Ph: 970-871-6772 · Fax: 970-879-8023 · P.O. Box 775966 · Steamboat Springs, Colorado 80477

Draft Drainage Study & Stormwater Quality Plan for Steamboat Airpark Preliminary Plat

Address: TBD

Draft: 4/25/2022
Final:

Prepared by: Joe Wiedemeier, P.E.
Four Points Surveying & Engineering

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Steamboat Springs, Colorado 80477
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NOTE

City of Steamboat Springs plan review and approval is only for general conformance with City design criteria and City code. The City is not responsible for the accuracy and adequacy of the design, dimensions, and elevations that shall be confirmed and correlated at this job site. The City of Steamboat Springs assumes no responsibility for the completeness or accuracy of this document.

CERTIFICATION

I hereby affirm that this Drainage Report for the (name of project) was prepared by me (or under my direct supervision) for the owners thereof and is, to the best of my knowledge, in accordance with the provisions of the City of Steamboat Springs Storm Drainage Criteria and approved variances. I understand that the City of Steamboat Springs does not and will not assume liability for drainage facilities designed by others.

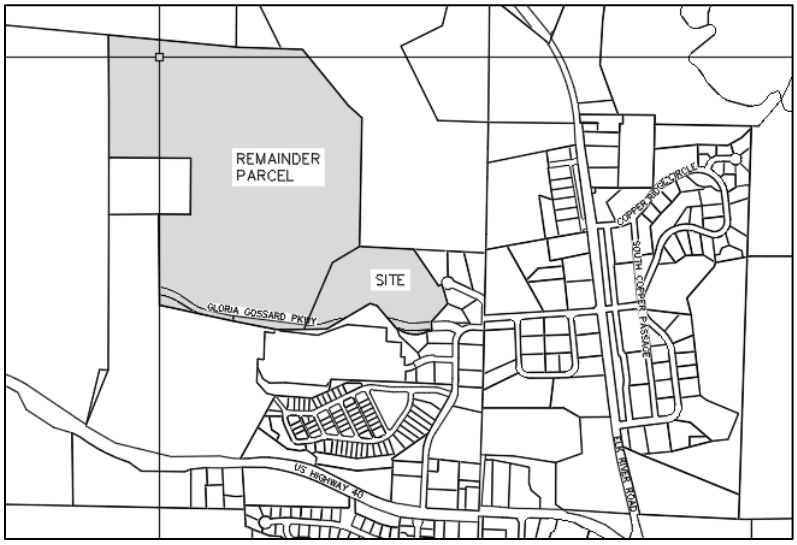
_____
Joe Wiedemeier, P.E.
State of Colorado No. 0054959
Date:_____

1.0 Introduction

This report provides a detailed analysis of existing and proposed post-development drainage conditions and proposed water quality facilities at Lot 1 West Acres Ranch Subdivision. The conditional improvements associated with the plat include a 24-foot access road, a detached sidewalk along Gloria Gossard Parkway, earth retainage, drainage infrastructure, This report includes all data, engineering methods, assumptions, and calculations used by Four Points Surveying and Engineering (Four Points) to design the stormwater drainage system for the Project. Four Points prepared this report and performed engineering for the Project in accordance with the most recent version of the City of Steamboat Springs Drainage Criteria and Engineering Standards.

A. Location

Figure 1: Vicinity Map – Lot 1 West Acres Ranch Subdivision



B. Owner/Developer

Ken Marsh

C. Drainage Reports for Adjacent Developments

Joe Wiedemeier, P.E. Four Points Surveying and Engineering (March 2020) Final Drainage Study for Overlook Park Subdivision.

D. Stormwater Quality Purpose, Goal, and Special Requirements

The purpose of the stormwater quality plan is to design a conveyance and treatment system that fits with the proposed Project and provides both functionality and aesthetics. The goal is to treat stormwater runoff from the proposed road impervious areas per City standards.

2.0 Drainage Criteria and Methodology Used

A. Design Rainfall and Storm Frequency

Design rainfall: NOAA Atlas 14, Volume 8, Version 2 for Steamboat Springs, CO.

- Minor Event (5-year) 24-hour rainfall depth: 1.59 inches
- Major Event (100-year) 24-hour rainfall depth: 2.91 inches

B. Runoff Calculation Methodology

Runoff calculation method: Small basin peak flow runoff was analyzed using the Rational Method, shown in Eq-1.

Rational Method: **Q = CiA** (Eq-1)

Where: Q = runoff, CFS
C = runoff coefficient, dimensionless
i = rainfall intensity, inches per hour
A = basin area, acres

C. Stormwater Quality Design Standard

Proposed permanent stormwater treatment facilities will meet total suspended solids (TSS) design standards. TSS calculations were performed for grass lined water quality swales per City drainage engineering standards.

3.0 Existing Conditions

A. Ground Cover, Imperviousness, Topography and Size

- Vacant undeveloped lot with mountainous terrain
- Gloria Gossard Boulevard (Paved Road)
- Rough cut access road and a two-track trail
- Temporary 12”-18” culverts installed on the rough cut road
- 2% imperviousness
- Moderate to steep sloping terrain rugged terrain
- Total lot size: 131.5 acres (Lot 1 and Lot 1 Remainder Parcel)

B. Existing Stormwater Systems

See existing conditions drainage exhibit, DR1, to view the existing conditions and existing drainage basin designations.

- Existing basin (EB) EB1 drains west and into the Overlook Park Subdivision.
- EB2 drains south-southwest and into a ditch and travels west into the Overlook Park Subdivision as concentrated flow. Gloria Gossard Parkway borders the southern portion of the Lot 1/Lot remainder parcel and is public right-of-way. A high point on Gloria Gossard Parkway divides EB2 and EB3.
- EB3 drains to two parallel 30” culverts conveying concentrated flows under Gloria Gossard.
- EB4 drains south and into an existing ditch along Gloria Gossard that flows east into a public storm sewer.
- EB5 drains to an existing cutoff ditch and detention pond that outfalls into the Overlook Park Subdivision.

C. Site Outfall and Ultimate Outfall Locations

EB1, EB2, and EB5 outfall into the Overlook Park Subdivision which feeds into Slate Creek and ultimately the Yampa River. EB3 and EB4 outfall into existing stormwater infrastructure and ultimately the Yampa River.

D. USDA NRCS Soil Type

A USDA NRCS Web Soil Survey was performed to determine basic soil characteristics within the Lot 1. Soil types include:

- Eckmanpark clay → Hydrologic Soil Group Rating: D
- Eckmanpark clay loam → Hydrologic Soil Group Rating: D
- Impass silty clay loam → Hydrologic Soul Group Rating: C

E. Existing Easements

See existing conditions drainage exhibit for existing easement locations. A 40-foot wide construction and slope maintenance easement on the north side of Gloria Gossard.

4.0 Proposed Conditions

A. Proposed Stormwater Systems

See proposed conditions drainage exhibit, DR2. Proposed conditions will maintain historic outfall points but drainage patterns will be changed with the proposed access road, sidewalk, and other drainage improvements. The new sidewalk will increase impervious surface area by 0.57 acres. The new road will increase impervious surface area by 2.30 acres. Drainage infrastructure additions include standard drainage curb and gutter installed along the north side of Gloria Gossard Parkway, two 12 foot wide drainage ditches, three 18" culverts (for the Airpark Access Road), three stormwater inlets (Denver Type 16), storm sewer piping and pervious sidewalk shoulder and French drains along portions of the proposed 8-foot wide sidewalk.

Design points (DP's) were used to analyze drainage hydraulics at key points such as gutter/roadway capacity, drainage ditch capacity, inlet capacity, and culvert capacity. Design points are identified on the drainage exhibits, DR1 and DR2.

B. Ground Cover, Imperviousness, Topography and Size

- Total area of development is approximately 10.8 acres.
- Finished ground cover will consist of undeveloped area and paving.
- Runoff from the Airpark Access Road will be directed via drainage ditches to the proposed water quality swales for treatment.
- Impervious area: 2.87 acres
- Impervious area to be treated: 2.30 acres

C. Outlets: Historic and Proposed Flow

Historic outfall points will be maintained under the proposed conditions.

D. Hydraulic Calculations

- Inlet capacity was analyzed using UD-Inlet version 4.05 design spreadsheet.
- Roadway curb and gutter, Storm sewer piping, drainage swales and culvert crossings were analyzed using AutoCAD Hydroflow Express software.

E. Major and Minor Flow Summary Table

Existing and proposed drainage was analyzed by dividing the lot into existing basins (e.g. EB1), sub-basins (e.g. SB1) and design basins (e.g. DB1). Major and minor flows for each basin are summarized in the following table, Table 1.

Table 1: Major and Minor Flow Summary Table

Basin ID	Area (acres)	Impervious Area (%)	Runoff	
			Q_5 (cfs)	Q_{100} (cfs)
EB1	13.70	2%	3.18	21.73
EB2	24.75	3%	6.40	42.36
EB3	25.75	4%	7.28	46.89
EB4	1.92	12%	1.37	7.24
EB5	2.50	2%	0.91	6.22
DB1	25.30	8%	7.32	42.23
DB2	8.50	7%	3.08	18.25
DB3	28.85	6%	8.53	52.39
SB1	11.50	2%	2.81	19.17
SB2	6.75	7%	3.47	20.60
SB3	2.50	12%	1.26	6.71
SB4	3.90	2%	1.05	7.16
SB5	10.30	12%	4.85	26.07
SB6	1.85	2%	0.61	4.19
SB7	15.50	5%	4.59	28.94
SB8	6.65	8%	2.91	16.69
SB9	4.85	6%	1.97	11.93
SB10	0.22	78%	0.46	1.21
SB11	0.20	80%	0.47	1.22
SB12	0.24	84%	0.59	1.51
SB13	0.54	96%	1.56	3.71
SB14	0.23	100%	0.77	1.79
SB15	0.47	75%	0.97	2.61
SB16	0.17	100%	0.57	1.33
SB17	0.17	100%	0.57	1.33

F. Proposed Easements

Drainage easements are proposed for the permanent water quality treatment swales and receiving pervious areas. See drainage exhibit DR1.

G. Off Site Flows

No significant off-site flows exist.

H. Impacts to Downstream Properties

There are no anticipated impacts to downstream properties due to the proposed development.

I. Potential Site Contaminants

- Sediment, sand, grit, and salts,
- Vehicular pollutants (Oils, antifreeze, carbon deposits, etc.),

J. On-Site Stormwater Flows

On site flows will originate primarily from the Airpark access road, Gloria Gossard road and, the Gloria Gossard sidewalk and the remaining undisturbed native landscape.

K. Water Quality Design Standards

Two water quality design standards were utilized for stormwater BMP designs. TSS design standards were used for the water quality swale designs. WQCV design standards were used for the receiving pervious areas (RPAs). Please reference the design spreadsheets in Appendix E.
(Provide design variables summary table for Final Draft)

L. Channels: Ditches and Curb and Gutter

Roadside drainage ditches shall convey surface runoff along the Airpark Access Road and Gloria Gossard Parkway. All roadside drainage ditches shall be capable of conveying the major event peak flow rate. See appendices for drainage swale flow calculations.

Table 2: Ditch Capacity

Design Point #	Minor Storm Flow (cfs)	Major Storm Flow (cfs)	Major Event Velocity (ft/sec)
6	4.44	25.20	7.69
12	4.59	28.94	7.96

Curb and gutter installations along the northern side of Gloria Gossard Parkway will convey flow into the proposed drainage ditches. Gutter conveyance and associated gutter and roadway capacity were analyzed to ensure inundation requirements were met. Flows were calculated using UD_Inlet v4.05 spreadsheet for the street hydraulic capacity evaluation. Gloria Gossard road is 32 feet wide, which leaves 8 feet of street spread flow available. This leaves the required 12 feet of lane in each direction open. Design points 5, 6, and 8 as seen on the proposed conditions drainage exhibit were evaluated for curb/gutter and roadway capacity with 8 feet of spread flow into the street. All gutters and roadways will effectively convey both the minor and major storm events within the inundation limit and within the required velocity of 8 feet per second or less. Table 4 summarizes the curb/gutter and roadway conveyance analysis. See UD_Inlet v4.05 curb/gutter and roadway conveyance calculations in **Appendix C.**

Table 3: Roadway Curb & Gutter Capacity

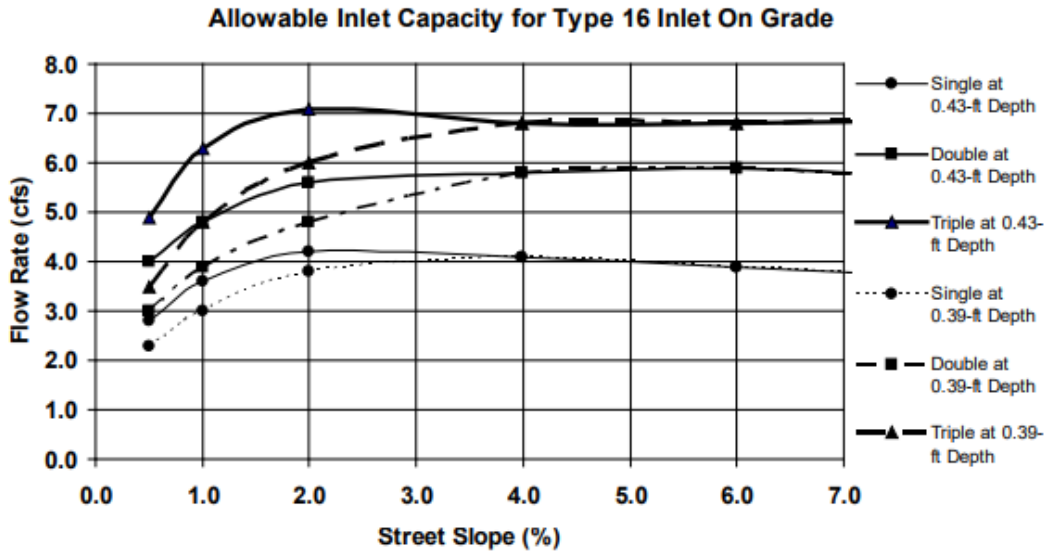
Design Point #	Roadway/Gutter Capacity (cfs)	Minor Storm Flow (cfs)	Major Storm Flow (cfs)	Major Event Velocity (ft/sec)
5	3.10	1.27	2.61	7.80
7	3.90	0.92	3.68	7.35
9	3.10	0.69	3.05	7.80

M. Inlets

Two Type 16 inlets (see plan for locations) will be installed along Gloria Gossard Parkway at the midpoint of each proposed culvert to drain flow from the roadway. A type C inlet is proposed to be installed at the 18" culver inlet at Design Point No. 1. Figure 1 Denver Type 16 capacity chart was used to

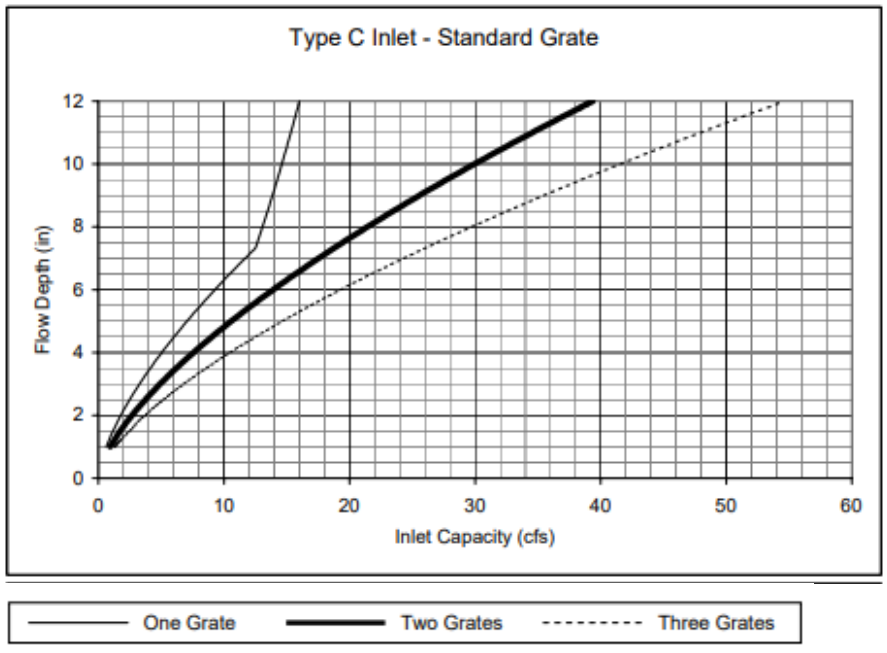
approximate inlet capacity at approximately 5.16 inches of depth. Figure 2 is for a CDOT Type C inlet. The Type 16 inlets will effectively handle the minor and major storm events. The Type C inlet will handle the minor event without surcharging. Table 5 summarizes the inlet analysis.

