FINAL DRAINAGE REPORT

ROCK CREEK CANYON PLANT SITE
710 Rock Creek Canyon Rd.
El Paso County, Colorado 80926

Prepared For:

Castle Rock Construction Co. of Colorado LLC

6374 South Racine Circle
Centennial, Colorado 80111

Prepared By:

Baseline Engineering Corporation

1046 Elkton Drive
Colorado Springs, Colorado 80907

Steven Baggs, PE

Date: September 15, 2022

PCD File No.: CDR2211

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September 15, 2022

El Paso County
Planning and Community Development
2880 International Circle, Suite 110
Colorado Springs, Colorado 80910

Re: Final Drainage Report
For Rock Creek Canyon Plant Site
Located on 710 Rock Creek Canyon Rd.
El Paso County, CO 80926

To Whom It May Concern:

Transmitted herewith is the Final Drainage Report for the Rock Creek Canyon Plant Site, located on an unplatted parcel addressed 710 Rock Creek Canyon Rd, Colorado Springs, CO, 80926-9800. The Rock Creek Canyon Plant Site is approximately 10 acres and located on the property's southern edge along Rock Creek Canyon Road. The site is currently zoned RS-5000, F-5. The proposed batch plant on site is located on vacant land. The purpose of the proposed batch plant is to support construction operations for CDOT Project 22903 on SH115. The proposed batch plant would only be permitted/used for this one Project (less than 2 years). We would therefore like to submit for a temporary use permit through El Paso County in accordance with section 5.2.34(C) of the Counties land development code.

This drainage analysis was prepared in accordance with the most current El Paso County Drainage Criteria Manual. If there are any comments or questions regarding any part of this drainage analysis, please contact the undersigned.

Very truly yours,
BASELINE ENGINEERING CORP.

Sean P Callahan, E.I.

Reviewed by:
Steven G. Baggs, P.E.

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Certification Statements

Engineer's Statement

The attached drainage plan and report were 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 applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

COLORADO REGISTERED
STEVEN G. BAGGS
10/19/22
26020
PROFESSIONAL ENGINEER

Steven G Baggs, P.E. Colorado 26020

Developer's Statement

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

Name of Developer: Castle Rock Construction Co. of Colorado.

Authorized Signature/Date: 10-19-2022.

Printed Name: Richard Tinnian.

Title: General Superintendent

Address: 6374 So. Racine Cir. Centennial, Co. 80111.

El Paso County Certification

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

Joshua Palmer, P.E. County Engineer / ECM Administrator D

APPROVED
Engineering Department
10/31/2022 8:04:04 AM
dsdnijkamp
EPC Planning & Community Development Department

1) General Location and Description

a) Location

This Final Drainage Report has been prepared for Rock Creek Canyon Batch Plant, located on an unplatted parcel addressed 710 Rock Creek Canyon Rd Colorado Springs, El Paso County, Colorado 80926. The property is bound to the North by conservation of forest properties (F-5), the East by CO115 Right-of-Way, the South by Rock Creek Canyon Rd Right-of-Way, and the West by conservation of forest properties (F-5).

The site is located within the SE ¼ of Section 36, Township 15 S, Range 67 West of the 6th Principal Meridian.

There is an existing residential building and campground on the property. The location of the proposed batch plant on site consists of vacant land. There are no major drainageways adjacent to the site.

The Rock Creek Park (Plat No. 912) and Penchoff Subdivision (Plat No. 9483) are located at the south edge of the site across the Rock Creek Canyon Rd ROW.

b) Description of Property

For the purposes of this report "the site" will refer to the Rock Creek Canyon Batch Plant site, which is approximately 10 acres of disturbed area. The entirety of the property which the Rock Creek Canyon Batch Plant site is located on encompasses 387.07 acres.

The proposed Rock Creek Canyon Batch Plant portion of the site consists of undeveloped land covered by native grasses, trees, and weeds.

The existing site drains from the West to the East primarily at slopes between 3-5% into an existing roadside ditch on the West side of CO-115.

The soil type at the site was identified primarily as Bresser Sandy Loam, with slopes ranging from 3-5%, and a hydrologic soil grouping of "B". Soils associated with hydrologic soil group B have a moderate infiltration rate when thoroughly wet. These are moderately deep, well-draining soils with a moderate rate of water transmission.

There are no major drainageways adjacent to the site. There is a FEMA floodplain (Zone A) Southwest of the parcel. The floodplain is not located on the batch plant portion of the property and will not be disturbed with this project. Refer to the appendix for the FIRM Map.

There are no known existing irrigation facilities located on the site.

There is an existing overhead transmission line on the eastern boundary of the site. The transmission line will not be disturbed with this project. There are no other known utilities or encumbrances on the batch plant portion of the site.

2) Drainage Basins and Sub-Basins

a) Major Basin Descriptions

This project is within the Fort Carson Drainage Basin. Stormwater from this site drains from the West to East into an existing road side ditch on the West side of CO-115. The immediate receiving water for the site is an unnamed drainage north of the site, with the ultimate receiving water being Fountain Creek (COARFO04d_A).

According to the FEMA Flood Insurance Rate Map (FIRM) Panel No. 08041C0950G, effective 12/07/2018, this site is located within an area of minimal flood hazard (Zone X). Refer to the appendix for FIRM Map.

The Fort Carson Drainage Basin generally drains east, until its confluence with Fountain Creek approximately 6.5 miles east of the batch plant site.

There are no known irrigation facilities or other obstructions which could influence or be influenced by the local drainage patterns.

b) Sub-basin Description

An Existing Conditions Drainage Plan has been included in the Appendix of this report. A description of the existing subbasins is as follows:

Subbasin E1 (26.27 acres) consists of the entirety of the existing area draining to DP3 in the existing roadside ditch on the west side of CO-115. This subbasin drains from the West to the East generally at slopes between 3-5% into an existing roadside ditch on the West side of CO-115 at DP3. Stormwater then drains North along the West side of CO-115 to an unnamed drainage ultimately tributary to Fountain Creek in existing conditions. The determined existing runoff quantities from subbasin E1 draining to DP3 are Q_5=7.98 cfs and Q_{100}=38.36 cfs in the minor and major storms.

A Proposed Temporary Conditions Drainage Plan has been included in the Appendix of this report. All subbasins described below are temporary. After batch plant operations are complete, drainage conditions will be returned to existing conditions. A description of the temporary subbasins is as follows:

Subbasin T1 (5.55 acres) consists of the western portion of vacant land, west of the proposed batch plant tributary to the western temporary berm section. This subbasin will drain from West to East, into the western temporary berm section. The temporary berm section will create a minimum 1.5’ deep swale at this location that will drain north around the batch plant site. From DP1, drainage will flow southeast into a proposed temporary level spreader at DP2 via a 3’ deep drainage swale. Calculations have been provided for the temporary swale in the minor and major storms in the appendix of this report. The determined temporary runoff quantities from subbasin T1 draining to DP1 are Q_5=1.30 cfs and Q_{100}=8.72 cfs in the minor and major storms.

Subbasin T2 (9.73 acres) consists of the entirety of the disturbed area for the batch plant site. This subbasin will drain from the West to the East generally at slopes between 3-5% into a proposed temporary sedimentation pond. This subbasin was assumed at 13% impervious due to a likely temporary

increase in impervious percentage resulting from the batch plant equipment and haul routes. Stormwater will be treated at the temporary sedimentation pond and be released into subbasin T3 via the temporary level spreader at DP2. From the level spreader at DP2 runoff will follow the existing drainage patterns of subbasin T3. The determined temporary runoff quantities from subbasin T2 draining to DP2 are Q_5=4.09 cfs and Q_{100}=21.82 cfs in the minor and major storms. The total accumulative flows from subbasins T1 and T2 draining to DP2 are Q_5=5.39 cfs and Q_{100}=30.54 cfs in the minor and major storms. The 2-year storm was also analyzed for the temporary level spreader and grass buffer design at DP2. The total accumulative flows in the 2-year storm drainage to DP2 was calculated at 1.83 cfs. Calculations for the 2-year storm have been provided in the appendix of this report.

Subbasin T3 (10.99 acres) consists of the vacant land east of the temporary batch plant, and portions of ROW for Rock Creek Canyon Road & CO-115 adjacent to the site. This subbasin will maintain existing drainage patterns. The temporary subbasin drains from the West to the East generally at slopes between 3-5% into an existing roadside ditch on the West side of CO-115 at DP3. Stormwater then drains North along the West side of CO-115 to an unnamed drainage ultimately tributary to Fountain Creek. The determined temporary runoff quantities from subbasin T3 draining to DP3 are Q_5=3.66 cfs and Q_{100}=16.43 cfs in the minor and major storms. The total accumulative flows from subbasins T1, T2 and T3 draining to DP3 are Q_5=9.05 cfs and Q_{100}=46.97 cfs in the minor and major storms. The effects of the temporary increase in runoff quantities due to the batch plant will be mitigated to some degree by the use of the temporary sediment basin, the level spreader (reduces flow concentration) and utilizing subbasin T3 as a grass buffer.

There are no known off-site drainage flow patterns that will impact this project.

3) Drainage Design Criteria

a) Development Criteria Reference

This drainage analysis has been prepared in accordance with the current El Paso County Drainage Criteria Manual Volumes 1 & 2, as well as applicable portions of the City of Colorado Springs Drainage Criteria Manual Volumes 1 & 2.

This site is located within the Fort Carson Drainage Basin (FOFO2200). There are no previous drainage studies completed for this project site. There are no associated drainage fees for this basin.

b) Hydrologic Criteria

The design rainfall depths for the site were determined from the NOAA Atlas 14, Volume 8, Version 2. Design rainfall depths have been included in the appendix of this report.

The Rational Method was used to determine developed flow volumes for historic and developed conditions. The Rational Formula is Q = CiA, where Q, the maximum rate of runoff is equal to the runoff coefficient C, times the rainfall intensity (I), times the area (A).

The minor and major design storms were analyzed as the 5-yr and 100-yr storm events in this report. The 2-year storm was also analyzed for the temporary level spreader and grass buffer design at DP2. A summary of calculated direct runoff flows has been provided below, refer to the Appendix for additional rational calculations.

There were no detention discharge calculation methods required for this report.

4) Drainage Facility Design

a) General Concept

The proposed drainage patterns of the site will maintain the existing drainage patterns. The site drains from Northwest to the Southeast into a roadside ditch on the west side of SH115. This batch plant will be utilized for CDOT Project 22903 on SH115 and only be permitted/used for this one project (less than 2 years). This project will not have a negative impact on downstream drainageways.

Four Step Process: The four-step process for minimizing adverse impacts of urbanization must be applied to all new or redevelopment projects for which construction activities disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale. The four steps have been applied to this site as follows:

Step 1: Reduce runoff by disconnecting impervious area, eliminating "unnecessary" impervious area and encouraging infiltration into soils that are suitable.
The stormwater management for the Rock Creek Canyon Batch Plant does employ runoff reduction practices. The temporary increase in flows from basin T2 will be treated via a temporary sediment pond, and a temporary grass buffer through basin T3 to promote infiltration. The UD-BMP IRF spreadsheet was prepared for this project and is included in the Hydrologic Calculations section of the Appendix.

Step 2: Treat and slowly release the WQCV.
This site is exempt from water quality treatment per the exclusion in ECM Appendix I.E.4.a.i.G. Also, per the post construction stormwater management applicability evaluation from, no permanent post construction stormwater management is required since the undeveloped land will remain undeveloped following the batch plant activity.

