

Final

EPC STORMWATER REVIEW COMMENTS ARE SHOWN IN ORANGE BOXES WITH BLACK TEXT

PRELIMINARY DRAINAGE REPORT FOR BRADLEY POINT FILING NO. 1

EL PASO COUNTY, COLORADO

PCD-ENGINEERING REVIEW COMMENTS
IN BLUE BOXES WITH BLUE TEXT

December 2020

Engineering Review

04/02/2021 2:18:51 PM

dsdrice

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EPC Planning & Community
Development Department

See comment memo also.

Prepared for:

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Prepared by:



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Project #70-074

PCD Project # ~~70-XXX~~ **MS-21-002**

**PRELIMINARY 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

**PRELIMINARY DRAINAGE REPORT FOR
BRADLEY POINT FILING NO. 1**

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PRELIMINARY DRAINAGE REPORT FOR BRADLEY POINT FILING NO. 1

PURPOSE

Final

This document is the Preliminary 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, which includes relocation of the existing subdividing lot line further south. 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 to Fountain Creek.

Bradley Point Filing No. 1 consists of 9.74 acres and is presently undeveloped. Vegetation is sparse, consisting of native grasses. Existing site terrain generally slopes from northwest to southeast at grade rates that vary between 0.7% and 10.4%.

Mention the existing access road.

Bradley Point Filing No. 1 is currently zoned M for industrial use, and is proposed to host materials storage, along with a surrounding fence and entrance gate. Additional improvements proposed for the site include paving for an internal access road to both lots and storm drainage improvements, as normally constructed for an industrial parking and materials storage development.

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 a semi-compacted base material. The site was treated this way through hydrologic analysis as a reasonable, conservative assumption.

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 9.74 acres and is situated east of the Fountain Creek Channel, on the southwestern side of the Little Johnson 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 4.82 undeveloped acres of moderately sparse natural grasses and vegetation, and is comprised of the northwestern half of this site. Runoff produced within **Basin A** is anticipated to reach peak runoff rates of $Q_5=3.5$ cfs and $Q_{100}=9.2$ cfs, and will flow east towards the design point, where it collects in a localized depression. Ponding effects were not considered in this analysis. From here, the runoff is considered to be directed east, entering **Basin B**.

Design Point 2

Basin B consists of 1.27 undeveloped acres of extremely sparse vegetation growing through a semi-compacted base material, and is centrally located within the site. Runoff produced within **Basin B** is anticipated to reach peak runoff rates of $Q_5=1.5$ cfs and $Q_{100}=3.5$ cfs, which will collect with runoff from **Design Point 1** to reach combined peak flow rates of $Q_5=4.8$ and $Q_{100}=12.0$ 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 a semi-compacted 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 $Q_5=1.1$ cfs and $Q_{100}=2.9$ cfs, and will flow south towards the design point, where it will be redirected south east.

Design Point 4

Basin C consists of 1.82 undeveloped acres, approximately 30% of which is extremely sparse vegetation growing through a semi-compacted base material, while the rest of the basin consists of sparse natural grasses and vegetation. This basin is situated on the south eastern side of the site. Runoff produced within **Basin C** flows from north to south, collecting in a localized depression at the design point, and is anticipated to reach peak runoff rates of $Q_5=1.4$ cfs and $Q_{100}=3.7$ cfs.

southwest to roadside ditch per routing?

Design Point 5

Basin E consists of approximately 1.00 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 E** is anticipated to reach peak runoff rates of $Q_5=1.8$ cfs and $Q_{100}=4.0$ cfs, and will flow east where it will be redirected southeast towards the design point.

Design Point 6

Basin F consists of approximately 0.54 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, and the rest consists of sparse natural grasses and vegetation. Runoff produced within **Basin F** is anticipated to reach peak runoff rates of $Q_5=1.4$ cfs and $Q_{100}=2.6$ cfs. This flow will run east, and then will be redirected southeast towards the design point. At this point, the runoff will combine with flows from Design Point 2 and Design Point 5. This cumulative flow is expected to reach rates of $Q_5=8.0$ and $Q_{100}=19.2$ cfs.

Design Point 7

Basin G consists of approximately 1.13 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 E** is anticipated to reach peak runoff rates of $Q_5=1.9$ cfs and $Q_{100}=4.1$ cfs. This flow will run east in order

to discharge into the existing roadside ditch. At this point, the runoff will combine with flows from Design Point 3 and Design Point 6, and will be redirected south east towards downstream infrastructure. This cumulative flow is expected to reach rates of Q5=9.0 and Q100=21.3 cfs.

FOUR STEP PROCESS

Step 1 Employ Runoff Reduction Practices. A reduced slope has been used to lower the flows on site. A gravel base material was also proposed as the ground cover to minimize directly connected impervious areas from the proposed paved road, and to promote infiltration.

Step 2 Implement BMPs that provide a water quality capture volume with slow release. – A Full Spectrum Detention Facility was planned to handle tributary flows for this site which will incorporate water quality capture volumes that are intended to slowly drain in 40 hours and excess urban runoff volumes that are intended to drain within 72 hours.

Step 3 Stabilize streams. – With the full spectrum detention facility in place, the runoff from the proposed industrial development will be reduced to 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 site specific and other source control BMPs. – The proposed project will use silt fences, vehicle tracking control pads, straw bale barriers, stabilized staging areas, outlet protection, and mulching and reseeded to mitigate the potential for erosion across the site and protect downstream waters.

Please use the "Four-Step Process" for selecting structural BMPs as outlined in the ECM Section I.7.2 BMP Selection

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 for this project consists of a paved street and gravel storage area. Surface runoff is routed from the north side of the site to the detention pond at the south end of the site via over lot drainage, and a swale located on the southeastern end of the site. In the event of clogging or inlet failure at the detention pond's outlet structure, an emergency overflow route has been designed to convey runoff to the adjacent lot, at flow rates equal to or less than that of historic conditions.

← This appears to be a changed condition to a point discharge. See comment memo.

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 Points)

Design Point 1

Basin A consists of 2.85 acres of moderately sparse natural grasses and vegetation growing through gravel storage area, and is comprised of the northwestern half of this site. Runoff produced within **Basin**

The grading plan shows regrading - will this just be gravel?

how does it cross
the access road?

A is anticipated to reach peak runoff rates of Q5=2.1 cfs and Q100=5.6 cfs, and will flow from north to south towards the design point, where it collects in a proposed 10' bottom, grassed swale. The runoff is then directed south east towards downstream infrastructure.

Design Point 2 What is the proposed material?

Basin B consists of 5.88 acres, including a proposed paved road that makes up about 20% of the basin. Approximately half of this basin is extremely sparse vegetation growing through a moderately compacted base material, while the remaining area is gravel storage area. This basin is centrally located within the site. Runoff produced within **Basin B** is anticipated to reach peak runoff rates of Q5=5.6 cfs and Q100=14.1 cfs, which will collect with runoff from **Design Point 1** to reach combined peak flow rates of Q5=7.0 and Q100=17.8 cfs, at the proposed private 18" RCP storm sewer. This storm sewer will convey the flow collection south east under the pond's berm. A rip rap pad is located at the terminus of the storm sewer.

FSD Pond?

Design Point 3

Basin C consists of 0.29 undeveloped acres of the berm surrounding the detention pond, and is comprised of moderately sparse natural grasses and vegetation. This basin is situated on the southern end of the site. Runoff from this basin begins at the top of the earthen berm of the detention pond and flows to the south to reach the bottom. This flow collects at the central point of the basin. Runoff produced within **Basin C** is anticipated to reach peak runoff rates of Q5=0.1 cfs and Q100=0.5 cfs, and will combine with flows from **PR A1** and **Design Point 4** at the rip rap at the design point, at rates of Q5=0.3 and Q100=2.6. This cumulative flow will be directed southeast, where it will exit the site. These rates are less than existing flows exiting the site near this point; therefore, downstream infrastructure will not be affected.

but the manner of discharge is being
changed to a point discharge

Design Point 4

Basin E consists of approximately 1.10 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 E** is anticipated to reach peak runoff rates of Q5=2.0 cfs and Q100=4.5 cfs, and will flow east from the crown of the road where it discharges into the existing roadside ditch, which will redirect the flow southeast towards the design point. From here, the runoff will continue southeast.

Design Point 5

Basin F consists of approximately 0.68 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, and the rest consists of sparse natural grasses and vegetation. Runoff produced within **Basin F** is anticipated to reach peak runoff rates of Q5=1.6 cfs and Q100=3.3 cfs. This flow will run east from the crown of the road in order to discharge into the existing roadside ditch. At this point, the runoff will combine with flows from **Design Point 5** and will be redirected south east. This cumulative flow is expected to reach rates of Q5=3.6 and Q100=7.7 cfs.

continue?

Design Point 6

Basin G consists of approximately 0.90 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=2.2 cfs and Q100=4.4 cfs. This flow will run east from the crown of the road in order to discharge into the existing roadside ditch. At this point, the runoff will combine with flows from **Design Point 6**, and will be redirected south east. This cumulative flow is expected to reach rates of Q5=4.7 and Q100=9.9 cfs.

Address
conveyance - ditch
or sheet flow?

WATER QUALITY

A Private Full Spectrum Detention (FSD) Pond is being proposed for this site in order to reduce the fully developed flows from the site to pre-development levels and address water quality. The pond has been sized utilizing MHFD v4.0 from Urban Drainage and Flood Control District (UDFCD). The pond is being constructed with an outlet control structure which limits the release rate of the pond through the use of orifices, weirs, and a restrictor plate placed before a proposed public 18” RCP outlet pipe. The pond has been sized to store the WQCV, EURV, and the flood control volumes for the 2, 5, 10, 25, 50, and 100 year storm events. The WQCV will be slowly released over 40 hours. The 100 year will drain in less than 120 hours. The maximum 100-Yr storage volume is 0.424 acre-feet. Watershed imperviousness is 33.3%. An overflow emergency weir is proposed along the southern embankment to safely convey flows to the directly adjacent U-Haul Neighborhood Dealer parcel in the event of outlet clogging, at rates lower than historic conditions provide. The emergency overflow weir will be situated at a crest elevation of 5781.34 feet and will have a crest length of 30 feet, and a spillway design flow depth of 0.35 feet. This overflow weir will contain permanent erosion control fabric as reinforcement.

Gravel is 80%, plus pavement

EROSION CONTROL

It is the policy of the City of Colorado Springs 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 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 – SOUTH PLANT 85/87

Drainage Facilities:

Item	Description	Quantity	Unit Cost	Cost
1.	18" ADS HP Pipe	50 LF	\$50 /LF	\$2,500.00
2.	FSD/WQ Pond	1 EA	\$15,000 /EA	\$15,000
Total \$				\$17,500

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 2020.

DRAINAGE & BRIDGE FEES – BRADLEY POINT FILING NO. 1

This site is within the Little Johnson Drainage Basin. The 2020 Drainage and Bridge Fees per El Paso County for the Bradley Point Filing No. 1 site are as follows:

2021

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

(no bridge fees)

these need to be based on the ultimate use of the property. Gravel and paving , except for the FSD pond area.

