washouts shall not be located in an area where shallow groundwater may be present, or within 50 feet of a surface water body, creek or stream.
- During dewatering operations of uncontaminated ground water may be discharged on site, but shall not leave the site in the form of surface runoff unless an approved State dewatering permit is in place.
- Erosion control blanketing or other protective covering shall be used on slopes steeper than 3:1.
- Contractor shall be responsible for the removal of all wastes from the construction and disposal in accordance with local and State regulatory requirements. No construction debris, tree slash, building materials or unused building materials shall be buried, dumped, or discharged at the site.
- Waste materials shall not be temporarily placed or stored in the street, alley, or other public way, unless in accordance with an approved Traffic Control Plan. Control measures may be required by El Paso County Engineering if deemed necessary, based on specific conditions and circumstances.
- Tracking of soils and construction debris off-site shall be minimized. Materials tracked off-site shall be cleaned up and properly disposed of immediately.
- The owner/developer shall be responsible for the removal of all construction debris, dirt, trash, rock, sediment, soil, and sand that may accumulate in roads, storm drains and other drainage conveyance systems and stormwater appurtenances as a result of site development.
- The quantity of materials stored on the project site shall be limited, as much as practical, to that quantity required to perform the work in an orderly sequence. All materials stored on-site shall be stored in a neat, orderly manner. In their original containers, with original manufacturer's labels.
- No chemical(s) having the potential to be released in stormwater are to be stored or used unless permission for the use of such chemical(s) is granted in writing by the ERM Administrator. In granting approval for the use of such chemical(s), special conditions and monitoring may be required.
- Bulk storage of allowed petroleum products or other allowed liquid chemicals in excess of 55 gallons shall require adequate secondary containment protection to contain all spills onsite and to prevent any spilled materials from entering State Waters, any surface or subsurface storm drainage system or other facilities.
- No person shall cause the impingement of stormwater flow in the curb and gutter or ditch except with approved sediment or subsurface storm drainage system or other facilities.
- Owner/developer and their agents shall comply with the "Colorado Water Quality Control Act" (Title 25, Article 8, CRS), and the "Clean Water Act" (33 USC 1344). In addition to the requirements of the Land Development Code, DCM Volume II and the ERM Appendix I, all appropriate permits must be obtained by the contractor prior to construction (1041, NPDES, Floodplain, 404, fugitive dust, etc.). In the event of conflicts between these requirements and other laws, rules, or regulations of other Federal, State, local, or County agencies, the most restrictive laws, rules, or regulations shall apply.
- All construction traffic must enter/exit the site only at approved construction access points.
- Prior to construction the permittee shall verify the location of existing utilities.
- No water source shall be available on site during earthwork operations and shall be utilized as required to minimize dust from earthwork equipment and wind.
- The soils report for this site has been prepared by CTL Thompson and shall be considered a part of these plans.
- At least ten (10) days prior to the anticipated start of construction, for projects that will disturb one (1) acre or more, the owner or operator of construction activity shall submit a permit application for stormwater discharge to the Colorado Department of Public Health and Environment, Water Quality Division. The application contains certification of completion of a stormwater management plan (SWMP), of which this Grading and Erosion Control Plan may be a part. For information or application materials contact:

Colorado Department of Public Health and Environment
Water Quality Control Division
WQCD - Permits
4300 Cherry Creek Drive South
Denver, CO 80246-1530
Attn: Permits Unit

811
Know what's below.
Call before you dig.

PROJECT SPECIFIC GRADING AND EROSION CONTROL NOTES:

- All earthwork required of this construction shall be completed in accordance with all applicable sections of the Project Specifications and Soil Investigation Report (Geotechnical Report).
- Rubbish including timber, concrete rubble, trees, brush, and asphalt shall not be backfilled adjacent to any of the structures or be in the placement of any unclassified fill. The Contractor shall be responsible for the removal and hauling of such materials to a suitable spoil area. Costs associated with the removal of such materials shall be paid for as documented in the Specs.
- Excess excavation shall become the property of the Contractor and shall be disposed of at the Contractor's expense. The cost of haulage and spoiling of excess excavated materials shall be paid for as documented in the Project Specifications.
- Water shall be used as a dust palliative as required and shall be included in the cost for earthwork (item 5). No separate payment will be made for dust control associated with the site construction.
- The road grades shall be cleared of vegetation and the topsoil stockpiled for later use.
- All grading shall be in conformance with the Geotechnical Report for the area.
- Placement of fill for roadway embankments shall be completed in conformance with the Geotechnical Report.
- Grading contours shown on this plan are to final grade.
- Compaction under filled areas, including roadway and detention basin embankments, shall be 95 percent of the maximum Standard Proctor Density (ASTM D698) at two (2) percent of optimum moisture content.
- No rubble or debris shall be placed in the backfill under any of the proposed buildings, streets, curb & gutter, sidewalk and drainage structures or within five (5) feet of a building footprint. Properly graded rubble may be used in some locations as specified and verified by the Geotechnical Engineer.
- Contractor is responsible for reviewing the site prior to bidding to verify site conditions.
- Contractor is responsible for providing erosion control measures as approved by the El Paso County Planning and Community Development Engineering Division and as may be required by the El Paso County Inspector.
- All slopes equal or greater than 3:1 shall require anchored soil retention blanket (SRB) Geococul 700 or equal.
- The Developer is responsible for maintaining erosion control measures until a mature stage of vegetation is established.
- All soils used for fill must be approved by a representative of the Geotechnical Engineer.
- All natural ground to receive fill must be properly scarified, watered and compacted prior to placing fill.
- The Contractor is solely responsible for the design, maintenance and operation of any required dewatering system. The Contractor shall perform such independent investigation as he deems necessary to satisfy himself as to the subsurface groundwater conditions and unstable soil conditions to be encountered throughout the construction. Contractor shall coordinate the dewatering system with El Paso County when associated with public facilities.
- No fill shall be placed, spread or rolled while it is frozen, thawing or during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until a representative of the Geotechnical Engineer indicates that the moisture content and density of the previously placed fill are as specified. Fill surfaces may be scarified and recompacted after rainfall if necessary, to obtain proper moisture content and density.
- Additional erosion control structures and/or grading may be required at the time of construction.
- Sediment removal for erosion control facilities shall be performed continuously for proper function.
- Base mapping was provided by Rampart Surveys, Inc.
- Proposed Construction Schedule: Begin Construction: Fall 2020, End Construction: Fall 2021, Total Site Area = 7.23 Acres
- Area to be disturbed = 4.6 Acres (est.). Existing 100-year runoff coefficient = 0.53, Proposed 100-year runoff coefficient = 0.57
- Existing Hydrological Soil Groups: B & D (Pring course sandy loam, and Alamosa loam)
- Site is currently undeveloped and covered with native grasses on gentle slopes (2%-8%).
- Site is located in the Dirty Women Creek Drainage Basin.
- The existing vegetative cover within the property consists primarily of smooth brome (*Bromus inermis*), a non-native grass commonly used for re-vegetation in good condition throughout the site.
- Refer to landscape plan for treatment of areas not planned to be paved.

OWNER'S STATEMENT
I, THE OWNER/DEVELOPER HAVE READ AND WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN.

BY: _____ DATE _____
ADDRESS: LAKE WOODMOOR HOLDINGS, LLC
1755 TELSTAR DRIVE, SUITE 211
COLORADO SPRINGS, COLORADO 80920

ENGINEER'S STATEMENT
THIS GRADING AND EROSION CONTROL PLAN WAS PREPARED UNDER MY DIRECTION AND SUPERVISION AND IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. SAID PLAN HAS BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE COUNTY FOR GRADING AND EROSION CONTROL PLANS. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENT ACTS, ERRORS OR OMISSIONS ON MY PART IN PREPARING THIS PLAN.

BY: CHRISTOPHER J. CASTELLI, P.E. 30842 DATE _____
FOR AND ON BEHALF OF KIOWA ENGINEERING CORPORATION

EL PASO COUNTY
COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT. FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE, DRAINAGE CRITERIA MANUAL VOLUMES 1 AND 2, AND ENGINEERING CRITERIA MANUAL, AS AMENDED.

IN ACCORDANCE WITH ERM SECTION 1.12, THESE CONSTRUCTION DOCUMENTS WILL BE VALID FOR CONSTRUCTION FOR A PERIOD OF 2 YEARS FROM THE DATE SIGNED BY THE EL PASO COUNTY ENGINEER. IF CONSTRUCTION HAS NOT STARTED WITHIN THOSE 2 YEARS, THE PLANS WILL NEED TO BE RESUBMITTED FOR APPROVAL, INCLUDING PAYMENT OF REVIEW FEES AT THE PLANNING AND COMMUNITY DEVELOPMENT DIRECTOR'S DISCRETION.

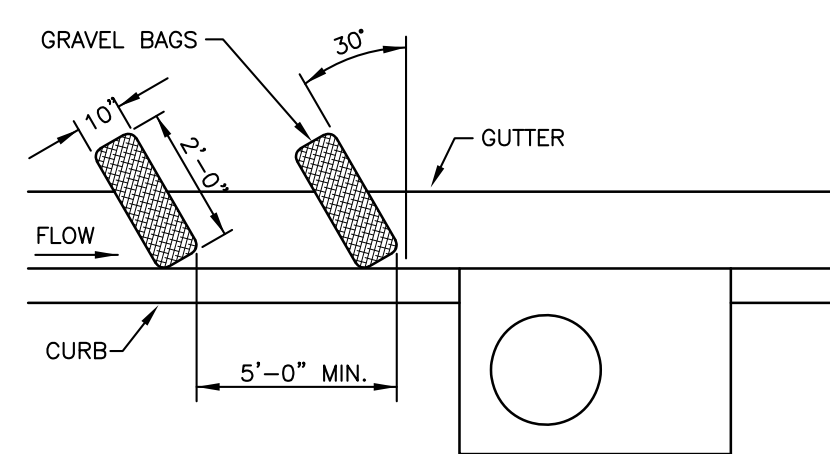
BY: JENNIFER IRVINE, P.E. DATE _____
COUNTY ENGINEER/ECM ADMINISTRATOR

Kiowa
Celebrating 30 years
Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

**North Bay at Lake Woodmoor
Stormwater Management Plan
Final Grading and Erosion Control Plan**
El Paso County, Colorado

Project No.:	15073
Date:	February 21, 2020
Design:	NRK, MTR
Drawn:	CAD
Check:	CJC
Revisions:	

FIGURE 2



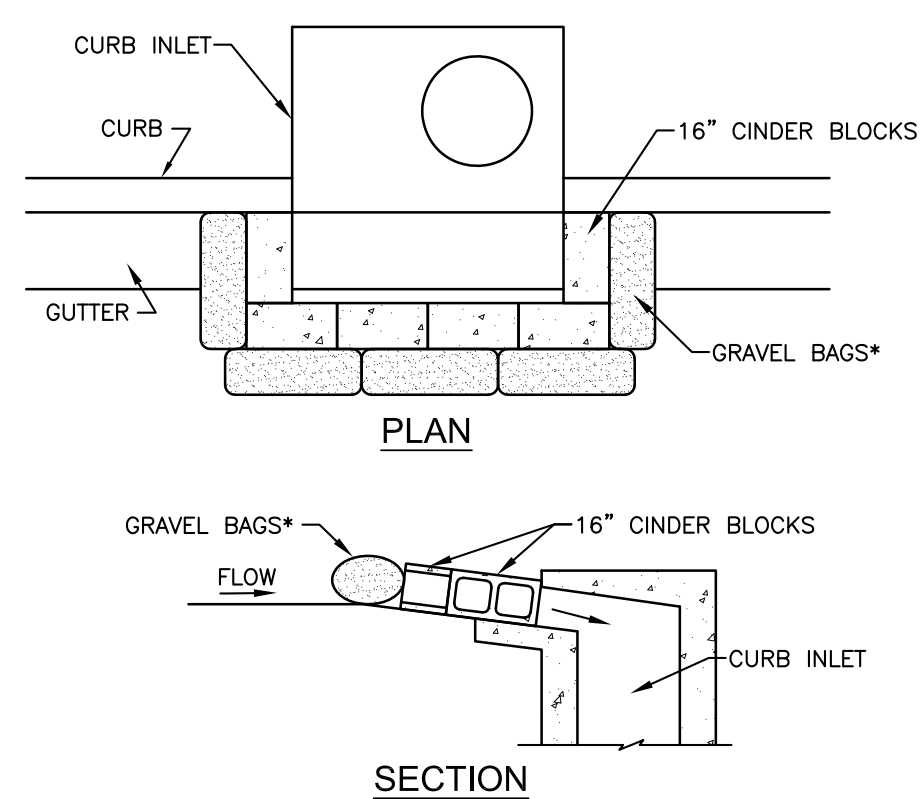
INSTALLATION REQUIREMENTS

1. INLET PROTECTION SHALL BE INSTALLED IMMEDIATELY AFTER CONSTRUCTION OF INLET.
2. BAGS ARE TO BE MADE OF 1/4" WIRE MESH (USED WITH GRAVEL ONLY) OR GEOTEXTILE.
3. WASHED SAND OR GRAVEL 3/4 INCH TO 4 INCHES IN DIAMETER IS PLACED INSIDE THE SOCK.
4. PLACEMENT OF THE SOCK IS TO BE 30 DEGREES FROM PERPENDICULAR IN THE OPPOSITE DIRECTION OF FLOW.
5. AT LEAST 2 CURB SOCKS IN SERIES IS REQUIRED.

MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT INLET PROTECTION IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL.
2. DAMAGED OR INEFFECTIVE INLET PROTECTION SHALL PROMPTLY BE REPAIRED OR REPLACED.
3. SEDIMENT SHALL BE REMOVED WHEN GUTTER WIDTH IS FILLED.
4. INLET PROTECTION SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED WITHIN THE DRAINAGE AREA AS APPROVED BY THE COUNTY.

CURB SOCK INLET PROTECTION (IP-4)
NTS



INSTALLATION REQUIREMENTS

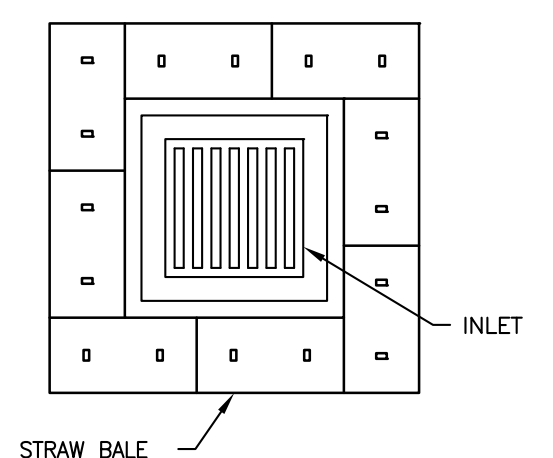
1. INLET PROTECTION SHALL BE INSTALLED IMMEDIATELY AFTER CONSTRUCTION OF INLET.
2. CONCRETE BLOCKS ARE TO BE LAID AROUND THE INLET IN A SINGLE ROW ON THEIR SIDES, ABUTTING ONE ANOTHER WITH THE OPEN ENDS OF THE BLOCK FACING OUTWARD.
3. GRAVEL BAGS ARE TO BE PLACED AROUND THE CONCRETE BLOCKS CLOSELY ABUTTING ONE ANOTHER SO THERE ARE NO GAPS.
4. GRAVEL BAGS ARE TO CONTAIN WASHED SAND OR GRAVEL APPROXIMATELY 3/4" IN DIAMETER.
5. BAGS ARE TO BE MADE OF 1/4" WIRE MESH (USED WITH GRAVEL ONLY) OR GEOTEXTILE.

MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT INLET PROTECTION IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL.
2. DAMAGED OR INEFFECTIVE INLET PROTECTION SHALL PROMPTLY BE REPAIRED OR REPLACED.
3. SEDIMENT SHALL BE REMOVED WHEN SEDIMENT HAS ACCUMULATED TO APPROXIMATELY 1/2 THE DESIGN DEPTH OF THE TRAP.
4. INLET PROTECTION SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED WITHIN THE DRAINAGE AREA AS APPROVED BY THE COUNTY.

***NOTE:** AN ALTERNATE 3/4" TO 1" GRAVEL FILTER OVER A WIRE SCREEN MAY BE USED IN PLACE OF GRAVEL BAGS. THE WIRE MESH SHALL EXTEND ABOVE THE TOP OF THE CONCRETE BLOCKS AND THE GRAVEL PLACED OVER THE WIRE SCREEN TO THE TOP OF THE CONCRETE BLOCKS.

BLOCK AND GRAVEL BAG INLET PROTECTION (IP-3)
NTS



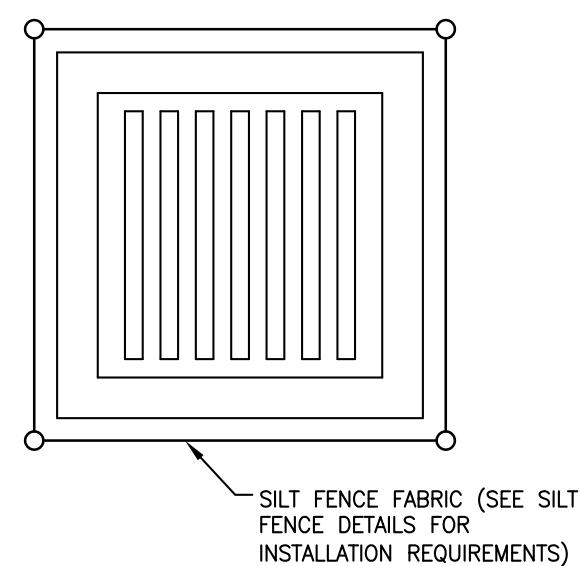
INSTALLATION REQUIREMENTS

1. INLET PROTECTION SHALL BE INSTALLED IMMEDIATELY AFTER CONSTRUCTION OF INLET.
2. BALES ARE TO BE PLACED IN A SINGLE ROW AROUND THE INLET WITH THE END OF THE BALES TIGHTLY ABUTTING ONE ANOTHER.
3. SEE STRAW BALE BARRIER DETAILS AND NOTES FOR INSTALLATION REQUIREMENTS.

MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT STRAW BALE INLET PROTECTION IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL.
2. DAMAGED OR INEFFECTIVE INLET PROTECTION SHALL PROMPTLY BE REPAIRED OR REPLACING BALES IF NECESSARY, AND UNTRENCHED BALES NEED TO BE REPAIRED WITH COMPACTED BACKFILL MATERIAL.
3. SEDIMENT SHALL BE REMOVED FROM BEHIND STRAW BALES WHEN IT ACCUMULATES TO APPROXIMATELY 1/3 THE HEIGHT OF THE BARRIER.
4. INLET PROTECTION SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED WITHIN THE DRAINAGE AREA AS APPROVED BY THE COUNTY.

STRAW BALE INLET PROTECTION (IP-2)
NTS



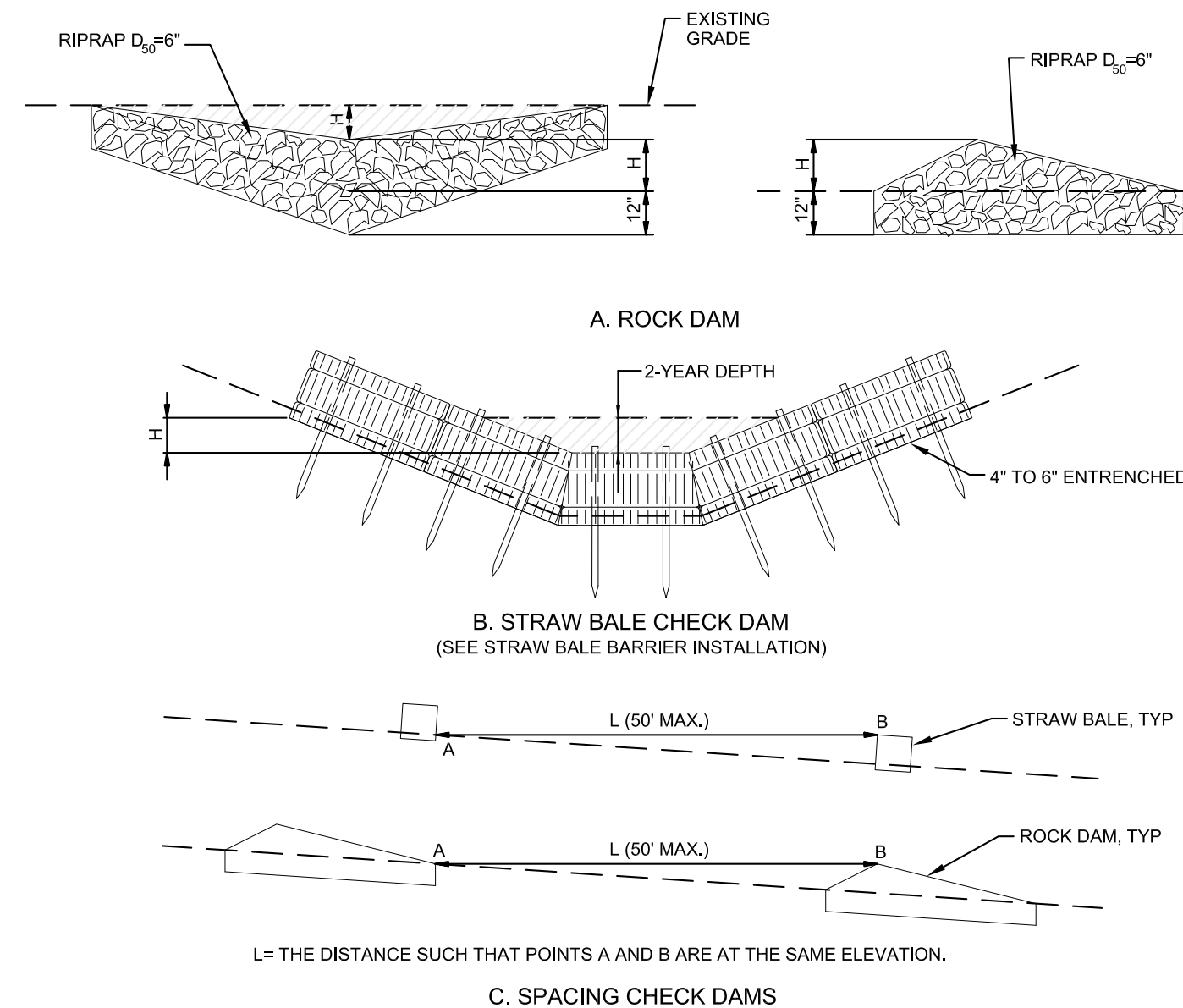
INSTALLATION REQUIREMENTS

1. INLET PROTECTION SHALL BE INSTALLED IMMEDIATELY AFTER CONSTRUCTION OF INLET.
2. SEE SILT FENCE DETAILS AND NOTES FOR INSTALLATION REQUIREMENTS.
3. POSTS ARE TO BE PLACED AT EACH CORNER OF THE INLET AND AROUND THE EDGES AT A MAXIMUM SPACING OF 3 FEET.

MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT STRAW BALE INLET PROTECTION IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL.
2. DAMAGED, COLLAPSED, UNTRENCHED OR INEFFECTIVE INLET PROTECTION SHALL BE PROMPTLY REPAIRED OR REPLACED.
3. SEDIMENT SHALL BE REMOVED FROM BEHIND FILTER FABRIC WHEN IT ACCUMULATES TO HALF THE EXPOSED GEOTEXTILE HEIGHT.
4. FILTER FABRIC PROTECTION SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED IN THE DRAINAGE AREA AS APPROVED BY THE COUNTY.

FILTER FABRIC INLET PROTECTION (IP-1)
NTS



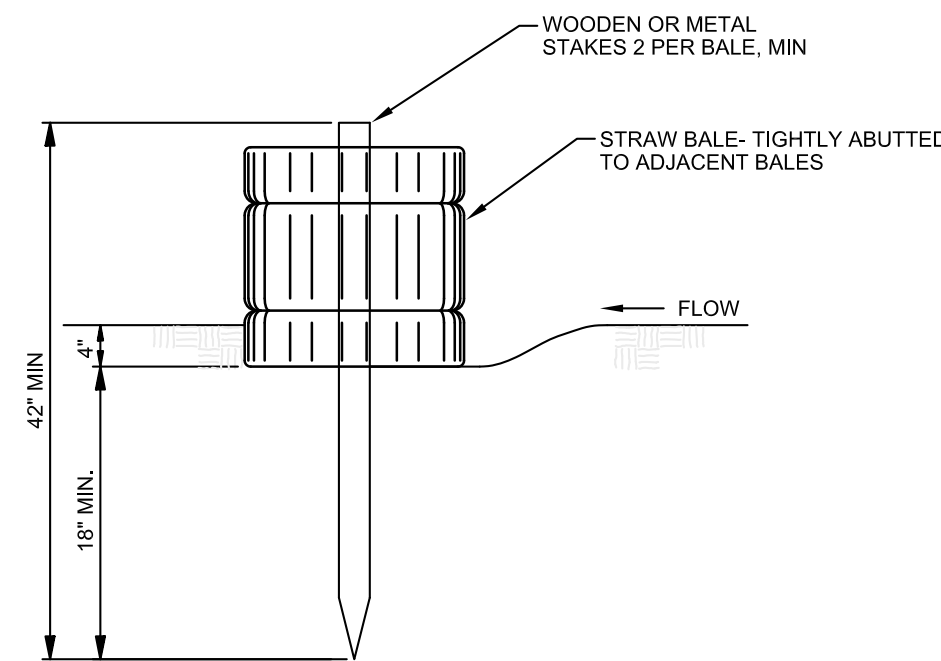
INSTALLATION REQUIREMENTS

1. STRAW BALES USED AS CHECK DAMS ARE TO MEET THE REQUIREMENTS STATED IN THE STRAW BALE BARRIER DETAILS AND NOTES.
2. THE "H" DIMENSION SHALL BE SELECTED TO PROVIDE WEIR FLOW CONVEYANCE FOR 2-YEAR FLOW OR GREATER.
3. STRAW BALE CHECKS TO BE INSTALLED AT 50-FOOT MAXIMUM INTERVALS ALONG TEMPORARY OR PERMANENT GRASSLINED SWALES.

MAINTENANCE REQUIREMENTS

1. REGULAR INSPECTIONS ARE TO BE MADE OF ALL CHECK DAMS, ESPECIALLY AFTER STORM EVENTS.
2. REPLACE STONE AS NECESSARY TO MAINTAIN THE CORRECT HEIGHT OF THE DAM.
3. ACCUMULATED SEDIMENT AND DEBRIS IS TO BE REMOVED FROM BEHIND THE DAMS AFTER EACH STORM OR WHEN HALF OF THE ORIGINAL HEIGHT OF THE DAM IS REACHED.
4. CHECK DAMS ARE TO REMAIN IN PLACE AND OPERATIONAL UNTIL THE DRAINAGE AREA AND CHANNEL ARE PERMANENTLY STABILIZED.
5. WHEN CHECK DAMS ARE REMOVED THE CHANNEL LINING OR VEGETATION IS TO BE RESTORED.

CHECK DAM (CD-A, CD-B)
NTS



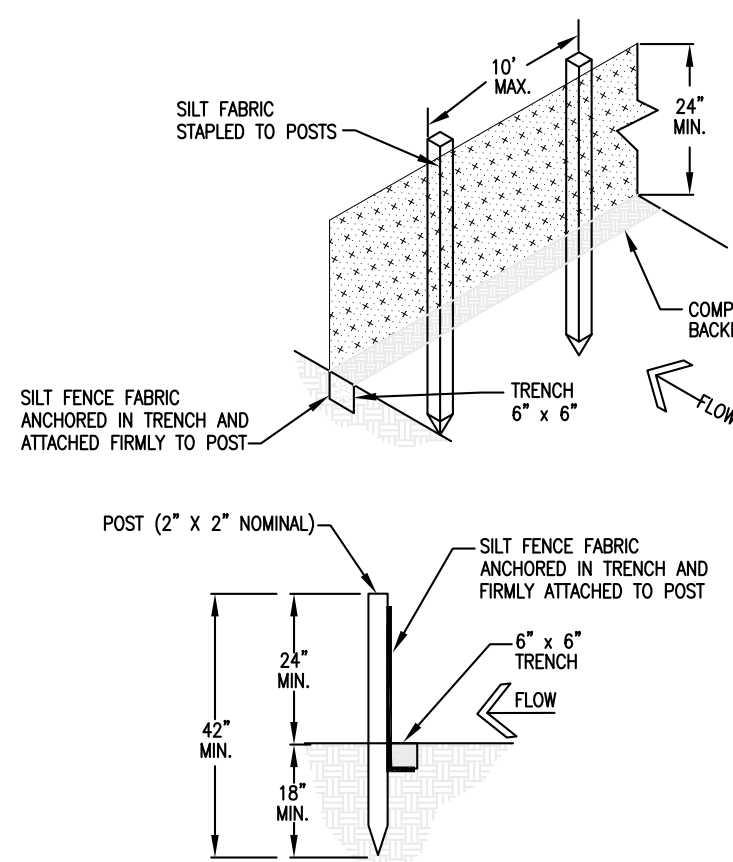
INSTALLATION REQUIREMENTS

1. STRAW BALE BARRIERS SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
2. BALES SHALL CONSIST OF APPROXIMATELY 5 CUBIC FEET OF CERTIFIED WEED FREE FREE WOOD OR STRAW AND WEIGH NOT LESS THAN 35 POUNDS.
3. BALES ARE TO BE PLACED IN A SINGLE ROW WITH THE END OF THE BALES TIGHTLY ABUTTING ONE ANOTHER.
4. EACH BALE IS TO BE SECURELY ANCHORED WITH AT LEAST TWO STAKES AND THE FIRST STAKE IS TO BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE TO FORCE THE BALES TOGETHER.
5. STAKES ARE TO BE A MINIMUM OF 42 INCHES LONG. METAL STAKES SHALL BE STANDARD "T" OR "U" TYPE WITH MINIMUM WEIGHT OF 1.33 POUNDS PER LINEAR FOOT. WOOD STAKES SHALL HAVE A MINIMUM DIAMETER OR CROSS SECTION DIMENSION OF 2 INCHES.
6. BALES ARE TO BE BOUND WITH EITHER WIRE OR STRING AND ORIENTED SUCH THAT THE BINDINGS ARE AROUND THE SIDES AND NOT ALONG THE TOPS AND BOTTOMS OF THE BALE.
7. GAPS BETWEEN BALES ARE TO BE CHINKED (FILLED BY WEDGING) WITH STRAW OR THE SAME MATERIAL OF THE BALE.
8. END BALES ARE TO EXTEND UPSLOPE SO THE TRAPPED RUNOFF CANNOT FLOW AROUND THE ENDS OF THE BARRIER.

MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT STRAW BALE BARRIERS IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL.
2. DAMAGED OR INEFFECTIVE BARRIERS SHALL PROMPTLY BE REPAIRED, REPLACING BALES IF NECESSARY, AND UNTRENCHED BALES NEED TO BE REPAIRED WITH COMPACTED BACKFILL MATERIAL.
3. SEDIMENT SHALL BE REMOVED FROM BEHIND STRAW BALE BARRIERS WHEN IT ACCUMULATES TO APPROXIMATELY 1/2 THE HEIGHT OF THE BARRIER.
4. STRAW BALE BARRIERS SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED AS APPROVED BY THE COUNTY.

STRAW BALE BARRIER (SBB)
NTS



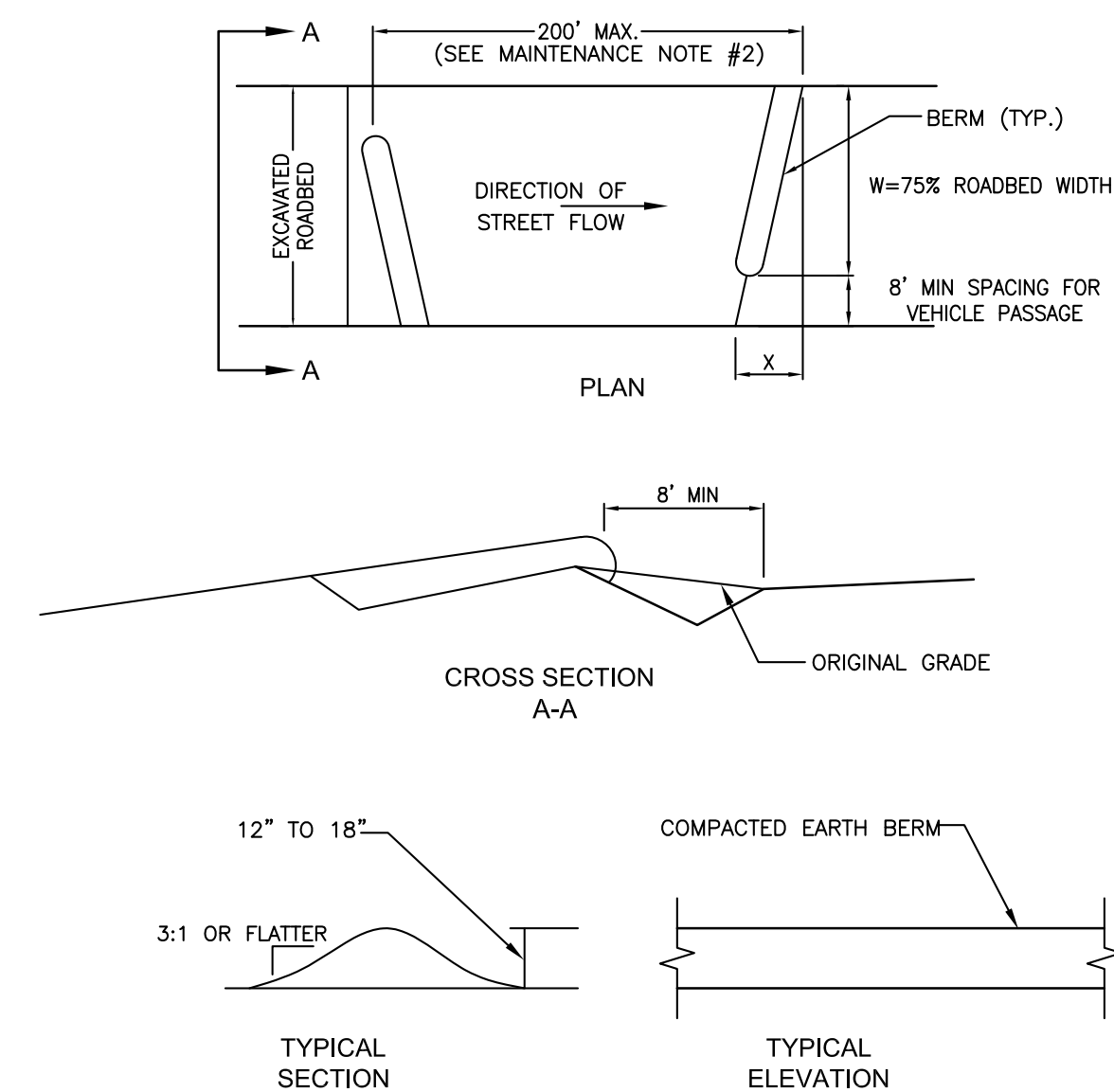
SILT FENCE DETAIL (SF)
NTS

INSTALLATION REQUIREMENTS

1. SILT FENCES SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES AT THE LOCATIONS SHOWN ON THE GRADING AND EROSION CONTROL PLAN (GEC).
2. WHEN JOINTS ARE NECESSARY, SILT FENCE GEOTEXTILE SHALL BE SPLICED TOGETHER ONLY AT SUPPORT POST AND SECURELY SEALED.
3. METAL POSTS SHALL BE "STUDDED TEE" OR "U" TYPE WITH MINIMUM WEIGHT OF 1.33 POUNDS PER LINEAR FOOT. WOOD POSTS SHALL HAVE A MINIMUM DIAMETER OR CROSS SECTION DIMENSION OF 2 INCHES.
4. THE FILTER MATERIAL SHALL BE FASTENED SECURELY TO METAL OR WOOD POSTS USING WIRE TIES, OR TO WOOD POSTS WITH 3/4" LONG #9 HEAVY-DUTY STAPLES. THE SILT FENCE GEOTEXTILE SHALL NOT BE STAPLED TO EXISTING TREES.
5. WHILE NOT REQUIRED, WIRE MESH FENCE MAY BE USED TO SUPPORT THE GEOTEXTILE. WIRE FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 3/4" LONG. THE WIRES OR HOG RINGS, THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 6" AND SHALL NOT EXTEND MORE THAN 3" ABOVE THE ORIGINAL GROUND SURFACE.
6. ALONG THE TOE OF FILLS, INSTALL THE SILT FENCE ALONG A LEVEL CONTOUR AND PROVIDE AN AREA BEHIND THE FENCE FOR RUNOFF TO POND AND SEDIMENT TO SETTLE. A MINIMUM DISTANCE OF 5 FEET FROM THE TOE OF THE FILL IS RECOMMENDED.
7. THE HEIGHT OF THE SILT FENCE FROM THE GROUND SURFACE SHALL BE MINIMUM OF 24 INCHES AND SHALL NOT EXCEED 36 INCHES; HIGHER FENCES MAY IMPOUND VOLUMES OF WATER SUFFICIENT TO CAUSE FAILURE OF THE STRUCTURE.

MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT SILT FENCES IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL.
2. DAMAGED, COLLAPSED, UNTRENCHED OR INEFFECTIVE SILT FENCES SHALL BE PROMPTLY REPAIRED OR REPLACED.
3. SEDIMENT SHALL BE REMOVED FROM BEHIND SILT FENCE WHEN IT ACCUMULATES TO HALF THE EXPOSED GEOTEXTILE HEIGHT.
4. SILT FENCES SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED AS APPROVED BY THE COUNTY.



ROUGH-CUT STREET CONTROL (RCS)
NTS FOR STREET SLOPES > 4%

INSTALLATION REQUIREMENTS:

1. TEMPORARY SOIL BERMS SHALL BE GRADED ALONG BOTH SIDES OF A ROUGH CUT STREET TO DIVERT SEDIMENT-LADEN RUNOFF & SLOW THE VELOCITY OF STORM RUNOFF.
2. ALTERNATE MATERIALS SUCH AS CURB SOCKS OR SILT FENCES MAY BE USED WHERE LARGE FLOWS ARE NOT EXPECTED.
3. REQUIREMENTS FOR AND SPACING OF VELOCITY REDUCERS FOR STREETS WITH GRADES OF LESS THAN 4% SHALL BE AS SHOWN ON THE EROSION CONTROL PLAN.

MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT BERMS AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL.
2. BERMS SHALL BE ROUTINELY CLEARED OF ANY DEBRIS OR ACCUMULATION OF SEDIMENT.
3. ERODED BERMS SHALL IMMEDIATELY BE REPAIRED.
4. TEMPORARY BERMS SHALL REMAIN OPERATIONAL AND PROPERLY MAINTAINED UNTIL THE SITE AREA IS PERMANENTLY STABILIZED WITH ADEQUATE VEGETATIVE COVER AND/OR OTHER PERMANENT STRUCTURE AS APPROVED BY THE COUNTY.

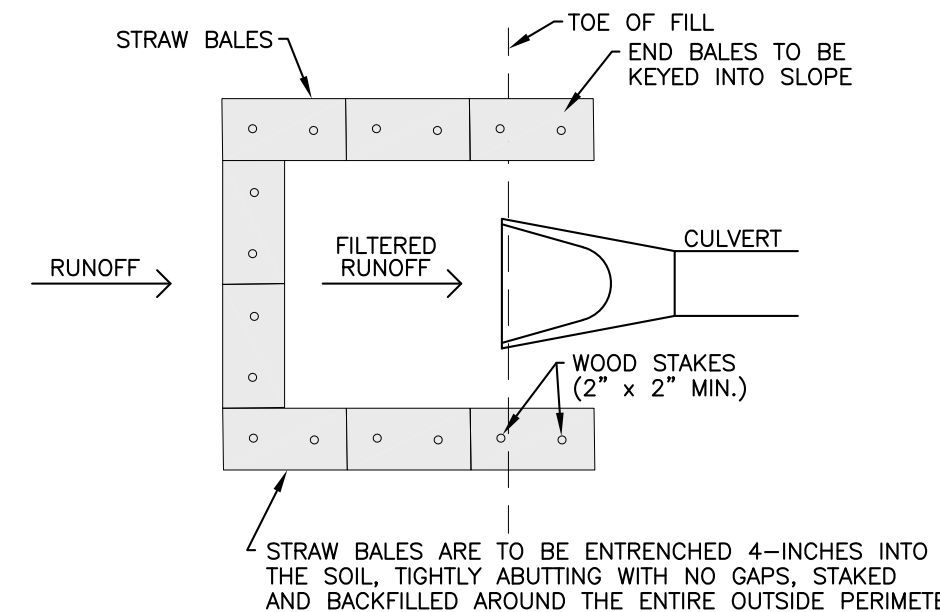
W	X
20' - 30'	5'
31 - 40'	7'
41 - 50'	9'
51' - 60'	10.5'
61' - 70'	12'

DEFINITION

A SEDIMENT FILTER OR AN EXCAVATED IMPOUNDING AREA AROUND A STORM DRAIN CULVERT INLET.

PURPOSES

TO PREVENT SEDIMENT FROM ENTERING STORM DRAINAGE SYSTEMS PRIOR TO PERMANENT STABILIZATION OF THE DISTURBED AREA.



CULVERT INLET PROTECTION (CIP)
NTS

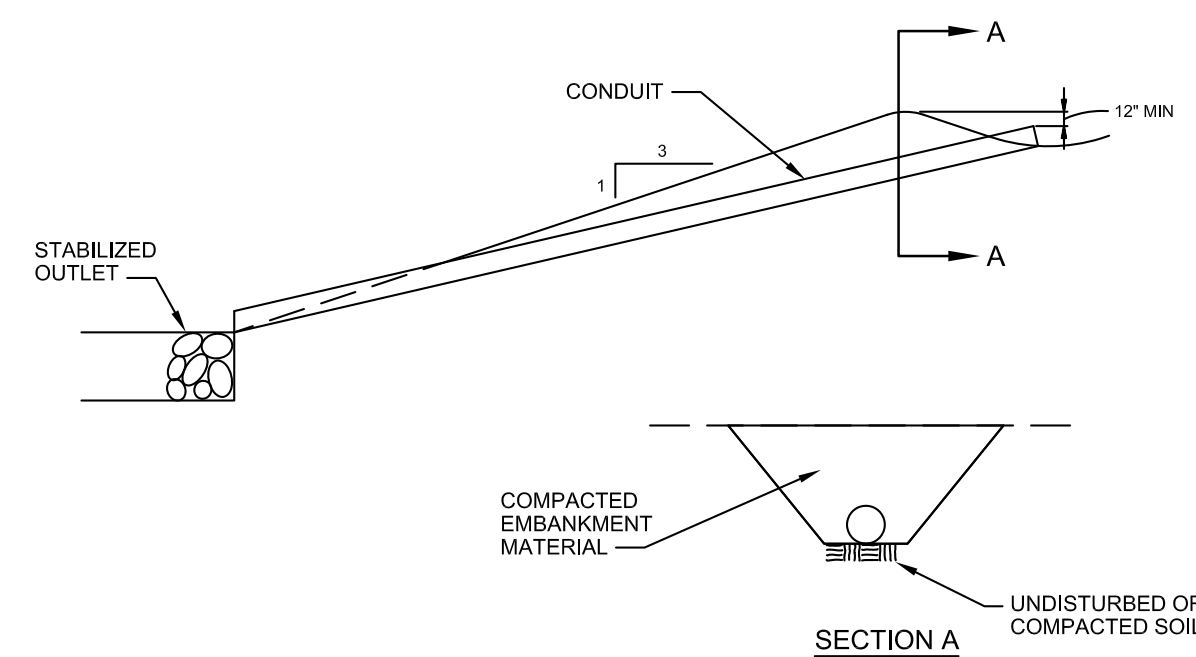
INSTALLATION REQUIREMENTS

1. INLET PROTECTION SHALL BE INSTALLED IMMEDIATELY AFTER CONSTRUCTION OF INLET.
2. BALES ARE TO BE PLACED IN A SINGLE ROW AROUND THE INLET WITH THE END OF THE BALES TIGHTLY ABUTTING ONE ANOTHER.
3. SEE STRAW BALE BARRIER DETAILS AND NOTES FOR INSTALLATION REQUIREMENTS.

MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT STRAW BALE INLET PROTECTION IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL.
2. DAMAGED OR INEFFECTIVE INLET PROTECTION SHALL PROMPTLY BE REPAIRED OR REPLACING BALES IF NECESSARY, AND UNTRENCHED BALES NEED TO BE REPAIRED WITH COMPACTED BACKFILL MATERIAL.
3. SEDIMENT SHALL BE REMOVED FROM BEHIND STRAW BALES WHEN IT ACCUMULATES TO APPROXIMATELY 1/3 THE HEIGHT OF THE BARRIER.
4. INLET PROTECTION SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED WITHIN THE DRAINAGE AREA AS APPROVED BY THE COUNTY.

NOTE:
DETAILS SHOWN MAY NOT BE REQUIRED FOR THIS PROJECT. REFER TO GRADING AND EROSION CONTROL PLAN. ANY CHANGES SHALL BE COORDINATED WITH EL PASO COUNTY ENGINEERING DIVISION INSPECTIONS



TEMPORARY SLOPE DRAIN (TSD)
NTS

INSTALLATION REQUIREMENTS

1. THE SLOPE DRAIN IS TO BE DESIGNED TO CONVEY THE PEAK RUNOFF FOR THE 2-YEAR STORM.
2. PIPE MATERIAL MAY INCLUDE CORRUGATED METAL, OR RIGID OR FLEXIBLE PLASTIC.
3. EMBANKMENT MATERIAL SHALL CONSIST OF SOIL WITH A MINIMUM OF 15% PASSING A #200 SIEVE. EXCAVATED SOIL CAN BE USED IF IT MEETS THIS REQUIREMENT.
4. EMBANKMENT IS TO BE COMPACTED TO AT LEAST 90% OF MAXIMUM DENSITY AND WITHIN 2% OF OPTIMUM MOISTURE CONTENT ACCORDING TO ASTM D 698.
5. SLOPE DRAIN SECTIONS ARE TO BE SECURELY FASTENED TOGETHER AND HAVE WATERTIGHT FITTINGS.
6. THE OUTLET IS TO BE STABILIZED AND, UNLESS THE DRAIN DISCHARGES DIRECTLY TO A SEDIMENT BASIN, A TEMPORARY SURFACE IS TO BE PROVIDED TO CONVEY FLOWS DOWNSTREAM.
7. IMMEDIATELY STABILIZE ALL AREAS DISTURBED BY INSTALLATION OR REMOVAL OF THE PIPE SLOPE DRAIN.

MAINTENANCE REQUIREMENTS

1. INLET AND OUTLET POINTS ARE TO BE CHECKED REGULARLY, AND AFTER HEAVY STORMS FOR CLOGGING AND OVERCHARGING. ANY BREAKS IN THE PIPE ARE TO BE PROMPTLY REPAIRED, AND CLOGS REMOVED AS NEEDED.
2. WATER IS NOT TO BYPASS OR UNDERCUT THE INLET OR PIPE. IF THESE PROBLEMS DO EXIST, THE HEADWALL NEEDS TO BE REINFORCED WITH COMPACT EARTH OR SANDBAGS.
3. THE OUTLET POINT IS TO BE FREE OF EROSION, AND, IF NECESSARY, ADDITIONAL OUTLET PROTECTION SHOULD BE INSTALLED.
4. CONSTRUCTION TRAFFIC IS NOT TO CROSS THE SLOPE DRAIN AND MATERIALS ARE NOT TO BE PLACED ON IT.
5. THE SLOPE DRAIN IS TO REMAIN IN PLACE UNTIL THE SLOPE HAS BEEN COMPLETELY STABILIZED OR UP TO 30 DAYS AFTER PERMANENT SLOPE STABILIZATION.

EROSION CONTROL BLANKET INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
 - LOCATION OF ECB.
 - TYPE OF ECB (STRAW, STRAW-COCOONUT, COCONUT, OR EXCELSIOR).
 - AREA, A, IN SQUARE YARDS OF EACH TYPE OF ECB.
2. 100% NATURAL AND BIODEGRADABLE MATERIALS ARE PREFERRED FOR RECPS, ALTHOUGH SOME JURISDICTIONS MAY ALLOW OTHER MATERIALS IN SOME APPLICATIONS.
3. IN AREAS WHERE ECBs ARE SHOWN ON THE PLANS, THE PERMITTEE SHALL PLACE TOPSOIL AND PERFORM FINAL GRADING, SURFACE PREPARATION, AND SEEDING AND MULCHING. SUBGRADE SHALL BE SMOOTH AND MOIST PRIOR TO ECB INSTALLATION AND THE ECB SHALL BE IN FULL CONTACT WITH SUBGRADE. NO GAPS OR VOIDS SHALL EXIST UNDER THE BLANKET.
4. PERIMETER ANCHOR TRENCH SHALL BE USED ALONG THE OUTSIDE PERIMETER OF ALL BLANKET AREAS.
5. JOINT ANCHOR TRENCH SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER (LONGITUDINALLY AND TRANSVERSELY) FOR ALL ECBs EXCEPT STRAW WHICH MAY USE AN OVERLAPPING JOINT.
6. INTERMEDIATE ANCHOR TRENCH SHALL BE USED AT SPACING OF ONE-HALF ROLL LENGTH FOR COCONUT AND EXCELSIOR ECBs.
7. OVERLAPPING JOINT DETAIL SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER FOR ECBs ON SLOPES.
8. MATERIAL SPECIFICATIONS OF ECBs SHALL CONFORM TO TABLE ECB-1.
9. ANY AREAS OF SEEDING AND MULCHING DISTURBED IN THE PROCESS OF INSTALLING ECBs SHALL BE RESEDED AND MULCHED.
10. DETAILS ON DESIGN PLANS FOR MAJOR DRAINAGEWAY STABILIZATION WILL GOVERN IF DIFFERENT FROM THOSE SHOWN HERE.

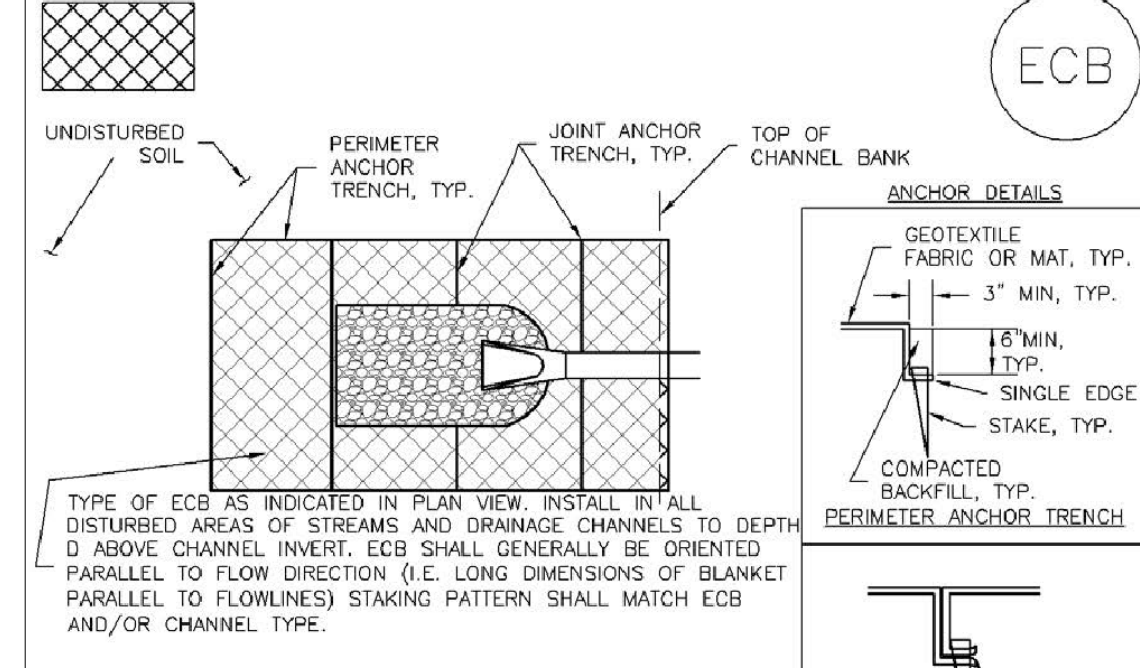
TABLE ECB-1. ECB MATERIAL SPECIFICATIONS

TYPE	COCONUT CONTENT	STRAW CONTENT	EXCELSIOR CONTENT	RECOMMENDED NETTING**
STRAW*	-	100%	-	DOUBLE/NATURAL
STRAW-COCOONUT	30% MIN	70% MAX	-	DOUBLE/NATURAL
COCONUT	100%	-	-	DOUBLE/NATURAL
EXCELSIOR	-	-	100%	DOUBLE/NATURAL

