

El Paso County Stormwater Management Plan

for

Clear View Properties I, LLC Clear View Industrial Park Filing No. 2B

Prepared for:
**El Paso County Planning and
Community Development Department**
2880 International Circle, Suite 110
Colorado Springs, CO 80910
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ACCEPTED for FILE
Engineering Review

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EPC Planning & Community
Development Department



On Behalf of:
Clear View Properties I, LLC
9720 Arroya Lane
Colorado Springs, CO 80908
(719) 337-3534

Prepared by:
CTR Engineering, Inc.
16392 Timber Meadow Drive
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January 2021

PCD Filing No. SF2029

Applicant:

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Prepared By:

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Qualified Stormwater Manager

Name: _____
Company: _____
Address: _____

Contractor Information

Name: _____
Company: _____
Address: _____

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GENERAL DESCRIPTION AND LOCATION

Site Description

An industrial subdivision, Clear View Industrial Park Filing No. 2B, is in Security, CO, on Clear View Loop, approximately a quarter mile southwest of intersection of Milton E. Proby Parkway and Hancock Expressway.

Being a portion of the eastern half of the east half of the section 2, Township 15 south, range 66 west of the 6th P.M., City of Colorado Springs, County of El Paso, State of Colorado, the vicinity map can be found in the Appendix.

No major drainageways or facilities exist near the site, except for the Fountain Mutual Canal, which is located west of the site. Per the flood insurance map 08041C0763G, dated 12/7/2018 the site is located in Zone X area of Minimal Flood Hazard.



Fountain
Mutual
Canal

Names of surrounding platted developments:

North – New Sunshine, LLC, a commercial/industrial building

South – Clear View Industrial Park Filing No. 1

East - Clear View Industrial Park Filing No. 1

West – Security Water and Wastewater District, agriculture ground

The 2.7+/- acre site consists of 3 lots and a drainage easement within lot 2B. Lot 3B contains an existing building and earthen/gravel storage yard. Lot 2B (drainage easement) will contain the water quality pond for lots 1-3 and will not have any structures built on it. Ground cover consists of very few native grasses, lot 3B contains some existing trees and shrubs. General topography directs all storm runoff in a westerly direction, to the Fountain Mutual Canal. Per the NRCS soils report in the appendix, soil is comprised of Blakeland loamy sand with a Hydrologic Soil Group (HSG) of A. No major drainageways exist on-site or adjacent to the property. No irrigation facilities exist on-site, but when lots 1B and 2B develop, they will most likely install irrigation systems for on-site landscaped areas. Lots 1B and 2B are currently

earthen/gravel car storage lots. Lot 3B contains private utility service lines, and there is an existing Security Water and Wastewater District sanitation line running along the western property boundary; however, that line has been abandoned.

CONSTRUCTION ACTIVITY

Narrative Description of Construction Activity

The areas that require the water quality pond, storm pipe, and swales will be cleared and grubbed. The water quality pond will be constructed first, then the storm pipe, and lastly, the swales. As soon as the water quality pond and swales are constructed, erosion control blankets will be placed on all slopes greater than 3:1. No public roadway grading will be required. Grading for lots 1B and 2B will not take place until the lots are sold. The new owners of lots 1B and 2B will submit their own grading and erosion control plans. Once the reseeding has been completed and vegetation has been growing for over a month, and the vegetation has reached 70% of pre-development levels, the silt fence will be removed.

Phasing Plan

This is a small project, and for this reason, there will not be any erosion control phasing. However, the erosion control plan will be onsite at all times, and will be updated. If any repairs to BMP's are needed due to a heavy storm event, those repairs will be marked on the erosion control plan. This project will take only a month at the most to complete. The water quality pond will be constructed first, then the storm pipe, and then the swales.

Proposed Sequence for Major Activities

The following schedule includes all major activity completions for this project:

Clear and Grub – 1 day;

Build the pond with forebay, outlet box and spillway – 1 weeks;

Construct the sewer line and box – 1 week;

Construct the swales and riprap – 3 days; and

Finalize all erosion control measures – 2 days.

Estimate of Total Areas

Clear View Industrial Park Filing No. 2B contains 2.7+/- acres (ac), however the grading, storm, and water quality pond will only disturb approximately 1.1 ac.

DRAINAGE, SOILS AND VEGETATION

Estimate of Runoff Coefficients

Lot 1B and 2B have been estimated at 85% impervious once they are fully developed, with no current impervious surfaces. Lots 1B and 2B will remain mostly pervious at the end of the project even after the pond, swales, and storm water pipes have been constructed. Lot 3B contains an existing building and a small piece of asphalt with some gravel storage areas. With no further improvements expected, it's imperviousness has been estimated at 70%. Lot 2B will contain nothing but the water quality pond and therefore, has no impervious surface.

Soil Erosion Potential

The only soil erosion potential from disturbed areas will be on the proposed 3:1 slopes, around the water quality pond, and swales. Both will receive erosion blankets and will be

monitored for any major erosion after a storm event. If there is any erosion due to heavy rain fall, soil will be replaced, and an erosion blanket will be laid over the new soil. All disturbed areas will be seeded as well. The existing un-vegetated areas in both lot 1B and 2B could pose erosion control issues, however all flows will be intercepted by the proposed swales and directed to the forebay of the pond. Until the lots are sold the owner will monitor those lots for potential erosion control issues and fix any problems that come up by seeding, mulching or by placing erosion control blankets. Single -net erosion control blankets will be used on 3:1 slopes, and double-net erosion control blankets will be used on 2:1 slopes.

Existing Vegetation & Vegetative Cover – 70% Pre-Disturbed

This site has been used as a car storage lot for several years, so the majority of the area is dirt, with some various grasses and bushes growing (see attached pictures). There are several trees growing outside the property, along the Fountain Mutual Canal; none of these trees will be impacted by the grading or the construction of the water quality pond. On-site visual inspections conclude that lots 1B, 2B, and 2B have 10% ground cover, with the majority of Lot 3B containing approximately 10% vegetation.



Existing on-site ground cover (Lots 1B and 2B)

POLLUTION AND SOURCES

Potential Pollution Sources

Pollution sources for the site could include sediment erosion, sediment from tracking pad, concrete washout, and vehicle fueling and maintenance. The Contractor is to follow the Best Management Practices (BMP) when fueling and maintaining construction vehicles, with any temporary on-site storage of oils, fuel, or chemicals. To facilitate sedimentation and minimize erosion, control measures that will be installed to minimize these potential pollutant sources are: inlet protection, sediment control logs, mulching & seeding, erosion control blankets, and an extended detention basin.

A silt fence will surround the north, south, and west sides where potential construction activity will be to prevent wind-blown and storm water sediment from leaving the site. A vehicle tracking pad is designed for this site to prevent offsite sediment migration. If sediment is observed in the adjacent streets then a street sweeper will be brought in to clean the street of sediment from this site. No permanent outdoor storage of any material is expected at this time for this small project. The Contractor will utilize a water truck for any dust control.

Material Handling

Any potential hazardous materials generally in regards to vehicle fueling and maintenance, including oils and fuels will be handled in a professional way by the contractor and any spills will be quickly cleaned, removed, and disposed of off-site. Spills and leaks of solid and liquid materials processed, handled or stored outdoors can be a significant source of stormwater pollutants. Spilled substances can reach receiving waters when runoff washes these materials from impervious surfaces or when spills directly enter the storm sewer system during dry weather conditions.

Effective spill control includes both spill prevention and spill response measures and depends on proper employee training for spill response measures and may also include structural spill containment, particularly at industrial locations. Structural spill containment measures typically include temporary or permanent curbs or berms that surround a potential spill site. Berms may be constructed of concrete, earthen material, metal, synthetic liners, or other material that will safely contain the spill. Spill control devices may also include valves, slide gates, or other devices that can control and contain spilled material before it reaches the storm sewer system or receiving waters.

Check local, state, and/or federal regulations to determine when spill containment and control measures are required by law. Spill Prevention, Control and Countermeasures Plans may be required for certain facilities handling oil and hazardous substances under Section 311(j)(1)(C) of the federal Clean Water Act.

Spill Prevention Measures

- Train employees on potential sources of pollution on-site and provide clear, common-sense spill prevention practices. Require that these practices be strictly followed.
- Identify equipment that may be exposed to stormwater, pollutants that may be generated and possible sources of leaks or discharges.
- Perform regular inspection and preventative maintenance of equipment to ensure proper operation and to check for leaks or evidence of discharge (stains). Provide clear procedures to ensure that needed repairs are completed and provide temporary leak containment until such repairs can be implemented.
- Drain or replace motor oil and other automotive fluids in a designated area away from storm sewer inlets. Collect spent fluids and recycle or dispose of properly. Never dispose of these fluids in the storm sewer or sanitary sewer.

- In fueling areas, clean up spills with dry methods (absorbents) and use damp cloths on gas pumps and damp mops on paved surfaces. Never use a hose to “wash down” a fuel spill.
- Where practical, reduce stormwater contact with equipment and materials by implementing indoor or covered storage, implementing stormwater run-on control measures and following good housekeeping practices.

Identification of Spill Areas

Identify potential spill areas, potential spill volumes, material types, frequency of material use, and drainage paths from spill areas with relation to storm sewer inlets, adjacent waterbodies, structural BMPs, and containment structures. Use this information to determine the types of spill prevention and control measures needed specific to the site conditions. Examples of potential spill locations include:

- Loading and unloading areas
- Outdoor storage areas
- Outdoor manufacturing or processing activities
- Waste disposal/storage areas
- Areas that generate significant dust or particulates (that may be subsequently deposited on the ground)
- Salt piles
- Areas prone to spills based on past experience at the site
- Locations where other routine maintenance activities occur such as equipment maintenance and cleaning, pesticide/fertilizer application, etc.

Additionally, areas where smaller leaks may occur such as parking should also have basic spill cleanup procedures.

Material Handling Procedures

From a water quality perspective, the primary principle behind effective material handling practices is to minimize exposure to stormwater. This can be accomplished by storing the material indoors under weather-resistant covering, elevating the material off the ground by using pallets, and diverting stormwater around materials storage areas. Representative outdoor materials handling procedures include:

- Keep bulk solid materials such as raw materials, sand, gravel, topsoil, compost, concrete, packing materials, metal products and other materials covered and protected from stormwater.
- When practical, store materials on impermeable surfaces.
- Store hazardous materials according to federal, state, and local hazardous materials requirements.
- Adopt procedures that reduce the chance of spills or leaks during filling or transfer of materials.
- Substitute less toxic or non-toxic materials for toxic materials.
- Store containers that are easily punctured or damaged away from high traffic areas (i.e., adopt a materials flow/plant layout plan).
- Add waste-capture containers such as collection pans for lubricating fluids.

- Store drums and containers with liquid materials on impermeable surfaces and provide secondary containment where appropriate. Drums stored outdoors should be located on pallets to minimize contact with runoff.

Spill Response Procedures and Equipment

Spill response procedures should be tailored to site-specific conditions and industry-specific regulatory requirements. General spill response procedures include:

- Containment and cleanup of spills should begin promptly after the spill is observed.
- Sweep up small quantities of dry chemical or solids to reduce exposure to runoff. Shoveling may be used for larger quantities of materials.
- Absorbents should be readily accessible in fueling areas or other areas susceptible to spills.
- Wipe up small spills with a shop rag, store shop rags in appropriate containers, dispose of rags properly or use a professional industrial cleaning service.
- Contain medium-sized spills with absorbents (e.g., kitty litter, sawdust) and use inflatable berms or absorbent “snakes” as temporary booms for the spill. Store and dispose of absorbents properly. Wet/dry vacuums may also be used, but not for volatile fluids.
- Develop procedures and locations for containing and storing leaking containers.
- Install drip pans below minor equipment leaks and properly dispose of collected material until a repair can be made.
- For large spills, first contain the spill and plug storm drain inlets where the liquid may migrate offsite, then clean up the spill.
- Excavation of spill areas to removed contaminated material may be required where large liquid spills occur on unpaved surfaces.
- An inventory of cleanup materials should be maintained onsite and strategically located based on the types and quantities of chemicals present.

Dedicated Asphalt/Concrete Batch Plants

No dedicated batch plants will be required for this small construction project nor will any be located on the site.

Waste Disposal

All waste products, which will include normal construction products will be removed from the site and disposed of at an offsite waste management site, as needed. Site dumpsters will be inspected daily for leaks and overflowing capacity or illegal dumps. Waste disposal company will be called to pick up and change out the dumpsters at 75% full.

The Contractor is to provide a portable toilet and will be responsible for it's routine cleaning. Portable toilets will be located a minimum of 50-feet from State waters. They shall be adequately staked and cleaned on a weekly basis. They will be inspected daily for spills. No off-site soil will enter the site, except as fill material, if needed. Any soil that is tracked onto or nearby roadways will be swept up, via a road cleaning machine. Dewatering activities are not anticipated for this site.

Non-Stormwater Components

No non-stormwater discharges will impact this site or the water quality pond. There are no springs or large irrigation systems existing or proposed on-site.

Ultimate Receiving Waters

All storm runoff flows will be directed to the outfall box within the water quality pond and then into the Fountain Mutual Canal via a storm pipe from the water quality pond. The canal outfalls to Big Thompson Reservoir. Flows from the reservoir are directed through the County and then back again to the Fountain Creek, then into the Arkansas River.

Stream Crossings

No stream crossings are located on this property.

BEST MANAGEMENT PRACTICES (BMP'S)

Structural BMP's

Structural BMPs that will be used with this project include: 1) concrete forebay, 2) concrete outlet box that will release storm flows over a 40-hour period, 3) concrete micro pool, 4) silt fence, 5) drainage swales to direct water to the storm pipe system, 6) riprap to prevent erosion from the swales to the storm pipe flared-end section, 7) inlet protection, 8) sediment basin, 9) concrete washout area, 10) vehicle tracking control, and 11) street sweeping. All details related to the listed BMP's regrading upkeep and maintenance, when and where they will be used and other details can be found in the grading and erosion control plans that have been attached to the appendix of this report.

Non-Structural BMP's

Non-structural BMP's that will be used with this project include: 1) seeded, 2) mulching, and 3) rolled erosion control products. No site watering will be used as the seeding mix will be native grasses and plants. Erosion blankets for 3:1 slopes and erosion logs will be laid, within the swales. All details related to the listed BMP's regrading upkeep and maintenance, when and where they will be used and other details can be found in the grading and erosion control plans that have been attached to the appendix of this report.

Technical Drawings (Grading and Erosion Control Plans)

See the Appendix of this report for technical drawings.

Procedure for SWMP

The 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 Qualified Stormwater Manager 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. Any modification to erosion control measures will be noted and dated on the plans. Any site changes will also be noted and dated on the plans.

Final Stabilization and Long-Term Stormwater Quality

Final stabilization will occur by placing erosion blankets, seeding, and mulching. Single-net erosion control blankets will be used on 3:1 slopes, and double-net erosion control blankets will be used on 2:1 slopes. Lot 3B is already developed, lot 2B will contain only the water quality pond and lots 1B and 2B will develop once they are sold. Long-term stormwater management will be achieved by the development of lots 1B and 2B and by following the IM Plan for the Extended Detention Basin Water Quality Pond. This project does not rely on control measures owned or operated by another entity.

INSPECTIONS AND RECORDS

Inspection Procedures

Owner shall schedule construction activities to minimize the total amount of soil exposed at any given time, in order to reduce the period of soil erosion. Topsoil shall not be disturbed to expose bare ground for more than 30 days. All Disturbed Areas that remain exposed and/or inactive for longer than fourteen (14) days shall be stabilized to protect the soils from erosion. Within 14 days after construction activity has temporarily or permanently ceased, Owners shall plant temporary and, where applicable, permanent vegetative cover on disturbed areas. All temporary and permanent erosion control and sediment control features will be self-inspected, maintained, and repaired as needed by the Contractor/Owner. The person performing the inspections must be a registered Professional Engineer in Colorado, a certified erosion control specialist, or certified in a regionally recognized inspection training program.

A thorough self-inspection shall be completed at least once every 14 calendar days. In addition, post-storm event inspections must be performed within 24 hours after the end of any precipitation or snowmelt event that causes surface erosion. El Paso County Engineer may inspect and direct said contractor as needed. Where self-inspections note that there is a need for BMP maintenance activities, actions should be taken by the contractor as soon as possible.

In addition to self-inspections being performed by the owner or contractor, County Engineering inspections are also required for the construction site. These County Engineering inspections can be of any of the following types: initial inspections, compliance inspections, reconnaissance inspections, compliant response inspections, follow-up inspections, and final inspections, as described in the El Paso County Drainage Criteria Manual Volume 2. Along with initial and final inspections, compliance inspections are performed by County Engineering Inspectors and are performed at least once every 30-60 days. Where County inspections identify the need for BMP maintenance, the County Engineering Inspector will notify the owner and/or contractor and will perform a follow-up inspection within 5 business days.

Record Keeping

The stormwater manager shall ensure that, at a minimum, the following is recorded for each inspection and kept on-site within the construction staging area in a water proof contractor box for reference:

- Inspection Date
- Name(s), Title(s), and signatures of Inspection Personnel
- Location of Discharges of Sediment and Other Pollutants from the Site
- Location of BMPs Requiring Maintenance
- Location of Failed BMPs
- Location of Additional Required BMPs
- Description of Corrective Actions

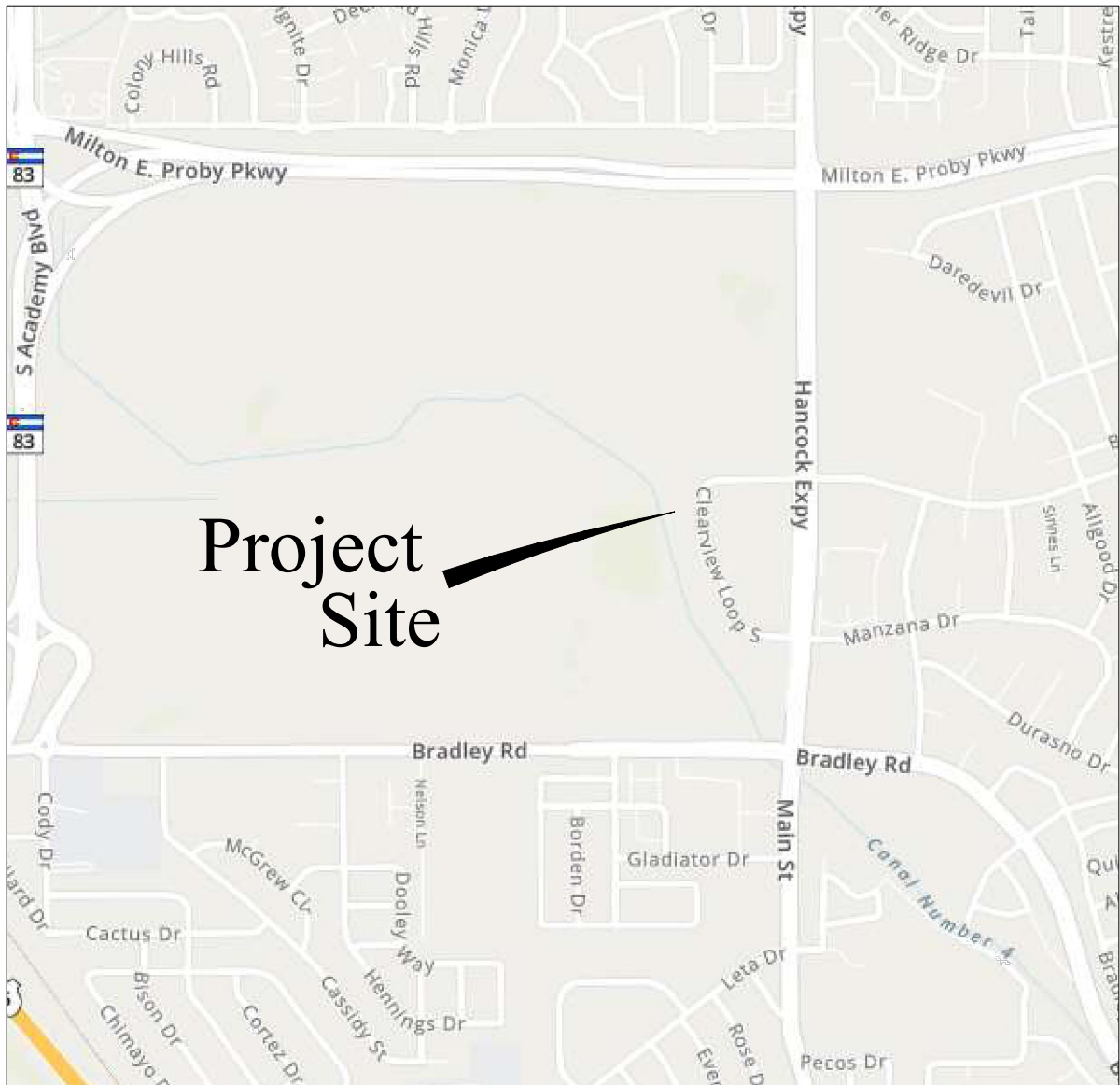
The use and maintenance of log books, photographs, field notebooks, drawings or maps should also be included in the records, when appropriate.

Control Measures

No control measures are owned or operated by others. Only the Fountain Mutual Canal is owned and operated by the Fountain Mutual Ditch Company. Approval to discharge into the canal will be obtained before approval to begin construction.

Appendix

CLEAR VIEW INDUSTRIAL PARK, FILING 2A



VICINITY MAP

N.T.S.

CTR ENGINEERING, INC.

National Flood Hazard Layer FIRMette



38°46'41.97"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- | | | |
|------------------------------------|--|---|
| SPECIAL FLOOD HAZARD AREAS | | Without Base Flood Elevation (BFE)
Zone A, V, A99 |
| | | With BFE or Depth Zone AE, AO, AH, VE, AR |
| | | Regulatory Floodway |
| OTHER AREAS OF FLOOD HAZARD | | 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X |
| | | Future Conditions 1% Annual Chance Flood Hazard Zone X |
| | | Area with Reduced Flood Risk due to Levee. See Notes. Zone X |
| | | Area with Flood Risk due to Levee Zone D |
| OTHER AREAS | | NO SCREEN Area of Minimal Flood Hazard Zone X |
| | | Effective LOMRs |
| GENERAL STRUCTURES | | Area of Undetermined Flood Hazard Zone D |
| | | Channel, Culvert, or Storm Sewer |
| | | Levee, Dike, or Floodwall |
| OTHER FEATURES | | 20.2 Cross Sections with 1% Annual Chance Water Surface Elevation |
| | | 17.5 |
| | | Coastal Transect |
| | | Base Flood Elevation Line (BFE) |
| | | Limit of Study |
| | | Jurisdiction Boundary |
| MAP PANELS | | Coastal Transect Baseline |
| | | Profile Baseline |
| | | Hydrographic Feature |
| | | Digital Data Available |
| | | No Digital Data Available |
| | | Unmapped |
- The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/25/2020 at 8:04:06 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

104°44'49.38"W

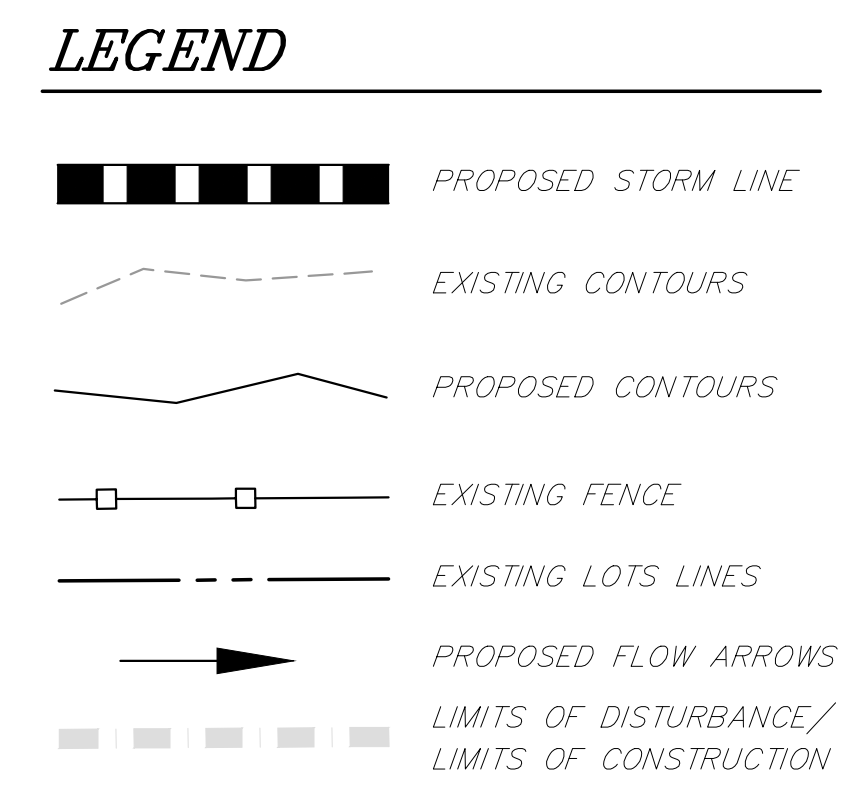
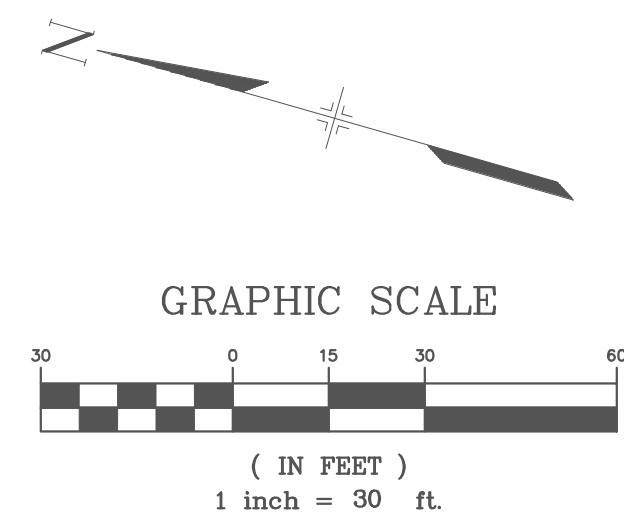
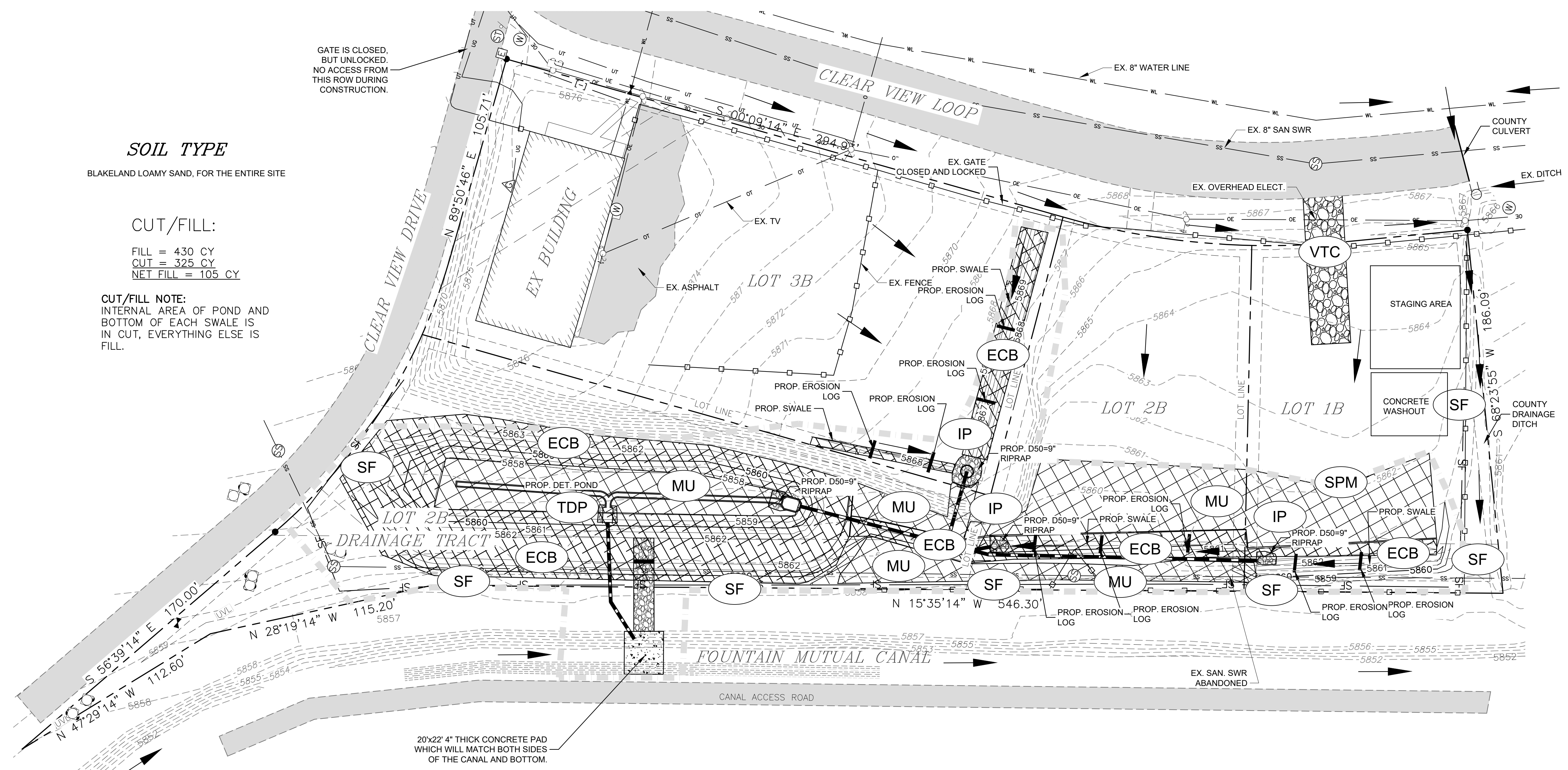
104°44'11.92"W

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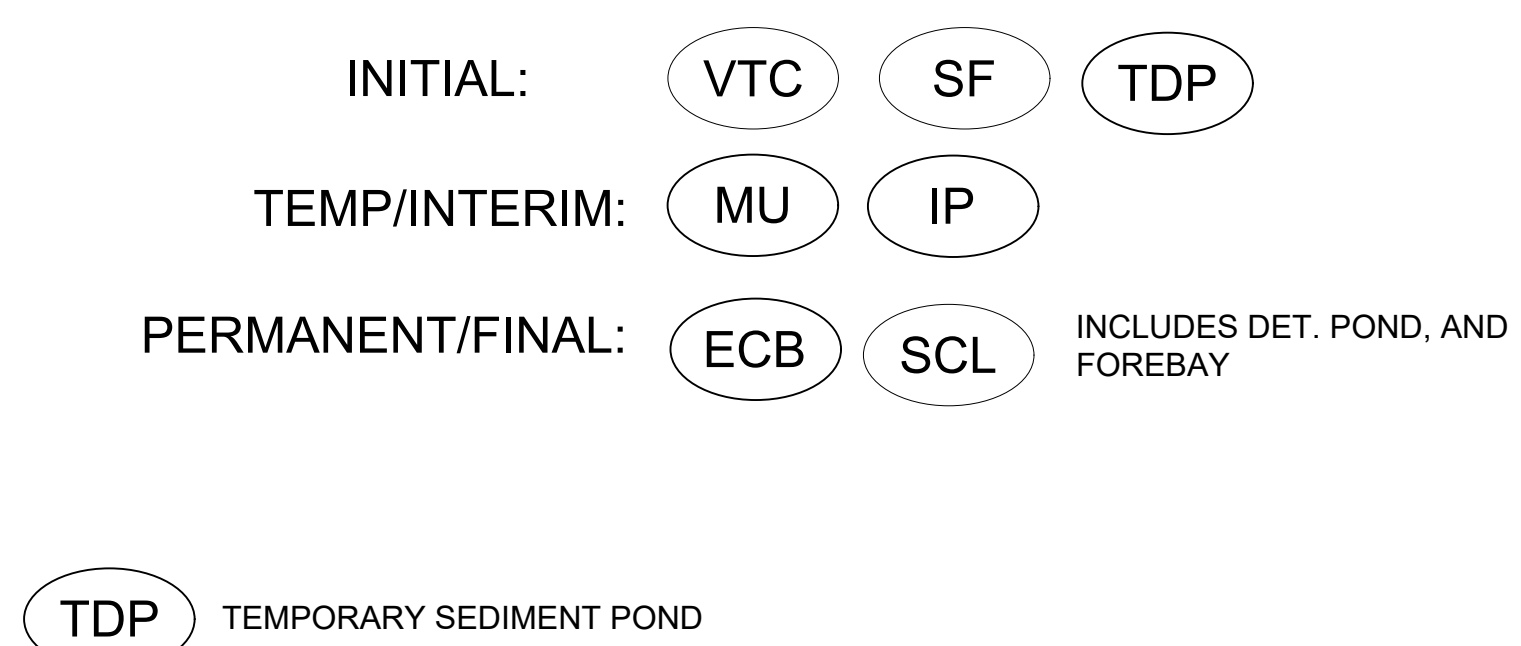
SOIL TYPE
BLAKELAND LOAMY SAND, FOR THE ENTIRE SITE

CUT/FILL:
FILL = 430 CY
CUT = 325 CY
NET FILL = 105 CY

CUT/FILL NOTE:
INTERNAL AREA OF POND AND BOTTOM OF EACH SWALE IS IN CUT, EVERYTHING ELSE IS FILL.

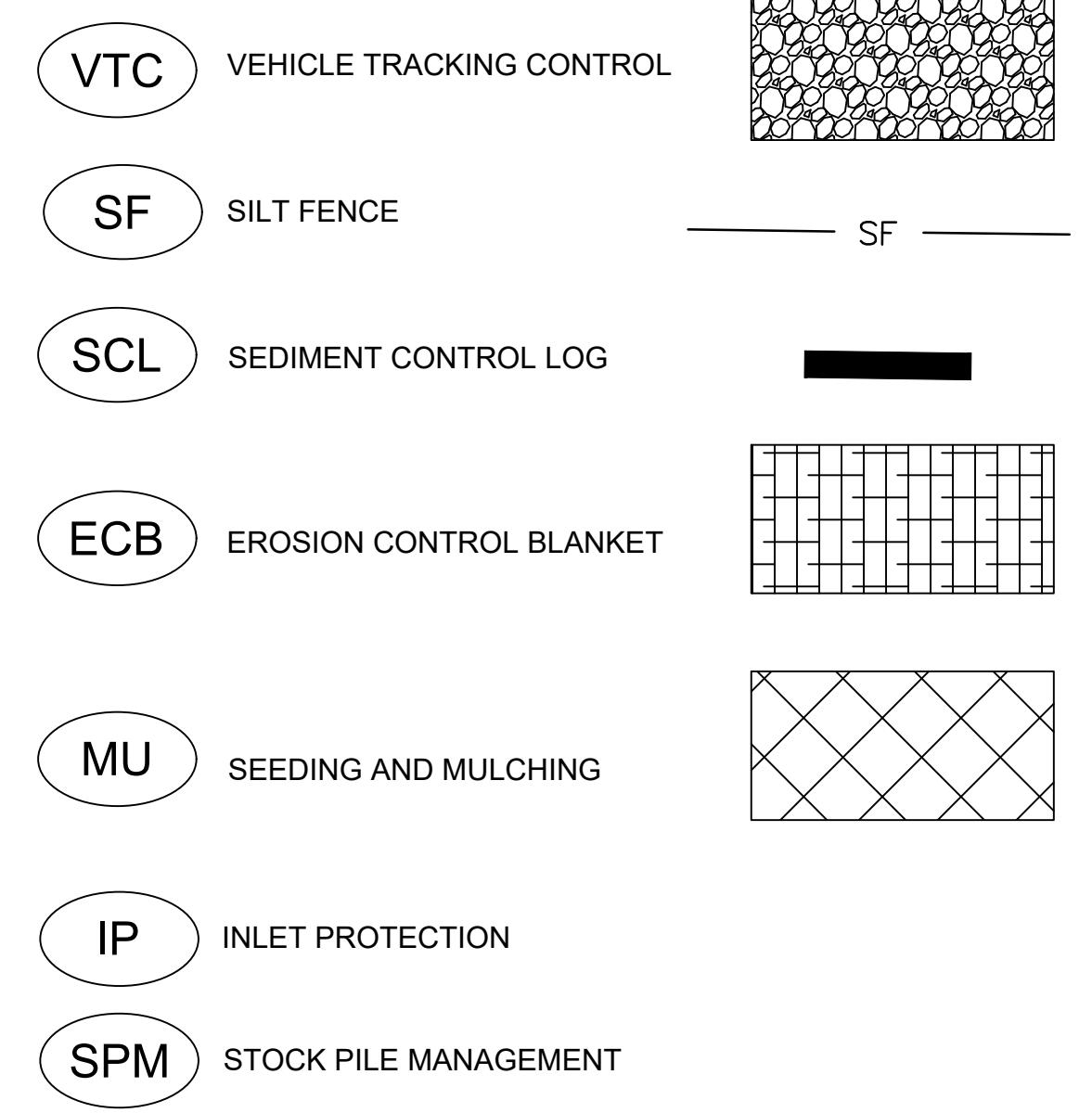


EROSION CONTROL PHASING



TRIBUTARY AREA = 3.0 AC
BASIN BOTTOM WIDTH = 28'
LENGTH OF BASIN BOTTOM = 56'
SEDIMENT POND DEPTH = 4'
SEDIMENT POND MIN. VOLUME = 6,272 CUBIC FEET
SPILLWAY CREST WIDTH = 5'
HOLE DIAMETER FOR RISER PIPE = 12"
SINGLE COLUMN OF HOLES ON RISER PIPE
SEE DETAILS ON SHEET ---

LEGEND



NOTE:

- 1) EXISTING VEGETATION CONSISTS OF FEW WEEDS AS THE SITE WAS A USED CAR LOT.
- 2) FEMA 100-YEAR FLOOD PLAN MAP FOR THIS AREA IS 08041C0763G, DATED 12/7/18
- 3) NO CONSTRUCTION OUTSIDE THE SILT FENCE TO PROTECT EXISTING VEGETATION
- 4) NO OFFSITE GRADING IS PROPOSED, HOWEVER INSTALLATION OF THE OUTFALL PIPE WILL BE REQUIRED. THIS AREA WILL RECEIVE RIPRAP, SEEDING AND MULCHING.
- 5) NO CONSTRUCTION TRAILER WILL BE USED FOR THIS PROJECT.
- 6) TEMPORARY SEDIMENT POND WILL BE THE DETENTION POND UNTIL COMPLETION.
- 7) NO DEWATERING IS ANTICIPATED FOR THIS SITE. GROUND WATER WAS NOT ENCOUNTERED UNTIL 11-12 FEET BELOW SURFACE. THE MAXIMUM CUTS IN THE POND ARE ONLY 5- FEET DEEP. IF GROUNDWATER IS ENCOUNTERED DURING CONSTRUCTION AND DEWATERING NEEDS TO TAKE PLACE, THE CONTRACTION MANAGER MUST FOLLOW SECTION 3.3.6C IN THE COUNTY ECM.
- 8) SEE SHEETS x THRU x FOR EROSION CONTROL DETAILS.
- 9) NO OFFSITE FLOWS WILL IMPACT THIS SITE.
- 10) NO DRAINAGE EASEMENT WILL BE REQUIRED UNTIL LOTS 1A OR 2A ARE SOLD.
- 11) THE LOCATION OF THE WASTE DISPOSAL BIN, PORTABLE TOILETS, AND SWMP BINDER WILL BE DETERMINED BY THE CONTRACTOR AND THE SWMP WILL BE MARKED-UP.
- 12) SINGLE AND DOUBLE LAYER E.C. BLANKETS WILL BE USED.

NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B			
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)			
PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL			
SHEET TITLE: SWMP			
DESIGNED BY: JCM	SCALE: 1"=30'	DATE ISSUED: JAN. 2021	
DRAWN BY: JCM	HH: 1"=30'	SHEET NO. 1 OF 1 SHEETS	
CHECKED BY: JH	V:		
DWG:			



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for El Paso County Area, Colorado



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Map Scale: 1:1,030 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)




















Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features

Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
 Survey Area Data: Version 17, Sep 13, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	4.8	100.0%
Totals for Area of Interest		4.8	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

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An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

El Paso County Area, Colorado

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369v
Elevation: 4,600 to 5,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blakeland

Setting

Landform: Hills, flats
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 11 inches: loamy sand
AC - 11 to 27 inches: loamy sand
C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 1 percent

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Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent

Landform: Depressions

Hydric soil rating: Yes

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Appendix C Inspection Checklist – Grading Erosion, and Stormwater Quality Controls

CITY OF COLORADO SPRINGS

DATE/TIME:
INSPECTOR:
TYPE OF INSPECTION: Self-Monitoring_____
Initial _____ Compliance_____ Follow-Up_____
Reconnaissance_____ Complaint_____ Final_____

SITE:	DATE OF PERMIT:
ADDRESS:	
CONTRACTOR: CONTACT: PHONE:	OWNER/OWNER'S REPRESENTATIVE: CONTACT: PHONE:
STAGE OF CONSTRUCTION: Initial BMP Installation/Prior to Construction_____ Clearing & Grubbing_____	
Rough Grading_____ Finish Grading_____ Utility Construction_____ Building Construction_____	
Final Stabilization_____	

OVERALL SITE INSPECTION	YES/NO/N.A.	REMARKS/ACTIONS
Is there any evidence of sediment leaving the construction site? If so, note areas.		
Have any adverse impacts such as flooding, structural damage, erosion, spillage, or accumulation of sediment, debris or litter occurred on or within public or private property, wetlands or surface waters –to include intermittent drainageways and the City's stormwater system (storm sewers, gutters, ditches, etc.)?		
Are the BMPs properly installed and maintained?		
Have the BMPs been placed as shown on approved plans?		
Are the BMPs functioning as intended?		
Is work being done according to approved plans and any phased construction schedule?		
Is the construction schedule on track?		
Are drainage channels and outlets adequately stabilized?		
Is there any evidence of discharges or spills of fuels, lubricants, chemicals, etc.?		

BMP MAINTENANCE CHECKLIST	YES/NO/N.A.	REMARKS/ACTIONS NECESSARY
<p>CHECK DAM</p> <p>Has accumulated sediment and debris been removed per maintenance requirements?</p>		
<p>EROSION CONTROL BLANKET</p> <p>Is fabric damaged, loose or in need of repairs?</p>		
<p>INLET PROTECTION</p> <p>Is the inlet protection damaged, ineffective or in need of repairs?</p> <p>Has sediment been removed per maintenance requirements?</p>		
<p>MULCHING</p> <p>Distributed uniformly on all disturbed areas?</p> <p>Is the application rate adequate?</p> <p>Any evidence of mulch being blown or washed away?</p> <p>Has the mulched area been seeded, if necessary?</p>		
<p>SEDIMENT BASIN</p> <p>Is the sediment basin properly constructed and operational?</p> <p>Has sediment and debris been cleaned out of the basin?</p>		
<p>SILT FENCE</p> <p>Is the fence damaged, collapsed, unentrenched or ineffective?</p> <p>Has sediment been removed per maintenance requirements?</p> <p>Is the silt fence properly located?</p>		
<p>SLOPE DRAIN</p> <p>Is water bypassing or undercutting the inlet or pipe?</p> <p>Is erosion occurring at the outlet of the pipe?</p>		
<p>STRAW BALE BARRIER</p> <p>Are the straw bales damaged, ineffective or unentrenched?</p> <p>Has sediment been removed per maintenance requirements?</p> <p>Are the bales installed and positioned correctly?</p>		

BMP MAINTENANCE CHECKLIST	YES/NO/N.A.	REMARKS/ACTIONS NECESSARY
<p>SURFACE ROUGHENING</p> <p>Is the roughening consistent/uniform on slopes??</p> <p>Any evidence of erosion?</p>		
<p>TEMPORARY SEEDING</p> <p>Are the seedbeds protected by mulch?</p> <p>Has any erosion occurred in the seeded area?</p> <p>Any evidence of vehicle tracking on seeded areas?</p>		
<p>TEMPORARY SWALES</p> <p>Has any sediment or debris been deposited within the swales?</p> <p>Have the slopes of the swale eroded or has damage occurred to the lining?</p> <p>Are the swales properly located?</p>		
<p>VEHICLE TRACKING</p> <p>Is gravel surface clogged with mud or sediment?</p> <p>Is the gravel surface sinking into the ground?</p> <p>Has sediment been tracked onto any roads and has it been cleaned up?</p> <p>Is inlet protection placed around curb inlets near construction entrance?</p>		
<p>OTHER</p>		

FINAL INSPECTION CHECKLIST	YES/NO/N.A.	REMARKS/ACTIONS NECESSARY
Has all grading been completed in compliance with the approved Plan, and all stabilization completed, including vegetation, retaining walls or other approved measures?		
Has final stabilization been achieved – uniform vegetative cover with a density of at least 70 percent of pre-disturbance levels, and cover capable of adequately controlling soil erosion; or permanent, physical erosion methods?		
Have all temporary measures been removed?		
Have all stockpiles, construction materials and construction equipment been removed?		
Are all paved surfaces clean (on-site and off-site)?		
Has sediment and debris been removed from drainage facilities (on-site and off-site) and other off-site property, including proper restoration of any damaged property?		
Have all permanent stormwater quality BMPs been installed and completed?		

ADDITIONAL COMMENTS:
--

The items noted as needing action must be remedied no later than _____.

The contractor shall notify the inspector when all the items noted above have been addressed.

By signing this inspection form, the owner/owner's representative and the contractor acknowledge that they have received a copy of the inspection report and are aware it is their responsibility to take corrective actions by the date noted above. Failure to sign does not relieve the contractor and owner/owner's representative of their responsibility to take the necessary corrective action and of their liability for any damages that have occurred or may occur.

INSPECTOR'S SIGNATURE:	DATE:
OWNER/OWNER'S REPRESENTATIVE SIGNATURE:	DATE:
CONTRACTOR'S SIGNATURE:	DATE:

APPENDIX E CHECKLISTS AND PERMITS

As described in Appendix I, an Erosion and Stormwater Quality Control Permit is required for any project disturbing 1 acre or more of land, as well as any disturbance associated with a non-residential land use application. During the vertical building phase, builders of single-family residences and duplexes may obtain a Builders Erosion and Stormwater Quality Control Permit for each lot with a separate address instead.

Projects that go through any part of the development review process (land use applications include subdivision, site development plan, location approval, etc), shall obtain their ESQC permit from Department of Community Services, Development Services Division. Projects that are not associated with a land use application, but propose to disturb more than one acre of land (e.g. roadwork, installation of minor utility lines, maintenance/minor upgrades within existing utility corridors), shall obtain their ESQC Permits through Department of Public Services, Transportation Division (Stormwater Program).

To assist in preparing the plan sets required for the ESQCP approval, a land use committee comprised of DSD and the Housing and Building Association prepared a joint policy statement on grading, erosion control, and dust. The group sought to clarify the requirements of each plan to meet the current regulations. The effort resulted in checklists for Stormwater Management Plans and Grading and Erosion Control Plan Submittals plus Standard Notes for Grading and Erosion Control Plans.

Permits – Applications

Erosion and Stormwater Quality Control Permit – Issued by Department of Public Services, Transportation Division

Builders Erosion and Stormwater Quality Control Permit – Issued by Department of Department of Community Services, Development Services Division

Checklists and Standard Notes

El Paso County Stormwater Management Plan Checklist

El Paso County Grading and Erosion Control Plan Submittal Checklist

Standard Notes for El Paso County Grading and Erosion Control Plans

**EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP)
EL PASO COUNTY PUBLIC SERVICES DEPARTMENT
APPLICATION AND PERMIT**

PERMIT NUMBER _____

APPLICANT INFORMATION

Applicant Contact Information	
Owner	
Name (person of responsibility)	
Company/Agency	
Position of Applicant	
Address (physical address, not PO Box)	
City	
State	
Zip Code	
Mailing address, if different from above	
Telephone	
FAX Number	
Email Address	
Cellular Phone Number	

CONTRACTOR INFORMATION

Contractor	
Name (person of responsibility)	
Company	
Address (physical address, not PO Box)	
City	
State	
Zip Code	
Mailing address, if different from above	
Telephone	
FAX number	
Email Address	
Cellular Phone number	
Erosion Control Supervisor (ECS)*	
ECS Phone number*	
ECS Cellular Phone number*	

*Required for all applicants. May be provided at later date pending securing a contract when applicable.

PROJECT INFORMATION

Project Specifications	
Project Name	
Legal Description	
Address (or nearest major cross streets)	
Acreage (total and disturbed)	Total: acres Disturbed: acres
Schedule	Start of Construction: Completion of Construction: Final Stabilization:
Project Purpose	
Description of Project	
Tax Schedule Number	

FOR OFFICE USE ONLY

The following signature from the ECM Administrator signifies the approval of this ESQCP. All work shall be performed in accordance with the permit, the El Paso County Engineering Criteria Manual (ECM) Standards, City of Colorado Springs Drainage Criteria Manual, Volume 2 (DCM2) as adopted by El Paso County Addendum, approved plans, and any attached conditions. The approved plans are an enforceable part of the ESQCP. Construction activity, except for the installation of initial construction BMPs is not permitted until issuance of a Construction permit and Notice to Proceed.

Signature of ECM Administrator: _____ Date _____

1.1 REQUIRED SUBMISSIONS

In addition to this completed and signed application, the following items must be submitted to obtain an ESQCP:

- Permit fees;
- Stormwater Management Plan (SWMP) meeting the requirements of DCM2 and ECM either as part of the plan set or as a separate document;
- Cost estimates of construction and maintenance of construction and permanent stormwater control measures (Cost estimates shall be provided on a unit cost basis for all stormwater BMPs);
- Financial surety in an amount agreeable to the ECM Administrator based on the cost estimates of the stormwater quality protection measures provided. The financial surety shall be provided in the form of a Letter of Credit, Surety with a Bonding Company, or other forms acceptable to El Paso County;
- Operation and Maintenance Plan for any proposed permanent BMPs; and
- **Signed Private Detention Basin/Stormwater Quality Best Management Practice Maintenance Agreement and Easement, if any Permanent Best Management Practices are to be located on site.**

1.2 RESPONSIBILITY FOR DAMAGE

The County and its officers and employees, including but not limited to the ECM Administrator, shall not be answerable or accountable in any manner, for injury to or death of any person, including but not limited to a permit holder, persons employed by the permit holder, persons acting in behalf of the permit holder, or for damage to property resulting from any activities undertaken by a permit holder or under the direction of a permit holder. The permit holder shall be responsible for any liability imposed by law and for injuries to or death of any person, including but not limited to the permit holder, persons employed by the permit holder, persons acting in behalf of the permit holder, or damage to property arising out of work or other activity permitted and done by the permit holder under a permit, or arising out of the failure on the permit holder's part to perform the obligations under any permit in respect to maintenance or any other obligations, or resulting from defects or obstructions, or from any cause whatsoever during the progress of the work, or other activity, or at any subsequent time work or other activity is being performed under the obligations provided by and contemplated by the permit.

To the extent allowed by law, the permit holder shall indemnify, save, and hold harmless the County and its officers and employees, including but not limited to the BOCC and ECM Administrator, from all claims, suits or actions of every name, kind and description brought for or on account of injuries to or death of any person, including but not limited to the permit holder, persons employed by the permit holder, persons acting in behalf of the permit holder and the public, or damage to property resulting from the performance of work or other activity under the permit, or arising out of the failure on the permit holder's part to perform his obligations under any permit in respect to maintenance or any other obligations, or resulting from defects or obstructions, or from any cause whatsoever during the progress of the work, or other activity or at any subsequent time work or other activity is being performed under the obligations provided by and contemplated by the permit, except as otherwise provided by state law. The permit holder waives any and all rights to any type of expressed or implied indemnity against the County, its officers or employees.

1.3 APPLICATION CERTIFICATION

I, as the Applicant or the representative of the Applicant, hereby certify that this application is correct and complete as per the requirements presented in this application and the El Paso County Engineering Criteria Manual and Drainage Criteria Manual, Volume 2 and El Paso County Addendum.

I, as the Applicant or the representative of the Applicant, have read and will comply with all of the requirements of the specified Stormwater Management Plan and any other documents specifying stormwater best management practices to be used on the site including permit conditions that may be required by the ECM Administrator. I understand that the Best Management Practices are to be maintained on the site and revised as necessary to protect stormwater quality as the project progresses. I further understand that a Construction Permit must be obtained and all necessary stormwater quality control BMPs are to be installed in accordance with the SWMP and the El Paso County Engineering Criteria Manual and Drainage Criteria Manual, Volume 2 and El Paso County Addendum before land disturbance begins and that failure to comply will result in a Stop Work Order and may result in other penalties as allowed by law. I further understand and agree to indemnify, save, and hold harmless the County and its officers and employees, including but not limited to the BOCC and ECM Administrator, from all claims, suits or actions of every name, kind and description as outlined in Section 1.2 Responsibility for Damage.

Date: _____

Signature of Applicant or Representative

Print Name and Title of Applicant or Representative

Permit Fee \$ _____

Surcharge \$ _____

Financial Surety \$ _____ Type of Surety _____

Total \$ _____

APPLICATION AND PERMIT BUILDERS EROSION AND STORMWATER QUALITY CONTROL PERMIT (BESQCP)

PERMIT NUMBER _____

APPLICANT INFORMATION

Applicant Contact Information	
Owner	
Name (person of responsibility)	
Company	
Position of Applicant	
Address (physical address, not PO Box)	
City	
State	
Zip Code	
Phone	

CONTRACTOR INFORMATION

Contractor	
Name (person of responsibility)	
Company	
Position of Applicant	
Address	
City	
State	
Zip Code	
Phone	

PROJECT INFORMATION

Project Specifications	
Name and Legal Description	
Name of Subdivision Filing	
Address (or nearest major cross streets)	
Acreage (total and disturbed)	
Schedule (start and finish and date of final stabilization)	
Description of Project	
Tax Schedule Number	

FOR OFFICE USE ONLY

The following signature from the ECM Administrator signifies the approval of this BESQCP. All work shall be performed in accordance with the permit and the El Paso County ECM Standards.

Signature of ECM Administrator: _____ Date _____

1.1 1.1 REQUIRED SUBMISSIONS

In addition to this completed and signed application, all permit fees must be submitted to obtain a BESQCP. Submission and review of a Stormwater Management Plan or posting of financial sureties are not required for a BESQCP.

1.2 1.2 RESPONSIBILITY FOR DAMAGE

The County and its officers and employees, including but not limited to the ECM Administrator, shall not be answerable or accountable in any manner, for injury to or death of any person, including but not limited to a permit holder, persons employed by the permit holder, persons acting in behalf of the permit holder, or for damage to property from any cause. The permit holder shall be responsible for any liability imposed by law and for injuries to or death of any person, including but not limited to the permit holder, persons employed by the permit holder, persons acting in behalf of the permit holder, or damage to property arising out of work or other activity permitted and done by the permit holder under a permit, or arising out of the failure on the permit holder's part to perform the obligations under any permit in respect to maintenance or any other obligations, or resulting from defects or obstructions, or from any cause whatsoever during the progress of the work, or other activity, or at any subsequent time work or other activity is being performed under the obligations provided by and contemplated by the permit.

The permit holder shall indemnify, save, and hold harmless the County and its officers and employees, including but not limited to the ECM Administrator, from all claims, suits or actions of every name, kind and description brought for or on account of injuries to or death of any person, including but not limited to the permit holder, persons employed by the permit holder, persons acting in behalf of the permit holder and the public, or damage to property resulting from the performance of work or other activity under the permit, or arising out of the failure on the permit holder's part to perform his obligations under any permit in respect to maintenance or any other obligations, or resulting from defects or obstructions, or from any cause whatsoever during the progress of the work, or other activity or at any subsequent time work or other activity is being performed under the obligations provided by and contemplated by the permit, except as otherwise provided by state law. The permit holder waives any and all rights to any type of expressed or implied indemnity against the County, its officers or employees. It is the intent of the parties that the permit holder will indemnify, save, and hold harmless the County, its officers and employees from any and all claims, suits or actions as set forth above regardless of the existence or degree of fault or negligence, whether active or passive, primary or secondary, on the part of the County, the permit holder, persons employed by the permit holder, or persons acting in behalf of the permit holder.

1.3 1.3 APPLICATION CERTIFICATION

I, as the Applicant or the representative of the Applicant, hereby certify that this application is correct and complete as per the requirements presented in this application and the El Paso County Engineering Criteria Manual and Drainage Criteria Manual, Volume 2 and El Paso County Addendum. I own and will build on ten (10) or fewer lots in the referenced subdivision filing.

I understand that the Best Management Practices are to be maintained on the site and revised as necessary to protect stormwater quality as the project progresses. The site and adjacent areas will be self-inspected as often as necessary to be sure that Best Management Practices are installed correctly and functioning for each stage of construction and following each rain event.

Installation and maintenance of Best Management Practices include, but are not limited to:

- Source control and physical barriers that prevent pollutants, including sediment, from leaving the site, especially into waterways or storm drain systems. Pollutants are also to be kept off of roadways, including roadside ditches, and adjacent properties.
- Protection of downstream storm drains, channels, ponds, or waterways.
- Immediate cleanup of sediment and other pollutants that are tracked or otherwise leave the permitted site.

Examples of pollutants that must be contained and cleaned up are:

- Sediment (mud or dirt)
- Excavated or imported soil, aggregate, or rock
- Landscaping materials, including topsoil
- Concrete washout water
- Stucco
- Paints
- Solvents
- Fuels and lubricants
- Pesticides and fertilizers
- Cleaning products
- Other chemicals
- Trash, litter, garbage
- Sanitary waste (e.g. portable toilets), other animal waste

Note: El Paso County does not require that a Stormwater Management Plan (SWMP) be reviewed for a BESQCP. However, it is recommended that a SWMP be prepared and site personnel **be trained in the procedures necessary to protect stormwater quality. The measures in the City of Colorado Springs' Drainage Criteria Manual, Volume 2, Chapter 3, and the El Paso County approved Addendum provide guidance on BMPs for construction sites. Sites covered by BESQCPs are still subject** to any other relevant regulations such as the Colorado Discharge Permit System regulations. The permit holder is responsible for subcontractors onsite complying with the terms of the permit holder's BESQCP.

Signature of Applicant or Representative

Date: _____

EL PASO COUNTY STORMWATER MANAGEMENT PLAN CHECKLIST

Revised 5/21/07

1) Applicant (owner/ designated operator), Prepared By, SWMP Administrator, and Contractor Information.

2) Table of Contents.

3) Site description and location to include vicinity map (not just Section, Township, Range)

4) Narrative description of construction activities proposed (e.g., may include clearing and grubbing, temporary stabilization, road grading, utility / storm installation, final grading, final stabilization, and removal of temporary control measures).

5) Phasing plan – may require separate drawings indicating initial, interim, and final site phases for larger projects. Provide “living maps” that can be revised in the field as conditions dictate.

6) Proposed sequence for major activities: Provide a construction schedule of anticipated starting and completion dates for each stage of land-disturbing activity depicting conservation measures anticipated, including the expected date on which the final stabilization will be completed.

7) Estimates of the total site area and area to undergo disturbance.

8) An estimate of runoff coefficients before and after project construction (may not be required with next State update).

9) Soil erosion potential and potential impacts upon discharge.

10) A description of existing vegetation at the site and percent ground cover.

11) The location and description of any other potential pollution sources such as fueling (mobile or stationary), chemical storage, etc.

12) Material handling to include spill prevention and response procedures.

13) Spill prevention and pollution controls for dedicated batch plants.

14) Other SW pollutant control measures to include waste disposal and off site soil tracking.

15) The location and description of any anticipated non-stormwater components of discharge (springs, irrigation, etc.).

16) The name of ultimate receiving waters; size, type and location of stormwater outfall or storm sewer system discharge.

17) SWMP Map to include:

a) construction boundaries

b) all areas of disturbance

c) areas of cut and fill

d) areas used for storage of building materials, soils or wastes (stockpiles)

e) location of any dedicated asphalt / concrete batch plants

f) major erosion control facilities or structures (sedimentation ponds, etc.)

g) springs, streams, wetlands and other surface waters

h) boundaries of FEMA mapped 100 year flood plain

18) Narrative description of structural BMPs to be used, including silt fence, straw bales, check dams, sediment basins, drainage swales, etc. Ensure method is ECM / DCM approved.

19) Description of non-structural BMPs to be used including seeding, mulching, protection of existing vegetation, site watering, sod placement, etc.

20) Technical drawing details for BMP installation and maintenance.

21) Procedure for how the SWMP will be revised.

22) Description of Final Stabilization and Long-term Stormwater Quality (describe measures to control SW pollutants after construction operations have been completed.

23) Provide for vegetative cover density to be 70% of pre-disturbed levels.

24) Outline of permit holder inspection procedures to install, maintain, and effectively operate BMPs, to manage erosion and sediment.

25) Record keeping procedures identified to include signature on inspection logs and location of SWMP records on-site.

Please note: all items need to be addressed. If not applicable, explain; simply identifying "not applicable" will not satisfy CDPHE requirement of explanation.

Joint Policy Statement on Grading, Erosion Control and Dust El Paso County Development Services Department, and Housing and Building Association – Land Use Committee

1. Summary:

Earthwork and grading operations at construction sites have long been a concern because of the potential for soil erosion carried by storm runoff and related dust generated during dry seasons. Dust first, then runoff sediment were both significant problems in El Paso County in 2006 and came to the attention of the County Commissioners, the County Health Department, and the Colorado Department of Public Health and the Environment (CDPHE). In meetings that followed, County Administration asked County Development Services Department (DSD) to work with the construction industry through the Housing and Building Association (HBA) to improve compliance with the current regulations. A working group was formed between DSD and the HBA to make improvements to processes, and make clarifications of requirements so that the result would be improved compliance (less erosion and related dust) at construction sites. The working group has met six times to date, and held “work” meetings where the current requirements were discussed and clarified in detail. The industry acknowledged that it can do a better job of compliance through required self- inspection and maintaining compliance at construction sites. The working group used the meetings to prepare submittal checklists for two of the main required documents: Grading and Erosion Control (GEC) Plans, and Storm Water Management Plans. A set of standard notes for GEC Plans was also prepared. These checklists and notes are attached. The meetings allowed for much improved understanding of specific regulations, requirements, and enforcement along with some of the challenges industry faces in maintaining compliance.

County staff believes that we are already seeing the benefit of this work in construction site compliance. No additional regulations have been proposed at this time. More thought about these issues and planning is being brought to pre-construction conferences. More attention is being paid in the field.

After endorsement from both El Paso County and the Industry, the working group proposes follow up actions. These clarifications and policies would be shared with the wider development and construction community through public workshops. A trial period of a year is proposed to allow for improvement and then evaluation of effectiveness. After that time, the working group could be convened again to make necessary changes to policies and procedures, and if necessary to propose changes to the regulations.

The sections that follow provide detailed discussion of these policies and procedures in an effort to lessen the impact of construction and to improve construction site compliance.

