EPC STORMWATER REVIEW COMMENTS
IN ORANGE BOXES WITH BLACK TEXT

FINAL DRAINAGE REPORT FOR BRADLEY POINT FILING NO. 1

EL PASO COUNTY, COLORADO

DECEMBER 2022

PCD-ENGINEERING REVIEW COMMENTS
IN BLUE BOXES WITH BLUE TEXT

Prepared for:

Stephen J. Schnurr
Bradley Point, LLC
2010 Fox Mountain Point
Colorado Springs, CO 80906
(719) 491-3101

Prepared by:

CIVIL CONSULTANTS, INC.

212 N. Wahsatch Avenue, Suite 305
Colorado Springs, CO 80903
(719) 955-5485

Project #70-074
PCD Project # MS-21-002

Remove "Preliminary" and update accordingly on all pages.

PRELIMINARY/FINAL DRAINAGE REPORT FOR BRADLEY POINT FILING NO. 1

DRAINAGE PLAN STATEMENTS

ENGINEERS STATEMENT

The attached drainage plan and report was prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the master plan of the drainage basin.

_____
Virgil A. Sanchez, P.E. #37160
For and on Behalf of M&S Civil Consultants, Inc

DEVELOPER'S STATEMENT

I, the developer have read and will comply with all the requirements specified in this drainage report and plan.

BY:_____
Stephen J. Schnurr

TITLE:_____
DATE:_____

ADDRESS: Stephen J. Schnurr
2010 Fox Mountain Point
Colorado Springs, CO 80906

EL PASO COUNTY'S STATEMENT

Filed in accordance with the requirements of El Paso County Land Development Code, Drainage Criteria Manual Volumes 1 and 2, and the Engineering Criteria Manual, as amended.

BY:_____ DATE:_____
Jennifer Irvine, P.E.
County Engineer / ECM Administrator

At time of final submittal replace "Jennifer Irvine, P.E." with "Joshua Palmer, P.E.". Include signatures and stamps from engineer and developer.

PRELIMINARY/FINAL DRAINAGE REPORT FOR BRADLEY POINT FILING NO. 1

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APPENDIX

PRELIMINARY/FINAL DRAINAGE REPORT FOR BRADLEY POINT FILING NO. 1

Remove "Preliminary"

PURPOSE

This document is the Preliminary/Final Drainage Report for Bradley Point Filing No. 1. The purpose of this document is to identify and analyze the on and offsite drainage patterns and to ensure that post development runoff is routed through the site safely and in a manner that satisfies the requirements set forth by the El Paso County Drainage Criteria Manual.

GENERAL LOCATION AND DESCRIPTION

"Bradley Point Filing No. 1" refers to the subdivision of two parcels, 6503-40-0038 and 6503-40-0040. Bradley Point Filing No. 1 is located within the southeast and northwest quarters of the southeast quarter of Section 3, Township 15 south, Range 66 West, of the 6th Principal Meridian, El Paso County, Colorado. The site boundary is defined by Highway 85/87 on the southwestern boundary, Parcel 1 of the Rocky Mountain Materials and Asphalt Exemption Plat Map – Rec. No. 211713132 on the northwestern boundary, A.T. & S.F. Railroad Right of Way on the northeastern boundary, and unplatted land – Book 2780, Page 119, Schedule No. 65112-00-001 on the southeastern boundary. Bradley Point Filing No. 1 lies within the Little Johnson Drainage Basin. Flows from this site are tributary the US 85-87 corridor and ultimately tributary to Fountain Creek.

Bradley Point Filing No. 1 consists of 9.736 acres and is presently undeveloped. Vegetation is sparse, consisting of native grasses. Approximately 23.5% of the site is covered in an aggregate base coarse material. Existing site terrain generally slopes from northwest to southeast at grade rates that vary between 0.7% and 10.4%. An existing dirt access road runs along the southwestern edge of the railroad. One end terminates at the fence along the northwestern boundary of the project site, while the other end terminates as it meets the asphalt road of the project site.

Bradley Point Filing No. 1 is currently zoned M for industrial use. The purpose of development is to provide secure materials storage and parking. The development is be secured via a perimeter fence and controlled access gate. Additional improvements proposed for the site include paving for an internal access entrance and storm drainage improvements for both lots.

add "to"

SOILS

Soils for this project are delineated by the Soils Map in the appendix as Blakeland Loamy Sand (8) and Nunn Clay Loam (59). Blakeland Loamy Sand is characterized as Hydrologic Soil Type "A", and comprises approximately 99.3% of the site. The remaining 0.7% on the southern corner of the site consists of the Nunn Clay Loam, which is characterized as Hydrologic Soil Group C. Soils in the study area are shown as mapped by S.C.S. in the "Soils Survey of El Paso County Area". Natural vegetation is sparse, consisting of native grasses and weeds over a majority of the site. Approximately one quarter of the site is covered with an aggregate base material.

HYDROLOGIC CALCULATIONS

Hydrologic calculations were performed using the El Paso County and City of Colorado Springs Storm Drainage Design Criteria manual and where applicable the Urban Storm Drainage Criteria Manual. The Rational Method was used to estimate stormwater runoff anticipated from design storms with 5-year and 100-year recurrence intervals.

HYDRAULIC CALCULATIONS

Hydraulic calculations were estimated using the Manning's Formula and the methods described in the El Paso County and City of Colorado Springs Storm Drainage Design Criteria manual. The relevant data sheets are included in the appendix of this report.

FLOODPLAIN STATEMENT

No portion of this site is within a designated F.E.M.A. floodplain as determined by the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel No. 08041C0744 G, effective date December 7th, 2018. A copy of this panel can be found in the appendix.

DRAINAGE CRITERIA

This drainage analysis has been prepared in accordance with the current City of Colorado Springs/El Paso County Drainage Criteria Manual, Volumes I & II, dated November 1991, including subsequent updates. El Paso County has also adopted Chapter 6 and Section 3.2.1 of Chapter 13 in the City of Colorado Springs & El Paso County Drainage Criteria Manual Volumes I and II, dated May 2014. (Appendix I of the El Paso County's Engineering Criteria Manual (ECM), 2008). In addition to the ECM, the Urban Storm Drainage Criteria Manuals, Volumes 1-3, published by the Urban Drainage and Flood Control District (Volumes 1 & 2 dated January 2016, Volume 3 dated November 2010 and updates). Calculations were performed to determine runoff quantities for the 5-year and 100-year frequency storms for developed conditions using the Rational Method.

EXISTING DRAINAGE CONDITIONS

The Bradley Point Filing No. 1 site consists of 9.736 Drainage Basin. This area was previously studied in the "Little Johnson/Security Creek Drainage Basin Planning Study" (DBPS), dated April 1988, and prepared by Simons, LLI & Associates, Inc., in cooperation with Kiowa Engineering Corporation.

Design Point 1

Basin A consists of 4.65 undeveloped acres of moderately sparse natural grasses and vegetation, and is comprised of the northwestern half of the overall site. Runoff produced within **Basin A** is anticipated to reach peak runoff rates of Q5=6.0 cfs and Q100=15.5 cfs, and will flow east towards the **DP1**, where it collects in a localized depression. Runoff reaching **DP1**, continues east and discharges into Lot 2 (**Basin B)**. Any delays in routing potentially caused by intermittent ponding are not considered by this analysis.

Design Point 2

Basin B consists of 1.27 undeveloped acres of extremely sparse vegetation growing through a semi-compacted base material, located near the center of the site. Runoff produced within **Basin B** is anticipated to reach peak runoff rates of Q5=2.1 cfs and Q100=4.9 cfs, which will collect with runoff from **Design Point 1** to reach combined peak flow rates of Q5=6.7 and Q100=16.8 cfs. This flow naturally continues south towards the design point, where it collects in the roadside ditch and is redirected southeast towards downstream infrastructure.

Design Point 3

Basin C consists of 1.39 undeveloped acres, approximately 60% of which is extremely sparse vegetation growing through an aggregate base material, while the rest of the basin consists of moderately sparse natural grasses and vegetation. This basin is situated near the center of the site. Runoff produced within **Basin C** is anticipated to reach peak runoff rates of Q5=1.8 cfs and Q100=4.7 cfs, and will flow south towards the **DP3**, where it will be redirected south east via the roadside ditch.

Design Point 4

Basin D consists of 1.82 undeveloped acres, approximately 30% of which is extremely sparse vegetation growing through an aggregate base material, while the rest of the basin consists of sparse natural grasses and vegetation. This basin is situated on the southeastern side of the site. Runoff produced within **Basin D** flows from north to south, collecting in a localized depression at the design point, and is anticipated to reach peak runoff rates of Q5=2.4 cfs and Q100=6.1 cfs.

Design Point 5

Offsite **Basin E** consists of 5.53 acres, which is located to the northwest of the site, consisting of a portion of sparse natural grasses and vegetation within the borrow ditch and northern half of the existing asphalt paved US Highway 85/87. Peak runoff rates from **Basin E** reach Q5=6.5 cfs and Q100=16.2 cfs. **Basin E2** consists of approximately 1.08 acres of the northern half of existing Highway 85/87, located immediately adjacent to the southwest of the site. Approximately half of **Basin E2** consists of an asphalt paved roadway surface, and the other half consists of sparse natural grasses and vegetation, reaching peak runoff rates of Q5=1.8 cfs and Q100=4.2 cfs. Runoff produced within **Basin E** and **Basin E2** will combine and flow east towards **Design Point 5.** Runoff at **DP5** is anticipated to reach peak runoff rates of Q5=6.7 cfs and Q100=16.5 cfs.

Design Point 6

Basin F consists of approximately 0.45 acres of the northern half of existing Highway 85/87, and is located on the south end of the site. A majority of this basin consists of an asphalt paved roadway surface, while a small portion consists of sparse natural grasses and vegetation. Runoff produced within **Basin F** is anticipated to reach peak runoff rates of Q5=1.4 cfs and Q100=2.6 cfs. Runoff from **DP2** and **DP5 combine with runoff from Basin F at DP6**. This cumulative flow is expected to reach peak flow rates of Q5=13.1 and Q100=32.0 cfs.

Design Point 7

Basin G consists of approximately 0.65 acres of the northern half of existing Highway 85/87, located along the southwest of the site. Approximately half of this basin consists of an asphalt paved roadway surface, and the other half consists of sparse natural grasses and vegetation. Runoff produced

within **Basin G** is anticipated to reach peak runoff rates of Q5=1.7 cfs and Q100=3.4 cfs. This runoff will discharge into the existing roadside ditch. At **DP7**, runoff from **Basin G** will combine with flows from **Design Point 3** and **Design Point 6**, and shall continue within the existing roadside ditch. The cumulative flow is expected to reach rates of Q5=13.5 and Q100=32.7 cfs. A cross section of the existing ditch with 100 year event flows can be viewed on the Existing Drainage Map.

Delete or revise regarding 100-year volume

FOUR STEP PROCESS

Step 1 Reduce runoff by disconnecting impervious area, eliminating "unnecessary" impervious area and encouraging infiltration into soils that are suitable. An aggregate base material is proposed as the ground cover to minimize directly connected impervious areas from the proposed paved road. This material also serves the purpose of eliminating unnecessary impervious area (pavement) and encouraging infiltration.

State the types of BMP

Porous Landscape Detention (PLDs) or Sand Filter Basins (SFBs)?

Step 2 Treat and Slowly Release the WQCV. – Two infiltration detention facilities are planned collect and slowly discharge runoff by infiltration. The water quality capture volume is intended to slowly drain in approximately 12 hours within 97% of the 100 year event to drain in less than 120 hours.

PLD/SFB??

Step 3 Stabilize Stream Channels. – With implementation of the two detention facilies, the runoff from the proposed industrial development will be significantly reduced to below predevelopment conditions. The developed discharge on and off the site is less than existing and, therefore, is not anticipated to have negative effects on downstream drainageways.

Step 4 Implement Source Controls. – The proposed project will use silt fences, vehicle tracking control pads, straw bale barriers, outlet protection, temporary sediment basins, erosion control blankets, and reseeding to mitigate the potential for erosion across the site and protect downstream waters.

PROPOSED DRAINAGE CHARACTERISTICS

General Concept Drainage Discussion

The following is a description of the onsite basins, offsite flows and the overall drainage characteristics for the development of Bradley Point Filing No. 1. The development of Bradley Point Filing No. 1 consists converting the two existing undeveloped lots into two distinct storage parking areas, one with a paved entrance. A shared access easement will be provided from the primary access, within Lot 1 to the southern second lot. At the request of the developer, the internal surface runoff from each lot will be routed its own onsite infiltration pond. This type of treatment has proved a suitable solution for the parcel located upstream from this subject site.

Specifically surface runoff will be collected and conveyed by swales located along the perimeter of the parcels and ponds. Flows conveyed by the swales which will direct runoff to low points and proposed 24" RCP culverts which will convey runoff to the bottom of the ponds. Riprap stilling basins will be provided at the outfall of the system as would be constructed in a sand filter pond. These facilities will be detailed and designed within the subsequent drainage report update to accompany the final plat submittal.

Designed in this report?

The following detailed drainage discussion provides an overview of the proposed development. Surface flow is designated as Design Points (DP). Captured flow within the storm sewer system is designated as Pipe Runs (PR).

Detailed Drainage Discussion

Design Point 1

Basin A consists of 4.47 acres of gravel parking lot/storage area, including a portion of a proposed paved road and is comprised of the northeastern half of this site. Runoff produced within **Basin A** is anticipated to reach peak runoff rates of Q5=9.9 cfs and Q100=19.7 cfs, and will flow from north to south towards the design point as sheet flow over lot and following a proposed swale. The proposed swale to the western boundary of the basin conveys runoff to a forebay with a rip rap level spreader structure, to dissipate energy and approximate existing flow conditions, and the runoff continues east into a proposed infiltration **Pond 1** through a 24" PVC storm pipe.

verify material

Design Point 2

Basin B consists of 4.17 acres of gravel parking lot/storage area. This basin is located within the southeastern half of the site. Runoff will be conveyed as sheet flow over lot and following a proposed swale. The proposed swale to the southern boundary of the basin conveys runoff to a forebay with a rip rap level spreader structure, to dissipate energy and approximate existing flow conditions, and the runoff continues east into a proposed infiltration **Pond 2** through a 24" PVC storm pipe. Runoff produced within **Basin B** generally flows north to south and is anticipated to reach peak runoff rates of Q5=9.0 cfs and Q100=18.0 cfs at the proposed infiltration **Pond 2**. Runoff rates are less than existing flows.

Design Point 3

Basin E consists of 5.53 acres which is located to the northwest of the site, consisting of a portion of sparse natural grasses and vegetation within the borrow ditch and northern half of the existing asphalt paved US Highway 85/87. This basin is situated on the northwestern portion of the site. Runoff from this basin flows north to south onsite. See existing **Basin E** conditions. Runoff produced within **Basin E** is anticipated to reach peak runoff rates of Q5=6.5 cfs and Q100=16.2 cfs, and will combine with flows from **Basin F**. **Basin F** consists of 0.72 acres of the northern half of existing Highway 85/87, located to the southwest of the site. Approximately half of this basin consists of an asphalt paved roadway surface, and the other half consists of sparse natural grasses and vegetation. Runoff produced within **Basin F** is anticipated to reach peak runoff rates of Q5=1.4 and Q100=3.0 cfs, and will flow east from the crow of the road where it discharges into the existing roadside ditch and combines with runoff from **Basin E**. The flows are redirected southeast towards the design point at peak runoff rates of Q5=6.6 and Q100=16.0 cfs. From here, the runoff will continue southeast to downstream infrastructure

Design Point 4

Basin G consists of approximately 2.28 acres of the northern half of existing Highway 85/87, located to the southwest of the site. Approximately half of this basin consists of an asphalt paved roadway surface, and the other half consists of sparse natural grasses and vegetation. Runoff produced within **Basin G** is anticipated to reach peak runoff rates of Q5=4.0 cfs and Q100=8.8 cfs. At this point, the runoff will combine with flows from **Design Point 3** and will continue southeast. This flow will run east from the crown of the road in order to discharge into the existing roadside ditch. A cross section of the roadside

Address the driveway crossing design.

ditch at this point can be viewed on the Proposed Drainage Map, depicting what is experienced during the 100 year event. This cumulative flow is expected to reach rates of Q5=7.4 and Q100=17.5 cfs. Flows to the ditch have been reduced by not quite half from that of the existing condition (Q5=13.5 and Q100=32.7 cfs). As the roadside ditch flattens out near the corner of the subject site, the collected runoff will dissipate into sheet flow and be directed east towards an offsite 18" ADS culvert that drains into the existing railroad ditch. This conveyance process can be seen on the Roadside Ditch Conveyance Exhibit in the Appendix.

WATER QUALITY AND DETENTION

Please clarify type of pond. Previous section mentioned a sand filter basin.

Two Private Infiltration Ponds are proposed for this site in order to reduce the fully developed flows from the site to pre-development levels and address water quality. The ponds have been sized utilizing the StormShed 4G program with the outlet being infiltration only. The ponds have been sized to store the WQCV, EURV, and the flood control volumes for the 2, 5, 10, 25, 50, and 100 year storm events. Based upon contributing area of 4.47 acres and watershed imperviousness is 82% for Pond 1 and a contributing area of 4.17 acres and 80% imperviousness for Pond 2. The WQCV for both ponds will be slowly released over approximately 12-12.5 hours. The 100 year storm events will drain fully in less than 120 hours. The maximum 100-Yr storage volume is 0.626 acre-feet (27,287.79 cf) for Pond 1 and 0.578 acre-feet (25,163.86 cf) for Pond 2, resulting in maximum ponding depths of 4.880 feet and 4.615 feet respectively. Each pond has a minimum of 2' of freeboard and is capable of storing the 500 year storm event. Print outs of the model are included in the appendix. It is important to note that the parcel to the northwest is currently utilizing a similarly constructed facility to detain onsite runoff.

How do these compare to MHFD calculations (SDI sheets)?

Address infiltration test results.

EROSION CONTROL

It is the policy of the El Paso County that M&S Civil Consultants, Inc submits an erosion control plan with the drainage report. Proposed straw bale barriers, silt fence, vehicle traffic control, a temporary sediment basin, permanent erosion control fabric, and reseeding are proposed as erosion control measures. The proposed development will not adversely impact the existing surrounding industrial infrastructure.

CONSTRUCTION COST OPINION – BRADLEY POINT FILING NO. 1

State the total land disturbance. Discuss Appendix I requirements and applicable permits.

Private Drainage Facilities:

Item	Description	Quantity		Unit Cost			Cost
1.	24" RCP	80	LF	$125	/LF		$10,000
2.	Infiltration Pond	2	EA	$8,000	/EA		$16,000
3.	Forebay	2	EA	$5,000	/EA		$10,000
						Total $	**$36,000**

M & S Civil Consultants, Inc. (M & S) cannot and does not guarantee the construction cost will not vary from these opinions of probable costs. These opinions represent our best judgment as design professionals familiar with the construction industry and this development in particular. The above is only an estimate of the facility cost and drainage basin fee amounts in 2021.

DRAINAGE & BRIDGE FEES – BRADLEY POINT FILING NO. 1

This site is within the Little Johnson Drainage Basin. The 2021 Drainage and Bridge Fees per El Paso County for the Bradley Point Filing No. 1 site are as follows:

Per Bradley Point Filing No. 1 Site Boundary – **Total Area** **9.74 Acres**

BRADLEY POINT FILING NO. 1 FEES:

Drainage Fees:	9.736	x	81.0%	x	$12,048	=	$	95,012.46
						Total	**$**	**95,012.46**

It should be noted that these fees are provided in this Final Drainage Report for informational purposes only.

The fees are due with plat recording, not information only.

M & S Civil Consultants, Inc. (M & S) cannot and does not guarantee the construction cost will not vary from these opinions of probable costs. These opinions represent our best judgment as design professionals familiar with the construction industry and this development in particular. The above is only an estimate of the facility cost and drainage basin fee amounts in 2021.

SUMMARY

Development of this site will not adversely affect the surrounding developments per this final drainage report. The proposed drainage facilities will adequately convey, detain and route runoff from tributary and onsite flows to the Fountain Creek Drainage Channel via proposed onsite improvements. A Full Spectrum Detention pond will be used to discharge developed flows that approximate historic conditions onto the adjoining, vacant Rio Grande property to the southeast. This property discharges into the railroad ditch to the east, which eventually discharges into Fountain Creek. Proposed Flow rates are lower than existing. Care will be taken during construction to accommodate overland flow routes onsite and temporary drainage conditions. Overall, the development of the Bradley Point Filing No. 1 project shall not adversely affect adjacent or downstream property.

adjoining property?

REFERENCES

1.) "City of Colorado Springs Drainage Criteria Manual", Volumes 1 & 2, City of Colorado May 2014.

2.) Mile High Flood District (2021). Criteria Manual. "Urban Storm Drainage Criteria Manuals, Volumes 1-3". Retrieved from https://mhfd.org/resources/criteria-manual/

3.) NRSC Web Soil Survey Map for El Paso County. http://websoilsurvey.nrcs.usda.gov

4.) Flood Insurance Rate Map (FIRM), Federal Emergency Management Agency, Effective date December 7th, 2018.