Figure 1: Denver Type 16 Inlet Capacity Chart



Source: City and County of Denver Storm Drainage Design and Technical Criteria, January 2006

Figure 2: Denver Type C Inlet Capacity Chart



Source: City and County of Denver Storm Drainage Design and Technical Criteria, January 2006

Table 4: Inlet Capacity

Design Point #	No. of Inlets	Type of Inlet	Inlet Capacity (cfs)	Minor Storm Flow (cfs)	Major Storm Flow (cfs)
3	1	Type 16	4.0	0.41	0.83
6	1	Type C	13.0	4.44	25.20
7	1	Type C	13.0	3.08	18.25

N. Culverts and Storm Sewers

Two 18" culverts along Gloria Gossard Parkway and a culvert for the access road are proposed. Both culverts will effectively handle the minor and major storms without surcharging. See culvert calculations in **Appendix H**.

Table 5: Culvert Capacity

Design Point #	Diameter (in)	Flow Regime	Minor Storm Flow (cfs)	Major Storm Flow (cfs)	Major Event Velocity (ft/sec)
6	18"	Inlet Control	4.44	25.20	8.22
7	18"	Inlet Control	2.23	13.67	7.85
8	(2) 30"	Outlet Control	8.53	52.39	5.90
11	18"	Inlet Control	1.05	7.16	4.49

O. Sidewalk Drainage

Portions of sidewalk are proposed to be installed along the steep slopes on the North side of Gloria Gossard. Stormwater runoff from the slopes must be managed to avoid conveyance over the sidewalk surface. As opposed to excavating into the hillside to construct a cutoff ditch, Four Points proposes installing a 6" PVC French along the northern shoulder of the sidewalk from design point No. 6 to design point No. 7 and design point No. 8 to design point No. 9. The French drain is proposed to outfall within the proposed 12-foot roadside ditch, a proposed Denver Type 16 inlet, and the existing dual-culvert crossing extension basin. Cleanouts should be installed every 100-feet to facilitate maintenance. Geotextile fabric should separate the gravel bedding to inhibit vegetation intrusion. The primary concern in this instance is icing from snow melt along the hillside. Therefore it is not anticipated that capacity of the French drain system will need to be very great. 6" PVC capacity calcs were performed for the sidewalk slopes of 4.75% and 7%, the respective slopes for the aforementioned stations. This does not include calculation of the additional flow capacity within the gravel medium of the French drain. The pipe capacity should facilitate the intended use. A large rainfall event may inundate the French drain and overflow into the street but this has been accounted for with the minor and major peak flow inundation determined for street flow.

5.0 Construction Stormwater Management

Temporary erosion and sediment control during construction is the responsibility of the general contractor. This responsibility includes acquisition of any required permits. The contractor and owner shall be required to obtain a state general permit for the discharge of construction site stormwater associated with the approximate 10.0 acres of development. The contractor shall be responsible for obtaining this permit prior to construction.

A detailed stormwater management plan prepared by a Colorado professional engineer shall be required. The stormwater management plan should take into account the changing topography and conditions of the

site throughout the construction process. All stormwater control measures shall conform to jurisdictional standards.

6.0 Post Construction Stormwater Management

See Operation and Maintenance Plans provided in the appendices.

7.0 Concluding General Summary

In conclusion, the development of an access road, sidewalk, retaining walls and associated drainage infrastructure along Gloria Gossard Parkway as part of the Steamboat Airpark Preliminary Plat will not substantially impact existing drainage conditions. All proposed drainage infrastructure has been thoroughly evaluated and design of such is within the Steamboat Springs Drainage Criteria standards. Westerly flows off-site are accounted for in the Overlook Park Final Drainage Report.

A. Compliance

The proposed stormwater drainage system complies with City Drainage Criteria.

B. Historic and Proposed Site Flows

Peak proposed flows for design points No. 1 and No. 2 will be about the same as that of historic peak flows. This is due primarily to the decrease in tributary area from the proposed access road. However, flows to design point No. 8 will increase due to the subsequent increase in drainage area. Increased peak flow at design point No. 8 is not substantial however and detention is not required.

C. Proposed New Stormwater System Requirements

The proposed stormwater system shall effectively convey and treat all flows on site with proper installation and maintenance.

8.0 References

Joe Wiedemeier, P.E. Four Points Surveying and Engineering (March 2020) Final Drainage Study for Overlook Park Subdivision.

Urban Drainage and Flood Control District Criteria Manual, 2018.

NOAA Precipitation Frequency Server. NOAA Atlas 14, Volume 8, Version 2. www.NOAA.com

City of Steamboat Springs Engineering Drainage Criteria, Latest Version.

9.0 Appendices

A. Existing Conditions Drainage Exhibit, DR1
B. Proposed Conditions Drainage Exhibit, DR2
C. USDA NRCS Web Soil Survey
D. Basin Runoff Calculations
E. BMP Design Spreadsheet Calculations for TSS Concentration and Runoff Reduction
F. Channel Flow Calculations (Ditches, curb and gutter, French drains)
G. Inlet Capacity Curves
H. Culvert and Storm Sewer Capacity Calculations
I. Standard forms No. 3, 4, & 5
J. Project Design Sheets
K. Operation and Maintenance Plan for Permanent Water Quality Facilities

Appendix A: Existing Conditions Drainage Exhibit, DR1

Drainage Study: Show full extents, basins, calcs, etc of parcels associated with this application

DRAINAGE PLAN LEGEND

- 2' CONTOUR
- 10' CONTOUR
- DRAINAGE BASIN BOUNDARY
- FLOW PATH, SHEET FLOW/OVERLAND FLOW
- FLOW PATH, CONCENTRATED
- DITCH/SWALE CENTERLINE
- 1 — DESIGN POINT DESIGNATION
- A / B C — A: BASIN DESIGNATION; B: BASIN AREA (ACRES); C: % IMPERVIOUS

DESIGN POINTS:

1. EB2 FLOWS CONTINUE INTO OVERLOOK PARK CONSTRUCTION AREA AND FLOW TO THE SEDIMENTATION BASIN DOWNSTREAM.
2. OUTFALL POINT FOR EB5. EXISTING DETENTION POND OUTFALLS INTO OVERLOOK PARK.
8. EB3 OUTFALLS FROM (2) PARALLEL 30" CMP CULVERTS CROSSING GLORIA GOSSARD BLVD.

Drainage Basin Summary Table

Basin ID	Area (acres)	Impervious Area (%)	Runoff	
			Q_5 (cfs)	Q_{100} (cfs)
EB1	13.70	2%	3.18	21.73
EB2	24.75	3%	6.40	42.36
EB3	25.75	4%	7.28	46.89
EB4	1.92	12%	1.37	7.24
EB5	2.50	2%	0.91	6.22

LOT 2
(NOT A PART)

EB1
13.70 | 2%

LOT 1 WEST ACRES
RANCH SUBD. EXEMPTION
OWNER: STEAMBOAT SPRINGS
AIRPARK, LLC

STEAMBOAT AIRPARK

EB2
24.75 | 3%

EB3
25.75 | 4%

EB5
2.50 | 2%

ROUGH CUT ROAD

8" OUTFALL PIPE AND RIP-RAP
OVERFLOW APRON INTO THE
OVERLOOK PARK CONSTRUCTION SITE

TEMP
18" CULVERT

DETENTION BASIN

TEMP
18" CULVERT

TWO TRACK TRAIL

CUTOFF DITCH

ROUGH CUT ROAD

FLOWS TO OVERLOOK PARK SITE AND
CONSTRUCTION SEDIMENTATION POND
DRAINAGE AREA: 24.75 AC
HISTORIC FLOW: 5-YR: 6.40 CFS
HISTORIC FLOW: 100-YR: 42.36 CFS

DITCH

CONSTRUCTION ACCESS ROAD
TO OVERLOOK PARK

ROUGH CUT ROAD

EXISTING RIPRAP

DITCH

EXISTING BOULDERS AND
SLOPE STABILIZATION

DITCH

GLORIA GOSSARD PARKWAY

DITCH

EB4
1.92 | 12%

DITCH

GLORIA GOSSARD PARKWAY

OVERLOOK PARK
CONSTRUCTION SITE

TEMPORARY 6" PVC CULVERT

DITCH

HIGH POINT,
EAST/WEST
FLOW SPLIT

EXISTING 30" DOUBLE HDPE CULVERTS
DRAINAGE AREA: 25.75 AC
HISTORIC FLOW: 5-YR: 7.28 CFS
HISTORIC FLOW: 100-YR: 46.89 CFS

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No.	DATE	REVISIONS
		INT

STEAMBOAT AIRPARK PRELIMINARY PLAT
STEAMBOAT SPRINGS, CO 80487

Horizontal Scale

0 100' 200'

SCALE: 1" = 100'

Contour Interval = 2 ft

DATE: 4/21/22
JOB #: 1670-001
DRAWN BY: JLW
DESIGN BY: JLW
REVIEW BY: JLW

IF THIS DRAWING IS PRESENTED IN A FORMAT OTHER THAN 24" X 36", THE GRAPHIC SCALE SHOULD BE UTILIZED.

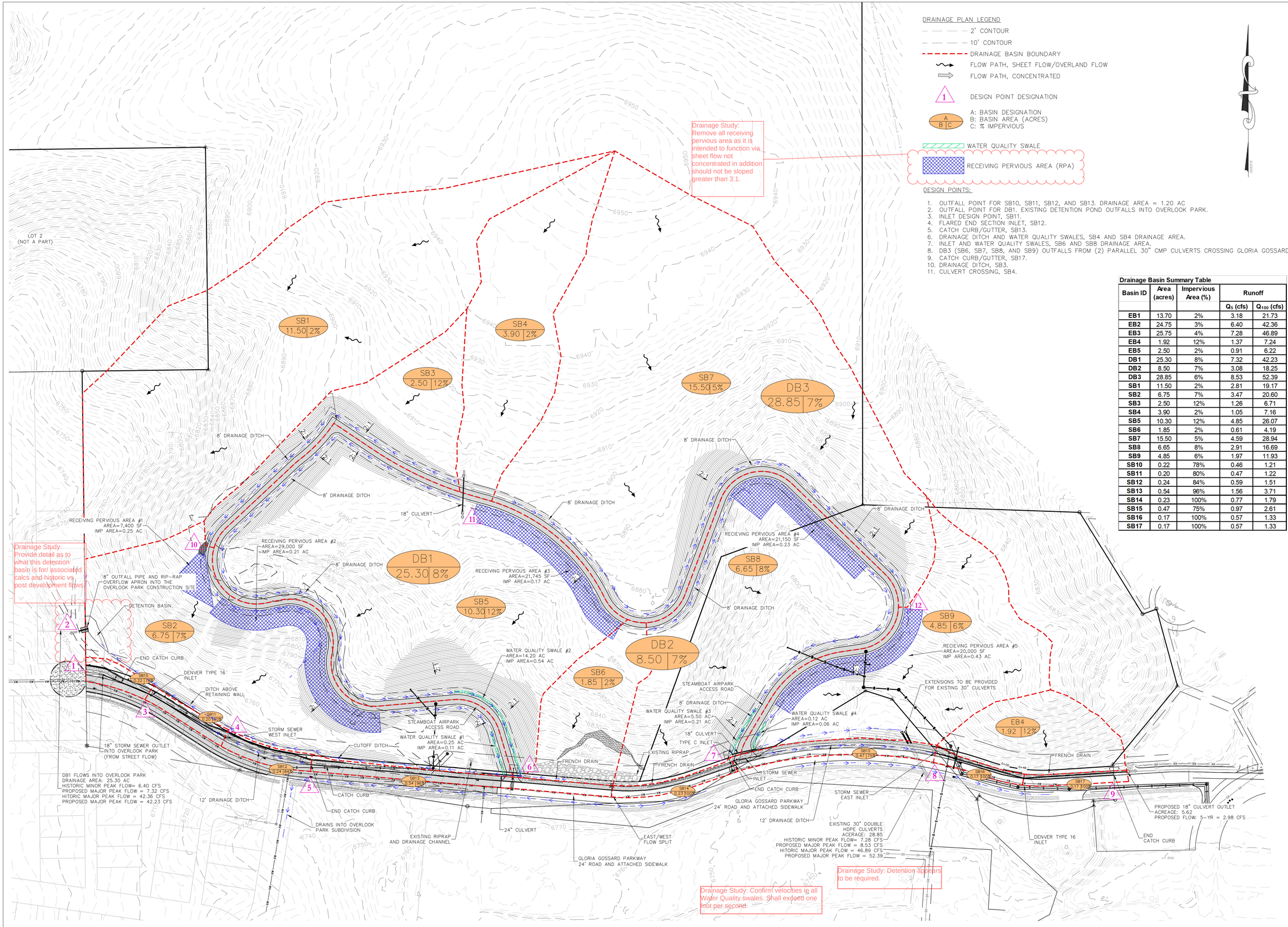
DRAWING:

EXISTING CONDITIONS DRAINAGE

SHEET #

DR1

Appendix B: Proposed Conditions Drainage Exhibit, DR2



DRAINAGE PLAN LEGEND

- 2' CONTOUR
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- FLOW PATH, SHEET FLOW/OVERLAND FLOW
- FLOW PATH, CONCENTRATED
- 1 — DESIGN POINT DESIGNATION
- A / B | C — A: BASIN DESIGNATION; B: BASIN AREA (ACRES); C: % IMPERVIOUS
- WATER QUALITY SWALE
- RECEIVING PERVIOUS AREA (RPA)

DESIGN POINTS:

1. OUTFALL POINT FOR SB10, SB11, SB12, AND SB13. DRAINAGE AREA = 1.20 AC
2. OUTFALL POINT FOR DB1. EXISTING DETENTION POND OUTFALLS INTO OVERLOOK PARK.
3. INLET DESIGN POINT, SB11.
4. FLARED END SECTION INLET, SB12.
5. CATCH CURB/GUTTER, SB13.
6. DRAINAGE DITCH AND WATER QUALITY SWALES, SB4 AND SB4 DRAINAGE AREA.
7. INLET AND WATER QUALITY SWALES, SB6 AND SB8 DRAINAGE AREA.
8. DB3 (SB6, SB7, SB8, AND SB9) OUTFALLS FROM (2) PARALLEL 30" CMP CULVERTS CROSSING GLORIA GOSSARD.
9. CATCH CURB/GUTTER, SB17.
10. DRAINAGE DITCH, SB3.
11. CULVERT CROSSING, SB4.

Drainage Basin Summary Table

Basin ID	Area (acres)	Impervious Area (%)	Runoff	
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SB3	2.50	12%	1.26	6.71
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SB5	10.30	12%	4.85	26.07
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SB7	15.50	5%	4.59	28.94
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SB9	4.85	6%	1.97	11.93
SB10	0.22	78%	0.46	1.21
SB11	0.20	80%	0.47	1.22
SB12	0.24	84%	0.59	1.51
SB13	0.54	96%	1.56	3.71
SB14	0.23	100%	0.77	1.79
SB15	0.47	75%	0.97	2.61
SB16	0.17	100%	0.57	1.33
SB17	0.17	100%	0.57	1.33

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DRAWING: PROPOSED CONDITIONS DRAINAGE

SHEET #
DR2

Appendix C: USDA NRCS Web Soil Survey

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Routt Area, Colorado, Parts of Rio Blanco and Routt Counties

April 25, 2022

Custom Soil Resource Report
Soil Map

Map Scale: 1:5,350 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Routt Area, Colorado, Parts of Rio Blanco and Routt Counties
Survey Area Data: Version 11, Sep 2, 2021

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

Date(s) aerial images were photographed: May 8, 2012—Oct 5, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
89	Eckmanpark clay, 6 to 25 percent slopes	61.7	46.1%
120	Eckmanpark clay loam, 25 to 65 percent slopes	62.5	46.7%
C10	Impass silty clay loam, 3 to 12 percent slopes	9.7	7.3%
Totals for Area of Interest		**134.0**	**100.0%**

Map Unit Descriptions

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

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

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

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

Routt Area, Colorado, Parts of Rio Blanco and Routt Counties

89—Eckmanpark clay, 6 to 25 percent slopes

Map Unit Setting

National map unit symbol: k0ht
Elevation: 6,560 to 8,530 feet
Mean annual precipitation: 20 to 24 inches
Mean annual air temperature: 38 to 41 degrees F
Frost-free period: 30 to 70 days
Farmland classification: Not prime farmland

Map Unit Composition

Eckmanpark and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Eckmanpark

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Slope alluvium and/or colluvium over residuum weathered from shale

Typical profile

A - 0 to 2 inches: clay
Bss1 - 2 to 9 inches: clay
Bss2 - 9 to 17 inches: clay
Bk - 17 to 32 inches: clay
Cr - 32 to 36 inches: bedrock

Properties and qualities

Slope: 6 to 25 percent
Depth to restrictive feature: 28 to 37 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.00 to 0.21 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R048AY244CO - Mountain Shale
Hydric soil rating: No

120—Eckmanpark clay loam, 25 to 65 percent slopes

Map Unit Setting

National map unit symbol: k0jp
Elevation: 6,560 to 8,690 feet
Mean annual precipitation: 20 to 24 inches
Mean annual air temperature: 38 to 41 degrees F
Frost-free period: 30 to 70 days
Farmland classification: Not prime farmland

Map Unit Composition

Eckmanpark and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Eckmanpark

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Colluvium over residuum weathered from shale

Typical profile

A - 0 to 1 inches: clay loam
Bss - 1 to 10 inches: clay
Bk - 10 to 26 inches: clay
Cr - 26 to 35 inches: bedrock

Properties and qualities

Slope: 25 to 65 percent
Depth to restrictive feature: 20 to 33 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.00 to 0.21 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): 7e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R048BY296CO - Claypan