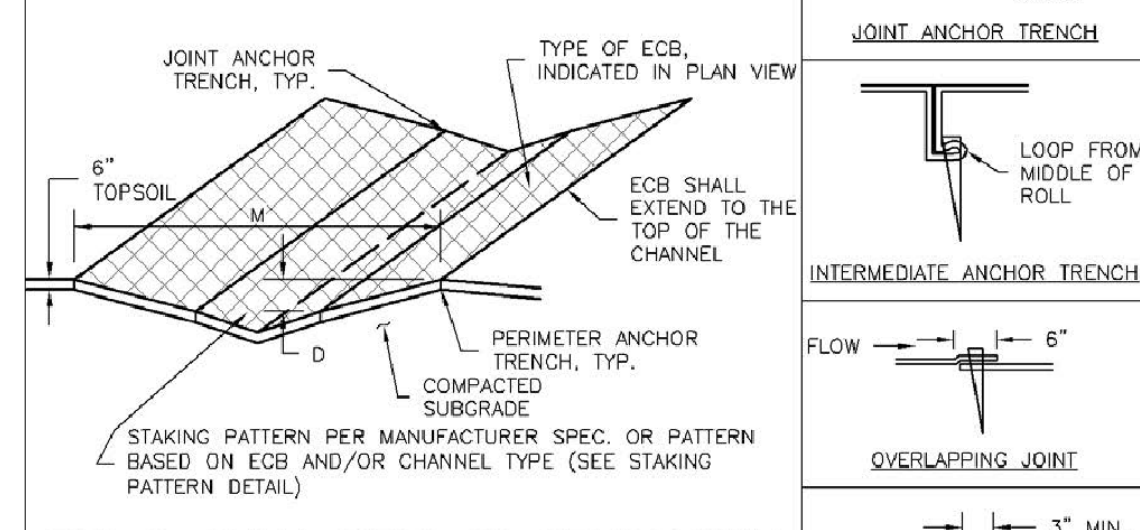
*STRAW ECBs MAY ONLY BE USED OUTSIDE OF STREAMS AND DRAINAGE CHANNELS.
**ALTERNATE NETTING MAY BE ACCEPTABLE IN SOME JURISDICTIONS

EROSION CONTROL BLANKET MAINTENANCE NOTES

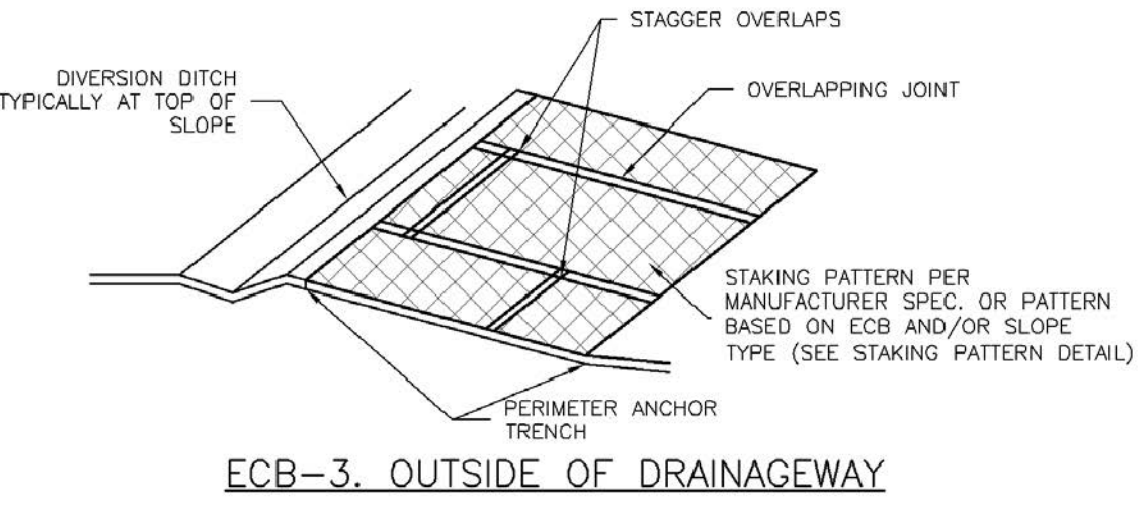
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. ECBs SHALL BE LEFT IN PLACE TO EVENTUALLY BIODEGRADE, UNLESS REQUESTED TO BE REMOVED BY THE LOCAL JURISDICTION.
5. ANY ECB PULLED OUT, TORN, OR OTHERWISE DAMAGED SHALL BE REPAIRED OR REINSTALLED. ANY SUBGRADE AREAS BELOW THE GEOTEXTILE THAT HAVE ERODED TO CREATE A VOID UNDER THE BLANKET OR THAT REMAIN DEVOID OF GRASS SHALL BE REPAIRED, RESEDED AND MULCHED AND THE ECB REINSTALLED.



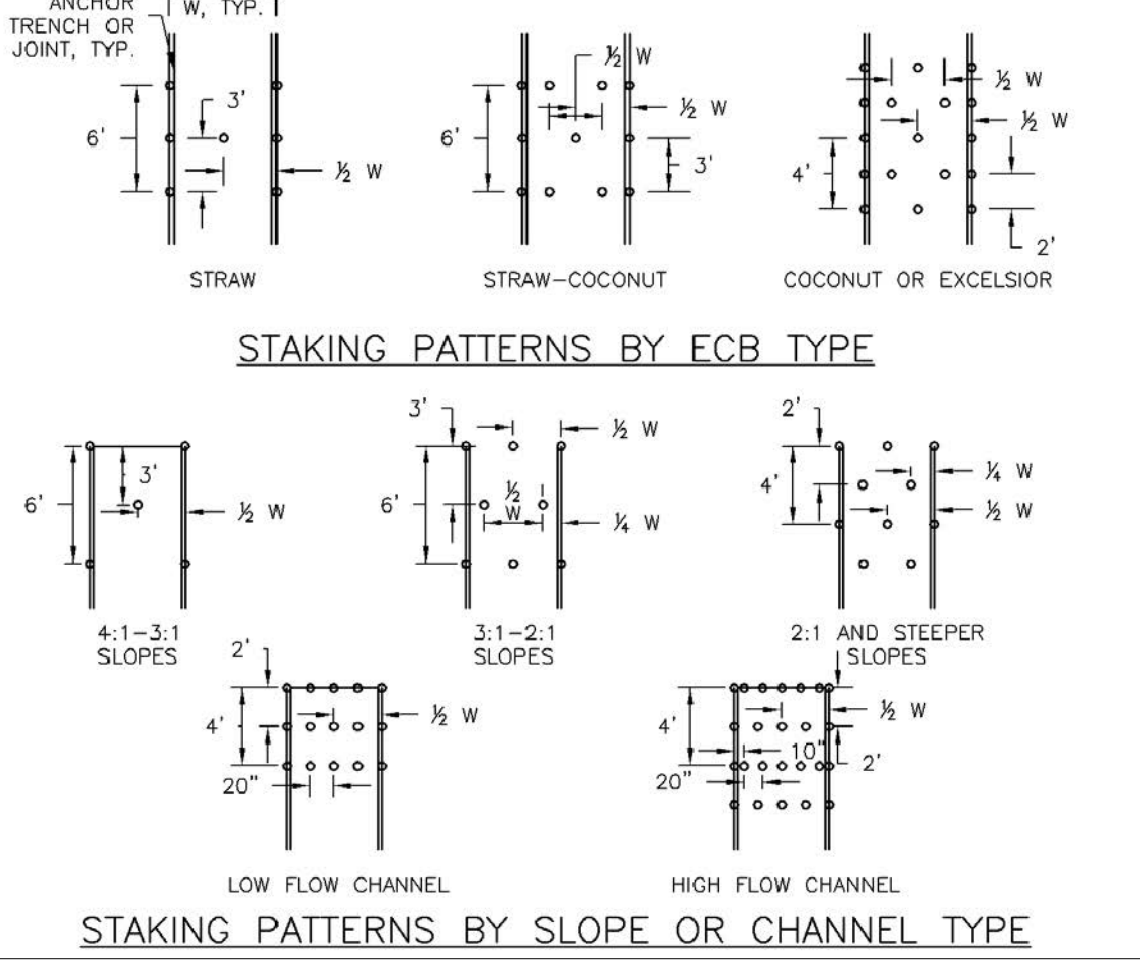
ECB-1. PIPE OUTLET TO DRAINAGEWAY



ECB-2. SMALL DITCH OR DRAINAGEWAY



ECB-3. OUTSIDE OF DRAINAGEWAY



STAKING PATTERNS BY SLOPE OR CHANNEL TYPE

EROSION CONTROL BLANKET (ECB)
NTS

Sediment Basin (SB) SC-7

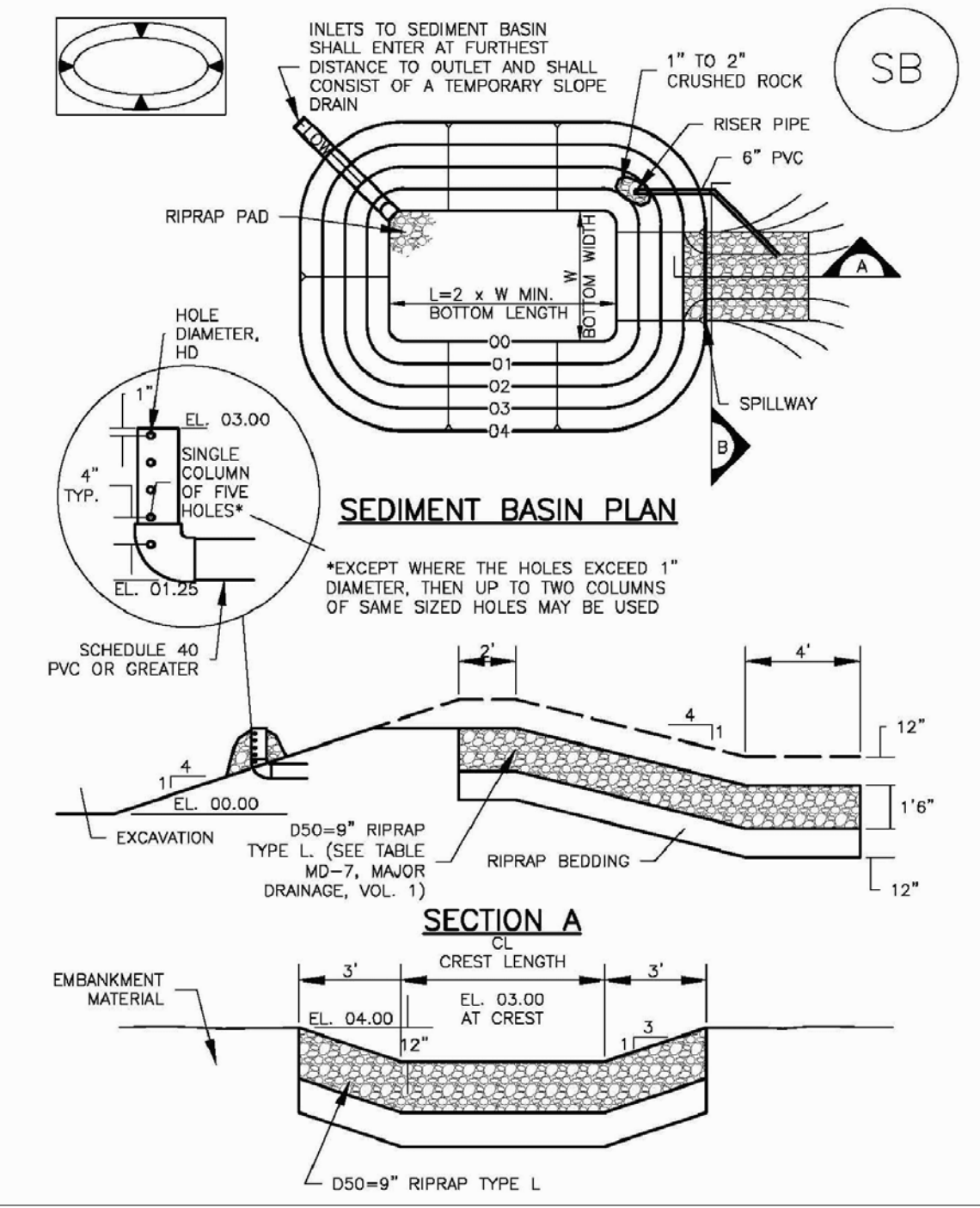


TABLE SB-1. SIZING INFORMATION FOR STANDARD SEDIMENT BASIN

Upstream Drainage Area (rounded to nearest acre), (ac)	Basin Bottom Width (W), (ft)	Spillway Crest Length (CL), (ft)	Hole Diameter (HD), (in)
1	12 1/2	2	3/2
2	28	3	3/4
3	28	5	3/4
4	33 1/2	6	3/4
5	38 1/2	8	3/4
6	43	9	3/4
7	47 1/2	11	3/4
8	51	12	3/4
9	55	13	3/4
10	58 1/2	15	3/4
11	61	16	3/4
12	64	18	1
13	67 1/2	19	1 1/8
14	70 1/2	21	1 1/8
15	73 1/2	22	1 3/8