\$12,048

BRADLEY POINT FILING NO. 1 FEES:

Drainage Fees:	9.74	x	33.3%	x	\$13,902	=	\$	45,090.02
Pond Land Fees:	9.74	x	33.3%	x	\$8,057	=	\$	26,132.23
Total							\$	71,222.25

It should be noted that these fees are provided in this Preliminary Drainage Report for informational purposes 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 2020.

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 into Fountain Creek per the Urban Drainage criteria flow rates, which are at or less than the historic flow. 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?

El Paso County Drainage Basin Fees

Resolution No. 20-424

Basin Number	Receiving Waters	Year Studied	Drainage Basin Name	2021 Drainage Fee (per Impervious Acre)	2021 Bridge Fee (per Impervious Acre)
<u>Drainage Basins with DBPS's:</u>					
CHMS0200	Chico Creek	2013	Haegler Ranch	\$11,113	\$1,640
CHWS1200	Chico Creek	2001	Bennett Ranch	\$12,441	\$4,772
CHWS1400	Chico Creek	2013	Falcon	\$31,885	\$4,380
FOFO2000	Fountain Creek	2001	West Fork Jimmy Camp Creek	\$13,524	\$4,001
FOFO2600	Fountain Creek	1991*	Big Johnson / Crews Gulch	\$19,752	\$2,551
FOFO2800	Fountain Creek	1988*	Widefield	\$19,752	\$0
FOFO2900	Fountain Creek	1988*	Security	\$19,752	\$0
FOFO3000	Fountain Creek	1991*	Windmill Gulch	\$19,752	\$296
FOFO3100 / FOFO3200	Fountain Creek	1988*	Carson Street / Little Johnson	\$12,048	\$0

REFERENCES

- 1.) "El Paso County and City of Colorado Springs Drainage Criteria Manual, Vol I & II".
- 2.) "Urban Storm Drainage Criteria Manuals, Volumes 1-3"
- 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.) "Little Johnson/Security Creek Drainage Basin Planning Study" (DBPS), dated April 1988 prepared by Simons, LLI & Associates, Inc., in cooperation with Kiowa Engineering Corporation

APPENDIX

VICINITY MAP

SOILS MAP

FIRM PANEL

HYDROLOGIC CALCULATIONS

HYDRAULIC CALCULATIONS

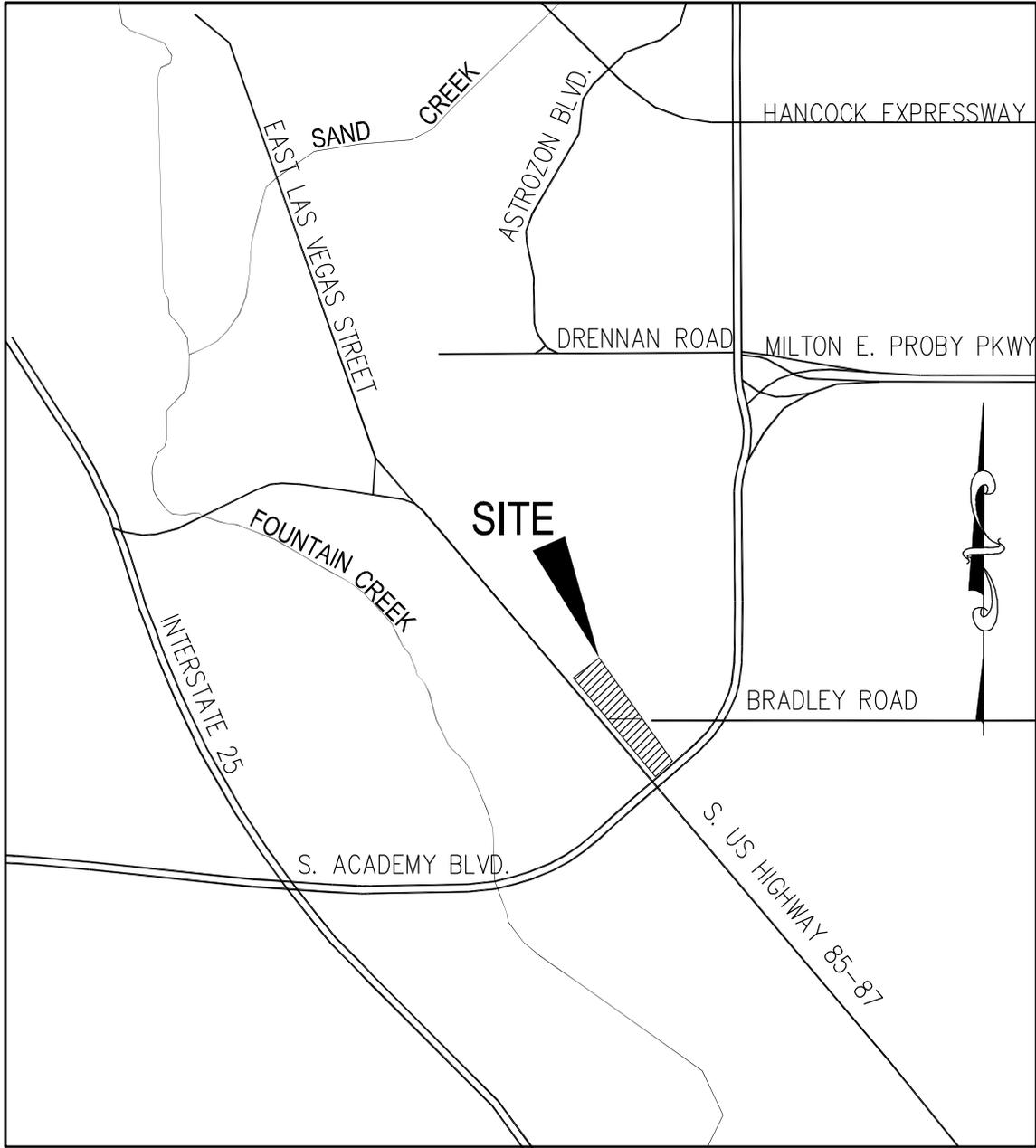
EXISTING DRAINAGE MAP

PROPOSED DRAINAGE MAP

GRADING AND EROSION CONTROL PLANS

APPENDIX

VICINITY MAP

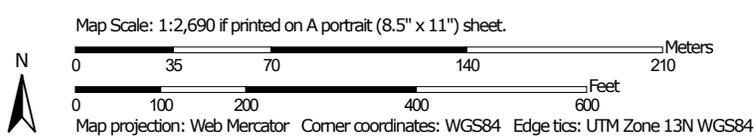
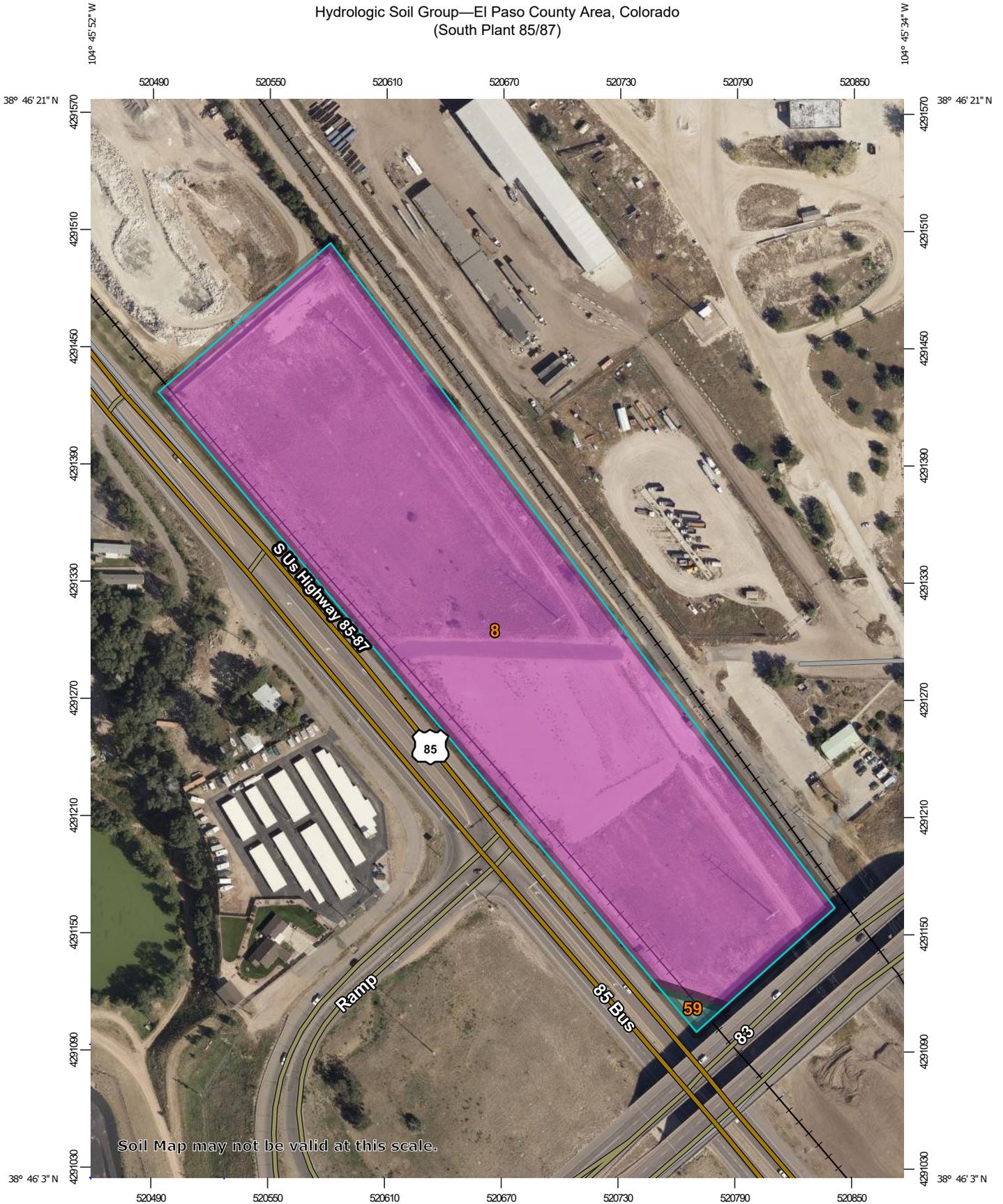


VICINITY MAP

N.T.S.

