



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

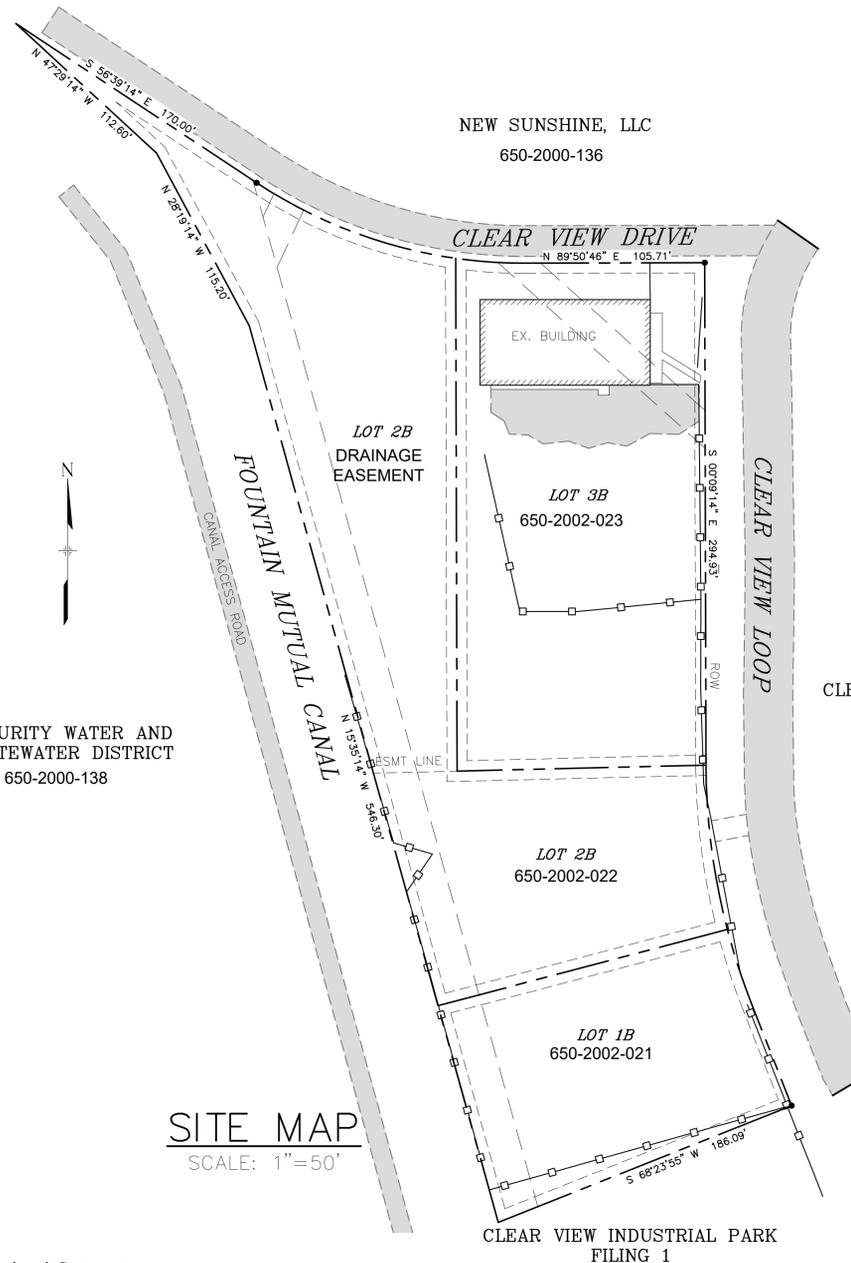
SITE MAP
SCALE: 1"=50'

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

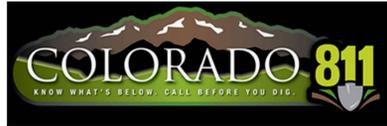
OWNER/DEVELOPER:
CLEAR VIEW PROPERTIES I, LLC
KEVIN FERGUSON, 719-337-3534
ENGINEER:
CTR ENGINEERING, INC.
JONATHAN MOORE, 719-964-6654
EL PASO COUNTY:
LUPE PACKMAN, 719-520-7550
SECURITY WAT. AND SAN. DISTRICT:
ROY HEALD, 719-392-3475
FOUNTAIN MUTUAL METRO. DISTRICT:
GARY BARBER, 719-598-0230

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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 | |
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PCD FILE NO. SF2029



1-800-922-1987

CLEAR VIEW INDUSTRIAL PARK, FILING 2B

GRADING, STORM AND EROSION CONTROL PLANS

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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> |
|---|--|---|---|

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 |
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| REVISIONS | | | |
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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**

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

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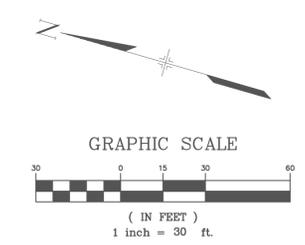
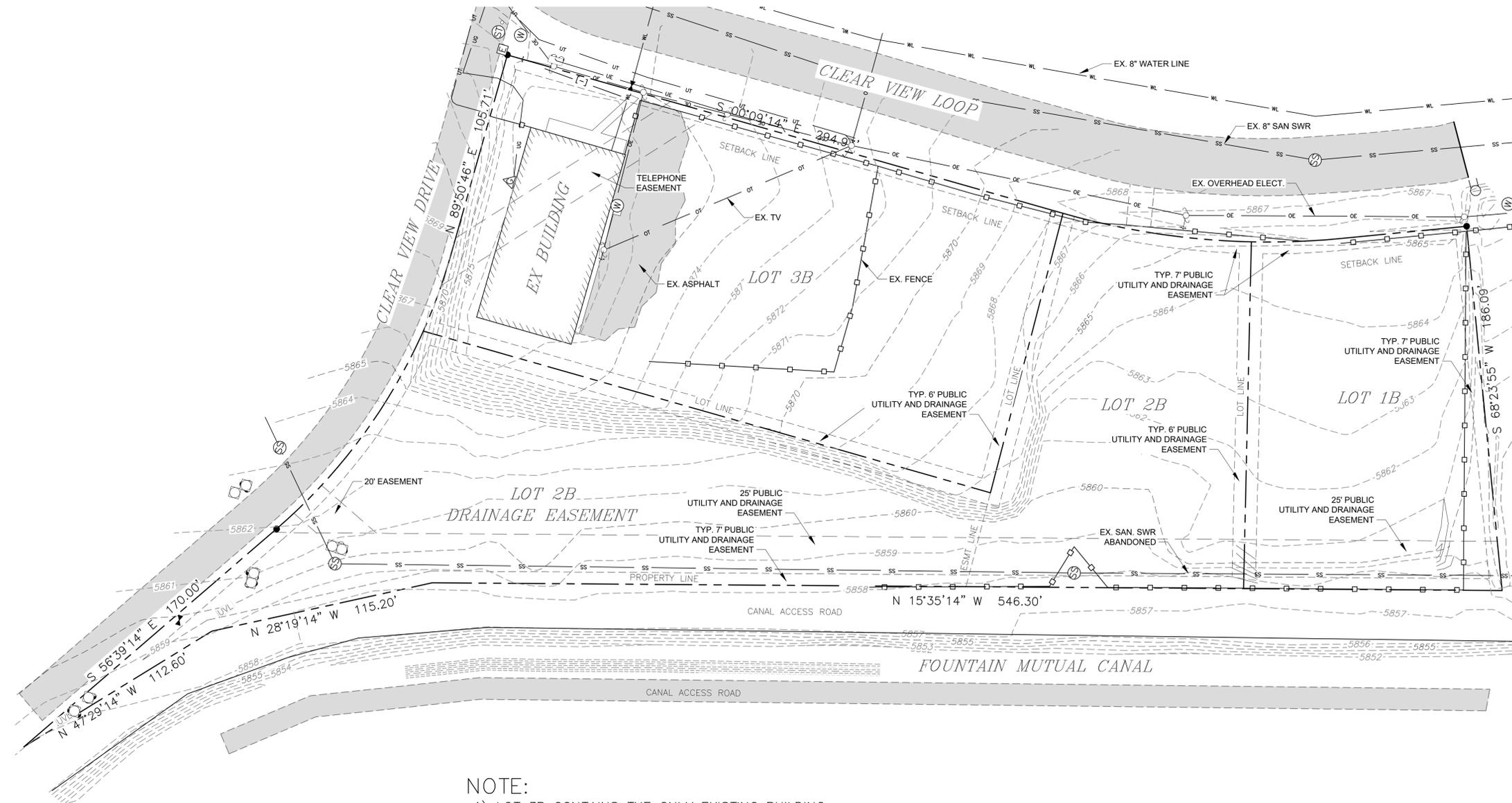