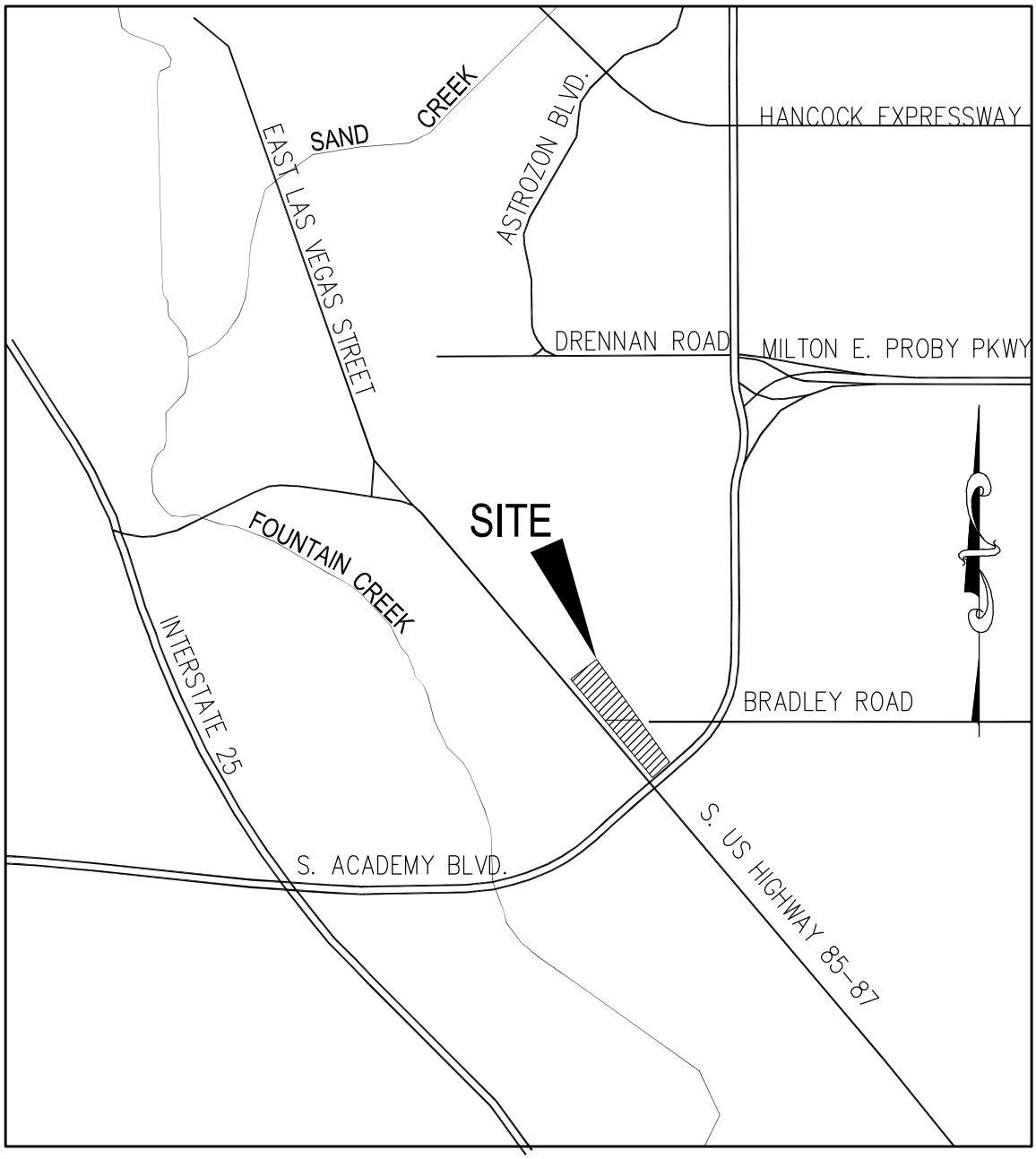
5.) Simons, LLI & Associates, Inc., in cooperation with Kiowa Engineering Corporation (April 1988). "Little Johnson/Security Creek Drainage Basin Planning Study". Retrieved from https://coloradosprings.gov/dbps

6.) Colorado Aggregate Recycling (2021). Colorado Springs: Products. Retrieved From https://www.coloradoaggregaterecycling.com/colorado-springs/

7.) "El Paso County Drainage Criteria Manual", Volumes 1 & 2, Municode 2021.

APPENDIX

VICINITY MAP

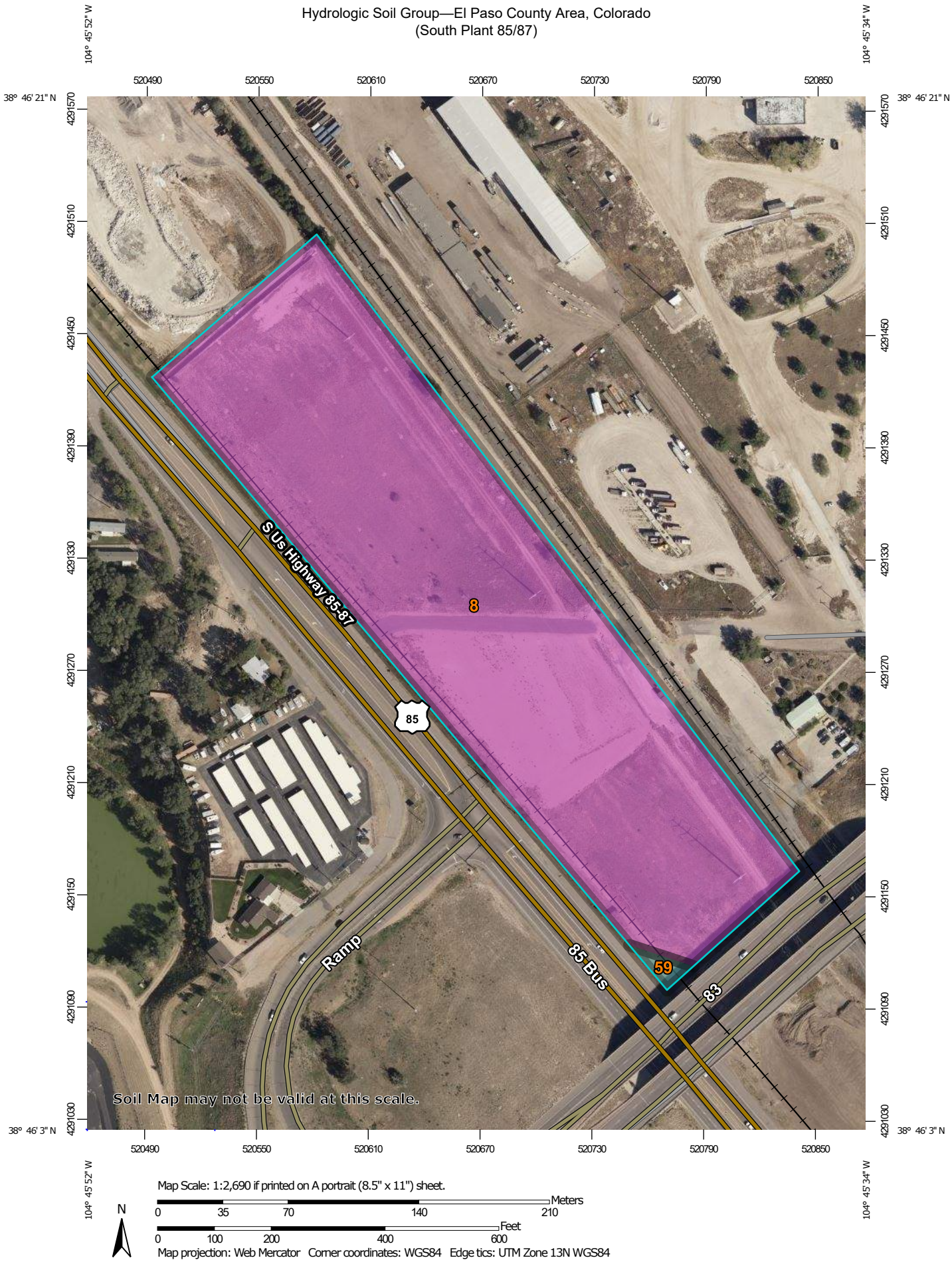


VICINITY MAP

N.T.S.

SOILS MAP

Hydrologic Soil Group—El Paso County Area, Colorado
(South Plant 85/87)



Map Scale: 1:2,690 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 35 70 140 210

Feet
0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	11.2	99.3%
59	Nunn clay loam, 0 to 3 percent slopes	C	0.1	0.7%
Totals for Area of Interest			**11.3**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

FIRM PANEL

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current **elevation**, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, City of Fountain, Bureau of Land Management, National Oceanic and Atmospheric Administration, United States Geological Survey, and Anderson Consulting Engineers, Inc. These data are current as of 2006.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

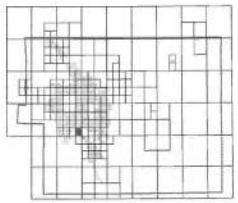
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

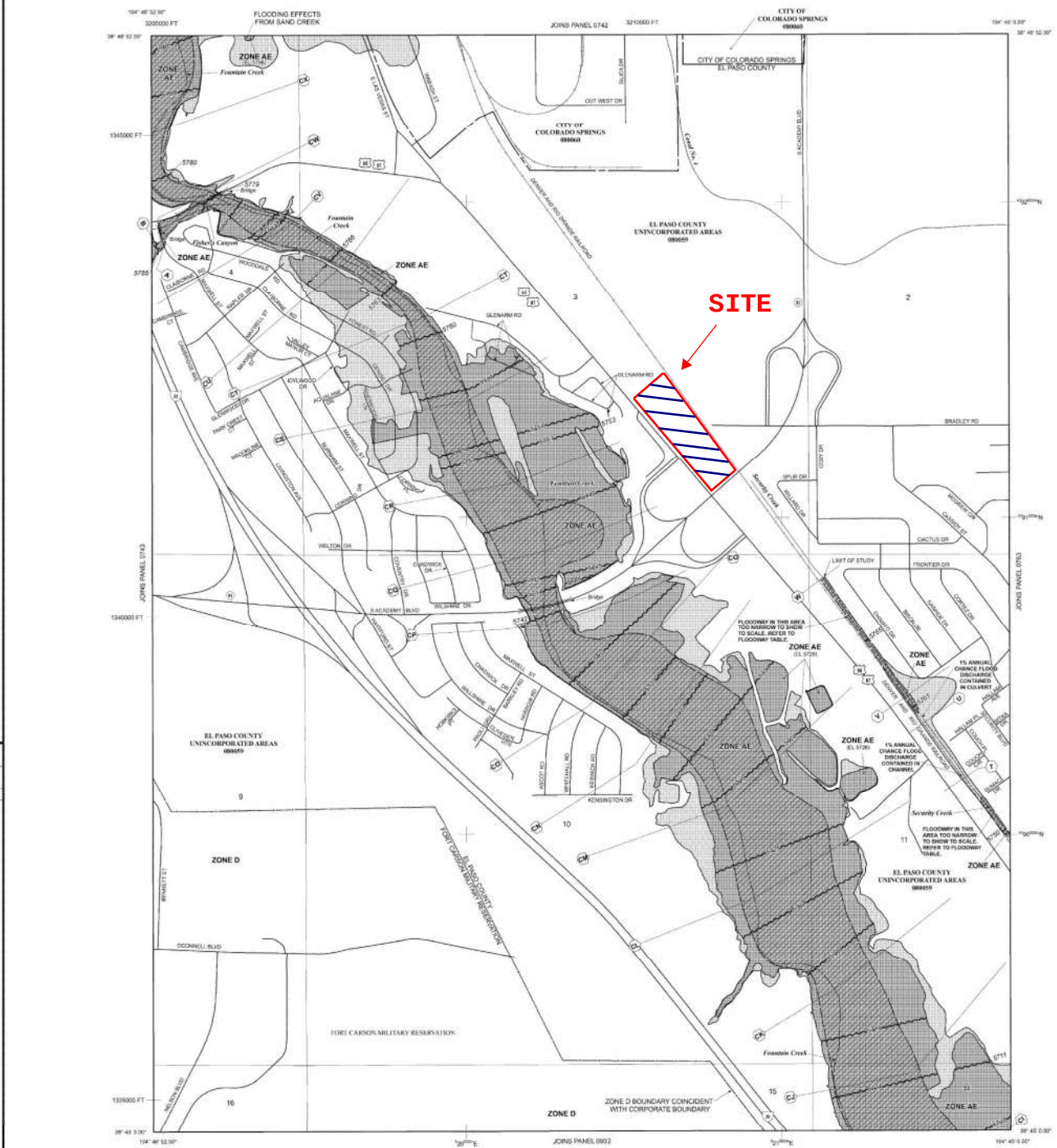
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard Information and resources are available from local communities and the Colorado Water Conservation Board.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equalled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.
ZONE AE Base Flood Elevations determined.
ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513 Base flood elevation line and value; elevation in feet*
(EL 957) Base Flood Elevation value where uniform within zone; elevation in feet*
* Referenced to the North American Vertical Datum of 1988 (NAVD 88)
A — A Cross section line
23 — 23 Transect line
97° 07' 30.00" / 32° 22' 30.00" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4319000mN 1000-meter Universal Transverse Mercator grid ticks, zone 13
4500000 FT 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 × Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0744G

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 744 OF 1300
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0744	G
EL PASO COUNTY	080059	0744	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08041C0744G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

HYDROLOGIC CALCULATIONS

BRADLEY POINT FILING NO. 1
EXISTING CONDITIONS DRAINAGE CALCULATIONS
(Area Runoff Coefficient Summary)

			STREETS/DEVELOPED			*AGGREGATE BASE MATERIAL*			*UNDEVELOPED/LANDSCAPE*			*RUNOFF COEFFICIENT*	
BASIN	**TOTAL AREA** *(SF)*	**TOTAL AREA** *(Acres)*	**AREA** *(Acres)*	**C_5**	**C_{100}**	**AREA** *(Acres)*	**C_5**	**C_{100}**	**AREA** *(Acres)*	**C_5**	**C_{100}**	**C_5**	**C_{100}**
A	***202348.4143***	4.65	0.07	0.90	0.96	4.58	0.35	0.54	0.00	0.08	0.35	**0.36**	**0.55**
B	***55366.9622***	1.27	0.20	0.90	0.96	1.07	0.35	0.54	0.00	0.08	0.35	**0.44**	**0.61**
C	***60455.3113***	1.39	0.00	0.90	0.96	1.39	0.35	0.54	0.00	0.08	0.35	**0.35**	**0.54**
D	***79161.6725***	1.82	0.00	0.90	0.96	1.82	0.35	0.54	0.00	0.08	0.35	**0.35**	**0.54**
E	***240799.7172***	5.53	2.12	0.90	0.96	0.00	0.35	0.54	3.41	0.08	0.35	**0.39**	**0.58**
E2	***46914.4055***	1.08	0.50	0.90	0.96	0.00	0.35	0.54	0.58	0.08	0.35	**0.46**	**0.63**
F	***19702.8045***	0.45	0.35	0.90	0.96	0.00	0.35	0.54	0.10	0.08	0.35	**0.71**	**0.82**
G	***28387.025***	0.65	0.49	0.90	0.96	0.00	0.35	0.54	0.16	0.08	0.35	**0.70**	**0.81**

Calculated by: CVW
Date: 12/7/2022
Checked by: DLM

BRADLEY POINT FILING NO. 1
EXISTING CONDITIONS DRAINAGE CALCULATIONS
(Area Drainage Summary)

From Area Runoff Coefficient Summary				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*		*INTENSITY **		*TOTAL FLOWS*	
BASIN	**AREA TOTAL**	**C_5**	**C_{100}**	**C_5**	**Length**	**Height**	**T_C**	**Length**	**Slope**	**Velocity**	**T_t**	**TOTAL**	**CHECK**	**I_5**	**I_{100}**	**Q_5**	**Q_{100}**
	(Acres)	*From DCM Table 5-1*			*(ft)*	*(ft)*	*(min)*	*(ft)*	*(%)*	*(fps)*	*(min)*	*(min)*	*(min)*	*(in/hr)*	*(in/hr)*	*(c.f.s.)*	*(c.f.s.)*
A	4.65	0.36	0.55	0.36	100	2.75	9.6	613	0.9%	0.7	15.1	24.7	14.0	3.6	6.1	**6.0**	**15.5**
B	1.27	0.44	0.61	0.44	100	1.6	10.3	316	0.9%	1.0	5.5	15.8	12.3	3.8	6.4	**2.1**	**4.9**
C	1.39	0.35	0.54	0.35	100	1.4	12.1	417	1.1%	1.1	6.6	18.7	12.9	3.8	6.3	**1.8**	**4.7**
D	1.82	0.35	0.54	0.35	100	1.98	10.8	470	1.3%	0.8	9.7	20.5	13.2	3.7	6.2	**2.4**	**6.1**
E	5.53	0.39	0.58	0.39	30	0.6	5.6	2000	1.5%	0.9	38.7	44.2	21.3	3.0	5.0	**6.5**	**16.2**
E2	1.08	0.46	0.63	0.46	100	0.96	11.7	525	0.3%	0.8	10.8	22.5	13.5	3.7	6.2	**1.8**	**4.2**
F	0.45	0.71	0.82	0.71	75	1.06	5.4	298	0.7%	1.3	4.0	9.3	12.1	4.2	7.1	**1.4**	**2.6**
G	0.65	0.70	0.81	0.70	100	1.34	6.6	406	0.6%	1.1	5.9	12.5	12.8	3.8	6.4	**1.7**	**3.4**

* Intensity equations assume a minimum travel time of 5 minutes.

Calculated by: CVW
Date: 12/7/2022
Checked by: DLM

please be sure and check intensity formula if you expand and add columns!!!

BRADLEY POINT FILING NO. 1
EXISTING CONDITIONS DRAINAGE CALCULATIONS
(Basin Routing Summary)

From Area Runoff Coefficient Summary				*OVERLAND*				*PIPE / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*		
DESIGN POINT	**CONTRIBUTING BASINS/PIPES**	**CA_5**	**CA_{100}**	**C_5**	**Length** *(ft)*	**Height** *(ft)*	**T_C** *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	**T_t** *(min)*	**TOTAL** *(min)*	**I_5** *(in/hr)*	**I_{100}** *(in/hr)*	**Q_5** *(c.f.s.)*	**Q_{100}** *(c.f.s.)*	COMMENTS
1	**Basin A**	1.66	2.54				14.0					14.0	3.6	6.1	***6.0***	***15.5***	*LOCALIZED DEPRESSION*
				Basin A Tc was used													
2	**Basin B**	0.55	0.77				14.0	406	0.7%	1.1	7.0	20.9	3.0	5.1	***6.7***	***16.8***	*EXITS SITE TO ROADSIDE DITCH*
	Design Point 1	1.66	2.54														
		2.22	3.31	Design Pt 1 Tc was used													
3	**Basin C**	0.49	0.75				12.9					12.9	3.8	6.3	***1.8***	***4.7***	*EXITS SITE TO ROADSIDE DITCH*
				Basin C Tc was used													
4	**Basin D**	0.64	0.98				13.2					13.2	3.7	6.2	***2.4***	***6.1***	*LOCALIZED DEPRESSION*
				Basin D Tc was used													
5	**Basin E2**	0.50	0.68				21.3	525	0.3%	1.1	8.1	29.4	2.5	4.2	***6.7***	***16.5***	*EXISTING ROADSIDE DITCH*
	Basin E	2.18	3.23														
		2.67	3.91	Basin E Tc was used													
6	**Basin F**	0.32	0.37				29.4					29.4	2.5	4.2	***13.1***	***32.0***	*EXISTING ROADSIDE DITCH*
	Design Point 5	2.67	3.91														
	Design Point 2	2.22	3.31														
		5.22	7.59	Design Point 5 Tc was used													
7	**Basin G**	0.45	0.53				29.4	452	0.5%	1.1	7.0	36.3	2.2	3.7	***13.5***	***32.7***	*EXISTING ROADSIDE DITCH*
	Design Point 6	5.22	7.59														
	Design Point 3	0.49	0.75														
		6.16	8.87	Design Pt 6 Tc was used													

Use the total Time of Travel, Tt, from pg. 23 for existing conditions calculation not the Tt check..

Time of Travel (T_t)	
TOTAL *(min)*	**CHECK** *(min)*
24.7	14.0
15.8	12.3
18.7	12.9
20.5	13.2
44.2	21.3
22.5	13.5
9.3	12.1
12.5	12.8

BRADLEY POINT FILING NO. 1
PROPOSED CONDITIONS DRAINAGE CALCULATIONS
(Area Runoff Coefficient Summary)

			STREETS/DEVELOPED			*AGGREGATE BASE MATERIAL*			*UNDEVELOPED/LANDSCAPE*			*RUNOFF COEFFICIENT*	
BASIN	**TOTAL AREA** *(SF)*	**TOTAL AREA** *(Acres)*	**AREA** *(Acres)*	**C_5**	**C_{100}**	**AREA** *(Acres)*	**C_5**	**C_{100}**	**AREA** *(Acres)*	**C_5**	**C_{100}**	**C_5**	**C_{100}**
A	***194500.7466***	4.47	0.12	0.90	0.96	4.34	0.59	0.70	0.00	0.08	0.35	**0.60**	**0.71**
B	***181766.1572***	4.17	0.00	0.90	0.96	4.17	0.59	0.70	0.00	0.08	0.35	**0.59**	**0.70**
E	***240799.7172***	5.53	2.12	0.90	0.96	0.00	0.35	0.54	3.41	0.08	0.35	**0.39**	**0.58**
F	***31224.2092***	0.72	0.38	0.90	0.96	0.00	0.35	0.54	0.33	0.08	0.35	**0.52**	**0.68**
G	***99495.0053***	2.28	1.19	0.90	0.96	0.00	0.35	0.54	1.09	0.08	0.35	**0.51**	**0.67**

Calculated by: CVW
Date: 12/7/2022
Checked by: DLM

BRADLEY POINT FILING NO. 1
PROPOSED CONDITIONS DRAINAGE CALCULATIONS
(Area Drainage Summary)

From Area Runoff Coefficient Summary				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*		*INTENSITY **		*TOTAL FLOWS*	
BASIN	**AREA TOTAL** *(Acres)*	**C_5** *From DCM Table 5-1*	**C_{100}** *From DCM Table 5-1*	**C_5**	**Length** *(ft)*	**Height** *(ft)*	**T_C** *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	**T_t** *(min)*	**TOTAL** *(min)*	**CHECK** *(min)*	**I_5** *(in/hr)*	**I_{100}** *(in/hr)*	**Q_5** *(c.f.s.)*	**Q_{100}** *(c.f.s.)*
A	4.47	0.60	0.71	0.60	100	0.6	10.7	460	0.5%	1.5	5.2	15.9	13.1	3.7	6.2	**9.9**	**19.7**
B	4.17	0.59	0.70	0.59	100	0.6	10.9	540	1.1%	1.0	8.7	19.6	13.6	3.7	6.2	**9.0**	**18.0**
E	5.53	0.39	0.58	0.39	30	0.6	5.6	2000	1.5%	1.8	18.1	23.6	21.3	3.0	5.0	**6.5**	**16.2**
F	0.72	0.52	0.68	0.52	60	0.8	7.4	525	0.3%	0.8	11.3	18.7	13.3	3.7	6.2	**1.4**	**3.0**
G	2.28	0.51	0.67	0.51	60	1	7.0	985	0.4%	0.9	17.8	24.8	15.8	3.4	5.8	**4.0**	**8.8**

* Intensity equations assume a minimum travel time of 5 minutes.

Calculated by: CVW
Date: 12/7/2022
Checked by: DLM

please be sure and check intensity formula if you expand and add columns!!!

