Final Drainage Report
For
Iron Wheel Subdivision
Fruita, Colorado

Date:	February 2, 2017
Revised:	**April 20, 2018** **December 14, 2018** **February 9, 2022** **February 21, 2022**
Prepared by:	Vortex Engineering, Inc. 2394 Patterson Road, Suite 201 Grand Junction, CO 81505 970-245-9051 VEI# F10-053
Submitted to:	City of Fruita 325 E Aspen Ave, Fruita, CO 81521
Type of Design:	Major Subdivision
Owners:	Bookcliff Orchards, LLC Attn: Cody Davis 637 25 Road Grand Junction, CO 81505
Property Address:	1860 Highway 6&50 953, 961 & 973 19 Road 1702 Skiff Avenue Fruita, CO 81521
Tax Schedule No.:	2697-211-07-003 2697-211-07-004 2697-211-07-005 2697-211-08-005 2697-211-00-011 2697-211-00-012

"I hereby certify that this Final Drainage Report for the design Iron Wheel Subdivision was prepared by me (or under my direct supervision) in accordance with the provisions of the Stormwater Management Manual for the owners thereof. I understand that City of Fruita does not and will not assume liability for drainage facilities designed by others.

Stephen E. Swindell, P.E. Date 2/9/2022

As an authorized signing representative of Iron Wheel Subdivision, I hereby certify that the drainage facilities shall be constructed according to the design presented in this report. I understand that City of Fruita does not and will not assume liability for the drainage facilities designed and/or certified by my engineer. I understand that Fruita reviews drainage plans but cannot, on behalf of Iron Wheel Subdivision, guarantee that final drainage design review will absolve Iron Wheel Subdivision and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the Construction Plans does not imply approval of my engineer's drainage design.

2/9/2022
Date

Table of Contents

1.0 Introduction

A. Background

This Final Drainage Report has been prepared by Vortex Engineering, Inc., and is required as part of the Iron Wheel Subdivision submittal. The property being an assemblage of 6 separate land parcels. This Final Drainage report has been created in accordance with the Mesa County/City of Fruita Stormwater Management Manual. This Final Drainage Report references a previously approved Drainage Report dated December 14, 2018.

B. Project Location

The Iron Wheel Subdivision is approximately 55.3 acres located in the political boundary of The City of Fruita, Colorado. The site is situated west of 19 Road and north of Highway 6 and 50. There are three main access points proposed for the project; two from the ease on 19 Road and the other to the west from an extension of 18 ½ Road from J Road to the project site. A drainage map is provided in Appendix A for reference.

C. Property Description

The site slopes from the northeast to the south and southwest at grades varying between 0.7%. and 1.3%. The site is currently undeveloped. The west 30 acres is covered with native grasses, sparsely located shrubs, and occasional trees. The remaining east portion of the site consists of alfalfa. With the development of the project site, it is planned to draw irrigation water from the Independent Ranch Irrigation Ditch to irrigate the property.

The following are the Natural Resources Conservation Service (NRCS) soils followed by the hydrologic soil group within the Iron Wheel Subdivision: *Fruitland Sandy Clay Loam* (Rc) – Group B; *Turley Clay Loam* – Group C; and *Massadona silty clay loam* (Tr) – Group C.

2.0 Drainage System Description

A. Existing conditions

The existing runoff from the project consists of sheet flows, shallow concentrated flows, and shallow ditch flows. There are two discharge points from the site. One discharge point is located in the northwest corner of the property discharging basin EX200 into the Palmer Drain, a Grand Valley Drainage District facility, which continues to drain in a westerly direction. The other point of discharge is located

approximately mid-way along the southern boundary. These discharge points are identified respectively as Design Point 1 and 2 on the *Drainage Map - Existing Conditions* in the Appendix. The offsite runoff from basin OS-1 enters the EX100 basin at design point 3. From that point the offsite runoff merges with the runoff from EX100; at design point 1 the surface runoff from EX100 and the offsite Basin OS-1 is intercepted by a 15" PVC culvert which conveys the water into a manhole located just on the south side of the Independent Ranch Irrigation Ditch. From there the runoff is carried in an 18" pipe into the Highway 6 and 50 roadway ditch. The runoff is then carried in either ditches or pipes in a southwesterly direction for approximately 1.5 miles; finally discharging into the Colorado River.

B. Master Drainage Plans

This site is in Major Basin 117, which is located between the Major Basins known as Adobe Creek and Little Salt Wash. The site does not drain into either of these basins; instead draining into smaller open drain ditches which empty directly into the Colorado River.

C. Offsite Tributary Areas

Basin OS-1 is the only offsite basin identified in this study. The runoff from this basin will be routed as by-pass flow. The runoff from the offsite basin was determined by a hydrograph model, (see Appendix C for the calculations. This model yielded 0 cfs for the minor event. However, it is anticipated that as much as 105 gpm or 0.23 cfs will enter the subject property from Basin OS-1 as tail irrigation water. This tail water shall be intercepted by inlets OS1 and OS2 routing the tail water through a bypass line directly into the existing 15" PVC culvert.

D. Proposed Drainage System Description

The proposed storm sewer system for this project consists of overland sheet flows, shallow concentrated flows, gutter flows, piped storm sewer and detention ponds. There are two ponds proposed for the site; the ponds are designed to treat and attenuate the Water Quality Capture Volume (WQCV), the 10-year minor storm and the 100 year major storm. Pond 100 discharges into an existing 15" PVC via 2 - 0.5 HP submersible pumps that lift the pond outfall into inlet 61 from where the outfall flows in gravity sewer for approximately 280 feet into manhole MH-65.1 and the existing 15" PVC, which then is routed to Colorado River as described above. The size of the pond is twice the size as required for the entire project in order to decrease the major storm water surface elevation to be below the grates of the inlets 104 and 106, located the closest to the Pond 100. Additionally, for an eventuality of pumps being inoperable, an emergency 12" orifice spillway shall be added to inlet 61 with the invert elevation of 4524.08, thereby keeping the houses in the surround area safe from flooding with more than 1' of freeboard at the lowest finished floor

elevation in the vicinity of the pond (lot 15 min. FF 4525.6'). The following is the summary of the hydrograph model:

Pump 1 On Elevation = 4519.59' (WQCV)
Pump 2 On Elevation = 4519.87' (10yr storm)
Peak Water Surface Elevation = 4521.26' (100yr storm)
100-yr Peak Volume = 59,027 ft^3
100-yr Peak discharge = 0.53 cfs
INLET 106 FL EL = 4522.93' (AS-BUILT)
Peak Water Surface Elevation (No Pumps) = 4521.40'

The above result from the hydrograph models set the 100-yr water surface elevation to be 1.67' below the as-built elevation of the grate on INLET 106. In case of the pumps' failure the Peak Water Surface Elevation in the Pond 100 is estimated to be at 4521.40' or 1.53' below the grate of INLET 106.

Ponds Summary Tables:

Pumps Operable

POND 100	VOLUME (CF)	WSEL (FT)	PEAK DISCHARGE FLOW (CFS)
WQCV	25,005	4519.59	NA
10 YEAR	30,028	4519.87	0.25
100 YEAR	59,027	4521.26	0.53

In addition to the above described models, a 24 hour 10- and 100-year storms, with SCS Type II distribution have been added to this analysis to predict water surface elevations in case the pumps become inoperable. This model's 100-year water surface elevation is within allowable street inundation (Mesa County SWMM) for such event in the area of Inlet 106.

Pumps Inoperable

POND 100	VOLUME (CF)	WSEL (FT)	PEAK DISCHARGE FLOW (CFS)
10 YEAR/24hr	31,099	4519.92	0.00
100 YEAR/24hr	127,526	4523.36	0.52

Pond 200 Summary Table:

POND 200	VOLUME (CF)	WSEL (FT)	PEAK DISCHARGE FLOW (CFS)
WQCV	3,030	4523.42	40 hrs
10 YEAR	3,403	4523.95	0.5
100 YEAR	10,616	4524.52	2.3

The discharge water from Pond 200 outfalls into the Palmer Drain via gravity, which also outfalls to the Colorado River. The runoff from the offsite Basin OS-1 will be intercepted by a 12" PVC and is routed into Inlet 65. The runoff from OS-1 is treated as a by-pass.

E. Hydrologic Criteria

The hydrologic and hydraulic analysis proposed is to use procedures per the Mesa County Stormwater Management Manual (SWMM) guidelines, dated December 2007. Rational method was applied to estimate flows in this report.

3.0 Drainage Analysis and Drainage Criteria

A. Regulations

The supporting drainage design and calculations were performed in accordance with the Mesa County/City of Fruita Stormwater Management Manual (SWMM) and the UDFCD "Urban Storm Drainage Criteria Manual, Volume 1**". No variance from SWMM shall be needed for the storm water design as presented in this document.**

B. Development Criteria and Constraints

The supporting drainage design and calculations were performed in accordance to the Grand Valley "Stormwater Management Manual" [1] and the UDFCD "Urban Storm Drainage Criteria Manual, Volume 1" [4]. No deviations from these published criteria are requested for this site. The proposed grading on the site is designed to eliminate cross lot drainage and to maintain positive runoff from the site. No cross basin drainage is occurring in the proposed plan.

C. Existing conditions Hydrology analysis

Currently, runoff from the site drains via overland flows and shallow concentrated flows in the south and southwest direction to the discharge points described above.

D. Hydrologic Criteria

The hydrologic and hydraulic analysis proposed is to use procedures per the Mesa County Stormwater Management Manual (SWMM) guidelines, dated December 2007.

E. Hydraulic Criteria

Storm Drains

Storm Drains are designed to have the 2 year HGL below pipes' crowns.

Street Flow and Inlet Capacities

The SWMM criteria were used to check for street flow capacity and inlet capacities. Street capacity monographs (Figure 1105 and Figure 1106) were used to evaluate street capacity. The runoff flows from basin 103 was used to check the street capacity on streets with the mountable curb and the vertical curb. The street capacity is well in excess of the proposed flows.

For inlet capacity check Figure 1117 was used.

In summary, street capacities and inlet capacities exceed the estimated runoff. SWMM Figures 1105, 1106 and 1117 are included in the Appendix.

4.0 Conclusions

A. General

This report discusses the information requirements for a Final Drainage Report and Plan as defined by the SWMM, Section 300. The proposed development of the Iron Wheel Subdivision property will effectively convey runoff from the site per the SWMM best recommendations and discharge to Palmer Drain as well as the storm and ditch system that carries the runoff to Colorado River.

The proposed drainage facilities are designed to accept the WQCV and 10 and 100 year runoff and continue the conveyance to the ultimate discharge in the Colorado River. Erosion control BMP's will be implemented during construction in an effort to prevent adverse impacts on downstream properties and drainage facilities. The proposed development will not adversely affect the surrounding properties or existing storm drainage systems.

B. Compliance with Manual

This report discusses the information requirements for a Final Drainage Report and Plan per the Mesa County/City of Fruita Stormwater Management Manual. The proposed drainage facilities are designed to collect and detain the WQCV and 10 and 100 year event runoff rates from the site along with offsite contributory flows and release at/or below the allowed rates. The proposed development will not adversely affect the surrounding properties or existing drainage systems. No variances from the Stormwater Management Manual criteria are requested.

5.0 References

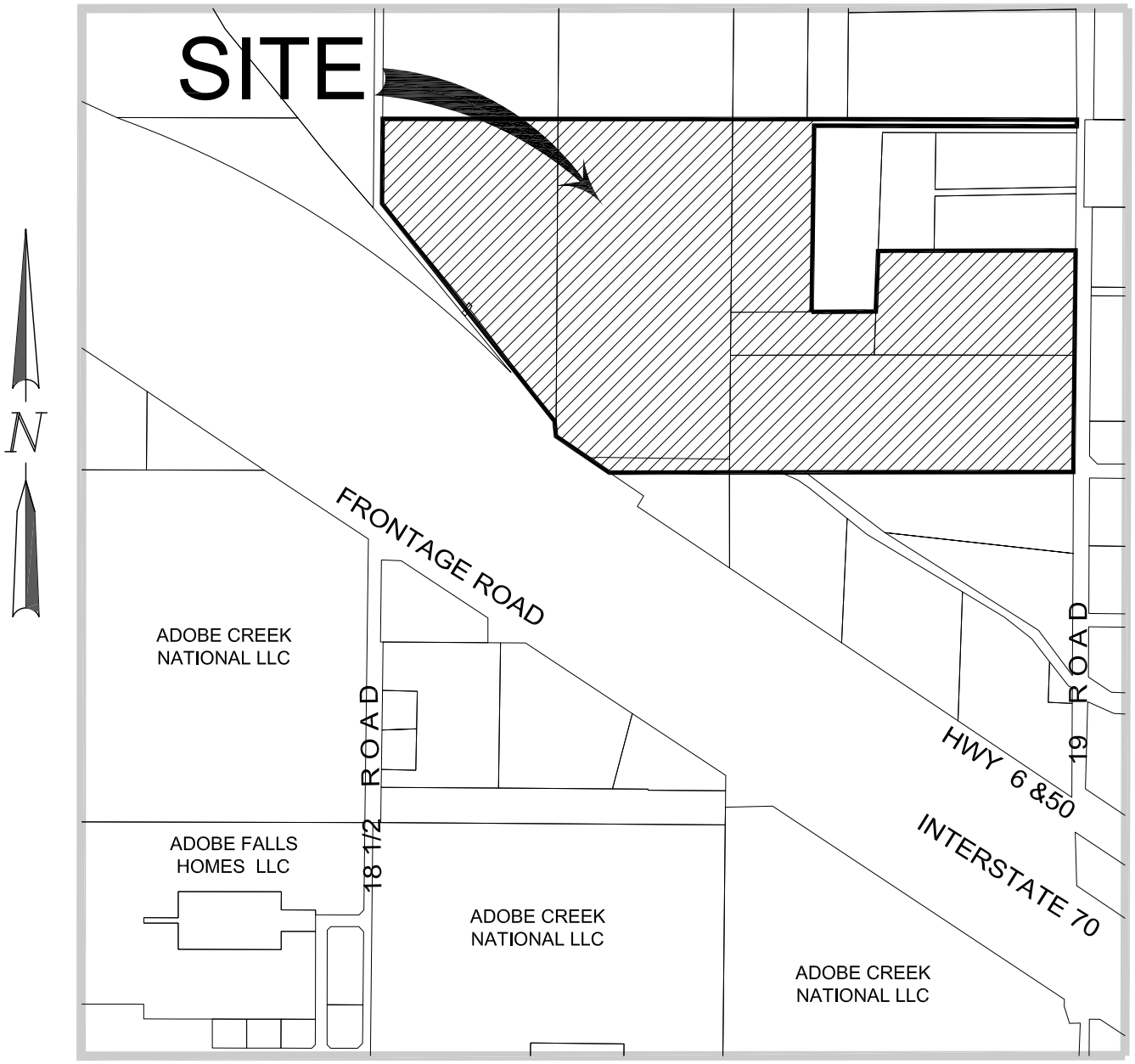
Mesa County/City of Fruita Stormwater Management Manual, adopted March 20, 2008.

“NRCS Soil Survey” web soil survey, generated February 2, 2017.

“Urban Storm Drainage Criteria Manual, Volume 1”, prepared by the Urban Drainage and Flood Control District, effective September 1999.

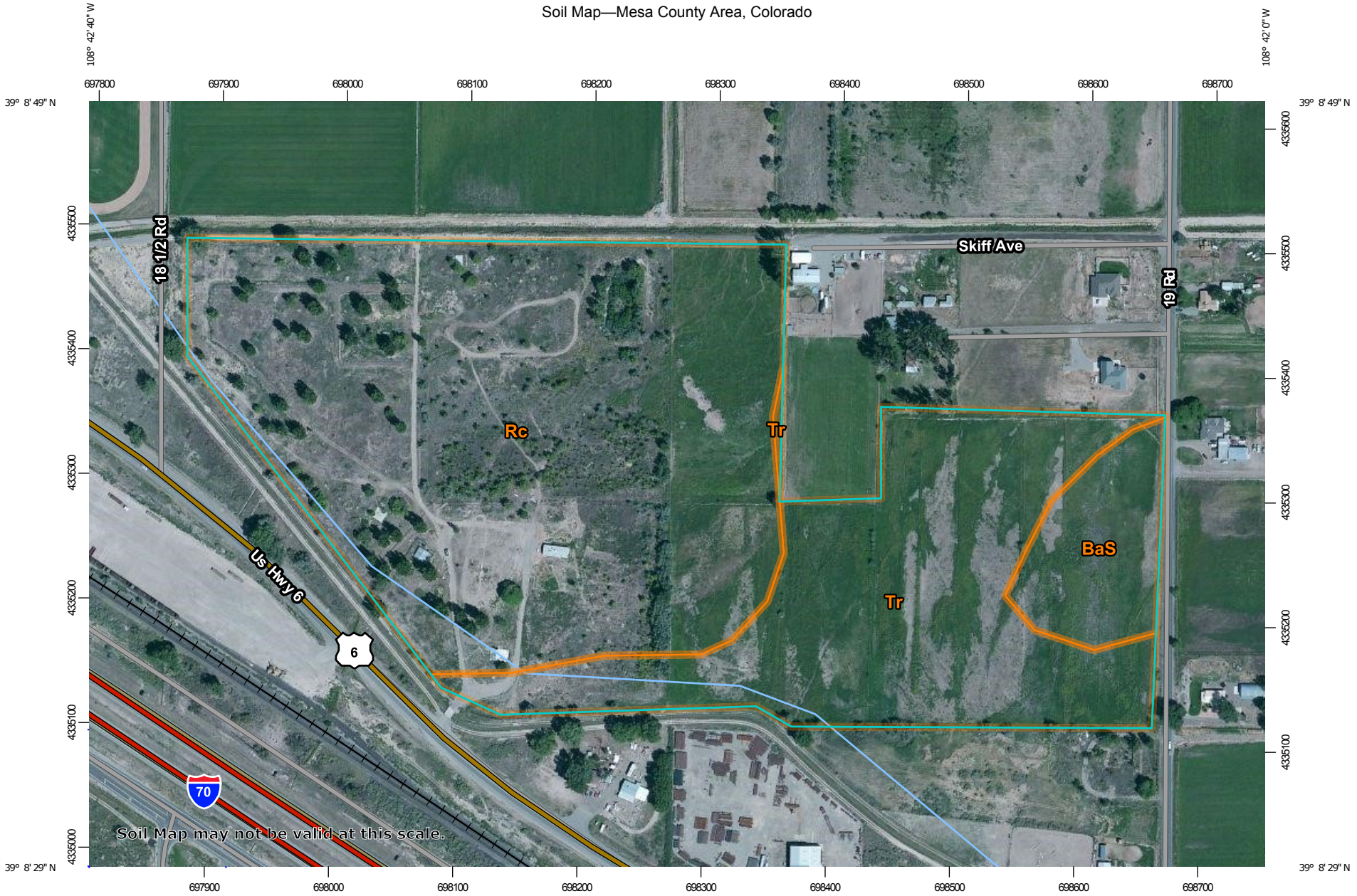
Federal Emergency Management Agency, Flood Insurance Rate Map, Mesa County, Colorado unincorporated Areas, Map No. 08077C0439F.

Appendix A
Vicinity Map



VICINITY MAP

Appendix B
NRCS Soils Report



Map Scale: 1:4,330 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

Map Unit Legend

Mesa County Area, Colorado (CO680)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BaS	Massadona silty clay loam, saline, 0 to 2 percent slopes	3.8	7.0%
Rc	Fruitland sandy clay loam, 0 to 2 percent slopes	33.9	62.0%
Tr	Turley clay loam, 0 to 2 percent slopes	17.0	31.0%
Totals for Area of Interest		**54.7**	**100.0%**

Mesa County Area, Colorado

BaS—Massadona silty clay loam, saline, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: k06p
Elevation: 4,500 to 4,890 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 150 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Massadona, saline, and similar soils: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Massadona, Saline

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from clayey shale

Typical profile

A - 0 to 2 inches: silty clay loam
Bw - 2 to 12 inches: silty clay
Bky - 12 to 24 inches: silty clay
BCky1 - 24 to 48 inches: stratified silty clay loam to fine sandy loam
BCky2 - 48 to 60 inches: stratified silty clay loam to fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Gypsum, maximum in profile: 2 percent
Salinity, maximum in profile: Strongly saline (20.0 to 40.0 mmhos/cm)
Available water storage in profile: High (about 10.0 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Pariette

Percent of map unit: 15 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Degater

Percent of map unit: 15 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 7, Sep 30, 2016

Mesa County Area, Colorado

Rc—Fruitland sandy clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: k0d0
Elevation: 4,600 to 4,800 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 150 to 190 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Fruitland and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fruitland

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone and shale

Typical profile

A - 0 to 8 inches: sandy clay loam
C1 - 8 to 30 inches: stratified sandy loam to gravelly fine sandy loam
C2 - 30 to 60 inches: stratified sandy loam to fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Fruita

Percent of map unit: 5 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Fruitvale

Percent of map unit: 5 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 7, Sep 30, 2016

Mesa County Area, Colorado

Tr—Turley clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: k0d8
Elevation: 4,500 to 4,800 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 150 to 190 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Turley and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Turley

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone and shale

Typical profile

Ap - 0 to 10 inches: clay loam
C1 - 10 to 20 inches: fine sandy loam
C2 - 20 to 30 inches: clay loam
C3 - 30 to 60 inches: stratified loam to silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Gypsum, maximum in profile: 4 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Fruitland

Percent of map unit: 10 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 7, Sep 30, 2016

Appendix C
Runoff Calculations

Iron Wheel
Area Impreviousness
Proposed Conditions

Vortex Engineering, Inc.
February 2, 2018

BASIN	TOTAL AREA (ft^2)	BASIN AREA (ac)	PERV. AREA (ft^2)	PERV. AREA (ac)	IMP. AREA (ft^2)	IMPREVIOUS AREA (ac)	Impreviousness (%)
P100	2,175,937	49.95	1,033,711	23.73	23.73	26.22	52%
P200	233,131	5.35	91,571	2.10	2.10	3.25	61%
OS-1	504,711	11.59	486,711	11.17	18,000	0.41	4%
	Total On-Site Area =	55.30		25.83		29.47	
	Total Off-Site Area =	11.59		11.17		0.41	

Iron Wheel **Vortex Engineering, Inc.**
Pond volume Calculations **February 2, 2018**
Pond 100 **Revised: January 19, 2022**

Detention Pond Calculations

Elevation [ft.]	Area [ft²]	Stage Volume [cf]	Change in Elevation [ft]	Cumulative Volume [cf]	Cumulative Volume [acre-ft]
4517.80	0	0.00	0.0	0.0	0.000
4518.00	12652	843.47	0.2	843.5	0.019
4519.00	15520	14061.61	1.0	14905.1	0.342
4520.00	18831	17148.84	1.0	32053.9	0.736
4521.00	22183	20484.13	1.0	52538.0	1.206
4522.00	25549	23846.19	1.0	76384.2	1.754
4523.00	38406	31759.89	1.0	108144.1	2.483
4524.00	77763	56939.49	1.0	165083.6	3.790

$WQCV=K(a(0.91*I^3-1.19*I^2+0.78*I))$

Where:

K = adjustment to equation for Mesa County = $d_6/0.43$)= 0.65
a = Adjustment for BMP's drain Time (for 40hrs a=1.0)= 1.00
I = watershed Imperviousness in decimal = 0.52
d_6 = Depth of average producing storm d_6= 0.28
Watershed area = 49.95

WQCV=	0.138 in	
Req'd storage WQCV =	25005 cf	4,519.59
		WSEL (ft)
10 yr Runoff + WQCV =	30028 cf	4,519.87*
100 yr Runoff =	59027 cf	4,521.26*

* Water surface elevation thru hydrograph model

Allowable Pond Discharge:

Hydrologic Soil Group C (SWMM Table 1402)
10 yr Discharge Coeficient = 0.12 **10 yr = 5.99 cfs**
100 yr Discharge Coeficient = 0.50 **100 yr = 24.98 cfs**

Iron Wheel **Vortex Engineering, Inc.**
Pond volume Calculations February 2, 2018
Pond 200 **Revised: April 20, 2018**

Detention Pond Calculations

Elevation [ft.]	Area [ft²]	Stage Volume [cf]	Change in Elevation [ft]	Cumulative Volume [cf]	Cumulative Volume [acre-ft]
4522.80	0	0.00	0.0	0.0	0.000
4523.00	5841	389.40	0.2	389.4	0.009
4524.00	6885	6355.85	1.0	6745.3	0.155
4525.00	7979	7425.28	1.0	14170.5	0.325

$WQCV=K(a(0.91*I^3-1.19*I^2+0.78*I))$

Where:

K = adjustment to equation for Mesa County = $d_6/0.43$) = 0.65
a = Adjustment for BMP's drain Time (for 40hrs a=1.0) = 1.00
I = watershed Imperviousness in decimal = 0.61
d_6 = Depth of average producing storm d_6 = 0.28
Watershed area = 5.35

WQCV= 0.156 in
Req'd storage WQCV = 3030 cf 4,523.42*

Req'd 10 yr Volume:

$K_{10}=(0.95P-1.90)(X_{10}/1000)$ 0.0146
$V_{10}=K_{10}A$ 0.078 ac-ft
$V_{10}=$ 3403 cf

Where:
P = Developed Basin Impreviousness (%)
X = Mesa Co. adjustment factor X_{10}=0.26, X_{100}=0.42 for impreviousness <50% (SWMM Table 1401)
A = Tributary Area (ac)
V = Volume (ac-ft)

Req'd 100 yr Volume:

$K_{100}=(1.78P-0.002P^2-3.56)(X_{100}/900)$ 0.0455
$V_{100}=K_{100}A$ 0.244 ac-ft
$V_{100}=$ 10616 cf

10 yr Runoff + WQCV = 6434 cf 4,523.95*
100 yr Runoff = 10616 cf 4,524.52*

* Water surface elevation thru linear interpolation

Allowable Pond Discharge:

Hydrologic Soil Group B (SWMM Table 1402)
10 yr Discharge Coeficient = 0.09 **10 yr = 0.48 cfs**
100 yr Discharge Coeficient = 0.43 **100 yr = 2.30 cfs**

Iron Wheel
Detention Pond-200
WQ Orifice Plate

Vortex Engineering, Inc.
February 2, 2018
Revised: April 20, 2018

WQCV Orifice Plate Area

Per UDFCD Volume 2, SO-13a, pg SO-12

$$A_o = \frac{88V^{(0.95/H^{0.085})}}{T_D S^{0.09} H^{(2.6S0.8)}}$$

A_o= area per row of orifice spaced on 4" centers (in^2)
V= design volume (WQCV, ac-ft)
T_D= Time to drain the prescribed volume (hrs)
H= Depth of Volume (ft)
S= slope (ft/ft)

V= 0.06957 ac-ft
T_D= 40 hrs
H= 0.62
S= 0.02
A_o= 0.2281
# of columns= 1
area per hole in a row (in^2)= 0.2281
hole diameter (in)= 0.5389

USE 1/2 " DIA. HOLES

#DIV/0!
#DIV/0!