SOILS MAP

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



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

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

FIRM PANEL

HYDROLOGIC CALCULATIONS

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

BASIN	STREETS/DEVELOPED		GRAVEL STORAGE AREA			UNDEVELOPED/LANDSCAPE			RUNOFF COEFFICIENT				
	TOTAL AREA (SF)	TOTAL AREA (Acres)	AREA (Acres)	C ₅	C ₁₀₀	AREA (Acres)	C ₅	C ₁₀₀	C ₅	C ₁₀₀			
<i>A</i>	21004.2499	4.82	0.07	0.90	0.96	4.75	0.26	0.41	0.00	0.08	0.35	0.27	0.42
<i>B</i>	55366.9622	1.27	0.20	0.90	0.96	1.07	0.26	0.41	0.00	0.08	0.35	0.36	0.50
<i>C</i>	60412.5405	1.39	0.00	0.90	0.96	1.39	0.26	0.41	0.00	0.08	0.35	0.26	0.41
<i>D</i>	79161.6725	1.82	0.00	0.90	0.96	1.82	0.26	0.41	0.00	0.08	0.35	0.26	0.41
<i>E</i>	43453.8094	1.00	0.50	0.90	0.96	0.00	0.26	0.41	0.50	0.08	0.35	0.49	0.66
<i>F</i>	19702.8045	0.45	0.35	0.90	0.96	0.00	0.26	0.41	0.10	0.08	0.35	0.71	0.82
<i>G</i>	28387.025	0.65	0.49	0.90	0.96	0.00	0.26	0.41	0.16	0.08	0.35	0.70	0.81

Calculated by: CVW

Date: 11/12/2020

Checked by: VAS

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

BASIN	From Area Runoff Coefficient Summary		OVERLAND				STREET / CHANNEL FLOW				Time of Travel (T _t)		INTENSITY *			TOTAL FLOWS	
	AREA TOTAL (Acres)	C _s	C ₁₀₀	Length (ft)	Height (ft)	T _c (min)	Length (ft)	Slope (%)	Velocity (fps)	T _t (min)	TOTAL (min)	CHECK (min)	I _s (in/hr)	I ₁₀₀ (in/hr)	Q _s (c.f.s.)	Q ₁₀₀ (c.f.s.)	
A	4.82	0.27	0.42	100	2.75	10.7	613	0.9%	0.7	15.1	25.8	14.0	2.7	4.5	3.5	9.2	
B	1.27	0.36	0.50	100	1.6	11.4	316	0.9%	1.0	5.5	16.9	12.3	3.3	5.6	1.5	3.5	
C	1.39	0.26	0.41	100	1.4	13.6	417	1.1%	1.1	6.6	20.1	12.9	3.1	5.2	1.1	2.9	
D	1.82	0.26	0.41	100	1.98	12.1	470	1.3%	0.8	9.7	21.8	13.2	3.0	5.0	1.4	3.7	
E	1.00	0.49	0.66	100	0.96	11.1	525	0.3%	0.8	10.8	21.9	13.5	3.7	6.2	1.8	4.0	
F	0.45	0.71	0.82	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	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: 11/12/2020

Checked by: VAS

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)

DESIGN POINT	From Area Runoff Coefficient Summary			OVERLAND			PIPE / CHANNEL FLOW			Time of Travel (T _r)		INTENSITY*		TOTAL FLOWS		COMMENTS	
	CONTRIBUTING BASINS/PIPES	C _A	C _{A100}	C _s	Length (ft)	Height (ft)	T _c (min)	Length (ft)	Slope (%)	Velocity (fps)	T _r (min)	TOTAL (min)	I _s (in/hr)	I ₁₀₀ (in/hr)	Q _s (cfs)		Q ₁₀₀ (cfs)
1	Basin A	1.30	2.02				25.8					25.8	2.7	4.5	3.5	9.2	LOCALIZED DEPRESSION
2	Basin B Design Point 1	1.76	2.65				25.8					25.8	2.7	4.5	4.8	12.0	
3	Basin C	0.36	0.57				20.1					20.1	3.1	5.2	1.1	2.9	
4	Basin D	0.47	0.75				21.8					21.8	3.0	5.0	1.4	3.7	LOCALIZED DEPRESSION
5	Basin E	0.49	0.65				13.5					13.5	3.7	6.2	1.8	4.0	
6	Basin F Design Point 5 Design Point 2	2.57	3.67				19.7					19.7	3.1	5.2	8.0	19.2	
7	Basin G Design Point 6 Design Point 3	3.39	4.77				19.7		0.5%	1.1	7.0	26.7	2.7	4.5	9.0	21.3	EXISTING ROADSIDE DITCH

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

BASIN	TOTAL AREA (SF)	TOTAL AREA (Acres)	STREETS/DEVELOPED			GRAVEL STORAGE AREA			UNDEVELOPED/LANDSCAPE			RUNOFF COEFFICIENT		
			AREA (Acres)	C ₅	C ₁₀₀	AREA (Acres)	C ₅	C ₁₀₀	AREA (Acres)	C ₅	C ₁₀₀	C ₅	C ₁₀₀	
A	124119	2.85	0.03	0.90	0.96	2.82	0.26	0.41	0.00	0.09	0.36	0.00	0.09	0.42
B	256008.6	5.88	0.31	0.90	0.96	5.57	0.26	0.41	0.00	0.09	0.36	0.00	0.09	0.44
C	12709.5	0.29	0.00	0.90	0.96	0.00	0.26	0.41	0.29	0.09	0.36	0.29	0.09	0.36
E	47916	1.10	0.56	0.90	0.96	0.00	0.26	0.41	0.54	0.09	0.36	0.25	0.09	0.67
F	29795	0.68	0.43	0.90	0.96	0.00	0.26	0.41	0.25	0.09	0.36	0.25	0.09	0.74
G	39363	0.90	0.62	0.90	0.96	0.00	0.26	0.41	0.28	0.09	0.36	0.28	0.09	0.77

Calculated by: CVW

Date: 11/19/2020

Checked by: VAS

Table 6-6. Runoff Coefficients for Rational Method
(Source: UDFCD 2001)

Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients													
		2-year		5-year		10-year		25-year		50-year		100-year			
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D		
Business															
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.88	0.89	
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.66		
Residential															
1/8 Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65		
1/4 Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58		
1/3 Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57		
1/2 Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56		
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55		
Industrial															
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74		
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83		
Parks and Cemeteries	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52		
Playgrounds	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54		
Railroad Yard Areas	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58		
Undeveloped Areas															
Historic Flow Analysis-- Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51		
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50		
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50		
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96		
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59		
Streets															
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96		
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74		
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96		
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83		
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50		

12/14/2020

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

BASIN	From Area Runoff Coefficient Summary		OVERLAND			STREET / CHANNEL FLOW				Time of Travel (T _t)		INTENSITY *			TOTAL FLOWS		
	AREA TOTAL (Acres)	C _s	C ₁₀₀	C _s	Length (ft)	Height (ft)	T _c (min)	Length (ft)	Slope (%)	Velocity (fps)	T _t (min)	TOTAL (min)	CHECK (min)	I _s (in/hr)	I ₁₀₀ (in/hr)	Q _s (c.f.s.)	Q ₁₀₀ (c.f.s.)
A	2.85	0.27	0.42	0.27	100	2	12.0	665	0.9%	0.9	11.9	23.9	14.3	2.8	4.7	2.1	5.6
B	5.88	0.29	0.44	0.29	100	1.6	12.5	316	0.9%	1.0	5.5	18.0	12.3	3.3	5.5	5.6	14.1
C	0.29	0.09	0.36	0.09	100	1.4	16.3	417	1.1%	0.7	9.4	25.7	12.9	2.7	4.6	0.1	0.5
E	1.10	0.50	0.67	0.50	100	1.47	9.5	525	0.2%	0.7	13.1	22.6	13.5	3.7	6.2	2.0	4.5
F	0.68	0.60	0.74	0.60	100	1.28	8.3	287	0.6%	1.2	4.0	12.2	12.2	3.8	6.4	1.6	3.3
G	0.90	0.65	0.77	0.65	100	1.34	7.4	406	0.5%	1.0	6.6	14.1	12.8	3.8	6.3	2.2	4.4

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

Calculated by: CVW

Date: 11/19/2020

Checked by: VAS

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)

DESIGN POINT	From Area Runoff Coefficient Summary		OVERLAND				PIPE / CHANNEL FLOW				Time of Travel (T _t)		INTENSITY*		TOTAL FLOODS		COMMENTS
	CA _s	CA ₁₀₀	C _s	Length (ft)	Height (ft)	T _c (min)	Length (ft)	Slope (%)	Velocity (fps)	T _t (min)	TOTAL (min)	I _s (in/hr)	I ₁₀₀ (in/hr)	Q _s (cfs)	Q ₁₀₀ (cfs)		
1	0.76	1.19				23.9					23.9	2.8	4.7	2.1	5.6	10' BOTTOM GRASSSED SWALE	
2	2.49	3.77				23.9					23.9	2.8	4.7	7.0	17.8	18" RCP STORM SEWER	
3	0.10	0.54				23.9					23.9	2.8	4.7	0.3	2.6	RIP RAP PAD	
4	0.03	0.44				23.9					13.5	3.7	6.2	2.0	4.5		
5	0.55	0.73				13.5					13.5	3.7	6.2	3.6	7.7		
6	1.55	1.94				13.5					20.5	3.1	5.1	4.7	9.9	EXISTING ROADSIDE DITCH	

HYDRAULIC CALCULATIONS

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 A1	DESIGN POINT 2	REFER TO "Prelim Pond Sizing, Outlet Structure" SHEET PEAK OUTFLOW			3.2	5.4	0.1	2.4

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

Calculated by: CVW

Date: 11/19/2020

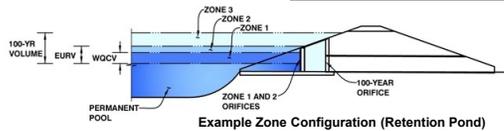
Checked by: VAS _____

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-*Detention, Version 4.03 (May 2020)*

Project: Bradley Point Filing No. 1

Basin ID: Pond 1



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.30	0.121	Orifice Plate
Zone 2 (EURV)	2.78	0.187	Orifice Plate
Zone 3 (100+1/2WQCV)	3.24	0.306	Weir&Pipe (Restrict)
Total (all zones)		0.613	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth = ft (distance below the filtration media surface)

Underdrain Orifice Diameter = inches

Calculated Parameters for Underdrain

Underdrain Orifice Area = ft²

Underdrain Orifice Centroid = feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice = ft (relative to basin bottom at Stage = 0 ft)

Depth at top of Zone using Orifice Plate = ft (relative to basin bottom at Stage = 0 ft)

Orifice Plate: Orifice Vertical Spacing = inches

Orifice Plate: Orifice Area per Row = inches

Calculated Parameters for Plate

WQ Orifice Area per Row = ft²

Elliptical Half-Width = feet

Elliptical Slot Centroid = feet

Elliptical Slot Area = ft²

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.94	1.88					
Orifice Area (sq. inches)	0.40	0.40	1.05					
	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected		Not Selected	Not Selected
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A
Vertical Orifice Diameter =	N/A	N/A	inches		feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe))

	Zone 3 Weir	Not Selected		Zone 3 Weir	Not Selected
Overflow Weir Front Edge Height, Ho =	2.83	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H _g =	2.83
Overflow Weir Front Edge Length =	5.70	N/A	feet	Overflow Weir Slope Length =	2.90
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	15.25
Horiz. Length of Weir Sides =	2.90	N/A	feet	Overflow Grate Open Area w/o Debris =	11.57
Overflow Grate Open Area % =	70%	N/A	% grate open area/total area	Overflow Grate Open Area w/ Debris =	5.79
Debris Clogging % =	50%	N/A	%		