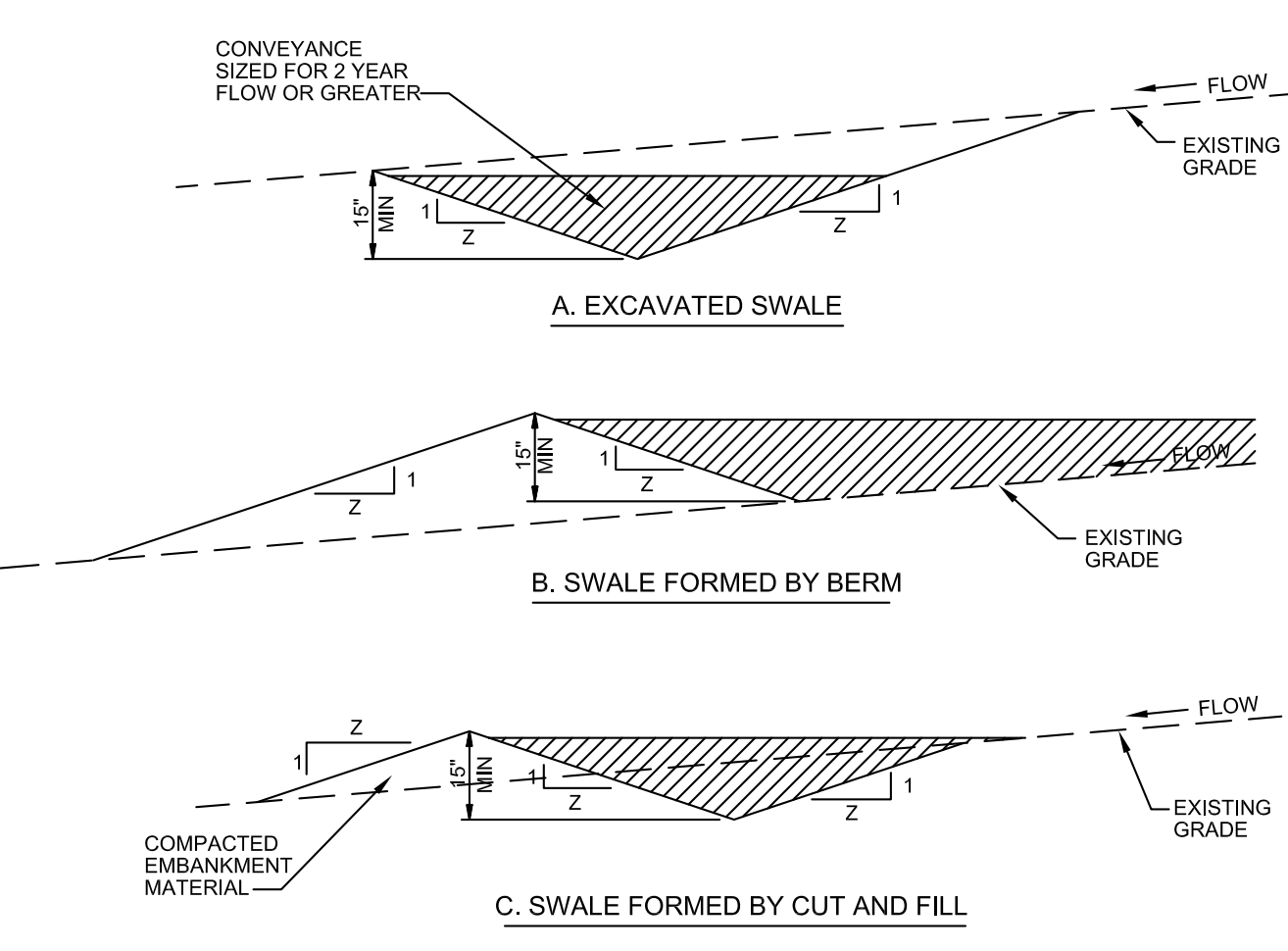
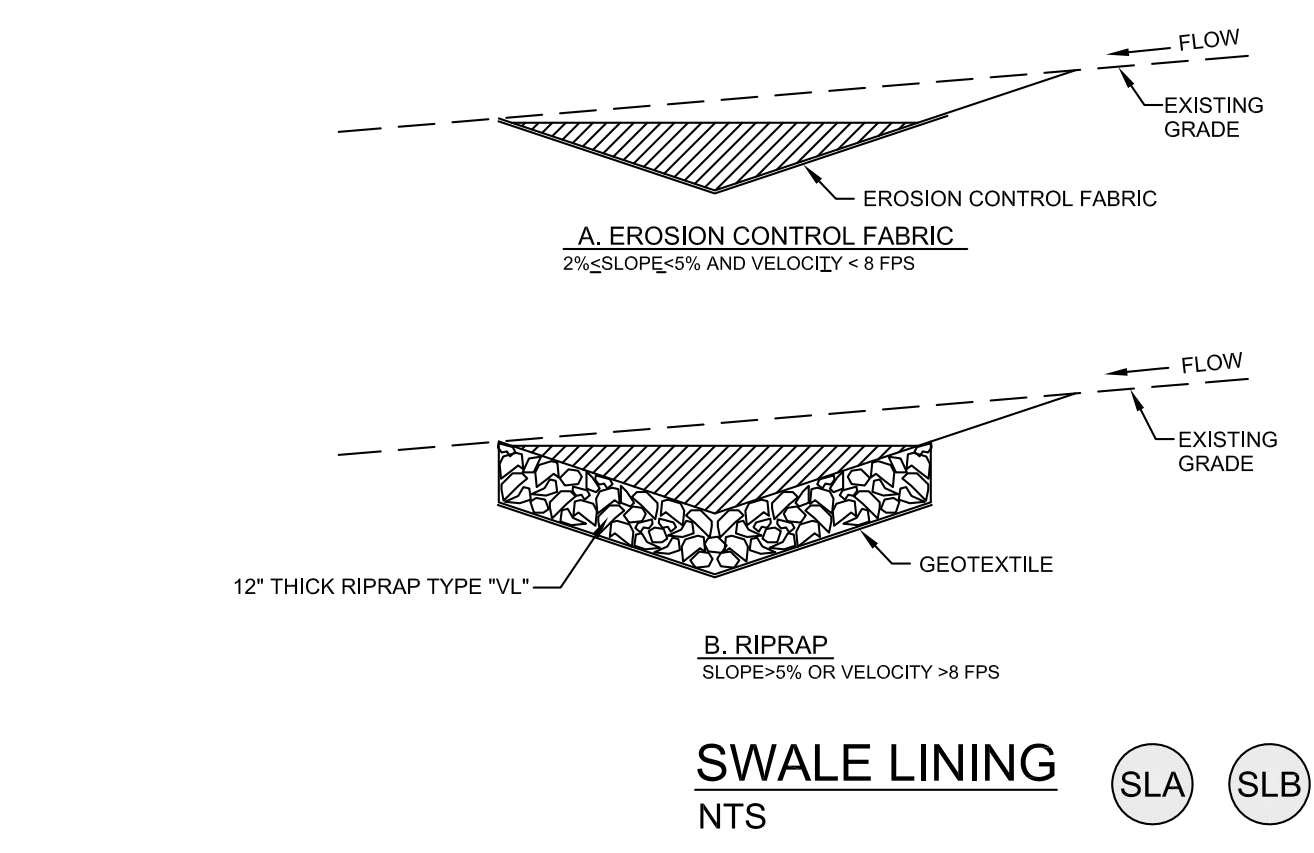
SEDIMENT BASIN INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
 - LOCATION OF SEDIMENT BASIN.
 - TYPE OF BASIN (STANDARD BASIN OR NONSTANDARD BASIN).
 - FOR STANDARD BASIN, BOTTOM WIDTH W, CREST LENGTH CL, AND HOLE DIAMETER, HD.
 - FOR NONSTANDARD BASIN, SEE CONSTRUCTION DRAWINGS FOR DESIGN OF BASIN INCLUDING RISER HEIGHT H, NUMBER OF COLUMNS N, HOLE DIAMETER HD AND PIPE DIAMETER D.
2. FOR STANDARD BASIN, BOTTOM DIMENSION MAY BE MODIFIED AS LONG AS BOTTOM AREA IS NOT REDUCED.
3. SEDIMENT BASINS SHALL BE INSTALLED PRIOR TO ANY OTHER LAND-DISTURBING ACTIVITY THAT RELIES ON ON BASINS AS A STORMWATER CONTROL.
4. EMBANKMENT MATERIAL SHALL CONSIST OF SOIL FREE OF DEBRIS, ORGANIC MATERIAL, AND ROCKS OR CONCRETE GREATER THAN 3 INCHES AND SHALL HAVE A MINIMUM OF 15 PERCENT BY WEIGHT PASSING THE NO. 200 SIEVE.
5. EMBANKMENT MATERIAL SHALL BE COMPACTED TO AT LEAST 95 PERCENT OF MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D698.
6. PIPE SCH 40 OR GREATER SHALL BE USED.
7. THE DETAILS SHOWN ON THESE SHEETS PERTAIN TO STANDARD SEDIMENT BASIN(S) FOR DRAINAGE AREAS LESS THAN 15 ACRES. SEE CONSTRUCTION DRAWINGS FOR EMBANKMENT, STORAGE VOLUME, SPILLWAY, OUTLET, AND OUTLET PROTECTION DETAILS FOR ANY SEDIMENT BASIN(S) THAT HAVE BEEN INDIVIDUALLY DESIGNED FOR DRAINAGE AREAS LARGER THAN 15 ACRES.

SEDIMENT BASIN MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. SEDIMENT ACCUMULATED IN BASIN SHALL BE REMOVED AS NEEDED TO MAINTAIN BMP EFFECTIVENESS. TYPICALLY WHEN SEDIMENT DEPTH REACHES ONE FOOT (I.E., TWO FEET BELOW THE SPILLWAY CREST).
5. SEDIMENT BASINS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND GRASS COVER IS ACCEPTED BY THE LOCAL JURISDICTION.
6. WHEN SEDIMENT BASINS ARE REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

TEMPORARY SEDIMENT BASIN (TSB)
NTS



TEMPORARY SWALE (TS)
NTS

NOTE:
DETAILS SHOWN MAY NOT BE REQUIRED FOR THIS PROJECT.
REFER TO GRADING AND EROSION CONTROL PLAN. ANY CHANGES SHALL BE COORDINATED WITH EL PASO COUNTY ENGINEERING DIVISION INSPECTIONS

Project No.: 15073
Date: February 21, 2020
Design: NRK, MTR
Drawn: CAD
Check: CJC
Revisions:

INSTALLATION REQUIREMENTS

- SEE GEC FOR:
 - LOCATION OF DIVERSION DITCH.
 - TYPE OF DITCH (UNLINED, ECB LINED, PLASTIC LINED OR RIPRAP LINED).
 - LENGTH OF EACH TYPE OF DITCH.
 - DEPTH, "D", AND WIDTH, "W", DIMENSIONS.
 - FOR ECB LINED DITCH, EROSION CONTROL BLANKET TYPE (SEE ECB DETAIL).
 - FOR RIPRAP LINED DITCH, SIZE OF RIPRAP, "D₅₀".
- SEE DRAINAGE PLANS FOR DETAILS OF ANY PERMANENT CONVEYANCE FACILITIES OR DIVERSION DITCHES EXCEEDING A 2-YEAR FLOW RATE OF 10 CFS.
- DIVERSION DITCHES INDICATED ON INITIAL SWMP PLAN SHALL BE INSTALLED PRIOR TO ANY LAND-DISTURBING ACTIVITIES.
- FOR ECB LINED DITCHES, INSTALLATION OF EROSION CONTROL BLANKET SHALL CONFORM TO THE REQUIREMENTS OF THE ECB DETAIL.
- IN LOCATIONS WHERE CONSTRUCTION TRAFFIC MUST CROSS A DIVERSION DITCH, THE PERMITTEES SHALL INSTALL A TEMPORARY CULVERT WITH A MINIMUM DIAMETER OF 12-INCHES.

MAINTENANCE REQUIREMENTS

- THE SWMP MANAGER SHALL INSPECT DIVERSION DITCHES WEEKLY AND DURING AND AFTER ANY STORM, MAKE REPAIRS AS NECESSARY.
- DIVERSION DITCHES ARE TO REMAIN IN PLACE UNTIL THE END OF CONSTRUCTION, OR IF APPROVED BY LOCAL JURISDICTION MAY BE LEFT IN PLACE.
- IF DIVERSION DITCHES ARE REMOVED, DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, DRILL, SEEDED, HAY CRIMPED MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.

INSTALLATION REQUIREMENTS

- ALL ENTRANCES TO THE CONSTRUCTION SITE ARE TO BE STABILIZED PRIOR TO CONSTRUCTION BEGINNING.
- CONSTRUCTION ENTRANCES ARE TO BE BUILT WITH AN APRON TO ALLOW FOR TURNING TRAFFIC, BUT SHOULD NOT BE BUILT OVER EXISTING PAVEMENT EXCEPT FOR A SLIGHT OVERLAP.
- AREAS TO BE STABILIZED ARE TO BE PROPERLY GRADED AND COMPACTED PRIOR TO LAYING DOWN GEOTEXTILE AND STONE.
- CONSTRUCTION ROADS, PARKING AREAS, LOADING/UNLOADING ZONES, STORAGE AREAS, AND STAGING AREAS ARE TO BE STABILIZED.
- CONSTRUCTION ROADS ARE TO BE BUILT TO CONFORM TO SITE GRADES, BUT SHOULD NOT HAVE SIDE SLOPES OR ROAD GRADES THAT ARE EXCESSIVELY STEEP.

MAINTENANCE REQUIREMENTS

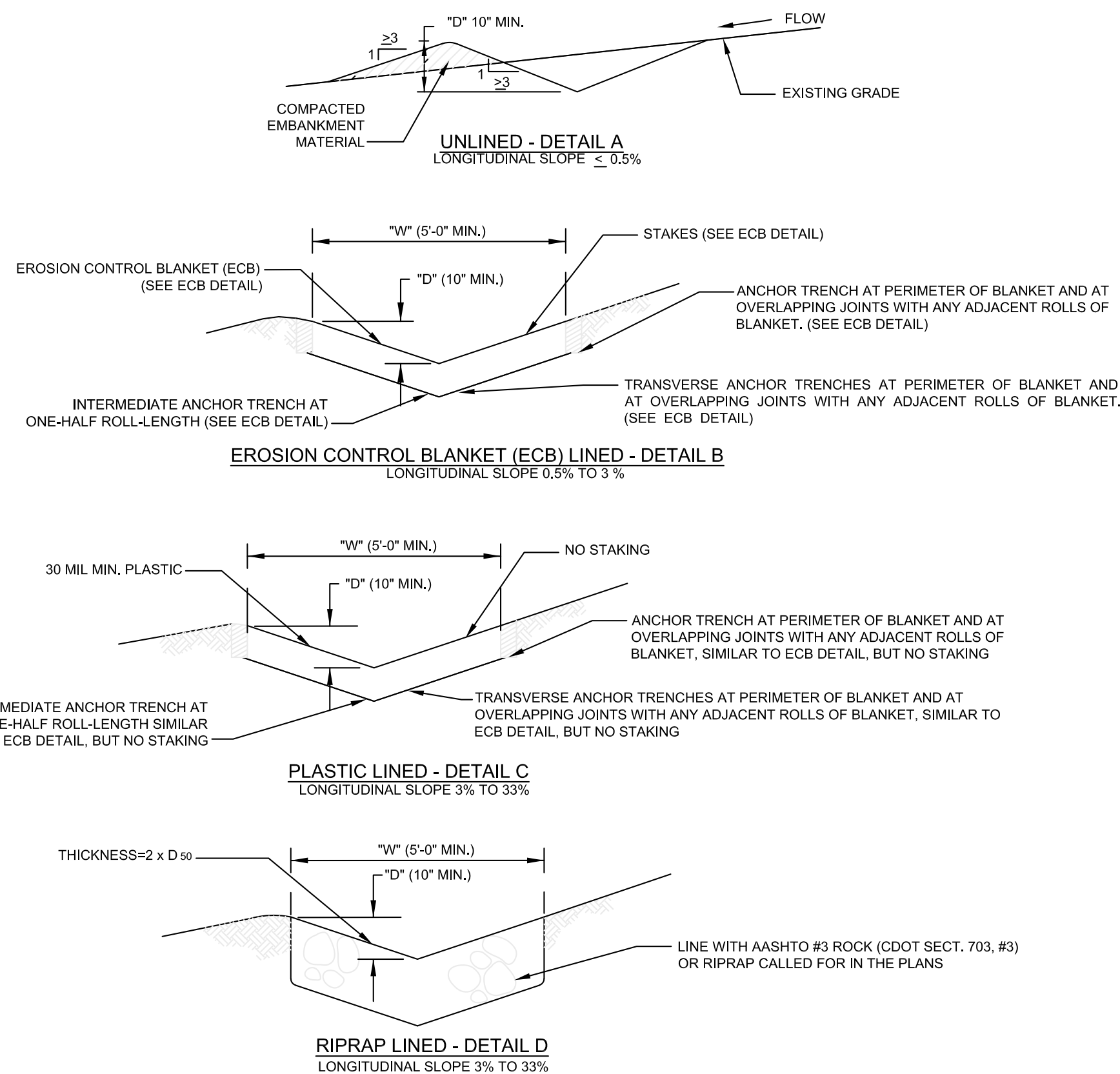
- REGULAR INSPECTIONS ARE TO BE MADE OF ALL STABILIZED AREAS, ESPECIALLY AFTER STORM EVENTS.
- STONES ARE TO BE REAPPLIED PERIODICALLY AND WHEN REPAIR IS NECESSARY.
- SEDIMENT TRACKED ONTO PAVED ROADS IS TO BE REMOVED DAILY BY SHOVELING OR SWEEPING. SEDIMENT IS NOT TO BE WASHED DOWN STORM SEWER DRAINS.
- STORM SEWER INLET PROTECTION IS TO BE IN PLACE, INSPECTED, AND CLEANED IF NECESSARY.
- OTHER ASSOCIATED SEDIMENT CONTROL MEASURES ARE TO BE INSPECTED TO ENSURE GOOD WORKING CONDITION.

INSTALLATION REQUIREMENTS

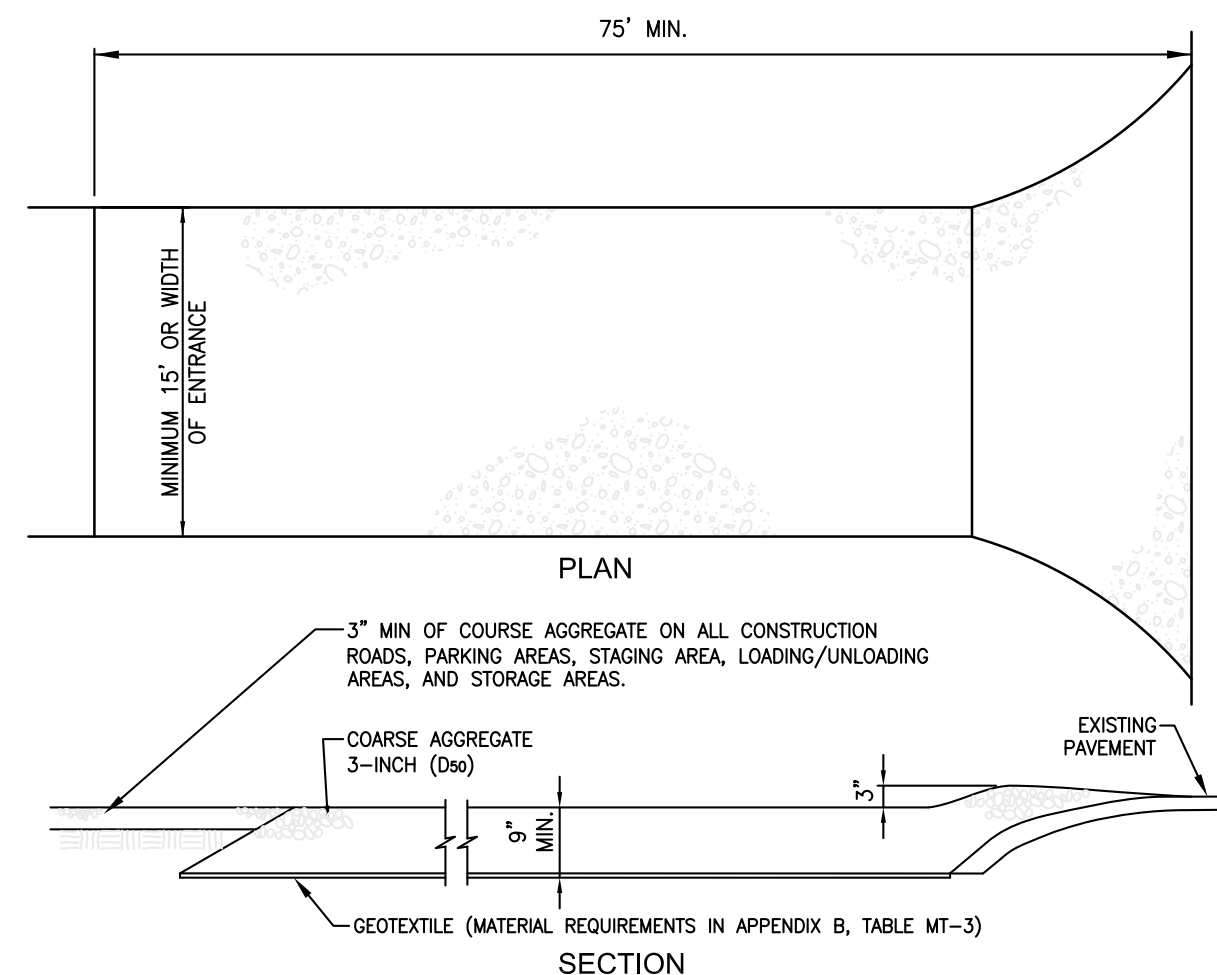
- SEE GEC FOR:
 - LOCATION, LENGTH AND WIDTH OF SEDIMENT TRAP.
 - SEDIMENT TRAPS INDICATED ON INITIAL GESC PLAN SHALL BE INSTALLED PRIOR TO ANY LAND-DISTURBING ACTIVITIES.
 - SEDIMENT TRAP BERM SHALL BE CONSTRUCTED FROM MATERIAL FROM EXCAVATION, THE BERM SHALL BE COMPACTED TO 95% OF THE MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D998.
 - RIPRAP OUTLET SHALL BE CONSTRUCTED WITH D₅₀=12" RIPRAP WITH A MINIMUM OVERFLOW OF 6".
 - THE TOP OF THE EARTHEN BERM SHALL BE A MINIMUM OF 6" HIGHER THAN THE TOP OF THE RIPRAP OUTLET STRUCTURE.
 - THE ENDS OF THE RIPRAP OUTLET STRUCTURE SHALL BE A MINIMUM OF 6" HIGHER THAN THE CENTER OF THE OUTLET STRUCTURE.