Iron Wheel
Detention Pond-200
Outfall

Vortex Engineering, Inc.
February 2, 2018
Revised: April 20, 2018

Q_{10}= **0.48 cfs**

Allowable Discharge (cfs)=	0.48
Weir Coefficient C_w=	3.33
10 yr WS Elevation (ft)=	4523.95
Weir Invert Elevation (ft)=	4523.42
Total Head (ft)=	0.54
Weir Base Width (ft)=	0.37

4" **wide weir**

100 Year Rectangular Weir

Q_{100}= **2.30 cfs**

Allowable Discharge (cfs)=	2.30
Weir Coefficient C_w=	3.33
100 yr WS Elevation (ft)=	4524.52
Weir Invert Elevation (ft)=	4523.95
Total Head (ft)=	0.57
Weir Base Width (ft)=	1.60

USE **19"** **ft wide weir**

Iron Wheel
Drainage Area C calculations - 2yr and 100yr Events

Vortex Engineering, Inc.
February 2, 2018

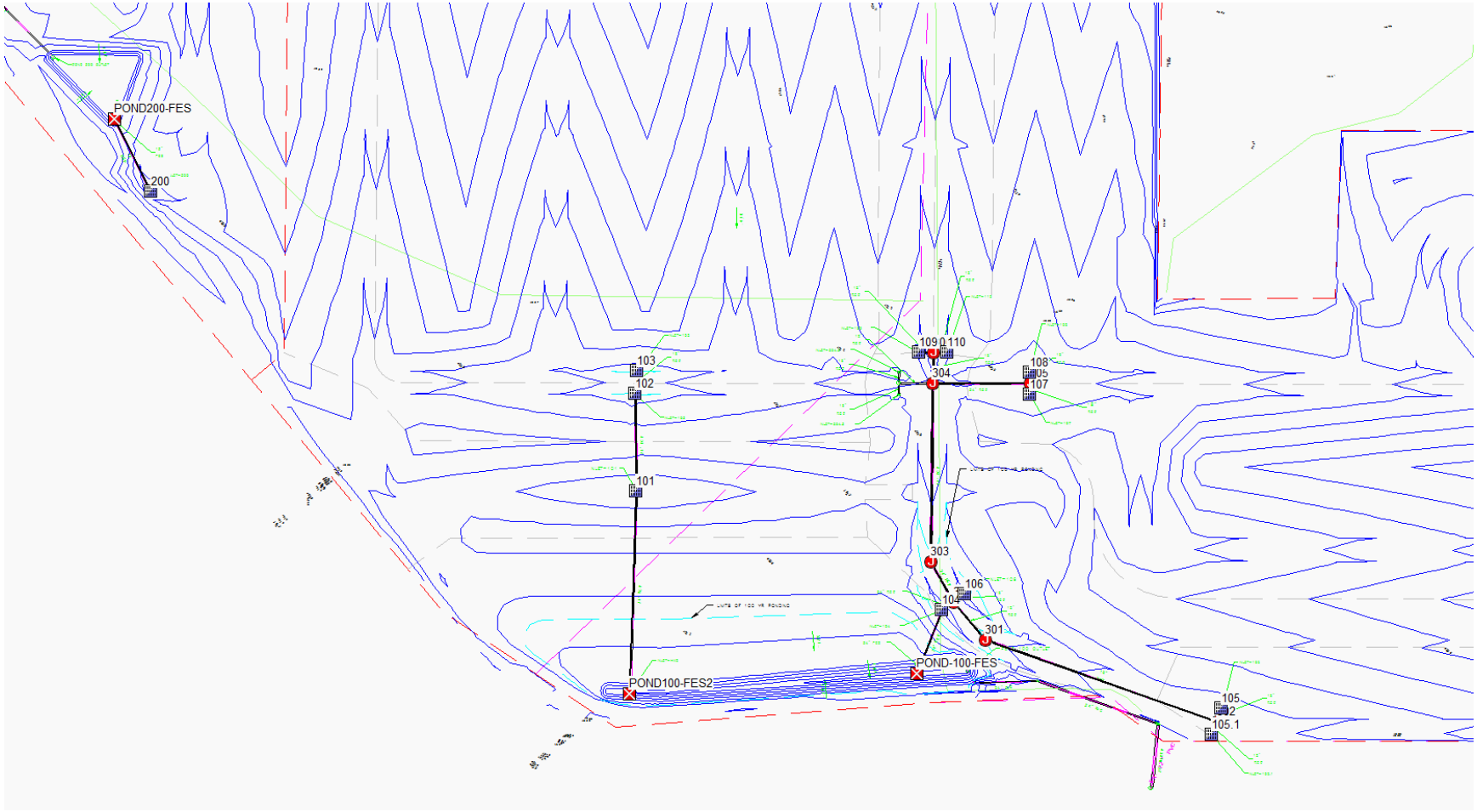
BASIN	TOTAL AREA (ft^2)	BASIN AREA (ac)	LOT/PERV. AREA (ft^2)	LOT AREA $C_{2\ year}$	LOT AREA $C_{2\ 100\text{-}year}$	STREET IMP. AREA (ft^2)	STREET IMP. AREA (ac)	STREET AREA $C_{2\ year}$	STREET AREA $C_{100\ year}$	2 yr WEIGHTED C VALUE	100 yr WEIGHTED C VALUE
100	153,275	3.52	148,100	0.34	0.34	5,175	0.12	0.89	0.96	0.36	0.36
101	110,492	2.54	93,492	0.34	0.34	17,000	0.39	0.89	0.96	0.42	0.44
102	204,627	4.70	157,127	0.34	0.60	47,500	1.09	0.89	0.96	0.47	0.68
103	514,570	11.81	416,785	0.34	0.60	97,785	2.24	0.89	0.96	0.44	0.67
104	36,108	0.83	18,636	0.34	0.60	17,472	0.40	0.89	0.96	0.61	0.77
105	118,625	2.72	95,375	0.34	0.60	23,250	0.53	0.89	0.96	0.45	0.67
106	140,812	3.23	125,362	0.34	0.60	15,450	0.35	0.89	0.96	0.40	0.64
107	316,851	7.27	242,293	0.34	0.60	74,558	1.71	0.89	0.96	0.47	0.68
108	462,159	10.61	366,919	0.34	0.60	95,240	2.19	0.89	0.96	0.45	0.67
109	57,741	1.33	42,737	0.34	0.60	15,004	0.34	0.89	0.96	0.48	0.69
110	60,674	1.39	45,224	0.34	0.60	15,450	0.35	0.89	0.96	0.48	0.69
200	233,131	5.35	175,541	0.29	0.52	57,590	1.32	0.89	0.96	0.44	0.63
Total On-Site Area =		55.30	44.25				11.05				

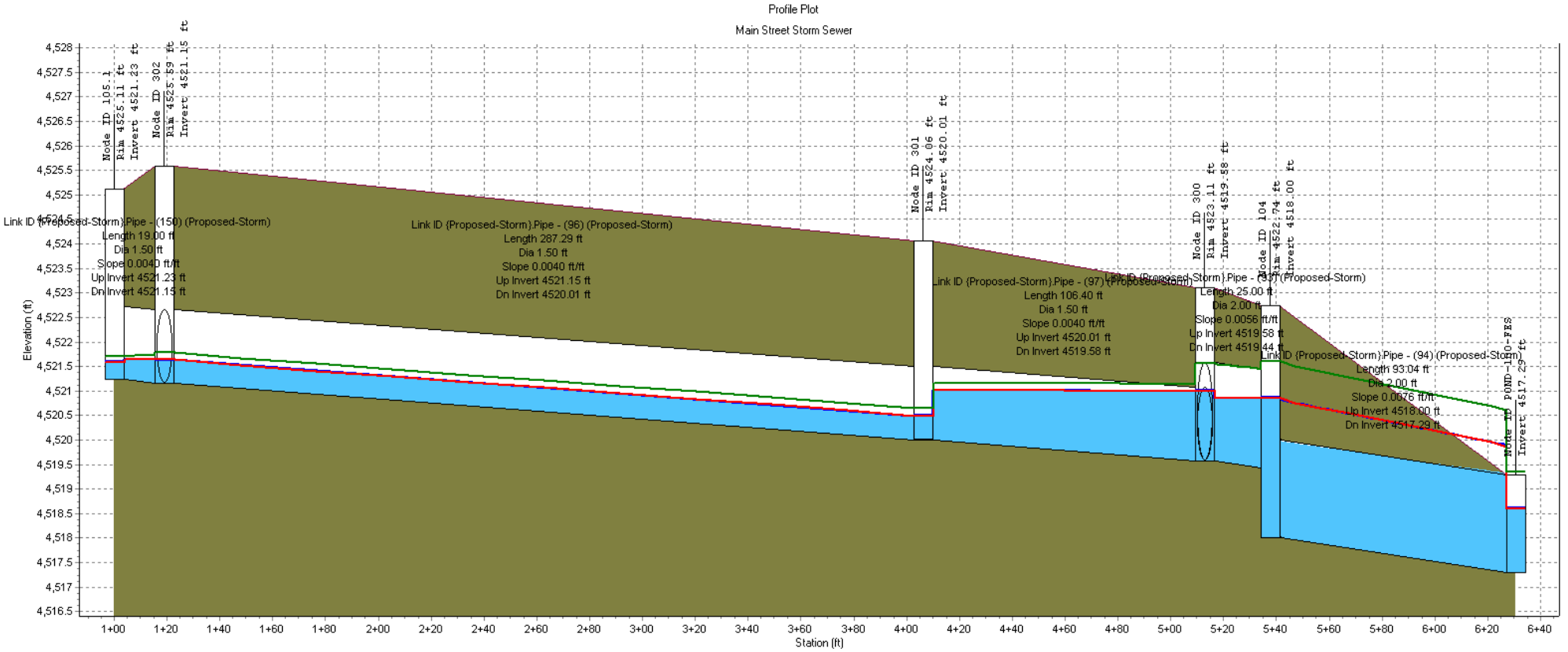
Iron Wheel
Basin Runoff Calculation

Vortex Engineering, Inc.
February 2, 2018
Revised: December 14, 2018

DRAINAGE AREA	INLET #	Area (ac)	'C_2' Weighted	'C_{100}' Weighted	T_c (min)	2-Yr. Storm Intensity (in/hr)	100-Yr. Storm Intensity (in/hr)	2-Yr. Q (cfs) Basin Runoff	100-Yr. Q (cfs) Basin Runoff	Inlet Type for Minor Storm
100	100	3.52	0.36	0.36	5	1.2	4.68	1.51	5.94	
101	101	2.54	0.42	0.44	5	1.2	4.68	1.29	5.17	
102	102	4.70	0.47	0.68	5	1.2	4.68	2.64	15.03	
103	103	11.81	0.44	0.67	5	1.2	4.68	6.30	36.95	
104	104	0.83	0.61	0.77	5	1.2	4.68	0.60	3.00	
105	105	2.72	0.45	0.67	5	1.2	4.68	1.46	8.55	
106	106	3.23	0.40	0.64	5	1.2	4.68	1.55	9.67	
107	107	7.27	0.47	0.68	9	1.2	4.68	4.10	23.31	
108	108	10.61	0.45	0.67	5	1.2	4.68	5.77	33.48	
109	109	1.33	0.48	0.69	5	1.2	4.68	0.77	4.30	
110	110	1.39	0.48	0.69	5	1.2	4.68	0.80	4.51	
200	200	5.35	0.44	0.63	5	1.2	4.68	2.81	15.75	
OS-1		11.59	via hydrograph routing					0.00	1.19	
Total on site basins =		55.30				55.3				

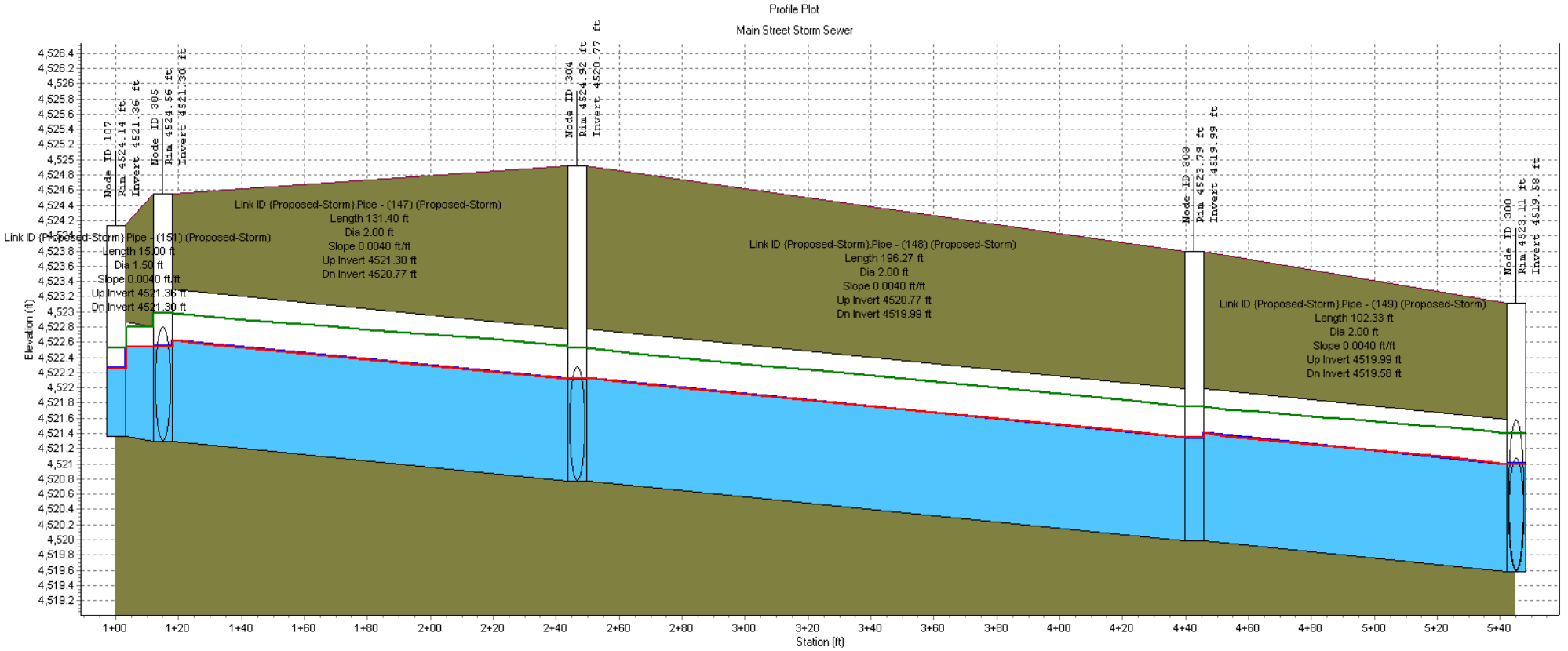
IRON WHEEL - ON-STE - 2 YEAR HGL





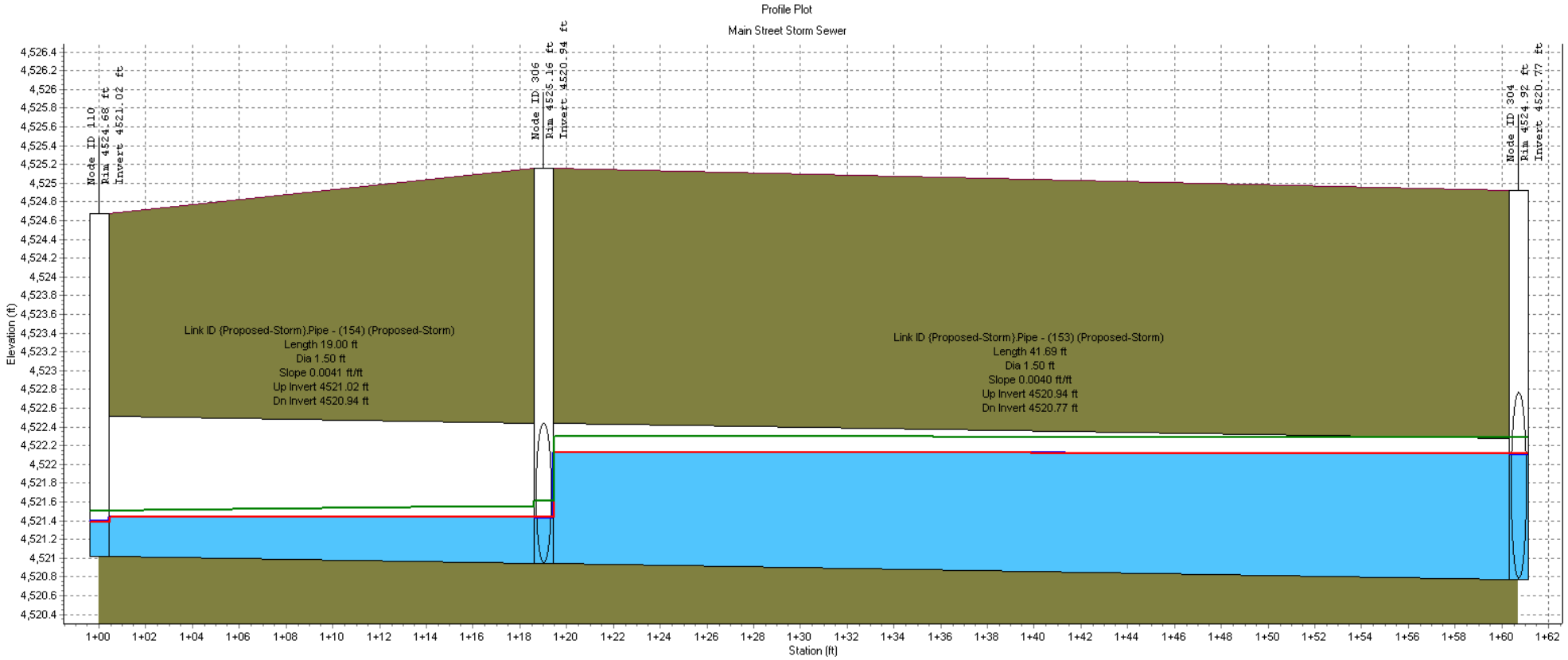
Node ID:	105.1	302	301	300	104	POND-100-FES
Rim (ft):	4525.11	4525.59	4524.06	4523.11	4522.74	
Invert (ft):	4521.23	4521.15	4520.01	4519.58	4518.00	4517.29
Min Pipe Cover (ft):		2.94	2.56	1.53		
Max HGL (ft):	4521.59	4521.68	4520.50	4521.00	4520.86	4518.61

Link ID:		{Proposed-Storm}.Pipe - (96) (Proposed-Storm)	{Proposed-Storm}.Pipe - (97) (Proposed-Storm)	{Proposed-Storm}.Pipe - (93) (Proposed-Storm)	{Proposed-Storm}.Pipe - (94) (Proposed-Storm)	
Length (ft):	19.00	287.29	106.40	25.00	93.04	
Dia (ft):	1.50	1.50	1.50	2.00	2.00	
Slope (ft/ft):	0.0040	0.0040	0.0040	0.0056	0.0076	
Up Invert (ft):	4521.23	4521.15	4520.01	4519.58	4518.00	
Dn Invert (ft):	4521.15	4520.01	4519.58	4519.44	4517.29	
Max Q (cfs):	0.87	1.50	1.50	14.50	15.10	
Max Vel (ft/s):	2.63	3.03	3.05	6.07	6.91	
Max Depth (ft):	0.34	0.49	0.48	1.42	1.31	



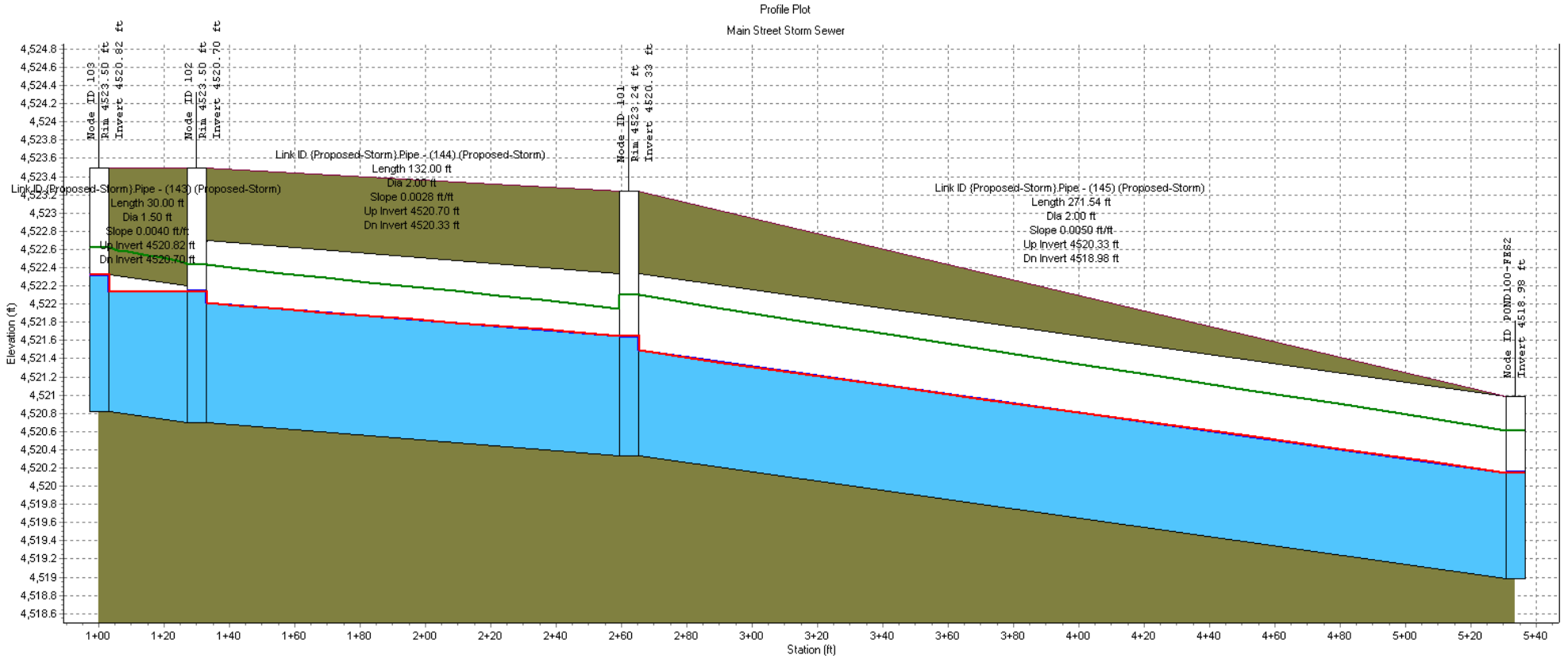
Node ID:	107	305	304	303	300
Rim (ft):	4524.14	4524.56	4524.92	4523.79	4523.11
Invert (ft):	4521.36	4521.30	4520.77	4519.99	4519.58
Min Pipe Cover (ft):		1.26	2.15	1.81	1.53
Max HGL (ft):	4522.26	4522.64	4522.20	4521.35	4521.00

Link ID:		{Proposed-Storm}.Pipe - (147) (Proposed-Storm)	{Proposed-Storm}.Pipe - (148) (Proposed-Storm)	{Proposed-Storm}.Pipe - (149) (Proposed-Storm)	
Length (ft):	15.00	131.40	196.27	102.33	
Dia (ft):	1.50	2.00	2.00	2.00	
Slope (ft/ft):	0.0040	0.0040	0.0040	0.0040	
Up Invert (ft):	4521.36	4521.30	4520.77	4519.99	
Dn Invert (ft):	4521.30	4520.77	4519.99	4519.58	
Max Q (cfs):	4.70	10.50	11.52	11.47	
Max Vel (ft/s):	4.17	5.27	5.11	5.09	
Max Depth (ft):	0.87	1.23	1.35	1.35	



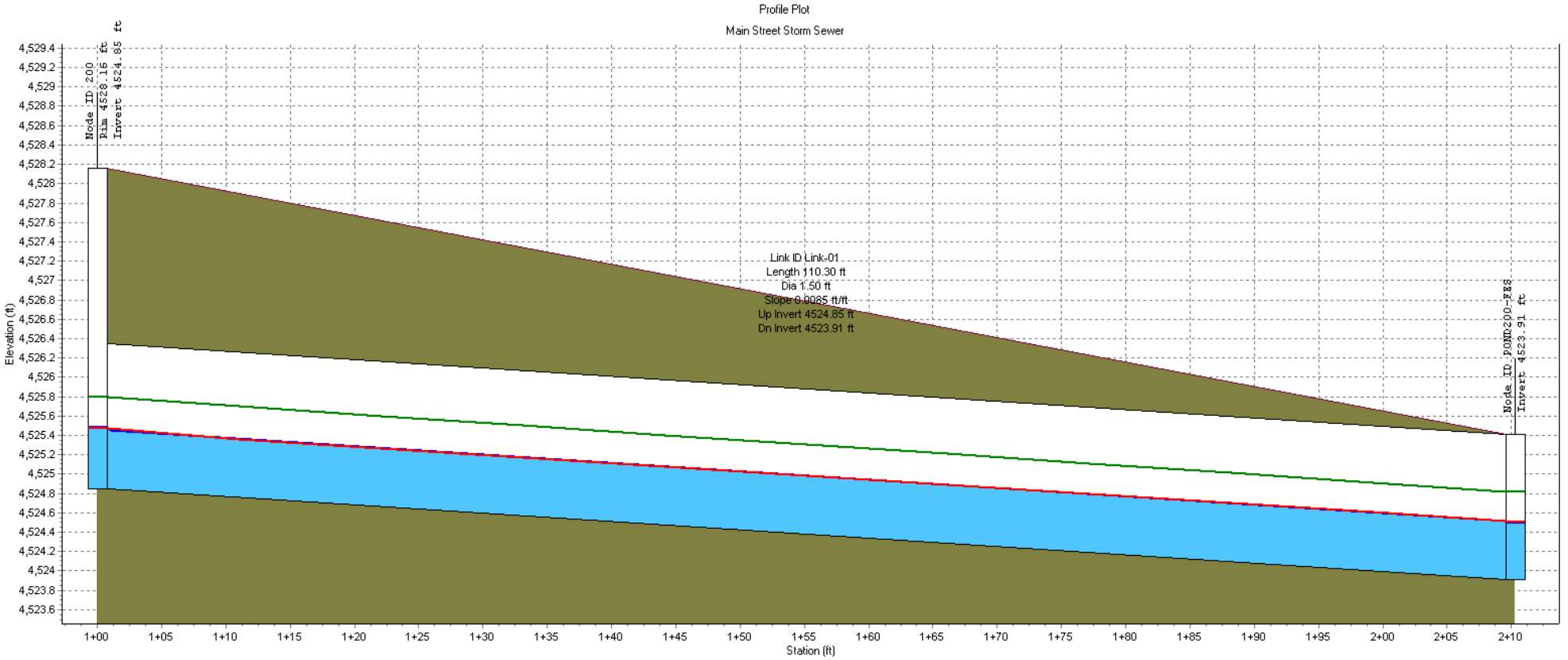
Node ID:	110	306	304
Rim (ft):	4524.68	4525.16	4524.92
Invert (ft):	4521.02	4520.94	4520.77
Min Pipe Cover (ft):		2.72	2.15
Max HGL (ft):	4521.39	4521.48	4522.20

Link ID:	{Proposed-Storm}.Pipe - (154) (Proposed-Storm)	{Proposed-Storm}.Pipe - (153) (Proposed-Storm)
Length (ft):	19.00	41.69
Dia (ft):	1.50	1.50
Slope (ft/ft):	0.0041	0.0040
Up Invert (ft):	4521.02	4520.94
Dn Invert (ft):	4520.94	4520.77
Max Q (cfs):	0.93	1.73
Max Vel (ft/s):	2.73	3.32
Max Depth (ft):	0.35	0.50



Node ID:	103	102	101	POND100-FES2
Rim (ft):	4523.50	4523.50	4523.24	
Invert (ft):	4520.82	4520.70	4520.33	4518.98
Min Pipe Cover (ft):				
Max HGL (ft):	4522.32	4522.14	4521.65	4520.15

Link ID:	{Proposed-Storm}.Pipe - (144) (Proposed-Storm)	{Proposed-Storm}.Pipe - (145) (Proposed-Storm)
Length (ft):	30.00	132.00	271.54
Dia (ft):	1.50	2.00	2.00
Slope (ft/ft):	0.0040	0.0028	0.0050
Up Invert (ft):	4520.82	4520.70	4520.33
Dn Invert (ft):	4520.70	4520.33	4518.98
Max Q (cfs):	7.05	9.25	10.23
Max Vel (ft/s):	4.44	4.36	5.41
Max Depth (ft):	1.34	1.29	1.16



Node ID:	200		POND200-FES
Rim (ft):	4528.16		
Invert (ft):	4524.85		4523.91
Min Pipe Cover (ft):			
Max HGL (ft):	4525.48		4524.52

Link ID:	Link-01
Length (ft):	110.30
Dia (ft):	1.50
Slope (ft/ft):	0.0085
Up Invert (ft):	4524.85
Dn Invert (ft):	4523.91
Max Q (cfs):	2.91
Max Vel (ft/s):	4.52
Max Depth (ft):	0.60

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	300	Junction	4519.58	4523.11	4518.58	4523.11	0.00	14.51	4521.00	0.00	2.10	0 00:00	0.00	0.00
2	301	Junction	4520.01	4524.06	4519.01	4524.06	0.00	1.50	4520.50	0.00	3.57	0 00:00	0.00	0.00
3	302	Junction	4521.15	4525.60	4520.15	4525.60	0.00	1.74	4521.68	0.00	3.92	0 00:00	0.00	0.00
4	303	Junction	4519.99	4523.79	4518.99	4523.79	0.00	11.52	4521.35	0.00	2.44	0 00:00	0.00	0.00
5	304	Junction	4520.77	4524.92	4519.77	4524.92	0.00	12.22	4522.20	0.00	2.73	0 00:00	0.00	0.00
6	305	Junction	4521.30	4524.56	4520.30	4524.56	0.00	11.27	4522.64	0.00	1.92	0 00:00	0.00	0.00
7	306	Junction	4520.94	4525.16	4519.94	4525.16	0.00	1.82	4521.48	0.00	3.69	0 00:00	0.00	0.00
8	POND-100-FES	Outfall	4517.29					15.10	4518.61					
9	POND100-FES2	Outfall	4518.98					10.23	4520.15					
10	POND200-FES	Outfall	4523.91					2.91	4524.52					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)
1	{Proposed-Storm}.Pipe - (143) (Proposed-Storm)	Pipe	103	102	30.00	4520.82	4520.70	0.4000	18.000	0.0130	7.05	6.64	1.06	4.44	1.34	0.98	0.00
2	{Proposed-Storm}.Pipe - (144) (Proposed-Storm)	Pipe	102	101	132.00	4520.70	4520.33	0.2800	24.000	0.0130	9.25	12.01	0.77	4.36	1.29	0.64	0.00
3	{Proposed-Storm}.Pipe - (145) (Proposed-Storm)	Pipe	101	POND100-FES2	271.54	4520.33	4518.98	0.5000	24.000	0.0130	10.23	15.94	0.64	5.41	1.16	0.58	0.00
4	{Proposed-Storm}.Pipe - (146) (Proposed-Storm)	Pipe	108	305	15.00	4521.36	4521.30	0.4000	18.000	0.0130	6.57	6.59	1.00	4.36	1.18	0.80	0.00
5	{Proposed-Storm}.Pipe - (147) (Proposed-Storm)	Pipe	305	304	131.40	4521.30	4520.77	0.4000	24.000	0.0130	10.50	14.33	0.73	5.27	1.23	0.62	0.00
6	{Proposed-Storm}.Pipe - (148) (Proposed-Storm)	Pipe	304	303	196.27	4520.77	4519.99	0.4000	24.000	0.0130	11.52	14.29	0.81	5.11	1.35	0.68	0.00
7	{Proposed-Storm}.Pipe - (149) (Proposed-Storm)	Pipe	303	300	102.33	4519.99	4519.58	0.4000	24.000	0.0130	11.47	14.32	0.80	5.09	1.35	0.68	0.00
8	{Proposed-Storm}.Pipe - (150) (Proposed-Storm)	Pipe	105.1	302	19.00	4521.23	4521.15	0.4000	18.000	0.0130	0.87	6.64	0.13	2.63	0.34	0.24	0.00
9	{Proposed-Storm}.Pipe - (151) (Proposed-Storm)	Pipe	107	305	15.00	4521.36	4521.30	0.4000	18.000	0.0130	4.70	6.64	0.71	4.17	0.87	0.61	0.00
10	{Proposed-Storm}.Pipe - (152) (Proposed-Storm)	Pipe	109	306	19.00	4521.01	4520.94	0.3800	18.000	0.0130	0.89	6.47	0.14	2.60	0.35	0.25	0.00
11	{Proposed-Storm}.Pipe - (153) (Proposed-Storm)	Pipe	306	304	41.69	4520.94	4520.77	0.4000	18.000	0.0130	1.73	6.65	0.26	3.32	0.50	0.34	0.00
12	{Proposed-Storm}.Pipe - (154) (Proposed-Storm)	Pipe	110	306	19.00	4521.02	4520.94	0.4100	18.000	0.0130	0.93	6.82	0.14	2.73	0.35	0.25	0.00
13	{Proposed-Storm}.Pipe - (92) (Proposed-Storm)	Pipe	106	300	13.00	4519.63	4519.58	0.3800	18.000	0.0130	1.85	6.45	0.29	3.20	0.51	0.36	0.00
14	{Proposed-Storm}.Pipe - (93) (Proposed-Storm)	Pipe	300	104	25.00	4519.58	4519.44	0.5600	24.000	0.0130	14.50	16.99	0.85	6.07	1.42	0.71	0.00
15	{Proposed-Storm}.Pipe - (94) (Proposed-Storm)	Pipe	104	POND-100-FES	93.04	4518.00	4517.29	0.7600	24.000	0.0130	15.10	19.71	0.77	6.91	1.31	0.66	0.00
16	{Proposed-Storm}.Pipe - (95) (Proposed-Storm)	Pipe	105	302	19.00	4521.23	4521.15	0.4000	18.000	0.0130	0.87	6.64	0.13	2.63	0.34	0.24	0.00
17	{Proposed-Storm}.Pipe - (96) (Proposed-Storm)	Pipe	302	301	287.29	4521.15	4520.01	0.4000	18.000	0.0130	1.50	6.63	0.23	3.03	0.49	0.32	0.00
18	{Proposed-Storm}.Pipe - (97) (Proposed-Storm)	Pipe	301	300	106.40	4520.01	4519.58	0.4000	18.000	0.0130	1.50	6.68	0.22	3.05	0.48	0.32	0.00
19	Link-01	Pipe	200	POND200-FES	110.30	4524.85	4523.91	0.8500	18.000	0.0150	2.91	8.40	0.35	4.52	0.60	0.40	0.00