2. Background:

Soil erosion along with blowing dust has long been a concern in the region. Dry weather early in 2006 and blowing dust that resulted made this a significant concern on construction sites that were undergoing earthwork and grading operations. Later in 2006, the other concern over

construction site stabilization was illustrated as severe rain events threatened to send sediment laden runoff to downstream properties from many construction sites in the County.

The County development-related regulations concerning grading and erosion control requirements emphasize storm water management, water quality concerns, and prevention of soil erosion from rainfall events. It is clear that wind erosion is also a significant concern, both from the standpoint of soil transfer to surrounding properties, and the impact to public health. From ongoing experience on various construction sites it is also evident that the amount of disturbed land area actively being graded is directly related to dust production.

3. Current Regulations and Enforcement:

Dust is regulated in El Paso County by the County Health Department. Grading, Erosion Control and storm water quality is regulated in El Paso County by the County Development Services Department, the County Public Services Department under the County MS4 (Municipal Separate Storm Sewer System) storm water quality permit, and by the Colorado Department of Public Health and Environment under a Colorado Discharge Permit for each construction site.

The overlapping requirements from different jurisdictions is confusing and has added to the problem. When County DSD or DOT staff receive dust complaints, those specific complaints are turned over to the County Health Department. If a construction site in the County is implicated by the complaint, DSD inspections staff does follow up with a site visit in order to determine if non-compliance with GEC or water quality best management practices are contributing to the dust complaint. The responsibility for dust enforcement is with the Health Department, but there are times when DSD or DOT get involved with enforcement of related GEC requirements.

The County Health Department issues Construction Activity Permits for projects that disturb more than one acre of ground under the County Air Quality Regulations. The permit regulates visual dust emissions (opacity), and often sets a maximum wind speed under which earthwork activities can be performed. The regulations list control measures such as compacting, minimizing disturbed areas, phasing, watering among others that may be required in order to minimize dust. Projects larger than 25 acres, or that will exceed six months in duration are also regulated by the CDPHE Air Quality Control Commission. County Health Department enforcement includes possible revocation of the permit, and civil penalties up to \$10,000.

Regulations concerning grading, erosion control and storm water quality management are primarily in the El Paso County Engineering Criteria Manual (ECM), and the City / County Drainage Criteria Manual (DCM) Volumes 1 and 2 that are administered by County DSD and DOT. Builder's Erosion and Storm water Quality Control Permits (BESQCP), and Erosion and Storm water Quality Control Permits (ESQCP) for development and larger projects are issued for construction projects under the County's MS4 permit.

The County regulations currently require that:

- "All earth disturbances shall be designed, constructed, and completed in such a manner so that the exposed area of any disturbed land shall be limited to the shortest practical period of time." (DCM, vol. 2)
- "All disturbed areas and stockpiles shall be mulched within 21 days after final grade is reached." (DCM, vol. 2)
- "The overall area being graded should be kept to a minimum per provisions presented in an approved Erosion and Stormwater Quality Control Permit (ESQCP)." (ECM)
- Areas that will be dormant for more than 30 days be stabilized by mulching. (DCM vol. 2)

- Areas that are at final grade or will be dormant for more than 60 days be stabilized by seeding and mulching (DCM vol. 2)

Enforcement provisions are carried out by DSD and DOT under the procedure provided in the ECM Appendix I and include: Letter of Non-Compliance, Stop Work Order, permit revocation, and ultimately court summons.

The Colorado Department of Public Health and Environment administers the NPDES water quality program for the EPA. CDPHE requires separate Colorado Discharge Permits for construction sites. State enforcement can include stop work orders and significant daily fines for violations.

4. County and Industry Committee Meetings:

To address the concerns over erosion, sediment and the related dust from construction sites, County DSD staff met with the County Health Department and the Housing and Building Association (HBA) land use committee. Initially, County staff discussed the possibility of specific disturbed area limits, similar to Douglas and Arapahoe County where a limit is placed on the amount of land (e.g., 40 acres, 50 acres, etc.) that could be undergoing active earth disturbance, at any given time.

In August, 2006, the HBA provided a letter to County Administration requesting that disturbed area limits not be applied. The letter requested that the County work to better enforce the existing regulations, and acknowledged that the construction industry can do a better job of compliance with the regulations. The HBA requested that a committee be set up to work on these improvements. Upon direction from County Administration, County DSD and the HBA formed a grading and erosion control working group to provide clarification of the requirements and enforcement as called for in current regulations. To date, this group has met six times.

5. Resulting Clarification of County Engineering Criteria, Grading / Erosion Control Plans and Storm Water Management Plans:

As described earlier, there are overlapping regulations in the County and at the State level concerning grading and erosion control. The County's water quality permit required by the State (MS4 permit) is fairly recent. It began in 2004 with a 5-year implementation period. The County Engineering Criteria Manual (ECM) was initially adopted in December 2004, also with an implementation period. The ECM in place now sets forth construction site requirements for grading and erosion control in Chapter 5 and in Appendix I. These current County regulations are those that implement the County's obligation under the State MS4 permit.

Two critical requirements of the ECM are Grading and Erosion Control (GEC) Plans, and Storm Water Management Plans (SWMP). Because of the overlapping regulations and permit requirements, clarifying the scope and timing of these two plans has been the main focus of the County / HBA working group. Early on, the working group determined that clarifying these plan requirements would allow for more efficient preparation and County review, and much improved construction related compliance.

Because the GEC Plan and SWMP are so inter-related, the working group sought clarification on what each plan includes, when each of the plans is actually prepared, approved and carried out.

It is clear from the ECM that GEC Plans are required to be prepared by the Professional Engineer, reviewed and approved by County DSD as part of the development related Construction Drawings. It was less clear as to when the SWMP would be required in the

development review process. Further, many of the State mandated requirements for the SWMP overlap with the GEC Plan.

Through much discussion, the working group sought to sort out the requirements and timing for each plan to meet all the current regulations. As a work product the group developed simplified checklists for both the GEC Plan and SWMP. As there has been inconsistency in the standard notes on GEC Plans that are intended to help the project stay in compliance with applicable regulations (many have evolved from other jurisdictions or old regulations, etc.), another work product was to develop together standard County notes to be placed on the GEC Plan. These checklists and standard notes are attached. The following are the resulting scope and timing policies that have resulted from the work of the working group:

Grading and Erosion Control (GEC) Plan: The intent of the GEC Plan is to provide for overall subdivision or development grading design as part of the engineering required for review and approval by the County. This plan is done at the time subdivision or development construction drawings are prepared by the Professional Engineer working for the developer. This is complex work whereby cuts and fills are analyzed for balance, slopes and contours are proposed as an integral part of the engineering design. A second important use of the GEC Plan is to estimate the cost of the overall grading, erosion control measures known as Best Management Practices (BMPs), and ultimate site stabilization. The County subdivision regulations require that collateral for these activities be posted prior to any land disturbing activity. The GEC Plan is therefore important to be completed and approved at the time of subdivision construction drawing approval so that these costs can be accurately estimated and included with the required subdivision collateral.

It was also determined that at the time of GEC Plan approval, the exact timing and phasing of the work is not always known. The exact starting date is sometimes delayed, and often the contractor that will do the earthwork is not yet under contract. The earthwork contractor has expertise in planning and phasing the earth disturbing activity to maintain compliance that is not yet a part of the project at the time of GEC Plan approval. Although overall phasing and general timing may be known and presented, the exact dates, phasing and progression of the earthwork and stabilization work is not known at plan approval. It is therefore the working group's recommendation that detailed phasing of the work and the proposed construction schedule be deferred to the required SWMP. The GEC Plan checklist and Standard Notes prepared by the working group are attached.

Storm Water Management Plan (SWMP): The SWMP is required before any ground disturbing activities. It describes in detail exactly what BMPs will be used prior to construction, during the construction period and at project closeout. It is the plan that is required to show how the project will maintain compliance throughout construction to final stabilization. The consulting engineer, the owner and contractors should collaborate on the preparation to provide the best information possible.

The SWMP does not have to be prepared by a registered Professional Engineer. The SWMP is required to be kept up to date on site by the designated permit Site Manager. On larger projects it will include "Living Maps" that are marked to show current status of disturbance, and stabilized areas. This plan is required before a notice to proceed is issued by the County and should be provided to the DSD Inspections group at least 2 weeks prior to ground disturbance. The SWMP checklist prepared by the working group is attached.

6. Enforcement of Regulations:

Concerning enforcement, the working group determined that the current County enforcement tools (i.e., Letter of Non-Compliance, Stop Work, Court injunction, etc.) are adequate. Letter of Non-Compliance and Stop Work orders have been used since the time of ECM adoption, and have been effective. During this intervening time, the CDPHE has also been active in enforcing its Colorado Discharge Permit regulations through inspection of construction projects in the unincorporated County. The State enforcement actions have also been effective. The working group is not recommending any changes to enforcement regulations at this time. The industry acknowledges that it can do a better job of self inspection and compliance with the regulations. It is the working group's belief that renewed focus on the regulations, and the beneficial clarifications in this policy will result in better compliance and a significant decrease in the concern of the public over construction related soil erosion and related dust.

Acknowledgements:

The Development Services Department and the Housing and Building Association wishes to thank the following individuals for participating in the working group meetings:

Kirk Ager, Rice and Rice, Inc.
Mike Mallon, Mallon Development Co.
Charlie Williams, Infinity Land Corp.
Brenda Quinones, Housing and Building Assoc.
Kim Cooper, Lennar
Bobby Ingels, Ingels Company
Matthew Merritt, Classic Consulting
Marc Whorton, Classic Consulting
Darin Moffatt, Classic Consulting
Jeff Dwire, Dwire Earthmoving
Chad Ellington, Oakwood Homes
Dean Blazik, Construction Site Management
Margie DeLaurell, JR Engineering
Larry Lee, Raw Land Detailing, Inc.
Mike Lee, Raw Land Detailing, Inc.
Mike DeGrant, Lowell Development
Rudy Cross, Cross Company
Ken Bailey, LaPlata
Jennifer Davis, Kiowa Engineering
Stewart Wills, Classic Homes
John LeSage, Matrix Design Group
Tom Kerby, PBS&J
Jim Luthi, Century Communities
Roger DeKloe, New Generation Homes
Mel Keys, Banning Lewis Ranch
Tara McGowan, El Paso County DSD
Larry Syslo, El Paso County DSD
Paul Danley, El Paso County DSD
Robert Wolf, El Paso County DSD
Todd Sturtevant, City Stormwater Enterprise

EL PASO COUNTY GRADING AND EROSION CONTROL PLAN SUBMITTAL CHECKLIST

Revised 5/21/07

- 1) Vicinity map.
- 2) North arrow and acceptable scale (1"=20' to 1"=100').
- 3) Existing and proposed Contours 2 feet or less (except for hillside).
- 4) Standard EPC Grading and Erosion Control Notes included.
- 5) Delineate mapped FEMA 100-yr floodplain.
- 6) Construction site boundaries clearly delineated.
- 7) Areas of soil disturbance shown.
- 8) All proposed construction BMPs and Construction BMP details shown.
- 9) Show existing vegetation.
- 10) Existing and proposed water courses including springs, streams, wetlands, Detention ponds, roadside ditches, irrigation ditches and other water surfaces.
- 11) Show any existing structures.
- 12) Show all existing utilities.
- 13) Submit geotechnical investigation from soils engineer.
- 14) Conclusions from soils report and geologic hazards report incorporated in grading design.
- 15) Show existing and proposed property lines and subdivision boundary.
- 16) All existing and proposed easements (permanent and construction) including required off site easements.
- 17) Any offsite grading clearly shown and called out.
- 18) Existing and proposed storm drainage facilities as necessary to show all BMPs.
- 19) Temporary sediment ponds provided for disturbed drainage areas greater than 1 acre.
- 20) Proposed slopes steeper than 3:1 with top and toe of slope delineated.
- 21) Erosion control blanketing shown on slopes steeper than 3:1.
- 22) Retaining walls greater than or equal to 4ft in height require design by P.E. and building permit from Regional Building Department. Locations to be shown on the plan (not located in County ROW).
- 23) Vehicle tracking shown at all construction entrances.
- 24) The erosion control plan is to be certified by a Colorado Registered P.E. with appropriate signature blocks for EPC and the Engineer and the statement "The Owner will comply with the requirements of the Erosion Control Plan" signed by the owner.
- 25) Required Signature blocks:

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 report.

Name

Date

El Paso County Grading and Erosion Control Plan

Submittal Checklist

Page 2 of 2

Owner's Statement:

The Owner will comply with the requirements of the Grading and Erosion Control Plan.

Name

Date

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, and Engineering Criteria Manual as amended.

Standard Notes for El Paso County Grading and Erosion Control Plans

Revised 5/21/07

1. 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.
2. 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 to regulations and standards must be requested, and approved, in writing.
3. 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. During construction the SWMP is the responsibility of the designated Stormwater Manager, shall be located on site at all times and shall be kept up to date with work progress and changes in the field.
4. Once the ESQCP has been issued, the contractor may install the initial stage erosion and sediment control BMPs as indicated on the 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 DSD inspections staff.
5. Soil erosion control measures for all slopes, channels, ditches, or any disturbed land area shall be completed within 21 calendar days after final grading, or final earth disturbance, has been completed. Disturbed areas and stockpiles which are not at final grade but will remain dormant for longer than 30 days shall also be mulched within 21 days after interim grading. An area that is going to remain in an interim state for more than 60 days shall also be seeded. All temporary soil erosion control measures and BMPs shall be maintained until permanent soil erosion control measures are implemented and established.
6. Temporary soil erosion control facilities shall be removed and earth disturbance areas graded and stabilized with permanent soil erosion control measures pursuant to standards and specification prescribed in the DCM Volume II and the Engineering Criteria Manual (ECM) appendix I.
7. All persons engaged in earth disturbance shall implement and maintain acceptable soil erosion and sediment control measures including BMPs in conformance with the erosion control technical standards of the Drainage Criteria Manual (DCM) Volume II and in accordance with the Stormwater Management Plan (SWMP).

8. All temporary erosion control facilities including BMPs and all permanent facilities intended to control erosion of any earth disturbance operations, shall be installed as defined in the approved plans, the SWMP and the DCM Volume II and maintained throughout the duration of the earth disturbance operation.
9. Any earth disturbance shall be conducted in such a manner so as to effectively reduce 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.
10. Any temporary or permanent facility designed and constructed for the conveyance of stormwater around, through, or from the earth disturbance area shall be designed to limit the discharge to a non-erosive velocity.
11. Concrete wash water shall be contained and disposed of in accordance with the SWMP. No wash water shall be discharged to or allowed to runoff to State Waters, including any surface or subsurface storm drainage system or facilities.
12. Erosion control blanketing is to be used on slopes steeper than 3:1.
13. Building, construction, excavation, or other 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. BMP's may be required by El Paso County Engineering if deemed necessary, based on specific conditions and circumstances.
14. Vehicle tracking of soils and construction debris off-site shall be minimized. Materials tracked offsite shall be cleaned up and properly disposed of immediately.
15. Contractor shall be responsible for the removal of all wastes from the construction site for disposal in accordance with local and State regulatory requirements. No construction debris, tree slash, building material wastes or unused building materials shall be buried, dumped, or discharged at the site.
16. The owner, site developer, contractor, and/or their authorized agents shall be responsible for the removal of all construction debris, dirt, trash, rock, sediment, and sand that may accumulate in the storm sewer or other drainage conveyance system and stormwater appurtenances as a result of site development.
17. 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.
18. No chemicals are to be used by the contractor, which have the potential to be released in stormwater unless permission for the use of a specific chemical is granted in writing by the ECM Administrator. In granting the use of such chemicals, special conditions and monitoring may be required.
19. Bulk storage structures for petroleum products and other chemicals shall have adequate protection so as to contain all spills and prevent any spilled material from entering State Waters, including any surface or subsurface storm drainage system or facilities.
20. No person shall cause the impediment of stormwater flow in the flow line of the curb and gutter or in the ditchline.

21. Individuals 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 included in the DCM Volume II and the ECM Appendix I. All appropriate permits must be obtained by the contractor prior to construction (NPDES, Floodplain, 404, fugitive dust, etc.). In the event of conflicts between these requirements and laws, rules, or regulations of other Federal, State, or County agencies, the more restrictive laws, rules, or regulations shall apply.

22. All construction traffic must enter/exit the site at approved construction access points.

23. Prior to actual construction the permittee shall verify the location of existing utilities.

24. A water source shall be available on site during earthwork operations and utilized as required to minimize dust from earthwork equipment and wind.

25. The soils report for this site has been prepared by _____ and shall be considered a part of these plans.

26. At least ten days prior to the anticipated start of construction, for projects that will disturb 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

DRAFT

PRIVATE DETENTION BASIN / STORMWATER QUALITY
BEST MANAGEMENT PRACTICE MAINTENANCE
AGREEMENT AND EASEMENT

This PRIVATE DETENTION BASIN / STORMWATER QUALITY BEST MANAGEMENT PRACTICE MAINTENANCE AGREEMENT AND EASEMENT (Agreement) is made by and between EL PASO COUNTY by and through THE BOARD OF COUNTY COMMISSIONERS OF EL PASO COUNTY, COLORADO (Board or County) and **Clear View Properties I, LLC (Clear View Industrial Park Filing No. 2A -Lots 1A, 2A, 4A (Drainage Track) (Owner)**. The above may occasionally be referred to herein singularly as “Party” and collectively as “Parties.”

Recitals

A. WHEREAS, Developer is the owner of certain real estate (the Property or Subdivision) in El Paso County, Colorado, which Property is legally described in Exhibit A attached hereto and incorporated herein by this reference; and

B. WHEREAS, Developer has platted and developed on the Property a subdivision/land use to be known as **Clear View Industrial Park Filing No. 2A** and

C. WHEREAS, the development of this Property will substantially increase the volume of water runoff and will decrease the quality of the stormwater runoff from the Property, and, therefore, it is in the best interest of public health, safety and welfare for the County to condition approval of this subdivision/land use on Developer’s promise to construct adequate drainage, water runoff control facilities, and stormwater quality structural Best Management Practices (“BMPs”) for the subdivision/land use; and

D. WHEREAS, Chapter 8, Section 8.4.5 of the El Paso County Land Development Code, as periodically amended, promulgated pursuant to Section 30-28-133(1), Colorado Revised Statutes (C.R.S.), requires the County to condition approval of all subdivisions on a developer’s promise to so construct adequate drainage, water runoff control facilities, and BMPs in subdivisions; and

E. WHEREAS, the Drainage Criteria Manual, Volume 2, as amended by Appendix I of the El Paso County Engineering Criteria Manual (ECM), as each may be periodically amended, promulgated pursuant to the County’s Colorado Discharge Permit System General Permit (MS4 Permit) as required by Phase II of the National Pollutant Discharge Elimination System (NPDES), which MS4 Permit requires that the County take measures to protect the quality of stormwater from sediment and other contaminants, requires subdividers, developers, landowners, and owners of facilities located in the County’s rights-of-way or easements to

provide adequate permanent stormwater quality BMPs with new development or significant redevelopment; and

F. WHEREAS, Section 2.9 of the El Paso County Drainage Criteria Manual provides for a developer's promise to maintain a subdivision's drainage facilities in the event the County does not assume such responsibility; and

G. WHEREAS, developers in El Paso County have historically chosen water runoff detention basins as a means to provide adequate drainage and water runoff control in subdivisions, which basins, while effective, are less expensive for developers to construct than other methods of providing drainage and water runoff control; and

H. WHEREAS, Developer desires to construct for the subdivision/land use [insert number of basins/BMPs] detention basin/stormwater quality BMP(s) ("detention basin/BMP(s)") as the means for providing adequate drainage and stormwater runoff control and to meet requirements of the County's MS4 Permit, and to operate, clean, maintain and repair such detention basin/BMP(s); and

I. WHEREAS, Developer desires to construct the detention basin/BMP(s) on property that is or will be platted as **Lot 4A, Clear View Industrial Park Filing No. 2A** as indicated on the final plat of the subdivision, and as set forth on Exhibit B attached hereto; and

J. WHEREAS, Developer shall be charged with the duties of constructing, operating, maintaining and repairing the detention basin/BMP(s) on the Property described in Exhibit B; and

K. WHEREAS, it is the County's experience that subdivision developers and property owners historically have not properly cleaned and otherwise not properly maintained and repaired these detention basins/BMPs, and that these detention basins/BMPs, when not so properly cleaned, maintained, and repaired, threaten the public health, safety and welfare; and

L. WHEREAS, the County, in order to protect the public health, safety and welfare, has historically expended valuable and limited public resources to so properly clean, maintain, and repair these detention basins/BMPs when developers and property owners have failed in their responsibilities, and therefore, the County desires the means to recover its costs incurred in the event the burden falls on the County to so clean, maintain and repair the detention basin/BMP(s) serving this subdivision/land use due to the Developer/Owner's failure to meet its obligations to do the same; and

M. WHEREAS, the County conditions approval of this subdivision/land use on the Developer's promise to so construct the detention basin/BMP(s), and conditions approval on the Owner's promise to reimburse the County in the event the burden falls upon the County to so clean, maintain and/or repair the detention basin/BMP(s) serving this Subdivision; and

N. WHEREAS, the County could condition subdivision/land use approval on the Developer's promise to construct a different and more expensive drainage, water runoff control system and BMPs than those proposed herein, which more expensive system would not create the possibility of the burden of cleaning, maintenance and repair expenses falling on the County; however, the County is willing to forego such right upon the performance of Developer/Owner's promises contained herein; and

O. WHEREAS, the County, in order to secure performance of the promises contained herein, conditions approval of this subdivision/land use upon the Developer's grant herein of a perpetual Easement over a portion of the Property for the purpose of allowing the County to periodically access, inspect, and, when so necessary, to clean, maintain and/or repair the detention basin/BMP(s); and

Agreement

NOW, THEREFORE, in consideration of the mutual Promises contained herein, the sufficiency of which are hereby acknowledged, the Parties agree as follows:

1. Incorporation of Recitals: The Parties incorporate the Recitals above into this Agreement.
2. Covenants Running with the Land: Developer/Owner agrees that this entire Agreement and the performance thereof shall become a covenant running with the land, which land is legally described in Exhibit A attached hereto, and that this entire Agreement and the performance thereof shall be binding upon itself, its successors and assigns.
3. Construction: Developer shall construct on that portion of the Property described in Exhibit B attached hereto and incorporated herein by this reference, 1 detention basin/BMP(s). Developer shall not commence construction of the detention basin/BMP(s) until the El Paso County Development Services Department (DSD) has approved in writing the plans and specifications for the detention basin/BMP(s) and this Agreement has been signed by all Parties and returned to the DSD. Developer shall complete construction of the detention basin/BMP(s) in substantial compliance with the County-approved plans and specifications for the detention basin/BMP(s). Failure to meet these requirements shall be a material breach of this Agreement, and shall entitle the County to pursue any remedies available to it at law or in equity to enforce the same. Construction of the detention basin/BMP(s) shall be substantially completed within one (1) year (defined as 365 days), which one year period will commence to run on the date the approved plat of this Subdivision is recorded in the records of the El Paso County Clerk and Recorder. In cases where a subdivision is not required, the one year period will commence to run on the date the Erosion and Stormwater Quality Control Permit (ESQCP) is issued. Rough grading of the detention

basin/BMP(s) must be completed and inspected by the El Paso County Development Services Department prior to commencing road construction.

In the event construction is not substantially completed within the one (1) year period, then the County may exercise its discretion to complete the project, and shall have the right to seek reimbursement from the Developer/Owner and its successors and assigns, for its actual costs and expenses incurred in the process of completing construction. The term actual costs and expenses shall be liberally construed in favor of the County, and shall include, but shall not be limited to, labor costs, tool and equipment costs, supply costs, and engineering and design costs, regardless of whether the County uses its own personnel, tools, equipment and supplies, etc. to correct the matter. In the event the County initiates any litigation or engages the services of legal counsel in order to enforce the Provisions arising herein, the County shall be entitled to its damages and costs, including reasonable attorney fees, regardless of whether the County contracts with outside legal counsel or utilizes in-house legal counsel for the same.

4. Maintenance: The Developer/Owner agrees for itself and its successors and assigns, that it will regularly and routinely inspect, clean and maintain the detention basin/BMP(s), and otherwise keep the same in good repair, all at its own cost and expense. No trees or shrubs that will impair the structural integrity of the detention basin/BMP(s) shall be planted or allowed to grow on the detention basin/BMP(s).

5. Creation of Easement: Developer/Owner hereby grants the County a non-exclusive perpetual easement upon and across that portion of the Property described in Exhibit B. The purpose of the easement is to allow the County to access, inspect, clean, repair and maintain the detention basin/BMP(s); however, the creation of the easement does not expressly or implicitly impose on the County a duty to so inspect, clean, repair or maintain the detention basin/BMP(s).

6. County's Rights and Obligations: Any time the County determines, in the sole exercise of its discretion, that the detention basin/BMP(s) is not properly cleaned, maintained and/or otherwise kept in good repair, the County shall give reasonable notice to the Developer/Owner and its successors and assigns, that the detention basin/BMP(s) needs to be cleaned, maintained and/or otherwise repaired. The notice shall provide a reasonable time to correct the problem(s). Should the responsible parties fail to correct the specified problem(s), the County may enter upon the Property to so correct the specified problem(s). Notice shall be effective to the above by the County's deposit of the same into the regular United States mail, postage pre-paid. Notwithstanding the foregoing, this Agreement does not expressly or implicitly impose on the County a duty to so inspect, clean, repair or maintain the detention basin/BMP(s).

7. Reimbursement of County's Costs / Covenant Running With the Land: The Developer/Owner agrees and covenants, for itself, its successors and assigns, that it will reimburse the County for its costs and expenses incurred in the process of completing construction of, cleaning, maintaining, and/or repairing the detention basin/BMP(s) pursuant to the provisions of this Agreement.

The term “actual costs and expenses” shall be liberally construed in favor of the County, and shall include, but shall not be limited to, labor costs, tools and equipment costs, supply costs, and engineering and design costs, regardless of whether the County uses its own personnel, tools, equipment and supplies, etc. to correct the matter. In the event the County initiates any litigation or engages the services of legal counsel in order to enforce the provisions arising herein, the County shall be entitled to its damages and costs, including reasonable attorney’s fees, regardless of whether the County contracts with outside legal counsel or utilizes in-house legal counsel for the same.

8. Contingencies of Land Use/Land Disturbance Approval: Developer/Owner’s execution of this Agreement is a condition of land use/land disturbance approval.

The County shall have the right, in the sole exercise of its discretion, to approve or disapprove any documentation submitted to it under the conditions of this Paragraph, including but not limited to, any separate agreement or amendment, if applicable, identifying any specific maintenance responsibilities not addressed herein. The County’s rejection of any documentation submitted hereunder shall mean that the appropriate condition of this Agreement has not been fulfilled.

9. Agreement Monitored by El Paso County Development Services Department and/or El Paso County Public Services Department: Any and all actions and decisions to be made hereunder by the County shall be made by the Director of the El Paso County Development Services Department and/or the Director of the El Paso County Public Services Department. Accordingly, any and all documents, submissions, plan approvals, inspections, etc. shall be submitted to and shall be made by the Director of the Development Services Department and/or the Director of the El Paso County Public Services Department.

10. Indemnification and Hold Harmless: To the extent authorized by law, Developer/Owner agrees, for itself, its successors and assigns, that it will indemnify, defend, and hold the County harmless from any and all loss, costs, damage, injury, liability, claim, lien, demand, action and causes of action whatsoever, whether at law or in equity, arising from or related to its intentional or negligent acts, errors or omissions or that of its agents, officers, servants, employees, invitees and licensees in the construction, operation, inspection, cleaning (including analyzing and disposing of any solid or hazardous wastes as defined by State and/or Federal environmental laws and regulations), maintenance, and repair of the detention basin/BMP(s), and such obligation arising under this Paragraph shall be joint and several. Nothing in this Paragraph shall be deemed to waive or otherwise limit the defense available to the County pursuant to the Colorado Governmental Immunity Act, Sections 24-10-101, et seq. C.R.S., or as otherwise provided by law.

11. Severability: In the event any Court of competent jurisdiction declares any part of this Agreement to be unenforceable, such declaration shall not affect the enforceability of the remaining parts of this Agreement.

12. Third Parties: This Agreement does not and shall not be deemed to confer upon or grant to any third party any right to claim damages or to bring any lawsuit, action or other proceeding against either the County, the Developer/Owner, or their respective successors and assigns, because of any breach hereof or because of any terms, covenants, agreements or conditions contained herein.

13. Solid Waste or Hazardous Materials: Should any refuse from the detention basin/BMP(s) be suspected or identified as solid waste or petroleum products, hazardous substances or hazardous materials (collectively referred to herein as “hazardous materials”), the Developer/Owner shall take all necessary and proper steps to characterize the solid waste or hazardous materials and properly dispose of it in accordance with applicable State and/or Federal environmental laws and regulations, including, but not limited to, the following: Solid Wastes Disposal Sites and Facilities Acts, §§ 30-20-100.5 – 30-20-119, C.R.S., Colorado Regulations Pertaining to Solid Waste Disposal Sites and Facilities, 6 C.C.R. 1007-2, et seq., Solid Waste Disposal Act, 42 U.S.C. §§ 6901-6992k, and Federal Solid Waste Regulations 40 CFR Ch. I. The County shall not be responsible or liable for identifying, characterizing, cleaning up, or disposing of such solid waste or hazardous materials. Notwithstanding the previous sentence, should any refuse cleaned up and disposed of by the County be determined to be solid waste or hazardous materials, the Developer/Owner, but not the County, shall be responsible and liable as the owner, generator, and/or transporter of said solid waste or hazardous materials.

14. Applicable Law and Venue: The laws, rules, and regulations of the State of Colorado and El Paso County shall be applicable in the enforcement, interpretation, and execution of this Agreement, except that Federal law may be applicable regarding solid waste or hazardous materials. Venue shall be in the El Paso County District Court.

IN WITNESS WHEREOF, the Parties affix their signatures below.

Executed this _____ day of _____, 20____, by:

Clear View Properties I, LLC (Lots 1A, 2A, and 4A)

By: _____
Kevin J. Ferguson, Manager

The foregoing instrument was acknowledged before me this _____ day of _____, 20____, by Lot 1A, 2A, and 4A, Manager,

Witness my hand and official seal.

My commission expires: _____

Notary Public

Executed this _____ day of _____, 20____,

BOARD OF COUNTY COMMISSIONERS
OF EL PASO COUNTY, COLORADO

By: _____

_____, Chair

Attest:

County Clerk and Recorder

The foregoing instrument was acknowledged before me this _____ day of _____, 20____, by _____, Chair of the Board of County

Commissioners of El Paso County, Colorado, as Attested to by _____, County Clerk and Recorder.

Witness my hand and official seal.

My commission expires: _____

Notary Public

Approved as to Content and Form:

~~Assistant County Attorney~~

SURETY ESTIMATE FORM

This Surety Estimate Form is located on the El Paso County website at
<http://adm.elpasoco.com/Development%20Services/Pages/CollateralSuretyForms.aspx>

The following pages contain typical wording for:

- Defect Surety
- Performance Surety
- Punchlist Inspection Form
- Schedule for Completion of Improvements
- Surety Release Inspection Request

Appendix H Surety Release Request Form
Adopted: 12/23/2004
Revised: 12/13/2016
REVISION 6

DEFECT SURETY (TYPICAL WORDING)

KNOW ALL MEN BY THESE PRESENTS: That (Owner or Contractor and Address) as Principal and the (Insurance Company) as a (Name of State) corporation authorized to execute an approved form of surety in the State of Colorado, and duly authorized to transact a general surety business in the State of Colorado, as Surety, are held and firmly bound unto County of El Paso, State of Colorado, in the sum of (20% of Contract Price) lawful money of the United States, for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH THAT: WHEREAS (The Principal) has _____, and WHEREAS, the said (Principal) is required to give a form of surety in the amount of (20% Contract Price) to protect the said COUNTY OF EL PASO against the result of faulty materials or workmanship for a period of TWO YEARS from and after the date of completion and preliminary acceptance of said work;

NOW, THEREFORE, if the said (Principal) shall for a period of TWO YEARS from and after the date of completion and acceptance of said work, replace any and all defects arising in said work whether resulting from defective materials or defective workmanship, then the above obligation to be void; otherwise, to remain in full force and effect.

Signed and sealed this _____ day of _____, 20__.

Appendix H Defect Surety Form
Adopted: 12/23/2004
Revised: 12/13/2016
REVISION 6

PERFORMANCE SURETY (TYPICAL WORDING)

WHEREAS, the County of El Paso, State of Colorado, and _____
(hereinafter designated as "Principal") have entered into an agreement whereby Principal agrees to install and complete certain designated public and development or subdivision improvements, which said agreement, dated _____, and identified as Project _____ is hereby referred to and made a part hereof; and

WHEREAS, Principal is required under the terms of said agreement to furnish surety for the faithful performance of said agreement;

NOW, THEREFORE, we, the Principal and _____, as Surety, are held firmly bound unto the County of El Paso (hereinafter called "County") in the penal sum of _____ Dollars (\$ _____) of lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

The condition of this obligation is such that if the above Principal, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and provisions in said agreement and any alteration thereof made as therein provided, on his or their part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the County, its elected officials, officers, employees, agents, and volunteers, as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect.

As a part of the obligation secured hereby and in addition to the face amount specified therefore, there shall be included costs and reasonable expenses and fees, including reasonable attorney's fees, incurred by County in successfully enforcing such obligation, all to be taxed as costs and included in any judgment rendered. The surety hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the agreement or to the work to be performed thereunder or the specifications accompanying the same shall in manner affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the agreement or to the work or to the specifications.

IN WITNESS WHEREOF, this instrument has been duly executed by the Principal and Surety above named on _____:

Appendix H Performance Surety Form

Adopted: 12/23/2004

Revised: 12/13/2016

REVISION 6

APPROVED AS TO FORM:

COUNTY ATTORNEY

ATTEST:

County Clerk (Seal)

Name of Principal

By: _____
(Seal)

Name of Surety

By: _____
(Seal) Attorney-in-Fact

PUNCHLIST INSPECTION FORM

1.1 PURPOSE

The purpose of this form is to ensure the completion a preliminary or final acceptance punchlist inspection and provide a comprehensive list of needed corrections.

1.2 INSPECTION CODES

The following codes shall be used:

NA - not applicable, NI – not installed, WU – work underway

1.3 DRAINAGE CONDITIONS CONFORM TO PLANS AND ARE ACCEPTABLE:

- Permanent BMPs
- Culverts
- Storm Sewers
- Manholes (including risers, steps, and inverts)
- Inlets (including risers, steps, and inverts)
- Drainage Contained Within the Right-of-Way
- Platted Drainage Easement
- Construction BMPs Removed

1.4 ROADWAY CONDITIONS CONFORM TO PLANS AND ARE ACCEPTABLE:

- Paved Surface in Acceptable Condition (i.e. free of cracking and potholes)
- Pavement Crown & Super Elevation Acceptable
- Shoulders to Grade and Stabilized
- Roadside Ditches Acceptable
- Cut Slopes to Grade and Stabilized
- Fill Slopes to Grade and Stabilized
- Paved Surface Cleared of Loose Stone

1.5 RIGHT-OF-WAY:

- Clear of Vegetation
- Clear of Debris
- Curbing Acceptable
- Sidewalk Acceptable
- Driveway Entrances Properly Installed According to Road Plan or Site Plan
- Driveway Entrances and/or Commercial Entrances Located as shown on Plans
- Guardrail Installed in Correct Location(s)
- Guardrail Installed at Correct Distance from Edge of Pavement
- Proper Guardrail End Sections Installed in Approved Manner

- _____ Grass on Shoulders & Ditches Has Been Mowed
- _____ Dead Trees Removed That Might Fall in Right-Of-Way
- _____ Shoulders and Ditches Free of Loose Stone
- _____ Driveway Pipes Clean and Functioning Properly

1.6 INSPECTION RESULTS

An Inspection Report shall be completed with all items failing to adhere to the approved plans and ECM Standards and specifications. This handwritten punchlist is to be typed, proofed, and then given to the engineer. In addition, the completed Inspection Form shall be put in the project file.

SCHEDULE FOR COMPLETION OF IMPROVEMENTS

1.1 PURPOSE

This form is intended to facilitate the completion of approved improvements in a timely manner by assuring the applicant has a schedule in place for the completion of the improvements, and by providing the County a means to assess the applicant's ability to meet the completion date stated in the approved agreement. The permit holder must provide an estimated completion date for each milestone listed below.

1.2 GENERAL INFORMATION

Date: _____

Applicant: _____

Phone: _____

Tax Map Parcel No.: _____

Project Name (Include phase, section, and other relevant information to clearly identify the project): _____

Date	Milestone
	Start of construction.
	Temporary erosion control systems installed (Initial BMPs).
	Grading, subgrade, and stormwater management activities completed.
	Road base constructed to required grade.
	Asphalt, curb and gutter installation completed.
	End of construction.
Office Use	
	Road Improvements "Preliminary Acceptance Inspection"
	Road Improvements "Final Inspection" (private roads accepted at this point)
	Public Road "Preliminary Acceptance" notification received from BOCC.

1.3 AUTHORIZATION OF REQUEST

Signature of Applicant

Print Applicant Name

Title (if appropriate)

SURETY RELEASE INSPECTION REQUEST

1.1 PURPOSE

This form is used to request that an inspection be scheduled to determine if the following performance sureties can be reduced or released (check below all that apply). Requests are required for either partial or full release of any construction surety. Requests for construction surety reduction will be subject to the following conditions based upon the percentage of work completed and approved by the County, or other authority or agency having jurisdiction over the improvement. The following conditions apply to surety reductions and inspection fees.

- No more than three inspections for surety reductions will be scheduled during any twelve-month period.
- A surety reduction inspection fee must accompany each request for reduction.
- Inspections will be scheduled within 30 days of receipt of the surety reduction inspection request form and applicable fee.
- Reductions will not occur until completion and approval of at least 30% of the proposed improvements.
- 20% of the original construction surety amount will be retained until final completion and preliminary acceptance of all improvements.

Inspections will be scheduled within thirty days of receipt of this request and the required fee.

Inspections must be requested by the permit holder.

1.2 GENERAL INFORMATION

Date: _____

Applicant: _____

Phone: _____

Tax Map Parcel No.: _____

Project Name (Include phase, section, and other relevant information to clearly identify the project): _____

1.3 SURETY RELEASE INFORMATION

- Water Protection Performance Surety**
- Erosion & Sediment Control***
- Stormwater Management & Water Quality***

Identification No.: _____

Description of Release Requested: _____

Appendix H Surety Release Request Form

Adopted: 12/23/2004

Revised: 12/13/2016

REVISION 6

Amount of Requested Release: _____

Subdivision/Public Improvement Performance Surety

Roads & Drainage (at least 30% of the work must be satisfactorily completed before requesting an inspection for reduction)

Water & Sewer (at least 30% of the work must be satisfactorily completed before requesting an inspection for reduction)

Other – list below (i.e. landscaping, pedestrian paths)

Identification No.: _____

Description of Release Requested: _____

Amount of Requested Release: _____

Work in the Right-of-Way Performance Surety

Identification No.: _____

Description of Release Requested: _____

Amount of Requested Release: _____

Site Development Performance Surety

Identification No.: _____

Description of Release Requested: _____

Amount of Requested Release: _____

1.4 FEE

SUBMIT REQUIRED SURETY INSPECTION FEE - make check payable to the El Paso County and submit with request.

1.5 AUTHORIZATION OF REQUEST

Signature of Permit Holder

Print Permit Holder Name

Title (if appropriate)

APPENDIX I STORMWATER QUALITY POLICY & PROCEDURES

I.1 TITLE

This appendix is called the "El Paso County Addendum to the Colorado Springs Drainage Criteria Manual, Volume 2: Stormwater Quality Policies, Procedures and Best Management Practices (BMPs)" (DCM2) and shall be referred to throughout the text as the Addendum.

I.2 OVERVIEW

As part of the National Pollutant Discharge Elimination System (NPDES)-Phase II program administered by the Colorado Department of Public Health and the Environment, El Paso County has a Colorado General Discharge Permit for Stormwater Discharges Associated with Municipal Separate Storm Sewer Systems (MS4 Permit). This Permit, made effective March 10, 2003, authorizes El Paso County to discharge stormwater associated with municipal separate storm sewers in its permitted area into waters of the State. As part of this permit, the County is required to take measures to protect the quality of stormwater from contaminants, including sediment.

The El Paso County Policy Plan, adopted January 20, 1998, includes several policies directly related to protecting the quality of surface water in the County, especially as it relates to stormwater runoff. Policy 2.1.1 commits the County to meeting the requirements of the Clean Water Act.

Directly related to the NPDES programs are:

- Policy 3.3.4 – Implement appropriate measures to protect and/or mitigate effects of point and non-point sources of pollution to surface water,
- Policy 3.3.5 – Regulate or restrict uses that are proven to contribute to contamination of water supplies,
- Policy 3.3.6 – Evaluate the consequences to surface water from new development including run off of natural soils, as well as chemical compounds that may result from the proposed uses,
- Policy 11.1.4 – Require development plans to effectively address both quantitative and qualitative impacts of drainage within the project site,
- Policy 11.3.3 – Fully evaluate the relative impact of proposed drainage improvements on the maintenance of water quality,
- Policy 11.3.4 – Promote the effective use of innovative short and long term strategies including sediment ponds, buffer strips, and constructed wetlands as a means of reducing peak flows and improving stormwater quality, and
- Policy 11.3.6 – Encourage the effective use of control measures to mitigate the short and long term erosion impacts of development.

The following Addendum, when combined with the City of Colorado Springs Drainage Criteria Manual Volume 2: Stormwater Quality Policies, Procedures and Best Management Practices, El Paso County Policy Plan, El Paso County Land Development Code, El Paso County Engineering Criteria Manual, and their successors, forms the basis for protecting surface water quality in the County by reducing exposure of stormwater runoff to contaminants.

Nothing contained herein relieves any person, corporation, firm or entity from the obligation to comply with any applicable state or federal laws or regulations relating to water quality or water quality standards or any other standards related to land disturbance activities.

I.3 ADOPTION OF DRAINAGE CRITERIA MANUAL VOLUME 2 BY EL PASO COUNTY

In November of 2002, the City of Colorado Springs adopted Drainage Criteria Manual Volume 2: Stormwater Quality Policies, Procedures and Best Management Practices (BMPs). The goal of this document is to provide guidance and engineering criteria for water quality protection measures during construction and for permanent installations.

DCM2 is adopted as the County’s stormwater quality design criteria with this Addendum that provides additions and revisions as applicable to the County in order to expand its scope to cover rural areas and other situations specific to the County. The goal has been to maintain consistency between criteria used in the County and the City of Colorado Springs.

To clarify applicability, “El Paso County” will be substituted for “City of Colorado Springs” or a County department or position analogous to one in the City will be used where appropriate unless otherwise specified in this Addendum. Table I-1 summarizes the most common or typical substitutions that shall be used in applying and interpreting DCM2. An example of a section where substitution would not be appropriate is the discussion of Colorado Springs’ stormwater discharge permit in Section 2.3 which is different in history and requirements from that of the County.

Table I-1. General Substitutions

Text in DCM2	Substitution in DCM2 as Applied in El Paso County
City of Colorado Springs	El Paso County
City	County
City Engineer	County Engineer
City Engineering Inspector	County Inspector
City Inspections	County Inspections
Erosion and Stormwater Quality Control Plan	Stormwater Management Plan
Other Changes	
Hillside Overlay	Remove references to “Hillside Overlay”

I.4 EL PASO COUNTY EROSION AND STORMWATER QUALITY CONTROL PERMITS

An overview of the two types of erosion and stormwater quality permits issued by El Paso County is provided in section 5.6 of the ECM. The following section provides specific stormwater permit application requirements and permit holder responsibilities for construction activities that occur within the unincorporated areas of El Paso County.

I.4.1 Erosion and Stormwater Quality Control Permit

An Erosion and Stormwater Quality Control Permit (ESQCP) is required for construction activities that result in land disturbance of greater than or equal to (\geq) one acre. An ESQCP is required for construction of less than ($<$) one acre if the activity is part of a larger common plan of development or sale that would disturb one acre or more of ground surface. Refer to Table I-2 for additional criteria to determine applicability of an

ESQCP. Ground surface disturbing activities include, but are not limited to, clearing, grading, excavating, demolition, installation of new or improved haul roads, staging areas, stockpile and borrow areas. Measures to protect water quality are to be implemented when needed as determined by an El Paso County Inspector, even if a permit is not required. The ESQCP is the key part of protecting water quality in the County and provides for detailed and specific Best Management Practices (BMPs) during construction through final stabilization.

Storm Sewer Connections:

An ESQCP may be used as a storm sewer connection permit to allow for a connection to the El Paso County separate storm sewer system. Those cases are limited to entities that possess their own Colorado Discharge Permit System permit for stormwater discharges, the land disturbances is less than one acre and not part of a larger common plan of development or sale.

A. Application

Applications for ESQCPs generally are submitted to the El Paso County Development Services Department as part of a Land Use application. For projects not involved in the Land Use application process, an ESQCP application must be submitted to the Public Services Department at least ten (10) days prior to the anticipated start of construction. The owner or operator of the construction activity must submit an ESQCP application with all required material listed below to allow for review and approval of the permit.

No work shall begin until the ECM administrator, or his designee, issues a Notice to Proceed under an approved Land Use application. Typically the Notice to Proceed is issued as part of the preconstruction conference held by Development Services Department staff. For ESQCP issued by the Public Services Department, a separate written Notice to Proceed is provided with the approved ESQCP.

Applications for an ESQCP shall include a completed permit application form and any required attachments reasonably necessary to review and evaluate the application or complete the permit. Generally, an application for an ESQCP shall be accompanied by the following:

1. Stormwater Management Plan (SWMP)

The goal of a SWMP is to identify possible pollutant sources that may contribute to stormwater pollution, 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 prior to the time construction starts. The SWMP shall be submitted as a separate, stand-alone document from the engineering plan set submitted for review and approval.

El Paso County uses a checklist to perform a completeness review of the initially submitted SWMP. The SWMP is intended to be a dynamic

document and must be revised as construction proceeds to accurately reflect the current conditions and Best Management Practices in use at the site. A copy of the checklist can be found in Appendix E.

2. Permit Fee

Permit fees must be paid at the time of application for a permit. If the ESQCP and associated documents are reviewed as part of the Land Use application process, the ESQCP permit fee is included in the fee for plan review. If the ESQCP and associated documents are reviewed by the Public Services Department, a separate permit fee payment must be made. The permit fee shall be in a form acceptable to the ECM Administrator. Permit fees are non-refundable.

3. Financial Surety

Financial surety equal to the estimated cost of all construction Best Management Practices and permanent Best Management Practices as described in the SWMP shall be required with each ESQCP application. The El Paso County Surety Estimate form found in Appendix H of the Engineering Criteria Manual must be used to calculate the surety amount. The financial surety shall be in a form acceptable to the ECM Administrator. The following are exempt from ESQCP Financial Surety requirements: special districts, utilities governed by the State Public Utilities Commission and municipalities.

4. Statement of Certification

Signed statement from owner (applicant) certifying that the SWMP and other terms of the permit will be met.

5. Operation and Maintenance Plan

Submitted and approved Operation and Maintenance Manual for Permanent BMPs, if any to be located on site.

6. Maintenance Agreement

Submitted and signed Private Detention Basin / Stormwater Quality Best Management Practice Maintenance Agreement and Easement, if any Permanent Best Management Practices are to be located on site.

7. Application Information

- Property location and legal description
- Owner Name and Contact Information
- Contractor Name and Contact Information
- Project-related information such as: total acres, disturbed acres, brief description of project, and project schedule

- El Paso County Surety Estimate form that contains cost estimates of Construction and Maintenance of Control Measures for determination of Financial Surety

Because each permit and site is different with respect to the scope of work and location, additional requirements may be added to address specific concerns relative to the proposed work. Attached to each approved permit will be a list of Special Provisions, if any, which shall govern the work and set forth minimum requirements for disturbing land in the County.

B. Permit Holder Responsibilities

The permit holder shall be responsible for the work authorized under the permit. Should there be any defects or failures in the work that result in erosion or sediment releases, following preliminary acceptance, corrective work shall be performed immediately upon notification from the County Stormwater Staff or County Subdivision Inspector. Failure to respond in a reasonable time frame, as determined by the County Stormwater Staff, shall be just cause for the County Stormwater Staff to take the necessary action to have the defect corrected and to bill the permit holder or draw on the financial assurance for the cost to correct the defect.

The permit holder is responsible for subcontractors and others at the site meeting the provisions of the SWMP. The permit holder is responsible for determining the need for and obtaining other required permits. A State General Permit for Stormwater Discharges from Construction Activities may be required if criteria for an ESQCP is met.

Upon completion of the permitted project, the permit holder is responsible for contacting the County, in writing to request closure of the permit. Permit Closure will be granted when all of the following conditions are met:

- Construction is complete and final stabilization has been achieved. Final stabilization will be achieved when re-vegetation efforts result in at least 70% of pre-disturbance vegetative cover at the site or equivalent permanent structural erosion and sediment control methods have been employed;
- All temporary BMPs have been removed from the site;
- A copy of the Construction Stormwater Inactivation Notice submitted to the Colorado Department of Public Health and Environment is provided to the County.

C. Transfer of Property and Permit Holder Responsibilities

Each successive owner of a property through the land development and building process will obtain its own ESQCP and submit its own permit fees and financial surety until final stabilization is achieved. The new owner of a property that is under an open ESQCP must immediately obtain its own ESQCP. The SWMP

from the previous owner may be used, if the previous owner agrees, it covers the phases of work planned by the new owner and it remains relevant to the work to be done. If the new owner will be building single-family residences or duplexes, it may qualify for a BESQCP. The BESQCP is to be obtained immediately following purchase.

When a property is covered by an ESQCP, construction is complete, final stabilization has not occurred, and more than one lot of the covered property is sold to another party (e.g., a home builder or private investor) the previous owner (i.e., current permit holder) is responsible for installing all necessary temporary erosion and sediment control BMP's and informing the new property owner in writing of their responsibility to maintain the temporary BMP's until final stabilization (e.g., landscaping) has been installed. Upon closing of the sale, the previous owner will then be allowed to modify the ESQCP by notifying a county stormwater inspector in writing by providing them with a copy of the "Notice of Reassignment of Permit Coverage and General Permit Application Stormwater Discharges Associated with Construction Activities," which should be provided to the State of Colorado, when applicable. The Stormwater Management Plan must also be revised to account for the change in permit area coverage. Following the transfer and issuance of an ESQCP (or BESQCP as described below), the original owner may receive a partial release of the financial assurance proportional to the BMPs on the part of the property that was sold.

In situations where a BMP that provides protection for property that has been sold is located on the property that belongs to the original or other owner, the responsibility for the BMP rests with the owner of the property where it is located.

I.4.2 Builder's Erosion and Stormwater Quality Control Permit

Builders of single family residences or duplexes may follow a simplified procedure by obtaining a Builder's Erosion and Stormwater Quality Control Permit (BESQCP) for each lot and structure with a separate address. A BESQCP is used to protect stormwater on individual building lots with < 1 acre of total disturbed area. A property must be covered by either an ESQCP or BESQCP in order to obtain a building permit.

If the lot has been disturbed previously by construction work but has been completely stabilized and any ESQCP on the property has been closed, the lot may be considered undisturbed. A builder that has acquired a single residential lot that is covered by an ESQCP and the property has not been stabilized nor the ESQCP closed, the builder must obtain a new BESQCP to cover the future construction activity of single residential lots or duplexes.

A. Application

Applications for a BESQCP shall include a completed permit application form and any required attachments reasonably necessary to review and evaluate the application or complete the permit, a signed statement from the owner (applicant) certifying the terms of the permit will be met, and a permit fee. Financial surety or

a SWMP are not required for a BESQCP. However, a site covered by a BESQCP is required to meet stormwater quality protection criteria of preventing pollutants, including sediment, from leaving the site. If a BESQCP is revoked, the applicant will obtain an ESQCP, including the submission of a SWMP and payment of permit fee and financial surety.

Table I-2 provides guidance on which permit is to be obtained for various situations.

Table I-2. ESQCP and BESQCP Permit Guidance

ESQCP	BESQCP	Description
For Developers		
X		Disturbs >= 1 acre
X		Disturbs < 1 acre, but part of larger project that disturbs >= 1 acre
X		New ESQCP required when developer acquires disturbed land previously or currently covered by an ESQCP unless meets criteria for BESQCP.
For Builders		
No	No	Single family residence or duplex building site disturbs < 1 acre that is not part of larger project and is not in a sensitive area ¹ .
	X	Single family residence or duplex site that has < 1 acre of disturbed areas and the site is not currently covered by an ESQCP and site is not in sensitive area.
X		Single family residence or duplex site that has < 1 acre of disturbed areas and the site is currently covered by an ESQCP and site is not in sensitive area.
X		Single family residence or duplex building site that has <1 acre of disturbed area and the site has been covered by ESQCP in the past and is in sensitive area.
X		Single family residence or duplex building site that disturbs ≥ 1 acre that has not previously been covered by an ESQCP.
X		Commercial or multi-family building sites other than duplexes that disturbs ≥ 1 acre of land.
X		Commercial building sites that disturbs < 1 acre of land that are located within a sensitive area, or have potential stormwater discharges of concern ² to the ECM Administrator.
<p>NOTES:</p> <p>1. Sensitive Areas are defined as those waters identified in Table I-5 of the ECM; and any other areas of concern identified by the ECM Administrator, such as endangered species habitat area, jurisdictional wetlands, flood plains or direct discharges to waters of the state.</p> <p>2. "Potential stormwater discharges of concern," include possible discharges from commercial sources with ability to cause water quality violations or acutely toxic conditions in receiving waters. Examples of sources include, but are not limited to, auto salvage yards, auto repair facilities, industrial sources, restaurants.</p>		

B. Permit Holder Responsibilities

The builder permit holder (owner) is responsible for subcontractors and others at the site to meet the provisions requirements of the BESQCP. The permit owner is responsible for determining the need for and obtaining other required permits. A State General Permit for Stormwater Discharges Associated with Construction Activities may be required.

The BESQCP owner is responsible for closure of the BESQCP upon completion of the project. To close a BESQCP all the following requirements must be met:

- Notify a County Inspector in writing that all work under the Building Permit is complete and request closure of the BESQCP;
- The site is stabilized to prevent sediment transport off the lot;
- All temporary BMPs have been removed.

C. Transfer of Property and Permit Holder Responsibilities

If a single residential lot covered by a ESQCP is sold prior to completion of construction and final stabilization of the lot has not been achieved, the new owner must obtain a BESQCP and will become responsible for achieving final stabilization of the lot. Only when a new BESQCP is obtained by the new owner will the ESQCP holder be allowed to modify the ESQCP to remove the sold lot from permit coverage.

D. Reassignment of Permit Coverage

When a property is covered by a ESQCP, construction is complete, final stabilization has not occurred, and the property is sold to a private home owner the current permit holder is responsible for installing all necessary temporary erosion and sediment control BMP's and informing the new property owner, in writing, of their responsibility to maintain the temporary BMP's until final landscaping has been installed. Upon closing of the sale, the previous owner will then be allowed to remove the sold property from the ESQCP coverage by notifying a county stormwater inspector in writing.

I.5 EL PASO COUNTY CONSTRUCTION SITE INSPECTIONS

[Replaces DCM2 Section 3.4]

Inspections of construction sites are conducted by the County Inspectors (Stormwater and Subdivision) to ensure compliance with the SWMP and associated county permits.

The focus of construction sites inspections is to ensure construction is in compliance with the approved plans and that BMPs are installed and maintained consistent with the onsite SWMP to prevent erosion, sediment transfer, spillage and leakage, improper sludge or waste disposal, and drainage from raw material storage from leaving the site creating negative public safety, property or stormwater quality impacts.

Inspections also serve as a means of educating owners/owner's representatives, developers, and contractors of the need to minimize negative stormwater quality impacts from the site operations and to assist in complying with the requirements of the County's Stormwater Program. As such County Inspectors will take a compliance assistance approach and will work with and assist the owner/owner's representative and contractor to maintain compliance with its approved plans and erosion and stormwater quality control requirements.

I.5.1 County Engineering and Subdivision Inspections

County Engineering Inspections shall be accomplished by County Inspectors (Stormwater and Subdivision) for the purpose of assuring compliance with the County's General Permit for Stormwater Discharges Associated with Municipal Separate Storm Sewer Systems (MS4). Projects located in the unincorporated areas of El Paso County with an active ESQCP issued by the Public Services Department shall be inspected by County Stormwater Inspectors. Projects located within the unincorporated areas of El Paso County with an ESQCP associated with Land Use Permits or Construction Permits issued by Development Services Department will be inspected by County Subdivision Inspectors. County Stormwater Inspectors typically will perform Reconnaissance, Compliance, Complaint Response, and Follow up inspections.

County Subdivision Inspectors and County Stormwater Inspectors may share duties.

Inspections are not limited to new development and may be performed on any other land-disturbing activities except agriculture and mineral extraction that occur in unincorporated areas of the County.

County Subdivision Inspections of installed BMPs shall be accomplished by County Subdivision Inspectors. The types of inspections that County Subdivision Inspectors will perform are the Initial, Compliance, Follow-up, and Acceptance Inspections.

I.5.2 Types of Inspections

The following are inspections that may be performed at the construction sites within the unincorporated areas of El Paso County. Not all inspection types will be performed at all sites.

A. Self-Monitoring Inspections

The permit holder or authorized agent shall conduct Self-Monitoring Inspections. The purpose of these Self-Monitoring inspections is to ensure that all BMPs are installed according to approved plans, the BMPs are being properly maintained and the SWMP is updated to reflect current conditions. The person performing the inspections must be a registered Professional Engineer in Colorado, a certified erosion control specialist, or certified in a regionally recognized inspection training program. The person performing inspections should be a person with authority to expend project dollars on erosion and stormwater quality control.

The self monitoring inspections are to be performed and documented at least once every 14 calendar days. In addition to the bi-weekly inspections the owner or representative shall perform inspections of all BMPs after any precipitation or snowmelt event that causes surface erosion to insure that the BMPs have operated as designed, to determine if maintenance is needed, and to locate and clean up any areas where materials have run off site. The owner or his representative will record the results of all inspections by completing a copy of the Field Inspection Report or similar inspection checklist included in the SWMP.

Completed inspection reports shall be kept on site and available to County Inspectors (Stormwater and Subdivision). The County may require the submission of these inspection reports on a site-specific basis. Self-monitoring inspections are required on all construction sites, even if an ESQCP or BESQCP is not required.

The owner or representative may request an alternative to the 14 day self monitoring inspection cycle discussed above. Self Monitoring Inspections of stormwater best management practices may be requested for at least once every month (i.e., 30 days) for permitted construction sites where all construction activity is completed except final stabilization because planted vegetative cover has not yet become established. Self Monitoring Inspections after precipitation events are not required during an approved 30 day inspection cycle.

B. Initial Inspections for Sites Covered by ESQCPs

Initial inspections are to confirm that the SWMP is being implemented prior to the start of construction. The Initial Inspection must be scheduled at least 48 hours in advance. At the time of the Initial Inspection, the Initial BMPs must have been implemented according to the SWMP. No other land disturbing activity shall occur prior to the Initial Inspection. This inspection also serves to establish contact between Inspectors and the site personnel responsible for implementing the approved plans. This is especially important for those sites that have a long construction period or the potential to have a significant impact. These inspections are documented on the Field Inspection Report.

For projects permitted through the Development Services Department, during the Preconstruction Conference a County Inspector will provide the permit owner with an overview of initial BMPs expected to be installed prior to construction as outlined in the grading, erosion, and sediment control plans and/or SWMP and a timeline for completion of installation will be determined. Typically, a Notice to Proceed with initial temporary BMP installation will be given to the permit holder during the Preconstruction meeting. Upon installation of initial BMPs the permit holder (owner) or representative shall request an Initial Inspection by a County Inspector. Following a satisfactory Initial Inspection and verification that all required permits have been obtained by the permit holder (owner), a written Notice to Proceed will be provided for construction within two county working days after completion of an acceptable Initial Inspection.

For projects permitted through the Public Services Division, upon approval of the ESQCP and after an Initial Inspection a written Notice to Proceed will be provided to the permit owner or owner's representative.

Failure to install initial BMPs, pass an Initial Inspection, or obtain a Notice to Proceed prior to beginning land disturbing activities may result in an immediate Stop Work Order.

Initial Inspections and Notices to Proceed are not required for sites with BESQCPs.

C. Compliance Inspections

Compliance Inspections are routine inspections conducted by County Inspectors (Stormwater and Subdivision) to ensure that the SWMP is being implemented. Compliance Inspections may occur during or immediately after a precipitation event.

During Compliance Inspections the County Inspectors (Stormwater and Subdivision) verify that the BMPs are installed and functioning according to design; only allowable discharges are occurring; the required Self Monitoring Inspections and associated documentation of activities are occurring; and the SWMP map is revised to reflect current site conditions. The County Inspectors will examine the SWMP, and Self Monitoring inspection reports and will evaluate installed BMPs to identify any installation, maintenance or effectiveness issues to determine compliance with the ESQCP.

Compliance Inspections are typically conducted for sites that require an ESQCP and are located within the urbanized areas of unincorporated El Paso County. The County uses the Field Inspection Report to document Compliance Inspections. A copy of the completed report will be provided to the permit holder (owner) typically within two County work days following the inspection.

D. Reconnaissance Inspections

Reconnaissance Inspections occur on a routine basis and are conducted for the general purpose of determining obvious compliance issues at the site. Particular attention is paid to determine if the site has contributed to offsite transfer of sediment or other pollutants to roads, drainage facilities, or surface water bodies and if any obvious BMP maintenance is needed.

Reconnaissance Inspections are generally performed from off-site on adjacent streets or property, and may occur during or immediately after a significant precipitation event. The Reconnaissance Inspection will be documented using the Field Inspection Report and a copy of the completed report will be provided to the permit owner.

A Reconnaissance inspection with cause could result in requiring a site that previously was not permitted, to submit a permit application and obtain an ESQCP or BESQCP.

E. Complaint Response Inspections

These Compliant Response Inspections will occur in response to either a citizen complaint or a complaint from another County agency. The County Inspectors (Stormwater and Subdivision) will inform the permit holder or authorized agent of the complaint, determine the validity of the complaint, and if necessary, advise on the necessary repair, maintenance or cleanup. The County Inspectors (Stormwater and Subdivision) may also require the implementation of specific measures or additional BMPs to prevent the recurrence of the problems that

gave rise to the complaint. All construction sites are subject to complaint response inspections. The Complaint Response Inspection will be documented using the Field Inspection Report.

F. Follow-up Inspections

Follow-up Inspections are conducted to ensure that measures or requirements from a previous inspection have been performed or complied with. These requirements may involve the cleanup of a discharge, implementing additional or revised BMPs, repairing, re-installing, or maintaining damaged or non-functioning BMPs. All construction sites are subject to Follow-up Inspections. The Follow-up Inspection will be documented using the Field Inspection Report.

Reconnaissance, Complaint and Follow-up Inspections will be used for construction sites with BESQCPs.

