4.2 RCQ Diversion Channel

This section describes the proposed diversion channel to collect and convey stormwater flows around the proposed RCQ infrastructure. Proposed infrastructure in the northwest corner of RCQ includes a material staging area (also referred to as the waste dump area), a material processing unit (crusher), conveyor equipment, and associated support facilities (e.g., gravel parking area, office). Grading will be performed to shed water away from new infrastructure into the new diversion channel. The new infrastructure will not significantly change the quantity of impervious area and does not change the time of concentration in this area.

Existing stormwater flow through this area follows an existing shallow channel that is typically dry. The contribution drainage area and peak flow rates were summarized previously in Section 3.

A stormwater channel will be constructed to divert stormwater from the upstream drainage area and to collect stormwater runoff from the proposed infrastructure. Site grading will route the stormwater around the proposed infrastructure. Channel sizing was conducting using Manning's equation for open channel flow and the following assumptions:

- Channel is trapezoidal with 2H:1V side slopes.
- Channel is lined with rip rap with a Manning's n value of 0.035.
- The bottom width and depth of the channel are 3 ft and 2 ft, respectively.
- The channel will have a minimum slope of 0.5 percent.
- Channel is designed to convey the 25-year design storm at 50 percent or less of total channel depth.
- Channel is designed to convey the 100-year design storm with a minimum of 0.5 ft of freeboard.

Table 3 summarizes the channel flow capacity, depth, and velocity during the design storms.

Table 3. Red Creek Quarry Stormwater Channel

Full-Flow Flow Capacity (cfs)	Flow Depth to Convey 25-Year Design Storm (ft)	Freeboard During 25-Year Design Storm (ft)	Flow Depth to Convey 100-Year Design Storm (ft)	Flow Velocity During 100-Year Design Storm (fps)	Freeboard During 100-Year Design Storm (ft)	Design Criteria Met?
46.9	1	1	1.4	2.8	0.65	Yes

cfs = cubic feet per second
fps = feet per second

4.3 MTAC Culverts

This section describes the selection of culvert geometry and sizing to be installed along the MTAC to convey stormwater. The upstream and downstream channels beyond MTAC limits were not assessed as part of this drainage plan and are assumed to be stable. Hydraulic sizing of the culverts was conducted to convey the design storm peak flows without causing damage to upstream and downstream features. The culvert geometry and sizing presented in this drainage plan is based on the hydrologic analysis described above and the assumptions described below, and is intended to show that culverts along the MTAC are technically viable. The final design and selection of the culvert sizing, based on channel headwater and tailwater characteristics, will be conducted separately.

Figure 6 depicts drainage areas and significant waterway crossings along the MTAC. Hydraulic sizing for the MTAC culverts was conducted using the HY-8 Culvert Hydraulic Analysis program (HY-8) developed by the Federal Highway Administration (FHWA). Preliminary design assumptions include:

- This drainage plan is preliminary; tailwater conditions are assumed to be free-draining such that culvert flow capacity will not be limited by tailwater. This assumption limits this drainage plan to hydraulic design and sizing of the culverts to safely convey the design storms. The design will be further developed as described in Section 1, including design of the culverts as wildlife crossings.
  - To use HY-8, the tailwater channel is assumed to be trapezoidal with 2H:1V side slopes (based on field observations), to be sufficiently wide and deep to convey the design storm, to have an average channel slope of 0.5 percent, and to have a Manning's roughness value of 0.02.
- The culverts are assumed to be either concrete pipes or rectangular concrete boxes (refer to Table 4) with a minimum slope of 0 percent (i.e., installed level). Manning's roughness values for the culverts used the base value in HY-8 for concrete of 0.012.

Table 4. MTAC Culvert Type, Dimensions, and Design Storm Headwater Depth

Crossing Identification	Material Type and Shape	Dimension(s) (width x height or diameter) (ft)	Minimum Slope (ft/ft)	25-year Design Storm Headwater Depth (ft)	100-year Design Storm Headwater Depth (ft)
RCQ Channel	Concrete Pipe	3	0	1.5	2.3
Crossing 1	Concrete Box	4 x 4	0	2.3	3.7
Crossing 2A	Concrete Box	10 x 8	0	4.2	7.0
Crossing 2B	Twin Concrete Boxes	Two 12 x 10	0	5.3	8.6
Crossing 2C	Concrete Box	4 x 4	0	2.1	3.7
Crossing 3	Concrete Pipe, 2 Barrels	3	0	1.5	2.3
Crossing 4	Concrete Pipe	3	0	1.3	2.0
Crossing 5	Concrete Box	6 x 4	0	2.0	3.3
Crossing 6A	Concrete Pipe	3	0	1.5	2.2
Crossing 6B	Concrete Box	8 x 6	0	3.4	5.6
Crossing 6C	Concrete Pipe	3	0	1.3	1.9
Crossing 7	Concrete Box	8 x 6	0	2.8	4.6
Crossing 8	Concrete Box	6 x 4	0	1.8	3.0
Crossing 9	Concrete Box	4 x 4	0	1.8	3.0
Crossing 10	Concrete Pipe	3	0	1.2	1.9
Crossing 11	Concrete Pipe	3	0	1.1	1.8

Table 4. MTAC Culvert Type, Dimensions, and Design Storm Headwater Depth					
Crossing Identification	Material Type and Shape	Dimension(s) (width x height or diameter) (ft)	Minimum Slope (ft/ft)	25-year Design Storm Headwater Depth (ft)	100-year Design Storm Headwater Depth (ft)
Crossing 12	Concrete Pipe	3	0	0.8	1.4
Crossing 13	Concrete Pipe, 2 Barrels	3	0	1.6	2.7
Crossing 14	Concrete Box	6 x 4	0	1.8	3.2
Crossing 15	Concrete Box	10 x 8	0	4.0	6.3
Crossing 16	Concrete Box	10 x 8	0	3.3	5.7
Crossing 17	Concrete Pipe	3	0	1.3	1.9
Crossing 18	Concrete Pipe, 2 Barrels	3	0	1.4	2.5
Crossing 19	Concrete Box	10 x 8	0	3.9	6.3

ft/ft = feet per foot

Culvert sizes were selected to convey the 25-year design storm with headwater less than 66 percent (two-thirds full) of the culvert height and to convey the 100-year design storm without headwater above the top of the culvert inlet. Table 4 provides a summary of the proposed culvert sizing.

4.4 Rip Rap

This section describes rip rap sizing to protect the RCQ diversion channel and MTAC culverts from erosion.

4.4.1 RCQ Channel Rip Rap Lining

Rip rap sizing for the RCQ diversion channel was conducted to determine stone sizing in shallow-slope channels using the method as described in the USACE publication Hydraulic Design of Flood Control Channels. The flow depth and velocity associated with the 100-year design storm calculated in Section 4.2 was used. This calculation method indicates that rip rap with a D_{30} size (i.e., rip rap size of which 30 percent is finer by weight) greater than 1 inch is sufficient to prevent erosion. A minimum D_{30} size of 2 inches installed to a minimum thickness of 6 inches is recommended for this channel.

4.4.2 MTAC Culvert Rip Rap Protection

This drainage plan assumes that rip rap will be placed at the culvert inlets and that rip rap basins will be used to protect against scour/erosion. The HY-8 program includes analysis of rip rap basins. This analysis was used to confirm that a technically sound and economically feasible rip rap basin was viable for each culvert.

Design of the rip rap inlet and outlet protection for one of the ephemeral crossings, Crossing 2C, is included with this drainage plan. As noted in Section 1, the design of the remaining structures will be developed as part of a USACE Nationwide Permit Application.

Rip rap sizing was conducted using the FHWA Hydraulic Engineering Circular No. 14, Third Edition, Hydraulic Design of Energy Dissipators for Culverts and Channels (FHWA, 2006). The culvert type and dimensions from the culvert sizing in Section 4.3 and the HY-8 tailwater information included in Attachment D were used for rip rap sizing.

Table 5 summarizes the rip rap sizing and dimensions for the inlet protection and outlet basin. A typical detail for the rip rap inlet protection and outlet basin is shown in Figure 3.

Table 5. MTAC Rip Rap Sizing for Culvert Inlet and Outlet Protection						
Crossing Identification, Culvert Type and Dimension	Minimum Rip Rap Size (inch)	Dissipation Pool Depth (in)	Dissipation Pool Length (ft)	Apron Lenth (ft)	Total Basin Length (ft)	Basin Width at End of Apron (ft)
Crossing 2C, Concrete Box 4 ft wide x 4 ft tall	D_{50} = 2	3	12	4	16	28

Section 5: Conclusion

The proposed culverts and outlet protection for the project will be protective of upstream and downstream drainage conditions and will appropriately convey runoff from the design storms. The primary change to the existing drainage conditions includes the addition of culvert crossings to convey stormwater across the MTAC.

The proposed grading and drainage features have been designed according to the methods and assumptions described herein. The hydrologic analysis inputs (drainage area, time of concentration, hydraulic soil groups, composite curve number) and peak flows are included in Attachment D. The HY-8 culvert analysis reports for the crossings are provided in Attachment E, and the shape and dimensions for each culvert is summarized in Table 4.

References

Federal Highway Administration. 2006, “Hydraulic Engineering Circular No. 14, Third Edition, Hydraulic Design of Energy Dissipators for Culverts and Channels.”

Fremont County, Department of Planning and Zoning. 2020, "Zoning Resolution" Cañon City, Colorado: Fremont County, May 26.”

United Stated Army Corp of Engineers, Engineering Manual 1110-2-1601. 1994, "Engineering and Design, Hydraulic Design of Flood Control Channels.”

Figures

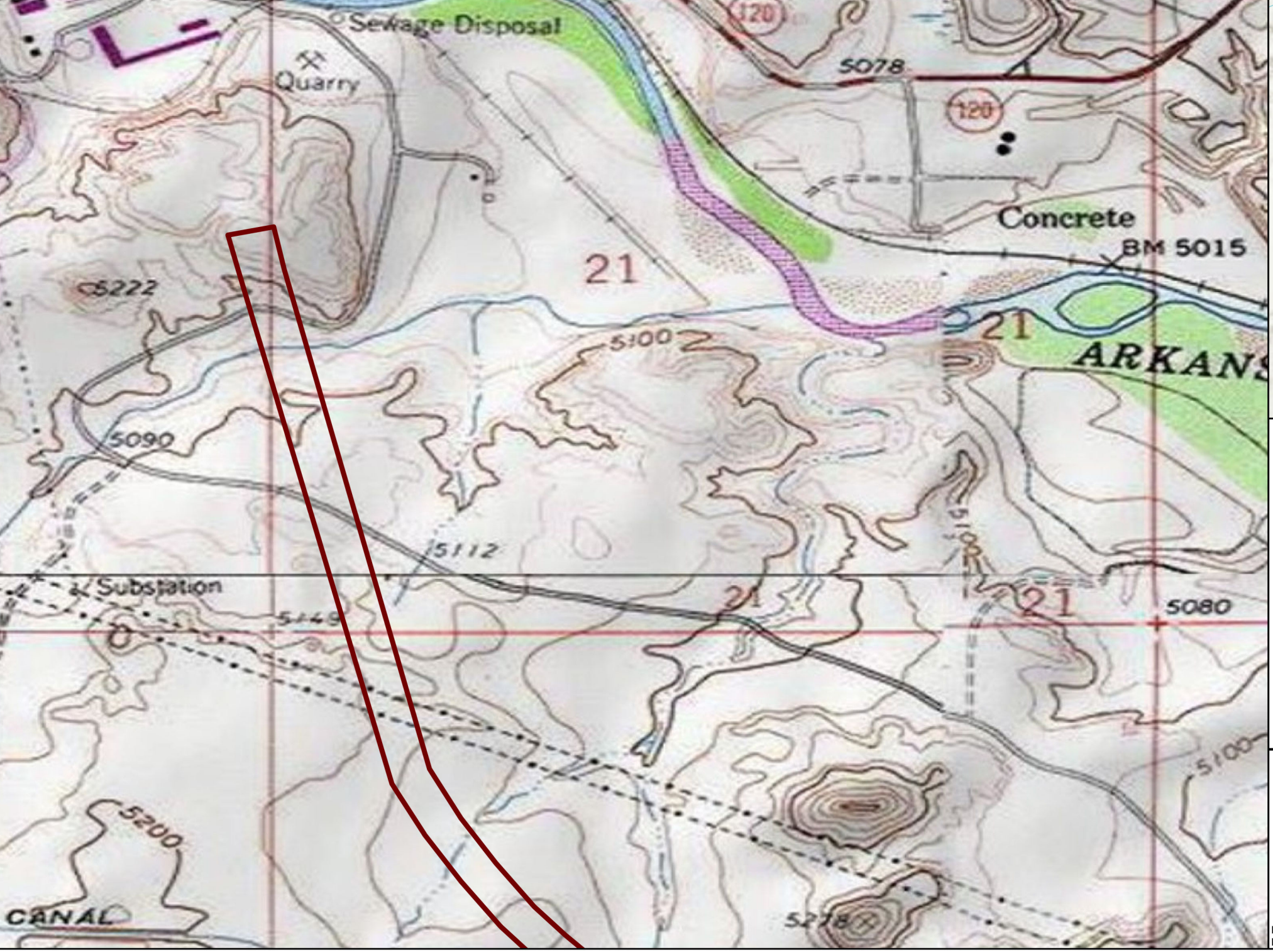

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Figure 1

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Figure 1

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Figure 1

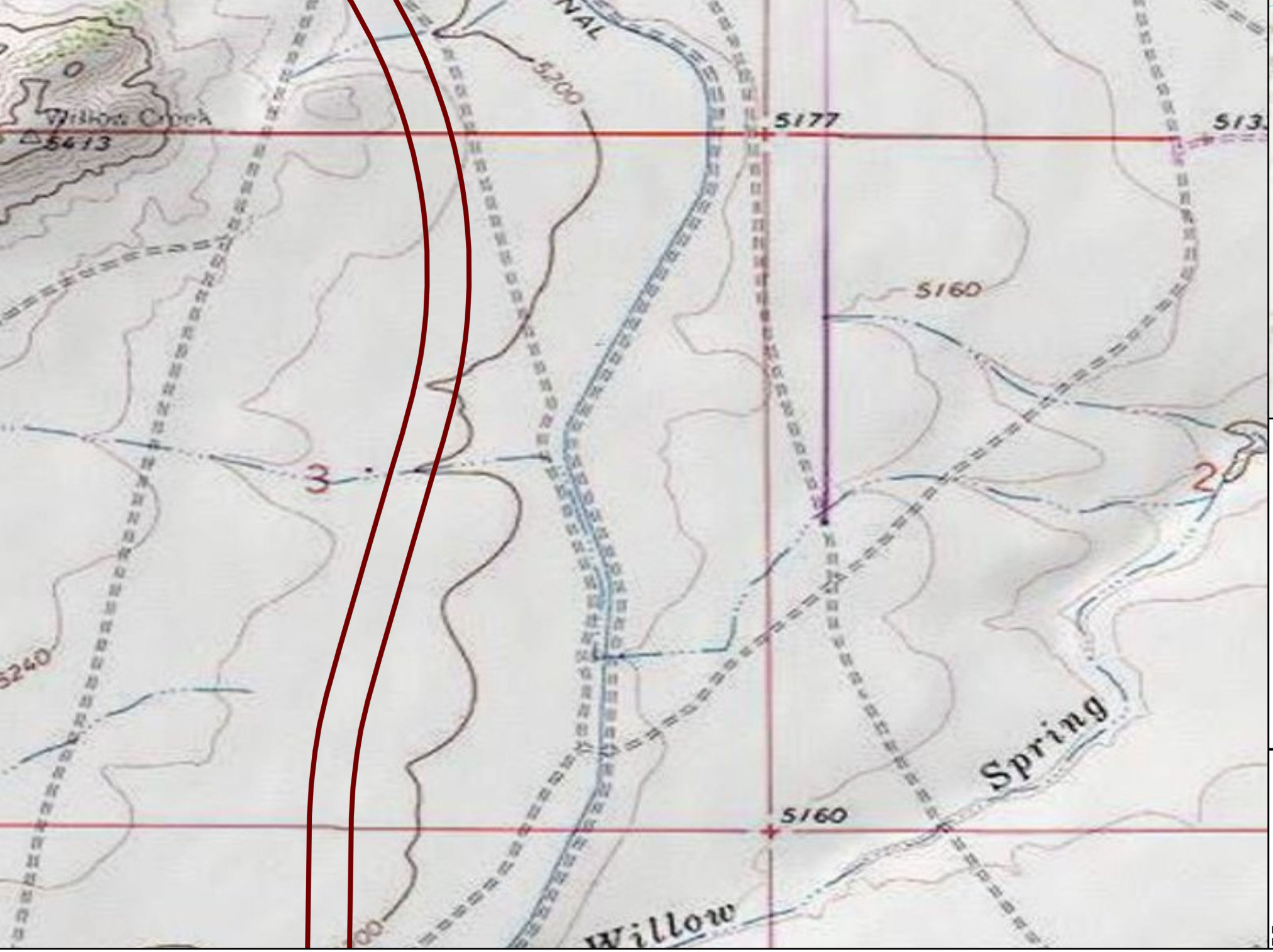

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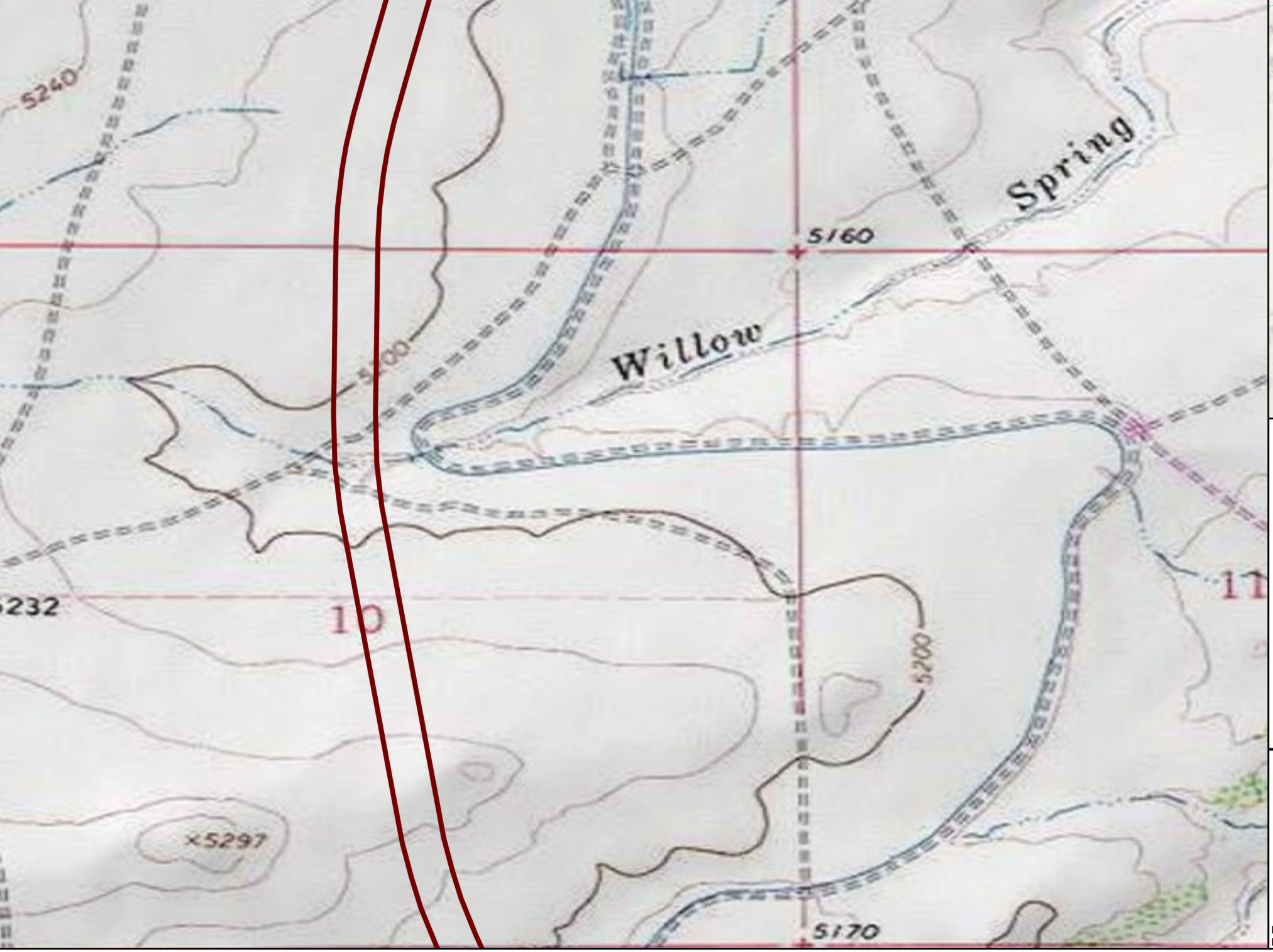
Figure 1



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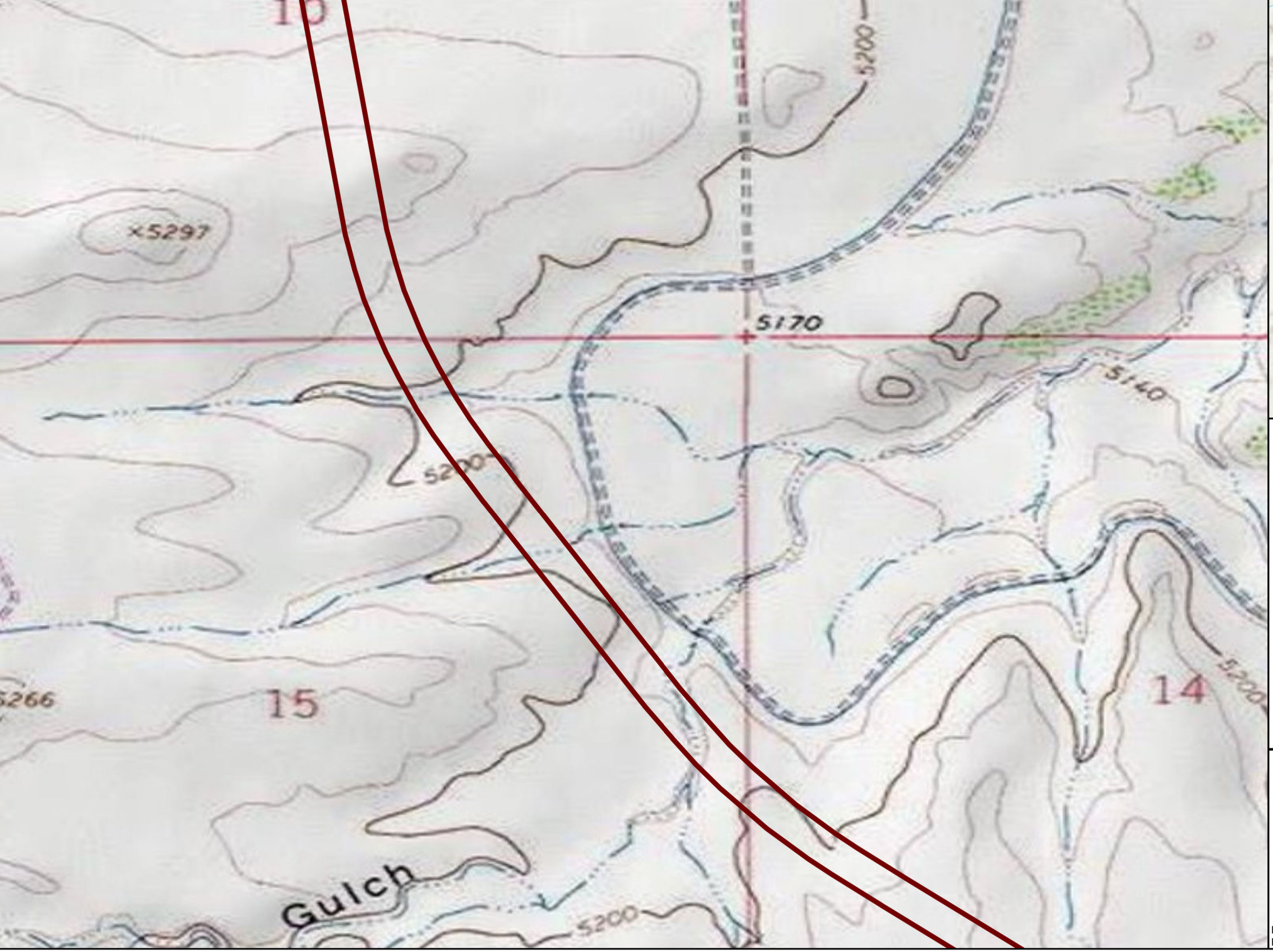