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft^2)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	M W du
1	101	FHWA HEC-22 GENERIC	N/A	On Sag	1	4520.33	4523.24	4519.33	0.00	1.29	N/A	N/A	N/A	7.00	6.58	
2	102	FHWA HEC-22 GENERIC	N/A	On Sag	1	4520.70	4523.50	4519.70	0.00	2.64	N/A	N/A	N/A	7.00	11.39	
3	103	FHWA HEC-22 GENERIC	N/A	On Sag	1	4520.82	4523.50	4519.82	0.00	6.30	N/A	N/A	N/A	7.00	12.40	
4	104	FHWA HEC-22 GENERIC	N/A	On Sag	1	4518.00	4522.74	4518.44	0.00	0.60	N/A	N/A	N/A	7.00	3.28	
5	105	FHWA HEC-22 GENERIC	N/A	On Sag	1	4520.23	4525.11	4520.23	0.00	0.75	N/A	N/A	N/A	7.00	4.10	
6	105.1	FHWA HEC-22 GENERIC	N/A	On Sag	1	4521.23	4525.11	4520.23	0.00	0.75	N/A	N/A	N/A	7.00	4.10	
7	106	FHWA HEC-22 GENERIC	N/A	On Sag	1	4518.63	4522.74	4518.63	0.00	1.55	N/A	N/A	N/A	7.00	7.58	
8	107	FHWA HEC-22 GENERIC	N/A	On Sag	1	4521.36	4524.14	4520.36	0.00	4.10	N/A	N/A	N/A	7.00	15.71	
9	108	FHWA HEC-22 GENERIC	N/A	On Sag	1	4520.36	4524.14	4520.36	0.00	5.77	N/A	N/A	N/A	7.00	11.82	
10	109	FHWA HEC-22 GENERIC	N/A	On Sag	1	4520.01	4524.68	4520.01	0.00	0.77	N/A	N/A	N/A	7.00	4.21	
11	110	FHWA HEC-22 GENERIC	N/A	On Sag	1	4521.02	4524.68	4520.02	0.00	0.80	N/A	N/A	N/A	7.00	4.37	
12	200	FHWA HEC-22 GENERIC	N/A	On Sag	1	4524.85	4528.16	4523.85	0.00	2.81	N/A	N/A	N/A	7.00	11.94	

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	300	4519.58	4523.11	3.53	4518.58	-1.00	4523.11	0.00	0.00	18.34
2	301	4520.01	4524.06	4.05	4519.01	-1.01	4524.06	0.00	0.00	30.71
3	302	4521.15	4525.60	4.45	4520.15	-1.00	4525.60	0.00	0.00	35.29
4	303	4519.99	4523.79	3.80	4518.99	-1.00	4523.79	0.00	0.00	21.66
5	304	4520.77	4524.92	4.15	4519.77	-1.00	4524.92	0.00	0.00	25.81
6	305	4521.30	4524.56	3.26	4520.30	-1.00	4524.56	0.00	0.00	15.07
7	306	4520.94	4525.16	4.22	4519.94	-1.00	4525.16	0.00	0.00	32.69

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	300	14.51	0.00	4521.00	1.42	0.00	2.10	4521.00	1.42	0 00:36	0 00:00	0.00	0.00
2	301	1.50	0.00	4520.50	0.49	0.00	3.57	4520.49	0.48	0 21:54	0 00:00	0.00	0.00
3	302	1.74	0.00	4521.68	0.53	0.00	3.92	4521.64	0.49	0 00:01	0 00:00	0.00	0.00
4	303	11.52	0.00	4521.35	1.36	0.00	2.44	4521.34	1.35	0 00:03	0 00:00	0.00	0.00
5	304	12.22	0.00	4522.20	1.43	0.00	2.73	4522.13	1.36	0 00:01	0 00:00	0.00	0.00
6	305	11.27	0.00	4522.64	1.34	0.00	1.92	4522.52	1.22	0 00:01	0 00:00	0.00	0.00
7	306	1.82	0.00	4521.48	0.54	0.00	3.69	4521.44	0.50	0 00:01	0 00:00	0.00	0.00

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses
1	{Proposed-Storm}.Pipe - (143) (Proposed-Storm)	30.00	4520.82	0.00	4520.70	0.00	0.12	0.4000	CIRCULAR	18.000	18.000	0.0130	0.5000
2	{Proposed-Storm}.Pipe - (144) (Proposed-Storm)	132.00	4520.70	0.00	4520.33	0.00	0.37	0.2800	CIRCULAR	24.000	24.000	0.0130	0.5000
3	{Proposed-Storm}.Pipe - (145) (Proposed-Storm)	271.54	4520.33	0.00	4518.98	0.00	1.35	0.5000	CIRCULAR	24.000	24.000	0.0130	0.5000
4	{Proposed-Storm}.Pipe - (146) (Proposed-Storm)	15.00	4521.36	1.00	4521.30	0.00	0.06	0.4000	CIRCULAR	18.000	18.000	0.0130	0.5000
5	{Proposed-Storm}.Pipe - (147) (Proposed-Storm)	131.40	4521.30	0.00	4520.77	0.00	0.53	0.4000	CIRCULAR	24.000	24.000	0.0130	0.5000
6	{Proposed-Storm}.Pipe - (148) (Proposed-Storm)	196.27	4520.77	0.00	4519.99	0.00	0.78	0.4000	CIRCULAR	24.000	24.000	0.0130	0.5000
7	{Proposed-Storm}.Pipe - (149) (Proposed-Storm)	102.33	4519.99	0.00	4519.58	0.00	0.41	0.4000	CIRCULAR	24.000	24.000	0.0130	0.5000
8	{Proposed-Storm}.Pipe - (150) (Proposed-Storm)	19.00	4521.23	0.00	4521.15	0.00	0.08	0.4000	CIRCULAR	18.000	18.000	0.0130	0.5000
9	{Proposed-Storm}.Pipe - (151) (Proposed-Storm)	15.00	4521.36	0.00	4521.30	0.00	0.06	0.4000	CIRCULAR	18.000	18.000	0.0130	0.5000
10	{Proposed-Storm}.Pipe - (152) (Proposed-Storm)	19.00	4521.01	1.00	4520.94	0.00	0.07	0.3800	CIRCULAR	18.000	18.000	0.0130	0.5000
11	{Proposed-Storm}.Pipe - (153) (Proposed-Storm)	41.69	4520.94	0.00	4520.77	0.00	0.17	0.4000	CIRCULAR	18.000	18.000	0.0130	0.5000
12	{Proposed-Storm}.Pipe - (154) (Proposed-Storm)	19.00	4521.02	0.00	4520.94	0.00	0.08	0.4100	CIRCULAR	18.000	18.000	0.0130	0.5000
13	{Proposed-Storm}.Pipe - (92) (Proposed-Storm)	13.00	4519.63	1.00	4519.58	0.00	0.05	0.3800	CIRCULAR	18.000	18.000	0.0130	0.5000
14	{Proposed-Storm}.Pipe - (93) (Proposed-Storm)	25.00	4519.58	0.00	4519.44	1.44	0.14	0.5600	CIRCULAR	24.000	24.000	0.0130	0.5000
15	{Proposed-Storm}.Pipe - (94) (Proposed-Storm)	93.04	4518.00	0.00	4517.29	0.00	0.71	0.7600	CIRCULAR	24.000	24.000	0.0130	0.5000
16	{Proposed-Storm}.Pipe - (95) (Proposed-Storm)	19.00	4521.23	1.00	4521.15	0.00	0.08	0.4000	CIRCULAR	18.000	18.000	0.0130	0.5000
17	{Proposed-Storm}.Pipe - (96) (Proposed-Storm)	287.29	4521.15	0.00	4520.01	0.00	1.15	0.4000	CIRCULAR	18.000	18.000	0.0130	0.5000
18	{Proposed-Storm}.Pipe - (97) (Proposed-Storm)	106.40	4520.01	0.00	4519.58	0.00	0.43	0.4000	CIRCULAR	18.000	18.000	0.0130	0.5000
19	Link-01	110.30	4524.85	0.00	4523.91	0.00	0.94	0.8500	CIRCULAR	18.000	18.000	0.0150	0.5000

Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1
0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number
1	{Proposed-Storm}.Pipe - (143) (Proposed-Storm)	7.05	0 00:01	6.64	1.06	4.44	0.11	1.34	0.98	0.00	
2	{Proposed-Storm}.Pipe - (144) (Proposed-Storm)	9.25	0 00:01	12.01	0.77	4.36	0.50	1.29	0.64	0.00	
3	{Proposed-Storm}.Pipe - (145) (Proposed-Storm)	10.23	0 00:05	15.94	0.64	5.41	0.84	1.16	0.58	0.00	
4	{Proposed-Storm}.Pipe - (146) (Proposed-Storm)	6.57	0 00:01	6.59	1.00	4.36	0.06	1.18	0.80	0.00	
5	{Proposed-Storm}.Pipe - (147) (Proposed-Storm)	10.50	0 00:01	14.33	0.73	5.27	0.42	1.23	0.62	0.00	
6	{Proposed-Storm}.Pipe - (148) (Proposed-Storm)	11.52	0 00:03	14.29	0.81	5.11	0.64	1.35	0.68	0.00	
7	{Proposed-Storm}.Pipe - (149) (Proposed-Storm)	11.47	0 00:03	14.32	0.80	5.09	0.34	1.35	0.68	0.00	
8	{Proposed-Storm}.Pipe - (150) (Proposed-Storm)	0.87	0 00:01	6.64	0.13	2.63	0.12	0.34	0.24	0.00	
9	{Proposed-Storm}.Pipe - (151) (Proposed-Storm)	4.70	0 00:01	6.64	0.71	4.17	0.06	0.87	0.61	0.00	
10	{Proposed-Storm}.Pipe - (152) (Proposed-Storm)	0.89	0 00:01	6.47	0.14	2.60	0.12	0.35	0.25	0.00	
11	{Proposed-Storm}.Pipe - (153) (Proposed-Storm)	1.73	0 00:01	6.65	0.26	3.32	0.21	0.50	0.34	0.00	
12	{Proposed-Storm}.Pipe - (154) (Proposed-Storm)	0.93	0 00:01	6.82	0.14	2.73	0.12	0.35	0.25	0.00	
13	{Proposed-Storm}.Pipe - (92) (Proposed-Storm)	1.85	0 00:01	6.45	0.29	3.20	0.07	0.51	0.36	0.00	
14	{Proposed-Storm}.Pipe - (93) (Proposed-Storm)	14.50	0 01:38	16.99	0.85	6.07	0.07	1.42	0.71	0.00	
15	{Proposed-Storm}.Pipe - (94) (Proposed-Storm)	15.10	0 00:40	19.71	0.77	6.91	0.22	1.31	0.66	0.00	
16	{Proposed-Storm}.Pipe - (95) (Proposed-Storm)	0.87	0 00:01	6.64	0.13	2.63	0.12	0.34	0.24	0.00	
17	{Proposed-Storm}.Pipe - (96) (Proposed-Storm)	1.50	0 21:54	6.63	0.23	3.03	1.58	0.49	0.32	0.00	
18	{Proposed-Storm}.Pipe - (97) (Proposed-Storm)	1.50	0 21:55	6.68	0.22	3.05	0.58	0.48	0.32	0.00	
19	Link-01	2.91	0 00:01	8.40	0.35	4.52	0.41	0.60	0.40	0.00	

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft^2)	Grate Clogging Factor (%)
1	101	FHWA HEC-22 GENERIC	N/A	On Sag	1	4520.33	4523.24	2.91	4519.33	-1.00	0.00	0.00
2	102	FHWA HEC-22 GENERIC	N/A	On Sag	1	4520.70	4523.50	2.80	4519.70	-1.00	0.00	0.00
3	103	FHWA HEC-22 GENERIC	N/A	On Sag	1	4520.82	4523.50	2.68	4519.82	-1.00	0.00	0.00
4	104	FHWA HEC-22 GENERIC	N/A	On Sag	1	4518.00	4522.74	4.74	4518.44	0.44	0.00	0.00
5	105	FHWA HEC-22 GENERIC	N/A	On Sag	1	4520.23	4525.11	4.88	4520.23	0.00	0.00	0.00
6	105.1	FHWA HEC-22 GENERIC	N/A	On Sag	1	4521.23	4525.11	3.88	4520.23	-1.00	0.00	0.00
7	106	FHWA HEC-22 GENERIC	N/A	On Sag	1	4518.63	4522.74	4.11	4518.63	0.00	0.00	0.00
8	107	FHWA HEC-22 GENERIC	N/A	On Sag	1	4521.36	4524.14	2.78	4520.36	-1.00	0.00	0.00
9	108	FHWA HEC-22 GENERIC	N/A	On Sag	1	4520.36	4524.14	3.78	4520.36	0.00	0.00	0.00
10	109	FHWA HEC-22 GENERIC	N/A	On Sag	1	4520.01	4524.68	4.67	4520.01	0.00	0.00	0.00
11	110	FHWA HEC-22 GENERIC	N/A	On Sag	1	4521.02	4524.68	3.66	4520.02	-1.00	0.00	0.00
12	200	FHWA HEC-22 GENERIC	N/A	On Sag	1	4524.85	4528.16	3.32	4523.85	-1.00	0.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	101	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
2	102	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
3	103	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
4	104	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
5	105	N/A	0.0200	0.0160	0.0620	2.00	0.0657	7.00
6	105.1	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
7	106	N/A	0.0200	0.0160	0.0620	2.00	0.0657	7.00
8	107	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
9	108	N/A	0.0200	0.0160	0.0620	2.00	0.0657	7.00
10	109	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
11	110	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
12	200	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00

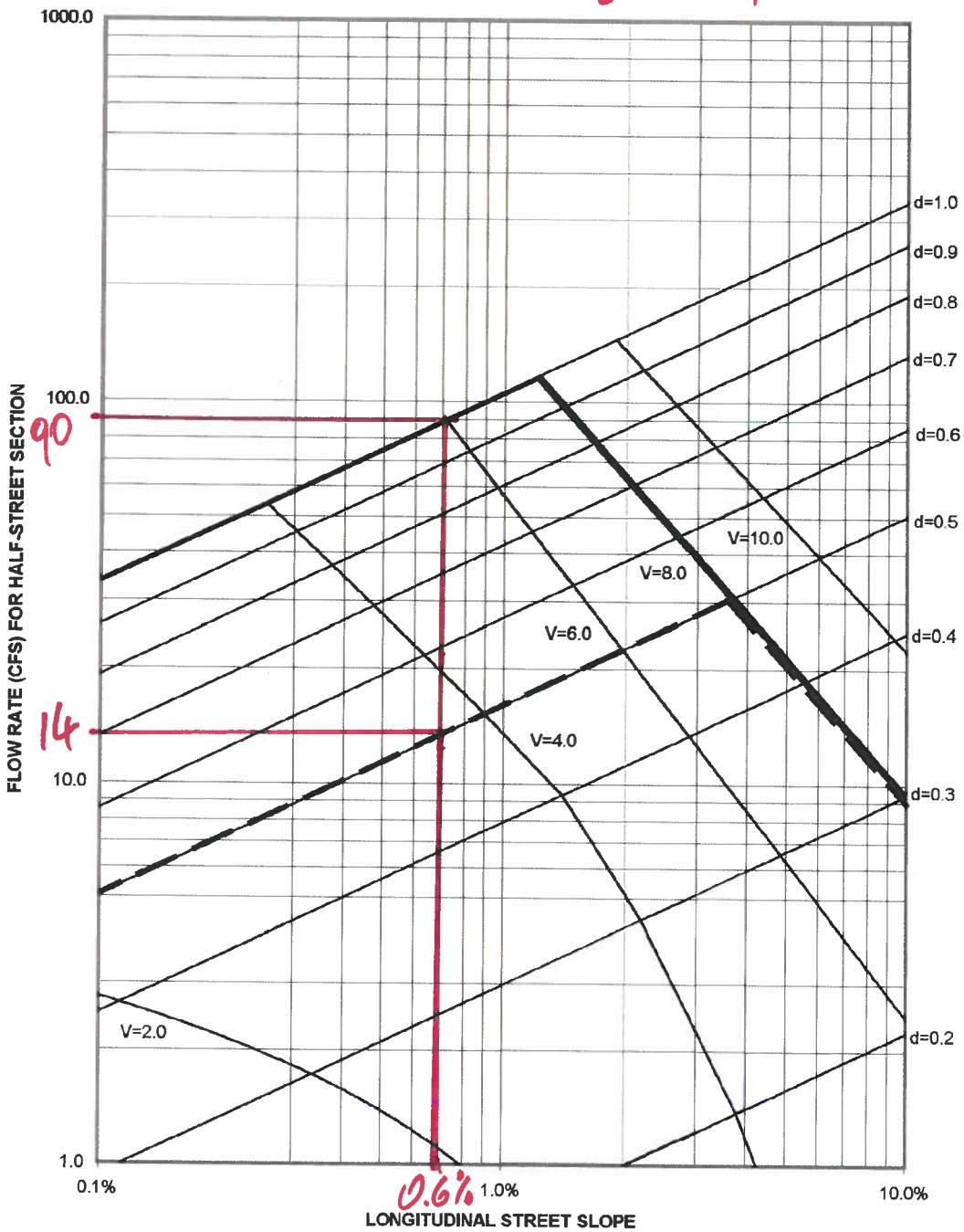
Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	101	1.29	1.29	N/A	N/A	N/A	6.58	4523.63	0.39	0 00:01	0.00	0.00
2	102	2.64	2.64	N/A	N/A	N/A	11.39	4523.99	0.49	0 00:01	0.00	0.00
3	103	6.30	6.30	N/A	N/A	N/A	12.40	4524.16	0.66	0 00:01	0.00	0.00
4	104	0.60	0.60	N/A	N/A	N/A	3.28	4522.96	0.22	0 01:38	0.00	0.00
5	105	0.75	0.75	N/A	N/A	N/A	4.10	4525.38	0.27	0 00:01	0.00	0.00
6	105.1	0.75	0.75	N/A	N/A	N/A	4.10	4525.38	0.27	0 00:01	0.00	0.00
7	106	1.55	1.55	N/A	N/A	N/A	7.58	4523.15	0.41	0 00:01	0.00	0.00
8	107	4.10	4.10	N/A	N/A	N/A	15.71	4524.71	0.57	0 00:01	0.00	0.00
9	108	5.77	5.77	N/A	N/A	N/A	11.82	4524.78	0.65	0 00:35	0.00	0.00
10	109	0.77	0.77	N/A	N/A	N/A	4.21	4524.96	0.28	0 00:01	0.00	0.00
11	110	0.80	0.80	N/A	N/A	N/A	4.37	4524.97	0.29	0 00:01	0.00	0.00
12	200	2.81	2.81	N/A	N/A	N/A	11.94	4528.66	0.50	0 00:01	0.00	0.00

STORMWATER MANAGEMENT MANUAL

HALF-STREET FLOW CAPACITY
(RESIDENTIAL, VERTICAL CURB)

BASIN 103 Q_2 = 6.3 cfs Q_{100} = 37 cfs



FULL STREET CAPACITY
MINOR = 14 x 2 = 28 cfs
MAJOR = 90 x 2 = 180 cfs

DESIGN LIMITS

- — — — MINOR STORM
- ——— MAJOR STORM

Revision	Date
ORIGINAL ISSUE	3/27/06

WRC ENGINEERING, INC.

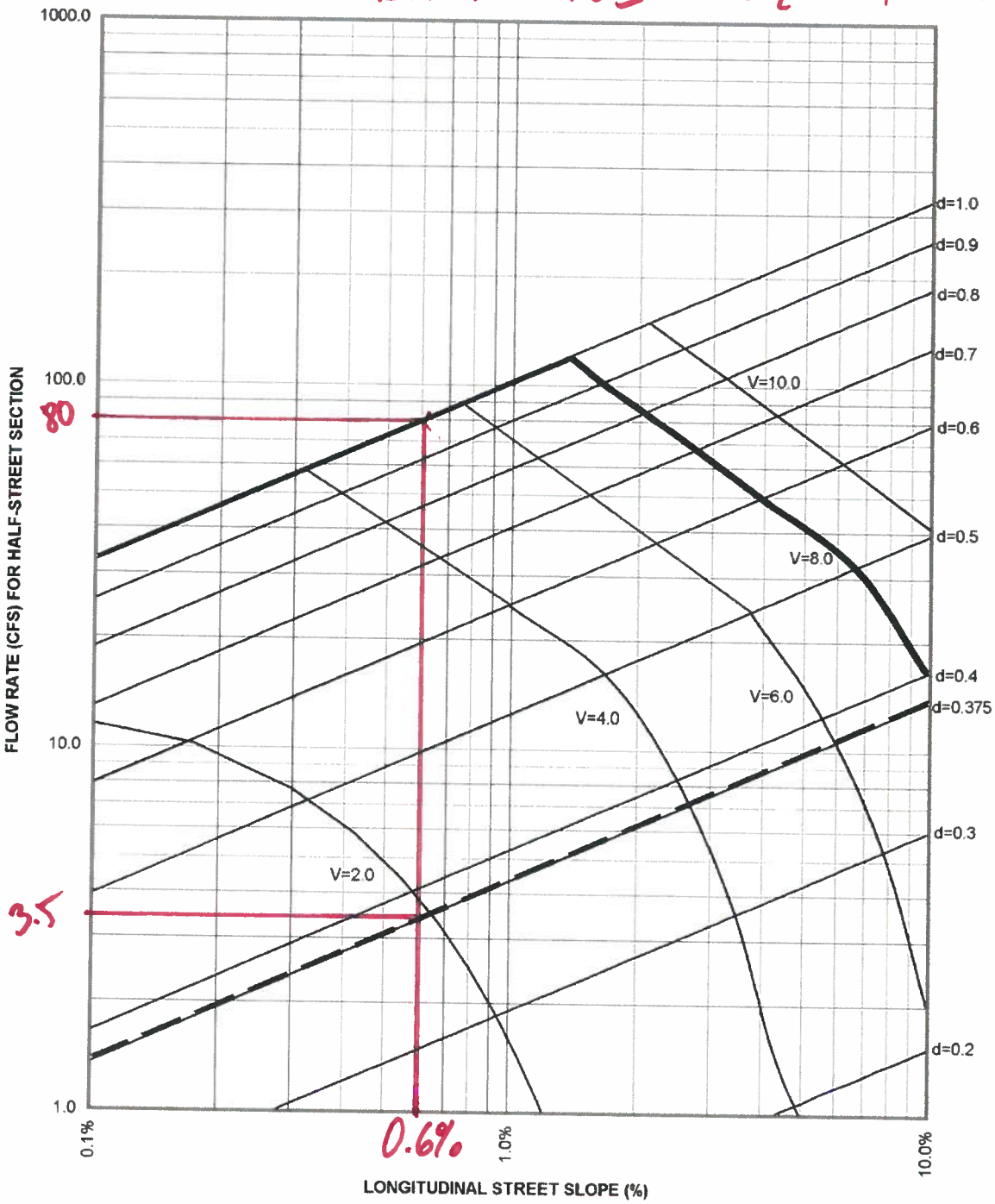
REFERENCE:

FIGURE 1106

STORMWATER MANAGEMENT MANUAL

HALF-STREET FLOW CAPACITY
(RESIDENTIAL, MOUNTABLE CURB)

BASIN 103 $Q_i = 6.3$ cfs $Q_{100} = 37$ cfs



DESIGN LIMITS
- MINOR STORM
- MAJOR STORM

FULL STREET CAPACITY
MINOR $3.5 \times 2 = 7$ cfs
MAJOR $80 \times 2 = 160$ cfs

Revision	Date
ORIGINAL ISSUE	3/27/06

WRC ENGINEERING, INC.

REFERENCE:

FIGURE 1105

Maximum Inlet Capacities
Sump or Sag Condition

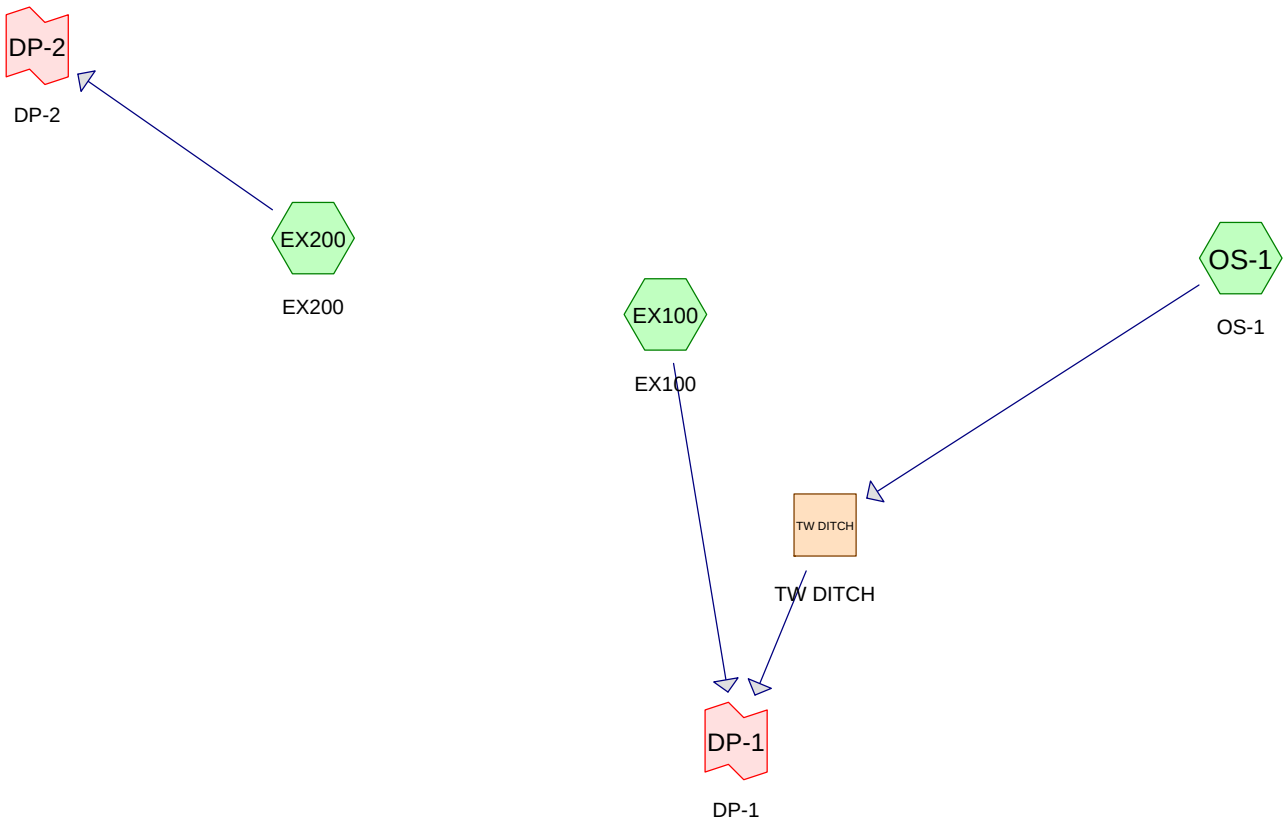
	INLET TYPE	6-INCH VERTICAL CURB					
		SINGLE		DOUBLE		TRIPLE	
		2-YR	100-YR	2-YR	100-YR	2-YR	100-YR
2-INCH CURB-OPENING DEPRESSION	COMBINATION INLET (TYPE D GRATES)	9.8	12.4	14.7	20.1	19.6	27.8
	COMBINATION INLET (TYPE R GRATES)	9.8	11.1	14.7	18.8	19.6	26.5
	CURB-OPENING INLET CAPACITY	7.7	10.3	12.7	20.6	15.0	30.9
NO CURB-OPENING DEPRESSION	COMBINATION INLET (TYPE D GRATES)	6.4	9.3	9.5	14.2	12.7	19.1
	COMBINATION INLET (TYPE R GRATES)	5.1	8.1	9.5	13.0	12.7	17.9
	CURB-OPENING INLET CAPACITY	4.1	6.5	8.3	13.1	12.4	19.6

	INLET TYPE	4.5-INCH MOUNTABLE CURB					
		SINGLE		DOUBLE		TRIPLE	
		2-YR	100-YR	2-YR	100-YR	2-YR	100-YR
2-INCH CURB-OPENING DEPRESSION	COMBINATION INLET (TYPE D GRATES)	7.2	10.8	10.8	16.8	14.4	22.7
	COMBINATION INLET (TYPE R GRATES)	7.2	9.4	10.8	15.4	14.4	21.4
	CURB-OPENING INLET CAPACITY	5.6	8.0	9.3	16.0	11.0	23.9
NO CURB-OPENING DEPRESSION	COMBINATION INLET (TYPE D GRATES)	4.1	7.8	6.2	10.9	8.3	14.1
	COMBINATION INLET (TYPE R GRATES)	4.1	6.5	6.2	9.7	8.3	12.8
	CURB-OPENING INLET CAPACITY	2.3	4.2	4.7	8.5	7.0	12.7

See Chart Legend (Figure 1113) for standard inlet lengths.