G. Final Inspection

At the completion of a project, when the ESQCP permit holder (owner) believes conditions in section 1.4.3 are met and a request to close the ESQCP is received by the County, a County Inspector will perform a final inspection to verify the conditions required to close the permit are met. If so confirmed during the ESQCP Final Inspection, the County will provide the permit holder (owner) a written notice of permit closure using the Field Inspection Form.

During ESQCP Final Inspection, the following items will be evaluated in addition to the requirements listed in section 1.4.3.

- The site has final stabilization equal to a uniform vegetative cover with a density of at least 70 percent compared to the pre-disturbance levels and such cover is capable of adequately controlling soil erosion, as determined by the County Inspectors (Stormwater and Subdivision), or equivalent permanent, structural erosion and sediment control methods have been employed.
- Any sediment or other pollutant that may have been transferred off-site has been removed.
- The site shall be free of noxious weeds or treated according to an approved Noxious Weed Control Plan.
- All approved permanent (post construction) BMPs have been maintained and are functioning in accordance with the design and with the Operation and Maintenance Manual.
- Streets, parking lots and other paved surfaces (on-site and off-site) are free of sediment and debris.
- Drainage structures such as pipes, inlets and channels are clean and in good service.
- The site is in compliance with required corrective action identified during previous Inspections.

Upon a satisfactory Final ESQCP Inspection the County will initiate the Surety Release process.

I.5.3 Frequency and Types of Inspections of Construction Sites

The frequency and type of inspections conducted by County Inspectors (Stormwater and Subdivision) will depend on the characteristics of the site, the type or phase of construction and the potential for the site to impact stormwater quality and other areas of environmental concern. The level of construction activity throughout the County and availability of staff resources will also factor into the decision. Key factors involved in the decision that relate to construction and the site are:

- The size of the disturbed area.
- The length of time that the site will be left disturbed.
- The proximity of the construction site to areas of environmental concern.
- Past experiences with the permit holder.
- The phase of construction.
- Season of land disturbing activity.

I.6 CONSTRUCTION STORMWATER ENFORCEMENT

[Replaces DCM2 Section 3.5]

As part of the effective stormwater protection and erosion control, a series of enforcement measures will be followed to ensure compliance with the County's stormwater program.

The County considers the owner of the land the ultimate responsible party for all construction activities. It is the responsibility of the owner to take all necessary measures to ensure that the site is in compliance with County resolutions and Construction Permit, Stormwater Management Plan and the Erosion and Stormwater Quality Control Permit or Builder's Erosion and Stormwater Quality Control Permit.

In addition to County requirements, the owner must meet State and Federal regulatory requirements for permits and BMPs. The County has tried to make its requirements consistent with State requirements for construction activities (CDPS General Permit – Stormwater Discharges Associated with Construction Activities). Should requirements conflict, it will be the responsibility of the owner to bring these conflicts to the County's attention and propose how to address them.

Whenever a Stop Work Order is issued, it will be the County's policy to stop any or all related work activities or further approvals relative to the site until the necessary measures are taken to address the concerns, as stipulated in the Stop Work Order.

In cases where the ECM Administrator deems it necessary to address a construction site with more aggressive action, the El Paso County Ordinance 07-01: Prohibiting Illicit Discharges to the County Storm Sewer System may be used, as appropriate, to address the site. Additional information on the County's Enforcement Procedures is discussed in Section I.6.2.

I.6.1 Definitions

A. Stop Work Order

A Stop Work Order is a written order to immediately cease construction activity at a site. The Stop Work Order may be issued by the ECM Administrator, or County Stormwater staff and Subdivision Inspectors to the permit holder or authorized agent of a construction site. An immediate Stop Work Order shall be issued when the property owner has failed to obtain an ESQCP, BESQCP, or a Notice to Proceed prior to land-disturbing activity. A Stop Work Order may also be issued if the site operator has demonstrated obvious non-compliance with the ESQCP or BESQCP after repeated attempts by the Inspector to bring the site into compliance. When the Stop Work Order is issued, it requires all work on the site to cease until the permit holder (owner) takes the measures necessary to bring the site into compliance. A written notice to resume construction activity will be provided in the Field Inspection Report, upon a Follow up Inspection by a County Inspector to verify satisfactory completion of required corrective actions identified in the Stop Work Order.

B. Inspection

The term “inspection” refers to an evaluation of compliance with the SWMP, approved plans and permits for a construction site, which is performed by a County Inspector. (Stormwater or Subdivision). For the purposes of Appendix I, inspections performed by County Inspectors include, but are not limited to: Initial Inspections, Compliance Inspections, Reconnaissance Inspections, Complaint Response Inspections, Follow-Up Inspections, and ESQCP Final Inspections. Self Monitoring inspections are performed by the permit holder (owner) or authorized agent.

C. Stormwater Management Plan

A Stormwater Management Plan (SWMP) is a plan developed in compliance with the content requirements in the “CDPS General Permit and El Paso County Stormwater Quality Policy and Procedures”. A copy of the SWMP Checklist can be found in Appendix E. The SWMP shall be a separate, stand alone document from the engineering plan set. The purpose of the SWMP is to develop and document a systematic approach 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 negative water quality impacts. The SWMP must be completed and implemented prior to beginning ground disturbing activities, and revised as construction proceeds to accurately reflect the conditions and practices at the site.

Revisions must be made to the SWMP before changes are made in the field. A map showing the current location, status and changes to the BMPs are required. The owner or his representative shall keep records of the BMPs as they are installed or removed according to the SWMP.

A current copy of the SWMP, which documents real-time conditions in the field must be maintained and kept on the site during all times of construction.

Given the dynamic nature of the SWMP, the following guidance is provided for making in-field modifications to BMPs based on Self Monitoring Inspections. Changes to BMPs identified in the SWMP may be completed in the field without approval from the County when:

- The BMP is a temporary BMP;
- The change results in a comparable BMP. Examples include but are not limited to, silt fence replaced with a wattle, rock check dam replaced with straw bale check, erosion control mat used in place of straw mulch, etc.,
- Prior to installation, the change is reflected in the on-site SWMP including a BMP detail for the new BMP.

Changes to permanent BMPs or any other BMP change that will affect the approved engineering design, hydraulics or hydrology must be approved by the ECM Administrator, or designee, through the established plan modification process.

D. Erosion and Stormwater Quality Control Permit

An Erosion and Stormwater Quality Control Permit (ESQCP) is a County permit developed to comply with the County's MS4 Permit. An ESQCP is issued typically for construction sites that disturb ≥ 1 acre of land. Application requirements and permit holder responsibilities are discussed in Section I.4.1. The permit authorizes the implementation of the approved erosion and stormwater quality control measures and allowable stormwater discharges from construction sites.

E. Builder's Erosion and Stormwater Quality Control Permit

A Builder's Erosion and Stormwater Quality Control Permit (BESQCP) is a County permit developed to address stormwater discharges associated with the construction of single family residential lots and duplexes with less than one acre of land disturbance. Application requirements and permit holder responsibilities are discussed in Section I.4.5.

F. Notice to Proceed

A Notice to Proceed is a written notice provided by the County after an ESQCP is approved. The notice allows for the implementation of initial BMPs and commencement of construction activities upon completion of an Initial Inspection. Construction is authorized only after issuance of a Notice to Proceed.

G. Letter of Noncompliance

A Letter of Noncompliance is a written notice provided by a County Inspector (Stormwater or Subdivision) to the permit holder (owner) and contractor to notify them that the permitted project is not in compliance with the SWMP, requirements of the ESQCP, or BESQCP are in noncompliance with the

requirements of County criteria, codes or ordinance relating to grading, erosion, and stormwater quality. The letter contains a description of the measures required to bring the site into compliance and a date by which these measures must be implemented.

H. Performance or Contracting of Remedial Work

If the permit holder does not successfully complete all required work or violates any requirement of the permit, the County may take corrective measures and charge the cost of such to the permit holder. Such costs shall include the actual cost of any work deemed necessary by the County plus reasonable administrative and inspection costs and penalties, as established by Resolution adopted by the Board of County Commissioners or by a fee schedule adopted by the ECM Administrator as authorized by the Board of County Commissioners. If the total of such costs exceeds the financial assurance, the permit holder shall be responsible for payment of the remaining balance within thirty calendar days of receipt of an accounting of such from the County.

I.6.2 Enforcement Procedures

When the County performs inspections at construction sites, it notes those areas that need to be addressed to bring the site into compliance with its ESQCP. A time frame for addressing any noncompliance is included in the inspection report as a required follow-up action. Based on a review of the site, the inspector will list the actions that are needed. The Inspector will determine if a Follow-Up Inspection is needed or if submission of information that verifies that the necessary actions were taken is adequate. Subdivision Inspectors or County Engineering Stormwater Staff may initiate Letters of Non-compliance.

There are several situations where the County may determine that more aggressive action is necessary to get the site into compliance with its permit. The first situation is when there are impacts on public safety, property or water resources. This could include, but is not limited to, the deposition of sediment on a roadway that has the potential to cause accidents, the deposition of materials into water ways, the wash out of channels, spills of toxic materials, or deposition of sediment that causes or has the potential to cause property damage. The magnitude of the impacts will determine what action is appropriate.

Another instance that may result in more aggressive action is when the history of the permit holder or authorized agent suggests that a more formal action is necessary.

Problems that may warrant such action include:

- Where the same problem is reoccurring at the site.
- Where the site appears to be having frequent minor problems.
- The individuals involved repeatedly fail to comply with required corrective measures.
- The individuals involved have a history of noncompliance.

There are several options for formal action that are available to the County. Table I-3 summarizes some of the more common options. The County may take other action as deemed appropriate. In cases where deemed appropriate by the ECM Administrator the El Paso County Ordinance 07-01: Prohibiting Illicit Discharges to the County Storm Sewer System may be used, as appropriate, to address compliance issues at a site meeting the criteria listed in this section.

It is expected that under normal conditions the progression of enforcement actions is a Letter of Noncompliance, then a Stop Work Order, then a revocation of the ESQCP or BESQCP. Once a permit has been revoked, it will be necessary to submit or resubmit a SWMP and permit application to the County. An El Paso County Court Summons may be issued for noncompliance with a Stop Work Order or other situations as outlined in DCM2 and ECM.

I.7 NEW DEVELOPMENT STORMWATER MANAGEMENT

I.7.1 New Development Planning

[Replaces DCM2 Section 4.1, pages 4-1 through "Other BMPs" continued on 4-5]

A. Overview

This chapter contains guidance and requirements for the selection and siting of structural BMPs for new development and significant redevelopment. Guidance is provided within the context of a flow chart and a four-step process to be followed for new site developments and significant redevelopments.

Detailed descriptions, sizing and design criteria, and design procedures for these BMPs are provided in the New Development BMP Factsheets. It is recommended that discussions and collaboration regarding proposed BMPs occur early in each project between the developer's planner and engineer, County Stormwater and County Development Services Review staff. These Section 4.0 requirements shall be incorporated into existing ECM Administrator submittals for review and acceptance including Preliminary/Final Drainage Reports and construction plans, or as otherwise specified by the ECM Administrator.

B. BMPs for New Development or Significant Redevelopment

For the purpose of defining when permanent water quality BMPs are required, "New Development and Significant Redevelopment" are defined as:

- All sites that include total development/redevelopment areas of one (1) acre or larger except developments with low density (rural) housing (2.5 acre or larger lots). Water Quality Capture Volume (WQCV), as discussed later in DCM2, shall be provided for the total site or individual lots/parcels. Other permanent BMPs may also be required as appropriate.
- Development/redevelopment areas of low density (rural) housing (2.5 acre or larger lots). WQCV is not required, but may be considered, in

addressing stormwater protection in rural subdivisions. Sediment control BMPs for lots and roads must be provided. If a legal entity that will provide maintenance such as a Homeowners' Association is in place, a BMP serving several lots may be used. Otherwise, sediment control BMPs must be included on each lot. If a pollution source other than normal residential activities is present, stormwater quality protection measures such as spill control measures and WQCV-based BMPs must be implemented.

- All sites in any zone that include total development/redevelopment areas of one (1) acre or larger for which stormwater quantity detention is required, as specified in the approved Final Drainage Report. WQCV shall be incorporated into stormwater quantity detention basins as discussed later in this section. Retrofitting of existing stormwater quantity detention facilities may be possible. The method for feasibility analysis of retrofitting is referenced below and in DCM2. If retrofitting is not feasible, a new BMP(s) will be required. Other permanent BMPs may also be required as appropriate.

Table I-3. Enforcement Options

Enforcement Option	Description	Typical Applications
Letter of Noncompliance	This is a letter written to the owner and contractor. It contains a description of the problem, the measures required to bring the site into compliance and a timeframe for completion of those measures.	(1) No immediate danger to the public safety, property or water resources. (2) Compliance has not been achieved while working with the owner/representative or contractor. (3) When the County wants to document ongoing problems and agreed upon follow-up.
Stop Work Order	This Stop Work Order requires the owner and contractor to stop all activity on the site except for the work necessary to bring the site into compliance with its ESQCP or BESQCP. Depending on the compliance problem and the County's past experience with the individuals involved, the County may impose the Order on only a portion of the site.	(1) Used when there is an immediate threat to the public safety, property or water resources. (2) Used when the site has failed to comply with the Letter of Noncompliance. (3) Used when land disturbance occurs before issuance of an approved Land Use Permit, Construction Permit, ESQCP or Notice to Proceed.
Permit Revocation	The County may revoke the ESQCP or BESQCP if the requirements of the SWMP are not implemented. Revocation of the permit has the same effect as a Stop Work Order, except that the owner will need to resubmit an adequate SWMP, a Grading Plan, if required, a new ESQCP application and ESQCP Fee.	(1) Used when the site has failed to comply with the Stop Work Order. (2) Used when the current plan has been judged to be inadequate, and the owner and/or contractor have failed to take the necessary measures to improve the plan. (3) Used when the owner and/or contractor repeatedly failed to comply with required corrective measures.
Performing Remedial Work	A County crew or a private contractor may be retained to perform remedial work. The cost of the work may be deducted from the Financial Assurance.	(1) Used when high risk situation is imminent. (2) Used when permit holder is intransigent about non-compliance.
§ 30-28-124, Colorado Revised Statutes	Misdemeanor criminal charge, with a maximum penalty of \$100 and/or 10 days in jail, with each day the violation continues a separate offense.	Used when the site has failed to comply with the Stop Work Order.
§ 30-28-124.5, Colorado Revised Statutes	Civil enforcement action, resulting in injunction, civil penalties between \$500-1000, and daily penalties up to \$100 per day.	Used when the site has failed to comply with the Stop Work Order.

- All other sites that do not meet the above requirements may be required to provide permanent water quality BMPs, if significant water quality impacts are anticipated as a result of development/redevelopment of the site, as determined by County Stormwater staff. Sensitive and high risk sites are discussed below.

The intent of permanent BMPs is that they be placed prior to the stormwater runoff being discharged to State Waters. However, downstream BMPs (such as detention ponds or improved channels) may also be acceptable if there are minimal impacts to State Waters between the downstream BMP and the area of new development/redevelopment. At a minimum, grass buffer or swales or equivalent BMPs are required before stormwater reaches the State Waters. With increased impacts, other permanent BMPs may also be required on or adjacent to the site or in combination with new/retrofitted downstream BMPs. When determining the need for permanent BMPs for reaches of State Waters above downstream BMPs, consideration will be given to, but not limited to the following: overall assessment of water quality impacts/benefits (including looking at the intervening reach between the development site and any downstream BMP), other BMPs incorporated into the overall site, costs, and long-term maintenance viability.

Whenever practical, the County promotes permanent BMPs for all sites.

1.7.2 BMP Selection

The selection of appropriate BMPs is based on the characteristics of the site and potential pollutants. The Four-Step Process provides a method of going through the selection process. Figure I.1 and Figure I.2 with annotations covers site-specific issues to be considered in selecting an effective BMP for each site.

A. Four-Step Process

The following four-step process is recommended for selecting structural BMPs in newly developing and redeveloping urban areas:

Step 1: Employ Runoff Reduction Practices

To reduce runoff peaks and volumes from urbanizing areas, employ a practice generally termed “minimizing directly connected impervious areas” (MDCIA). The principal behind MDCIA is twofold -- to reduce impervious areas and to route runoff from impervious surfaces over grassy areas to slow down runoff and promote infiltration. The benefits are less runoff, less stormwater pollution, and less cost for drainage infrastructure. There are several approaches to reduce the effective imperviousness of a development site:

Reduced Pavement Area

Sometimes, creative site layout can reduce the extent of paved areas including parking, thereby saving on initial capital cost of pavement and then saving on pavement maintenance, repair, and replacement over time.

Porous Pavement

The use of modular block porous pavement or reinforced turf in low-traffic zones such as parking areas and low use service drives such as fire lanes can significantly reduce site imperviousness. This practice may reduce the extent and size of the downstream storm sewers and detention.

Grass Buffers

Draining impervious areas over grass buffers slows down runoff and encourages infiltration, in effect reducing the impact of the impervious area.

Grass Swales

The use of grass swales instead of storm sewers slows down runoff, promotes infiltration, and also reducing effective imperviousness. It also may reduce the size and cost of downstream storm sewers and detention.

Implementing these approaches on a new development site is discussed further in the DCM2 section titled Employing Runoff Reduction Techniques. This section provides a procedure for estimating a reduced imperviousness based on the use of grass buffers and swales. The latter three of the approaches for reducing imperviousness are structural BMPs and are described in detail in Section 4.2 of DCM2 (New Development BMP Factsheets):

- Grass Buffer.
- Grass Swale.
- Modular Block Porous Pavement (or Stabilized-Grass Porous Pavement).

Step 2: Stabilize Drainageways

Drainageway, natural and manmade, erosion can be a major source of sediment and associated constituents, such as phosphorus. Natural drainageways are often subject to bed and bank erosion when urbanizing areas increase the frequency, rate, and volume of runoff. Therefore, drainageways are required to be stabilized. One of three basic methods of stabilization may be selected.

Constructed Grass, Riprap, or Concrete-Lined Channel

These methods of channel stabilization have been in practice for some time. The water quality benefit associated with these channels is the reduction of severe bed and bank erosion that can occur in the absence of a stabilized channel. On the other hand, the hard-lined low flow channels that are often used do not offer much in the way of water quality enhancement or wetland habitat. The use of riprap or concrete lined flood conveyance channels is not recommended, unless hydraulic

or physical conditions require such an alternative. Rock lined low-flow channels in many cases may be a better alternative.

Stabilized Natural Channel

In practice, many natural drainageways in and adjacent to new developments are frequently left in an undisturbed condition. While this may be positive in terms of retaining desirable riparian vegetation and habitat, urban development may cause the channel to become destabilized. When degradation occurs in these drainageways, significant erosion, loss of riparian and aquatic habitat, and elevated levels of sediment and associated pollutants can result. Therefore, it is recommended that some level of stream stabilization always be considered. Small grade control structures sized for a 5-year or larger runoff event are often an effective means of establishing a mild slope for the baseflow channel and arresting stream degradation. Severe bends or cut banks may also need to be stabilized. Such efforts to stabilize a natural waterway also preserve and promote natural riparian vegetation which can provide paybacks in terms of enhanced aesthetics, habitat, and water quality.

One additional method of drainageway stabilization gives special attention to stormwater quality and is described in Section 4.2 (New Development BMP Factsheets):

- Constructed Wetland Channel.

Step 3: Provide Water Quality Capture Volume (WQCV)

All sites defined as "New Development and Significant Redevelopment" and all sites requiring stormwater quantity detention, as listed above in the Section I.7.1B, shall address stormwater quality by providing the WQCV. One or more of six types of water quality basins, each draining slowly to provide for long-term settling of sediment particles, may be selected. Information on selecting and configuring one or more of these WQCV facilities at a site is provided in the section providing Water Quality Capture Volume (WQCV). These six BMPs are also described in detail in the New Development BMP Factsheets:

- Porous Pavement Detention
- Porous Landscape Detention
- Extended Detention Basin
- Sand Filter Extended Detention Basin
- Constructed Wetland Basin
- Retention Pond

Step 4: Consider Need for Industrial and Commercial BMPs

If a new development or significant redevelopment activity is planned for an industrial or commercial site, the need for specialized BMPs must be considered.

Two approaches are described in the New Development BMP Factsheets:

- Covering of Storage/Handling Areas
- Spill Containment and Control

Other Specialized BMPs may also be required

B. Other Specialized BMPs

The Technical Advisory Committee (TAC) selected the above structural BMPs after a comprehensive screening of known structural BMPs. The members of TAC included representatives from many city and County agencies and individuals from the development community. Final selection by TAC was based on the review of documentation on potential effectiveness in a semiarid climate, local applicability, maintenance considerations, and cost.

Development and evaluation of permanent BMPs are continuing processes. Better designs of the BMPs included in DCM2 and designs of new BMPs, including manufactured (proprietary) BMPs, will be developed and tested. To allow for this progress, additional BMPs will be considered on a case-by-case basis by County Stormwater Staff. Design and sizing details and results of independent testing of the BMP in conditions similar to those at the site will be submitted demonstrating that the BMP will meet or exceed the performance of approved BMPs for the site.

To promote improvement in stormwater protection, County Stormwater Staff may approve promising BMPs on an experimental basis. A performance monitoring program to be pre-approved by County Stormwater Staff and an agreement to replace the Experimental System with an approved system should it not function to the required level of performance, both at the owner's expense, will be required. Design of an experimental BMP is not to commence until after a meeting with County Stormwater Staff is held.

C. Guidance for Selecting and Locating WQCV Facilities

[The following section replaces DCM2 Section 4.1 pages 4-19 through 4-23]

Laying out WQCV facilities within a development site and watershed requires thought and planning. This planning and decision-making should occur during a master drainage planning process (Drainage Basin Planning Study or Master Development Drainage Plan) undertaken by local jurisdictions or a developer's engineer. Such plans, studies or other reports may depict a recommended approach for implementing WQCV on a watershed basis. Such reports may call for a few large regional WQCV facilities, smaller sub-regional facilities, or alternatively an onsite approach. It is always a good idea to find out if a master

planning study has been completed that addresses water quality and to attempt to follow the Plan's recommendations.

If the master drainage planning process addresses water quality, the following provides supplemental information on the BMPs. If the existing master drainage planning process has not addressed water quality, or if a new master drainage process is underway, this will direct the water quality evaluation.

D. Permanent Best Management Practice Selection Process

The BMP selection process is illustrated in Figure I-1 and Figure I-2. These two figures shall be used for all projects except those that are strictly highway/roadway projects; that is, projects with no plans for building pad sites. Projects that are strictly highway/roadway projects are discussed in a separate section below.

The following requirements pertain to sites that are not otherwise covered under NPDES permits for post-construction BMPs. For construction activity permitting, see other County and State requirements. Sites that are covered by an industrial NPDES permit do not need to meet these requirements if they adequately protect stormwater quality with onsite BMPs.

The following process references the use of the BMPs and other practices outlined in DCM2 and this Addendum. The use of DCM2 BMPs will promote consistency between the City and County. These BMPs are commonly found in manuals and other literature from municipalities across the country, and they are the accepted "state of the art" in stormwater quality control. As described below, other BMPs (which may be relatively new to the field of stormwater management) are acceptable if they can be shown to meet certain performance criteria.

The following items explain the decision points (i.e., the Boxes) in Figure I-1 and Figure I-2:

Box 1: For all sites, the possibility of incorporating runoff reduction practices must be investigated. Impervious area should be reduced to the maximum extent practicable, per DCM2. DCM2 also provides guidance for MDCIA by routing runoff to pervious areas. This is Step 1 in the Four-Step Process.

Box 2: All drainageways, ditches, and channels shall be stabilized with one of three methods included in Step 2, which include the use of appropriate methods for the type of drainageway as described in the DCM1.

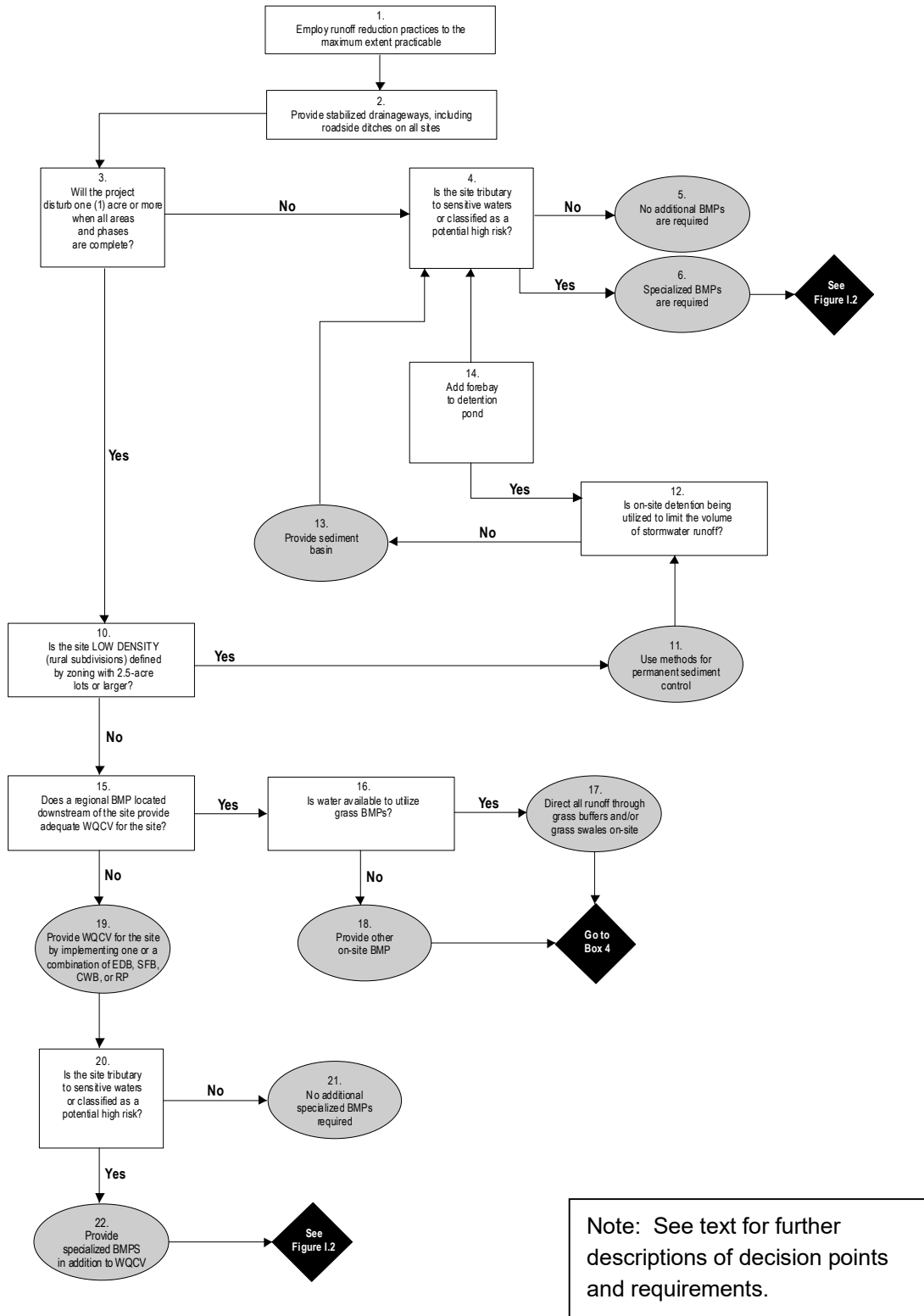
Drainageways include:

- Tributaries to creeks that have been left in a relatively natural state,
- Tributaries, channels, and drainageways that are graded or regraded and may include drop or check structures, side slope stabilization, and low-flow channels.
- Roadside ditches that are completely man-made and should only be used to convey runoff from roads and roadway right-of-ways (ROWs).

Box 3: It must be determined if the development and/or redevelopment disturbs an area of land that is 1 acre or larger (or planned to be 1 acre or larger) when all phases are complete.

Box 4: Sites tributary to sensitive waters should consider specialized BMPs to address the parameter of concern as shown in Table I-5. At this time, no special BMPs are required until the County develops an overall strategy to address the parameters of concern, probably if and when a Total Maximum Daily Load (TMDL) is determined.

Figure I-1. BMP Requirements Flowchart for New Development and Redevelopment Sites - For Selecting Post-Construction BMPs in Compliance with El Paso County's Stormwater NPDES Permit



Note: See text for further descriptions of decision points and requirements.

Figure I-2. BMP Requirements Flowchart for New Development and Redevelopment Sites - For Selecting Post-Construction BMPs in Compliance with El Paso County's Stormwater NPDES Permit

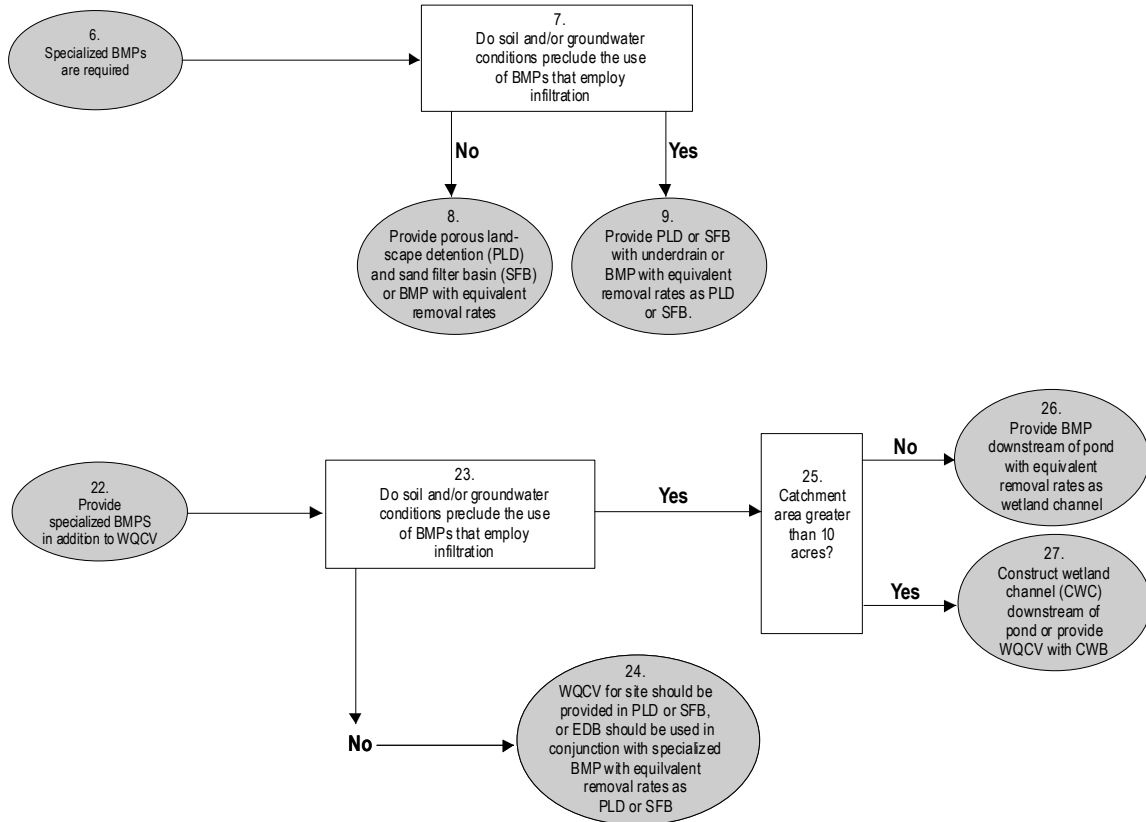


Table I-4. Best Management Practices Abbreviations

Abbreviation	Best Management Practice
CWB	Constructed Wetlands Basin
CWC	Constructed Wetlands Channel – Sedimentation Facility
EDB	Extended Detention Basin – Sedimentation Facility
PLD	Porous Landscape Detention
RP	Retention Pond – Sedimentation Facility
SFB	Sand Filter Extended Detention Basin
WQCV	Water Quality Capture Volume
GB	Grass Buffer
GS	Grass Swale
MBP	Modular Block Porous Pavement
PPD	Porous Pavement Detention

Table I-5. El Paso County Sensitive¹ Waters

Stream and Segment	Parameter of Concern	Specialized BMPs Required
Fountain Creek and tributaries above Monument Creek	E. coli and Se	None at this time
Fountain Creek from Monument Creek to Highway 47	E. coli	None at this time
Monument Creek from National Forest to Fountain Creek	Se	None at this time
Willow Springs Pond #1 and #2	PCE	None at this time
¹ CDPHE 2006 303(d) list. Standard agreement forms for Private Detention Basins are in Appendix G. [This list may change in the future. The 303(d) list or equivalent in effect at the time of permitting will apply.]		

Potential high-risk sites must also incorporate specialized BMPs. High-risk sites are defined by two factors:

- Sites with land uses involving the potential for significant deposition of pollutants.
- Sites without practices to eliminate exposure of pollutants to stormwater.

Land uses involving the potential for significant deposition of pollutants include, but are not limited to:

- Vehicle maintenance facilities,
- Gas stations,
- Automobile salvage yards and junk yards,
- Commercial sites with high levels of “in and out” traffic such as fast-food restaurants and convenience stores,

Many industrial facilities are required to obtain coverage under an industrial stormwater permit; these facilities include automobile salvage yards. Practices to eliminate exposure of pollutants to stormwater may or may not be part of an industrial stormwater permit. These practices include coverage of material storage areas, berms around tanks, spill control plans, and other “good housekeeping” measures. For industrial sites where stormwater is not exposed to pollutants, structural BMPs, including detention ponds for water quality and other BMPs discussed below, may not be required.

Because stormwater pollutants are often transported with sediment, erosion protection and sediment control are necessary for stormwater quality protection. This is very important in the County because of the sandy soils in the region. In particular, discharges that may impact sensitive waters or that come from potentially high-risk sites should have a high level of sediment protection. Thus,

in addition to the specialized BMPs, sediment control practices such as revegetation, grading to prevent steep side slopes, check dams, slope drains, and sediment basins should be employed where practical.

Box 5: No BMPs are required other than stabilized drainageways and possibly MDCIA.

Box 6: Specialized BMPs are required and therefore proceed to Box 7 on Table I-1.

Box 7: BMPs that employ infiltration include porous landscape detention and sand filter basins without underdrains. Certain conditions preclude the use of these types of BMPs, including close proximity of groundwater or relatively impervious soils to the bottom of the facility. Groundwater levels should be characterized during the season with the highest levels (often late Spring or early Summer). Impervious soils include bedrock as well as soil types C and D. The term "close proximity" means 5 feet or less. If there is less than 5 feet, a study of the hydraulic conductivity of the soils must be conducted to show that excessive groundwater mounding or direct groundwater contamination will not result from the use of BMPs that employ infiltration.

Box 8: If groundwater or relatively impervious soils are not within 5 feet of the surface, implement porous landscape detention (PLD) or a sand filter basin (SFB) from DCM2. Alternative BMPs can be used if shown to be equally effective as PLD or SFB (see discussion below).

Box 9: Implement PLDs or SFBs with underdrains, or implement a BMP with removal rates equivalent to PLDs or SFBs, including qualifying manufactured BMPs. Qualifying manufactured BMPs are those that have undergone independent tests to verify that the installation, flow volumes, and removal rates will work for the site under consideration.

Box 10: If the site is larger than one acre and is low density residential, then no water quality capture volume is required, but the need for sediment basins must be evaluated, and the site must be categorized by the sensitive waters and high-risk criteria (return to Box 4). Low density (rural) subdivisions include lots with 2.5 acre or larger lots.

Box 11: Sediment is best controlled at the source. That is, rather than using structures to collect soil after it is suspended in stormwater, it is preferable to stabilize soil to prevent suspension from occurring. Sediment source controls must be implemented for all low-density developments and include (but are not limited to):

- Adequately established vegetation per DCM1 criteria,
- Side slopes that are 3 horizontal to 1 vertical or flatter or the use of benched side slopes when slopes are steeper than 3 horizontal to 1 vertical,
- The use of erosion control blankets to aid establishment of vegetation,

- Check dams,
- Slope drains.

Temporary irrigation and maintenance of vegetation until adequately established may be required.

Box 12: In low density (rural) subdivisions, a method for permanent sediment control must be provided. If a detention pond is used, the forebay is to be sized according to the criteria for Extended Detention Basins. If a detention pond/Extended Detention Pond is not required, a sediment basin as described in DCM2, page 3-32 may be used. It should be sized to collect 1,800 cubic feet per acre of disturbed area. Drainage area above a sediment basin can be reduced by use of vegetated swales, buffers, or contour berms.

Box 13: If there are no detention ponds, separate sediment basins must be located to catch all runoff leaving the disturbed area of the site.

Box 14: In cases where a detention pond is already required for controlling the volume of runoff, a sediment basin can take the form of a forebay to this pond.

Box 15: Regional ponds are often used to control the increase in runoff flow and volume due to development. If the site is not low density, and there is a regional downstream BMP that provides adequate WQCV for the site plus the other sites planning to use it, then proceed to Box 16.

Box 16: The site is required to direct all runoff through grass buffers and/or grass swales or provide a similar BMP. (Note that this is required in accordance with the CDPHE guidance manual to afford some protection to state waters in between the site and the downstream WQCV BMP.)

Box 17: Grass buffers require irrigation in almost all cases in the County; swales sometimes require irrigation.

Box 18: "Dry" alternatives may be used if they are shown to have equivalent removal rates as buffers and swales. All of the structural treatment BMPs in DCM2 (Section 4.2) have equivalent removal rates and may be used. The covering of storage/handling areas and spill containment and control are not structural treatment BMPs, and thus are not substitutes for grass buffers and swales.

Box 19: If there is no regional downstream BMP that provides WQCV, then WQCV must be provided for the site with one or a combination of the following BMPs in DCM2: Extended Detention Basin (EDB), Sand Filter Basin (SFB), Constructed Wetland Basin (CWB), or Retention Pond (RP). Chapter 4 in DCM2 (in particular, Figure ND-7) should be consulted for a selection process for the BMP with WQCV. For all ponds, issues related to dam construction and potential groundwater contamination must be considered. Retention Ponds must be considered in the context of additional issues including safety and health (e.g., drowning and mosquito/West Nile virus) and water rights. Surface water storage rights will be obtained before a retention pond can be proposed for a site.

Box 20: Sites tributary to sensitive waters must meet the requirements as outlined in Table I-5, and potential high-risk sites must have specialized BMPs.

Box 21: No additional BMPs are required other than WQCV-based BMPs. Also, as always, drainageways must be stabilized and runoff should be reduced as much as possible (Boxes 1 and 2).

Box 22: When specialized BMPs are required, proceed to Box 23 on Figure I-2.

Box 23: Two situations apply, one where conditions preclude the installation of BMPs that employ infiltration, and one where they do not. (See Box 7.) If conditions preclude the installation of BMPs that employ infiltration then proceed to Box 25; otherwise proceed to Box 24.

Box 24: Where soil and groundwater conditions are not prohibitive (that is, groundwater or relatively impervious soils are not within 5 feet of the surface), implement PLD or SFB from DCM2. Alternative BMPs can be used if shown to be equally effective as PLD or SFB (see discussion below).

Box 25: Constructed wetlands (either channels or basins) are an effective BMP for sites with drainage areas greater than 10 acres.

Box 26: Provide a BMP downstream of the pond with equivalent removal rates as a wetland channel; this could be a qualifying manufactured BMP or other BMP that meets the criteria below.

Box 27: If the catchment area is greater than 10 acres, provide a constructed wetland channel (CWC) downstream of pond or provide WQCV with CWB.

E. Projects that are Strictly Roadway Construction

For projects that entail highway or other roadway construction, there are three basic questions for the applicant:

- Is the road urban or rural? That is, does the road have curb and gutter or does it utilize roadside ditches?
- For rural roads, do the ditches require “water turnouts?”
- Is the road a “hot spot” or does it discharge to sensitive waters?

For urban road construction, the applicant must follow the requirements in DCM1. Rural roads (which by definition have roadside ditches) must be stabilized with one of three methods included in DCM2 on pages 4-3 and 4-4. These methods are described in DCM1.

Rural roads, i.e. those roads which utilize roadside ditches for conveyance of runoff from the roadway, do not have sufficient capacity in the roadside ditches to convey much more runoff than that which runs off the road itself. “Water turnouts,” which function as spillways which direct flow out of the ditches onto property adjacent to the ROW, are frequently required as a result. Design for the “water turnout” should ensure the turnout discharges into a “suitable outfall” as described in DCM1 along the roadway such as a natural swale. A drainage easement for this runoff must be acquired at these locations. A possible

consequence of “water turnouts” is the loading of sediment onto private property. If “water turnouts” will be utilized for the ditches, sediment basins shall be used at these locations. However, there must be sufficient space in the ROW for both the structure itself and for maintenance access, or a specific drainage easement must be provided for the feature and access. Sediment basins can be designed in accordance with the guidelines in DCM2 in the section for construction BMPs. The basin shall be sized to collect 1,800 cubic feet of sediment per acre of drainage area of the roadway.

The term “high risk site” can be defined by traffic volume for a section of roadway. If the road will experience traffic volume of 30,000 average daily traffic (ADT) or more it is likely to contribute high levels of pollutants. For these situations, additional BMPs are required and selection must follow Boxes 6, 7, 8, and 9 in Figure 1b. Additional BMPs may also be required for discharge to sensitive waters. As described above for the general developments (with building pads), these additional requirements will depend on the TMDL process.

F. Additional Guidelines for BMP Selection

Additional Guidelines for selecting among the appropriate BMPs determined from Figure I-1 and Figure I-2. Figure I-3 (Figure ND-7 in DCM2) depicts a decision tree for selecting one of the six WQCV BMPs based on drainage catchment area and whether water is available to satisfy evapotranspiration requirements. Porous pavement and porous landscape detention are generally suited for small drainage areas (i.e. much less than 1.0 acres); however, larger subwatersheds can be subdivided into individual drainage sub-catchment areas meeting the criteria shown in Figure I-3 for these BMPs.

One of the questions involved in laying out WQCV facilities on a site is whether to locate a BMP onstream or offstream. Onstream refers to locating a BMP on a drainageway that traverses a site such that all of the runoff from the upstream watershed flows through the facility. A single onstream BMP can treat both site runoff and runoff generated in any upstream offsite catchment areas that are part of that watershed. Locating BMPs offstream requires that all onsite catchment areas flow through a BMP prior to entering the drainageway. Offstream BMPs do not provide treatment of runoff from any upstream drainage catchment areas.

Onstream WQCV facilities are only recommended if the offsite drainage catchment area tributary to the drainageway has less impervious area than the onsite drainage catchment’s impervious area tributary to the same drainageway. Nevertheless, onstream WQCV facilities must be designed to serve the entire upstream watershed, including any catchment areas upstream of the development, based on future development conditions. This is true even if upstream developments have installed their own WQCV facilities.

The intent of WQCV facilities is they are located prior to the stormwater runoff being discharged to State Waters. However, see additional information in Section 4.1 of DCM2: Definition of New Development and Significant

Redevelopment/BMP Requirements regarding the acceptability of using downstream BMPs (including WQCV facilities) to serve as BMP controls for upstream development.

Figure I-4 (Figure ND-8 in DCM2) provides an illustration of selection and location options for WQCV facilities based on the principles discussed above. Figure I-6 (Table ND-1 in DCM2) indicates the BMP options for the four watershed areas shown in Figure I-4.

I.7.3 Incorporating WQCV into Stormwater Quantity Detention Basins

Wherever possible, it is recommended that WQCV facilities be incorporated into stormwater quantity detention facilities. This is relatively straightforward for an extended detention basin, constructed wetland basin, and a retention pond. When combined, the 2, 5, 10, and 100-year detention levels are provided above the WQCV and the outlet structure is designed to control two or three different releases. Stormwater quantity detention could be provided above the WQCV for porous pavement and landscape detention provided the drain times for the larger events are kept short.

The following approaches are to be implemented when incorporating WQCV into stormwater quantity detention facilities:

1. Water Quality

The full WQCV is to be provided according to the design procedures documented in the New Development BMP Factsheets.

2. Minor Storm

The full WQCV plus the full minor storm quantity detention volume is to be provided.

3. 100-Year Storm

One-half the WQCV plus the full 100-year detention volume is to be provided.

At this time, water quality detention is not to be incorporated into underground detention facilities, such as installations of buried large-diameter pipe sections, stone trenches, underground "infiltrating" devices, etc. Any underground detention facilities proposed for use in the County must meet state requirements for Injection Wells and requirements for experimental systems, in addition to Operation and Maintenance Manuals and maintenance agreements.

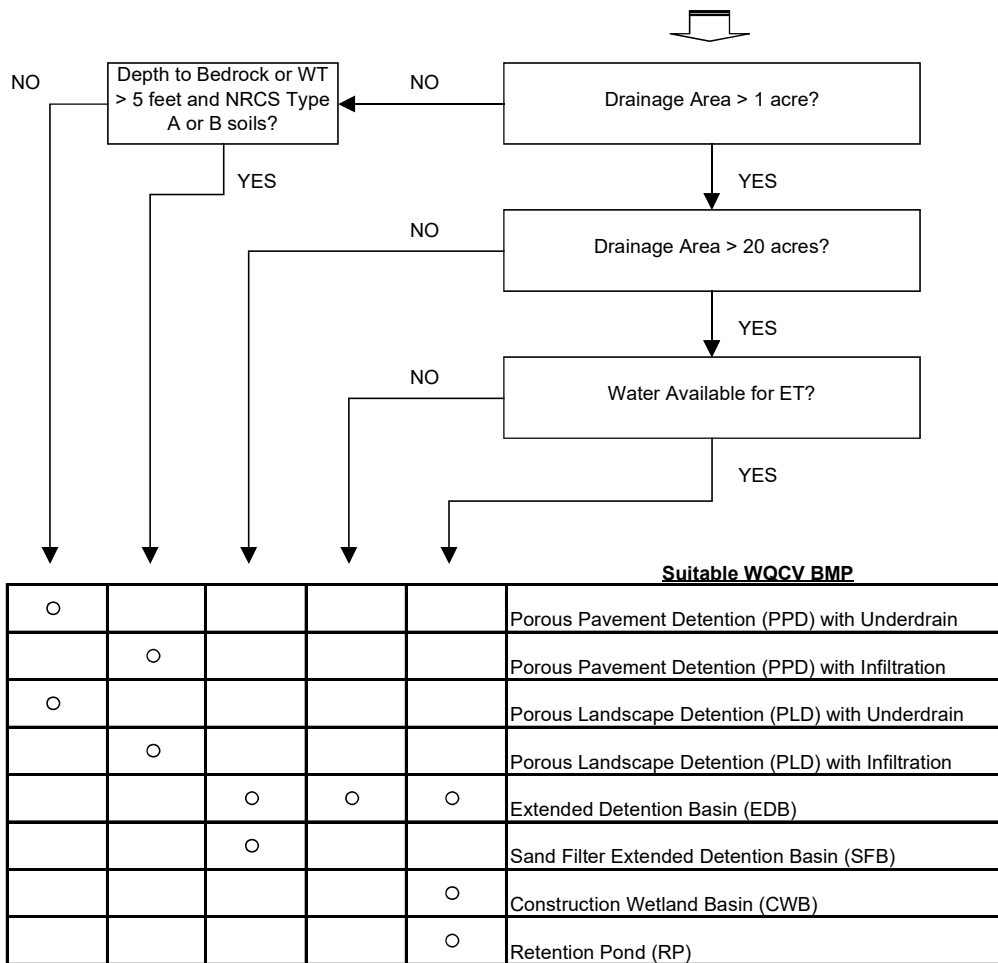
I.7.4 Separate Presedimentation Facilities

The design criteria shown in the New Development BMP Factsheets section shows presedimentation forebays at the upstream end of the extended detention basin, constructed wetland basin, and retention pond. The purpose of the forebay is to settle out coarse sediment and skim off floatables prior to the main body of the facility. An option to this approach is to install a separate facility upstream from the main WQCV facility. If this option is selected, the recommended size is at least 20 percent of the WQCV and the

recommended drain time is 1 hour for the presedimentation forebay volume only. Using this approach, the size of the main WQCV facility may be reduced by 10 percent, any requirement for sediment storage in the main facility may be reduced by one-half, and the forebay within the main facility may be eliminated.

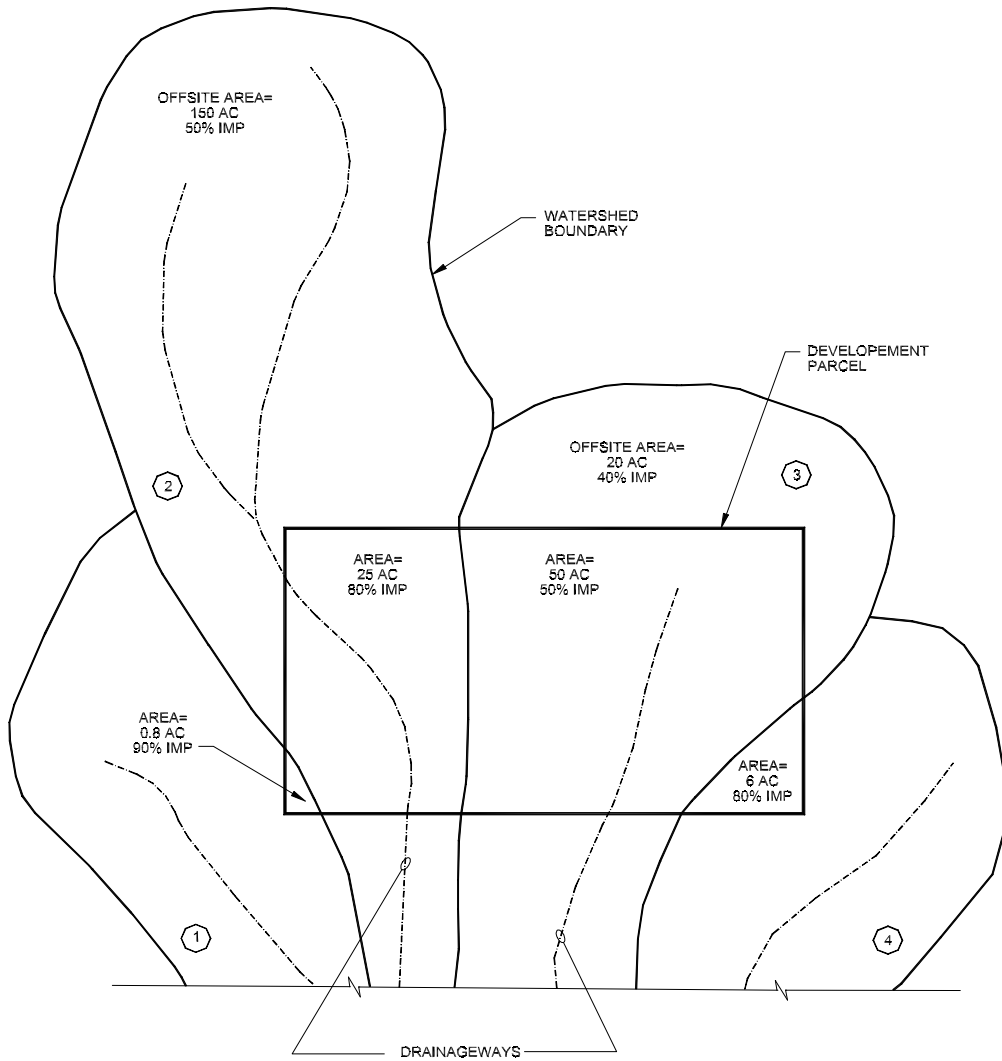
It is extremely important that high sediment loading be controlled for porous pavement detention, porous landscape detention, and sand filter extended detention basins. These facilities are best suited to being brought on line at the end of the construction phase where disturbed ground has been established with pavement or vegetation.

Figure I-3. Decision Tree for WQCV BMP Selection



Note: Large drainage areas may be subdivided into areas <20 acres for use of SFB or <1 acre for use of PPD or PLD.

Figure I-4. Illustration of Selection and Location Options for WQCV Facilities



Note: For this example, sufficient make-up water exists for constructed wetlands and retention pond for the watershed areas >50 acres through irrigation return flows.

Table I-7. Illustration of Selection and Location Options for WQCV Facilities for the Development Parcel on Figure I.4

Watershed Number	Onstream or Offstream	BMP Options	Minimum Number of BMP Installations	Average Drainage Area for Sizing each BMP, acre
1	Offstream	Porous Pavement Detention	1	0.8
		Porous Landscape Detention	1	0.8
2	Offstream	Porous Pavement Detention	24	1
		Porous Landscape Detention	24	1
		Extended Detention Basin	2	12
		Sand Filter Extended Detention Basin	2	12
3	Offstream	Porous Pavement Detention	49	1
		Porous Landscape Detention	49	1
		Extended Detention Basin	2	24
		Sand Filter Extended Detention Basin	3	16
	Onstream	Extended Detention Basin	1	70
		Constructed Wetland Basin	1	70
		Retention Pond	1	70
4	Offstream	Porous Pavement Detention	6	1
		Porous Landscape Detention	6	1
		Extended Detention Basin	1	6
		Sand Filter Extended Detention Basin	1	6

I.7.5 Structural BMP Effectiveness

Table I-7 (Table ND-2 in DCM2) indicates ranges of removal efficiencies reported in literature for a number of structural BMPs. Although combinations of nonstructural/structural BMPs can improve the overall water quality of the runoff, the effectiveness of several BMPs in their ability to reduce influent pollutant concentrations as a group are not directly additive. Table I-7 also shows a most probable range of removal efficiencies for structural BMPs recommended in the New Development BMP section.

I.7.6 Separation Distances

To reduce potential for surface and ground water contamination, permanent water quality BMPs will be located away from wells and Individual Sewage Disposal Systems (ISDS). Rules for separation distances and grouting depths for wells and BMPs will be based on distances between wells and “sources of contamination” in Colorado's Rules and Regulations for Water Well Construction, Pump Installation, and Monitoring and Observation Hole/Well Construction. Permanent BMPs and ISDS will be separated by the

same distances specified between the components of the ISDS and “waterways” in the El Paso County ISDS regulations.

Table I-8. BMP Pollutant Removal Ranges for Stormwater Runoff and Most Probable Range for BMPs

Type of BMP	(1)	TSS	TP	TN	TZ	TPb	BOD	Bacteria
Grass Buffer	LRR:	10-50	0-30	0-10	0-10	N/A	N/A	N/A
	EPR	10-20	0-10	0-10	0-10	N/A	N/A	N/A
Grass Swale	LRR:	20-60	0-40	0-30	0-40	N/A	N/A	N/A
	EPR	20-40	0-15	0-15	0-20	N/A	N/A	N/A
Modular Block Porous Pavement	LRR:	80-95	65	75-85	98	80	80	N/A
	EPR	70-90	40-55	10-20	40-80	60-70	N/A	N/A
Porous Pavement Detention	LRR:	8-96	5-92	-130-	10-98	60-80	60-80	N/A
	EPR	70-90	40-55	85 10-20	40-80	60-70	N/A	N/A
Porous Landscape Detention	LRR:	8-96	5-92	-100-	10-98	60-90	60-80	N/A
	EPR	70-90	40-55	85 20-55	50-80	60-80	N/A	N/A
Extended Detention Basin	LRR:	50-70	10-20	10-20	30-60	75-90	N/A	50-90
	EPR	55-75	45-55	10-20	30-60	55-80	N/A	N/A
Constructed Wetland Basin	LRR:	40-94	-4-90	21	-29-82	27-94	18	N/A
	EPR	50-60	40-80	20-50	30-60	40-80	N/A	N/A
Retention Pond	LRR:	70-91	0-79	0-80	0-71	9-95	0-69	N/A
	EPR	80-90	45-70	20-60	20-60	60-80	N/A	N/A
Sand Filter Extended Detention	LRR:	8-96	5-92	-129-	10-98	60-80	60-80	N/A
	EPR	80-90	45-55	84 35-55	50-80	60-80	60-80	N/A
Constructed Wetland Channel*	LRR:	20-60	0-40	0-30	0-40	N/A	N/A	N/A
	EPR	30-50	20-40	10-30	20-40	20-40	N/A	N/A

Ref: Bell et al. (1996), Colorado (1990), Harper & Herr (1992), Lakatos & McNemer (1987), Schueler (1987), Southwest (1995), Strecker et al. (1990), USGS (1986), US EPA (1983), Veenhuis et al. (1989), Whipple and Hunter (1981), Urbonas (1997).

(1)LRR Literature reported range, EPR—expected probable range of annual performance by DCM2 BMPs.

N/A Insufficient data to make an assessment.

*The EPR rates for a Constructed Wetland Channel assume the wetland surface area is equal or greater than 0.5% of the tributary total impervious area.

I.7.7 Operation and Maintenance of Best Management Practices

A. Long-term Maintenance Agreements for BMPs

Per the Colorado Department of Public Health and Environment, Colorado’s Phase II Guidance Document:

“All stormwater BMPs shall have an enforceable operation and maintenance agreement to ensure that the system functions as designed. This agreement will

include any and all maintenance easements required to access and inspect the BMP(s), and to perform routine maintenance as necessary to ensure proper functioning of the stormwater BMP. In addition, prior to the issuance of any permits for land development, legally binding documents shall be adopted and agreed to wherein the owners of the real property associated with the BMPs that benefit that property are held ultimately responsible for the proper maintenance of all BMPs, including a mechanism for the collection of the costs of the maintenance if it is not performed by the owners of the property.”

The property owner shall be responsible for the maintenance of all permanent stormwater quality measures. All temporary stormwater quality control measures shall be removed after work on the site has been completed and the measures are no longer needed. Should any property owner fail to adequately maintain the permanent stormwater quality control measures or remove the temporary measures, the County may, after notifying the owner of the required maintenance and/or removal and the owner failing to perform such maintenance and/or removal, enter the affected property and perform or cause to be performed the required work and assess the charge for such work against the property owner. Prior to approval of a subdivision or issuance of a Certificate of Occupancy for a site that did not go through the subdivision review process that has permanent BMPs, a signed Private Maintenance Agreement for Permanent BMPs must be submitted to the County.

B. Operation and Maintenance Manual

A detailed Operation and Maintenance Manual covering inspections, operation and maintenance of permanent BMPs will be provided to the party who holds the Private Maintenance Agreement for Permanent BMPs. The Operation and Maintenance Manual will include specifics on frequency of inspections and maintenance; standards for vegetation or structures, such as species of vegetation, mowing height, revegetation of worn or eroded areas, cleaning methods; depth of sediment requiring removal; replacement frequencies; and other relevant topics.

I.8 PROCEDURES FOR ASSESSMENT OF STRUCTURAL CONTROLS FOR RETROFITTING WATER QUALITY FEATURES

[Replaces DCM2 Section 4.4, page 4-133]

At some sites, there may be an existing structure for flood control and other water quantity control purposes. It may be possible to retrofit this structure for water quality in addition to the quantity functions. The following procedure will assist in evaluating the potential for retrofitting. In a new or major redevelopment project, new erosion and water quality control BMPs will be required, if retrofitting is not a reasonable option.

The purpose of this document is to outline the procedures for these evaluations. These procedures would then be utilized in conjunction with developing each new Drainage Basin Planning Study (DBPS) to determine the potential and feasibility for retrofitting existing structural controls (detention/retention basins).

The analysis of the structures involves three possible levels of review. The first is a qualitative review to determine if retrofitting of the structure is acceptable. The second element is quantitative to determine the pollutant removal effectiveness of the structure, both with and without water quality elements. Total Suspended Solids (TSS) will normally be the only constituent evaluated, unless other pollutants of concern are specified by the ECM Administrator, based on site-specific information such as draining to sensitive waters or high risk pollution sources. A third element of review involves developing a cost estimate for retrofitting to determine the economic feasibility.

A qualitative assessment evaluates the changes that would occur if the flood-control detention facility was modified for water quality purposes, and determines the extent to which the changes would affect these functions, and if these changes in function are acceptable. The detention pond must first be acceptable under the qualitative criteria, or the evaluation will conclude and not continue to the second level of review. A quantitative analysis involves a determination of whether the percent removal of TSS (or other specified constituent of concern) is significant. For purposes of this assessment, a significant change is defined as the percent removal of the constituent after retrofitting the detention pond is estimated to be at least 20 percent greater than the percent removal of the constituent for the detention pond without the water quality element incorporated. If a significant change is estimated, then the third element of analysis, a cost estimate of the economic feasibility, is conducted. If a significant change is not estimated, then the option to retrofit the detention pond is eliminated.

I.8.1 Final Alternative Selection

The final alternative selection process for drainage improvement options in any new DBPS is based on the evaluation of many factors including costs, safety, environmental issues including water quality, public input, etc. If the selected alternative includes retrofitting structural controls to provide additional pollutant removal, responsibility for implementation would need to be outlined in the study. If the responsibility was determined to be a public (County) responsibility, consideration for funding any such drainage improvement project would be made by the Board of County Commissions during its annual budget approval process in conjunction with all other budget requests. If the responsibility was determined to be a private development responsibility, ECM Administration would decide when implementation would be required in conjunction with the timing of future developments.

I.9 SUPPLEMENTAL INFORMATION A: NEW DEVELOPMENT DESIGN FORMS

[Replaces DCM2 Appendix A]

ATTENTION TO PERSONS USING THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT SUPPLIED DESIGN FORM WORKSHEETS

The Design Form Worksheets with the accompanying Visual Basic macros have been developed using a high standard of care, including professional review for identification of errors, bugs, and other problems related to the software. Minor modifications have been made by the City of Colorado Springs. However, as with any initial release of software driven products, it is likely that some nonconformities, defects, bugs, and errors with the software program will be discovered as

they become more widely used. The developers of these products welcome user feedback in helping to identify these potential problems so that improvements can be made to future releases of the Design Form Worksheets.

The Design Form Worksheets are intended to streamline the preliminary design process. Preparation of final design plans, addressing details of structural adequacy, public safety, hydraulic functionality, maintainability, and aesthetics, remain the sole responsibility of the designer.

BY THE INSTALLATION AND USE OF THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT SUPPLIED DESIGN FORM WORKSHEETS, AS MODIFIED BY THE CITY OF COLORADO SPRINGS, THE USER AGREES TO THE FOLLOWING:

NO LIABILITY FOR CONSEQUENTIAL DAMAGES

To the maximum extent permitted by applicable law, in no event shall the Urban Drainage and Flood Control District or the City of Colorado Springs or El Paso County, their contractors, advisors, reviewers, or their member governmental agencies, be liable for any incidental, special, punitive, exemplary, or consequential damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information or other pecuniary loss) arising out of the use or inability to use these products, even if the Urban Drainage and Flood Control District or the City of Colorado Springs or El Paso County, their contractors, advisors, reviewers, or their member governmental agencies have been advised of the possibility of such damages. In any event, the total liability of the Urban Drainage and Flood Control District or the City of Colorado Springs or El Paso County, their contractors, advisors, reviewers, or their member governmental agencies, and your exclusive remedy, shall not exceed the amount of fees paid by you to the Urban Drainage and Flood Control District for the Product.

NO WARRANTY

The Urban Drainage and Flood Control District or the City of Colorado Springs or El Paso County, their contractors, advisors, reviewers, or their member governmental agencies do not warrant that the Design Form Worksheets will meet your requirements, or that the use of this product will be uninterrupted or error free.