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Figure 1

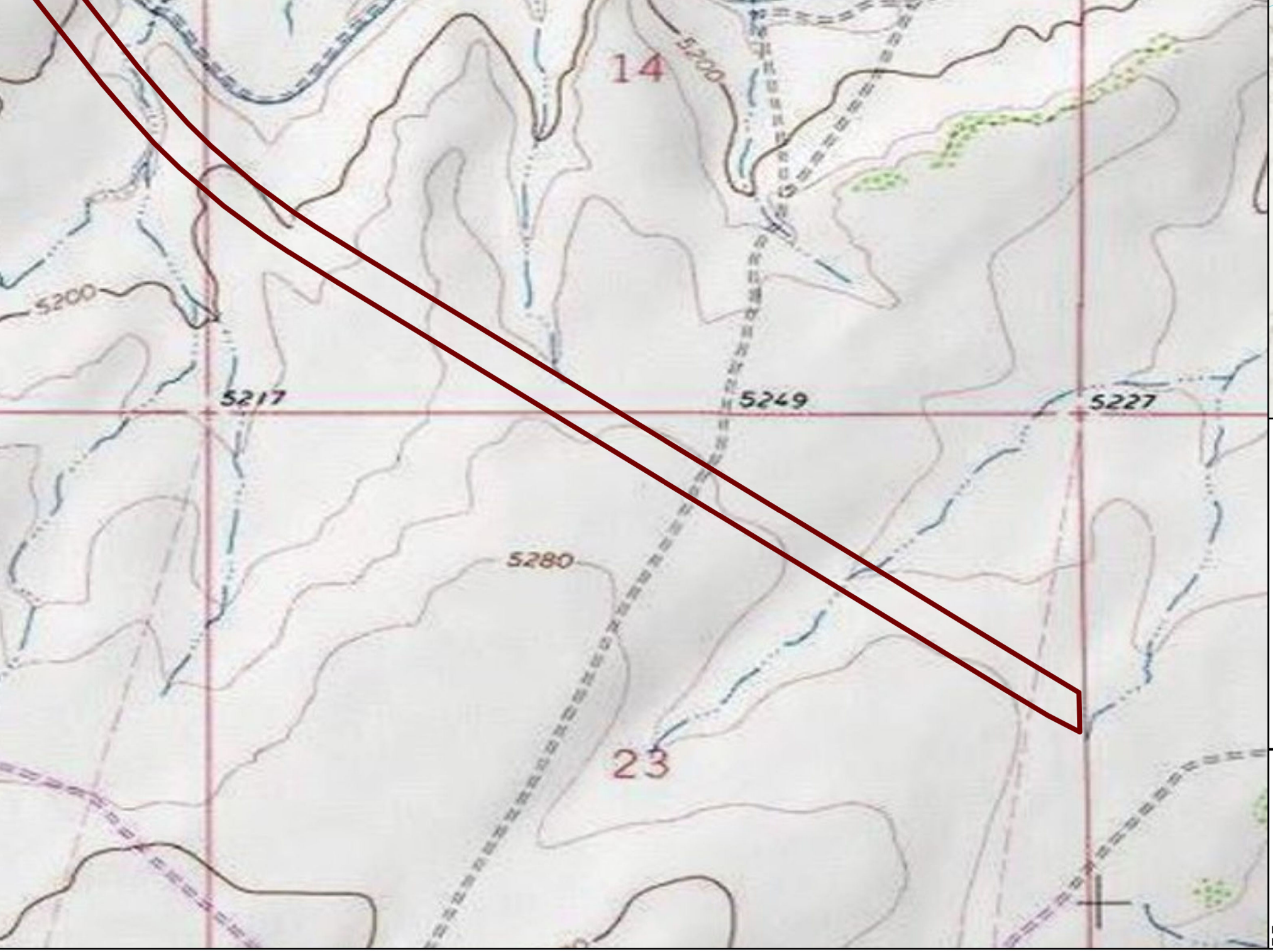

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Figure 1

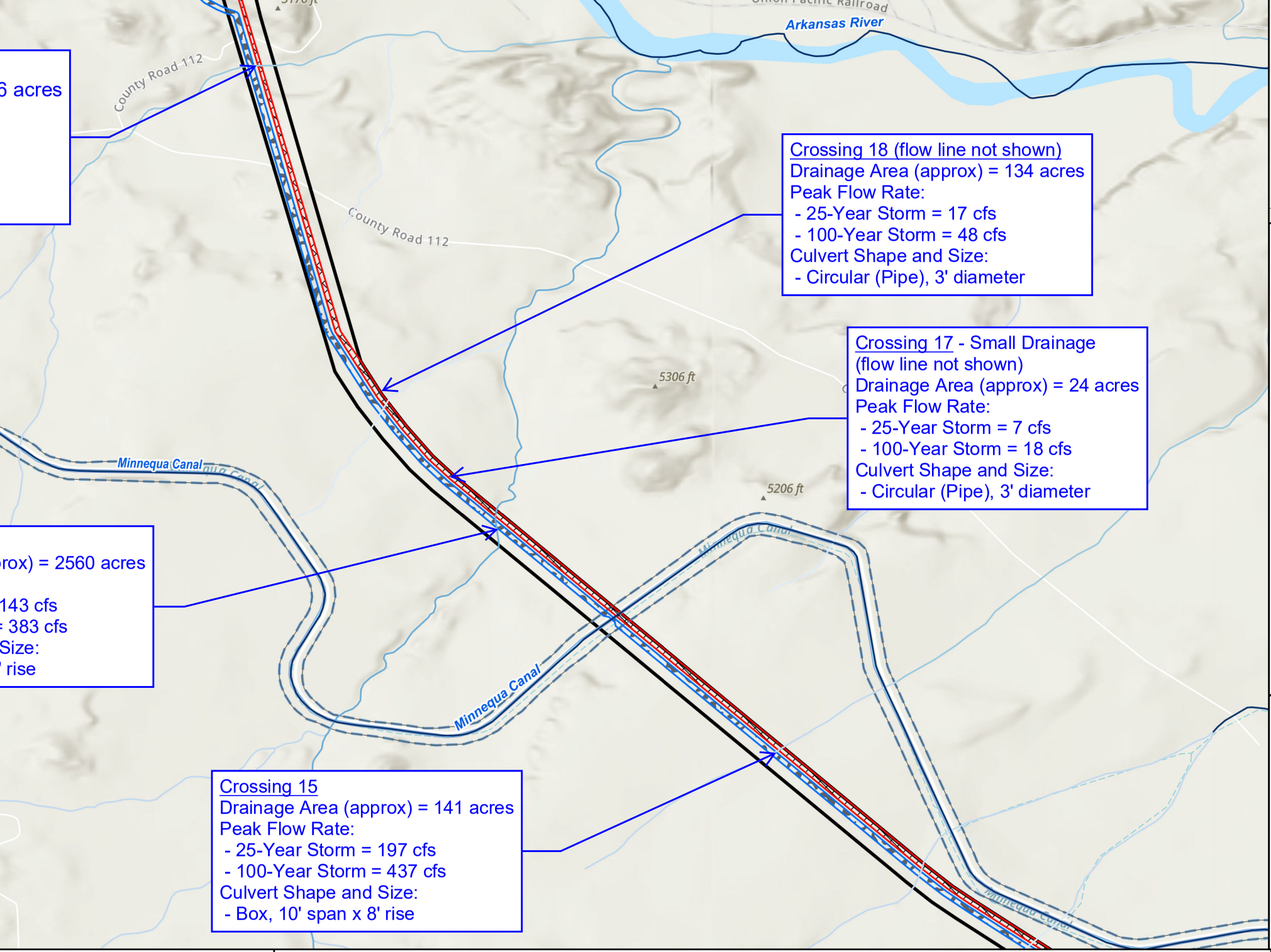


Figure 2

Spatial
Name:
Zone 13

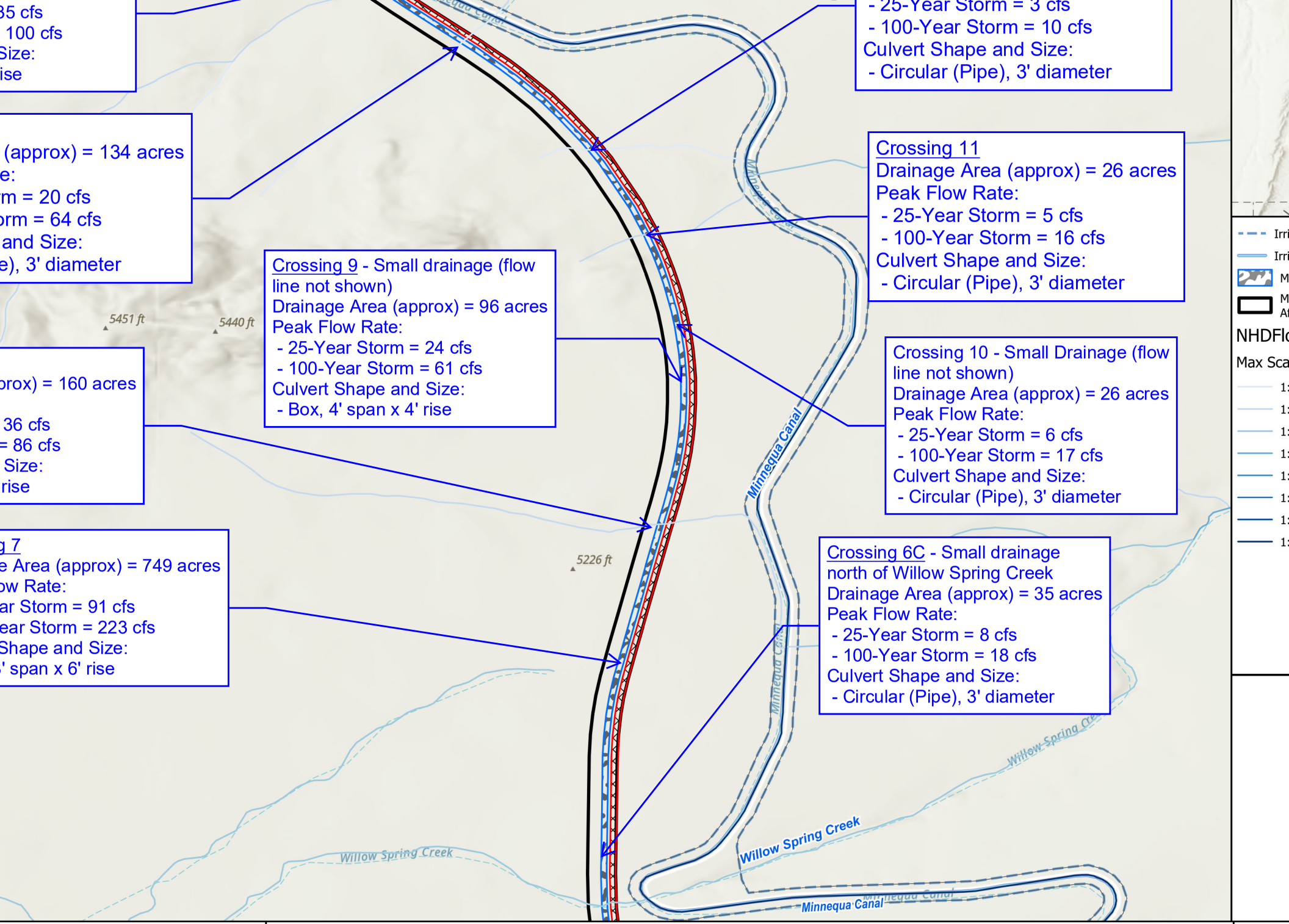


Figure 2

Spatial
Name:
Zone 13

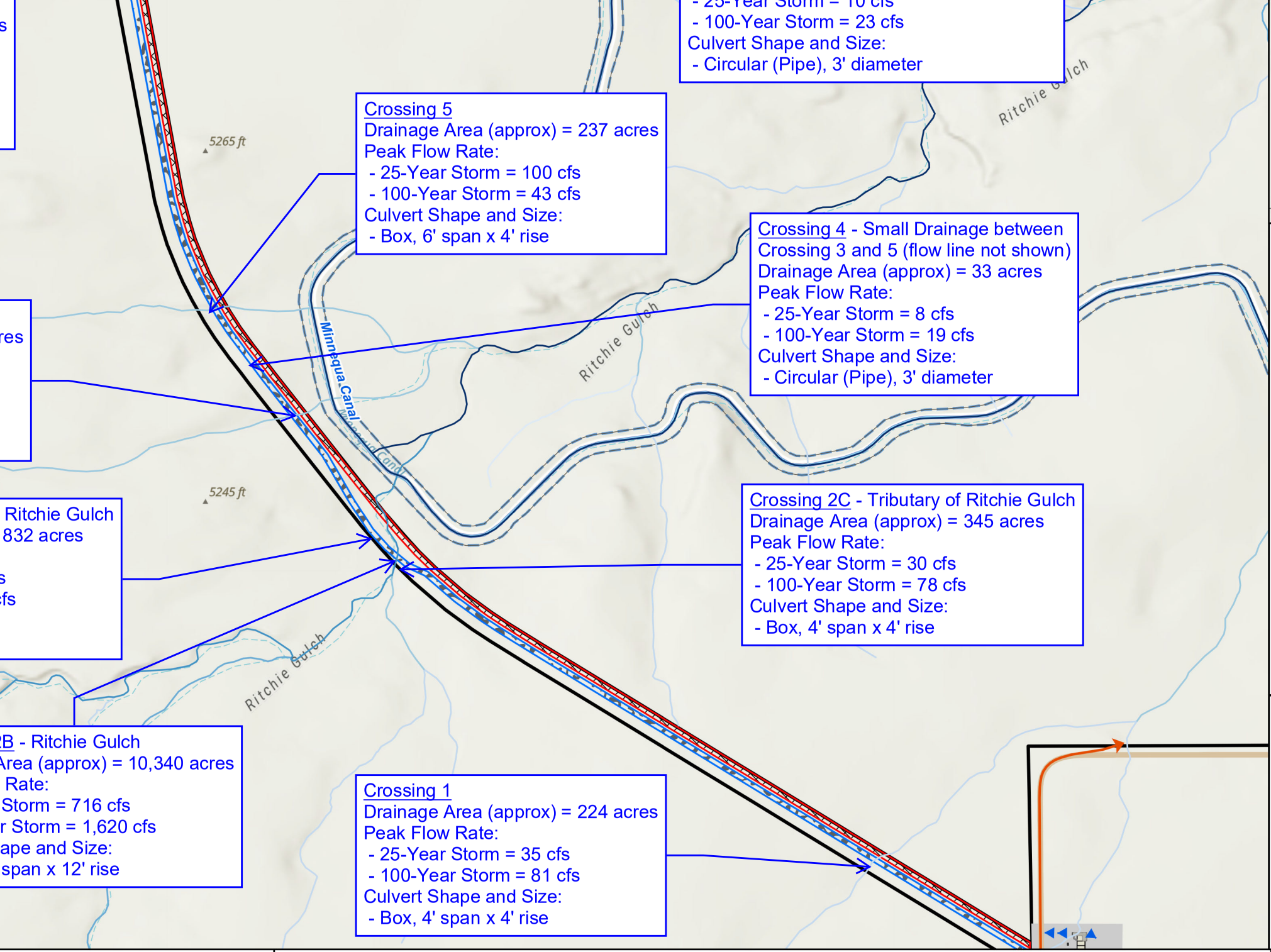

- 25-Year Storm = 10 cfs
- 100-Year Storm = 23 cfs
Culvert Shape and Size:
- Circular (Pipe), 3' diameter
Crossing 5
Drainage Area (approx) = 237 acres
Peak Flow Rate:
- 25-Year Storm = 100 cfs
- 100-Year Storm = 43 cfs
Culvert Shape and Size:
- Box, 6' span x 4' rise
Crossing 4 - Small Drainage between Crossing 3 and 5 (flow line not shown)
Drainage Area (approx) = 33 acres
Peak Flow Rate:
- 25-Year Storm = 8 cfs
- 100-Year Storm = 19 cfs
Culvert Shape and Size:
- Circular (Pipe), 3' diameter
Crossing 2C - Tributary of Ritchie Gulch
Drainage Area (approx) = 345 acres
Peak Flow Rate:
- 25-Year Storm = 30 cfs
- 100-Year Storm = 78 cfs
Culvert Shape and Size:
- Box, 4' span x 4' rise
Crossing 1
Drainage Area (approx) = 224 acres
Peak Flow Rate:
- 25-Year Storm = 35 cfs
- 100-Year Storm = 81 cfs
Culvert Shape and Size:
- Box, 4' span x 4' rise
Ritchie Gulch
5265 ft
5245 ft
Minnequa Canal
Ritchie Gulch
Ritchie Gulch
Ritchie Gulch
NHDFlo
Max Sca

Figure 2

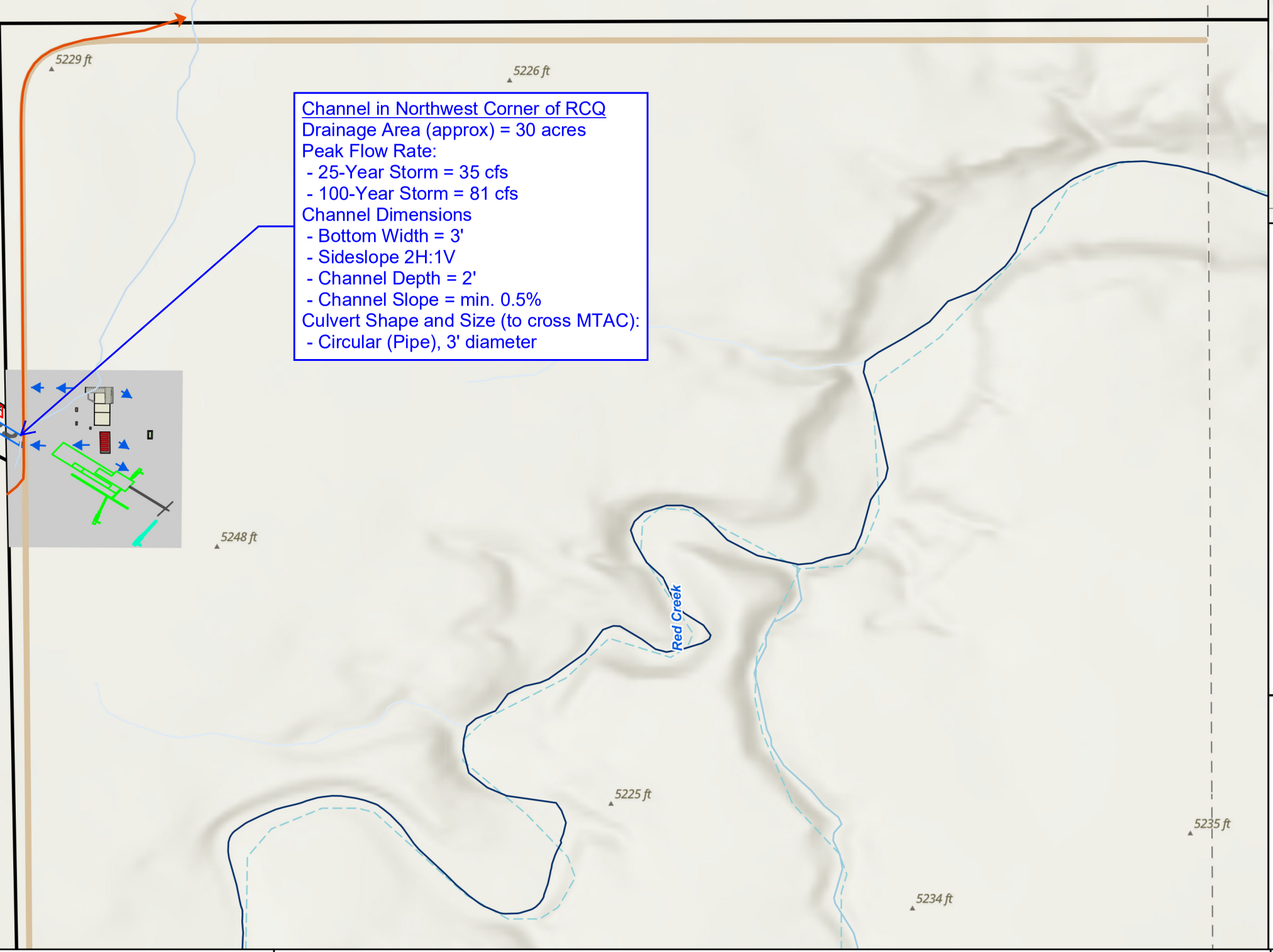

Channel in Northwest Corner of RCQ
Drainage Area (approx) = 30 acres
Peak Flow Rate:
- 25-Year Storm = 35 cfs
- 100-Year Storm = 81 cfs
Channel Dimensions
- Bottom Width = 3'
- Sideslope 2H:1V
- Channel Depth = 2'
- Channel Slope = min. 0.5%
Culvert Shape and Size (to cross MTAC):
- Circular (Pipe), 3' diameter
5229 ft
5226 ft
5248 ft
5225 ft
5235 ft
5234 ft
Red Creek

Figure 2

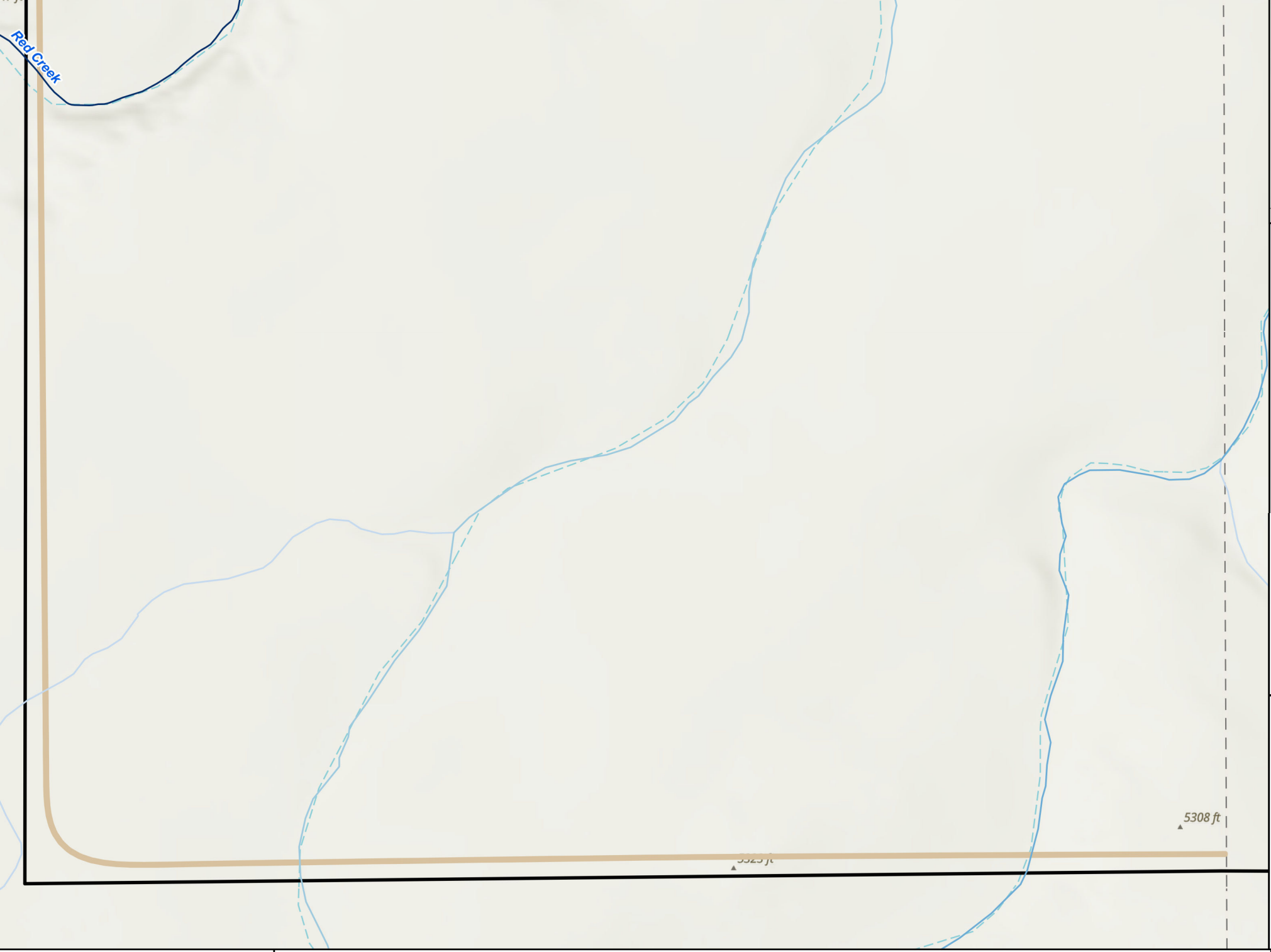
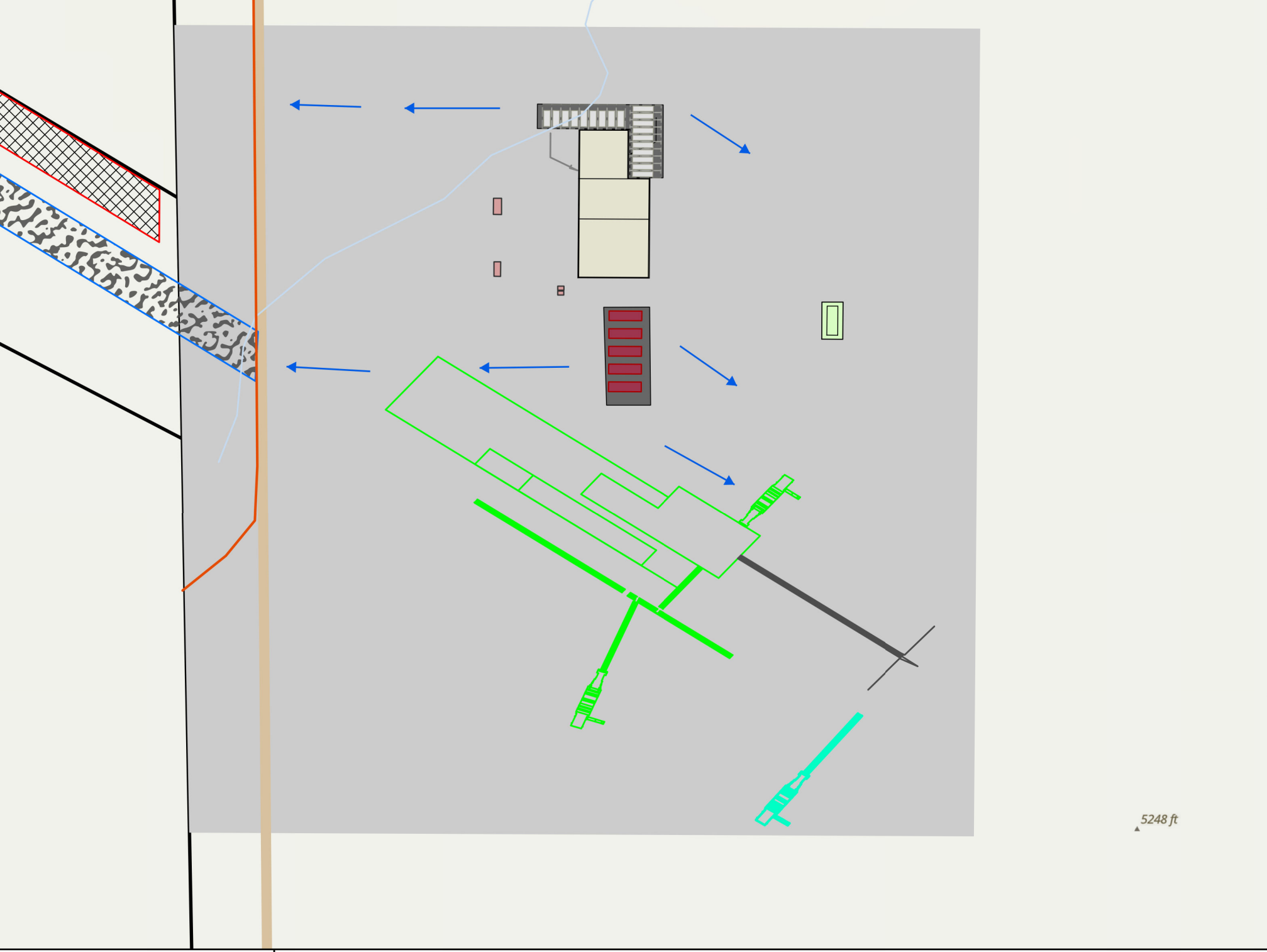


Figure 2



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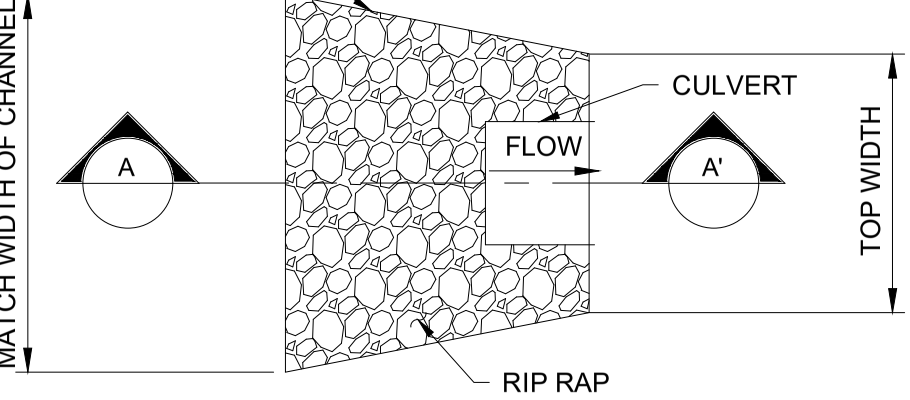
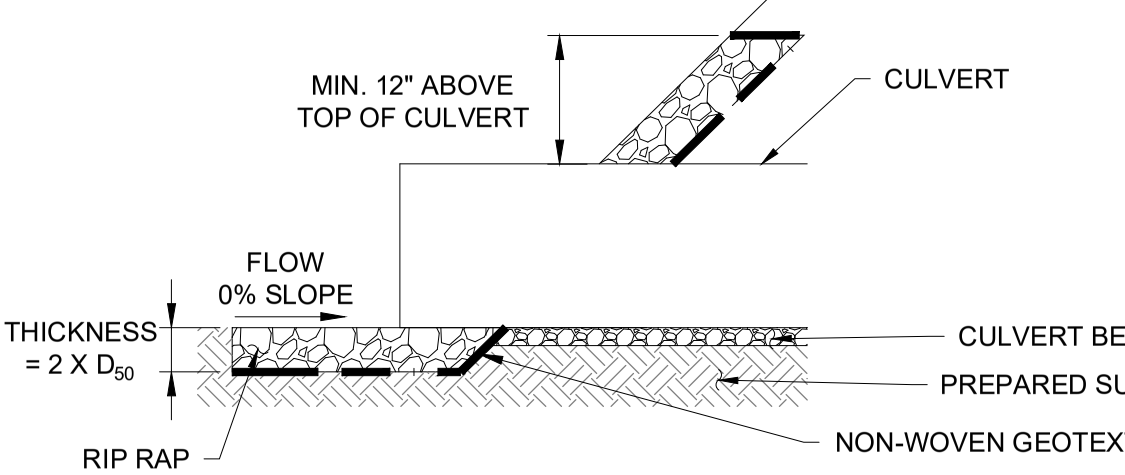
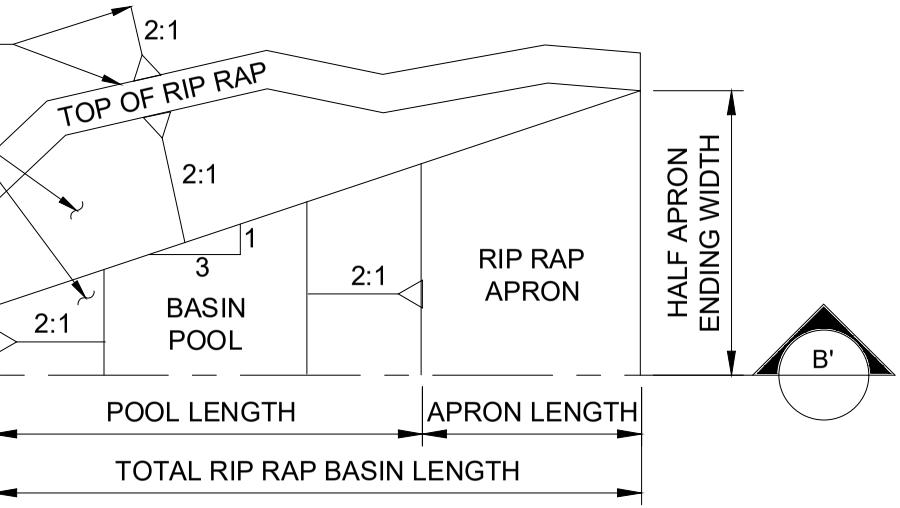


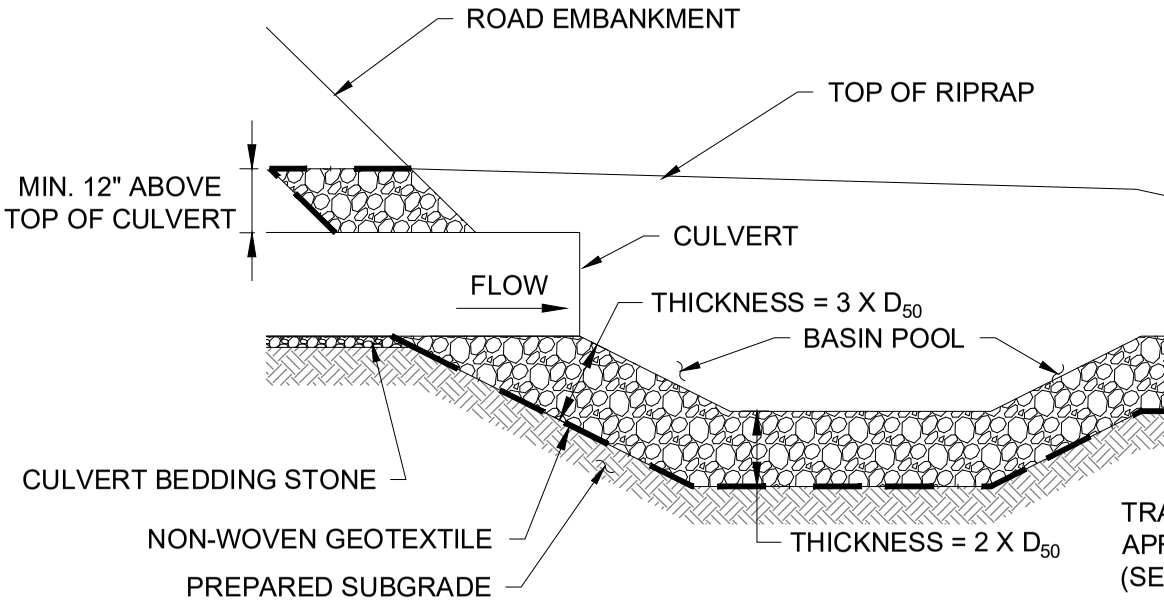
INLET APRON PLAN



INLET PROTECTION APRON SECTION A-A'



PLAN OF RIP RAP OUTLET BASIN



OUTLET BASIN SECTION B-B'

A TYPICAL CULVERT INLET PROTECTION APRON AND OUTLET
D IS NOT INTENDED FOR CONSTRUCTION. DIMENSIONS SHALL
D ON FINAL CULVERT DESIGN.
EEK QUARRY AND MATERIAL TRANSPORT AND ACCESS
PLAN FOR THE CULVERT SHAPE AND DIMENSIONS, THE
IZE, RIP RAP LAYER THICKNESS, AND DIMENSIONS.
OUTLET TO PROVIDE A SMOOTH TRANSITION BETWEEN THE
KMENT, AND SURROUNDING GRADE.