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected		Zone 3 Restrictor	Not Selected
Depth to Invert of Outlet Pipe =	0.25	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	0.76
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.39
Restrictor Plate Height Above Pipe Invert =	8.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.46

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =	3.00	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth =	0.24	feet
Spillway Crest Length =	30.00	feet	Stage at Top of Freeboard =	4.24	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	1.60	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	1.55	acre-ft

Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
One-Hour Rainfall Depth (in) =	0.121	0.307	0.117	0.168	0.215	0.363	0.504	0.695	1.113
CUHP Runoff Volume (acre-ft) =	N/A	N/A	0.117	0.168	0.215	0.363	0.504	0.695	1.113
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.0	0.1	0.1	1.0	2.1	3.5	6.5
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A							
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.00	0.01	0.01	0.12	0.23	0.39	0.72
Peak Inflow Q (cfs) =	N/A	N/A	0.8	1.2	1.5	2.8	4.0	5.6	8.9
Peak Outflow Q (cfs) =	0.1	0.1	0.1	0.1	0.1	0.1	1.0	2.4	6.0
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.8	0.6	0.1	0.5	0.7	0.9
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	0.0	0.1	0.2	0.4
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	69	38	47	55	77	76	74	69
Time to Drain 99% of Inflow Volume (hours) =	40	72	40	50	58	81	82	81	79
Maximum Ponding Depth (ft) =	2.30	2.78	2.22	2.40	2.52	2.84	2.92	2.99	3.07
Area at Maximum Ponding Depth (acres) =	0.27	0.52	0.23	0.32	0.38	0.54	0.58	0.62	0.69
Maximum Volume Stored (acre-ft) =	0.122	0.311	0.102	0.149	0.194	0.337	0.382	0.424	0.476

BRADLEY POINT FILING NO. 1
EMERGENCY SPILLWAY CALCULATIONS FSD POND 1

Horizontal Broad-Crested Weir (Eqn 12-20 UDFCD)					
Variable			Solve For		
<i>C</i>	3.00		<i>L</i> (ft)	<i>H</i> (ft)	<i>Q</i> (cfs)
<i>L</i>	30.00	ft	0.0	0.0	18.6
<i>H</i>	0.35	ft			
<i>Q</i>		cfs			

Sloping Broad-Crested Weir (Eqn 12-21 UDFCD)					
Variable			Solve For		
<i>C</i>	3.00		<i>Z</i> (ft)	<i>H</i> (ft)	<i>Q</i> (cfs)
<i>Z</i>	2.00	ft	0.0	0.0	0.2
<i>H</i>	0.35	ft			
<i>Q</i>		cfs			

Total <i>Q</i>	18.98
100-yr Emergency Spillway Crest Elev.	5781.34
100-yr Emergency Spillway W.S Elev.	5781.69
Top of Embankment Elev.	5783.00
Freeboard Provided (ft.)	1.31

Equation 12-20

$$Q = C_{BCW} L H^{1.5}$$

Where:

Q = discharge (cfs)

C_{BCW} = broad-crested weir coefficient (This ranges from 2.6 to 3.0. A value of 3.0 is often used in practice.) See Hydraulic Engineering Circular No. 22 for additional information.

L = broad-crested weir length (ft)

H = head above weir crest (ft)

Equation 12-21

$$Q = \left(\frac{2}{5}\right) C_{BCW} Z H^{2.5}$$

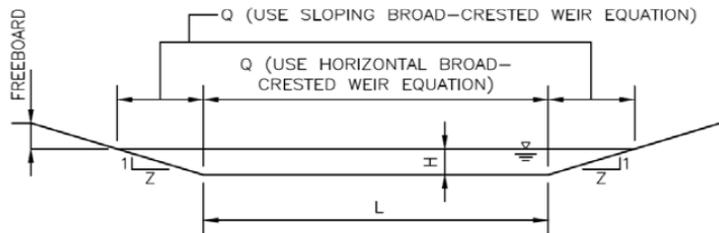


Figure 12-20. Sloping broad-crest weir

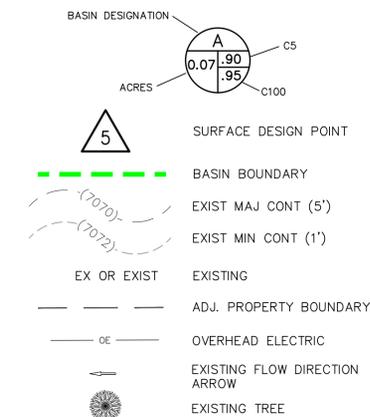
Provide roadside ditch and downstream conveyance calculations.

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



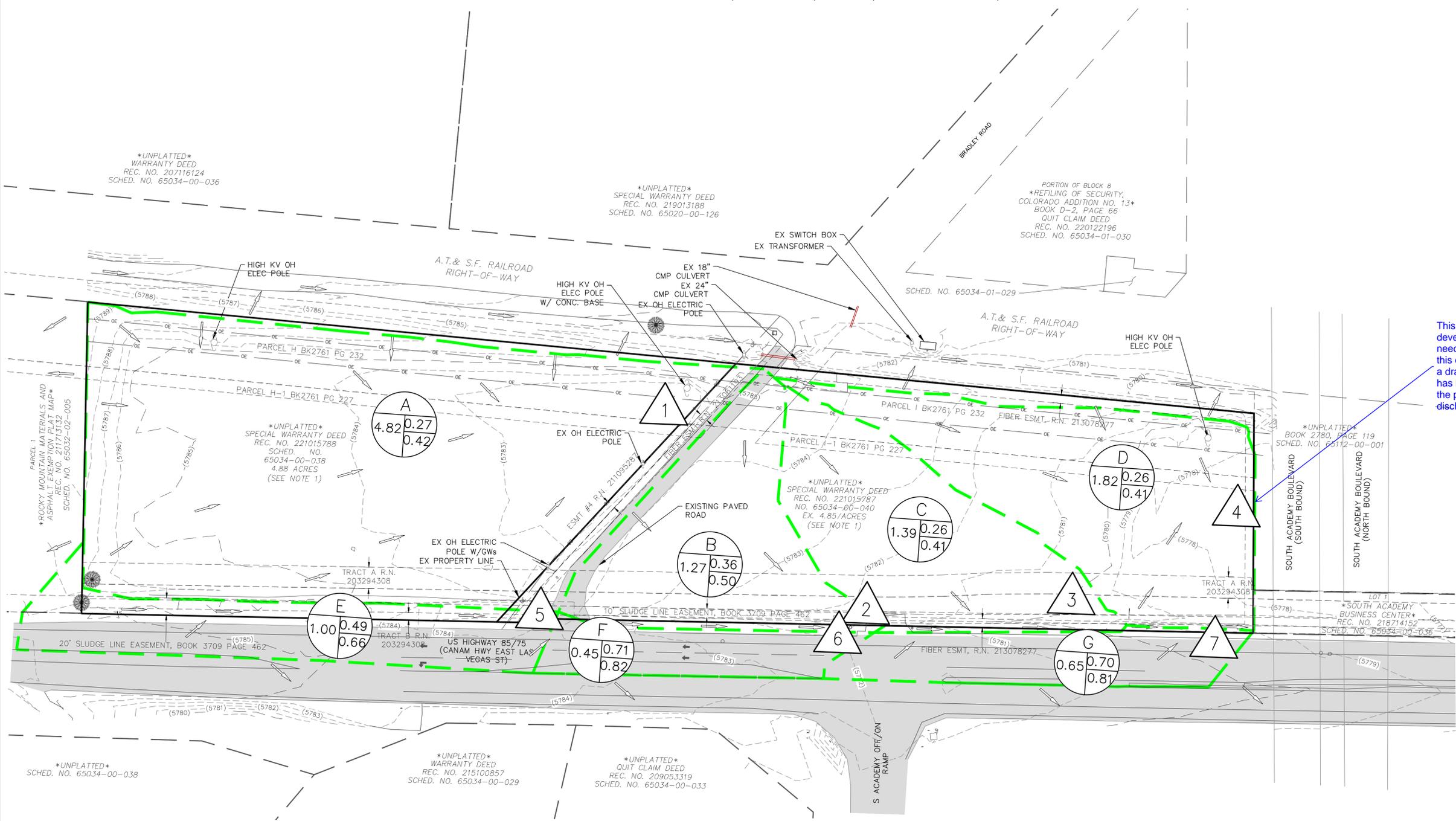
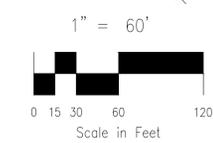
BASIN SUMMARY				
BASIN	AREA (ACRES)	Q ₅	Q ₁₀₀	
A	4.82	3.5	9.2	
B	1.27	1.5	3.5	
C	1.39	1.1	2.9	
D	1.82	1.4	3.7	
E	1.00	1.8	4.0	
F	0.45	1.4	2.6	
G	0.65	1.7	3.4	

DESIGN POINT SUMMARY				
DESIGN POINT	Q ₅	Q ₁₀₀	CONTRIBUTING BASIN/DESIGN POINT	STRUCTURE
1	3.5	9.2	A	LOCALIZED DEPRESSION
2	4.8	12.0	B, DP 1	
3	1.1	2.9	C	
4	1.4	3.7	D	LOCALIZED DEPRESSION
5	1.8	4.0	E	
6	8.0	19.2	F, DP 2, DP 5	
7	9.0	21.3	G, DP 3, DP 6	EXISTING ROADSIDE DITCH

This is a wide swale - developed release needs to approximate this condition unless a drainage easement has been obtained for the proposed point discharge.

BRADLEY POINT FILING NO. 1
EXISTING DRAINAGE MAP
DATE SUBMITTED: 12/18/20
SHEET 1 OF 1

Does the ditch have capacity or do flows enter the site?