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LEGEND

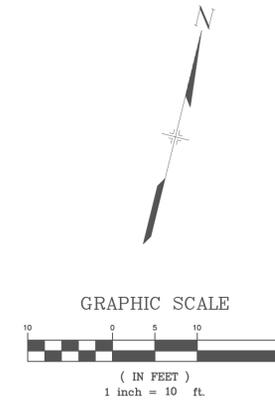
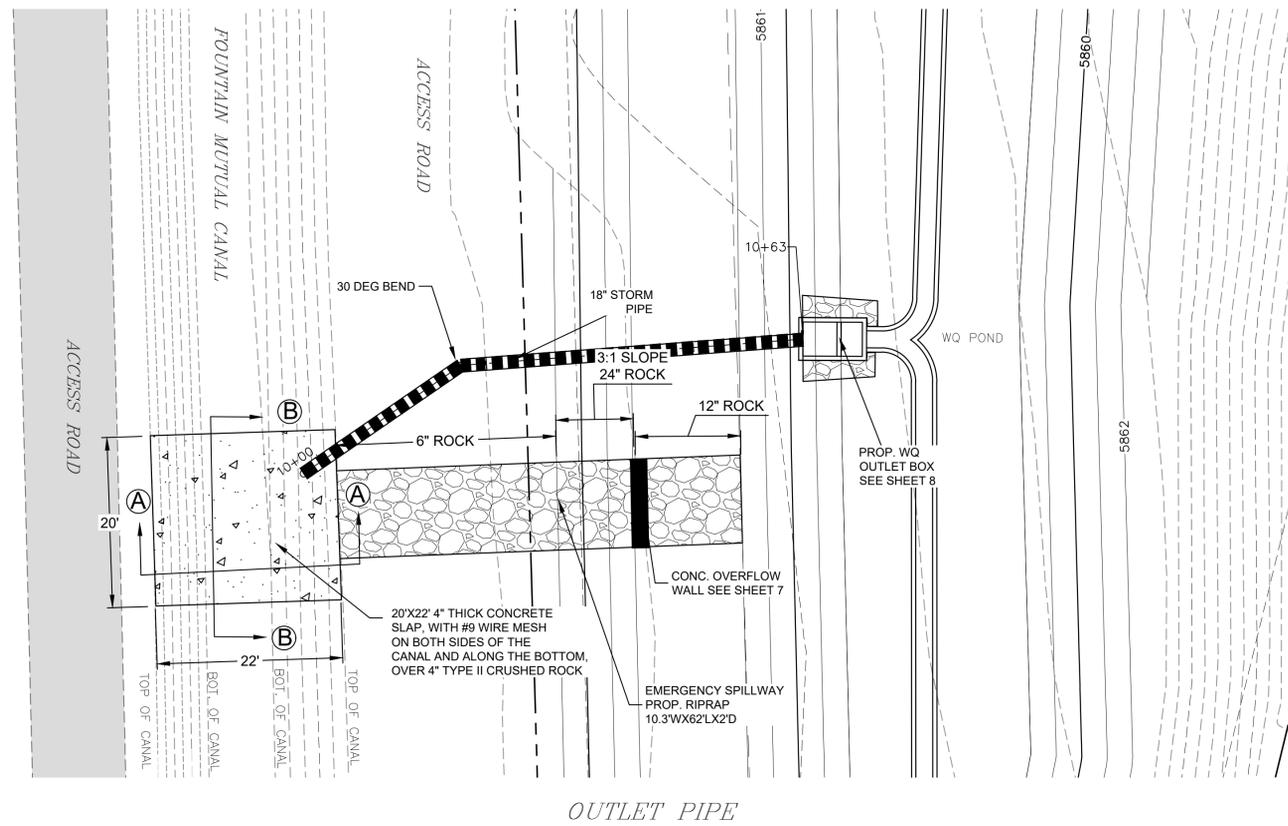
- EXISTING CONTOURS
- EXISTING FENCE
- EXISTING LOTS LINES

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.

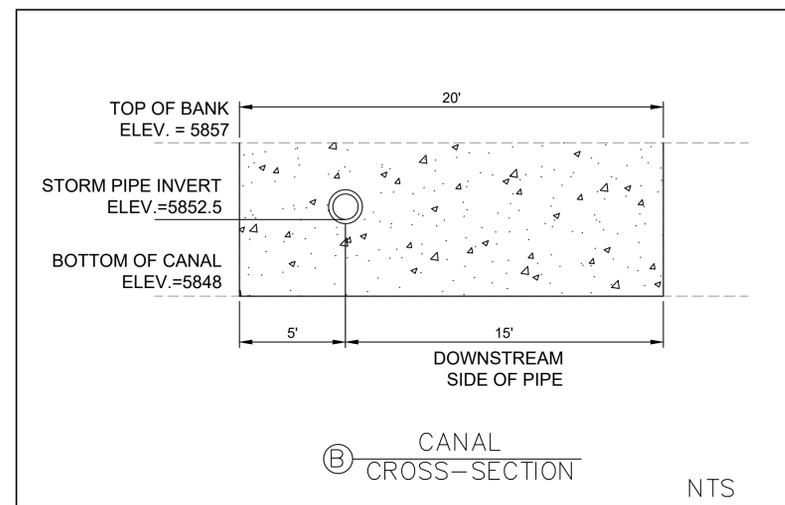
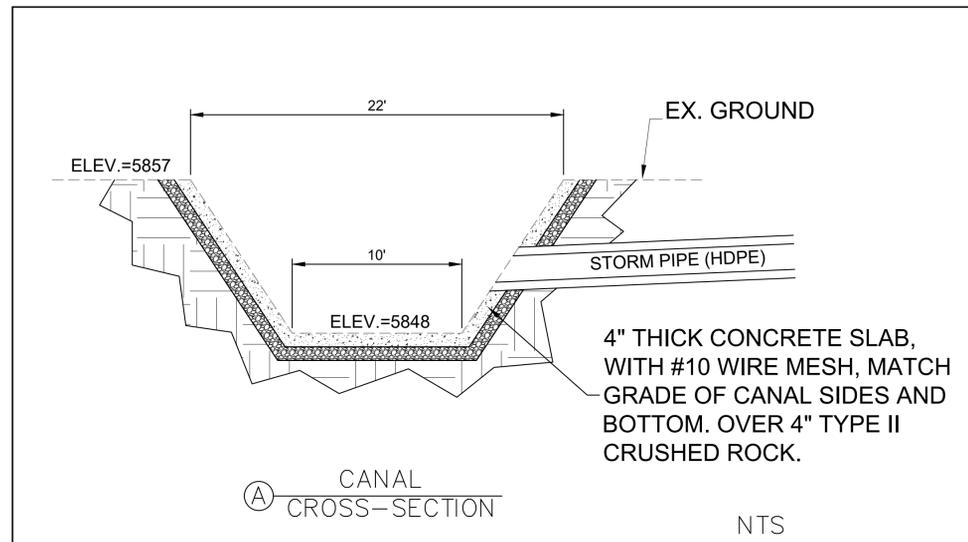
| NO. | DATE | DESCRIPTION | BY |
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| REVISIONS | | | |
| CTR Engineering, Inc. | | | |
| 16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654 | | | |
| PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B | | | |
| BENCHMARK: Elevations are 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: 1"=30' | DATE ISSUED: JAN. 2021 | |
| DRAWN BY: JCM | DATE: 1/23/2021 | SHEET NO. 3 OF 22 SHEETS | |
| CHECKED BY: JH | DATE: 1/23/2021 | | |
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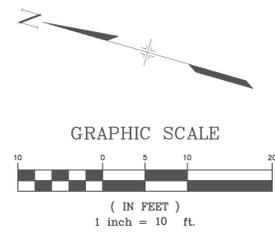
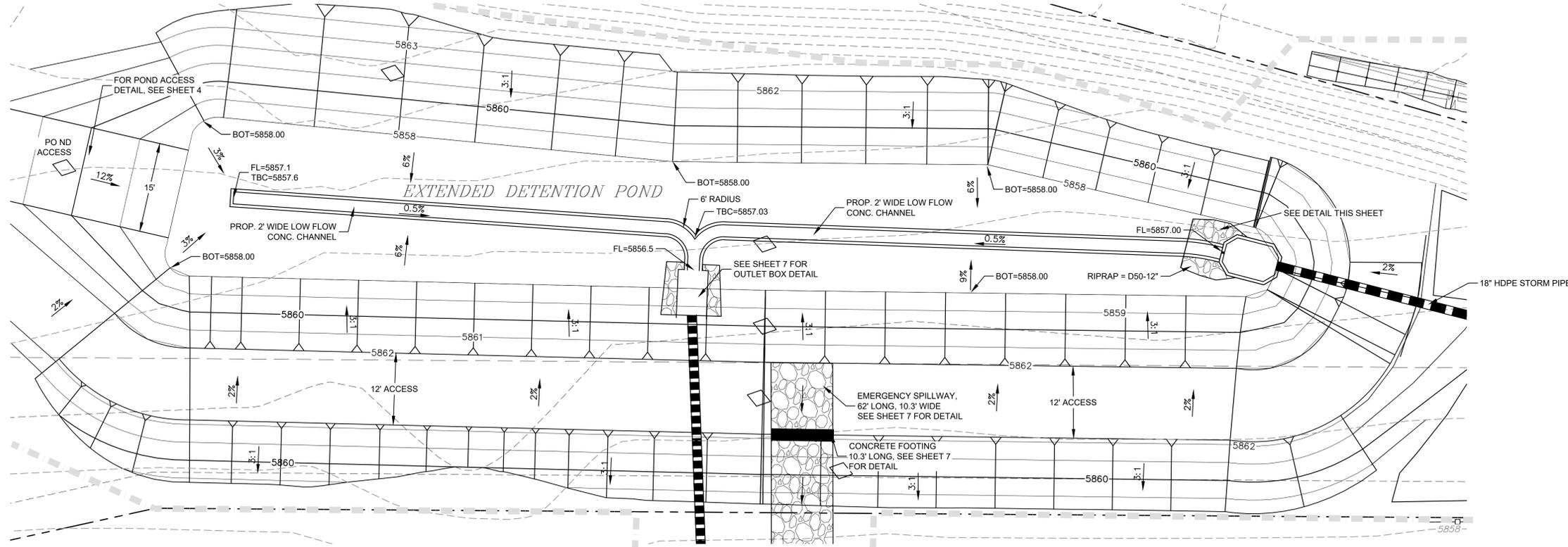
LEGEND

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



| NO. | DATE | DESCRIPTION | BY |
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| 16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654 | | | |
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| 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 | |
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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.