Step 3: Stabilize stream channels.
All new and re-development projects are required to construct or participate in the funding of channel stabilization measures. There are no associated drainage fees for the Fort Carson Drainage Basin. There are no major drainage ways that are adjacent to the site. There are no negative drainage impacts on downstream facilities, the temporary increase in flows from basin T2 will be treated via a temporary sediment pond, the level spreader to reduce runoff concentration and a temporary grass buffer through basin T3 to promote infiltration. After completion of operation of the batch plant, the site will be restored to historic conditions. Runoff from the site is conveyed via sheet flow to an existing roadside ditch on the West side of SH115 in historic and temporary conditions.

Step 4: Implement source controls.
This development will implement a Stormwater Management Plan that utilizes construction control measures, proper housekeeping practices, and spill containment procedures. There is no outdoor storage of contaminants or outside pollutant sources anticipated at this site.

b) Specific Details

Below is a summary of the existing and proposed direct runoff summaries for the disturbed area of the batch plant. Rational calculations have been provided in the appendix of this report.

Table 1. Subbasin Direct Runoff Summary

DIRECT RUNOFF SUMMARY										
BASIN LABEL	DESIGN POINT	AREA	Imp.	C5	C100	LOCAL (CFS)		ACCUMULATIVE (CFS)		Notes
						Q5	Q100	Q5	Q100	
E1	3	26.27	8%	0.14	0.40	7.98	38.36			
T1	1	5.55	2%	0.09	0.36	1.30	8.72			
T2	2	9.73	13%	0.16	0.41	4.09	21.82	5.39	30.54	
T3	3	10.99	16%	0.20	0.45	3.66	16.43	9.05	46.97	

There are no negative drainage impacts on downstream facilities, the temporary increase in flows from basin T2 will be treated via a temporary sediment pond, the level spreader to reduce runoff concentration and a temporary grass buffer through basin T3 to promote infiltration. After completion of operation of the batch plant, the site will be restored to historic conditions. Runoff from the site is conveyed via sheet flow to an existing roadside ditch on the West side of SH115. Stormwater will continue to drain into the existing roadside ditch on the West side of SH115.

The purpose of the proposed batch plant is for CDOT Project 22903 on SH115. The proposed batch plant would be used for the CDOT project on SH115 and only be permitted/used for this one Project (less than 2 years).

The existing roadside ditch located on the West side of SH115 drains North, into an unnamed drainage channel. The ultimate receiving water for the unnamed drainage is Fountain Creek approximately 6.5 miles east of the site.

There are no known environmental or drainage issues existing on site.

Maintenance for the site will be provided off of the proposed access location on Rock Creek Canyon Road for the operation of the batch plant. The site will not be developed with an impervious surface material.

There is no permanent detention structure proposed with this project. Temporary erosion control CM's will be in place prior to final stabilization of the site. Grading and Erosion Control Plans for the site will be submitted separately.

There are no public or private drainage facilities proposed for this project. Applicable portions of the 2022 Financial Assurance Estimate From has been completed and provided to the County.

There are no associated drainage fees for the Fort Carson Drainage Basin.

c) Other Government Agency Requirements

Federal Emergency Management Agency (FEMA)

According to the FEMA Flood Insurance Rate Map (FIRM) Panel No. 08041C0950G, effective 12/07/2018, this site is located within an area of minimal flood hazard (Zone X). Refer to the appendix for FIRM Map.

Army Corps of Engineers (COE)

N/A

Colorado State Engineer

N/A

Colorado Water Conservation Board (CWCB)

N/A

CDOT

N/A

Drawings/Appendix

A. General Location (Vicinity) Map

B. Hydrologic Calculations

C. Hydraulic Calculations

D. Drainage Maps

APPENDIX A

BASELINE
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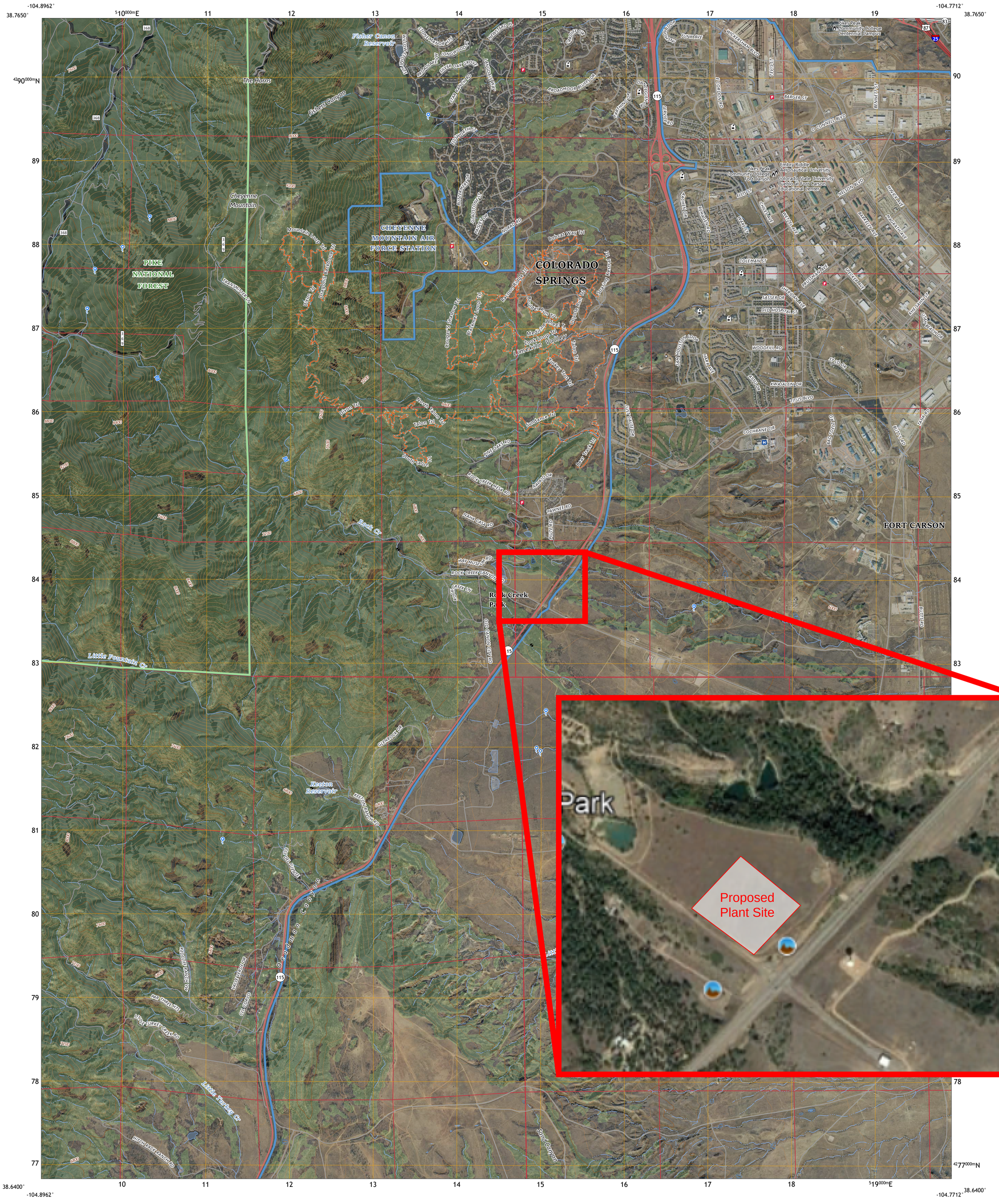
Plant Site Vicinity Map

7.5-MINUTE TOPO 1 QUADRANGLE
Custom Extent
7.5-MINUTE TOPO

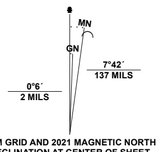


Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 13S

Data is provided by The National Map (TNM), is the best available at the time of map generation, and includes data content from supporting themes of Elevation, Hydrography, Geographic Names, Boundaries, Transportation, Structures, Land Cover, and Orthoimagery. Refer to associated Federal Geographic Data Committee (FGDC) Metadata for additional source data information.

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands. Temporal changes may have occurred since these data were collected and some data may no longer represent actual surface conditions.

Learn About The National Map: https://nationalmap.gov



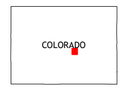
UTM GRID AND 2021 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
EC
Grid Zone Designation 13S

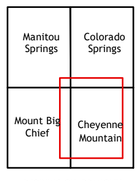
SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 80 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988
CONTOUR SMOOTHNESS = Medium



QUADRANGLE LOCATION



ADJOINING QUADRANGLES

ROAD CLASSIFICATION

Expressway	Local Connector
Secondary Hwy	Local Road
Ramp	4WD
Interstate Route	US Route
State Route	
FS Primary Route	FS Passenger Route
FS High Clearance Route	

Check with local Forest Service unit
for current travel conditions and restrictions.