NOTE 1:
PARCELS ARE UNDER THE SAME OWNERSHIP

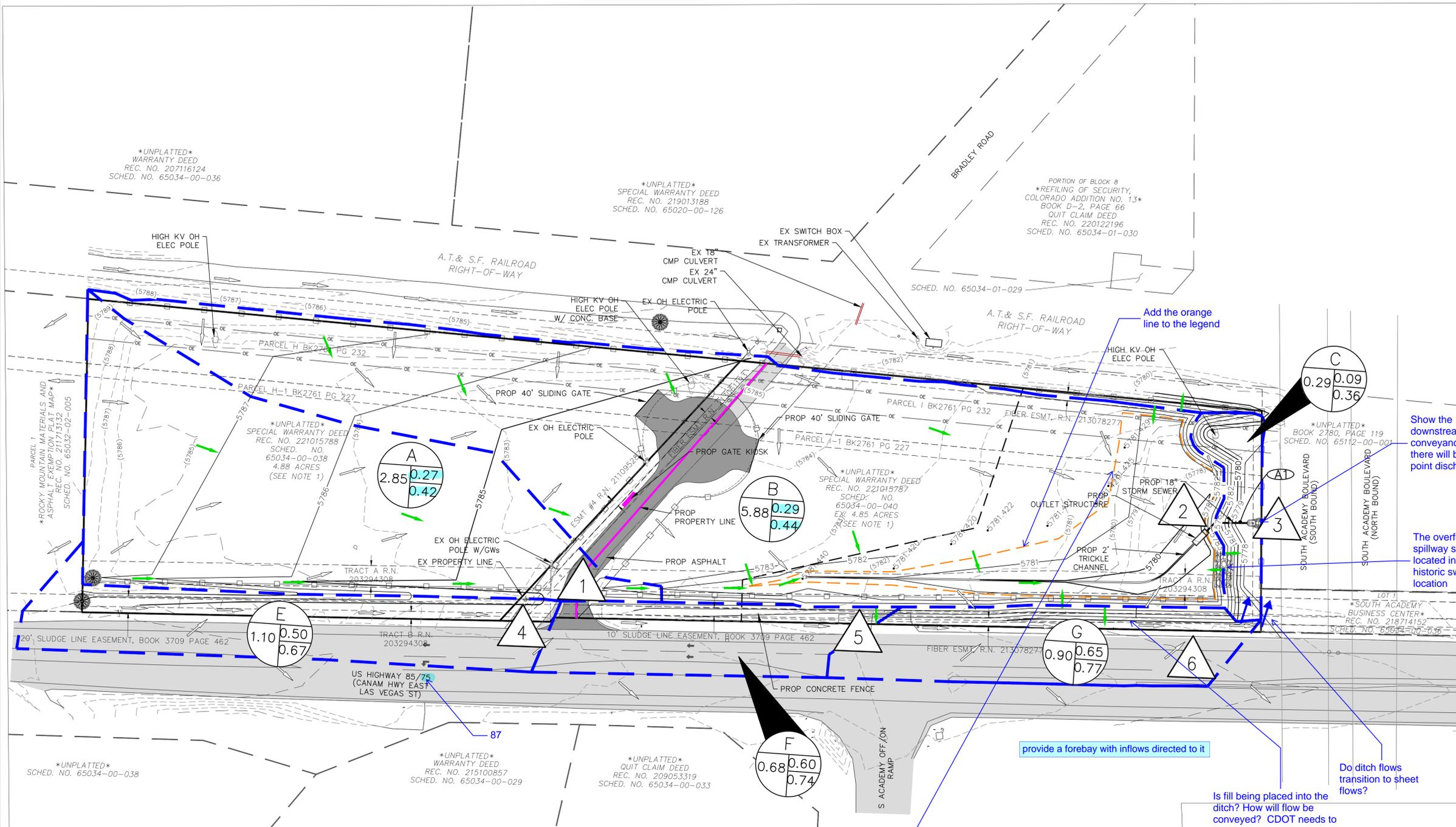
PROPOSED DRAINAGE MAP

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, 0.90, 0.95) C5, C100
- ACRES: 4
- PIPE RUN REFERENCE LABEL: 5
- SURFACE DESIGN POINT: 5
- BASIN BOUNDARY: Dashed blue line
- PROP MAJ CONT: Solid blue line
- PROP MIN CONT: Dashed blue line
- EXIST MAJ CONT: Dotted blue line
- EXIST MIN CONT: Dashed blue line
- EX OR EXIST: Existing (solid black), Future (dashed black)
- FUT: Future (dashed black)
- PROP: Proposed (solid black)
- ADJ. PROPERTY BOUNDARY: Dashed black line
- OVERHEAD ELECTRIC: OE (solid black)
- PROPOSED STORM SEWER PIPE: Thick solid black line
- PROPOSED RIPRAP: Stippled pattern
- EXISTING FLOW DIRECTION ARROW: Solid black arrow
- PROPOSED FLOW DIRECTION ARROW: Green arrow



BASIN SUMMARY			
BASIN	AREA (ACRES)	Q ₅	Q ₁₀₀
A	2.85	2.3	5.6
B	5.88	5.6	14.1
C	0.29	0.1	0.5
E	1.10	2.0	4.5
F	0.68	1.6	3.3
G	0.90	2.1	4.2

DESIGN POINT SUMMARY				
DESIGN POINT	Q ₅	Q ₁₀₀	BASIN	STRUCTURE
1	2.1	5.6	A	10' BOTTOM GRASSED SWALE
2	7.0	17.8	B, DP 1	18" RCP STORM SEWER
3	0.3	2.6	C, PR A1, DP 4	RIP RAP PAD
4	2.0	4.5	E	
5	3.6	7.7	F, DP 5	
6	4.7	9.9	G, DP 6	EXISTING ROADSIDE DITCH

BRADLEY POINT FILING NO. 1
PROPOSED DRAINAGE MAP
DATE SUBMITTED: 12/18/20
SHEET 1 OF 1

NOTE 1:
PARCELS ARE UNDER THE SAME OWNERSHIP

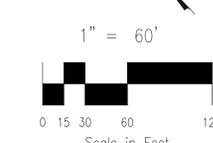
How will the storage area be separated from the ponding area?

provide a forebay with inflows directed to it

Provide roadside ditch cross-sections at DP 5 and DP 6 and capacity calculations

Is fill being placed into the ditch? How will flow be conveyed? CDOT needs to approve any revisions.

Do ditch flows transition to sheet flows?



GRADING AND EROSION CONTROL PLANS

STANDARD CONSTRUCTION NOTES:

- ALL DRAINAGE AND ROADWAY CONSTRUCTION SHALL MEET THE STANDARDS AND SPECIFICATIONS OF THE CITY OF COLORADO SPRINGS/EL PASO COUNTY DRAINAGE CRITERIA MANUAL VOLUMES 1 AND 2, AND THE EL PASO COUNTY ENGINEERING CRITERIA MANUAL.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE NOTIFICATION AND FIELD 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.
- 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:
 - EL PASO COUNTY ENGINEERING CRITERIA MANUAL (ECM)
 - CITY OF COLORADO SPRINGS/EL PASO COUNTY ENGINEERING CRITERIA MANUAL VOLUMES 1 AND 2.
 - COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARDS SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION.
 - CDOT M&S STANDARDS.
- IT IS THE DESIGN ENGINEER'S 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 DEVELOPER'S RESPONSIBILITY TO RECTIFY.
- 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 PCO INSPECTIONS STAFF.
- 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.
- ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE CONSTRUCTION SITE AT APPROVED CONSTRUCTION ACCESS POINTS.
- ANY TEMPORARY SIGNAGE AND STRIPING SHALL COMPLY WITH EL PASO COUNTY DOW AND MUTCD CRITERIA.
- CONTRACTOR SHALL OBTAIN ANY PERMITS REQUIRE BY EL PASO COUNTY DOT INCLUDING WORK WITHIN THE RIGHT-OF-WAY AND SPECIAL TRANSPORT PERMITS.
- THE LIMITS OF CONSTRUCTION SHALL REMAIN WITHIN THE PROPERTY LINE UNLESS OTHERWISE NOTED. THE OWNER/DEVELOPER SHALL OBTAIN WRITTEN PERMISSION AND EASEMENTS, WHERE REQUIRED, FROM ADJOINING PROPERTY OWNER(S) PRIOR TO ANY OFFSITE DISTURBANCE GRADING, OR CONSTRUCTION.

GRADING AND EROSION CONTROL NOTES:

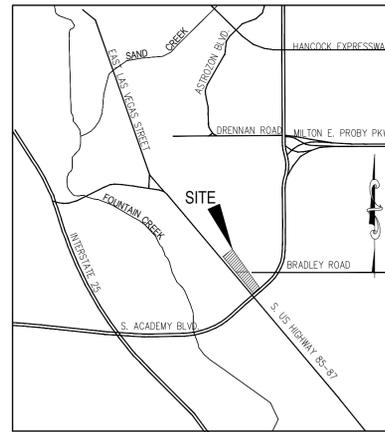
- STORMWATER DISCHARGES FROM CONSTRUCTION SITES SHALL NOT CAUSE OR THREATEN TO CAUSE POLLUTION, CONTAMINATION, OR DEGRADATION OF STATE WATERS. ALL WORK AND EARTH DISTURBANCE SHALL BE DONE IN A MANNER THAT MINIMIZES POLLUTION OF ANY ON-SITE OR OFF-SITE WATERS, INCLUDING WETLANDS.
- NOTWITHSTANDING ANYTHING DEPICTED IN THESE PLANS IN WORDS OR GRAPHIC REPRESENTATION, ALL DESIGN AND CONSTRUCTION RELATED TO ROADS, STORM DRAINAGE AND EROSION CONTROL SHALL CONFORM TO THE STANDARDS AND REQUIREMENTS OF THE MOST RECENT VERSION OF THE RELEVANT ADOPTED EL PASO COUNTY STANDARDS, INCLUDING THE LAND DEVELOPMENT CODE, THE ENGINEERING CRITERIA MANUAL, THE DRAINAGE CRITERIA MANUAL, AND THE DRAINAGE CRITERIA MANUAL VOLUME 2. ANY DEVIATIONS FROM REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING.
- A SEPARATE STORMWATER MANAGEMENT PLAN (SWMP) 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.
- ONCE THE ESQCP IS APPROVED AND A "NOTICE TO PROCEED" HAS BEEN ISSUED, THE CONTRACTOR MAY INSTALL THE INITIAL STAGE EROSION AND SEDIMENT CONTROL MEASURES AS INDICATED ON THE APPROVED GEC. A PRECONSTRUCTION MEETING BETWEEN THE CONTRACTOR, ENGINEER, AND EL PASO COUNTY WILL BE HELD PRIOR TO ANY CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE APPLICANT TO COORDINATE THE MEETING TIME AND PLACE WITH COUNTY STAFF.
- CONTROL MEASURES MUST BE INSTALLED PRIOR TO COMMENCEMENT OF ACTIVITIES THAT 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.
- ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE MAINTAINED AND REMAIN IN EFFECTIVE OPERATING CONDITION UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED AND FINAL STABILIZATION IS ESTABLISHED. ALL PERSONS ENGAGED IN LAND DISTURBANCE ACTIVITIES SHALL ASSESS THE ADEQUACY OF CONTROL MEASURES AT THE SITE AND IDENTIFY IF CHANGES TO THOSE CONTROL MEASURES ARE NEEDED TO ENSURE THE CONTINUED EFFECTIVE PERFORMANCE OF THE CONTROL MEASURES. ALL CHANGES TO TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES MUST BE INCORPORATED INTO THE STORMWATER MANAGEMENT PLAN.
- TEMPORARY STABILIZATION SHALL BE IMPLEMENTED ON DISTURBED AREAS AND STOCKPILES WHERE GROUND DISTURBING CONSTRUCTION ACTIVITY HAS PERMANENTLY CEASED OR TEMPORARILY CEASED FOR LONGER THAN 14 DAYS.
- FINAL STABILIZATION 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.
- 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.
- 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.
- 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 LOOSENEED PRIOR TO INSTALLATION OF THE CONTROL MEASURE(S).
- ANY TEMPORARY OR PERMANENT FACILITY DESIGNED AND CONSTRUCTED FOR THE CONVEYANCE OF STORMWATER AROUND, THROUGH, OR FROM THE EARTH DISTURBANCE AREA SHALL BE A STABILIZED CONVEYANCE DESIGNED TO MINIMIZE EROSION AND THE DISCHARGE OF SEDIMENT OFF SITE.
- CONCRETE WASH WATER SHALL BE CONTAINED AND DISPOSED OF IN ACCORDANCE WITH THE SWMP. NO WASH WATER SHALL BE DISCHARGED TO OR ALLOWED TO ENTER STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEMS OR FACILITIES. CONCRETE WASHOUTS SHALL NOT BE LOCATED IN AN AREA WHERE SHALLOW GROUNDWATER MAY BE PRESENT, OR WITHIN 50 FEET OF A SURFACE WATER BODY, CREEK OR STREAM.
- DURING DEWATERING OPERATIONS OF UNCONTAMINATED GROUND WATER MAY BE DISCHARGED ON SITE, BUT SHALL NOT LEAVE THE SITE IN THE FORM OF SURFACE RUNOFF UNLESS AN APPROVED STATE DEWATERING PERMIT IS IN PLACE.
- EROSION CONTROL BLANKETING OR OTHER PROTECTIVE COVERING SHALL BE USED ON SLOPES STEEPER THAN 3:1.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL WASTES FROM THE CONSTRUCTION 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.
- WASTE MATERIALS SHALL NOT BE TEMPORARILY PLACED OR STORED IN THE STREET, ALLEY, OR OTHER PUBLIC WAY, UNLESS IN ACCORDANCE WITH AN APPROVED TRAFFIC CONTROL PLAN. CONTROL MEASURES MAY BE REQUIRED BY EL PASO COUNTY ENGINEERING IF DEEMED NECESSARY, BASED ON SPECIFIC CONDITIONS AND CIRCUMSTANCES.
- TRACKING OF SOILS AND CONSTRUCTION DEBRIS OFF-SITE SHALL BE MINIMIZED. MATERIALS TRACKED OFF-SITE SHALL BE CLEANED UP AND PROPERLY DISPOSED OF IMMEDIATELY.
- THE OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL CONSTRUCTION DEBRIS, DIRT, TRASH, ROCK, SEDIMENT, SOIL, AND SAND THAT MAY ACCUMULATE IN ROADS, STORM DRAINS AND OTHER DRAINAGE CONVEYANCE SYSTEMS AND STORMWATER APPURTENANCES AS A RESULT OF SITE DEVELOPMENT.
- THE QUANTITY OF MATERIALS STORED ON THE PROJECT SITE SHALL BE LIMITED, AS MUCH AS PRACTICAL, TO THAT QUANTITY REQUIRED TO PERFORM THE WORK IN AN ORDERLY SEQUENCE. ALL MATERIALS STORED ON-SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER, IN THEIR ORIGINAL CONTAINERS, WITH ORIGINAL MANUFACTURER'S LABELS.
- NO CHEMICAL(S) HAVING THE POTENTIAL TO BE RELEASED IN STORMWATER ARE TO BE STORED OR USED 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.
- BULK STORAGE OF ALLOWED PETROLEUM PRODUCTS OR OTHER ALLOWED LIQUID CHEMICALS IN EXCESS OF 55 GALLONS SHALL REQUIRE ADEQUATE SECONDARY CONTAINMENT PROTECTION TO CONTAIN ALL SPILLS ONSITE AND TO PREVENT ANY SPILLED MATERIALS FROM ENTERING STATE WATERS, ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR OTHER FACILITIES.
- NO PERSON SHALL CAUSE THE IMPEDIMENT OF STORMWATER FLOW IN THE CURB AND GUTTER OR DITCH EXCEPT WITH APPROVED SEDIMENT CONTROL MEASURES.
- 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, DOM VOLUME 1 AND THE ECM APPENDIX 1. ALL APPROPRIATE PERMITS MUST BE OBTAINED BY THE CONTRACTOR PRIOR TO CONSTRUCTION (1041, NPDES, FLOODPLAIN, 404, FUGITIVE DUST, ETC.). IN THE EVENT OF CONFLICTS BETWEEN THESE REQUIREMENTS AND OTHER LAWS, RULES, OR REGULATIONS OF OTHER FEDERAL, STATE, LOCAL, OR COUNTY AGENCIES, THE MOST RESTRICTIVE LAWS, RULES, OR REGULATIONS SHALL APPLY.
- ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE ONLY AT APPROVED CONSTRUCTION ACCESS POINTS.
- PRIOR TO CONSTRUCTION THE PERMITTEE SHALL VERIFY THE LOCATION OF EXISTING UTILITIES.
- 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.
- 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.
- 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
WOOD - PERMITS
4300 CHERRY CREEK DRIVE SOUTH
DENVER, CO 80246-1530
ATTN: PERMITS UNIT

BRADLEY POINT FILING NO. 1

COUNTY OF EL PASO, STATE OF COLORADO

GRADING/EROSION CONTROL PLANS

DECEMBER 2020



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.
- TEMPORARY SEDIMENT TRAP LOCATIONS WILL BE DETERMINED BY THE CONTRACTOR IN THE FIELD.
- EXISTING SITE TERRAIN GENERALLY SLOPES FROM NORTH TO SOUTHWEST AT GRADE RATES THAT VARY BETWEEN 2% TO 9%.
- 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.

BENCHMARKS

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

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.
102 E. PIKES PEAK AVENUE, 5TH FLOOR
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
FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC. DATE

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
BRADLEY POINT, LLC
2010 FOX MOUNTAIN POINT
COLORADO SPRINGS, CO 80906
(719) 491-3101 DATE

EL PASO COUNTY:

COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.

FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE, DRAINAGE CRITERIA 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.
COUNTY ENGINEER/ECM ADMINISTRATOR DATE



EL PASO COUNTY FILE NO. SF 70-XXX

BRADLEY POINT FILING NO. 1	
GRADING & EROSION CONTROL PLAN	DATE: 11/30/20
PROJECT NO: 70-074	SCALE: HORIZONTAL: N/A VERTICAL: N/A
DESIGNED BY: VAS	CHECKED BY: N/A
DRAWN BY: CWV	SHEET 1 OF 5
	GR01

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



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

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

NO.	DATE:	DESCRIPTION:

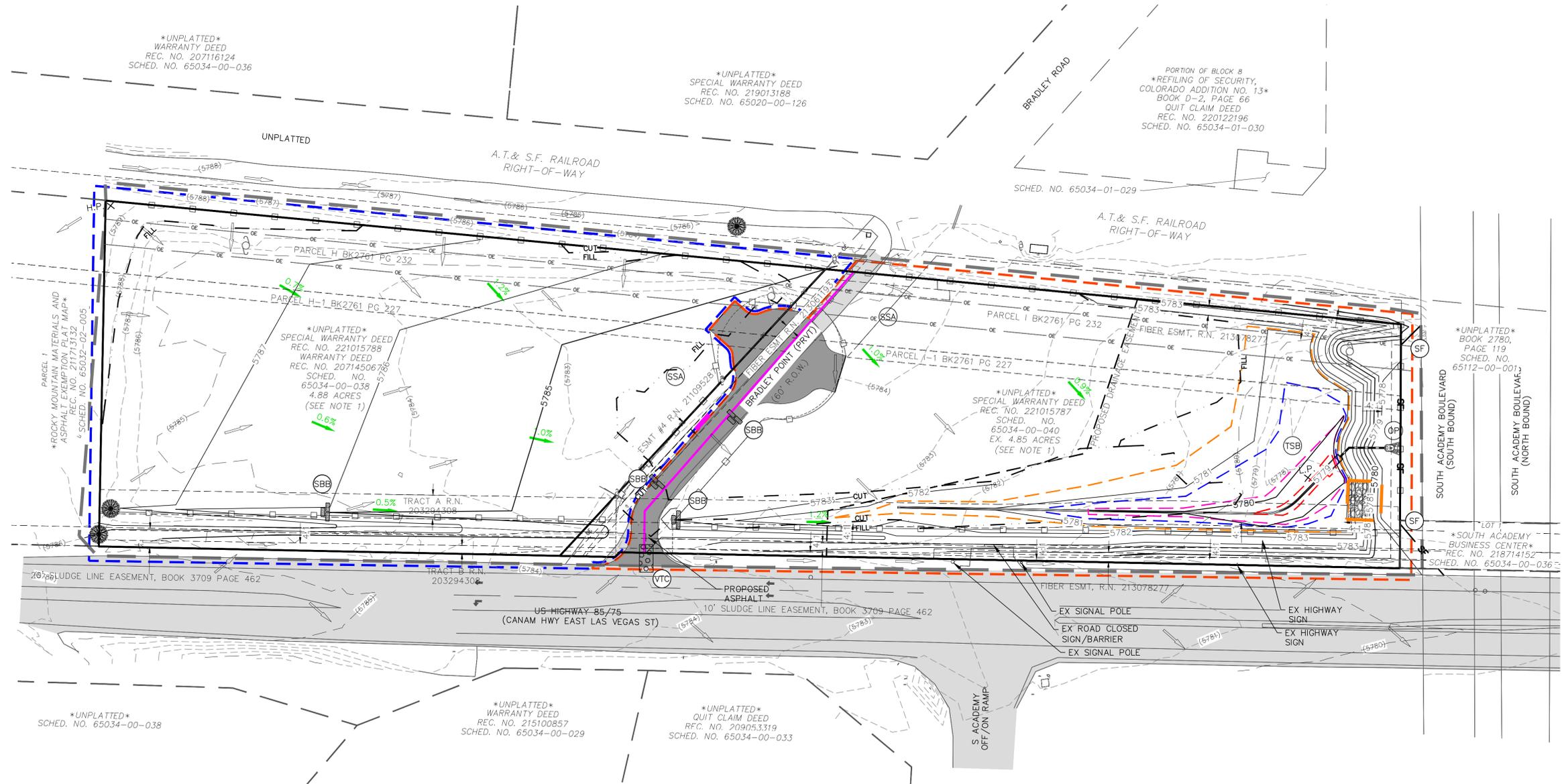
THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

CAUTION

BRADLEY POINT FILING NO. 1

GRADING AND EROSION CONTROL PLAN

DECEMBER 2020



NARRATIVE NOTES:

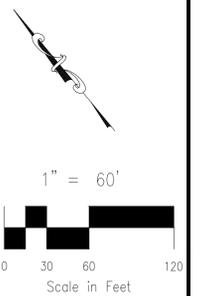
1. LOCATION OF STOCKPILES SHALL BE DETERMINED BY CONTRACTOR. ALL STOCKPILES SHALL REMAIN WITHIN THE CONSTRUCTION BOUNDARIES AS INDICATED ON THE SITE MAP.
2. THE EXACT LOCATION FOR THE STABILIZED STAGING AREA, STORAGE EQUIPMENT AND TEMPORARY DISPOSAL AREAS SHALL BE DETERMINED IN THE FIELD BY THE CONTRACTOR. PLAN SHALL BE UPDATED BY CONTRACTOR UPON DETERMINATION OF EXACT LOCATION.
3. 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.
4. NO PORTION OF THE PROPOSED CROSSROADS MIXED USE SITE LIES WITH A FEMA EFFECTIVE 100-YR FLOODPLAIN.
5. EROSION CONTROL BLANKET SHALL BE USED ON SLOPES GREATER THAN 4:1.