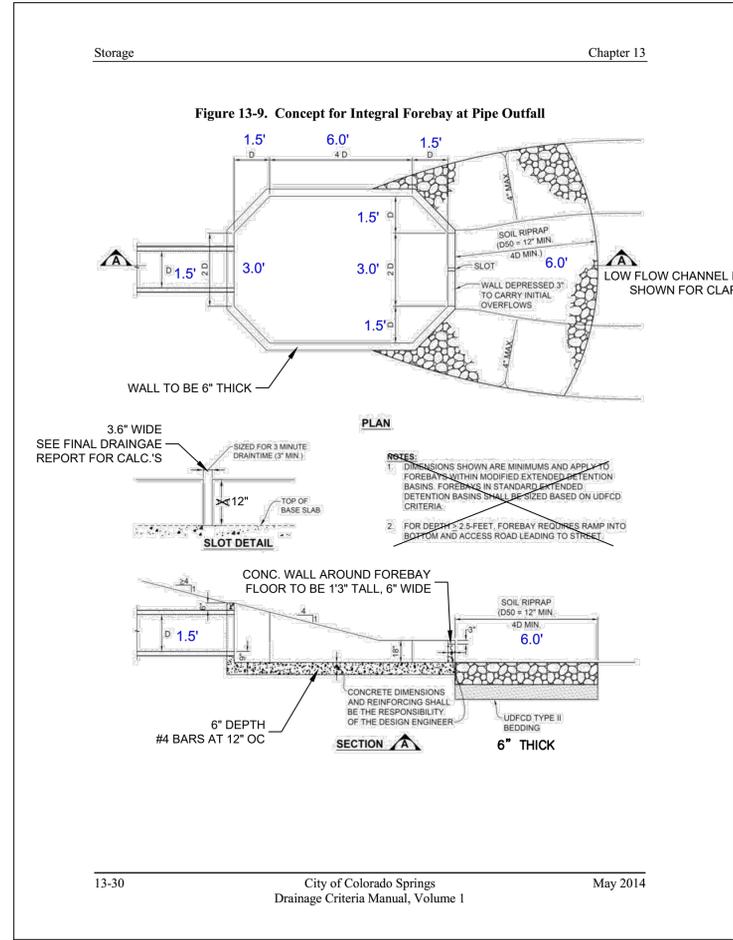
** Fifty percent or more by weight retained on the #40 sieve.

RIPRAP CLASSIFICATION

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

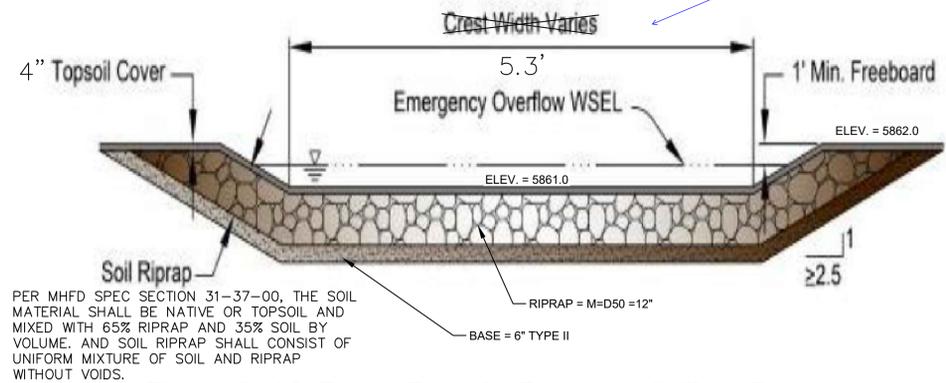
GRADATION FOR GRANULAR BEDDING

| 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 |



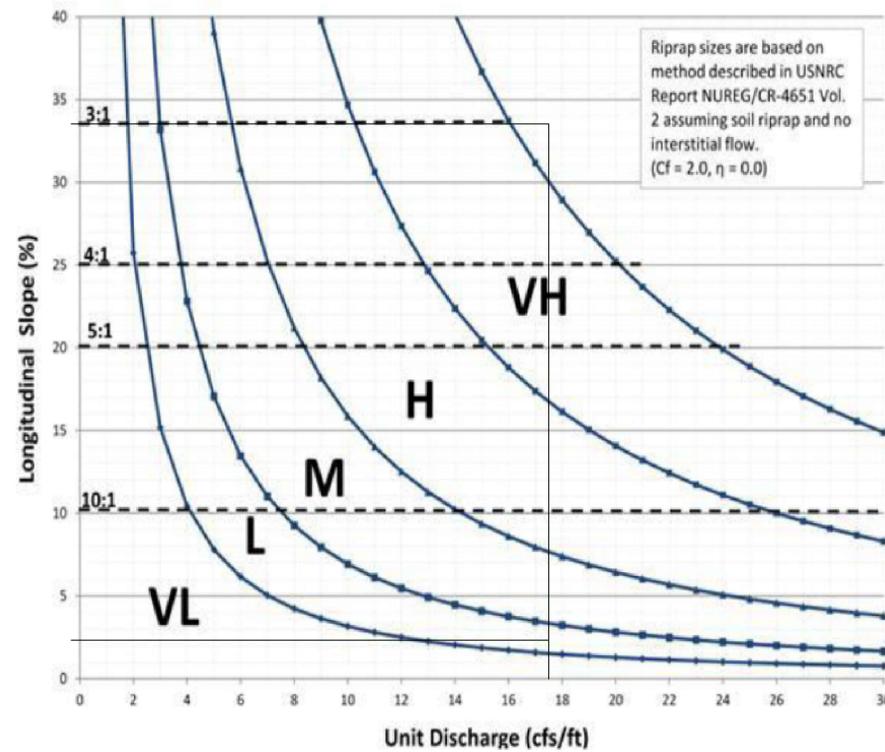
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| SHEET TITLE: POND DETAILS | | | |
| DESIGNED BY: JCM | SCALE: 1"=10' | DATE ISSUED: JAN. 2021 | |
| DRAWN BY: JCM | JH | SHEET NO. 6 OF 22 SHEETS | |
| CHECKED BY: JH | V: | DWG: | |

Figure 13-12c. Emergency Spillway Protection



Please revise. Construction drawings as sheet 6 shows a width of 10.3'.

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 13-12b. Emergency Spillway Profile at Embankment

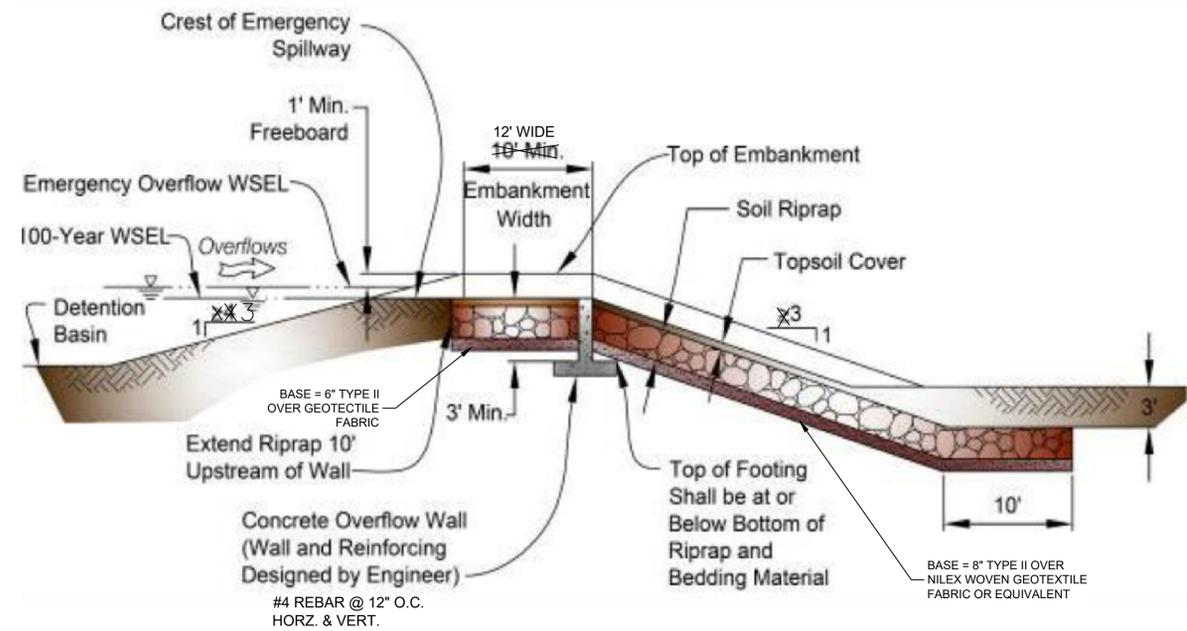
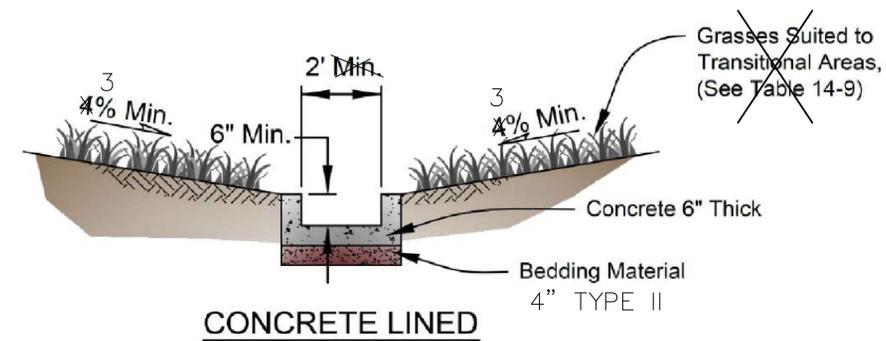
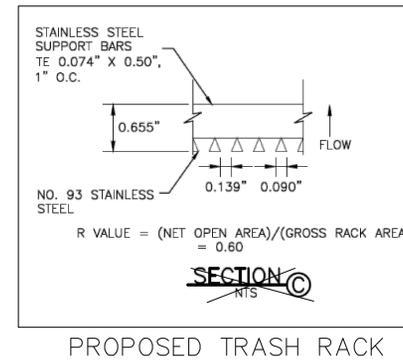
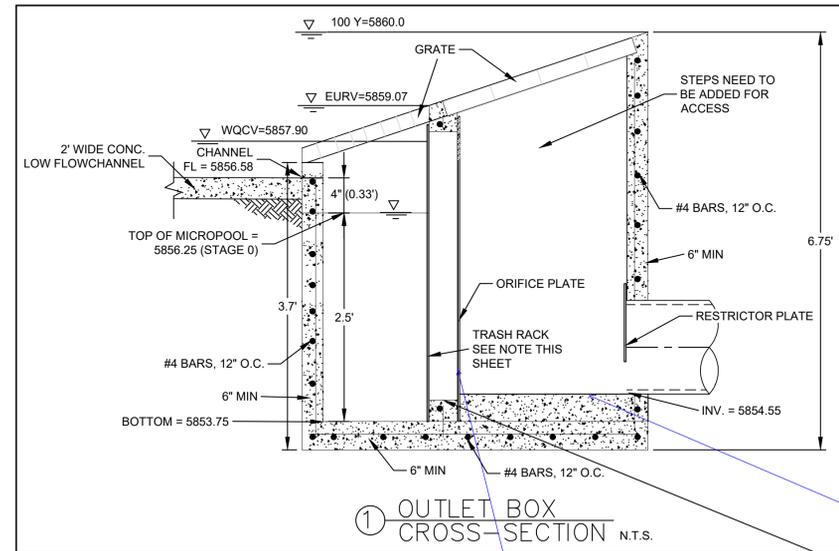