THIS PRODUCT IS PROVIDED "AS IS" AND THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT OR THE CITY OF COLORADO SPRINGS OR EL PASO COUNTY, THEIR CONTRACTORS, ADVISORS, REVIEWERS, AND THEIR MEMBER GOVERNMENTAL AGENCIES DISCLAIM ALL WARRANTIES OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, PERFORMANCE LEVELS, COURSE OF DEALING OR USAGE IN TRADE.



1-800-922-1987

CLEAR VIEW INDUSTRIAL PARK, FILING 2B

GRADING, STORM AND EROSION CONTROL PLANS

THE LOCATIONS OF EXISTING ABOVE GROUND AND UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL ABOVE GROUND AND UNDERGROUND UTILITIES.



VICINITY MAP
N.T.S.

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 ECM 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 Directors discretion.

Jennifer Irvine, P.E.
County Engineer/ECM Administrator

Date

Owner/Developer's Statement:

I, the owner/developer have read and will comply with the requirements of the grading and erosion control plan and all of the requirements specified in these detailed plans and specifications.

Kevin J. Ferguson, Manager (Lots 1A, 2A, 4A)
Clear View Properties I, LLC
9720 Arroya Lane
Colorado Springs, CO 80908

Date

Owner/Developer's Statement:

I, the owner/developer have read and will comply with the requirements of the grading and erosion control plan and all of the requirements specified in these detailed plans and specifications.

Robert C. Bullard, Manager (Lot 3A)
Dilligaf Leasing, LLC
3950 Clear View Loop
Colorado Springs, CO 80911

Date

SECURITY WATER AND
WASTEWATER DISTRICT
650-2000-138

NEW SUNSHINE, LLC
650-2000-136

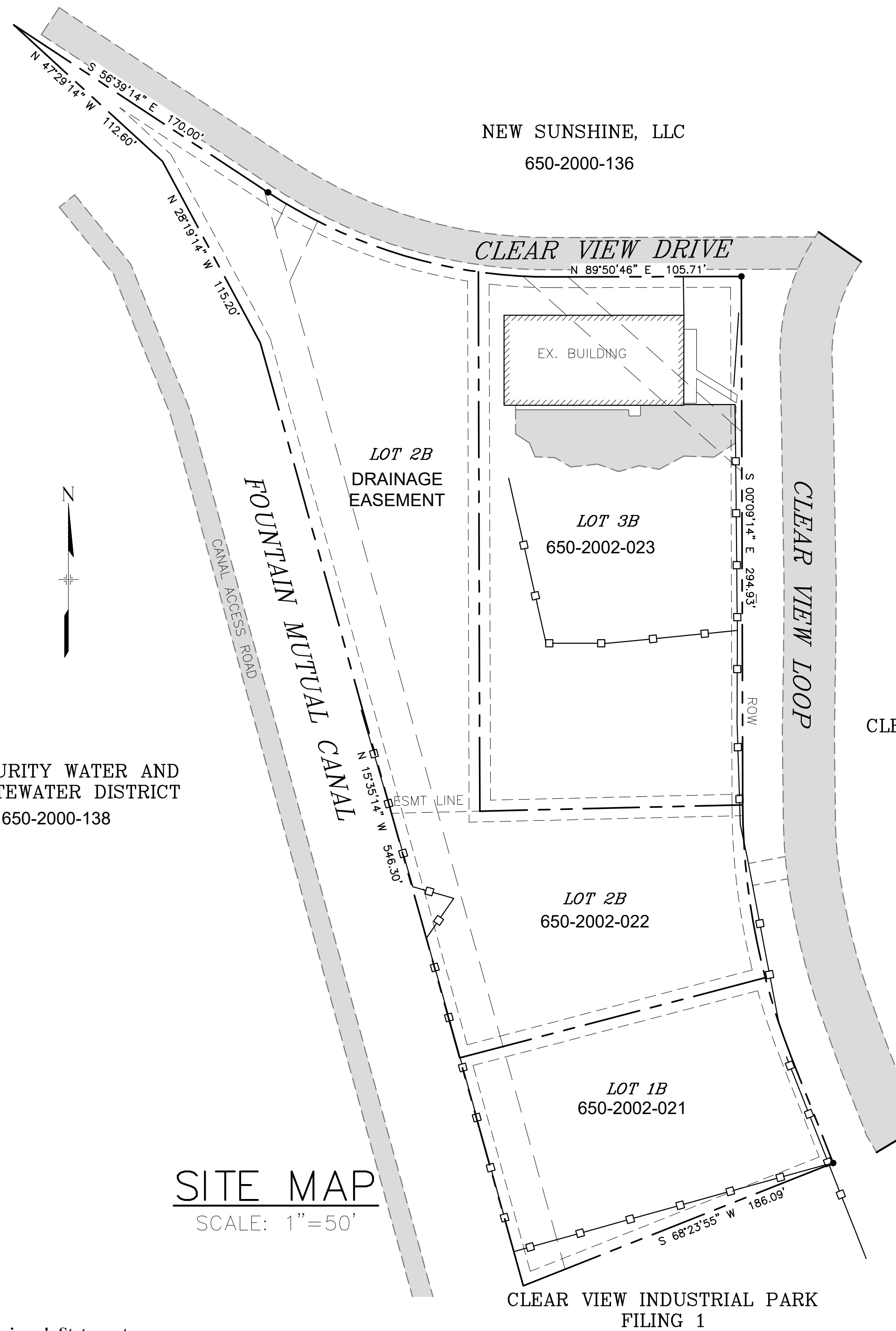
SITE MAP
SCALE: 1"=50'

Design Engineer's Statement:

These detailed plans and specifications were prepared under my direction and supervision. Said plans and specifications have been prepared according to the criteria established by the County for detailed roadway, drainage, grading and erosion control plans and specifications, and said plans and specifications are in conformity with applicable master drainage plans and master transportation plans. Said plans and specifications meet the purposes for which the particular roadway and drainage facilities are designed and are correct to the best of my knowledge and belief. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparation of these detailed plans and specifications.

Jonathan Moore, P.E. #34944
For and Behalf of CTR Engineering, Inc.

Date



CLEAR VIEW INDUSTRIAL PARK
FILING 1
650-2001-007

CLEAR VIEW INDUSTRIAL PARK
FILING 1
650-2002-002

OWNER/DEVELOPER:
CLEAR VIEW PROPERTIES I, LLC
KEVIN FERGUSON, 719-337-3534
ENGINEER:
CTR ENGINEERING, INC.
JONATHAN MOORE, 719-964-6654
EL PASO COUNTY:
LUPE PACKMAN, 719-520-7550
SECURITY WAT. AND SAN. DISTRICT:
ROY HEALD, 719-392-3475
FOUNTAIN MUTUAL METRO. DISTRICT:
GARY BARBER, 719-598-0230

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NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B			
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)			
PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL			
SHEET TITLE: TITLE SHEET			
DESIGNED BY: JCM	SCALE:	DATE ISSUED: JAN. 2021	
DRAWN BY: JCM	HH:		
CHECKED BY: JH	V:	SHEET NO. 1 OF 22 SHEETS	
DWG: C:\Temp\CV\CAD\Grad\1 Title Sheet-Grad.dwg			

PCD FILE NO. SF2029



1-800-922-1987

CLEAR VIEW INDUSTRIAL PARK, FILING 2B

GRADING, STORM AND EROSION CONTROL PLANS

THE LOCATIONS OF EXISTING ABOVE GROUND AND UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL ABOVE GROUND AND UNDERGROUND UTILITIES.

STANDARD NOTES FOR EL PASO COUNTY GRADING AND EROSION CONTROL PLANS

<p>STANDARD NOTES FOR EL PASO COUNTY GRADING AND EROSION CONTROL PLANS</p> <p>Revised July 2019</p> <ol style="list-style-type: none"> 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 to 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. During construction the SMWP is the responsibility of the designated Qualified Stormwater Manager or Certified Erosion Control Inspector and 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. Control measures must be installed prior to commencement of activities that may contribute pollutants to stormwater. Temporary sediment and erosion control measures for all slopes, channels, ditches, or any disturbed land area shall be completed immediately upon completion of the disturbance. 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 is 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 prior to implementation. 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. An area that is going to remain in an interim state for more than 60 days shall also be stabilized. 	<ol style="list-style-type: none"> Final stabilization must 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 plan 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 defined in the approved plans. Any proposed changes that effect the hydrology or hydraulics of a permanent stormwater management structures must be approved by the ECM Administrator prior to implementation. Any earth disturbance shall be conducted in such a manner so 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 infeasible. 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 shall also be protected from sedimentation during construction until final stabilization is achieved. Any temporary or permanent facility designed and constructed for the conveyance of stormwater around, through, or from the earth disturbance area shall be a stabilized conveyance 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 runoff to State Waters, including any surface or subsurface storm drainage system or facilities. Concrete washout shall not be located in an area where shallow groundwater may be present, or within 50 feet of a surface water body. Dewatering operations: uncontaminated ground water may be discharged on site, but may not leave the site in the form of surface runoff. Erosion control blanketing is to be used on slopes steeper than 3:1. Building, construction, excavation, or other 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. BMP's may be required by El Paso County Engineering if deemed necessary, based on specific conditions and circumstances. Vehicle tracking of soils and construction debris off-site shall be minimized. Materials tracked offsite shall be cleaned up and properly disposed of immediately. Contractor shall be responsible for the removal of all wastes from the construction site for disposal in accordance with local and State regulatory requirements. No 	<p>construction debris, tree slash, building material wastes or unused building materials shall be buried, dumped, or discharged at the site.</p> <ol style="list-style-type: none"> The owner, site developer, contractor, and/or their authorized agents shall be responsible for the removal of all construction debris, dirt, trash, rock, sediment, and sand that may accumulate in the storm sewer or other drainage conveyance system 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 chemicals are to be used by the contractor, which have the potential to be released in stormwater unless permission for the use of a specific chemical is granted in writing by the ECM Administrator. In granting the use of such chemicals, special conditions and monitoring may be required. Bulk storage of petroleum products or other liquid chemicals in excess of 55 gallons shall have adequate secondary containment protection to contain all spills and prevent any spilled material from entering State Waters, including any surface or subsurface storm drainage system or facilities. No person shall cause the impediment of stormwater flow in the flow line of the curb and gutter or in the ditch flow line. Individuals 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 included in the DCM Volume I and the ECM Appendix I. All appropriate permits must be obtained by the contractor prior to construction (NPDES, Floodplain, 404, fugitive dust, etc.). In the event of conflicts between these requirements and laws, rules, or regulations of other Federal, State, or County agencies, the more restrictive laws, rules, or regulations shall apply. All construction traffic must enter/exit the site at approved construction access points. Prior to actual construction the permittee shall verify the location of existing utilities. A water source shall be available on site during earthwork operations and utilized as required to minimize dust from earthwork equipment and wind. The soils report for this site has been prepared by <u>ENTECH ENG</u> 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 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 	<p>grading and erosion control plan may be a part. For information or application materials contact:</p> <p>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</p>
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Standard Notes for El Paso County Construction Plans

- All drainage and roadway construction shall meet the standards and specifications of the City of Colorado Springs/El Paso County Drainage Criteria Manual, Volumes 1 and 2, and the El Paso County Engineering Criteria Manual.
- Contractor shall be responsible for the notification and field notification of all existing utilities, whether shown on the plans or not, before beginning construction. Location of existing utilities shall be verified by the contractor prior to construction. Call 811 to contact the Utility Notification Center of Colorado (UNCC).
- Contractor shall keep a copy of these approved plans, the Grading and Erosion Control Plan, the Stormwater Management Plan (SWMP), the soils and geotechnical report, and the appropriate design and construction standards and specifications at the job site at all times, including the following:
 - El Paso County Engineering Criteria Manual (ECM)
 - City of Colorado Springs/El Paso County Drainage Criteria Manual, Volumes 1 and 2
 - Colorado Department of Transportation (CDOT) Standard Specifications for Road and Bridge Construction
 - CDOT M & S Standards
- 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. Any modifications necessary to meet criteria after-the-fact will be entirely the developer's responsibility to rectify.
- It is the design engineer's responsibility to accurately show existing conditions, both onsite and offsite, on the construction plans. Any modifications necessary due to conflicts, omissions, or changed conditions will be entirely the developer's responsibility to rectify.
- Contractor shall schedule a pre-construction meeting with El Paso County Planning and Community Development (PCD) – Inspections, prior to starting construction.

- It is the contractor's responsibility to understand the requirements of all jurisdictional agencies and to obtain all required permits, including but not limited to El Paso County Erosion and Stormwater Quality Control Permit (ESQCP), Regional Building Floodplain Development Permit, U.S. Army Corps of Engineers—issued 401 and/or 404 permits, and county and state fugitive dust permits.
- Contractor shall not deviate from the plans without first obtaining written approval from the design engineer and PCD. Contractor shall notify the design engineer immediately upon discovery of any errors or inconsistencies.
- All storm drain pipe shall be Class III RCP unless otherwise noted and approved by PCD.
- Contractor shall coordinate geotechnical testing per ECM standards. Pavement design shall be approved by El Paso County PCD prior to placement of curb and gutter and pavement.
- All construction traffic must enter/exit the site at approved construction access points.
- Sight visibility triangles as identified in the plans shall be provided at all intersections. Obstructions greater than 18 inches above flowline are not allowed within sight triangles.
- Signing and striping shall comply with El Paso County DOT and MUTCD criteria. [If applicable, additional signing and striping notes will be provided.]
- Contractor shall obtain any permits required by El Paso County DOT, including Work Within the Right-of-Way and Special Transport permits.
- The limits of construction shall remain within the property line unless otherwise noted. The owner/developer shall obtain written permission and easements, where required, from adjoining property owner(s) prior to any off-site disturbance, grading, or construction.

NO.	DATE	DESCRIPTION	BY
REVISIONS			

CTR Engineering, Inc.

16392 TIMBER MEADOW DRIVE
COLORADO SPRINGS, CO 80908
(719) 964-6654

PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B

BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)

PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL

SHEET TITLE: GENERAL NOTES

DESIGNED BY: JCM	SCALE:	DATE ISSUED: JAN. 2021
DRAWN BY: JCM	HH:	
CHECKED BY: JH	V:	SHEET NO. 2 OF 22 SHEETS

DWG: c:\Temp\CV\CAD\Grad\2 GENERAL NOTES.dwg

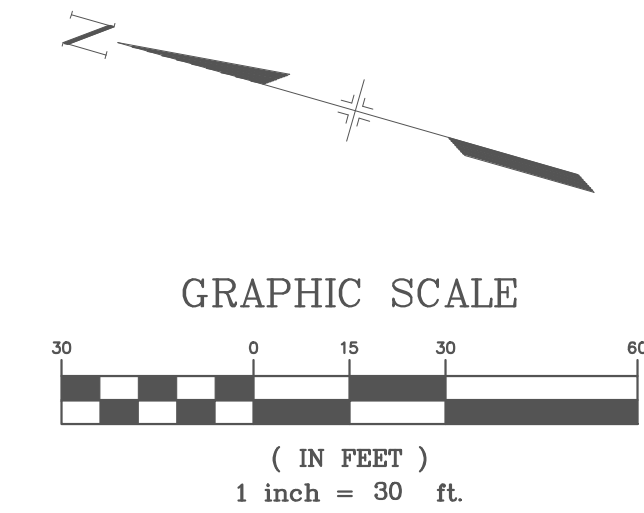
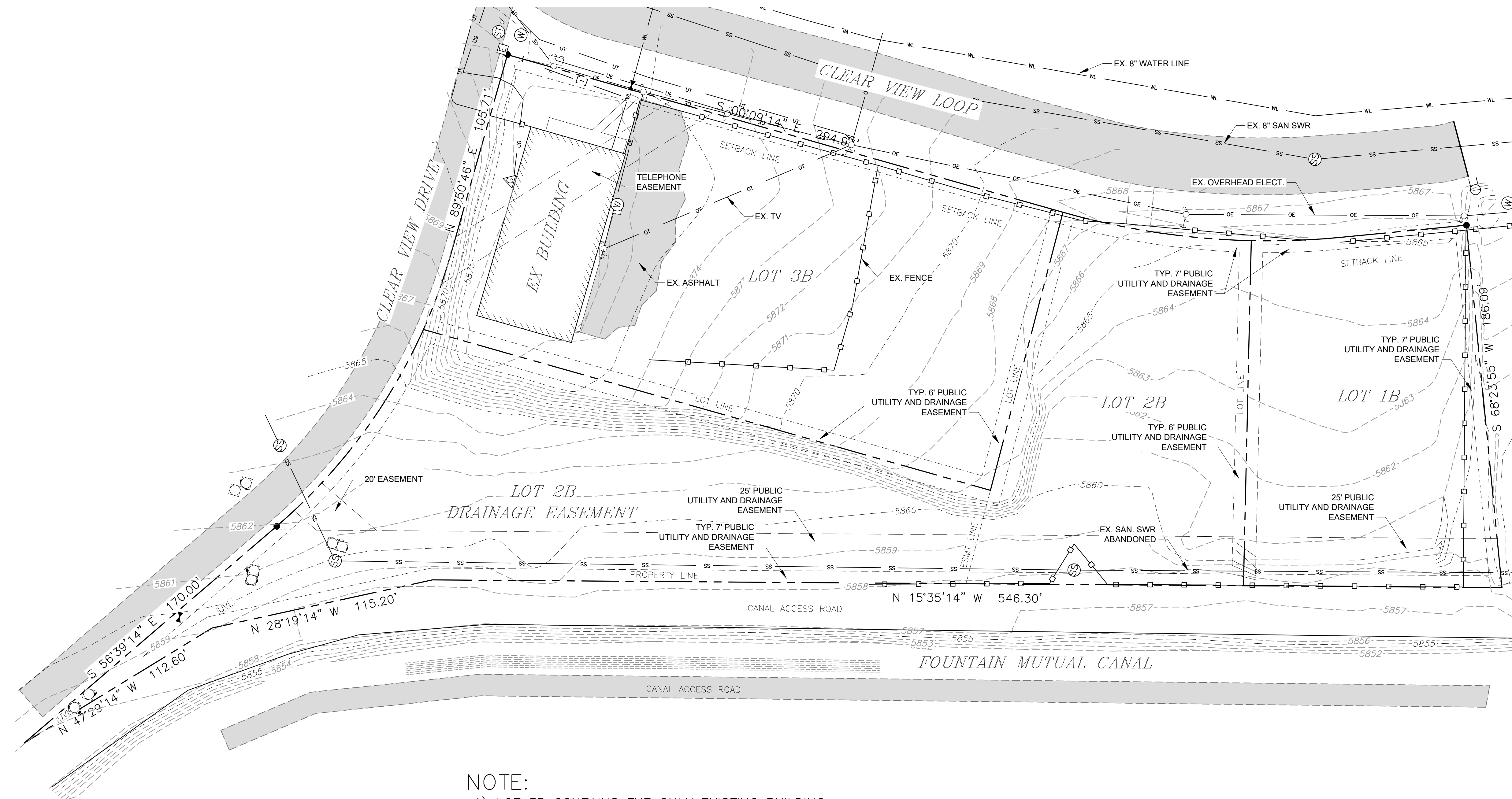


1-800-922-1987

CLEAR VIEW INDUSTRIAL PARK, FILING 2B

GRADING, STORM AND EROSION CONTROL PLANS

THE LOCATIONS OF EXISTING ABOVE GROUND AND UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL ABOVE GROUND AND UNDERGROUND UTILITIES.



LEGEND

- EXISTING CONTOURS
- EXISTING FENCE
- EXISTING LOTS LINES

NO.	DATE	DESCRIPTION	BY
REVISIONS			

CTR Engineering, Inc.

16392 TIMBER MEADOW DRIVE
COLORADO SPRINGS, CO 80908
(719) 964-6654

PROJECT:
CLEAR VIEW
INDUSTRIAL PARK FILING 2B

BENCHMARK:
Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)

PROJECT TITLE:
GRADING, WATER QUALITY POND
AND EROSION CONTROL

SHEET TITLE:
EXISTING SITE PLAN

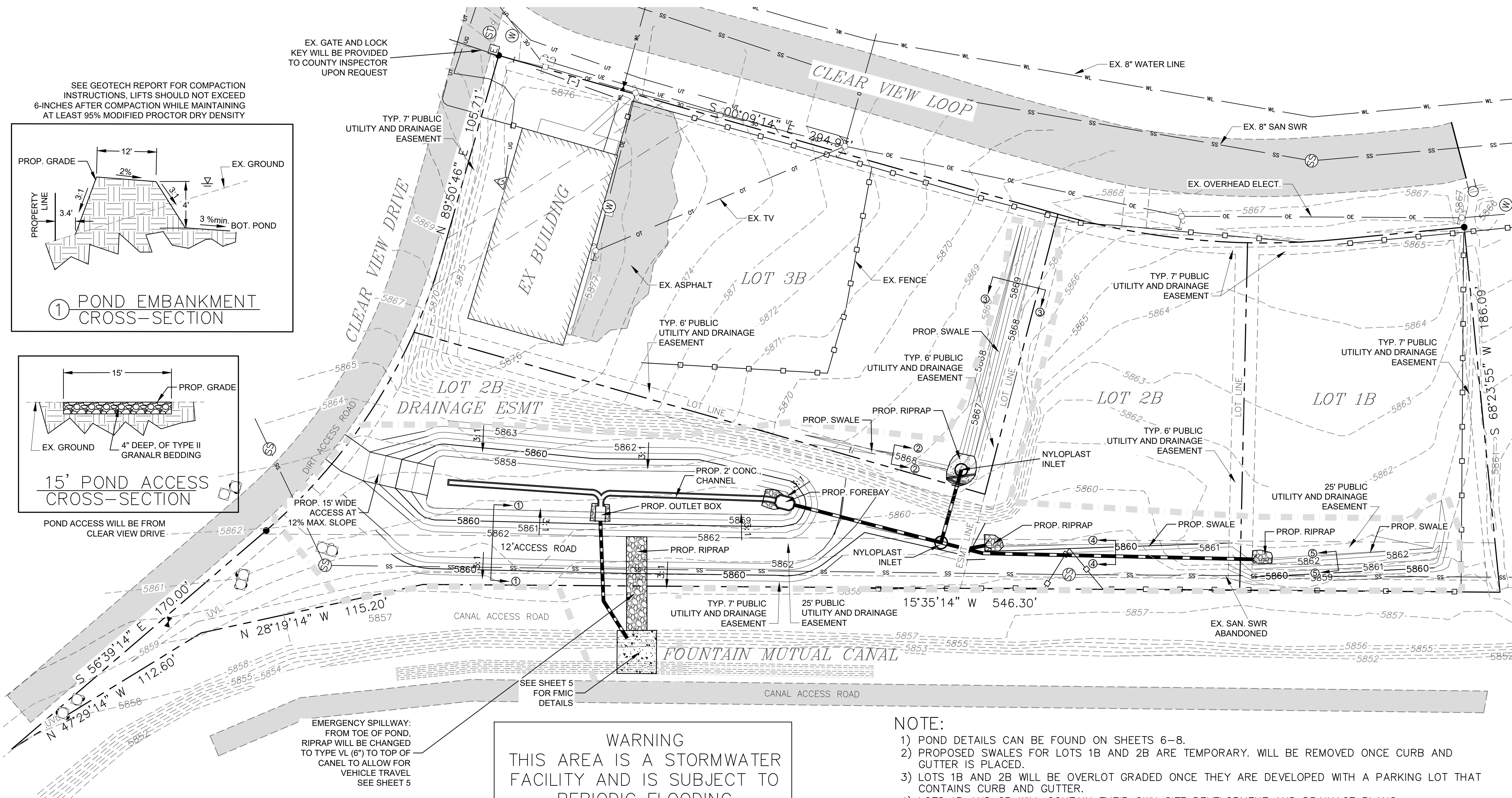
DESIGNED BY: JCM SCALE: DATE ISSUED: JAN. 2021
DRAWN BY: JCM H: 1"=30'
CHECKED BY: JH V: SHEET NO. 3 OF 22 SHEETS

DWG:

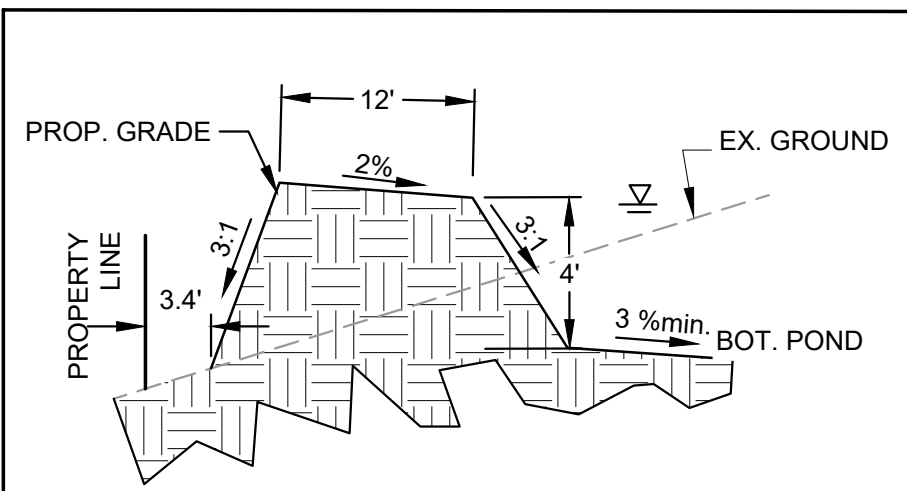
NOTE:

- 1) LOT 3B CONTAINS THE ONLY EXISTING BUILDING
- 2) PART OF LOT 2B WILL BE DEDICATED AS A DRAINAGE EASEMENT WHICH WILL ONLY CONTAIN THE WATER QUALITY POND AND NO BUILDINGS.
- 3) LOTS 1B AND 2B WILL BE DEVELOPED AT A LATER DATE
- 4) LOT 1B AND 2B WILL SUBMIT INDIVIDUAL SITE DEVELOPMENT PLANS ONCE THEY ARE SOLD TO A BUILDER, THOSE LOTS WILL NEED THEIR OWN GEOTECHNICAL/FOUNDATION REPORT.
- 5) A GEOTECHNICAL REPORT BY ENTECH ENGINEERING ACCOMPANY THESE CONSTRUCTION DRAWINGS.

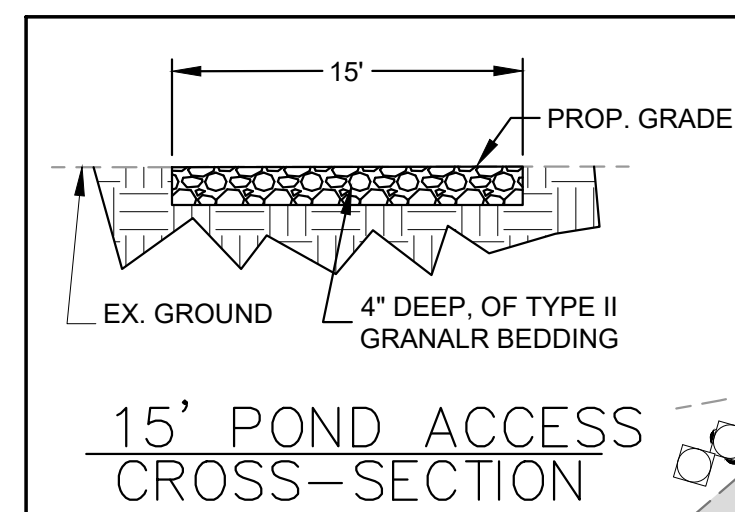
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SEE GEOTECH REPORT FOR COMPACTION INSTRUCTIONS. LIFTS SHOULD NOT EXCEED 6-INCHES AFTER COMPACTION WHILE MAINTAINING AT LEAST 95% MODIFIED PROCTOR DRY DENSITY



1 POND EMBANKMENT CROSS-SECTION



15' POND ACCESS CROSS-SECTION

POND ACCESS WILL BE FROM CLEAR VIEW DRIVE

EX. GATE AND LOCK KEY WILL BE PROVIDED TO COUNTY INSPECTOR UPON REQUEST

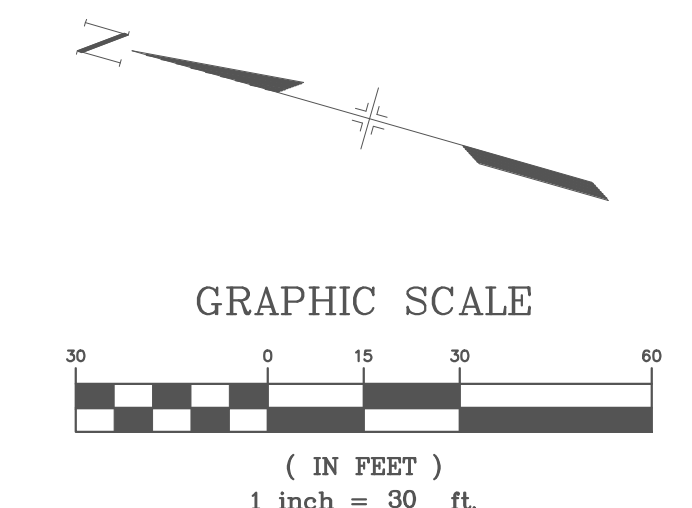
EMERGENCY SPILLWAY: FROM TOE OF POND, RIPRAP WILL BE CHANGED TO TYPE VL (6") TO TOP OF CANEL TO ALLOW FOR VEHICLE TRAVEL SEE SHEET 5

WARNING THIS AREA IS A STORMWATER FACILITY AND IS SUBJECT TO PERIODIC FLOODING

DETENTION POND SIGN

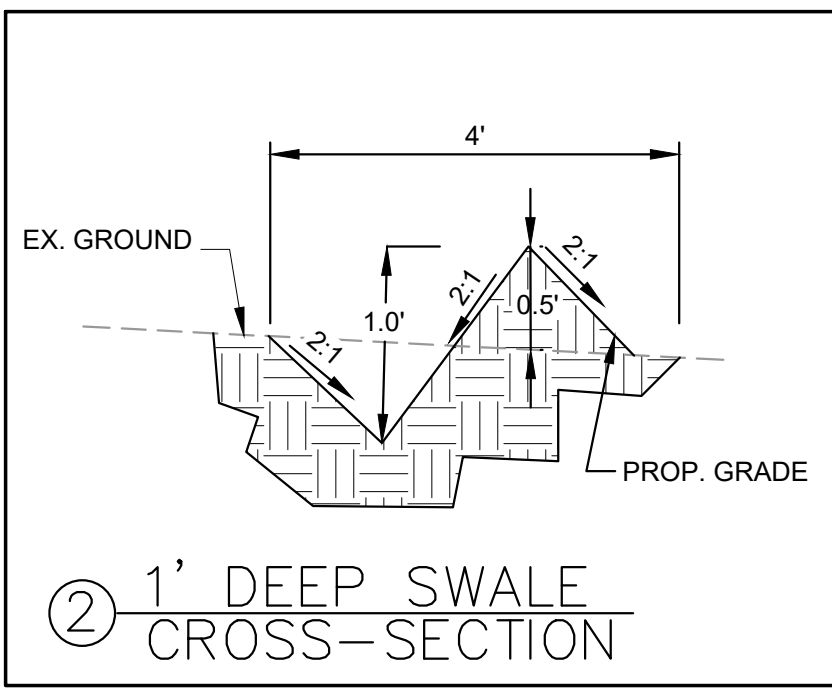
NOTE:

- 1) POND DETAILS CAN BE FOUND ON SHEETS 6-8.
2) PROPOSED SWALES FOR LOTS 1B AND 2B ARE TEMPORARY. WILL BE REMOVED ONCE CURB AND GUTTER IS PLACED.
3) LOTS 1B AND 2B WILL BE OVERLOT GRADED ONCE THEY ARE DEVELOPED WITH A PARKING LOT THAT CONTAINS CURB AND GUTTER.
4) LOTS 1B AND 2B WILL CONTAIN THEIR OWN SITE DEVELOPMENT AND DRAINAGE PLANS.
5) THE OVERALL WATER QUALITY POND HAS BEEN DESIGN FOR ALL 3 LOTS WITHIN THE CLEAR VIEW INDUSTRIAL PARK, FILING 2B.
6) SIGNAGE - TWO SIGNS, EACH WITH A MINIMUM AREA OF 3 SQUARE FEET, SHALL BE PROVIDED AROUND THE PERIMETER OF ALL DETENTION FACILITIES. THE SIGNS SHALL BE FABRICATED OF DURABLE MATERIALS, SUCH AS METAL OR PLASTIC, USING RED LETTERING ON A WHITE BACKGROUND.



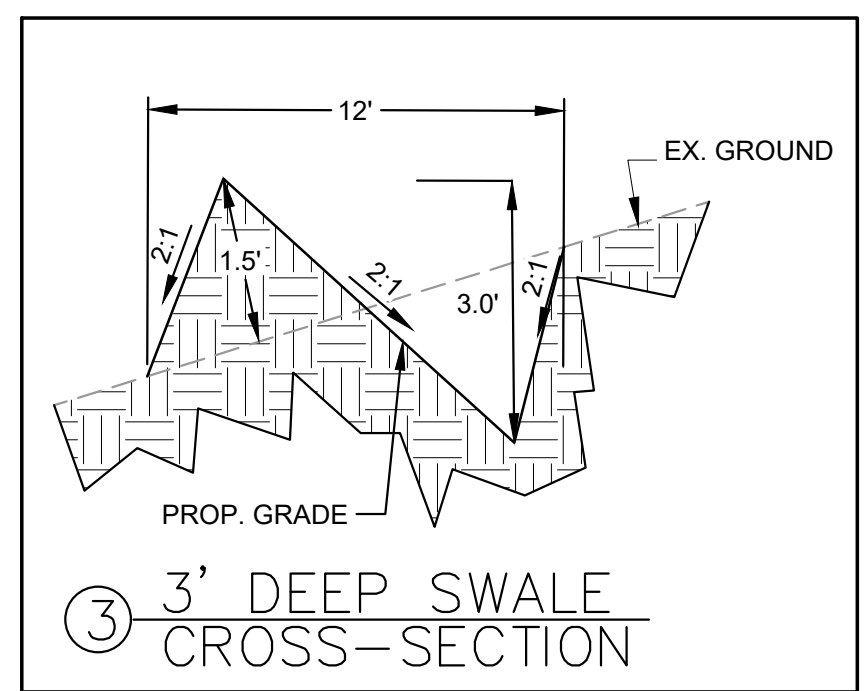
LEGEND

- PROPOSED STORM LINE
EXISTING CONTOURS
PROPOSED CONTOURS
EXISTING FENCE
EXISTING LOTS LINES
LIMITS OF DISTURBANCE/ LIMITS OF CONSTRUCTION



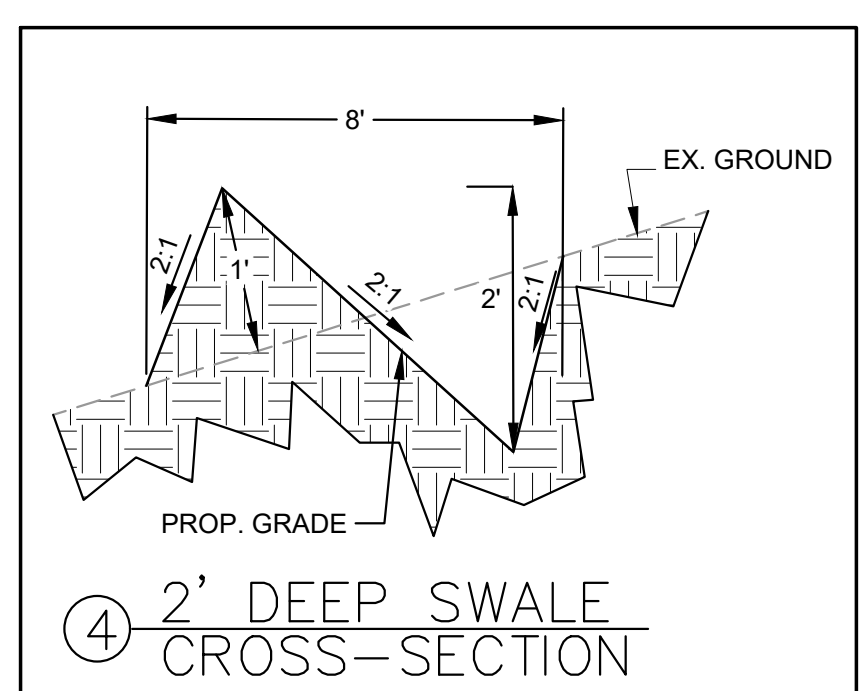
2 1' DEEP SWALE CROSS-SECTION

LONG. SLOPE = 2.7%



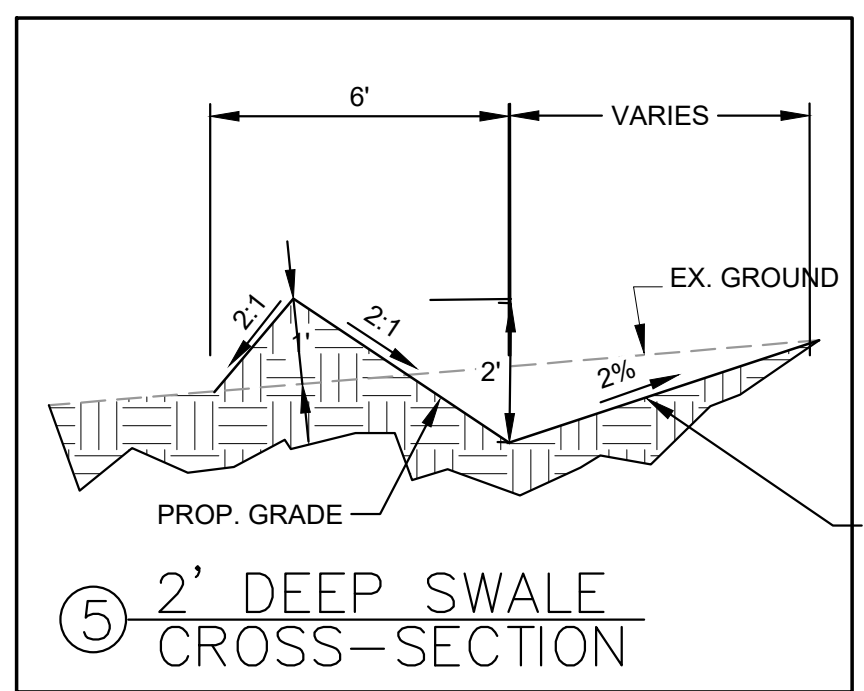
3 3' DEEP SWALE CROSS-SECTION

LONG. SLOPE = 0.84%



4 2' DEEP SWALE CROSS-SECTION

LONG. SLOPE = 1.2%



5 2' DEEP SWALE CROSS-SECTION

LONG. SLOPE = 0.54%

THE 2% GRADE IS TO MATCH BACK INTO THE SITE.

Table with columns: NO., DATE, DESCRIPTION, BY. Includes a REVISIONS header.

CTR Engineering, Inc.

16392 TIMBER MEADOW DRIVE
COLORADO SPRINGS, CO 80908
(719) 964-6654

PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B

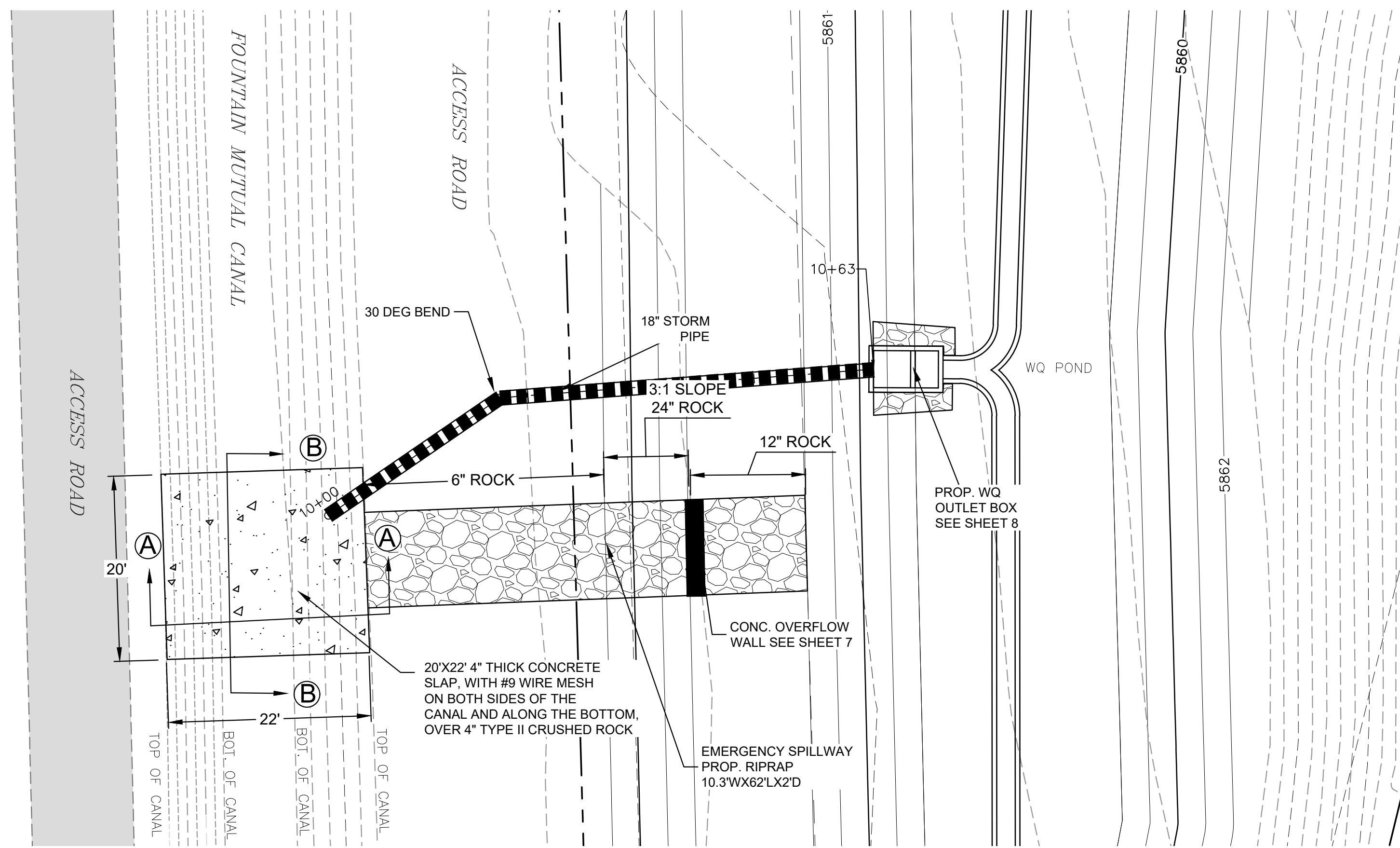
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)

PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL

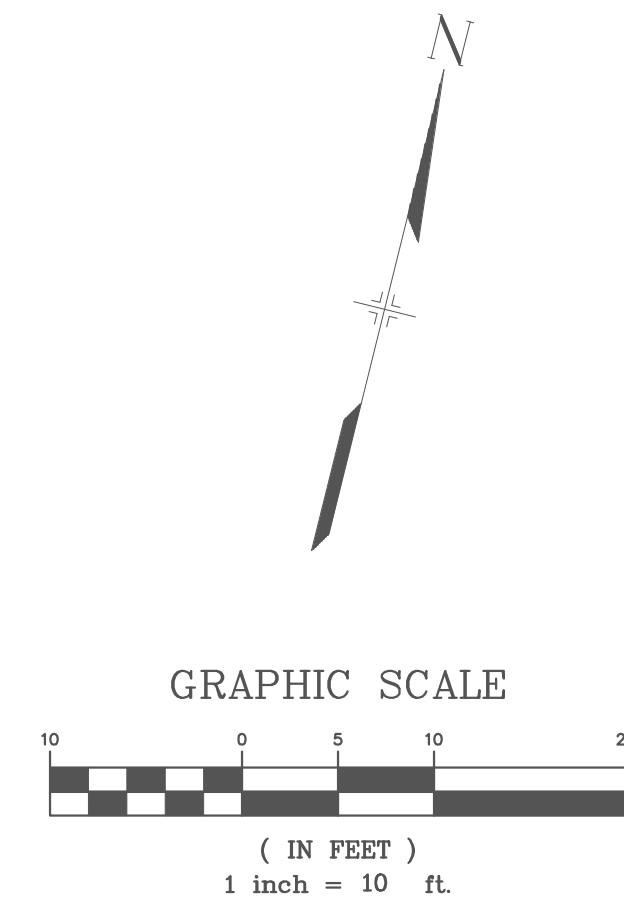
SHEET TITLE: PROP. GRADING PLAN

DESIGNED BY: JCM SCALE: DATE ISSUED: JAN. 2021
DRAWN BY: JCM H: 1"=30'
CHECKED BY: JH V: SHEET NO. 4 OF 22 SHEETS

DWG:

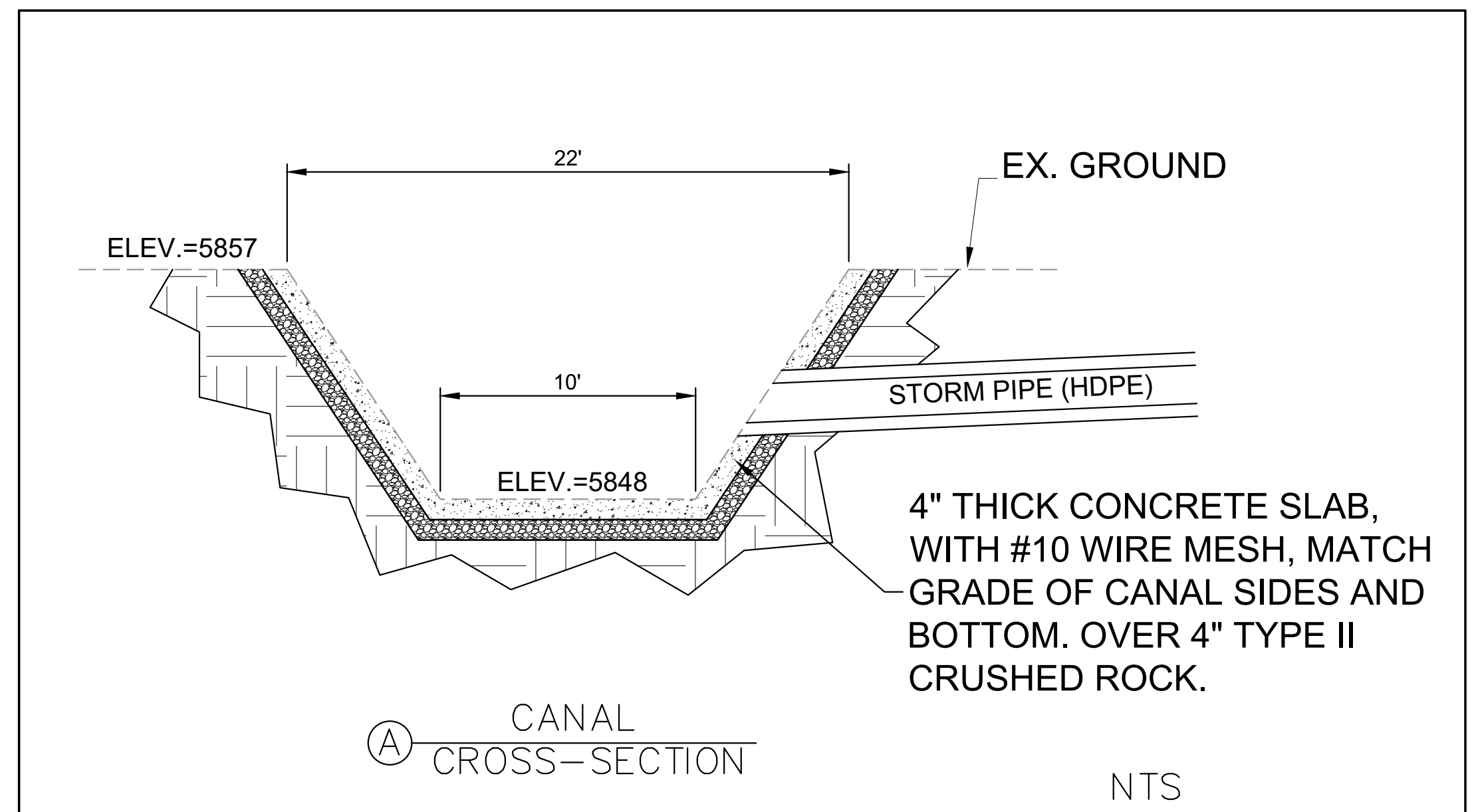


OUTLET PIPE



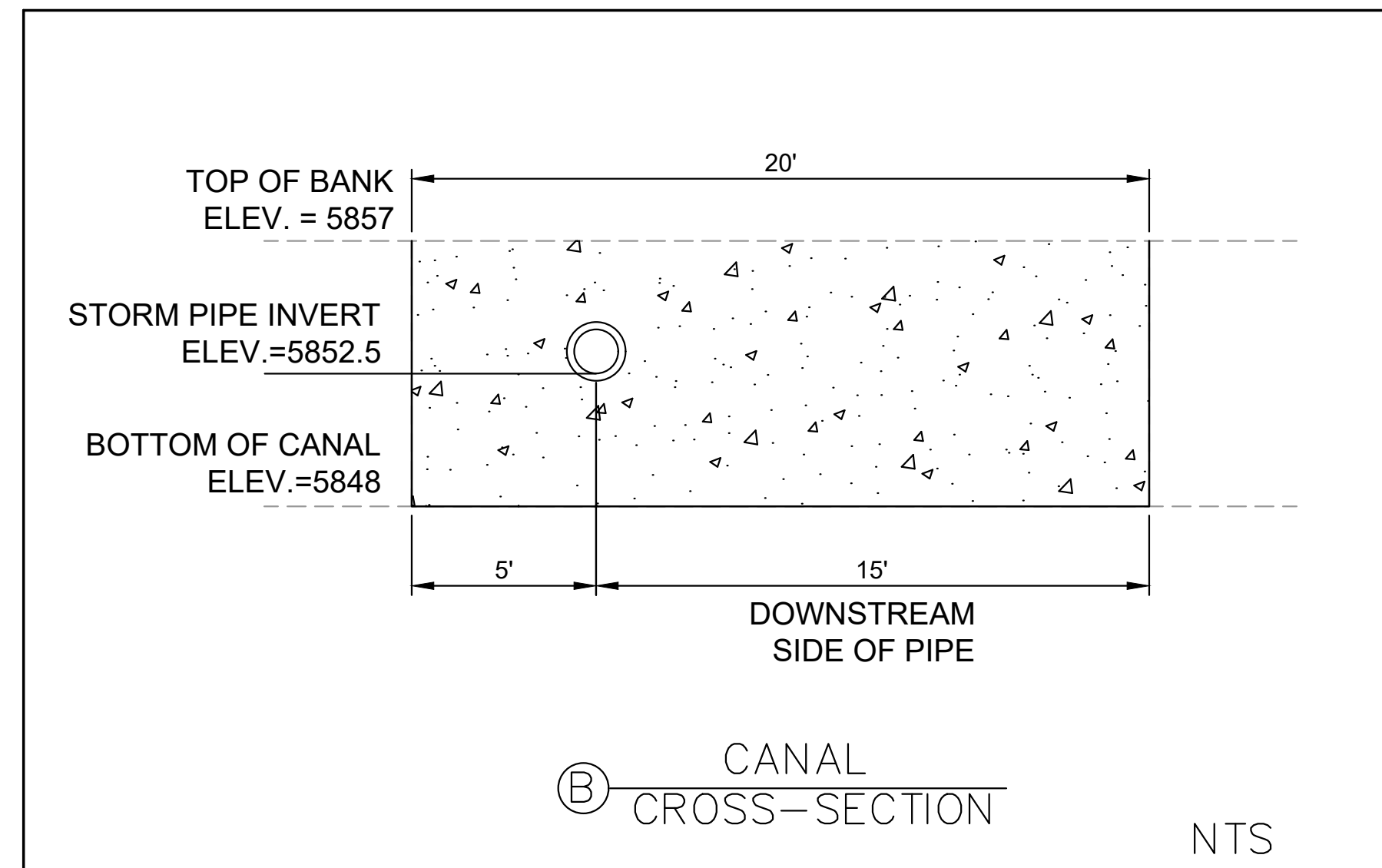
LEGEND

- PROPOSED STORM LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- EXISTING FENCE
- EXISTING LOTS LINES
- HGL & EGL



Ⓐ CANAL CROSS-SECTION

NTS

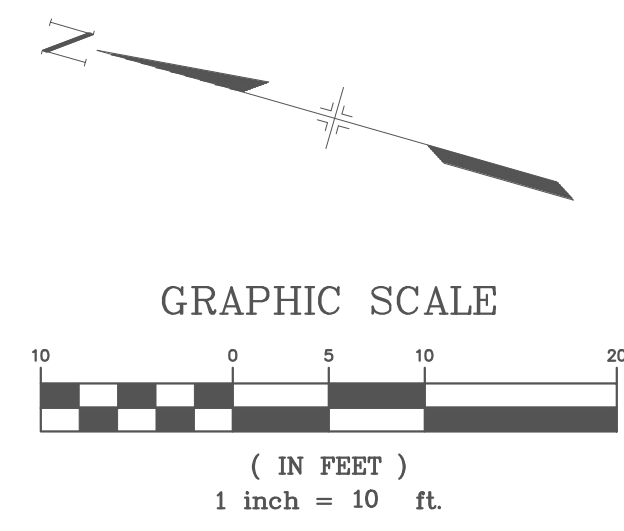
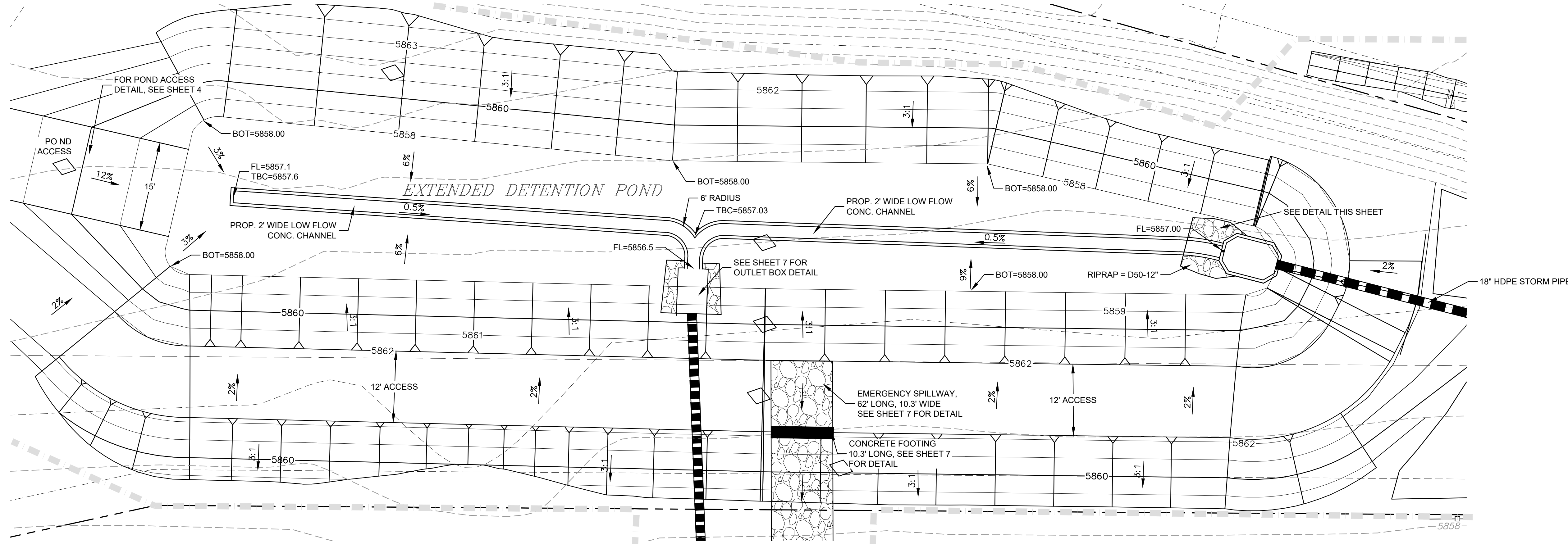


Ⓑ CANAL CROSS-SECTION

NTS

NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc. 16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B			
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)			
PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL			
SHEET TITLE: FMIC DETAILS			
DESIGNED BY: JCM	SCALE: 1"=10'	DATE ISSUED: JAN. 2021	
DRAWN BY: JCM			
CHECKED BY: JH		SHEET NO. 5 OF 22 SHEETS	
DWG:			

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- LEGEND**
- PROPOSED STORM LINE
 - EXISTING CONTOURS
 - PROPOSED CONTOURS
 - EXISTING FENCE
 - EXISTING LOTS LINES
 - FLOW/DRAINAGE ARROWS
 - LIMITS OF DISTURBANCE/ LIMITS OF CONSTRUCTION

THICKNESS REQUIREMENTS FOR GRANULAR BEDDING

Minimum Bedding Thickness (Inches)

Riprap Designation	Fine Grained Soils* (Two Layer System)		Course Grained Soils**
	Type I	Type II	Type II
L, G, SM	4	4	6
M	4	4	6
H	4	6	8
VH	4	6	8

*May substitute one 12 inch layer of Type II bedding. Substitution of one layer of Type II bedding shall not be permitted at drop structures. Use of a combination of filter fabric and Type II bedding at drop structures is acceptable.

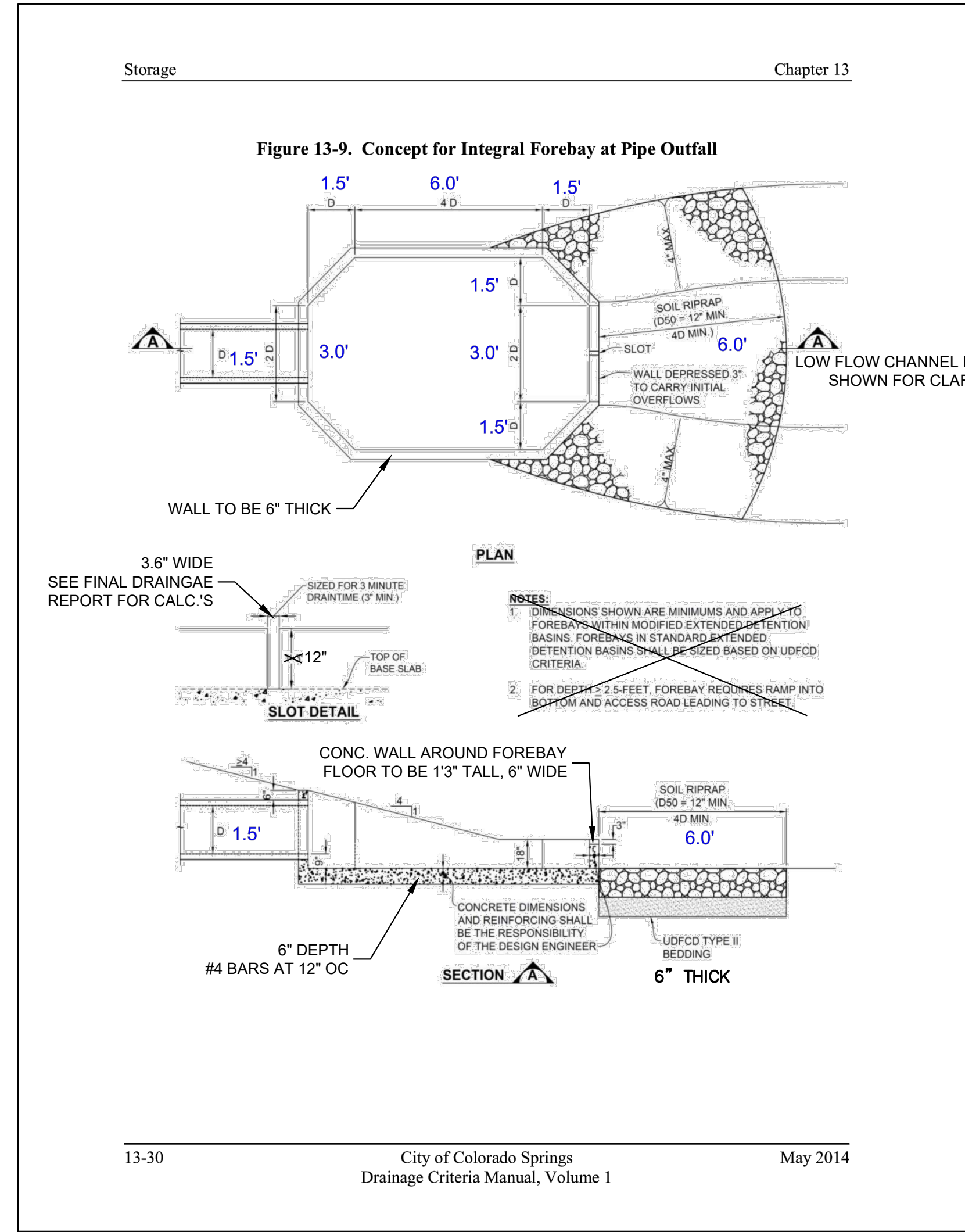
** Fifty percent or more by weight retained on the #40 sieve.