Hydric soil rating: No

Minor Components

Routt

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F048AY449CO - Aspen Woodland
Hydric soil rating: No

C10—Impass silty clay loam, 3 to 12 percent slopes

Map Unit Setting

National map unit symbol: k0ky
Elevation: 6,560 to 7,870 feet
Mean annual precipitation: 20 to 24 inches
Mean annual air temperature: 38 to 41 degrees F
Frost-free period: 30 to 70 days
Farmland classification: Not prime farmland

Map Unit Composition

Impass and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Impass

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Slope alluvium derived from sandstone and shale

Typical profile

A - 0 to 4 inches: silty clay loam
Bss - 4 to 18 inches: silty clay
Bkss - 18 to 25 inches: silty clay
Bk1 - 25 to 45 inches: silty clay
Bk2 - 45 to 60 inches: silty clay

Properties and qualities

Slope: 3 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.07 to 0.21 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): 6c
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: C
Ecological site: R048BY296CO - Claypan
Hydric soil rating: No

Minor Components

Gourley

Percent of map unit: 10 percent
Landform: Hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R048AY247CO - Deep Clay Loam
Hydric soil rating: No

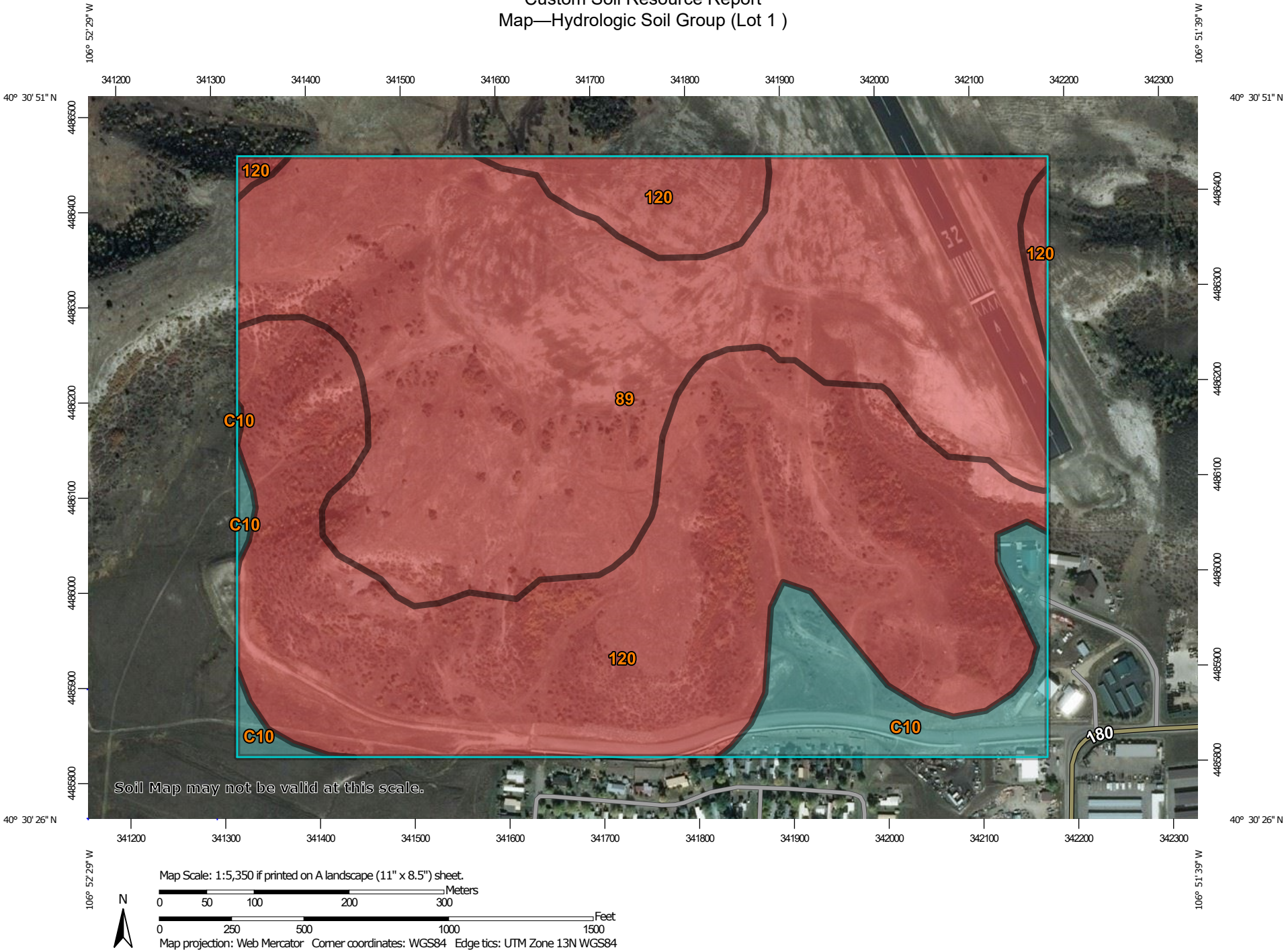
Routtskin

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R048AY247CO - Deep Clay Loam
Hydric soil rating: No

Eckmanpark

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R048BY296CO - Claypan
Hydric soil rating: No

Custom Soil Resource Report
Map—Hydrologic Soil Group (Lot 1)



Map Scale: 1:5,350 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

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: Routt Area, Colorado, Parts of Rio Blanco and Routt Counties
Survey Area Data: Version 11, Sep 2, 2021

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

Date(s) aerial images were photographed: May 8, 2012—Oct 5, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

Table—Hydrologic Soil Group (Lot 1)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
89	Eckmanpark clay, 6 to 25 percent slopes	D	61.7	46.1%
120	Eckmanpark clay loam, 25 to 65 percent slopes	D	62.5	46.7%
C10	Impass silty clay loam, 3 to 12 percent slopes	C	9.7	7.3%
Totals for Area of Interest			**134.0**	**100.0%**

Rating Options—Hydrologic Soil Group (Lot 1)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix D: Basin Runoff Calculations

RATIONAL METHOD RUNOFF ANALYSIS

Job #	1670-001	Date:	April 22, 2022
Job Name	Copper Ridge Village	Revised:	
Designed by:	JLW		

Existing Basin 1 (EB1)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION							RESULTS				
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	13.70	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.02	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.06	0.7	13.70	0.50
Asphalt Parking & Walkways	0.00	100%		Length, ft	300	Length, ft	300	Length, ft	850	Tc, min	2-YR	0.06	1.0	13.70	0.72
Roof	0.00	90%	P2	Slope, percent	5.0000	Slope, percent	10.0000	Slope, ft/ft	0.2000	5.0	5-YR	0.16	1.4	13.70	3.18
Gravel	0.00	40%	1.4	Runoff Coefficient	0.162	Runoff Coefficient	0.162	Conveyance Coefficient	15	Final	10-YR	0.26	1.8	13.70	6.51
Other	0.00	0%						Velocity, ft/s	6.7	Tc, min	25-YR	0.38	2.3	13.70	12.15
	13.70	2%		Ti, min=	17.1	Ti, min=	13.6	Tt, min=	2.1	**32.8**	**100-YR**	**0.51**	**3.1**	**13.70**	**21.73**

Existing Basin 2 (EB2)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION							RESULTS				
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	24.50	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.02	Land Surface	Paved Areas and Shallow Swales	Minimum	1.25 YR	0.06	0.7	24.75	1.10
Asphalt Parking & Walkways	0.25	100%		Length, ft	300	Length, ft	300	Length, ft	2200	Tc, min	2-YR	0.06	1.0	24.75	1.59
Roof	0.00	90%	P2	Slope, percent	10.0000	Slope, percent	20.0000	Slope, ft/ft	0.1000	5.0	5-YR	0.17	1.5	24.75	6.40
Gravel	0.00	0%	1.4	Runoff Coefficient	0.162	Runoff Coefficient	0.162	Conveyance Coefficient	20	Final	10-YR	0.27	1.9	24.75	12.87
Other	0.00	0%						Velocity, ft/s	6.3	Tc, min	25-YR	0.38	2.5	24.75	23.82
	24.75	3%		Ti, min=	13.6	Ti, min=	10.8	Tt, min=	5.8	**30.1**	**100-YR**	**0.51**	**3.4**	**24.75**	**42.36**

Existing Basin 3 (EB3)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION							RESULTS				
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	25.25	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.02	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.07	0.8	25.75	1.34
Asphalt Parking & Walkways	0.50	100%		Length, ft	300	Length, ft	300	Length, ft	1200	Tc, min	2-YR	0.07	1.1	25.75	1.93
Roof	0.00	90%	P2	Slope, percent	10.0000	Slope, percent	20.0000	Slope, ft/ft	0.1300	5.0	5-YR	0.18	1.6	25.75	7.28
Gravel	0.00	0%	1.4	Runoff Coefficient	0.162	Runoff Coefficient	0.162	Conveyance Coefficient	15	Final	10-YR	0.27	2.1	25.75	14.42
Other	0.00	0%						Velocity, ft/s	5.4	Tc, min	25-YR	0.39	2.7	25.75	26.49
	25.75	4%		Ti, min=	13.6	Ti, min=	10.8	Tt, min=	3.7	**28.0**	**100-YR**	**0.51**	**3.5**	**25.75**	**46.89**

Existing Basin 4 (EB4)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION							RESULTS				
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	1.72	2%	C	Surface Imperviousness	0.1	Surface Imperviousness	0	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.12	1.5	1.92	0.36
Asphalt Parking & Walkways	0.20	100%		Length, ft	200	Length, ft	0	Length, ft	200	Tc, min	2-YR	0.12	2.2	1.92	0.51
Roof	0.00	90%	P2	Slope, percent	40.0000	Slope, percent	1.0000	Slope, ft/ft	0.0500	5.0	5-YR	0.22	3.2	1.92	1.37
Gravel	0.00	0%	1.4	Runoff Coefficient	0.21	Runoff Coefficient	0.15	Conveyance Coefficient	15	Final	10-YR	0.31	4.1	1.92	2.45
Other	0.00	0%						Velocity, ft/s	3.4	Tc, min	25-YR	0.42	5.3	1.92	4.24
	1.92	12%		Ti, min=	6.6	Ti, min=	0.0	Tt, min=	1.0	**7.6**	**100-YR**	**0.54**	**7.0**	**1.92**	**7.24**

Existing Basin 5 (EB5)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION							RESULTS				
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	2.50	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.06	1.0	2.50	0.14
Asphalt Parking & Walkways	0.00	100%		Length, ft	300	Length, ft	250	Length, ft	0	Tc, min	2-YR	0.06	1.5	2.50	0.21

RATIONAL METHOD RUNOFF ANALYSIS

Job #	1670-001	Date:	April 22, 2022
Job Name	Copper Ridge Village	Revised:	
Designed by:	JLW		

Roof	0.00	90%	P2	Slope, percent	35.0000	Slope, percent	40.0000	Slope, ft/ft	0.0100	5.0	5-YR	0.16	2.2	2.50	0.91
Gravel	0.00	0%	1.4	Runoff Coefficient	0.162	Runoff Coefficient	0.15	Conveyance Coefficient	15	Final	10-YR	0.26	2.8	2.50	1.86
Other	0.00	0%						Velocity, ft/s	1.5	Tc, min	25-YR	0.38	3.7	2.50	3.48
	2.50	2%		Ti, min=	8.9	Ti, min=	7.9	Tt, min=	0.0	**16.8**	**100-YR**	**0.51**	**4.9**	**2.50**	**6.22**

Design Basin 1 (DB1)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	23.71	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.05	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.10	0.7	25.30	1.68
Asphalt Parking & Walkways	1.59	100%		Length, ft	300	Length, ft	300	Length, ft	1725	Tc, min	2-YR	0.10	1.0	25.30	2.42
Roof	0.00	90%	P2	Slope, percent	8.0000	Slope, percent	25.0000	Slope, ft/ft	0.0600	5.0	5-YR	0.20	1.4	25.30	7.32
Gravel	0.00	0%	1.4	Runoff Coefficient	0.162	Runoff Coefficient	0.18	Conveyance Coefficient	15	Final	10-YR	0.29	1.8	25.30	13.69
Other	0.00	0%						Velocity, ft/s	3.7	Tc, min	25-YR	0.41	2.4	25.30	24.32
	25.30	8%		Ti, min=	14.6	Ti, min=	9.8	Tt, min=	7.8	**32.3**	**100-YR**	**0.53**	**3.2**	**25.30**	**42.23**

Design Basin 2 (DB2)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	8.06	2%	C	Surface Imperviousness	0.05	Surface Imperviousness	0.05	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.09	0.9	8.50	0.68
Asphalt Parking & Walkways	0.44	100%		Length, ft	300	Length, ft	100	Length, ft	800	Tc, min	2-YR	0.09	1.3	8.50	0.97
Roof	0.00	90%	P2	Slope, percent	10.0000	Slope, percent	20.0000	Slope, ft/ft	0.0700	5.0	5-YR	0.19	1.9	8.50	3.08
Gravel	0.00	0%	1.4	Runoff Coefficient	0.18	Runoff Coefficient	0.18	Conveyance Coefficient	15	Final	10-YR	0.29	2.4	8.50	5.84
Other	0.00	0%						Velocity, ft/s	4.0	Tc, min	25-YR	0.40	3.1	8.50	10.46
	8.50	7%		Ti, min=	13.3	Ti, min=	6.1	Tt, min=	3.4	**22.8**	**100-YR**	**0.52**	**4.1**	**8.50**	**18.25**

Design Basin 3 (DB3)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	27.79	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.05	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.08	0.7	28.85	1.74
Asphalt Parking & Walkways	1.06	100%		Length, ft	300	Length, ft	300	Length, ft	1250	Tc, min	2-YR	0.08	1.1	28.85	2.50
Roof	0.00	90%	P2	Slope, percent	10.0000	Slope, percent	20.0000	Slope, ft/ft	0.1000	5.0	5-YR	0.19	1.6	28.85	8.53
Gravel	0.00	0%	1.4	Runoff Coefficient	0.162	Runoff Coefficient	0.18	Conveyance Coefficient	15	Final	10-YR	0.28	2.0	28.85	16.47
Other	0.00	0%						Velocity, ft/s	4.7	Tc, min	25-YR	0.40	2.6	28.85	29.83
	28.85	6%		Ti, min=	13.6	Ti, min=	10.6	Tt, min=	4.4	**28.5**	**100-YR**	**0.52**	**3.5**	**28.85**	**52.39**

Sub Basin 1 (SB1)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	11.50	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.02	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.06	0.7	11.50	0.44
Asphalt Parking & Walkways	0.00	100%		Length, ft	300	Length, ft	300	Length, ft	850	Tc, min	2-YR	0.06	1.0	11.50	0.64
Roof	0.00	90%	P2	Slope, percent	5.0000	Slope, percent	10.0000	Slope, ft/ft	20.0000	5.0	5-YR	0.16	1.5	11.50	2.81
Gravel	0.00	0%	1.4	Runoff Coefficient	0.162	Runoff Coefficient	0.162	Conveyance Coefficient	15	Final	10-YR	0.26	1.9	11.50	5.74
Other	0.00	0%						Velocity, ft/s	67.1	Tc, min	25-YR	0.38	2.5	11.50	10.72
	11.50	2%		Ti, min=	17.1	Ti, min=	13.6	Tt, min=	0.2	**30.9**	**100-YR**	**0.51**	**3.3**	**11.50**	**19.17**

RATIONAL METHOD RUNOFF ANALYSIS

Job #	1670-001	Date:	April 22, 2022
Job Name	Copper Ridge Village	Revised:	
Designed by:	JLW		

Sub Basin 2 (SB2)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	6.41	2%	C	Surface Imperviousness	0.05	Surface Imperviousness	0	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.09	1.2	6.75	0.76
Asphalt Parking & Walkways	0.34	100%		Length, ft	300	Length, ft	0	Length, ft	500	Tc, min	2-YR	0.09	1.8	6.75	1.09
Roof	0.00	90%	P2	Slope, percent	25.0000	Slope, percent	1.0000	Slope, ft/ft	0.0700	5.0	5-YR	0.19	2.7	6.75	3.47
Gravel	0.00	0%	1.4	Runoff Coefficient	0.18	Runoff Coefficient	0.15	Conveyance Coefficient	15	Final	10-YR	0.29	3.4	6.75	6.58
Other	0.00	0%						Velocity, ft/s	4.0	Tc, min	25-YR	0.40	4.4	6.75	11.81
	6.75	7%		Ti, min=	9.8	Ti, min=	0.0	Tt, min=	2.1	**11.9**	**100-YR**	**0.52**	**5.8**	**6.75**	**20.60**

Sub Basin 3 (SB3)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	2.25	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.1	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.12	1.1	2.50	0.32
Asphalt Parking & Walkways	0.25	100%		Length, ft	300	Length, ft	50	Length, ft	800	Tc, min	2-YR	0.12	1.5	2.50	0.47
Roof	0.00	90%	P2	Slope, percent	25.0000	Slope, percent	50.0000	Slope, ft/ft	0.0800	5.0	5-YR	0.22	2.3	2.50	1.26
Gravel	0.00	0%	1.4	Runoff Coefficient	0.162	Runoff Coefficient	0.21	Conveyance Coefficient	15	Final	10-YR	0.31	2.9	2.50	2.26
Other	0.00	0%						Velocity, ft/s	4.2	Tc, min	25-YR	0.42	3.7	2.50	3.92
	2.50	12%		Ti, min=	10.0	Ti, min=	3.1	Tt, min=	3.1	**16.2**	**100-YR**	**0.54**	**5.0**	**2.50**	**6.71**