Figure 13-6. Typical Low-flow Channel Details

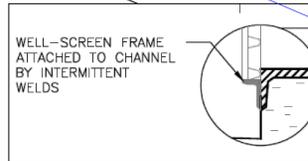


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| REVISIONS | | | |
| CTR Engineering, Inc. | | | |
| 16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654 | | | |
| PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B | | | |
| BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" 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 | CHK: JCM | SHEET NO. 7 OF 22 SHEETS | |
| CHECKED BY: JH | V: JH | DWG: | |

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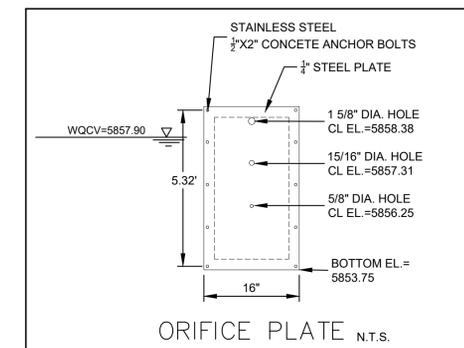
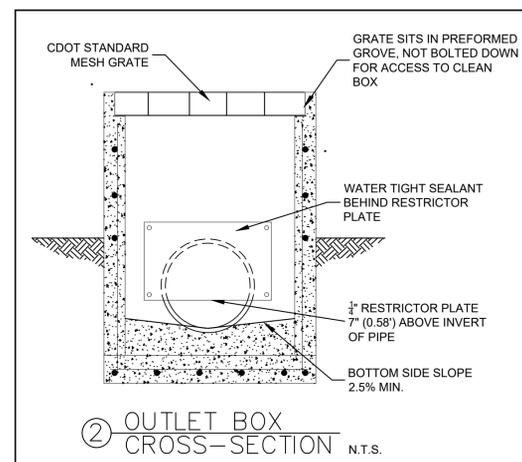
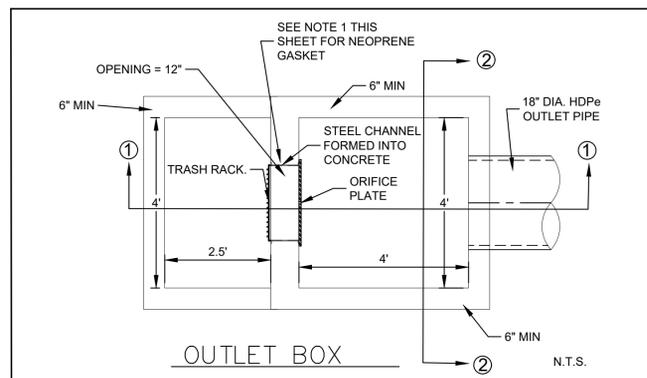
Show Orifice plate above all concrete, such that it does not get embedded in the concrete, so it can be removed for maintenance.



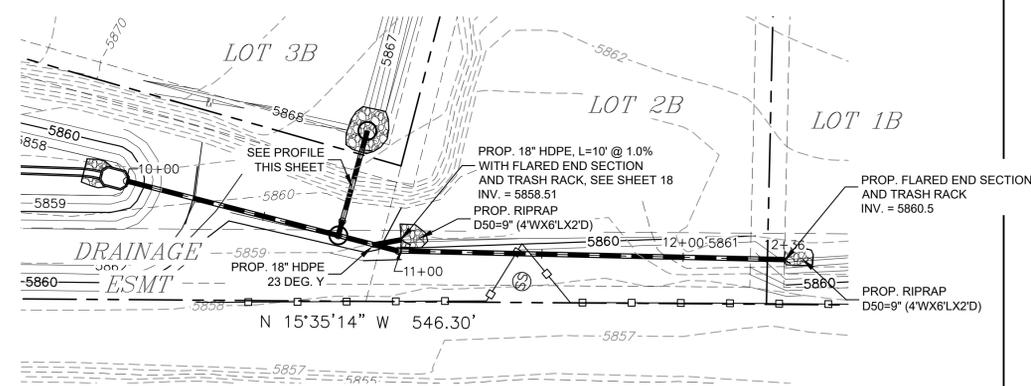
Show a 2.5% min slope in this left to right direction per page OS-9 of MHFD detail T-12. This is in addition to the sloped sides that you already show in Section 2 below.

NOTE:

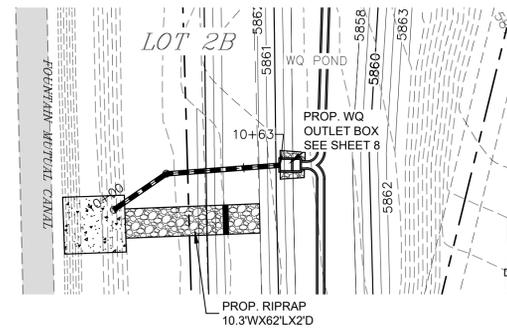
- 1) PROVIDE CONTINUOUS NEOPRENE GASKET BETWEEN ORIFICE PLATE AND CONCRETE STRUCTURE.
- 2) ALL EXTERIOR STEEL SHALL BE WITH STAINLESS OR HOT DIPPED GALVANIZED.
- 3) ALL METAL SURFACES ARE TO BE COATED WITH ZRC COLD GALVANIZING COMPOUND.
- 4) PER GEOTECH REPORT, ALL CONCRETE PLACED ON SITE IS TO USE TYPE 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.



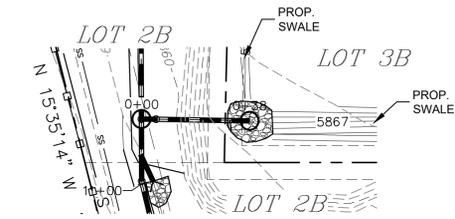
| NO. | DATE | DESCRIPTION | BY |
|---|------------|--------------------------|----|
| REVISIONS | | | |
| CTR Engineering, Inc. | | | |
| 16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654 | | | |
| PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B | | | |
| BENCHMARK: Elevations are based upon FIMS monument DR02, a 2\"/> | | | |
| PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL | | | |
| SHEET TITLE: OUTLET BOX DETAILS | | | |
| DESIGNED BY: JCM | SCALE: NTS | DATE ISSUED: JAN. 2021 | |
| DRAWN BY: JCM | H: NTS | SHEET NO. 8 OF 22 SHEETS | |
| CHECKED BY: JH | V: | | |
| DWG: | | | |



STORM LINE TO POND

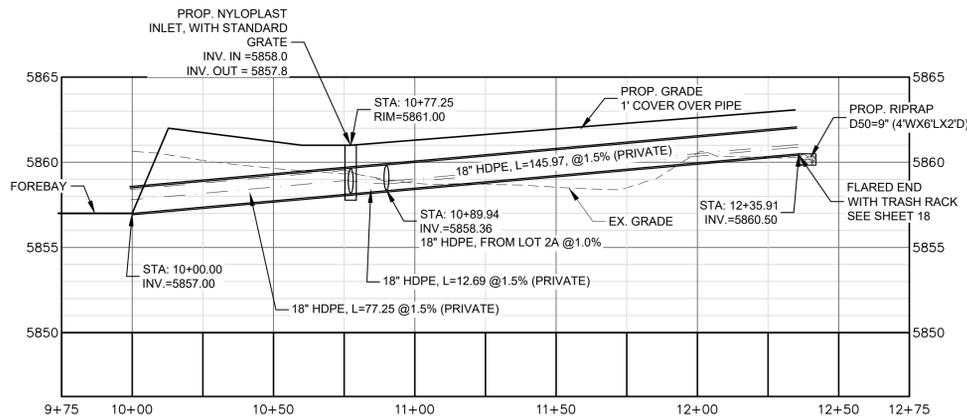


OUTLET PIPE



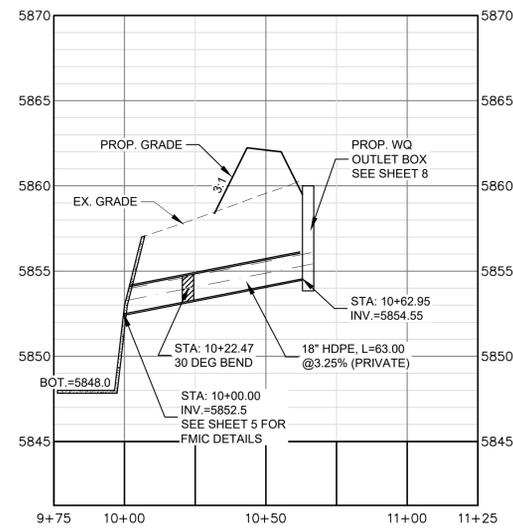
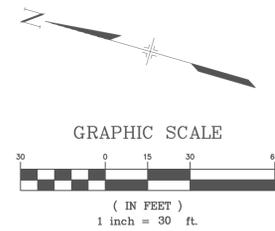
STORM PIPE FROM LOT 3B