RIPRAP CLASSIFICATION

VL = D50 = 6"
 L = D50 = 9"
 M = D50 = 12"
 H = D50 = 18"
 VH = D50 = 24"

GRADATION FOR GRANULAR BEDDING

U.S. Standard Sieve Size	Percent Weight By Passing		Square Mesh Sieves
	Type I	Type II	
3"	-	-	90 - 100
1-1/2"	-	-	-
3/4"	-	-	20 - 90
3/8"	100	-	-
#4	95 - 100	-	0 - 20
#16	45 - 80	-	-
#50	10 - 30	-	-
#100	2 - 10	-	-
#200	0 - 2	-	0 - 3



NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B			
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)			
PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL			
SHEET TITLE: POND DETAILS			
DESIGNED BY: JCM	SCALE: 1"=10'	DATE ISSUED: JAN. 2021	
DRAWN BY: JCM		SHEET NO. 6 OF 22 SHEETS	
CHECKED BY: JH			
DWG:			

Figure 13-12b. Emergency Spillway Profile at Embankment

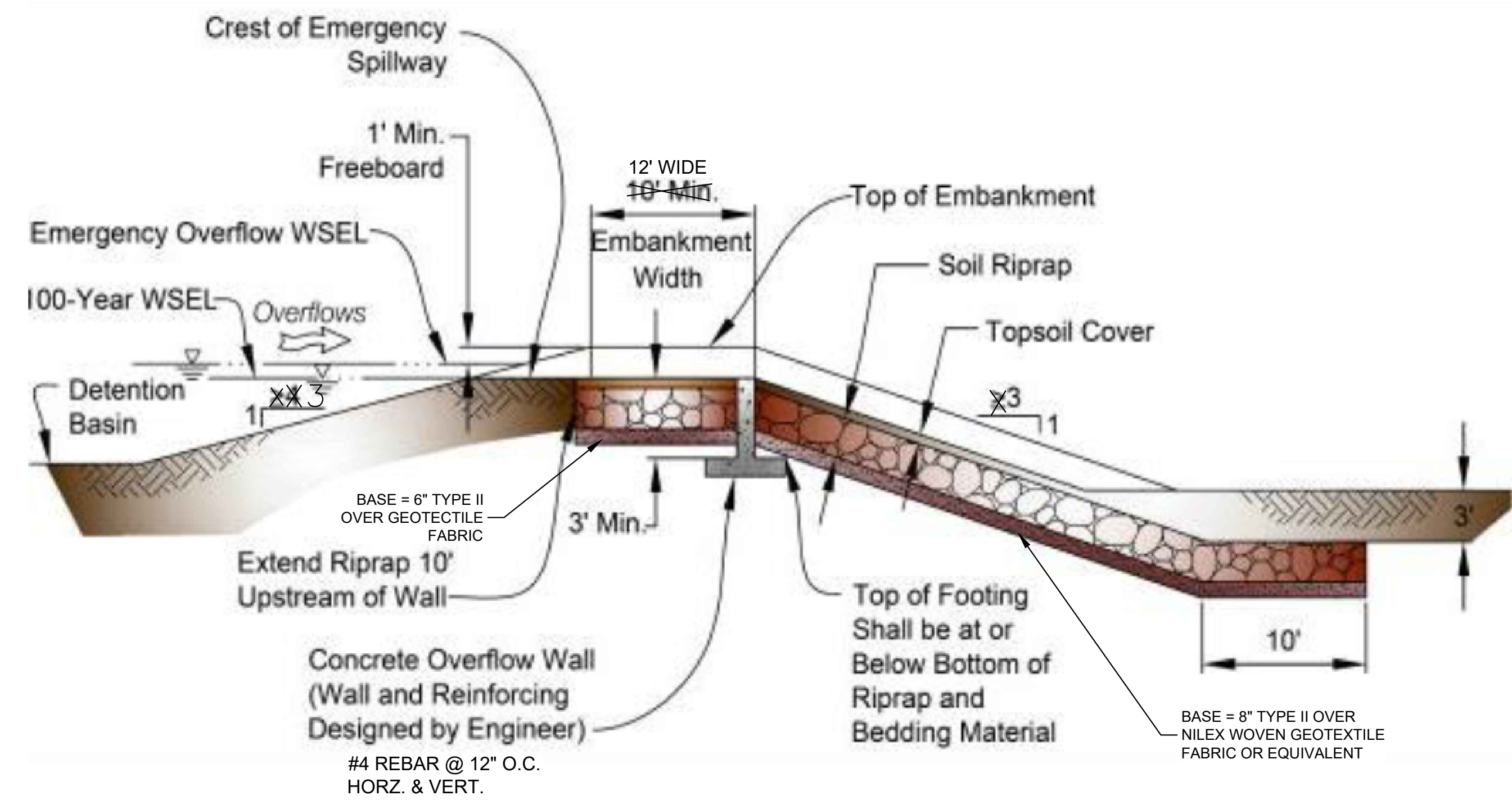


Figure 13-12c. Emergency Spillway Protection

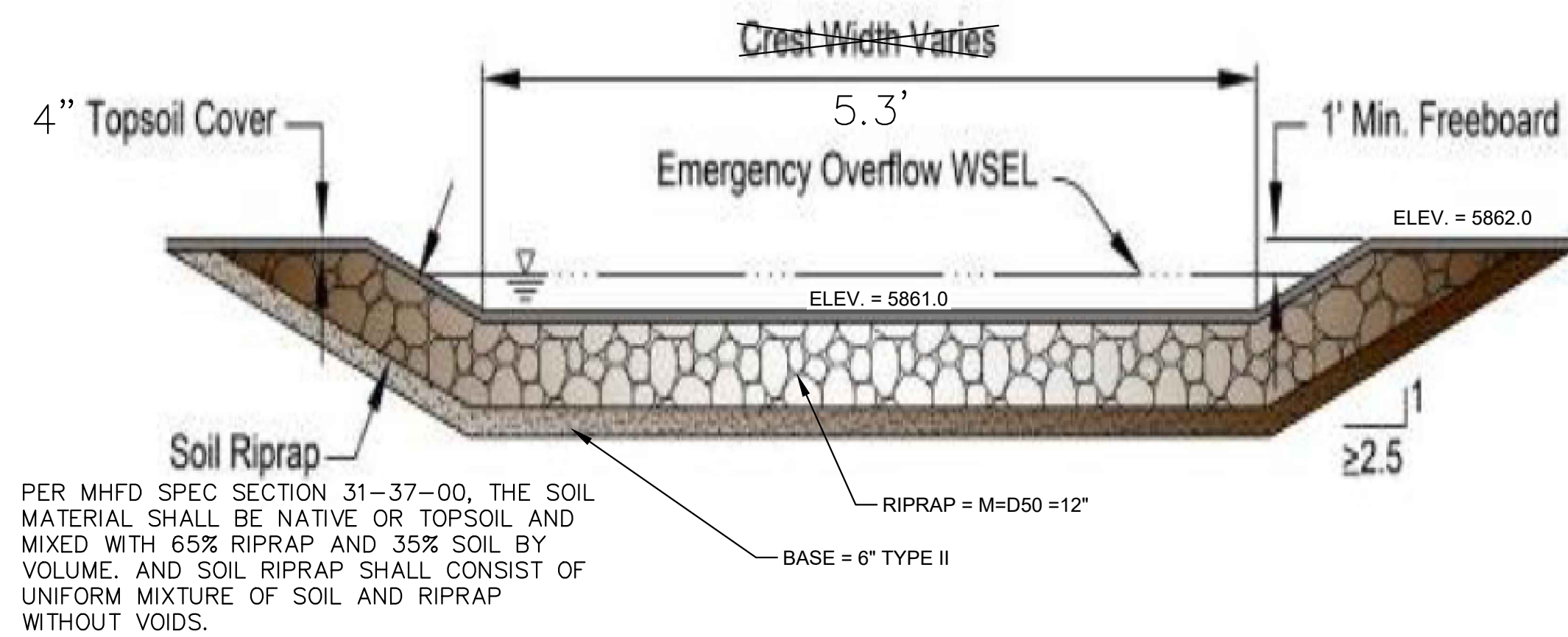
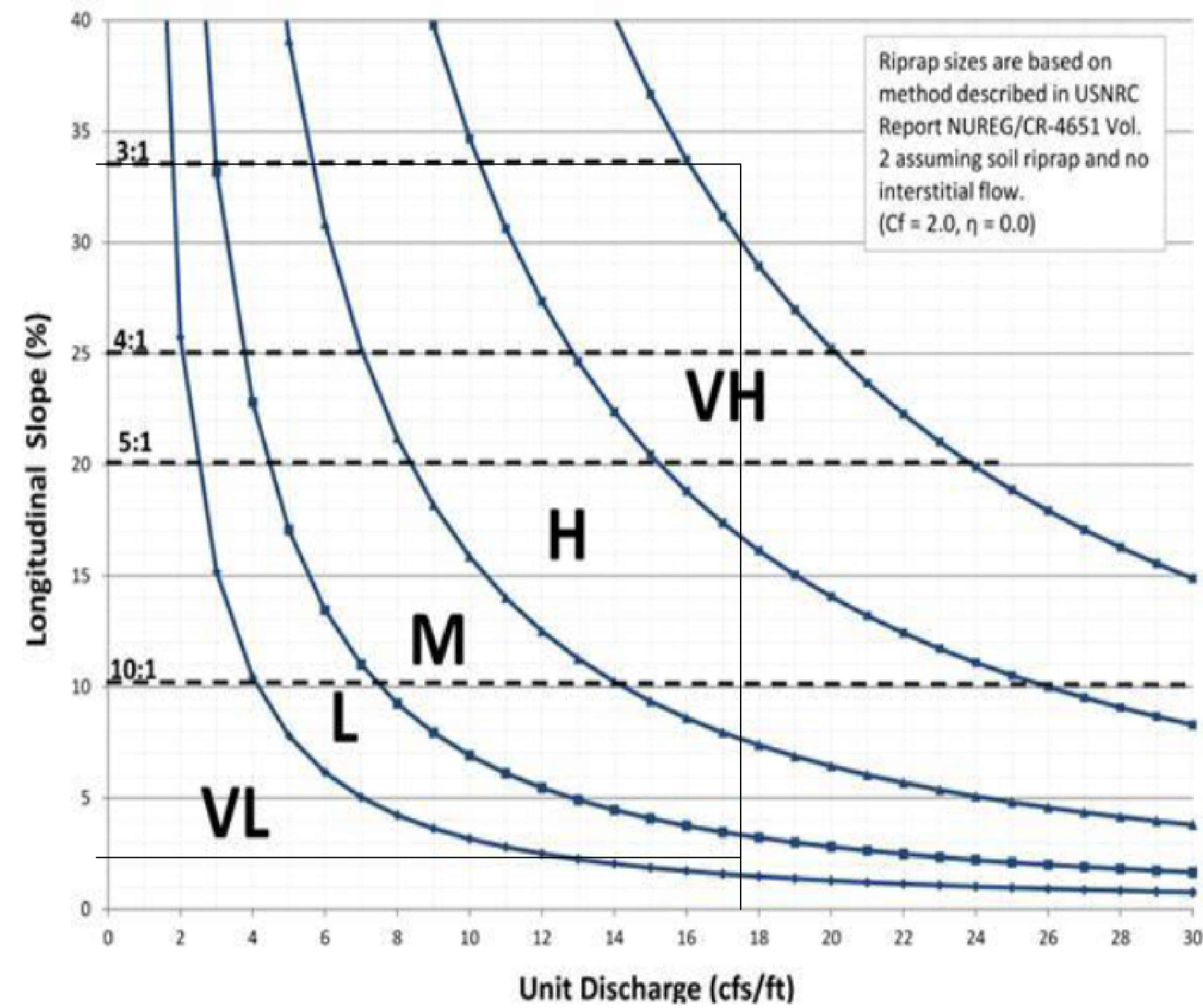
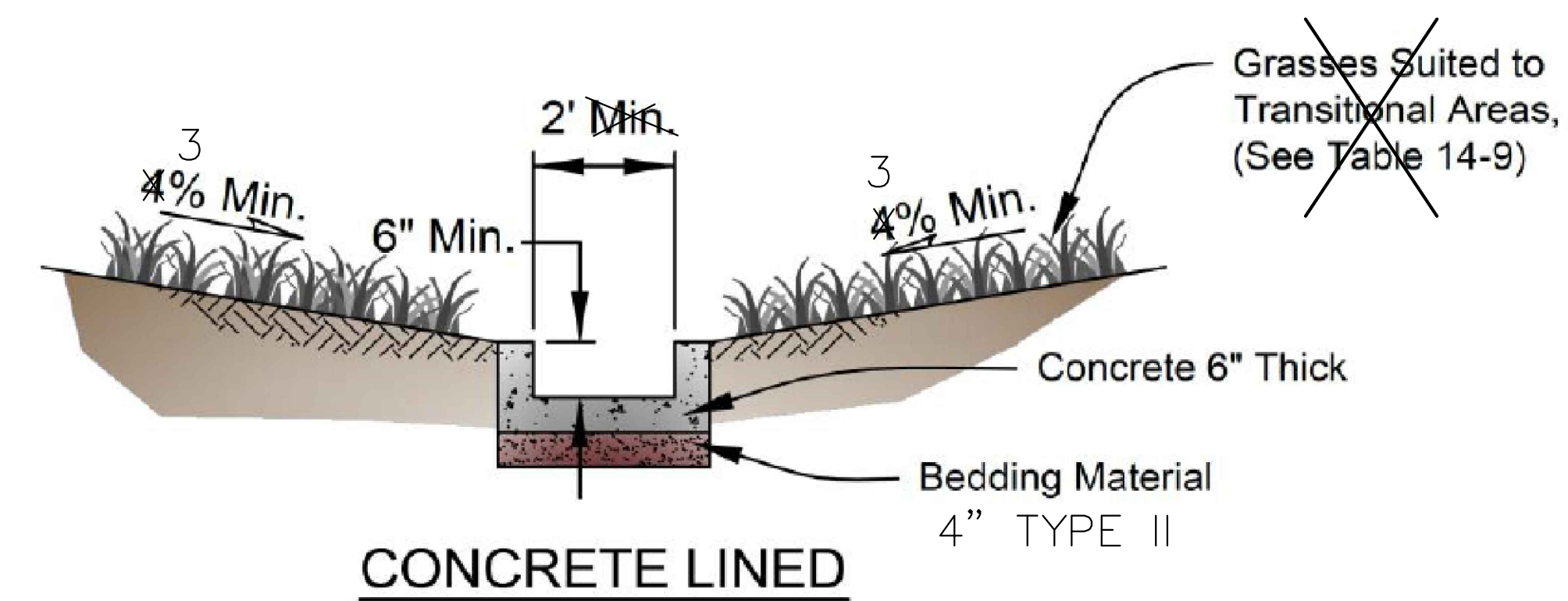


Figure 13-12d. Riprap Types for Emergency Spillway Protection



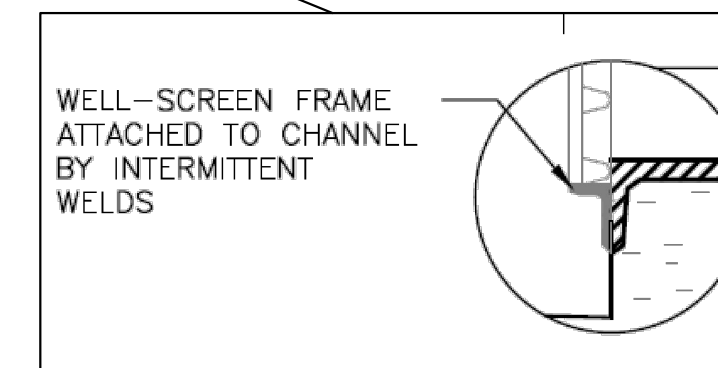
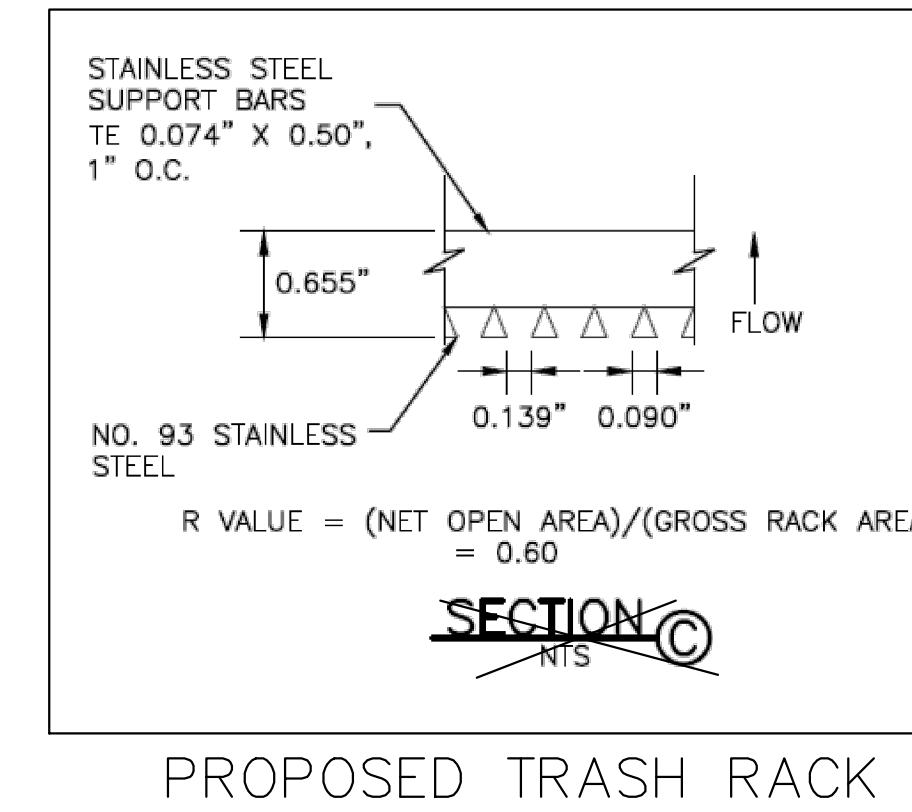
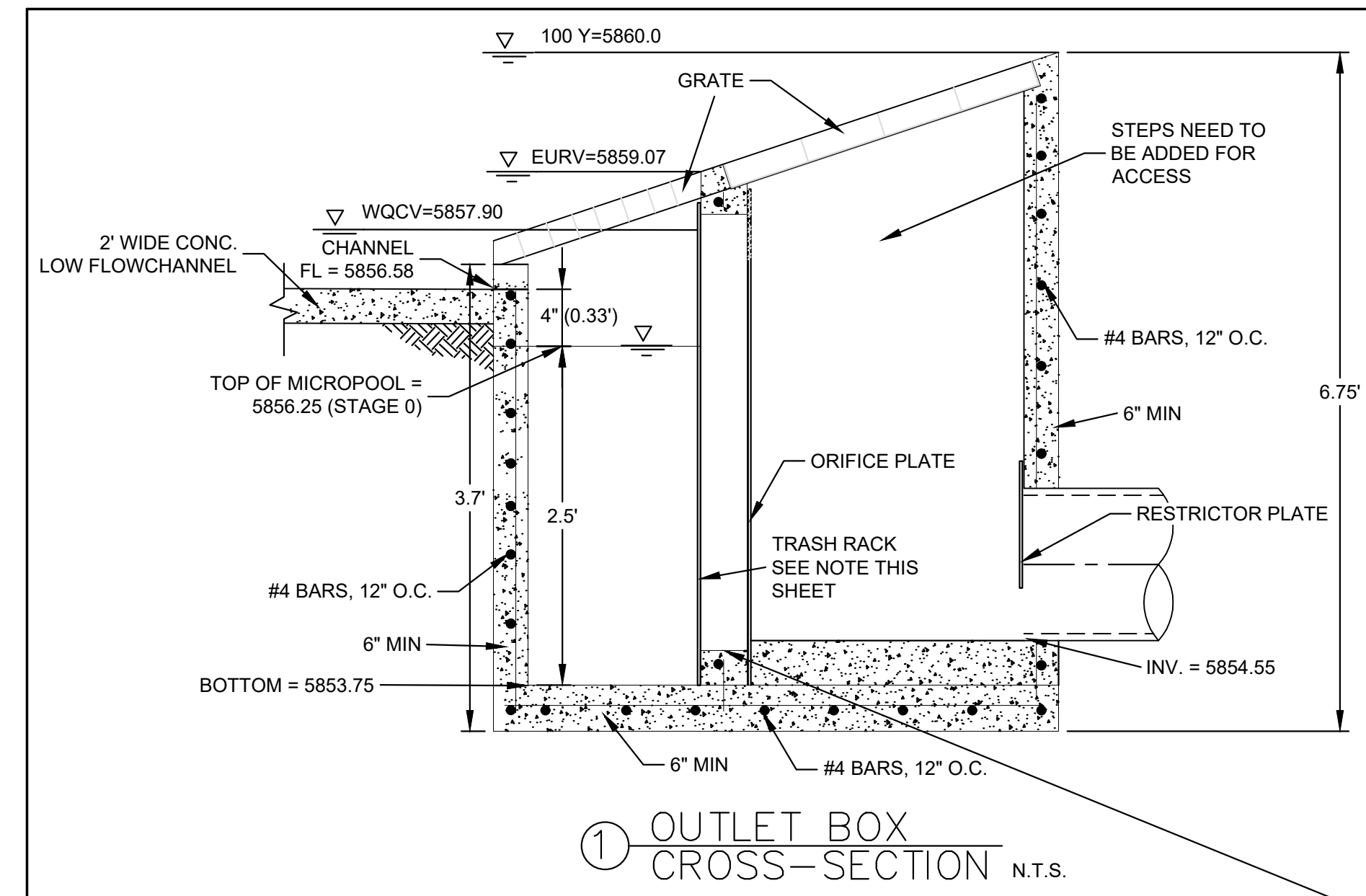
- VH = D50 = 24" FOR 3:1 SLOPE ONLY
- M = D50 = 12" EMERGENCY SPILLWAY ON TOP OF DAM.
- L = D50 = 9" FOR INLET PROTECTION.
- VL = D50 = 6" EMERGENCY SPILLWAY FROM TOE OF DAM TO EDGE OF CANAL.

Figure 13-6. Typical Low-flow Channel Details

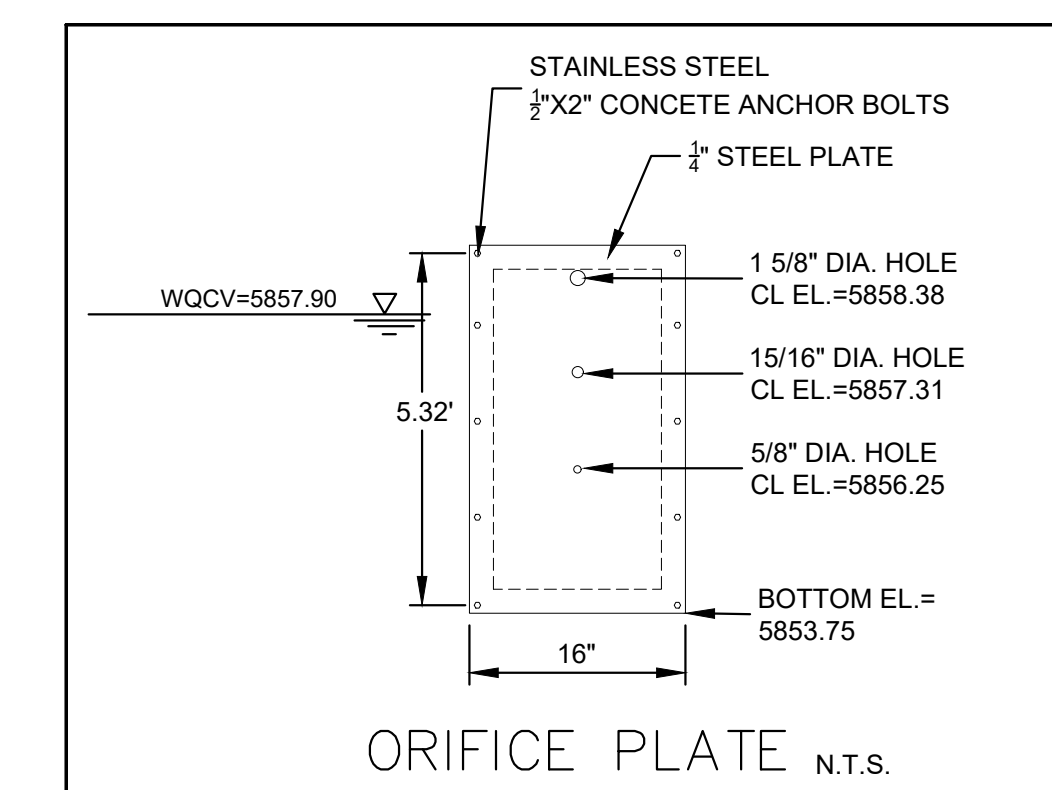
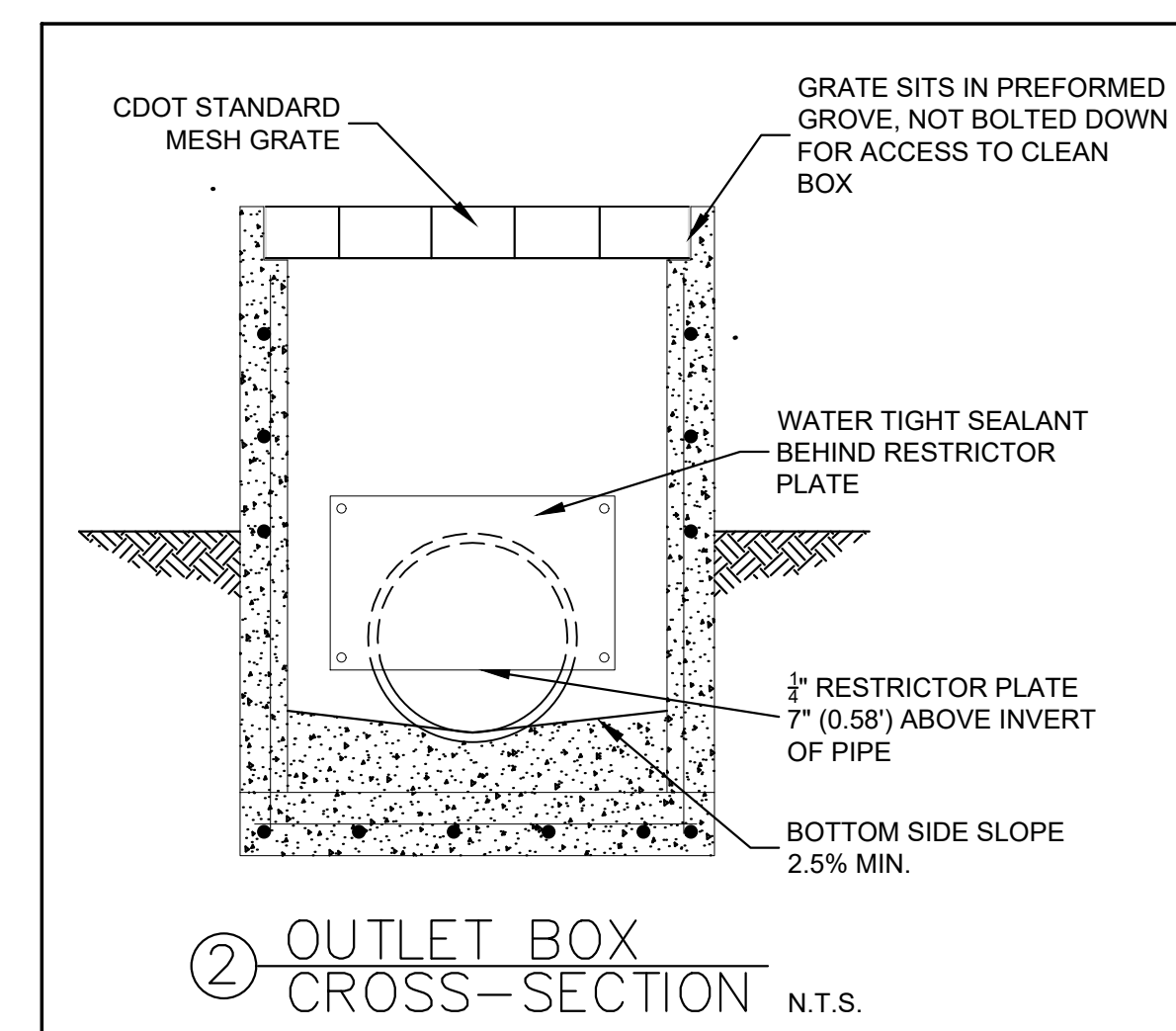
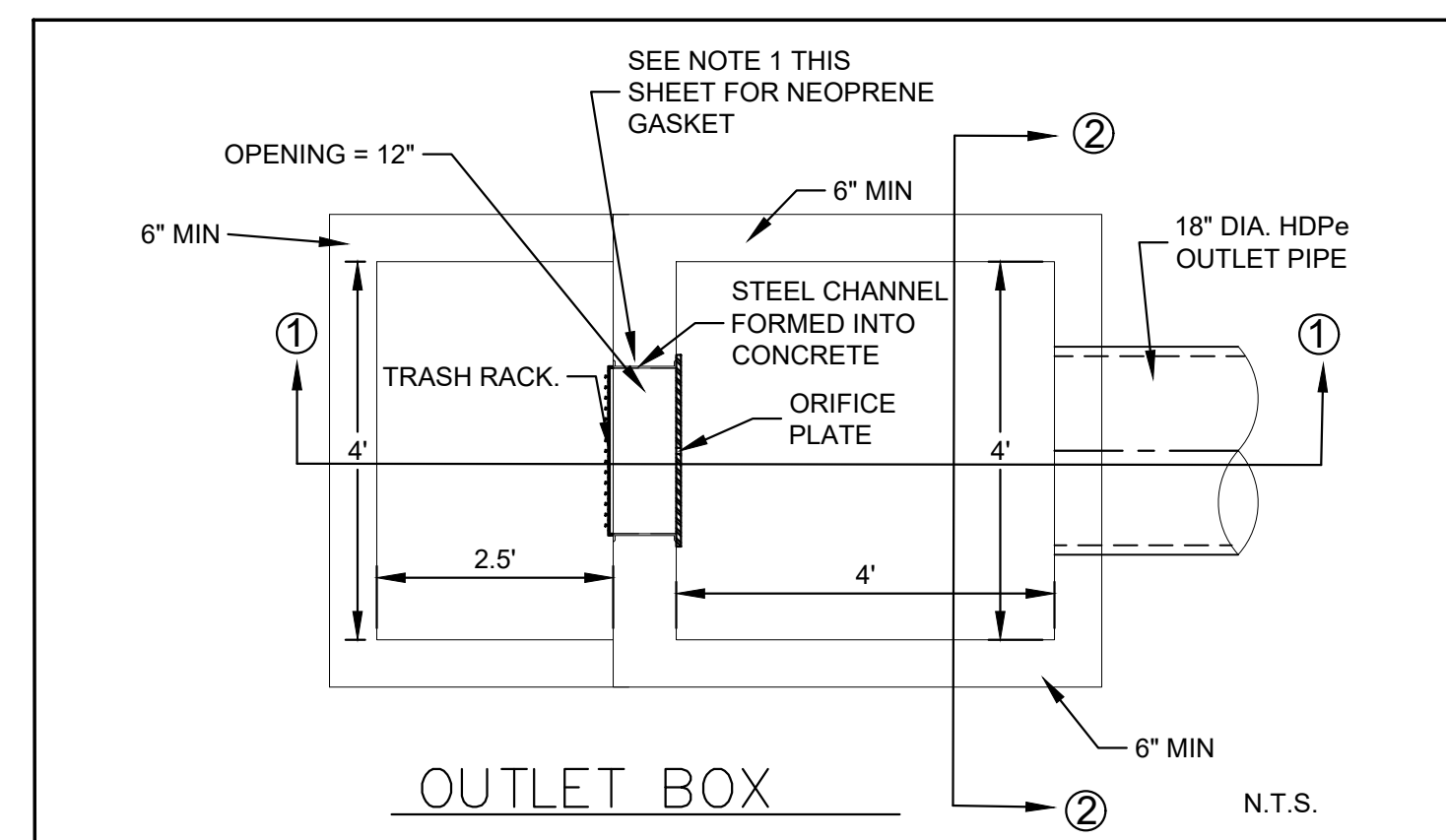


NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B			
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)			
PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL			
SHEET TITLE: POND DETAILS (2)			
DESIGNED BY: JCM	SCALE: NTS	DATE ISSUED: JAN. 2021	
DRAWN BY: JCM	INCHES: NTS	SHEET NO. 7 OF 22 SHEETS	
CHECKED BY: JH	VERTICAL: NTS		
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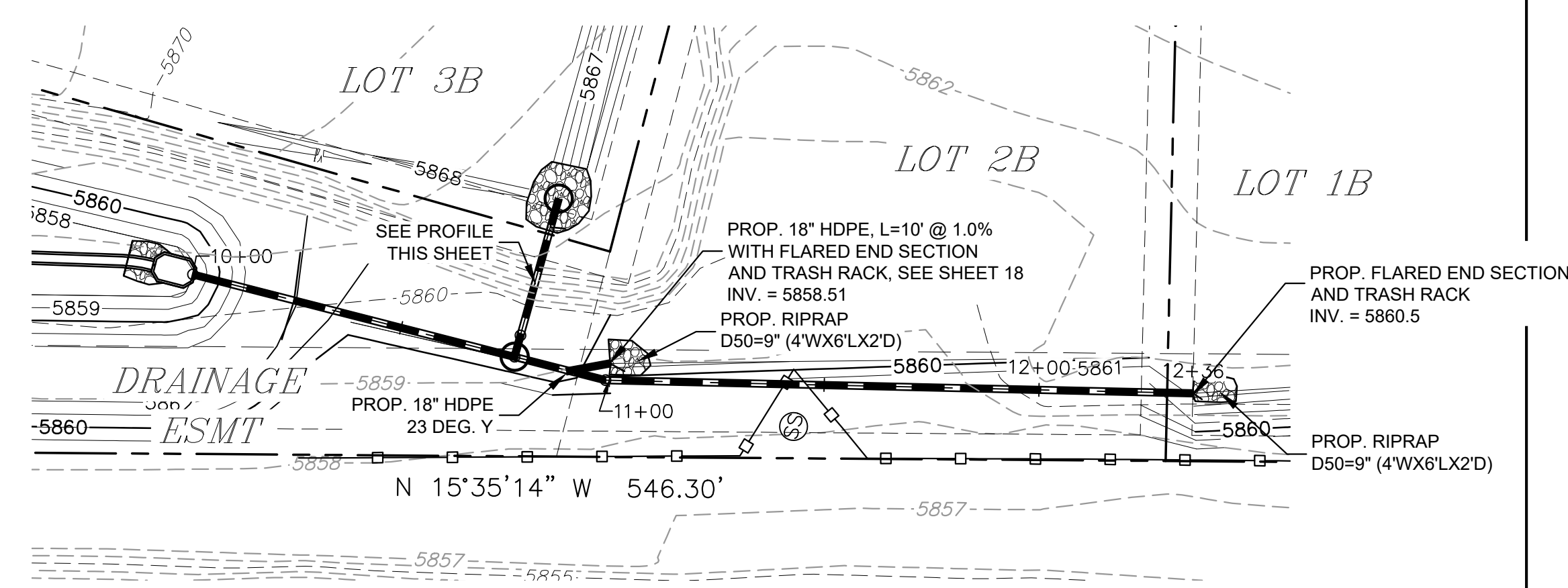


- NOTE:
- 1) PROVIDE CONTINUOUS NEOPRENE GASKET BETWEEN ORIFICE PLATE AND CONCRETE STRUCTURE.
 - 2) ALL EXTERIOR STEEL SHALL BE WITH STAINLESS OR HOT DIPPED GALVANIZED.
 - 3) ALL METAL SURFACES ARE TO BE COATED WITH ZRC COLD GALVANIZING COMPOUND.
 - 4) PER GEOTECH REPORT, ALL CONCRETE PLACED ON SITE IS TO USE TYPE II CEMENT.
 - 5) TRASH RACK: ACCEPTABLE ARE EITHER A NO. 93 JOHNSON VEE WIRE STAINLESS STEEL SCREEN OR AMICO KLEMP SR SERIES ALUMINUM BAR GRATE OR APPROVED EQUIVALENT.

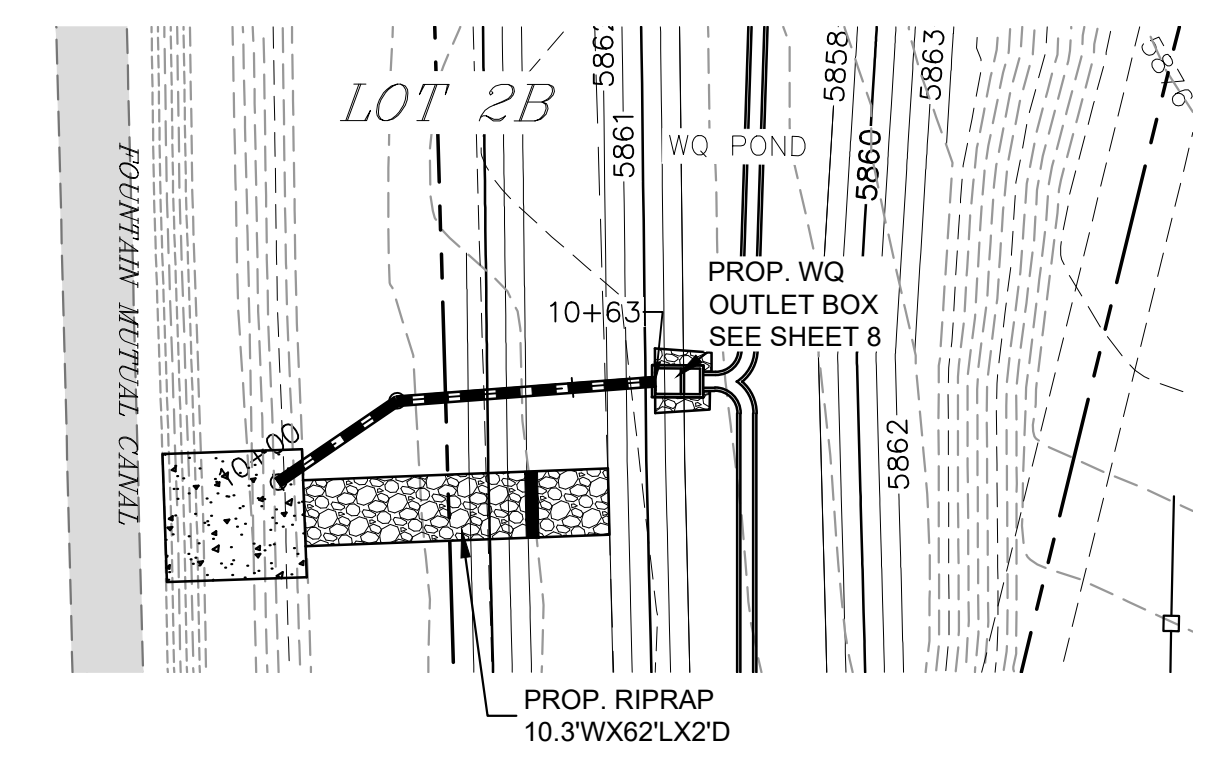


NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B			
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)			
PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL			
SHEET TITLE: OUTLET BOX DETAILS			
DESIGNED BY: JCM	SCALE: NTS	DATE ISSUED: JAN. 2021	
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CHECKED BY: JH	VERTICALS: NTS		
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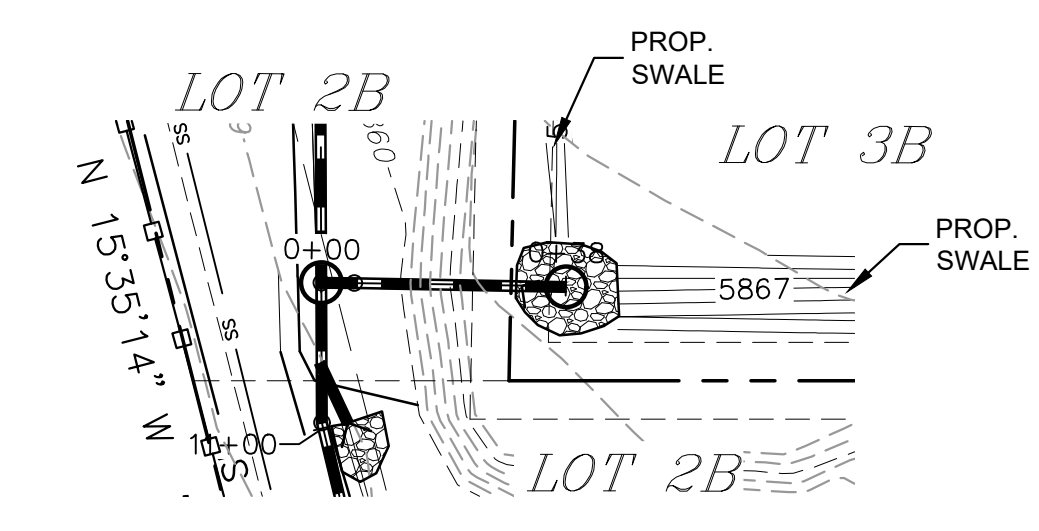
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STORM LINE TO POND

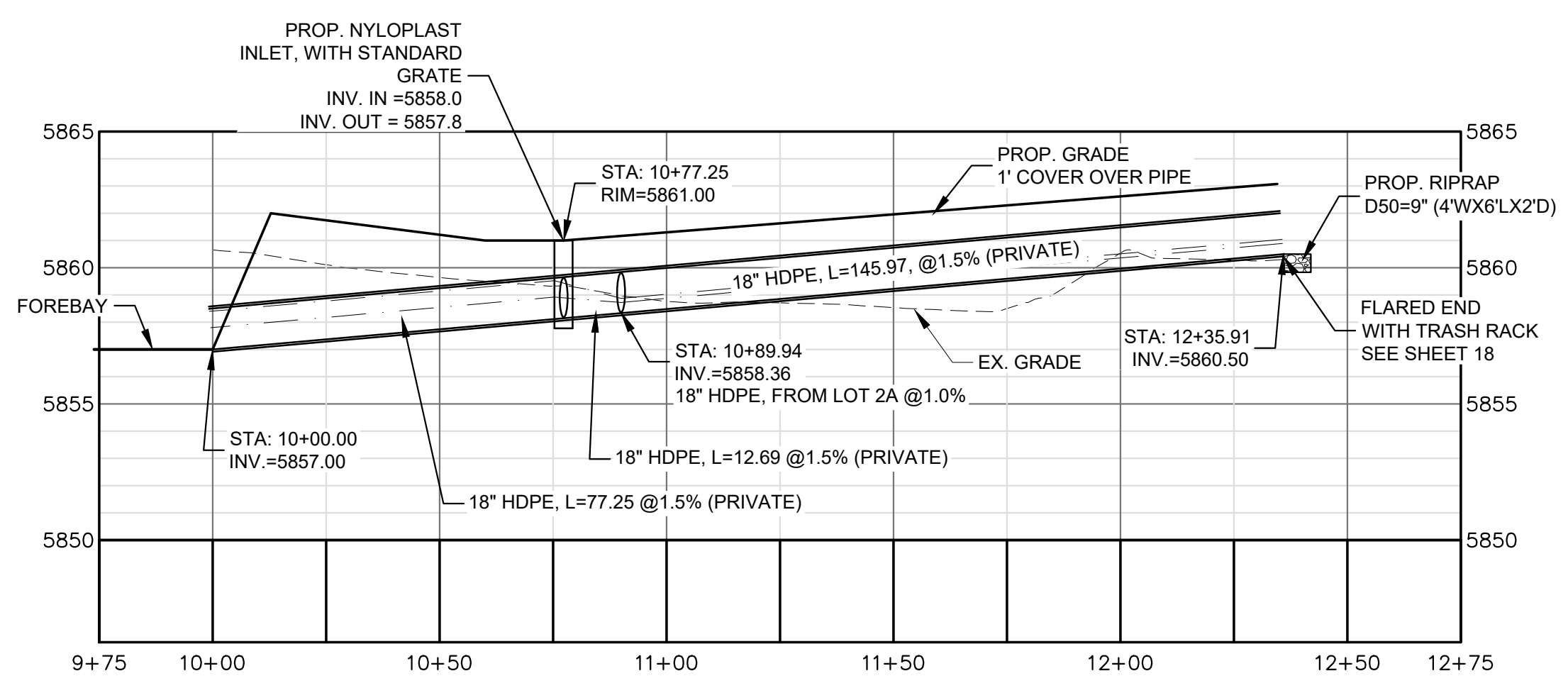


OUTLET PIPE



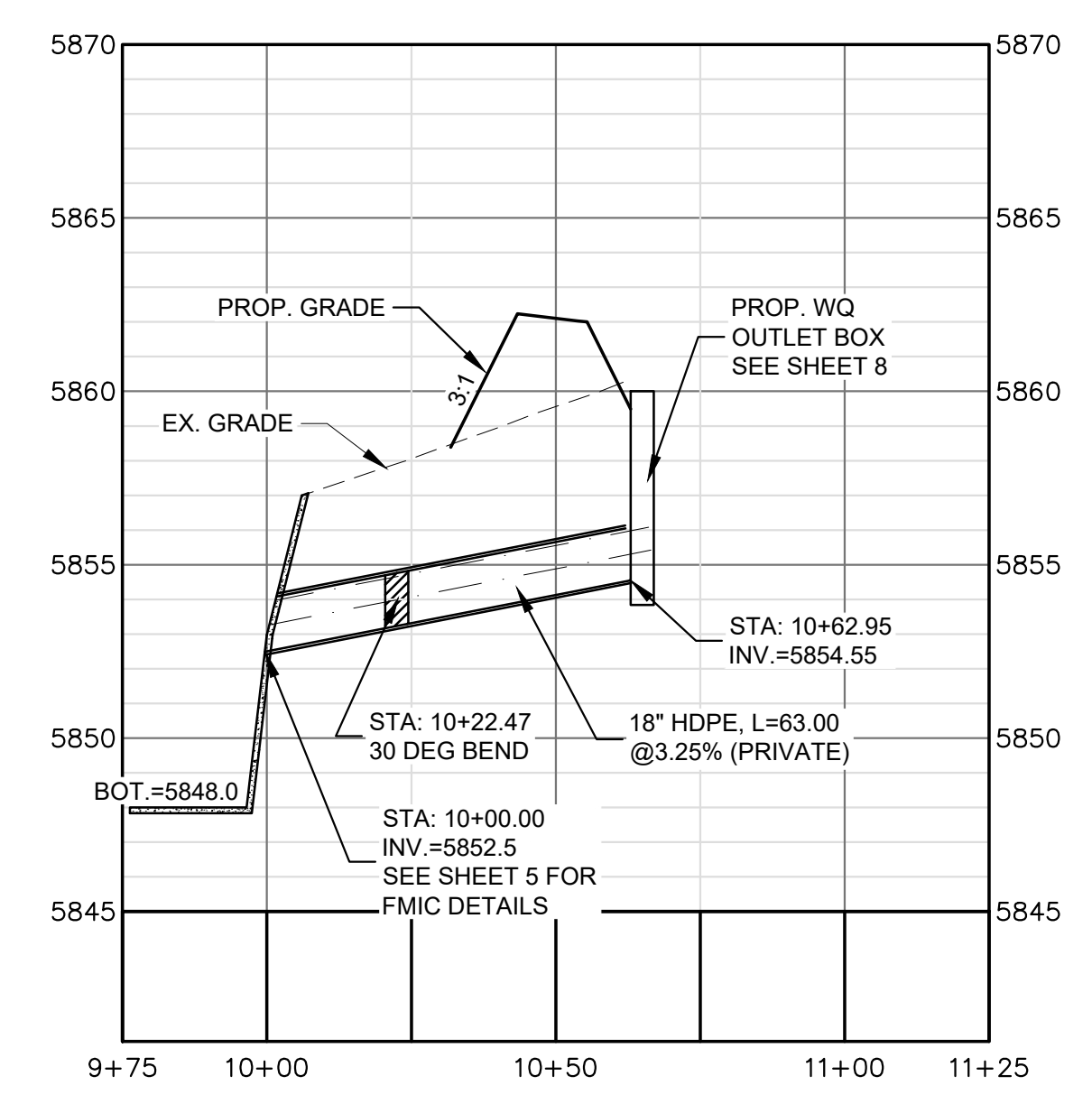
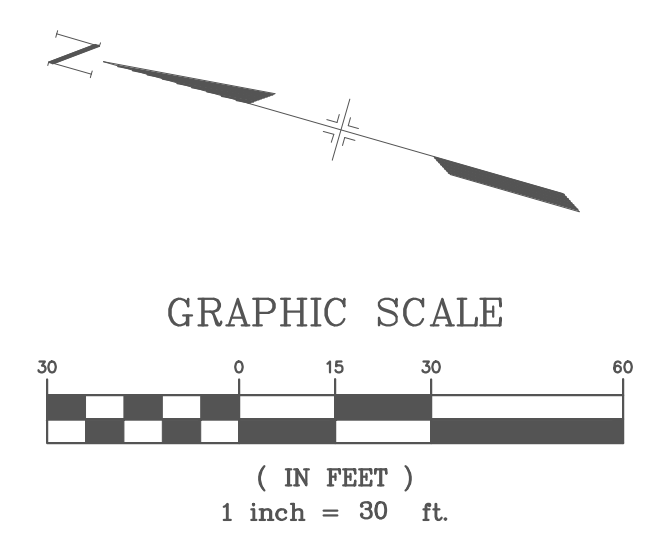
STORM PIPE FROM LOT 3B

NOTE:
 1) SEE SHEET 10 FOR NYLOPLAST DETAILS.
 2) SEE SHEET 18 FOR FLARED END SECTIONS AND TRASH GUARD.



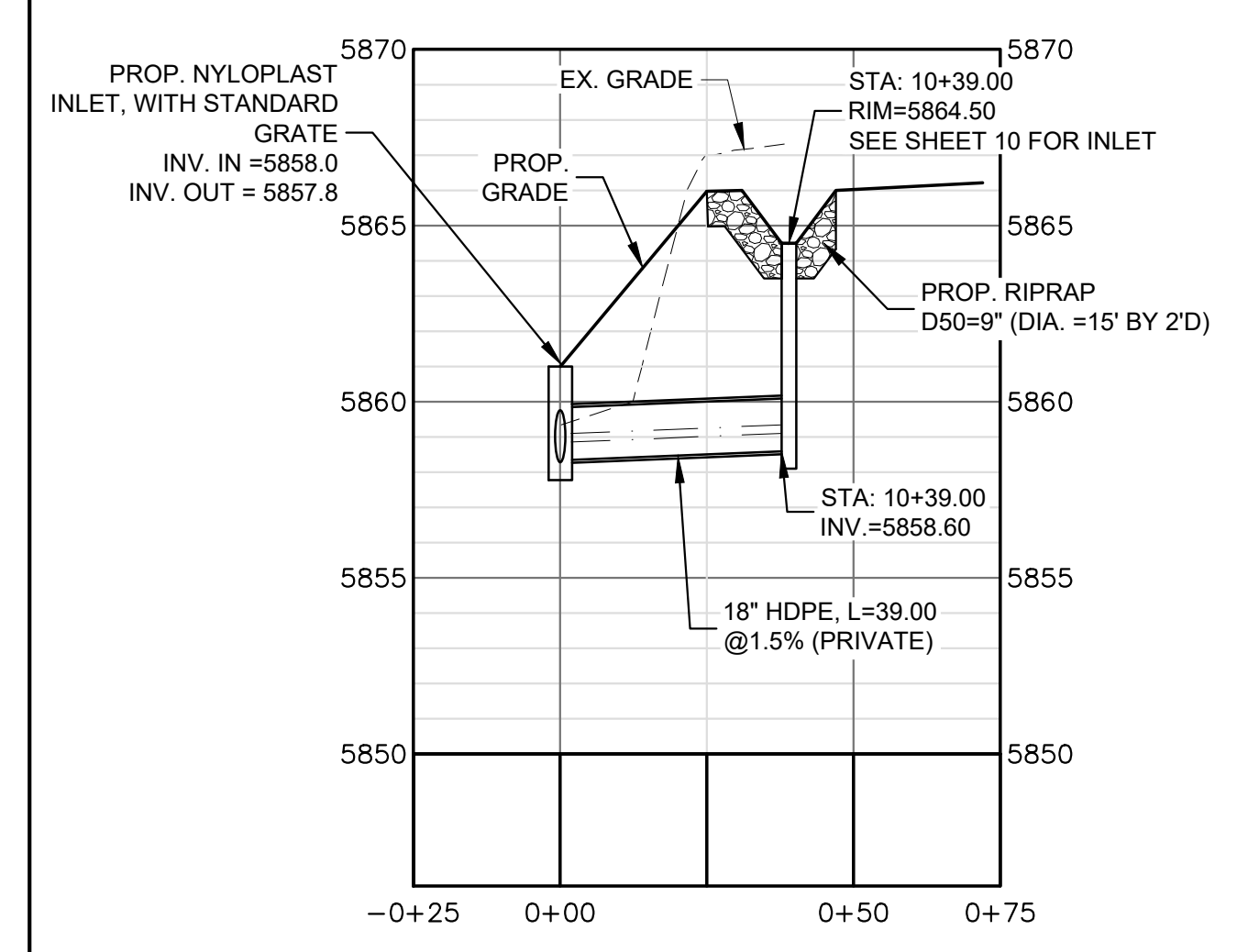
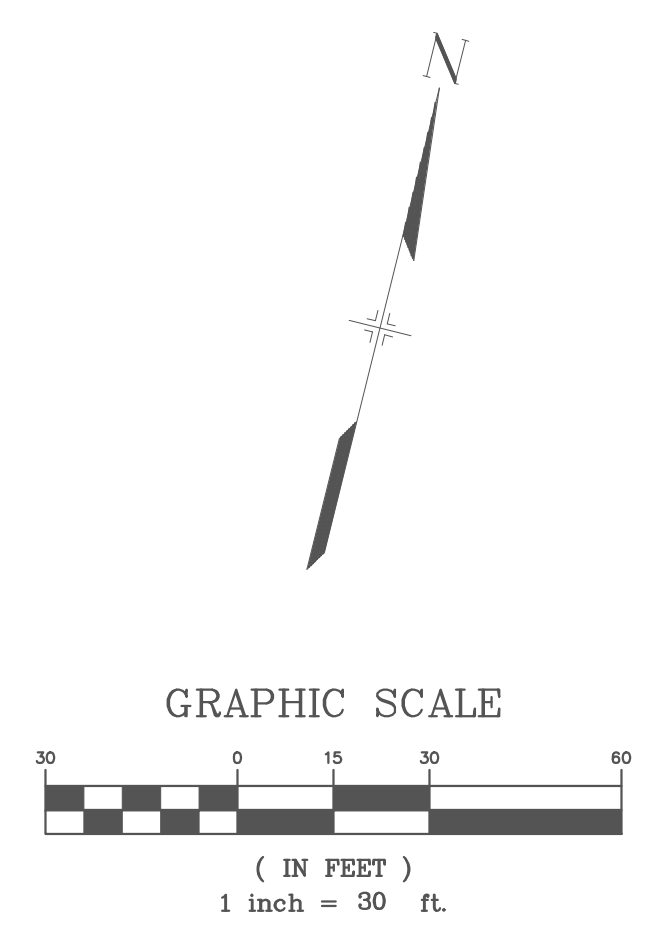
STORM PROFILE

HOR: 1"=30'
 VERT: 1"=5'



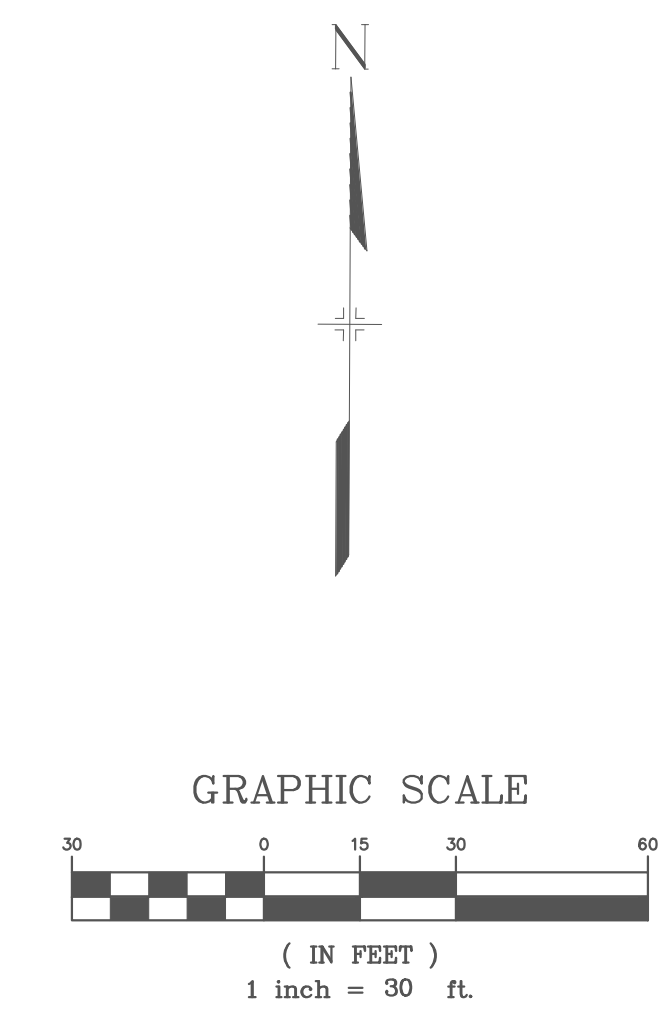
STORM PROFILE

HOR: 1"=30'
 VERT: 1"=5'



STORM PROFILE

HOR: 1"=30'
 VERT: 1"=5'



LEGEND

- PROPOSED STORM LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- EXISTING FENCE
- EXISTING LOTS LINES
- HGL & EGL

NO.	DATE	DESCRIPTION	BY
REVISIONS			

CTR Engineering, Inc.