Attachment A: NOAA Precipitation

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.222** (0.171-0.287)	**0.266** (0.204-0.344)	**0.347** (0.266-0.450)	**0.423** (0.323-0.552)	**0.541** (0.406-0.751)	**0.643** (0.469-0.901)	**0.754** (0.532-1.09)	**0.876** (0.594-1.30)	**1.05** (0.686-1.61)	**1.20** (0.756-1.84)
10-min	**0.325** (0.250-0.420)	**0.389** (0.299-0.503)	**0.508** (0.389-0.659)	**0.619** (0.472-0.808)	**0.792** (0.594-1.10)	**0.941** (0.687-1.32)	**1.10** (0.779-1.59)	**1.28** (0.869-1.90)	**1.54** (1.00-2.35)	**1.75** (1.11-2.70)
15-min	**0.397** (0.305-0.512)	**0.475** (0.365-0.614)	**0.619** (0.475-0.803)	**0.755** (0.576-0.985)	**0.966** (0.725-1.34)	**1.15** (0.837-1.61)	**1.35** (0.950-1.94)	**1.56** (1.06-2.32)	**1.88** (1.23-2.87)	**2.13** (1.35-3.29)
30-min	**0.582** (0.448-0.751)	**0.692** (0.533-0.895)	**0.899** (0.689-1.17)	**1.09** (0.834-1.43)	**1.40** (1.05-1.94)	**1.66** (1.21-2.33)	**1.95** (1.38-2.81)	**2.26** (1.54-3.36)	**2.72** (1.78-4.16)	**3.09** (1.96-4.77)
60-min	**0.728** (0.561-0.940)	**0.858** (0.660-1.11)	**1.11** (0.850-1.44)	**1.35** (1.03-1.76)	**1.74** (1.31-2.42)	**2.08** (1.52-2.93)	**2.46** (1.74-3.55)	**2.88** (1.95-4.28)	**3.49** (2.28-5.35)	**3.99** (2.53-6.15)
2-hr	**0.875** (0.680-1.12)	**1.02** (0.795-1.31)	**1.32** (1.02-1.69)	**1.61** (1.24-2.07)	**2.08** (1.59-2.88)	**2.50** (1.85-3.48)	**2.96** (2.12-4.25)	**3.49** (2.40-5.14)	**4.26** (2.81-6.46)	**4.89** (3.13-7.45)
3-hr	**0.933** (0.730-1.18)	**1.08** (0.846-1.38)	**1.39** (1.08-1.77)	**1.70** (1.31-2.17)	**2.20** (1.69-3.04)	**2.66** (1.98-3.69)	**3.17** (2.29-4.52)	**3.75** (2.60-5.51)	**4.61** (3.07-6.96)	**5.33** (3.43-8.05)
6-hr	**1.05** (0.828-1.31)	**1.20** (0.947-1.51)	**1.52** (1.20-1.92)	**1.85** (1.45-2.35)	**2.41** (1.88-3.30)	**2.92** (2.20-4.01)	**3.49** (2.55-4.93)	**4.15** (2.90-6.02)	**5.12** (3.45-7.64)	**5.94** (3.86-8.87)
12-hr	**1.20** (0.959-1.49)	**1.37** (1.09-1.70)	**1.71** (1.36-2.13)	**2.07** (1.64-2.59)	**2.66** (2.09-3.59)	**3.20** (2.44-4.34)	**3.81** (2.80-5.31)	**4.50** (3.18-6.45)	**5.53** (3.76-8.14)	**6.39** (4.20-9.43)
24-hr	**1.38** (1.11-1.69)	**1.58** (1.27-1.94)	**1.97** (1.58-2.43)	**2.37** (1.89-2.93)	**3.01** (2.38-3.98)	**3.58** (2.74-4.78)	**4.21** (3.13-5.78)	**4.93** (3.52-6.96)	**5.98** (4.11-8.69)	**6.86** (4.55-10.0)
2-day	**1.57** (1.28-1.90)	**1.82** (1.48-2.21)	**2.30** (1.87-2.80)	**2.76** (2.23-3.37)	**3.48** (2.77-4.53)	**4.11** (3.18-5.40)	**4.80** (3.59-6.48)	**5.57** (4.00-7.74)	**6.68** (4.63-9.56)	**7.60** (5.10-10.9)
3-day	**1.70** (1.40-2.04)	**1.99** (1.63-2.40)	**2.53** (2.06-3.05)	**3.04** (2.47-3.69)	**3.83** (3.06-4.93)	**4.52** (3.51-5.88)	**5.26** (3.96-7.04)	**6.08** (4.40-8.38)	**7.27** (5.06-10.3)	**8.24** (5.57-11.8)
4-day	**1.81** (1.49-2.17)	**2.13** (1.75-2.55)	**2.71** (2.22-3.25)	**3.25** (2.65-3.92)	**4.09** (3.28-5.23)	**4.81** (3.75-6.22)	**5.59** (4.22-7.44)	**6.45** (4.69-8.84)	**7.69** (5.38-10.9)	**8.70** (5.90-12.4)
7-day	**2.10** (1.75-2.49)	**2.46** (2.04-2.91)	**3.10** (2.56-3.69)	**3.69** (3.04-4.41)	**4.60** (3.71-5.80)	**5.36** (4.21-6.85)	**6.19** (4.71-8.12)	**7.09** (5.18-9.59)	**8.37** (5.90-11.7)	**9.41** (6.44-13.2)
10-day	**2.36** (1.96-2.77)	**2.74** (2.28-3.22)	**3.42** (2.85-4.04)	**4.05** (3.35-4.80)	**4.98** (4.03-6.23)	**5.77** (4.55-7.30)	**6.61** (5.05-8.60)	**7.52** (5.53-10.1)	**8.81** (6.24-12.2)	**9.84** (6.78-13.8)
20-day	**3.05** (2.57-3.54)	**3.52** (2.97-4.10)	**4.34** (3.64-5.06)	**5.05** (4.22-5.92)	**6.08** (4.95-7.44)	**6.92** (5.50-8.59)	**7.79** (6.00-9.95)	**8.71** (6.46-11.5)	**9.98** (7.14-13.6)	**11.0** (7.65-15.2)
30-day	**3.62** (3.07-4.17)	**4.18** (3.54-4.82)	**5.12** (4.32-5.92)	**5.91** (4.97-6.88)	**7.03** (5.74-8.49)	**7.91** (6.32-9.72)	**8.81** (6.82-11.1)	**9.74** (7.25-12.7)	**11.0** (7.90-14.8)	**12.0** (8.39-16.4)
45-day	**4.35** (3.72-4.98)	**5.03** (4.29-5.76)	**6.13** (5.22-7.05)	**7.04** (5.96-8.13)	**8.28** (6.78-9.88)	**9.22** (7.40-11.2)	**10.2** (7.90-12.7)	**11.1** (8.31-14.3)	**12.3** (8.91-16.4)	**13.3** (9.36-18.0)
60-day	**4.98** (4.27-5.67)	**5.76** (4.94-6.57)	**7.02** (6.00-8.02)	**8.03** (6.82-9.22)	**9.38** (7.69-11.1)	**10.4** (8.35-12.5)	**11.4** (8.85-14.1)	**12.3** (9.24-15.7)	**13.5** (9.80-17.9)	**14.4** (10.2-19.5)

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

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

Please refer to NOAA Atlas 14 document for more information.

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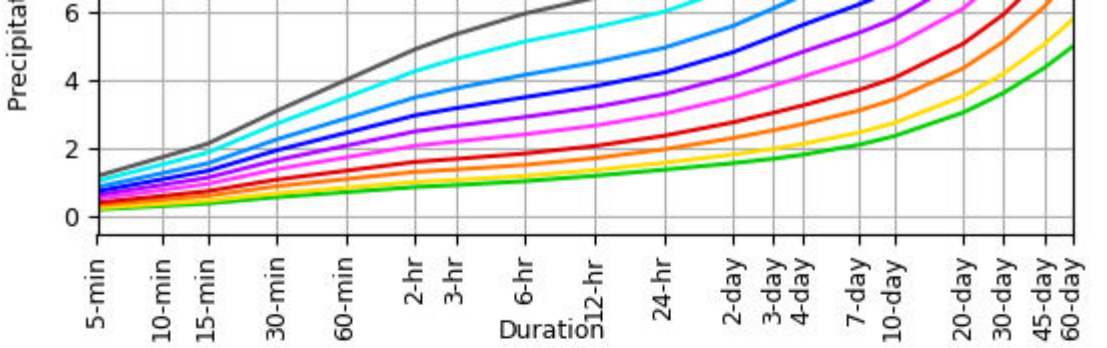
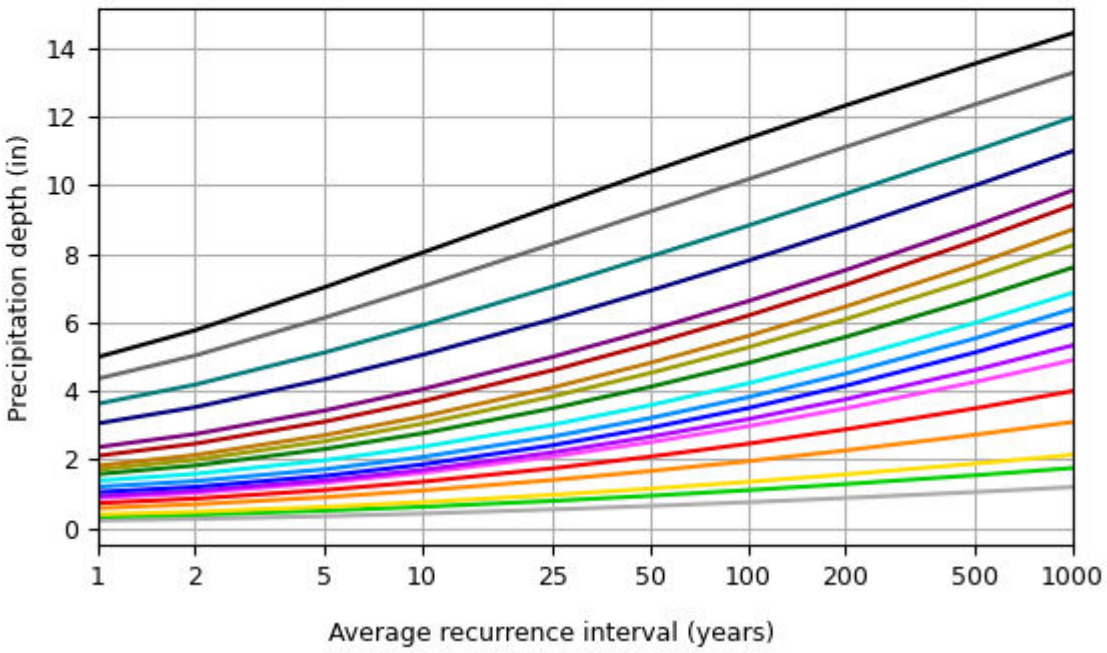
PF graphical





DAA Atlas 14, Volume 8, Version 2

Created (GMT): Fri Feb 23 19:56:48 2024

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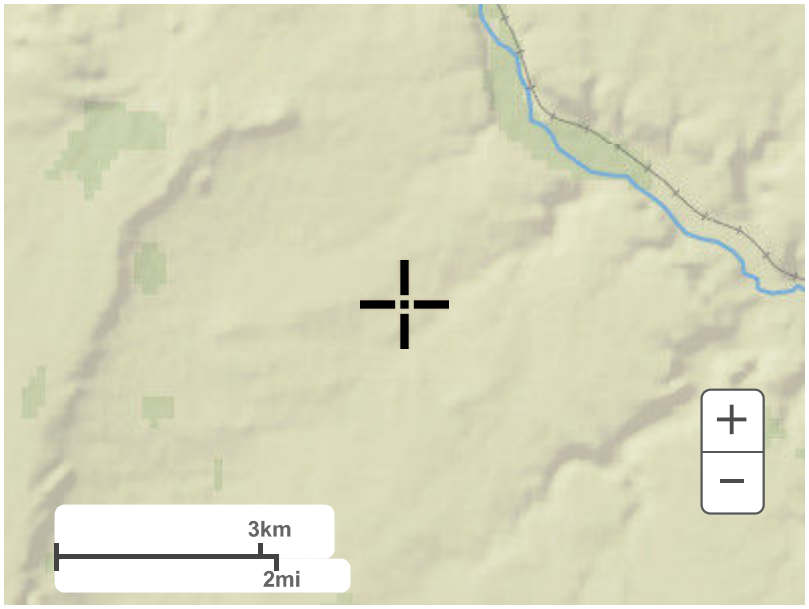
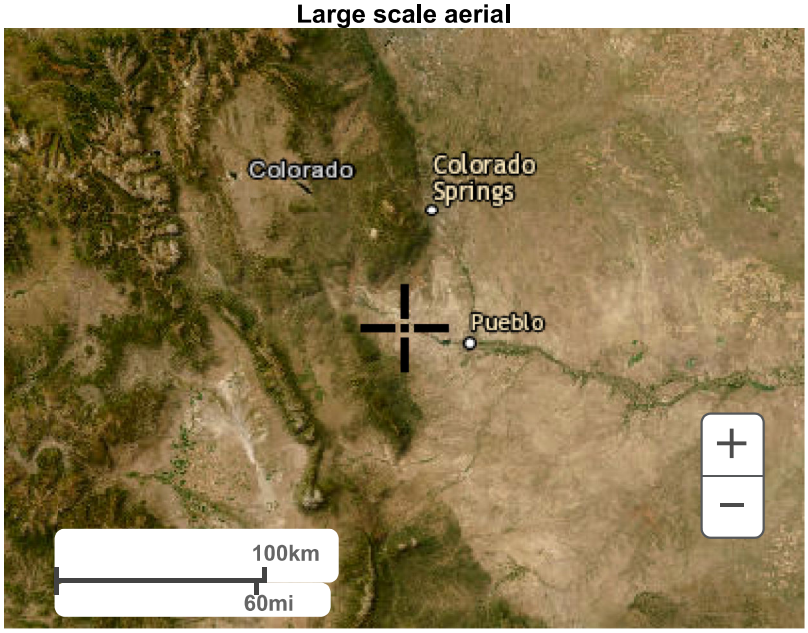
Maps & aerials

Small scale terrain



Large scale terrain

Large scale aerial



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

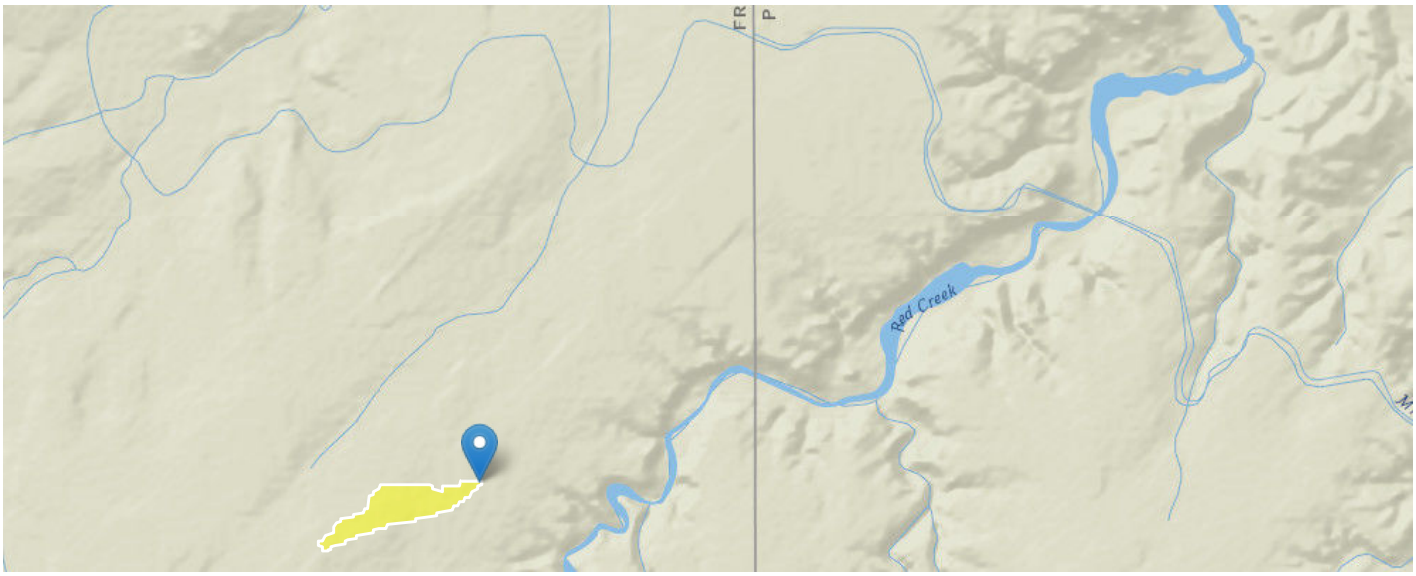
Attachment B: StreamStats Reports

Red Creek Quarry StreamStats Report

Materials Transport and Access Corridor StreamStats Report

Red Creek Quarry
Stream in Northwest Corner

Region ID: CO
Workspace ID: CO20240229163921814000
Clicked Point (Latitude, Longitude): 38.29442, -104.95726
Time: 2024-02-29 11:39:48 -0500



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLDEM10M	Mean basin slope computed from 10 m DEM	2	percent
CSL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	94.1	feet per mi
DRNAREA	Area that drains to a point on a stream	0.0464	square miles
EL7500	Percent of area above 7500 ft	0	percent
ELEV	Mean Basin Elevation	5275	feet
ELEVMAX	Maximum basin elevation	5310	feet
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.26	inches
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.6	inches
I6H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3.53	inches
I6H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.22	inches
LAT_OUT	Latitude of Basin Outlet	38.294436	degrees
LC11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
LC11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
LC11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent
LC11GRASS	Percent of area covered by grassland/herbaceous using 2011 NLCD	100	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	0	percent

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Parameter Code	Parameter Description	Value	Unit
LC11SHRUB	Percent of area covered by shrubland using 2011 NLCD	0	percent
LC11SNOIC	Percent snow and ice from NLCD 2011 class 12	0	percent
LC11WATER	Percent of open water, class 11, from NLCD 2011	0	percent
LC11WETLND	Percentage of wetlands, classes 90 and 95, from NLCD 2011	0	percent
LFPLENGTH	Length of longest flow path	0.64	miles
LONG_OUT	Longitude of Basin Outlet	-104.957288	degrees
MINBELEV	Minimum basin elevation	5250	feet
OUTLETELEV	Elevation of the stream outlet in feet above NAVD88	5253	feet
PRECIP	Mean Annual Precipitation	13.55	inches
RCN	Runoff-curve number as defined by NRCS (http://policy.nrcs.usda.gov/OpenNonWebContent.aspx?content=17758.wba)	73.44	dimensionless
RUNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.22	dimensionless
SSURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SSURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	11.8	percent
SSURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	27.6	percent
SSURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	60.6	percent
STATSCLAY	Percentage of clay soils from STATSGO	26	percent
STORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
TOC	Time of concentration in hours	1.2	hours

Application Version: 4.19.4
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

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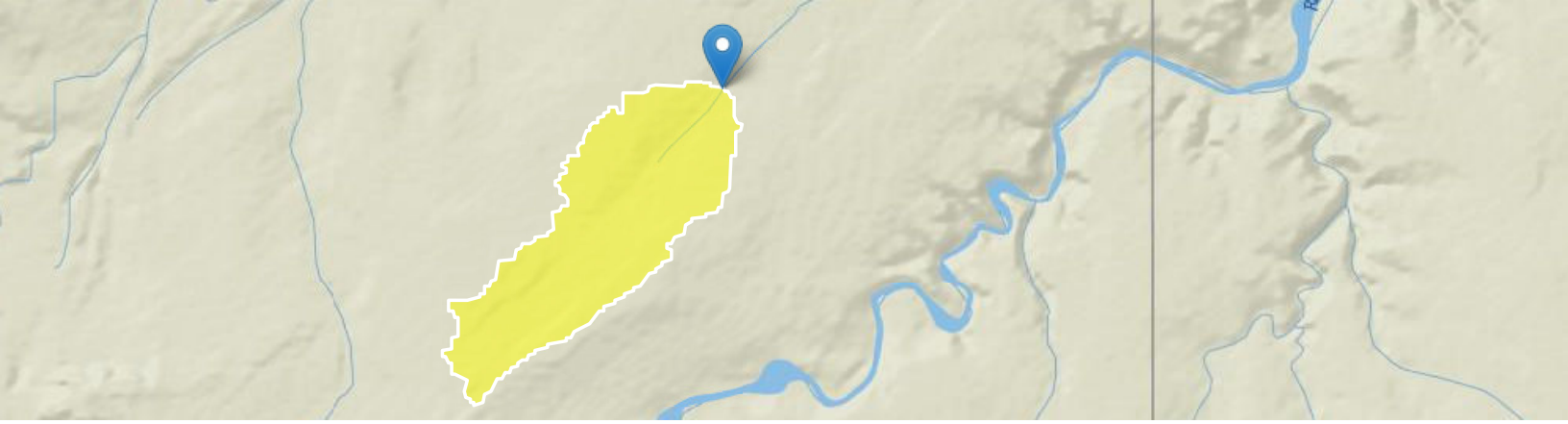


in Characteristics

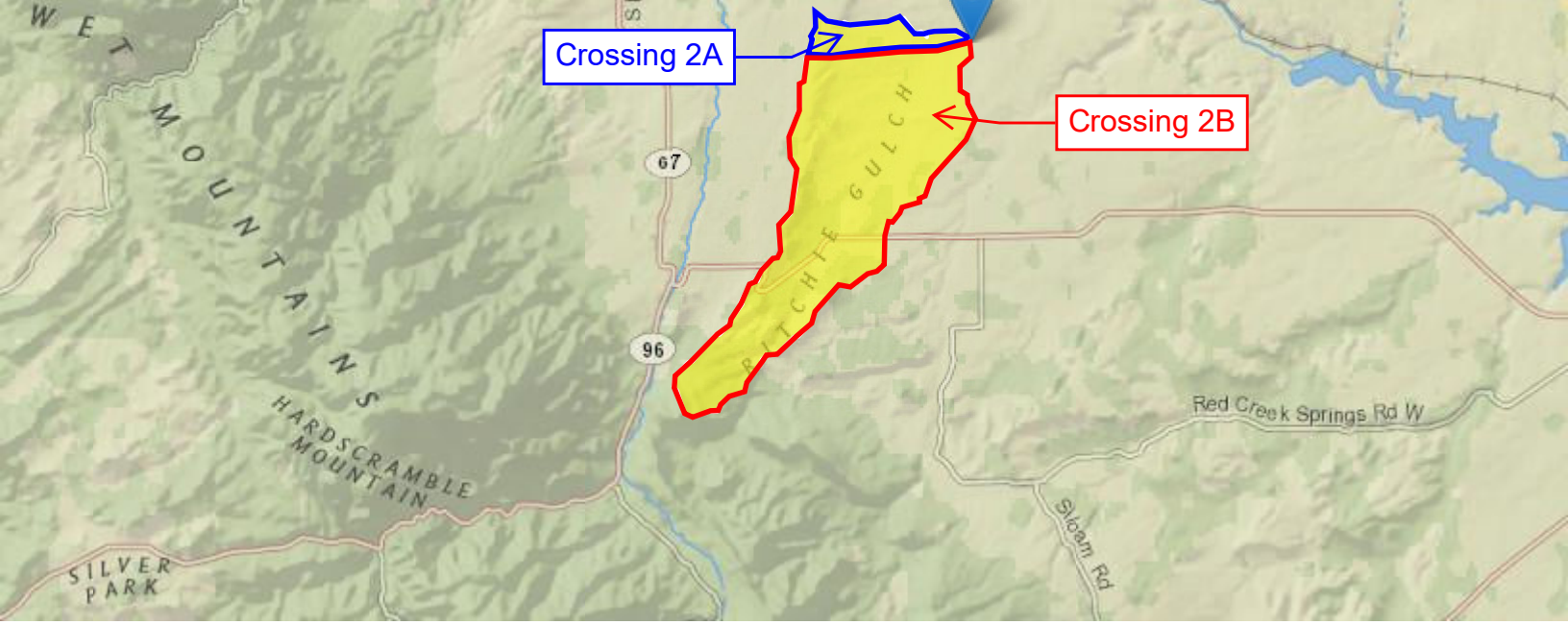
meter e	Parameter Description	Value	Unit
DEM10M	Mean basin slope computed from 10 m DEM	2	percent
1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	57.2	feet per
AREA	Area that drains to a point on a stream	0.36	square
500	Percent of area above 7500 ft	0	percent
V	Mean Basin Elevation	5292	feet
VMAX	Maximum basin elevation	5330	feet
100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.26	inches
2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.6	inches
00Y	6-hour precipitation that is expected to occur on average once in 100 years	3	inches
Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.21	inches
LOUT	Latitude of Basin Outlet	38.298314	degrees
BARE	Percentage of barren from NLCD 2011 class 31	0	percent
CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	1.2	percent
FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent
GRASS	Percent of area covered by grassland/herbaceous using 2011 NLCD	98.8	percent
IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	8.3	percent
SHRUB	Percent of area covered by shrubland using 2011 NLCD	0	percent
SNOIC	Percent snow and ice from NLCD 2011 class 12	0	percent
WATER	Percent of open water, class 11, from NLCD 2011	0	percent
WETLND	Percentage of wetlands, classes 90 and 95, from NLCD 2011	0	percent
LENGTH	Length of longest flow path	1.38	miles
G_OUT	Longitude of Basin Outlet	-104.964033	degrees
BELEV	Minimum basin elevation	5240	feet
LETELEV	Elevation of the stream outlet in feet above NAVD88	5245	feet

uct Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

n Version: 4.19.4

ts Services Version: 1.2.22

ces Version: 2.2.1



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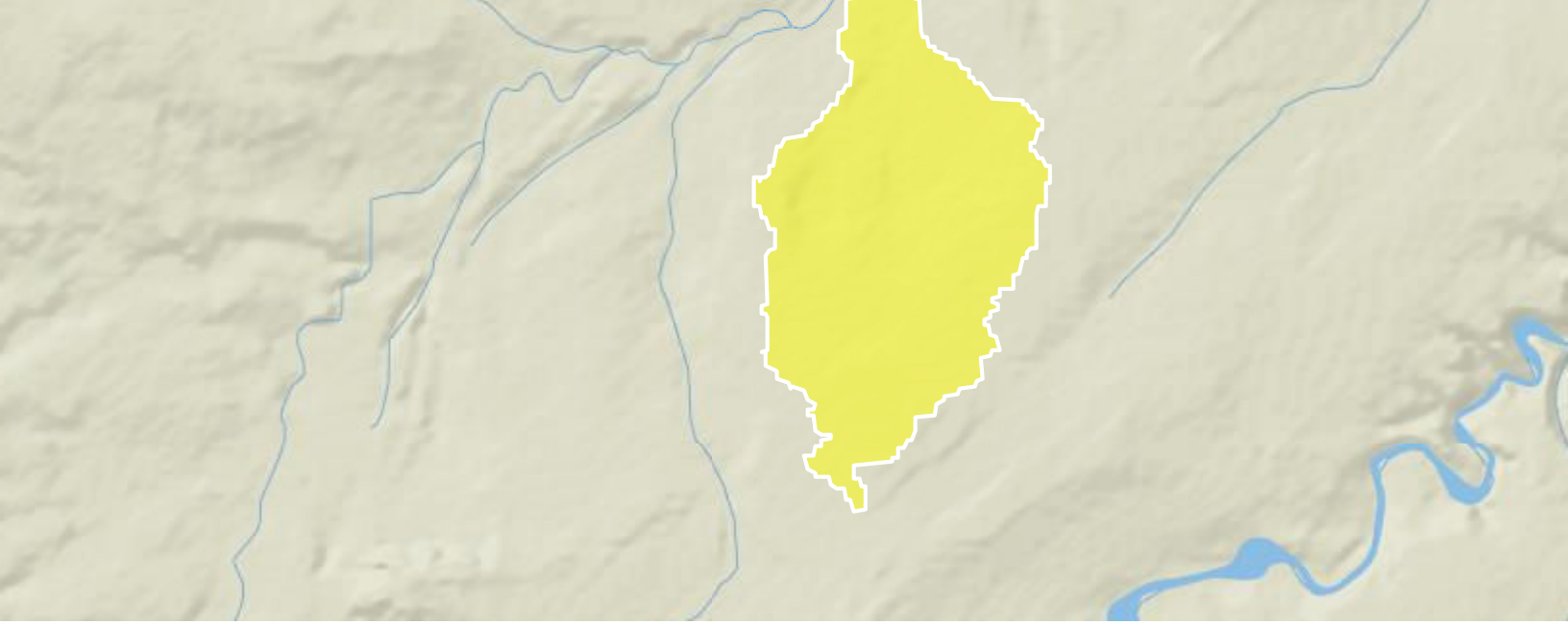
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	10	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	115.9	feet per m
RNAREA	Area that drains to a point on a stream	17.4	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5624	feet
LEVMAX	Maximum basin elevation	7350	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.44	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.67	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3.64	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.24	inches
AT_OUT	Latitude of Basin Outlet	38.306338	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0.8	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	12.2	percent

UNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.27	dimensior
SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	10.5	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	16.6	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	50.6	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	22.3	percent
TATSCLAY	Percentage of clay soils from STATSGO	23.67	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0.1	percent
OC	Time of concentration in hours	6.39	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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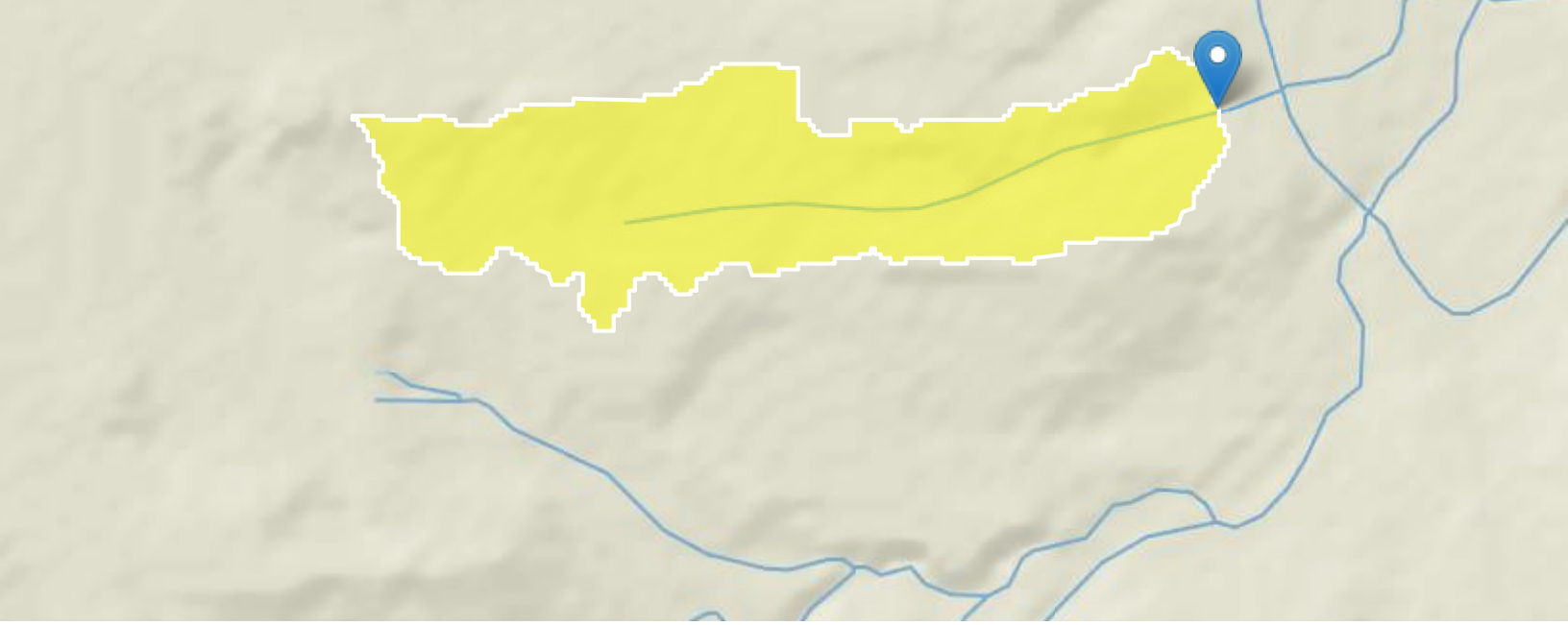
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	2	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	88.3	feet per m
RNAREA	Area that drains to a point on a stream	0.54	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5265	feet
LEVMAX	Maximum basin elevation	5320	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.25	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.59	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.21	inches
AT_OUT	Latitude of Basin Outlet	38.306789	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent

UNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.22	dimensior
SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	37.6	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	56.6	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	5.8	percent
TATSCLAY	Percentage of clay soils from STATSGO	26	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	3.09	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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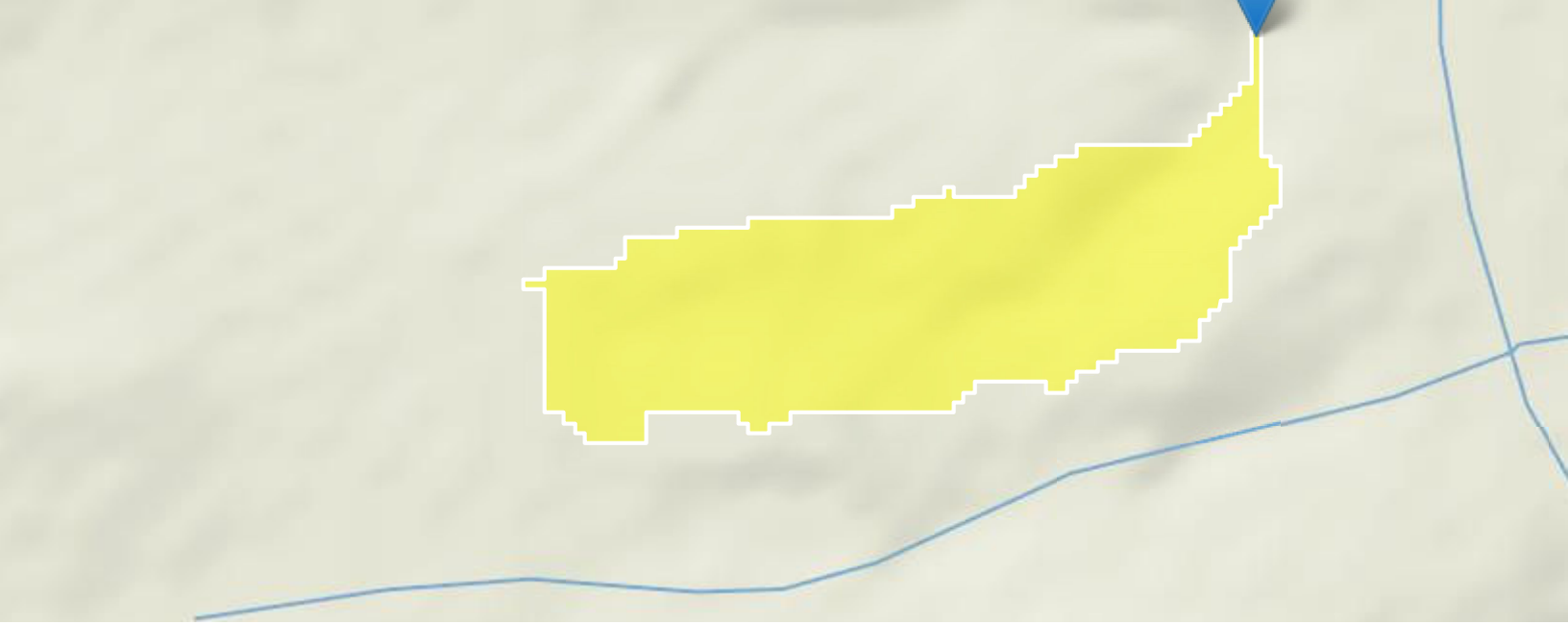
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	3	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	86.7	feet per m
RNAREA	Area that drains to a point on a stream	0.2	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5252	feet
LEVMAX	Maximum basin elevation	5320	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.23	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.58	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.2	inches
AT_OUT	Latitude of Basin Outlet	38.311836	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent

UNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.22	dimensior
SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	30.2	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	61.3	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	8.44	percent
TATSCLAY	Percentage of clay soils from STATSGO	26	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	1.91	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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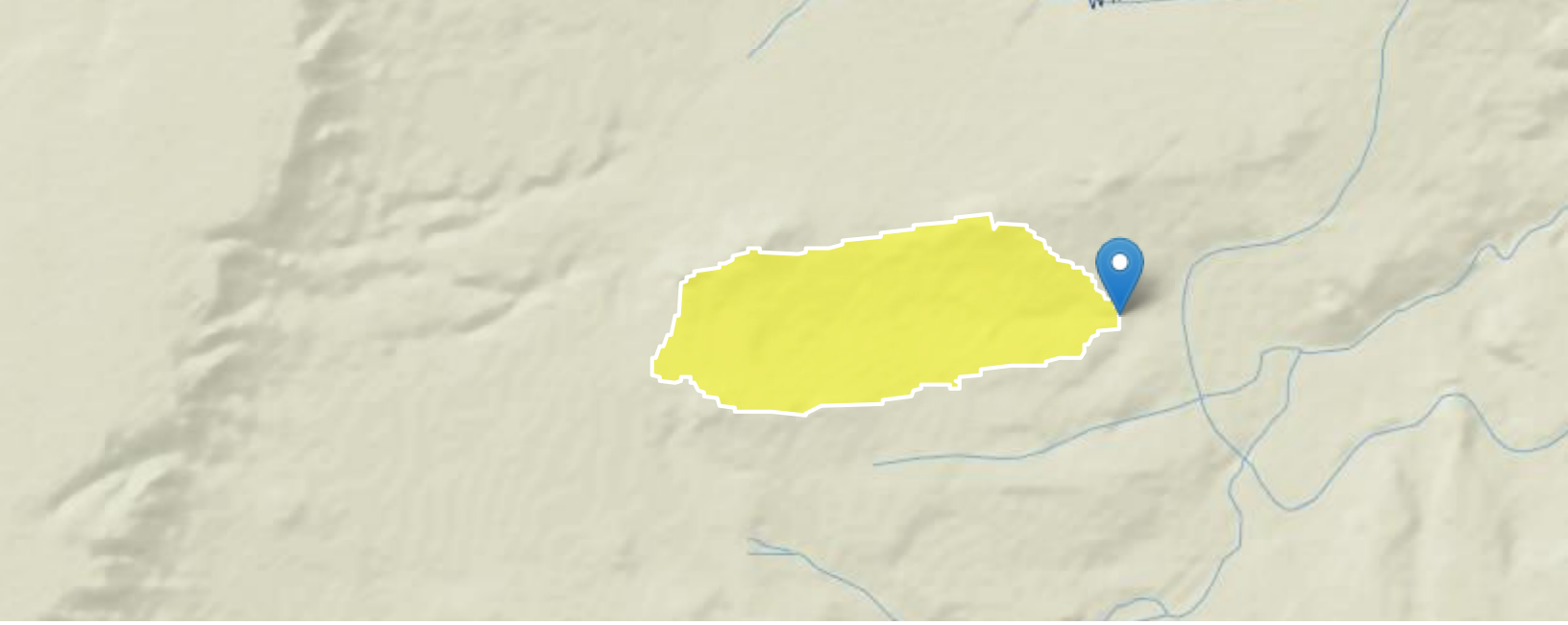
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	3	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	116.1	feet per m
RNAREA	Area that drains to a point on a stream	0.0519	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5229	feet
LEVMAX	Maximum basin elevation	5250	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.22	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.58	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.2	inches
AT_OUT	Latitude of Basin Outlet	38.314901	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent

UNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.22	dimensior
SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	31.4	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	51.2	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	17.4	percent
TATSCLAY	Percentage of clay soils from STATSGO	26	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	1.05	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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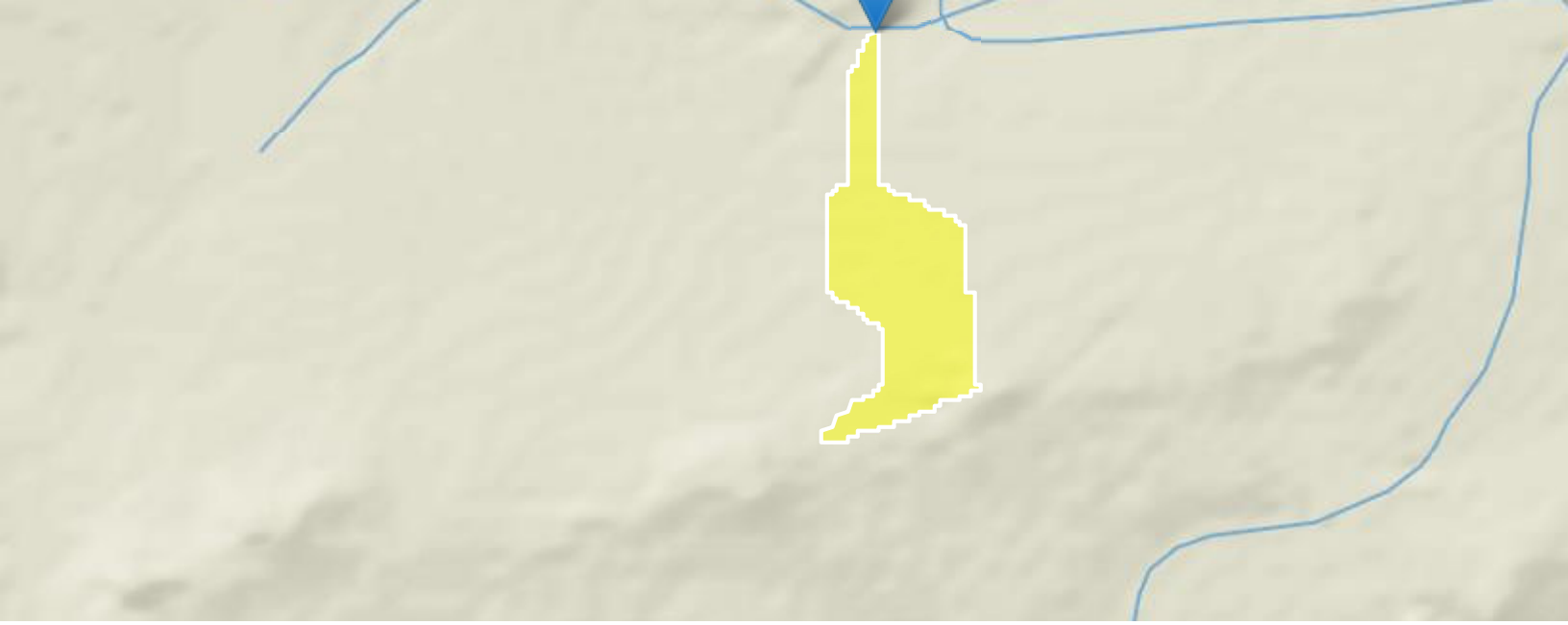
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	3	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	102.1	feet per m
RNAREA	Area that drains to a point on a stream	0.37	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5267	feet
LEVMAX	Maximum basin elevation	5340	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.23	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.58	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3.5	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.2	inches
AT_OUT	Latitude of Basin Outlet	38.315081	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0.6	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent

UNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.22	dimensior
SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	8.58	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	83.4	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	8.03	percent
TATSCLAY	Percentage of clay soils from STATSGO	26	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	1.91	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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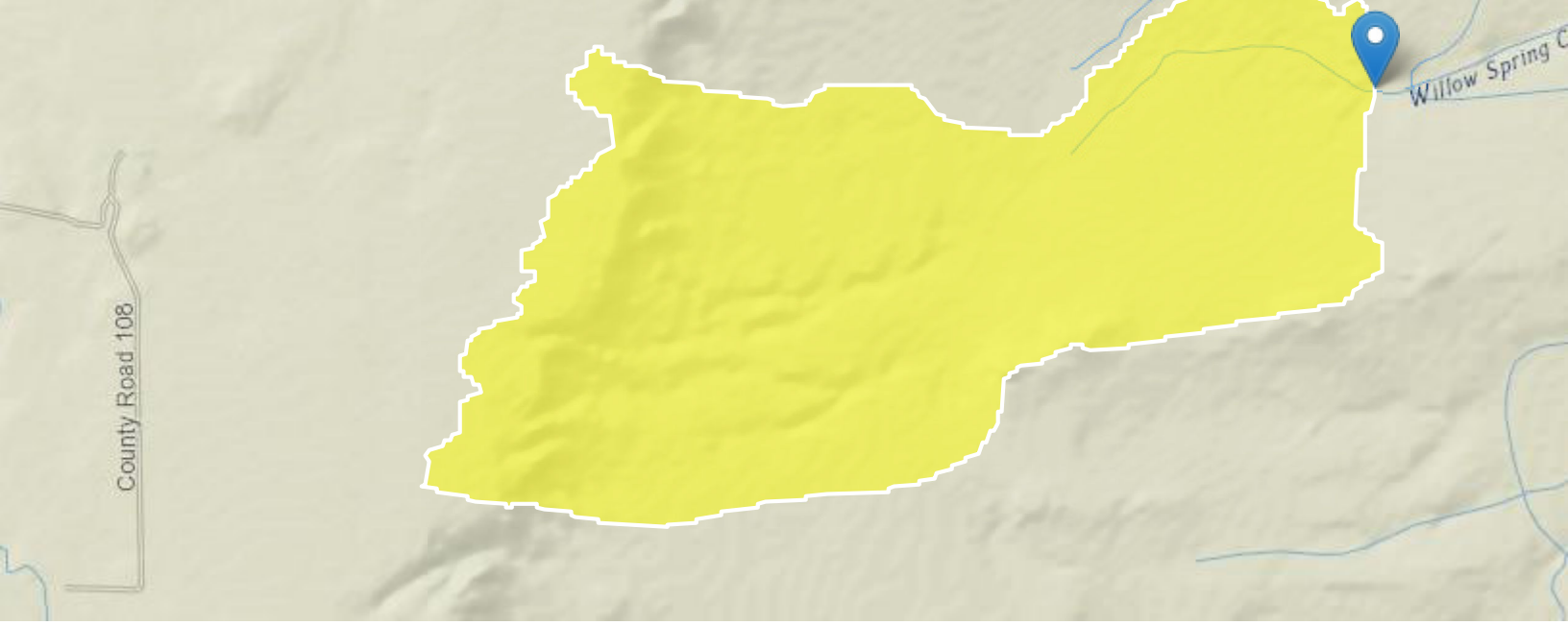
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	3	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	123.6	feet per m
RNAREA	Area that drains to a point on a stream	0.0455	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5230	feet
LEVMAX	Maximum basin elevation	5260	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3.5	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1	inches
AT_OUT	Latitude of Basin Outlet	38.326167	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent

UNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.22	dimensior
SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	1.1	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	82.9	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	16	percent
TATSCLAY	Percentage of clay soils from STATSGO	26	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	0.98	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	5	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	96.2	feet per m
RNAREA	Area that drains to a point on a stream	1.82	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5331	feet
LEVMAX	Maximum basin elevation	5580	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.23	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.58	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.19	inches
AT_OUT	Latitude of Basin Outlet	38.326347	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent

UNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.22	dimensior
SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	29.3	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	60.9	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	9.82	percent
TATSCLAY	Percentage of clay soils from STATSGO	26.45	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0.2	percent
OC	Time of concentration in hours	3.16	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1

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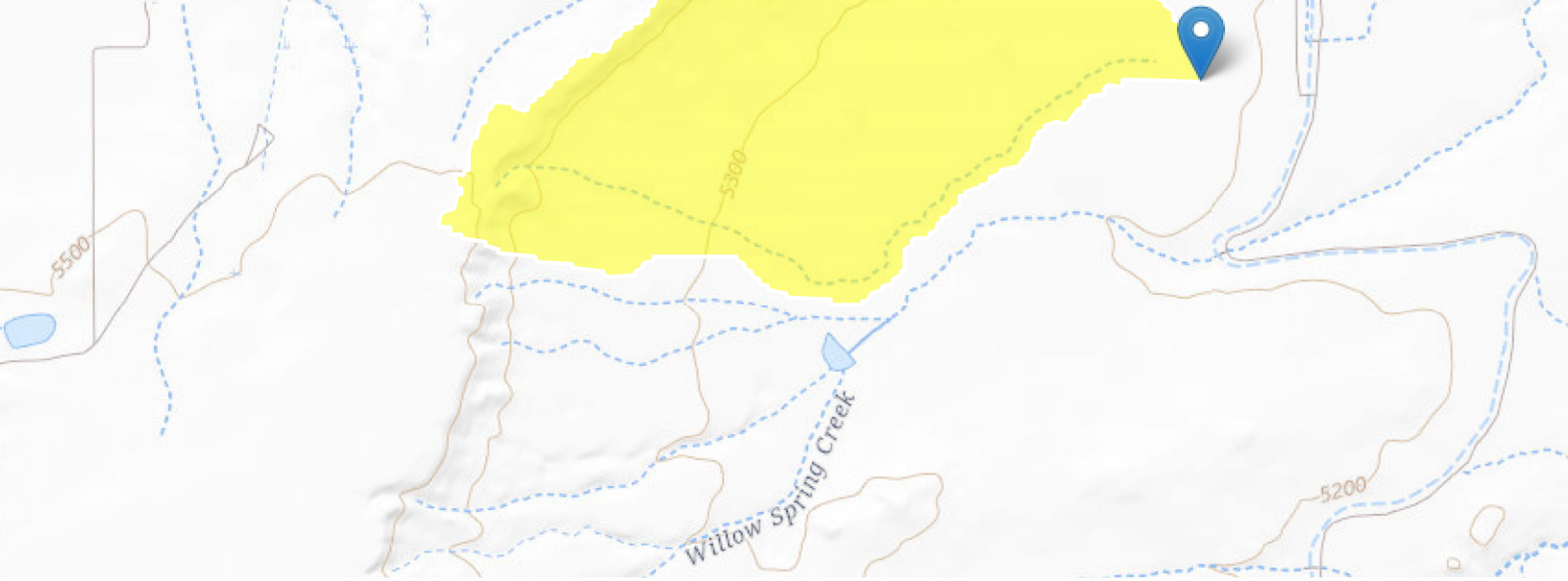
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	1	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	43.4	feet per m
RNAREA	Area that drains to a point on a stream	0.054	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5216	feet
LEVMAX	Maximum basin elevation	5230	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.2	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.57	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.18	inches
AT_OUT	Latitude of Basin Outlet	38.32815	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent

UNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.22	dimensior
SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	0	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	100	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	0	percent
TATSCLAY	Percentage of clay soils from STATSGO	26	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	1.56	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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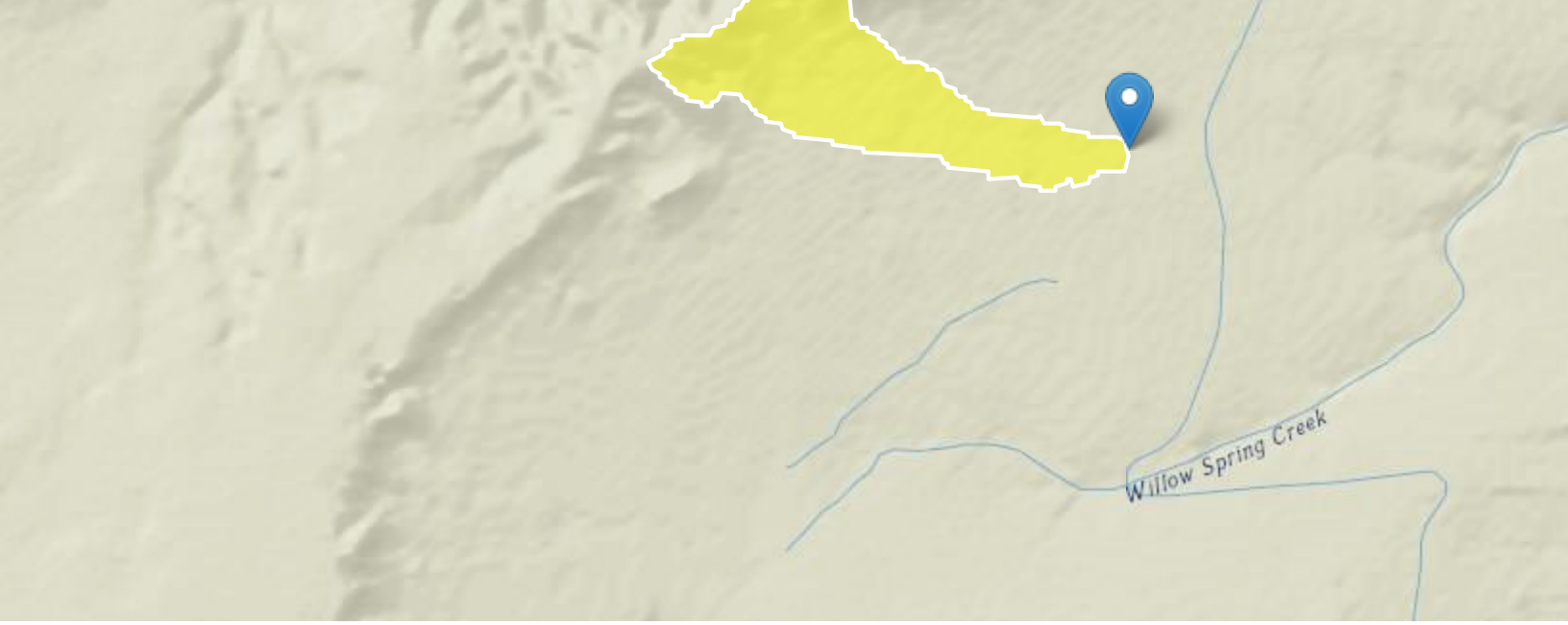
asin Characteristics

rameter ode	Parameter Description	Value	Unit
LDEM10M	Mean basin slope computed from 10 m DEM	5	percent
L1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	83.8	feet per n
RNAREA	Area that drains to a point on a stream	1.17	square m
7500	Percent of area above 7500 ft	0	percent
EV	Mean Basin Elevation	5313	feet
EVMAX	Maximum basin elevation	5510	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.21	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.57	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3.49	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.18	inches
T_OUT	Latitude of Basin Outlet	38.332926	degrees
11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent
11GRASS	Percent of area covered by grassland/herbaceous using 2011 NLCD	97.7	percent
11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	2.5	percent

URGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	14.8	percent
ATSCLAY	Percentage of clay soils from STATSGO	25.33	percent
ORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
C	Time of concentration in hours	2.55	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	7	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	141.8	feet per m
RNAREA	Area that drains to a point on a stream	0.25	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5310	feet
LEVMAX	Maximum basin elevation	5470	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.19	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.56	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.18	inches
AT_OUT	Latitude of Basin Outlet	38.338153	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent

UNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.22	dimensior
SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	24.2	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	57.3	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	18.5	percent
TATSCLAY	Percentage of clay soils from STATSGO	24.82	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	1.27	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1