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



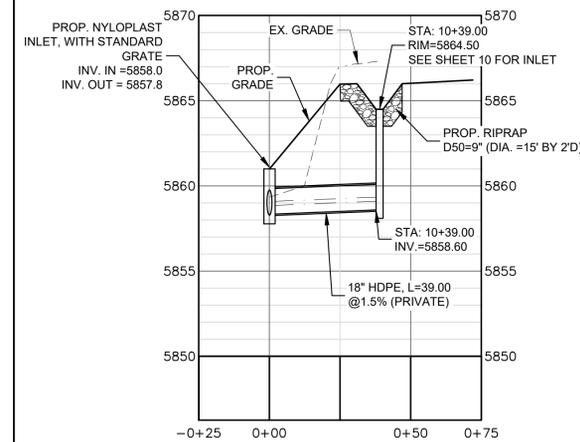
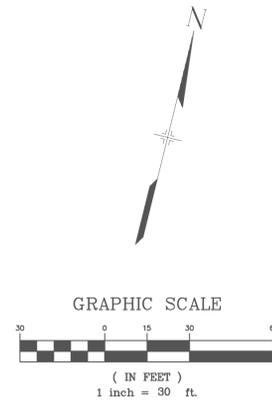
STORM PROFILE

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



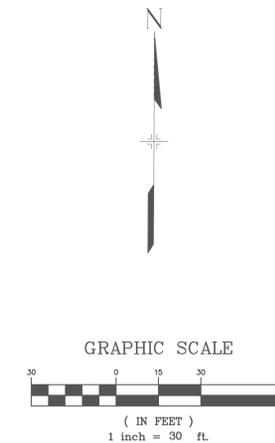
STORM PROFILE

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

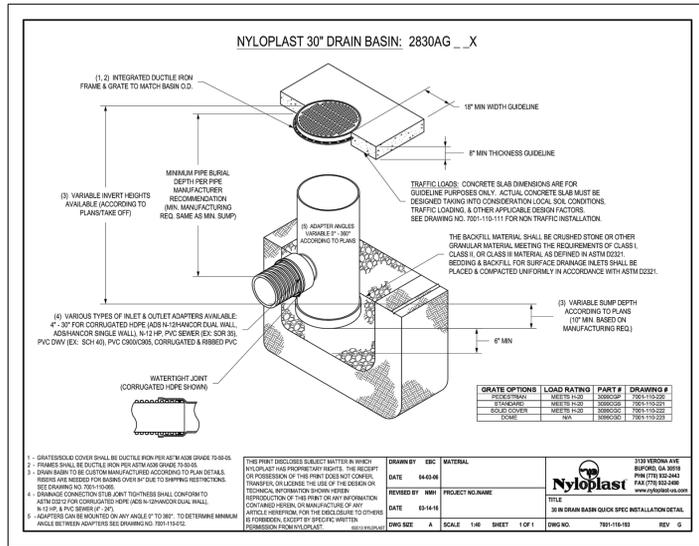
BENCHMARK: Elevations are based upon FIMS monument DR02, a 2" aluminum cap, stamped "CSU FIMS CONTROL DR02", at the southeast corner of Monica Drive and Hancock Expressway (Elevation=5927.27 NGVD29)

PROJECT TITLE: GRADING, WATER QUALITY POND AND EROSION CONTROL

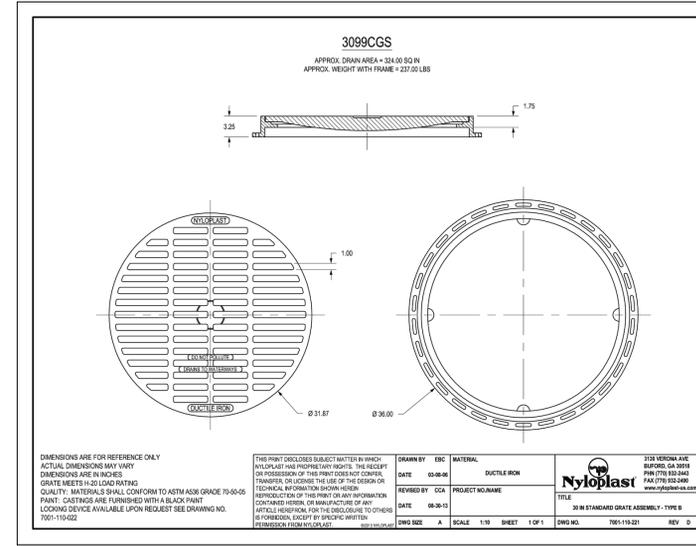
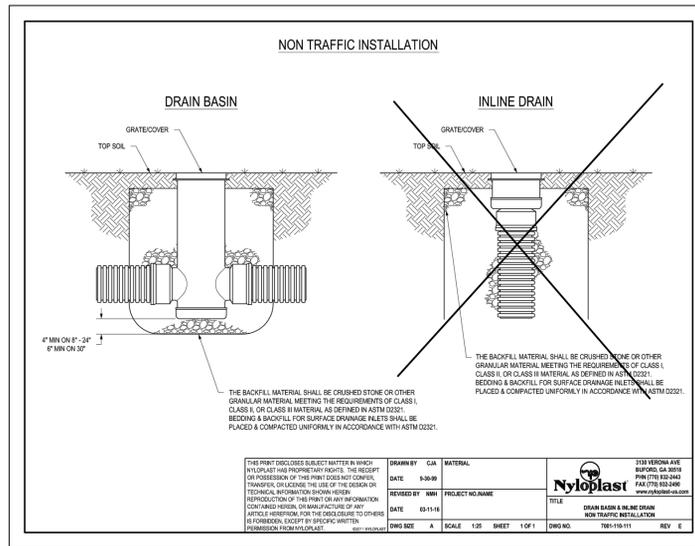
SHEET TITLE: STORM PLAN AND PROFILE

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

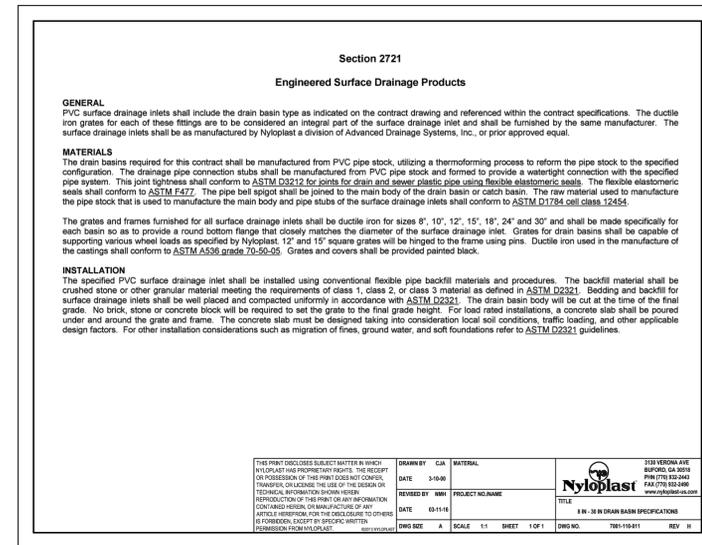
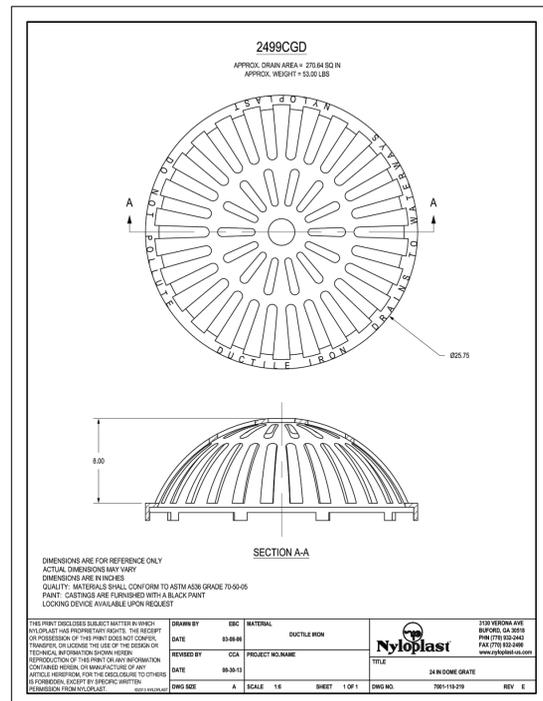
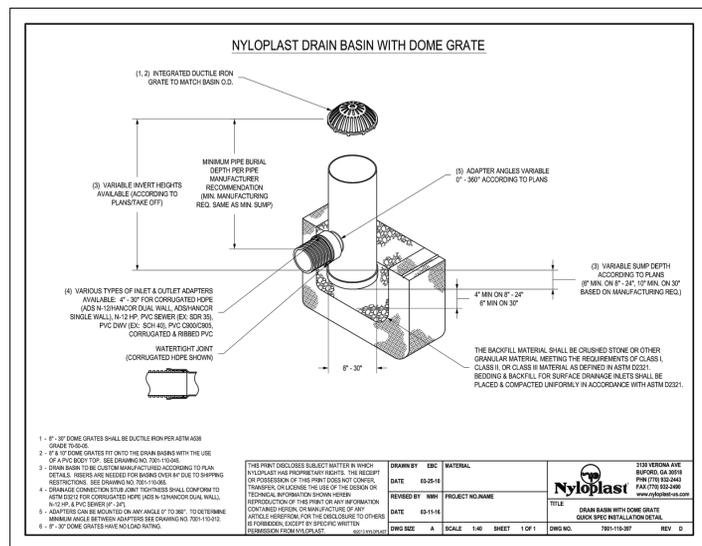
DWG:



INLINE STORM STA: 10+77.30



LOT 3B



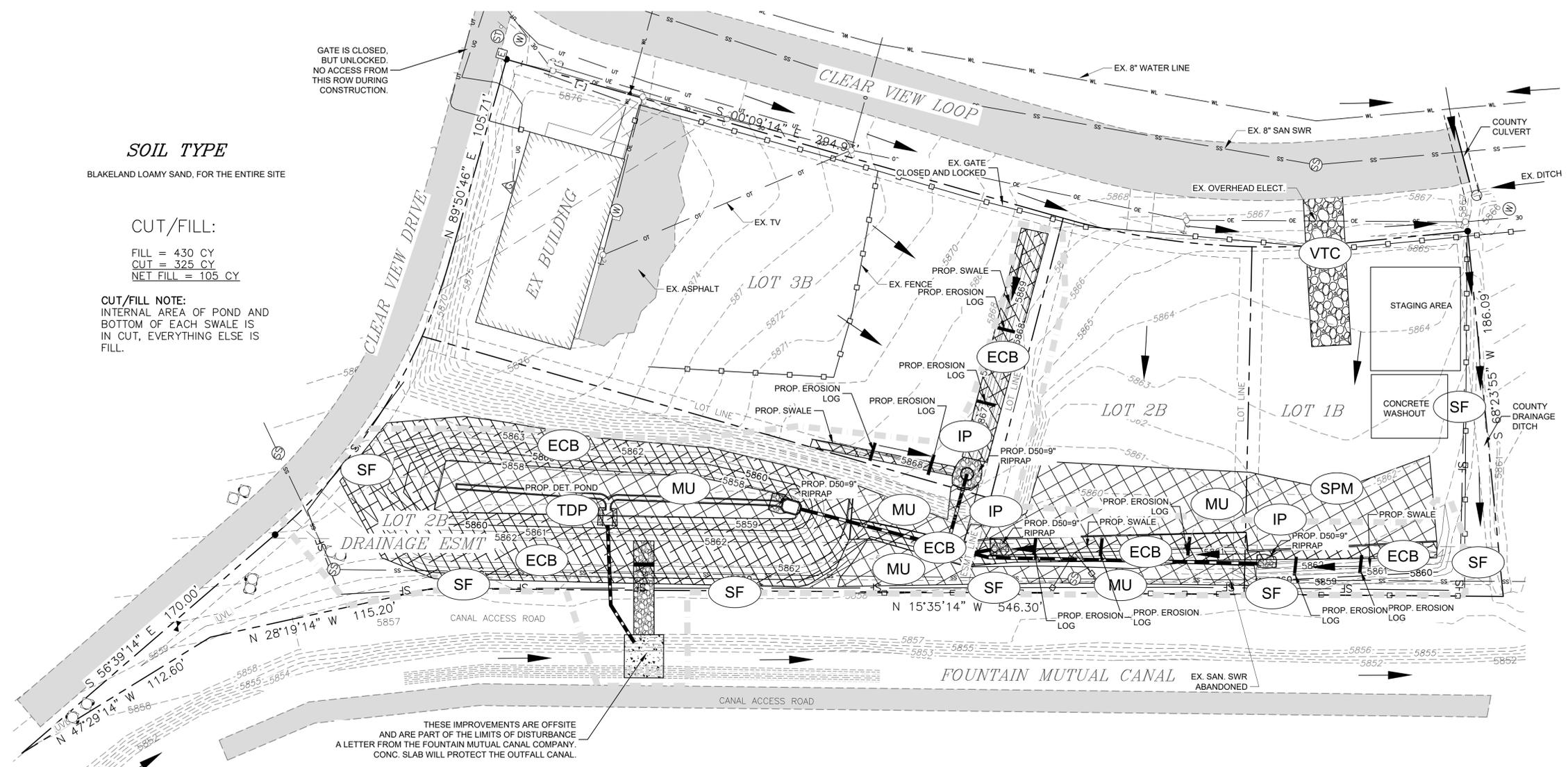
| NO. | DATE | DESCRIPTION | BY |
|--|-----------|---------------------------|----|
| REVISIONS | | | |
| CTR Engineering, Inc. | | | |
| 16392 TIMBER MEADOW DRIVE COLORADO SPRINGS, CO 80908 (719) 964-6654 | | | |
| PROJECT: CLEAR VIEW INDUSTRIAL PARK FILING 2B | | | |
| BENCHMARK: Elevations are based 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
BLAKELAND LOAMY SAND, FOR THE ENTIRE SITE

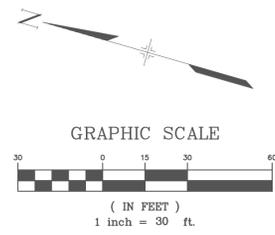
CUT/FILL:
FILL = 430 CY
CUT = 325 CY
NET FILL = 105 CY

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



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.

The drainage easement on lot 2b will be platted through this application process. Please remove note.

| 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: V: | SHEET NO. 11 OF 22 SHEETS | |
| CHECKED BY: JH | | | |
| 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

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 PERMEABLE 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 1% PASSING A #60 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 Swale 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

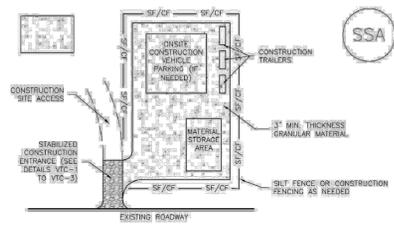
- CONTRACTOR SHALL INSPECT SWALE LININGS AFTER EACH RAINFALL AT LEAST DAILY DURING PROLONGED RAINFALL AND WEEKLY DURING PERIODS OF NO RAINFALL.
- DAMAGED LININGS SHALL IMMEDIATELY BE REPAIRED.
- REFER TO THE EROSION CONTROL BLANKETS FACTSHEET FOR PROPER MAINTENANCE.
- DISPLACED RIPRAP OR COARSE AGGREGATE 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

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: | | | |

Stabilized Staging Area (SSA) SM-6



SSA-1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

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

STABILIZED STAGING AREA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

SM-6 Stabilized Staging Area (SSA)

STABILIZED STAGING AREA MAINTENANCE NOTES

1. THE STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.
2. 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 MULCH 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 USDCO 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.

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 |

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/exit 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.

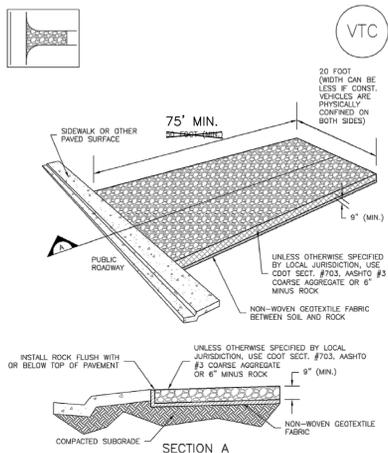
When wheel wash equipment is used, be sure that the wash water is discharged to a sediment trap prior to discharge. Also inspect channels conveying the water from the wash area to the sediment trap and stabilize areas that may be eroding.

When a construction entrance/exit 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.



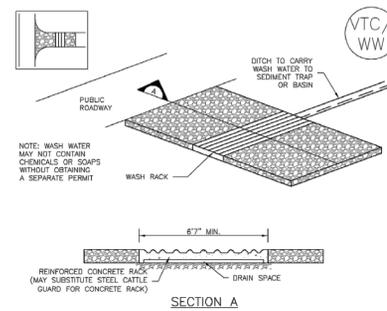
Photograph VTC-2. A vehicle tracking control pad with wheel wash facility. Photo courtesy of Tom Gore.

Vehicle Tracking Control (VTC) SM-4



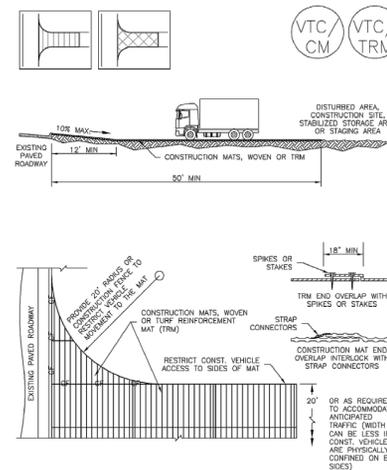
VTC-1. AGGREGATE VEHICLE TRACKING CONTROL

SM-4 Vehicle Tracking Control (VTC)



VTC-2. AGGREGATE VEHICLE TRACKING CONTROL WITH WASH RACK

Vehicle Tracking Control (VTC) SM-4



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

SM-4 Vehicle Tracking Control (VTC)

STABILIZED CONSTRUCTION ENTRANCE/EXIT INSTALLATION NOTES

1. 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).
2. 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.
3. A STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE LOCATED AT ALL ACCESS POINTS WHERE VEHICLES ACCESS THE CONSTRUCTION SITE FROM PAVED RIGHT-OF-WAYS.
4. STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
5. A NON-WOVEN GEOTEXTILE FABRIC SHALL BE PLACED UNDER THE STABILIZED CONSTRUCTION ENTRANCE/EXIT PRIOR TO THE PLACEMENT OF ROCK.
6. 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

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY TO THE STABILIZED ENTRANCE/EXIT TO MAINTAIN A CONSISTENT DEPTH.
5. 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 USDCO 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)

| 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 | | | |
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| 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 "hook" 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 "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 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).

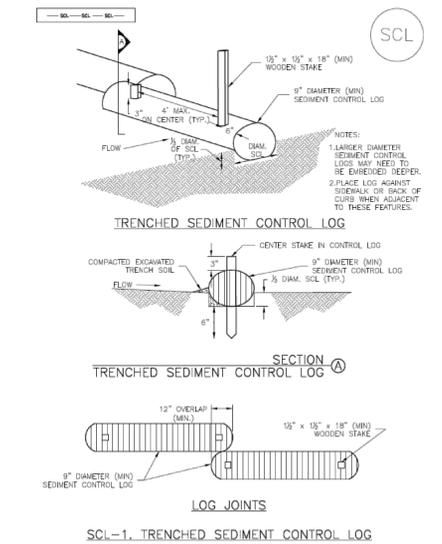
Improper installation can lead to poor performance. Be sure that sediment control logs are properly trenched (if lighter than 8 lb/foot), anchored and tightly jointed.