16392 TIMBER MEADOW DRIVE
 COLORADO SPRINGS, CO 80908
 (719) 964-6654

PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B

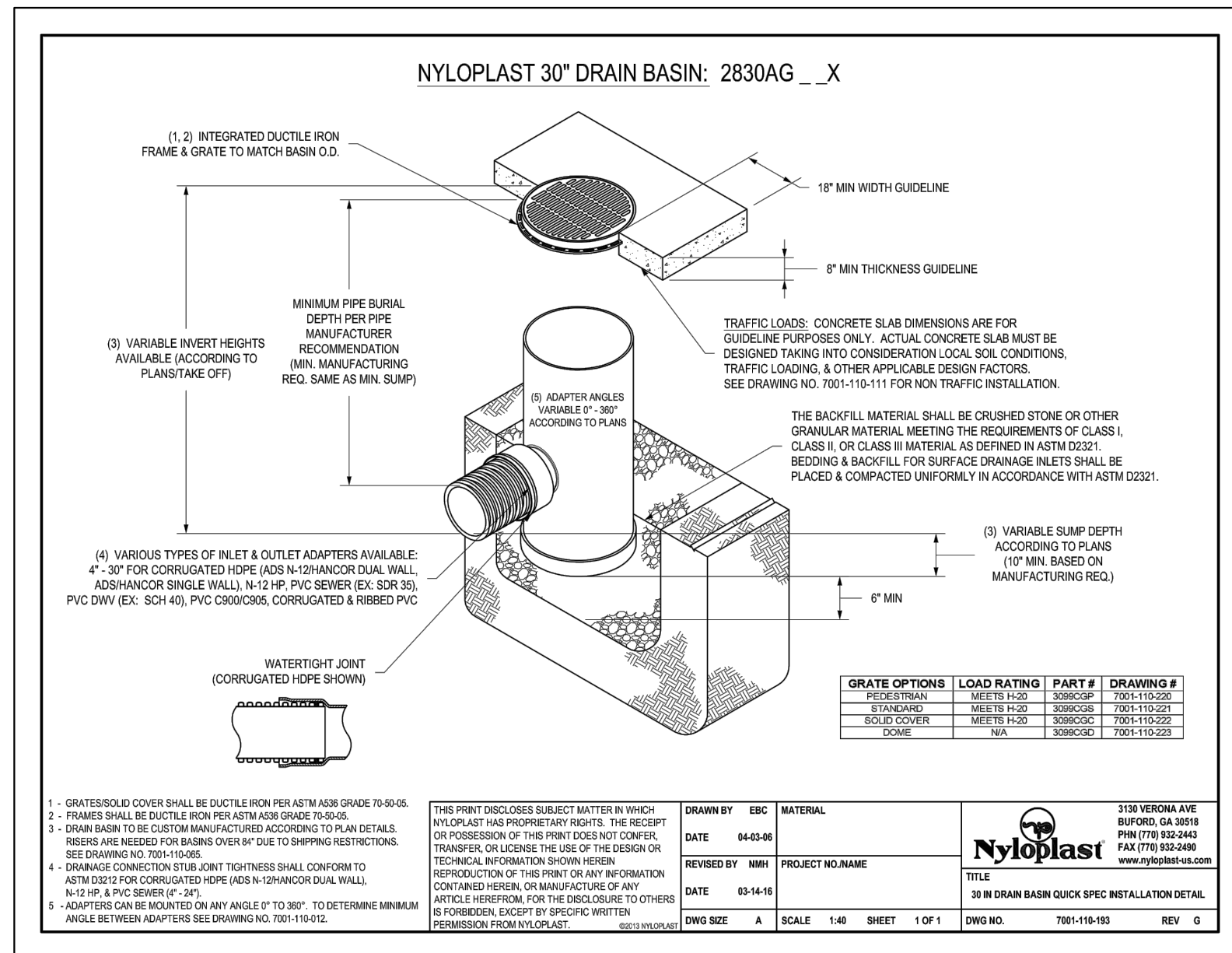
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)

PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL

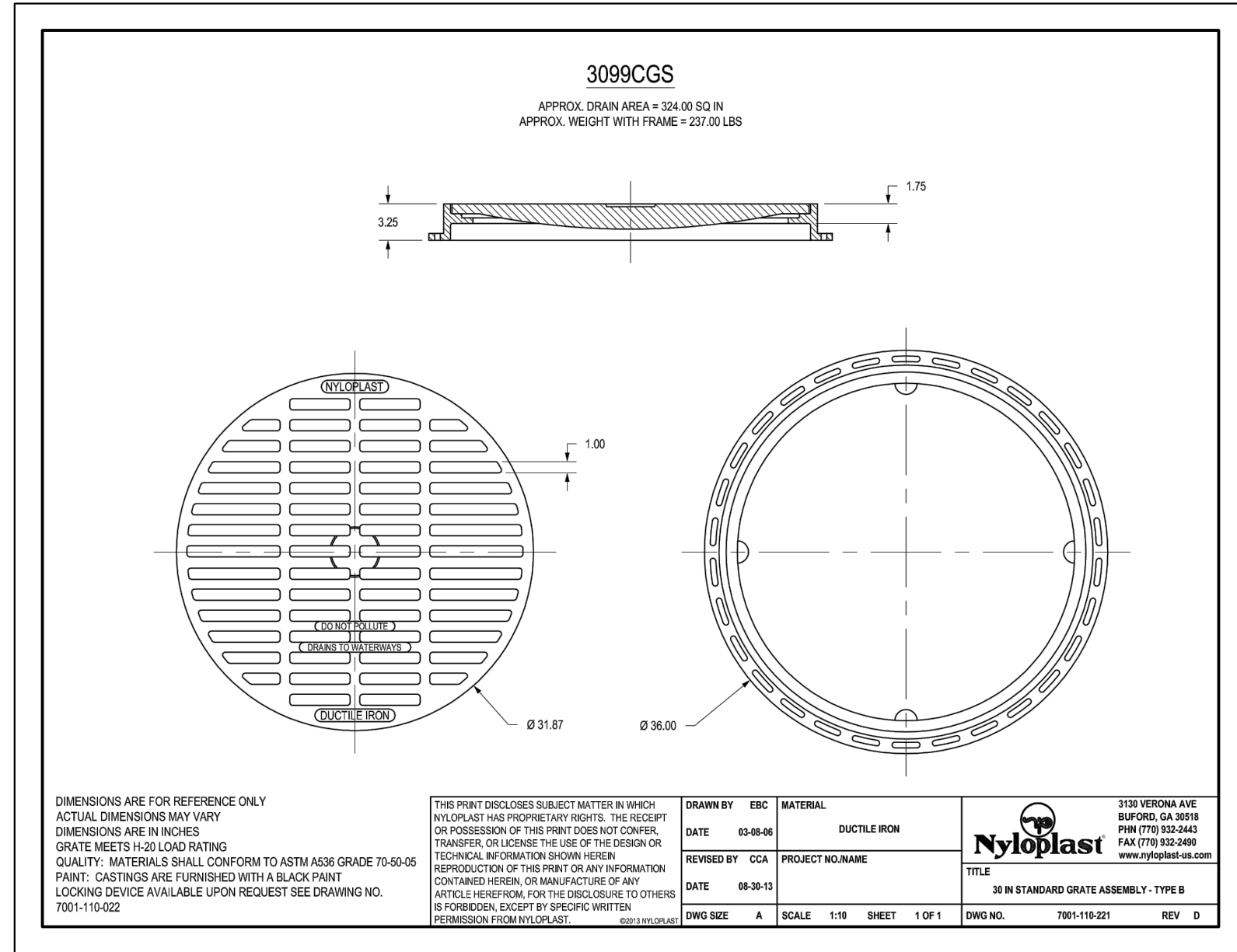
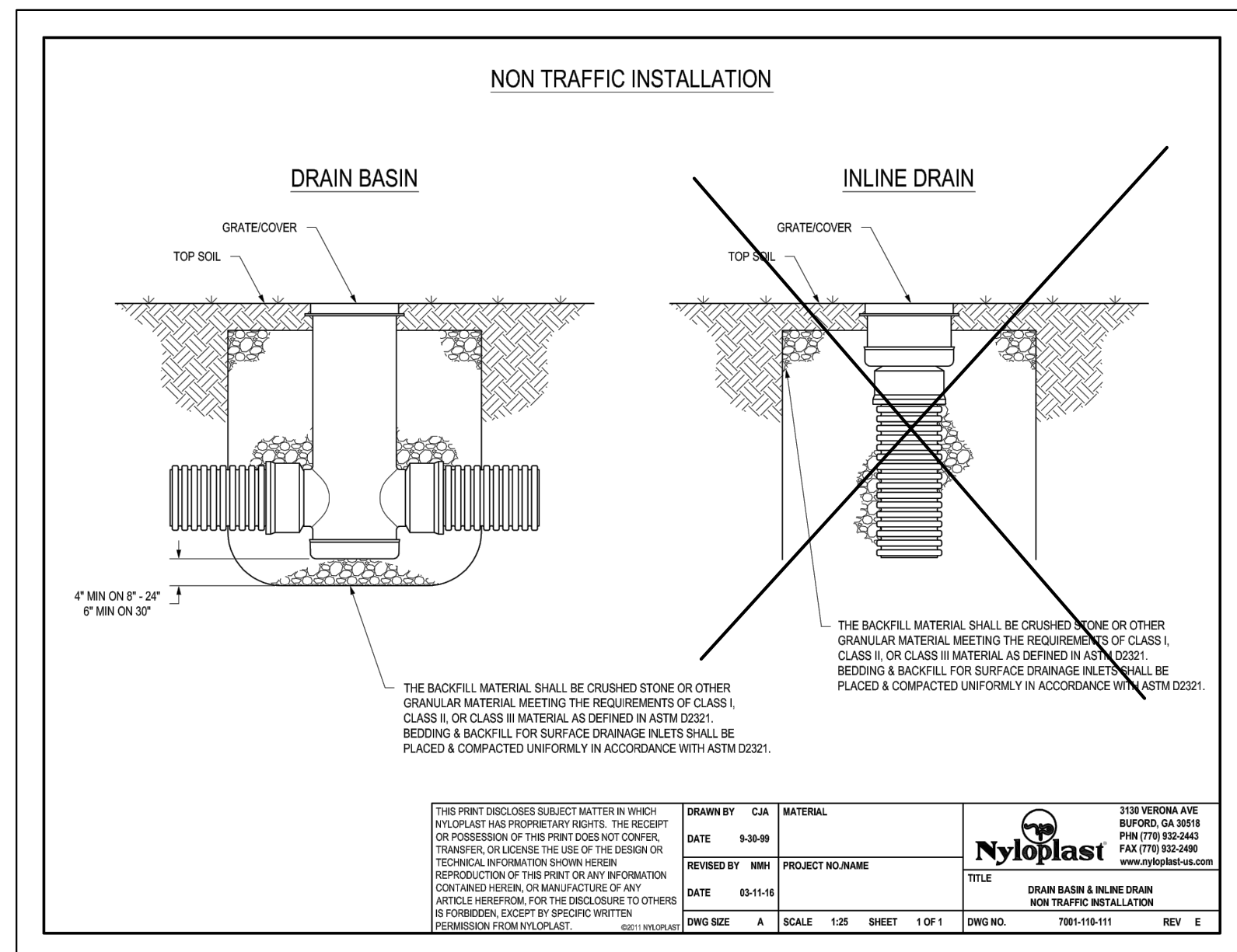
SHEET TITLE: STORM PLAN AND PROFILE

DESIGNED BY: JCM SCALE: DATE ISSUED: JAN. 2021
 DRAWN BY: JCM H: 1"=30'
 CHECKED BY: JH V: SHEET NO. 9 OF 22 SHEETS

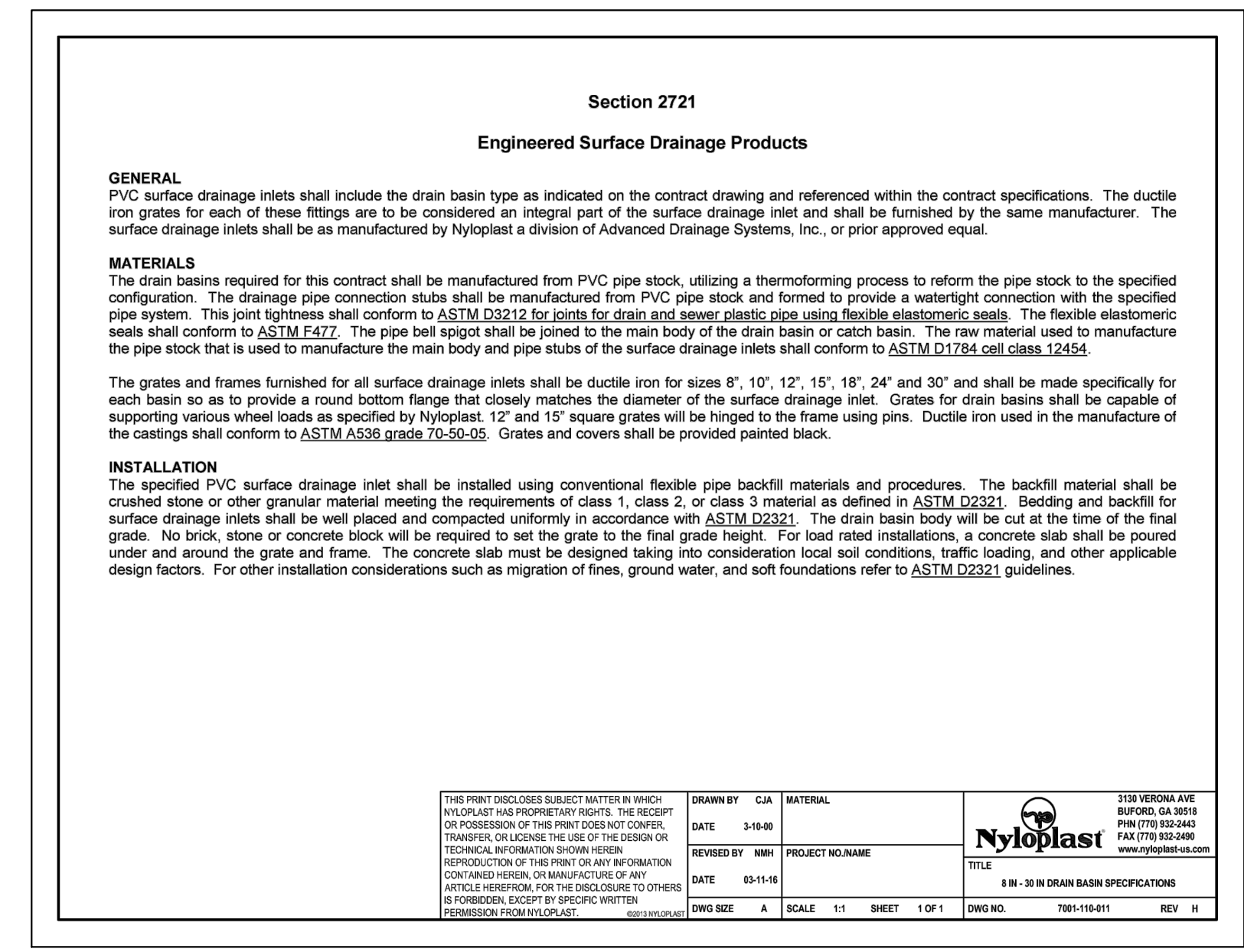
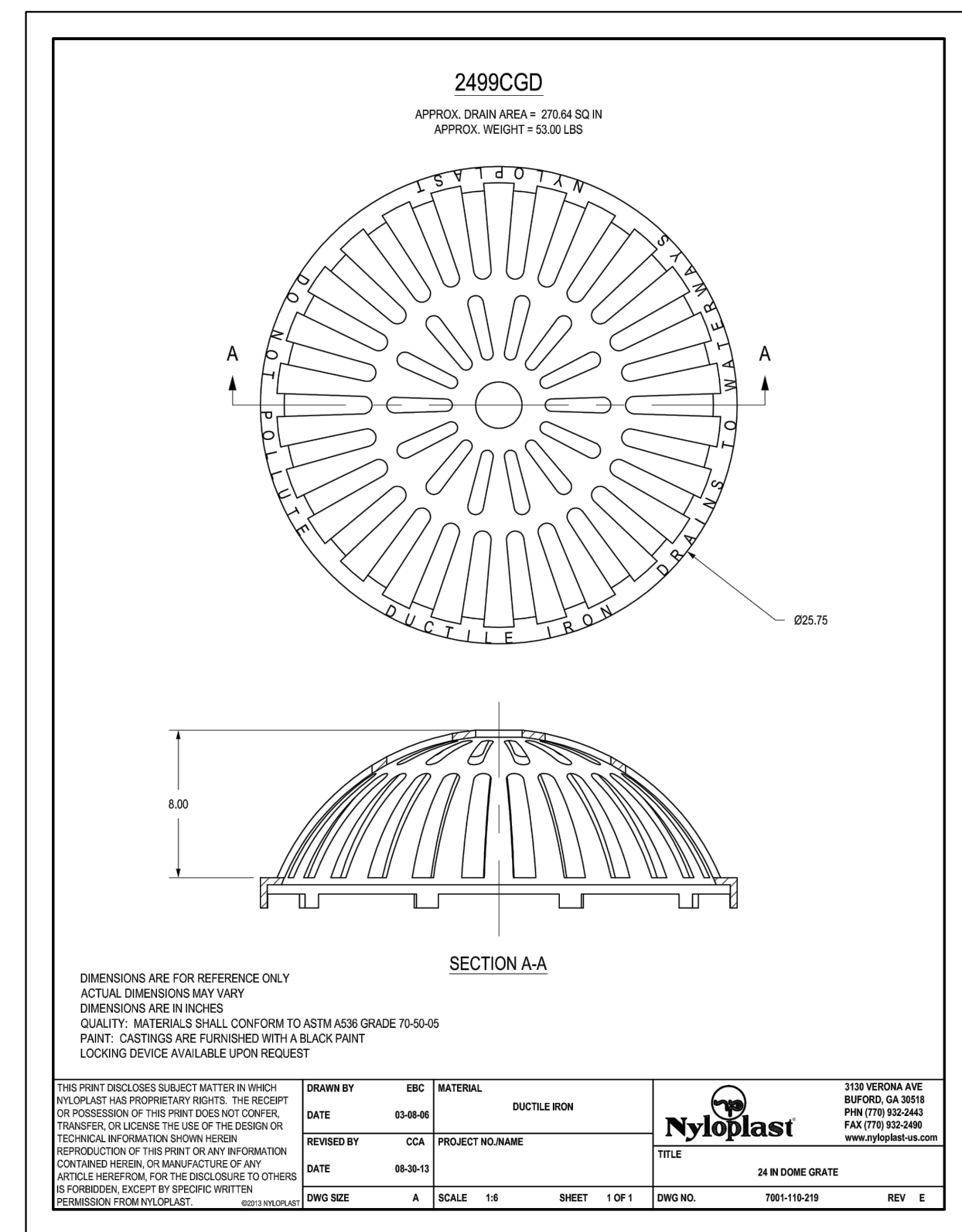
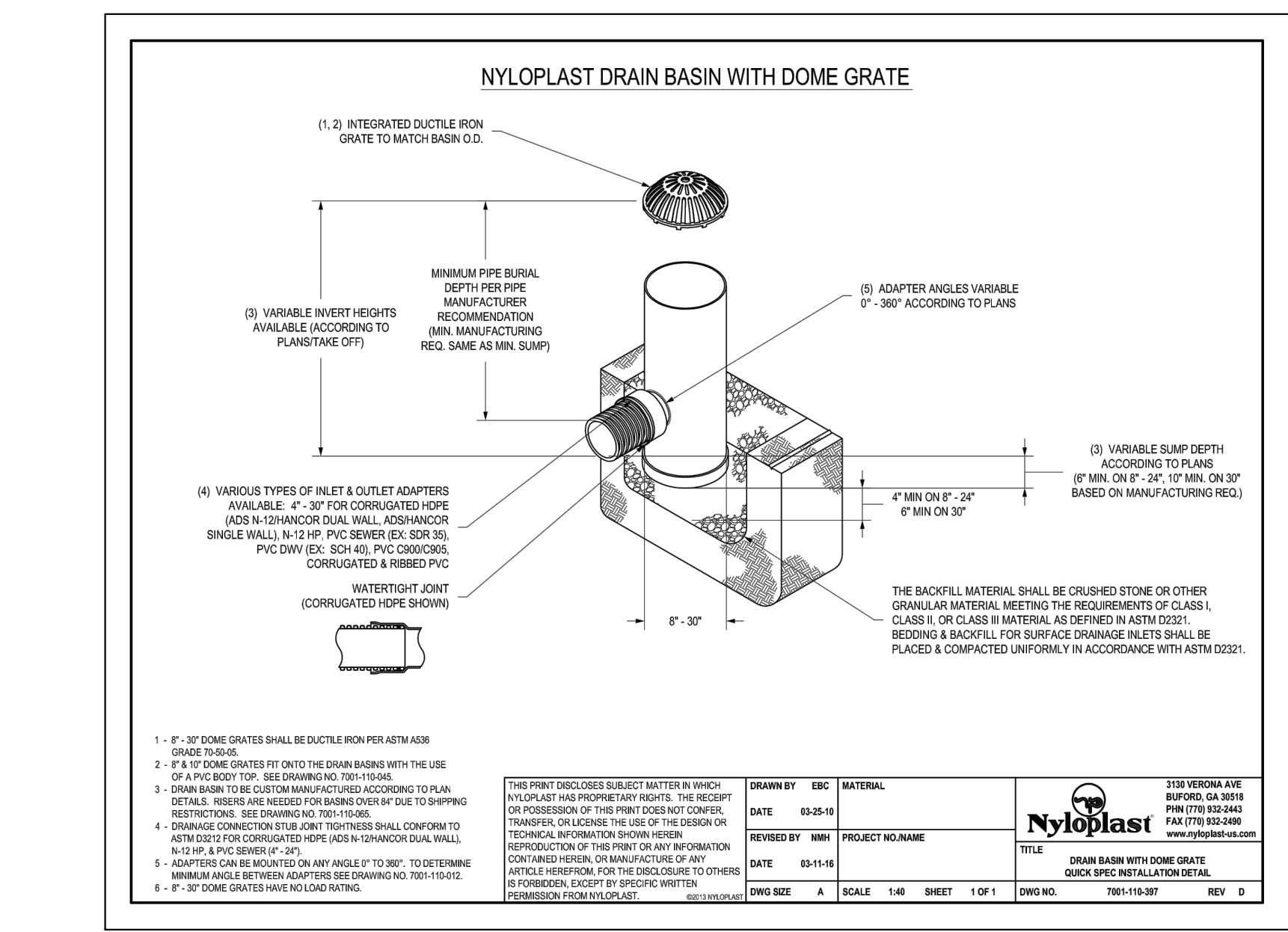
DWG:



INLINE STORM STA: 10+77.30



LOT 3B



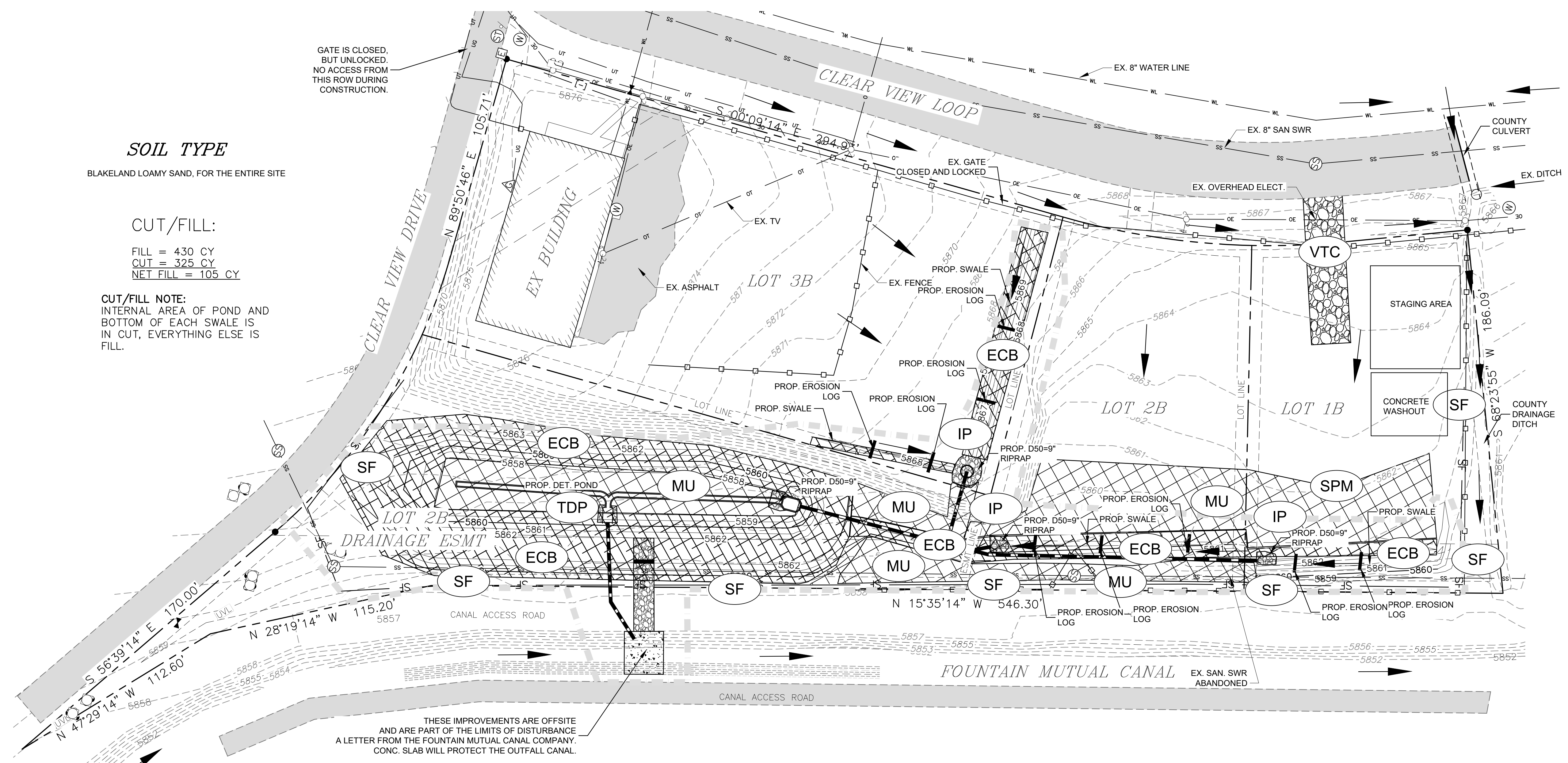
NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B			
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)			
PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL			
SHEET TITLE: NYLOPLAST DETAILS			
DESIGNED BY: JCM	SCALE: NA	DATE ISSUED: JAN. 2021	
DRAWN BY: JCM	HH: NA	SHEET NO. 10 OF 22 SHEETS	
CHECKED BY: JH	V:		
DWG:			

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SOIL TYPE
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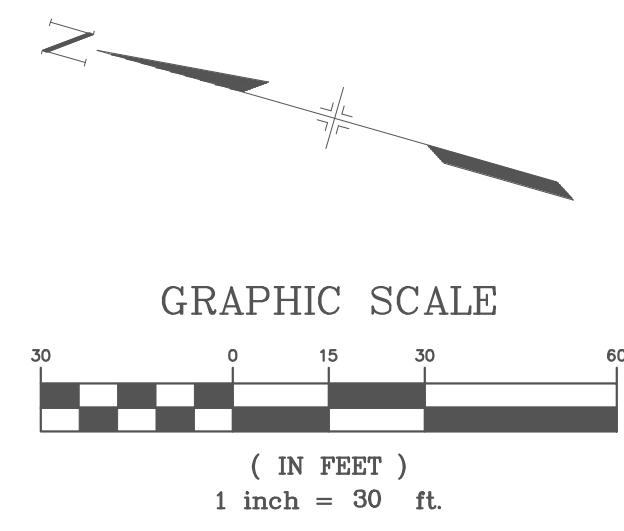
CUT/FILL:
FILL = 430 CY
CUT = 325 CY
NET FILL = 105 CY

CUT/FILL NOTE:
INTERNAL AREA OF POND AND BOTTOM OF EACH SWALE IS IN CUT, EVERYTHING ELSE IS FILL.



GATE IS CLOSED, BUT UNLOCKED. NO ACCESS FROM THIS ROW DURING CONSTRUCTION.

THESE IMPROVEMENTS ARE OFFSITE AND ARE PART OF THE LIMITS OF DISTURBANCE. A LETTER FROM THE FOUNTAIN MUTUAL CANAL COMPANY. CONC. SLAB WILL PROTECT THE OUTFALL CANAL.



LEGEND

- PROPOSED STORM LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- EXISTING FENCE
- EXISTING LOTS LINES
- PROPOSED FLOW ARROWS
- LIMITS OF DISTURBANCE/ LIMITS OF CONSTRUCTION

EROSION CONTROL PHASING

- INITIAL:** (VTC) (SF) (TDP)
- TEMP/INTERIM:** (MU) (IP)
- PERMANENT/FINAL:** (ECB) (SCL) INCLUDES DET. POND, AND FOREBAY
- (TDP) TEMPORARY SEDIMENT POND

TRIBUTARY AREA = 3.0 AC
BASIN BOTTOM WIDTH = 28'
LENGTH OF BASIN BOTTOM = 56'
SEDIMENT POND DEPTH = 4'
SEDIMENT POND MIN. VOLUME = 6,272 CUBIC FEET
SPILLWAY CREST WIDTH = 5'
HOLE DIAMETER FOR RISER PIPE = 12"
SINGLE COLUMN OF HOLES ON RISER PIPE
SEE DETAILS ON SHEET ---

LEGEND

- (VTC) VEHICLE TRACKING CONTROL
- (SF) SILT FENCE
- (SCL) SEDIMENT CONTROL LOG
- (ECB) EROSION CONTROL BLANKET, AREA OF CUT AND FILL, SOIL DISTURBANCE AREA
- (MU) SEEDING AND MULCHING, SOIL DISTURBANCE AREA
- (IP) INLET PROTECTION
- (SPM) STOCK PILE MANAGEMENT

NOTE:

- 1) EXISTING VEGETATION CONSISTS OF FEW WEEDS AS THE SITE WAS A USED CAR LOT.
- 2) FEMA 100-YEAR FLOOD PLAN MAP FOR THIS AREA IS 08041C0763G, DATED 12/7/18
- 3) NO CONSTRUCTION OUTSIDE THE SILT FENCE TO PROTECT EXISTING VEGETATION
- 4) NO OFFSITE GRADING IS PROPOSED, HOWEVER INSTALLATION OF THE OUTFALL PIPE WILL BE REQUIRED. THIS AREA WILL RECEIVE RIPRAP, SEEDING AND MULCHING. FMIC CANAL PROTECTION WILL ALSO BE COMPLETED.
- 5) NO CONSTRUCTION TRAILER WILL BE USED FOR THIS PROJECT.
- 6) TEMPORARY SEDIMENT POND WILL BE THE DETENTION POND UNTIL COMPLETION. NO DEWATERING IS ANTICIPATED FOR THIS SITE. GROUND WATER WAS NOT ENCOUNTERED UNTIL 11-12 FEET BELOW SURFACE. THE MAXIMUM CUTS IN THE POND ARE ONLY 5- FEET DEEP. IF GROUNDWATER IS ENCOUNTERED DURING CONSTRUCTION AND DEWATERING NEEDS TO TAKE PLACE, THE CONTRACTION MANAGER MUST FOLLOW SECTION 3.3.6C IN THE COUNTY ECM.
- 8) SEE SHEETS 12 THRU 22 FOR EROSION CONTROL DETAILS.
- 9) NO OFFSITE FLOWS WILL IMPACT THIS SITE.
- 10) NO DRAINAGE EASEMENT WILL BE REQUIRED UNTIL LOTS 1B OR 2B ARE SOLD.
- 11) THE LOCATION OF THE WASTE DISPOSAL BIN, PORTABLE TOILETS, AND SWMP BINDER WILL BE DETERMINED BY THE CONTRACTOR AND THE SWMP WILL BE MARKED-UP.
- 12) SINGLE AND DOUBLE LAYER E.C. BLANKETS WILL BE USED.

NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B			
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)			
PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL			
SHEET TITLE: EROSION CONTROL PLAN			
DESIGNED BY: JCM	SCALE: 1"=30'	DATE ISSUED: JAN. 2021	
DRAWN BY: JCM	HH: 1"=30'	SHEET NO. 11 OF 22 SHEETS	
CHECKED BY: JH	V:		
DWG:			

Silt Fence (SF) SC-1

Description

A silt fence is a woven geotextile fabric attached to wooden posts and trenched into the ground. It is designed as a sediment barrier to intercept sheet flow runoff from disturbed areas.

Appropriate Uses

A silt fence can be used where runoff is conveyed from a disturbed area as sheet flow. Silt fence is not designed to receive concentrated flow or to be used as a filter fabric. Typical uses include:

- Down slope of a disturbed area to accept sheet flow.
- Along the perimeter of a receiving water such as a stream, pond or wetland.
- At the perimeter of a construction site.

Design and Installation

Silt fence should be installed along the contour of slopes so that it intercepts sheet flow. The maximum recommended tributary drainage area per 100 lineal feet of silt fence, installed along the contour, is approximately 0.25 acres with a disturbed slope length of up to 150 feet and a tributary slope gradient no steeper than 3:1. Longer and steeper slopes require additional measures. This recommendation only applies to silt fence installed along the contour. Silt fence installed for other uses, such as perimeter control, should be installed in a way that will not produce concentrated flows. For example, a "J-hook" installation may be appropriate to force runoff to pond and evaporate or infiltrate in multiple areas rather than concentrate and cause erosive conditions parallel to the silt fence.

See Detail SF-1 for proper silt fence installation, which involves proper trenching, staking, securing the fabric to the stakes, and backfilling the silt fence. Properly installed silt fence should not be easily pulled out by hand and there should be no gaps between the ground and the fabric.

Silt fence must meet the minimum allowable strength requirements, depth of installation requirement, and other specifications in the design details. Improper installation of silt fence is a common reason for silt fence failure; however, when properly installed and used for the appropriate purposes, it can be highly effective.

Silt Fence	
Functions	
Erosion Control	No
Sediment Control	Yes
Site/Material Management	No

November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 SF-1



Photograph SF-1. Silt fence creates a sediment barrier, forcing sheet flow runoff to evaporate or infiltrate.

SC-1 Silt Fence (SF)

Maintenance and Removal

Inspection of silt fence includes observing the material for tears or holes and checking for slumping fence and undercut areas bypassing flows. Repair of silt fence typically involves replacing the damaged section with a new section. Sediment accumulated behind silt fence should be removed, as needed to maintain BMP effectiveness, typically before it reaches a depth of 6 inches.

Silt fence may be removed when the upstream area has reached final stabilization.

Photograph SF-2. When silt fence is not installed along the contour, a "J-hook" installation may be appropriate to ensure that the BMP does not create concentrated flow parallel to the silt fence. Photo courtesy of Tom Gore.

SF-2 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 November 2010

Silt Fence (SF) SC-1

SECTION A
SF-1. SILT FENCE

November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 SF-3

SC-1 Silt Fence (SF)

SILT FENCE INSTALLATION NOTES

- SILT FENCE MUST BE PLACED AWAY FROM THE TOE OF THE SLOPE TO ALLOW FOR WATER PONDING. SILT FENCE AT THE TOE OF A SLOPE SHOULD BE INSTALLED IN A FLAT LOCATION AT LEAST SEVERAL FEET (2-5 FT) FROM THE TOE OF THE SLOPE TO ALLOW ROOM FOR PONDING AND DEPOSITION.
- A UNIFORM 6" x 4" ANCHOR TRENCH SHALL BE EXCAVATED USING TRENCHER OR SILT FENCE INSTALLATION DEVICE. NO ROAD GRADERS, BACKHOES, OR SIMILAR EQUIPMENT SHALL BE USED.
- COMPACT ANCHOR TRENCH BY HAND WITH A "JUMPING JACK" OR BY WHEEL ROLLING. COMPACTION SHALL BE SUCH THAT SILT FENCE RESISTS BEING PULLED OUT OF ANCHOR TRENCH BY HAND.
- SILT FENCE SHALL BE PULLED TIGHT AS IT IS ANCHORED TO THE STAKES. THERE SHOULD BE NO NOTICEABLE SAG BETWEEN STAKES AFTER IT HAS BEEN ANCHORED TO THE STAKES.
- SILT FENCE FABRIC SHALL BE ANCHORED TO THE STAKES USING 1" HEAVY DUTY STAPLES OR NAILS WITH 1" HEADS. STAPLES AND NAILS SHOULD BE PLACED 3' ALONG THE FABRIC DOWN THE STAKE.
- AT THE END OF A RUN OF SILT FENCE ALONG A CONTOUR, THE SILT FENCE SHOULD BE TURNED PERPENDICULAR TO THE CONTOUR TO CREATE A "J-HOOK". THE "J-HOOK" EXTENDING PERPENDICULAR TO THE CONTOUR SHOULD BE OF SUFFICIENT LENGTH TO KEEP RUNOFF FROM FLOWING AROUND THE END OF THE SILT FENCE (TYPICALLY 10' - 20').
- SILT FENCE SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.

SILT FENCE MAINTENANCE NOTES

- 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.
- FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
- WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
- SEDIMENT ACCUMULATED UPSTREAM OF THE SILT FENCE SHALL BE REMOVED AS NEEDED TO MAINTAIN THE FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 6".
- REPAIR OR REPLACE SILT FENCE WHEN THERE ARE SIGNS OF WEAR, SUCH AS SAGGING, TEARING, OR COLLAPSE.
- SILT FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION, OR IS REPLACED BY AN EQUIVALENT PERIMETER SEDIMENT CONTROL BMP.
- WHEN SILT FENCE IS REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

DETAILS ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, NOT AVAILABLE IN AURORA.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM LISTED STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

SF-4 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 November 2010

Mulching (MU) EC-4

Description

Mulching consists of evenly applying straw, hay, shredded wood mulch, rock, bark or compost to disturbed soils and securing the mulch by crimping, tackifiers, netting or other measures. Mulching helps reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

Although often applied in conjunction with temporary or permanent seeding, it can also be used for temporary stabilization of areas that cannot be reseeded due to seasonal constraints.

Mulch can be applied either using standard mechanical dry application methods or using hydromulching equipment that hydraulically applies a slurry of water, wood fiber mulch, and often a tackifier.

Appropriate Uses

Use mulch in conjunction with seeding to help protect the seedbed and stabilize the soil. Mulch can also be used as a temporary cover on low to mild slopes to help temporarily stabilize disturbed areas where growing season constraints prevent effective reseeding. Disturbed areas should be properly mulched and tacked, or seeded, mulched and tacked promptly after final grade is reached (typically within no longer than 14 days) on portions of the site not otherwise permanently stabilized.

Standard dry mulching is encouraged in most jurisdictions; however, hydromulching may not be allowed in certain jurisdictions or may not be allowed near waterways.

Do not apply mulch during windy conditions.

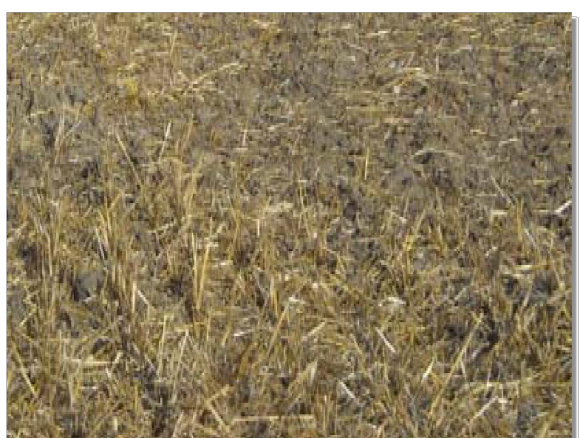
Design and Installation

Prior to mulching, surface-roughen areas by rolling with a crimping or punching type roller or by track walking. Track walking should only be used where other methods are impractical because track walking with heavy equipment typically compacts the soil.

A variety of mulches can be used effectively at construction sites. Consider the following:

Mulch	
Functions	
Erosion Control	Yes
Sediment Control	Moderate
Site/Material Management	No

June 2012 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 MU-1



Photograph MU-1. An area that was recently seeded, mulched, and crimped.

EC-4 Mulching (MU)

- Clean, weed-free and seed-free cereal grain straw should be applied evenly at a rate of 2 tons per acre and must be tacked or fastened by a method suitable for the condition of the site. Straw mulch must be anchored (and not merely placed) on the surface. This can be accomplished mechanically by crimping or with the aid of tackifiers or nets. Anchoring with a crimping implement is preferred, and is the recommended method for areas flatter than 3:1. Mechanical crimpers must be capable of tacking the long mulch fibers into the soil to a depth of 3 inches without cutting them. An agricultural disk, while not an ideal substitute, may work if the disk blades are dull or blunted and set vertically; however, the frame may have to be weighted to afford proper soil penetration.
- Grass hay may be used in place of straw; however, because hay is comprised of the entire plant including seed, mulching with hay may seed the site with non-native grass species which might in turn out-compete the native seed. Alternatively, native species of grass hay may be purchased, but can be difficult to find and are more expensive than straw. Purchasing and utilizing a certified weed-free straw is an easier and less costly mulching method. When using grass hay, follow the same guidelines as for straw (provided above).
- On small areas sheltered from the wind and heavy runoff, spraying a tackifier on the mulch is satisfactory for holding it in place. For steep slopes and special situations where greater control is needed, erosion control blankets anchored with stakes should be used instead of mulch.
- Hydraulic mulching consists of wood cellulose fibers mixed with water and a tackifying agent and should be applied at a rate of no less than 1,500 pounds per acre (1,425 lbs of fibers mixed with at least 75 lbs of tackifier) with a hydraulic mulcher. For steeper slopes, up to 2000 pounds per acre may be required for effective hydrosceding. Hydromulch typically requires up to 24 hours to dry; therefore, it should not be applied immediately prior to inclement weather. Application to roads, waterways and existing vegetation should be avoided.
- Erosion control mats, blankets, or nets are recommended to help stabilize steep slopes (generally 3:1 and steeper) and waterways. Depending on the product, these may be used alone or in conjunction with grass or straw mulch. Normally, use of these products will be restricted to relatively small areas. Biodegradable mats made of straw and jute, straw-cocconut, coconut fiber, or excelsior can be used instead of mulch. (See the ECM/TRM BMP for more information.)
- Tackifiers or binders may be used to anchor mulch. Check with the local jurisdiction for allowed tackifiers. Manufacturer's recommendations should be followed at all times. (See the Soil Binder BMP for more information on general types of tackifiers.)
- Rock can also be used as mulch. It provides protection of exposed soils to wind and water erosion and allows infiltration of precipitation. An aggregate base course can be spread on disturbed areas for temporary or permanent stabilization. The rock mulch layer should be thick enough to provide full coverage of exposed soil on the area it is applied.

Maintenance and Removal

After mulching, the bare ground surface should not be more than 10 percent exposed. Reapply mulch, as needed, to cover bare areas.

MU-2 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 June 2012

1/18/2021 El Paso County, CO Drainage Criteria Manual

TEMPORARY SWALE NOTES

INSTALLATION REQUIREMENTS

- TEMPORARY SWALES SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
- THE AREA UNDER WHICH THE EMBANKMENT IS TO BE INSTALLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF ALL VEGETATION AND ROOT MAT.
- EMBANKMENT MATERIAL SHALL CONSIST OF SOIL WITH A MINIMUM OF 75% PASSING A #100 SIEVE. EXCAVATED SOIL CAN BE USED IF IT MEETS THIS REQUIREMENT.
- EMBANKMENT IS TO BE COMPACTED TO AT LEAST 90% OF MAXIMUM DENSITY AND WITH 2% OF OPTIMUM MOISTURE CONTENT ACCORDING TO ASTM D 1557.
- SWALES WITH SLOPE > 2% SHALL BE LINED, SEE FIGURE TSW-3.
- SWALES ARE TO DRAIN INTO A SEDIMENT BASIN OR OTHER STABILIZED OUTLET.
- Z SHALL BE 3 OR GREATER.

MAINTENANCE REQUIREMENTS

- CONTRACTOR SHALL INSPECT SWALES AFTER EACH RAINFALL AT LEAST DAILY DURING PROLONGED RAINFALL AND WEEKLY DURING PERIODS OF NO RAINFALL.
- SWALES SHALL BE ROUTINELY CLEARED OF ANY DEBRIS OR ACCUMULATION OF SEDIMENT.
- EROSION OR OTHER DAMAGED LININGS SHALL IMMEDIATELY BE REPAIRED.
- TEMPORARY SWALES SHALL REMAIN OPERATIONAL AND PROPERLY MAINTAINED UNTIL THE SITE AREA IS PERMANENTLY STABILIZED WITH ADEQUATE VEGETATIVE COVERAGE FOR OTHER PERMANENT STRUCTURE AS APPROVED BY THE CITY.

City of Colorado Springs Stormwater Quality Figure TSW-2 Temporary Swales Construction Detail and Maintenance Requirements

64226

1/18/2021 El Paso County, CO Drainage Criteria Manual

SWALE LINING NOTES

INSTALLATION REQUIREMENTS

- REFER TO THE EROSION CONTROL BLANKETS FACTSHEET FOR PROPER INSTALLATION OF EROSION CONTROL FABRIC LINING.
- SWALES WITH EASILY ERODIBLE SOILS AND SLOPES GREATER THAN 8% SHALL BE LINED WITH RIP-RAP.

MAINTENANCE REQUIREMENTS

- CONTRACTOR SHALL INSPECT SWALE LININGS AFTER EACH RAINFALL AT LEAST DAILY DURING PROLONGED RAINFALL AND WEEKLY DURING PERIODS OF NO RAINFALL.
- DAMAGED LININGS SHALL IMMEDIATELY BE REPAIRED.
- REFER TO THE EROSION CONTROL BLANKETS FACTSHEET FOR PROPER MAINTENANCE.
- DISPLACED RIPRAP OR COARSE AGGREGATE IS TO BE REPLACED AS SOON AS POSSIBLE.
- SWALE LININGS ARE TO REMAIN IN PLACE AND BE MAINTAINED UNTIL THE TEMPORARY SWALE IS REMOVED.

City of Colorado Springs Stormwater Quality Figure TSW-3 Swale Linings Construction Detail and Maintenance Requirements

Vehicle Tracking
What it is

65226

NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B			
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)			
PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL			
SHEET TITLE: GRADING AND EROSION DETAILS			
DESIGNED BY: JCM	SCALE:	DATE ISSUED: JAN. 2021	
DRAWN BY: JCM	HH:		
CHECKED BY: JH	V:	SHEET NO. 12 OF 22 SHEETS	
DWG:			

Temporary and Permanent Seeding (TS/PS) EC-2

Description

Temporary seeding can be used to stabilize disturbed areas that will be inactive for an extended period. Permanent seeding should be used to stabilize areas at final grade that will not be otherwise stabilized. Effective seeding includes preparation of a seedbed, selection of an appropriate seed mixture, proper planting techniques, and protection of the seeded area with mulch, geotextiles, or other appropriate measures.



Photograph TS/PS-1. Equipment used to drill seed. Photo courtesy of Douglas County.

Appropriate Uses

When the soil surface is disturbed and will remain inactive for an extended period (typically 30 days or longer), proactive stabilization measures should be implemented. If the inactive period is short-lived (on the order of two weeks), techniques such as surface roughening may be appropriate. For longer periods of inactivity, temporary seeding and mulching can provide effective erosion control. Permanent seeding should be used on finished areas that have not been otherwise stabilized.

Typically, local governments have their own seed mixes and timelines for seeding. Check jurisdictional requirements for seeding and temporary stabilization.

Design and Installation

Effective seeding requires proper seedbed preparation, selection of an appropriate seed mixture, use of appropriate seeding equipment to ensure proper coverage and density, and protection with mulch or fabric until plants are established.

The USDCM Volume 2 *Revegetation* Chapter contains detailed seed mix, soil preparations, and seeding and mulching recommendations that may be referenced to supplement this Fact Sheet.

Drill seeding is the preferred seeding method. Hydros seeding is not recommended except in areas where steep slopes prevent use of drill seeding equipment, and even in these instances it is preferable to hand seed and mulch. Some jurisdictions do not allow hydros seeding or mulching.

Seedbed Preparation

Prior to seeding, ensure that areas to be revegetated have soil conditions capable of supporting vegetation. Overlook grading can result in loss of topsoil, resulting in poor quality subsoils at the ground surface that have low nutrient value, little organic matter content, few soil microorganisms, rooting restrictions, and conditions less conducive to infiltration of precipitation. As a result, it is typically necessary to provide stockpiled topsoil, compost, or other

Temporary and Permanent Seeding	
Functions	
Erosion Control	Yes
Sediment Control	No
Site/Material Management	No

EC-2 Temporary and Permanent Seeding (TS/PS)

soil amendments and rototill them into the soil to a depth of 6 inches or more.

Topsoil should be salvaged during grading operations for use and spread on areas to be revegetated later. Topsoil should be viewed as an important resource to be utilized for vegetation establishment, due to its water-holding capacity, structure, texture, organic matter content, biological activity, and nutrient content. The rooting depth of most native grasses in the semi-arid Denver metropolitan area is 6 to 18 inches. At a minimum, the upper 6 inches of topsoil should be stripped, stockpiled, and ultimately respread across areas that will be revegetated.

Where topsoil is not available, subsoils should be amended to provide an appropriate plant-growth medium. Organic matter, such as well digested compost, can be added to improve soil characteristics conducive to plant growth. Other treatments can be used to adjust soil pH conditions when needed. Soil testing, which is typically inexpensive, should be completed to determine and optimize the types and amounts of amendments that are required.

If the disturbed ground surface is compacted, rip or rototill the surface prior to placing topsoil. If adding compost to the existing soil surface, rototilling is necessary. Surface roughening will assist in placement of a stable topsoil layer on steeper slopes, and allow infiltration and root penetration to greater depth.

Prior to seeding, the soil surface should be rough and the seedbed should be firm, but neither too loose nor compacted. The upper layer of soil should be in a condition suitable for seeding at the proper depth and conducive to plant growth. Seed-to-soil contact is the key to good germination.

Seed Mix for Temporary Vegetation

To provide temporary vegetative cover on disturbed areas which will not be paved, built upon, or fully landscaped or worked for an extended period (typically 30 days or more), plant an annual grass appropriate for the time of planting and mulch the planted areas. Annual grasses suitable for the Denver metropolitan area are listed in Table TS/PS-1. These are to be considered only as general recommendations when specific design guidance for a particular site is not available. Local governments typically specify seed mixes appropriate for their jurisdiction.

Seed Mix for Permanent Revegetation

To provide vegetative cover on disturbed areas that have reached final grade, a perennial grass mix should be established. Permanent seeding should be performed promptly (typically within 14 days) after reaching final grade. Each site will have different characteristics and a landscape professional or the local jurisdiction should be contacted to determine the most suitable seed mix for a specific site. In lieu of a specific recommendation, one of the perennial grass mixes appropriate for site conditions and growth season listed in Table TS/PS-2 should be used. The pure live seed (PLS) rates of application recommended in these tables are considered to be absolute minimum rates for seed applied using proper drill-seeding equipment.

If desired for wildlife habitat or landscape diversity, shrubs such as rubber rabbitbrush (*Chrysothamnus nauseosus*), flowering saltbush (*Atriplex canescens*) and skunkbrush sumac (*Rhus trilobata*) could be added to the upland seedmixes at 0.25, 0.5 and 1 pound PLS/acre, respectively. In riparian zones, planting root stock of such species as American plum (*Prunus americana*), woods rose (*Rosa woodsii*), plains cottonwood (*Populus sargentii*), and willow (*Populus spp.*) may be considered. On non-topsoiled upland sites, a legume such as Ladak alfalfa at 1 pound PLS/acre can be included as a source of nitrogen for perennial grasses.

Temporary and Permanent Seeding (TS/PS) EC-2

Seeding dates for the highest success probability of perennial species along the Front Range are generally in the spring from April through early May and in the fall after the first of September until the ground freezes. If the area is irrigated, seeding may occur in summer months, as well. See Table TS/PS-3 for appropriate seeding dates.

Table TS/PS-1. Minimum Drill Seeding Rates for Various Temporary Annual Grasses

Species* (Common name)	Growth Season	Pounds of Pure Live Seed (PLS)/acre	Planting Depth (Inches)
1. Oats	Cool	35 - 50	1 - 2
2. Spring wheat	Cool	25 - 35	1 - 2
3. Spring barley	Cool	25 - 35	1 - 2
4. Annual ryegrass	Cool	10 - 15	½
5. Millet	Warm	3 - 15	½ - ¾
6. Sudangrass	Warm	5 - 10	½ - ¾
7. Sorghum	Warm	5 - 10	½ - ¾
8. Winter wheat	Cool	20 - 35	1 - 2
9. Winter barley	Cool	20 - 35	1 - 2
10. Winter rye	Cool	20 - 35	1 - 2
11. Triticale	Cool	25 - 40	1 - 2

* Successful seeding of annual grass resulting in adequate plant growth will usually produce enough dead-plant residue to provide protection from wind and water erosion for an additional year. This assumes that the cover is not disturbed or moved closer than 8 inches.

Hydraulic seeding may be substituted for drilling only where slopes are steeper than 3:1 or where access limitations exist. When hydraulic seeding is used, hydraulic mulching should be applied as a separate operation, when practical, to prevent the seeds from being encapsulated in the mulch.

³ See Table TS/PS-3 for seeding dates. Irrigation, if consistently applied, may extend the use of cool season species during the summer months.

⁴ Seeding rates should be doubled if seed is broadcast, or increased by 50 percent if done using a Brillion Drill or by hydraulic seeding.

EC-2 Temporary and Permanent Seeding (TS/PS)

Table TS/PS-2. Minimum Drill Seeding Rates for Perennial Grasses

Common Name	Botanical Name	Growth Season	Growth Form	Seeds/ Pound	Pounds of PLS/acre
Alkali Soil Seed Mix					
Alkali sacaton	<i>Sporobolus airoides</i>	Cool	Bunch	1,750,000	0.25
Basin wildrye	<i>Elymus cinereus</i>	Cool	Bunch	165,000	2.5
Sodar streambank wheatgrass	<i>Agropyron riparium 'Sodas'</i>	Cool	Sod	170,000	2.5
Jose tall wheatgrass	<i>Agropyron elongatum 'Jose'</i>	Cool	Bunch	79,000	7.0
Ariha western wheatgrass	<i>Agropyron smithii 'Ariha'</i>	Cool	Sod	110,000	5.5
Total					17.75
Fertile Loamy Soil Seed Mix					
Ephraim crested wheatgrass	<i>Agropyron cristatum 'Ephraim'</i>	Cool	Sod	175,000	2.0
Dural hard fescue	<i>Festuca ovina 'Duraliscula'</i>	Cool	Bunch	565,000	1.0
Lincoln smooth brome	<i>Bromus inermis 'leysa' 'Lincoln'</i>	Cool	Sod	130,000	3.0
Sodar streambank wheatgrass	<i>Agropyron riparium 'Sodas'</i>	Cool	Sod	170,000	2.5
Ariha western wheatgrass	<i>Agropyron smithii 'Ariha'</i>	Cool	Sod	110,000	7.0
Total					15.5
High Water Table Soil Seed Mix					
Meadow foxtail	<i>Allegrocyrus pratensis</i>	Cool	Sod	900,000	0.5
Reedtop	<i>Agrostis alba</i>	Warm	Open sod	5,000,000	0.25
Reed canarygrass	<i>Phalaris arundinacea</i>	Cool	Sod	68,000	0.5
Lincoln smooth brome	<i>Bromus inermis 'leysa' 'Lincoln'</i>	Cool	Sod	130,000	3.0
Pathfinder switchgrass	<i>Panicum virgatum 'Pathfinder'</i>	Warm	Sod	389,000	1.0
Alkali tall wheatgrass	<i>Agropyron elongatum 'Alkal'</i>	Cool	Bunch	79,000	5.5
Total					10.75
Transition Turf Seed Mix					
Ruebens Canadian bluegrass	<i>Poa compressa 'Ruebena'</i>	Cool	Sod	2,500,000	0.5
Dural hard fescue	<i>Festuca ovina 'Duraliscula'</i>	Cool	Bunch	565,000	1.0
Citation perennial ryegrass	<i>Lolium perenne 'Citation'</i>	Cool	Sod	247,000	3.0
Lincoln smooth brome	<i>Bromus inermis 'leysa' 'Lincoln'</i>	Cool	Sod	130,000	3.0
Total					7.5

Temporary and Permanent Seeding (TS/PS) EC-2

Table TS/PS-2. Minimum Drill Seeding Rates for Perennial Grasses (cont.)

Common Name	Botanical Name	Growth Season	Growth Form	Seeds/ Pound	Pounds of PLS/acre
Sandy Soil Seed Mix					
Blue grama	<i>Bouteloua gracilis</i>	Warm	Sod-forming bunchgrass	825,000	0.5
Camper litle bluestem	<i>Schizachyrium scoparium 'Camper'</i>	Warm	Bunch	240,000	1.0
Prairie sandreed	<i>Calamagrostis longifolia</i>	Warm	Open sod	274,000	1.0
Sand dropseed	<i>Sporobolus cynosuroides</i>	Cool	Bunch	5,299,000	0.25
Vaughn sideoats grama	<i>Bouteloua curtipendula 'Vaughn'</i>	Warm	Sod	191,000	2.0
Ariha western wheatgrass	<i>Agropyron smithii 'Ariha'</i>	Cool	Sod	110,000	5.5
Total					10.25
Heavy Clay, Rocky Foothill Seed Mix					
Ephraim crested wheatgrass ¹	<i>Agropyron cristatum 'Ephraim'</i>	Cool	Sod	175,000	1.5
Oshe Intermediate wheatgrass	<i>Agropyron intermedium 'Oshe'</i>	Cool	Sod	115,000	5.5
Vaughn sideoats grama ²	<i>Bouteloua curtipendula 'Vaughn'</i>	Warm	Sod	191,000	2.0
Lincoln smooth brome	<i>Bromus inermis 'leysa' 'Lincoln'</i>	Cool	Sod	130,000	3.0
Ariha western wheatgrass	<i>Agropyron smithii 'Ariha'</i>	Cool	Sod	110,000	5.5
Total					17.5

¹ All of the above seeding mixes and rates are based on drill seeding followed by crimped straw mulch. These rates should be doubled if seed is broadcast and should be increased by 50 percent if the seeding is done using a Brillion Drill or is applied through hydraulic seeding. Hydraulic seeding may be substituted for drilling only where slopes are steeper than 3:1. If hydraulic seeding is used, hydraulic mulching should be done as a separate operation.

² See Table TS/PS-3 for seeding dates.

³ If site is to be irrigated, the transition turf seed rates should be doubled.

⁴ Crested wheatgrass should not be used on slopes steeper than 6H to 1V.

⁵ Can substitute 0.5 lbs PLS of blue grama for the 2.0 lbs PLS of Vaughn sideoats grama.

EC-2 Temporary and Permanent Seeding (TS/PS)

Table TS/PS-3. Seeding Dates for Annual and Perennial Grasses

Seeding Dates	Annual Grasses (Numbers in table reference species in Table TS/PS-1)		Perennial Grasses	
	Warm	Cool	Warm	Cool
January 1-March 15			✓	✓
March 16-April 30	4	1,2,3	✓	✓
May 1-May 15		4	✓	
May 16-June 30		4,5,6,7		
July 1-July 15		5,6,7		
July 16-August 31				
September 1-September 30		8,9,10,11		
October 1-December 31			✓	✓

Mulch

Cover seeded areas with mulch or an appropriate rolled erosion control product to promote establishment of vegetation. Anchor mulch by crimping, netting or use of a non-toxic tackifier. See the Mulching BMP Fact Sheet for additional guidance.

Maintenance and Removal

Monitor and observe seeded areas to identify areas of poor growth or areas that fail to germinate. Reseed and mulch these areas, as needed.

An area that has been permanently seeded should have a good stand of vegetation within one growing season if irrigated and within three growing seasons without irrigation in Colorado. Reseed portions of the site that fail to germinate or remain bare after the first growing season.

Seeded areas may require irrigation, particularly during extended dry periods. Targeted weed control may also be necessary.

Protect seeded areas from construction equipment and vehicle access.

Stabilized Staging Area (SSA) SM-6

Description

A stabilized staging area is a clearly designated area where construction equipment and vehicles, stockpiles, waste bins, and other construction-related materials are stored. The contractor office trailer may also be located in this area. Depending on the size of the construction site, more than one staging area may be necessary.



Photograph SSA-1. Example of a staging area with a gravel surface to prevent mud tracking and reduce runoff. Photo courtesy of Douglas County.

Appropriate Uses

Most construction sites will require a staging area, which should be clearly designated in SWMP drawings. The layout of the staging area may vary depending on the type of construction activity. Staging areas located in roadways due to space constraints require special measures to avoid materials being washed into storm inlets.

Design and Installation

Stabilized staging areas should be completed prior to other construction activities beginning on the site. Major components of a stabilized staging area include:

- Appropriate space to contain storage and provide for loading/unloading operations, as well as parking if necessary.
- A stabilized surface, either paved or covered, with 3-inch diameter aggregate or larger.
- Perimeter controls such as silt fence, sediment control logs, or other measures.
- Construction fencing to prevent unauthorized access to construction materials.
- Provisions for Good Housekeeping practices related to materials storage and disposal, as described in the Good Housekeeping BMP Fact Sheet.
- A stabilized construction entrance/exit, as described in the Vehicle Tracking Control BMP Fact Sheet, to accommodate traffic associated with material delivery and waste disposal vehicles.

Over-sizing the stabilized staging area may result in disturbance of existing vegetation in excess of that required for the project. This increases costs, as well as requirements for long-term stabilization following the construction period. When designing the stabilized staging area, minimize the area of disturbance to the extent practical.

Stabilized Staging Area	
Functions	
Erosion Control	Yes
Sediment Control	Moderate
Site/Material	Yes

SM-6 Stabilized Staging Area (SSA)

Minimizing Long-Term Stabilization Requirements

- Utilize off-site parking and restrict vehicle access to the site.
- Use construction mats in lieu of rock when staging is provided in an area that will not be disturbed otherwise.
- Consider use of a bermed contained area for materials and equipment that do not require a stabilized surface.
- Consider phasing of staging areas to avoid disturbance in an area that will not be otherwise disturbed.

See Detail SSA-1 for a typical stabilized staging area and SSA-2 for a stabilized staging area when materials staging in roadways is required.

Maintenance and Removal

Maintenance of stabilized staging areas includes maintaining a stable surface cover of gravel, repairing perimeter controls, and following good housekeeping practices.

When construction is complete, debris, unused stockpiles and materials should be recycled or properly disposed. In some cases, this will require disposal of contaminated soil from equipment leaks in an appropriate landfill. Staging areas should then be permanently stabilized with vegetation or other surface cover planned for the development.

NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT:	CLEAR VIEW INDUSTRIAL PARK FILING 2B		
BENCHMARK:	Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)		
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SHEET TITLE:	GRADING AND EROSION DETAILS		
DESIGNED BY:	JCM	SCALE:	DATE ISSUED:
DRAWN BY:	JCM	H:	JAN, 2021
CHECKED BY:	JH	V:	SHEET NO. 13 OF 22 SHEETS
DWG:			

Stabilized Staging Area (SSA) SM-6

SSA-1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

- SEE PLAN VIEW FOR LOCATION OF STAGING AREAS. CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.
- STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.
- STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.
- THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL.
- UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.
- ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SEE FENCE AND CONSTRUCTION FENCING AS NEEDED.

STABILIZED STAGING AREA MAINTENANCE NOTES

- 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.
- FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
- WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
- ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

November 2010 Urban Drainage and Flood Control District SSA-3
Urban Storm Drainage Criteria Manual Volume 3

SM-6 Stabilized Staging Area (SSA)

STABILIZED STAGING AREA MAINTENANCE NOTES

- THE STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.
- THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION (THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE LOCAL JURISDICTION, USED ON SITE AND THE AREA COVERED WITH TOPSOIL, SEEDS AND MULCHED OR OTHERWISE STABILIZED TO A MANNER APPROVED BY LOCAL JURISDICTION).

NOTE: MANY MUNICIPALITIES PROHIBIT THE USE OF RECYCLED CONCRETE AS GRANULAR MATERIAL FOR STABILIZED STAGING AREAS DUE TO DIFFICULTIES WITH RE-ESTABLISHMENT OF VEGETATION IN AREAS WHERE RECYCLED CONCRETE WAS PLACED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM USDCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM COLORADO COUNTY COLORADO, NOT AVAILABLE IN AUTOCAD)

SSA-4 Urban Drainage and Flood Control District November 2010
Urban Storm Drainage Criteria Manual Volume 3

Vehicle Tracking Control (VTC) SM-4

Description

Vehicle tracking controls provide stabilized construction site access where vehicles exit the site onto paved public roads. An effective vehicle tracking control helps remove sediment (mud or dirt) from vehicles, reducing tracking onto the paved surface.

Photograph VTC-1: A vehicle tracking control pad constructed with properly sized rock reduces off-site sediment tracking.

Appropriate Uses

Implement a stabilized construction entrance or vehicle tracking control where frequent heavy vehicle traffic exits the construction site onto a paved roadway. An effective vehicle tracking control is particularly important during the following conditions:

- Wet weather periods when mud is easily tracked off site.
- During dry weather periods where dust is a concern.
- When poorly drained, clayey soils are present on site.

Although wheel washes are not required in designs of vehicle tracking controls, they may be needed at particularly muddy sites.

Design and Installation

Construct the vehicle tracking control on a level surface. Where feasible, grade the tracking control towards the construction site to reduce off-site runoff. Place signage, as needed, to direct construction vehicles to the designated exit through the vehicle tracking control. There are several different types of stabilized construction entrances including:

VTC-1. Aggregate Vehicle Tracking Control. This is a coarse-aggregate surfaced pad underlain by a geotextile. This is the most common vehicle tracking control, and when properly maintained can be effective at removing sediment from vehicle tires.

VTC-2. Vehicle Tracking Control with Construction Mat or Turf Reinforcement Mat. This type of control may be appropriate for site access at very small construction sites with low traffic volume over vegetated areas. Although this application does not typically remove sediment from vehicles, it helps protect existing vegetation and provides a stabilized entrance.

Vehicle Tracking Control		
Functions		
Erosion Control		Moderate
Sediment Control		Yes
Site/Material Management		Yes

November 2010 Urban Drainage and Flood Control District VTC-1
Urban Storm Drainage Criteria Manual Volume 3

SM-4 Vehicle Tracking Control (VTC)

VTC-3. Stabilized Construction Entrance/Exit with Wheel Wash. This is an aggregate pad, similar to VTC-1, but includes equipment for fire washing. The wheel wash equipment may be as simple as hand-held power washing equipment to more advanced proprietary systems. When a wheel wash is provided, it is important to direct wash water to a sediment trap prior to discharge from the site.

Vehicle tracking controls are sometimes installed in combination with a sediment trap to treat runoff.

Maintenance and Removal

Inspect the area for degradation and replace aggregate or material used for a stabilized entrance/exits as needed. If the area becomes clogged and ponds water, remove and dispose of excess sediment or replace material with a fresh layer of aggregate as necessary.

With aggregate vehicle tracking controls, ensure rock and debris from this area do not enter the public right-of-way.

Remove sediment that is tracked onto the public right of way daily or more frequently as needed. Excess sediment in the roadway indicates that the stabilized construction entrance needs maintenance.

Ensure that drainage ditches at the entrance/exit area remain clear.

A stabilized entrance should be removed only when there is no longer the potential for vehicle tracking to occur. This is typically after the site has been stabilized.

When wheel wash equipment is used, be sure that the wash water is discharged to a sediment trap prior to discharge. Also inspect channels conveying the water from the wash area to the sediment trap and stabilize areas that may be eroding.

When a construction entrance/exits is removed, excess sediment from the aggregate should be removed and disposed of appropriately. The entrance should be promptly stabilized with a permanent surface following removal, typically by paving.

Photograph VTC-2: A vehicle tracking control pad with wheel wash facility. Photo courtesy of Tom Gore.

VTC-2 Urban Drainage and Flood Control District November 2010
Urban Storm Drainage Criteria Manual Volume 3

Vehicle Tracking Control (VTC) SM-4

VTC-1. AGGREGATE VEHICLE TRACKING CONTROL

20 FOOT WIDTH CAN BE LESS IF CONST. VEHICLES ARE PHYSICALLY CONFINED ON BOTH SIDES

75' MIN.

6" (MIN.)

UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, USE DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK

NON-WOVEN GEOTEXTILE FABRIC BETWEEN SOIL AND ROCK

INSTALL ROCK FLUSH WITH OR BELOW TOP OF PAVEMENT

UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, USE DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MIN.)

NON-WOVEN GEOTEXTILE FABRIC

COMPACTED SUBGRADE

SECTION A

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SM-4 Vehicle Tracking Control (VTC)

VTC-2. AGGREGATE VEHICLE TRACKING CONTROL WITH WASH RACK

NOTE: WASH WATER MAY NOT CONTAIN CHEMICALS OR SOAPS WITHOUT OBTAINING A SEPARATE PERMIT

DITCH TO CARRY WASH WATER TO SEDIMENT TRAP OR BASIN

6' MIN.

REINFORCED CONCRETE RACK (MAY SUBSTITUTE STEEL CATTLE GUARD FOR CONCRETE RACK)

SECTION A

November 2010 Urban Drainage and Flood Control District VTC-4
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Vehicle Tracking Control (VTC) SM-4

VTC-3. VEHICLE TRACKING CONTROL W/ CONSTRUCTION MAT OR TURF REINFORCEMENT MAT (TRM)

12' MIN.

50' MIN.

1.8" MIN.