ADDITIONAL NOTES:

1. STAGING 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.

LEGEND

	PROP MAJ CONT		STABILIZED STAGING AREA - INTERIM
	PROP MIN CONT		CUT/FILL LINE
	EXIST MAJ CONT		EX. FLOW ARROW
	EXIST MIN CONT		PROP. FLOW ARROW
	EXISTING		PROPERTY LINE
	FUTURE		PROPOSED SUBDIVISION LINE
	PROPOSED		100 YEAR FLOOD STAGE
	LOW POINT/HIGH POINT		6", 100 YR FLOOD DEPTH
	ADJ. PROPERTY BOUNDARY		12", 100 YR FLOOD DEPTH
	OVERHEAD ELECTRIC		24", 100 YR FLOOD DEPTH
	TEMPORARY SEDIMENT BASIN - INTERIM		PHASE 2 BOUNDARY
	SILT FENCE - INTERIM (SF)		PHASE 1 BOUNDARY
	STRAW BALE DITCH CHECK - INTERIM (SBC)		PROP CONCRETE FENCE
	TEMPORARY OUTLET PROTECTION - INTERIM (OP)		EMERGENCY OVERFLOW DIRECTION
			LIMITS OF DISTURBANCE/ CONSTRUCTION BOUNDARY
			VEHICLE TRACKING CONTROL - INTERIM (VTC)
			PROPOSED RIPRAP



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

DATE: 11/30/20

SHEET 2 OF 5

GRO2

DESIGNED BY: CW

DRAWN BY: CW

CHECKED BY: VAS

SCALE: HORIZONTAL: 1" = 60'

VERTICAL: N/A

212 N. WARSATCH AVE, STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.555.5465

CIVIL CONSULTANTS, INC.

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

APPROVED BY: _____

DATE: _____

REVISIONS:

NO.	DATE	DESCRIPTION

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.

File: G:\70074A SOUTH PLANT 85-87\South Plant 85-87\Map\Const Draw\GEO\GRO2.dwg Plotstamp: 2/1/2021 11:05 AM

SC-1 Silt Fence (SF)

Maintenance and Removal

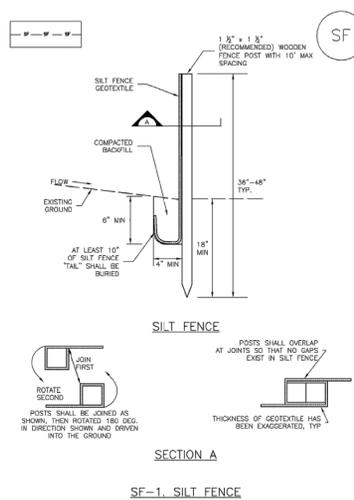
Inspection of silt fence includes observing the material for tears or holes and checking for slumping fence and undercut areas bypassing flows. Repair of silt fence typically involves replacing the damaged section with a new section. Sediment accumulated behind silt fence should be removed, as needed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



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 Goei.

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

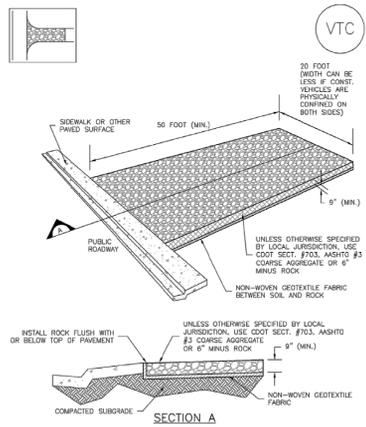
Silt Fence (SF) SC-1



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

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

Vehicle Tracking Control (VTC) SM-4

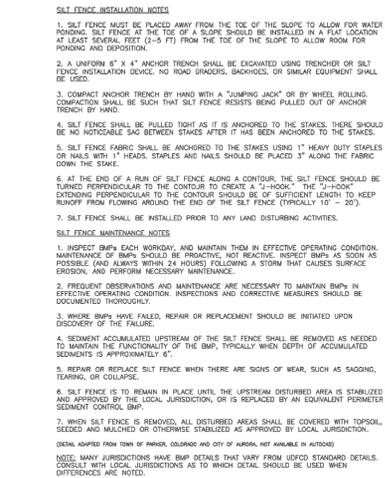


November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 VTC-3

SM-4 Vehicle Tracking Control (VTC)

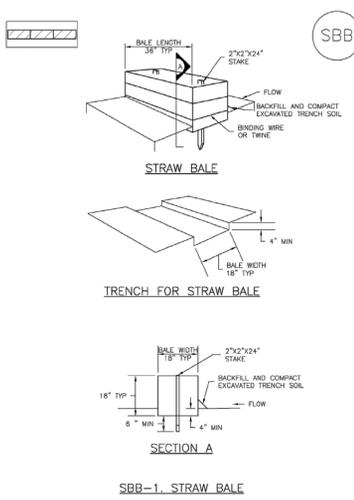
November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3

SC-1 Silt Fence (SF)



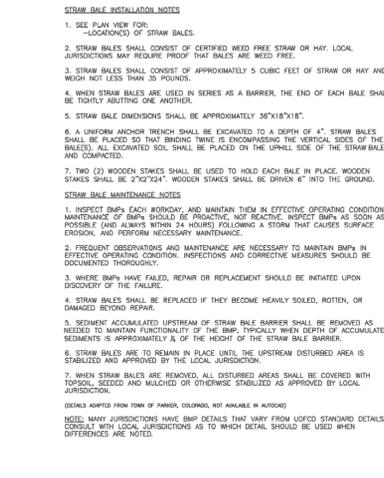
SF-4 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 November 2010

SC-3 Straw Bale Barrier (SBB)



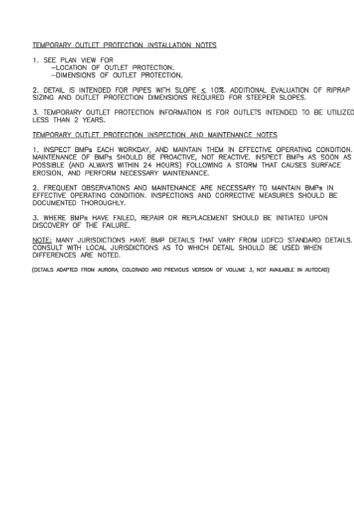
SBB-2 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 November 2010

Straw Bale Barrier (SBB) SC-3



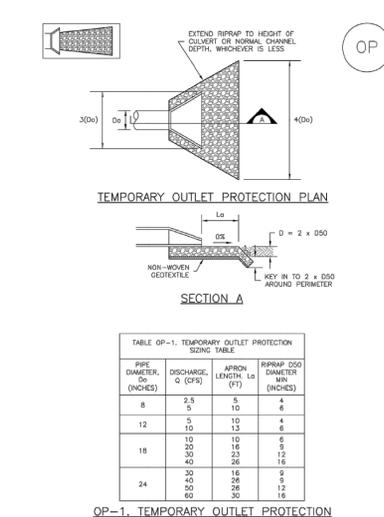
November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 SBB-3

Temporary Outlet Protection (TOP) EC-8



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

EC-8 Temporary Outlet Protection (TOP)



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

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.

- PRIOR TO START OF GRADING OPERATIONS, LOCATE AND SET THE SEDIMENT BERM AND VEHICLE TRACKING CONTROL AS SHOWN ON THE EROSION CONTROL PLAN.
- 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.
- 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 SEEDING. ALL TEMPORARY SOIL EROSION CONTROL MEASURES AND BMP'S SHALL BE MAINTAINED UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED.



BRADLEY POINT FILING NO. 1

GRADING & EROSION CONTROL DETAILS

PROJECT NO. 70-074 DATE: 11/30/20

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

DESIGNED BY: CWV DRAWN BY: CWV CHECKED BY: VAS

212 N. WAHATCH AVE., STE 305 COLORADO SPRINGS, CO 80903 PHONE: 719.555.5485

CIVIL CONSULTANTS, INC.

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

MARCELO A. SANCHEZ, COLORADO P.E. NO. 371660

NO. DATE: BY: DESCRIPTION:

REVISIONS:

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CAUTION

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

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

Common Name	Botanical Name	Growth Season*	Growth Form	Seeds/Pound	Pounds of PLS/acre
Alkali Soil Seed Mix					
Alkali sycamore	<i>Sporobolus airoides</i>	Cool	Bunch	1,750,000	0.25
Bain wildrye	<i>Elymus cinereus</i>	Cool	Bunch	165,000	2.5
Solar streambank wheatgrass	<i>Agropyron riparium 'Sodax'</i>	Cool	Sod	170,000	2.5
Junc tall wheatgrass	<i>Agropyron elongatum 'Junc'</i>	Cool	Bunch	70,000	7.0
Arriba western wheatgrass	<i>Agropyron amabilis 'Arriba'</i>	Cool	Sod	110,000	5.5
Total					17.5
Fertile Loamy Soil Seed Mix					
Ephraim crested wheatgrass	<i>Agropyron cristatum 'Ephraim'</i>	Cool	Sod	175,000	2.0
Dural hard fescue	<i>Festuca ovina 'Larivacala'</i>	Cool	Bunch	565,000	1.0
Lincoln smooth brome	<i>Bromus inermis 'Lynn'</i>	Cool	Sod	130,000	3.0
Solar streambank wheatgrass	<i>Agropyron riparium 'Sodax'</i>	Cool	Sod	170,000	2.5
Arriba western wheatgrass	<i>Agropyron amabilis 'Arriba'</i>	Cool	Sod	110,000	7.0
Total					15.5
High Water Table Soil Seed Mix					
Meadow foxtail	<i>Allopecurus pratensis</i>	Cool	Sod	900,000	0.5
Reedtop	<i>Agrostis alba</i>	Warm	Open sod	5,000,000	0.25
Reed canarygrass	<i>Phalaris arundinacea</i>	Cool	Sod	68,000	0.5
Lincoln smooth brome	<i>Bromus inermis 'Lynn'</i>	Cool	Sod	130,000	3.0
Partridge haygrass	<i>Panicum virgatum 'Partridge'</i>	Warm	Sod	389,000	1.0
Altair tall wheatgrass	<i>Agropyron elongatum 'Altair'</i>	Cool	Bunch	70,000	5.5
Total					10.75
Transition Turf Seed Mix¹					
Raeburn Canadian bluegrass	<i>Poa compressa 'Raeburn'</i>	Cool	Sod	2,500,000	0.5
Dural hard fescue	<i>Festuca ovina 'Larivacala'</i>	Cool	Bunch	565,000	1.0
Citation perennial ryegrass	<i>Lolium perenne 'Citation'</i>	Cool	Sod	247,000	3.0
Lincoln smooth brome	<i>Bromus inermis 'Lynn'</i>	Cool	Sod	130,000	3.0
Total					7.5