Maintenance and Removal

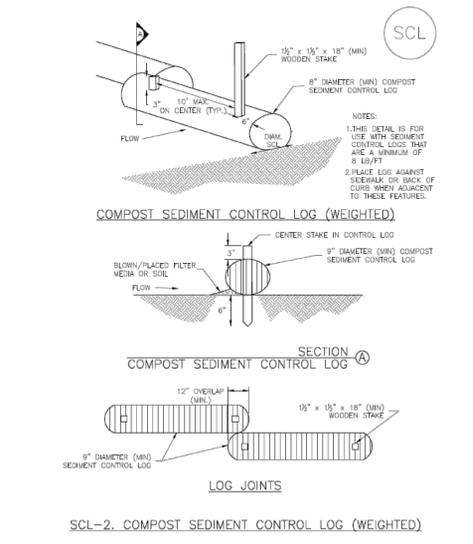
Be aware that sediment control logs will eventually degrade. Remove accumulated sediment before the logs may need to be seeded and mulched. Sediment control logs that are biodegradable may occasionally be left in place (e.g., when logs are used in conjunction with erosion control blankets as permanent 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

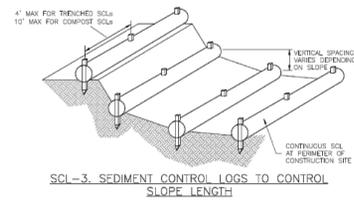


SC-2 Sediment Control Log (SCL)



Sediment Control Log (SCL) SC-2

SC-2



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 1/3 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 8 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 SEEDED. IF DISTURBED AREAS EXIST AFTER REMOVAL, THEY SHALL BE COVERED WITH TOP SOIL, SEEDED 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 LIVED STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

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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 |

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

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.

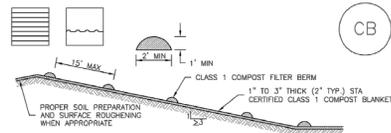
Weed control can be a maintenance challenge in areas using compost blankets. A weed control strategy may be necessary, including measures such as mechanical removal and spot application of targeted herbicides by licensed applicators.

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.

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

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 LOCAL 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 blanket 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 |

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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 ^{1,3} | | | |
| 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 | H: | | |
| 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:

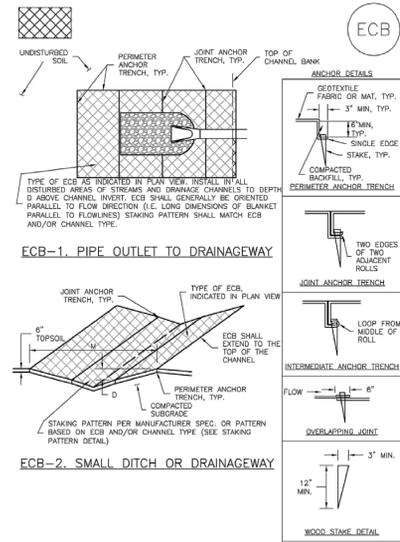
- Check for general signs of erosion, including voids beneath the mat. If voids are apparent, fill the void with suitable soil and replace the erosion control blanket, following the appropriate staking pattern.
- Check for damaged or loose stakes and secure loose portions of the blanket.

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.

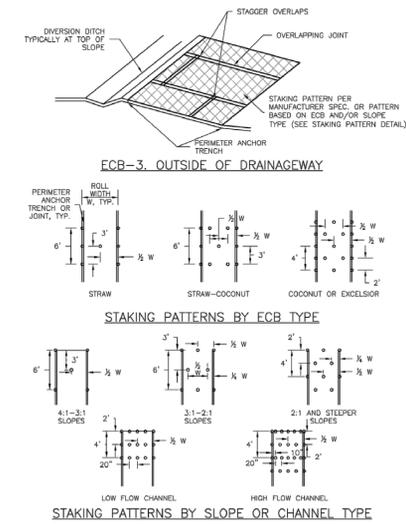
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EC-6 Rolled Erosion Control Products (RECP)



RECP-6 Urban Drainage and Flood Control District
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EC-6 Rolled Erosion Control Products (RECP) EC-6



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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 EXPOSED SOIL SHOULD BE RESEEDED AND MULCHED. THE ECB REINSTALLED.
- NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM USFCO 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 | 30-40 | 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 USFCO FOR RECOMMENDED ANNUAL GRASSES FOR THE DENVER METROPOLITAN AREA. THIS TABLE MAY BE USED UNLESS A SITE-SPECIFIC SEED MIX IS REQUESTED AND APPROVED.

TABLE TS-1

TEMPORARY SEEDING NOTES

- INSTALLATION REQUIREMENTS**
- 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 SEED. 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 SEEDING 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.
- MAINTENANCE REQUIREMENTS**
- REGULAR INSPECTIONS ARE TO BE MADE OF ALL SEEDING 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.
 - SEEDING 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

6/1/2006

| 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 |

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

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.



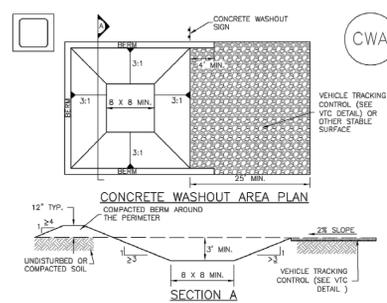
Photograph CWA-2. Prefabricated concrete washout. Photo courtesy of CDOT.



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.

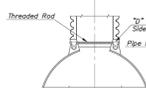
CWA-4 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 November 2010

| 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 | 25 | 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 | 66" |
| 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" |

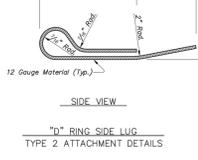
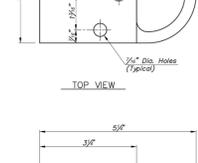
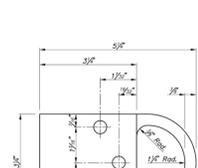
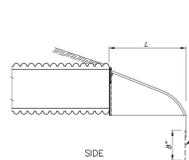
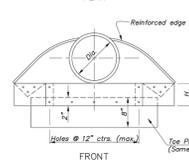
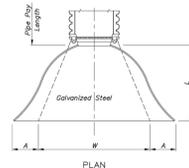
The plate extensions where specified, to be punched to match holes in across (p. 3/8" bolts to be furnished. The length of toe plate to be as follows: W = 10" for 12" to 36" diameter pipes inclusive. W = 20" for 36" to 60" diameter pipes inclusive.

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.

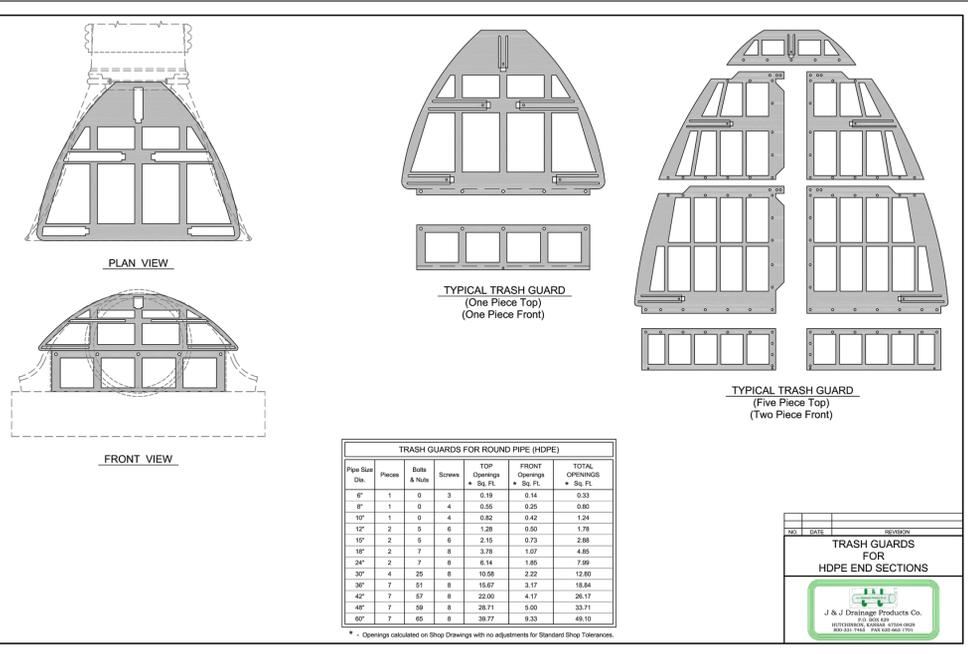
* - Dimensions in Inches Plus or Minus Standard Shop Tolerance.



TYPE 2 CONNECTIONS (12" & Larger)



STANDARD END SECTION FOR HDPE PIPES
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 | HH: | | |
| 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 be 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

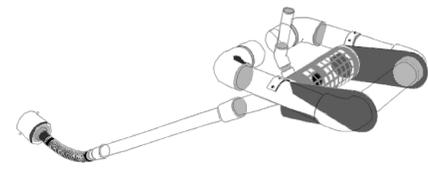


Illustration SB-1. Outlet structure for a temporary sediment basin - Faircloth Skimmer Floating Outlet. Illustration courtesy of J. W. Faircloth & Sons, Inc., FairclothSkimmer.com.