SPIKES OR STAKES

TRM END OVERLAP WITH SPIKES OR STAKES

CONSTRUCTION MAT END OVERLAP INTERLOCK WITH STRAP CONNECTORS

RESTRICT CONST. VEHICLE ACCESS TO SIDES OF MAT

OR AS REQUIRED TO ACCOMMODATE ANTICIPATED TRAFFIC (WIDTH CAN BE LESS IF CONST. VEHICLES ARE PHYSICALLY CONFINED ON BOTH SIDES)

20'

November 2010 Urban Drainage and Flood Control District VTC-5
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SM-4 Vehicle Tracking Control (VTC)

STABILIZED CONSTRUCTION ENTRANCE/EXIT INSTALLATION NOTES

- SEE PLAN VIEW FOR LOCATION OF CONSTRUCTION ENTRANCE(S)/EXIT(S). TYPE OF CONSTRUCTION ENTRANCE(S)/EXIT(S) (WITH/WITHOUT WHEEL WASH, CONSTRUCTION MAT OR TRM).
- CONSTRUCTION MAT OR TRM STABILIZED CONSTRUCTION ENTRANCES ARE ONLY TO BE USED ON SHORT DURATION PROJECTS (TYPICALLY RANGING FROM A WEEK TO A MONTH) WHERE THERE WILL BE LIMITED VEHICULAR ACCESS.
- A STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE LOCATED AT ALL ACCESS POINTS WHERE VEHICLES ACCESS THE CONSTRUCTION SITE FROM PAVED RIGHT-OF-WAYS.
- STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
- A NON-WOVEN GEOTEXTILE FABRIC SHALL BE PLACED UNDER THE STABILIZED CONSTRUCTION ENTRANCE/EXIT PRIOR TO THE PLACEMENT OF ROCK.
- UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.

STABILIZED CONSTRUCTION ENTRANCE/EXIT MAINTENANCE NOTES

- 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.
- FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
- WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
- ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY TO THE STABILIZED ENTRANCE/EXIT TO MAINTAIN A CONSISTENT DEPTH.
- SEDIMENT TRACKED ONTO PAVED ROADS IS TO BE REMOVED THROUGHOUT THE DAY AND AT THE END OF THE DAY BY SHOVELING OR SWEEPING. SEDIMENT MAY NOT BE WASHED DOWN STORM SEWER DRAINS.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM USDCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM CITY OF BROWNSVILLE, COLORADO, NOT AVAILABLE IN AUTOCAD)

November 2010 Urban Drainage and Flood Control District VTC-6
Urban Storm Drainage Criteria Manual Volume 3

NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B			
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)			
PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL			
SHEET TITLE: GRADING AND EROSION DETAILS			
DESIGNED BY: JCM	SCALE:	DATE ISSUED: JAN. 2021	
DRAWN BY: JCM	HH:		
CHECKED BY: JH	V:	SHEET NO. 14 OF 22 SHEETS	
DWG:			

Sediment Control Log (SCL)

SC-2

Description

A sediment control log is a linear roll made of natural materials such as straw, coconut fiber, or compost. The most common type of sediment control log has straw filling and is often referred to as a "straw wattle." All sediment control logs are used as a sediment barrier to intercept sheet flow runoff from disturbed areas.



Appropriate Uses

Sediment control logs can be used in the following applications to trap sediment:

- As perimeter control for stockpiles and the site.
- As part of inlet protection designs.
- As check dams in small drainage ditches. (Sediment control logs are not intended for use in channels with high flow velocities.)
- On disturbed slopes to shorten flow lengths (as an erosion control).
- As part of multi-layered perimeter control along a receiving water such as a stream, pond or wetland.



Photographs SCL-1 and SCL-2. Sediment control logs used as 1) a perimeter control around a soil stockpile; and, 2) as a "fishhook" perimeter control at the corner of a construction site.

Design and Installation

Sediment control logs should be installed along the contour to avoid concentrating flows. The maximum allowable tributary drainage area per 100 lineal feet of sediment control log, installed along the contour, is approximately 0.25 acres with a disturbed slope length of up to 150 feet and a tributary slope gradient no steeper than 3:1. Longer and steeper slopes require additional measures. This recommendation only applies to sediment control logs installed along the contour. When installed for other uses, such as perimeter control, it should be installed in a way that will not produce concentrated flows. For example, a "fishhook" installation may be appropriate to force runoff to pond and evaporate or infiltrate in multiple areas rather than concentrate and cause erosive conditions parallel to the BMP.

Sediment Control Log	
Erosion Control	Moderate
Sediment Control	Yes
Site/Material Management	No

SC-2 Sediment Control Log (SCL)

Although sediment control logs initially allow runoff to flow through the BMP, they can quickly become a barrier and should be installed as if they are impermeable.

Design details and notes for sediment control logs are provided in the following details. Sediment logs must be properly installed per the detail to prevent undercutting, bypassing and displacement. When installed on slopes, sediment control logs should be installed along the contours (i.e. perpendicular to flow).

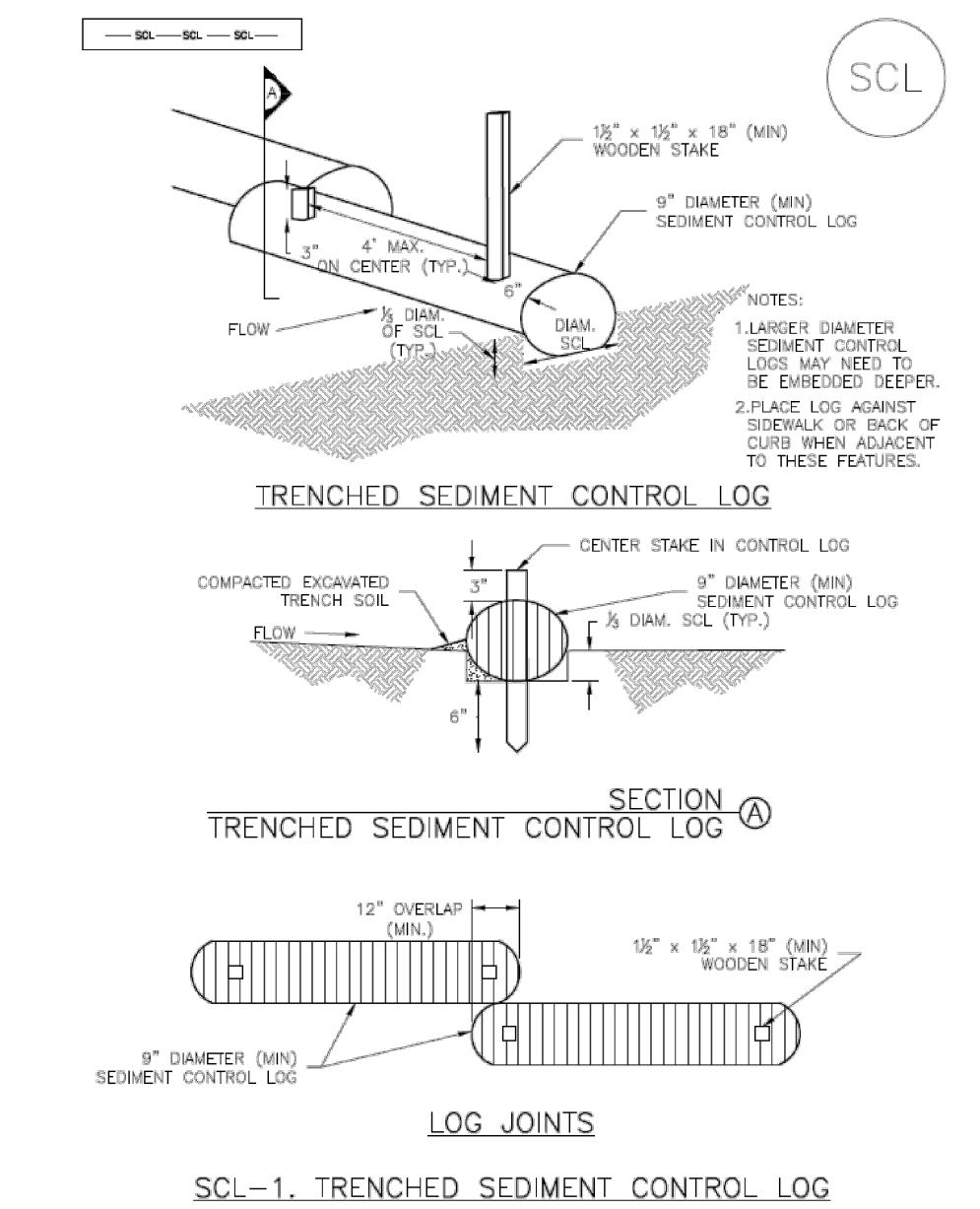
Improper installation can lead to poor performance. Be sure that sediment control logs are properly trenched (if lighter than 8 lb/foot), anchored and tightly jointed.

Maintenance and Removal

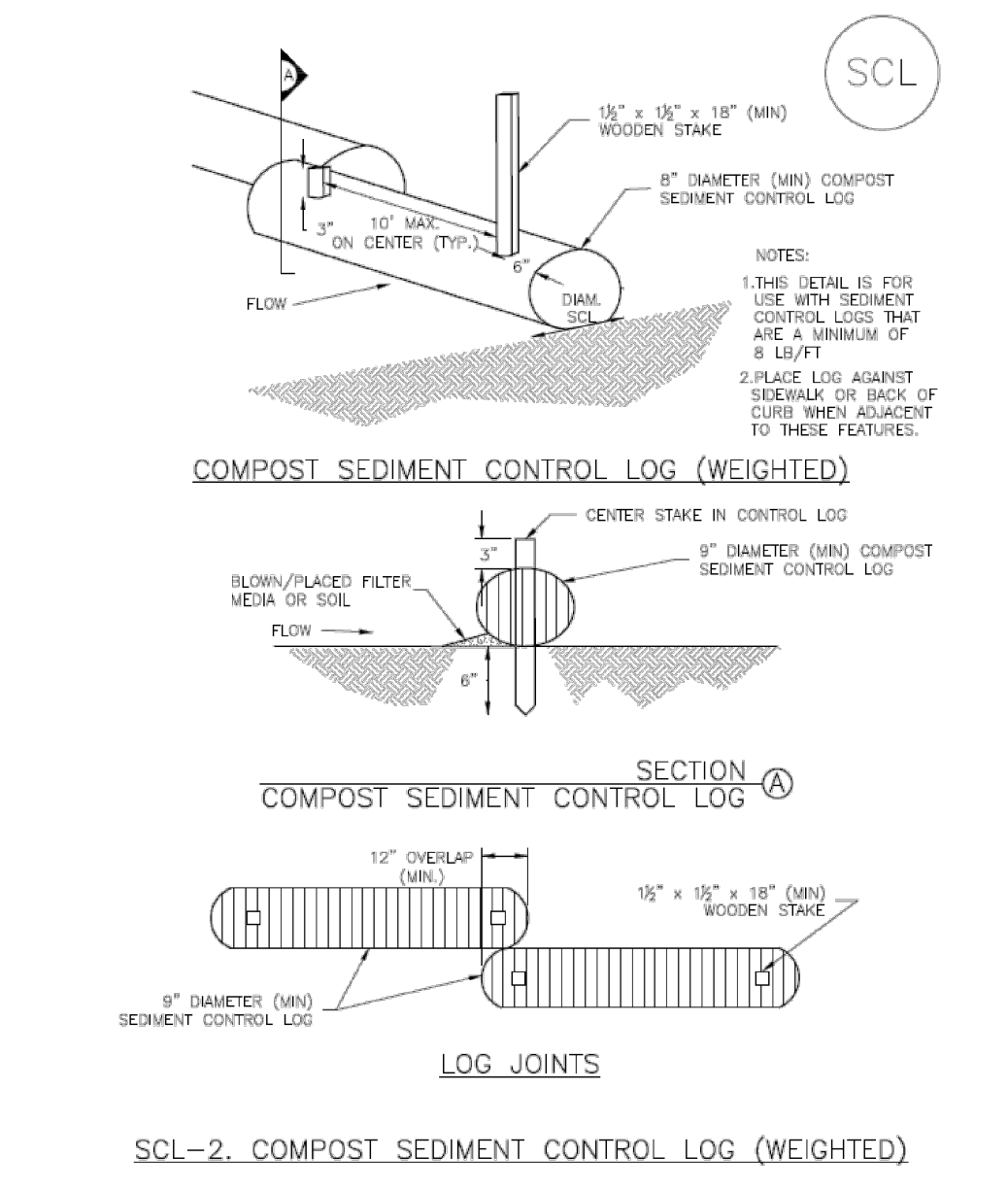
Be aware that sediment control logs will eventually degrade. Remove accumulated sediment before the logs may need to be seeded and mulched. Sediment control logs that are biodegradable may occasionally be left in place (e.g., when logs are used in conjunction with erosion control blankets as permanent slope breaks). However, removal of sediment control logs after final stabilization is typically appropriate when used in perimeter control, inlet protection and check dam applications. Compost from compost sediment control logs may be spread over the area and seeded as long as this does not cover newly established vegetation.

Once the upstream area is stabilized, remove and properly dispose of the logs. Areas disturbed beneath the logs may need to be seeded and mulched. Sediment control logs that are biodegradable may occasionally be left in place (e.g., when logs are used in conjunction with erosion control blankets as permanent slope breaks). However, removal of sediment control logs after final stabilization is typically appropriate when used in perimeter control, inlet protection and check dam applications. Compost from compost sediment control logs may be spread over the area and seeded as long as this does not cover newly established vegetation.

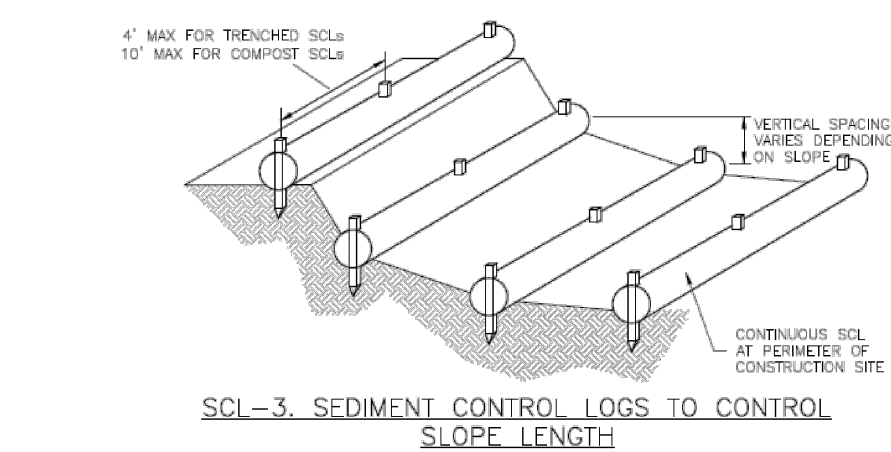
Sediment Control Log (SCL) SC-2



SC-2 Sediment Control Log (SCL)



Sediment Control Log (SCL) SC-2



SC-2 Sediment Control Log (SCL)

SEDIMENT CONTROL LOG INSTALLATION NOTES

- SEE PLAN VIEW FOR LOCATION AND LENGTH OF SEDIMENT CONTROL LOGS.
- SEDIMENT CONTROL LOGS THAT ACT AS A PERIMETER CONTROL SHALL BE INSTALLED PRIOR TO ANY UPGRADING LAND-DISTURBING ACTIVITIES.
- SEDIMENT CONTROL LOGS SHALL CONSIST OF STRAW, COMPOST, EXCELISOR OR COCONUT FIBER, AND SHALL BE FREE OF ANY NOXIOUS WEED SEEDS OR DEFECTS INCLUDING RIPS, HOLES AND OBVIOUS WEAR.
- SEDIMENT CONTROL LOGS MAY BE USED AS SMALL CHECK DAMS IN DITCHES AND SWALES. HOWEVER, THEY SHOULD NOT BE USED IN PERENNIAL STREAMS.
- IT IS RECOMMENDED THAT SEDIMENT CONTROL LOGS BE TRENCHED INTO THE GROUND TO A DEPTH OF APPROXIMATELY 1/2 OF THE DIAMETER OF THE LOG. IF TRENCHING TO THIS DEPTH IS NOT FEASIBLE AND/OR DESIRABLE, SHORT TERM INSTALLATION WITH DESIRE NOT TO DAMAGE LANDSCAPE) A LESSER TRENCHING DEPTH MAY BE ACCEPTABLE WITH MORE ROBUST STAKING. COMPOST LOGS THAT ARE 6 LB/FT DO NOT NEED TO BE TRENCHED.
- THE UPHILL SIDE OF THE SEDIMENT CONTROL LOG SHALL BE BACKFILLED WITH SOIL OR FILTER MATERIAL THAT IS FREE OF ROCKS AND DEBRIS. THE SOIL SHALL BE TIGHTLY COMPACTED INTO THE SHAPE OF A RIGHT TRIANGLE USING A SHOVEL OR WEIGHTED LAWN ROLLER OR BLOWN IN PLACE.
- FOLLOW MANUFACTURERS' GUIDANCE FOR STAKING. IF MANUFACTURERS' INSTRUCTIONS DO NOT SPECIFY SPACING, STAKES SHALL BE PLACED ON 4' CENTERS AND EMBEDDED A MINIMUM OF 6" INTO THE GROUND. 3" OF THE STAKE SHALL PROTRUDE FROM THE TOP OF THE LOG. STAKES THAT ARE BROKEN PRIOR TO INSTALLATION SHALL BE REPLACED. COMPOST LOGS SHOULD BE STAKED 10' ON CENTER.

SEDIMENT CONTROL LOG MAINTENANCE NOTES

- 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.
 - FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
 - WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
 - SEDIMENT ACCUMULATED UPSTREAM OF SEDIMENT CONTROL LOG SHALL BE REMOVED AS NEEDED TO MAINTAIN FUNCTIONALITY OF THE BMP. TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 1/2 OF THE HEIGHT OF THE SEDIMENT CONTROL LOG.
 - SEDIMENT CONTROL LOG SHALL BE REMOVED AT THE END OF CONSTRUCTION. COMPOST FROM COMPOST LOGS MAY BE LEFT IN PLACE AS LONG AS BASES REMOVED AND THE AREA SEEDS. IF DISTURBED AREAS EXIST AFTER REMOVAL, THEY SHALL BE COVERED WITH TOP SOIL, SEEDS AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.
- (DETAILS ADAPTED FROM TOWN OF PARKER, COLORADO, JEFFERSON COUNTY, COLORADO, DOUGLAS COUNTY, COLORADO, AND CITY OF AURORA, COLORADO, NOT SHOWN IN FIGURES)
- NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM USDC STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

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DWG:			

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Compost Blanket and Filter Berm (CB) EC-5

Description

A compost blanket is a layer of compost uniformly applied to the soil in disturbed areas to control erosion, facilitate revegetation, and retain sediment resulting from sheet-flow runoff.

A compost filter berm is a dike of compost or a compost product that is placed perpendicular to runoff to control erosion in disturbed areas and retain sediment. Compost berms can be placed at regular intervals to help reduce the formation of rill and gully erosion when a compost blanket is stabilizing a slope.

Appropriate Uses

Compost blankets can be used as an alternative to erosion control blankets and mulching to help stabilize disturbed areas where sheet flow conditions are present. Compost blankets should not be used in areas of concentrated flows. Compost provides an excellent source of nutrients for plant growth, and should be considered for use in areas that will be permanently vegetated.

Design and Installation

See Detail CB-1 for design details and notes.

Do not place compost in areas where it can easily be transported into drainage pathways or waterways. When using a compost blanket on a slope, berms should be installed periodically to reduce the potential for concentrated flow and rilling. Seeding should be completed before an area is composted or incorporated into the compost.

Compost quality is an important consideration when selecting compost blankets or berms. Representative compost quality factors include pH, salinity, moisture content, organic matter content, stability (maturity), and physical contaminants. The compost should meet all local, state, and federal quality requirements. Biosolids compost must meet the Standards for Class A biosolids outlined in 40 CFR Part 503. The U.S. Composting Council (USCC) certifies compost products under its Seal of Testing Assurance (STA) Program. Compost producers whose products have been certified through the STA Program provide customers with a standard product label that allows comparison between compost products. Only STA certified, Class I compost should be used.



Photograph CB-1. Application of a compost blanket to a disturbed area. Photo courtesy of Caltrans.

Compost Blankets and Berms	
Functions	
Erosion Control	Yes
Sediment Control	Moderate
Site/Material Management	No

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EC-5 Compost Blanket and Filter Berm (CB)

Maintenance and Removal

When rills or gullies develop in an area that has been composted, fill and cover the area with additional compost and install berms as necessary to help reduce erosion.

Weed control can be a maintenance challenge in areas using compost blankets. A weed control strategy may be necessary, including measures such as mechanical removal and spot application of targeted herbicides by licensed applicators.

For compost berms, accumulated sediments should be removed from behind the berm when the sediments reach approximately one third the height of the berm. Areas that have been washed away should be replaced. If the berm has experienced significant or repeated washouts, a compost berm may not be the appropriate BMP for this area.

Compost blankets and berms biodegrade and do not typically require removal following site stabilization.

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Compost Blanket and Filter Berm (CB) EC-5

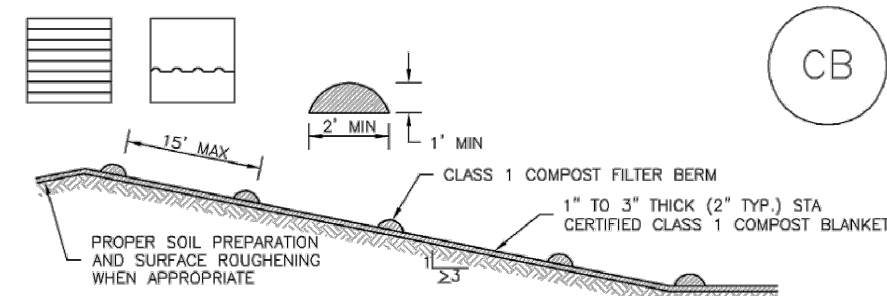


TABLE CB-1. CLASS 1 COMPOST	
PARAMETERS	CHARACTERISTIC
MINIMUM STABILITY INDICATOR	STABLE TO VERY STABLE
SOLUBLE SALTS	MAXIMUM 5 mmhos/cm
pH	6.0 - 8.0
AG INDEX	> 10
MATURITY INDICATOR EXPRESSED AS PERCENTAGE OF GERMINATION/VIGOR	80+/80+
MATURITY INDICATOR EXPRESSED AS AMMONIA N/ NITRATE N RATIO	< 4
MATURITY INDEX AS CARBON TO NITROGEN RATIO	20:1
TESTED FOR CLOSTRIDIA	YES/NEGATIVE RESULT
MOISTURE CONTENT	30-60%
ORGANIC MATTER CONTENT	25-45% OF DRY WEIGHT
PARTICLE SIZE DISTRIBUTION	3" (75mm) 100% PASSING
PRIMARY, SECONDARY NUTRIENTS, TRACE ELEMENTS	MUST BE REPORTED
TESTING AND TEST REPORT SUBMITTAL REQUIREMENTS	STA + CLOSTRIDIA
ORGANIC MATTER PER CUBIC YARD	MUST REPORT
CHEMICAL CONTAMINANTS	COMPLY WITH US EPA CLASS A STANDARD, 40 CFR 503.1 TABLES 1 & 3 UNLESS
MINIMUM MANUFACTURING/PRODUCTION REQUIREMENT	FULLY PERMITTED UNDER COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
RISK FACTOR RELATING TO PLANT GERMINATION AND HEALTH	LOW

CB-1. COMPOST BLANKET AND COMPOST FILTER BERM

November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 CB-3

EC-5 Compost Blanket and Filter Berm (CB)

COMPOST FILTER BERM AND COMPOST BLANKET INSTALLATION NOTES

- SEE PLAN VIEW FOR -LOCATION OF COMPOST FILTER BERM(S). -LENGTH OF COMPOST FILTER BERM(S).
- COMPOST BERMS AND BLANKETS MAY BE USED IN PLACE OF STRAW MULCH OR GEOTEXTILE FABRIC IN AREAS WHERE ACCESS TO LANDSCAPING IS DIFFICULT DUE TO LANDSCAPING OR OTHER OBJECTS OR IN AREAS WHERE A SMOOTH TURF GRASS FINISH IS DESIRED.
- FILTER BERMS SHALL RUN PARALLEL TO THE CONTOUR.
- FILTER BERMS SHALL BE A MINIMUM OF 1 FEET HIGH AND 2 FEET WIDE.
- FILTER BERMS SHALL BE APPLIED BY PNEUMATIC BLOWER OR BY HAND.
- FILTER BERMS SHALL ONLY BE UTILIZED IN AREAS WHERE SHEET FLOW CONDITIONS PREVAIL AND NOT IN AREAS OF CONCENTRATED FLOW.
- COMPOST BLANKETS SHALL BE APPLIED AT A DEPTH OF 1 -3 INCHES (TYPICALLY 2 INCHES). FOR AREAS WITH EXISTING VEGETATION THAT ARE TO BE SUPPLEMENTED BY COMPOST, A THIN 0.5-INCH LAYER MAY BE USED.
- SEEDING SHALL BE PERFORMED PRIOR TO THE APPLICATION OF COMPOST. ALTERNATIVELY, SEED MAY BE COMBINED WITH COMPOST AND BLOWN WITH THE PNEUMATIC BLOWER.
- WHEN TURF GRASS FINISH IS NOT DESIRED, SURFACE ROUGHENING ON SLOPES SHALL TAKE PLACE PRIOR TO COMPOST APPLICATION.
- COMPOST SHALL BE A CLASS 1 COMPOST AS DEFINED BY TABLE CB-1.

COMPOST FILTER BERM MAINTENANCE NOTES

- 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.
- FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
- WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
- COMPOST BERMS AND BLANKETS SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RILLING IN THE COMPOST SURFACE OCCURS.

(DETAILS ADAPTED FROM ANNEBORO COUNTY, COLORADO, NOT AVAILABLE IN AUTODOCS)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM LOFCO STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

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Rolled Erosion Control Products (RECP) EC-6

Description

Rolled Erosion Control Products (RECPs) include a variety of temporary or permanently installed manufactured products designed to control erosion and enhance vegetation establishment and survivability, particularly on slopes and in channels. For applications where natural vegetation alone will provide sufficient permanent erosion protection, temporary products such as netting, open weave textiles and a variety of erosion control blankets (ECBs) made of biodegradable natural materials (e.g., straw, coconut fiber) can be used.



Photograph RECP-1. Erosion control blankets protecting the slope from erosion and providing favorable conditions for revegetation.

For applications where natural vegetation alone will not be sustainable under expected flow conditions, permanent rolled erosion control products such as turf reinforcement mats (TRMs) can be used. In particular, turf reinforcement mats are designed for discharges that exert velocities and shear stresses that exceed the typical limits of mature natural vegetation.

Appropriate Uses

RECPs can be used to control erosion in conjunction with revegetation efforts, providing seedbed protection from wind and water erosion. These products are often used on disturbed areas on steep slopes, in areas with highly erosive soils, or as part of drainageway stabilization. In order to select the appropriate RECP for site conditions, it is important to have a general understanding of the general types of these products, their expected longevity, and general characteristics.

The Erosion Control Technology Council (ECTC 2005) characterizes rolled erosion control products according to these categories:

- Mulch control netting:** A planar woven natural fiber or extruded geosynthetic mesh used as a temporary degradable rolled erosion control product to anchor loose fiber mulches.
- Open weave textile:** A temporary degradable rolled erosion control product composed of processed natural or polymer yarns woven into a matrix, used to provide erosion control and facilitate vegetation establishment.
- Erosion control blanket (ECB):** A temporary degradable rolled erosion control product composed of processed natural or polymer fibers which are mechanically, structurally or chemically bound together to form a continuous matrix to provide erosion control and facilitate vegetation establishment. ECBS can be further differentiated into rapidly degrading single-net and double-net types or slowly degrading types.

Rolled Erosion Control Products	
Functions	
Erosion Control	Yes
Sediment Control	No
Site/Material Management	No

November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 RECP-1

EC-6 Rolled Erosion Control Products (RECP)

- Turf Reinforcement Mat (TRM):** A rolled erosion control product composed of non-degradable synthetic fibers, filaments, nets, wire mesh, and/or other elements, processed into a permanent, three-dimensional matrix of sufficient thickness. TRMs, which may be supplemented with degradable components, are designed to impart immediate erosion protection, enhance vegetation establishment and provide long-term functionality by permanently reinforcing vegetation during and after maturation. Note: TRMs are typically used in hydraulic applications, such as high flow ditches and channels, steep slopes, stream banks, and shorelines, where erosive forces may exceed the limits of natural, unreinforced vegetation or in areas where limited vegetation establishment is anticipated.

Tables RECP-1 and RECP-2 provide guidelines for selecting rolled erosion control products appropriate to site conditions and desired longevity. Table RECP-1 is for conditions where natural vegetation alone will provide permanent erosion control, whereas Table RECP-2 is for conditions where vegetation alone will not be adequately stable to provide long-term erosion protection due to flow or other conditions.

Tables RECP-1 and RECP-2 provide guidelines for selecting rolled erosion control products appropriate to site conditions and desired longevity. Table RECP-1 is for conditions where natural vegetation alone will provide permanent erosion control, whereas Table RECP-2 is for conditions where vegetation alone will not be adequately stable to provide long-term erosion protection due to flow or other conditions.

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Rolled Erosion Control Products (RECP) EC-6

Table RECP-1. ECTC Standard Specification for Temporary Rolled Erosion Control Products (Adapted from Erosion Control Technology Council 2005)

Product Description	Slope Applications*		Channel Applications* Max. Shear Stress ^{1,2}	Minimum Tensile Strength ³	Expected Longevity
	Maximum Gradient	C Factor ^{3,4}			
Mulch Control Nets	5:1 (H:V)	≤0.10 @ 5:1	0.25 lbs/ft ² (12 Pa)	5 lbs/ft (0.073 kN/m)	Up to 12 months
Netless Rolled Erosion Control Blankets	4:1 (H:V)	≤0.10 @ 4:1	0.5 lbs/ft ² (24 Pa)	5 lbs/ft (0.073 kN/m)	
Single-net Erosion Control Blankets & Open Weave Textiles	3:1 (H:V)	≤0.15 @ 3:1	1.5 lbs/ft ² (72 Pa)	50 lbs/ft (0.73 kN/m)	
Double-net Erosion Control Blankets	2:1 (H:V)	≤0.20 @ 2:1	1.75 lbs/ft ² (84 Pa)	75 lbs/ft (1.09 kN/m)	24 months
Mulch Control Nets	5:1 (H:V)	≤0.10 @ 5:1	0.25 lbs/ft ² (12 Pa)	25 lbs/ft (0.36 kN/m)	
Erosion Control Blankets & Open Weave Textiles (slowly degrading)	1.5:1 (H:V)	≤0.25 @ 1.5:1	2.00 lbs/ft ² (96 Pa)	100 lbs/ft (1.45 kN/m)	36 months
Erosion Control Blankets & Open Weave Textiles	1:1 (H:V)	≤0.25 @ 1:1	2.25 lbs/ft ² (108 Pa)	125 lbs/ft (1.82 kN/m)	

* C Factor and shear stress for mulch control nettings must be obtained with netting used in conjunction with pre-applied mulch material. (See Section 5.3 of Chapter 7 Construction BMPs for more information on the C Factor.)

¹ Minimum Average Roll Values, Machine direction using ECTC Mod. ASTM D 5035.

² C Factor calculated as ratio of soil loss from RECP protected slope (tested at specified or greater gradient, H:V) to ratio of soil loss from unprotected (control) plot in large-scale testing.

³ Required minimum shear stress RECP (unvegetated) can sustain without physical damage or excess erosion (> 12.7 mm (0.5 in) soil loss) during a 30-minute flow event in large-scale testing.

⁴ The permissible shear stress levels established for each performance category are based on historical experience with products characterized by Manning's roughness coefficients in the range of 0.01 - 0.05.

⁵ Acceptable large-scale test methods may include ASTM D 6459, or other independent testing deemed acceptable by the engineer.

⁶ Per the engineer's discretion. Recommended acceptable large-scale testing protocol may include ASTM D 6460, or other independent testing deemed acceptable by the engineer.

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NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B			
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)			
PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL			
SHEET TITLE: GRADING AND EROSION DETAILS			
DESIGNED BY: JCM	SCALE:	DATE ISSUED: JAN. 2021	
DRAWN BY: JCM	HH:		
CHECKED BY: JH	V:	SHEET NO. 16	OF 22 SHEETS
DWG:			

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EC-6 Rolled Erosion Control Products (RECP)

Table RECP-2. ECTC Standard Specification for Permanent¹ Rolled Erosion Control Products
(Adapted from: Erosion Control Technology Council 2005)

Product Type	Slope Applications	Channel Applications	Minimum Tensile Strength ^{2,3}
TRMs with a minimum thickness of 0.25 inches (6.35 mm) per ASTM D 6525 and UV stability of 80% per ASTM D 4355 (500 hours exposure).	Maximum Gradient	Maximum Shear Stress ^{4,5}	125 lbs/ft (1.82 kN/m)
	0.5:1 (H:V)	6.0 lbs/ft ² (288 Pa)	150 lbs/ft (2.19 kN/m)
	0.5:1 (H:V)	10.0 lbs/ft ² (480 Pa)	175 lbs/ft (2.55 kN/m)

¹ For TRMs containing degradable components, all property values must be obtained on the non-degradable portion of the matting alone.
² Minimum Average Roll Values, machine direction only for tensile strength determination using ASTM D 6818 (Supersedes Mod. ASTM D 5035 for RECPs)
³ Field conditions with high loading and/or high survivability requirements may warrant the use of a TRM with a tensile strength of 44 kN/m (3,000 lb/ft) or greater.
⁴ Required minimum shear stress TRM (fully vegetated) can sustain without physical damage or excess erosion (> 12.7 mm (0.5 in.) soil loss) during a 30-minute flow event in large scale testing.
⁵ Acceptable large-scale testing protocols may include ASTM D 6460, or other independent testing deemed acceptable by the engineer.

Design and Installation

RECPs should be installed according to manufacturer's specifications and guidelines. Regardless of the type of product used, it is important to ensure no gaps or voids exist under the material and that all contact of the material is secured using stakes and trenching. Continuous contact between the product and the soil is necessary to avoid failure. Never use metal stakes to secure temporary erosion control products. Often wooden stakes are used to anchor RECPs; however, wood stakes may present installation and maintenance challenges and generally take a long time to biodegrade. Some local jurisdictions have had favorable experiences using biodegradable stakes.

This BMP Fact Sheet provides design details for several commonly used ECB applications, including:

- ECB-1 Pipe Outlet to Drainageway
- ECB-2 Small Ditch or Drainageway
- ECB-3 Outside of Drainageway

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EC-6 Rolled Erosion Control Products (RECP) EC-6

Staking patterns are also provided in the design details according to these factors:

- ECB type
- Slope or channel type

For other types of RECPs including TRMs, these design details are intended to serve as general guidelines for design and installation; however, engineers should adhere to manufacturer's installation recommendations.

Maintenance and Removal

Inspection of erosion control blankets and other RECPs includes:

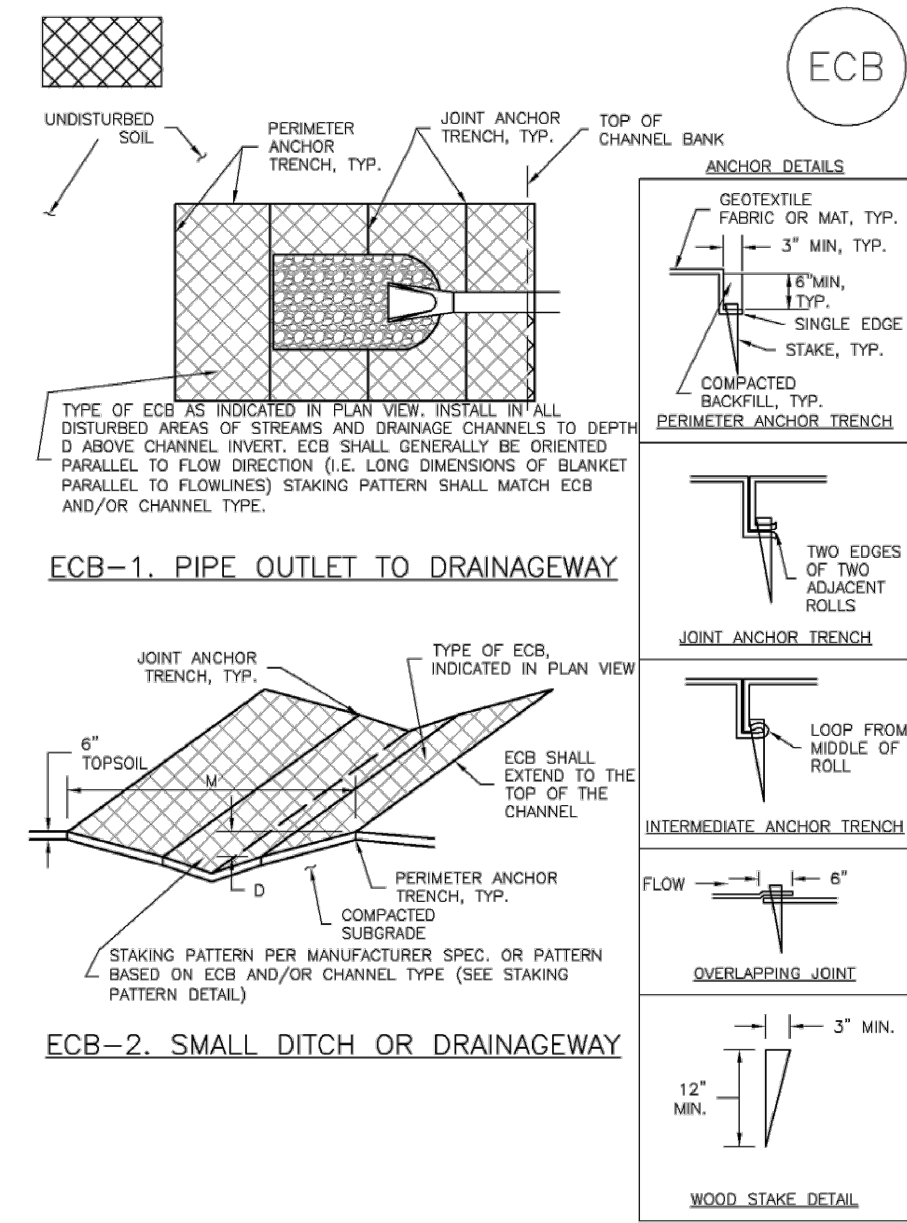
- Check for general signs of erosion, including voids beneath the mat. If voids are apparent, fill the void with suitable soil and replace the erosion control blanket, following the appropriate staking pattern.
- Check for damaged or loose stakes and secure loose portions of the blanket.

Erosion control blankets and other RECPs that are biodegradable typically do not need to be removed after construction. If they must be removed, then an alternate soil stabilization method should be installed promptly following removal.

Turf reinforcement mats, although generally resistant to biodegradation, are typically left in place as a dense vegetated cover grows in through the mat matrix. The turf reinforcement mat provides long-term stability and helps the established vegetation resist erosive forces.

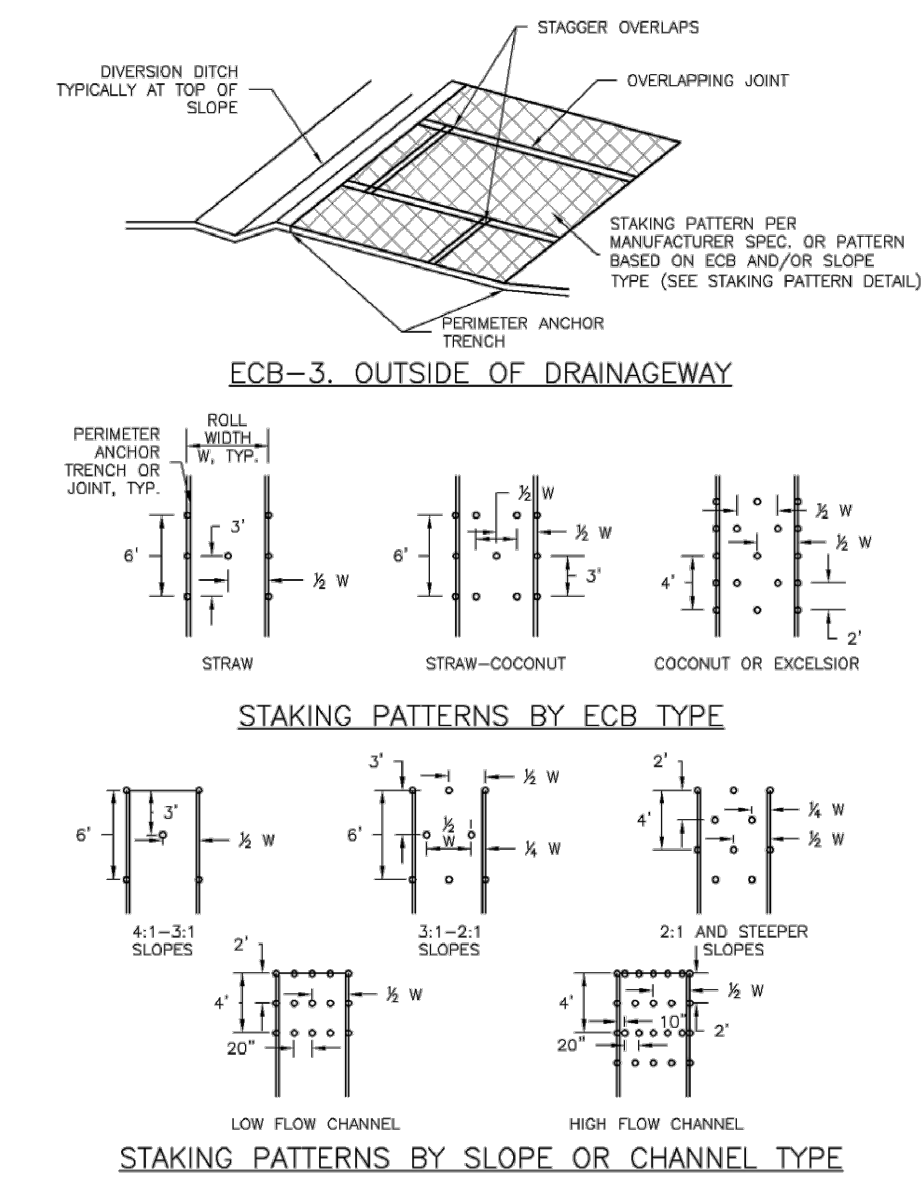
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EC-6 Rolled Erosion Control Products (RECP)



RECP-6 Urban Drainage and Flood Control District
Urban Storm Drainage Criteria Manual Volume 3 November 2010

EC-6 Rolled Erosion Control Products (RECP) EC-6



RECP-7 Urban Drainage and Flood Control District
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EC-6 Rolled Erosion Control Products (RECP)

EROSION CONTROL BLANKET INSTALLATION NOTES

- 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
- 100% NATURAL AND BIODEGRADABLE MATERIALS ARE PREFERRED FOR RECP, ALTHOUGH SOME JURISDICTIONS MAY ALLOW OTHER MATERIALS IN SOME APPLICATIONS.
- IN AREAS WHERE ECBs ARE SHOWN ON THE PLANS, THE PERMITEE SHALL PLACE TOPSOIL AND PERFORM FINAL GRADING, SURFACE PREPARATION AND SEEDING AND MULCHING. SUBGRADE SHALL BE SMOOTH AND MOST PRIOR TO ECB INSTALLATION AND THE ECB SHALL BE IN FULL CONTACT WITH SUBGRADE. NO GAPS OR Voids SHALL EXIST UNDER THE BLANKET.
- PERMETER ANCHOR TRENCH SHALL BE USED ALONG THE OUTSIDE PERMETER OF ALL BLANKET AREAS.
- 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.
- INTERMEDIATE ANCHOR TRENCH SHALL BE USED TO SPACING OF ONE-HALF ROLL LENGTH FOR COCONUT AND EXCELSIOR ECBs.
- OVERLAPPING JOINT DETAIL SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER FOR ECBs ON SLOPES.
- MATERIAL SPECIFICATIONS OF ECBs SHALL CONFORM TO TABLE ECB-1.
- ANY AREAS OF SEEDING AND MULCHING DISTURBED IN THE PROCESS OF INSTALLING ECBs SHALL BE RESEEDED AND MULCHED.
- DETAILS ON DESIGN PLANS FOR MAJOR DRAINAGEWAY STABILIZATION WILL GOVERN IF DIFFERENT FROM THOSE SHOWN HERE.

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 TO STAKE AND ANCHOR CHANNELS.
 **ALTERNATE METHOD MAY BE ACCEPTABLE IN SOME JURISDICTIONS.

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EC-6 Rolled Erosion Control Products (RECP) EC-6

EROSION CONTROL BLANKET MAINTENANCE NOTES

- 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.
- FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
- WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
- ECBs SHALL BE LEFT IN PLACE TO EVENTUALLY BIODEGRADE, UNLESS REQUESTED TO BE REMOVED BY THE LOCAL JURISDICTION.
- ANY ECB PULLED OUT, TORN, OR OTHERWISE DAMAGED SHALL BE REPAIRED OR REINSTALLED. ANY SUBGRADE AREAS BELOW THE GEOTEXTILE THAT HAVE ERODED TO CRATERED Voids UNDER THE BLANKET, OR THAT REMAIN DEVOID OF GRASS SHALL BE REPAIRED, RESEEDED AND MULCHED AND THE ECB REINSTALLED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM USFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO AND TOWN OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD)

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1/18/2021

El Paso County, CO Drainage Criteria Manual

RECOMMENDED ANNUAL GRASSES				
SPECIES (COMMON NAME)	GROWTH SEASON	SEEDING DATE	FOURDS OR PURE LIVE SEED (PLB) (PLB/ACRE)	PLANTING DEPTH (INCHES)
1. OATS	COOL	MARCH 15 - APRIL 30	30-60	1-2
2. SPRING WHEAT	COOL	MARCH 15 - APRIL 30	25-35	1-2
3. SPRING BARLEY	COOL	MARCH 15 - APRIL 30	25-35	1-2
4. ANNUAL RYEGRASS	COOL	MARCH 15 - JUNE 30	10-15	1/2
5. MALLETT	WARM	MAY 15 - JULY 15	5-10	10-3/4
6. BROMUS	WARM	MAY 15 - JULY 15	5-10	10-3/4
7. SORGHUM	WARM	MAY 15 - JULY 15	5-10	10-3/4
8. WINTER WHEAT	COOL	SEPTEMBER 1 - 30	20-30	1-2
9. WINTER BARLEY	COOL	SEPTEMBER 1 - 30	20-30	1-2
10. WINTER RYE	COOL	SEPTEMBER 1 - 30	20-30	1-2
11. TRITICALE	COOL	SEPTEMBER 1 - 30	20-40	1-2

THIS TABLE WAS TAKEN FROM USFCD FOR RECOMMENDED ANNUAL GRASSES FOR THE DOWNEY METROPOLITAN AREA. THIS TABLE MAY BE USED UNLESS A SITE-SPECIFIC SEED MIX IS REQUESTED AND APPROVED.

TABLE TS-1

TEMPORARY SEEDING NOTES

- | | |
|--|---|
| <p>INSTALLATION REQUIREMENTS</p> <ol style="list-style-type: none"> DISTURBED AREAS ARE TO BE SEEDDED WITHIN 21 DAYS AFTER CONSTRUCTION ACTIVITY OR GRADING ENDS IF SEASON ALLOWS. IF NECESSARY, SOIL IS TO BE CONDITIONED FOR PLANT GROWTH BY APPLYING TOPSOIL, FERTILIZER, OR LIMING. SOIL IS TO BE FILLED IMMEDIATELY PRIOR TO APPLYING SEEDS. COMPACT SOILS ESPECIALLY NEED TO BE LOOSENED. SEEDING DEPTH IS TO BE 4 INCHES FOR SLOPES FLATTER THAN 2:1, AND 1 INCH FOR SLOPES STEEPER THAN 2:1. ANNUAL GRASSES LISTED IN TABLE TS-1 ARE TO BE USED FOR TEMPORARY SEEDING. SEED MIXES ARE NOT TO CONTAIN ANY NOXIOUS WEED SEEDS INCLUDING RUSSIAN OR CANADIAN THISTLE, HAWTHORN, PURSH, DOGWOOD, BURNING BUSH, BRANIFFEL, JOHNSON GRASS, AND LARK SPURGE. TABLE TS-1 ALSO PROVIDES REQUIREMENTS FOR SEEDING RATES, SEEDING DATES, AND PLANTING DEPTHS FOR THE APPROVED TYPES OF ANNUAL GRASSES. SEEDING IS TO BE APPLIED USING MECHANICAL TYPE DRILLS EXCEPT WHERE SLOPES ARE STEEP OR ACCESS IS LIMITED THEN HYDRAULIC SEEDING MAY BE USED. ALL SEEDDED AREAS ARE TO BE MULCHED (SEE FACTSHEET ON MULCHING). IF HYDRAULIC SEEDING IS USED THEN HYDRAULIC MULCHING SHALL BE DONE SEPARATELY TO AVOID SEEDS BECOMING ENCAPSULATED IN THE MULCH. | <p>MAINTENANCE REQUIREMENTS</p> <ol style="list-style-type: none"> REGULAR INSPECTIONS ARE TO BE MADE OF ALL SEEDDED AREAS TO ENSURE GROWTH. AREAS WHERE GROWTH IS NOT OCCURRING QUICKLY OR THE MULCH HAS BEEN REMOVED SHALL BE RE-SEEDDED AS SOON AS POSSIBLE AND RE-MULCHED IF NEEDED. SEEDDED AREAS ARE NOT TO BE DRIVEN OVER WITH CONSTRUCTION EQUIPMENT OR VEHICLES. |
|--|---|

City of Colorado Springs
Stormwater Quality
Figure TS-1
Temporary Seeding
Construction Detail and Maintenance Requirements

Temporary Swale

6/1/2026

NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT:	CLEAR VIEW INDUSTRIAL PARK FILING 2B		
BENCHMARK:	Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)		
PROJECT TITLE:	GRADING, WATER QUALITY POND AND EROSION CONTROL		
SHEET TITLE:	GRADING AND EROSION DETAILS		
DESIGNED BY:	JCM	SCALE:	DATE ISSUED: JAN. 2021
DRAWN BY:	JCM	HT:	
CHECKED BY:	JH	V:	SHEET NO. 17 OF 22 SHEETS
DWG:			

Concrete Washout Area (CWA) MM-1

Description

Concrete waste management involves designating and properly managing a specific area of the construction site as a concrete washout area. A concrete washout area can be created using one of several approaches designed to receive wash water from washing of tools and concrete mixer chutes, liquid concrete waste from dump trucks, mobile batch mixers, or pump trucks. Three basic approaches are available: excavation of a pit in the ground, use of an above ground storage area, or use of prefabricated haul-away concrete washout containers.



Photograph CWA-1. Example of concrete washout area. Note gravel tracking pad for access and sign.

Appropriate Uses

Concrete washout areas must be designated on all sites that will generate concrete wash water or liquid concrete waste from onsite concrete mixing or concrete delivery.

Because pH is a pollutant of concern for washout activities, when unlined pits are used for concrete washout, the soil must have adequate buffering capacity to result in protection of state groundwater standards; otherwise, a liner/containment must be used. The following management practices are recommended to prevent an impact from unlined pits to groundwater:

- The use of the washout site should be temporary (less than 1 year), and
- The washout site should be not be located in an area where shallow groundwater may be present, such as near natural drainages, springs, or wetlands.

Design and Installation

Concrete washout activities must be conducted in a manner that does not contribute pollutants to surface waters or stormwater runoff. Concrete washout areas may be lined or unlined excavated pits in the ground, commercially manufactured prefabricated washout containers, or aboveground holding areas constructed of berms, sandbags or straw bales with a plastic liner.

Although unlined washout areas may be used, lined pits may be required to protect groundwater under certain conditions.

Do not locate an unlined washout area within 400 feet of any natural drainage pathway or waterbody or within 1,000 feet of any wells or drinking water sources. Even for lined concrete washouts, it is advisable to locate the facility away from waterbodies and drainage paths. If site constraints make these

Concrete Washout Area	
Functions	
Erosion Control	No
Sediment Control	No
Site/Material Management	Yes

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MM-1 Concrete Washout Area (CWA)

setbacks infeasible or if highly permeable soils exist in the area, then the pit must be installed with an impermeable liner (16 mil minimum thickness) or surface storage alternatives using prefabricated concrete washout devices or a lined aboveground storage area should be used.

Design details with notes are provided in Detail CWA-1 for pits and CWA-2 for aboveground storage areas. Pre-fabricated concrete washout container information can be obtained from vendors.

Maintenance and Removal

A key consideration for concrete washout areas is to ensure that adequate signage is in place identifying the location of the washout area. Part of inspecting and maintaining washout areas is ensuring that adequate signage is provided and in good repair and that the washout area is being used, as opposed to washout in non-designated areas of the site.

Remove concrete waste in the washout area, as needed to maintain BMP function (typically when filled to about two-thirds of its capacity). Collect concrete waste and deliver offsite to a designated disposal location.

Upon termination of use of the washout site, accumulated solid waste, including concrete waste and any contaminated soils, must be removed from the site to prevent on-site disposal of solid waste. If the wash water is allowed to evaporate and the concrete hardens, it may be recycled.



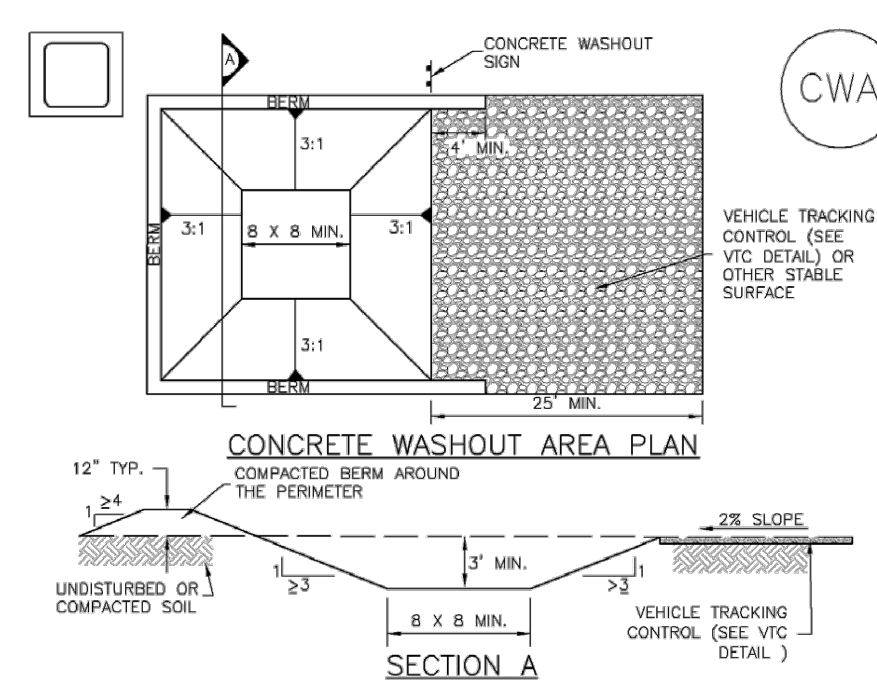
Photograph CWA-2. Prefabricated concrete washout. Photo courtesy of CDOT.



Photograph CWA-3. Earthen concrete washout. Photo courtesy of CDOT.

CWA-2 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 November 2010

Concrete Washout Area (CWA) MM-1



CWA-1. CONCRETE WASHOUT AREA

- CWA INSTALLATION NOTES**
- SEE PLAN VIEW FOR:
 - CWA INSTALLATION LOCATION.
 - DO NOT LOCATE AN UNLINED CWA WITHIN 400' OF ANY NATURAL DRAINAGE PATHWAY OR WATERBODY. DO NOT LOCATE WITHIN 1,000' OF ANY WELLS OR DRINKING WATER SOURCES. IF SITE CONSTRAINTS MAKE THIS INFEASIBLE, OR IF HIGHLY PERMEABLE SOILS EXIST ON SITE, THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (16 MIL MIN. THICKNESS) OR SURFACE STORAGE ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE GROUND STORAGE ARE SHOULD BE USED.
 - THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.
 - CWA SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 8" BY 8" SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER. THE PIT SHALL BE AT LEAST 3' DEEP.
 - BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE MINIMUM HEIGHT OF 1'.
 - VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA.
 - SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE AT THE CWA AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP TRUCKS.
 - USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

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MM-1 Concrete Washout Area (CWA)

CWA MAINTENANCE NOTES

- 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.
- FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
- WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
- THE CWA SHALL BE REPAIRED, CLEANED, OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE. CONCRETE MATERIALS, ACCUMULATED IN PIT, SHALL BE REMOVED ONCE THE MATERIALS HAVE REACHED A DEPTH OF 2'.
- CONCRETE WASHOUT WATER, WASTED PIECES OF CONCRETE AND ALL OTHER DEBRIS IN THE SUBSURFACE PIT SHALL BE TRANSPORTED FROM THE JOB SITE IN A WATER-TIGHT CONTAINER AND DISPOSED OF PROPERLY.
- THE CWA SHALL REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.
- WHEN THE CWA IS REMOVED, COVER THE DISTURBED AREA WITH TOP SOIL, SEED AND MULCH OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAIL ADAPTED FROM DOUGLAS COUNTY, COLORADO AND THE CITY OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD).
NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM USDC STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

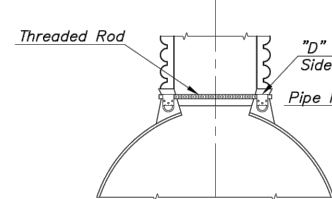
CWA-4 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 November 2010

Dis.	Gauge	Weight	* A	* H	* L	* W	Slope	Overall Width
6"	18	10	4	3	8	12	2	20"
8"	18	14	5	3/4	4	14 1/2	18	2 1/4 27 1/2"
10"	18	17	7	5/8	6	14 1/2	20	2 1/2 35 1/4"
12"	18	20	7	6	21	24	2 1/2	38"
15"	18	33	8	6	26	30	2 1/2	46"
18"	18	42	8	6	31	36	2 1/2	52"
21"	18	49	9	6	36	42	2 1/2	60"
24"	18	65	10	6	41	48	2 1/2	68"
30"	14	123	12	8	51	60	2 1/2	84"
36"	14	184	14	9	60	72	2 1/2	100"
42"	12	320	16	11	69	84	2 1/2	116"
48"	12	375	18	12	78	90	2 1/4	126"
54"	12	440	18	12	84	102	2 1/4	138"
60"	12/10	610	18	12	87	114	2	150"

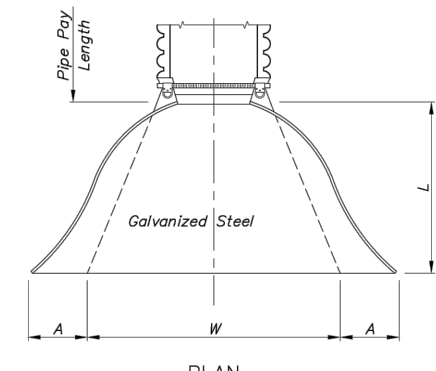
The plate extensions where specified, to be punched to match holes in across (p. 3/8" bolts to be furnished. The length of toe plate to be as follows: W = 10" for 12" to 36" diameter pipes inclusive. W = 20" for 36" to 60" diameter pipes inclusive.

Multiple panel end sections shall have lap seams which are to be lightly jointed by bolts. Corner plate, and toe plate to be same gauge as end section.

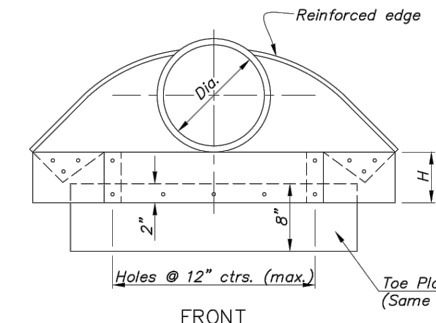
* - Dimensions in Inches Plus or Minus Standard Shop Tolerance.