BRADLEY POINT FILING NO. 1
PROPOSED CONDITIONS DRAINAGE CALCULATIONS
(Basin Routing Summary)

From Area Runoff Coefficient Summary				*OVERLAND*				*PIPE / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*		
DESIGN POINT	**CONTRIBUTING BASINS/PIPES**	**CA_5**	**CA_{100}**	**C_5**	**Length** *(ft)*	**Height** *(ft)*	**T_C** *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	**T_t** *(min)*	**TOTAL** *(min)*	**I_5** *(in/hr)*	**I_{100}** *(in/hr)*	**Q_5** *(c.f.s.)*	**Q_{100}** *(c.f.s.)*	COMMENTS
1	**Basin A**	2.67	3.16				13.1					13.1	3.7	6.2	***9.9***	***19.7***	*PROPOSED CULVERT*
				Basin A Tc was used													
2	**Basin B**	2.46	2.92				13.6					13.6	3.7	6.2	***9.0***	***18.0***	*PROPOSED CULVERT*
				Basin B Tc was used													
3	**Basin E**	2.18	3.23				21.3	525	0.4%	1.3	6.9	28.2	2.6	4.3	***6.6***	***16.0***	*ROADSIDE DITCH*
	Basin F	0.37	0.49														
		2.55	3.71	Basin E Tc was used													
4	**Design Pt 3**	2.55	3.71				28.2	985	0.4%	1.2	13.3	41.5	2.0	3.3	***7.4***	***17.5***	*ROADSIDE DITCH*
	Basin G	1.16	1.53														
		3.71	5.24	Design Pt 3 Tc was used													

BRADLEY POINT FILING NO. 1
PROPOSED CONDITIONS DRAINAGE CALCULATIONS
(Storm Sewer Routing Summary)

PIPE RUN	*Contributing Pipes/Design*	*Equivalent CA_5*	*Equivalent CA_{100}*	*Maximum T_C*	*Intensity**		*Flow*	
					I_5	*I_{100}*	*Q_5*	*Q_{100}*
PR 1	**DESIGN POINT 1**	2.67	**3.16**	13.1	3.7	6.2	***9.9***	***19.7***
PR 2	**DESIGN POINT 2**	2.46	**2.92**	13.6	3.7	6.2	***9.0***	***18.0***

* Intensity equations assume a minimum travel time of 5 minutes.

Calculated by: CVW

Date: 12/7/2022

Checked by: VAS

HYDRAULIC CALCULATIONS

Weighted Percent Imperviousness of Site to Pond 1				
Contributing Basins	***Area (Acres)***	***C_5***	****Impervious % (I)***	***(Acres)*(I)***
A	4.47	0.60	82	366.14
Totals	***4.47***			***366.14***
Imperviousness to Infiltration Pond 1	***82.0***			

BRADLEY POINT FILING NO. 1
DRAINAGE REPORT DRAINAGE CALCULATIONS
(Pond Volume Calculation)

POND 1

Elevation	SF	CF	Storage AF	Storage Sum
5777.00	3,863.00			0
5778.00	4,846.00	4,354.50	0.10	0.10
5779.00	5,885.00	5,365.50	0.12	0.22
5780.00	6,980.00	6,432.50	0.15	0.37
5781.00	8,133.00	7,556.50	0.17	0.54
5782.00	9,343.00	8,738.00	0.20	0.74
5783.00	10,650.00	9,996.50	0.23	0.97
5784.00	55,435.00	33,042.50	0.76	1.73

Total = 75,486 CF

Total = 1.733 Ac-ft

Calculated by: DLM

Date: 5/3/2022

Checked by:

Weighted Percent Imperviousness of FSD Pond 1				
Contributing Basins	***Area (Acres)***	***C_5***	****Impervious % (I)***	***(Acres)*(I)***
B	4.17	0.59	80	333.82
Totals	***4.17***			***333.82***
Imperviousness to Infiltration Pond 2	***80.0***			

	1	2	1*2	
Total Site Imperviousness	Ac	Imp		
Area 1	4.47	0.82	3.67	A
Area 2	4.17	0.8	3.34	B
Area 3				
Total	8.64		7.00	A+B
Site Imperviousness		7.00 / 8.64	0.81	

BRADLEY POINT FILING NO. 1
DRAINAGE REPORT DRAINAGE CALCULATIONS
(Pond Volume Calculation)

POND 2

Elevation	SF	CF	Storage AF	Storage Sum
5772.00	3,316.00			0
5773.00	4,278.00	3,797.00	0.09	0.09
5774.00	5,299.00	4,788.50	0.11	0.20
5775.00	6,373.00	5,836.00	0.13	0.33
5776.00	7,505.00	6,939.00	0.16	0.49
5777.00	8,692.00	8,098.50	0.19	0.68
5778.00	9,954.00	9,323.00	0.21	0.89
5779.00	24,989.00	17,471.50	0.40	1.29

Total = 56,254 CF

Total = 1.3 Ac-ft

#NUM!
#NUM!

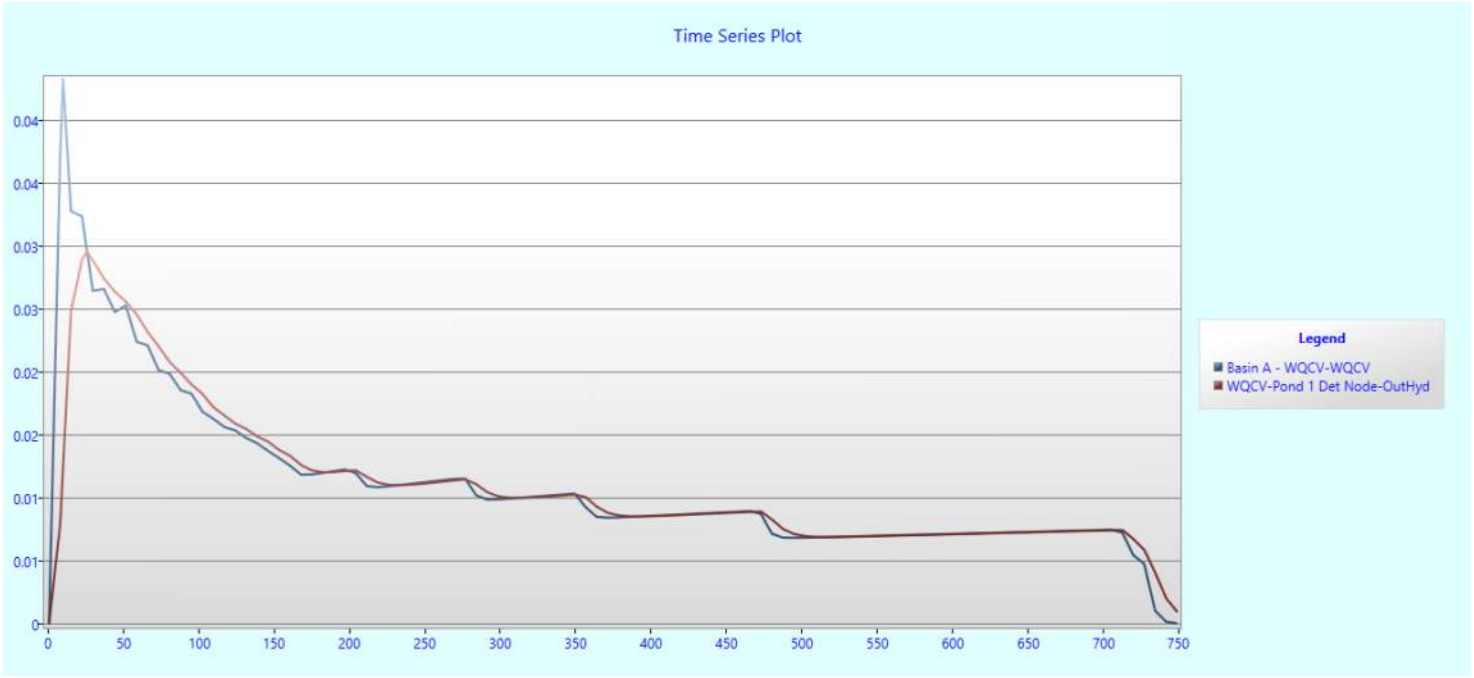
Calculated by: GT
Date: 9/15/2020
Checked by:

StormSHED 4G Analyses

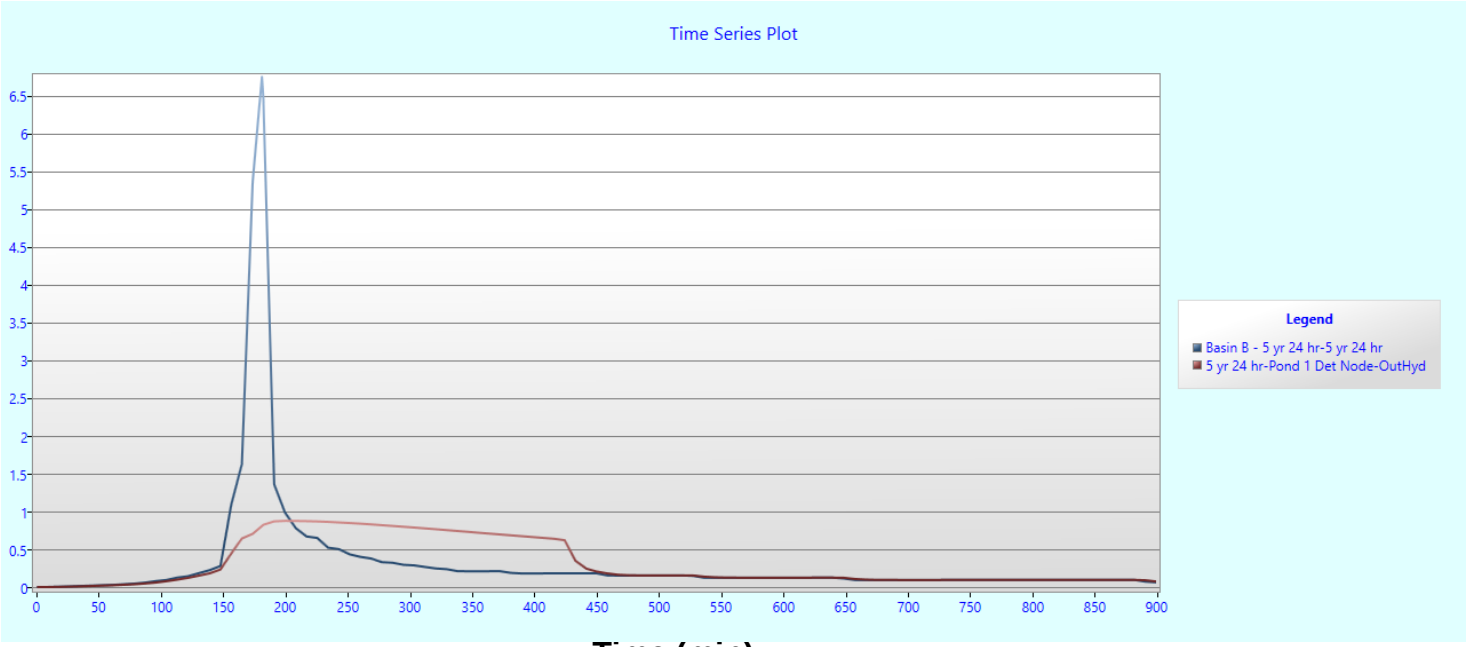
North Pond Summary Table (POND 1)

Design Evei	Match Flows (cfs)	Peak Q (cfs)	Max Depth (ft	Vol (cf)	HtoE	% Vol
WQCV	0.0432	0.0295	0.0047	15.7203	0.01	99.92
5 yr 24 hr	6.7560	0.8970	1.6587	6,668.4623	0.01	99.99
100 yr 24 hr	20.4919	1.5600	4.8800	27,287.7935	0.12	99.95

North Pond: WQCV Inflow and Outflow Hydrographs

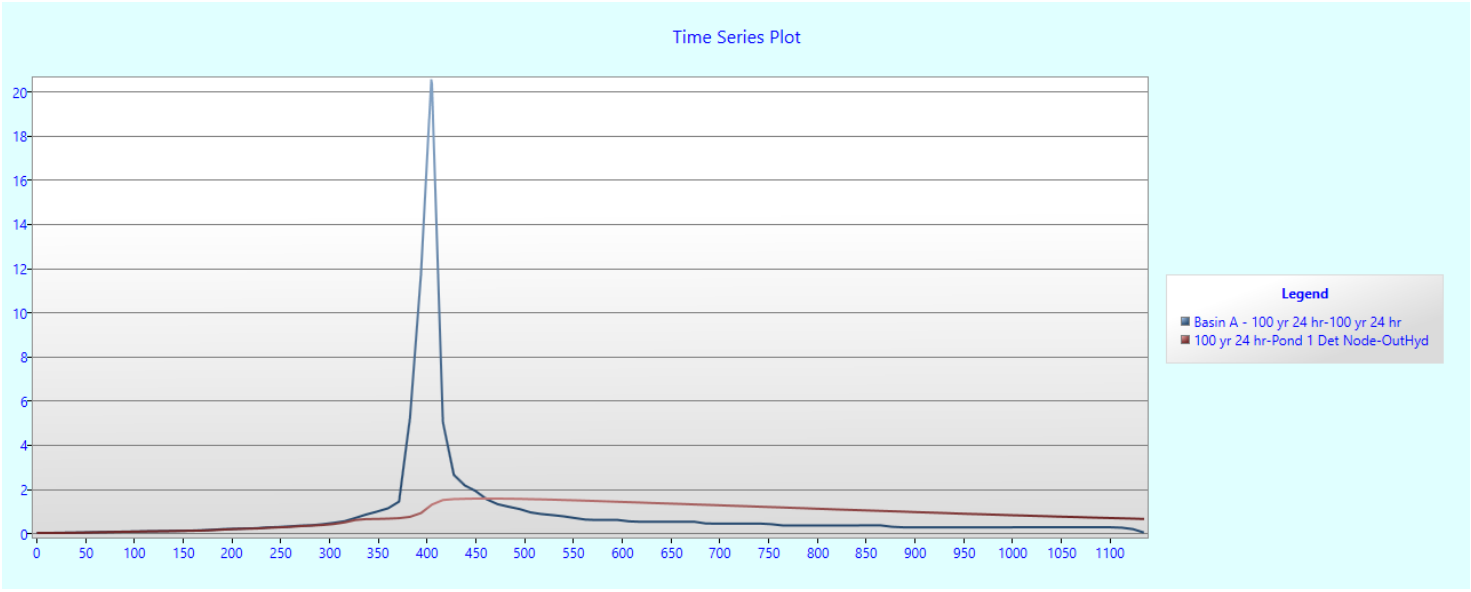


North Pond: 5 YR Inflow and Outflow Hydrographs

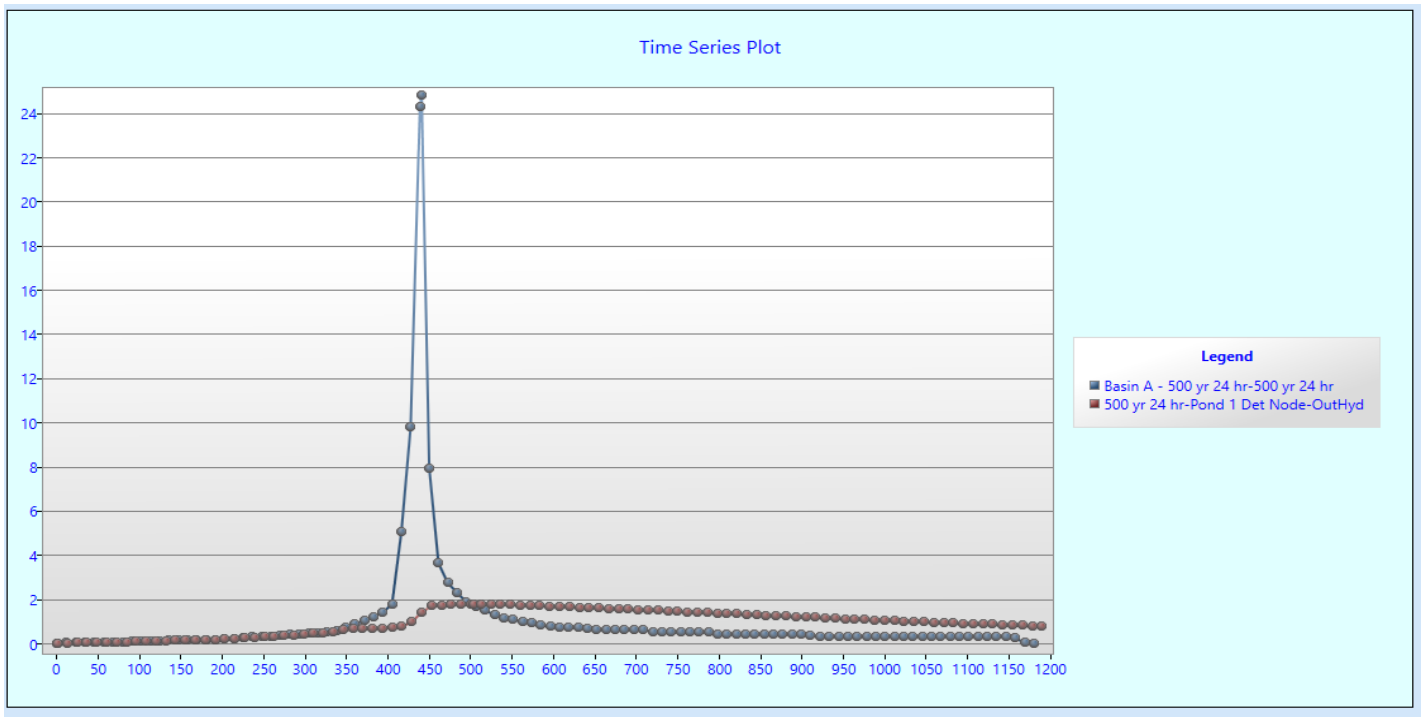


Address flows going through the spillway (overtopping) and flows being infiltrated. (See comment letter)

North Pond: 100 YR Inflow and Outflow Hydrographs



North Pond: 500 YR Inflow and Outflow Hydrograph and Summary Table

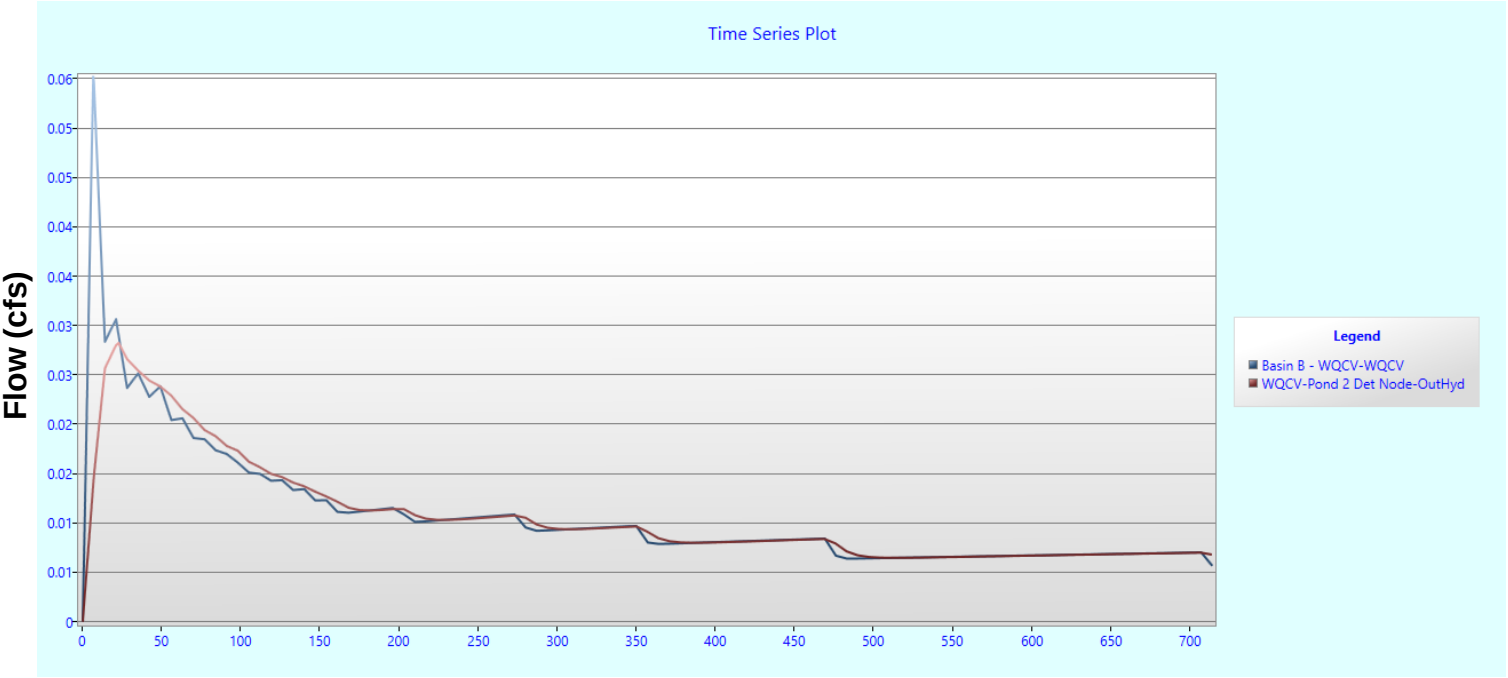


Design Evei	Match Flows (cfs)	Peak Q (cfs)	Max Depth (ft	Vol (cf)	HtoE	% Vol
500 yr 24 hr	24.7740	1.7555	5.7144	34,511.9753	1.42	99.96