Sub Basin 4 (SB4)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	3.90	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.02	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.06	0.8	3.90	0.17
Asphalt Parking & Walkways	0.00	100%		Length, ft	300	Length, ft	300	Length, ft	220	Tc, min	2-YR	0.06	1.1	3.90	0.24
Roof	0.00	90%	P2	Slope, percent	8.0000	Slope, percent	15.0000	Slope, ft/ft	0.1000	5.0	5-YR	0.16	1.6	3.90	1.05
Gravel	0.00	0%	1.4	Runoff Coefficient	0.162	Runoff Coefficient	0.162	Conveyance Coefficient	15	Final	10-YR	0.26	2.1	3.90	2.15
Other	0.00	0%						Velocity, ft/s	4.7	Tc, min	25-YR	0.38	2.7	3.90	4.01
	3.90	2%		Ti, min=	14.6	Ti, min=	11.9	Tt, min=	0.8	**27.3**	**100-YR**	**0.51**	**3.6**	**3.90**	**7.16**

Sub Basin 5 (SB5)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	9.30	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.3	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.12	1.0	10.30	1.25
Asphalt Parking & Walkways	1.00	100%		Length, ft	150	Length, ft	120	Length, ft	750	Tc, min	2-YR	0.12	1.4	10.30	1.79
Roof	0.00	90%	P2	Slope, percent	50.0000	Slope, percent	5.0000	Slope, ft/ft	0.0700	5.0	5-YR	0.22	2.2	10.30	4.85
Gravel	0.00	0%	1.4	Runoff Coefficient	0.162	Runoff Coefficient	0.3	Conveyance Coefficient	15	Final	10-YR	0.31	2.7	10.30	8.75
Other	0.00	0%						Velocity, ft/s	4.0	Tc, min	25-YR	0.42	3.5	10.30	15.23
	10.30	12%		Ti, min=	5.6	Ti, min=	9.2	Tt, min=	3.1	**18.0**	**100-YR**	**0.54**	**4.7**	**10.30**	**26.07**

Sub Basin 6 (SB6)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	1.85	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.02	Land Surface	Short Pature and Lawns	Minimum	1.25 YR	0.06	1.0	1.85	0.10
Asphalt Parking & Walkways	0.00	100%		Length, ft	300	Length, ft	150	Length, ft	0	Tc, min	2-YR	0.06	1.4	1.85	0.14
Roof	0.00	90%	P2	Slope, percent	10.0000	Slope, percent	35.0000	Slope, ft/ft	0.0800	5.0	5-YR	0.16	2.0	1.85	0.61

RATIONAL METHOD RUNOFF ANALYSIS

Job #	1670-001	Date:	April 22, 2022
Job Name	Copper Ridge Village	Revised:	
Designed by:	JLW		

Gravel	0.00	0%	1.4	Runoff Coefficient	0.162	Runoff Coefficient	0.162	Conveyance Coefficient	7	Final	10-YR	0.26	2.6	1.85	1.25
Other	0.00	0%						Velocity, ft/s	2.0	Tc, min	25-YR	0.38	3.3	1.85	2.34
	1.85	2%		Ti, min=	13.6	Ti, min=	6.3	Tt, min=	0.0	**19.9**	**100-YR**	**0.51**	**4.5**	**1.85**	**4.19**

Sub Basin 7(SB7)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	15.08	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.05	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.07	0.8	15.50	0.89
Asphalt Parking & Walkways	0.42	100%		Length, ft	300	Length, ft	300	Length, ft	750	Tc, min	2-YR	0.07	1.1	15.50	1.28
Roof	0.00	90%	P2	Slope, percent	10.0000	Slope, percent	20.0000	Slope, ft/ft	0.0700	5.0	5-YR	0.18	1.6	15.50	4.59
Gravel	0.00	0%	1.4	Runoff Coefficient	0.162	Runoff Coefficient	0.18	Conveyance Coefficient	15	Final	10-YR	0.28	2.1	15.50	8.99
Other	0.00	0%						Velocity, ft/s	4.0	Tc, min	25-YR	0.39	2.7	15.50	16.41
	15.50	5%		Ti, min=	13.6	Ti, min=	10.6	Tt, min=	3.1	**27.3**	**100-YR**	**0.52**	**3.6**	**15.50**	**28.94**

Sub Basin 8 (SB8)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	6.21	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.1	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.10	1.0	6.65	0.68
Asphalt Parking & Walkways	0.44	100%		Length, ft	300	Length, ft	100	Length, ft	800	Tc, min	2-YR	0.10	1.5	6.65	0.97
Roof	0.00	90%	P2	Slope, percent	40.0000	Slope, percent	20.0000	Slope, ft/ft	0.0700	5.0	5-YR	0.20	2.2	6.65	2.91
Gravel	0.00	0%	1.4	Runoff Coefficient	0.162	Runoff Coefficient	0.21	Conveyance Coefficient	15	Final	10-YR	0.30	2.8	6.65	5.43
Other	0.00	0%						Velocity, ft/s	4.0	Tc, min	25-YR	0.41	3.6	6.65	9.63
	6.65	8%		Ti, min=	8.6	Ti, min=	5.9	Tt, min=	3.4	**17.8**	**100-YR**	**0.53**	**4.8**	**6.65**	**16.69**

Sub Basin 9 (SB9)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	4.65	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.05	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.08	1.0	4.85	0.41
Asphalt Parking & Walkways	0.20	100%		Length, ft	300	Length, ft	150	Length, ft	500	Tc, min	2-YR	0.08	1.4	4.85	0.59
Roof	0.00	90%	P2	Slope, percent	15.0000	Slope, percent	40.0000	Slope, ft/ft	6.0000	5.0	5-YR	0.19	2.2	4.85	1.97
Gravel	0.00	0%	1.4	Runoff Coefficient	0.162	Runoff Coefficient	0.18	Conveyance Coefficient	15	Final	10-YR	0.28	2.7	4.85	3.77
Other	0.00	0%						Velocity, ft/s	36.7	Tc, min	25-YR	0.40	3.5	4.85	6.81
	4.85	6%		Ti, min=	11.9	Ti, min=	5.9	Tt, min=	0.2	**18.0**	**100-YR**	**0.52**	**4.7**	**4.85**	**11.93**

Sub Basin 10 (SB10)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	0.05	2%	C	Surface Imperviousness	0.8	Surface Imperviousness	0.02	Land Surface	Short Pature and Lawns	Minimum	1.25 YR	0.57	1.6	0.22	0.20
Asphalt Parking & Walkways	0.17	100%		Length, ft	160	Length, ft	0	Length, ft	0	Tc, min	2-YR	0.57	2.3	0.22	0.29
Roof	0.00	90%	P2	Slope, percent	5.0000	Slope, percent	1.0000	Slope, ft/ft	1.0000	5.0	5-YR	0.60	3.4	0.22	0.46
Gravel	0.00	0%	1.4	Runoff Coefficient	0.63	Runoff Coefficient	0.162	Conveyance Coefficient	7	Final	10-YR	0.64	4.4	0.22	0.62
Other	0.00	0%						Velocity, ft/s	7.0	Tc, min	25-YR	0.68	5.7	0.22	0.85
	0.22	78%		Ti, min=	6.3	Ti, min=	0.0	Tt, min=	0.0	**6.3**	**100-YR**	**0.73**	**7.6**	**0.22**	**1.21**

Sub Basin 11 (SB11)

RATIONAL METHOD RUNOFF ANALYSIS

Job #	1670-001	Date:	April 22, 2022
Job Name	Copper Ridge Village	Revised:	
Designed by:	JLW		

BASIN CHARACTERISTICS				TIME OF CONCENTRATION							RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	0.04	2%	C	Surface Imperviousness	0.8	Surface Imperviousness	0.02	Land Surface	Paved Areas and Shallow Swales	Minimum	1.25 YR	0.60	1.7	0.20	0.21
Asphalt Parking & Walkways	0.16	100%		Length, ft	20	Length, ft	0	Length, ft	200	Tc, min	2-YR	0.60	2.5	0.20	0.30
Roof	0.00	90%	P2	Slope, percent	2.0000	Slope, percent	1.0000	Slope, ft/ft	0.0200	5.0	5-YR	0.63	3.7	0.20	0.47
Gravel	0.00	0%	1.4	Runoff Coefficient	0.63	Runoff Coefficient	0.162	Conveyance Coefficient	20	Final	10-YR	0.67	4.7	0.20	0.63
Other	0.00	0%						Velocity, ft/s	2.8	Tc, min	25-YR	0.71	6.1	0.20	0.86
	0.20	80%		Ti, min=	3.0	Ti, min=	0.0	Tt, min=	1.2	**5.0**	**100-YR**	**0.75**	**8.2**	**0.20**	**1.22**

Sub Basin 12 (SB12)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION							RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	0.04	2%	C	Surface Imperviousness	0.85	Surface Imperviousness	0.02	Land Surface	Paved Areas and Shallow Swales	Minimum	1.25 YR	0.64	1.7	0.24	0.27
Asphalt Parking & Walkways	0.20	100%		Length, ft	20	Length, ft	0	Length, ft	220	Tc, min	2-YR	0.64	2.5	0.24	0.38
Roof	0.00	90%	P2	Slope, percent	2.0000	Slope, percent	1.0000	Slope, ft/ft	0.0500	5.0	5-YR	0.67	3.7	0.24	0.59
Gravel	0.00	0%	1.4	Runoff Coefficient	0.68	Runoff Coefficient	0.162	Conveyance Coefficient	20	Final	10-YR	0.70	4.7	0.24	0.79
Other	0.00	0%						Velocity, ft/s	4.5	Tc, min	25-YR	0.74	6.1	0.24	1.08
	0.24	84%		Ti, min=	2.7	Ti, min=	0.0	Tt, min=	0.8	**5.0**	**100-YR**	**0.77**	**8.2**	**0.24**	**1.51**

Sub Basin 13 (SB13)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION							RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	0.02	2%	C	Surface Imperviousness	0.95	Surface Imperviousness	0.02	Land Surface	Paved Areas and Shallow Swales	Minimum	1.25 YR	0.82	1.6	0.54	0.72
Asphalt Parking & Walkways	0.52	100%		Length, ft	20	Length, ft	0	Length, ft	750	Tc, min	2-YR	0.82	2.3	0.54	1.03
Roof	0.00	90%	P2	Slope, percent	2.0000	Slope, percent	1.0000	Slope, ft/ft	0.0200	5.0	5-YR	0.84	3.5	0.54	1.56
Gravel	0.00	0%	1.4	Runoff Coefficient	0.82	Runoff Coefficient	0.162	Conveyance Coefficient	20	Final	10-YR	0.86	4.4	0.54	2.04
Other	0.00	0%						Velocity, ft/s	2.8	Tc, min	25-YR	0.88	5.7	0.54	2.71
	0.54	96%		Ti, min=	1.8	Ti, min=	0.0	Tt, min=	4.4	**6.2**	**100-YR**	**0.91**	**7.6**	**0.54**	**3.71**

Sub Basin 14 (SB14)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION							RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	0.00	2%	C	Surface Imperviousness	1	Surface Imperviousness	0.02	Land Surface	Paved Areas and Shallow Swales	Minimum	1.25 YR	0.89	1.7	0.23	0.35
Asphalt Parking & Walkways	0.23	100%		Length, ft	20	Length, ft	0	Length, ft	320	Tc, min	2-YR	0.89	2.5	0.23	0.51
Roof	0.00	90%	P2	Slope, percent	2.0000	Slope, percent	1.0000	Slope, ft/ft	0.0700	5.0	5-YR	0.90	3.7	0.23	0.77
Gravel	0.00	0%	1.4	Runoff Coefficient	0.9	Runoff Coefficient	0.162	Conveyance Coefficient	20	Final	10-YR	0.92	4.7	0.23	1.00
Other	0.00	0%						Velocity, ft/s	5.3	Tc, min	25-YR	0.94	6.1	0.23	1.31
	0.23	100%		Ti, min=	1.3	Ti, min=	0.0	Tt, min=	1.0	**5.0**	**100-YR**	**0.96**	**8.2**	**0.23**	**1.79**

Sub Basin 15 (SB15)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION							RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	0.12	2%	C	Surface Imperviousness	0.75	Surface Imperviousness	0.02	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.54	1.7	0.47	0.42
Asphalt Parking & Walkways	0.35	100%		Length, ft	25	Length, ft	0	Length, ft	450	Tc, min	2-YR	0.54	2.4	0.47	0.61
Roof	0.00	90%	P2	Slope, percent	2.0000	Slope, percent	1.0000	Slope, ft/ft	0.0700	5.0	5-YR	0.58	3.6	0.47	0.97
Gravel	0.00	0%	1.4	Runoff Coefficient	0.58	Runoff Coefficient	0.162	Conveyance Coefficient	15	Final	10-YR	0.62	4.6	0.47	1.32
Other	0.00	0%						Velocity, ft/s	4.0	Tc, min	25-YR	0.66	5.9	0.47	1.82
	0.47	75%		Ti, min=	3.7	Ti, min=	0.0	Tt, min=	1.9	**5.6**	**100-YR**	**0.71**	**7.8**	**0.47**	**2.61**

Sub Basin 16 (SB16)

RATIONAL METHOD RUNOFF ANALYSIS

Job #	1670-001	Date:	April 22, 2022
Job Name	Copper Ridge Village	Revised:	
Designed by:	JLW		

BASIN CHARACTERISTICS				TIME OF CONCENTRATION							RESULTS				
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	0.00	2%	C	Surface Imperviousness	1	Surface Imperviousness	0.02	Land Surface	Paved Areas and Shallow Swales	Minimum	1.25 YR	0.89	1.7	0.17	0.26
Asphalt Parking & Walkways	0.17	100%		Length, ft	20	Length, ft	0	Length, ft	240	Tc, min	2-YR	0.89	2.5	0.17	0.38
Roof	0.00	90%	P2	Slope, percent	2.0000	Slope, percent	1.0000	Slope, ft/ft	0.0700	5.0	5-YR	0.90	3.7	0.17	0.57
Gravel	0.00	0%	1.4	Runoff Coefficient	0.9	Runoff Coefficient	0.162	Conveyance Coefficient	20	Final	10-YR	0.92	4.7	0.17	0.74
Other	0.00	0%						Velocity, ft/s	5.3	Tc, min	25-YR	0.94	6.1	0.17	0.97
	0.17	100%		Ti, min=	1.3	Ti, min=	0.0	Tt, min=	0.8	**5.0**	**100-YR**	**0.96**	**8.2**	**0.17**	**1.33**

Sub Basin 17 (SB17)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION							RESULTS				
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	0.00	2%	C	Surface Imperviousness	1	Surface Imperviousness	0.02	Land Surface	Paved Areas and Shallow Swales	Minimum	1.25 YR	0.89	1.7	0.17	0.26
Asphalt Parking & Walkways	0.17	100%		Length, ft	20	Length, ft	0	Length, ft	240	Tc, min	2-YR	0.89	2.5	0.17	0.38
Roof	0.00	90%	P2	Slope, percent	2.0000	Slope, percent	1.0000	Slope, ft/ft	0.0700	5.0	5-YR	0.90	3.7	0.17	0.57
Gravel	0.00	0%	1.4	Runoff Coefficient	0.9	Runoff Coefficient	0.162	Conveyance Coefficient	20	Final	10-YR	0.92	4.7	0.17	0.74
Other	0.00	0%						Velocity, ft/s	5.3	Tc, min	25-YR	0.94	6.1	0.17	0.97
	0.17	100%		Ti, min=	1.3	Ti, min=	0.0	Tt, min=	0.8	**5.0**	**100-YR**	**0.96**	**8.2**	**0.17**	**1.33**

WQ Swale #1

BASIN CHARACTERISTICS				TIME OF CONCENTRATION							RESULTS				
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	0.14	2%	C	Surface Imperviousness	1	Surface Imperviousness	0.02	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.31	1.7	0.25	0.13
Asphalt Parking & Walkways	0.11	100%		Length, ft	20	Length, ft	0	Length, ft	250	Tc, min	2-YR	0.31	2.5	0.25	0.19
Roof	0.00	90%	P2	Slope, percent	2.0000	Slope, percent	1.0000	Slope, ft/ft	0.0700	5.0	5-YR	0.37	3.7	0.25	0.35
Gravel	0.00	0%	1.4	Runoff Coefficient	0.9	Runoff Coefficient	0.162	Conveyance Coefficient	15	Final	10-YR	0.44	4.7	0.25	0.52
Other	0.00	0%						Velocity, ft/s	4.0	Tc, min	25-YR	0.51	6.1	0.25	0.78
	0.25	45%		Ti, min=	1.3	Ti, min=	0.0	Tt, min=	1.0	**5.0**	**100-YR**	**0.59**	**8.2**	**0.25**	**1.21**