MAINTENANCE REQUIREMENTS

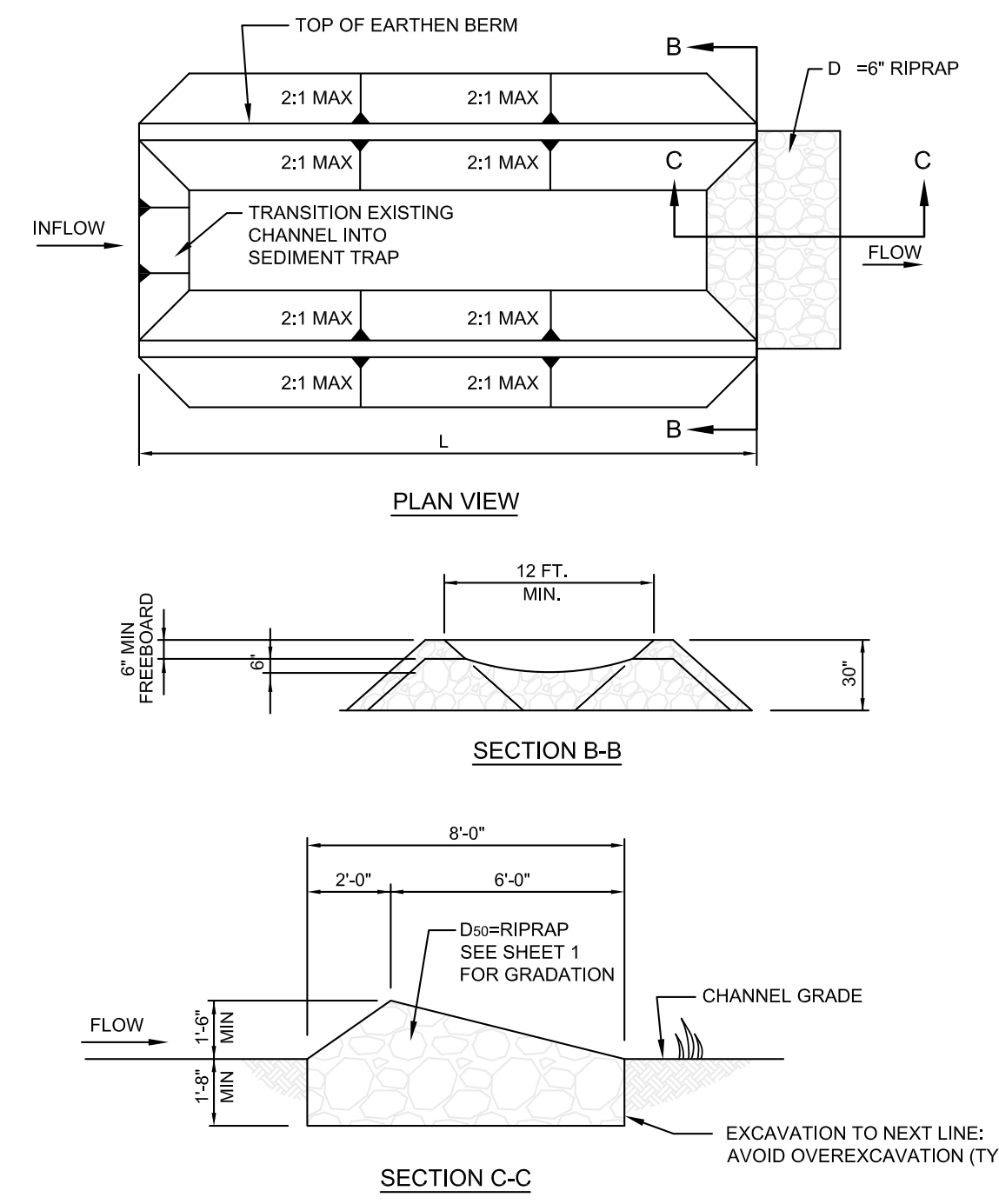
- THE GESC MANAGER SHALL INSPECT THE SEDIMENT TRAPS WEEKLY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT UPSTREAM SEDIMENT AS NECESSARY.
- SEDIMENT ACCUMULATED UPSTREAM OF RIPRAP SHALL BE REMOVED WHEN THE UPSTREAM SEDIMENT DEPTH IS WITHIN HALF THE HEIGHT OF THE RIPRAP OUTLET STRUCTURE.
- SEDIMENT TRAPS SHALL REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND GRASS COVERAGE IS APPROVED BY THE COUNTY.
- WHEN SEDIMENT TRAPS ARE REMOVED THE DISTURBED AREA SHALL BE DRILLED, SEEDED AND CRIMP MULCHED OR STABILIZED IN A MANNER APPROVED BY THE COUNTY.



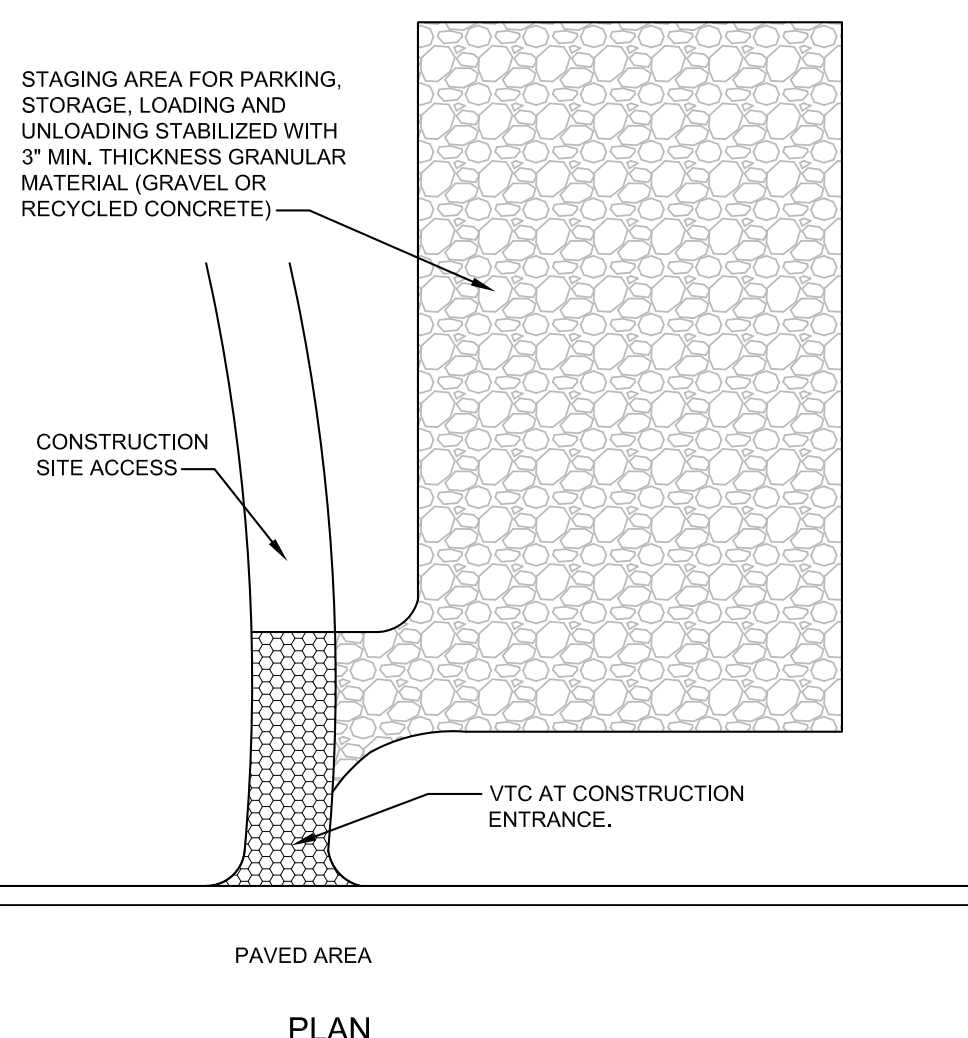
TEMPORARY DIVERSION DIKE
NTS



VEHICLE TRACKING CONTROL
NTS



SEDIMENT TRAP
NTS



STABILIZED STAGING AREA
NTS

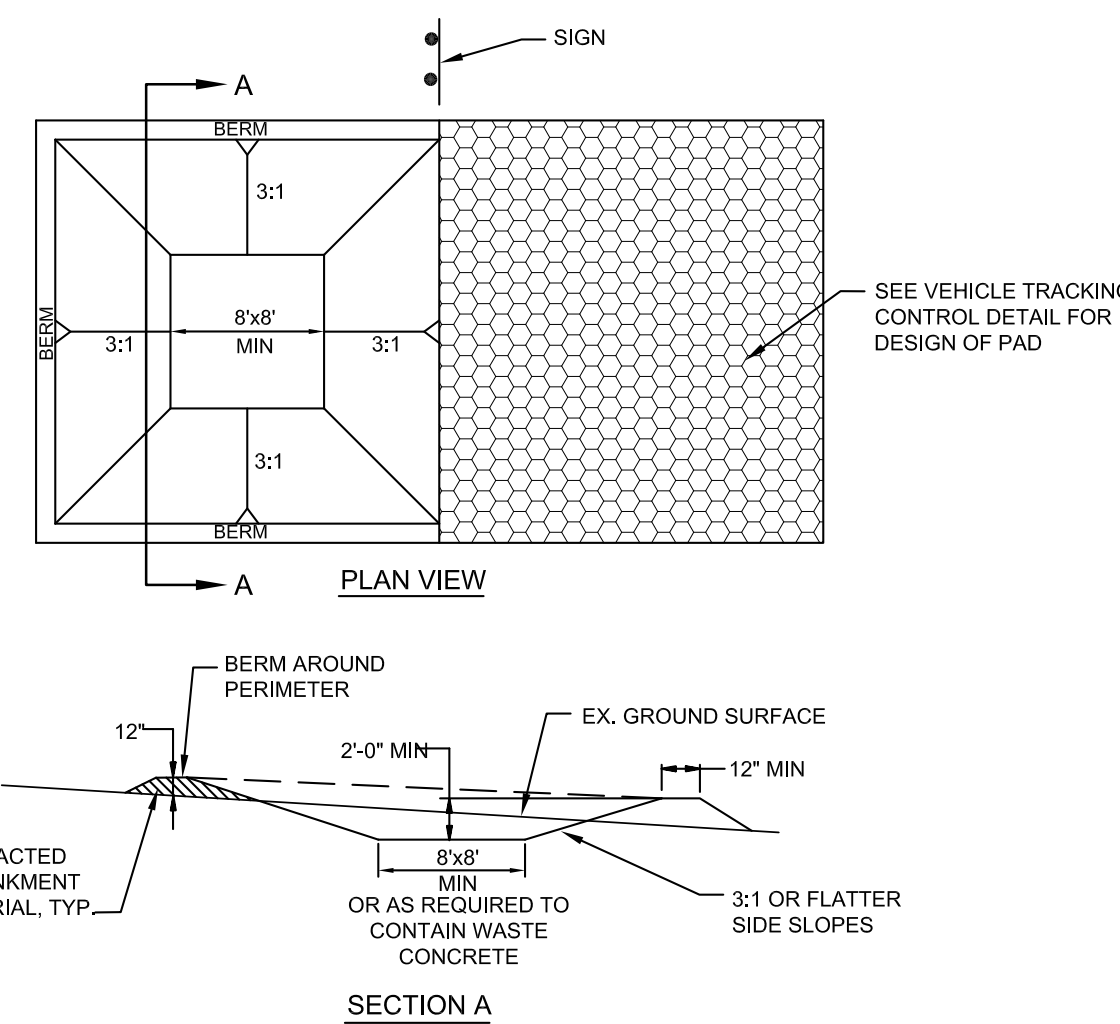


INSTALLATION REQUIREMENTS

- SEE GEC FOR GENERAL LOCATION OF STAGING AREA. CONTRACTOR MAY MODIFY LOCATION AND SIZE OF STABILIZED STAGING AREA WITH COUNTY APPROVAL.
- STABILIZED STAGING AREA SHALL BE LARGE ENOUGH TO FULLY CONTAIN PARKING, STORAGE, AND UNLOADING AND LOADING OPERATIONS.
- IF REQUIRED BY THE COUNTY, SITE ACCESS ROADS SHALL BE STABILIZED IN THE SAME MANNER AS THE STAGING AREA.
- STAGING AREA SHALL BE STABILIZED PRIOR TO ANY OTHER OPERATIONS ON THE SITE.
- THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM OF 3" OF GRANULAR MATERIAL (GRAVEL OR RECYCLED CONCRETE).

MAINTENANCE REQUIREMENTS

- THE GESC MANAGER SHALL INSPECT THE STABILIZED STAGING AREA WEEKLY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT UPSTREAM SEDIMENT AS NECESSARY.
- GESC MANAGER SHALL PROVIDE ADDITIONAL THICKNESS OF GRANULAR MATERIAL IF ANY RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.
- STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING AND LOADING OPERATIONS.
- ANY ACCUMULATED DIRT OR MUD SHALL BE REMOVED FROM THE SURFACE OF THE STABILIZED STAGING AREA.
- THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE COUNTY, USED ON SITE AND THE AREA TOPSOILED, DRILL SEEDED AND CRIMP MULCHED OR OTHERWISE STABILIZED.



CONCRETE WASHOUT AREA
NTS

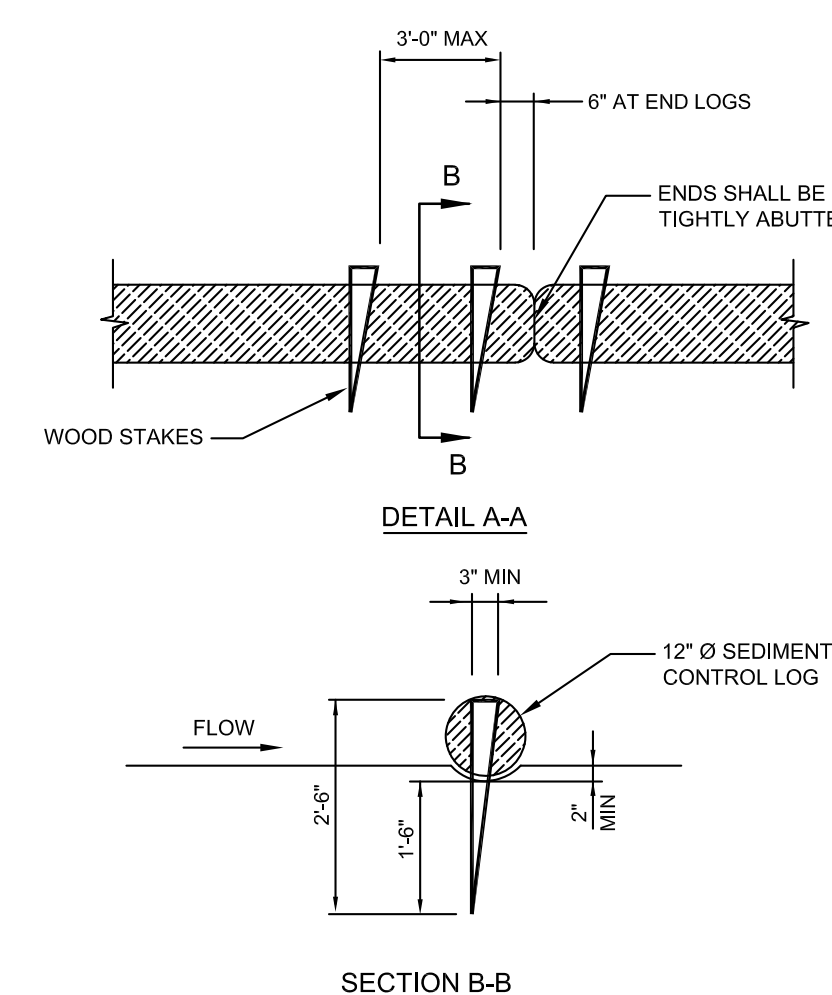


INSTALLATION REQUIREMENTS

- SEE GEC FOR LOCATIONS OF CONCRETE WASHOUT AREA.
- THE CONCRETE WASHOUT AREA SHALL BE INSTALLED PRIOR TO ANY CONCRETE PLACEMENT SITE.
- VEHICLE TRACKING CONTROL IS REQUIRED AT THE ACCESS POINT.
- SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE WASHOUT AREA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CONCRETE WASHOUT AREA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.
- EXCAVATED MATERIAL SHALL BE UTILIZED IN PERIMETER BERM CONSTRUCTION.

MAINTENANCE REQUIREMENTS

- THE CONCRETE WASHOUT AREA SHALL BE REPAIRED AND ENLARGED OR CLEANED OUT AS NECESSARY TO MAINTAIN CAPACITY FOR WASTED CONCRETE.
- AT THE END OF CONSTRUCTION ALL CONCRETE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF AT AN APPROVED WASTE SITE.
- WHEN THE CONCRETE WASHOUT AREA IS REMOVED, COVER THE DISTURBED AREA WITH TOPSOIL, DRILL SEED AND CRIMP MULCH OR OTHERWISE STABILIZE IN A MANNER APPROVED BY THE LOCAL JURISDICTION.
- INSPECT WEEKLY, AND DURING AND AFTER ANY STORM EVENT.