7.5-MINUTE TOPO 1, CO
2022

APPENDIX B

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NOAA Atlas 14, Volume 8, Version 2
Location name: Colorado, USA*
Latitude: 38.7035°, Longitude: -104.829°
Elevation: 6282.42 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.250** (0.202-0.311)	**0.298** (0.240-0.372)	**0.383** (0.308-0.480)	**0.461** (0.368-0.580)	**0.576** (0.447-0.768)	**0.673** (0.506-0.909)	**0.775** (0.561-1.08)	**0.886** (0.611-1.28)	**1.04** (0.687-1.56)	**1.17** (0.745-1.76)
10-min	**0.365** (0.295-0.456)	**0.436** (0.352-0.544)	**0.562** (0.451-0.703)	**0.675** (0.539-0.850)	**0.844** (0.654-1.12)	**0.985** (0.741-1.33)	**1.14** (0.821-1.58)	**1.30** (0.894-1.87)	**1.53** (1.01-2.28)	**1.71** (1.09-2.58)
15-min	**0.446** (0.360-0.556)	**0.532** (0.429-0.664)	**0.685** (0.551-0.858)	**0.823** (0.657-1.04)	**1.03** (0.797-1.37)	**1.20** (0.904-1.62)	**1.39** (1.00-1.93)	**1.58** (1.09-2.28)	**1.86** (1.23-2.78)	**2.09** (1.33-3.15)
30-min	**0.652** (0.527-0.812)	**0.780** (0.630-0.974)	**1.01** (0.811-1.26)	**1.21** (0.970-1.53)	**1.52** (1.18-2.03)	**1.78** (1.34-2.40)	**2.05** (1.48-2.86)	**2.34** (1.62-3.38)	**2.76** (1.82-4.11)	**3.09** (1.97-4.67)
60-min	**0.836** (0.675-1.04)	**0.982** (0.793-1.23)	**1.26** (1.01-1.57)	**1.51** (1.21-1.91)	**1.92** (1.49-2.57)	**2.26** (1.71-3.08)	**2.64** (1.92-3.70)	**3.06** (2.11-4.43)	**3.66** (2.42-5.48)	**4.16** (2.65-6.27)
2-hr	**1.02** (0.829-1.26)	**1.19** (0.962-1.47)	**1.50** (1.22-1.87)	**1.81** (1.46-2.27)	**2.31** (1.82-3.10)	**2.75** (2.09-3.73)	**3.23** (2.37-4.52)	**3.77** (2.64-5.45)	**4.56** (3.05-6.80)	**5.22** (3.36-7.82)
3-hr	**1.11** (0.907-1.37)	**1.27** (1.04-1.57)	**1.60** (1.30-1.98)	**1.93** (1.56-2.40)	**2.48** (1.97-3.33)	**2.97** (2.28-4.03)	**3.52** (2.60-4.92)	**4.15** (2.92-5.99)	**5.08** (3.42-7.56)	**5.85** (3.79-8.74)
6-hr	**1.28** (1.05-1.56)	**1.44** (1.18-1.77)	**1.80** (1.47-2.22)	**2.17** (1.76-2.69)	**2.81** (2.25-3.77)	**3.38** (2.62-4.58)	**4.04** (3.01-5.63)	**4.79** (3.41-6.88)	**5.91** (4.02-8.75)	**6.85** (4.48-10.2)
12-hr	**1.46** (1.21-1.78)	**1.67** (1.38-2.04)	**2.10** (1.72-2.56)	**2.53** (2.07-3.11)	**3.25** (2.62-4.31)	**3.90** (3.04-5.22)	**4.63** (3.47-6.38)	**5.45** (3.90-7.76)	**6.67** (4.58-9.79)	**7.70** (5.08-11.3)
24-hr	**1.68** (1.39-2.02)	**1.94** (1.61-2.34)	**2.44** (2.02-2.97)	**2.95** (2.42-3.59)	**3.75** (3.03-4.91)	**4.46** (3.49-5.90)	**5.25** (3.96-7.15)	**6.13** (4.42-8.63)	**7.42** (5.13-10.8)	**8.49** (5.67-12.4)
2-day	**1.92** (1.60-2.30)	**2.23** (1.86-2.68)	**2.82** (2.34-3.40)	**3.39** (2.80-4.11)	**4.29** (3.48-5.56)	**5.08** (4.00-6.66)	**5.95** (4.51-8.03)	**6.91** (5.02-9.64)	**8.31** (5.79-12.0)	**9.46** (6.38-13.7)
3-day	**2.09** (1.75-2.50)	**2.44** (2.04-2.92)	**3.10** (2.58-3.72)	**3.72** (3.09-4.49)	**4.71** (3.83-6.06)	**5.56** (4.39-7.25)	**6.49** (4.95-8.72)	**7.53** (5.49-10.4)	**9.02** (6.32-12.9)	**10.3** (6.95-14.8)
4-day	**2.25** (1.89-2.68)	**2.62** (2.20-3.12)	**3.31** (2.77-3.97)	**3.97** (3.30-4.78)	**5.01** (4.08-6.43)	**5.90** (4.68-7.67)	**6.88** (5.26-9.21)	**7.96** (5.83-11.0)	**9.53** (6.70-13.6)	**10.8** (7.36-15.6)
7-day	**2.67** (2.25-3.16)	**3.06** (2.58-3.63)	**3.79** (3.18-4.51)	**4.49** (3.75-5.37)	**5.58** (4.57-7.10)	**6.52** (5.20-8.42)	**7.56** (5.82-10.1)	**8.70** (6.42-12.0)	**10.4** (7.35-14.7)	**11.7** (8.05-16.8)
10-day	**3.04** (2.57-3.58)	**3.45** (2.92-4.08)	**4.23** (3.56-5.01)	**4.96** (4.15-5.91)	**6.09** (5.00-7.70)	**7.06** (5.64-9.06)	**8.12** (6.27-10.7)	**9.29** (6.88-12.7)	**11.0** (7.82-15.5)	**12.3** (8.52-17.6)
20-day	**4.04** (3.44-4.73)	**4.62** (3.93-5.42)	**5.62** (4.77-6.62)	**6.51** (5.49-7.70)	**7.80** (6.41-9.69)	**8.87** (7.11-11.2)	**9.98** (7.74-13.0)	**11.2** (8.32-15.0)	**12.8** (9.20-17.9)	**14.1** (9.86-20.0)
30-day	**4.86** (4.15-5.67)	**5.59** (4.77-6.53)	**6.80** (5.79-7.97)	**7.83** (6.62-9.23)	**9.27** (7.61-11.4)	**10.4** (8.35-13.0)	**11.6** (8.99-14.9)	**12.8** (9.53-17.0)	**14.4** (10.3-19.9)	**15.6** (11.0-22.0)
45-day	**5.91** (5.06-6.86)	**6.81** (5.83-7.92)	**8.27** (7.06-9.65)	**9.46** (8.03-11.1)	**11.1** (9.09-13.5)	**12.3** (9.89-15.2)	**13.5** (10.5-17.3)	**14.7** (11.0-19.5)	**16.3** (11.8-22.3)	**17.5** (12.3-24.5)
60-day	**6.80** (5.85-7.88)	**7.84** (6.73-9.09)	**9.49** (8.12-11.0)	**10.8** (9.20-12.6)	**12.6** (10.3-15.2)	**13.9** (11.2-17.1)	**15.1** (11.8-19.2)	**16.3** (12.3-21.5)	**17.9** (13.0-24.4)	**19.0** (13.5-26.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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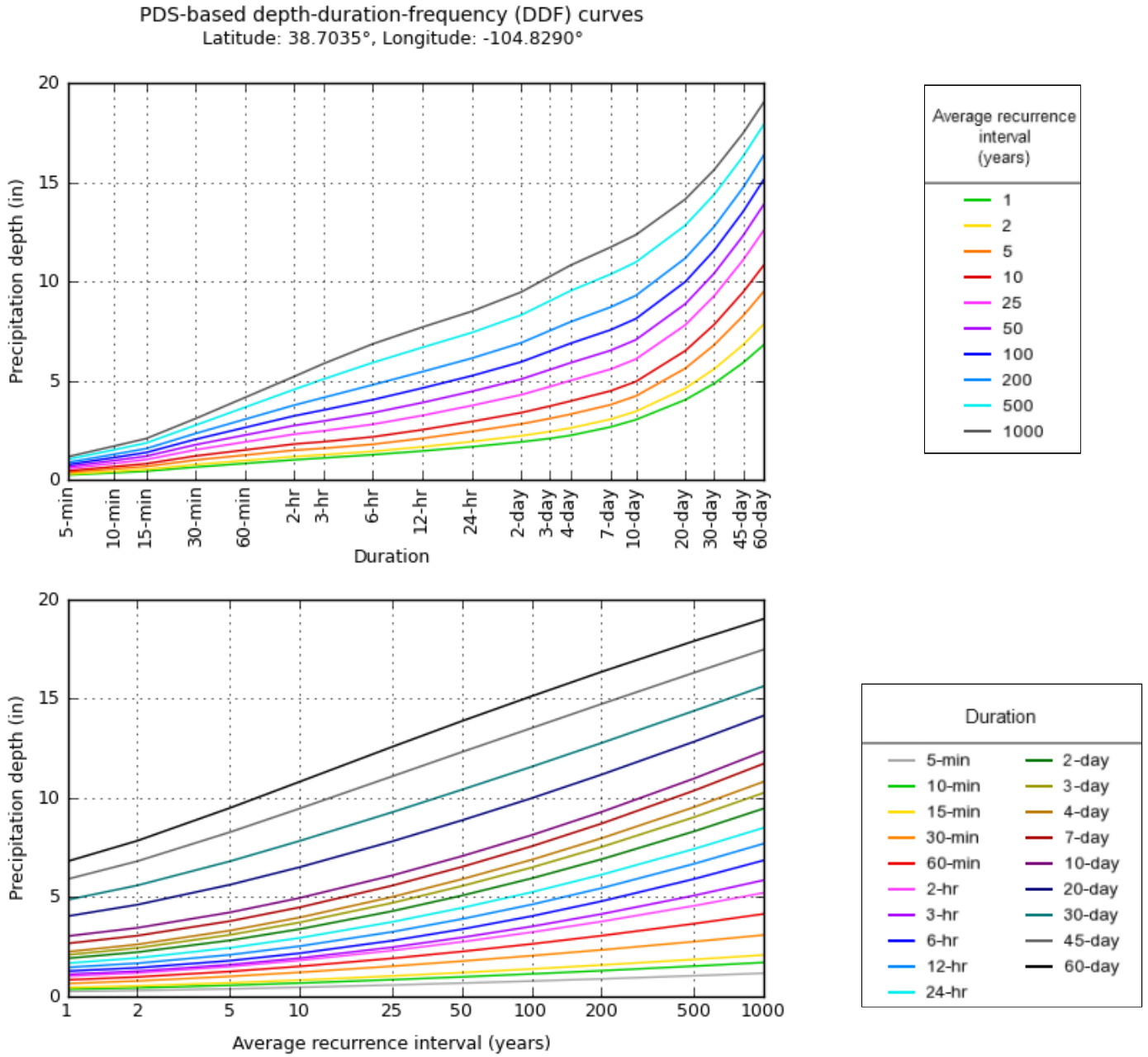
PF graphical



NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Thu Aug 25 21:19:46 2022

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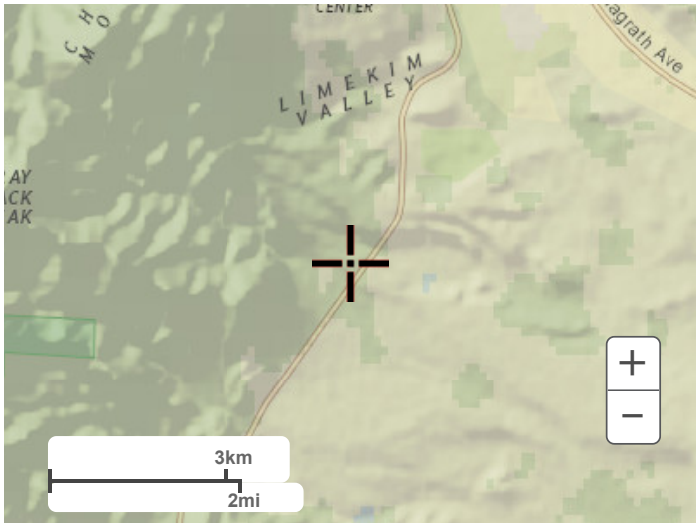
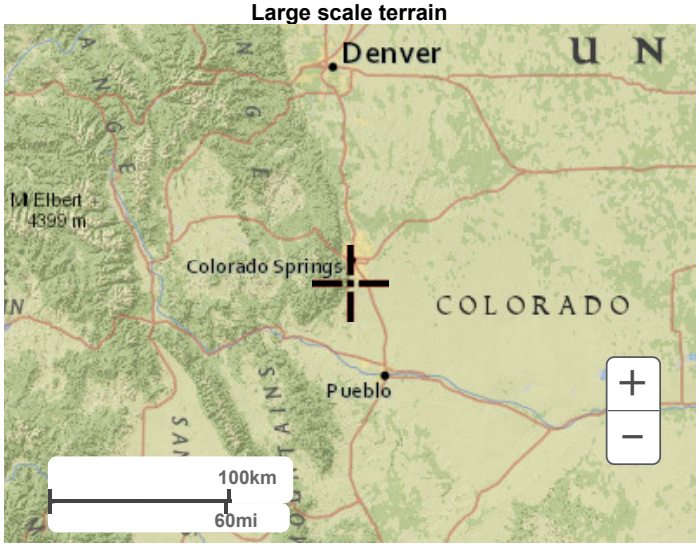
Maps & aerials