WQ Swale #2 (DP No. 6)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION							RESULTS				
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	13.20	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.1	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.10	0.7	14.20	1.05
Asphalt Parking & Walkways	1.00	100%		Length, ft	300	Length, ft	300	Length, ft	1000	Tc, min	2-YR	0.10	1.0	14.20	1.51
Roof	0.00	90%	P2	Slope, percent	8.0000	Slope, percent	15.0000	Slope, ft/ft	0.0700	5.0	5-YR	0.20	1.5	14.20	4.44
Gravel	0.00	0%	1.4	Runoff Coefficient	0.162	Runoff Coefficient	0.21	Conveyance Coefficient	15	Final	10-YR	0.30	2.0	14.20	8.23
Other	0.00	0%						Velocity, ft/s	4.0	Tc, min	25-YR	0.41	2.5	14.20	14.56
	14.20	9%		Ti, min=	14.6	Ti, min=	11.3	Tt, min=	4.2	**30.1**	**100-YR**	**0.53**	**3.4**	**14.20**	**25.20**

WQ Swale #3 (DP No. 7)

BASIN CHARACTERISTICS				TIME OF CONCENTRATION							RESULTS				
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	5.29	2%	C	Surface Imperviousness	0.05	Surface Imperviousness	0.1	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.08	1.0	5.50	0.46
Asphalt Parking & Walkways	0.21	100%		Length, ft	300	Length, ft	100	Length, ft	800	Tc, min	2-YR	0.08	1.5	5.50	0.66
Roof	0.00	90%	P2	Slope, percent	40.0000	Slope, percent	20.0000	Slope, ft/ft	0.0700	5.0	5-YR	0.19	2.2	5.50	2.23
Gravel	0.00	0%	1.4	Runoff Coefficient	0.18	Runoff Coefficient	0.21	Conveyance Coefficient	15	Final	10-YR	0.28	2.8	5.50	4.30
Other	0.00	0%						Velocity, ft/s	4.0	Tc, min	25-YR	0.40	3.6	5.50	7.79
	5.50	6%		Ti, min=	8.4	Ti, min=	5.9	Tt, min=	3.4	**17.6**	**100-YR**	**0.52**	**4.8**	**5.50**	**13.67**

WQ Swale #4

BASIN CHARACTERISTICS	TIME OF CONCENTRATION	RESULTS

RATIONAL METHOD RUNOFF ANALYSIS

Job #	1670-001	Date:	April 22, 2022
Job Name	Copper Ridge Village	Revised:	
Designed by:	JLW		

	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*I*, in/hr	A, acres	Q, cfs
Landscape	0.06	2%	C	Surface Imperviousness	0.5	Surface Imperviousness	0.1	Land Surface	Grassed Waterways	Minimum	1.25 YR	0.34	1.7	0.12	0.07
Asphalt Parking & Walkways	0.06	100%		Length, ft	20	Length, ft	0	Length, ft	100	Tc, min	2-YR	0.34	2.5	0.12	0.10
Roof	0.00	90%	P2	Slope, percent	2.0000	Slope, percent	20.0000	Slope, ft/ft	0.0500	5.0	5-YR	0.40	3.7	0.12	0.18
Gravel	0.00	0%	1.4	Runoff Coefficient	0.4	Runoff Coefficient	0.21	Conveyance Coefficient	15	Final	10-YR	0.46	4.7	0.12	0.26
Other	0.00	0%						Velocity, ft/s	3.4	Tc, min	25-YR	0.53	6.1	0.12	0.39
	0.12	51%		Ti, min=	4.5	Ti, min=	0.0	Tt, min=	0.5	**5.0**	**100-YR**	**0.61**	**8.2**	**0.12**	**0.59**

Appendix E: BMP Design Spreadsheet Calculations for TSS Concentration and Runoff Reduction

TSS Removal

BMP Designation WQ Swale #1

Event Mean TSS Per Table 5.12.3

120 mg/L

Variable	Value	Unit	
n	1	-	(Turbulance Factor: 1=bad, 5=good)
V_s	0.0059	ft/sec	(Settling Velocity of Particles)
Q	0.13	ft^3/sec	(Applied Flow Rate, 1.25 Yr Peak Flow)
A	80	ft^2	(Area of Treatment)
R	**0.78**	-	(Fraction of solids removed)

TSS Concentration After Treatment

25.91 mg/L Min 80% Removal of Event Mean TSS

TSS Removal

BMP Designation WQ Swale #2

Event Mean TSS Per Table 5.12.3

120 mg/L

Variable	Value	Unit	
n	1	-	(Turbulance Factor: 1=bad, 5=good)
V_s	0.0059	ft/sec	(Settling Velocity of Particles)
Q	1.05	ft^3/sec	(Applied Flow Rate, 1.25 Yr Peak Flow)
A	600	ft^2	(Area of Treatment)
R	**0.77**	-	(Fraction of solids removed)

TSS Concentration After Treatment

27.45 mg/L Min 80% Removal of Event Mean TSS

TSS Removal

BMP Designation WQ Swale #3

Event Mean TSS Per Table 5.12.3

120 mg/L

Variable	Value	Unit	
n	1	-	(Turbulance Factor: 1=bad, 5=good)
V_s	0.0059	ft/sec	(Settling Velocity of Particles)
Q	0.46	ft^3/sec	(Applied Flow Rate, 1.25 Yr Peak Flow)
A	250	ft^2	(Area of Treatment)
R	**0.76**	-	(Fraction of solids removed)

TSS Concentration After Treatment

28.53 mg/L Min 80% Removal of Event Mean TSS

TSS Removal

BMP Designation WQ Swale #4

Event Mean TSS Per Table 5.12.3

120 mg/L

Variable	Value	Unit	
n	1	-	(Turbulance Factor: 1=bad, 5=good)
V_s	0.0059	ft/sec	(Settling Velocity of Particles)
Q	0.1	ft^3/sec	(Applied Flow Rate, 1.25 Yr Peak Flow)
A	60	ft^2	(Area of Treatment)
R	**0.78**	-	(Fraction of solids removed)

TSS Concentration After Treatment

26.43 mg/L Min 80% Removal of Event Mean TSS

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Designer: Joe Wiedemeier, PE
Company: Four Points
Date: April 26, 2022
Project: Steamboat Airpark Preliminary Plat
Location: Lot 1 Steamboat Airpark

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth: 0.50 inches
Depth of Average Runoff Producing Storm, d_6 = 0.38 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA							
Area ID	RPA #1	RPA #2	RPA #3	RPA #4	RPA #5							
Downstream Design Point ID	DP No. 2	DP No. 6	DP No. 6	DP No. 7	DP No. 8							
Downstream BMP Type	None	None	None	None	None							
DCIA (ft^2)	--	--	--	--	--							
UIA (ft^2)	10,890	9,150	7,405	10,000	18,730							
RPA (ft^2)	29,000	7,400	21,745	21,150	20,000							
SPA (ft^2)	--	--	--	--	--							
HSG A (%)	0%	0%	0%	0%	0%							
HSG B (%)	0%	0%	0%	0%	0%							
HSG C/D (%)	100%	100%	100%	100%	100%							
Average Slope of RPA (ft/ft)	0.300	0.330	0.300	0.200	0.250							
UIA:RPA Interface Width (ft)	50.00	40.00	45.00	45.00	50.00							

CALCULATED RUNOFF RESULTS

Area ID	RPA #1	RPA #2	RPA #3	RPA #4	RPA #5							
UIA:RPA Area (ft^2)	39,890	16,550	29,150	31,150	38,730							
L / W Ratio	15.96	10.34	14.40	15.38	15.49							
UIA / Area	0.2730	0.5529	0.2540	0.3210	0.4836							
Runoff (in)	0.00	0.00	0.00	0.00	0.00							
Runoff (ft^3)	0	0	0	0	0							
Runoff Reduction (ft^3)	363	305	247	333	624							

CALCULATED WQCV RESULTS

Area ID	RPA #1	RPA #2	RPA #3	RPA #4	RPA #5							
WQCV (ft^3)	401	337	273	368	690							
WQCV Reduction (ft^3)	401	337	273	368	690							
WQCV Reduction (%)	100%	100%	100%	100%	100%							
Untreated WQCV (ft^3)	0	0	0	0	0							

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	DP No. 2	DP No. 6	DP No. 7	DP No. 8								
DCIA (ft^2)	0	0	0	0								
UIA (ft^2)	10,890	16,555	10,000	18,730								
RPA (ft^2)	29,000	29,145	21,150	20,000								
SPA (ft^2)	0	0	0	0								
Total Area (ft^2)	39,890	45,700	31,150	38,730								
Total Impervious Area (ft^2)	10,890	16,555	10,000	18,730								
WQCV (ft^3)	401	610	368	690								
WQCV Reduction (ft^3)	401	610	368	690								
WQCV Reduction (%)	100%	100%	100%	100%								
Untreated WQCV (ft^3)	0	0	0	0								

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft^2)	155,470
Total Impervious Area (ft^2)	56,175
WQCV (ft^3)	2,068
WQCV Reduction (ft^3)	2,068
WQCV Reduction (%)	100%
Untreated WQCV (ft^3)	0

Appendix F: Channel Flow Calculations

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Apr 25 2022

Drainage Ditch DP No. 6 - Major Event

Triangular

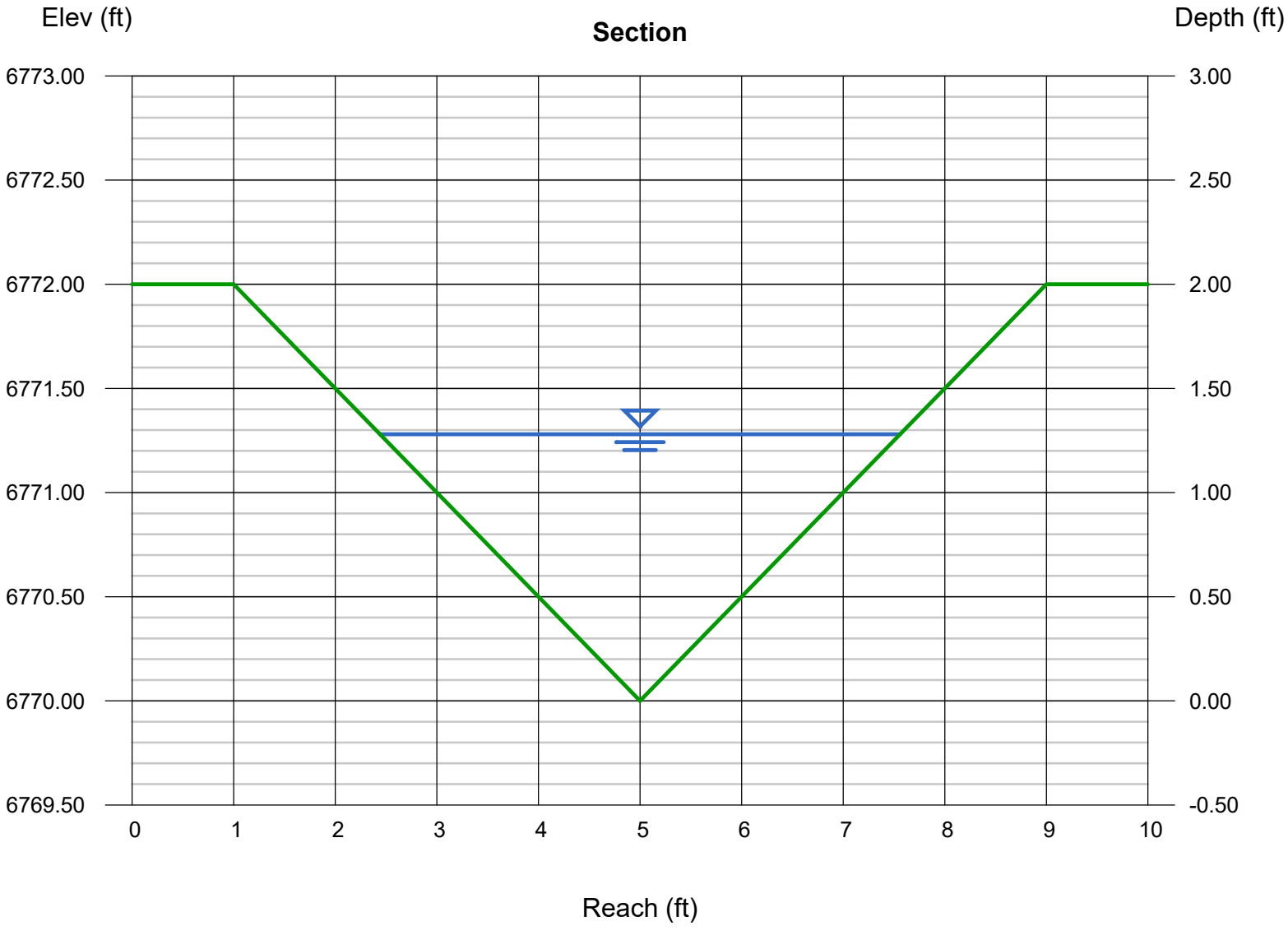
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 6770.00
Slope (%)	= 7.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 25.20

Highlighted

Depth (ft)	= 1.28
Q (cfs)	= 25.20
Area (sqft)	= 3.28
Velocity (ft/s)	= 7.69
Wetted Perim (ft)	= 5.72
Crit Depth, Yc (ft)	= 1.59
Top Width (ft)	= 5.12
EGL (ft)	= 2.20



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Apr 25 2022

Drainage Ditch DP No. 12 - Major Event

Triangular

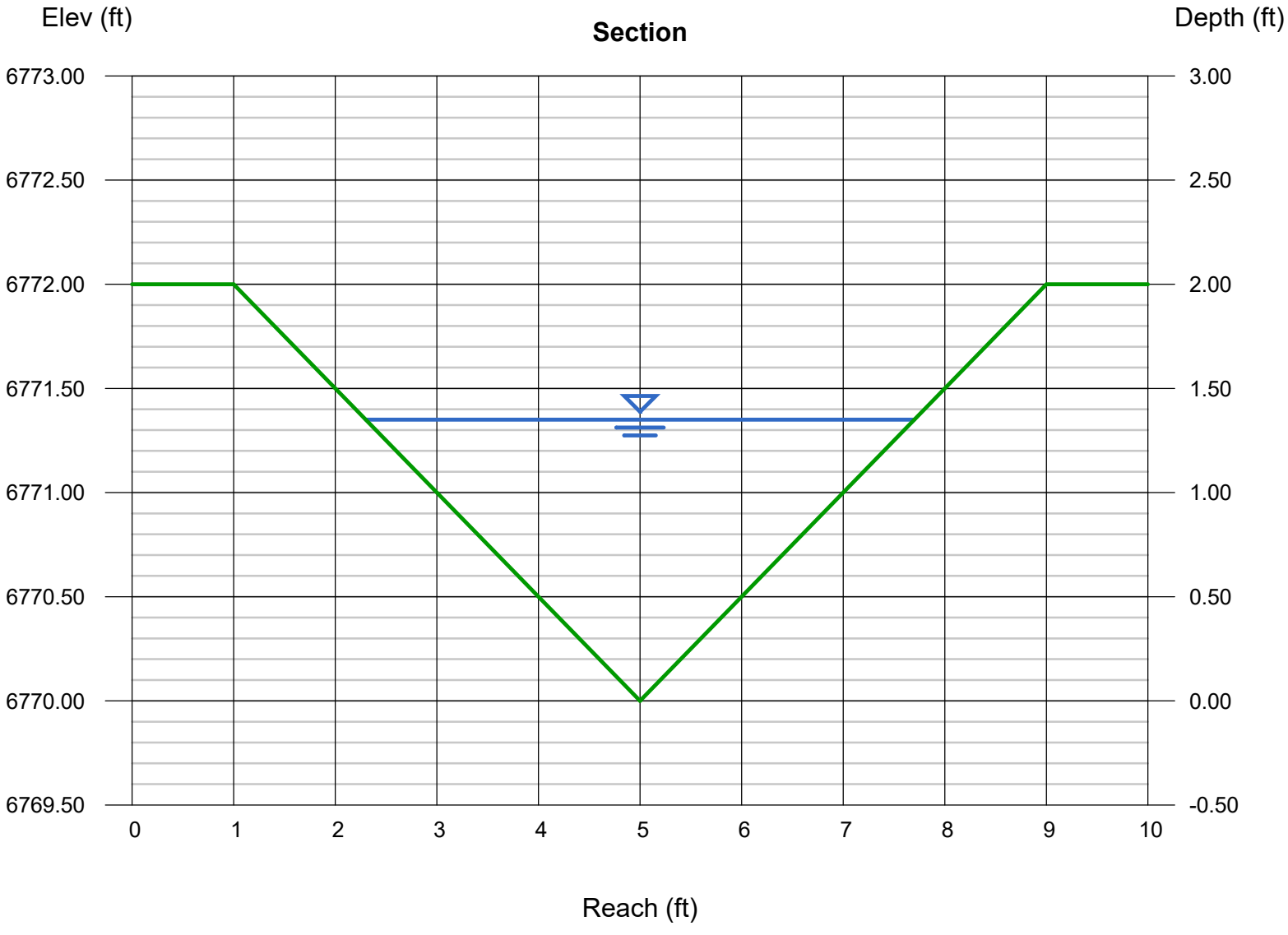
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 6770.00
Slope (%)	= 7.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 29.00