SEDIMENT CONTROL LOG
NTS



INSTALLATION REQUIREMENTS

- SEE GEC FOR:
 - LOCATION, LENGTH AND WIDTH OF SEDIMENT CONTROL LOG.
 - SEDIMENT CONTROL LOGS INDICATED ON INITIAL GESC PLAN SHALL BE INSTALLED PRIOR TO ANY LAND-DISTURBING ACTIVITIES.
 - SEDIMENT CONTROL LOGS SHALL CONSIST OF STRAW, COMPOST, EXCELSIOR, OR COCONUT FIBER.
 - NOT FOR USE IN CONCENTRATED AREAS.
 - THE SEDIMENT CONTROL LOG SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 2".

MAINTENANCE REQUIREMENTS

- THE GESC MANAGER SHALL INSPECT SEDIMENT CONTROL LOGS DAILY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT UPSTREAM SEDIMENT AS NECESSARY.
- SEDIMENT ACCUMULATED UPSTREAM OF SEDIMENT CONTROL LOGS SHALL BE REMOVED WHEN THE UPSTREAM SEDIMENT DEPTH IS WITHIN HALF THE HEIGHT OF THE CREST OF LOG.
- SEDIMENT CONTROL LOGS SHALL BE REMOVED AT THE END OF CONSTRUCTION. IF ANY DISTURBED AREA EXISTS AFTER REMOVAL, IT SHALL BE DRILLED, SEEDED AND CRIMP MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE COUNTY.

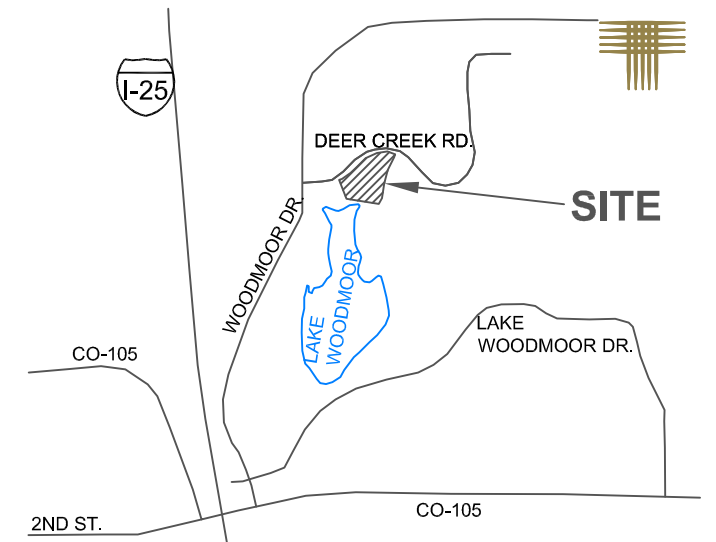
NOTE:
DETAILS SHOWN MAY NOT BE REQUIRED FOR THIS PROJECT. REFER TO GRADING AND EROSION CONTROL PLAN. ANY CHANGES SHALL BE COORDINATED WITH EL PASO COUNTY ENGINEERING DIVISION INSPECTIONS

North Bay at Lake Woodmoor
Stormwater Management Plan
Final Grading and Erosion Control Plan
El Paso County, Colorado

Project No.:	15073
Date:	February 21, 2020
Design:	NRK, MTR
Drawn:	CAD
Check:	CJC
Revisions:	

FIGURE 5

APPENDIX E
Soils Borings and Testing

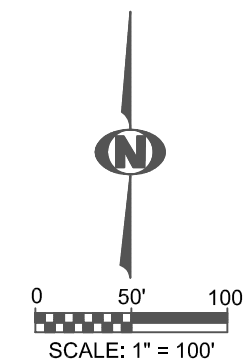


VICINITY MAP

(NOT TO SCALE)

LEGEND:

- TH-1** APPROXIMATE LOCATION OF EXPLORATORY BORING.
- PROJECT BOUNDARY
- EXISTING TOPOGRAPHY
- 7120** EXISTING CONTOUR ELEVATIONS
- LOCATION OF EXISTING 100 YEAR FLOODPLAIN.
- LOCATION OF PROPOSED BUILDING FOOTPRINT.
- LOCATION OF WATER STORAGE EASEMENT.

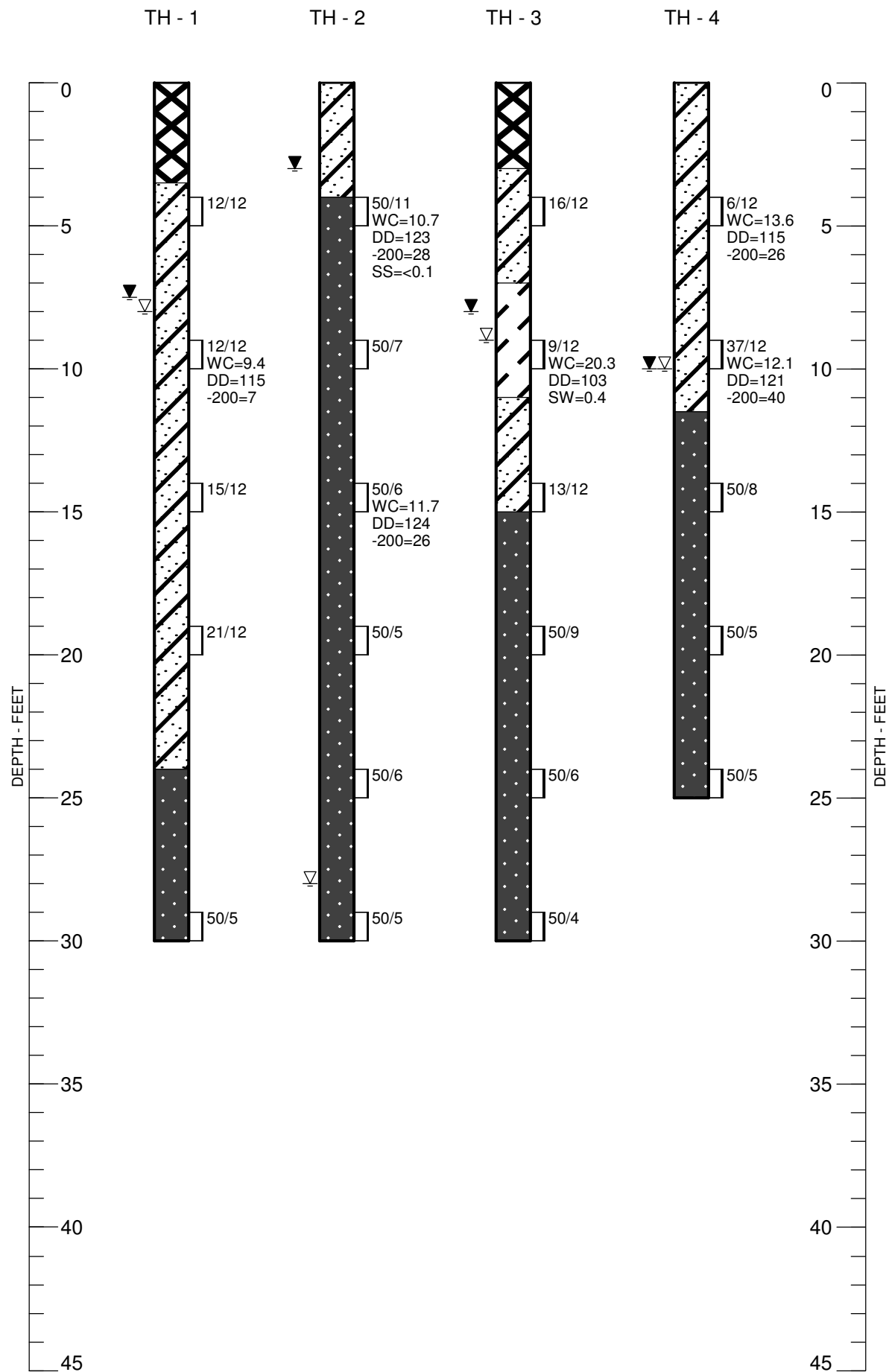


NOTE:
BASE DRAWING WAS PROVIDED BY N.E.S., INC.

**Location of
Exploratory
Borings**










APPENDIX A
SUMMARY LOGS OF EXPLORATORY BORINGS

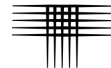


NOTES:

1. THE BORINGS WERE DRILLED MAY 19, 2016 USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT AUGER AND A CME-55, TRUCK-MOUNTED DRILL RIG.
2. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.
3. WC - INDICATES MOISTURE CONTENT. (%)
 DD - INDICATES DRY DENSITY. (PCF)
 SW - INDICATES SWELL WHEN WETTED UNDER ESTIMATED OVERBURDEN PRESSURE. (%)
 -200 - INDICATES PASSING NO. 200 SIEVE. (%)
 SS - INDICATES WATER-SOLUBLE SULFATE CONTENT. (%)

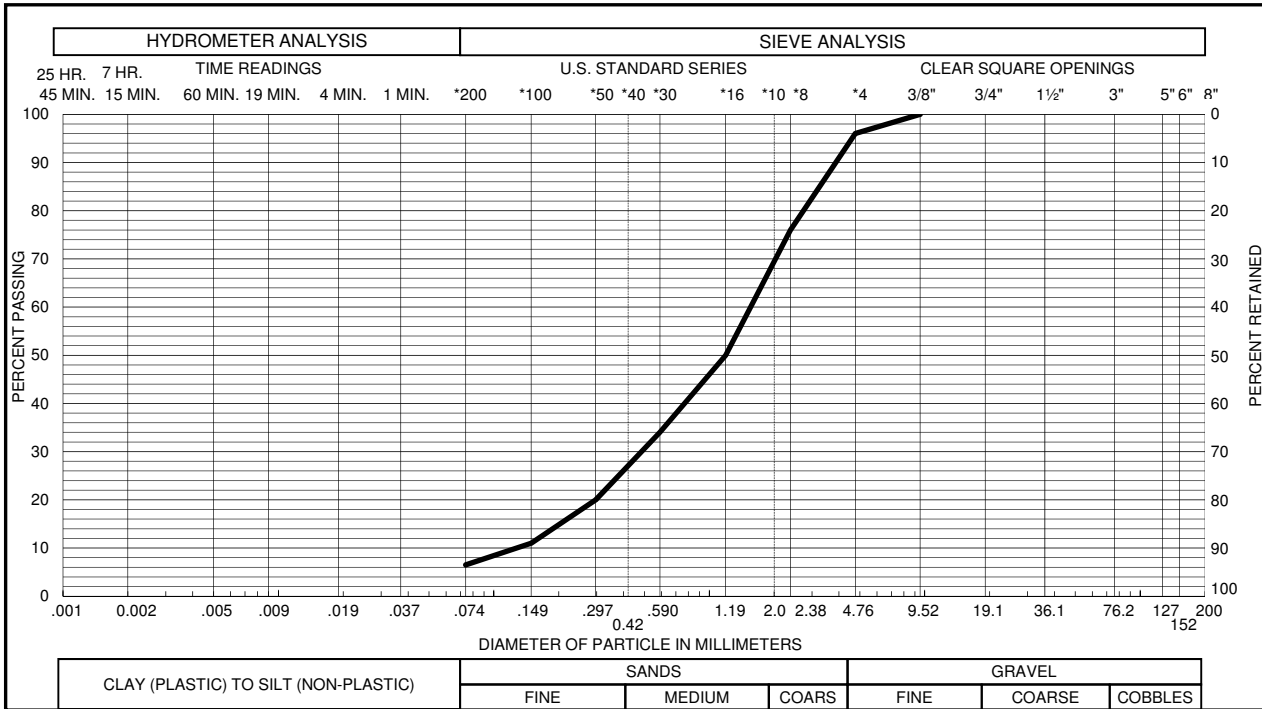
LEGEND:

-  FILL, SAND, CLAYEY, MOIST, DARK BROWN TO BROWN.
-  SAND, SLIGHTLY SILTY TO SILTY TO CLAYEY, LOOSE TO DENSE, MOIST TO WET, PALE BROWN TO RED BROWN, OCCASIONAL CLAY LENSES. (SP-SM, SM)
-  CLAY, SANDY, MEDIUM STIFF, MOIST TO WET, BROWN. (CL)
-  BEDROCK. SANDSTONE, SILTY TO CLAYEY, HARD TO VERY HARD, MOIST, BROWN TO RED BROWN.
-  DRIVE SAMPLE. THE SYMBOL 12/12 INDICATES 12 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.
-  GROUNDWATER LEVEL MEASURED AT TIME OF DRILLING.
-  GROUNDWATER LEVEL MEASURED FIVE DAYS AFTER DRILLING.

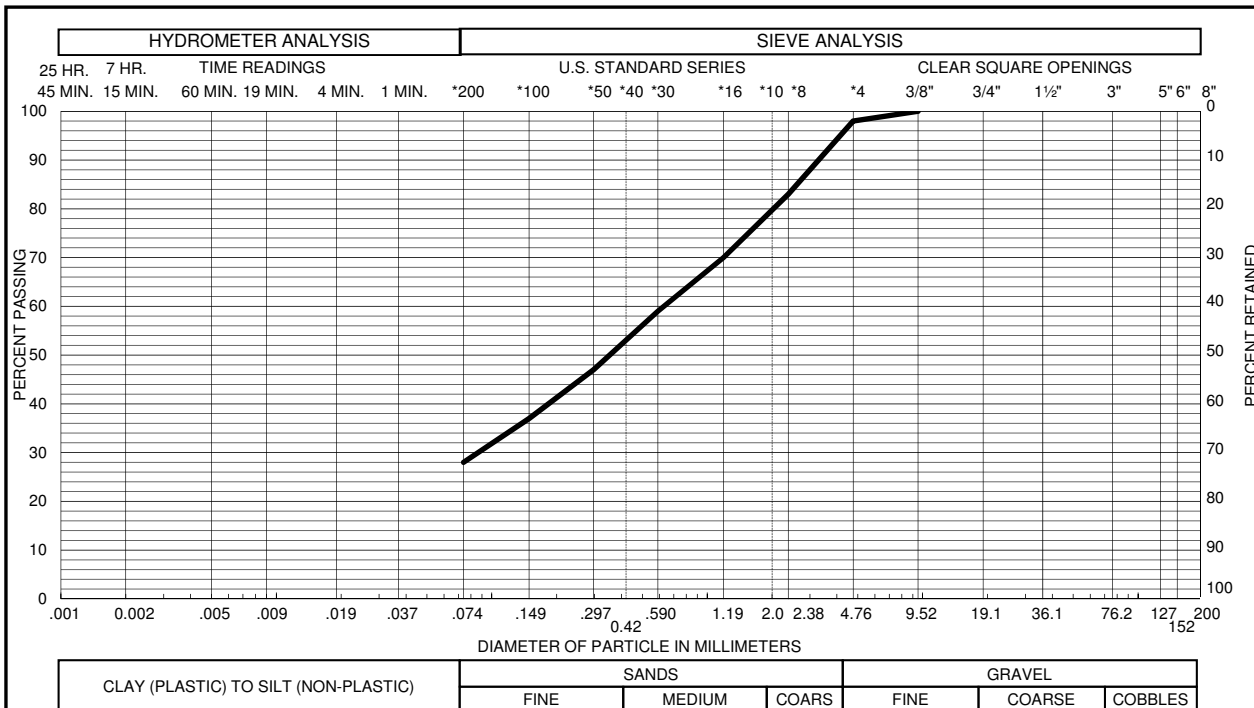


APPENDIX B

LABORATORY TEST RESULTS TABLE B-1: SUMMARY OF LABORATORY TESTING

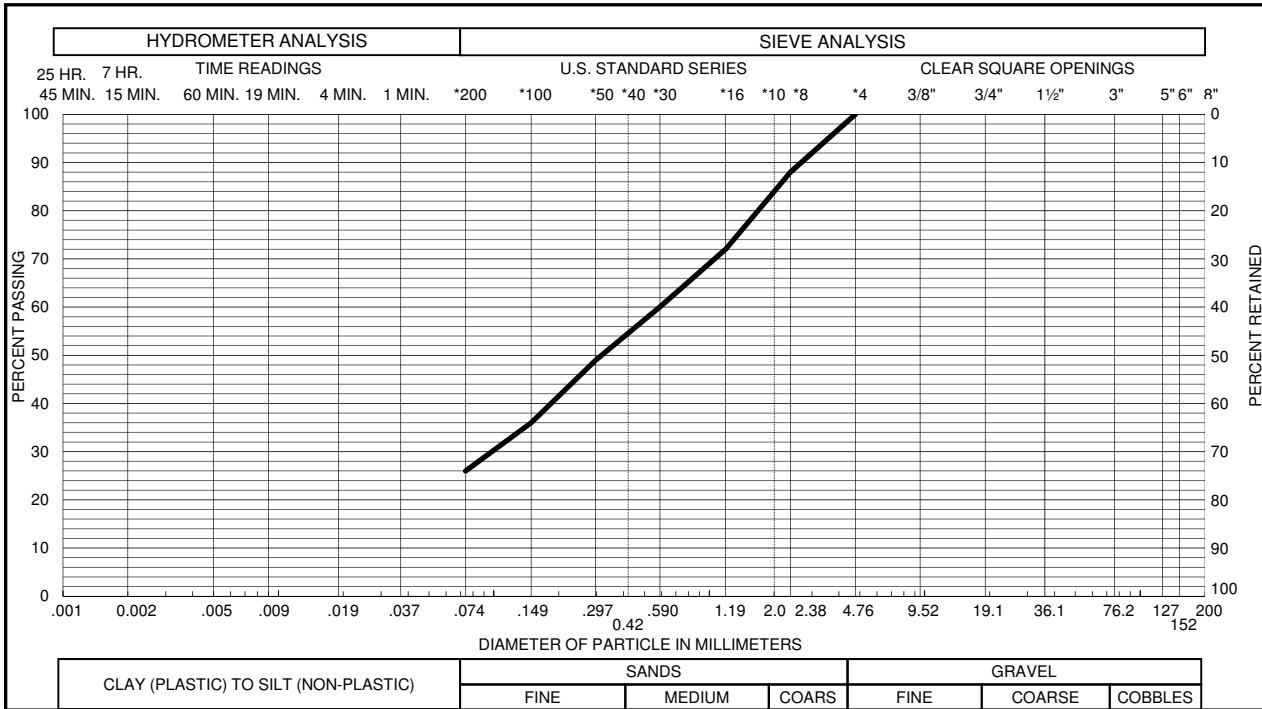


Sample of SAND, SLIGHTLY SILTY (SP-SM) GRAVEL 4 % SAND 89 %
 From TH - 1 AT 9 FEET SILT & CLAY 7 % LIQUID LIMIT %
 PLASTICITY INDEX %