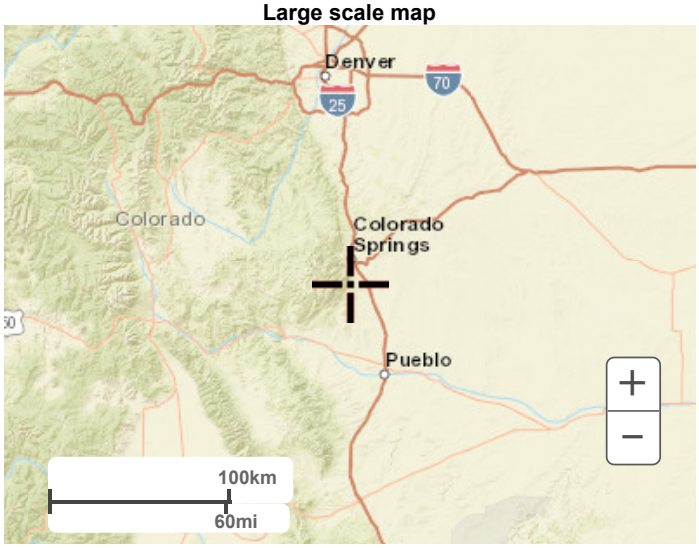
Small scale terrain



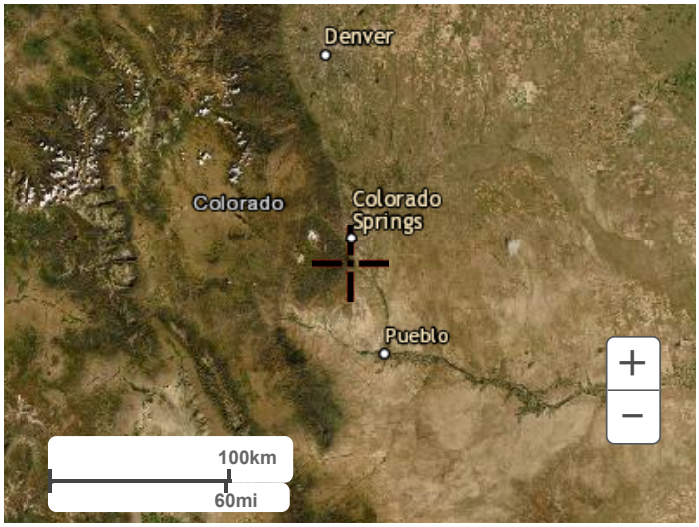
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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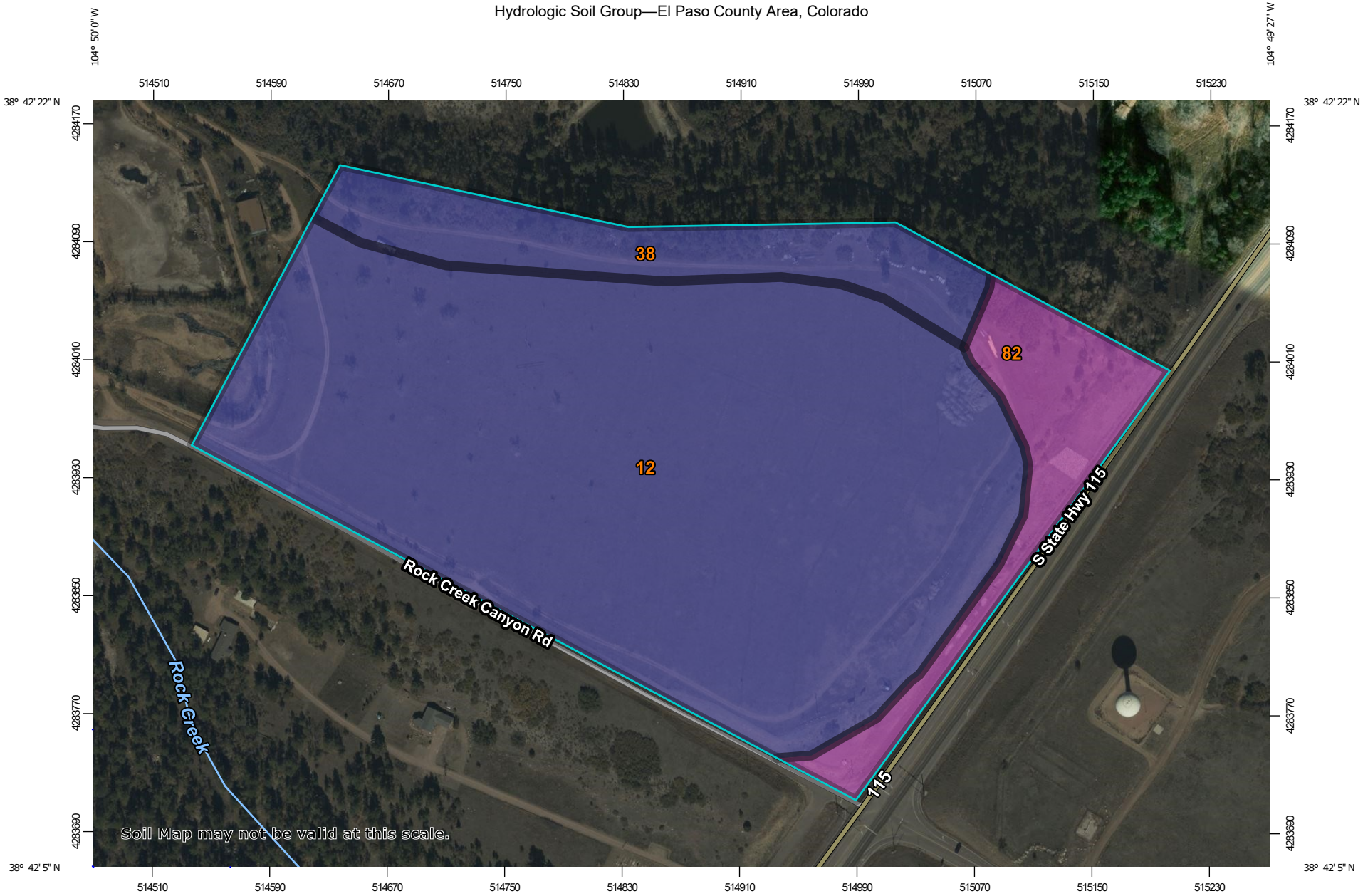

Map Scale: 1:3,660 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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 19, Aug 31, 2021

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

Date(s) aerial images were photographed: Nov 19, 2013—Oct 20, 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
12	Bresser sandy loam, cool, 3 to 5 percent slopes	B	31.5	77.7%
38	Jarre-Tecolote complex, 8 to 65 percent slopes	B	4.9	12.2%
82	Schamber-Razor complex, 8 to 50 percent slopes	A	4.1	10.1%
Totals for Area of Interest			**40.6**	**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

National Flood Hazard Layer FIRMette

FEMA

104°50'5"W 38°42'28"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

104°49'28"W 38°42'N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

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

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/22/2022 at 3:06 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

BASELINE
Engineering · Planning · Surveying

= FORMULA CELLS
= USER INPUT CELLS

PROJECT: BATCH PLANT SITE
JOB NO.: 35059
CALC. BY: SPC
DATE: 9/8/2022

Project Location
User Input

IDF Rainfall Data

D	P_1: 1-hour Rainfall Depths (inches)	
	Minor Storm	**Major Storm**
	5-Year	100-Year
Minutes	**1.26**	**2.64**
5	5.56	8.49
10	4.68	6.66
20	3.81	4.83
30	3.30	3.76
40	2.94	3.00
50	2.65	2.41
60	2.42	1.93

Figure 6-5 $I_5=-P_1 \ln(D) + 7.583$; $I_{100}= -P_1 \ln(D) + 12.735$

I = rainfall intensity (inches per hour)

P_1 = 1-hour point rainfall depth (inches)

D = storm duration (minutes)

Reference:

1) El Paso County - Drainage Criteria Manual Volume I, Revised 1987
2) City of Colorado Springs - Drainage Criteria Manual Volume I, May 2014
3) Rainfall depths determined via the NOAA Atlas 14, Volume 8, Version 2 (https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=co)

PROJECT: BATCH PLANT SITE
JOB NO.: 35059
CALC. BY: SPC
DATE: 9/8/2022

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Runoff Coefficients & Impervious Values for Rational Method - per CS DCM Vol I, Table 6-6.

	Impervious Percentage	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}
UA- Historic Flow Analysis -- Greenbelts	2%	0.03	0.09	0.17	0.26	0.31	0.36
S- Paved	100%	0.89	0.90	0.92	0.94	0.95	0.96
Batch Plant	13%	0.07	0.16	0.24	0.32	0.37	0.41
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00

	Impervious Percentage	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00

Hydrologic Soil Group: A or B

PROPOSED COMPOSITE IMPERVIOUSNESS

		Weighted Impervious and C Values							Areas (ac)							
Basin	**Area (ac)**	**Imp.**	**C_2**	**C_5**	**C_{10}**	**C_{25}**	**C_{50}**	**C_{100}**	**UA- Historic Flow Analysis -- Greenbelts, Agriculture**	**S- Paved**	**Batch Plant**	**Land Use**	**Land Use**	**Land Use**	**Land Use**	**Land Use**
Existing Conditions Subbasins																
E1	26.27	8%	0.08	0.14	0.21	0.30	0.35	0.40	24.71	1.56						

PROJECT: BATCH PLANT SITE
JOB NO.: 35059
CALC. BY: SPC
DATE: 9/8/2022

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BASELINE
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Runoff Coefficients & Impervious Values for Rational Method - per CS DCM Vol I, Table 6-6.

	Impervious Percentage	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}
UA- Historic Flow Analysis -- Greenbelts	2%	0.03	0.09	0.17	0.26	0.31	0.36
S- Paved	100%	0.89	0.90	0.92	0.94	0.95	0.96
Batch Plant	13%	0.07	0.16	0.24	0.32	0.37	0.41
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00

	Impervious Percentage	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00

Hydrologic Soil Group: A or B

PROPOSED COMPOSITE IMPERVIOUSNESS

		Weighted Impervious and C Values							Areas (ac)							
Basin	**Area (ac)**	**Imp.**	**C_2**	**C_5**	**C_{10}**	**C_{25}**	**C_{50}**	**C_{100}**	**UA- Historic Flow Analysis -- Greenbelts, Agriculture**	**S- Paved**	**Batch Plant**	**Land Use**	**Land Use**	**Land Use**	**Land Use**	**Land Use**
Temporary Conditions Subbasins																
T1	5.55	2%	0.03	0.09	0.17	0.26	0.31	0.36	5.55							
T2	9.73	13%	0.07	0.16	0.24	0.32	0.37	0.41			9.73					
T3	10.99	16%	0.15	0.20	0.28	0.36	0.40	0.45	9.43	1.56						

STANDARD FORM SF-1

TIME OF CONCENTRATION SUMMARY

Calculated By: SPC
Date: 9/8/2022

Project: BATCH PLANT SITE
Job No.: 35059
Checked By: SGB

SUB-BASIN DATA				INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)					t_c CHECK (URBANIZED BASINS)				FINAL t_c	REMARKS
Basin	i	C_5	AREA Ac	LENGTH Ft	SLOPE %	t_i Min	LENGTH Ft	Cv	SLOPE %	VEL. FPS	t_t Min	COMP. t_c	TOT. LENGTH Ft	S_o %	tc (Equation 6-7) Min	Min	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
Existing Conditions Subbasins																	
E1	0.08	0.14	26.27	100	12.2	7.61	1,949	5	5.2	1.14	28.60	36.2	2,049	5.50	39.1	36.21	
Temporary Conditions Subbasins																	
T1	0.02	0.09	5.55	100	12.2	7.99	937	5	2.5	0.79	19.75	27.7	1,037	3.44	35.7	27.74	
T2	0.13	0.16	9.73	100	6.2	9.30	839	10	2.7	1.63	8.56	17.9	939	3.04	32.1	17.86	
T3	0.16	0.20	10.99	100	3.8	10.45	2,456	5	4.5	1.06	38.72	49.2	2,556	4.44	41.3	41.30	

$t_c = t_i + t_t$

$t_i=((0.395(1.1-C_5)SQRT(L))/(S_o\text{^}0.33))$

$V=C_v*S_w^{0.5}$

Table 6-7. Conveyance Coefficient, C_v	
Heavy meadow	2.5
Tillage/Field	5
Riprap (not buried)*	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

*For bured riprap, select C_v value based on type of vegetative cover.