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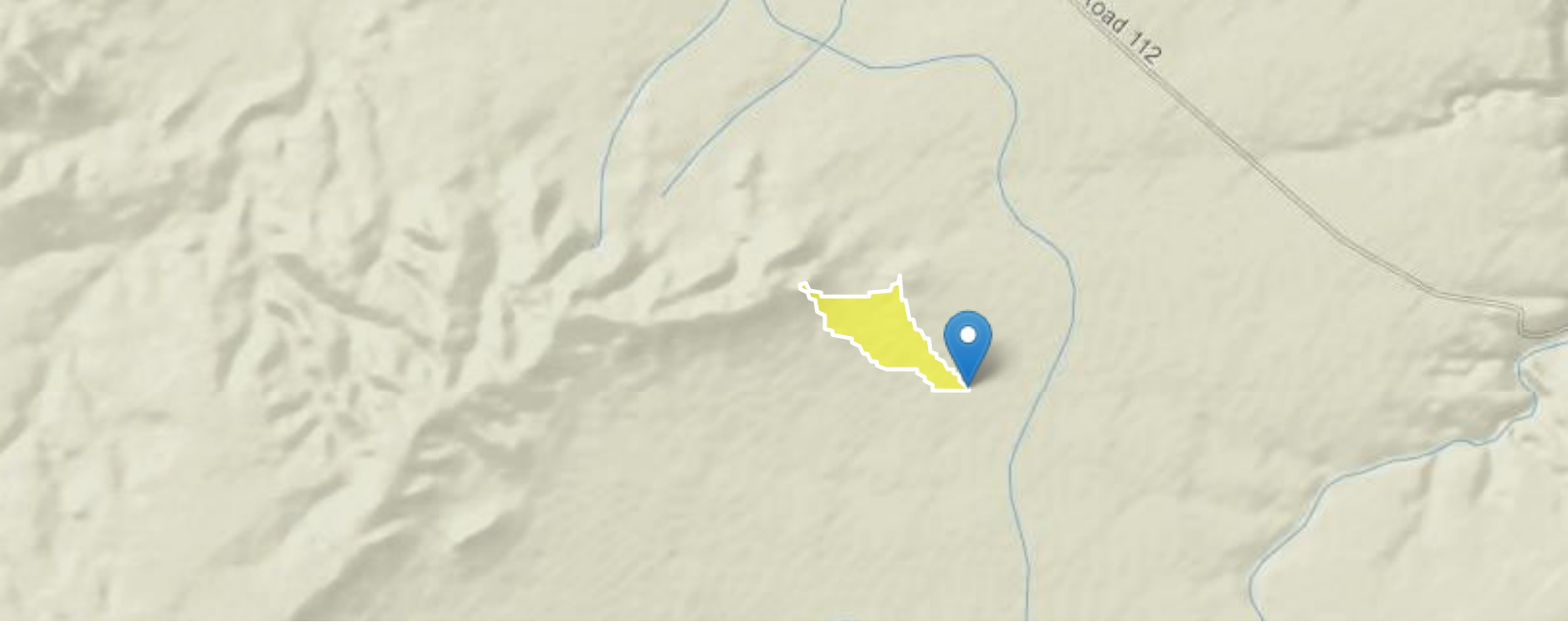
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	8	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	129.5	feet per m
RNAREA	Area that drains to a point on a stream	0.15	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5280	feet
LEVMAX	Maximum basin elevation	5440	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.19	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.56	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.18	inches
AT_OUT	Latitude of Basin Outlet	38.339865	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent

UNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.22	dimensior
SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	31.8	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	54.1	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	14.1	percent
TATSCLAY	Percentage of clay soils from STATSGO	25.74	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	0.94	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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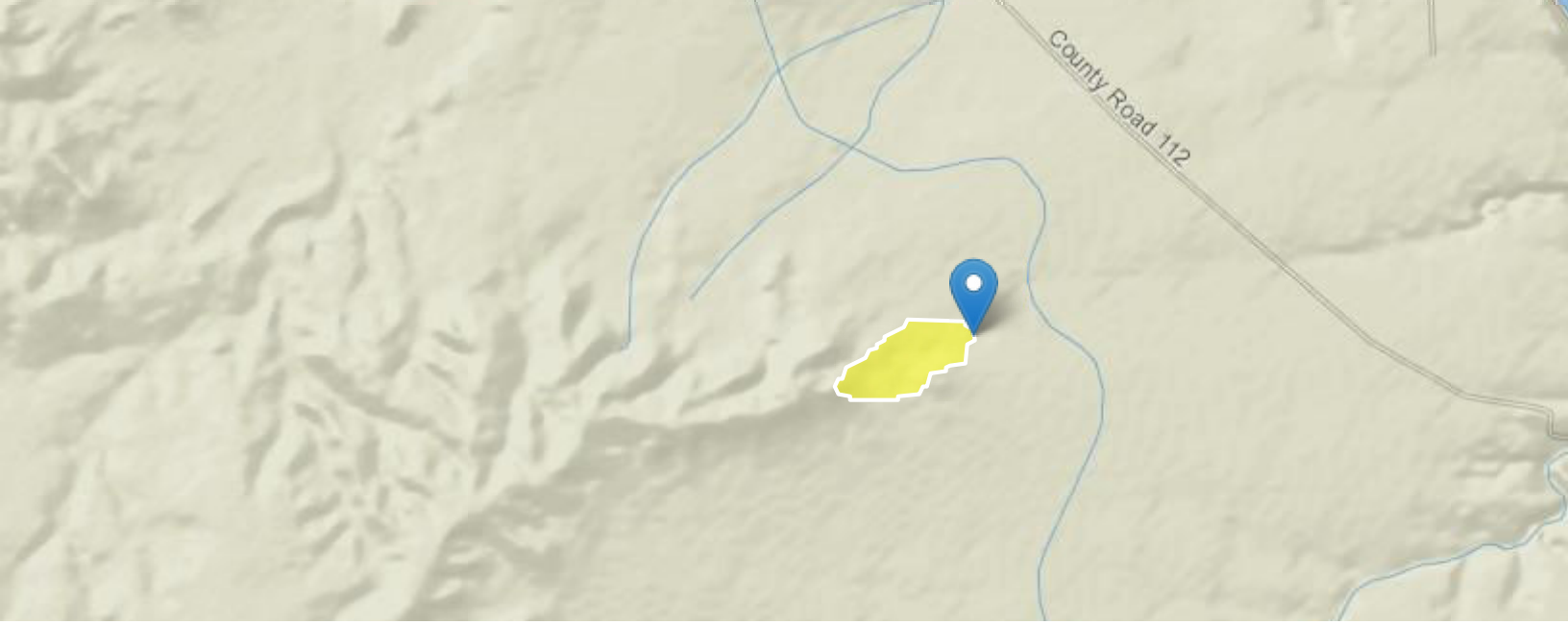
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	4	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	174.7	feet per m
RNAREA	Area that drains to a point on a stream	0.0415	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5245	feet
LEVMAX	Maximum basin elevation	5380	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.18	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.56	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3.45	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.17	inches
AT_OUT	Latitude of Basin Outlet	38.341758	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent

UNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.22	dimensior
SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	34.6	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	59.8	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	5.59	percent
TATSCLAY	Percentage of clay soils from STATSGO	26	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	0.88	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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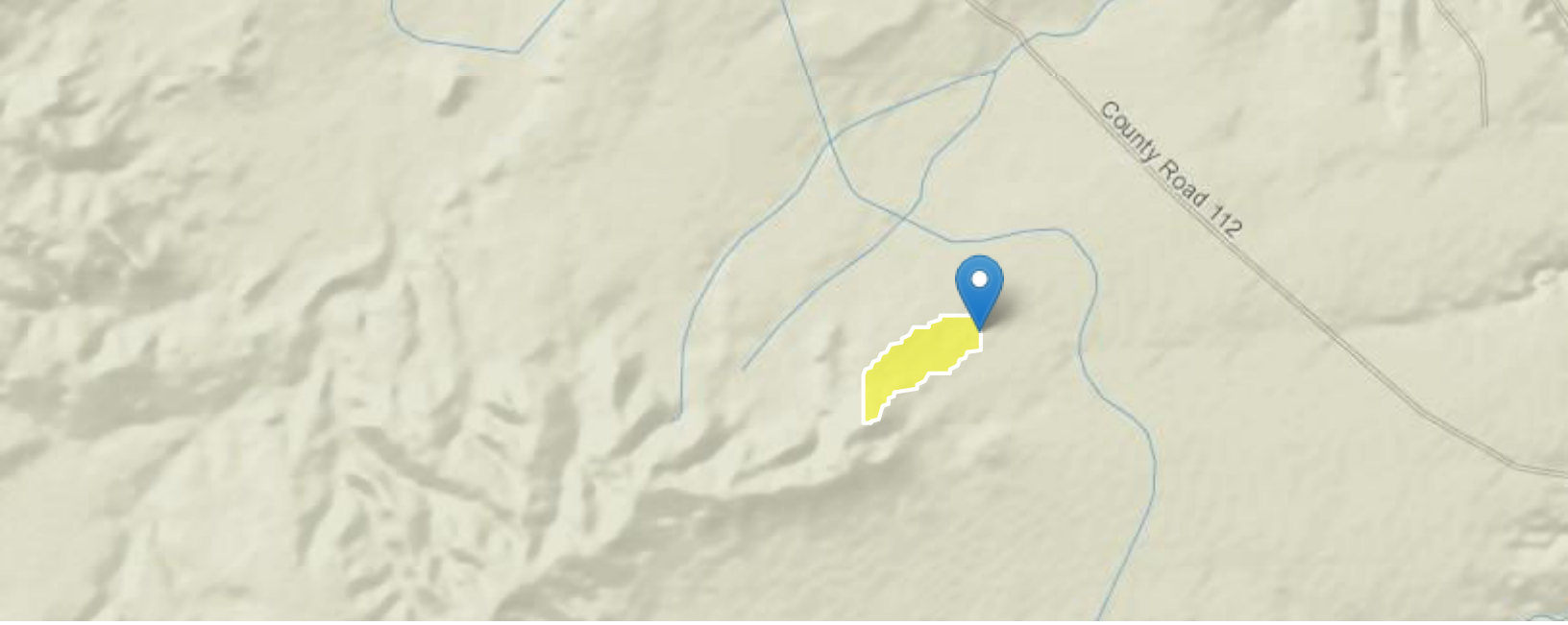
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	9	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	234.2	feet per m
RNAREA	Area that drains to a point on a stream	0.0403	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5250	feet
LEVMAX	Maximum basin elevation	5380	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.18	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.17	inches
AT_OUT	Latitude of Basin Outlet	38.347256	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent

UNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.23	dimensior
SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	73.3	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	0.19	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	26.6	percent
TATSCLAY	Percentage of clay soils from STATSGO	26	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	0.51	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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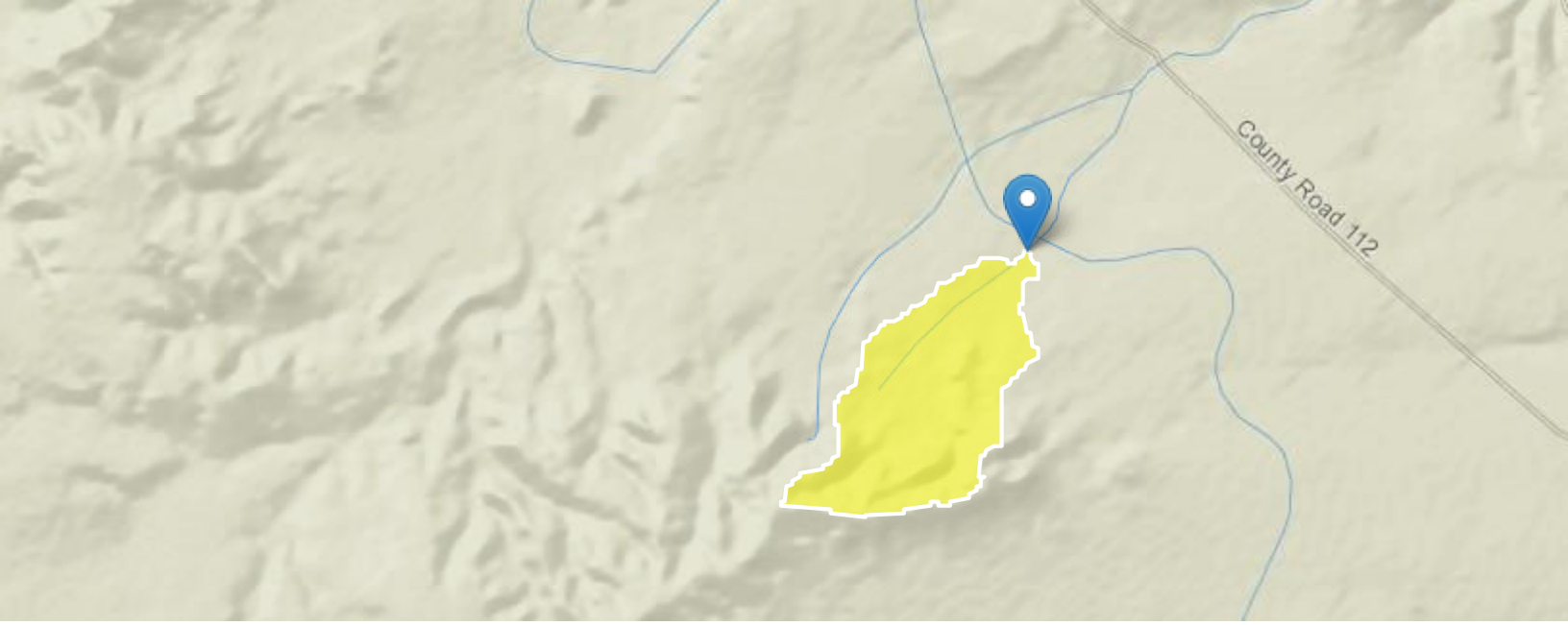
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	7	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	243.6	feet per m
RNAREA	Area that drains to a point on a stream	0.0359	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5251	feet
LEVMAX	Maximum basin elevation	5400	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.18	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.17	inches
AT_OUT	Latitude of Basin Outlet	38.349869	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent

UNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.23	dimensior
SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	85.7	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	0	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	14.3	percent
TATSCLAY	Percentage of clay soils from STATSGO	26	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	0.63	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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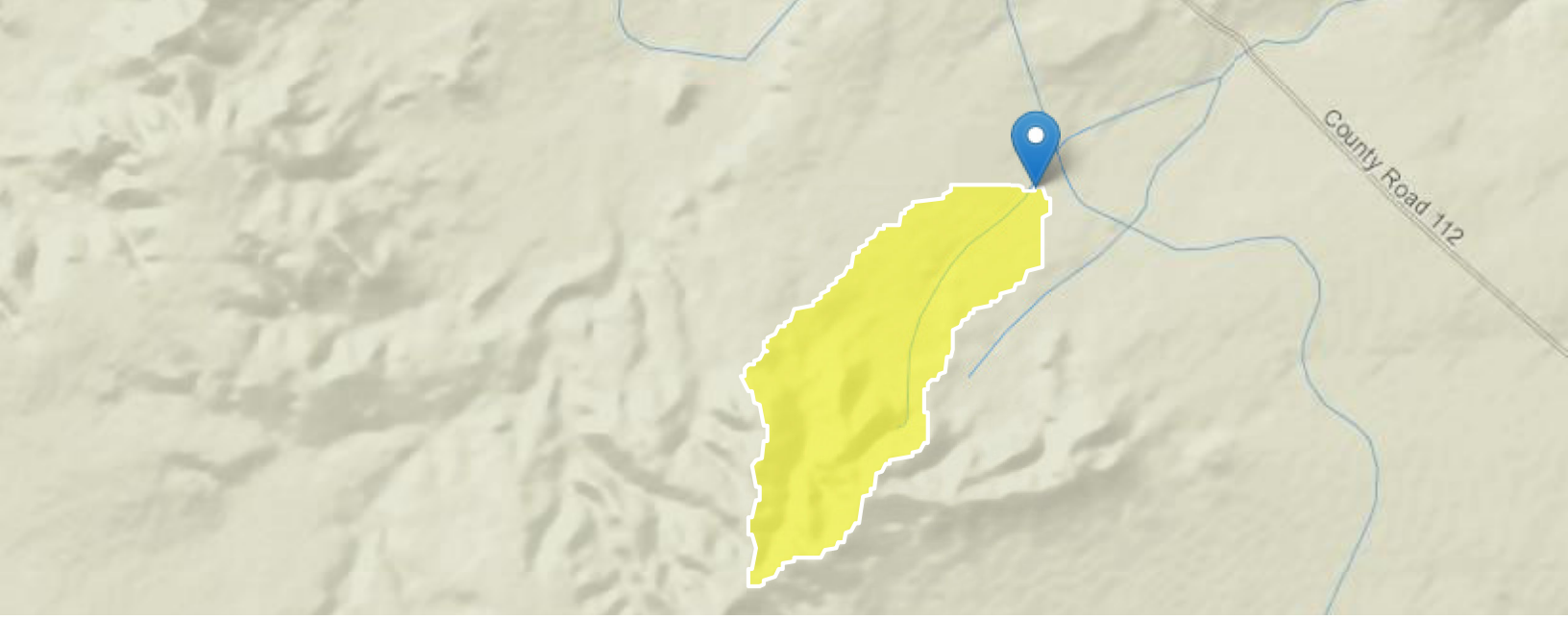
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	12	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	221.1	feet per m
RNAREA	Area that drains to a point on a stream	0.21	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5297	feet
LEVMAX	Maximum basin elevation	5450	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.18	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.55	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.17	inches
AT_OUT	Latitude of Basin Outlet	38.353385	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	1.5	percent

UNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.24	dimensior
SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	69.5	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	0	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	30.5	percent
TATSCLAY	Percentage of clay soils from STATSGO	25.62	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0.4	percent
OC	Time of concentration in hours	0.84	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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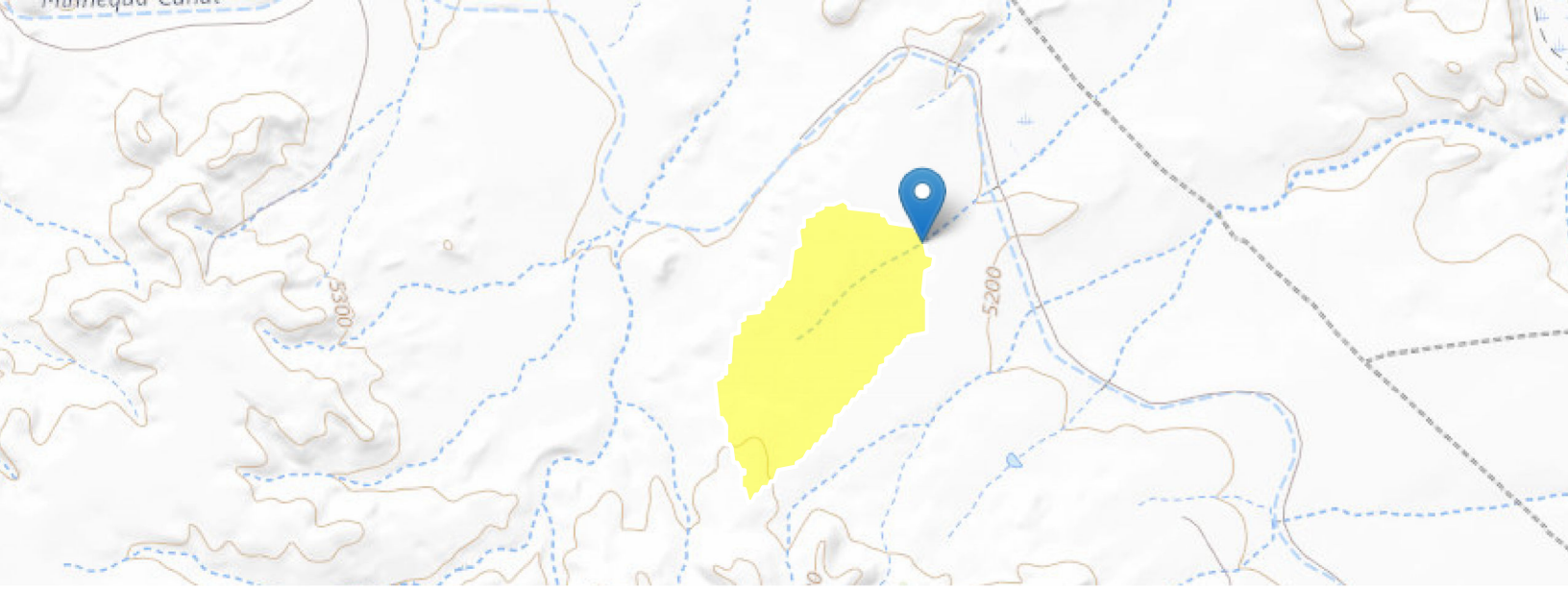
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	11	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	164.8	feet per m
RNAREA	Area that drains to a point on a stream	0.34	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5312	feet
LEVMAX	Maximum basin elevation	5470	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.18	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.55	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3.45	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.17	inches
AT_OUT	Latitude of Basin Outlet	38.355187	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	1.5	percent
C11GRASS	Percent of area covered by grassland/herbaceous using 2011 NLCD	80.2	percent

SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	59.7	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	0	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	40.3	percent
TATSCLAY	Percentage of clay soils from STATSGO	24.94	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	1.1	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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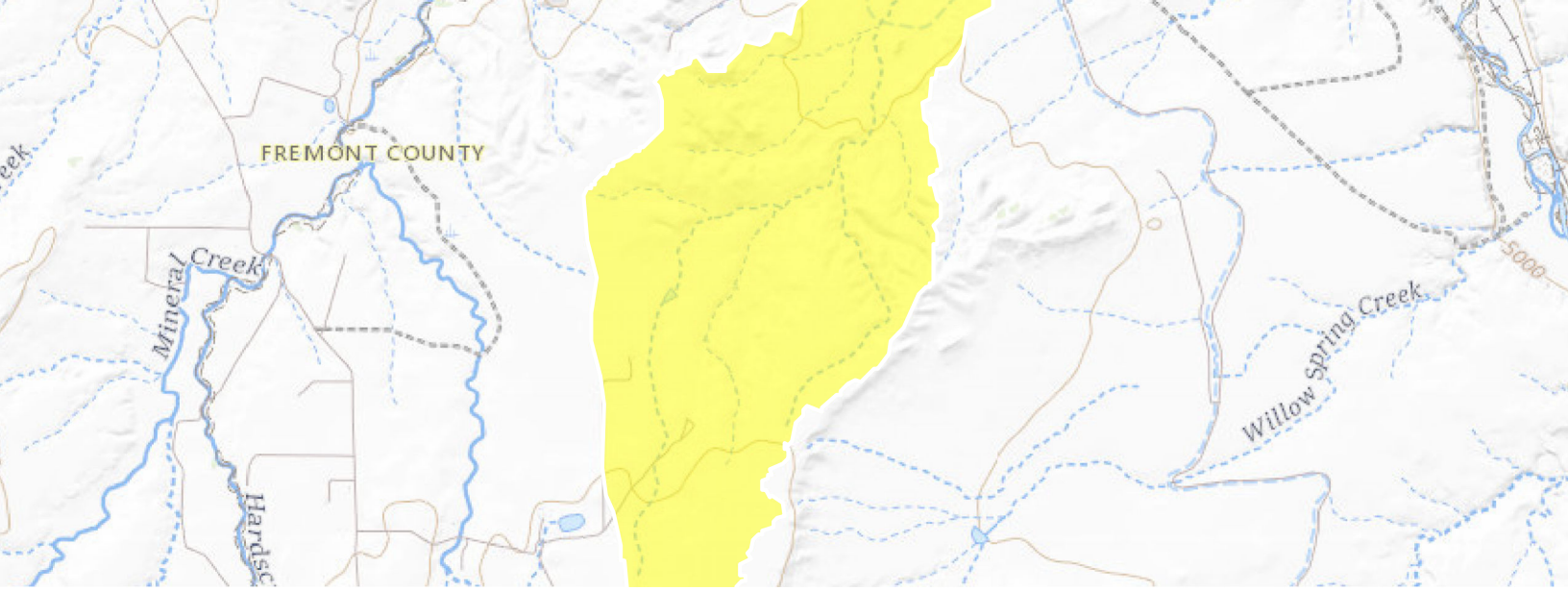
asin Characteristics

rameter ode	Parameter Description	Value	Unit
LDEM10M	Mean basin slope computed from 10 m DEM	3	percent
L1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	97.9	feet per m
RNAREA	Area that drains to a point on a stream	0.22	square m
7500	Percent of area above 7500 ft	0	percent
EV	Mean Basin Elevation	5252	feet
EVMAX	Maximum basin elevation	5320	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.17	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.55	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.16	inches
T_OUT	Latitude of Basin Outlet	38.359153	degrees
11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent
11GRASS	Percent of area covered by grassland/herbaceous using 2011 NLCD	100	percent
11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	0	percent

SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	0	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	0	percent
TATSCLAY	Percentage of clay soils from STATSGO	25.13	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	1.96	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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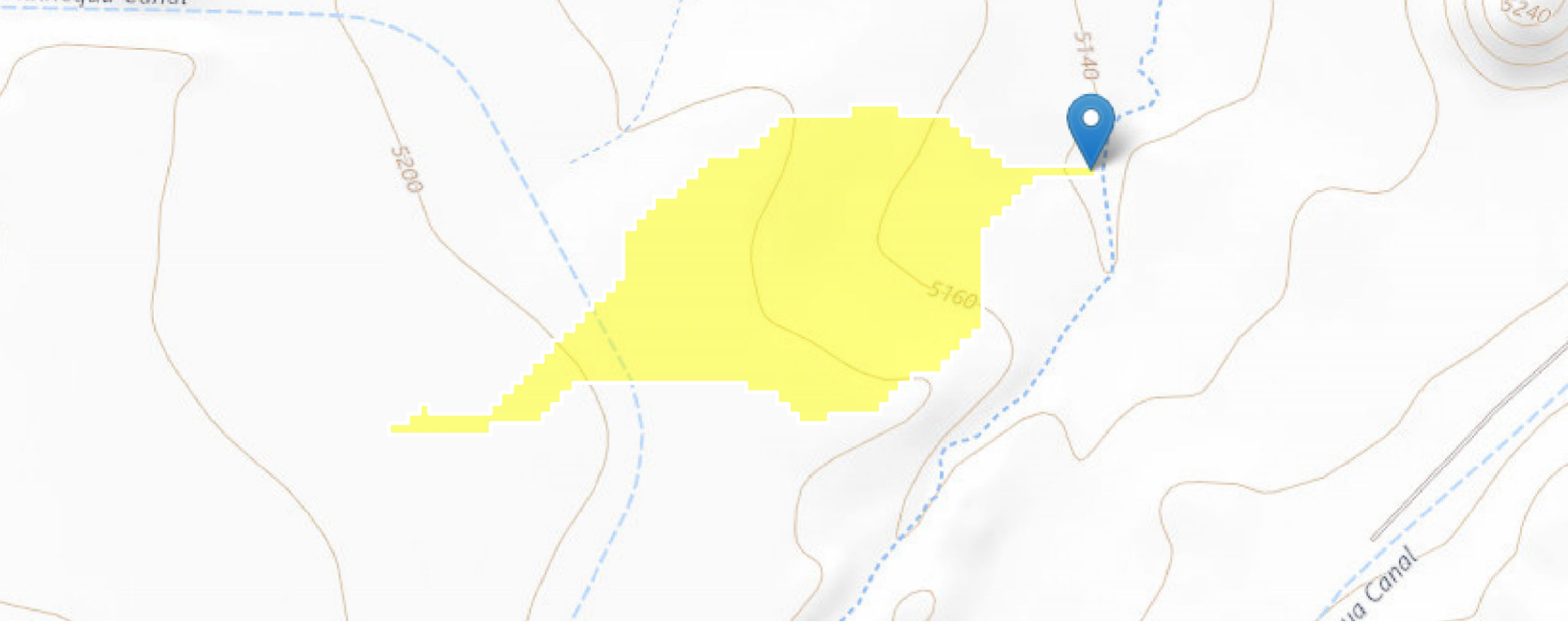
asin Characteristics

rameter ode	Parameter Description	Value	Unit
LDEM10M	Mean basin slope computed from 10 m DEM	6	percent
L1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	91	feet per m
RNAREA	Area that drains to a point on a stream	4	square m
7500	Percent of area above 7500 ft	0	percent
EV	Mean Basin Elevation	5388	feet
EVMAX	Maximum basin elevation	5580	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.2	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.56	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3.47	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.17	inches
T_OUT	Latitude of Basin Outlet	38.366002	degrees
11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0.1	percent
11GRASS	Percent of area covered by grassland/herbaceous using 2011 NLCD	87	percent
11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	2.3	percent

SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	20.9	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	19.5	percent
TATSCLAY	Percentage of clay soils from STATSGO	25.98	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0.1	percent
OC	Time of concentration in hours	4.59	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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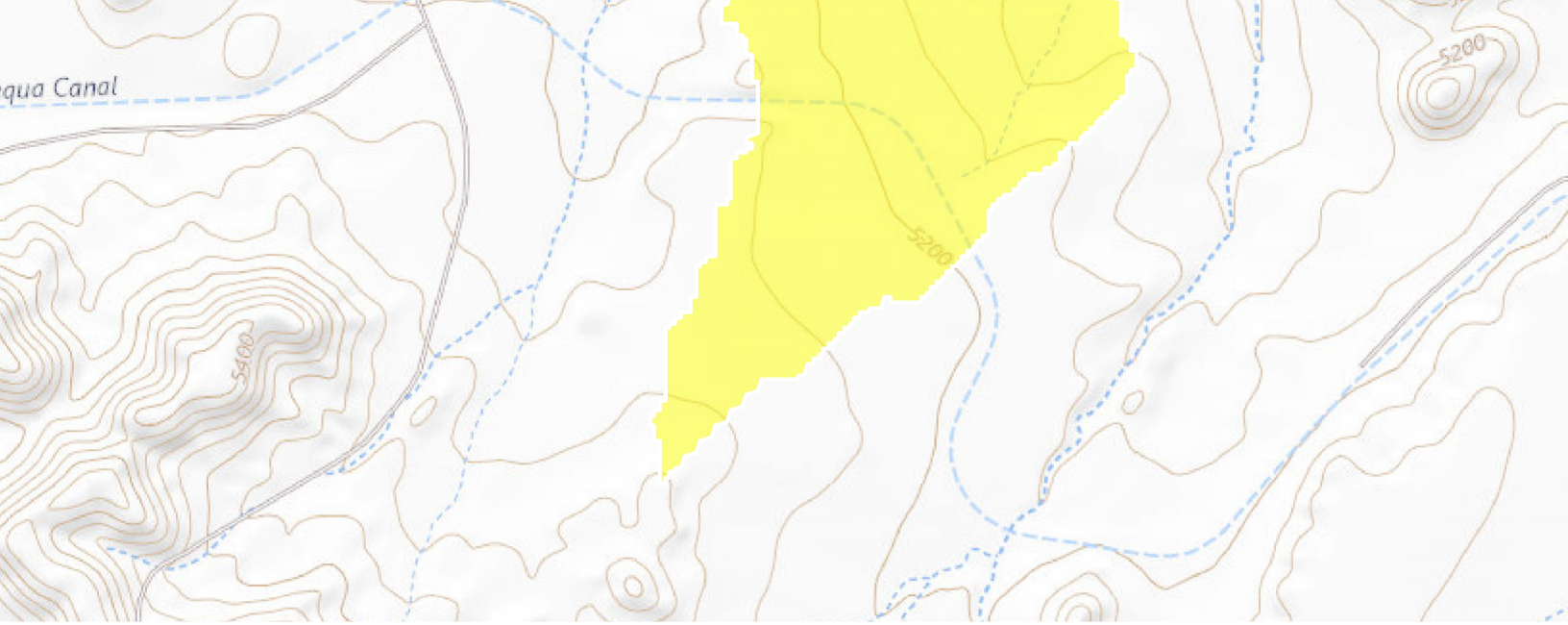
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	4	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	164.9	feet per m
RNAREA	Area that drains to a point on a stream	0.0375	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5177	feet
LEVMAX	Maximum basin elevation	5210	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3.41	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1	inches
AT_OUT	Latitude of Basin Outlet	38.366182	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent

UNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.23	dimensior
SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	45.2	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	7.11	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	47.7	percent
TATSCLAY	Percentage of clay soils from STATSGO	24.45	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	0.75	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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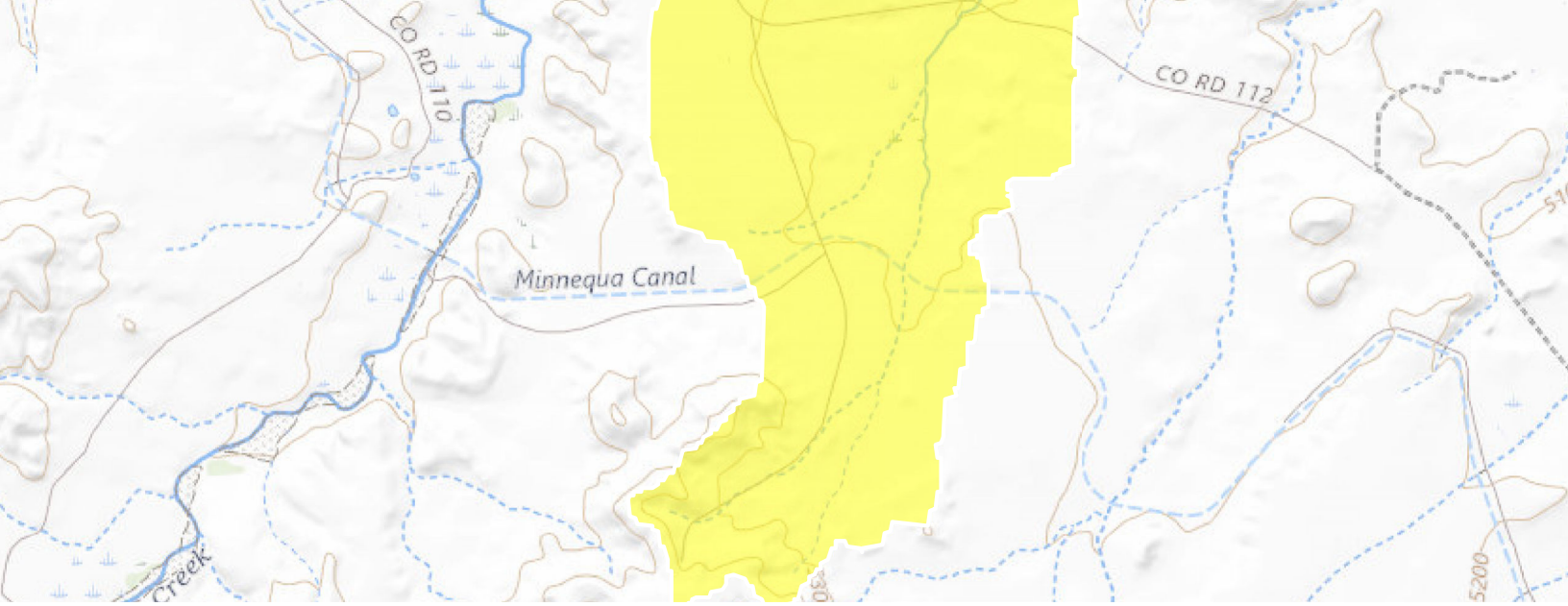
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	3	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	115.7	feet per m
RNAREA	Area that drains to a point on a stream	0.21	square mi
L7500	Percent of area above 7500 ft	0	percent
LEV	Mean Basin Elevation	5197	feet
LEVMAX	Maximum basin elevation	5260	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.16	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.54	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.15	inches
AT_OUT	Latitude of Basin Outlet	38.369697	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0.1	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent
C11GRASS	Percent of area covered by grassland/herbaceous using 2011 NLCD	81.2	percent

SURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
SURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	61.8	percent
SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	3.59	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	34.6	percent
TATSCLAY	Percentage of clay soils from STATSGO	25.13	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	1.56	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1



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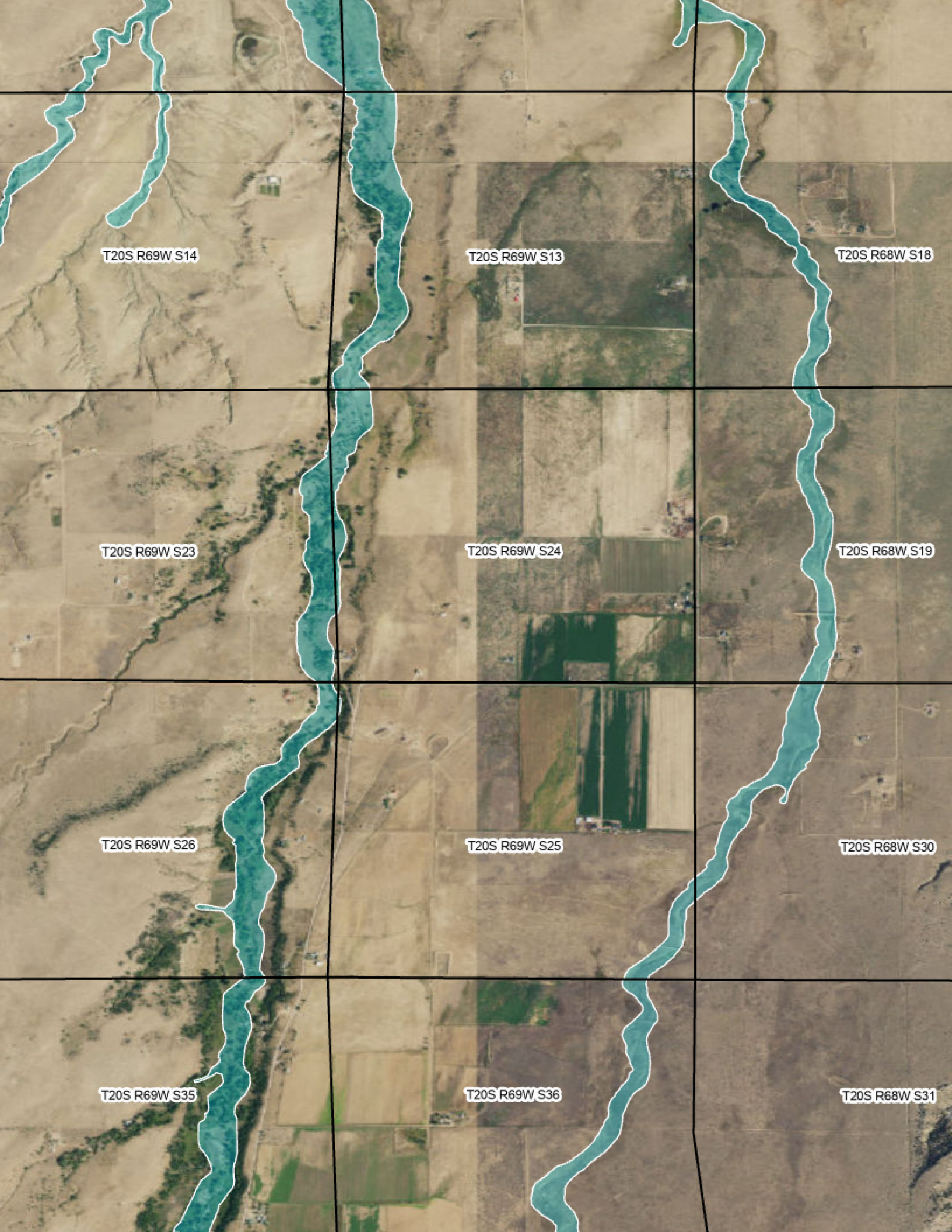
asin Characteristics

arameter ode	Parameter Description	Value	Unit
SLDEM10M	Mean basin slope computed from 10 m DEM	7	percent
SL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	139	feet per m
RNAREA	Area that drains to a point on a stream	1.29	square mi
7500	Percent of area above 7500 ft	0	percent
EV	Mean Basin Elevation	5200	feet
EVMAX	Maximum basin elevation	5450	feet
4H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.15	inches
4H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.53	inches
H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3.4	inches
H2Y	Maximum 6-hour precipitation that occurs on average once in 2 years	1.14	inches
AT_OUT	Latitude of Basin Outlet	38.37988	degrees
C11BARE	Percentage of barren from NLCD 2011 class 31	0.7	percent
C11CRPHAY	Percentage of cultivated crops and hay, classes 81 and 82, from NLCD 2011	0	percent
C11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0	percent
C11FOREST	Percentage of forest from NLCD 2011 classes 41-43	0	percent
C11GRASS	Percent of area covered by grassland/herbaceous using 2011 NLCD	58.2	percent
C11IMP	Average percentage of impervious area determined from NLCD 2011	3.9	percent

SURGOC	Percentage of area of Hydrologic Soil Type C from SSURGO	10.6	percent
SURGOD	Percentage of area of Hydrologic Soil Type D from SSURGO	62.1	percent
TATSCLAY	Percentage of clay soils from STATSGO	24.11	percent
TORNHD	Percent storage (wetlands and waterbodies) determined from 1:24K NHD	0	percent
OC	Time of concentration in hours	1.63	hours

tion Version: 4.19.4
Stats Services Version: 1.2.22
rvices Version: 2.2.1

Attachment C: FEMA FIRM Panels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T20S R69W S13
T20S R68W S18
T20S R69W S23
T20S R69W S24
T20S R68W S19
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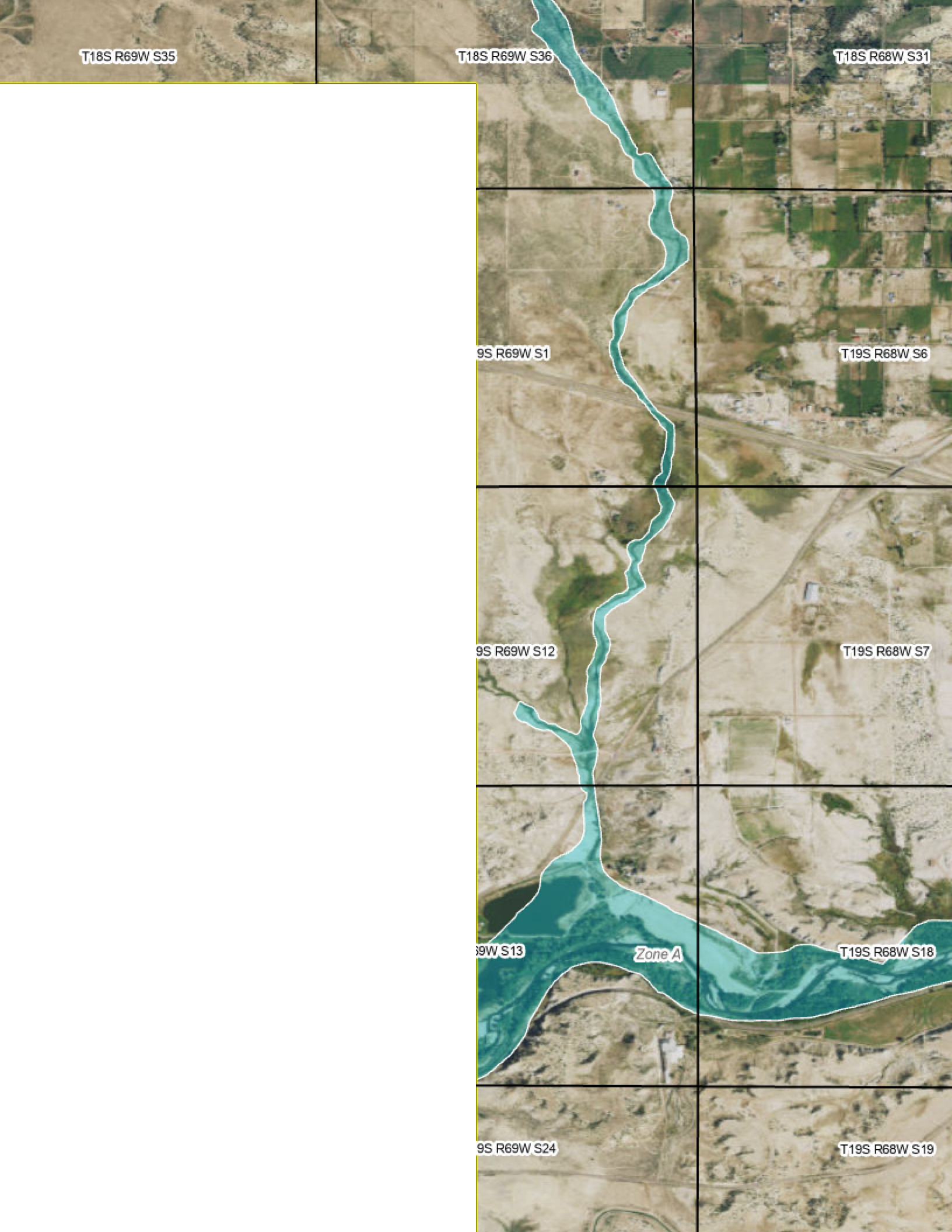
T20S R69W S25
T20S R68W S30
T20S R69W S35
T20S R69W S36
T20S R68W S31


T18S R69W S35
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T18S R68W S31
9S R69W S1
T19S R68W S6
9S R69W S12
T19S R68W S7
9W S13
Zone A
T19S R68W S18
9S R69W S24
T19S R68W S19


Zone A
T20S R68W S15
T20S R68W S14
T20S R68W S13
T20S R68W S22
T20S R68W S23
T20S R68W S24
T20S R68W S27
T20S R68W S26
Zone A
T20S R68W S25
T20S R68W S34
T20S R68W S35
T20S R68W S36

Attachment D: Red Creek Quarry and Materials Transport and Access Corridor HydroCAD Report

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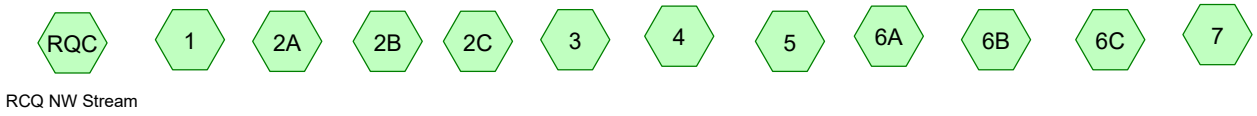
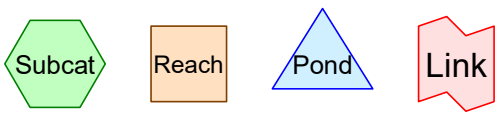


RCQ NW Stream



Routing Diagram for HydroCAD_RCQ-MTAC_1of2
Prepared by Brown & Caldwell, Printed 4/2/2024

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	25-yr 24-hr	Type II 24-hr		Default	24.00	1	3.01	2
2	100-yr 6-hr	Type II 6-hr		Default	6.00	1	3.49	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3,834.630	56	Brush, Fair, HSG B (1, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 7, RQC)
7,483.190	70	Brush, Fair, HSG C (1, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, RQC)
2,831.810	77	Brush, Fair, HSG D (1, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 7, RQC)
14,149.630	**68**	**TOTAL AREA**

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
3,834.630	HSG B	1, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 7, RQC
7,483.190	HSG C	1, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, RQC
2,831.810	HSG D	1, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 7, RQC
0.000	Other	
14,149.630		**TOTAL AREA**

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	3,834.630	7,483.190	2,831.810	0.000	14,149.630	Brush, Fair	1, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, RQC
0.000	**3,834.630**	**7,483.190**	**2,831.810**	**0.000**	**14,149.630**	**TOTAL AREA**	

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Time span=0.00-48.00 hrs, dt=0.20 hrs, 241 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Runoff Area=230.100 ac 0.00% Impervious Runoff Depth=0.68"
Tc=144.6 min CN=69 Runoff=34.98 cfs 12.944 af

Subcatchment2A: Runoff Area=831.000 ac 0.00% Impervious Runoff Depth=0.63"
Tc=60.0 min CN=68 Runoff=218.12 cfs 43.750 af

Subcatchment2B: Runoff Area=10,340.000 ac 0.00% Impervious Runoff Depth=0.63"
Tc=383.0 min CN=68 Runoff=715.79 cfs 544.372 af

Subcatchment2C: Runoff Area=345.500 ac 0.00% Impervious Runoff Depth=0.51"
Tc=185.0 min CN=65 Runoff=30.38 cfs 14.702 af

Subcatchment3: Runoff Area=127.920 ac 0.00% Impervious Runoff Depth=0.55"
Tc=115.0 min CN=66 Runoff=17.37 cfs 5.859 af

Subcatchment4: Runoff Area=33.280 ac 0.00% Impervious Runoff Depth=0.59"
Tc=63.0 min CN=67 Runoff=7.67 cfs 1.636 af

Subcatchment5: Runoff Area=236.830 ac 0.00% Impervious Runoff Depth=0.68"
Tc=115.0 min CN=69 Runoff=42.54 cfs 13.323 af

Subcatchment6A: Runoff Area=29.100 ac 0.00% Impervious Runoff Depth=0.77"
Tc=59.0 min CN=71 Runoff=10.17 cfs 1.858 af

Subcatchment6B: Runoff Area=1,165.100 ac 0.00% Impervious Runoff Depth=0.59"
Tc=190.0 min CN=67 Runoff=123.94 cfs 57.279 af

Subcatchment6C: Runoff Area=34.600 ac 0.00% Impervious Runoff Depth=0.72"
Tc=94.0 min CN=70 Runoff=7.84 cfs 2.076 af

Subcatchment7: Runoff Area=746.500 ac 0.00% Impervious Runoff Depth=0.59"
Tc=153.0 min CN=67 Runoff=91.04 cfs 36.700 af

SubcatchmentRQC: RCQ NW Stream Runoff Area=29.700 ac 0.00% Impervious Runoff Depth=0.86"
Tc=72.0 min CN=73 Runoff=10.54 cfs 2.137 af

Total Runoff Area = 14,149.630 ac Runoff Volume = 736.636 af Average Runoff Depth = 0.62"
100.00% Pervious = 14,149.630 ac 0.00% Impervious = 0.000 ac

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Summary for Subcatchment 1:

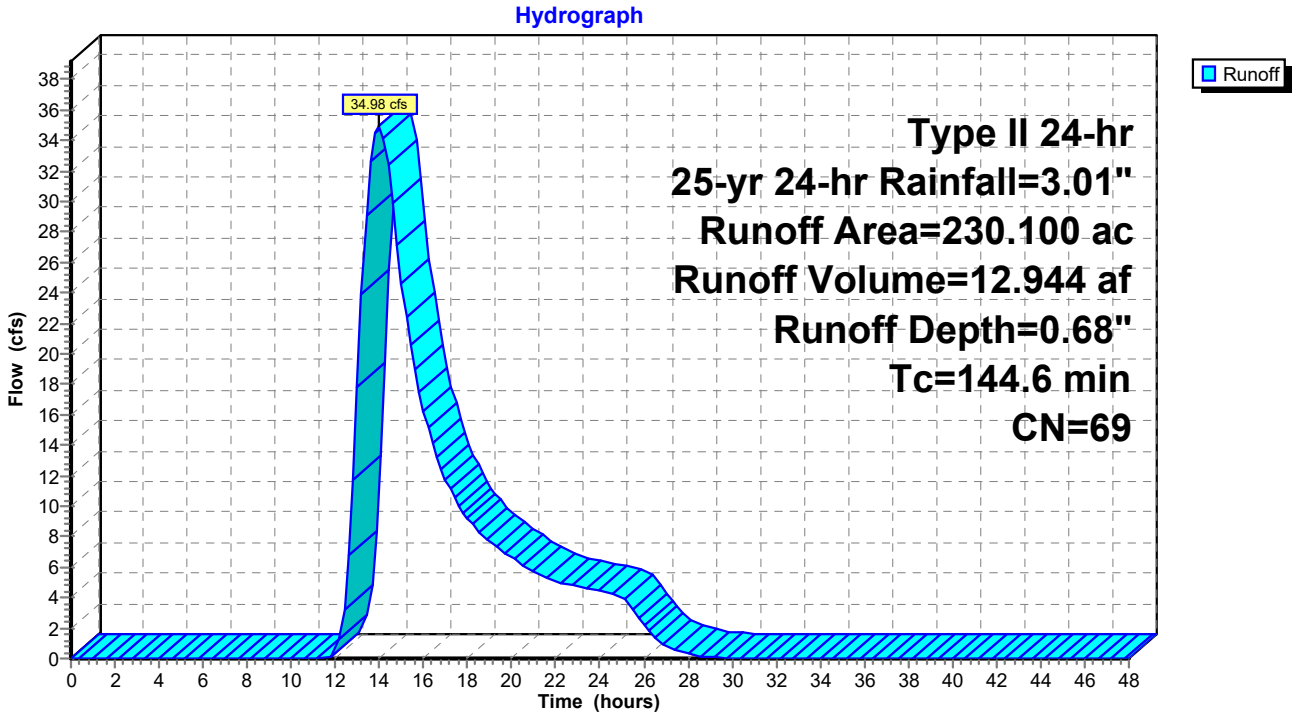
Runoff = 34.98 cfs @ 13.98 hrs, Volume= 12.944 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr 24-hr Rainfall=3.01"

Area (ac)	CN	Description
28.100	56	Brush, Fair, HSG B
164.700	70	Brush, Fair, HSG C
37.300	77	Brush, Fair, HSG D
230.100	69	Weighted Average
230.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
144.6					**Direct Entry, from StreamStats**

Subcatchment 1:



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Summary for Subcatchment 2A:

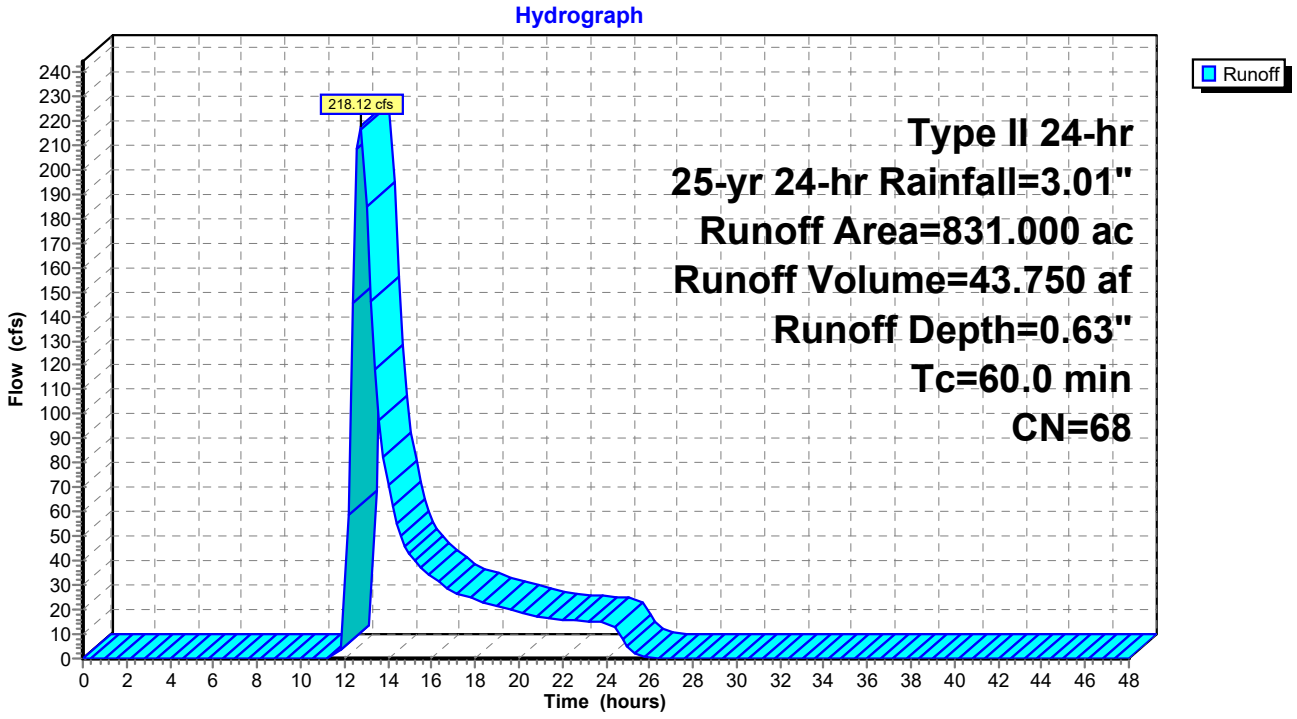
Runoff = 218.12 cfs @ 12.74 hrs, Volume= 43.750 af, Depth= 0.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr 24-hr Rainfall=3.01"

Area (ac)	CN	Description
225.000	56	Brush, Fair, HSG B
421.000	70	Brush, Fair, HSG C
185.000	77	Brush, Fair, HSG D
831.000	68	Weighted Average
831.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
60.0					**Direct Entry, Assume shorter than Crossing 19 for conservative**

Subcatchment 2A:



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Summary for Subcatchment 2B:

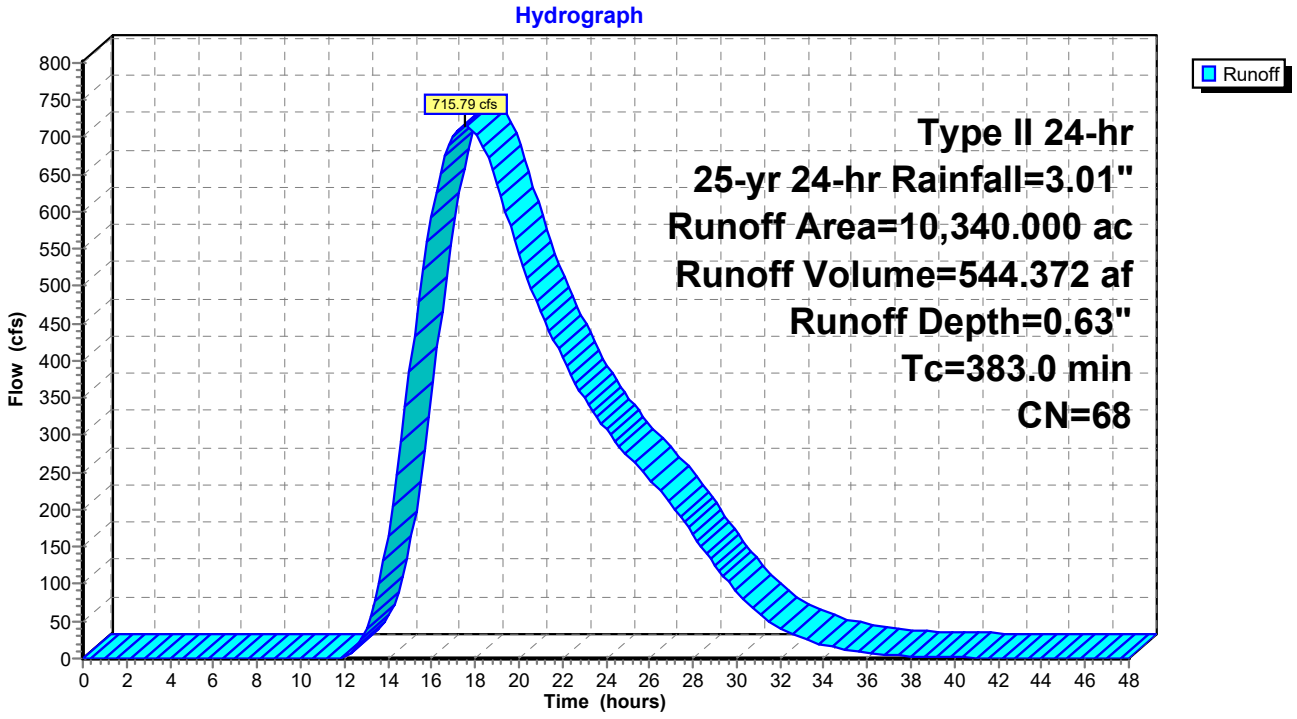
Runoff = 715.79 cfs @ 17.50 hrs, Volume= 544.372 af, Depth= 0.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr 24-hr Rainfall=3.01"