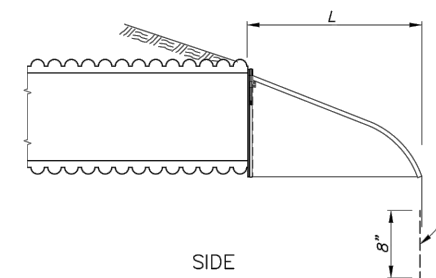
TYPE 2 CONNECTIONS (12" & Larger)



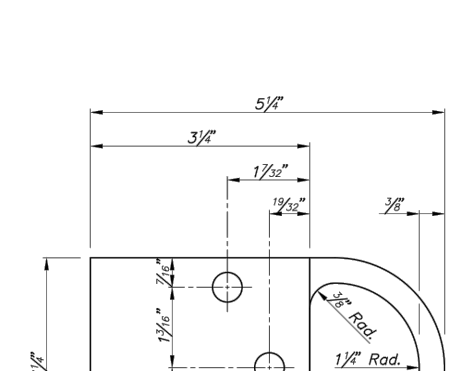
PLAN



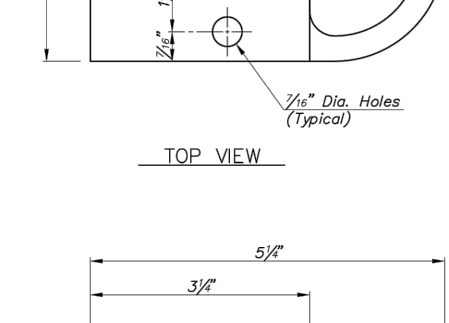
FRONT



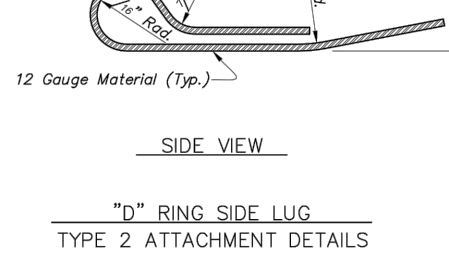
SIDE



TOP VIEW



SIDE VIEW

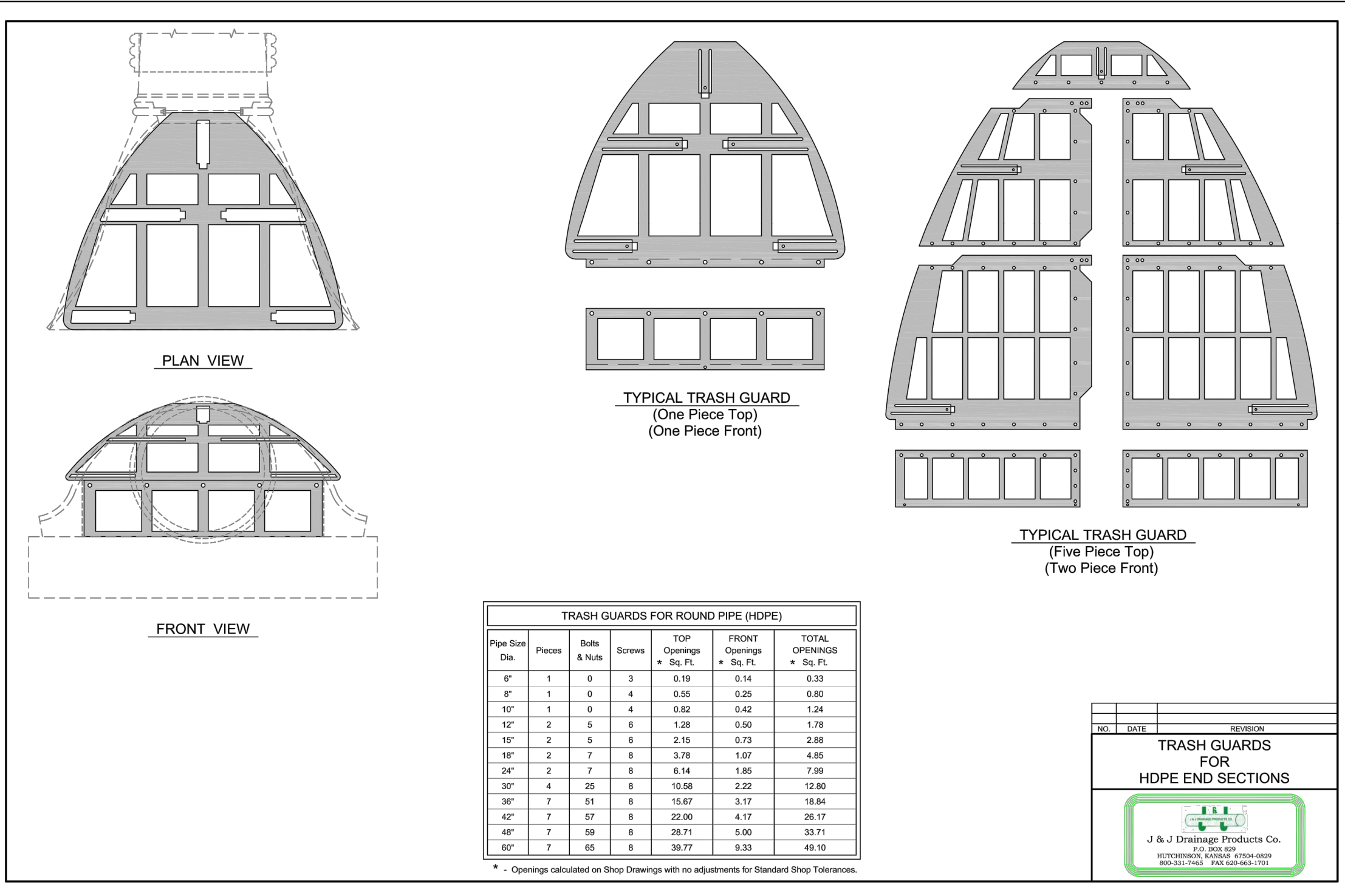


TOP RING SIDE LUG TYPE 2 ATTACHMENT DETAILS

Dis.	Weight	Top Ring Side Lug
6"	10	1.2
8"	14	1.6
10"	17	2.0
12"	20	2.4
15"	33	4.0
18"	42	5.0
21"	49	6.0
24"	65	8.0
30"	123	16.0
36"	184	24.0
42"	320	40.0
48"	375	48.0
54"	440	56.0
60"	610	76.0

STANDARD END SECTION FOR HDPE PIPES

J & J DRAINAGE PRODUCTS CO. Hutchinson, Kansas 1-800-551-7466 JJDrainage.com



Pipe Size Dia.	Plates	Bolts & Nuts	Screws	TOP OPENINGS # Sq. Ft.	FRONT OPENINGS # Sq. Ft.	TOTAL OPENINGS # Sq. Ft.
6"	1	0	3	0.19	0.14	0.33
8"	1	0	4	0.35	0.25	0.60
10"	1	0	4	0.52	0.42	0.94
12"	2	5	6	1.28	0.80	1.78
15"	2	5	6	2.15	0.73	2.88
18"	2	7	8	3.18	1.67	4.85
24"	2	7	8	6.14	1.85	7.99
30"	4	25	8	10.58	2.22	12.80
36"	7	31	8	15.67	3.17	18.84
42"	7	37	8	22.00	4.17	26.17
48"	7	39	8	28.71	5.00	33.71
60"	7	65	8	38.77	9.33	48.10

* - Openings calculated on Shop Drawings with no adjustments for Standard Shop Tolerances.

Dis.	Weight	Top Ring Side Lug
6"	10	1.2
8"	14	1.6
10"	17	2.0
12"	20	2.4
15"	33	4.0
18"	42	5.0
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J & J DRAINAGE PRODUCTS CO. HUTCHINSON, KANSAS 1-800-551-7466 JJDrainage.com

NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B			
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)			
PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL			
SHEET TITLE: GRADING AND EROSION DETAILS			
DESIGNED BY: JCM	SCALE:	DATE ISSUED: JAN. 2021	
DRAWN BY: JCM	JH:		
CHECKED BY: JH	V:	SHEET NO. 18 OF 22 SHEETS	
DWG:			

Sediment Basin (SB)

SC-7

Description

A sediment basin is a temporary pond built on a construction site to capture eroded or disturbed soil transported in storm runoff prior to discharge from the site. Sediment basins are designed to capture site runoff and slowly release it to allow time for settling of sediment prior to discharge. Sediment basins are often constructed in locations that will later be modified to serve as post-construction stormwater basins.



Photograph SB-1. Sediment basin at the toe of a slope. Photo courtesy of WVE.

Appropriate Uses

Most large construction sites (typically greater than 2 acres) will require one or more sediment basins for effective management of construction site runoff. On linear construction projects, sediment basins may be impractical; instead, sediment traps or other combinations of BMPs may be more appropriate.

Sediment basins should not be used as stand-alone sediment controls. Erosion and other sediment controls should also be implemented upstream.

When feasible, the sediment basin should be installed in the same location where a permanent post-construction detention pond will be located.

Design and Installation

The design procedure for a sediment basin includes these steps:

- Basin Storage Volume:** Provide a storage volume of at least 3,600 cubic feet per acre of drainage area. To the extent practical, undisturbed and/or off-site areas should be diverted around sediment basins to prevent "clean" runoff from mixing with runoff from disturbed areas. For undisturbed areas (both on-site and off-site) that cannot be diverted around the sediment basin, provide a minimum of 500 ft³/acre of storage for undeveloped (but stable) off-site areas in addition to the 3,600 ft³/acre for disturbed areas. For stable, developed areas that cannot be diverted around the sediment basin, storage volume requirements are summarized in Table SB-1.

- Basin Geometry:** Design basin with a minimum length-to-width ratio of 2:1 (L:W). If this cannot be achieved because of site space constraints, buffering may be required to extend the effective distance between the inflow point(s) and the outlet to minimize short-circuiting.

Sediment Basins	
Functions	
Erosion Control	No
Sediment Control	Yes
Site/Material Management	No

- Dam Embankment:** It is recommended that embankment slopes be 4:1 (H:V) or flatter and no steeper than 3:1 (H:V) in any location.

SC-7 Sediment Basin (SB)

- Inflow Structure:** For concentrated flow entering the basin, provide energy dissipation at the point of inflow.

Table SB-1. Additional Volume Requirements for Undisturbed and Developed Tributary Areas Draining through Sediment Basins

Imperviousness (%)	Additional Storage Volume (ft ³) Per Acre of Tributary Area
Undeveloped	500
10	800
20	1230
30	1600
40	2030
50	2470
60	2980
70	3560
80	4360
90	5300
100	6460

- Outlet Works:** The outlet pipe shall extend through the embankment at a minimum slope of 0.5 percent. Outlet works can be designed using one of the following approaches:

- Riser Pipe (Simplified Detail):** Detail SB-1 provides a simplified design for basins treating no more than 15 acres.
- Orifice Plate or Riser Pipe:** Follow the design criteria for Full Spectrum Detention outlets in the EDB Fact Sheet provided in Chapter 4 of this manual for sizing of outlet perforations with an emptying time of approximately 72 hours. In lieu of the trash rack, pack uniformly sized 1/4- to 2-inch gravel in front of the plate or surrounding the riser pipe. This gravel will need to be cleaned out frequently during the construction period as sediment accumulates within it. The gravel pack will need to be removed and disposed of following construction to reclaim the basin for use as a permanent detention facility. If the basin will be used as a permanent extended detention basin for the site, a trash rack will need to be installed once contributing drainage areas have been stabilized and the gravel pack and accumulated sediment have been removed.
- Floating Skimmer:** If a floating skimmer is used, install it using manufacturer's recommendations. Illustration SB-1 provides an illustration of a Faircloth Skimmer Floating Outlet™, one of the more commonly used floating skimmer outlets. A skimmer should be designed to release the design volume in no less than 48 hours. The use of a floating skimmer outlet can increase the sediment capture efficiency of a basin significantly. A floating outlet continually decants cleanest water off the surface of the pond and releases cleaner water than would discharge from a perforated riser pipe or plate.

Sediment Basin (SB) SC-7

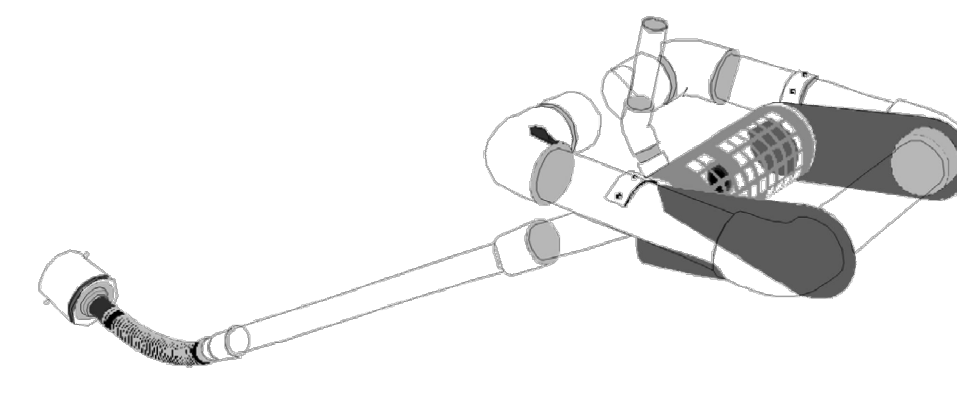


Illustration SB-1. Outlet structure for a temporary sediment basin - Faircloth Skimmer Floating Outlet. Illustration courtesy of J. W. Faircloth & Sons, Inc., FairclothSkimmer.com.

- Outlet Protection and Spillway:** Consider all flow paths for runoff leaving the basin, including protection at the typical point of discharge as well as overtopping.

- Outlet Protection:** Outlet protection should be provided where the velocity of flow will exceed the maximum permissible velocity of the material of the waterway into which discharge occurs. This may require the use of a riprap apron at the outlet location and/or other measures to keep the waterway from eroding.
- Emergency Spillway:** Provide a stabilized emergency overflow spillway for rainstorms that exceed the capacity of the sediment basin volume and its outlet. Protect basin embankments from erosion and overtopping. If the sediment basin will be converted to a permanent detention basin, design and construct the emergency spillway(s) as required for the permanent facility. If the sediment basin will not become a permanent detention basin, it may be possible to substitute a heavy polyvinyl membrane or properly bedded rock cover to line the spillway and downstream embankment, depending on the height, slope, and width of the embankments.

SC-7 Sediment Basin (SB)

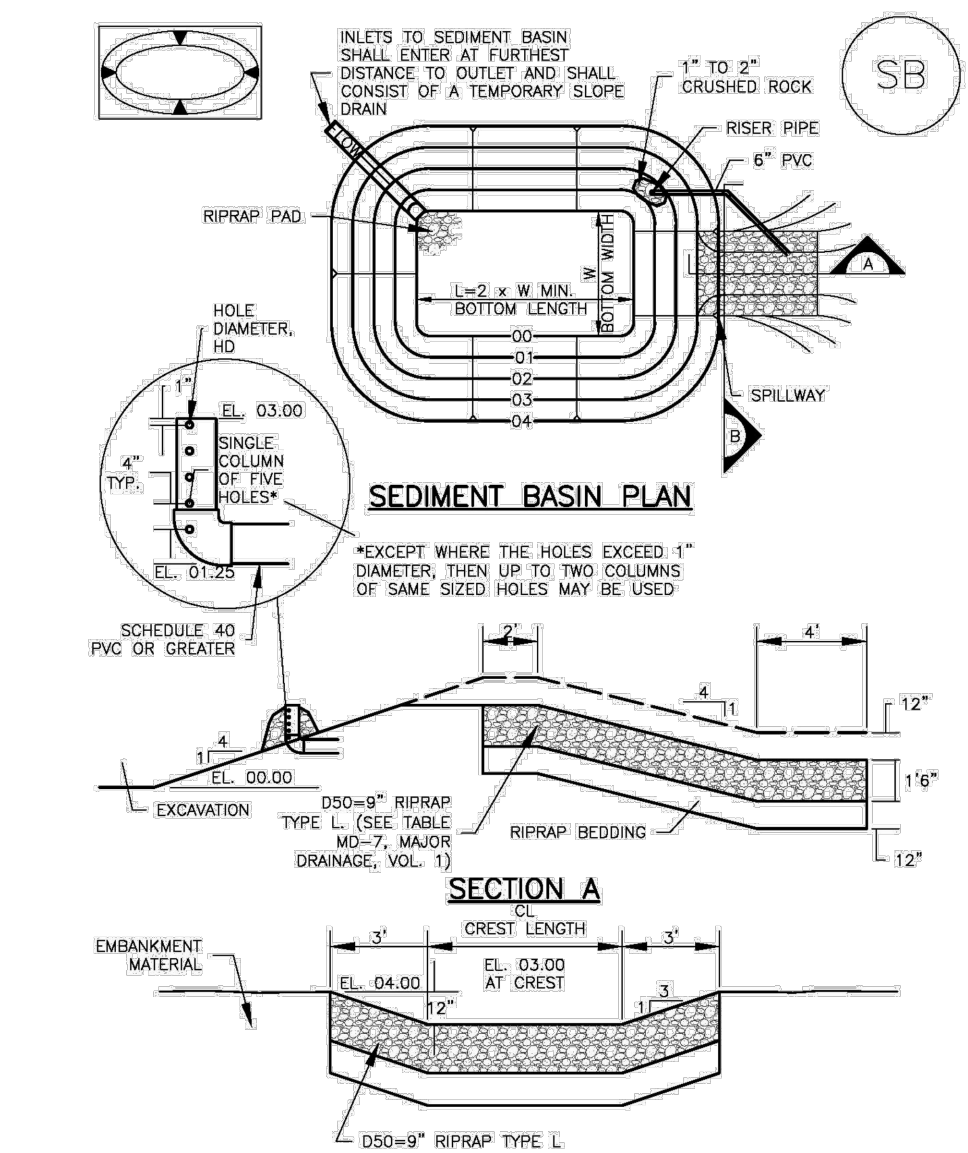
Maintenance and Removal

Maintenance activities include the following:

- Dredge sediment from the basin, as needed to maintain BMP effectiveness, typically when the design storage volume is no more than one-third filled with sediment.
- Inspect the sediment basin embankments for stability and seepage.
- Inspect the inlet and outlet of the basin, repair damage, and remove debris. Remove, clean and replace the gravel around the outlet on a regular basis to remove the accumulated sediment within it and keep the outlet functioning.
- Be aware that removal of a sediment basin may require dewatering and associated permit requirements.
- Do not remove a sediment basin until the upstream area has been stabilized with vegetation.

Final disposition of the sediment basin depends on whether the basin will be converted to a permanent post-construction stormwater basin or whether the basin area will be returned to grade. For basins being converted to permanent detention basins, remove accumulated sediment and reconfigure the basin and outlet to meet the requirements of the final design for the detention facility. If the sediment basin is not to be used as a permanent detention facility, fill the excavated area with soil and stabilize with vegetation.

Sediment Basin (SB) SC-7



SC-7 Sediment Basin (SB)

Upstream Drainage Area (rounded to nearest acre), (ac)	Basin Bottom Width (ft)	Spillway Crest Length (ft), (L)	Pipe Diameter (ft), (D)
1	12 1/2	2	18 1/2
2	21	4	24
3	33 1/2	6	30
4	42	8	36
5	48 1/2	9	39
6	51	10	42
7	47 1/2	11	45
8	51	12	48
9	50	13	51
10	56 1/4	15	54
11	61	16	57
12	64	18	60
13	67 1/2	19	63
14	70 1/2	21	66
15	73 1/4	22	69

SEDIMENT BASIN INSTALLATION NOTES

- 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.
- FOR STANDARD BASIN, BOTTOM DIMENSION MAY BE MODIFIED AS LONG AS BOTTOM AREA IS NOT REDUCED.
- SEDIMENT BASINS SHALL BE INSTALLED PRIOR TO ANY OTHER LAND-DISTURBING ACTIVITY THAT RELIES ON OR BASINS AS A STORMWATER CONTROL.
- 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.
- EMBANKMENT MATERIAL SHALL BE COMPACTED TO AT LEAST 95 PERCENT OF MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D698.
- PIPE SCH 40 OR GREATER SHALL BE USED.
- 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 (SB) SC-7

SEDIMENT BASIN MAINTENANCE NOTES

- 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.
- FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
- WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
- 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).
- SEDIMENT BASINS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND GRASS COVER IS ACCEPTED BY THE LOCAL JURISDICTION.
- WHEN SEDIMENT BASINS ARE REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDS AND MULCH OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

(DETAILS ADAPTED FROM BOULDER COUNTY, COLORADO)
NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM USDCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

NO.	DATE	DESCRIPTION	BY
REVISIONS			
<p>CTR Engineering, Inc.</p> <p>16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654</p>			
<p>PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B</p>			
BENCHMARK:			
Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)			
<p>PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL</p>			
<p>SHEET TITLE: GRADING AND EROSION DETAILS</p>			
DESIGNED BY: JCM	SCALE:	DATE ISSUED: JAN. 2021	
DRAWN BY: JCM	HH:		
CHECKED BY: JH	V:	SHEET NO. 19 OF 22 SHEETS	
DWG:			

Inlet Protection (IP)

SC-6

Description

Inlet protection consists of permeable barriers installed around an inlet to filter runoff and remove sediment prior to entering a storm drain inlet. Inlet protection can be constructed from rock socks, sediment control logs, silt fence, block and rock socks, or other materials approved by the local jurisdiction. Area inlets can also be protected by over-excavating around the inlet to form a sediment trap.



Photograph IP-1. Inlet protection for a curb opening inlet.

Appropriate Uses

Install protection at storm sewer inlets that are operable during construction. Consider the potential for tracked-out sediment or temporary stockpile areas to contribute sediment to inlets when determining which inlets must be protected. This may include inlets in the general proximity of the construction area, not limited to downgradient inlets. Inlet protection is not a stand-alone BMP and should be used in conjunction with other upgradient BMPs.

Design and Installation

To function effectively, inlet protection measures must be installed to ensure that flows do not bypass the inlet protection and enter the storm drain without treatment. However, designs must also enable the inlet to function without completely blocking flows into the inlet in a manner that causes localized flooding. When selecting the type of inlet protection, consider factors such as type of inlet (e.g., curb or area, sump or on-grade conditions), traffic, anticipated flows, ability to secure the BMP properly, safety and other site-specific conditions. For example, block and rock socks will be better suited to a curb and gutter along a roadway, as opposed to silt fence or sediment control logs, which cannot be properly secured in a curb and gutter setting, but are effective area inlet protection measures.

Several inlet protection designs are provided in the Design Details. Additionally, a variety of proprietary products are available for inlet protection that may be approved for use by local governments. If proprietary products are used, design details and installation procedures from the manufacturer must be followed. Regardless of the type of inlet protection selected, inlet protection is most effective when combined with other BMPs such as curb socks and check dams. Inlet protection is often the last barrier before runoff enters the storm sewer or receiving water.

Design details with notes are provided for these forms of inlet protection:

Inlet Protection (various forms)	
Functions	
Erosion Control	No
Sediment Control	Yes
Site/Material Management	No

August 2013 Urban Drainage and Flood Control District IP-1
Urban Storm Drainage Criteria Manual Volume 3

SC-6 Inlet Protection (IP)

- IP-3. Rock Sock Inlet Protection for Sump/Area Inlet
- IP-4. Silt Fence Inlet Protection for Sump/Area Inlet
- IP-5. Over-excavation Inlet Protection
- IP-6. Straw Bale Inlet Protection for Sump/Area Inlet
- CIP-1. Culvert Inlet Protection

Proprietary inlet protection devices should be installed in accordance with manufacturer specifications. More information is provided below on selecting inlet protection for sump and on-grade locations.

Inlets Located in a Sump

When applying inlet protection in sump conditions, it is important that the inlet continue to function during larger runoff events. For curb inlets, the maximum height of the protective barrier should be lower than the top of the curb opening to allow overflow into the inlet during larger storms without excessive localized flooding. If the inlet protection height is greater than the curb elevation, particularly if the filter becomes clogged with sediment, runoff will not enter the inlet and may bypass it, possibly causing localized flooding, public safety issues, and downstream erosion and damage from bypassed flows.

Area inlets located in a sump setting can be protected through the use of silt fence, concrete block and rock socks (on paved surfaces), sediment control logs/straw wattles embedded in the adjacent soil and stacked around the area inlet (on pervious surfaces), over-excavation around the inlet, and proprietary products providing equivalent functions.

Inlets Located on a Slope

For curb and gutter inlets on paved sloping streets, block and rock sock inlet protection is recommended in conjunction with curb socks in the gutter leading to the inlet. For inlets located along unpaved roads, also see the Check Dam Fact Sheet.

Maintenance and Removal

- Inspect inlet protection frequently. Inspection and maintenance guidance includes:
- Inspect for tears that can result in sediment directly entering the inlet, as well as result in the contents of the BMP (e.g., gravel) washing into the inlet.
 - Check for improper installation resulting in untreated flows bypassing the BMP and directly entering the inlet or bypassing to an unprotected downstream inlet. For example, silt fence that has not been properly trenched around the inlet can result in flows under the silt fence and directly into the inlet.
 - Look for displaced BMPs that are no longer protecting the inlet. Displacement may occur following larger storm events that wash away or reposition the inlet protection. Traffic or equipment may also crush or displace the BMP.
 - Monitor sediment accumulation upgradient of the inlet protection.

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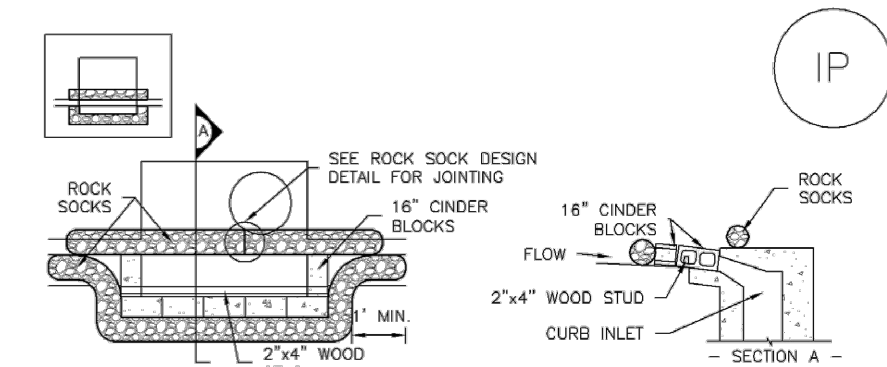
Inlet Protection (IP) SC-6

- Remove sediment accumulation from the area upstream of the inlet protection, as needed to maintain BMP effectiveness, typically when it reaches no more than half the storage capacity of the inlet protection. For silt fence, remove sediment when it accumulates to a depth of no more than 6 inches. Remove sediment accumulation from the area upstream of the inlet protection as needed to maintain the functionality of the BMP.
- Proprietary inlet protection devices should be inspected and maintained in accordance with manufacturer specifications. If proprietary inlet insert devices are used, sediment should be removed in a timely manner to prevent devices from breaking and spilling sediment into the storm drain.

Inlet protection must be removed and properly disposed of when the drainage area for the inlet has reached final stabilization.

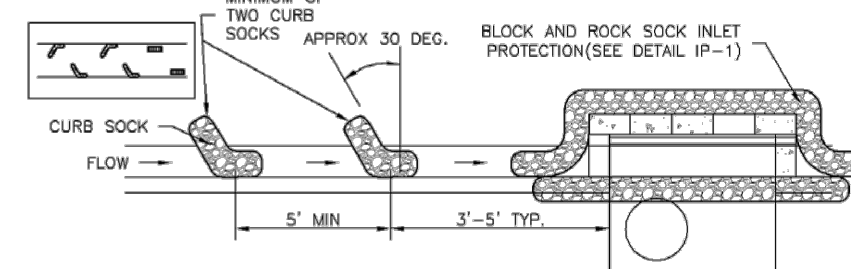
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SC-6 Inlet Protection (IP)



IP-1. BLOCK AND ROCK SOCK SUMP OR ON-GRADE INLET PROTECTION

- BLOCK AND CURB SOCK INLET PROTECTION INSTALLATION NOTES**
- SEE ROCK SOCK DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.
 - CONCRETE "TAPERED" BLOCKS SHALL BE Laid ON THEIR SIDES AROUND THE INLET IN A SINGLE ROW, ABUTTING ONE ANOTHER WITH THE OPEN END FACING AWAY FROM THE CURB.
 - GRAVEL BAGS SHALL BE PLACED AROUND CONCRETE BLOCKS, CLOSELY ABUTTING ONE ANOTHER AND JOINTED TOGETHER IN ACCORDANCE WITH ROCK SOCK DESIGN DETAIL.

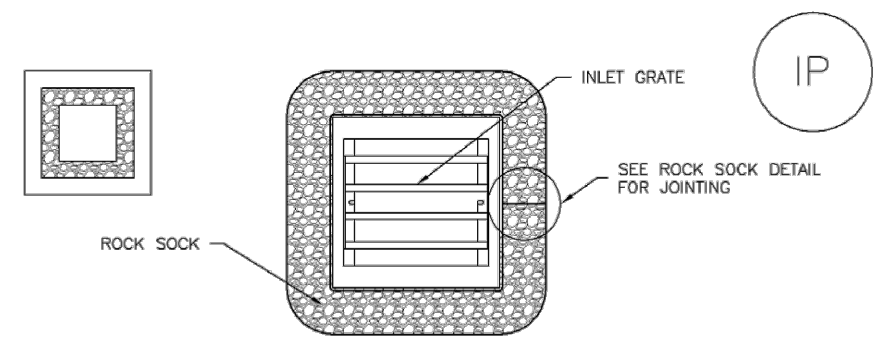


IP-2. CURB ROCK SOCKS UPSTREAM OF INLET PROTECTION

- CURB ROCK SOCK INLET PROTECTION INSTALLATION NOTES**
- SEE ROCK SOCK DESIGN DETAIL INSTALLATION REQUIREMENTS.
 - PLACEMENT OF THE SOCK SHALL BE APPROXIMATELY 30 DEGREES FROM PERPENDICULAR IN THE OPPOSITE DIRECTION OF FLOW.
 - SOCKS ARE TO BE FLUSH WITH THE CURB AND SPACED A MINIMUM OF 5 FEET APART.
 - AT LEAST TWO CURB SOCKS IN SERIES ARE REQUIRED UPSTREAM OF ON-GRADE INLETS.

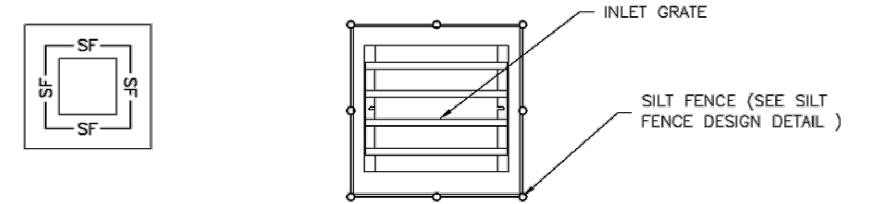
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Inlet Protection (IP) SC-6



IP-3. ROCK SOCK SUMP/AREA INLET PROTECTION

- ROCK SOCK SUMP/AREA INLET PROTECTION INSTALLATION NOTES**
- SEE ROCK SOCK DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.
 - STRAW WATTLES/SEDIMENT CONTROL LOGS MAY BE USED IN PLACE OF ROCK SOCKS FOR INLETS IN PERVIOUS AREAS. INSTALL PER SEDIMENT CONTROL LOG DETAIL.

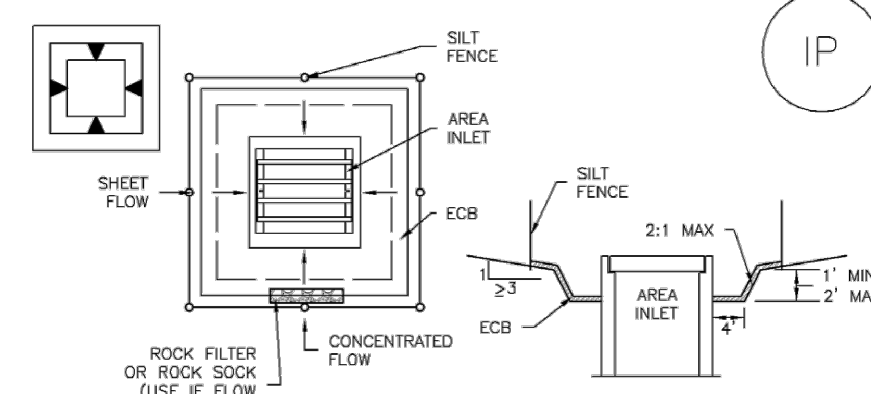


IP-4. SILT FENCE FOR SUMP INLET PROTECTION

- SILT FENCE INLET PROTECTION INSTALLATION NOTES**
- SEE SILT FENCE DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.
 - POSTS SHALL BE PLACED AT EACH CORNER OF THE INLET AND AROUND THE EDGES AT A MAXIMUM SPACING OF 3 FEET.
 - STRAW WATTLES/SEDIMENT CONTROL LOGS MAY BE USED IN PLACE OF SILT FENCE FOR INLETS IN PERVIOUS AREAS. INSTALL PER SEDIMENT CONTROL LOG DETAIL.

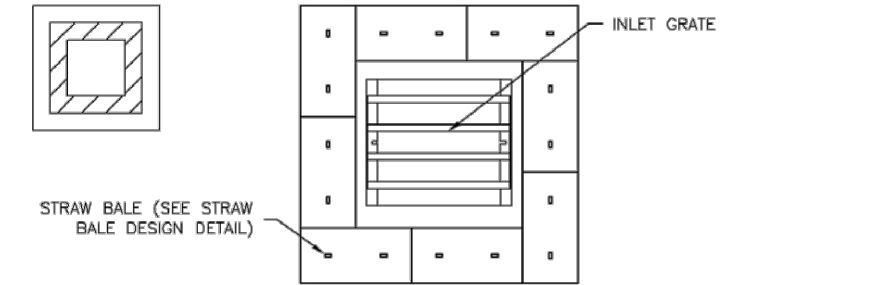
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SC-6 Inlet Protection (IP)



IP-5. OVEREXCAVATION INLET PROTECTION

- OVEREXCAVATION INLET PROTECTION INSTALLATION NOTES**
- THIS FORM OF INLET PROTECTION IS PRIMARILY APPLICABLE FOR SITES THAT HAVE NOT YET REACHED FINAL GRADE AND SHOULD BE USED ONLY FOR INLETS WITH A RELATIVELY SMALL CONTRIBUTING DRAINAGE AREA.
 - WHEN USING FOR CONCENTRATED FLOWS, SHAPE PAIN IN 2:1 RATIO WITH LENGTH ORIENTED TOWARD DIRECTION OF FLOW.
 - SEDIMENT MUST BE PERIODICALLY REMOVED FROM THE OVEREXCAVATED AREA.

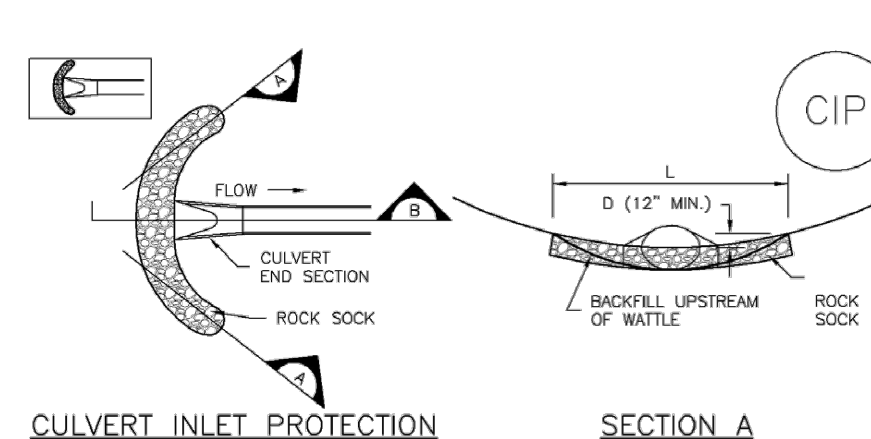


IP-6. STRAW BALE FOR SUMP INLET PROTECTION

- STRAW BALE BARRIER INLET PROTECTION INSTALLATION NOTES**
- SEE STRAW BALE DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.
 - BALES SHALL BE PLACED IN A SINGLE ROW AROUND THE INLET WITH ENDS OF BALES TIGHTLY ABUTTING ONE ANOTHER.

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Inlet Protection (IP) SC-6



CIP-1. CULVERT INLET PROTECTION

- CULVERT INLET PROTECTION INSTALLATION NOTES**
- SEE PLAN VIEW FOR -LOCATION OF INLET PROTECTION.
 - SEE ROCK SOCK DESIGN DETAIL FOR ROCK GRADATION REQUIREMENTS AND JOINTING DETAIL.

- CULVERT INLET PROTECTION MAINTENANCE NOTES**
- 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.
 - FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
 - WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
 - SEDIMENT ACCUMULATED UPSTREAM OF THE CULVERT SHALL BE REMOVED WHEN THE SEDIMENT DEPTH IS 1/2 THE HEIGHT OF THE ROCK SOCK.
 - CULVERT INLET PROTECTION SHALL REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS PERMANENTLY STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.
- (DETAILS ADAPTED FROM AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)
- NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

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SC-6 Inlet Protection (IP)

- GENERAL INLET PROTECTION INSTALLATION NOTES**
- SEE PLAN VIEW FOR -LOCATION OF INLET PROTECTION. -TYPE OF INLET PROTECTION (IP-1, IP-2, IP-3, IP-4, IP-5, IP-6)
 - INLET PROTECTION SHALL BE INSTALLED PROMPTLY AFTER INLET CONSTRUCTION OR PAVING IS COMPLETE (TYPICALLY WITHIN 48 HOURS). IF A RAINFALL/RUNOFF EVENT IS FORECAST, INSTALL INLET PROTECTION PRIOR TO ONSET OF FLOW.
 - MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

- INLET PROTECTION MAINTENANCE NOTES**
- 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.
 - FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
 - WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
 - SEDIMENT ACCUMULATED UPSTREAM OF INLET PROTECTION SHALL BE REMOVED AS NECESSARY TO MAINTAIN BMP EFFECTIVENESS, TYPICALLY WHEN STORAGE VOLUME REACHES 50% OF CAPACITY. A DEPTH OF 6" WHEN SILT FENCE IS USED, OR 1/2 OF THE HEIGHT FOR STRAW BALES.
 - INLET PROTECTION IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS PERMANENTLY STABILIZED, UNLESS THE LOCAL JURISDICTION APPROVES EARLIER REMOVAL OF INLET PROTECTION IN STREETS.
 - WHEN INLET PROTECTION AT AREA INLETS IS REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOP SOIL, SEEDS AND MULCHED, OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

- (DETAILS ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)
- NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

- NOTE: THE DETAILS INCLUDED WITH THIS FACT SHEET SHOW COMMONLY USED, CONVENTIONAL METHODS OF INLET PROTECTION IN THE DENVER METROPOLITAN AREA. THERE ARE MANY PROPRIETARY INLET PROTECTION METHODS ON THE MARKET. UDFCD NEITHER ENDORSES NOR DISCOURAGES USE OF PROPRIETARY INLET PROTECTION; HOWEVER, IN THE EVENT PROPRIETARY METHODS ARE USED, THE APPROPRIATE DETAIL FROM THE MANUFACTURER'S MUST BE INCLUDED IN THE SUMP AND THE BMP MUST BE INSTALLED AND MAINTAINED AS SHOWN IN THE MANUFACTURER'S DETAILS.
- NOTE: SOME MUNICIPALITIES DISCOURAGE OR PROHIBIT THE USE OF STRAW BALES FOR INLET PROTECTION. CHECK WITH LOCAL JURISDICTION TO DETERMINE IF STRAW BALE INLET PROTECTION IS ACCEPTABLE.

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NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT:	CLEAR VIEW INDUSTRIAL PARK FILING 2B		
BENCHMARK:	Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)		
PROJECT TITLE:	GRADING, WATER QUALITY POND AND EROSION CONTROL		
SHEET TITLE:	GRADING AND EROSION DETAILS		
DESIGNED BY:	JCM	SCALE:	DATE ISSUED:
DRAWN BY:	JCM	DATE:	JAN. 2021
CHECKED BY:	JH	SHEET NO. 20	OF 22 SHEETS
DWG:			

Earth Dikes and Drainage Swales (ED/DS) EC-10

Description

Earth dikes and drainage swales are temporary storm conveyance channels constructed either to divert runoff around slopes or to convey runoff to additional sediment control BMPs prior to discharge of runoff from a site. Drainage swales may be lined or unlined, but if an unlined swale is used, it must be well compacted and capable of resisting erosive velocities.



Photograph ED/DS-1. Example of an earth dike used to divert flows at a construction site. Photo courtesy of CDOT.

Appropriate Uses

Earth dikes and drainage swales are typically used to control the flow path of runoff at a construction site by diverting runoff around areas prone to erosion, such as steep slopes. Earth dikes and drainage swales may also be constructed as temporary conveyance features. This will direct runoff to additional sediment control treatment BMPs, such as sediment traps or basins.

Design and Installation

When earth dikes are used to divert water for slope protection, the earth dike typically consists of a horizontal ridge of soil placed perpendicular to the slope and angled slightly to provide drainage along the contour. The dike is used in conjunction with a swale or a small channel upslope of the berm to convey the diverted water. Temporary diversion dikes can be constructed by excavation of a V-shaped trench or ditch and placement of the fill on the downslope side of the cut. There are two types of placement for temporary slope diversion dikes:

- A dike located at the top of a slope to divert upland runoff away from the disturbed area and convey it in a temporary or permanent channel.
- A diversion dike located at the base or mid-slope of a disturbed area to intercept runoff and reduce the effective slope length.

Depending on the project, either an earth dike or drainage swale may be more appropriate. If there is a need for cut on the project, then an excavated drainage swale may be better suited. When the project is primarily fill, then a conveyance constructed using a berm may be the better option.

Earth Dikes and Drainage Swales	
Functions	
Erosion Control	Yes
Sediment Control	Moderate
Site/Material Management	No

All dikes or swales receiving runoff from a disturbed area should direct stormwater to a sediment control BMP such as a sediment trap or basin.

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EC-10 Earth Dikes and Drainage Swales (ED/DS)

Unlined dikes or swales should only be used for intercepting sheet flow runoff and are not intended for diversion of concentrated flows.

Details with notes are provided for several design variations, including:

- ED-1. Unlined Earth Dike formed by Berm
- DS-1. Unlined Excavated Swale
- DS-2. Unlined Swale Formed by Cut and Fill
- DS-3. ECD-lined Swale
- DS-4. Synthetic-lined Swale
- DS-5. Riprap-lined Swale

The details also include guidance on permissible velocities for cohesive channels if unlined approaches will be used.

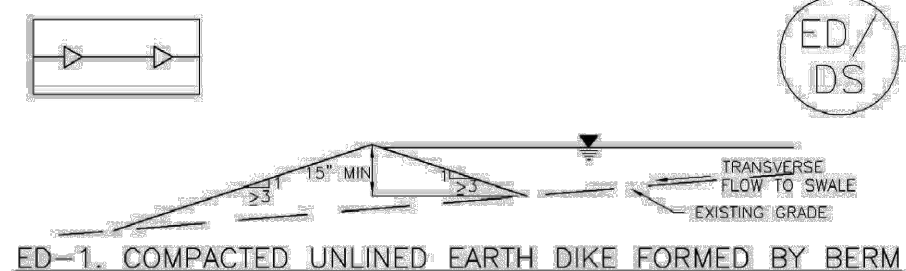
Maintenance and Removal

Inspect earth dikes for stability, compaction, and signs of erosion and repair. Inspect side slopes for erosion and damage to erosion control fabric. Stabilize slopes and repair fabric as necessary. If there is recurring extensive damage, consider installing rock check dams or lining the channel with riprap.

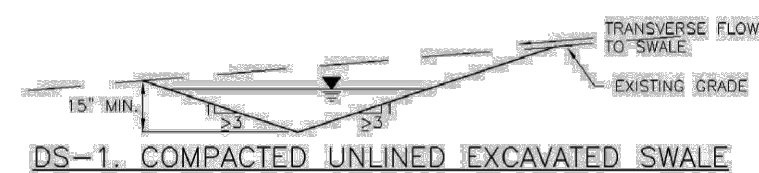
If drainage swales are not permanent, remove dikes and fill channels when the upstream area is stabilized. Stabilize the fill or disturbed area immediately following removal by revegetation or other permanent stabilization method approved by the local jurisdiction.

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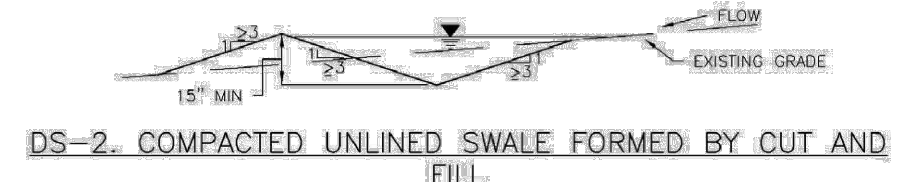
Earth Dikes and Drainage Swales (ED/DS) EC-10



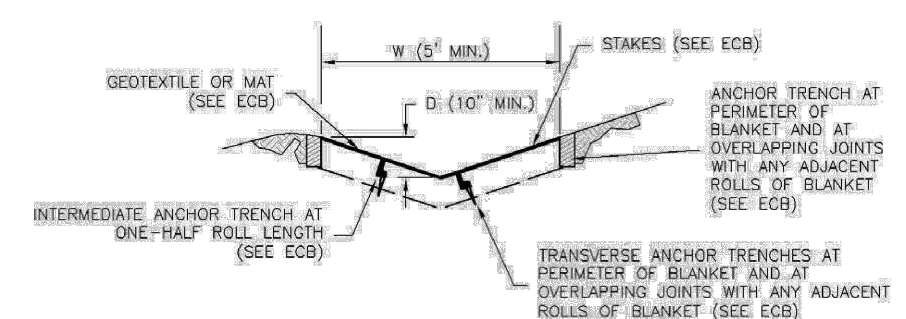
ED-1. COMPACTED UNLINED EARTH DIKE FORMED BY BERM



DS-1. COMPACTED UNLINED EXCAVATED SWALE



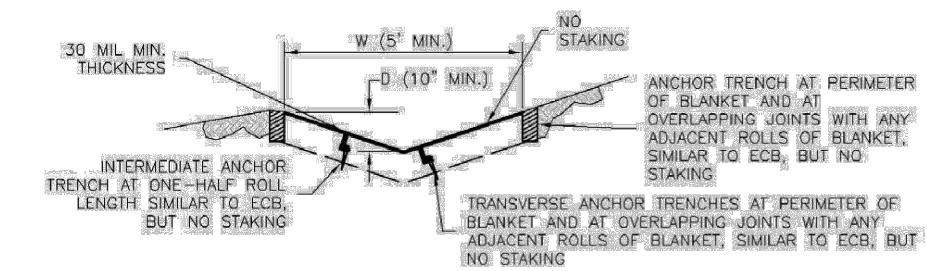
DS-2. COMPACTED UNLINED SWALE FORMED BY CUT AND FILL



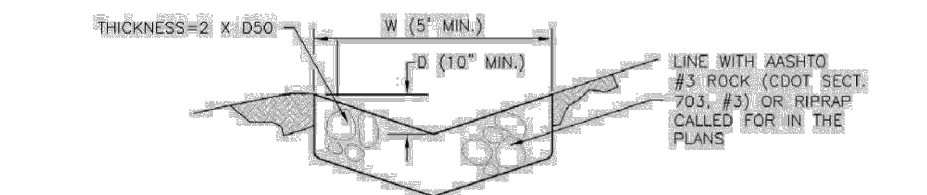
DS-3. ECD LINED SWALE (CUT AND FILL OR BERM)

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Urban Storm Drainage Criteria Manual Volume 3

EC-10 Earth Dikes and Drainage Swales (ED/DS)



DS-4. SYNTHETIC LINED SWALE



DS-5. RIPRAP LINED SWALE

EARTH DIKE AND DRAINAGE SWALE INSTALLATION NOTES

- SEE SITE PLAN FOR:
 - LOCATION OF DIVERSION SWALE
 - TYPE OF SWALE (UNLINED, COMPACTED/ANY/ORN LINED)
 - LENGTH OF EACH SWALE
 - DEPTH, SLOPE AND WIDTH OF DIVERSIONS
 - FOR ECD/FRM LINED DITCH, SEE ECD DETAIL
 - FOR RIPRAP LINED DITCH, SEE ECD DETAIL
- SEE SWALE PLAN FOR DETAILS OF PERMANENT CONVEYANCE FACILITIES AND/OR DIVERSION SWALES EXCEEDING 2-YEAR FLOW RATE OR 10 CFS.
- EARTH DIKES AND SWALES INDICATED ON SWMP PLAN SHALL BE INSTALLED PRIOR TO LAND-OBSTRUCTING ACTIVITIES IN PROXIMITY.
- EMBANKMENT IS TO BE COMPACTED TO 90% OF MAXIMUM DENSITY AND WITHIN 2% OF OPTIMUM MOISTURE CONTENT ACCORDING TO ASTM D698.
- SWALES ARE TO DRAIN TO A SEDIMENT CONTROL BMP.
- FOR UNLINED DITCHES, INSTALLATION OF ECD/FRM SWALE CONFORM TO THE REQUIREMENTS OF THE ECD DETAIL.
- WHEN CONSTRUCTION TRAFFIC MUST CROSS A DIVERSION/SWALE, INSTALL A TEMPORARY CULVERT WITH A MINIMUM DIAMETER OF 12 INCHES.

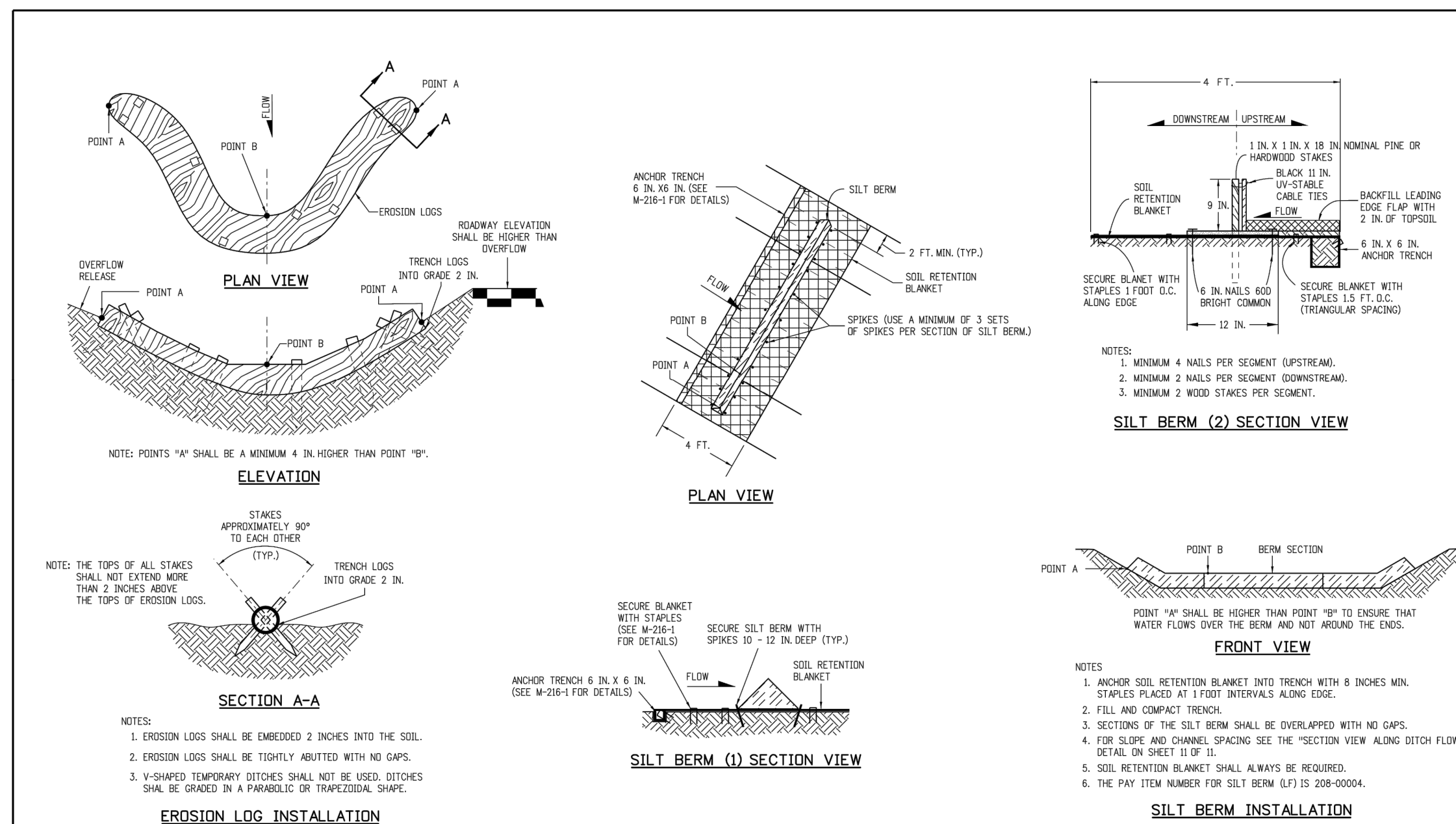
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Earth Dikes and Drainage Swales (ED/DS) EC-10

EARTH DIKE AND DRAINAGE SWALE MAINTENANCE NOTES

- INSPECT SWALES 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.
 - FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
 - WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
 - SWALES SHOULD REMAIN IN PLACE UNTIL THE END OF CONSTRUCTION IF APPROVED BY LOCAL JURISDICTION. SWALES MAY BE LEFT IN PLACE.
 - WHEN A SWALE IS REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, SEEDS AND MULCHED, OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.
- DETAIL ADAPTED FROM DOUGLAS COUNTY, COLORADO AND THE CITY OF COLORADO SPRINGS, COLORADO, NOT AVAILABLE IN APPROX.
- NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

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Computer File Information	Sheet Revisions	Colorado Department of Transportation	TEMPORARY EROSION CONTROL	STANDARD PLAN NO.
Creation Date: 07/31/19	Date	2829 West Howard Place	Issued by the Project Development Branch July 31, 2019	M-208-1
Designer: JMK	Comments	2007 1st Floor		Standard Sheet No. 6 of 11
Last Modification Date: 07/31/19		Denver, CO 80204		
Detailer: LTA		Phone: 303-757-9001 Fax: 303-757-9968		
CAD File: Revision 18 Scale: Not to Scale Units: English		Project Development Branch JMK		Project Sheet Number:

NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT:	CLEAR VIEW INDUSTRIAL PARK FILING 2B		
BENCHMARK:	Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)		
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SHEET TITLE:	GRADING AND EROSION DETAILS		
DESIGNED BY: JCM	SCALE:	DATE ISSUED: JAN. 2021	
DRAWN BY: JCM	BY:	SHEET NO. 21 OF 22 SHEETS	
CHECKED BY: JH	V:		
DWG:			

Stockpile Management (SP) MM-2

Description
Stockpile management includes measures to minimize erosion and sediment transport from soil stockpiles.

Appropriate Uses
Stockpile management should be used when soils or other erodible materials are stored at the construction site. Special attention should be given to stockpiles in close proximity to natural or manmade storm systems.



Design and Installation
Locate stockpiles away from all drainage system components including storm sewer inlets. Where practical, choose stockpile locations that that will remain undisturbed for the longest period of time as the phases of construction progress. Place sediment control BMPs around the perimeter of the stockpile, such as sediment control logs, rock socks, silt fence, straw bales and sand bags. See Detail SP-1 for guidance on proper establishment of perimeter controls around a stockpile. For stockpiles in active use, provide a stabilized designated access point on the upgradient side of the stockpile.

Stabilize the stockpile surface with surface roughening, temporary seeding and mulching, erosion control blankets, or soil binders. Soils stockpiled for an extended period (typically for more than 60 days) should be seeded and mulched with a temporary grass cover once the stockpile is placed (typically within 14 days). Use of mulch only or a soil binder is acceptable if the stockpile will be in place for a more limited time period (typically 30-60 days). Timeframes for stabilization of stockpiles noted in this fact sheet are "typical" guidelines. Check permit requirements for specific federal, state, and/or local requirements that may be more prescriptive.

Stockpiles should not be placed in streets or paved areas unless no other practical alternative exists. See the Stabilized Staging Area Fact Sheet for guidance when staging in roadways is unavoidable due to space or right-of-way constraints. For paved areas, rock socks must be used for perimeter control and all inlets with the potential to receive sediment from the stockpile (even from vehicle tracking) must be protected.

Maintenance and Removal
Inspect perimeter controls and inlet protection in accordance with their respective BMP Fact Sheets. Where seeding, mulch and/or soil binders are used, reseed or reapplication of soil binder may be necessary.

When temporary removal of a perimeter BMP is necessary to access a stockpile, ensure BMPs are reinstalled in accordance with their respective design detail section.

Stockpile Management	
Erosion Control	Yes
Sediment Control	Yes
Site/Material Management	Yes

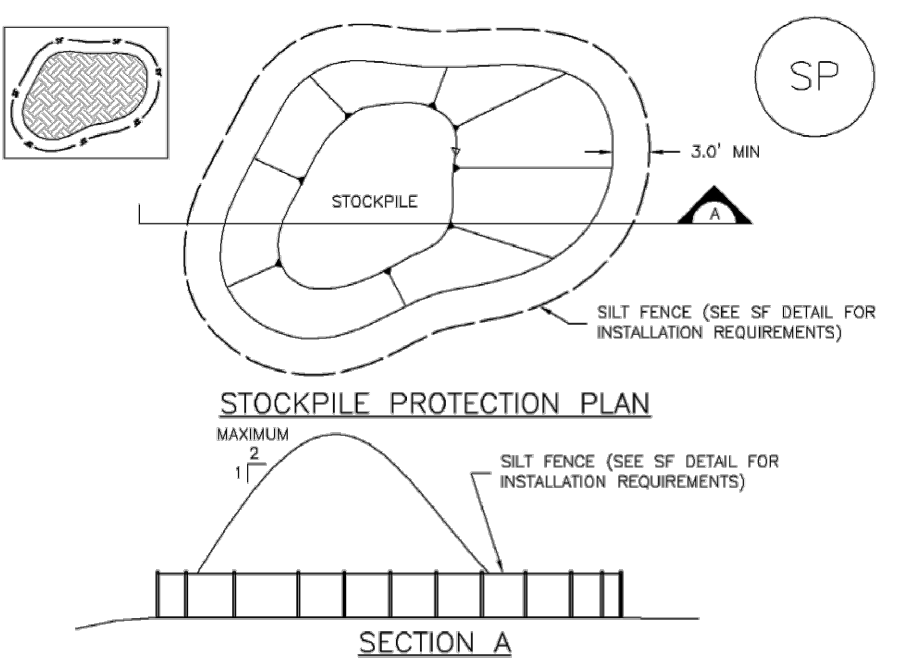
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MM-2 Stockpile Management (SM)

When the stockpile is no longer needed, properly dispose of excess materials and revegetate or otherwise stabilize the ground surface where the stockpile was located.

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Stockpile Management (SP) MM-2



SP-1. STOCKPILE PROTECTION

STOCKPILE PROTECTION INSTALLATION NOTES

- SEE PLAN VIEW FOR:
 - LOCATION OF STOCKPILES.
 - TYPE OF STOCKPILE PROTECTION.
- INSTALL PERIMETER CONTROLS IN ACCORDANCE WITH THEIR RESPECTIVE DESIGN DETAILS. SILT FENCE IS SHOWN IN THE STOCKPILE PROTECTION DETAILS; HOWEVER, OTHER TYPES OF PERIMETER CONTROLS INCLUDING SEDIMENT CONTROL LOGS OR ROCK SOCKS MAY BE SUITABLE IN SOME CIRCUMSTANCES. CONSIDERATIONS FOR DETERMINING THE APPROPRIATE TYPE OF PERIMETER CONTROL FOR A STOCKPILE INCLUDE WHETHER THE STOCKPILE IS LOCATED ON A PAVED OR IMPERVIOUS SURFACE, THE RELATIVE HEIGHTS OF THE PERIMETER CONTROL AND STOCKPILE, THE ABILITY OF THE PERIMETER CONTROL TO CONTAIN THE STOCKPILE WITHOUT FAILING IN THE EVENT THAT MATERIAL FROM THE STOCKPILE SHIFTS OR SLUMPS AGAINST THE PERIMETER, AND OTHER FACTORS.
- STABILIZE THE STOCKPILE SURFACE WITH SURFACE ROUGHENING, TEMPORARY SEEDING AND MULCHING, EROSION CONTROL, BLANKETS, OR SOIL BINDERS. SOILS STOCKPILED FOR AN EXTENDED PERIOD (TYPICALLY FOR MORE THAN 60 DAYS) SHOULD BE SEEDING AND MULCHED WITH A TEMPORARY GRASS COVER ONCE THE STOCKPILE IS PLACED (TYPICALLY WITHIN 14 DAYS). USE OF MULCH ONLY OR A SOIL BINDER IS ACCEPTABLE IF THE STOCKPILE WILL BE IN PLACE FOR A MORE LIMITED TIME PERIOD (TYPICALLY 30-60 DAYS).
- FOR TEMPORARY STOCKPILES ON THE INTERIOR PORTION OF A CONSTRUCTION SITE, WHERE OTHER DOWNGRADEMENT CONTROLS, INCLUDING PERIMETER CONTROL, ARE IN PLACE, STOCKPILE PERIMETER CONTROLS MAY NOT BE REQUIRED.

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MM-2 Stockpile Management (SM)

STOCKPILE PROTECTION MAINTENANCE NOTES

- 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.
- FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
- WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

STOCKPILE PROTECTION MAINTENANCE NOTES

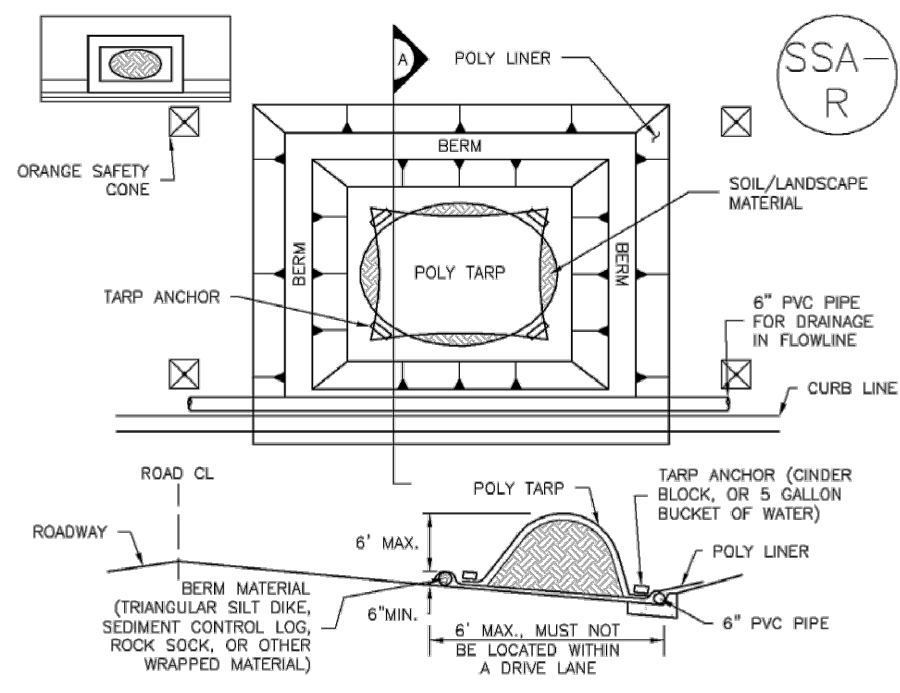
- IF PERIMETER PROTECTION MUST BE MOVED TO ACCESS SOIL STOCKPILE, REPLACE PERIMETER CONTROLS BY THE END OF THE WORKDAY.
- STOCKPILE PERIMETER CONTROLS CAN BE REMOVED ONCE ALL THE MATERIAL FROM THE STOCKPILE HAS BEEN USED.

(DETAILS ADAPTED FROM PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

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Stockpile Management (SP) MM-2



SP-2. MATERIALS STAGING IN ROADWAY

MATERIALS STAGING IN ROADWAYS INSTALLATION NOTES

- SEE PLAN VIEW FOR:
 - LOCATION OF MATERIAL STAGING AREA(S).
 - CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.
- FEATURE MUST BE INSTALLED PRIOR TO EXCAVATION, EARTHWORK OR DELIVERY OF MATERIALS.
- MATERIALS MUST BE STAGED ON THE POLY LINER. ANY INCIDENTAL MATERIALS DEPOSITED ON PAVED SECTION OR ALONG CURB LINE MUST BE CLEANED UP PROMPTLY.
- POLY LINER AND TARP COVER SHOULD BE OF SIGNIFICANT THICKNESS TO PREVENT DAMAGE OR LOSS OF INTEGRITY.
- SAND BAGS MAY BE SUBSTITUTED TO ANCHOR THE COVER TARP OR PROVIDE BERMING UNDER THE BASE LINER.
- FEATURE IS NOT INTENDED FOR USE WITH WET MATERIAL THAT WILL BE DRAINING AND/OR SPREADING OUT ON THE POLY LINER OR FOR DEMOLITION MATERIALS.
- THIS FEATURE CAN BE USED FOR:
 - UTILITY REPAIRS.
 - WHEN OTHER STAGING LOCATIONS AND OPTIONS ARE LIMITED.
 - OTHER LIMITED APPLICATION AND SHORT DURATION STAGING.

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MM-2 Stockpile Management (SM)

MATERIALS STAGING IN ROADWAY MAINTENANCE NOTES

- 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.
- FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
- WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
- INSPECT PVC PIPE ALONG CURB LINE FOR CLOGGING AND DEBRIS. REMOVE OBSTRUCTIONS PROMPTLY.
- CLEAN MATERIAL FROM PAVED SURFACES BY SWEEPING OR VACUUMING.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM AURORA, COLORADO)

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NO.	DATE	DESCRIPTION	BY
REVISIONS			
CTR Engineering, Inc.			
16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654			
PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B			
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)			
PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL			
SHEET TITLE: GRADING AND EROSION DETAILS			
DESIGNED BY: JCM	SCALE:	DATE ISSUED: JAN. 2021	
DRAWN BY: JCM	JH:	SHEET NO. 22 OF 22 SHEETS	
CHECKED BY: JH	V:		
DWG:			