Inlet capacities shown above are based upon the following:
1. Type D grate used for calculation is Neenah model R-3577.
2. Type R grate used for calculation is Neenah model R-3289-C.
3. Angled- and curved-vane grates are not allowed for sump or sag design conditions.
4. Capacities shown are based upon maximum ponding depths for the 2-year and 100-year storm events:
   a. 2-year event maximum ponding depth: curb height
   b. 100-year event maximum ponding depth: 1.0 foot
5. Combination inlets are preferred for sump or sag conditions. Curb-opening inlets without grates are allowed.
6. Grate-only inlets are not allowed for sump or sag conditions.

Revision	Date
ORIGINAL ISSUE	3/27/06
REVISED CALCULATIONS	12/20/07



Subcat Reach Pond Link

Routing Diagram for IronWheel-Exsting
Prepared by Vortex Engineering, Inc., Printed 12/12/2018

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX100: EX100 Runoff Area=29.900 ac Runoff Depth=0.00"
Flow Length=1,600' Slope=0.0100 '/' Tc=53.7 min CN=75 Runoff=0.00 cfs 0.000 af

Subcatchment EX200: EX200 Runoff Area=25.400 ac Runoff Depth=0.00"
Flow Length=1,650' Slope=0.0200 '/' Tc=52.4 min CN=64 Runoff=0.00 cfs 0.000 af

Subcatchment OS-1: OS-1 Runoff Area=11.590 ac Runoff Depth=0.00"
Flow Length=1,300' Slope=0.0050 '/' Tc=66.2 min CN=74 Runoff=0.00 cfs 0.000 af

Reach TW DITCH: TW DITCH Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.025 L=1,300.0' S=0.0046 '/' Capacity=4.72 cfs Outflow=0.00 cfs 0.000 af

Link DP-1: DP-1 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link DP-2: DP-2 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 66.890 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"

Summary for Subcatchment EX100: EX100

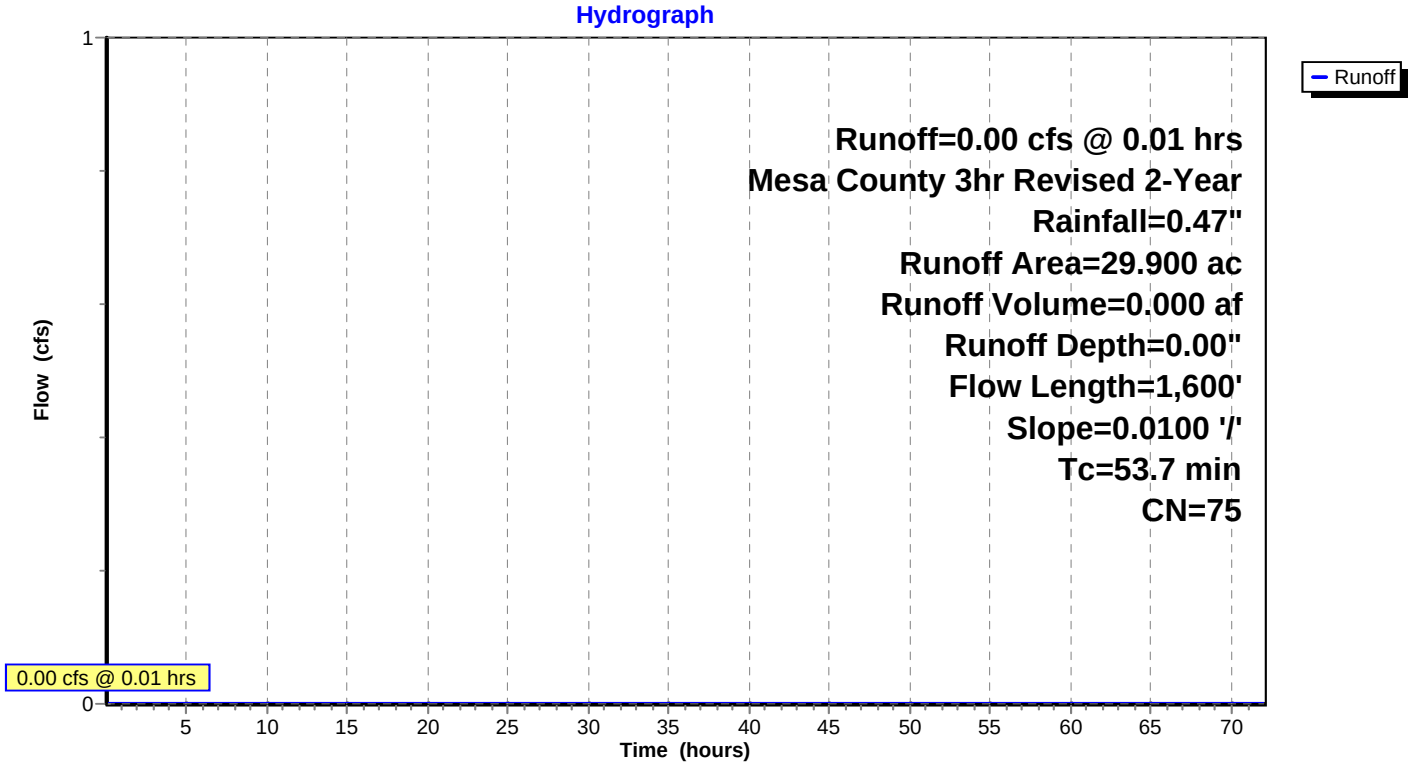
Runoff = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County 3hr Revised 2-Year Rainfall=0.47"

	Area (ac)	CN	Description
*	29.900	75	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.7	1,600	0.0100	0.50		**Lag/CN Method,**

Subcatchment EX100: EX100



Summary for Subcatchment EX200: EX200

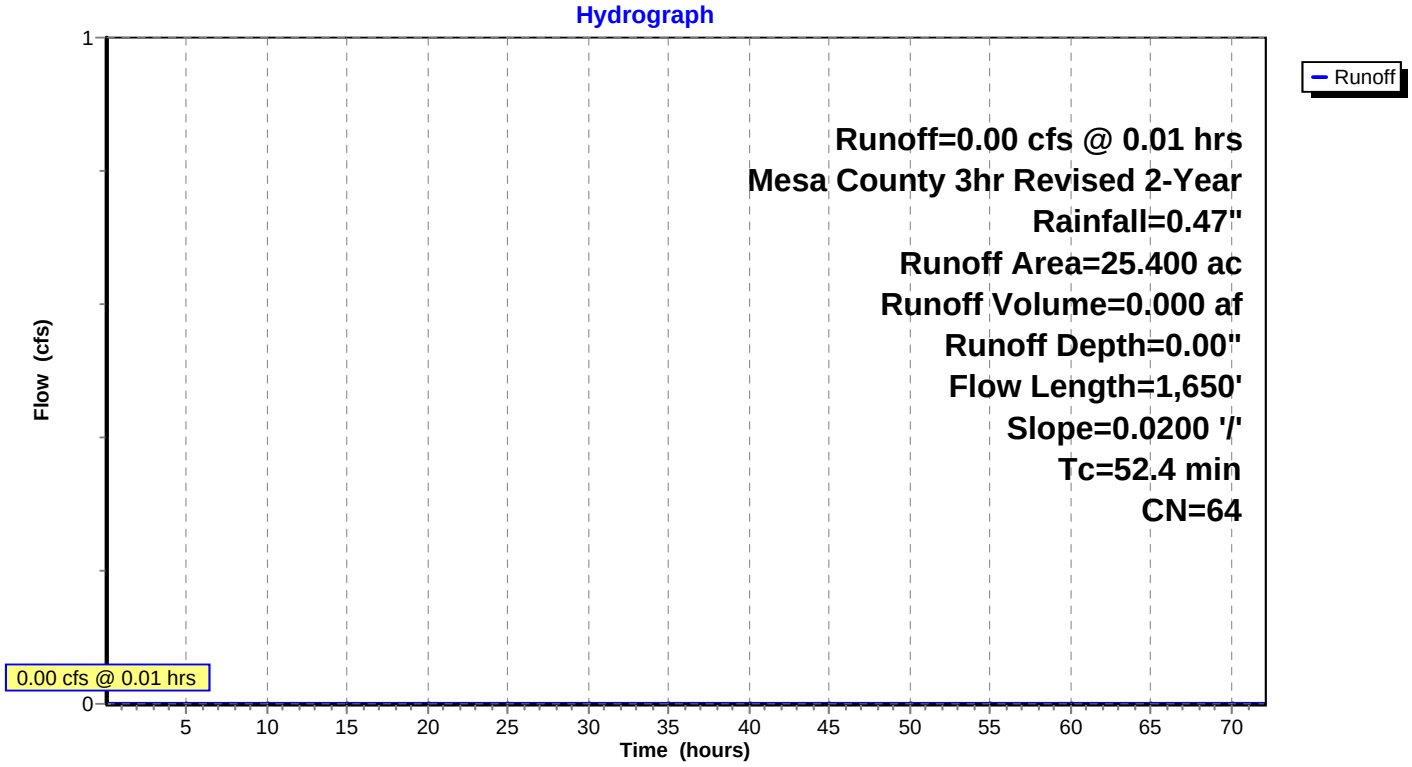
Runoff = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County 3hr Revised 2-Year Rainfall=0.47"

	Area (ac)	CN	Description
*	25.400	64	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
52.4	1,650	0.0200	0.52		**Lag/CN Method,**

Subcatchment EX200: EX200



Summary for Subcatchment OS-1: OS-1

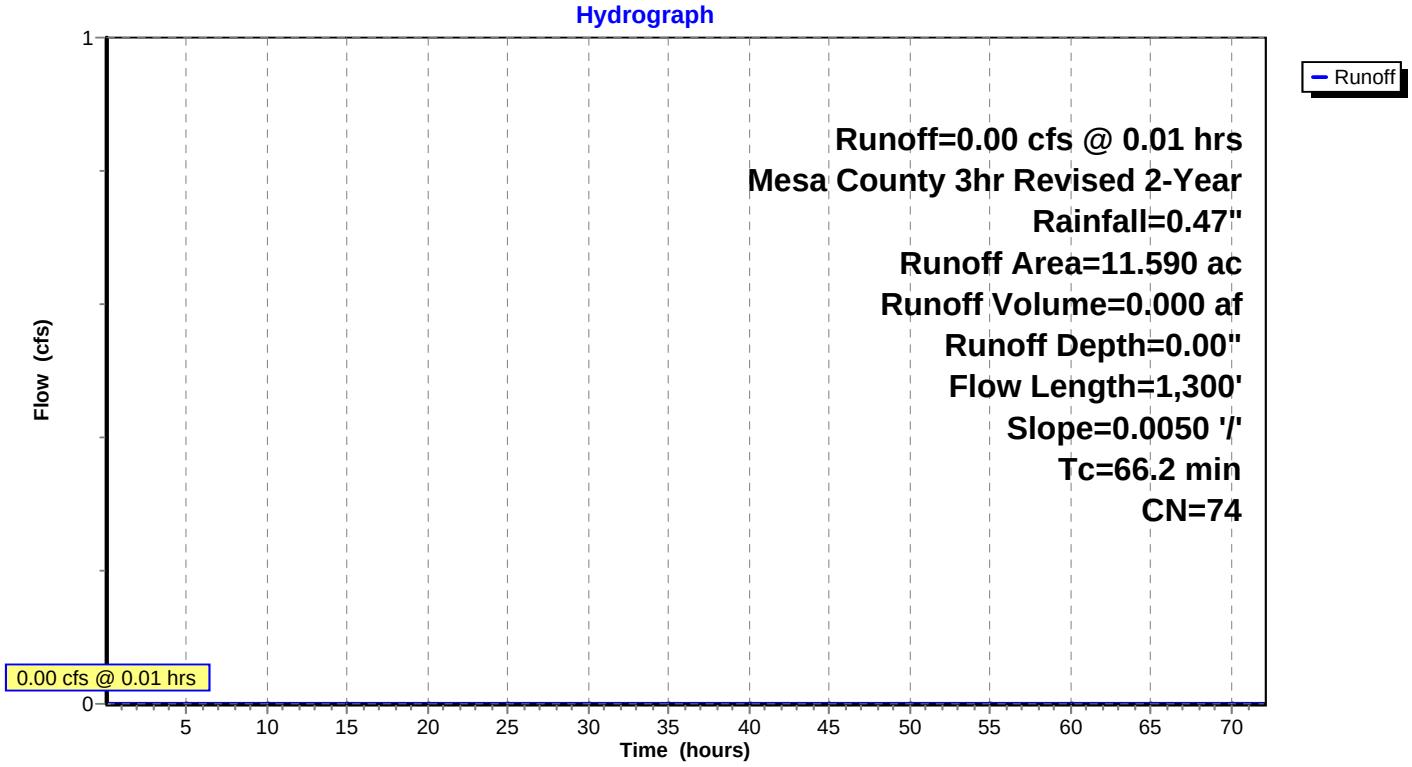
Runoff = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County 3hr Revised 2-Year Rainfall=0.47"

	Area (ac)	CN	Description
*	11.590	74	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.2	1,300	0.0050	0.33		**Lag/CN Method,**

Subcatchment OS-1: OS-1



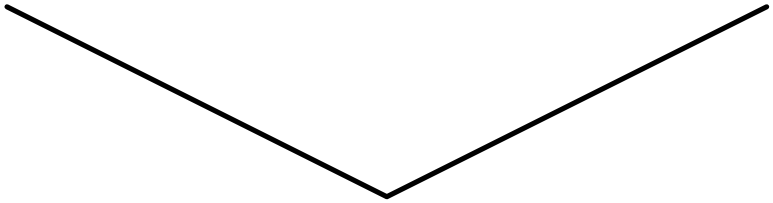
Summary for Reach TW DITCH: TW DITCH

Inflow Area = 11.590 ac, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

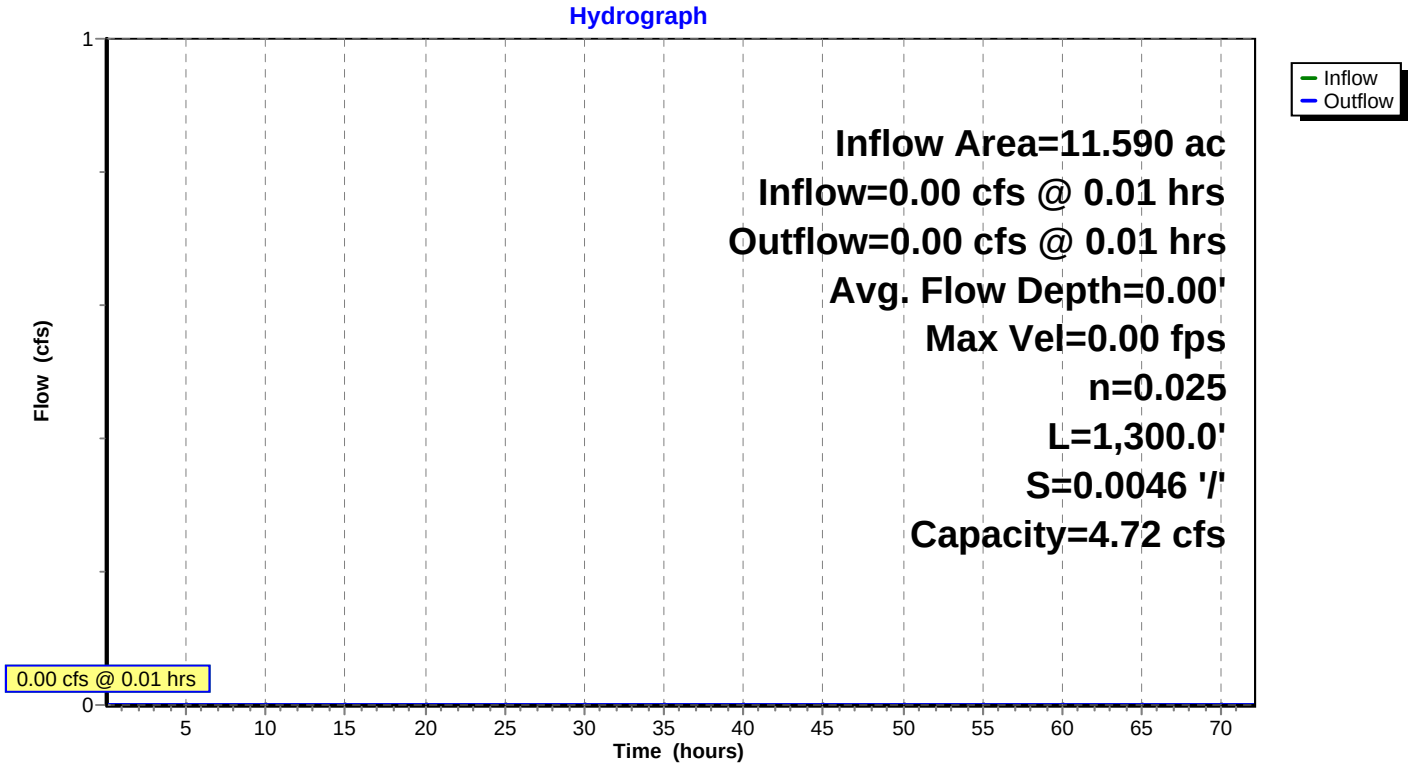
Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.01 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 2.0 sf, Capacity= 4.72 cfs

0.00' x 1.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 4.00'
Length= 1,300.0' Slope= 0.0046 '/'
Inlet Invert= 4,534.00', Outlet Invert= 4,528.00'



Reach TW DITCH: TW DITCH

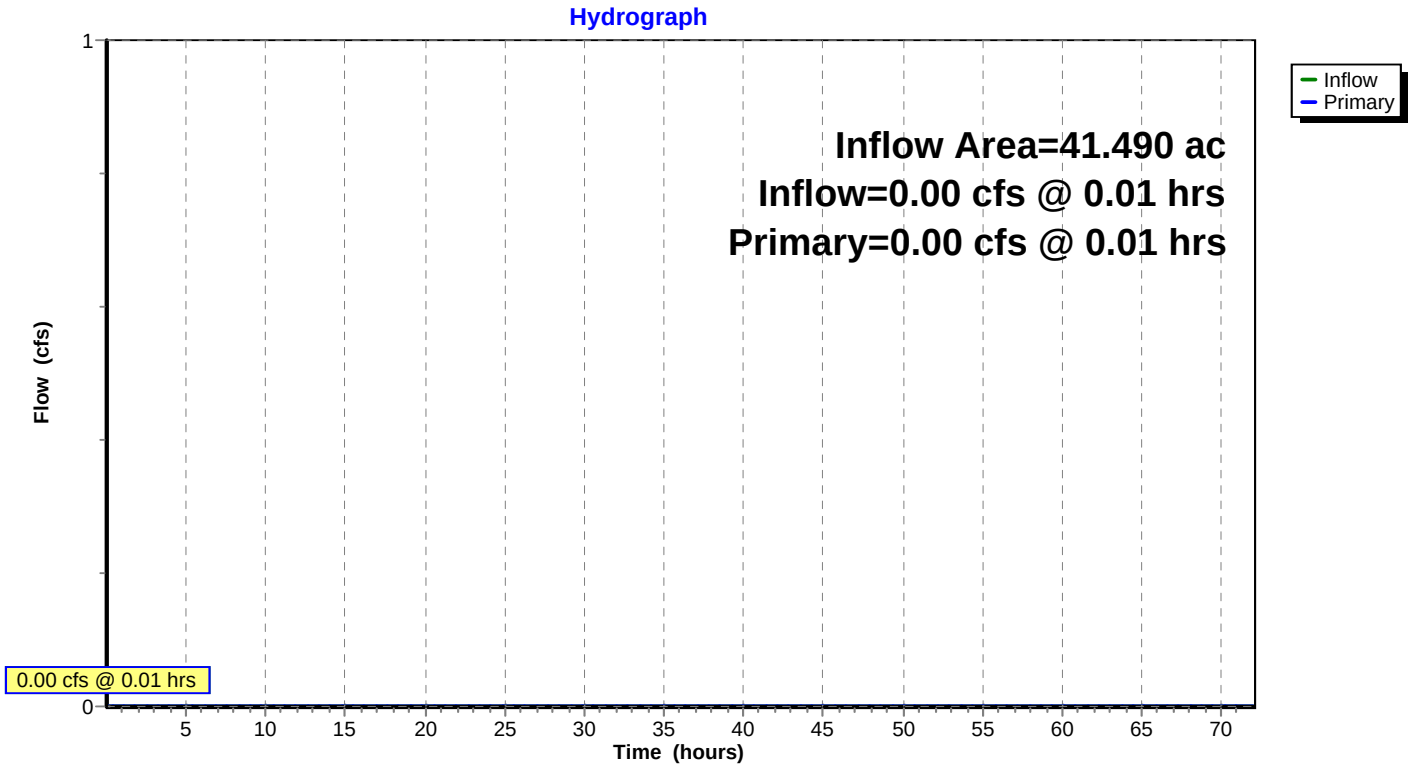


Summary for Link DP-1: DP-1

Inflow Area = 41.490 ac, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs

Link DP-1: DP-1

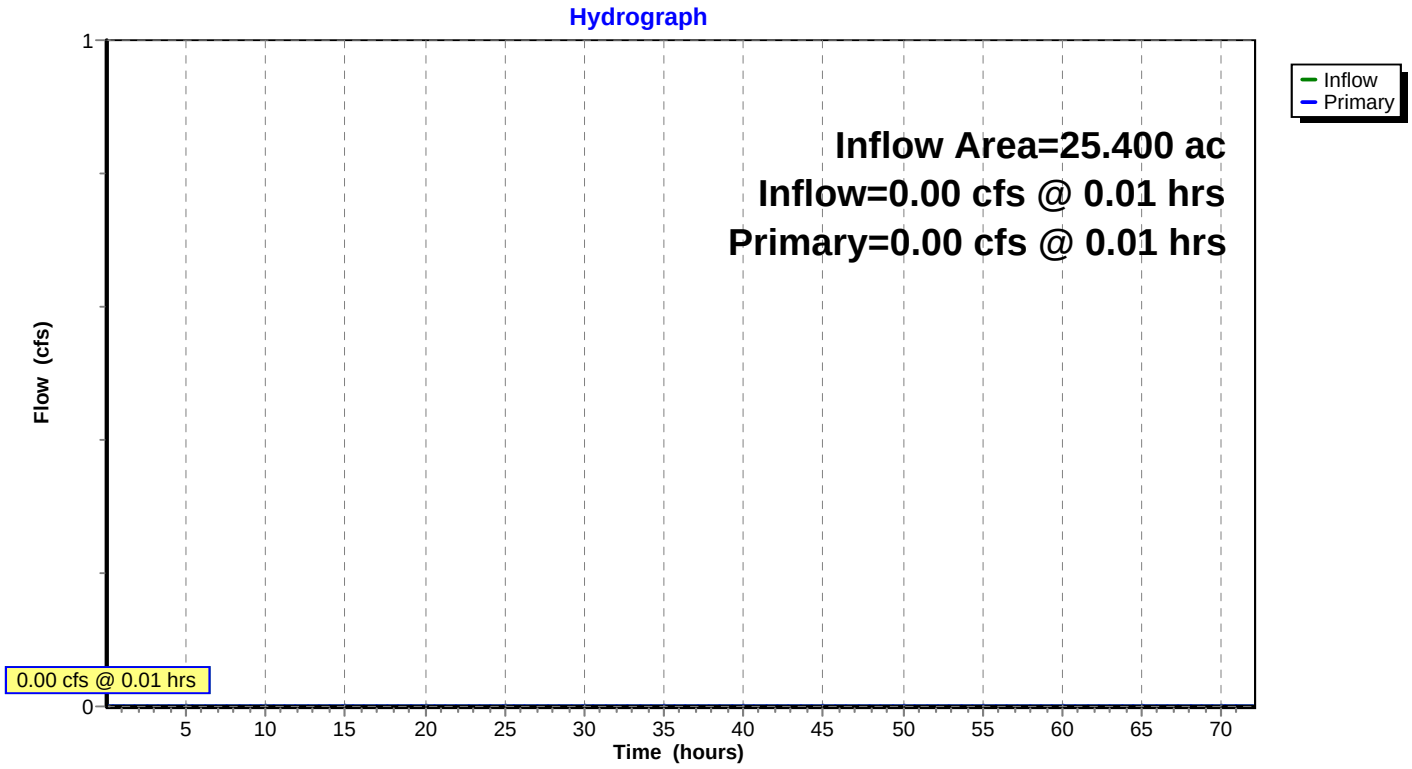


Summary for Link DP-2: DP-2

Inflow Area = 25.400 ac, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs

Link DP-2: DP-2



Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX100: EX100 Runoff Area=29.900 ac Runoff Depth=0.15"
Flow Length=1,600' Slope=0.0100 '/' Tc=53.7 min CN=75 Runoff=4.10 cfs 0.363 af

Subcatchment EX200: EX200 Runoff Area=25.400 ac Runoff Depth=0.02"
Flow Length=1,650' Slope=0.0200 '/' Tc=52.4 min CN=64 Runoff=0.36 cfs 0.035 af

Subcatchment OS-1: OS-1 Runoff Area=11.590 ac Runoff Depth=0.13"
Flow Length=1,300' Slope=0.0050 '/' Tc=66.2 min CN=74 Runoff=1.19 cfs 0.124 af

Reach TW DITCH: TW DITCH Avg. Flow Depth=0.58' Max Vel=1.64 fps Inflow=1.19 cfs 0.124 af
n=0.025 L=1,300.0' S=0.0046 '/' Capacity=4.72 cfs Outflow=1.10 cfs 0.124 af

Link DP-1: DP-1 Inflow=4.88 cfs 0.486 af
Primary=4.88 cfs 0.486 af

Link DP-2: DP-2 Inflow=0.36 cfs 0.035 af
Primary=0.36 cfs 0.035 af

Total Runoff Area = 66.890 ac Runoff Volume = 0.522 af Average Runoff Depth = 0.09"

Summary for Subcatchment EX100: EX100

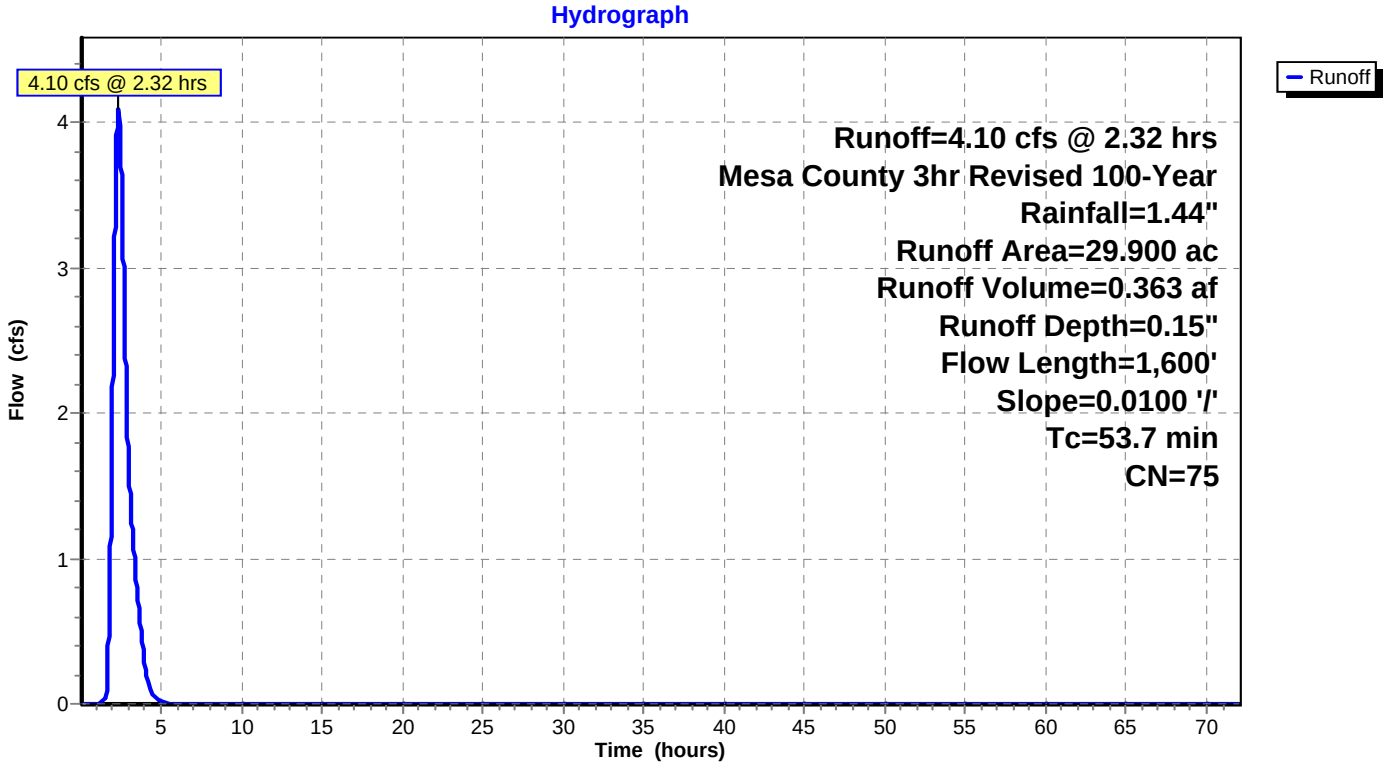
Runoff = 4.10 cfs @ 2.32 hrs, Volume= 0.363 af, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County 3hr Revised 100-Year Rainfall=1.44"