Area (ac)	CN	Description
2,802.000	56	Brush, Fair, HSG B
5,232.000	70	Brush, Fair, HSG C
2,306.000	77	Brush, Fair, HSG D
10,340.000	68	Weighted Average
10,340.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
383.0					**Direct Entry, StreamStats**

Subcatchment 2B:



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Summary for Subcatchment 2C:

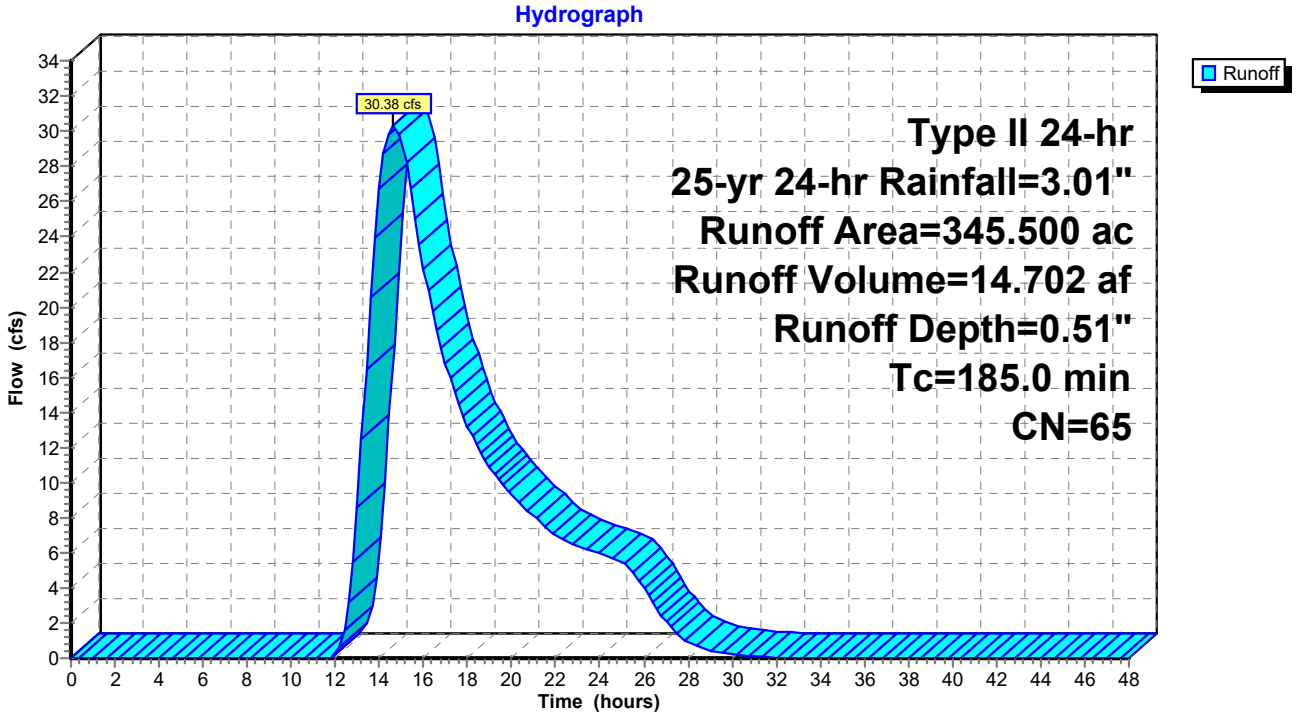
Runoff = 30.38 cfs @ 14.65 hrs, Volume= 14.702 af, Depth= 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr 24-hr Rainfall=3.01"

Area (ac)	CN	Description
0.000	35	Brush, Fair, HSG A
129.900	56	Brush, Fair, HSG B
195.600	70	Brush, Fair, HSG C
20.000	77	Brush, Fair, HSG D
345.500	65	Weighted Average
345.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
185.0					**Direct Entry, StreamStats**

Subcatchment 2C:



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Summary for Subcatchment 3:

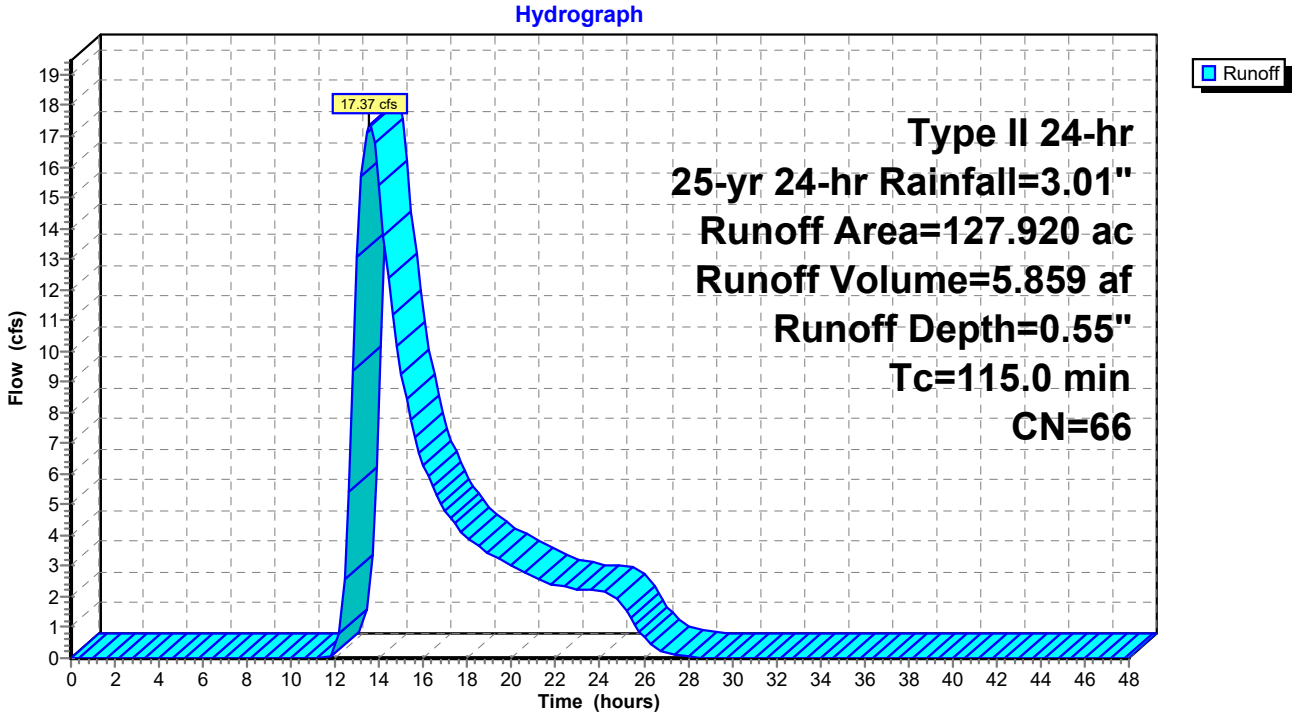
Runoff = 17.37 cfs @ 13.56 hrs, Volume= 5.859 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr 24-hr Rainfall=3.01"

Area (ac)	CN	Description
0.000	35	Brush, Fair, HSG A
38.660	56	Brush, Fair, HSG B
78.460	70	Brush, Fair, HSG C
10.800	77	Brush, Fair, HSG D
127.920	66	Weighted Average
127.920		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
115.0					**Direct Entry, Streamstats**

Subcatchment 3:



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Summary for Subcatchment 4:

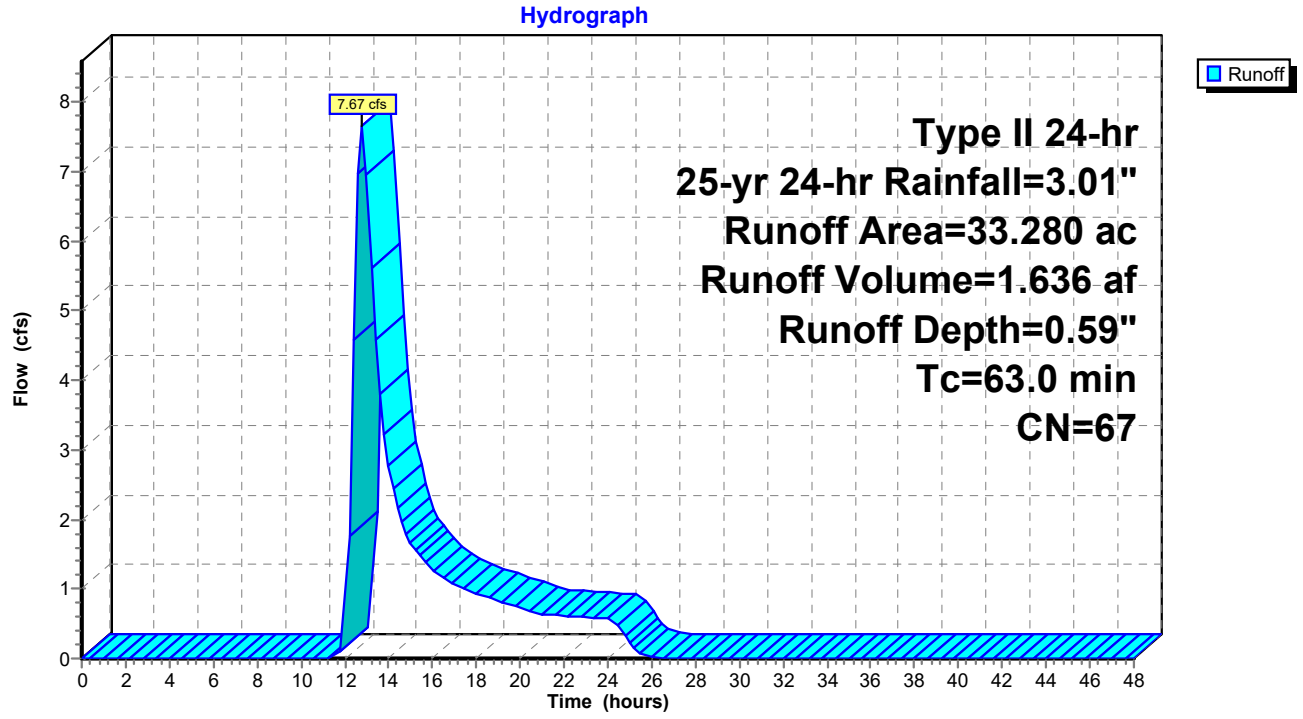
Runoff = 7.67 cfs @ 12.80 hrs, Volume= 1.636 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr 24-hr Rainfall=3.01"

Area (ac)	CN	Description
10.450	56	Brush, Fair, HSG B
17.040	70	Brush, Fair, HSG C
5.790	77	Brush, Fair, HSG D
33.280	67	Weighted Average
33.280		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
63.0					**Direct Entry, Streamstats**

Subcatchment 4:



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Summary for Subcatchment 5:

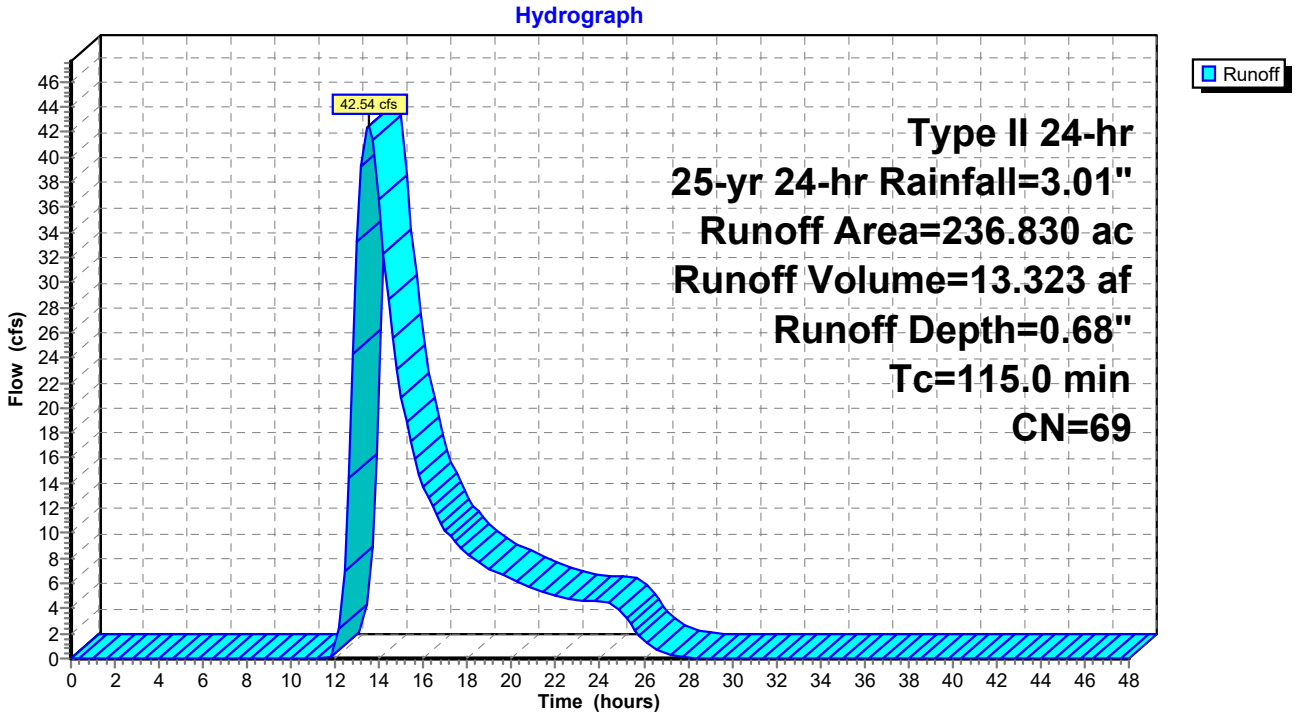
Runoff = 42.54 cfs @ 13.50 hrs, Volume= 13.323 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr 24-hr Rainfall=3.01"

Area (ac)	CN	Description
20.320	56	Brush, Fair, HSG B
197.490	70	Brush, Fair, HSG C
19.020	77	Brush, Fair, HSG D
236.830	69	Weighted Average
236.830		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
115.0					**Direct Entry, StreamStats**

Subcatchment 5:



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Summary for Subcatchment 6A:

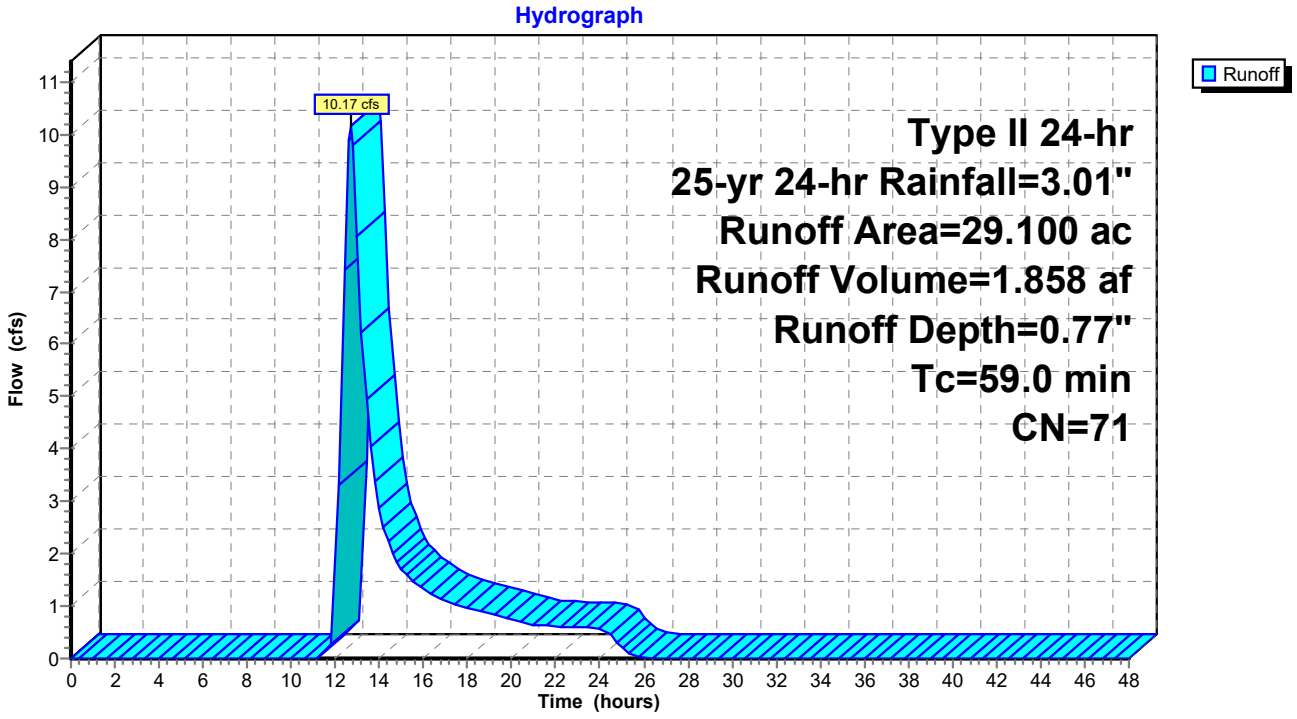
Runoff = 10.17 cfs @ 12.69 hrs, Volume= 1.858 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr 24-hr Rainfall=3.01"

Area (ac)	CN	Description
0.300	56	Brush, Fair, HSG B
24.100	70	Brush, Fair, HSG C
4.700	77	Brush, Fair, HSG D
29.100	71	Weighted Average
29.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
59.0					**Direct Entry, StreamStats**

Subcatchment 6A:



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Summary for Subcatchment 6B:

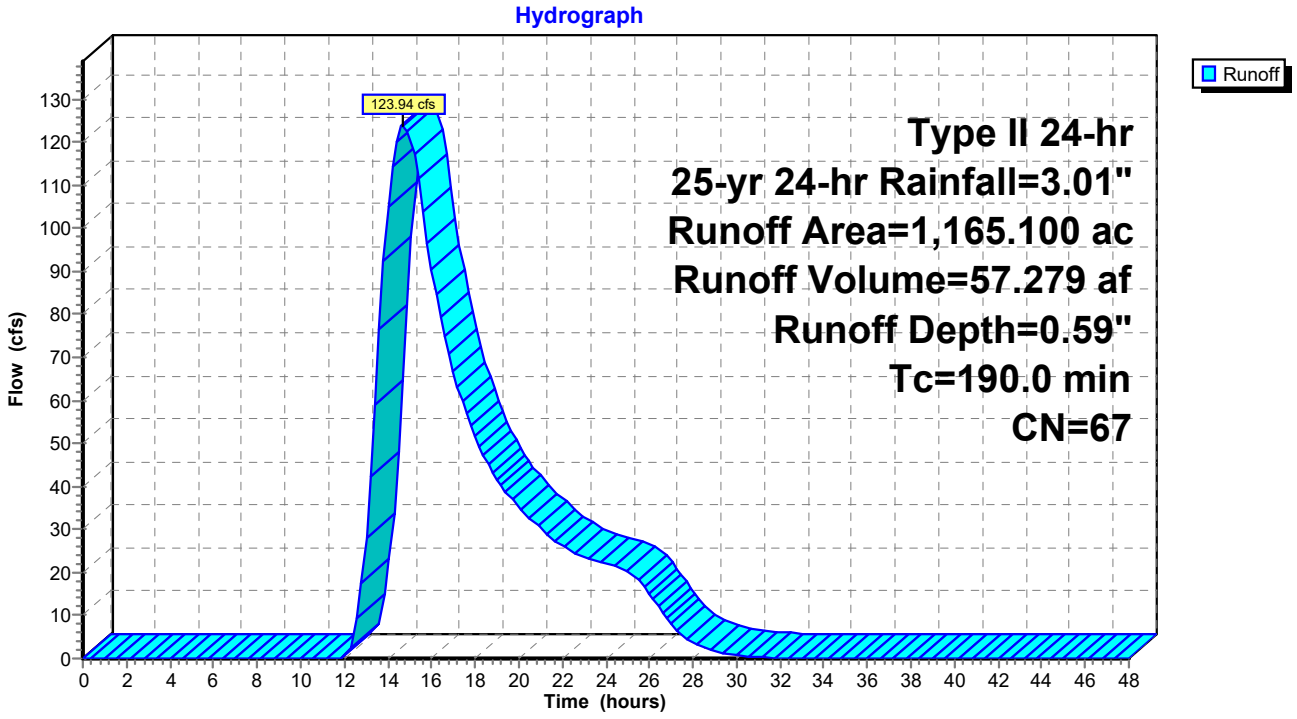
Runoff = 123.94 cfs @ 14.69 hrs, Volume= 57.279 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr 24-hr Rainfall=3.01"

Area (ac)	CN	Description
341.300	56	Brush, Fair, HSG B
709.400	70	Brush, Fair, HSG C
114.400	77	Brush, Fair, HSG D
1,165.100	67	Weighted Average
1,165.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
190.0					**Direct Entry, Streamstats**

Subcatchment 6B:



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Summary for Subcatchment 6C:

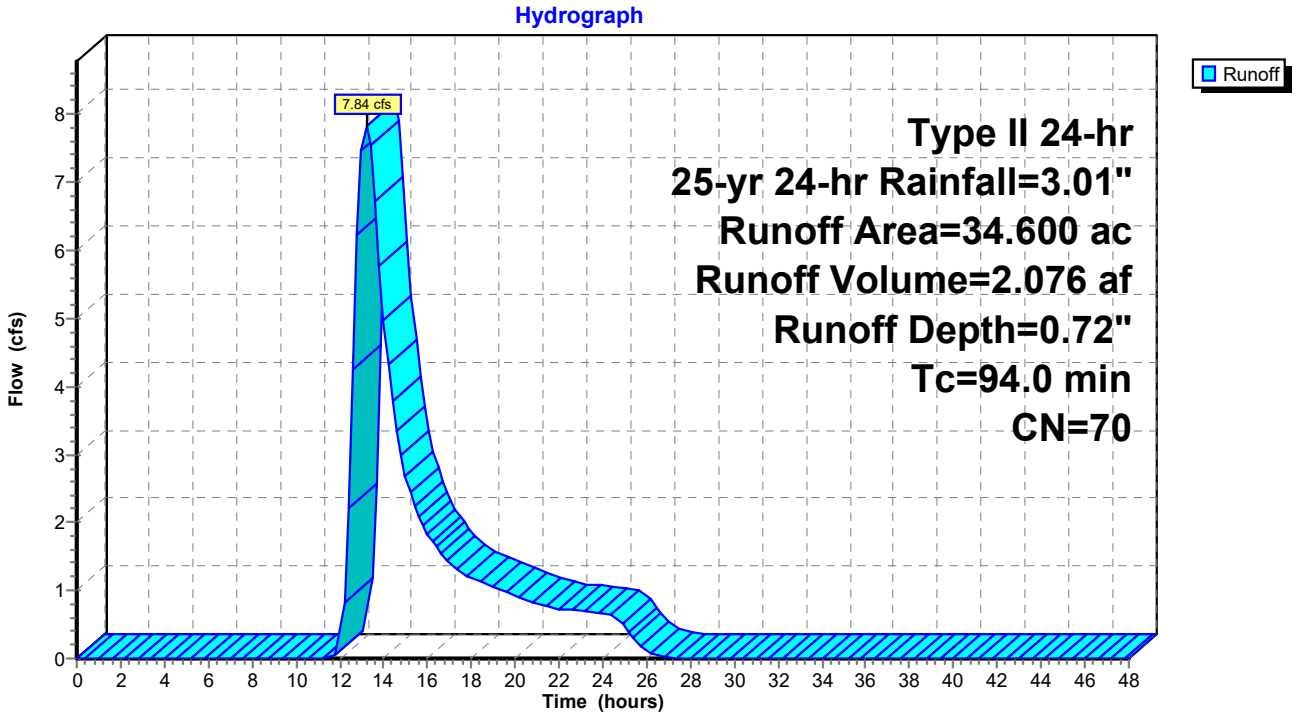
Runoff = 7.84 cfs @ 13.21 hrs, Volume= 2.076 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr 24-hr Rainfall=3.01"

Area (ac)	CN	Description
0.000	56	Brush, Fair, HSG B
34.600	70	Brush, Fair, HSG C
0.000	77	Brush, Fair, HSG D
34.600	70	Weighted Average
34.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
94.0					**Direct Entry, StreamStats**

Subcatchment 6C:



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Summary for Subcatchment 7:

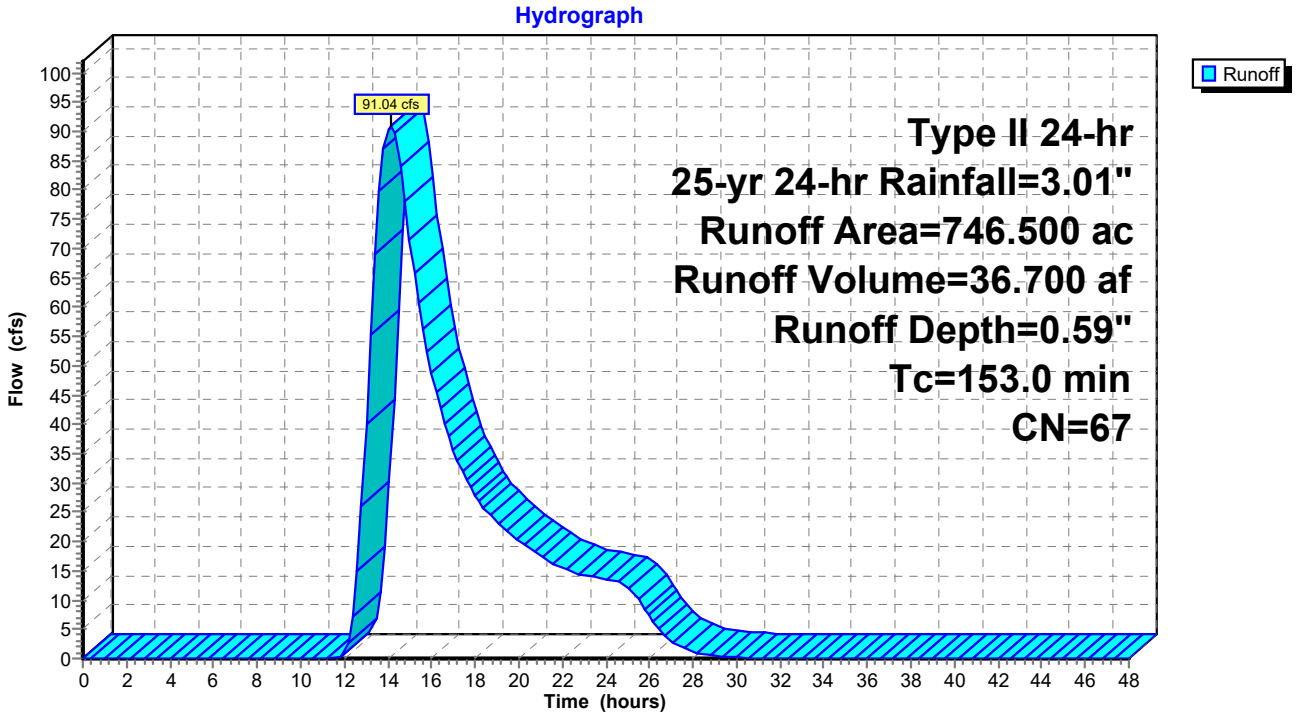
Runoff = 91.04 cfs @ 14.14 hrs, Volume= 36.700 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr 24-hr Rainfall=3.01"

Area (ac)	CN	Description
235.100	56	Brush, Fair, HSG B
400.600	70	Brush, Fair, HSG C
110.800	77	Brush, Fair, HSG D
746.500	67	Weighted Average
746.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
153.0					**Direct Entry, StreamStats**

Subcatchment 7:



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Summary for Subcatchment RQC: RCQ NW Stream