Highlighted

Depth (ft)	= 1.35
Q (cfs)	= 29.00
Area (sqft)	= 3.64
Velocity (ft/s)	= 7.96
Wetted Perim (ft)	= 6.04
Crit Depth, Yc (ft)	= 1.68
Top Width (ft)	= 5.40
EGL (ft)	= 2.33



Channel Report

6-inch Perforated PVC Pipe Full Flow Capacity @ 7% Slope

Circular

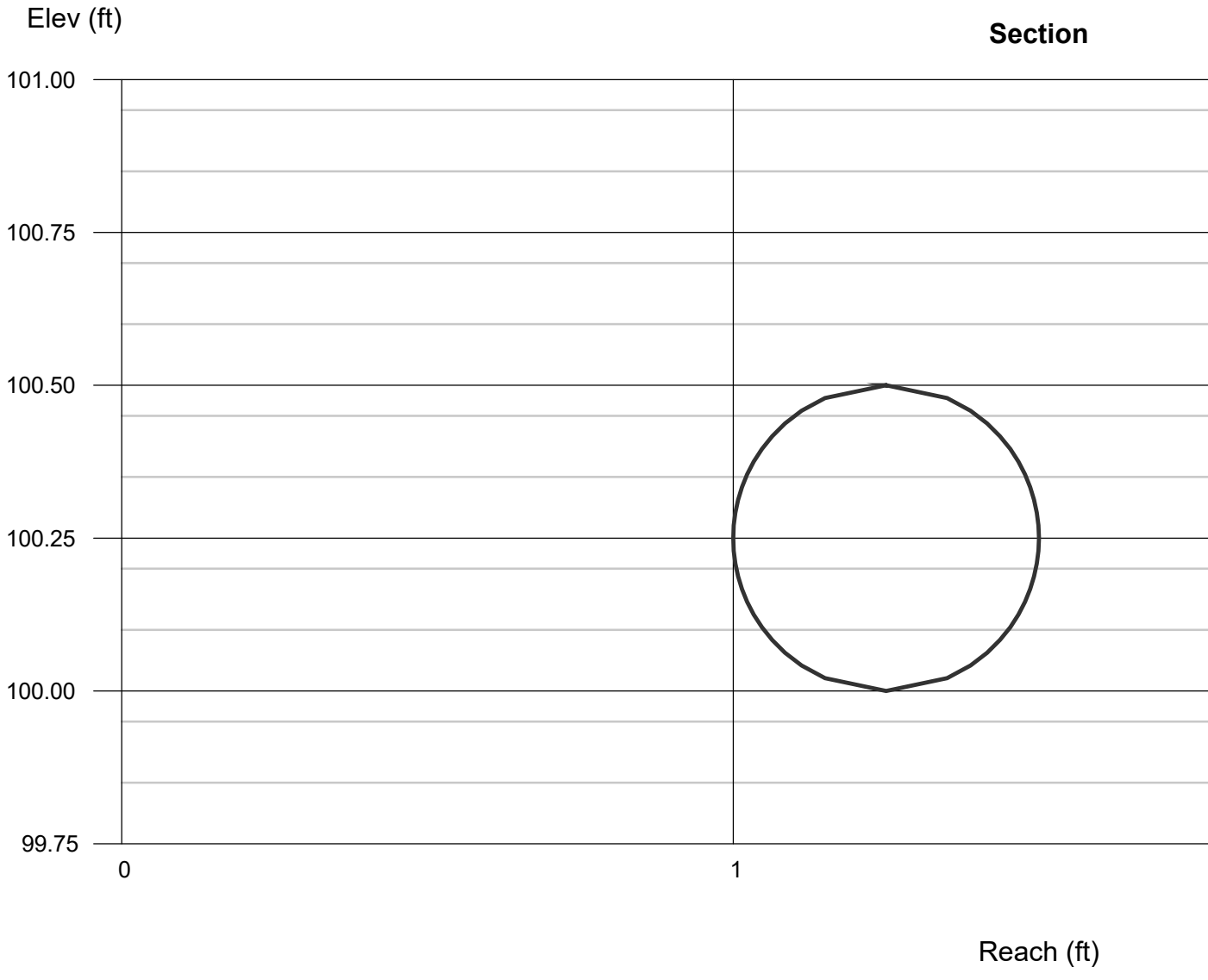
Diameter (ft)	= 0.50
Invert Elev (ft)	= 100.00
Slope (%)	= 7.00
N-Value	= 0.013

Calculations

Compute by:	Q vs Depth
No. Increments	= 10

Highlighted

Depth (ft)	= 0.50
Q (cfs)	= 1.484
Area (sqft)	= 0.20
Velocity (ft/s)	= 7.56
Wetted Perim (ft)	= 1.57
Crit Depth, Yc (ft)	= 0.50
Top Width (ft)	= 0.00
EGL (ft)	= 1.39



Channel Report

6-inch Perforated PVC Pipe Full Flow Capacity @ 4.75% Slope

Circular

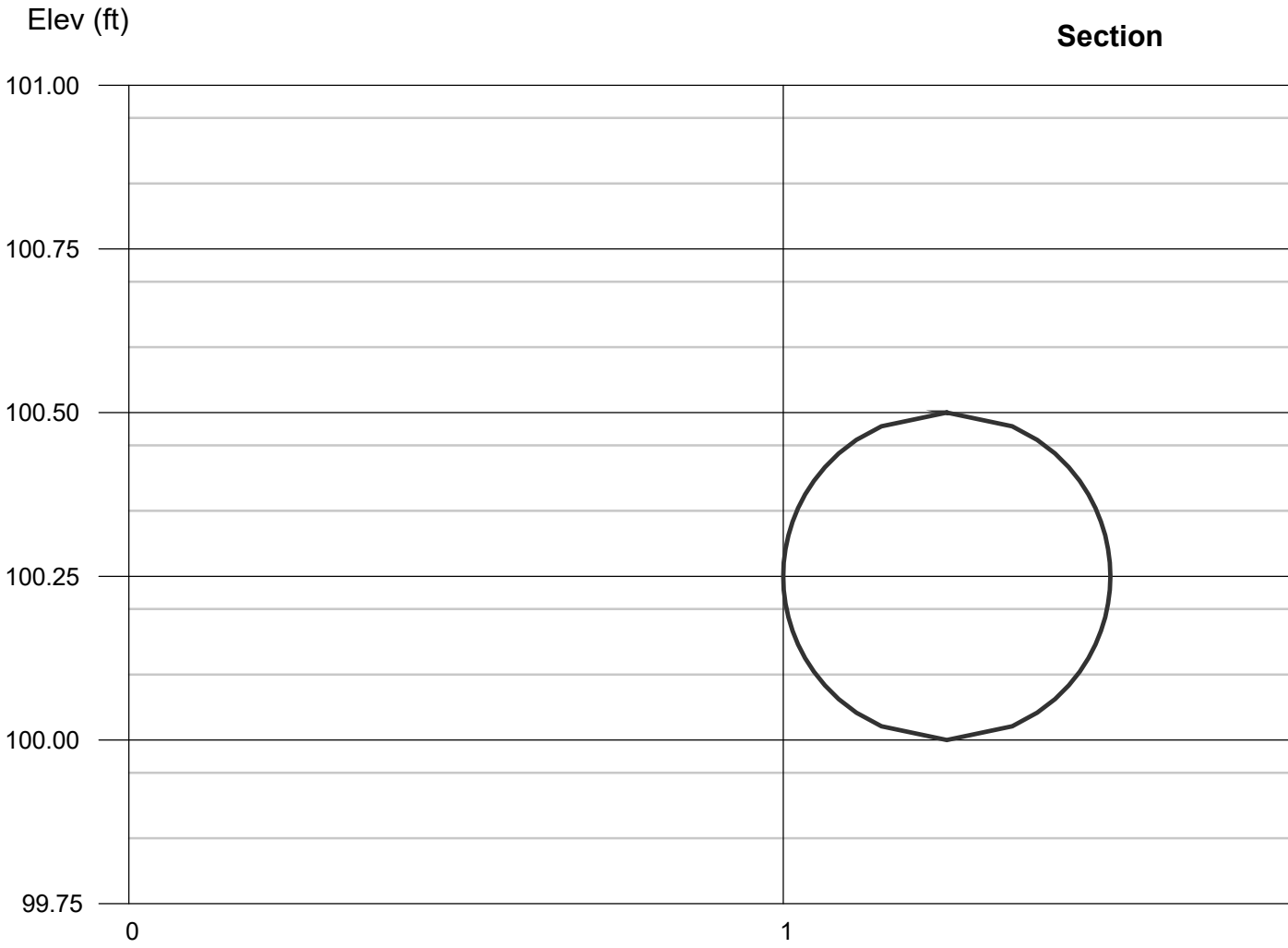
Diameter (ft)	= 0.50
Invert Elev (ft)	= 100.00
Slope (%)	= 4.75
N-Value	= 0.013

Calculations

Compute by:	Q vs Depth
No. Increments	= 10

Highlighted

Depth (ft)	= 0.50
Q (cfs)	= 1.222
Area (sqft)	= 0.20
Velocity (ft/s)	= 6.22
Wetted Perim (ft)	= 1.57
Crit Depth, Yc (ft)	= 0.49
Top Width (ft)	= 0.00
EGL (ft)	= 1.10



Appendix G: Inlet Capacity Curves

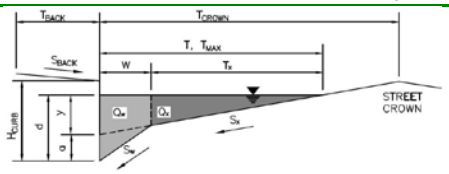
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: West Acres Ranch

Inlet ID: DP 5



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	1.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.045	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	8.0	8.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**3.1**	**3.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

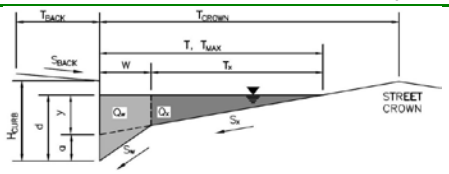
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: West Acres Ranch

Design Point DP 6



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.040	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	8.0	8.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**3.9**	**3.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

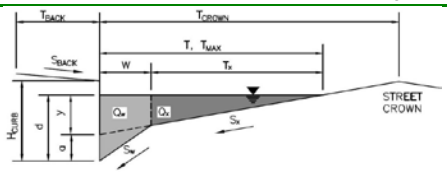
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: West Acres Ranch

Inlet ID: DP 8



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	1.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.045	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	8.0	8.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**3.1**	**3.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Appendix H: Culvert and Storm Sewer Capacity Calculations

Culvert Report

Culvert - DP No. 6 - Major Event

Invert Elev Dn (ft)	=	6766.50
Pipe Length (ft)	=	40.00
Slope (%)	=	1.00
Invert Elev Up (ft)	=	6766.90
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Culvert
Culvert Entrance	=	Smooth tapered inlet throat
Coeff. K,M,c,Y,k	=	0.534, 0.555, 0.0196, 0.9, 0.2

Embankment

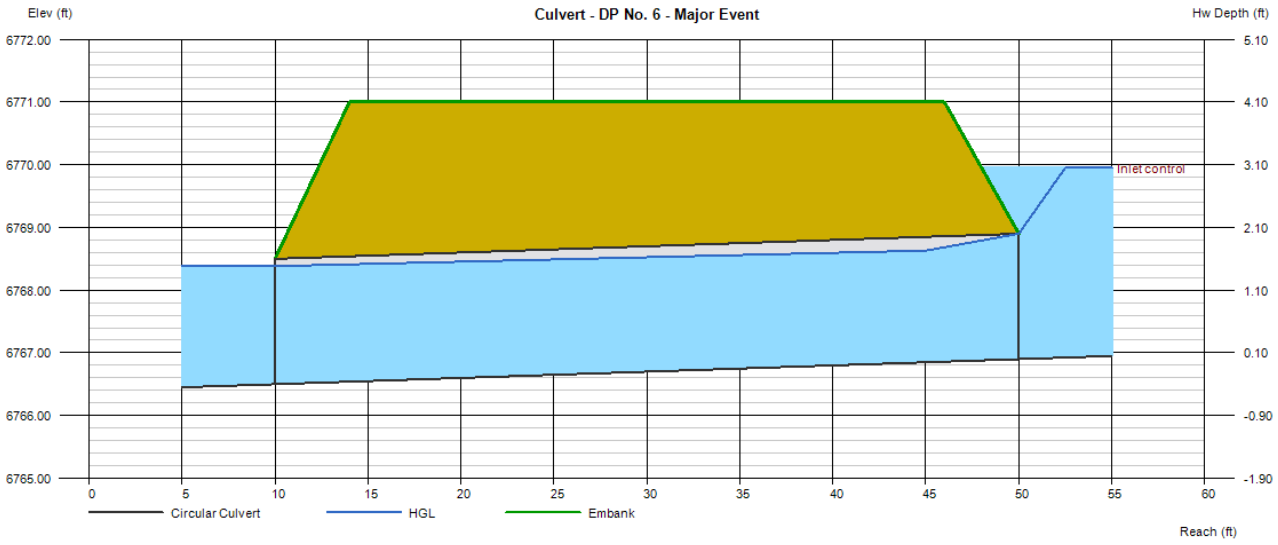
Top Elevation (ft)	=	6771.00
Top Width (ft)	=	32.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	25.20
Qmax (cfs)	=	25.20
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	25.20
Qpipe (cfs)	=	25.20
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	8.22
Veloc Up (ft/s)	=	8.58
HGL Dn (ft)	=	6768.38
HGL Up (ft)	=	6768.67
Hw Elev (ft)	=	6769.95
Hw/D (ft)	=	1.53
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Apr 26 2022

Culvert - DP No. 6 - Minor Event

Invert Elev Dn (ft)	=	6766.50
Pipe Length (ft)	=	40.00
Slope (%)	=	1.00
Invert Elev Up (ft)	=	6766.90
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Culvert
Culvert Entrance	=	Smooth tapered inlet throat
Coeff. K,M,c,Y,k	=	0.534, 0.555, 0.0196, 0.9, 0.2

Embankment

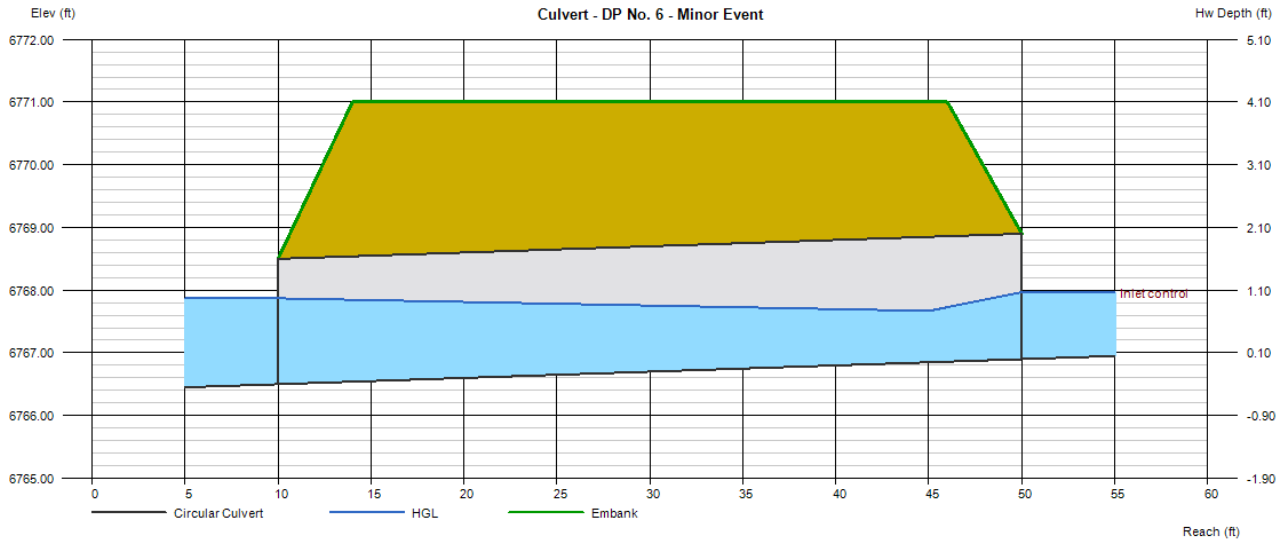
Top Elevation (ft)	=	6771.00
Top Width (ft)	=	32.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	4.44
Qmax (cfs)	=	4.44
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	4.44
Qpipe (cfs)	=	4.44
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.94
Veloc Up (ft/s)	=	4.20
HGL Dn (ft)	=	6767.87
HGL Up (ft)	=	6767.64
Hw Elev (ft)	=	6767.97
Hw/D (ft)	=	0.53
Flow Regime	=	Inlet Control



Culvert Report

Culvert - DP No. 7 - Major Event

Invert Elev Dn (ft)	=	6763.50
Pipe Length (ft)	=	55.00
Slope (%)	=	1.00
Invert Elev Up (ft)	=	6764.05
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Culvert
Culvert Entrance	=	Smooth tapered inlet throat
Coeff. K,M,c,Y,k	=	0.534, 0.555, 0.0196, 0.9, 0.2