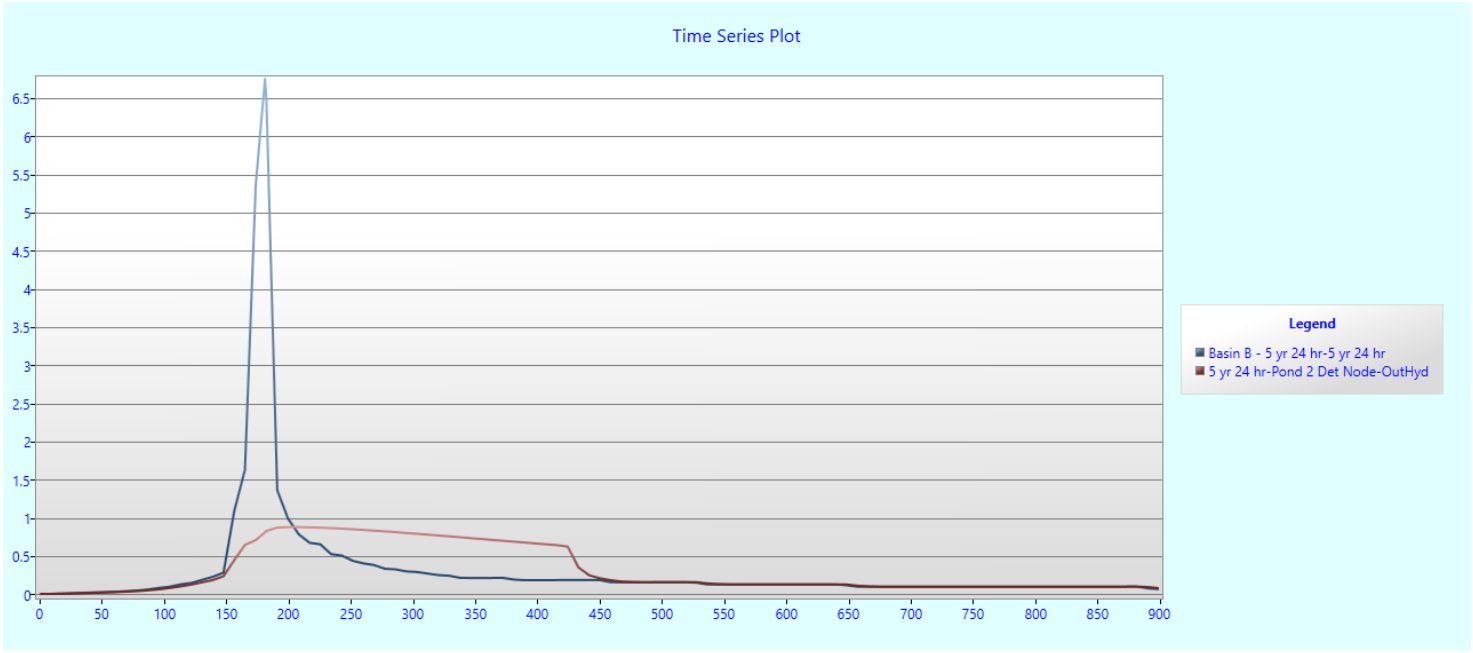
South Pond Summary Table (POND 2)

Design Event	Match Flows (cfs)	Peak Q (cfs)	Max Depth (ft)	Vol (cf)	HtoE	% Vol
WQCV	0.0551	0.0281	0.0045	14.9835	0.01	99.95
5 yr 24 hr	6.7430	0.8767	1.5473	6,143.8109	0.01	99.97
100 yr 24 hr	19.9827	1.4999	4.6147	25,163.8586	0.01	99.96

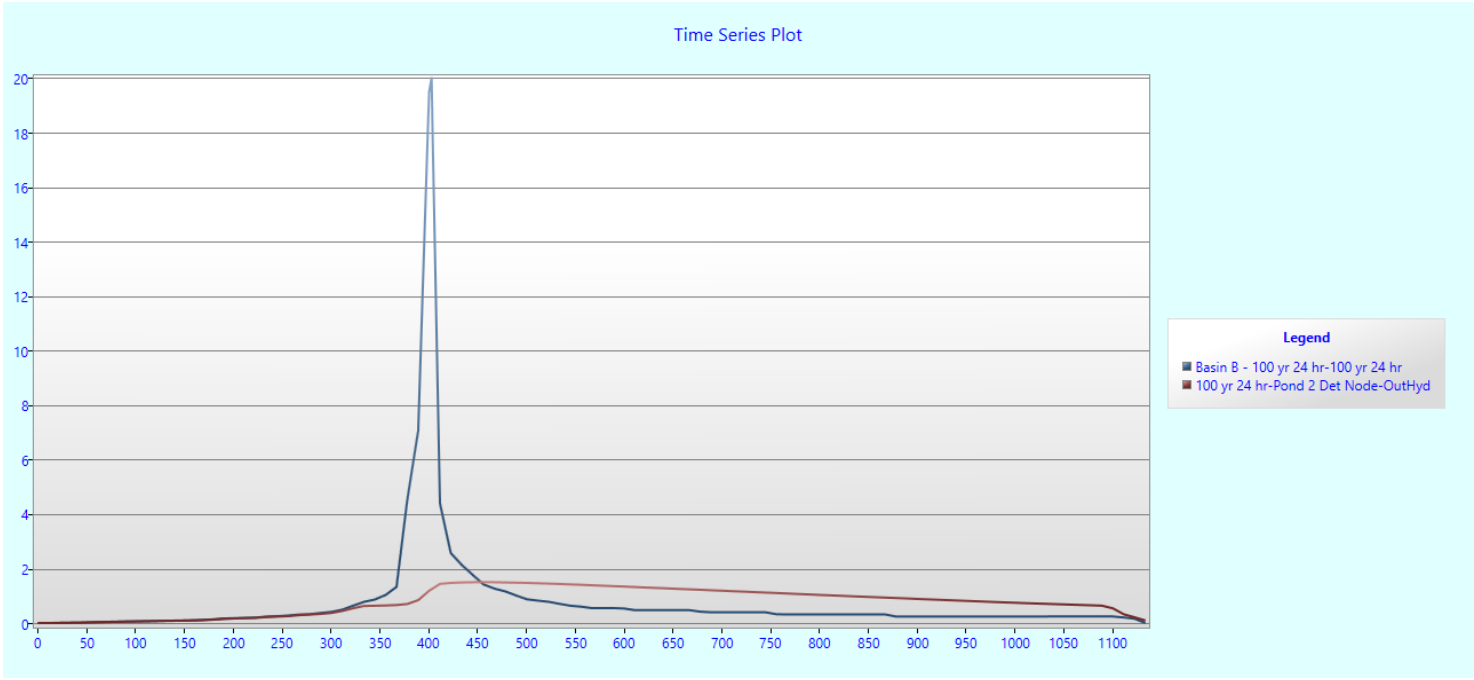
South Pond: WQCV Inflow and Outflow Hydrographs



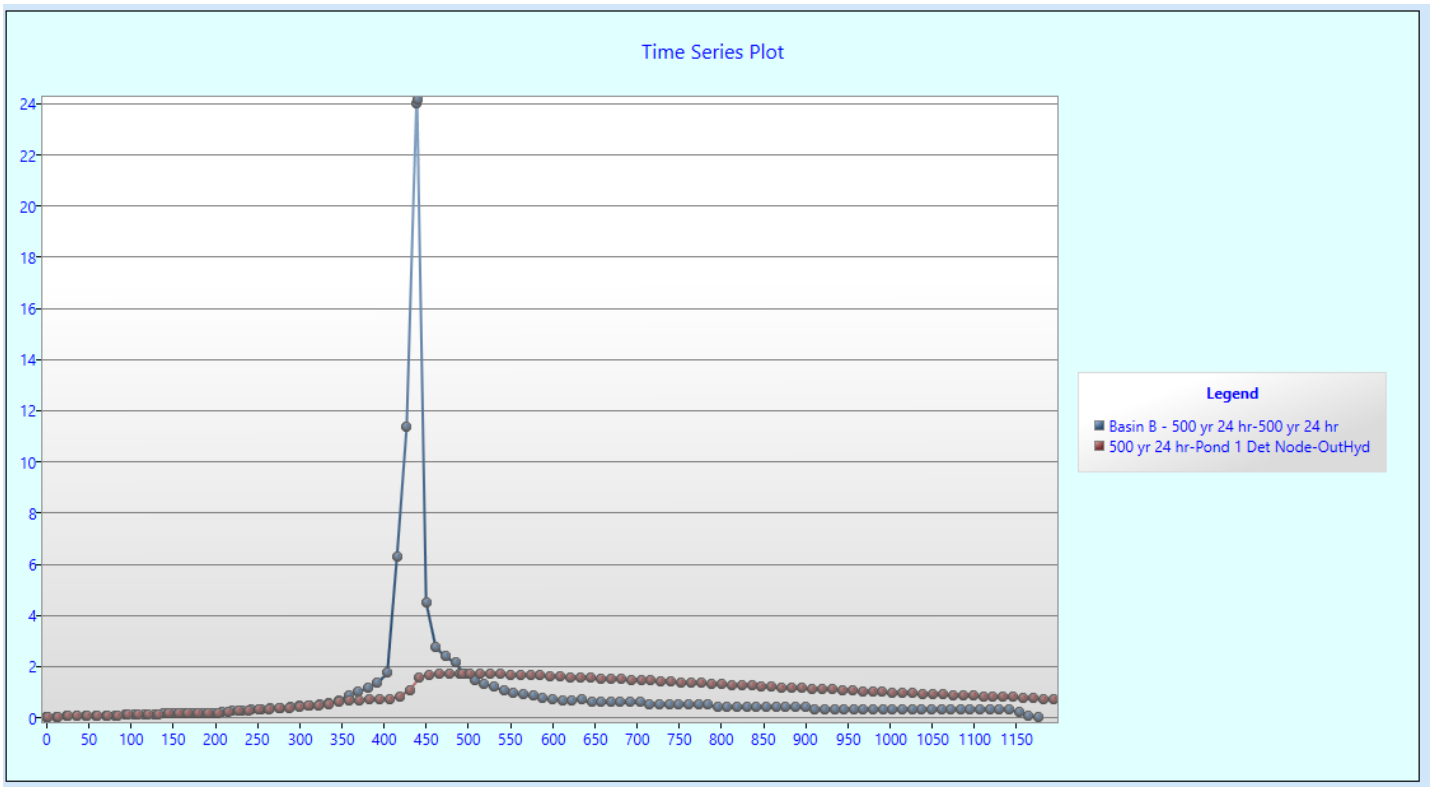
South Pond: 5 YR Inflow and Outflow Hydrographs



South Pond: 100 YR Inflow and Outflow Hydrographs



South Pond: 500 YR Inflow and Outflow Hydrograph and Summary Table



Design Evei	Match Flows (cfs)	Peak Q (cfs)	Max Depth (ft	Vol (cf)	HtoE	% Vol
500 yr 24 hr	24.0984	1.6845	5.4160	31,832.7139	1.05	99.95

provide entire report including calculations, boring logs, field notes, figure with boring locations.

ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
PHONE (719) 531-5599
FAX (719) 531-5238

August 4, 2021
Revised October 19, 2021

Highway 85/87 Properties, LLC
2010 Fox Mountain Point
Colorado Springs, CO 80906

Attn: Steve Schnurr

Re: Infiltration Rates (Percolation Test Method)
Bradley Point, Filing No. 1
Parcel Nos. 65034-00-038 and 65034-00-040
Colorado Springs, Colorado

Dear Mr. Schnurr:

As requested, personnel of Entech Engineering, Inc. have performed percolation testing at the above referenced site to evaluate the site soils to determine the infiltration rate for the proposed detention ponds.

The testing was performed on July 22 and 26, 2021 and on August 20, 2021. The test locations are shown in Figure 1. The Test Boring Logs, Percolation Test results, Infiltration Rates, and Laboratory Test results are included with this report. Laboratory results are summarized in Table 1. Soils encountered in the profile and percolation holes consisted of clayey sand, clayey-silty sand, and silty sand. Very clean sand was encountered at 4 to 5 feet in the test pits. The percent passing the No. 200 sieve in the Test Pit Samples was 1.8 and 4.1 percent. Bedrock and groundwater were not encountered in the test borings which were drilled to 20 feet. Based on the soils encountered in the test borings, the pond locations tested will have good infiltration characteristics, if the granular soils are exposed. The test boring logs and laboratory testing (grain size) are included with this report.

Southern Pond
The percolation rates were 10 minutes/inch for P1 (TB-1A), and 3 minutes/inch for P2 (TB-1A). The percolation rates correspond to adjusted average Infiltration Rate of 1 inch/hour (TB-1A). An additional test pit (TP 2) was excavated to evaluate the sands and gravel encountered at depth. A percolation rate less than 1 min/in, which corresponds to an infiltration rate of 8.1 inches/hour was measured.

Northern Pond
The percolation rates were 8 minutes/inch for P3 (TB-2A), and 10 minutes/inch for P4 (TB-2A). The percolation rates correspond to adjusted average Infiltration Rate of 0.35 inches/hour (TB-2A). An additional test pit (TP 1) was excavated to evaluate the sands and gravel encountered at depth. A percolation rate less than 1 min/in, which corresponds to an infiltration rate of 8.1 inches/hour was measured in the field. TB 3 was drilled in the northern site. A percolation rate of 4 minutes/inch, which corresponds to an infiltration rate of 1.7 inches/hour was measured.

Results of the percolation testing/infiltration testing is included in this report. If the proposed detention ponds penetrate into the sand and gravels, infiltration rates of 8.0 inches/hour can be used. The pond excavation should be observed to verify that suitable soils are encountered. The pond surfaces will require periodic cleaning to maintain the high infiltration rates. The ponds should be installed to El Paso County standards/specifications.

Address in O&M Manual

We trust that this has provided you with the information you required. If you have any questions or need additional information, please do not hesitate to contact us.

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Logan L. Langford, P.G.
Geologist

10-19-2021

Reviewed by:

Joseph C. Goode Jr., P.E.
President

LLL

Encl.
Entech Job No. 210082
AAprojects/2021/210082 Infiltration Rate

Design Procedure Form: Sand Filter (SF)

UD-BMP (Version 3.07, March 2018) **Sheet 1 of 2**

Designer: dlm
Company: M&S Civil Consultants
Date: December 8, 2022
Project: Bradley Point Filing No. 1
Location: US Hwy 85-87 / Bradley Road

(POND 1)

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, I_a (100% if all paved and roofed areas upstream of sand filter): I_a = 82.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a/100$): i = 0.820

C) Water Quality Capture Volume (WQCV) Based on 12-hour Drain Time
$WQCV = 0.8 * (0.91* i^3 - 1.19 * i^2 + 0.78 * i)$: WQCV = 0.27 watershed inches

D) Contributing Watershed Area (including sand filter area): Area = 194,501 sq ft

E) Water Quality Capture Volume (WQCV) Design Volume
$V_{WQCV} = WQCV / 12 * Area$: V_{WQCV} = cu ft

F) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm: d_6 = 0.60 in

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume: $V_{WQCV\ OTHER}$ = 6,173 cu ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired): $V_{WQCV\ USER}$ = cu ft

2. Basin Geometry

A) WQCV Depth: D_{WQCV} = 0.1 ft

B) Sand Filter Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred). Use "0" if sand filter has vertical walls.: Z = 3.00 ft / ft
DIFFICULT TO MAINTAIN, INCREASE WHERE POSSIBLE

C) Minimum Filter Area (Flat Surface Area): A_{Min} = 1994 sq ft

D) Actual Filter Area: A_{Actual} = 3863 sq ft

E) Volume Provided: V_T = cu ft

3. Filter Material

Fill in filter material used.

Choose One
- ○ 18" CDOT Class B or C Filter Material
- ◉ Other (Explain):

4. Underdrain System

A) Are underdrains provided?

Choose One
- ○ YES
- ◉ NO

B) Underdrain system orifice diameter for 12 hour drain time

i) Distance From Lowest Elevation of the Storage Volume to the Center of the Orifice: y = N/A ft

ii) Volume to Drain in 12 Hours: Vol_{12} = N/A cu ft

iii) Orifice Diameter, 3/8" Minimum: D_O = N/A in

Design Procedure Form: Sand Filter (SF)

Designer: dlm
Company: M&S Civil Consultants
Date: December 8, 2022
Project: Bradley Point Filing No. 1
Location: US Hwy 85-87 / Bradley Road

5. Impermeable Geomembrane Liner and Geotextile Separator Fabric

A) Is an impermeable liner provided due to proximity of structures or groundwater contamination?

Choose One: ○ YES ◉ NO

6. Inlet / Outlet Works

A) Describe the type of energy dissipation at inlet points and means of conveying flows in excess of the WQCV through the outlet

Notes:

Design Procedure Form: Sand Filter (SF)

UD-BMP (Version 3.07, March 2018)

Designer: dlm
Company: M&S Civil Consultants
Date: December 8, 2022
Project:
Location:

(POND 2)

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, I_a (100% if all paved and roofed areas upstream of sand filter): I_a = 80.0 %

B) Tributary Area's Imperviousness Ratio (i = I_a/100): i = 0.800

C) Water Quality Capture Volume (WQCV) Based on 12-hour Drain Time
WQCV= 0.8 * (0.91* i^3 - 1.19 * i^2 + 0.78 * i): WQCV = 0.26 watershed inches

D) Contributing Watershed Area (including sand filter area): Area = 181,766 sq ft

E) Water Quality Capture Volume (WQCV) Design Volume
V_{WQCV} = WQCV / 12 * Area: V_{WQCV} = cu ft

F) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm: d_6 = 0.60 in

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume: $V_{WQCV\ OTHER}$ = 5,551 cu ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired): $V_{WQCV\ USER}$ = cu ft

2. Basin Geometry

A) WQCV Depth: D_{WQCV} = 0.0 ft

B) Sand Filter Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred). Use "0" if sand filter has vertical walls.: Z = 3.00 ft / ft
DIFFICULT TO MAINTAIN, INCREASE WHERE POSSIBLE

C) Minimum Filter Area (Flat Surface Area): A_{Min} = 1818 sq ft

D) Actual Filter Area: A_{Actual} = 3316 sq ft

E) Volume Provided: V_T = cu ft

3. Filter Material

Choose One
- ○ 18" CDOT Class B or C Filter Material
- ◉ Other (Explain): In situ eathern materials

4. Underdrain System

A) Are underdrains provided?

Choose One
- ○ YES
- ◉ NO

B) Underdrain system orifice diameter for 12 hour drain time

i) Distance From Lowest Elevation of the Storage Volume to the Center of the Orifice: y = N/A ft

ii) Volume to Drain in 12 Hours: Vol_{12} = N/A cu ft

iii) Orifice Diameter, 3/8" Minimum: D_O = N/A in

Design Procedure Form: Sand Filter (SF)

Designer: dlm
Company: M&S Civil Consultants
Date: December 8, 2022
Project:
Location:

5. Impermeable Geomembrane Liner and Geotextile Separator Fabric

   A) Is an impermeable liner provided due to proximity of structures or groundwater contamination?

   Choose One: ○ YES ○ NO

6. Inlet / Outlet Works

   A) Describe the type of energy dissipation at inlet points and means of conveying flows in excess of the WQCV through the outlet

Notes:

Worksheet for Irregular Swale Section - A-A

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.004 ft/ft
Discharge	16.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	5,785.60
0+33	5,785.00
0+54	5,784.50
0+65	5,785.00
0+83	5,785.80

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5,785.60)	(0+65, 5,785.00)	0.030
(0+65, 5,785.00)	(0+83, 5,785.80)	0.016

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	7.1 in
Roughness Coefficient	0.029
Elevation	5,785.09 ft
Elevation Range	5,784.5 to 5,785.8 ft
Flow Area	11.2 ft²
Wetted Perimeter	39.0 ft
Hydraulic Radius	3.4 in
Top Width	39.03 ft
Normal Depth	7.1 in
Critical Depth	5.2 in
Critical Slope	0.021 ft/ft
Velocity	1.43 ft/s
Velocity Head	0.03 ft
Specific Energy	0.62 ft
Froude Number	0.469

Worksheet for Irregular Swale Section - A-A

Results	
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	7.1 in
Critical Depth	5.2 in
Channel Slope	0.004 ft/ft
Critical Slope	0.021 ft/ft

Worksheet for Irregular Swale Section - B-B

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.003 ft/ft
Discharge	16.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	5,785.20
0+50	5,784.00
0+57	5,783.70
0+62	5,784.00
0+86	5,784.90

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5,785.20)	(0+62, 5,784.00)	0.030
(0+62, 5,784.00)	(0+86, 5,784.90)	0.016

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	8.2 in
Roughness Coefficient	0.027
Elevation	5,784.39 ft
Elevation Range	5,783.7 to 5,785.2 ft
Flow Area	11.6 ft²
Wetted Perimeter	38.5 ft
Hydraulic Radius	3.6 in
Top Width	38.50 ft
Normal Depth	8.2 in
Critical Depth	6.2 in
Critical Slope	0.017 ft/ft
Velocity	1.38 ft/s
Velocity Head	0.03 ft
Specific Energy	0.71 ft
Froude Number	0.443

Worksheet for Irregular Swale Section - B-B

Results	
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	8.2 in
Critical Depth	6.2 in
Channel Slope	0.003 ft/ft
Critical Slope	0.017 ft/ft

Worksheet for Irregular Swale Section - C-C

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.004 ft/ft
Discharge	16.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	5,784.20
0+60	5,783.00
0+65	5,782.80
0+70	5,783.00
0+96	5,784.10

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5,784.20)	(0+70, 5,783.00)	0.030
(0+70, 5,783.00)	(0+96, 5,784.10)	0.016

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	7.1 in
Roughness Coefficient	0.027
Elevation	5,783.40 ft
Elevation Range	5,782.8 to 5,784.2 ft
Flow Area	11.0 ft²
Wetted Perimeter	39.5 ft
Hydraulic Radius	3.3 in
Top Width	39.47 ft
Normal Depth	7.1 in
Critical Depth	5.5 in
Critical Slope	0.018 ft/ft
Velocity	1.46 ft/s
Velocity Head	0.03 ft
Specific Energy	0.63 ft
Froude Number	0.489

Worksheet for Irregular Swale Section - C-C

Results	
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	7.1 in
Critical Depth	5.5 in
Channel Slope	0.004 ft/ft
Critical Slope	0.018 ft/ft

Worksheet for Irregular Swale Section - D-D

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.005 ft/ft
Discharge	17.50 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	5,782.50
0+52	5,782.00
0+65	5,781.60
0+78	5,782.00
0+96	5,782.90

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5,782.50)	(0+78, 5,782.00)	0.030
(0+78, 5,782.00)	(0+96, 5,782.90)	0.016

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	7.0 in
Roughness Coefficient	0.029
Elevation	5,782.19 ft
Elevation Range	5,781.6 to 5,782.9 ft
Flow Area	12.1 ft²
Wetted Perimeter	48.9 ft
Hydraulic Radius	3.0 in
Top Width	48.90 ft
Normal Depth	7.0 in
Critical Depth	5.5 in
Critical Slope	0.021 ft/ft
Velocity	1.45 ft/s
Velocity Head	0.03 ft
Specific Energy	0.62 ft
Froude Number	0.513

Worksheet for Irregular Swale Section - D-D

Results	
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	7.0 in
Critical Depth	5.5 in
Channel Slope	0.005 ft/ft
Critical Slope	0.021 ft/ft