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Calculated By: SPC
Date: 9/8/2022
Checked By: SGB
5-Year 1-hour rainfall= 1.26

STANDARD FORM SF-2

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Project: BATCH PLANT SITE
Job No.: 35059
Design Storm: 5-Year

= FORMULA CELLS
= USER INPUT CELLS

BASIN	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			LENGTH (FT)	VELOCITY (FPS)	t_t (MIN)	REMARKS
	DESIGN POINT	AREA DESIGN	AREA (AC)	RUNOFF COEFF	t_c (MIN)	C * A (AC)	I (IN/HR)	Q (CFS)	t_c (MIN)	S (C * A) (CA)	I (IN/HR)	Q (CFS)	SLOPE (%)	STREET FLOW	DESIGN FLOW (CFS)	SLOPE (%)	PIPE DIAM. (IN.)				
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Existing Conditions Subbasins																					
E1	3	3	26.27	0.14	36.2	3.63	2.20	**7.98**													
Temporary Conditions Subbasins																					
T1	1	3	5.55	0.09	27.7	0.50	2.60	**1.30**													
T2	2	3	9.73	0.16	17.9	1.56	2.63	**4.1**													
T3	3	3	10.99	0.20	41.3	2.25	1.63	**3.7**													

Calculated By: SPC
Date: 9/8/2022
Checked By: SGB
100-Year 1-hour rainfall= 2.64

STANDARD FORM SF-2

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Project: BATCH PLANT SITE
Job No.: 35059
Design Storm: 100-Year

= FORMULA CELLS
= USER INPUT CELLS

BASIN	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE						REMARKS
	DESIGN POINT	AREA DESIGN	AREA (AC)	RUNOFF COEFF	t_c (MIN)	C * A (AC)	I (IN/HR)	Q (CFS)	t_c (MIN)	S (C * A) (CA)	I (IN/HR)	Q (CFS)	SLOPE (%)	STREET FLOW	DESIGN FLOW (CFS)	SLOPE (%)	PIPE DIAM. (IN.)	LENGTH (FT)	VELOCITY (FPS)	t_t (MIN)	
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Existing Conditions Subbasins																					
E1	3	3	26.27	0.40	36.2	10.39	3.69	**38.36**													
Temporary Conditions Subbasins																					
T1	1	3	5.55	0.36	27.7	2.00	4.36	**8.72**													
T2	2	3	9.73	0.41	17.9	3.99	5.47	**21.82**													
T3	3	3	10.99	0.45	41.3	4.89	3.36	**16.43**													

PROJECT: BATCH PLANT SITE
JOB NO.: 35059
CALC. BY: SPC
DATE: 9/8/2022

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DIRECT RUNOFF SUMMARY

BASIN LABEL	DESIGN POINT	AREA [ac]	Imp. %	C5	C100	LOCAL (CFS)		ACCUMULATIVE (CFS)		Notes
						Q5	Q100	Q5	Q100	
Existing Subbasins										
E1	3	26.27	8%	0.14	0.40	7.98	38.36			
Temporary Subbasins										
T1	1	5.55	2%	0.09	0.36	1.30	8.72			
T2	2	9.73	13%	0.16	0.41	4.09	21.82	5.39	30.54	
T3	3	10.99	16%	0.20	0.45	3.66	16.43	9.05	46.97	

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PROJECT: BATCH PLANT SITE
JOB NO.: 35059
CALC. BY: SPC
DATE: 9/8/2022

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= USER INPUT CELLS

Project Location
User Input

IDF Rainfall Data

D	P_1: 1-hour Rainfall Depths (inches)	
	Minor Storm	**Major Storm**
	2-Year	100-Year
Minutes	**0.98**	**2.64**
5	6.00	8.49
10	5.32	6.66
20	4.64	4.83
30	4.24	3.76
40	3.96	3.00
50	3.74	2.41
60	3.56	1.93

Figure 6-5 $I_5=-P_1 \ln(D) + 7.583$; $I_{100}= -P_1 \ln(D) + 12.735$

I = rainfall intensity (inches per hour)

P_1 = 1-hour point rainfall depth (inches)

D = storm duration (minutes)

Reference:

1) El Paso County - Drainage Criteria Manual Volume I, Revised 1987
2) City of Colorado Springs - Drainage Criteria Manual Volume I, May 2014
3) Rainfall depths determined via the NOAA Atlas 14, Volume 8, Version 2 (https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=co)

PROJECT: BATCH PLANT SITE
JOB NO.: 35059
CALC. BY: SPC
DATE: 9/8/2022

= FORMULA CELLS
= USER INPUT CELLS

BASELINE
Engineering · Planning · Surveying

Runoff Coefficients & Impervious Values for Rational Method - per CS DCM Vol I, Table 6-6.

	Impervious Percentage	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}
UA- Historic Flow Analysis -- Greenbelts	2%	0.03	0.09	0.17	0.26	0.31	0.36
S- Paved	100%	0.89	0.90	0.92	0.94	0.95	0.96
Batch Plant	13%	0.07	0.16	0.24	0.32	0.37	0.41
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00

	Impervious Percentage	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00

Hydrologic Soil Group: A or B

PROPOSED COMPOSITE IMPERVIOUSNESS

		Weighted Impervious and C Values							Areas (ac)							
Basin	**Area (ac)**	**Imp.**	**C_2**	**C_5**	**C_{10}**	**C_{25}**	**C_{50}**	**C_{100}**	**UA- Historic Flow Analysis -- Greenbelts, Agriculture**	**S- Paved**	**Batch Plant**	**Land Use**	**Land Use**	**Land Use**	**Land Use**	**Land Use**
Existing Conditions Subbasins																
E1	26.27	8%	0.08	0.14	0.21	0.30	0.35	0.40	24.71	1.56						

PROJECT: BATCH PLANT SITE
JOB NO.: 35059
CALC. BY: SPC
DATE: 9/8/2022

= FORMULA CELLS
= USER INPUT CELLS

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Runoff Coefficients & Impervious Values for Rational Method - per CS DCM Vol I, Table 6-6.

	Impervious Percentage	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}
UA- Historic Flow Analysis -- Greenbelts	2%	0.03	0.09	0.17	0.26	0.31	0.36
S- Paved	100%	0.89	0.90	0.92	0.94	0.95	0.96
Batch Plant	13%	0.07	0.16	0.24	0.32	0.37	0.41
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00

	Impervious Percentage	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00

Hydrologic Soil Group: A or B

PROPOSED COMPOSITE IMPERVIOUSNESS

		Weighted Impervious and C Values							Areas (ac)							
Basin	**Area (ac)**	**Imp.**	**C_2**	**C_5**	**C_{10}**	**C_{25}**	**C_{50}**	**C_{100}**	**UA- Historic Flow Analysis -- Greenbelts, Agriculture**	**S- Paved**	**Batch Plant**	**Land Use**	**Land Use**	**Land Use**	**Land Use**	**Land Use**
Temporary Conditions Subbasins																
T1	5.55	2%	0.03	0.09	0.17	0.26	0.31	0.36	5.55							
T2	9.73	13%	0.07	0.16	0.24	0.32	0.37	0.41			9.73					
T3	10.99	16%	0.15	0.20	0.28	0.36	0.40	0.45	9.43	1.56						

STANDARD FORM SF-1

TIME OF CONCENTRATION SUMMARY

Calculated By: SPC
Date: 9/8/2022

Project: BATCH PLANT SITE
Job No.: 35059
Checked By: SGB

SUB-BASIN DATA				INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)					t_c CHECK (URBANIZED BASINS)				FINAL t_c	REMARKS
Basin	i	C_5	AREA Ac	LENGTH Ft	SLOPE %	t_i Min	LENGTH Ft	Cv	SLOPE %	VEL. FPS	t_t Min	COMP. t_c	TOT. LENGTH Ft	S_o %	tc (Equation 6-7) Min	Min	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
Existing Conditions Subbasins																	
E1	0.08	0.14	26.27	100	12.2	7.61	1,949	5	5.2	1.14	28.60	36.2	2,049	5.50	39.1	36.21	
Temporary Conditions Subbasins																	
T1	0.02	0.09	5.55	100	12.2	7.99	937	5	2.5	0.79	19.75	27.7	1,037	3.44	35.7	27.74	
T2	0.13	0.16	9.73	100	6.2	9.30	839	10	2.7	1.63	8.56	17.9	939	3.04	32.1	17.86	
T3	0.16	0.20	10.99	100	3.8	10.45	2,456	5	4.5	1.06	38.72	49.2	2,556	4.44	41.3	41.30	

$t_c = t_i + t_t$

$t_i=((0.395(1.1-C_5)SQRT(L))/(S_o\text{^}0.33))$

$V=C_v*S_w^{0.5}$

Table 6-7. Conveyance Coefficient, C_v	
Heavy meadow	2.5
Tillage/Field	5
Riprap (not buried)*	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

*For bured riprap, select C_v value based on type of vegetative cover.