	Area (ac)	CN	Description
*	29.900	75	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.7	1,600	0.0100	0.50		**Lag/CN Method,**

Subcatchment EX100: EX100



Summary for Subcatchment EX200: EX200

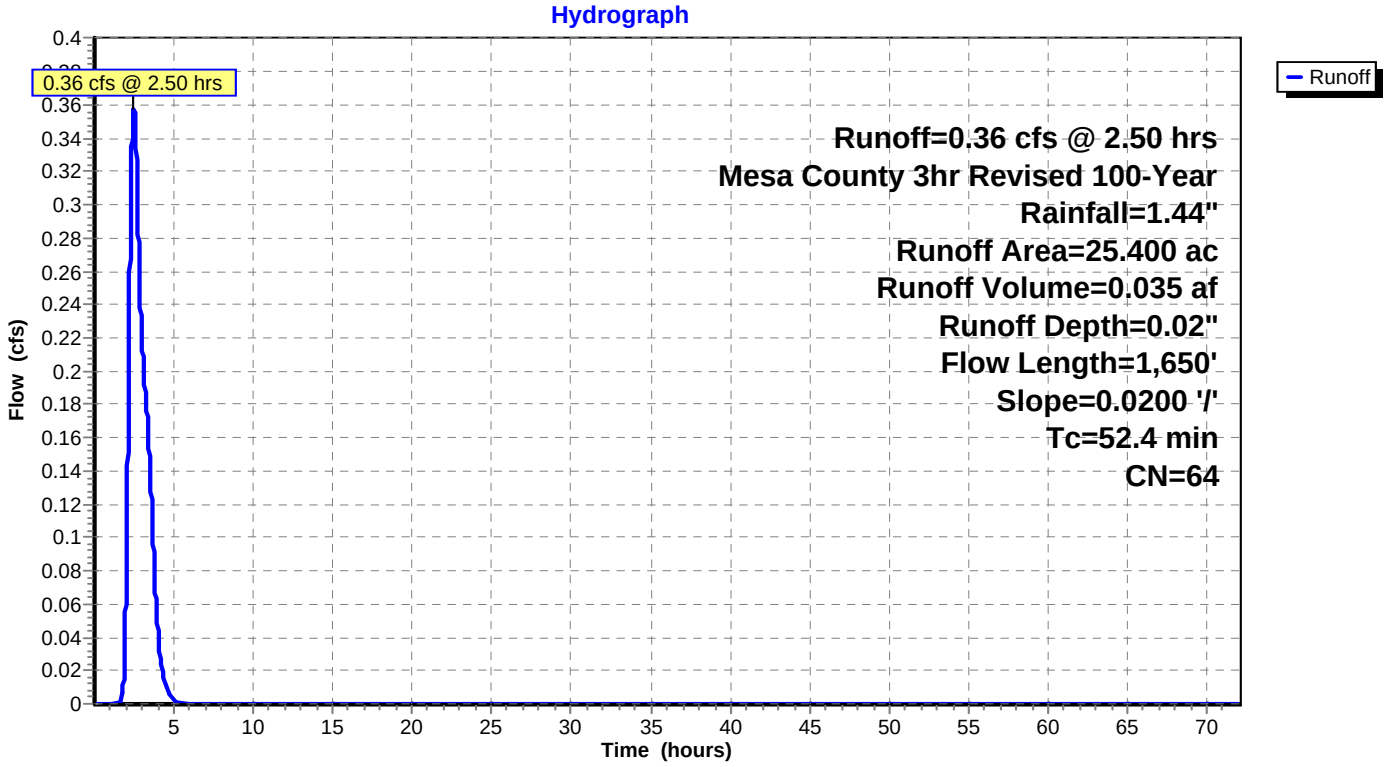
Runoff = 0.36 cfs @ 2.50 hrs, Volume= 0.035 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County 3hr Revised 100-Year Rainfall=1.44"

	Area (ac)	CN	Description
*	25.400	64	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
52.4	1,650	0.0200	0.52		**Lag/CN Method,**

Subcatchment EX200: EX200



Summary for Subcatchment OS-1: OS-1

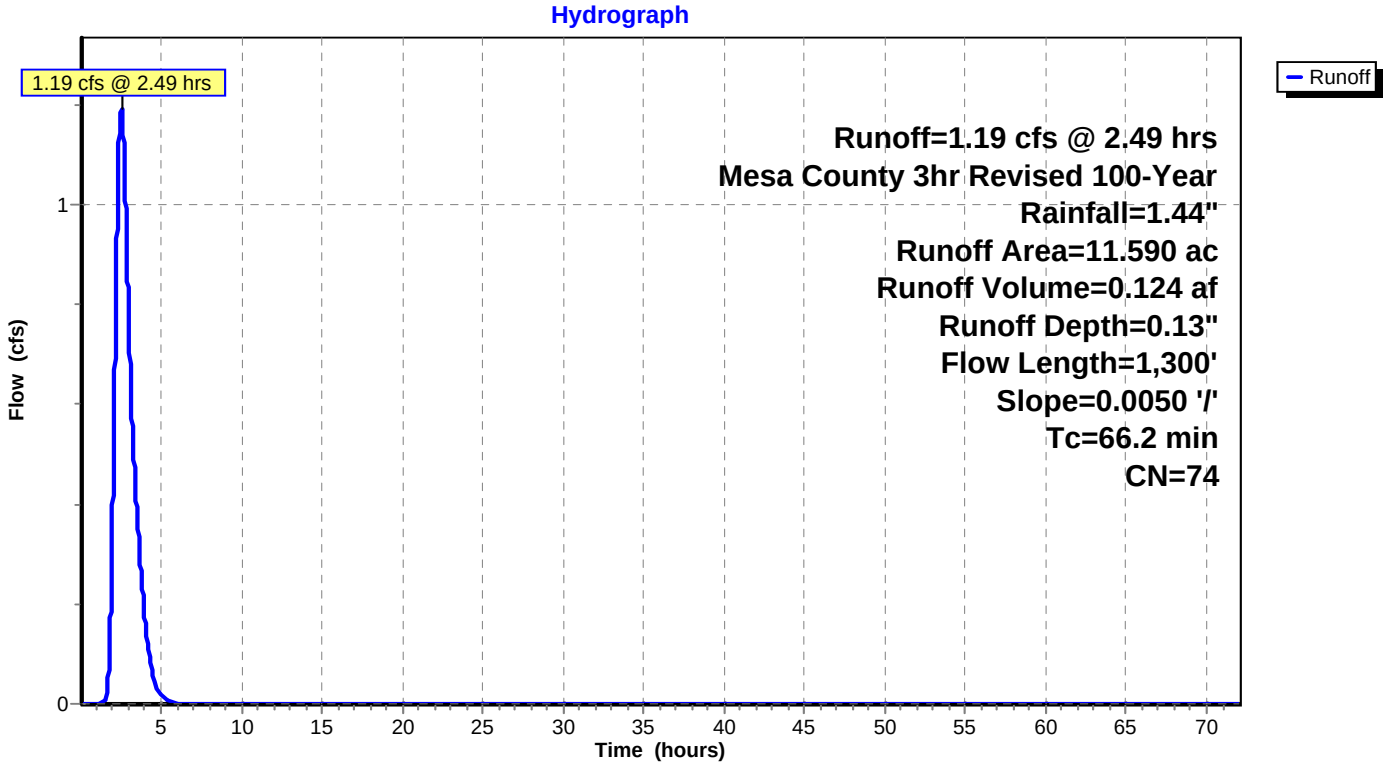
Runoff = 1.19 cfs @ 2.49 hrs, Volume= 0.124 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County 3hr Revised 100-Year Rainfall=1.44"

	Area (ac)	CN	Description
*	11.590	74	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.2	1,300	0.0050	0.33		**Lag/CN Method,**

Subcatchment OS-1: OS-1



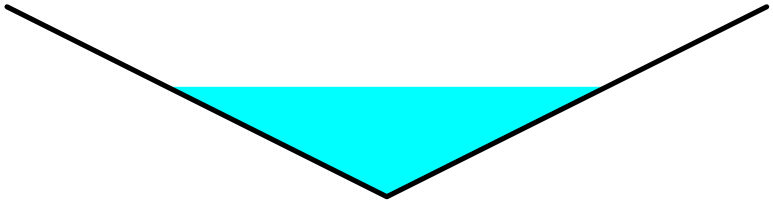
Summary for Reach TW DITCH: TW DITCH

Inflow Area = 11.590 ac, Inflow Depth = 0.13" for 100-Year event
Inflow = 1.19 cfs @ 2.49 hrs, Volume= 0.124 af
Outflow = 1.10 cfs @ 2.65 hrs, Volume= 0.124 af, Atten= 7%, Lag= 9.5 min

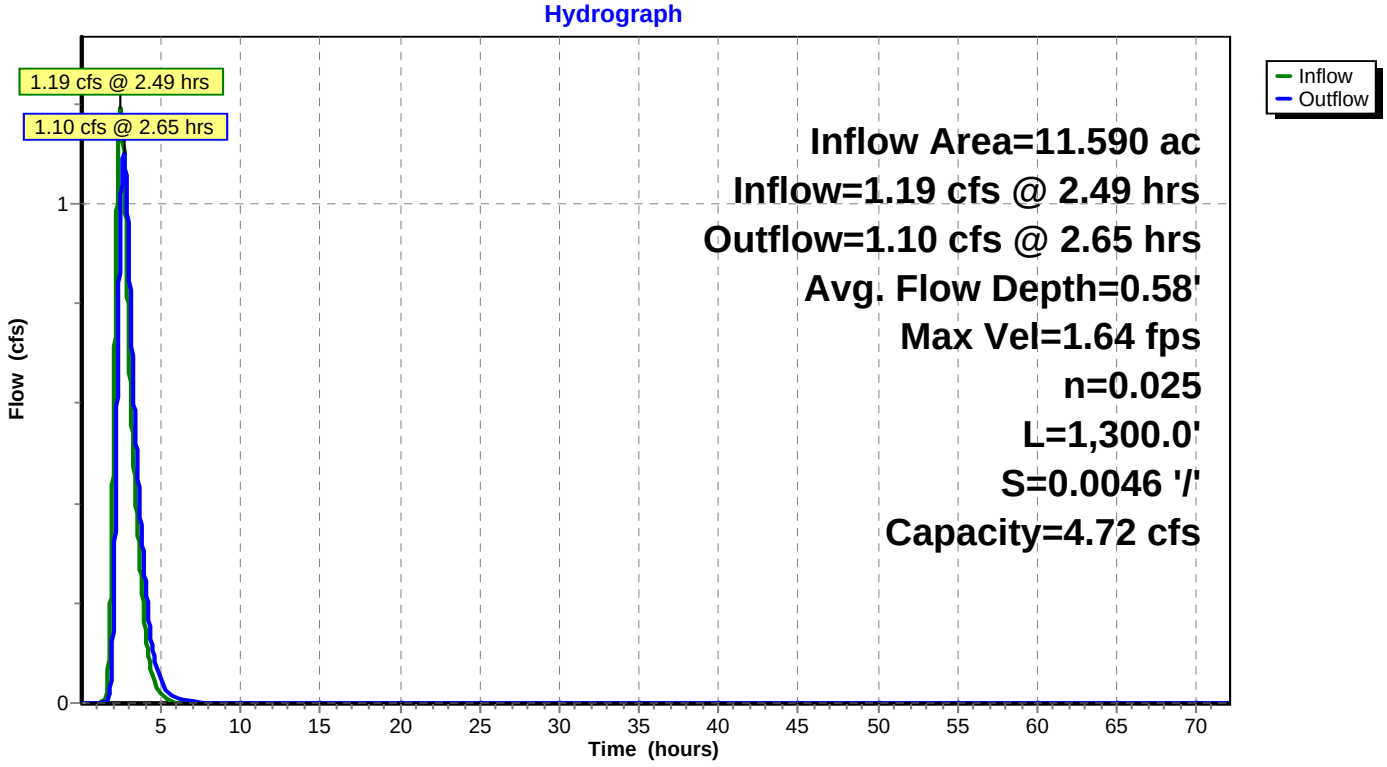
Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.64 fps, Min. Travel Time= 13.2 min
Avg. Velocity = 0.46 fps, Avg. Travel Time= 47.3 min

Peak Storage= 872 cf @ 2.65 hrs
Average Depth at Peak Storage= 0.58'
Bank-Full Depth= 1.00' Flow Area= 2.0 sf, Capacity= 4.72 cfs

0.00' x 1.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 4.00'
Length= 1,300.0' Slope= 0.0046 '/'
Inlet Invert= 4,534.00', Outlet Invert= 4,528.00'



Reach TW DITCH: TW DITCH

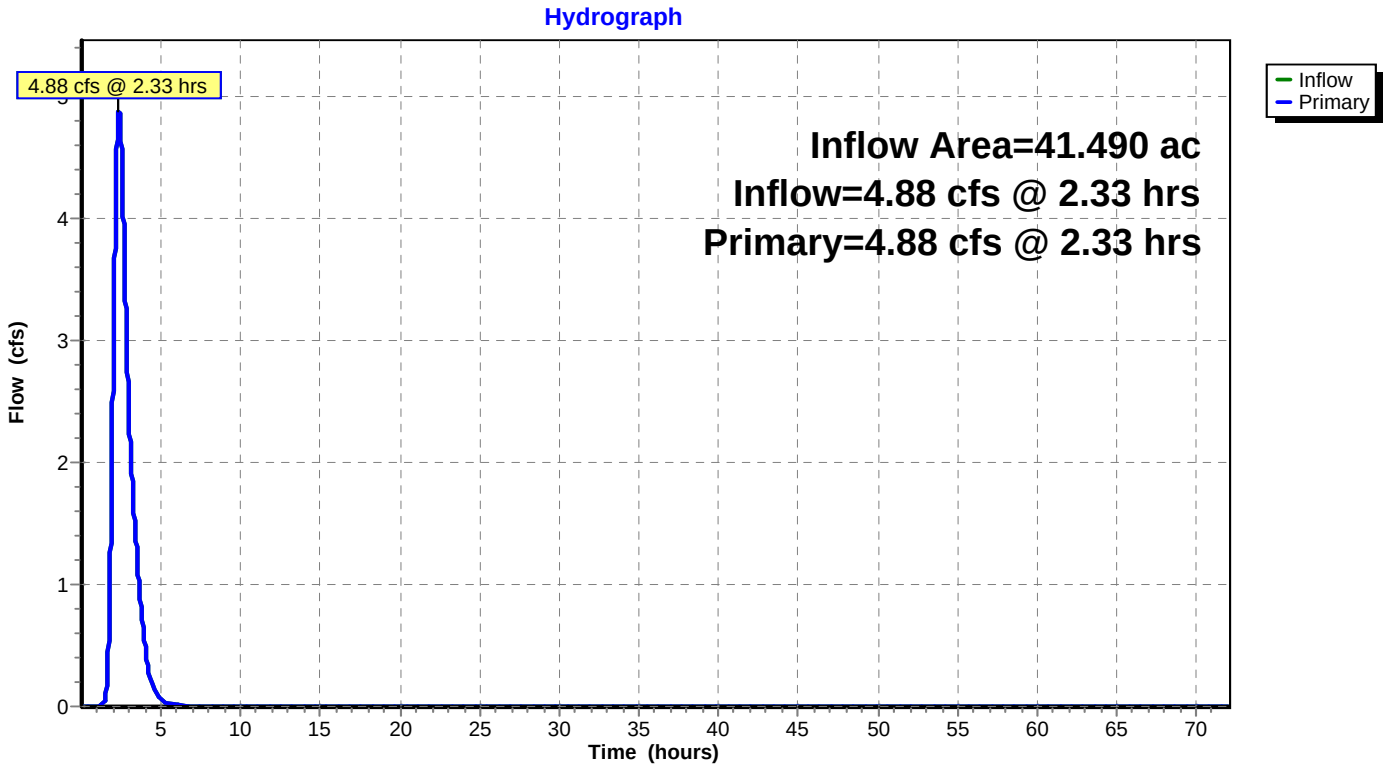


Summary for Link DP-1: DP-1

Inflow Area = 41.490 ac, Inflow Depth = 0.14" for 100-Year event
Inflow = 4.88 cfs @ 2.33 hrs, Volume= 0.486 af
Primary = 4.88 cfs @ 2.33 hrs, Volume= 0.486 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs

Link DP-1: DP-1

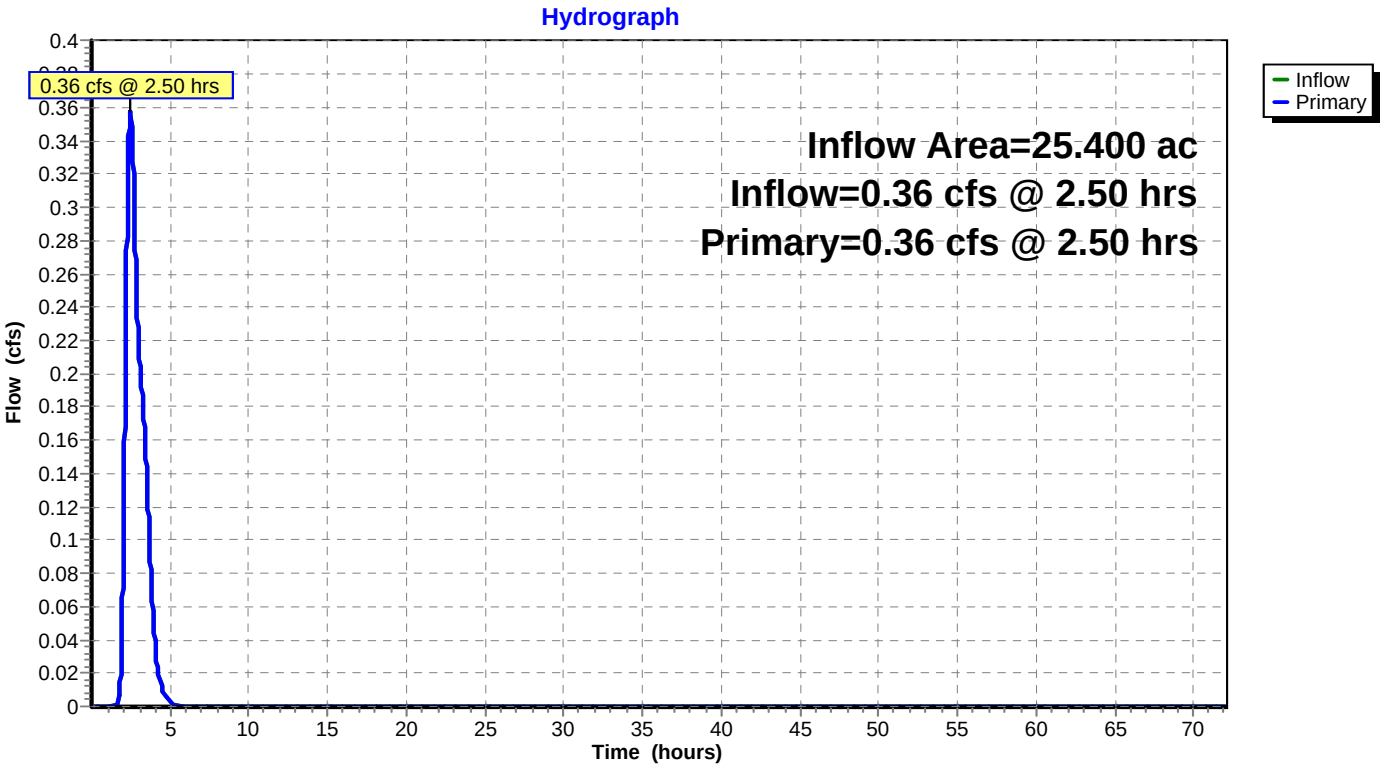


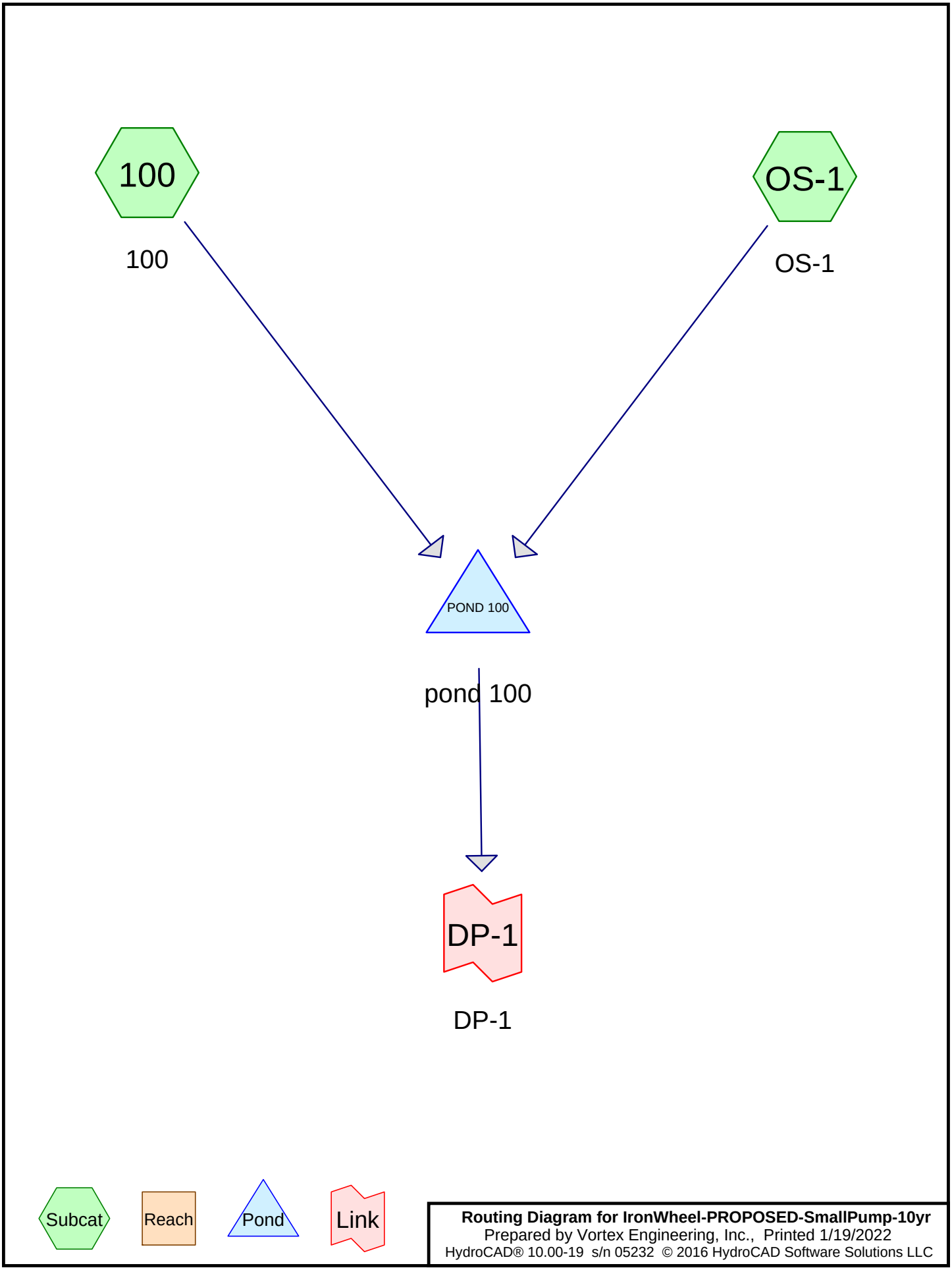
Summary for Link DP-2: DP-2

Inflow Area = 25.400 ac, Inflow Depth = 0.02" for 100-Year event
Inflow = 0.36 cfs @ 2.50 hrs, Volume= 0.035 af
Primary = 0.36 cfs @ 2.50 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs

Link DP-2: DP-2





Routing Diagram for IronWheel-PROPOSED-SmallPump-10yr
Prepared by Vortex Engineering, Inc., Printed 1/19/2022

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100: 100 Runoff Area=49.950 ac 0.00% Impervious Runoff Depth=0.04"
Tc=15.0 min CN=82 Runoff=3.60 cfs 0.181 af

Subcatchment OS-1: OS-1 Runoff Area=11.590 ac 0.00% Impervious Runoff Depth=0.00"
Tc=33.0 min CN=74 Runoff=0.01 cfs 0.001 af

Pond POND 100: pond 100 Peak Elev=4,519.87' Storage=30,028 cf Inflow=3.60 cfs 0.182 af
Outflow=0.25 cfs 0.729 af

Link DP-1: DP-1 Inflow=0.25 cfs 0.729 af
Primary=0.25 cfs 0.729 af

Summary for Subcatchment 100: 100

[73] Warning: Peak may fall outside time span

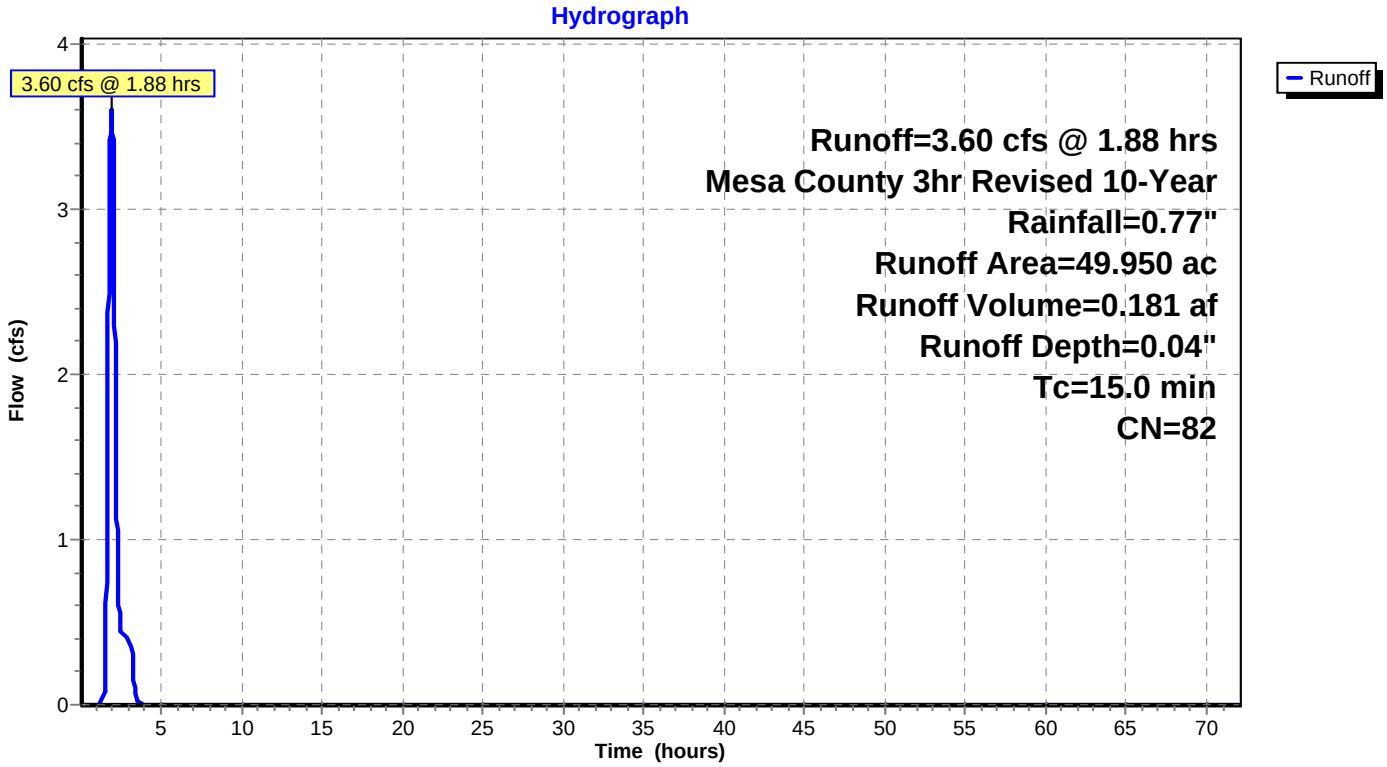
Runoff = 3.60 cfs @ 1.88 hrs, Volume= 0.181 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County 3hr Revised 10-Year Rainfall=0.77"