Embankment

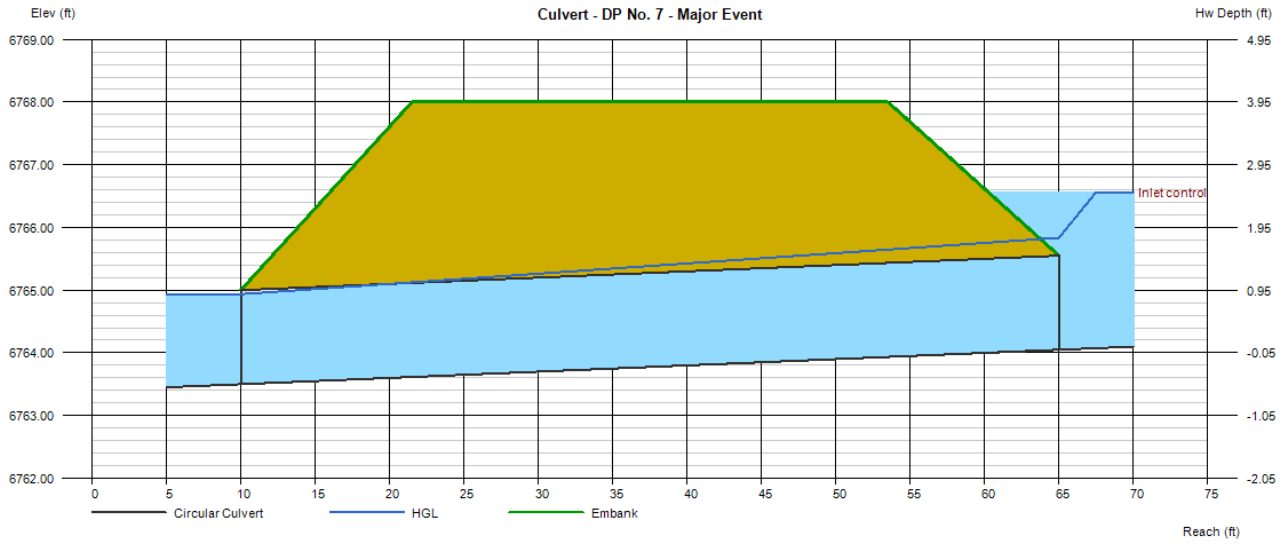
Top Elevation (ft)	=	6768.00
Top Width (ft)	=	32.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	13.67
Qmax (cfs)	=	13.67
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	13.67
Qpipe (cfs)	=	13.67
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	7.85
Veloc Up (ft/s)	=	7.74
HGL Dn (ft)	=	6764.94
HGL Up (ft)	=	6765.84
Hw Elev (ft)	=	6766.57
Hw/D (ft)	=	1.68
Flow Regime	=	Inlet Control



Culvert Report

Culvert - DP No. 7 - Minor Event

Invert Elev Dn (ft)	=	6763.50
Pipe Length (ft)	=	55.00
Slope (%)	=	1.00
Invert Elev Up (ft)	=	6764.05
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Culvert
Culvert Entrance	=	Smooth tapered inlet throat
Coeff. K,M,c,Y,k	=	0.534, 0.555, 0.0196, 0.9, 0.2

Embankment

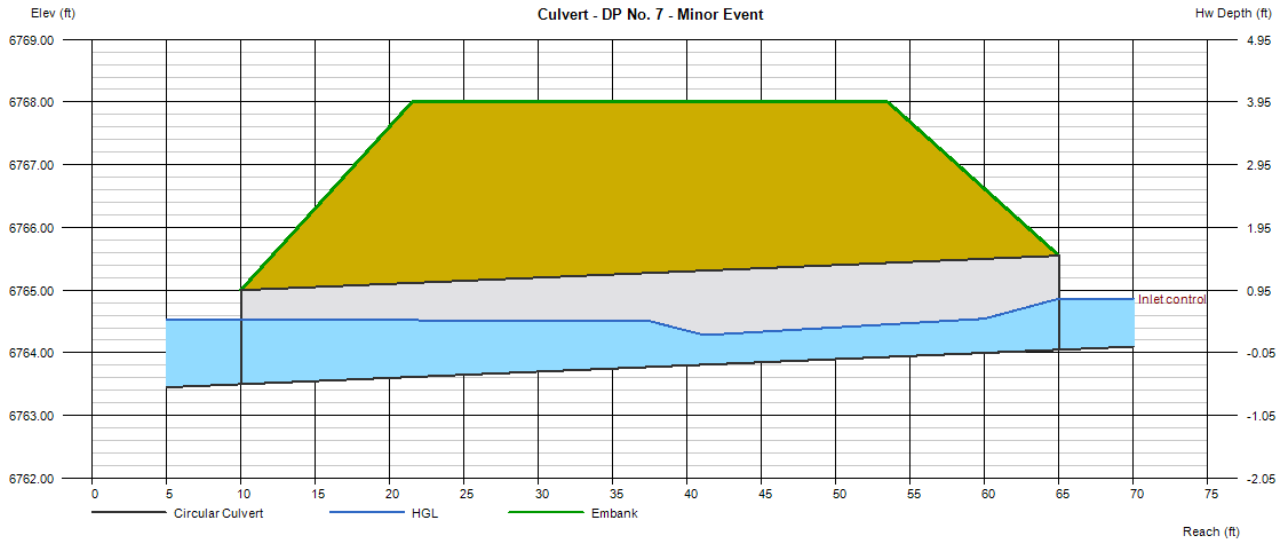
Top Elevation (ft)	=	6768.00
Top Width (ft)	=	32.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	2.23
Qmax (cfs)	=	2.23
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	2.23
Qpipe (cfs)	=	2.23
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.72
Veloc Up (ft/s)	=	3.67
HGL Dn (ft)	=	6764.53
HGL Up (ft)	=	6764.61
Hw Elev (ft)	=	6764.86
Hw/D (ft)	=	0.54
Flow Regime	=	Inlet Control



Culvert Report

Culvert - DP No. 11 - Major Event

Invert Elev Dn (ft)	=	6894.00
Pipe Length (ft)	=	78.00
Slope (%)	=	2.56
Invert Elev Up (ft)	=	6896.00
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.025
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Mitered to slope (C)
Coeff. K,M,c,Y,k	=	0.021, 1.33, 0.0463, 0.75, 0.7

Embankment

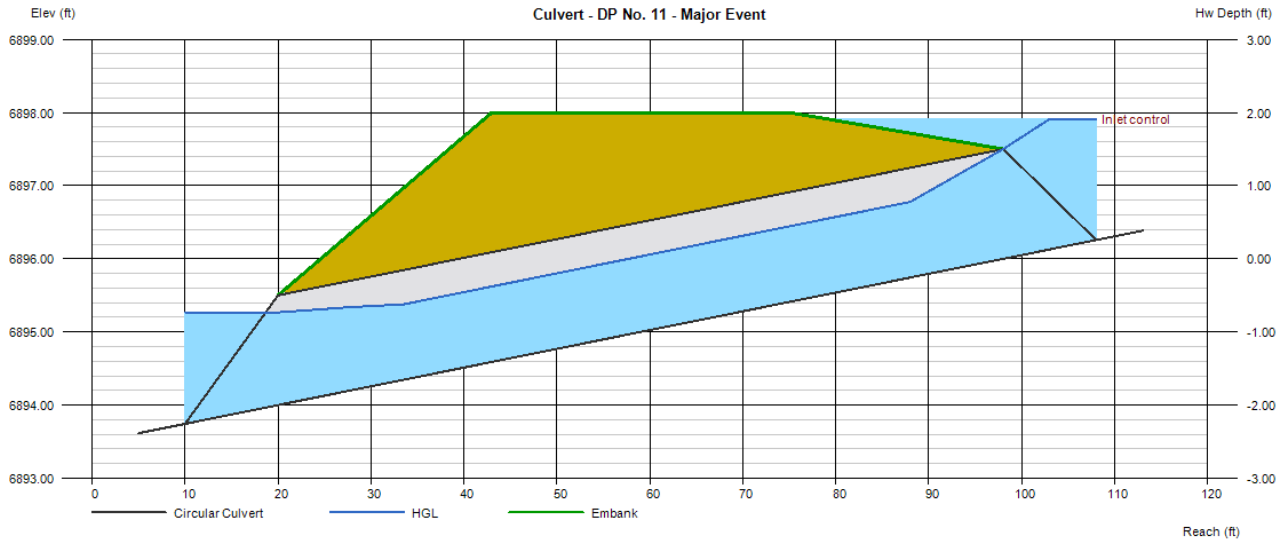
Top Elevation (ft)	=	6898.00
Top Width (ft)	=	32.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	7.16
Qmax (cfs)	=	7.16
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	7.16
Qpipe (cfs)	=	7.16
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	4.49
Veloc Up (ft/s)	=	5.50
HGL Dn (ft)	=	6895.27
HGL Up (ft)	=	6897.04
Hw Elev (ft)	=	6897.91
Hw/D (ft)	=	1.27
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Apr 26 2022

Culvert - DP No. 11 - Minor Event

Invert Elev Dn (ft)	=	6894.00
Pipe Length (ft)	=	78.00
Slope (%)	=	2.56
Invert Elev Up (ft)	=	6896.00
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.025
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Mitered to slope (C)
Coeff. K,M,c,Y,k	=	0.021, 1.33, 0.0463, 0.75, 0.7

Embankment

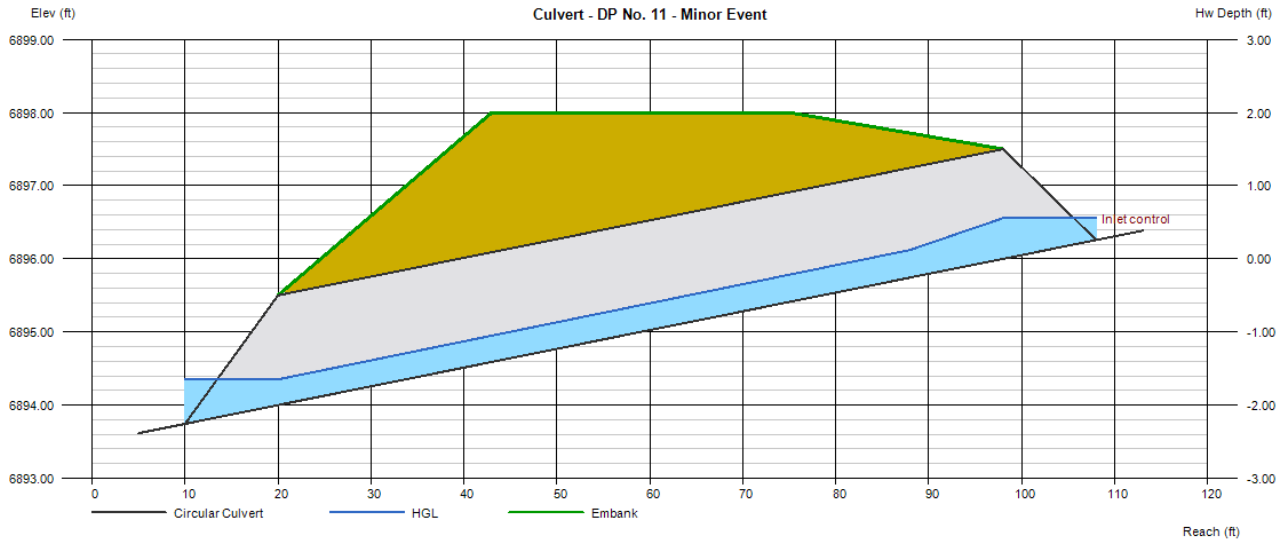
Top Elevation (ft)	=	6898.00
Top Width (ft)	=	32.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	1.05
Qmax (cfs)	=	1.05
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	1.05
Qpipe (cfs)	=	1.05
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.34
Veloc Up (ft/s)	=	2.96
HGL Dn (ft)	=	6894.35
HGL Up (ft)	=	6896.38
Hw Elev (ft)	=	6896.56
Hw/D (ft)	=	0.37
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Apr 26 2022

Gloria Gossard Dual 30-inch Culvert Crossing - Major Event for Proposed Conditions

Invert Elev Dn (ft)	=	6749.70
Pipe Length (ft)	=	130.00
Slope (%)	=	0.69
Invert Elev Up (ft)	=	6750.60
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	2
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Mitered to slope (C)
Coeff. K,M,c,Y,k	=	0.021, 1.33, 0.0463, 0.75, 0.7

Embankment

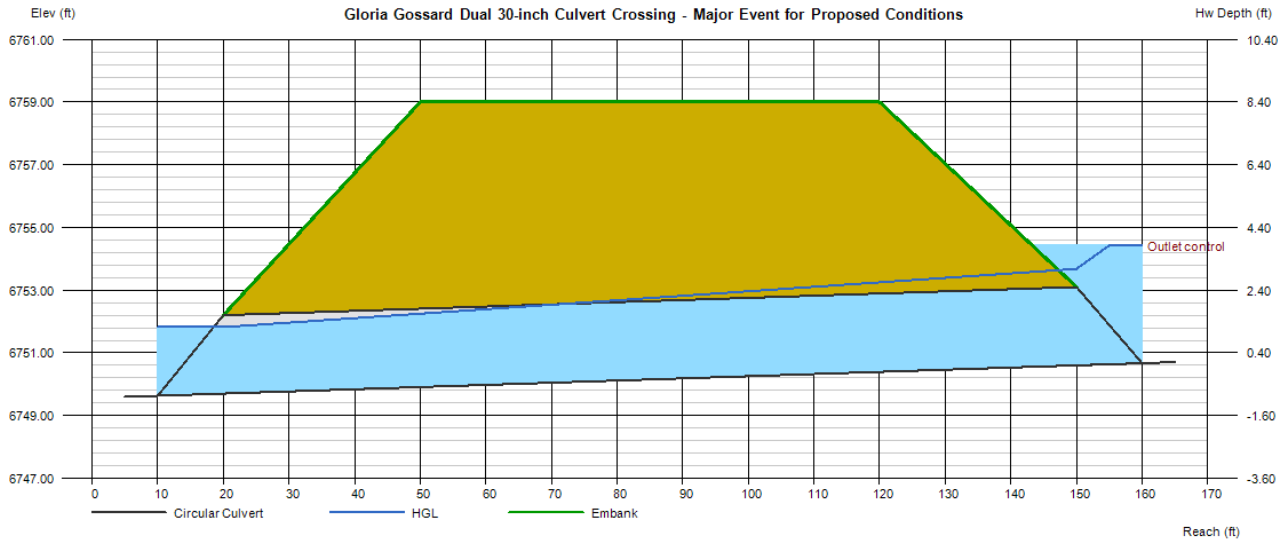
Top Elevation (ft)	=	6759.00
Top Width (ft)	=	70.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	52.39
Qmax (cfs)	=	52.39
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	52.39
Qpipe (cfs)	=	52.39
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	5.90
Veloc Up (ft/s)	=	5.34
HGL Dn (ft)	=	6751.82
HGL Up (ft)	=	6753.68
Hw Elev (ft)	=	6754.43
Hw/D (ft)	=	1.53
Flow Regime	=	Outlet Control



Appendix I: Standard forms No. 3, 4, & 5

Standard Form No. 3 Final Drainage Study Checklist

Instructions:

1. The applicant shall identify with a "check mark" if information is provided with letter. If applicant believes information is not required, indicate with "N/A" and attach separate sheet with explanation.
2. The reviewer will determine if information labeled "N/A" is required and whether additional information must be submitted.

I. General

x A. Report typed and legible in 8½" x 11" format.
x B. Report bound (comb, spiral, or staple – no notebook).
x C. Drawings that are 8½ x 11 or 11 x 17 bound within report, larger drawings (up to 24 x 36) included in a pocket attached to the report. Drawings shall be at an appropriate size and scale to be legible and include project area.

II. Cover

x A. Report Type – Final Drainage Study.
x B. Project Name, Subdivision, Original Date, Revision Date.
x C. Preparer's name, firm, address, phone number.
x D. "DRAFT" for 1st submittal and revisions; "FINAL" once approved.

III. Title Sheet

x A. Table of Contents.
____ B. Certification, PE Stamp, signature, and date from licensed Colorado PE.
x C. Note: City of Steamboat Springs plan review and approval is only for general conformance with City design criteria and the City code. The City is not responsible for the accuracy and adequacy of the design, dimensions, and elevations that shall be confirmed and correlated at the job site. The City of Steamboat Springs assumes no responsibility for the completeness or accuracy of this document.

IV. Introduction

x A. Description of site location, size in acres, existing and proposed land use, and any pertinent background info.
x B. Reference planning application type and plan set date and preparer.
x C. Identify drainage reports for adjacent development.

V. Drainage Criteria and Methodology Used

x A. Identify design rainfall and storm frequency.
x B. Identify the runoff calculation method used.
x C. Identify culvert and storm sewer design methodology.
x D. Identify detention discharge and storage methodology.
n/a E. Discuss HEC-HMS methodologies and parameters, if HEC-HMS is used.