TS/PS-4 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 June 2012

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

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

Common Name	Botanical Name	Growth Season*	Growth Form	Seeds/Pound	Pounds of PLS/acre
Sandy Soil Seed Mix					
Blue grama	<i>Bouteloua gracilis</i>	Warm	Sod-forming bunchgrass	825,000	0.5
Cumprer little bluestem	<i>Schizachyrium scoparium 'Cumprer'</i>	Warm	Bunch	240,000	1.0
Prarie sandroot	<i>Callisiphonella longistylis</i>	Warm	Open sod	274,000	1.0
Sand dropseed	<i>Sporobolus cryptandrus</i>	Cool	Bunch	5,298,000	0.25
Vaughn sidetons grama	<i>Bouteloua curtipendula 'Vaughn'</i>	Warm	Sod	191,000	2.0
Arriba western wheatgrass	<i>Agropyron amabilis 'Arriba'</i>	Cool	Sod	110,000	5.5
Total					10.25
Heavy Clay, Rocky Foothill Seed Mix					
Ephraim crested wheatgrass ²	<i>Agropyron cristatum 'Ephraim'</i>	Cool	Sod	175,000	1.5
Oakle Intermediate wheatgrass	<i>Agropyron intermedium 'Oakle'</i>	Cool	Sod	115,000	5.5
Vaughn sidetons grama ³	<i>Bouteloua curtipendula 'Vaughn'</i>	Warm	Sod	191,000	2.0
Lincoln smooth brome	<i>Bromus inermis 'Lynn'</i>	Cool	Sod	130,000	3.0
Arriba western wheatgrass	<i>Agropyron amabilis 'Arriba'</i>	Cool	Sod	110,000	5.5
Total					17.5

* 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 Billion Drill or an 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.

¹ See Table TS/PS-1 for seeding dates.

² If site is to be irrigated, the transition turf seed rates should be doubled.

³ Crested wheatgrass should not be used on slopes steeper than 6:1 to 1:1.

⁴ Can substitute 0.5 lbs PLS of blue grama for the 2.0 lbs PLS of Vaughn sidetons grama.

June 2012 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 TS/PS-5

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

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

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

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

Maintenance and Removal

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

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

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

Protect seeded areas from construction equipment and vehicle access.

TS/PS-6 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 June 2012

EC-6 Rolled Erosion Control Products (RECP)

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

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

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

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 ^{2,3}	Max. Shear Stress ^{3,4}		
Mulch Control Nets	3:1 (HV)	<0.10 @ 5:1	0.25 lbs/ft ² (12 Pa)	5 lbs/ft ² (0.073 kN/m)
Netless Rolled Erosion Control Blankets	4:1 (HV)	<0.10 @ 4:1	0.5 lbs/ft ² (24 Pa)	5 lbs/ft ² (0.073 kN/m)
Single-net Erosion Control Blankets & Open Weave Textiles	3:1 (HV)	<0.15 @ 3:1	1.5 lbs/ft ² (72 Pa)	50 lbs/ft ² (0.73 kN/m)
Double-net Erosion Control Blankets	2:1 (HV)	<0.20 @ 2:1	1.75 lbs/ft ² (84 Pa)	75 lbs/ft ² (1.09 kN/m)
Mulch Control Nets	5:1 (HV)	<0.10 @ 5:1	0.25 lbs/ft ² (12 Pa)	25 lbs/ft ² (0.36 kN/m)
Erosion Control Blankets & Open Weave Textiles (slowly degrading)	1.5:1 (HV)	<0.25 @ 1.5:1	2.00 lbs/ft ² (98 Pa)	100 lbs/ft ² (1.45 kN/m)
Erosion Control Blankets & Open Weave Textiles	1:1 (HV)	<0.25 @ 1:1	2.25 lbs/ft ² (108 Pa)	125 lbs/ft ² (1.82 kN/m)

¹ 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.)

² Minimum Average Roll Values, Machine direction using ECTC Mod. ASTM D 5035.

³ C Factor calculated as ratio of soil loss from RECP protected slope (tested at specified or greater gradient, HV) to ratio of soil loss from unprotected control plot in large-scale testing.

⁴ 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.

⁵ 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.

⁶ Acceptable large-scale test methods may include ASTM D 6459, or other independent testing deemed acceptable by the engineer.

⁷ For the engineer's discretion. Recommended acceptable large-scale testing protocol may include ASTM D 6460, or other independent testing deemed acceptable by the engineer.

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

EC-6 Rolled Erosion Control Products (RECP)

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

Product Type	Slope Applications	Channel Applications	Minimum Tensile Strength ¹
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 (HV)	6.0 lbs/ft ² (288 Pa)	125 lbs/ft ² (1.82 kN/m)
	0.5:1 (HV)	8.0 lbs/ft ² (384 Pa)	150 lbs/ft ² (2.19 kN/m)
	0.5:1 (HV)	10.0 lbs/ft ² (480 Pa)	175 lbs/ft ² (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 measurement using ASTM D 6518 (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.

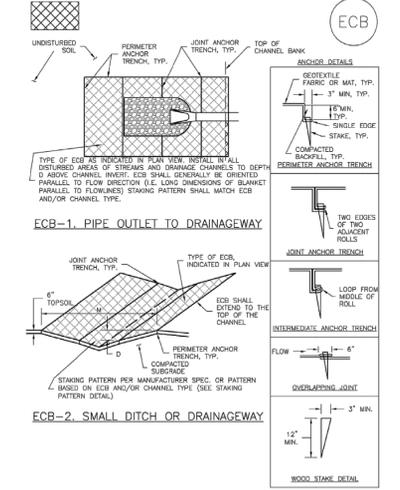
⁵ Acceptable large-scale testing protocols may include ASTM D 6460, or other independent testing deemed acceptable by the engineer.

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 prevent 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

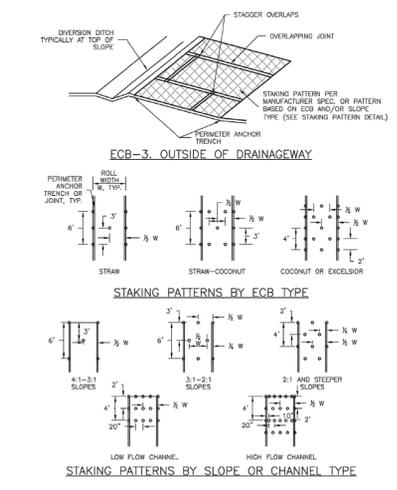
RECP-4 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 November 2010

EC-6 Rolled Erosion Control Products (RECP)



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

Rolled Erosion Control Products (RECP) EC-6



November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 RECP-7

EC-6 Rolled Erosion Control Products (RECP)

EROSION CONTROL BLANKET INSTALLATION NOTES

- SEE PLAN VIEW FOR: LOCATION OF JOB; TYPE OF ECB (STRAW, STRAW-COCOON, COCONUT, OR EXCELSIOR); AREA, A, IN SQUARE FEET OF EACH TYPE OF ECB.
- 100% NATURAL AND BIODEGRADABLE MATERIALS ARE PREFERRED FOR RECPs, ALTHOUGH SOME JURISDICTIONS MAY ALLOW OTHER MATERIALS IN SOME APPLICATIONS.
- IN AREAS WHERE ECBs ARE SHOWN ON THE PLANS, THE PERIMETER SHALL PLACE TOPSOIL AND PERFORM FINAL GRADING, SURFACE PREPARATION, AND SEEDING AND MULCHING. SURFACE 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.
- PERIMETER ANCHOR TRENCH SHALL BE USED ALONG THE OUTSIDE PERIMETER OF ALL BLANKET AREAS.
- JOINT ANCHOR TRENCH SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER (LONGITUDINALLY AND TRANSVERSELY) FOR ALL ECBs EXCEPT STRAW WHICH MAY USE AN OVERLAPPING JOINT.
- INTERMEDIATE ANCHOR TRENCH SHALL BE USED AT SPACING OF ONE-HALF ROLL LENGTH FOR COCONUT AND EXCELSIOR ECBs.
- OVERLAPPING JOINT DETAIL SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER FOR ECBs ON SLOPES.
- MATERIAL SPECIFICATIONS OF ECBs SHALL CONFORM TO TABLE ECB-1.
- ANY AREAS OF SEEDING AND MULCHING DISTURBED IN THE PROCESS OF INSTALLING ECBs SHALL BE RESEDED AND MULCHED.
- 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 ¹
STRAW	-	100%	-	DOUBLE/NATURAL
STRAW-COCOON	20% MIN	70% MAX	-	DOUBLE/NATURAL
COCONUT	100%	-	-	DOUBLE/NATURAL
EXCELSIOR	-	-	100%	DOUBLE/NATURAL

¹ STRAW NETTING IS ONLY FOR USE ON SLOPES OF 2:1 OR STEEPER SLOPES. COCONUT AND EXCELSIOR NETTING MAY BE ACCEPTABLE ON SLOPES SHOWN.

RECP-8 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 November 2010

Rolled Erosion Control Products (RECP) EC-6

EROSION CONTROL BLANKET MAINTENANCE NOTES

- INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE AND ALWAYS WITHIN 24 HOURS FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
 - FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
 - WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
 - ECBs SHALL BE LEFT IN PLACE TO EVENTUALLY BIODEGRADE, UNLESS REQUESTED TO BE REMOVED BY THE LOCAL JURISDICTION.
 - ANY ECB ROLLED, TORN, OR OTHERWISE DAMAGED SHALL BE REPAIRED OR REINSTALLED. ANY SUBGRADE AREAS BELOW THE GEOTEXTILE THAT HAVE ERODED TO CREATE A VOID UNDER THE BLANKET, OR THAT REMAIN BEYOND OF GRASS SHALL BE REPAIRED, RESEDED AND MULCHED AND THE ECB REINSTALLED.
- NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM LISTED STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.
- (DETAILS ADAPTED FROM COLORADO COUNTY, COLORADO AND TOWN OF PARKER COLORADO, NOT AVAILABLE IN AUTOCAD)

November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 RECP-9

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- 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.
- 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 SEEDDED. ALL TEMPORARY SOIL EROSION CONTROL MEASURES AND BMPs SHALL BE MAINTAINED UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED.



BRADLEY POINT FILING NO. 1
GRADING & EROSION CONTROL DETAILS
PROJECT NO. 70-074
DATE: 11/30/20
SCALE: N/A
DESIGNED BY: CW
DRAWN BY: CW
CHECKED BY: WAS
SHEET 5 OF 5
GR05

212 N. WABACH AVE., STE. 303
COLORADO SPRINGS, CO 80903
PHONE: 719.555.3463

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

REVISIONS:
NO. DATE BY DESCRIPTION

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR UNAUTHORIZED CHANGES TO OR EFFECTS OF EROSION AND SEDIMENTATION AS A RESULT OF CONSTRUCTION AND EARTHWORK ACTIVITIES WITHIN THE PROJECT SITE. ALL CHANGES TO THESE PLANS MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

CAUTION