= FORMULA CELLS
= USER INPUT CELLS

Calculated By: SPC
Date: 9/8/2022
Checked By: SGB
2-Year 1-hour rainfall= 0.98

STANDARD FORM SF-2

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Project: BATCH PLANT SITE
Job No.: 35059
Design Storm: 2-Year

= FORMULA CELLS
= USER INPUT CELLS

BASIN	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			LENGTH (FT)	VELOCITY (FPS)	t_t (MIN)	REMARKS
	DESIGN POINT	AREA DESIGN	AREA (AC)	RUNOFF COEFF	t_c (MIN)	C * A (AC)	I (IN/HR)	Q (CFS)	t_c (MIN)	S (C * A) (CA)	I (IN/HR)	Q (CFS)	SLOPE (%)	STREET FLOW	DESIGN FLOW (CFS)	SLOPE (%)	PIPE DIAM. (IN.)				
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Existing Conditions Subbasins																					
E1	3	3	26.27	0.08	36.2	2.13	2.20	**4.68**													
Temporary Conditions Subbasins																					
T1	1	3	5.55	0.03	27.7	0.17	2.60	**0.43**													
T2	2	3	9.73	0.07	17.9	0.68	2.05	**1.4**													
T3	3	3	10.99	0.15	41.3	1.67	1.27	**2.1**													

Calculated By: SPC
Date: 9/8/2022
Checked By: SGB
100-Year 1-hour rainfall= 2.64

STANDARD FORM SF-2

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Project: BATCH PLANT SITE
Job No.: 35059
Design Storm: 100-Year

= FORMULA CELLS
= USER INPUT CELLS

BASIN	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE						REMARKS
	DESIGN POINT	AREA DESIGN	AREA (AC)	RUNOFF COEFF	t_c (MIN)	C * A (AC)	I (IN/HR)	Q (CFS)	t_c (MIN)	S (C * A) (CA)	I (IN/HR)	Q (CFS)	SLOPE (%)	STREET FLOW	DESIGN FLOW (CFS)	SLOPE (%)	PIPE DIAM. (IN.)	LENGTH (FT)	VELOCITY (FPS)	t_t (MIN)	
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Existing Conditions Subbasins																					
E1	3	3	26.27	0.40	36.2	10.39	3.69	**38.36**													
Temporary Conditions Subbasins																					
T1	1	3	5.55	0.36	27.7	2.00	4.36	**8.72**													
T2	2	3	9.73	0.41	17.9	3.99	5.47	**21.82**													
T3	3	3	10.99	0.45	41.3	4.89	3.36	**16.43**													

PROJECT: BATCH PLANT SITE
JOB NO.: 35059
CALC. BY: SPC
DATE: 9/8/2022

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DIRECT RUNOFF SUMMARY

BASIN LABEL	DESIGN POINT	AREA [ac]	Imp. %	C2	C100	LOCAL (CFS)		ACCUMULATIVE (CFS)		Notes
						Q2	Q100	Q2	Q100	
Existing Subbasins										
E1	3	26.27	8%	0.08	0.40	4.68	38.36			
Temporary Subbasins										
T1	1	5.55	2%	0.03	0.36	0.43	8.72			
T2	2	9.73	13%	0.07	0.41	1.39	21.82	1.83	30.54	
T3	3	10.99	16%	0.15	0.45	2.12	16.43	3.94	46.97	

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

Designer: SPC
Company: Baseline Engineering Corp
Date: September 8, 2022
Project: Rock Creek Canyon Batch Plant
Location: El Paso County

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.05	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.26	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.64	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event	2.64	
Max Intensity for Optional User Defined Storm	2.63472		

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	**T1-3**													
Receiving Pervious Area Soil Type	Sandy Loam													
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	26.27													
Directly Connected Impervious Area (DCIA, acres)	0.00													
Unconnected Impervious Area (UIA, acres)	2.82													
Receiving Pervious Area (RPA, acres)	2.05													
Separate Pervious Area (SPA, acres)	21.40													
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C													

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	26.270													
Directly Connected Impervious Area (DCIA, %)	0.0%													
Unconnected Impervious Area (UIA, %)	10.7%													
Receiving Pervious Area (RPA, %)	7.8%													
Separate Pervious Area (SPA, %)	81.5%													
A_R (RPA / UIA)	0.727													
I_a Check	0.580													
f / I for WQCV Event:	20.8													
f / I for 5-Year Event:	0.5													
f / I for 100-Year Event:	0.3													
f / I for Optional User Defined Storm CUHP:	0.30													
IRF for WQCV Event:	0.65													
IRF for 5-Year Event:	0.91													
IRF for 100-Year Event:	0.95													
IRF for Optional User Defined Storm CUHP:	0.95													
Total Site Imperviousness: I_{total}	10.7%													
Effective Imperviousness for WQCV Event:	7.0%													
Effective Imperviousness for 5-Year Event:	9.7%													
Effective Imperviousness for 100-Year Event:	10.2%													
Effective Imperviousness for Optional User Defined Storm CUHP:	10.2%													

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	31.1%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	6.6%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:	3.2%													

Total Site Imperviousness:	**10.7%**
Total Site Effective Imperviousness for WQCV Event:	**7.0%**
Total Site Effective Imperviousness for 5-Year Event:	**9.7%**
Total Site Effective Imperviousness for 100-Year Event:	**10.2%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	**10.2%**

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.
** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.
*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

Design Procedure Form: Grass Buffer (GB)

UD-BMP (Version 3.06, November 2016) **Sheet 1 of 1**

Designer: SPC
Company: Baseline Engineering Corporation
Date: September 6, 2022
Project: Rock Creek Batch Plant
Location: El Paso County

1. Design Discharge A) 2-Year Peak Flow Rate of the Area Draining to the Grass Buffer	Q_2 = 1.8 cfs
2. Minimum Width of Grass Buffer	W_G = 37 ft
3. Length of Grass Buffer (14' or greater recommended)	L_G = 300 ft
4. Buffer Slope (in the direction of flow, not to exceed 0.1 ft / ft)	S_G = 0.030 ft / ft
5. Flow Characteristics (sheet or concentrated) A) Does runoff flow into the grass buffer across the entire width of the buffer? B) Watershed Flow Length C) Interface Slope (normal to flow) D) Type of Flow Sheet Flow: $F_L * S_I \leq 1$ Concentrated Flow: $F_L * S_I > 1$	Choose One: ○ Yes ◉ No F_L= ft S_I= ft / ft CONCENTRATED FLOW
6. Flow Distribution for Concentrated Flows	Choose One: ○ None (sheet flow) ○ Slotted Curbing ◉ Level Spreader ○ Other (Explain):
7 Soil Preparation (Describe soil amendment)	N/A
8 Vegetation (Check the type used or describe "Other")	Choose One: ○ Existing Xeric Turf Grass ○ Irrigated Turf Grass ◉ Other (Explain): Native grasses & weeds
9. Irrigation (*Select None if existing buffer area has 80% vegetation AND will not be disturbed during construction.)	Choose One: ○ Temporary ○ Permanent ◉ None*
10. Outflow Collection (Check the type used or describe "Other")	Choose One: ◉ Grass Swale ○ Street Gutter ○ Storm Sewer Inlet ○ Other (Explain):

Notes:

APPENDIX C

BASELINE
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Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Sep 7 2022

NW Temorary Berm Section (Minor Storm 5-yr)

Triangular

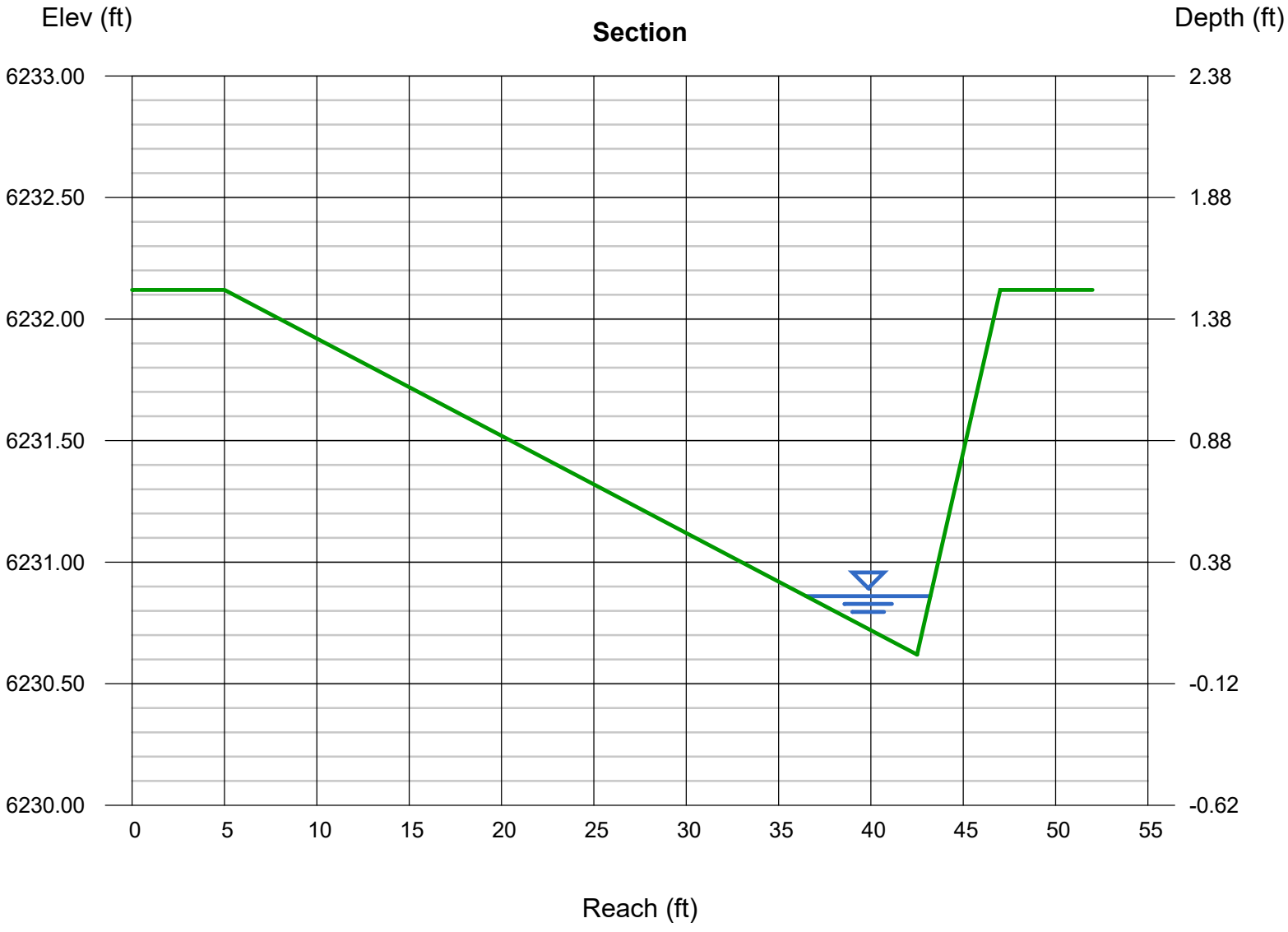
Side Slopes (z:1)	= 25.00, 3.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 6230.62
Slope (%)	= 0.97
N-Value	= 0.021

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.30

Highlighted

Depth (ft)	= 0.24
Q (cfs)	= 1.300
Area (sqft)	= 0.81
Velocity (ft/s)	= 1.61
Wetted Perim (ft)	= 6.76
Crit Depth, Yc (ft)	= 0.23
Top Width (ft)	= 6.72
EGL (ft)	= 0.28



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Sep 7 2022

NW Temorary Berm Section (Major Storm 100-yr)