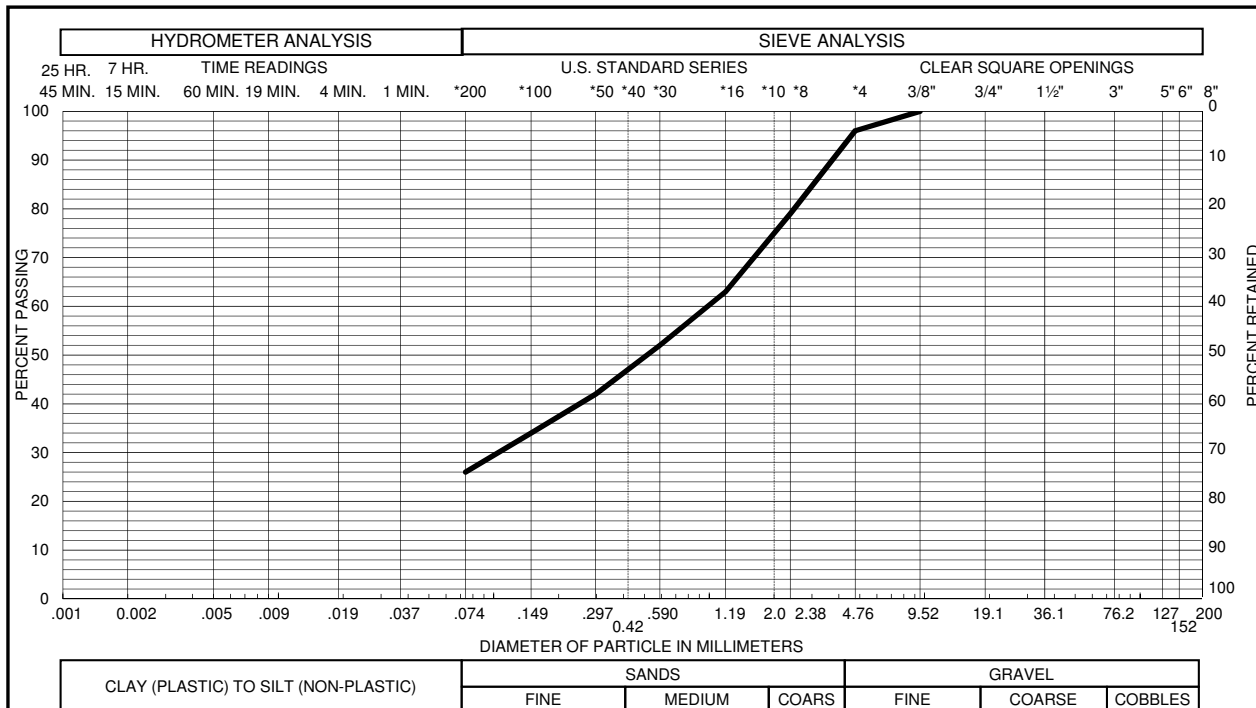


Sample of SANDSTONE, SILTY GRAVEL 2 % SAND 70 %
 From TH - 2 AT 4 FEET SILT & CLAY 28 % LIQUID LIMIT %
 PLASTICITY INDEX %

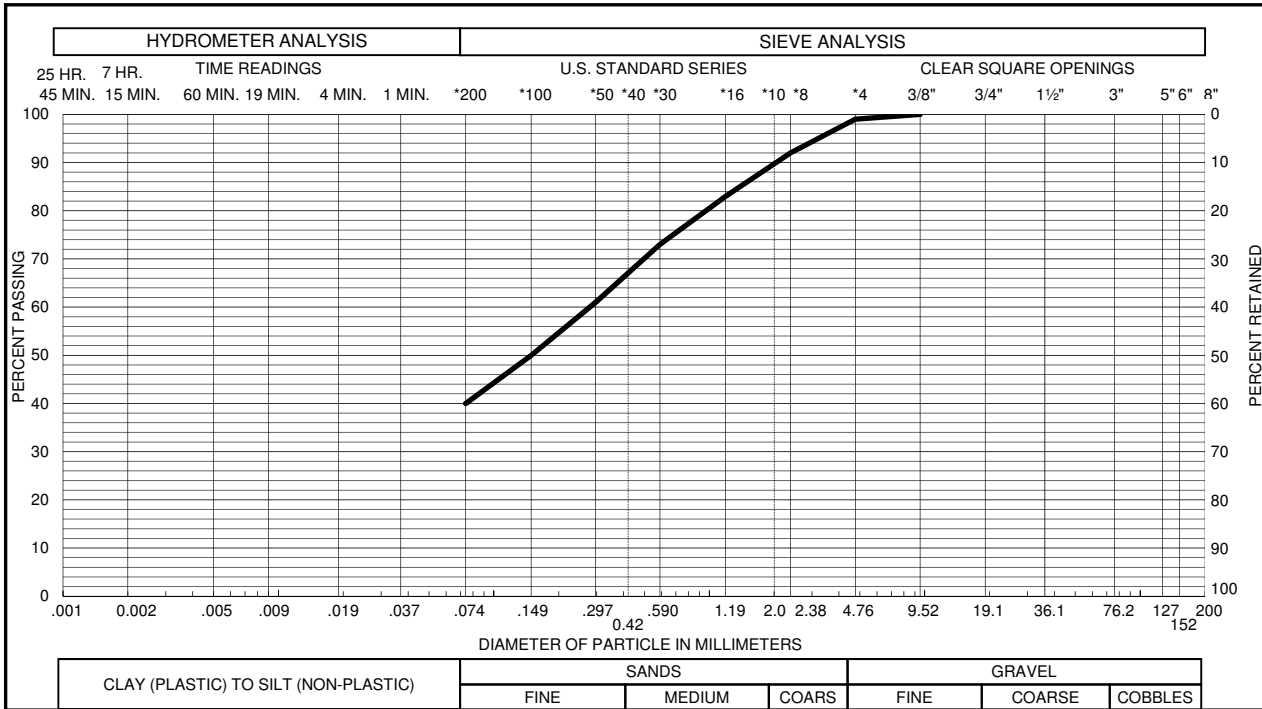
Gradation Test Results



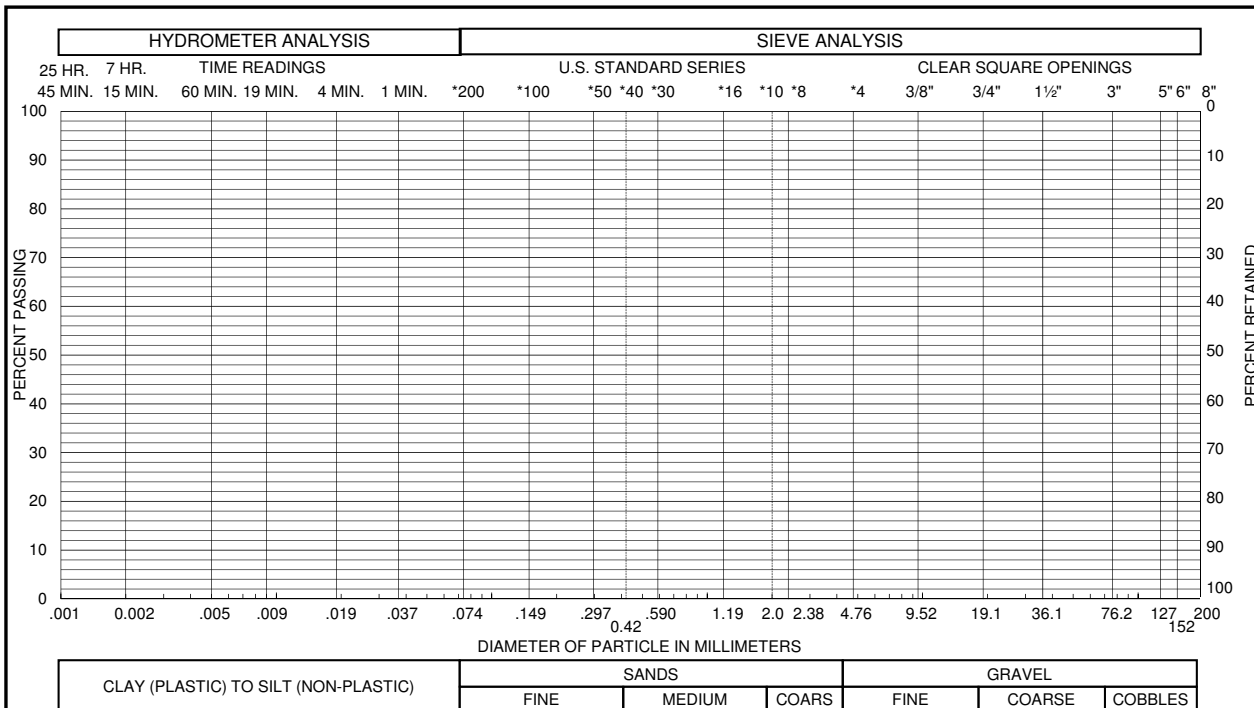
Sample of SANDSTONE, SILTY GRAVEL 0 % SAND 74 %
 From TH - 2 AT 14 FEET SILT & CLAY 26 % LIQUID LIMIT %
 PLASTICITY INDEX %



Sample of SAND, CLAYEY (SC) GRAVEL 4 % SAND 70 %
 From TH - 4 AT 4 FEET SILT & CLAY 26 % LIQUID LIMIT %
 PLASTICITY INDEX %



Sample of SAND, VERY CLAYEY (SC) GRAVEL 1 % SAND 59 %
 From TH - 4 AT 9 FEET SILT & CLAY 40 % LIQUID LIMIT %
 PLASTICITY INDEX %



Sample of _____ GRAVEL _____ % SAND _____ %
 From _____ SILT & CLAY _____ % LIQUID LIMIT _____ %
 PLASTICITY INDEX _____ %

TABLE B-1



**SUMMARY OF LABORATORY TESTING
CTL/T PROJECT NO. CS18589-115**

BORING	DEPTH (FEET)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	ATTERBERG LIMITS		SWELL TEST RESULTS*		PASSING NO. 200 SIEVE (%)	WATER SOLUBLE SULFATES (%)	DESCRIPTION
				LIQUID LIMIT (%)	PLASTICITY INDEX (%)	SWELL (%)	SWELL PRESSURE (PSF)			
TH-1	9	9.4	115					7		SAND, SLIGHTLY SILTY (SP-SM)
TH-2	4	10.7	123					28	<0.1	SANDSTONE, SILTY
TH-2	14	11.7	124					26		SANDSTONE, SILTY
TH-3	9	20.3	103			0.4				CLAY, SANDY (CL)
TH-4	4	13.6	115					26		SAND, CLAYEY (SC)
TH-4	9	12.1	121					40		SAND, VERY CLAYEY (SC)

* SWELL MEASURED WITH 1000 PSF APPLIED PRESSURE, OR ESTIMATED IN-SITU OVERBURDEN PRESSURE. NEGATIVE VALUE INDICATES COMPRESSION.

APPENDIX F
Operations and Maintenance Manuals for Permanent Stormwater Quality BMPs
Sand Filter Basins
Stormceptor

Sand Filter Basin

Maintenance Recommendations

Sand Filters (SF) are a filtering or infiltrating Best Management Practice (BMP) that consists of a surcharge zone underlain by a sand bed with an underdrain system. During a storm, accumulated runoff collects in the surcharge zone and gradually infiltrates into the underlying sand bed, filling the void spaces of the sand. The underdrain gradually dewateres the sand bed (designed to have a 12-hour drain time) and discharges the runoff to a nearby channel, swale or storm drain.

Sand Filters have relatively low routine maintenance requirements. Maintenance frequency depends on pollutant loads in runoff, the amount of construction activity within the tributary watershed, the erosion control measures implemented, the size of the watershed and the design of the facility. The basic elements of the maintenance requirements are presented in Table SF-1.

Table SF-1
Sand Filter Basin Maintenance Considerations

Required Action	Maintenance Objective	Frequency of Action
Inspection	Inspect basin to ensure it continues to function as intended. Determine if the sand filter is providing acceptable infiltration. Examine the outlet for clogging, the embankment and spillway integrity, and damage to any structural element. Check for erosion and repair as necessary.	Routine - Once or twice annually following precipitation events.
Debris and Litter Removal	Remove debris and litter from the detention area to minimize clogging of the media and to improve aesthetics. Remove debris and litter from the outlet structure.	Routine - Including just before annual storm seasons (April and May) and following significant rainfall events.
Filter Surface Maintenance	Scarify the top 2 inches of sand on the surface of the filter. After this has been done two or three times, replenish the top few inches of the filter with clean coarse sand (AASHTO C-33 or CDOT Class C filter material) to the original design elevation. Maintain a minimum sand depth of 12 inches. Eventually the entire sand layer and underdrain system may require replacement.	Nonroutine - This may be required once every two to five years depending on observed drain times.
Erosion and Structural Repairs	Repair basin inlets, outlets and all other structural components required for the BMP to operate as intended. Repair and revegetate any eroded side slopes as needed following inspection.	Nonroutine - Periodic and repair as necessary based on inspection.
Mowing	Occasional mowing of side slopes to limit unwanted vegetation. Maintain irrigated turf grass at 2 to 4 inches tall and nonirrigated native turf grasses at 4 to 6 inches tall.	Routine - Depending on aesthetic requirements.

Stormceptor STC

Maintenance Recommendations

The Stormceptor STC (Standard Treatment Cell) was developed to address the growing need to remove and isolate pollution from the storm drain system before it enters the environment. The Stormceptor STC targets hydrocarbons and total suspended solids (TSS) in stormwater runoff. It improves water quality by removing contaminants through the gravitational settling of fine sediments and floatation of hydrocarbons while preventing the re-suspension or scour of previously captured pollutants. The Stormceptor System has been designed to focus on the environmental objective of providing long-term pollution control. The design allows for continuous positive treatment of runoff during all rainfall events, while ensuring that all captured pollutants are retained within the system, even during intense storm events.

Health and Safety

It is recommended that confined space entry protocols be followed if entry to the unit is required. In addition, the fiberglass insert has the following health and safety features:

- Designed to withstand the weight of personnel
- A safety grate is located over the 24-inch riser pipe opening
- Ladder rungs can be provided for entry into the unit, if required

Maintenance Procedures

Maintenance of the Stormceptor system is performed using vacuum trucks. No entry into the unit is required for maintenance (in most cases). The need for maintenance can be determined easily by inspecting the unit from the surface. The depth of oil in the unit can be determined by inserting a dipstick in the oil inspection/cleanout port. Similarly, the depth of sediment can be measured from the surface without entry into the Stormceptor via a dipstick tube equipped with a ball valve. This tube would be inserted through the riser pipe. Maintenance should be performed once the sediment depth exceeds 8-inches for the Model STC 450i.

Although annual servicing is recommended, the frequency of maintenance may need to be increased or reduced based on local conditions. For example, if the unit is filling up with sediment more quickly than projected, maintenance may be required semi-annually. Once the site has stabilized, maintenance may only be required every two or three years.

Oil is removed through the oil inspection/cleanout port and sediment is removed through the riser pipe. Alternatively, oil could be removed from the 24-inch opening if water is removed from the lower chamber to lower the oil level below the drop pipes.

The following procedures should be taken when cleaning out the Stormceptor:

1. Check for oil through the oil cleanout port.
2. Remove any oil separately using a small portable pump.
3. Decant the water from the unit into a separate containment tank.
4. Remove the sludge from the bottom of the unit using the vacuum truck.
5. Re-fill the Stormceptor with water where required by the local jurisdiction.

The Stormceptor is often installed in areas where the potential for spills is great. The Stormceptor System should be cleaned immediately after a spill occurs by a licensed liquid waste hauler.

Requirements for the disposal of material from the Stormceptor System are similar to that of any other stormwater Best Management Practice (BMP) where permitted. Removed sediment should be taken to a sanitary landfill site. Petroleum waste products collected in the Stormceptor (free oil/chemical/fuel spills) should be removed by a licensed waste management company.

With a steady influx of water with high concentrations of oil, a sheen may be noticeable at the Stormceptor outlet. This may occur because a rainbow or sheen can be seen at very small oil concentrations (<10 mg/L). The Stormceptor will remove over 98% of all free oil spills from storm sewer systems for dry weather or frequently occurring runoff events. The appearance of a sheen at the outlet with high influent oil concentrations does not mean the unit is not working to this level of removal. In addition, if the influent oil is emulsified the Stormceptor will not be able to remove it. The Stormceptor is designed for free oil removal and not emulsified conditions.