VI. Existing Conditions (Pre-Development/Historic)

x A. Indicate ground cover, imperviousness, topography, and size of site (acres).
x B. Describe existing stormwater system (sizes, materials, etc.).
x C. Describe other notable features (canals, major utilities, etc.).
x D. Note site outfall locations and ultimate outfall location (typically Yampa River).
x E. Note capacity of existing system and identify any constraints.
x F. Identify NRCS soil type.
x G. Discuss any existing easements.
n/a H. Identify the FEMA Map reviewed, if site is in floodplain/way, and zone designation.

VII. Proposed Conditions

x A. Indicate ground cover, imperviousness, topography, and disturbed area (acres).
x B. Describe proposed stormwater system (sizes, materials, etc.).
x C. Describe proposed outlets and indicate historic and proposed flow for each.
x D. Include calculations for all culverts, ditches, ponds, etc. in appendix.
x E. Include a summary table for the 5- and 100-year events showing historic flow and proposed flow for total site and each basin.
n/a F. Discuss proposed easements.
x G. Describe off-site flows to be passed thru site.
x H. Summarize any impacts to downstream properties or indicate none. Reference CLOMR/LOMR and impacts.

I. Detention Ponds.
n/a 1. Indicate pond volume and area (size and depth) requirement.
n/a 2. Indicate release rates.
n/a 3. Discuss outfall design, location, and overflow location.
n/a 4. Discuss maintenance requirements.

J. Curb and Gutter
x 1. Indicate gutter capacity.
x 2. Indicate curb capacity.
x 3. Indicate design velocity
x 4. Indicate design depth of flow in street.

K. Culverts
x 1. Indicate whether each culvert is under inlet or outlet control.
x 2. Show that headwater is less than the maximum allowable.
x 3. Indicate design velocity.
x 4. Indicate required and provided flow rates.
x 5. Discuss whether outlet protection is required and what will be used.

L. Inlets
x 1. Indicate inlet capacity.
x 2. Indicate the type of inlet(s) used.

M. Channels
x 1. Indicate design velocity (and type of dissipation if required).
x 2. Indicate required and provided flow capacity.
x 3. Show critical cross-section(s) including water surface.

N. Site Discharge
x 1. Discuss use and design of detention to ensure discharge is less than or equal to historic flow.
x 2. Provide documentation that downstream facilities are adequate and no adverse impacts to downstream property owners (i.e. no rise certification)

VIII. Post Construction Stormwater Management

x A. Discuss in general terms which permanent BMP practices will be used to control pollutant and sediment discharge after construction is complete. Exhibit A, Storm Water Quality Plan shall be attached that will give details (see separate checklist)

IX. Conclusions

x A. Provide general summary.
x B. Note if site complies with criteria and any variances to criteria.
x C. Indicate if peak proposed flow is less than, equal to, or greater than peak historic flow for each outfall, design point, and for the total site.
x D. List proposed new stormwater system requirements.

X. References

x A. Provide a reference list of all criteria, master plans, drainage reports and technical information used.

XI. Tables

x A. Include a copy of all tables prepared for the study.

XII. Figures

x A. Vicinity Map.
x B. Site Plan (include the horizontal and vertical datum used and all benchmarks).
C. Existing conditions.
X 1. Delineate existing basin boundaries.
X 2. Delineate offsite basins impacting the site.
X 3. Show existing and proposed topography at an interval of at least 2-ft.
X 4. Show existing runoff flow arrows.
X 5. Show existing stormwater features (structures, sizes, materials, etc.).
N/A 6. Show floodplain limits and information.
X 7. For each basin show bubble with basin number, acreage and % impervious.
X 8. For each outlet show bubble with acreage and historic flow and proposed flow or provide information in summary table on figure.
D. Proposed Conditions
x 1. Delineate proposed basin boundaries.
x 2. Show proposed runoff flow arrows.
x 3. Show existing and proposed topography at an interval of at least 2-ft.
x 4. For each basin show bubble with basin number, acreage and percent impervious or provide a summary table or figure.
x 5. For each outlet show bubble with acreage, historic flow, and proposed flow or provide a summary table or figure.
x 6. Show floodplain limits and information.
n/a 7. Show proposed building footprints and FFE for commercial and multi-family
x 8. Show property lines and easements (existing and proposed).
x 9. Label public and private facilities. A general note can be placed on the plans in lieu of labeling all facilities, if applicable.

XIII. Appendices

x A. Runoff Calculations.
x B. Culvert Calculations.
n/a C. Pond Calculations.
x D. Other Calculations.

Acknowledgements

Standard Form No. 3 was prepared by: Joe Wiedemeier 4/26/2022
Date

Include Attachment A – Scope Approval Form (see Standard Form No. 5)
Include Attachment B – Storm Water Quality Plan (see Standard Form No. 4)

VII F. Easements will be established for all proposed permanent water quality features with the final draft.

Standard Form No. 4 Stormwater Quality Plan Checklist

This list is not an exhaustive list of every possible item that may be required or requested in a Stormwater Quality Plan but provides a general guideline for preparation of the Stormwater Quality Plan.

Instructions:

1. The applicant shall identify with a "check mark" if information is provided within the Stormwater Quality Plan. If applicant believes information is not required, indicate with "N/A" and attach separate sheet with explanation. If information is included with the associated drainage letter or study, indicated with a "D."
2. The reviewer will determine if information labeled "N/A" is required and whether additional information must be submitted.

I. General

x A. Report typed and legible in 8½" x 11" format.
x B. Report bound (comb, spiral, or staple – no notebook) and in digital PDF format.
x C. Drawings that are 11" x 17" bound within letter, larger drawings (up to 24" x 36") included in a pocket attached to the letter, and a digital PDF copy. Drawings shall be at an appropriate size and scale to be legible and include project area.

II. Cover

x A. Report Type – Stormwater Quality Plan.
x B. Project Name, Subdivision or Development, Original Date, Revision Date.
x C. Preparer's name, firm, address, and phone number.
x D. "DRAFT" for 1st submittal and revisions; "FINAL" once approved.

III. Title Sheet

x A. Table of Contents.
x B. Certification, PE Stamp, signature and date from licensed Colorado PE (for Final).
x C. Note: City of Steamboat Springs plan review and approval is only for general conformance with City design criteria and City code. The City is not responsible for the accuracy and adequacy of the design, dimensions, and elevations that shall be confirmed and correlated at the job site. The City of Steamboat Springs assumes no responsibility for the completeness or accuracy of this document.

IV. Introduction and Background

x A. Description of site location, study limits, size in acres, existing and proposed land use, soil data, permeability of the site, drainage patterns, and any pertinent background info.
x B. State purpose and goal of Stormwater Quality Plan and report along with any special requirements of the desired outcome.
x C. List any project stakeholders and/or requestors.
x D. Describe the background of the flooding source and any previous studies.

V. Design Criteria and Methodology Used

X A. Identify design rainfall and storm frequency used to design permanent stormwater treatment facilities.

X B Identify the runoff calculation method used to design permanent stormwater treatment facilities.

X C. Identify the standard the design will meet and the means and methodologies by which it will use to meet the standard.

X D. Provide all details supporting the use of the selected design standard.

VI. Proposed Conditions

X A. Identify total site area, total site imperviousness, area to be treated, and impervious area to be treated. Include justification for treating less than the total site area.

X B. Describe potential site contaminant sources including sediment.

x C. Identify source and quantity of on-site and off-site stormwater flows that need to be managed and how they will be managed.

X D. For each permanent treatment facility, identify the design standard, MDCIA level (if applicable), area treated (& percentage of total), imperviousness of area treated, C values of area treated, soil types, and all pertinent data for design.

X E. Volume based facilities: Provide total storage pond volume, WQCV, drain time, release rate, sediment storage, outlet & overflow structures, area and depth of pond, micropool, forebays, etc. (include all calculations in the appendix).

X F. Flow based facilities: Provide design flow rate and all treatment calculations and how flows larger than the water quality design flow rate will be handled. If proprietary facilities are proposed, provide the justification and sizing requirements from manufacturer.

n/a G. If stormwater detention is provided, discuss how water quality is provided within the detention facility. No underground detention is allowed.

VII. Operation and Maintenance Plan Requirements

See template O&M plan and guidance document.

_____ A. Describe general project information, facility description, ROW and access information, vegetation management, hydraulic design parameters, environmental permitting, snow and ice control, and additional pertinent information in the notes.

_____ B. Indicate, describe, and detail the permanent stormwater treatment facilities.

_____ C Include section details where necessary of the permanent treatment facilities.

_____ D. Provide an inspection and maintenance schedule and procedure of permanent treatment facilities and who is responsible for them.

_____ E. Identify design specifications for construction.

Acknowledgements

Standard Form No. 4 prepared by: Joe Wiedemeier 4/26/2022
Date

Include appropriate Project Sheet(s) and Design Checklist(s) (See Section 5.12)
Include this form as part of the Stormwater Quality Plan.

Standard Form No. 5 Drainage and Stormwater Treatment Scope Approval Form

Prior to starting a development plan and before the first drainage submittal, a Drainage and Stormwater Treatment Scope Approval Form must be submitted for review and signed by the City Engineer. A signed form shall also be included in every drainage submittal as Attachment A. This Scope Approval Form is for City requirements only. Values may be approximate. The City encourages supporting calculations and figures to be attached.

Project Information	
Project name:	West Acres Exemption Plan
Project location:	Lot 1 West Acres Ranch Subdivision Exemption
Developer name/contact info:	Bob Zibell, 785-845-3709
Drainage engineer name/contact info:	Matthew McLeod, PE 248-444-3268
Application Type:	Preliminary Plat
Proposed Land Use:	Subdividing lot for future developments

Project Site Parameters	
Total parcel area (acres):	134
Disturbed area (acres):	~3
Existing impervious area (acres, if applicable):	N/A
Proposed new impervious area (acres):	~1
Proposed total impervious area (acres):	~1
Proposed number of project outfalls:	Two, along the north side of Goria Gossard on each (west and east) end of the project site.
Number of additional parking spaces:	0
Description and site percentage of existing cover/land use(s):	Site is currently vacant with a portion of Gloria Gossard Parkway construction along the front of the lot.
Description and site percentage of proposed cover/land use(s):	Gloria Gossard Parkway will be completed to the west property line adjacent to Overlook Park with new sidewalk installed along the north side. A new public street will be included within the proposed platted ROW through proposed Lot 1 & Lot 2, ending at the remainder parcel for future connection.
Expected maximum proposed conveyance gradient (%):	33-50% on proposed cut and fill slopes
Description of size (acres) and cover/land use(s) of offsite areas draining to the site	Nothing is expected.

Type of Study Required:

☐ Drainage Letter
☐ Conceptual Drainage Study
☒ Final Drainage Study
☐ Stormwater Quality Plan

Hydrologic Evaluation:

☒ Rational Method ☐ CUHP/SWMM ☐ HEC-HMS ☐ Other_____

Project Drainage	
Number of subbasins to be evaluated:	~9, could increase as development progresses
Presence of pass through flow (circle): Minor flow from adjacent site	YES (NO)
Description of proposed stormwater conveyance on site:	Sheet flow, storm culvert system, curbs, valley pans and ditches will collect flow.
Project includes roadway conveyance as part of design evaluation (circle):	(YES) NO
Description of conveyance of site runoff downstream of site, identify any infrastructure noted in Stormwater Master Plan noted as lacking capacity for minor or major storm event:	There are two 30 inch culverts located near the middle of the site to the south which carry flow through Gloria Gossard road and eventually out to the Yampa River.
Detention expected onsite (circle):	YES (NO)
Presence of Floodway or Floodplain on site (circle):	YES (NO)
Anticipated modification of Floodway or Floodplain proposed (circle):	YES (NO)
Describe culvert or storm sewer conveyance evaluative method:	mannings

Permanent Stormwater Treatment Facility Design Standard (check all that apply with only one standard per tributary basin):

☒ WQCV Standard ☐ TSS Standard ☐ Infiltration Standard

☐ Constrained Redevelopment WQCV Standard

☐ Constrained Redevelopment TSS Standard

☐ Constrained Redevelopment Infiltration Standard

☐ Does not Require Permanent Stormwater Treatment (attach Exclusion Tracking Form)

Project Permanent Stormwater Treatment	
Justification of choice of proposed design standard, including how the site meets the constrained redevelopment standard, infiltration test results, etc.:	The site is currently vacant so all flow from the proposed public street will need to be treated.
Concept-level permanent stormwater treatment facility design details (type, location of facilities, proprietary structure selection, treatment train concept, etc.):	Water quality treatment will be designed as a part of the drainage study.
Proposed LID measures to reduce runoff volume:	Grass lined water quality swales, reveg
Will treatment evaluation include off-site, pass through flow (circle):	YES (NO)

Approvals

Matthew McLeod, PE Four Points Engineering	3/21/2022	248-444-3268
Prepared By: (Insert drainage engineer name & firm)	Date	Phone number

Approved By:

Printed Name: City Engineer	Date

Drainage Study: Include approved scope.

Appendix J: Project Design Sheets

PROJECT SHEET – BASE DESIGN STANDARDS (Site is not constrained)

Complete a Project Sheet for each project that includes Permanent Stormwater Treatment Facilities.

SITE INFORMATION

Project Name: Steamboat Airpark Preliminary Plat	
Project Location: North of Gloria Gossard Parkway	
Submitted Date: 4/26/2022	Submitted By:
Acreage Disturbed: 10.8 acres	
Existing Impervious: 2% (no imperviousness)	New Net Impervious: 5%
Review Date:	Reviewed By:

Preparer	City	Requirements
		Design Details are included for all Treatment Facilities
		List or include a description of any source controls or other non-structural practices:

DESIGN STANDARDS

Multiple Design Standards may be used on a site, as necessary, to meet the requirements, but only one Design Standard may be used for each treatment facility's tributary area. Evaluation of suitability of permanent stormwater treatment facilities is based on meeting the specified Design Standard and ease of long-term maintenance. Facilities must be designed in accordance with the most current versions of the City's Engineering Standards and Volume 3 of the USDCM and meet the specific requirements for each Design Standard used.

1. Indicate below, which Design Standard(s) will be used for the project, and
2. Complete a separate, corresponding Design Standards checklist for each facility (e.g., WQCV)

Design Standard	*Quantity*	*Tributary Area*	*Location/Identifying information*
WQCV	5	varies	Receiving Pervious Areas (RPAs)
Pollutant Removal	4	varies	Water Quality Swales, where the access road intersects with Gloria Gossard
Runoff Reduction			

DESIGN CHECKLIST – Water Quality Capture Volume (WQCV) Standard

WQCV STANDARD Criteria

Treatment facilities must be designed to provide treatment and/or infiltration of the WQCV for 100% of the site. Under certain conditions, up to 20% of the site may be excluded, not to exceed 1 acre. This may apply if it is not practicable to capture runoff from portions of the site and where it is not practicable to construct a separate treatment facility for those same portions of the site.

Complete checklist if using the WQCV Standard to meet Design Standard requirements.

Project Name: Steamboat Airpark Preliminary Plat			
Preparer	**City**	**Requirements**	
		Facilities provide treatment and/or infiltration of the WQCV for 100% of the site	
		% of site treated: 25% (Other 75% treated by WQ Swales)	
		Facility Type: RPAs	Facility Location: See exhibit DR2
		See Drainage Report section: 4	

If less than 100% of the site is treated, complete the following:

Preparer	**City**	**Requirements**	
		% of site not treated by control measures (not to exceed 20% or 1 acre):	
		%	Size (acres)
		Provide explanation of why the excluded area is impractical to treat:	
		Provide explanation of why another facility is not practicable for the untreated area:	

DESIGN CHECKLIST – Pollutant Removal (TSS) Standard

POLLUTANT REMOVAL STANDARD Criteria

Treatment facilities must be designed to provide treatment of the 80th percentile storm event. The treatment facilities shall be designed to treat stormwater runoff in a manner expected to reduce the event mean concentration of total suspended solids (TSS), at a minimum, to a median value of 30mg/L or less for 100% of the site. Substantiating data must meet criteria in Volume 3 of the USDCM and be included in the submittal. All runoff from the site shall be captured. Under certain conditions, up to 20% of the site may be excluded, not to exceed 1 acre. This may apply if it is not practicable to capture runoff from portions of the site t and it is not practicable to construct a separate treatment facility for those same portions of the site.

Complete checklist if using the Pollutant Removal Standard to meet Design Standard requirements.

Project Name: Steamboat Airpark Preliminary Plat			
Preparer	**City**	**Requirements**	
		Facilities provide treatment of the 80th percentile storm event. The facilities treat stormwater runoff in a manner expected to reduce the event mean concentration of total suspended solids (TSS) to a median value of 30mg/L or less for 100% of the site.	
		Facility Type: WQ Swale	Facility Location: See drainage exhibit , DR2
		Storm event: 1.25 yr	
		TSS mg/L reduction: 30 mg/l min	
		% of site treated: 75% (Other 25% treated by RPAs)	
		See Drainage Report section: 4	

If less than 100% of the site is treated, complete the following:

Preparer	**City**	**Requirements**	
		% of site not treated by control measures (not to exceed 20% or 1 acre):	
		%	Size (acres)
		Provide explanation of why the excluded area is impractical to treat:	
		Provide explanation of why another facility is not practicable for the untreated area:	

Appendix K: Operation and Maintenance Plan for Permanent Water Quality Facilities

provide for final draft