- 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)

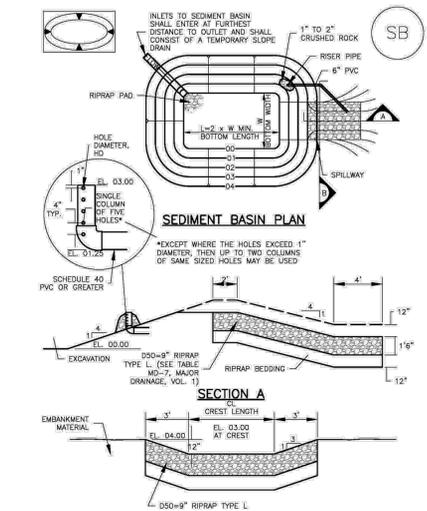
Maintenance and Removal

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 | 3/4 |
| 2 | 21 | 4 | 1 1/4 |
| 3 | 33 1/2 | 6 | 1 3/4 |
| 4 | 42 1/2 | 8 | 1 3/4 |
| 5 | 48 1/2 | 9 | 1 3/4 |
| 6 | 51 | 10 | 1 3/4 |
| 7 | 47 1/2 | 11 | 1 3/4 |
| 8 | 51 | 12 | 1 3/4 |
| 9 | 50 | 13 | 1 3/4 |
| 10 | 56 1/4 | 15 | 1 3/4 |
| 11 | 61 | 16 | 1 3/4 |
| 12 | 64 | 18 | 1 3/4 |
| 13 | 67 1/2 | 19 | 1 3/4 |
| 14 | 70 1/2 | 21 | 1 3/4 |
| 15 | 73 1/4 | 22 | 1 3/4 |

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 MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

(DETAILS ADAPTED FROM BOULDER COUNTY, COLORADO)
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.

| NO. | DATE | DESCRIPTION | BY |
|---|--------|---------------------------|----|
| REVISIONS | | | |
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| DRAWN BY: JCM | JH: | | |
| 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 |

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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.

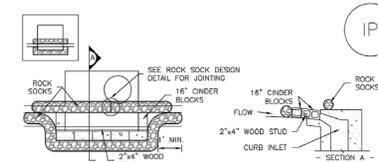
- Proprietary inlet protection devices should be inspected and maintained in accordance with manufacturer specifications. If proprietary inlet insert devices are used, sediment should be removed in a timely manner to prevent devices from breaking and spilling sediment into the storm drain.

Inlet protection must be removed and properly disposed of when the drainage area for the inlet has reached final stabilization.

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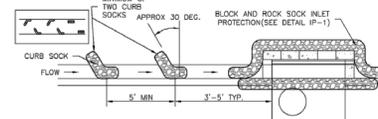
SC-6

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.



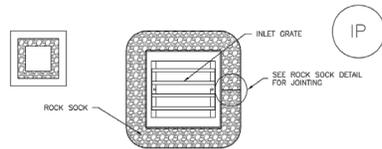
IP-2. CURB ROCK SOCKS UPSTREAM OF INLET PROTECTION

- 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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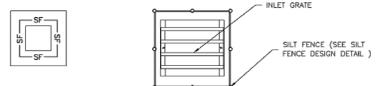
Inlet Protection (IP)

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.



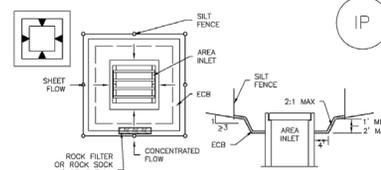
IP-4. SILT FENCE FOR SUMP INLET PROTECTION

- 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.

August 2013 Urban Drainage and Flood Control District IP-5
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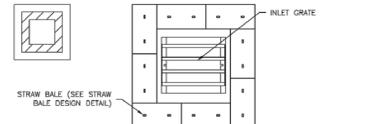
SC-6

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 PILE IN 2:1 RATIO WITH LENGTH ORIENTED TOWARDS DIRECTION OF FLOW.
 - SEDIMENT MUST BE PERIODICALLY REMOVED FROM THE OVEREXCAVATED AREA.



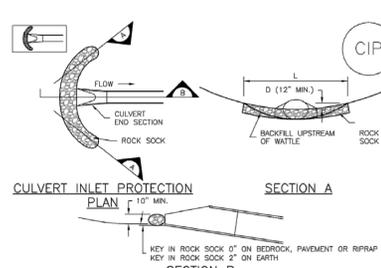
IP-6. STRAW BALE FOR SUMP INLET PROTECTION

- 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 CULVERT 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 EVENT.
 - 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 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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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: |
| DRAWN BY: | JCM | INCHES: | JAN. 2021 |
| CHECKED BY: | JH | FEET: | 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 | |
|---------------------------------|----------|
| Function | |
| 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.

ED/DS-2 Urban Drainage and Flood Control District November 2010
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Earth Dikes and Drainage Swales (ED/DS) EC-10



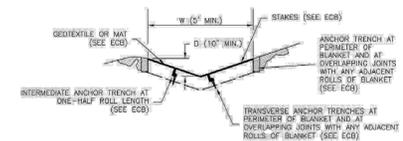
ED-1. COMPACTED UNLINED EARTH DIKE FORMED BY BERM



DS-1. COMPACTED UNLINED EXCAVATED SWALE



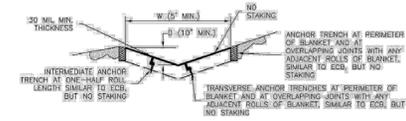
DS-2. COMPACTED UNLINED SWALE FORMED BY CUT AND FILL



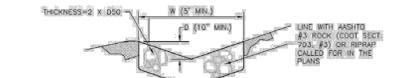
DS-3. ECB LINED SWALE (CUT AND FILL OR BERM)

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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, D, AND WIDTH W, DIVERSIONS
 - FOR ECB/TRM LINED DITCH, SEE ECD DETAIL
 - FOR RIPRAP LINED DITCH, SIZE OF RIPRAP D50
- 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/TRM SHALL 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.

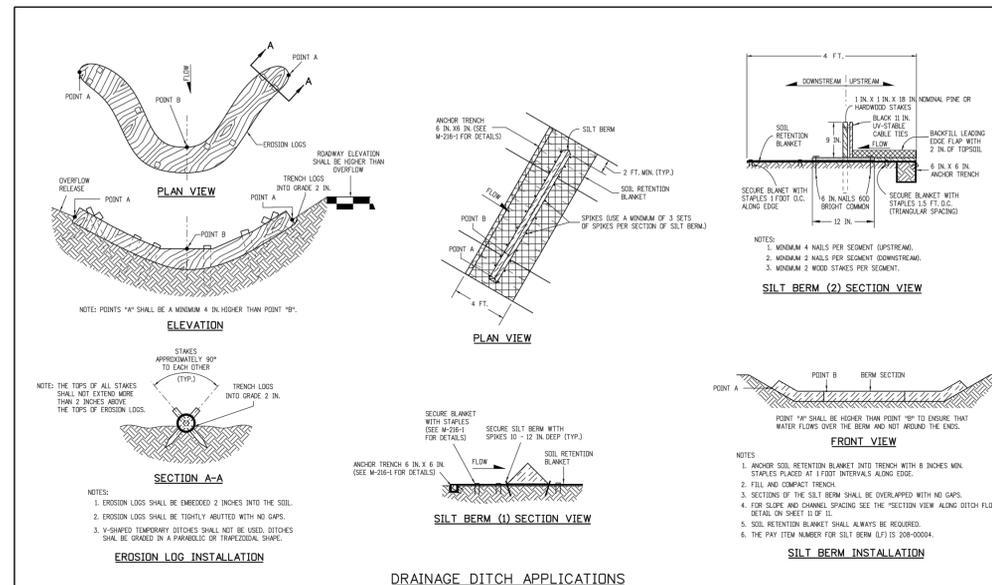
ED/DS-4 Urban Drainage and Flood Control District November 2010
Urban Storm Drainage Criteria Manual Volume 3

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.

November 2010 Urban Drainage and Flood Control District ED/DS-5
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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 | | M-208-1 | | Standard Sheet No. 6 of 11 | |
| Designer: | JBK | Comments: | | 2829 West Howard Place | | Project Sheet Number: | | | |
| Last Modification Date: | 07/31/19 | | | CDOT HQ, 3rd Floor | | | | | |
| Detailer: | LTA | | | Denver, CO 80204 | | | | | |
| CDOT File: | Maintenance 18_Scales Not to Scale (Units: English) | | | Phone: 303-757-8000 FAX: 303-757-8968 | | | | | |
| | | | | Project Development Branch | | JBC | | Issued by the Project Development Branch July 31, 2019 | |

| 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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| DESIGNED BY: | JCM | SCALE: | DATE ISSUED: |
| DRAWN BY: | JCM | H: | JAN. 2021 |
| CHECKED BY: | JH | V: | SHEET NO. 21 OF 22 SHEETS |
| 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 |

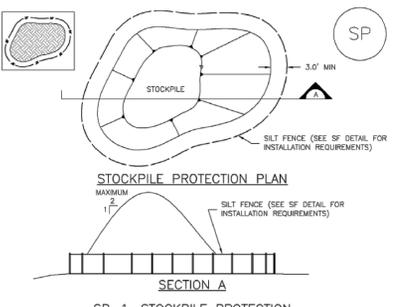
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MM-2 Stockpile Management (SM)

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.

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

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

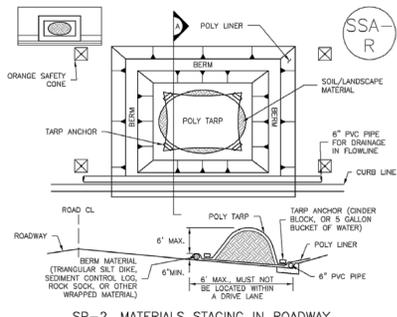
- IF PERIMETER PROTECTION MUST BE MOVED TO ACCESS SOIL STOCKPILE, REPLACE PERIMETER CONTROLS BY THE END OF THE WORKDAY.
- STOCKPILE PERIMETER CONTROLS CAN BE REMOVED ONCE ALL THE MATERIAL FROM THE STOCKPILE HAS BEEN USED.

(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.

November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 SP-5

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)

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

| NO. | DATE | DESCRIPTION | BY |
|--|--------|---------------------------|----|
| REVISIONS | | | |
| CTR Engineering, Inc. | | | |
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| DRAWN BY: JCM | JH: | SHEET NO. 22 OF 22 SHEETS | |
| CHECKED BY: JH | V: | | |
| DWG: | | | |