	Area (ac)	CN	Description
*	49.950	82	
	49.950		100.00% Pervious Area

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

Subcatchment 100: 100



Summary for Subcatchment OS-1: OS-1

[73] Warning: Peak may fall outside time span

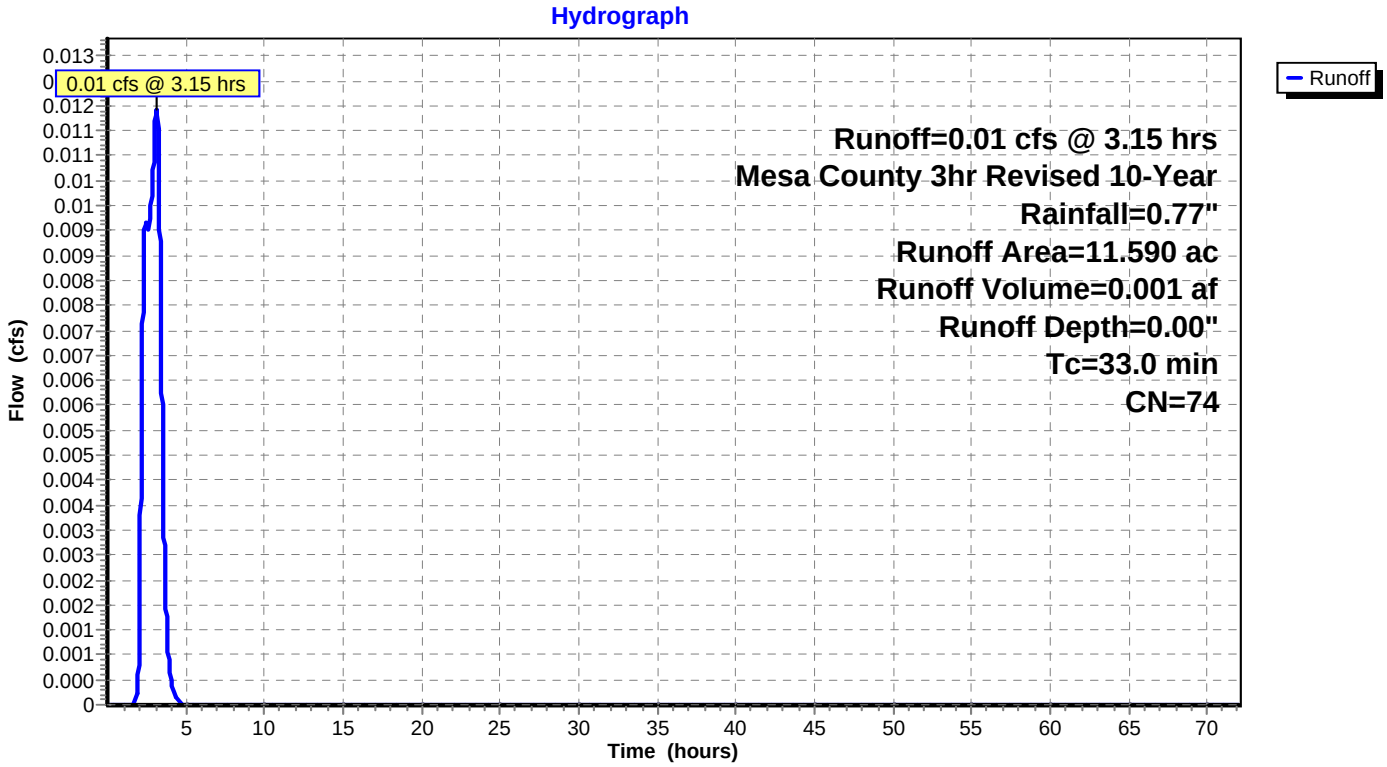
Runoff = 0.01 cfs @ 3.15 hrs, Volume= 0.001 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County 3hr Revised 10-Year Rainfall=0.77"

	Area (ac)	CN	Description
*	11.590	74	
	11.590		100.00% Pervious Area

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

Subcatchment OS-1: OS-1



Summary for Pond POND 100: pond 100

Inflow Area = 61.540 ac, 0.00% Impervious, Inflow Depth = 0.04" for 10-Year event
Inflow = 3.60 cfs @ 1.88 hrs, Volume= 0.182 af
Outflow = 0.25 cfs @ 3.19 hrs, Volume= 0.729 af, Atten= 93%, Lag= 78.9 min
Primary = 0.25 cfs @ 3.19 hrs, Volume= 0.729 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Starting Elev= 4,519.59' Surf.Area= 17,473 sf Storage= 25,084 cf
Peak Elev= 4,519.87' @ 3.19 hrs Surf.Area= 18,386 sf Storage= 30,028 cf (4,944 cf above start)

Plug-Flow detention time= 1,805.1 min calculated for 0.153 af (84% of inflow)
Center-of-Mass det. time= 942.1 min (1,065.1 - 123.0)

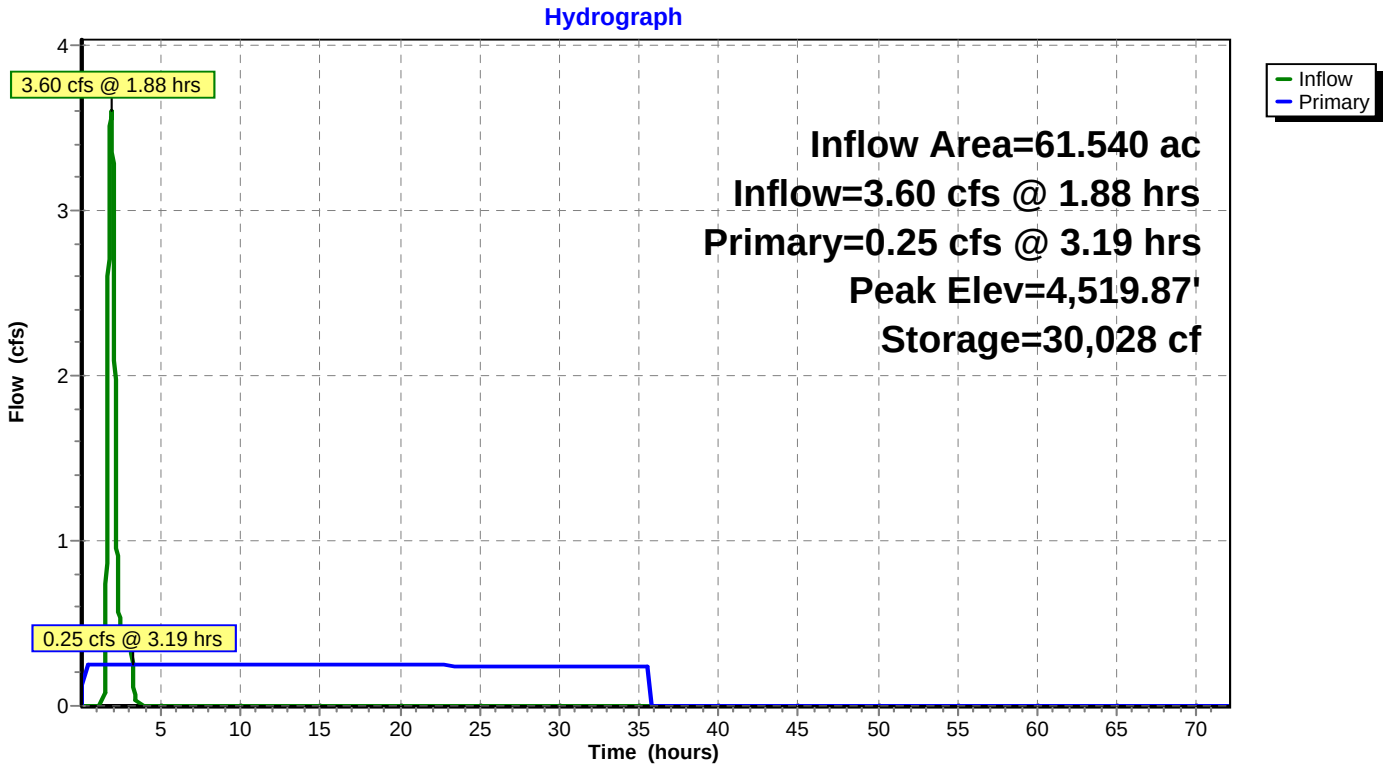
Volume	Invert	Avail.Storage	Storage Description
#1	4,517.80'	169,771 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4,517.80	0	0	0
4,518.00	12,652	1,265	1,265
4,519.00	15,520	14,086	15,351
4,520.00	18,831	17,176	32,527
4,521.00	22,183	20,507	53,034
4,522.00	25,549	23,866	76,900
4,523.00	41,215	33,382	110,282
4,524.00	77,763	59,489	169,771

Device	Routing	Invert	Outlet Devices
#1	Primary	4,519.59'	**Barmesa 0.5 HP** Discharges@4,523.83' Turns Off@4,518.00' 2.00" Diam. x 20.00' Long Discharge, Hazen-Williams C= 130 Flow (gpm)= 0.0 25.0 50.0 75.0 100.0 125.0 150.0 175.0 Head (feet)= 25.00 22.50 19.50 16.00 12.00 7.50 2.50 0.00 -Loss (feet)= 0.00 0.34 1.22 2.58 4.40 6.65 9.32 12.40 =Lift (feet)= 25.00 22.16 18.28 13.42 7.60 0.85 -6.82 -12.40
#2	Primary	4,519.87'	**Barmesa 0.5 HP** Discharges@4,523.83' Turns Off@4,518.00' 2.00" Diam. x 20.00' Long Discharge, Hazen-Williams C= 130 Flow (gpm)= 0.0 25.0 50.0 75.0 100.0 125.0 150.0 175.0 Head (feet)= 25.00 22.50 19.50 16.00 12.00 7.50 2.50 0.00 -Loss (feet)= 0.00 0.34 1.22 2.58 4.40 6.65 9.32 12.40 =Lift (feet)= 25.00 22.16 18.28 13.42 7.60 0.85 -6.82 -12.40
#3	Primary	4,523.55'	**12.00" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.51 cfs @ 3.19 hrs HW=4,519.87' TW=0.00' (Dynamic Tailwater)
- **1=Barmesa 0.5 HP** (Pump Controls 0.25 cfs)
- **2=Barmesa 0.5 HP** (Pump Controls 0.25 cfs)
- **3=Orifice/Grate** (Controls 0.00 cfs)

Pond POND 100: pond 100

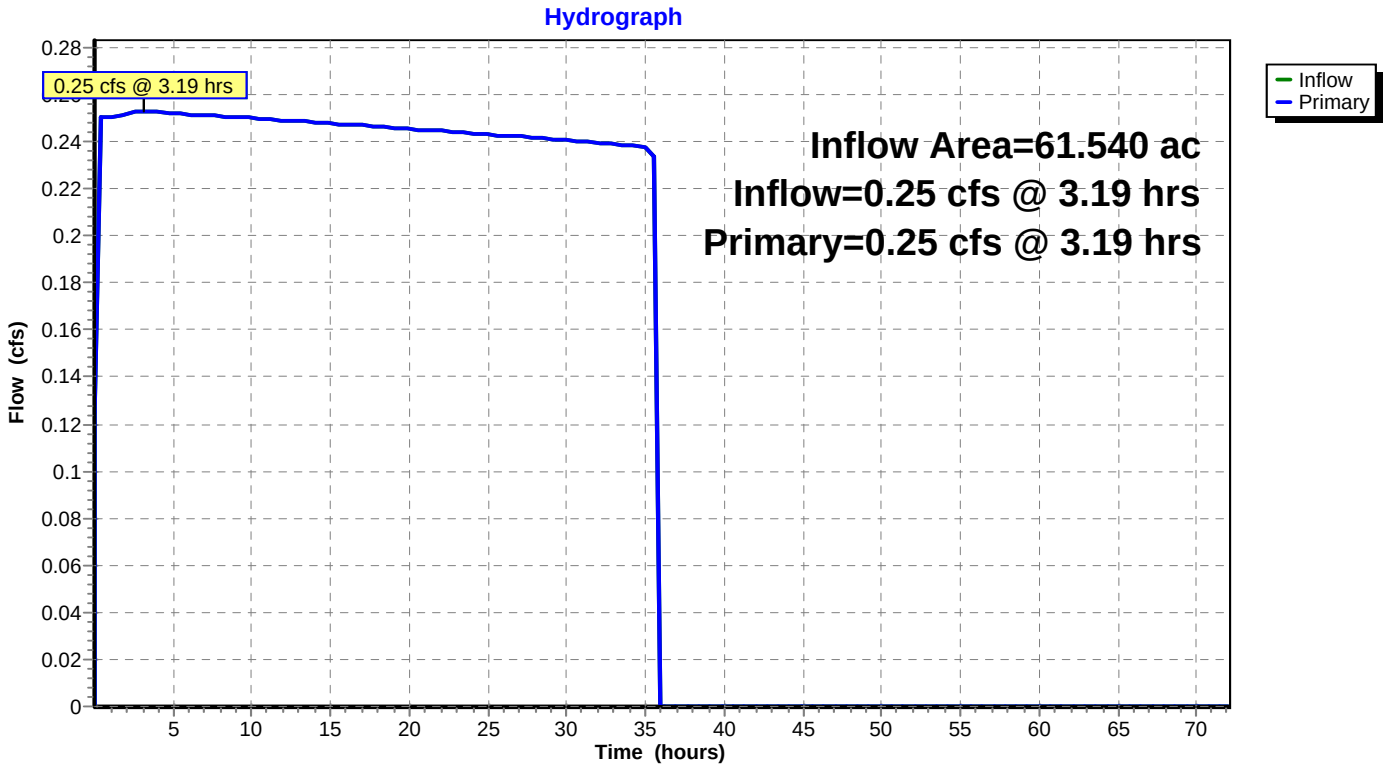


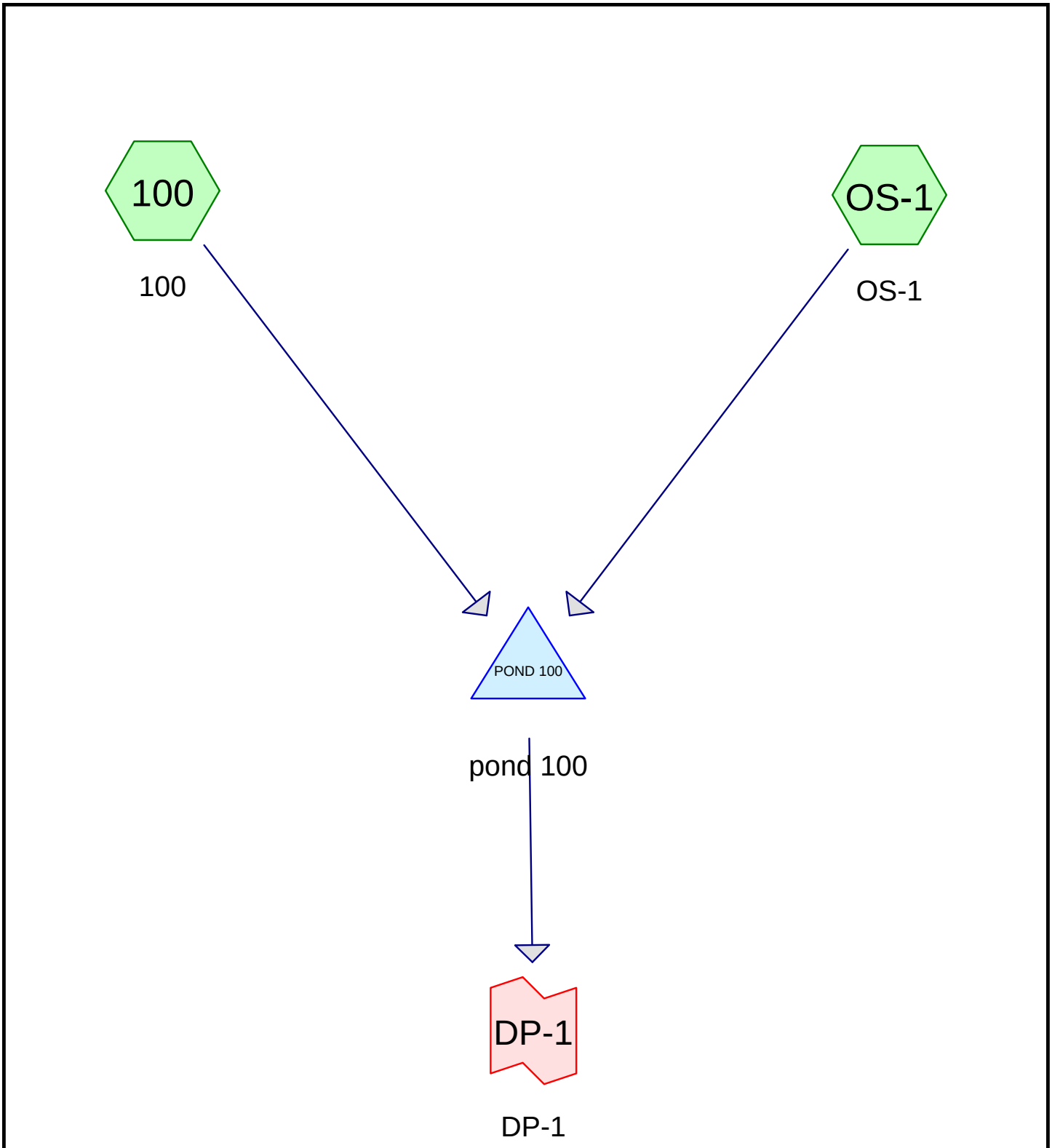
Summary for Link DP-1: DP-1

Inflow Area = 61.540 ac, 0.00% Impervious, Inflow Depth > 0.14" for 10-Year event
Inflow = 0.25 cfs @ 3.19 hrs, Volume= 0.729 af
Primary = 0.25 cfs @ 3.19 hrs, Volume= 0.729 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs

Link DP-1: DP-1





Subcat Reach Pond Link

Routing Diagram for IronWheel-PROPOSED-SmallPump-100yr
Prepared by Vortex Engineering, Inc., Printed 1/19/2022

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100: 100 Runoff Area=49.950 ac 0.00% Impervious Runoff Depth=0.31"
Tc=15.0 min CN=82 Runoff=23.43 cfs 1.305 af

Subcatchment OS-1: OS-1 Runoff Area=11.590 ac 0.00% Impervious Runoff Depth=0.13"
Tc=33.0 min CN=74 Runoff=1.86 cfs 0.124 af

Pond POND 100: pond 100 Peak Elev=4,521.26' Storage=59,027 cf Inflow=23.99 cfs 1.428 af
Outflow=0.53 cfs 1.399 af

Link DP-1: DP-1 Inflow=0.53 cfs 1.399 af
Primary=0.53 cfs 1.399 af

Summary for Subcatchment 100: 100

[73] Warning: Peak may fall outside time span

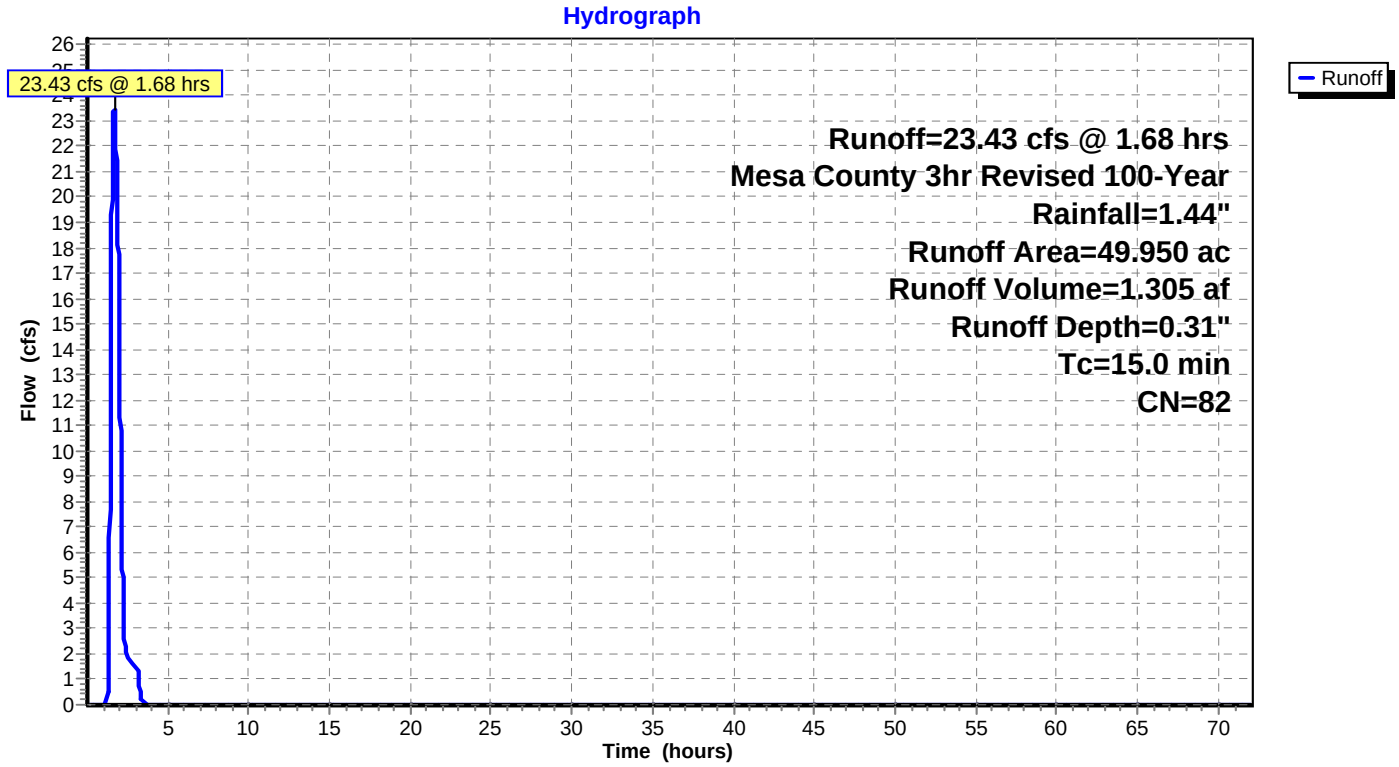
Runoff = 23.43 cfs @ 1.68 hrs, Volume= 1.305 af, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County 3hr Revised 100-Year Rainfall=1.44"

	Area (ac)	CN	Description
*	49.950	82	
	49.950		100.00% Pervious Area

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

Subcatchment 100: 100



Summary for Subcatchment OS-1: OS-1

[73] Warning: Peak may fall outside time span

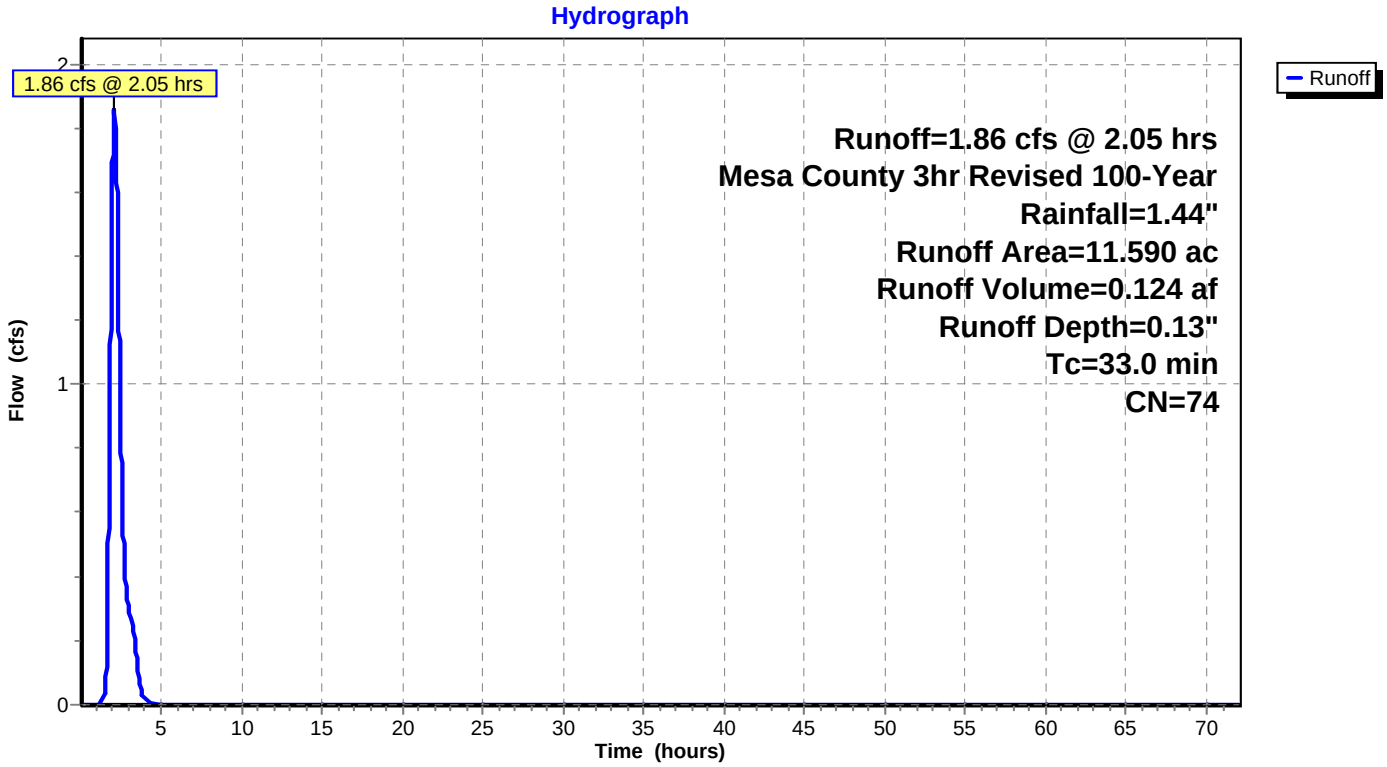
Runoff = 1.86 cfs @ 2.05 hrs, Volume= 0.124 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County 3hr Revised 100-Year Rainfall=1.44"

	Area (ac)	CN	Description
*	11.590	74	
	11.590		100.00% Pervious Area

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

Subcatchment OS-1: OS-1



Summary for Pond POND 100: pond 100

Inflow Area = 61.540 ac, 0.00% Impervious, Inflow Depth = 0.28" for 100-Year event
Inflow = 23.99 cfs @ 1.68 hrs, Volume= 1.428 af
Outflow = 0.53 cfs @ 3.31 hrs, Volume= 1.399 af, Atten= 98%, Lag= 97.5 min
Primary = 0.53 cfs @ 3.31 hrs, Volume= 1.399 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Peak Elev= 4,521.26' @ 3.31 hrs Surf.Area= 23,074 sf Storage= 59,027 cf

Plug-Flow detention time= 981.9 min calculated for 1.399 af (98% of inflow)
Center-of-Mass det. time= 980.3 min (1,094.6 - 114.3)

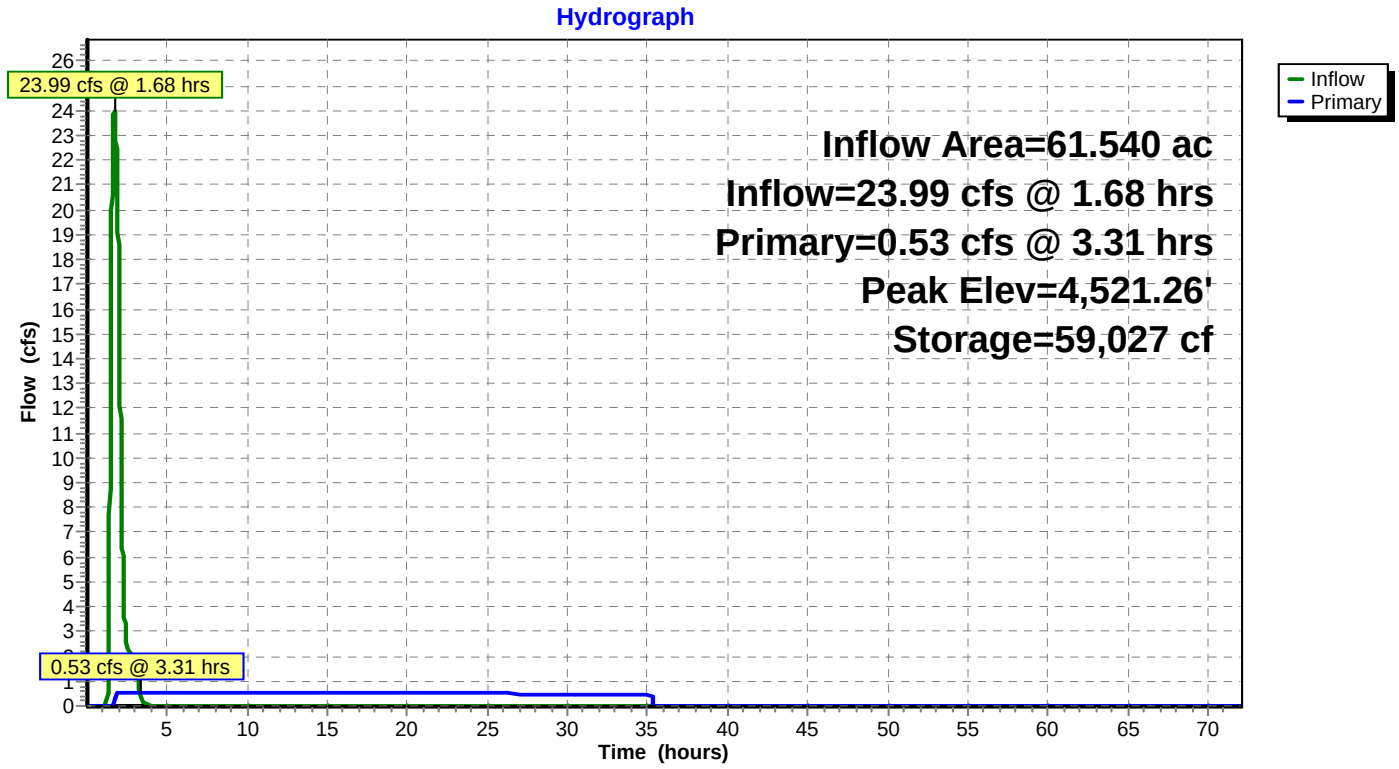
Volume	Invert	Avail.Storage	Storage Description
#1	4,517.80'	169,771 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4,517.80	0	0	0
4,518.00	12,652	1,265	1,265
4,519.00	15,520	14,086	15,351
4,520.00	18,831	17,176	32,527
4,521.00	22,183	20,507	53,034
4,522.00	25,549	23,866	76,900
4,523.00	41,215	33,382	110,282
4,524.00	77,763	59,489	169,771