Worksheet for Irregular Swale Section - E-E

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.020 ft/ft
Discharge	17.50 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	5,780.80
0+43	5,780.00
0+56	5,779.20
0+62	5,780.00
0+79	5,781.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5,780.80)	(0+62, 5,780.00)	0.030
(0+62, 5,780.00)	(0+79, 5,781.00)	0.016

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	8.0 in
Roughness Coefficient	0.030
Elevation	5,779.86 ft
Elevation Range	5,779.2 to 5,781.0 ft
Flow Area	5.2 ft²
Wetted Perimeter	15.8 ft
Hydraulic Radius	4.0 in
Top Width	15.76 ft
Normal Depth	8.0 in
Critical Depth	8.0 in
Critical Slope	0.019 ft/ft
Velocity	3.35 ft/s
Velocity Head	0.17 ft
Specific Energy	0.84 ft
Froude Number	1.025

Worksheet for Irregular Swale Section - E-E

Results	
Flow Type	Supercritical

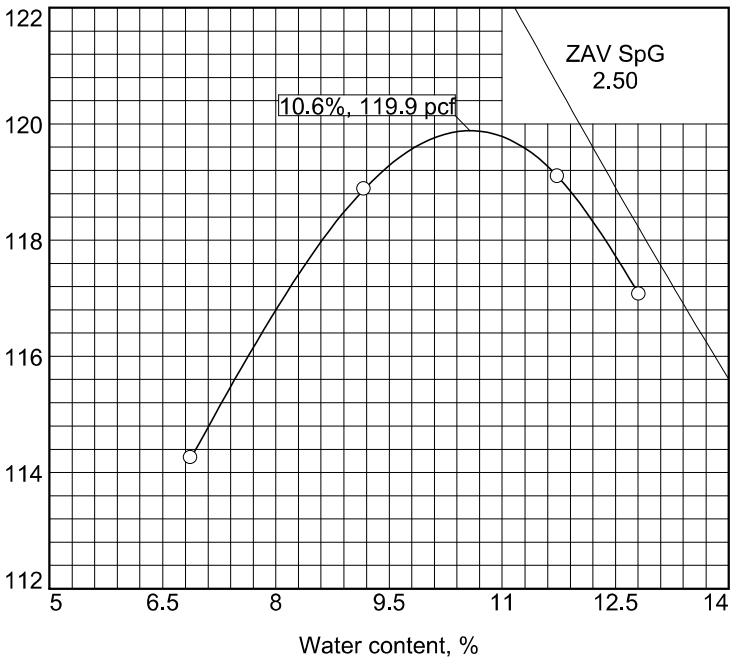
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	8.0 in
Critical Depth	8.0 in
Channel Slope	0.020 ft/ft
Critical Slope	0.019 ft/ft

AGGREGATE BASE EXHIBIT

COMPACTION TEST REPORT

Curve No. 1217



Preparation Method
Rammer: Wt. 10 lb. Drop 18 in.
Type Manual
Layers: No. five Blows per 56
Mold Size 0.075 cu. ft.
Test Performed on Material
Passing 3/4 in. Sieve

%>3/4 in. 1 %<No.200 6.8
Atterberg (D 4318): LL NV PI NP
NM (D 2216) Sp.G. (D 854) 2.5
USCS (D 2487) GP-GM
AASHTO (M 145) A-1-a
Date: Sampled 3-25-2021
Received 3-25-2021
Tested 4-6-2021
Tested By KP

COMPACTION TESTING DATA
ASTM D 1557-12 Method C Modified

	1	2	3	4	5	6
WM + WS	10658.0	10919.0	11031.0	10997.0		
WM	6504.0	6504.0	6504.0	6504.0		
WW + T #1	730.1	718.7	669.0	786.8		
WD + T #1	692.6	670.9	615.7	723.4		
TARE #1	147.1	149.6	161.5	228.7		
WW + T #2						
WD + T #2						
TARE #2						
MOIST.	6.9	9.2	11.7	12.8		
DRY DENS.	114.3	118.9	119.1	117.1		

SIEVE TEST RESULTS
ASTM D-422 ASTM D-1140

Opening Size	% Passing	Specs.
1"	100	100
3/4"	99	95 - 100
3/8"	68	
#4	48	30 - 65
#8	31	25 - 55
#16	21	
#30	16	
#50	12	
#100	9	
#200	6.8	3.0 - 12

TEST RESULTS

Maximum dry density = 119.9 pcf

Optimum moisture = 10.6 %

Material Description

Recycled Concrete/ Class 6 ABC/ poorly graded gravel with silt and sand

Remarks:

Project No. 21-1-235 **Client:**
Project: Colorado Aggregate Recycling

○ **Location:** Import, South Yard **Sample Number:** 1217

Checked by: DS
Title: Lab Manager

Kumar & Associates, Inc.

Denver, Colorado

Figure

BRADLEY POINT FILING NO. 1
AGGREGATE BASE RUNOFF COEFFICIENT CALCULATION

		PASSING #4 SIEVE			*LARGER THAN #4 SIEVE*			*RUNOFF COEFFICIENT*	
ITEM	**ITEM DESCRIPTION**	**PERCENT** *(%)*	**C_5**	**C_{100}**	**PERCENT** *(%)*	**C_5**	**C_{100}**	**C_5**	**C_{100}**
3/4" Minus, CDOT CL6 Road Base	Recycled Concrete/ Class 6 ABC/ poorly graded gravel with silt and sand	0.48	0.09	0.36	0.52	0.59	0.70	**0.35**	**0.54**

Calculated by: CVW
Date: 5/5/2021

Missing MHFD-Detention Worksheet for Sand Filter

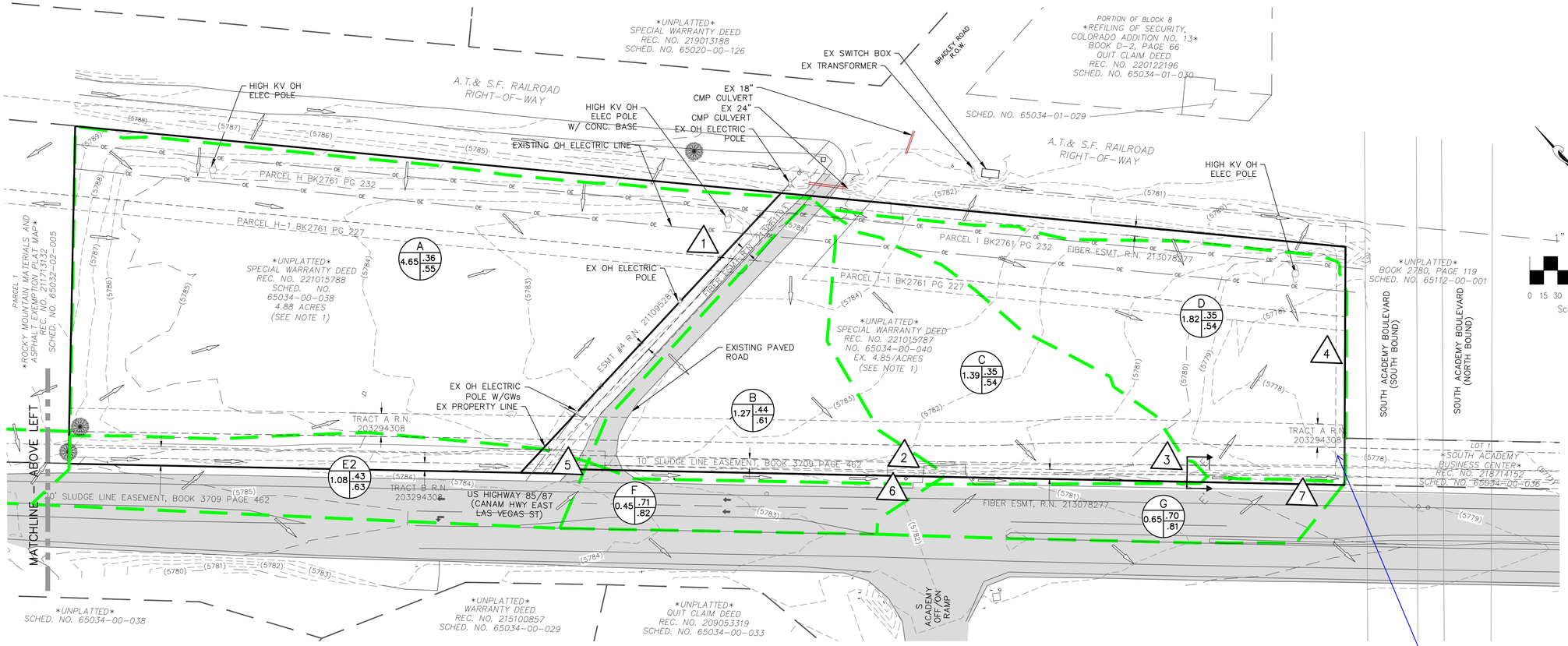
include riprap sizing calcs for spillway, forebay, and if there is a culvert crossing at entrance.

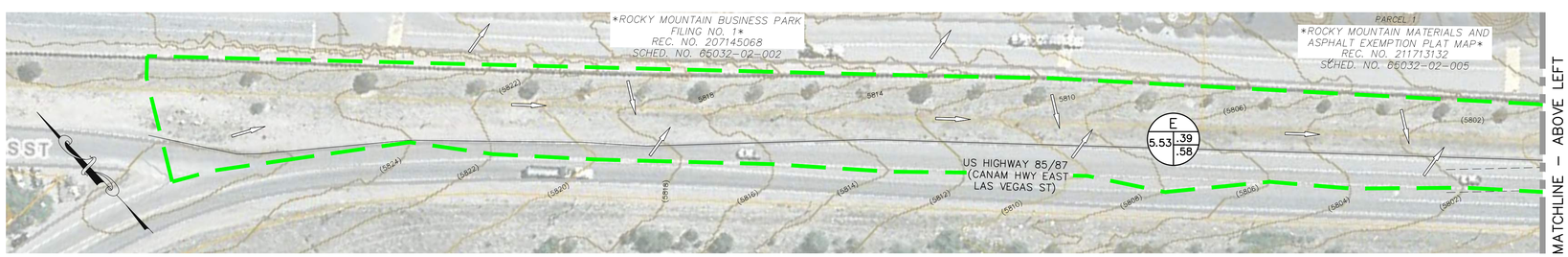
Drainage maps should be the last pages of the report. Move drainage maps to the end of the report.

EXISTING DRAINAGE MAP

BRADLEY POINT FILING NO. 1 - EXISTING DRAINAGE MAP

AP NO. 65034-00-038 AND AP NO. 65034-00-040 ON HIGHWAY 85/87 (EAST LAS VEGAS STREET)
IN SECTION 3, T15S R66W, 6th P.M., EL PASO COUNTY, COLORADO





LEGEND

BASIN DESIGNATION — ACRES — C5 — C100

5 SURFACE DESIGN POINT

BASIN BOUNDARY

(7070) EXIST MAJ CONT (5')

(7072) EXIST MIN CONT (1')

EX OR EXIST EXISTING

ADJ. PROPERTY BOUNDARY

OE OVERHEAD ELECTRIC

EXISTING FLOW DIRECTION ARROW

EXISTING TREE

1" = 60'

0 15 30 60 120
Scale in Feet

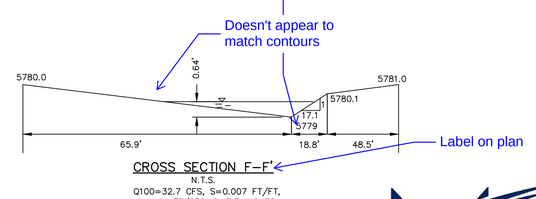
BASIN SUMMARY			
BASIN	AREA (ACRES)	Q_5	Q_{100}
A	4.65	6.0	15.5
B	1.27	2.1	4.9
C	1.39	1.8	4.7
D	1.82	2.4	6.1
E	5.53	6.5	16.2
E2	1.08	1.8	4.2
F	0.45	1.4	2.6
G	0.65	1.7	3.4

DESIGN POINT SUMMARY				
DESIGN POINT	Q_5	Q_{100}	CONTRIBUTING BASIN/DESIGN POINT	STRUCTURE
1	6.0	15.5	A	LOCALIZED DEPRESSION
2	6.7	16.8	B, DP 1	EXISTS TO ROADSIDE DITCH
3	1.8	4.7	C	EXISTS TO ROADSIDE DITCH
4	2.4	6.1	D	LOCALIZED DEPRESSION
5	6.7	16.5	E, E2	EXISTING ROADSIDE DITCH
6	13.1	32.0	F, DP 2, DP 5	EXISTING ROADSIDE DITCH
7	13.5	32.7	G, DP 3, DP 6	EXISTING ROADSIDE DITCH

BRADLEY POINT FILING NO. 1
EXISTING DRAINAGE MAP
DATE SUBMITTED: 9/30/22
SHEET 1 OF 1

NOTE 1:

PARCELS ARE UNDER THE SAME OWNERSHIP



CROSS SECTION F-F'
N.T.S.
Q100=32.7 CFS, S=0.007 FT/FT, V=1.91 FT/SEC, D=7.7 INCHES

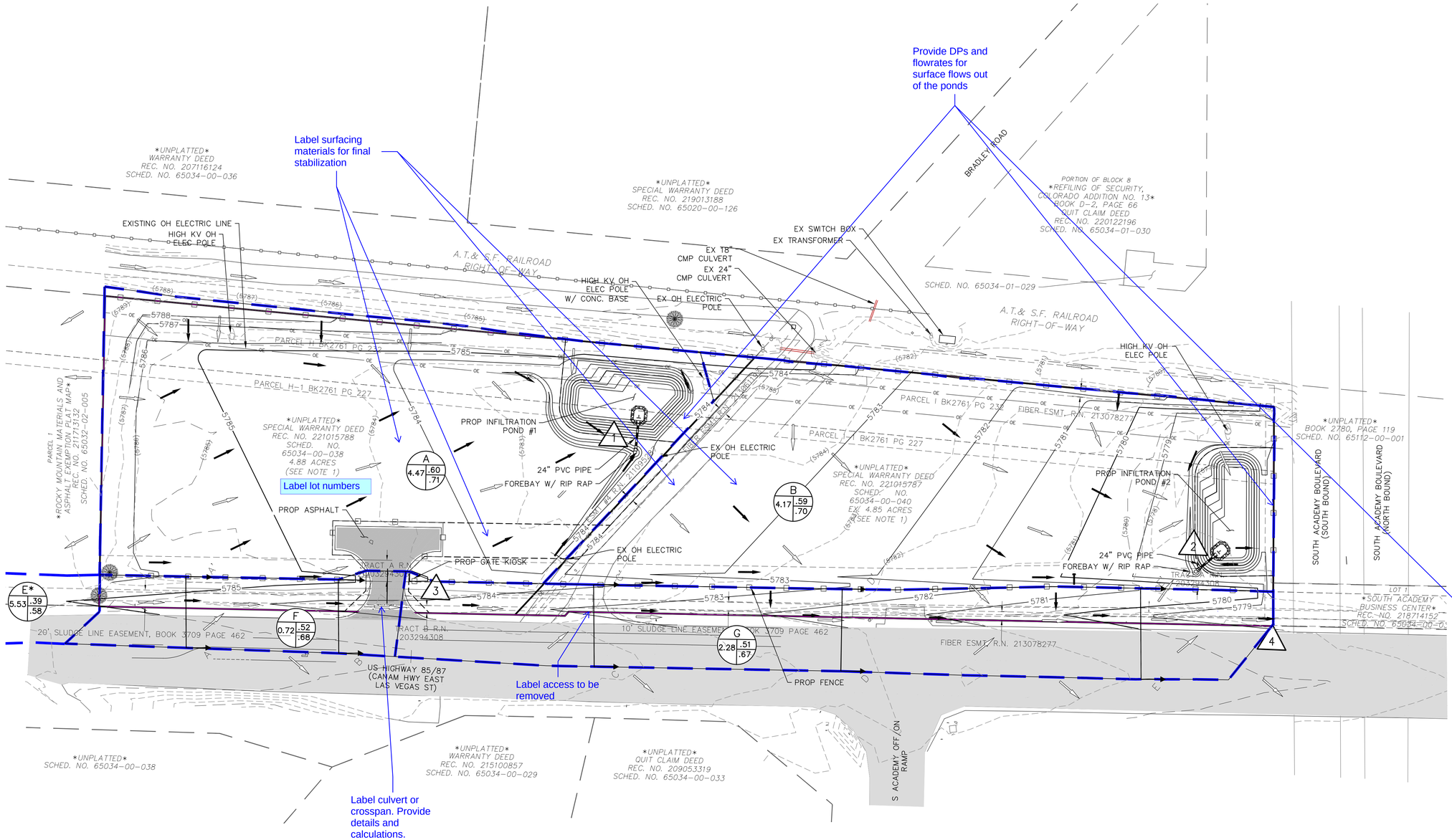
CIVIL CONSULTANTS, INC.
212 N. WAHSATCH AVE., STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

File: G:\70074A SOUTH PLANT 85-87\SOUTH PLANT 85-87\Drainage\Existing Drainage Map.dwg Plotstamp: 12/13/2022 1:55 PM

PROPOSED DRAINAGE MAP

BRADLEY POINT FILING NO. 1 - PROPOSED DRAINAGE MAP

AP NO. 65034-00-038 AND AP NO. 65034-00-040 ON HIGHWAY 85/87 (EAST LAS VEGAS STREET)
IN SECTION 3, T15S R66W, 6th P.M., EL PASO COUNTY, COLORADO



LEGEND

BASIN DESIGNATION — 661L / 0.07 / .90 / .95 — C5 / C100 / ACRES

PIPE RUN REFERENCE LABEL

SURFACE DESIGN POINT

BASIN BOUNDARY

100 YEAR FLOOD BOUNDARY

PROP MAJ CONT

PROP MIN CONT

EXIST MAJ CONT

EXIST MIN CONT

EX OR EXIST — EXISTING

FUT — FUTURE

PROP — PROPOSED

ADJ. PROPERTY BOUNDARY

OE — OVERHEAD ELECTRIC

PROPOSED STORM SEWER PIPE

PROP CONCRETE FENCE

EMERGENCY OVERFLOW DIRECTION

PROPOSED RIPRAP

EXISTING FLOW DIRECTION ARROW

PROPOSED FLOW DIRECTION ARROW

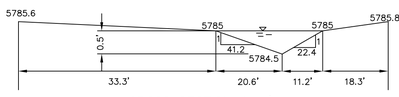
BASIN SUMMARY			
BASIN	AREA (ACRES)	Q_5	Q_{100}
A	4.47	9.9	19.7
B	4.17	9.0	18.0
E	5.53	6.5	16.2
F	0.72	1.4	3.0
G	2.28	4.0	8.8

DESIGN POINT SUMMARY				
DESIGN POINT	Q_5	Q_{100}	BASIN	STRUCTURE
1	9.9	19.7	A	PROPOSED CULVERT
2	9.0	18.0	B	PROPOSED CULVERT
3	6.6	16.0	E, F	ROADSIDE DITCH
4	7.4	17.5	G, DP 3	ROADSIDE DITCH

BRADLEY POINT FILING NO. 1
PROPOSED DRAINAGE MAP
DATE SUBMITTED: 9/30/22 SHEET 1 OF 1

NOTES:

1. PARCELS ARE UNDER THE SAME OWNERSHIP
2. * REFER TO OFFSITE BASIN E IN EXISTING CONDITIONS
3. FENCES AND SIGNAGE ADDED TO PREVENT ON-SITE, STORED MATERIALS FROM ENTERING THE PONDS.
4. EROSION CONTROL BLANKET SHALL BE USED ON SLOPES GREATER THAN 4:1.