Triangular

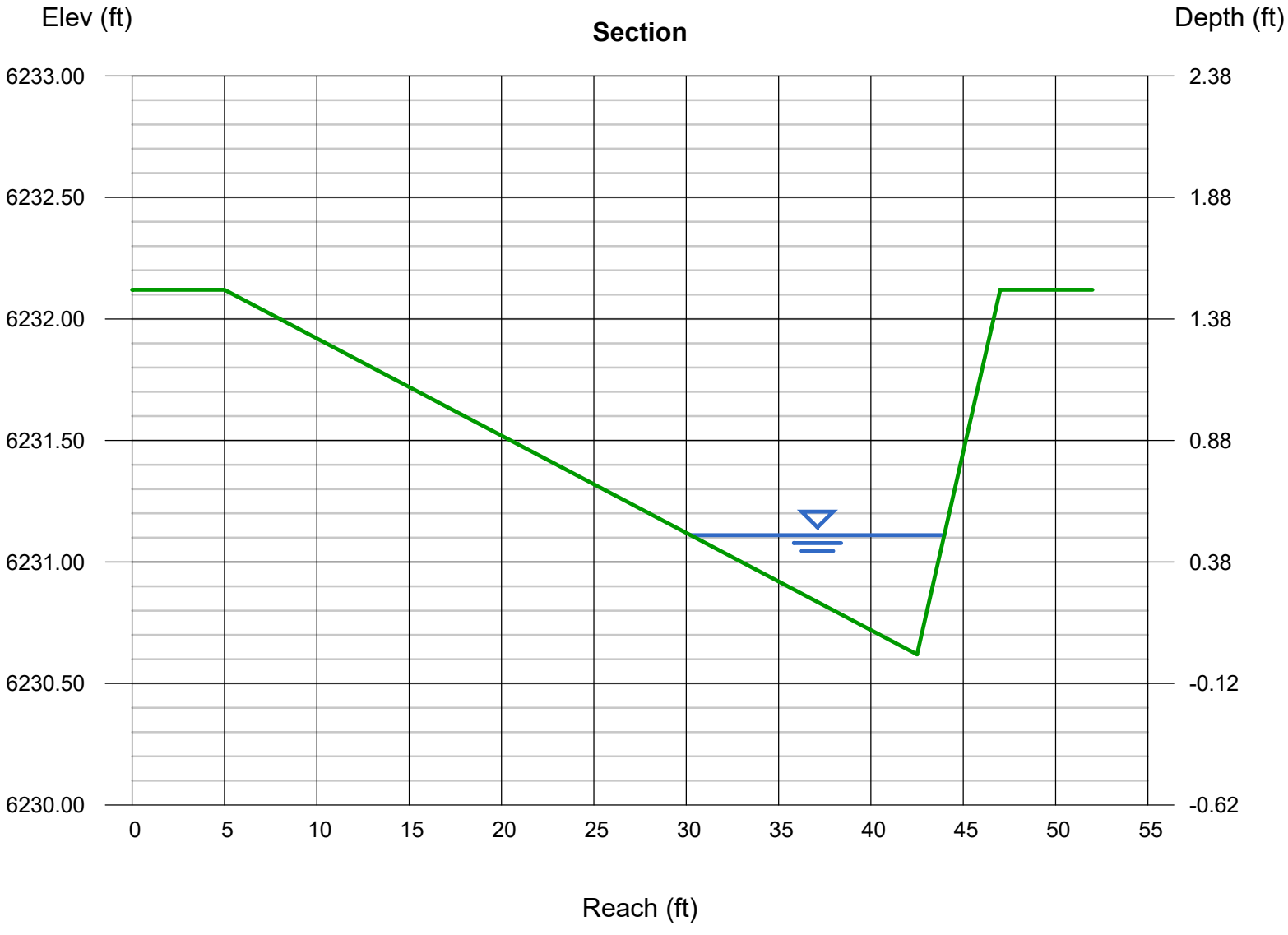
Side Slopes (z:1)	= 25.00, 3.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 6230.62
Slope (%)	= 0.97
N-Value	= 0.021

Calculations

Compute by:	Known Q
Known Q (cfs)	= 8.72

Highlighted

Depth (ft)	= 0.49
Q (cfs)	= 8.720
Area (sqft)	= 3.36
Velocity (ft/s)	= 2.59
Wetted Perim (ft)	= 13.81
Crit Depth, Yc (ft)	= 0.48
Top Width (ft)	= 13.72
EGL (ft)	= 0.59



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Sep 7 2022

NE Temorary Berm Section (Minor Storm 5-yr)

Triangular

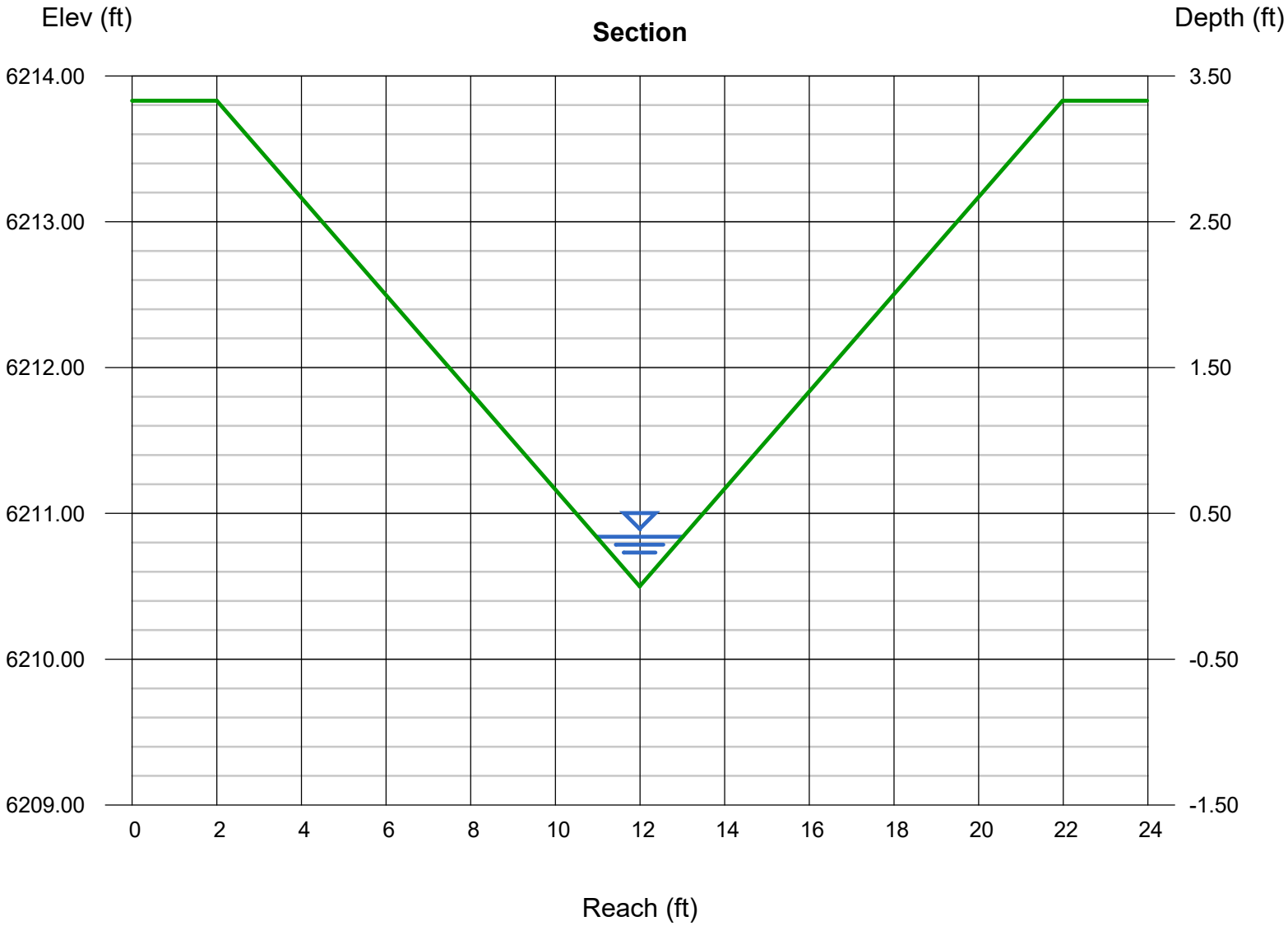
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 3.33
Invert Elev (ft)	= 6210.50
Slope (%)	= 3.67
N-Value	= 0.021

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.30

Highlighted

Depth (ft)	= 0.34
Q (cfs)	= 1.300
Area (sqft)	= 0.35
Velocity (ft/s)	= 3.75
Wetted Perim (ft)	= 2.15
Crit Depth, Yc (ft)	= 0.42
Top Width (ft)	= 2.04
EGL (ft)	= 0.56



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Sep 7 2022

NE Temorary Berm Section (Major Storm 100-yr)

Triangular

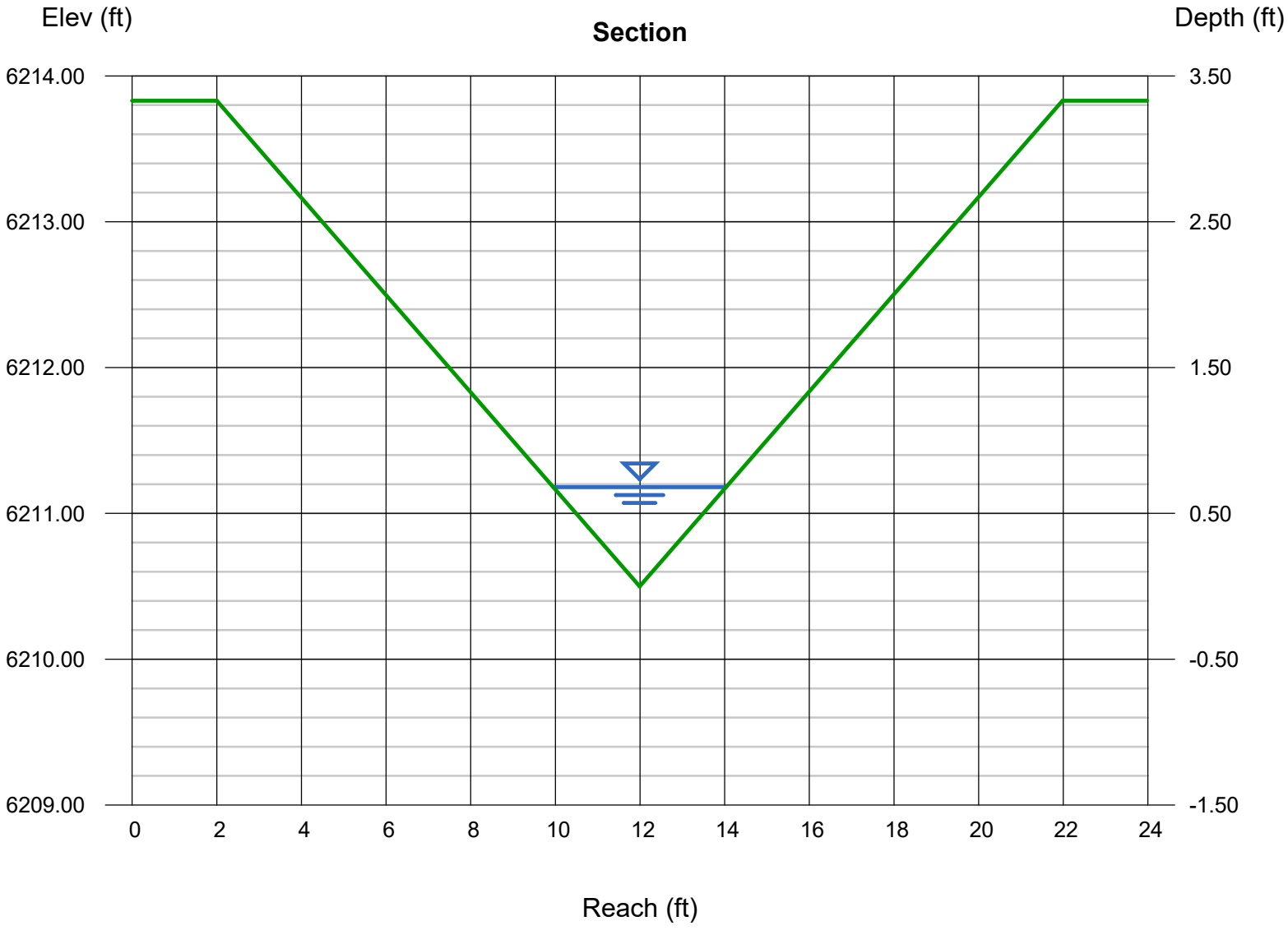
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 3.33
Invert Elev (ft)	= 6210.50
Slope (%)	= 3.67
N-Value	= 0.021

Calculations

Compute by:	Known Q
Known Q (cfs)	= 8.72

Highlighted

Depth (ft)	= 0.68
Q (cfs)	= 8.720
Area (sqft)	= 1.39
Velocity (ft/s)	= 6.29
Wetted Perim (ft)	= 4.30
Crit Depth, Yc (ft)	= 0.88
Top Width (ft)	= 4.08
EGL (ft)	= 1.29



BASELINE
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Project Name: Rock Creek Batch Plant
Project Number: 35059
Calculated By: SPC
Checked By: SGB
Date: 9/8/2022

For use when channel slopes are between 2% and 10%.