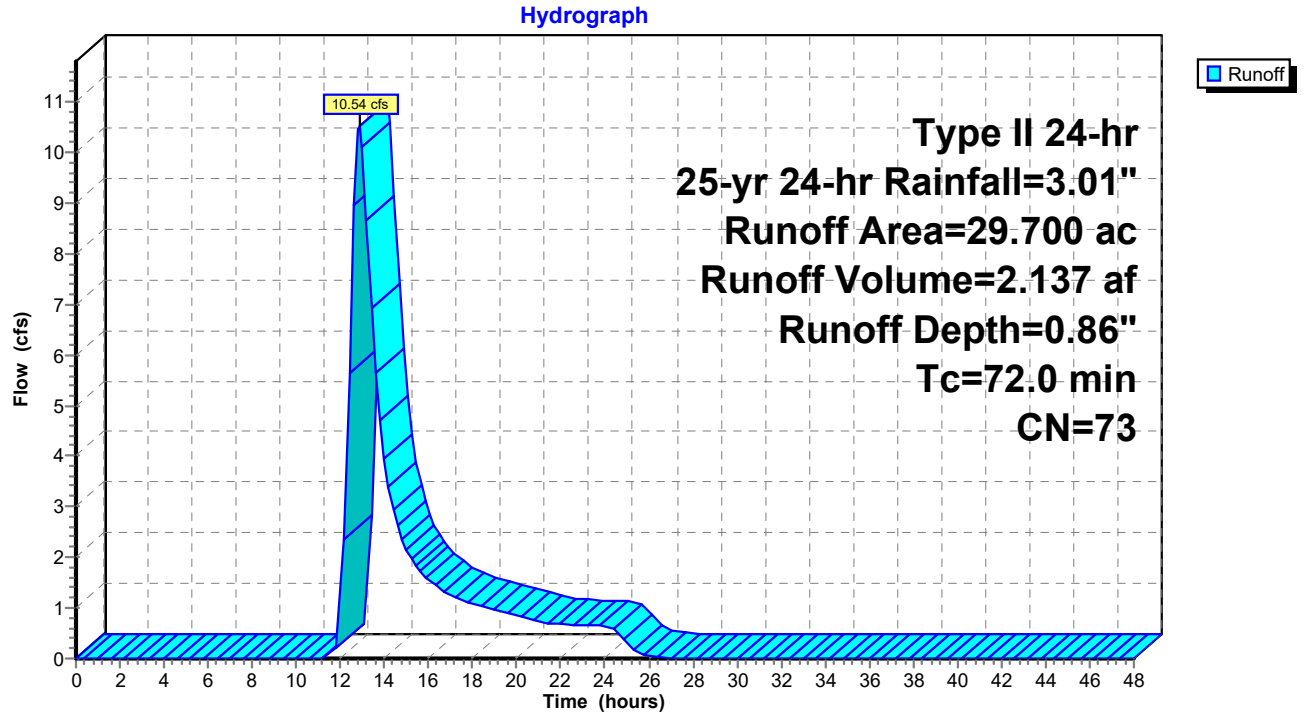
Runoff = 10.54 cfs @ 12.86 hrs, Volume= 2.137 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 24-hr 25-yr 24-hr Rainfall=3.01"

Area (ac)	CN	Description
3.500	56	Brush, Fair, HSG B
8.200	70	Brush, Fair, HSG C
18.000	77	Brush, Fair, HSG D
29.700	73	Weighted Average
29.700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
72.0					**Direct Entry, StreamStats**

Subcatchment RQC: RCQ NW Stream



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Time span=0.00-48.00 hrs, dt=0.20 hrs, 241 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Runoff Area=230.100 ac 0.00% Impervious Runoff Depth=0.95"
Tc=144.6 min CN=69 Runoff=73.22 cfs 18.177 af

Subcatchment2A: Runoff Area=831.000 ac 0.00% Impervious Runoff Depth=0.90"
Tc=60.0 min CN=68 Runoff=466.61 cfs 62.013 af

Subcatchment2B: Runoff Area=10,340.000 ac 0.00% Impervious Runoff Depth=0.90"
Tc=383.0 min CN=68 Runoff=1,511.85 cfs 771.612 af

Subcatchment2C: Runoff Area=345.500 ac 0.00% Impervious Runoff Depth=0.75"
Tc=185.0 min CN=65 Runoff=71.65 cfs 21.500 af

Subcatchment3: Runoff Area=127.920 ac 0.00% Impervious Runoff Depth=0.79"
Tc=115.0 min CN=66 Runoff=39.67 cfs 8.474 af

Subcatchment4: Runoff Area=33.280 ac 0.00% Impervious Runoff Depth=0.84"
Tc=63.0 min CN=67 Runoff=16.87 cfs 2.342 af

Subcatchment5: Runoff Area=236.830 ac 0.00% Impervious Runoff Depth=0.95"
Tc=115.0 min CN=69 Runoff=89.62 cfs 18.709 af

Subcatchment6A: Runoff Area=29.100 ac 0.00% Impervious Runoff Depth=1.06"
Tc=59.0 min CN=71 Runoff=20.20 cfs 2.564 af

Subcatchment6B: Runoff Area=1,165.100 ac 0.00% Impervious Runoff Depth=0.84"
Tc=190.0 min CN=67 Runoff=264.33 cfs 81.991 af

Subcatchment6C: Runoff Area=34.600 ac 0.00% Impervious Runoff Depth=1.00"
Tc=94.0 min CN=70 Runoff=16.01 cfs 2.889 af

Subcatchment7: Runoff Area=746.500 ac 0.00% Impervious Runoff Depth=0.84"
Tc=153.0 min CN=67 Runoff=201.19 cfs 52.533 af

SubcatchmentRQC: RCQ NW Stream Runoff Area=29.700 ac 0.00% Impervious Runoff Depth=1.17"
Tc=72.0 min CN=73 Runoff=20.30 cfs 2.903 af

Total Runoff Area = 14,149.630 ac Runoff Volume = 1,045.707 af Average Runoff Depth = 0.89"
100.00% Pervious = 14,149.630 ac 0.00% Impervious = 0.000 ac

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Summary for Subcatchment 1:

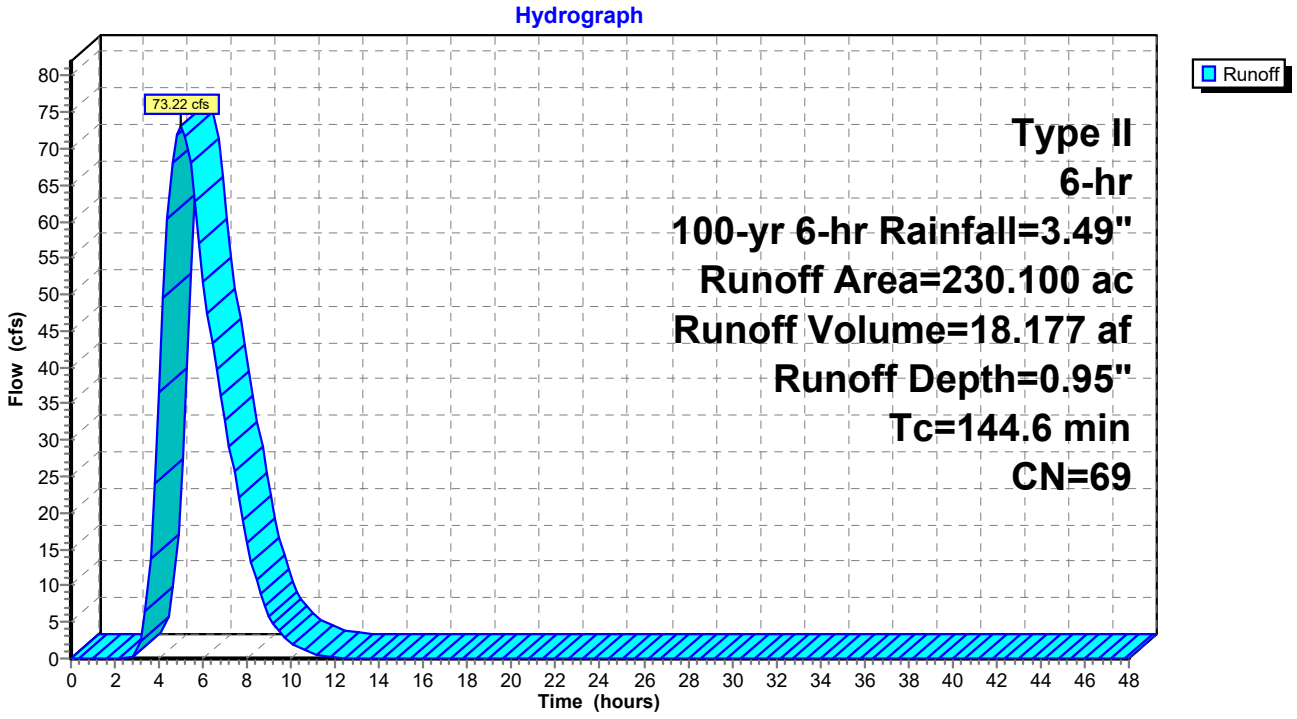
Runoff = 73.22 cfs @ 4.99 hrs, Volume= 18.177 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 6-hr 100-yr 6-hr Rainfall=3.49"

Area (ac)	CN	Description
28.100	56	Brush, Fair, HSG B
164.700	70	Brush, Fair, HSG C
37.300	77	Brush, Fair, HSG D
230.100	69	Weighted Average
230.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
144.6					**Direct Entry, from StreamStats**

Subcatchment 1:



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Summary for Subcatchment 2A:

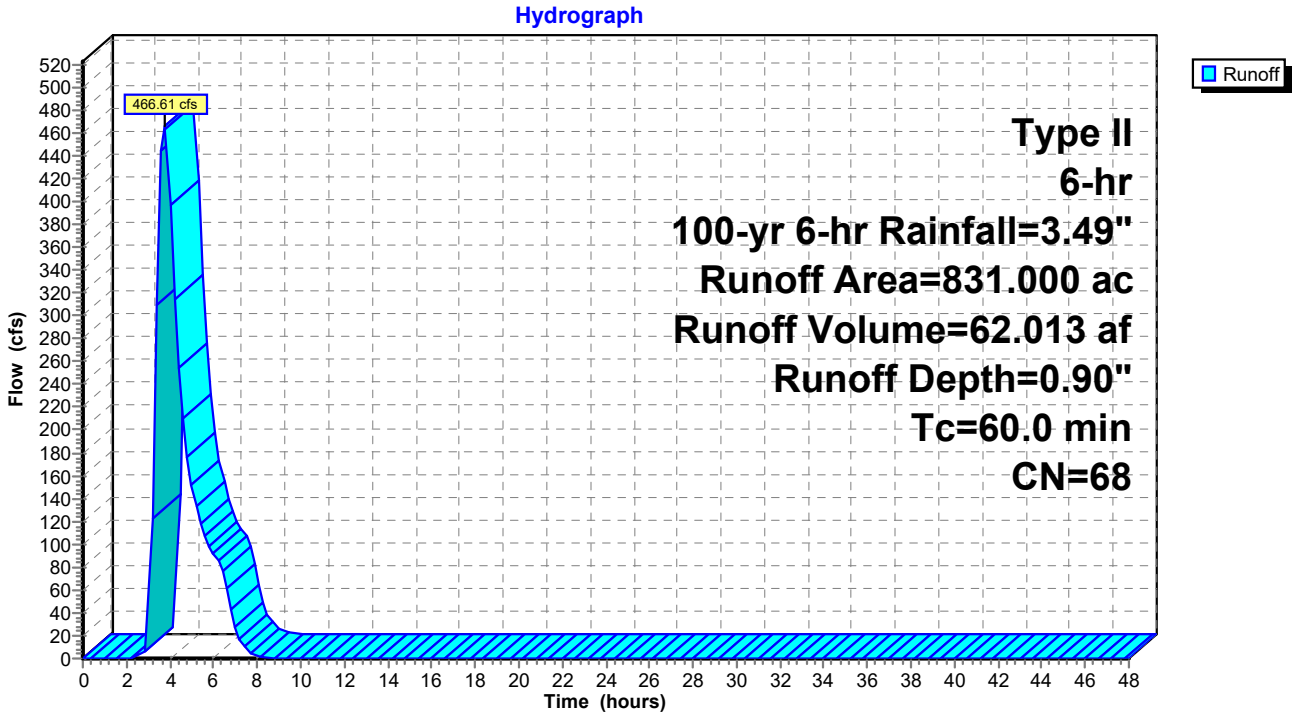
Runoff = 466.61 cfs @ 3.74 hrs, Volume= 62.013 af, Depth= 0.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 6-hr 100-yr 6-hr Rainfall=3.49"

Area (ac)	CN	Description
225.000	56	Brush, Fair, HSG B
421.000	70	Brush, Fair, HSG C
185.000	77	Brush, Fair, HSG D
831.000	68	Weighted Average
831.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
60.0					**Direct Entry, Assume shorter than Crossing 19 for conservative**

Subcatchment 2A:



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Summary for Subcatchment 2B:

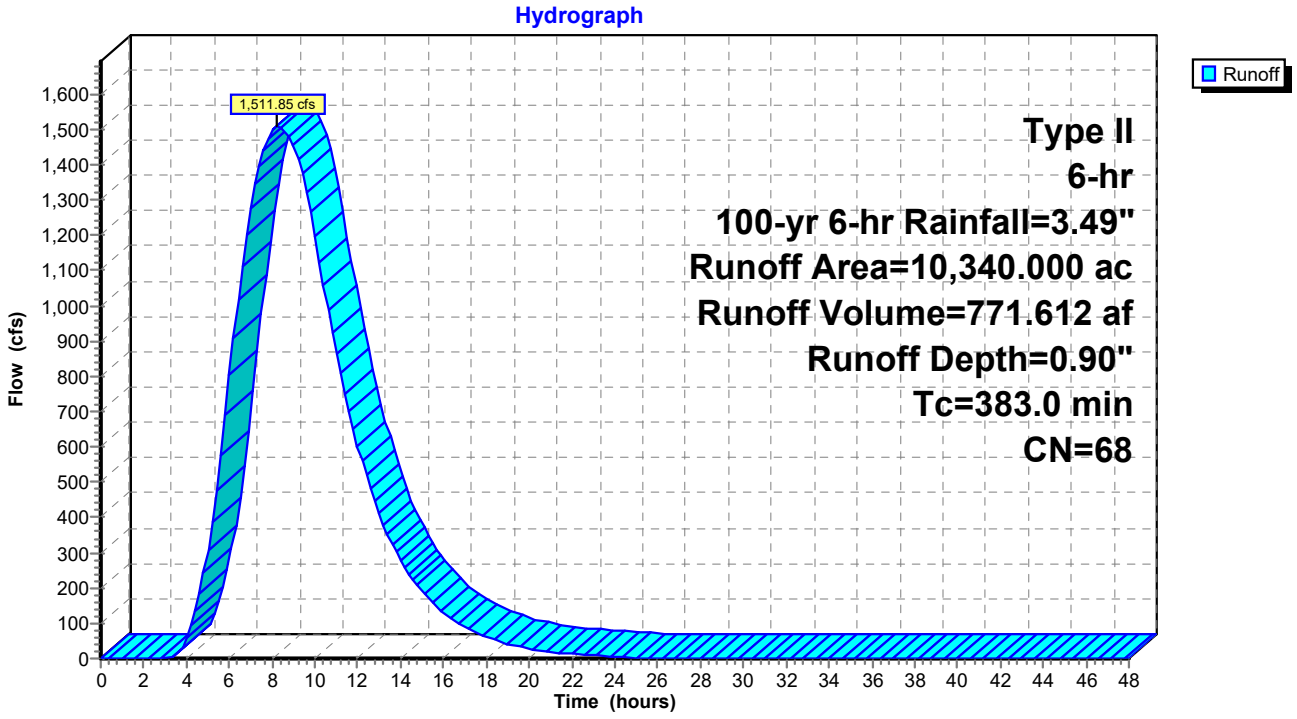
Runoff = 1,511.85 cfs @ 8.24 hrs, Volume= 771.612 af, Depth= 0.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 6-hr 100-yr 6-hr Rainfall=3.49"

Area (ac)	CN	Description
2,802.000	56	Brush, Fair, HSG B
5,232.000	70	Brush, Fair, HSG C
2,306.000	77	Brush, Fair, HSG D
10,340.000	68	Weighted Average
10,340.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
383.0					**Direct Entry, StreamStats**

Subcatchment 2B:



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Summary for Subcatchment 2C:

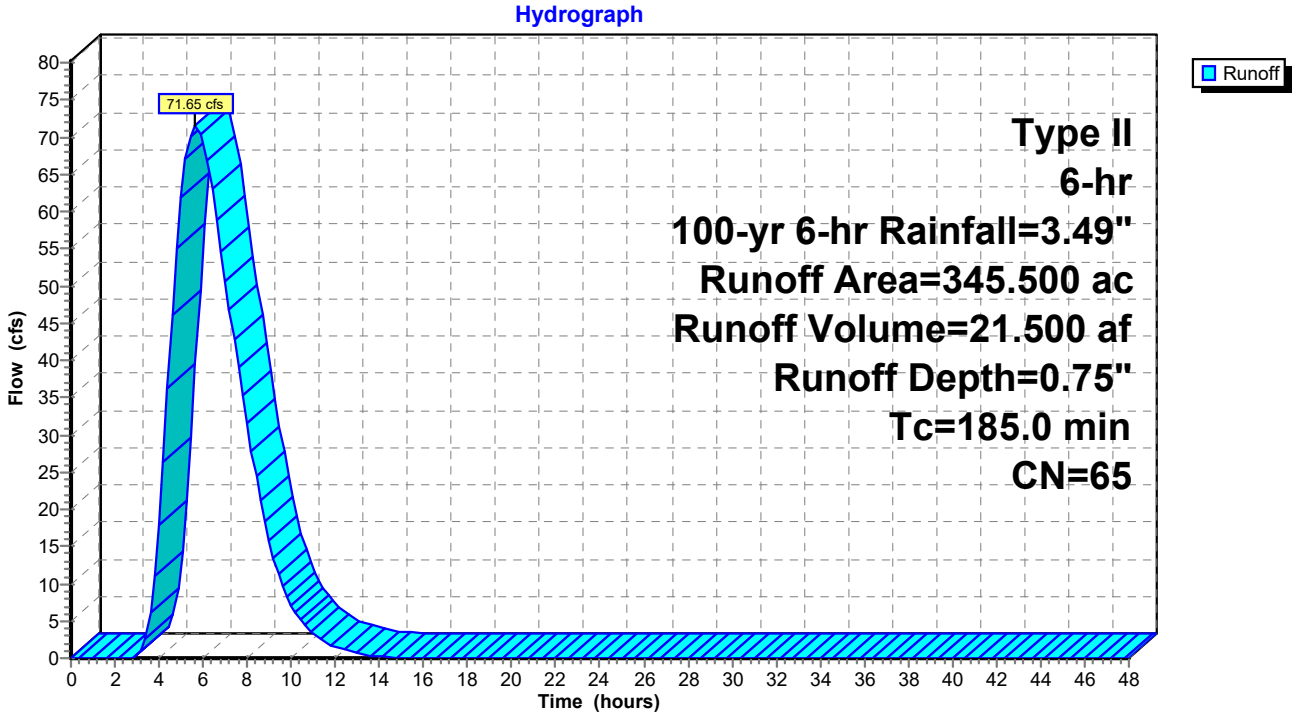
Runoff = 71.65 cfs @ 5.66 hrs, Volume= 21.500 af, Depth= 0.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 6-hr 100-yr 6-hr Rainfall=3.49"

Area (ac)	CN	Description
0.000	35	Brush, Fair, HSG A
129.900	56	Brush, Fair, HSG B
195.600	70	Brush, Fair, HSG C
20.000	77	Brush, Fair, HSG D
345.500	65	Weighted Average
345.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
185.0					**Direct Entry, StreamStats**

Subcatchment 2C:



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Summary for Subcatchment 3:

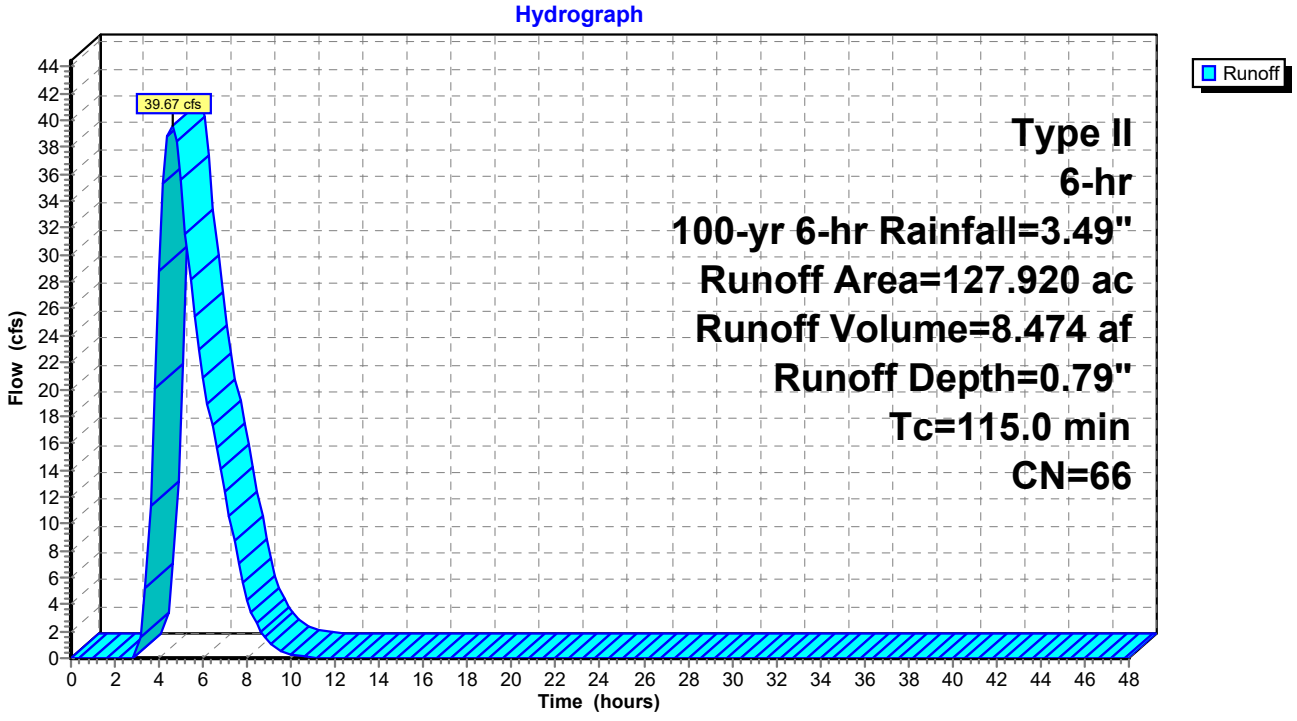
Runoff = 39.67 cfs @ 4.58 hrs, Volume= 8.474 af, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 6-hr 100-yr 6-hr Rainfall=3.49"

Area (ac)	CN	Description
0.000	35	Brush, Fair, HSG A
38.660	56	Brush, Fair, HSG B
78.460	70	Brush, Fair, HSG C
10.800	77	Brush, Fair, HSG D
127.920	66	Weighted Average
127.920		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
115.0					**Direct Entry, Streamstats**

Subcatchment 3:



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Summary for Subcatchment 4:

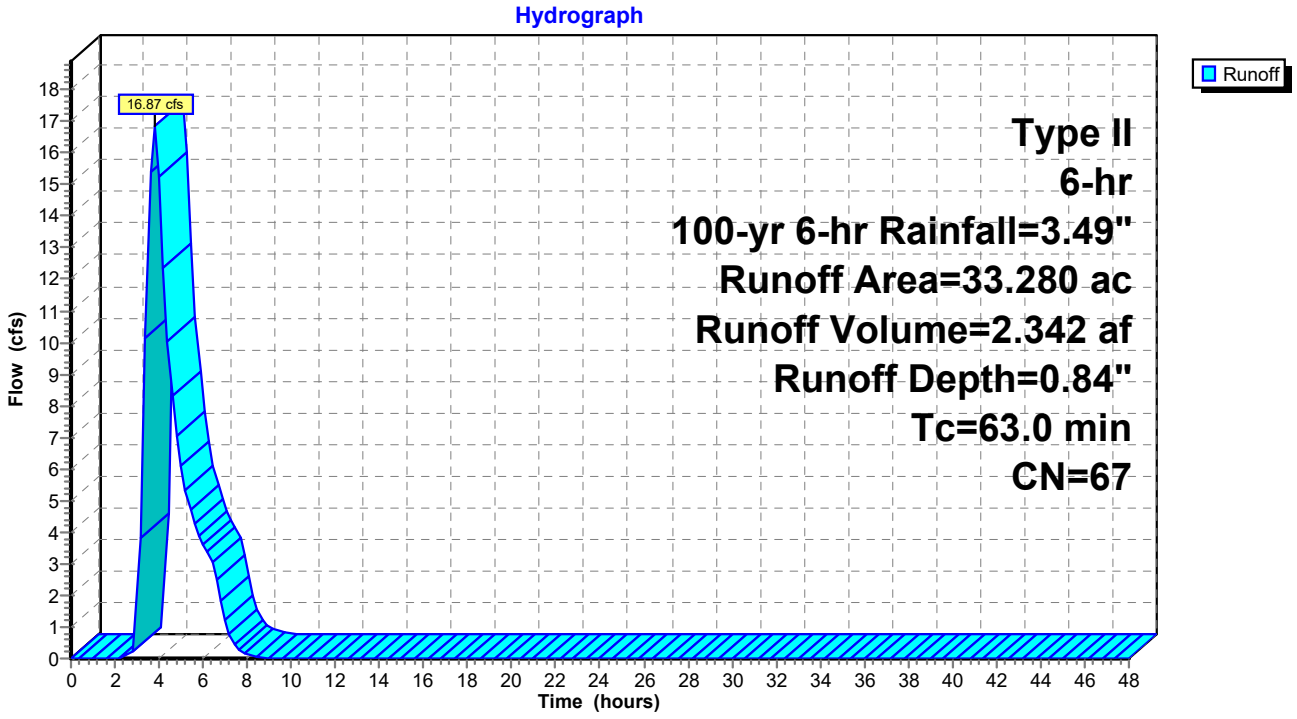
Runoff = 16.87 cfs @ 3.79 hrs, Volume= 2.342 af, Depth= 0.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 6-hr 100-yr 6-hr Rainfall=3.49"

Area (ac)	CN	Description
10.450	56	Brush, Fair, HSG B
17.040	70	Brush, Fair, HSG C
5.790	77	Brush, Fair, HSG D
33.280	67	Weighted Average
33.280		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
63.0					**Direct Entry, Streamstats**

Subcatchment 4:



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Summary for Subcatchment 5:

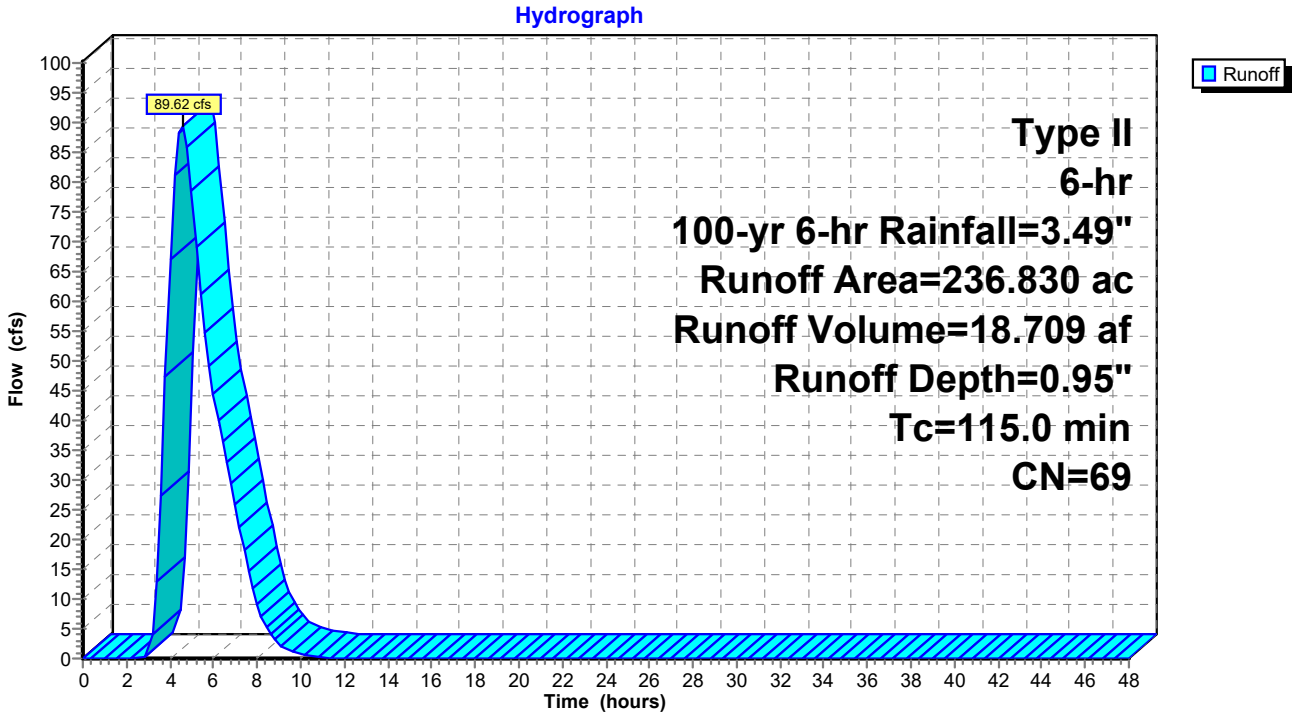
Runoff = 89.62 cfs @ 4.55 hrs, Volume= 18.709 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.20 hrs
Type II 6-hr 100-yr 6-hr Rainfall=3.49"

Area (ac)	CN	Description
20.320	56	Brush, Fair, HSG B
197.490	70	Brush, Fair, HSG C
19.020	77	Brush, Fair, HSG D
236.830	69	Weighted Average
236.830		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
115.0					**Direct Entry, StreamStats**

Subcatchment 5:



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