CROSS SECTION A-A'
N.T.S.
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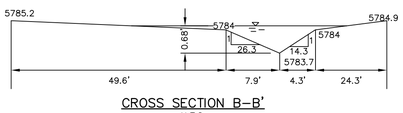
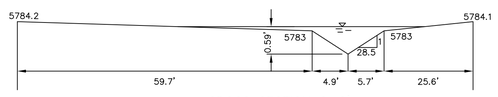
V=1.43 FT/SEC, D=5.2 INCHES



CROSS SECTION B-B'
N.T.S.
Q100=16.0 CFS, S=0.003 FT/FT,
V=1.38 FT/SEC, D=8.2 INCHES

Clearly show cross section locations on figure



CROSS SECTION C-C'
N.T.S.
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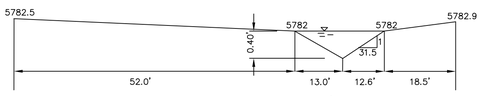
V=1.46 FT/SEC, D=7.1 INCHES



CROSS SECTION D-D'
N.T.S.
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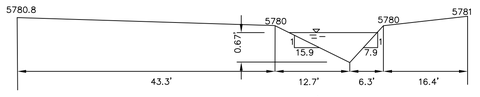
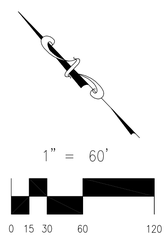
V=1.45 FT/SEC, D=7.0 INCHES

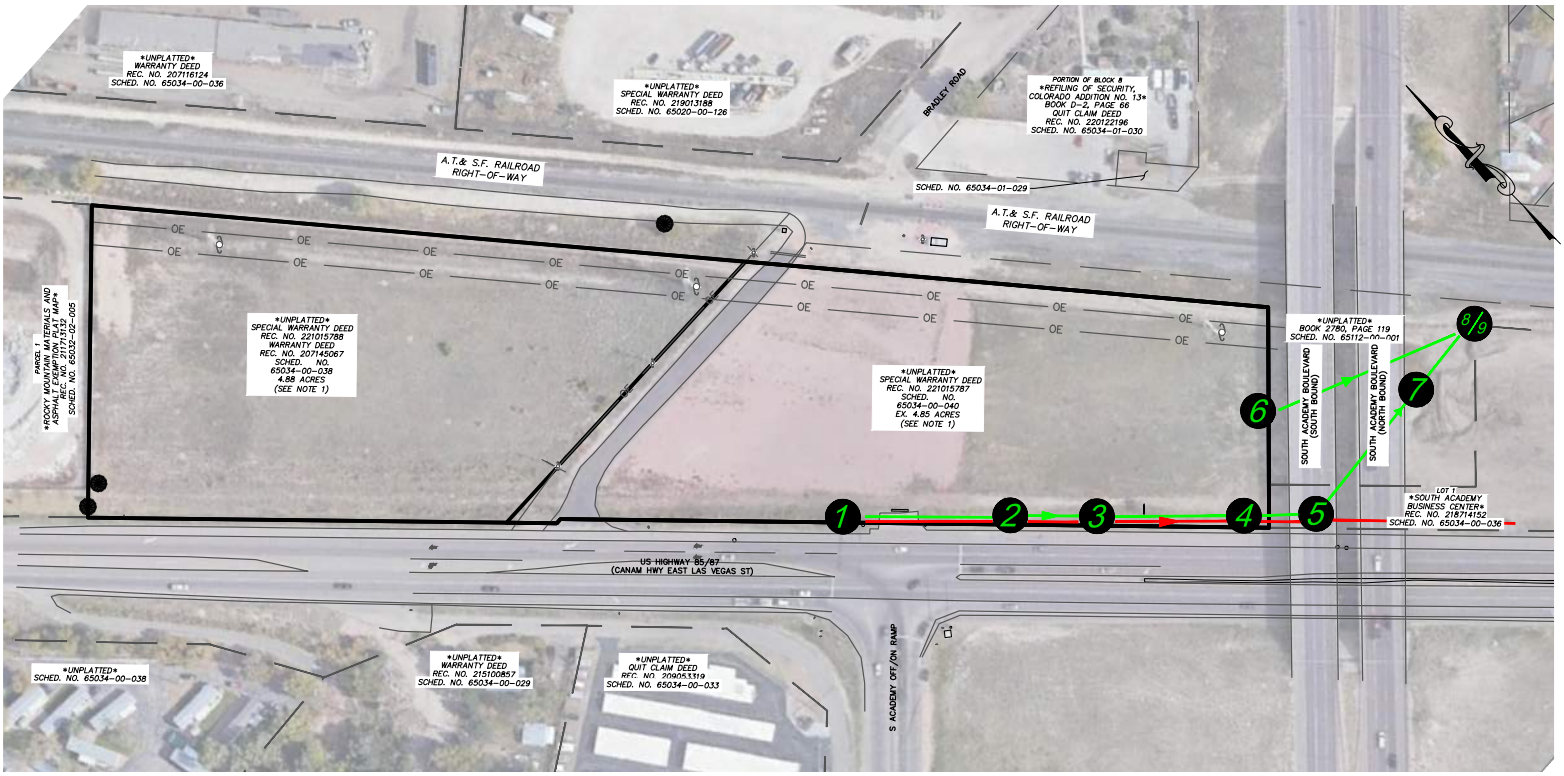


CROSS SECTION E-E'
N.T.S.
Q100=17.5 CFS, S=0.02 FT/FT,
V=3.35 FT/SEC, D=8.0 INCHES



CIVIL CONSULTANTS, INC.
212 N. WAHSATCH AVE., STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

ROADSIDE DITCH CONVEYANCE EXHIBIT

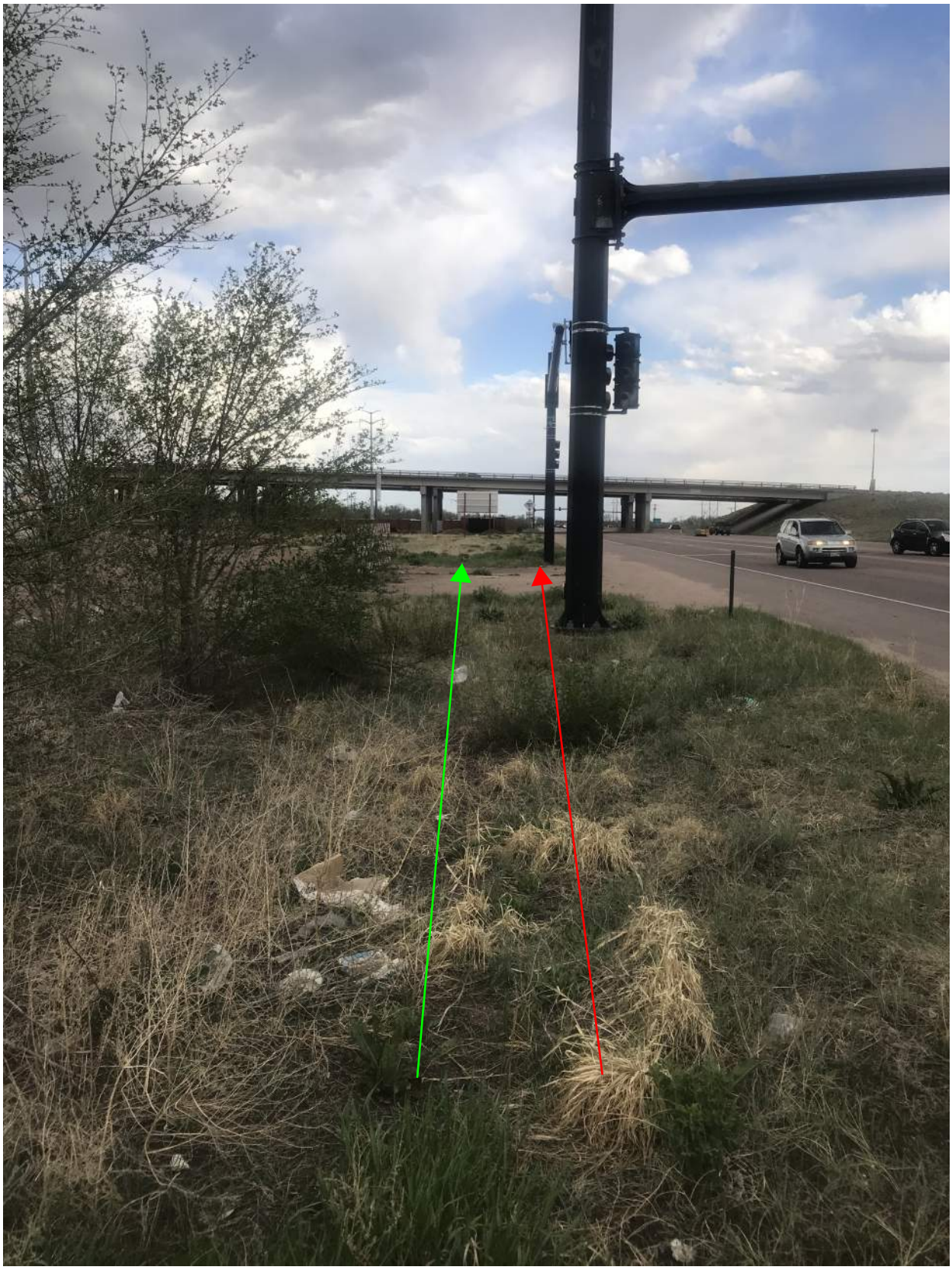


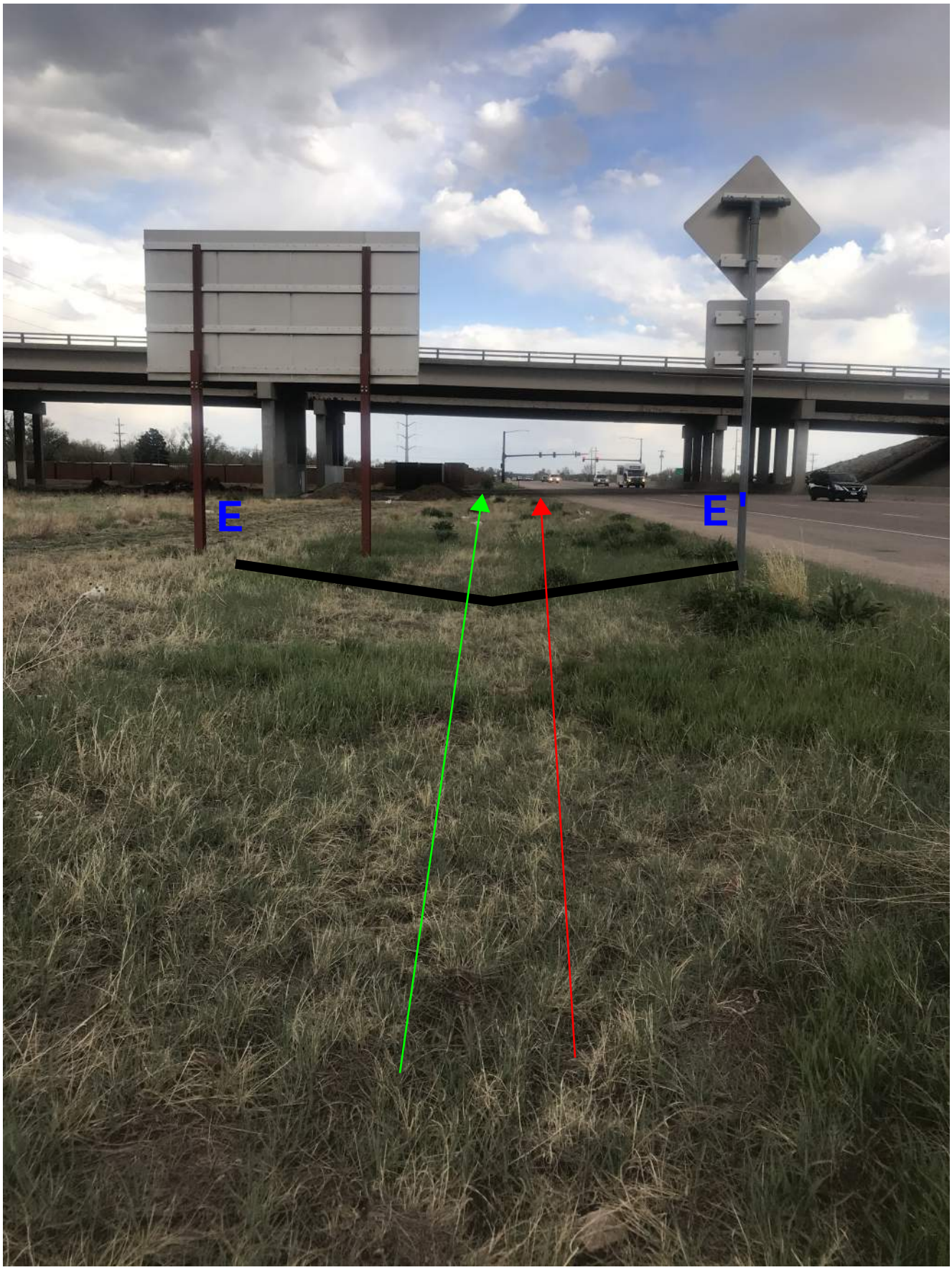
SITE MAP
N.T.S.

LEGEND

ACTUAL FLOWPATH

LOGICAL FLOWPATH




E
E'


18" ADS
CULVERT

Remove GEC Plans and submit as a separate document.

GRADING AND EROSION CONTROL PLANS

BRADLEY POINT FILING NO. 1

COUNTY OF EL PASO, STATE OF COLORADO

GRADING/EROSION CONTROL PLANS

DECEMBER 2022

STANDARD CONSTRUCTION NOTES:

1. 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.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR THE NOTIFICATION AND FIELD LOCATION 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 SPRINGS.

3. 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 TIME INCLUDING THE FOLLOWING:
   3.1 EL PASO COUNTY ENGINEERING CRITERIA MANUAL (ECM)
   3.2 CITY OF COLORADO SPRINGS/EL PASO COUNTY ENGINEERING CRITERIA MANUAL VOLUMES 1 AND 2.
   3.3 COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARDS SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION.
   3.4 CDOT M&S STANDARDS.

4. IT IS THE DESIGN ENGINEERS RESPONSIBILITY TO ACCURACY SHOW EXISTING CONDITION BOTH ONSITE AND OFFSITE ON THE CONSTRUCTION PLANS. ANY MODIFICATION NECESSARY DUE TO CONFLICT OMISSIONS OR CHANGED CONDITIONS WILL BE ENTIRELY THE DEVELOPERS RESPONSIBILITY TO RECTIFY.

5. ONCE THE ESQCP HAS BEEN ISSUED, THE CONTRACTOR MAY INSTALL THE INITIAL STAGE EROSION AND SEDIMENT CONTROL BMPS AS INDICATED ON THE GEC. A PRECONSTRUCTION MEETING BETWEEN THE CONTRACTOR, ENGINEER, AND EL PASO COUNTY WILL BE HELD PRIOR TO ANY CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE APPLICANT TO COORDINATE THE MEETING TIME AND PLACE WITH COUNTY PCD INSPECTIONS STAFF.

6. IT IS THE CONTRACTORS 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 STORM WATER QUALITY CONTROL PERMIT (ESQCP), US ARMY CORPS OF ENGINEER ISSUED 401 AND/OR 404 PERMITS AND COUNTY AND STATE FUGITIVE DUST PERMITS.

7. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE CONSTRUCTION SITE AT APPROVED CONSTRUCTION ACCESS POINTS.

8. ANY TEMPORARY SIGNAGE AND STRIPING SHALL COMPLY WITH EL PASO COUNTY DOW AND MUTCD CRITERIA.

9. CONTRACTOR SHALL OBTAIN ANY PERMITS REQUIRE BY EL PASO COUNTY DOT INCLUDING WORK WITHIN THE RIGHT-OF-WAY AND SPECIAL TRANSPORT PERMITS.

10. 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 OFFSITE DISTURBANCE GRADING, OR CONSTRUCTION.

GRADING AND EROSION CONTROL NOTES:

1. STORMWATER DISCHARGES FROM CONSTRUCTION SITES SHALL NOT CAUSE OR THREATEN TO CAUSE POLLUTION, CONTAMINATION, OR DEGRADATION OF STATE WATERS. ALL WORK AND EARTH DISTURBANCE SHALL BE DONE IN A MANNER THAT MINIMIZES POLLUTION OF ANY ON-SITE OR OFF-SITE WATERS, INCLUDING WETLANDS.

2. NOTWITHSTANDING ANYTHING DEPICTED IN THESE PLANS IN WORDS OR GRAPHIC REPRESENTATION, ALL DESIGN AND CONSTRUCTION RELATED TO ROADS, STORM DRAINAGE AND EROSION CONTROL SHALL CONFORM TO THE STANDARDS AND REQUIREMENTS OF THE MOST RECENT VERSION OF THE RELEVANT ADOPTED EL PASO COUNTY STANDARDS, INCLUDING THE LAND DEVELOPMENT CODE, THE ENGINEERING CRITERIA MANUAL, THE DRAINAGE CRITERIA MANUAL, AND THE DRAINAGE CRITERIA MANUAL VOLUME 2. ANY DEVIATIONS FROM REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING.

3. A SEPARATE STORMWATER MANAGEMENT PLAN (SMWP) FOR THIS PROJECT SHALL BE COMPLETED AND AN EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP) ISSUED PRIOR TO COMMENCING CONSTRUCTION. MANAGEMENT OF THE SWMP DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE DESIGNATED QUALIFIED STORMWATER MANAGER OR CERTIFIED EROSION CONTROL INSPECTOR. THE SWMP 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.

4. 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.

5. CONTROL MEASURES MUST BE INSTALLED PRIOR TO COMMENCEMENT OF ACTIVITIES THAT COULD CONTRIBUTE POLLUTANTS TO STORMWATER. CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, AND DISTURBED LAND AREAS SHALL BE INSTALLED IMMEDIATELY UPON COMPLETION OF THE DISTURBANCE.

6. ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE MAINTAINED AND REMAIN IN EFFECTIVE OPERATING CONDITION UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED AND FINAL STABILIZATION IS ESTABLISHED. ALL PERSONS ENGAGED IN LAND DISTURBANCE ACTIVITIES SHALL ASSESS THE ADEQUACY OF CONTROL MEASURES AT THE SITE AND IDENTIFY IF CHANGES TO THOSE CONTROL MEASURES ARE NEEDED TO ENSURE THE CONTINUED EFFECTIVE PERFORMANCE OF THE CONTROL MEASURES. ALL CHANGES TO TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES MUST BE INCORPORATED INTO THE STORMWATER MANAGEMENT PLAN.

7. 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.

8. 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 PLANT DENSITY OF 70 PERCENT OF PRE-DISTURBANCE LEVELS ESTABLISHED OR EQUIVALENT PERMANENT ALTERNATIVE STABILIZATION METHOD IS IMPLEMENTED. ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED UPON FINAL STABILIZATION AND BEFORE PERMIT CLOSURE.

9. ALL PERMANENT STORMWATER MANAGEMENT FACILITIES SHALL BE INSTALLED AS DESIGNED IN THE APPROVED PLANS. ANY PROPOSED CHANGES THAT EFFECT THE DESIGN OR FUNCTION OF PERMANENT STORMWATER MANAGEMENT STRUCTURES MUST BE APPROVED BY THE ECM ADMINISTRATOR PRIOR TO IMPLEMENTATION.

10. EARTH DISTURBANCES 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 SHOWN TO BE INFEASIBLE AND SPECIFICALLY REQUESTED AND APPROVED.

11. COMPACTION OF SOIL MUST BE PREVENTED IN AREAS DESIGNATED FOR INFILTRATION CONTROL MEASURES OR WHERE FINAL STABILIZATION WILL BE ACHIEVED BY VEGETATIVE COVER. AREAS DESIGNATED FOR INFILTRATION CONTROL MEASURES SHALL ALSO BE PROTECTED FROM SEDIMENTATION DURING CONSTRUCTION UNTIL FINAL STABILIZATION IS ACHIEVED. IF COMPACTION PREVENTION IS NOT FEASIBLE DUE TO SITE CONSTRAINTS, ALL AREAS DESIGNATED FOR INFILTRATION AND VEGETATION CONTROL MEASURES MUST BE LOOSENED PRIOR TO INSTALLATION OF THE CONTROL MEASURE(S).

12. 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.

13. CONCRETE WASH WATER SHALL BE CONTAINED AND DISPOSED OF IN ACCORDANCE WITH THE SWMP. NO WASH WATER SHALL BE DISCHARGED TO OR ALLOWED TO ENTER STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES. CONCRETE WASHOUTS SHALL NOT BE LOCATED IN AN AREA WHERE SHALLOW GROUNDWATER MAY BE PRESENT, OR WITHIN 50 FEET OF A SURFACE WATER BODY, CREEK OR STREAM.

14. DURING DEWATERING OPERATIONS OF UNCONTAMINATED GROUND WATER MAY BE DISCHARGED ON SITE, BUT SHALL NOT LEAVE THE SITE IN THE FORM OF SURFACE RUNOFF UNLESS AN APPROVED STATE DEWATERING PERMIT IS IN PLACE.

15. EROSION CONTROL BLANKETING OR OTHER PROTECTIVE COVERING SHALL BE USED ON SLOPES STEEPER THAN 3:1.

16. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL WASTES FROM THE CONSTRUCTION SITE FOR DISPOSAL IN ACCORDANCE WITH LOCAL AND STATE REGULATORY REQUIREMENTS. NO CONSTRUCTION DEBRIS, TREE SLASH, BUILDING MATERIAL WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURIED, DUMPED, OR DISCHARGED AT THE SITE.

17. WASTE MATERIALS SHALL NOT BE TEMPORARILY PLACED OR STORED IN THE STREET, ALLEY, OR OTHER PUBLIC WAY, UNLESS IN ACCORDANCE WITH AN APPROVED TRAFFIC CONTROL PLAN. CONTROL MEASURES MAY BE REQUIRED BY EL PASO COUNTY ENGINEERING IF DEEMED NECESSARY, BASED ON SPECIFIC CONDITIONS AND CIRCUMSTANCES.

18. TRACKING OF SOILS AND CONSTRUCTION DEBRIS OFF-SITE SHALL BE MINIMIZED. MATERIALS TRACKED OFF-SITE SHALL BE CLEANED UP AND PROPERLY DISPOSED OF IMMEDIATELY.

19. THE OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL CONSTRUCTION DEBRIS, DIRT, TRASH, ROCK, SEDIMENT, SOIL, AND SAND THAT MAY ACCUMULATE IN ROADS, STORM DRAINS AND OTHER DRAINAGE CONVEYANCE SYSTEMS AND STORMWATER APPURTENANCES AS A RESULT OF SITE DEVELOPMENT.

20. 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.

21. NO CHEMICAL(S) HAVING THE POTENTIAL TO BE RELEASED IN STORMWATER ARE TO BE STORED OR USED ONSITE UNLESS PERMISSION FOR THE USE OF SUCH CHEMICAL(S) IS GRANTED IN WRITING BY THE ECM ADMINISTRATOR. IN GRANTING APPROVAL FOR THE USE OF SUCH CHEMICAL(S), SPECIAL CONDITIONS AND MONITORING MAY BE REQUIRED.

22. BULK STORAGE OF ALLOWED PETROLEUM PRODUCTS OR OTHER ALLOWED LIQUID CHEMICALS IN EXCESS OF 55 GALLONS SHALL REQUIRE ADEQUATE SECONDARY CONTAINMENT PROTECTION TO CONTAIN ALL SPILLS ONSITE AND TO PREVENT ANY SPILLED MATERIALS FROM ENTERING STATE WATERS, ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR OTHER FACILITIES.

23. NO PERSON SHALL CAUSE THE IMPEDIMENT OF STORMWATER FLOW IN THE CURB AND GUTTER OR DITCH EXCEPT WITH APPROVED SEDIMENT CONTROL MEASURES.

24. OWNER/DEVELOPER AND THEIR AGENTS SHALL COMPLY WITH THE "COLORADO WATER QUALITY CONTROL ACT" (TITLE 25, ARTICLE 8, CRS), AND THE "CLEAN WATER ACT" (33 USC 1344), IN ADDITION TO THE REQUIREMENTS OF THE LAND DEVELOPMENT CODE, DCM VOLUME II AND THE ECM APPENDIX I. ALL APPROPRIATE PERMITS MUST BE OBTAINED BY THE CONTRACTOR PRIOR TO CONSTRUCTION (1041, NPDES, FLOODPLAIN, 404, FUGITIVE DUST, ETC.). IN THE EVENT OF CONFLICTS BETWEEN THESE REQUIREMENTS AND OTHER LAWS, RULES, OR REGULATIONS OF OTHER FEDERAL, STATE, LOCAL, OR COUNTY AGENCIES, THE MOST RESTRICTIVE LAWS, RULES, OR REGULATIONS SHALL APPLY.

25. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE ONLY AT APPROVED CONSTRUCTION ACCESS POINTS.