This method is one of the approved methods by UDFCD and is described in the *Design of Rock Chutes* by K.M. Robinson, C.E. Rice, and K.C. Kadavy (1998)

Input Parameters:

	SI Units		Metric	
Flow (Q) =	18.26	cfs	0.517	m^3/s
Flow per unit crest width (q) =	0.49351	cfs/ft	0.046	$m^3/s/m$
Bed Slope (S) =	0.05	ft/ft	0.05	m/m
Channel Bottom Width (B) =	37	ft	11.28	m
Channel Side Slopes (Z) =	0.25	ft/ft	0.25	m/m

The calculated D_{50} for the riprap is as follows:

$$D_{50} = \left[\frac{(qS^{1.5})}{9.76E-7}\right]^{1/1.89}$$

D_{50} =	1.0	in	25.3	mm

Per UDFCD the size calculated should be increased by 30%:

D_{50} with 30% Increase =	1.29	in

Per UDFCD the increased size should also have a 1.5 Factor of Safety applied:

D_{50} with S.F. applied =	2	in
UDFCD Riprap Type =	Type VL	
Design D_{50} =	6	in
Mannings n =	0.039	
Minimum Mantle Thickness =	12	in
Minimum Length of Apron =	7.5	ft

APPENDIX D

BASELINE
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LEGEND

EXISTING LINETYPES	PROPOSED LINETYPES	
		PROPERTY BOUNDARY
		RIGHT-OF-WAY
81	81	MINOR CONTOUR (2' INTERVAL)
5280	5280	MAJOR CONTOUR (10' INTERVAL)
		EDGE OF ASPHALT
		EDGE OF GRAVEL
		WIRE FENCE
		DRAINAGE BASIN
HVT HVT	HVT	HIGH VOLTAGE TRANSMISSION

EXISTING SYMBOLS	PROPOSED SYMBOLS	
3:1	3:1	NOMINAL SLOPE ON CUT OR FILL
		FLOW DIRECTION
0		DESIGN POINT DESIGNATION

A = BASIN ID
B = BASIN AREA (ACRES)
C = 100YR COEFFICIENT
D = 5YR COEFFICIENT

DIRECT RUNOFF SUMMARY

BASIN LABEL	DESIGN POINT	AREA [ac]	Imp. %	C5	C100	LOCAL (CFS)		ACCUMULATIVE (CFS)		Notes
						Q5	Q100	Q5	Q100	
Existing Subbasins										
E1	3	26.27	8%	0.14	0.40	7.98	38.36			

EL PASO COUNTY NOTE:
CITY/COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH CITY/COUNTY DESIGN CRITERIA. THE CITY/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 CITY/COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.

GRAPHIC SCALE
100 0 100 200
(IN FEET)
1 INCH = 100 FT

BASELINE
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1046 ELKTON DRIVE · COLORADO SPRINGS, COLORADO 80907
P: 7193318230 · F: 7193318236 · www.baselinecorp.com

DESIGNED BY SPC | DRAWN BY SPC | CHECKED BY SGB

REVISION DESCRIPTION | PREPARED BY | DATE

CASTLE ROCK CONSTRUCTION COMPANY

UNINCORPORATED | EL PASO COUNTY

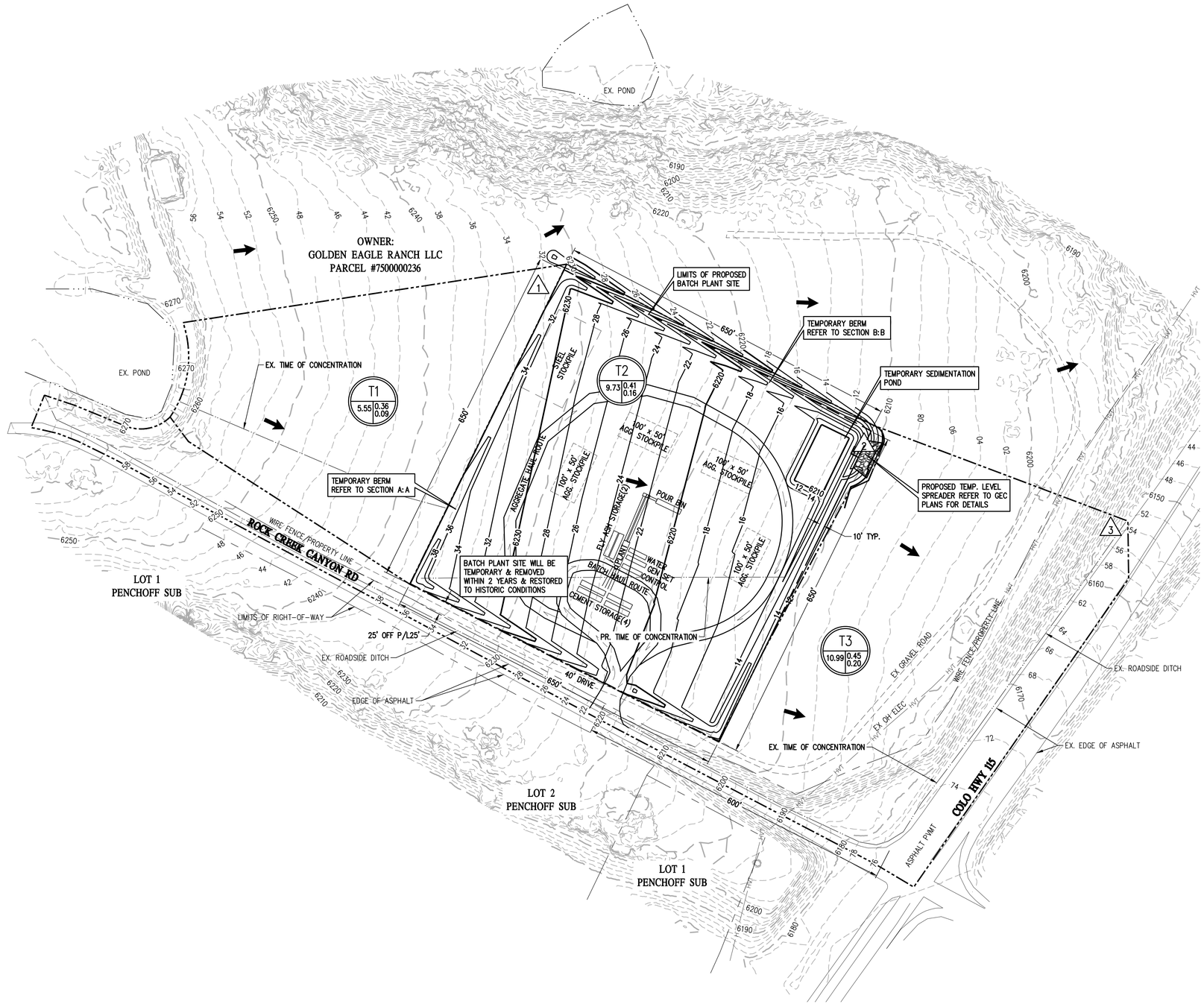
DRAINAGE PLAN
ROCK CREEK CANYON BATCH SITE – 710 ROCK CREEK CANYON RD
EXISTING CONDITIONS DRAINAGE PLAN

PREPARED UNDER THE DIRECT SUPERVISION OF

FOR AND ON BEHALF OF BASELINE CORPORATION

INITIAL SUBMITTAL	07/12/22
DRAWING SIZE	24" X 36"
SURVEY FIRM	SURVEY DATE
UNKNOWN	
JOB NO.	35059
DRAWING NAME	35059 – DNG MAP-plant.dwg
SHEET	01 OF 2

DNG01

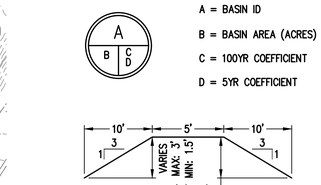


LEGEND

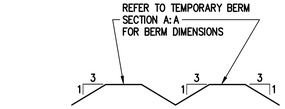
EXISTING LINETYPES	PROPOSED LINETYPES	
		PROPERTY BOUNDARY
		RIGHT-OF-WAY
81	81	MINOR CONTOUR (2' INTERVAL)
5280	5280	MAJOR CONTOUR (10' INTERVAL)
		EDGE OF ASPHALT
		EDGE OF GRAVEL
		WIRE FENCE
		DRAINAGE BASIN
HVT HVT	HVT	HIGH VOLTAGE TRANSMISSION

EXISTING SYMBOLS / PROPOSED SYMBOLS

- 3:1 / 3:1 — NOMINAL SLOPE ON CUT OR FILL
- FLOW DIRECTION
- 0 — DESIGN POINT DESIGNATION
- A = BASIN ID; B = BASIN AREA (ACRES); C = 100YR COEFFICIENT; D = 5YR COEFFICIENT



A:A TEMPORARY BERM DETAIL — NOT TO SCALE (DNG02 | DNG02)



B:B TEMPORARY BERM DETAIL 2 — NOT TO SCALE (DNG02 | DNG02)

DIRECT RUNOFF SUMMARY

BASIN LABEL	DESIGN POINT	AREA [ac]	Imp. %	C5	C100	LOCAL (CFS) Q5	LOCAL (CFS) Q100	ACCUMULATIVE (CFS) Q5	ACCUMULATIVE (CFS) Q100	Notes
Temporary Subbasins										
T1	1	5.55	2%	0.09	0.36	1.30	8.72			
T2	2	9.73	13%	0.16	0.41	4.09	21.82	5.39	30.54	
T3	3	10.99	16%	0.20	0.45	3.66	16.43	9.05	46.97	

EL PASO COUNTY NOTE:
CITY/COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH CITY/COUNTY DESIGN CRITERIA. THE CITY/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 CITY/COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.

N

GRAPHIC SCALE
100 0 100 200
(IN FEET)
1 INCH = 100 FT

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Engineering · Planning · Surveying
1046 ELKTON DRIVE · COLORADO SPRINGS, COLORADO 80907
P: 7193318230 · F: 7193318286 · www.baselinecorp.com

DESIGNED BY SPC | DRAWN BY SPC | CHECKED BY SGB

REVISION DESCRIPTION | PREPARED BY | DATE

CASTLE ROCK CONSTRUCTION COMPANY

UNINCORPORATED — EL PASO COUNTY

DRAINAGE PLAN
ROCK CREEK CANYON BATCH SITE - 710 ROCK CREEK CANYON RD
TEMPORARY DRAINAGE PLAN

PREPARED UNDER THE DIRECT SUPERVISION OF

FOR AND ON BEHALF OF BASELINE CORPORATION

INITIAL SUBMITTAL	07/12/22
DRAWING SIZE	24" X 36"
SURVEY FIRM	SURVEY DATE
UNKNOWN	
JOB NO.	35059
DRAWING NAME	35059 - DNG MAP-plant.dwg
SHEET	02 OF 2

DNG02