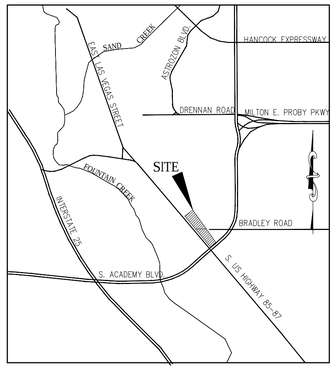
26. PRIOR TO CONSTRUCTION THE PERMITTEE SHALL VERIFY THE LOCATION OF EXISTING UTILITIES.

27. A WATER SOURCE SHALL BE AVAILABLE ON SITE DURING EARTHWORK OPERATIONS AND SHALL BE UTILIZED AS REQUIRED TO MINIMIZE DUST FROM EARTHWORK EQUIPMENT AND WIND.

28. THE SOILS REPORT FOR THIS SITE HAS BEEN PREPARED BY ENTECH ENGINEERS, ENTITLED "SOILS, GEOLOGY, AND GEOLOGIC HAZARD STUDY", DATED JANUARY 22ND, 2021, AND SHALL BE CONSIDERED A PART OF THESE PLANS.

29. AT LEAST TEN (10) DAYS PRIOR TO THE ANTICIPATED START OF CONSTRUCTION, FOR PROJECTS THAT WILL DISTURB ONE (1) ACRE OR MORE, THE OWNER OR OPERATOR OF CONSTRUCTION ACTIVITY SHALL SUBMIT A PERMIT APPLICATION FOR STORMWATER DISCHARGE TO THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, WATER QUALITY DIVISION. THE APPLICATION CONTAINS CERTIFICATION OF COMPLETION OF A STORMWATER MANAGEMENT PLAN (SWMP), OF WHICH THIS GRADING AND EROSION CONTROL PLAN MAY BE A PART. FOR INFORMATION OR APPLICATION MATERIALS CONTACT:

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
WATER QUALITY CONTROL DIVISION
WQCD - PERMITS
4300 CHERRY CREEK DRIVE SOUTH
DENVER, CO 80246-1530
ATTN: PERMITS UNIT



VICINITY MAP

N.T.S.

SITE MAP

N.T.S.

ADDITIONAL NOTES:

STAGING AREA TO BE DETERMINED BY CONTRACTOR IN THE FIELD. THE LOCATIONS SHALL BE DELINEATED ON THIS PLAN BY THE CONTRACTOR.

THE EROSION CONTROL DELINEATED ON THIS PLAN SHALL BE REGULARLY UPDATED BY THE CONTRACTOR.

EXISTING SITE TERRIAN GENERALLY SLOPES FROM NORTH TO SOUTHEAST AT GRADE RATES THAT VARY BETWEEN 0.7% TO 10%.

THERE ARE NO BATCH PLANTS ON SITE.

AREAS LEFT OPEN FOR 30 DAYS OR MORE, OTHER THAN FOR UTILITY AND DRAINAGE CONSTRUCTION SHALL BE SEEDED AND/OR MULCHED.

NO PORTION OF THIS PROPERTY IS LOCATED WITHIN A DESIGNATED FEMA FLOODPLAIN IN ACCORDANCE WITH FLOOD INSURANCE RATE MAPS (FIRM) 08041C0744 G, EFFECTIVE DATE DECEMBER 7, 2018.

SHEET INDEX

BENCHMARKS

1. CONTROL DISK SET IN ABUTMENT OF BRIDGE
   N: 1341598.37
   E: 3210918.78
   ELEV: 5782.74'

QUALIFIED STORMWATER MANAGER'S INSPECTIONS AND MAINTENANCE OF BMP'S:

1.) MAKE THOROUGH INSPECTION OF THE STORMWATER MANAGEMENT SYSTEM AFTER EACH PRECIPITATION EVENT THAT CAUSES RUNOFF.

2.) IF ANY DEFICIENCIES ARE NOTED, THEY MUST BE CORRECTED IMMEDIATELY AFTER BEING NOTED

3.) RECORDS OF THE SIGNED SITE INSPECTIONS OR MODIFICATIONS MUST BE KEPT AT THE SITE UNLESS AN ALTERNATE PLACE IS APPROVED BY THE EL PASO COUNTY INSPECTOR AND MUST BE MADE AVAILABLE UPON REQUEST.

4.) INSPECTIONS MUST TAKE PLACE WHERE CONSTRUCTION ACTIVITY IS COMPLETE, BUT LOT IS NOT SOLD

5.) MONTHLY INSPECTIONS MUST TAKE PLACE ON SITE WHERE CONSTRUCTION ACTIVITY IS COMPLETE, BUT VEGETATIVE COVER IS STILL BEING ESTABLISHED.

6.) MAINTENANCE OF CONTROL MEASURES CAN BE FOUND IN CONSTRUCTION DETAILS SECTION

7.) INFORMATION REGARDING DETAILED INSTALLATION OF BMP'S AND ALL OTHER IMPORTANT ASPECTS OF THESE PROCEDURES SHOULD BE REFERRED TO IN STORM WATER MANAGEMENT PLAN

AGENCIES

OWNER/DEVELOPER:	STEPHEN J. SCHNURR 2010 FOX MOUNTAIN POINT COLORADO SPRINGS, CO 80906 STEPHEN J. SCHNURR (719) 491-3101
CIVIL ENGINEER:	M & S CIVIL CONSULTANTS, INC. 212 N. WAHSATCH AVE, SUITE 305 COLORADO SPRINGS, CO 80903 VIRGIL A. SANCHEZ P.E. (719) 955-5485
WATER RESOURCES:	SECURITY WATER AND SANITATION DISTRICT 231 SECURITY BOULEVARD COLORADO SPRINGS, CO 80911 ROY HEALD (719) 392-3475
COUNTY ENGINEERING:	EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT 2880 INTERNATIONAL CIRCLE, SUITE 110 COLORADO SPRINGS, CO 80910 GILBERT LAFORCE (719) 520-7945
TRAFFIC ENGINEERING:	EL PASO COUNTY DEPARTMENT OF PUBLIC WORKS 3275 AKERS DRIVE COLORADO SPRINGS, CO 80922 JENNIFER IRVINE, P.E. (719) 520-6460
FIRE DISTRICT:	SECURITY FIRE DEPARTMENT 400 SECURITY BOULEVARD SECURITY, CO 80911 BRANDON SULLIVAN (719) 392-7121
GAS DEPARTMENT:	COLORADO SPRINGS UTILITIES 1521 HANCOCK EXPRESSWAY COLORADO SPRINGS, CO 80903 (719) 668-7640
ELECTRIC DEPARTMENT:	COLORADO SPRINGS UTILITIES 1521 HANCOCK EXPRESSWAY COLORADO SPRINGS, CO 80903 (719) 668-7640
COMMUNICATIONS:	TBD (U.N.C.C. LOCATORS) (800) 922-1987 AT&T (LOCATORS) (719) 635-3674

ENGINEER'S STATEMENT:

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

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160 — DATE
FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

DEVELOPER'S STATEMENT:

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

STEPHEN J. SHNURR — DATE
BRADLEY POINT, LLC
2010 FOX MOUNTAIN POINT
COLORADO SPRINGS, CO 80906
(719) 491-3101

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 DIRECTOR'S DISCRETION.

JENNIFER IRVINE, P.E. — DATE
COUNTY ENGINEER/ECM ADMINISTRATOR

EL PASO COUNTY FILE NO. MS-21-002

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES
FOR BURIED UTILITY INFORMATION
48 HRS BEFORE YOU DIG
CALL 1-800-922-1987

BRADLEY POINT FILING NO. 1
GRADING & EROSION CONTROL PLAN
PROJECT NO. 70-074 | DESIGNED BY: VAS | DRAWN BY: CVW | CHECKED BY: DLM
DATE: 12/07/22
SCALE: HORIZONTAL: N/A VERTICAL: N/A
SHEET 1 OF 5
GR01

212 N. WAHSATCH AVE, STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485
CIVIL CONSULTANTS, INC.

FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.
VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

REVISIONS: NO. | DATE: | BY: | DESCRIPTION: | APPR'D. BY: | DATE:

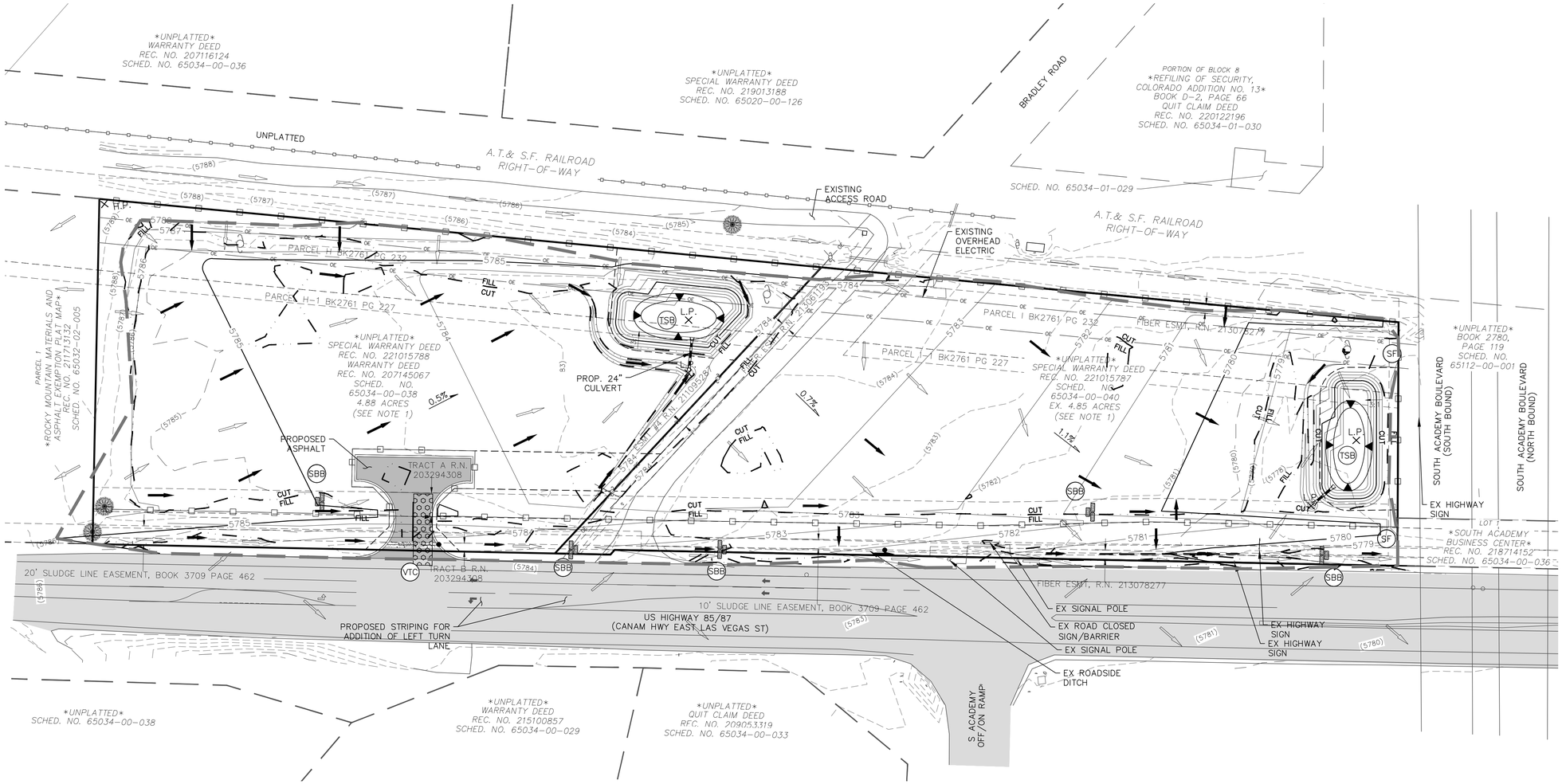
CAUTION

File: G:\70074A SOUTH PLANT 85-87\(dwg)\Const Dwg\GECD\GR01.dwg Plotstamp: 12/12/2022 10:43 AM

BRADLEY POINT FILING NO. 1

GRADING AND EROSION CONTROL PLAN

DECEMBER 2022



ADDITIONAL NOTES:

1. STAGING AND STOCKPILES AREA TO BE DETERMINED BY CONTRACTOR IN THE FIELD. THE LOCATIONS SHALL BE DELINEATED ON THIS PLAN BY THE CONTRACTOR.

2. THE EROSION CONTROL DELINEATED ON THIS PLAN SHALL BE REGULARLY UPDATED BY THE CONTRACTOR.

3. PROPOSED SLOPES SHALL BE 4:1 OR LESS.

4. THE CONTRACTOR SHALL OBTAIN A COPY OF THE GEOTECHNICAL ENGINEERING REPORT AND KEEP A COPY ONSITE DURING ALL EARTHWORK OPERATIONS.

5. THE CONTRACTOR SHALL PROVIDE SUFFICIENT BUFFER BETWEEN THE LIMITS OF DISTURBANCE AND AREAS IN WHICH NO GRADING SHALL OCCUR TO MAKE SUFFICIENT TIE IN BETWEEN THE PROPOSED GRADE AND EXISTING GRADE WHICH MAY NOT BE CLEARLY ILLUSTRATED ON THIS PLAN.

6. EXISTING VEGETATION CONSISTS OF SPARSE, NATIVE GRASSES; APPROXIMATELY 23.5% OF THE SITE IS COVERED IN AN AGGREGATE BASE MATERIAL IN THE EXISTING CONDITION

7. FINAL STABILIZATION SHALL BE COMPLETED AT THE END OF THE CONSTRUCTION ACTIVITIES. ALL AREAS DISTURBED WITHIN THE CONSTRUCTION BOUNDARY/LIMITS OF DISTURBANCE AREA SHALL BE RESEEDED WITH NATIVE SEEDING.

8. NO PORTION OF THE PROPOSED CROSSROADS MIXED USE SITE LIES WITHIN A FEMA EFFECTIVE 100-YR FLOODPLAIN.

9. EROSION CONTROL BLANKET SHALL BE USED ON SLOPES GREATER THAN 4:1.

10. FENCE AND SIGNAGE ADDED TO KEEP ON-SITE STORED MATERIALS OUT OF THE PONDS.

LEGEND

7070	PROP MAJ CONT
7072	PROP MIN CONT
(7070)	EXIST MAJ CONT
(7072)	EXIST MIN CONT
	ADJ. PROPERTY BOUNDARY
OE	OVERHEAD ELECTRIC
EX OR EXIST	EXISTING
FUT	FUTURE
PROP	PROPOSED
L.P./H.P.	LOW POINT/HIGH POINT
TSB	TEMPORARY SEDIMENT BASIN – INTERIM
SF	SILT FENCE – INITIAL/INTERIM
SBB	STRAW BALE DITCH CHECK – INTERIM
VTC	VEHICLE TRACKING CONTROL – INITIAL/INTERIM
	CUT/FILL LINE
	EX. FLOW ARROW
	PROP. FLOW ARROW
	PROPOSED SUBDIVISION LINE
	PROPERTY LINE
	PROP FENCE
	LIMITS OF DISTURBANCE
	VEHICLE TRACKING CONTROL
	EXIST BUSH/TREE

1" = 60'

0 30 60 120

Scale in Feet

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES

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BRADLEY POINT FILING NO. 1
GRADING & EROSION CONTROL PLAN
PROJECT NO. 70-074 | DESIGNED BY: CVW | DRAWN BY: CVW | CHECKED BY: DLM
SCALE: HORIZONTAL: 1" = 60' VERTICAL: N/A
DATE: 12/07/22
SHEET 2 OF 5
GR02

212 N. WAHSATCH AVE, STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485
CIVIL CONSULTANTS, INC.

FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37760

REVISIONS:

NO.	DATE:	BY:	DESCRIPTION:	APPVD. BY:	DATE:

File: G:\70074A SOUTH PLANT 85-87\SOUTH PLANT 85-87\dwg\Const Dwg\GEC\GR02.dwg Plotstamp: 12/12/2022 4:50 PM

SC-1 Silt Fence (SF)

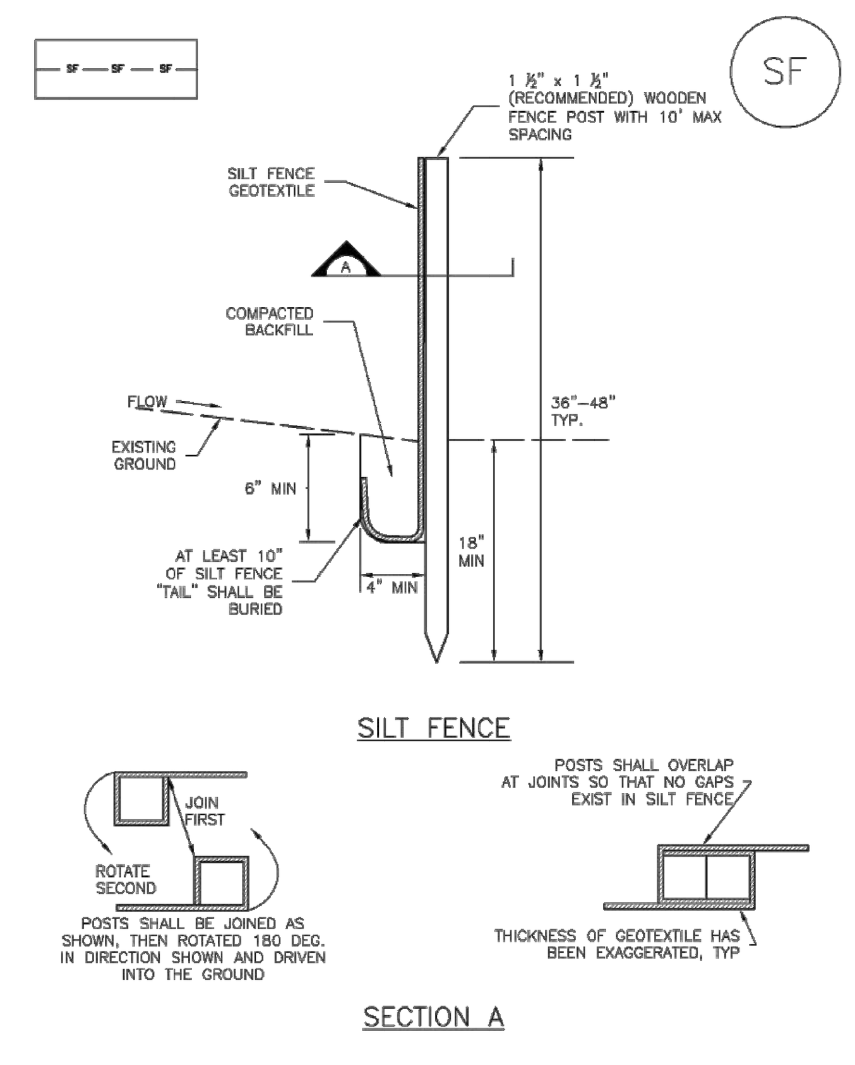
Maintenance and Removal

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.

Silt Fence (SF) SC-1



SC-1 Silt Fence (SF)

SILT FENCE INSTALLATION NOTES

1. 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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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').

7. SILT FENCE SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.

SILT FENCE MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. SEDIMENT ACCUMULATED 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".

5. REPAIR OR REPLACE SILT FENCE WHEN THERE ARE SIGNS OF WEAR, SUCH AS SAGGING, TEARING, OR COLLAPSE.

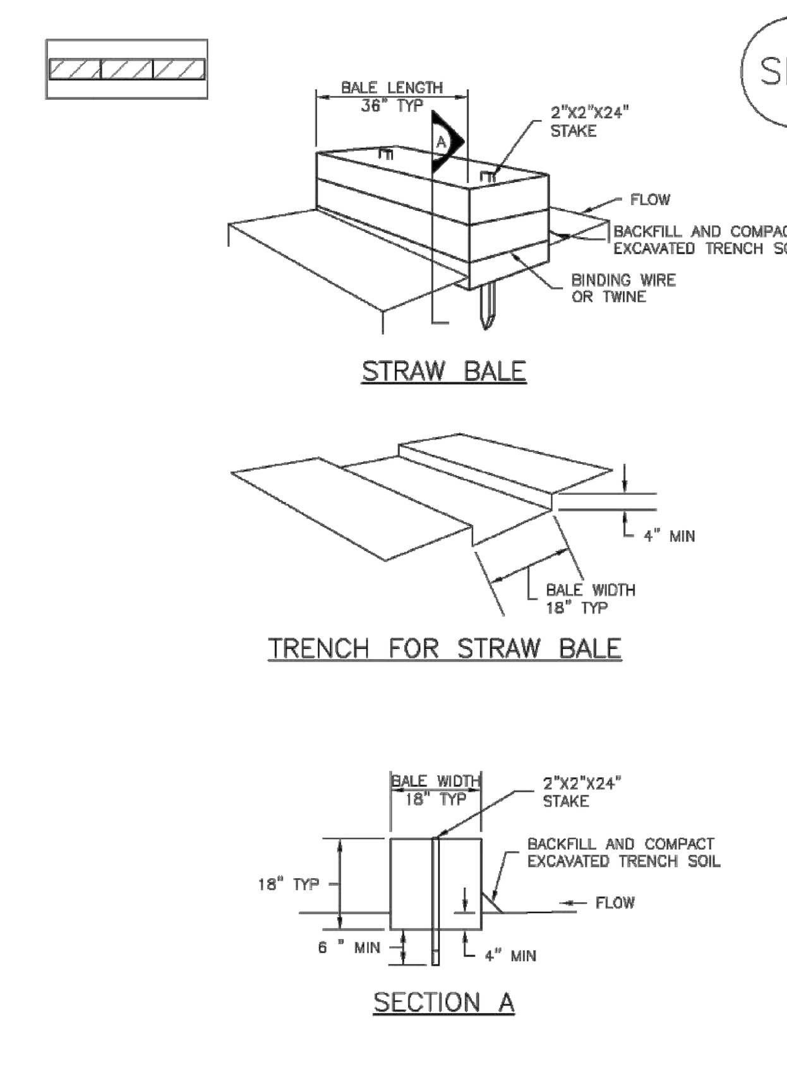
6. SILT FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION, OR IS REPLACED BY AN EQUIVALENT PERIMETER SEDIMENT CONTROL BMP.

7. WHEN SILT FENCE IS REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, 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.

SC-3 Straw Bale Barrier (SBB)



Straw Bale Barrier (SBB) SC-3

STRAW BALE INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   -LOCATION(S) OF STRAW BALES.

2. STRAW BALES SHALL CONSIST OF CERTIFIED WEED FREE STRAW OR HAY. LOCAL JURISDICTIONS MAY REQUIRE PROOF THAT BALES ARE WEED FREE.

3. STRAW BALES SHALL CONSIST OF APPROXIMATELY 5 CUBIC FEET OF STRAW OR HAY AND WEIGH NOT LESS THAN 35 POUNDS.

4. WHEN STRAW BALES ARE USED IN SERIES AS A BARRIER, THE END OF EACH BALE SHALL BE TIGHTLY ABUTTING ONE ANOTHER.

5. STRAW BALE DIMENSIONS SHALL BE APPROXIMATELY 36"X18"X18".

6. A UNIFORM ANCHOR TRENCH SHALL BE EXCAVATED TO A DEPTH OF 4". STRAW BALES SHALL BE PLACED SO THAT BINDING TWINE IS ENCOMPASSING THE VERTICAL SIDES OF THE BALE(S). ALL EXCAVATED SOIL SHALL BE PLACED ON THE UPHILL SIDE OF THE STRAW BALE(S) AND COMPACTED.

7. TWO (2) WOODEN STAKES SHALL BE USED TO HOLD EACH BALE IN PLACE. WOODEN STAKES SHALL BE 2"X2"X24". WOODEN STAKES SHALL BE DRIVEN 6" INTO THE GROUND.

STRAW BALE 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. STRAW BALES SHALL BE REPLACED IF THEY BECOME HEAVILY SOILED, ROTTEN, OR DAMAGED BEYOND REPAIR.

5. SEDIMENT ACCUMULATED UPSTREAM OF STRAW BALE BARRIER SHALL BE REMOVED AS NEEDED TO MAINTAIN FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY ¼ OF THE HEIGHT OF THE STRAW BALE BARRIER.

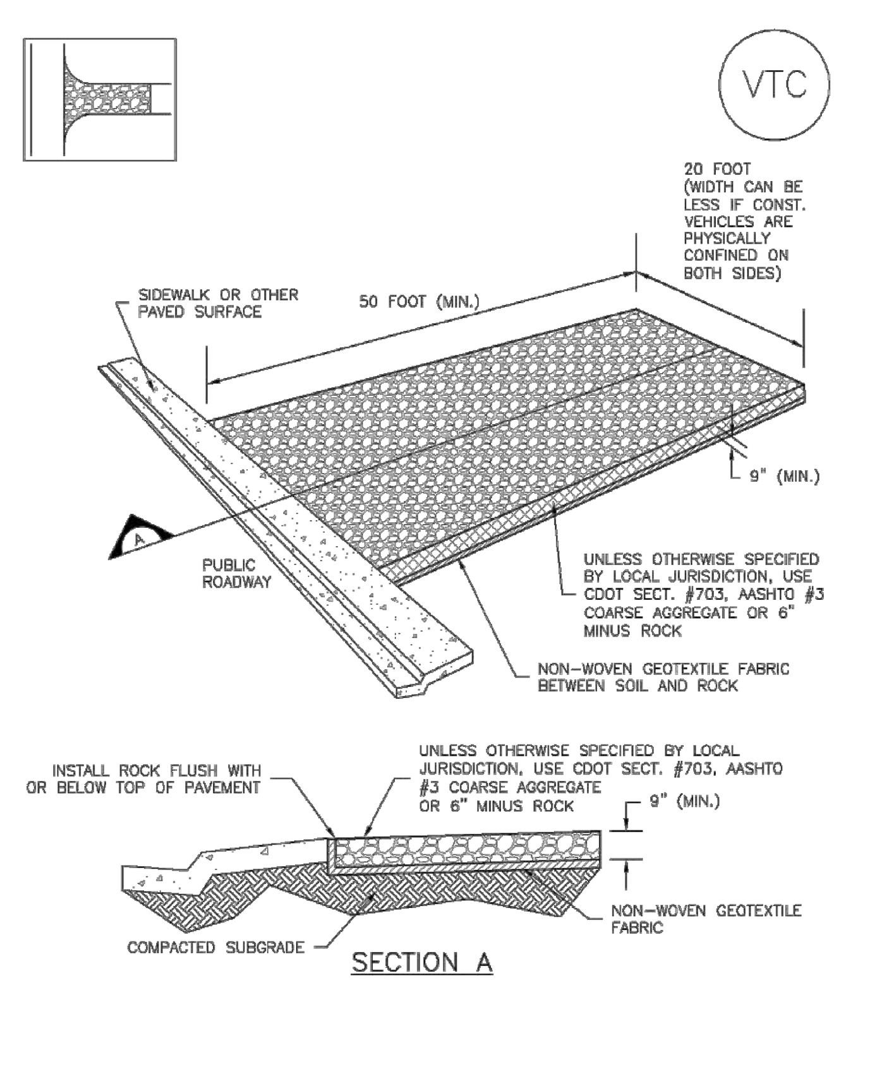
6. STRAW BALES ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

7. WHEN STRAW BALES ARE 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, 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.

Vehicle Tracking Control (VTC) SM-4



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)/EXITS(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 UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

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

Temporary Outlet Protection (TOP) EC-8

TEMPORARY OUTLET PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   -LOCATION OF OUTLET PROTECTION.
   -DIMENSIONS OF OUTLET PROTECTION.

2. DETAIL IS INTENDED FOR PIPES WITH SLOPE ≤ 10%. ADDITIONAL EVALUATION OF RIPRAP SIZING AND OUTLET PROTECTION DIMENSIONS REQUIRED FOR STEEPER SLOPES.

3. TEMPORARY OUTLET PROTECTION INFORMATION IS FOR OUTLETS INTENDED TO BE UTILIZED LESS THAN 2 YEARS.

TEMPORARY OUTLET PROTECTION INSPECTION AND 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.

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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 AND PREVIOUS VERSION OF VOLUME 3, NOT AVAILABLE IN AUTOCAD)

EC-8 Temporary Outlet Protection (TOP)

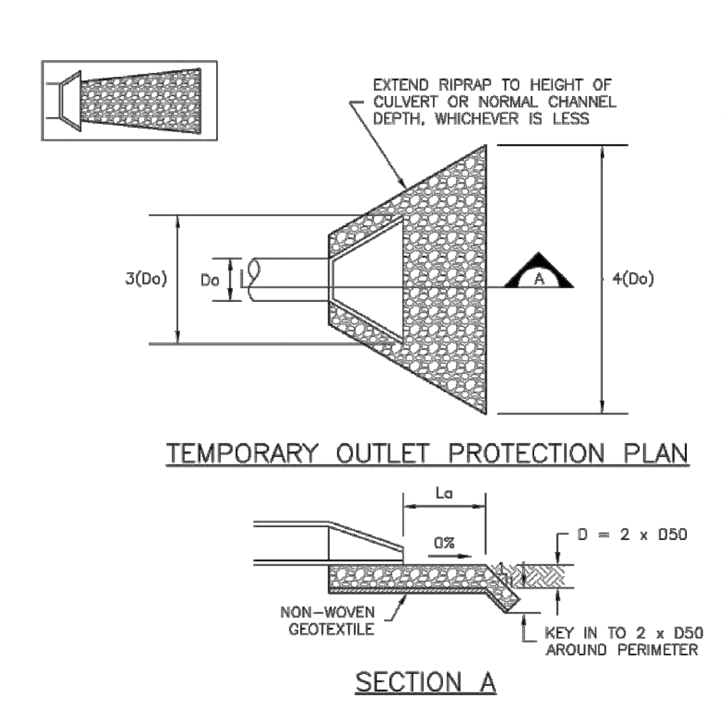
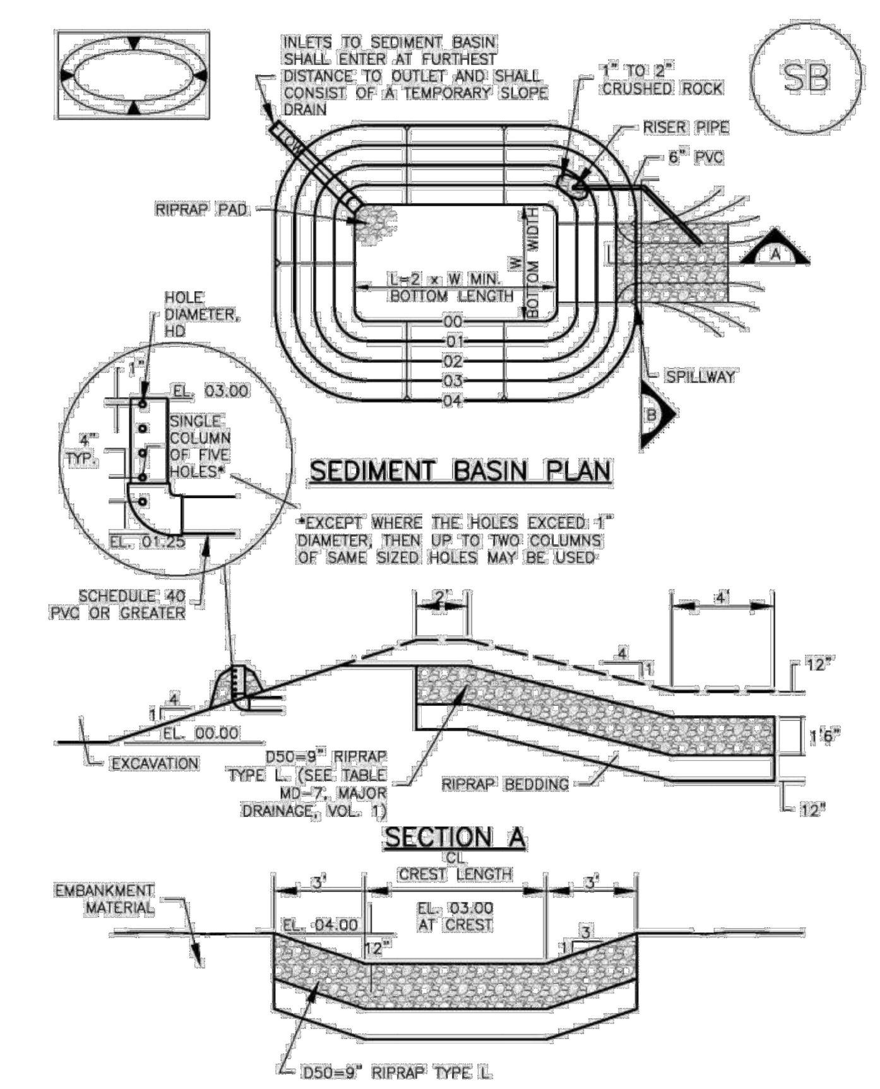


TABLE OP-1. TEMPORARY OUTLET PROTECTION SIZING TABLE

PIPE DIAMETER, Do (INCHES)	DISCHARGE, Q (CFS)	APRON LENGTH, La (FT)	RIPRAP D50 DIAMETER MIN (INCHES)
8	2.5 5	5 10	4 6
12	5 10	10 13	4 6
18	10 20 30 40	10 16 23 26	6 9 12 16
24	30 40 50 60	16 26 26 30	9 9 12 16

OP-1. TEMPORARY OUTLET PROTECTION

Sediment Basin (SB) SC-7



EROSION CONTROL CRITERIA:

EROSION CONTROL MEASURES SHALL BE IMPLEMENTED IN A MANNER THAT WILL PROTECT PROPERTIES AND PUBLIC FACILITIES FROM THE ADVERSE EFFECTS OF EROSION AND SEDIMENTATION AS A RESULT OF CONSTRUCTION AND EARTHWORK ACTIVITIES WITHIN THE PROJECT SITE.

1. PRIOR TO START OF GRADING OPERATIONS, LOCATE AND SET THE SEDIMENT BERM AND VEHICLE TRACKING CONTROL AS SHOWN ON THE EROSION CONTROL PLAN.

2. THE SEDIMENT BERM SHALL BE KEPT IN PLACE AND MAINTAINED UNTIL EROSION AND SEDIMENTATION POTENTIAL IS MITIGATED. REMOVAL OF SILT AND SEDIMENT COLLECTED BY THE SEDIMENT BERM IS REQUIRED ONCE IT REACHES HALF THE HEIGHT OF THE SEDIMENT BERM.

3. EROSION CONTROL DEVICES SHOULD BE CHECKED AFTER EVERY STORM OR NOT MORE THAN EVERY 14 DAYS. REPAIRS OR REPLACEMENT SHOULD BE MADE AS NECESSARY TO MAINTAIN PROPER PROTECTION.

SOIL EROSION CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN TWENTY-ONE (21) CALENDAR DAYS AFTER FINAL GRADING, OR FINAL EARTH DISTURBANCE HAS BEEN COMPLETED. DISTURBED AREAS AND STOCKPILES WHICH ARE NOT AT THE FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 30 DAYS SHALL ALSO BE MULCHED WITHIN 21 DAYS AFTER INTERIM GRADING. AN AREA THAT IS GOING TO REMAIN IN AN INTERIM STATE FOR MORE THAN 60 DAYS SHALL ALSO BE SEEDED. ALL TEMPORARY SOIL EROSION CONTROL MEASURES AND BMP'S SHALL BE MAINTAINED UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED.

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES

FOR BURIED UTILITY INFORMATION
48 HRS BEFORE YOU DIG
CALL 1-800-922-1987

BRADLEY POINT FILING NO. 1

GRADING & EROSION CONTROL DETAILS

PROJECT NO. 70-074
DESIGNED BY: CVW
DRAWN BY: CVW
CHECKED BY: DLM

SCALE: HORIZONTAL: N/A VERTICAL: N/A

DATE: 5/27/21

SHEET 3 OF 5

GR03

212 N. WAHSATCH AVE., STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

M&S CIVIL CONSULTANTS, INC.

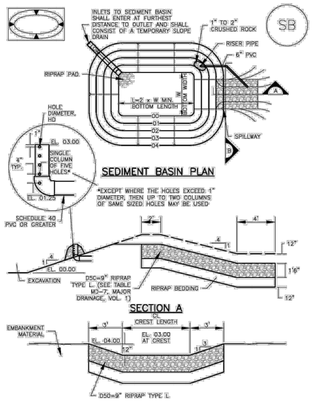
VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160
FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

REVISIONS: NO. DATE: BY: DESCRIPTION: APPR'D. BY: DATE:

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

CAUTION

Sediment Basin (SB) SC-7



SC-7 Sediment Basin (SB)

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

SEDIMENT BASIN INSTALLATION NOTES

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

Sediment Basin (SB) SC-7

SEDIMENT BASIN MAINTENANCE NOTES

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

(DETAILS ADAPTED FROM DOUGLAS 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.

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

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

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

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

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

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

Seed Mix for Temporary Vegetation

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

Seed Mix for Permanent Revegetation

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Common Name	Botanical Name	Growth Season[b]	Growth Form	Seeds/ Pound	Pounds of PLS/acre
Sandy Soil Seed Mix					
Blue grama	*Bouteloua gracilis*	Warm	Sod-forming bunchgrass	825,000	0.5
Camper little bluestem	*Schizachyrium scoparium 'Camper'*	Warm	Bunch	240,000	1.0
Prairie sandreed	*Calamovilfa longifolia*	Warm	Open sod	274,000	1.0
Sand dropseed	*Sporobolus cryptandrus*	Cool	Bunch	1,298,000	0.25
Vaughn sideoats grama	*Bouteloua curtipendula 'Vaughn'*	Warm	Sod	191,000	2.0
Arriba western wheatgrass	*Agropyron smithii 'Arriba'*	Cool	Sod	110,000	5.5
Total					**10.25**
Heavy Clay, Rocky Foothill Seed Mix					
Ephriam crested wheatgrass[d]	*Agropyron cristatum 'Ephriam'*	Cool	Sod	175,000	1.5
Oahe Intermediate wheatgrass	*Agropyron intermedium 'Oahe'*	Cool	Sod	115,000	5.5
Vaughn sideoats grama[e]	*Bouteloua curtipendula 'Vaughn'*	Warm	Sod	191,000	2.0
Lincoln smooth brome	*Bromus inermis leyss 'Lincoln'*	Cool	Sod	130,000	3.0
Arriba western wheatgrass	*Agropyron smithii 'Arriba'*	Cool	Sod	110,000	5.5
Total					**17.5**

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

[b] See Table TS/PS-3 for seeding dates.

[c] If site is to be irrigated, the transition turf seed rates should be doubled.

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

[e] Can substitute 0.5 lbs PLS of blue grama for the 2.0 lbs PLS of Vaughn sideoats grama.

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

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

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

Mulch

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

Maintenance and Removal

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

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

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

Protect seeded areas from construction equipment and vehicle access.

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*		Minimum Tensile Strength[1]	Expected Longevity
	Maximum Gradient:	C Factor[2,5]	Max. Shear Stress[3,4,6]			
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)	
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)	24 months
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)	24 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)	36 months

* 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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COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485
CIVIL CONSULTANTS, INC.

BRADLEY POINT FILING NO. 1
GRADING & EROSION CONTROL DETAILS
PROJECT NO. 70-074 | DESIGNED BY: CVW | DRAWN BY: CVW | CHECKED BY: DLM | DATE: 5/27/21 | SCALE: HORIZONTAL: N/A VERTICAL: N/A | SHEET 4 OF 5 | GR04

FOR AND ON BEHALF OF MKS CIVIL CONSULTANTS, INC.
VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

REVISIONS: NO. | DATE: | BY: | DESCRIPTION:

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APPVD: | BY: | DATE:

CAUTION

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES
FOR BURIED UTILITY INFORMATION
48 HRS BEFORE YOU DIG
CALL 1–800–922–1987

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Table RECP-2. ECTC Standard Specification for Permanent[1] Rolled Erosion Control Products
(Adapted from: Erosion Control Technology Council 2005)

Product Type	Slope Applications	Channel Applications	
	Maximum Gradient	Maximum Shear Stress[4,5]	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).	0.5:1 (H:V)	6.0 lbs/ft^2 (288 Pa)	125 lbs/ft (1.82 kN/m)
	0.5:1 (H:V)	8.0 lbs/ft^2 (384 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 corners of the material are 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

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.

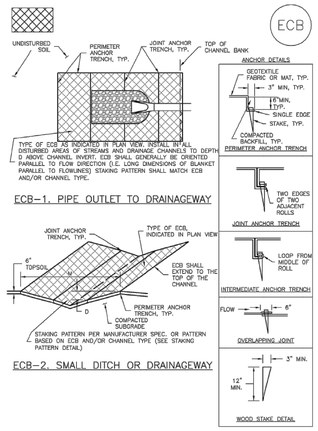
Maintenance and Removal

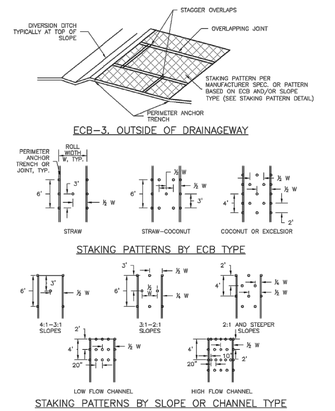
Inspection of erosion control blankets and other RECPs includes:

- 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.





EROSION CONTROL BLANKET INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   –LOCATION OF ECB.
   –TYPE OF ECB (STRAW, STRAW–COCONUT, COCONUT, OR EXCELSIOR).
   –AREA, A, IN SQUARE YARDS OF EACH TYPE OF ECB.

2. 100% NATURAL AND BIODEGRADABLE MATERIALS ARE PREFERRED FOR RECP's, ALTHOUGH SOME JURISDICTIONS MAY ALLOW OTHER MATERIALS IN SOME APPLICATIONS.

3. IN AREAS WHERE ECBs ARE SHOWN ON THE PLANS, THE PERMITTEE SHALL PLACE TOPSOIL AND PERFORM FINAL GRADING, SURFACE PREPARATION, AND SEEDING AND MULCHING. SUBGRADE SHALL BE SMOOTH AND MOIST PRIOR TO ECB INSTALLATION AND THE ECB SHALL BE IN FULL CONTACT WITH SUBGRADE. NO GAPS OR VOIDS SHALL EXIST UNDER THE BLANKET.

4. PERIMETER ANCHOR TRENCH SHALL BE USED ALONG THE OUTSIDE PERIMETER OF ALL BLANKET AREAS.

5. JOINT ANCHOR TRENCH SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER (LONGITUDINALLY AND TRANSVERSELY) FOR ALL ECBs EXCEPT STRAW WHICH MAY USE AN OVERLAPPING JOINT.

6. INTERMEDIATE ANCHOR TRENCH SHALL BE USED AT SPACING OF ONE–HALF ROLL LENGTH FOR COCONUT AND EXCELSIOR ECBs.

7. OVERLAPPING JOINT DETAIL SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER FOR ECBs ON SLOPES.

8. MATERIAL SPECIFICATIONS OF ECBs SHALL CONFORM TO TABLE ECB–1.

9. ANY AREAS OF SEEDING AND MULCHING DISTURBED IN THE PROCESS OF INSTALLING ECBS SHALL BE RESEEDED AND MULCHED.

10. DETAILS ON DESIGN PLANS FOR MAJOR DRAINAGEWAY STABILIZATION WILL GOVERN IF DIFFERENT FROM THOSE SHOWN HERE.

TABLE ECB–1. ECB MATERIAL SPECIFICATIONS

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

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

EROSION CONTROL BLANKET MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. ECBs SHALL BE LEFT IN PLACE TO EVENTUALLY BIODEGRADE, UNLESS REQUESTED TO BE REMOVED BY THE LOCAL JURISDICTION.

5. ANY ECB PULLED OUT, TORN, OR OTHERWISE DAMAGED SHALL BE REPAIRED OR REINSTALLED. ANY SUBGRADE AREAS BELOW THE GEOTEXTILE THAT HAVE ERODED TO CREATED A VOID UNDER THE BLANKET, OR THAT REMAIN DEVOID OF GRASS SHALL BE REPAIRED, RESEEDED AND MULCHED AND THE ECB REINSTALLED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD 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)

BRADLEY POINT FILING NO. 1
GRADING & EROSION CONTROL DETAILS
PROJECT NO. 70-074 | DESIGNED BY: CVW | DRAWN BY: CVW | CHECKED BY: DLM
DATE: 5/27/21
SCALE: HORIZONTAL: N/A VERTICAL: N/A
SHEET 5 OF 5
GR05

212 N. WAHSATCH AVE. STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

CIVIL CONSULTANTS, INC.

FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.
VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

REVISIONS:

NO.	DATE:	BY:	DESCRIPTION:	APRVD. BY:	DATE:

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

CAUTION

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES
FOR BURIED UTILITY INFORMATION
48 HRS BEFORE YOU DIG
CALL 1–800–922–1987