Device	Routing	Invert	Outlet Devices
#1	Primary	4,519.59'	**Barmesa 0.5 HP** Discharges@4,523.83' Turns Off@4,518.00' 2.00" Diam. x 20.00' Long Discharge, Hazen-Williams C= 130 Flow (gpm)= 0.0 25.0 50.0 75.0 100.0 125.0 150.0 175.0 Head (feet)= 25.00 22.50 19.50 16.00 12.00 7.50 2.50 0.00 -Loss (feet)= 0.00 0.34 1.22 2.58 4.40 6.65 9.32 12.40 =Lift (feet)= 25.00 22.16 18.28 13.42 7.60 0.85 -6.82 -12.40
#2	Primary	4,519.87'	**Barmesa 0.5 HP** Discharges@4,523.83' Turns Off@4,518.00' 2.00" Diam. x 20.00' Long Discharge, Hazen-Williams C= 130 Flow (gpm)= 0.0 25.0 50.0 75.0 100.0 125.0 150.0 175.0 Head (feet)= 25.00 22.50 19.50 16.00 12.00 7.50 2.50 0.00 -Loss (feet)= 0.00 0.34 1.22 2.58 4.40 6.65 9.32 12.40 =Lift (feet)= 25.00 22.16 18.28 13.42 7.60 0.85 -6.82 -12.40
#3	Primary	4,523.55'	**12.00" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.53 cfs @ 3.31 hrs HW=4,521.26' TW=0.00' (Dynamic Tailwater)
- **1=Barmesa 0.5 HP** (Pump Controls 0.26 cfs)
- **2=Barmesa 0.5 HP** (Pump Controls 0.26 cfs)
- **3=Orifice/Grate** (Controls 0.00 cfs)

Pond POND 100: pond 100

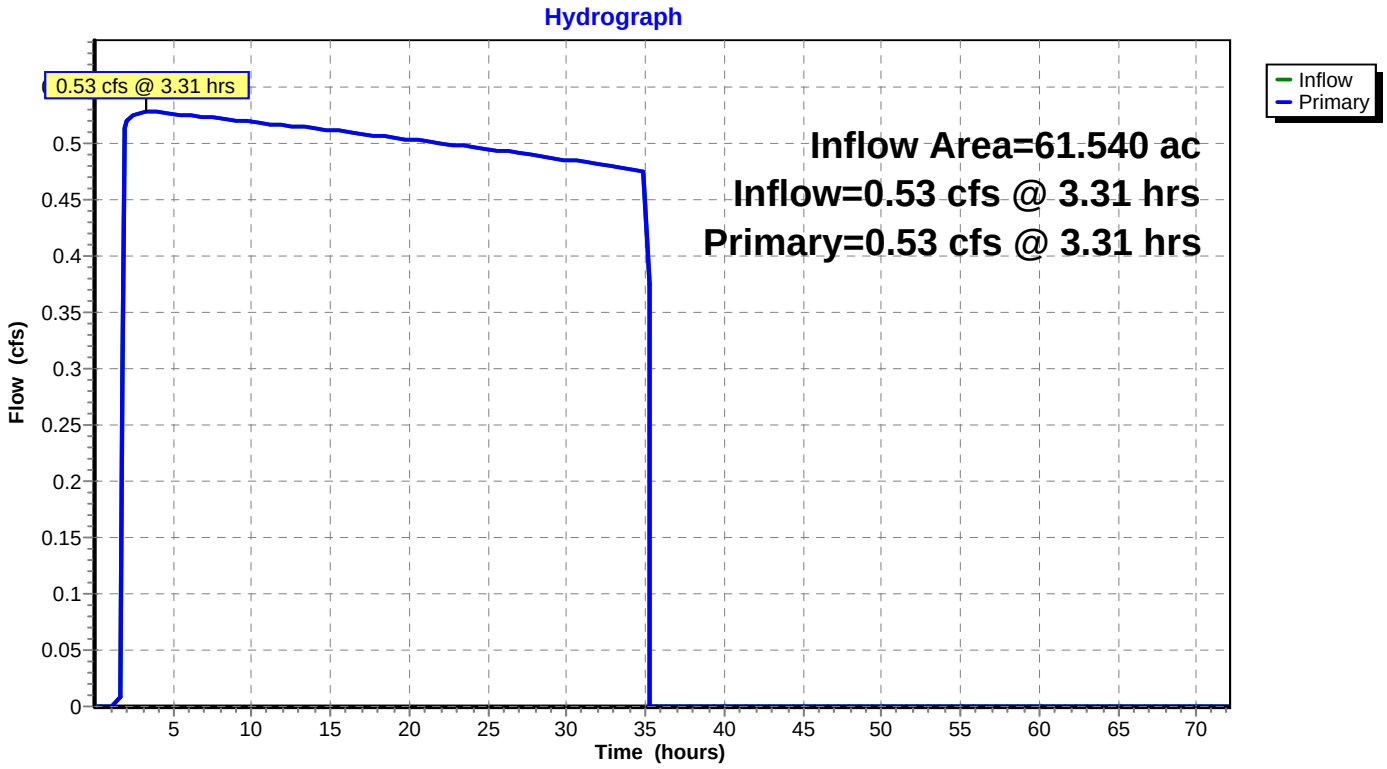


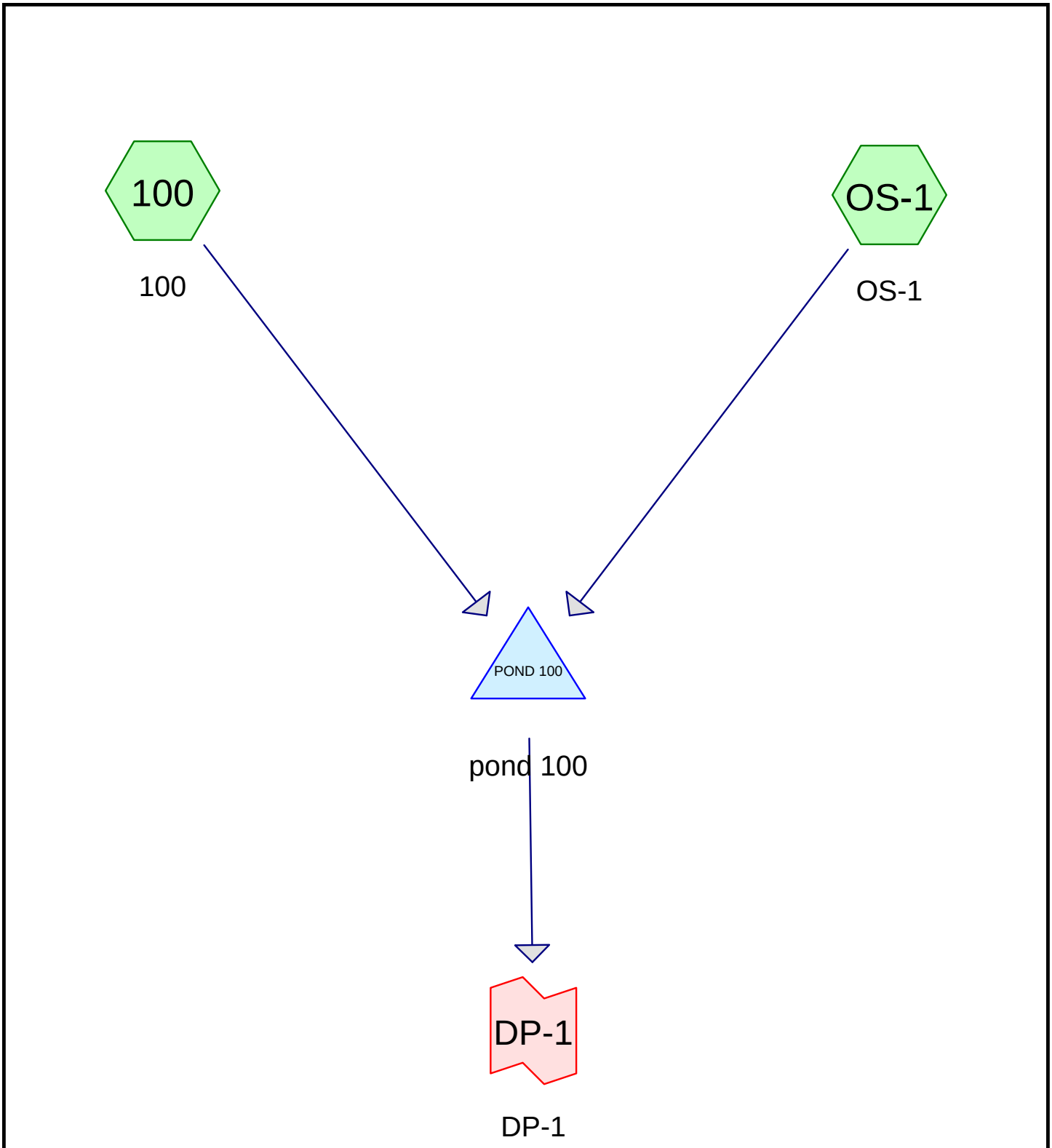
Summary for Link DP-1: DP-1

Inflow Area = 61.540 ac, 0.00% Impervious, Inflow Depth = 0.27" for 100-Year event
Inflow = 0.53 cfs @ 3.31 hrs, Volume= 1.399 af
Primary = 0.53 cfs @ 3.31 hrs, Volume= 1.399 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs

Link DP-1: DP-1





Subcat Reach Pond Link

Routing Diagram for IronWheel-PROPOSED-SmallPump-100yr-nopump
Prepared by Vortex Engineering, Inc., Printed 1/20/2022

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100: 100 Runoff Area=49.950 ac 0.00% Impervious Runoff Depth=0.31"
Tc=15.0 min CN=82 Runoff=23.43 cfs 1.305 af

Subcatchment OS-1: OS-1 Runoff Area=11.590 ac 0.00% Impervious Runoff Depth=0.13"
Tc=33.0 min CN=74 Runoff=1.86 cfs 0.124 af

Pond POND 100: pond 100 Peak Elev=4,521.40' Storage=62,222 cf Inflow=23.99 cfs 1.428 af
Outflow=0.00 cfs 0.000 af

Link DP-1: DP-1 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Summary for Subcatchment 100: 100

[73] Warning: Peak may fall outside time span

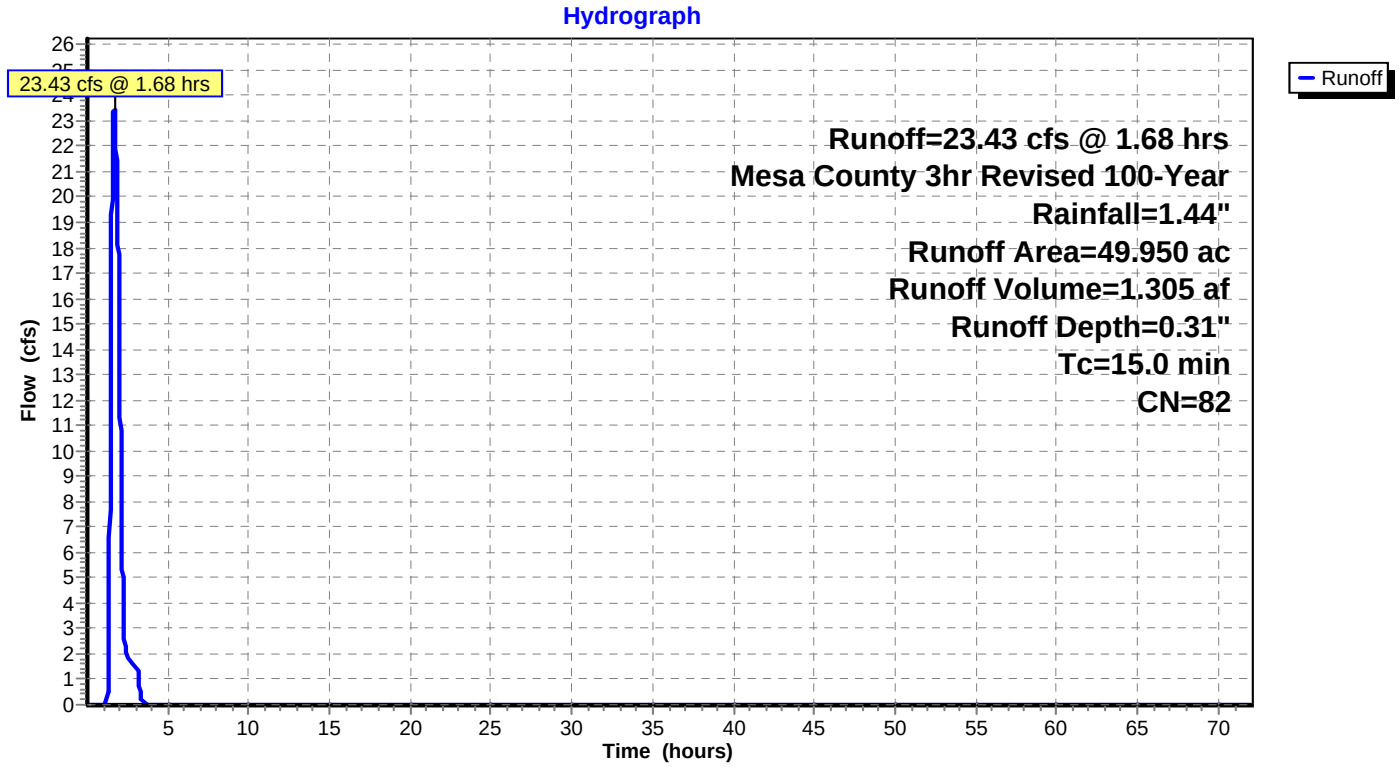
Runoff = 23.43 cfs @ 1.68 hrs, Volume= 1.305 af, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County 3hr Revised 100-Year Rainfall=1.44"

	Area (ac)	CN	Description
*	49.950	82	
	49.950		100.00% Pervious Area

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

Subcatchment 100: 100



Summary for Subcatchment OS-1: OS-1

[73] Warning: Peak may fall outside time span

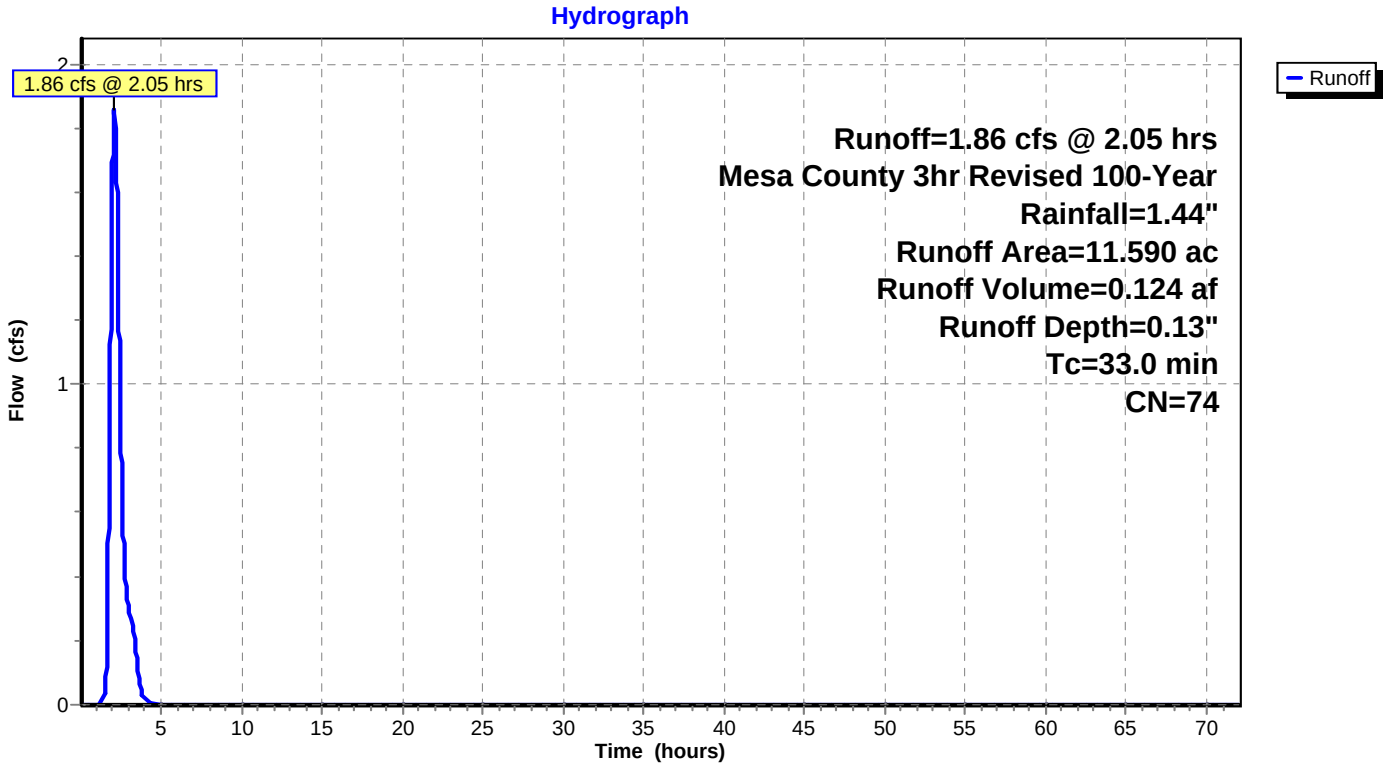
Runoff = 1.86 cfs @ 2.05 hrs, Volume= 0.124 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County 3hr Revised 100-Year Rainfall=1.44"

	Area (ac)	CN	Description
*	11.590	74	
	11.590		100.00% Pervious Area

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

Subcatchment OS-1: OS-1



Summary for Pond POND 100: pond 100

Inflow Area = 61.540 ac, 0.00% Impervious, Inflow Depth = 0.28" for 100-Year event
Inflow = 23.99 cfs @ 1.68 hrs, Volume= 1.428 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Peak Elev= 4,521.40' @ 4.85 hrs Surf.Area= 23,536 sf Storage= 62,222 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

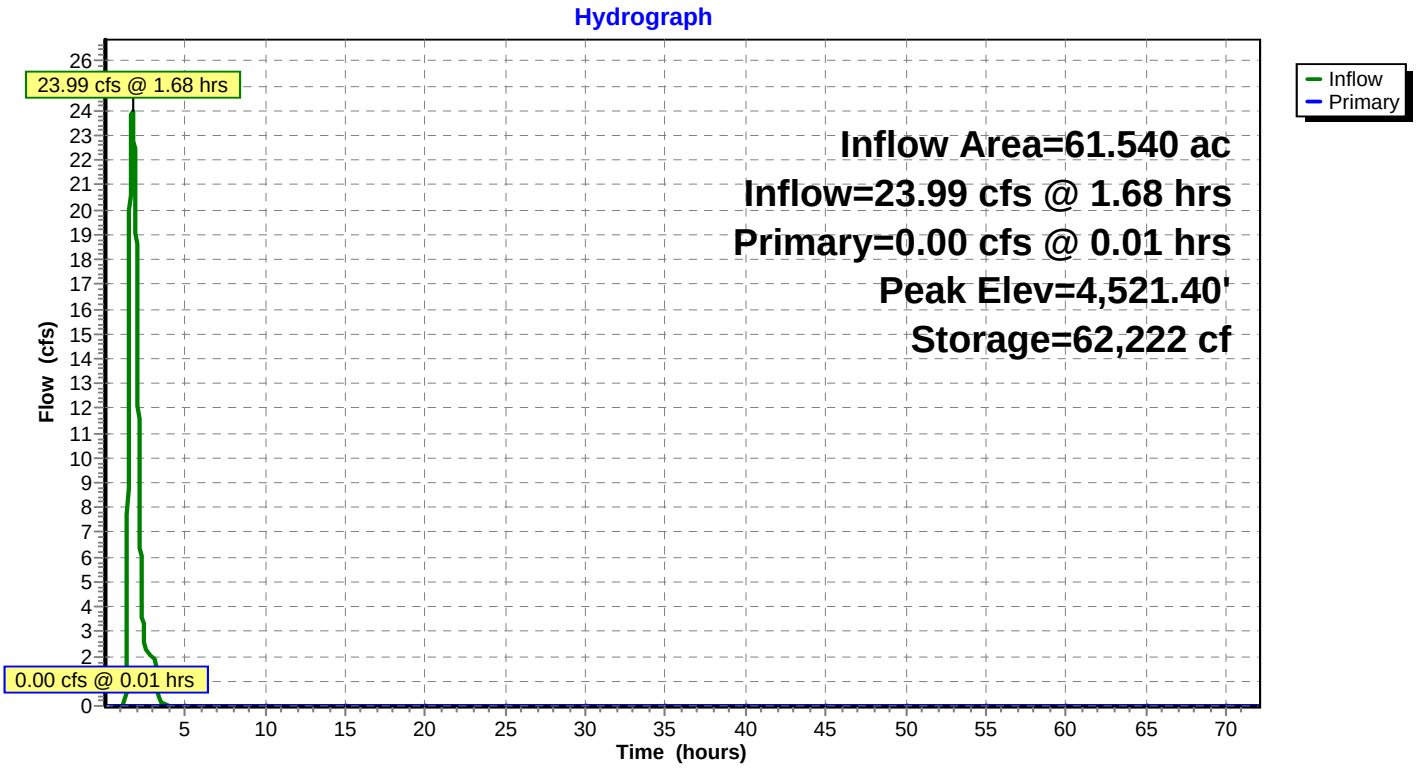
Volume	Invert	Avail.Storage	Storage Description
#1	4,517.80'	169,771 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4,517.80	0	0	0
4,518.00	12,652	1,265	1,265
4,519.00	15,520	14,086	15,351
4,520.00	18,831	17,176	32,527
4,521.00	22,183	20,507	53,034
4,522.00	25,549	23,866	76,900
4,523.00	41,215	33,382	110,282
4,524.00	77,763	59,489	169,771

Device	Routing	Invert	Outlet Devices
#1	Primary	4,523.55'	**12.00" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=4,517.80' TW=0.00' (Dynamic Tailwater)
1=Orifice/Grate (Controls 0.00 cfs)

Pond POND 100: pond 100

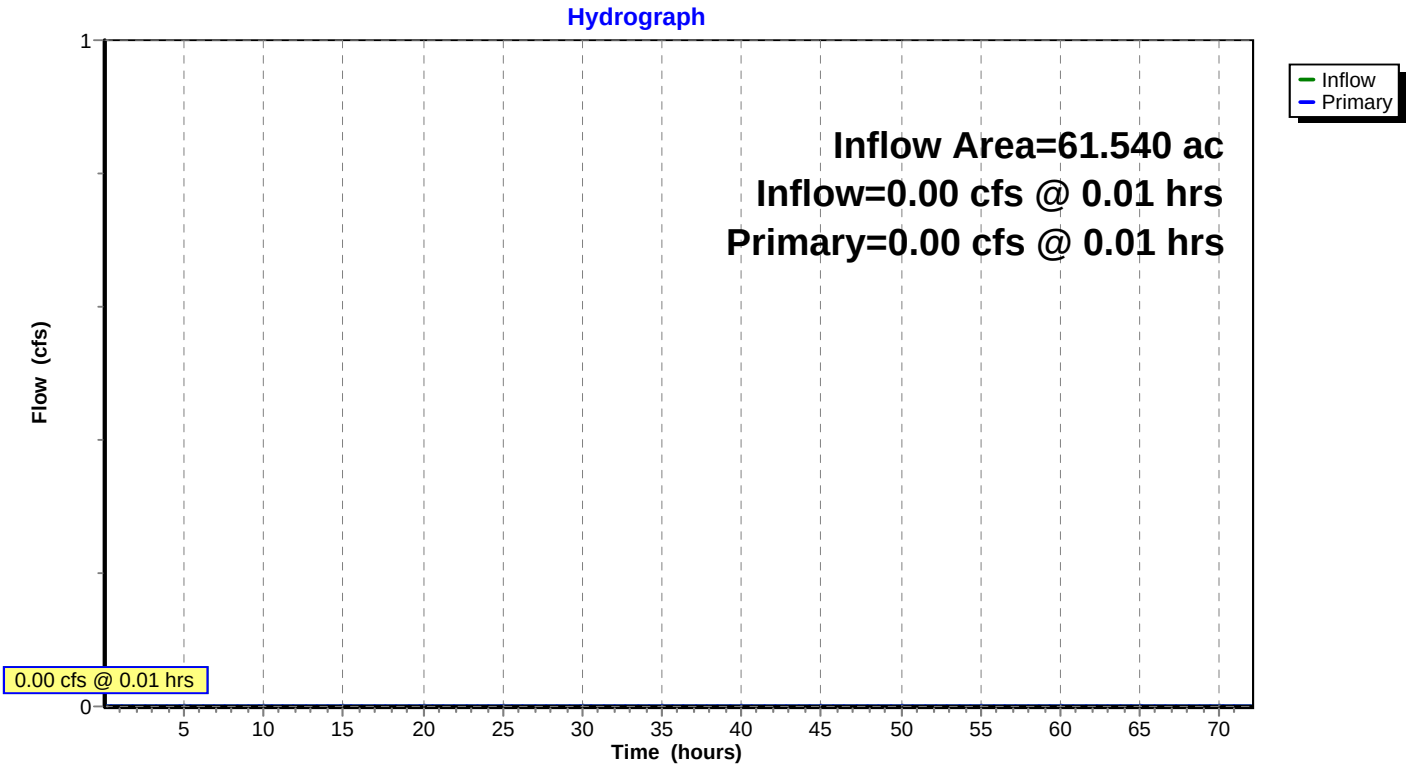


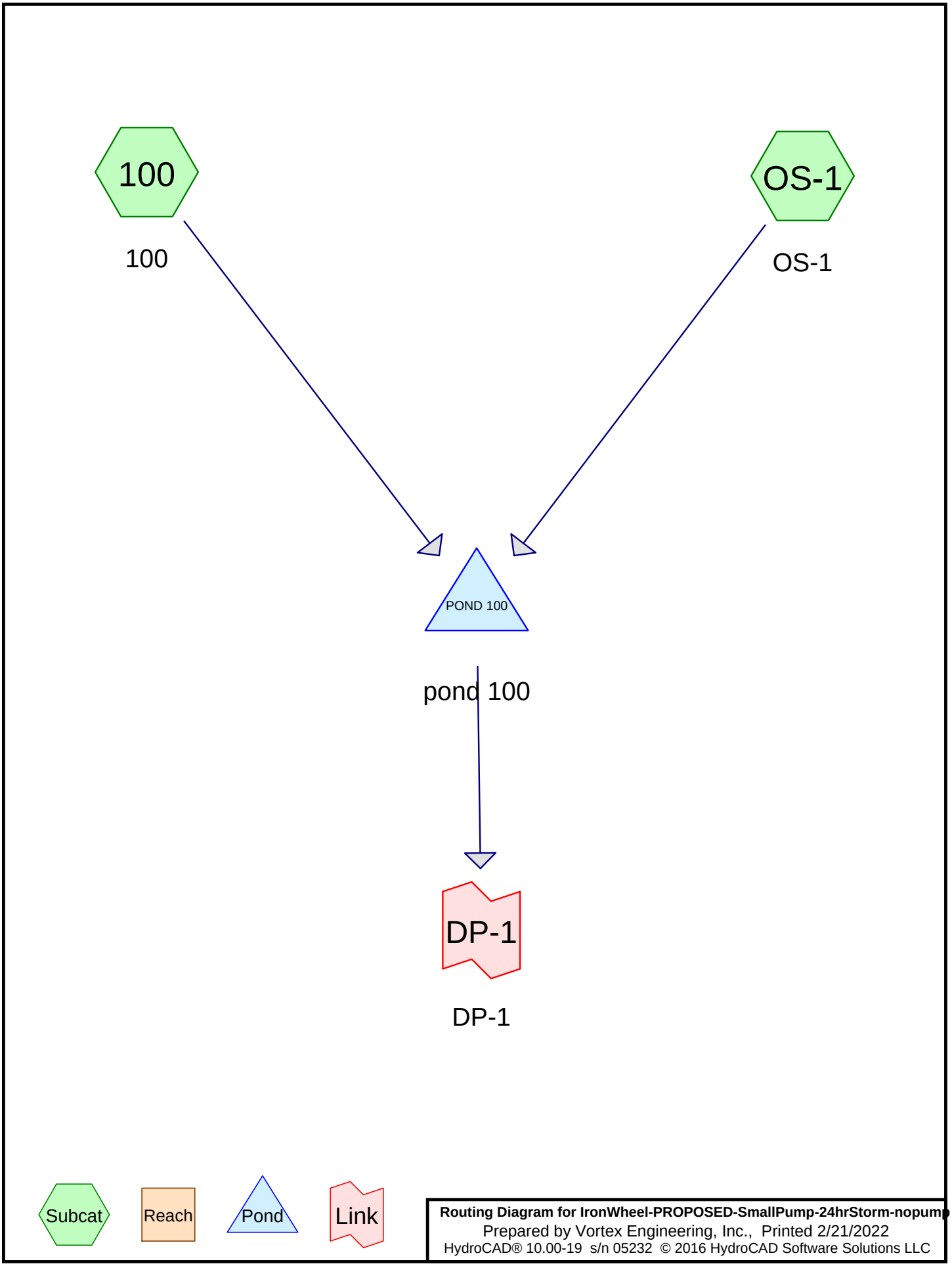
Summary for Link DP-1: DP-1

Inflow Area = 61.540 ac, 0.00% Impervious, Inflow Depth = 0.00" for 100-Year event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs

Link DP-1: DP-1





Routing Diagram for IronWheel-PROPOSED-SmallPump-24hrStorm-nopump
Prepared by Vortex Engineering, Inc., Printed 2/21/2022

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100: 100 Runoff Area=49.950 ac 0.00% Impervious Runoff Depth=0.16"
Tc=15.0 min CN=82 Runoff=7.14 cfs 0.671 af

Subcatchment OS-1: OS-1 Runoff Area=11.590 ac 0.00% Impervious Runoff Depth=0.04"
Tc=33.0 min CN=74 Runoff=0.08 cfs 0.043 af

Pond POND 100: pond 100 Peak Elev=4,519.92' Storage=31,099 cf Inflow=7.14 cfs 0.714 af
Outflow=0.00 cfs 0.000 af

Link DP-1: DP-1 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Summary for Subcatchment 100: 100

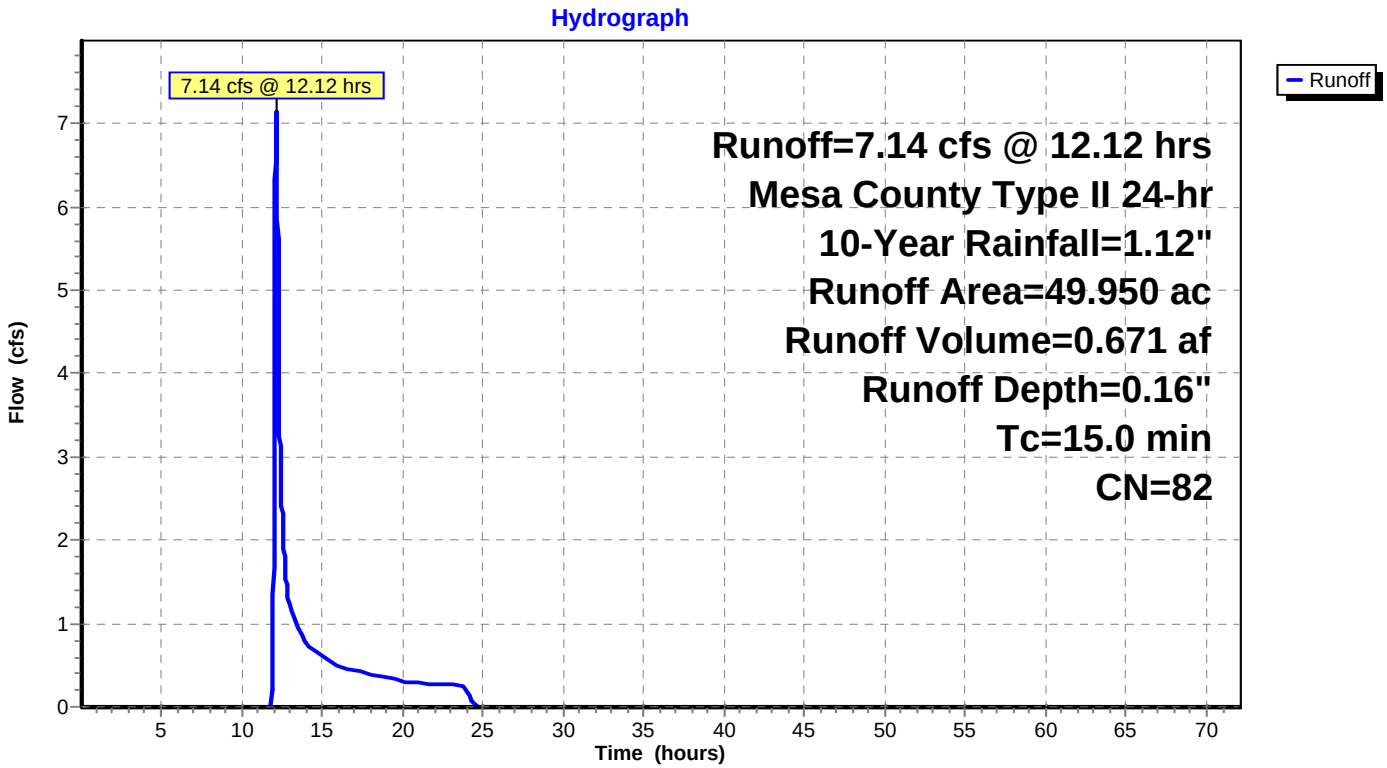
Runoff = 7.14 cfs @ 12.12 hrs, Volume= 0.671 af, Depth= 0.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County Type II 24-hr 10-Year Rainfall=1.12"

	Area (ac)	CN	Description
*	49.950	82	
	49.950		100.00% Pervious Area

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

Subcatchment 100: 100



Summary for Subcatchment OS-1: OS-1

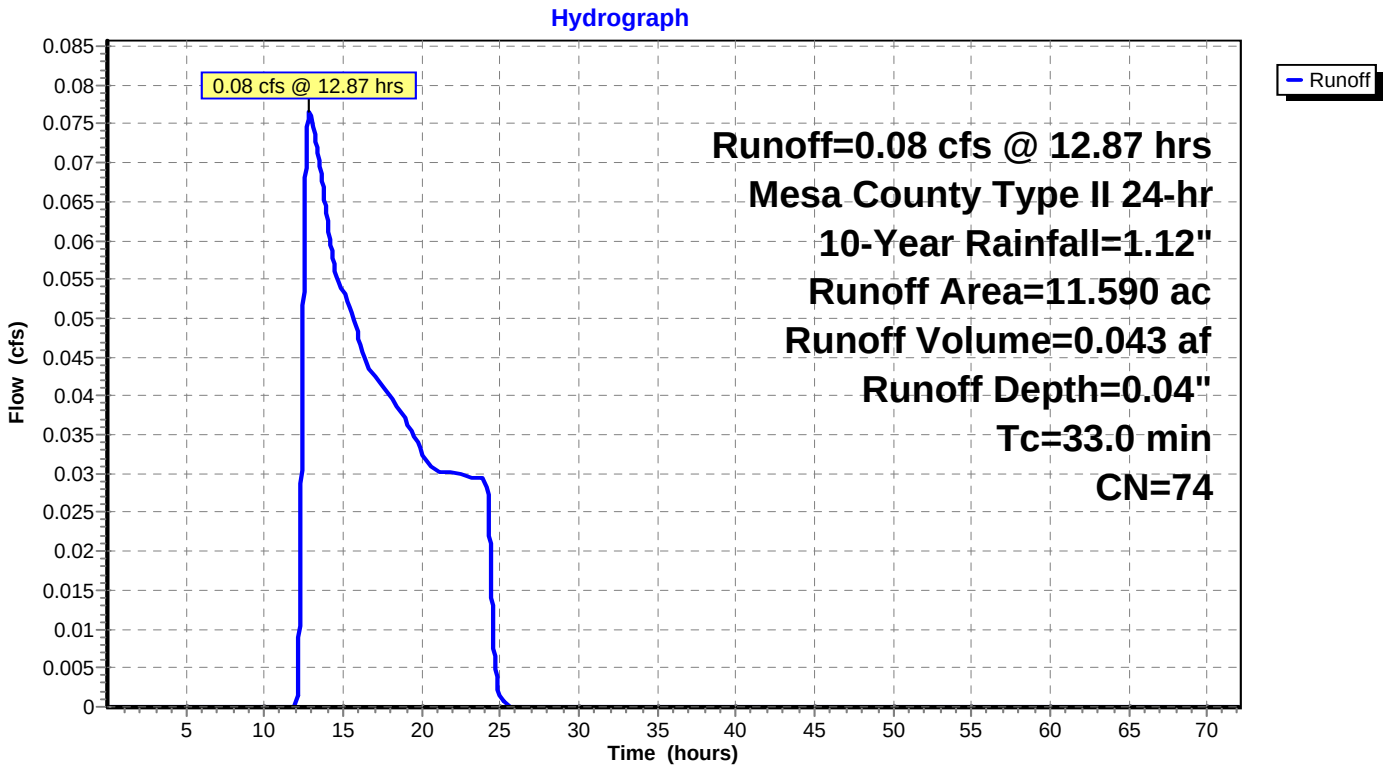
Runoff = 0.08 cfs @ 12.87 hrs, Volume= 0.043 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County Type II 24-hr 10-Year Rainfall=1.12"

	Area (ac)	CN	Description
*	11.590	74	
	11.590		100.00% Pervious Area

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

Subcatchment OS-1: OS-1



Summary for Pond POND 100: pond 100

Inflow Area = 61.540 ac, 0.00% Impervious, Inflow Depth = 0.14" for 10-Year event
Inflow = 7.14 cfs @ 12.12 hrs, Volume= 0.714 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Peak Elev= 4,519.92' @ 25.90 hrs Surf.Area= 18,578 sf Storage= 31,099 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

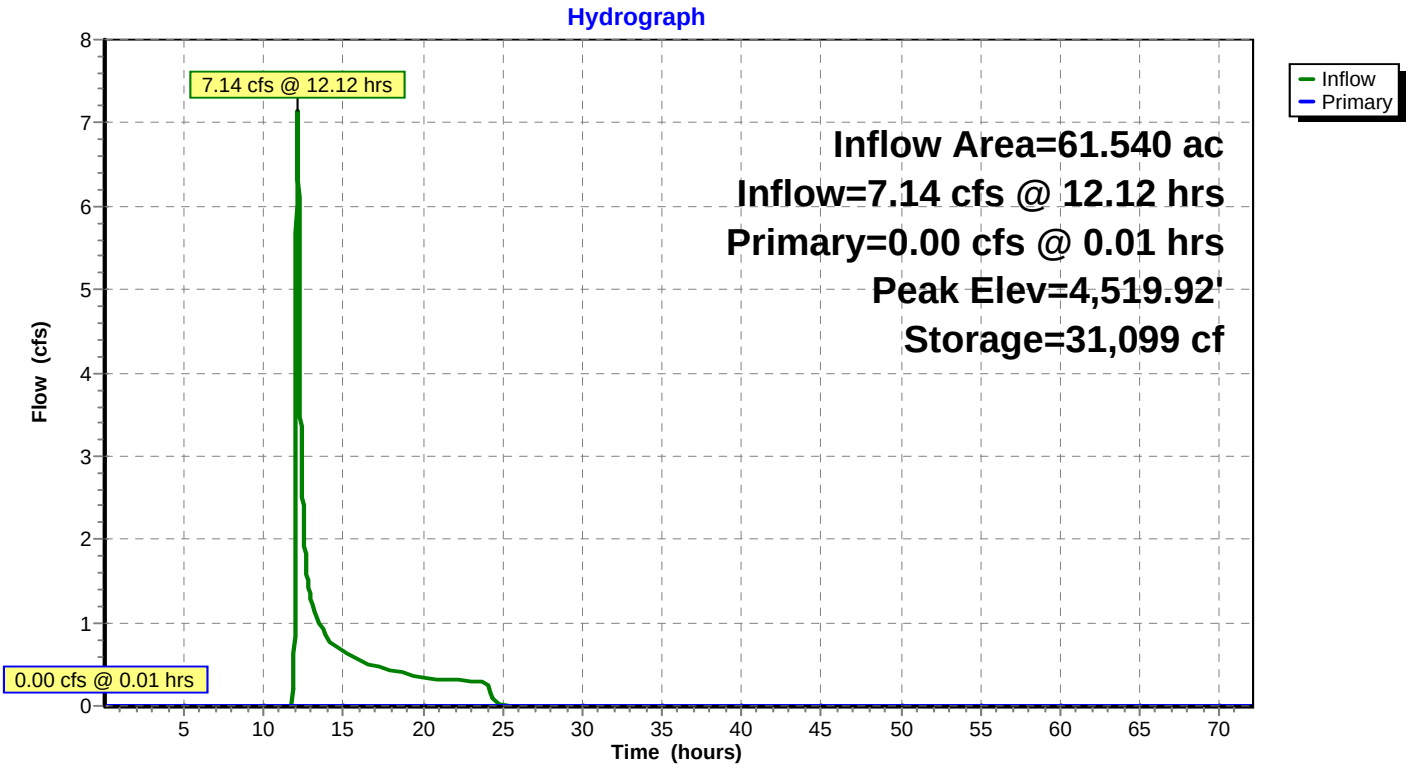
Volume	Invert	Avail.Storage	Storage Description
#1	4,517.80'	169,771 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4,517.80	0	0	0
4,518.00	12,652	1,265	1,265
4,519.00	15,520	14,086	15,351
4,520.00	18,831	17,176	32,527
4,521.00	22,183	20,507	53,034
4,522.00	25,549	23,866	76,900
4,523.00	41,215	33,382	110,282
4,524.00	77,763	59,489	169,771

Device	Routing	Invert	Outlet Devices
#1	Primary	4,523.00'	**12.00" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=4,517.80' TW=0.00' (Dynamic Tailwater)
1=Orifice/Grate (Controls 0.00 cfs)

Pond POND 100: pond 100

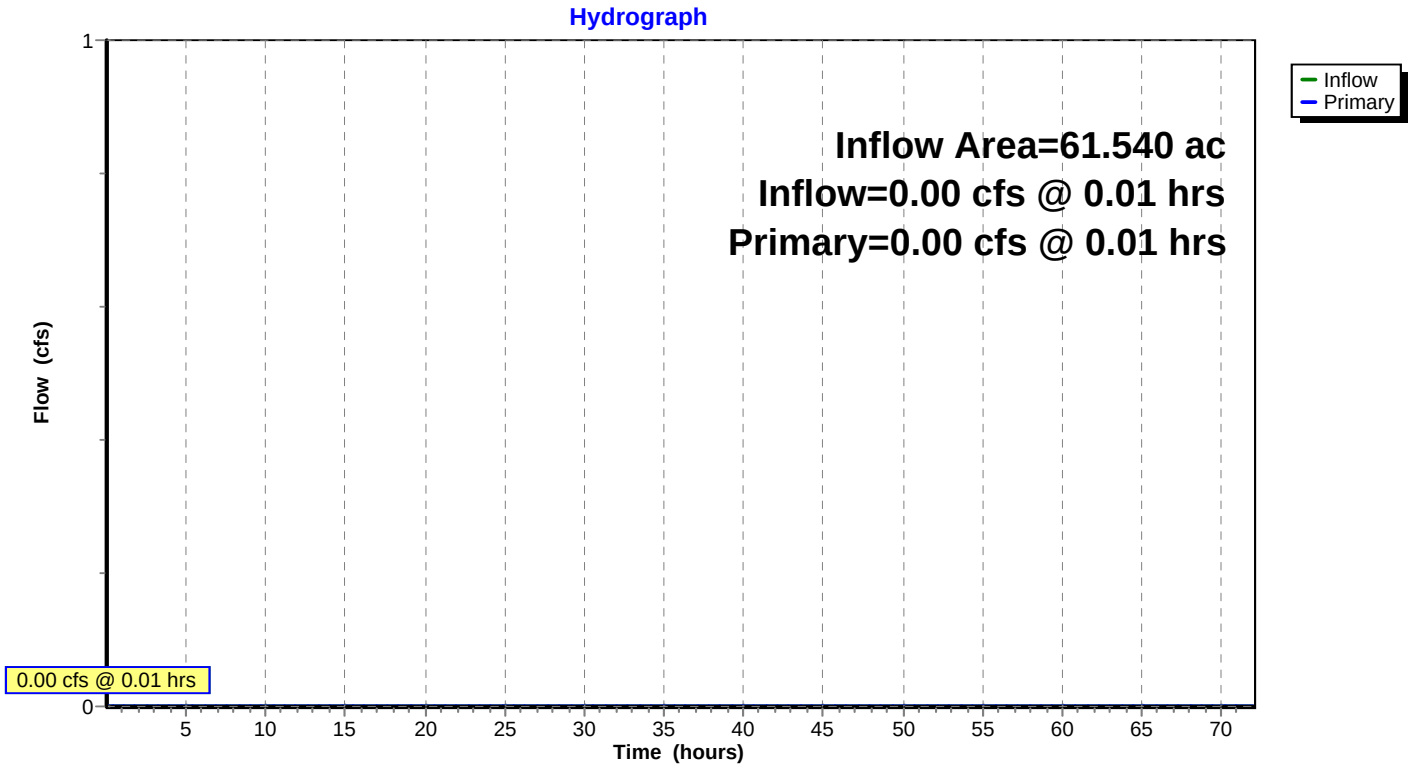


Summary for Link DP-1: DP-1

Inflow Area = 61.540 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs

Link DP-1: DP-1



Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100: 100 Runoff Area=49.950 ac 0.00% Impervious Runoff Depth=0.66"
Tc=15.0 min CN=82 Runoff=38.53 cfs 2.728 af

Subcatchment OS-1: OS-1 Runoff Area=11.590 ac 0.00% Impervious Runoff Depth=0.35"
Tc=33.0 min CN=74 Runoff=2.44 cfs 0.342 af

Pond POND 100: pond 100 Peak Elev=4,523.36' Storage=127,526 cf Inflow=39.44 cfs 3.070 af
Outflow=0.52 cfs 0.488 af

Link DP-1: DP-1 Inflow=0.52 cfs 0.488 af
Primary=0.52 cfs 0.488 af

Summary for Subcatchment 100: 100

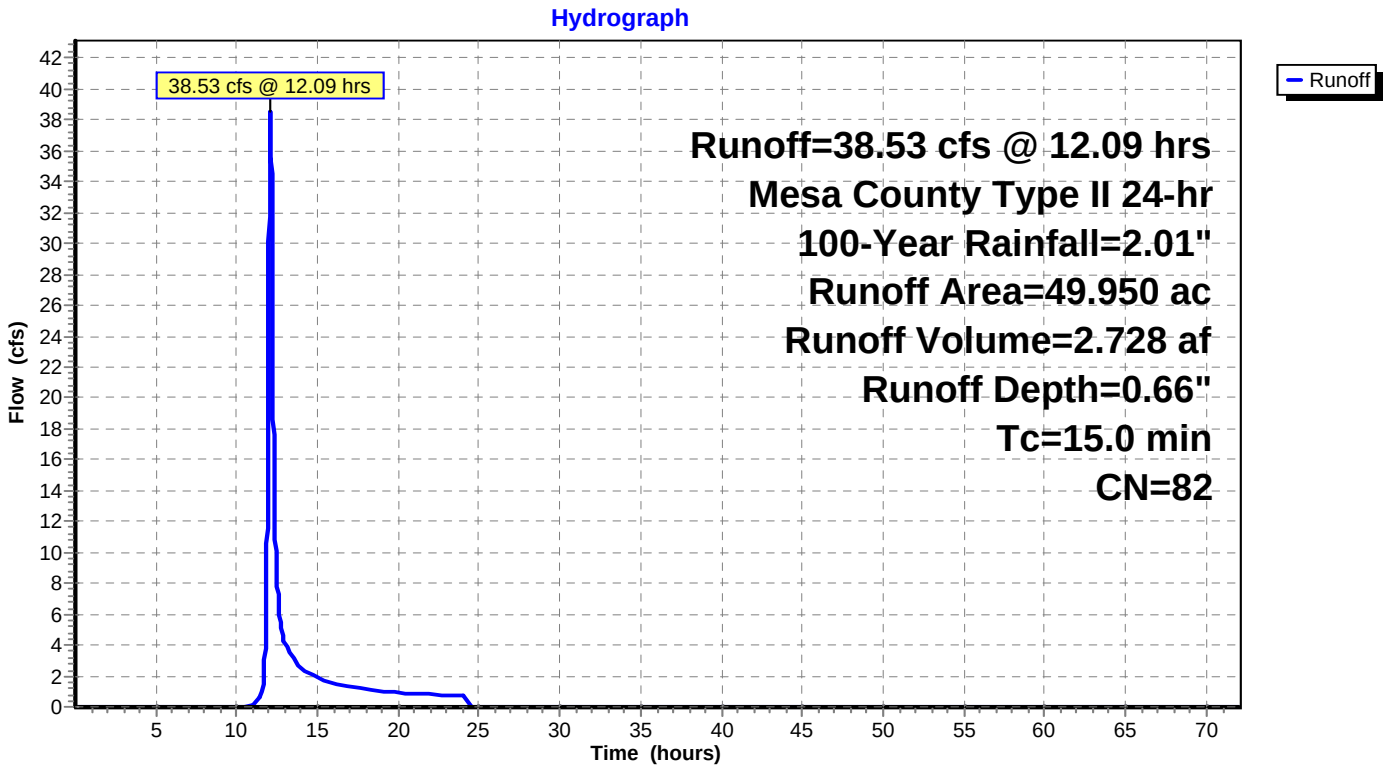
Runoff = 38.53 cfs @ 12.09 hrs, Volume= 2.728 af, Depth= 0.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County Type II 24-hr 100-Year Rainfall=2.01"

	Area (ac)	CN	Description
*	49.950	82	
	49.950		100.00% Pervious Area

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

Subcatchment 100: 100



Summary for Subcatchment OS-1: OS-1

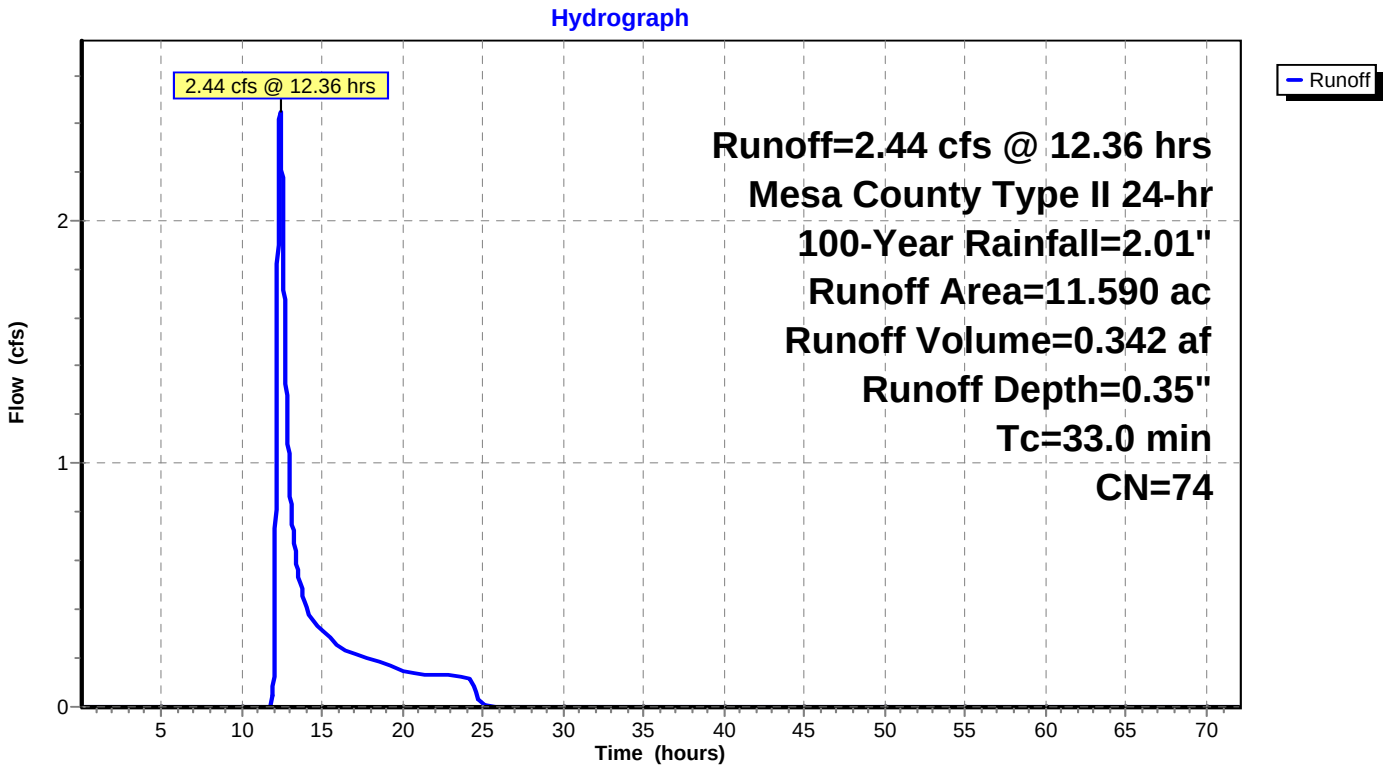
Runoff = 2.44 cfs @ 12.36 hrs, Volume= 0.342 af, Depth= 0.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Mesa County Type II 24-hr 100-Year Rainfall=2.01"

	Area (ac)	CN	Description
*	11.590	74	
	11.590		100.00% Pervious Area

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

Subcatchment OS-1: OS-1



Summary for Pond POND 100: pond 100

Inflow Area = 61.540 ac, 0.00% Impervious, Inflow Depth = 0.60" for 100-Year event
Inflow = 39.44 cfs @ 12.09 hrs, Volume= 3.070 af
Outflow = 0.52 cfs @ 24.20 hrs, Volume= 0.488 af, Atten= 99%, Lag= 726.3 min
Primary = 0.52 cfs @ 24.20 hrs, Volume= 0.488 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Peak Elev= 4,523.36' @ 24.20 hrs Surf.Area= 54,398 sf Storage= 127,526 cf

Plug-Flow detention time= 1,150.3 min calculated for 0.488 af (16% of inflow)
Center-of-Mass det. time= 992.8 min (1,865.8 - 873.0)

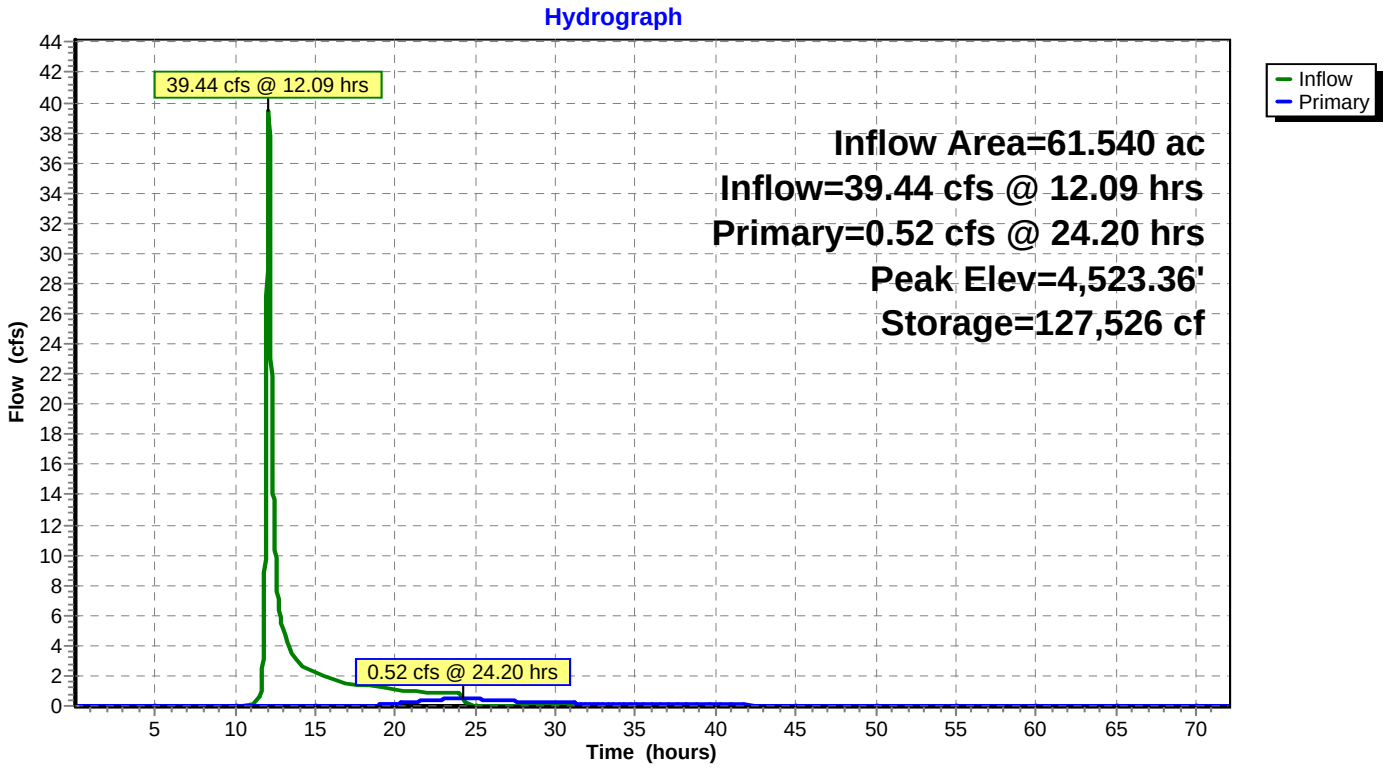
Volume	Invert	Avail.Storage	Storage Description
#1	4,517.80'	169,771 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4,517.80	0	0	0
4,518.00	12,652	1,265	1,265
4,519.00	15,520	14,086	15,351
4,520.00	18,831	17,176	32,527
4,521.00	22,183	20,507	53,034
4,522.00	25,549	23,866	76,900
4,523.00	41,215	33,382	110,282
4,524.00	77,763	59,489	169,771

Device	Routing	Invert	Outlet Devices
#1	Primary	4,523.00'	**12.00" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.52 cfs @ 24.20 hrs HW=4,523.36' TW=0.00' (Dynamic Tailwater)
└**1=Orifice/Grate** (Orifice Controls 0.52 cfs @ 2.04 fps)

Pond POND 100: pond 100

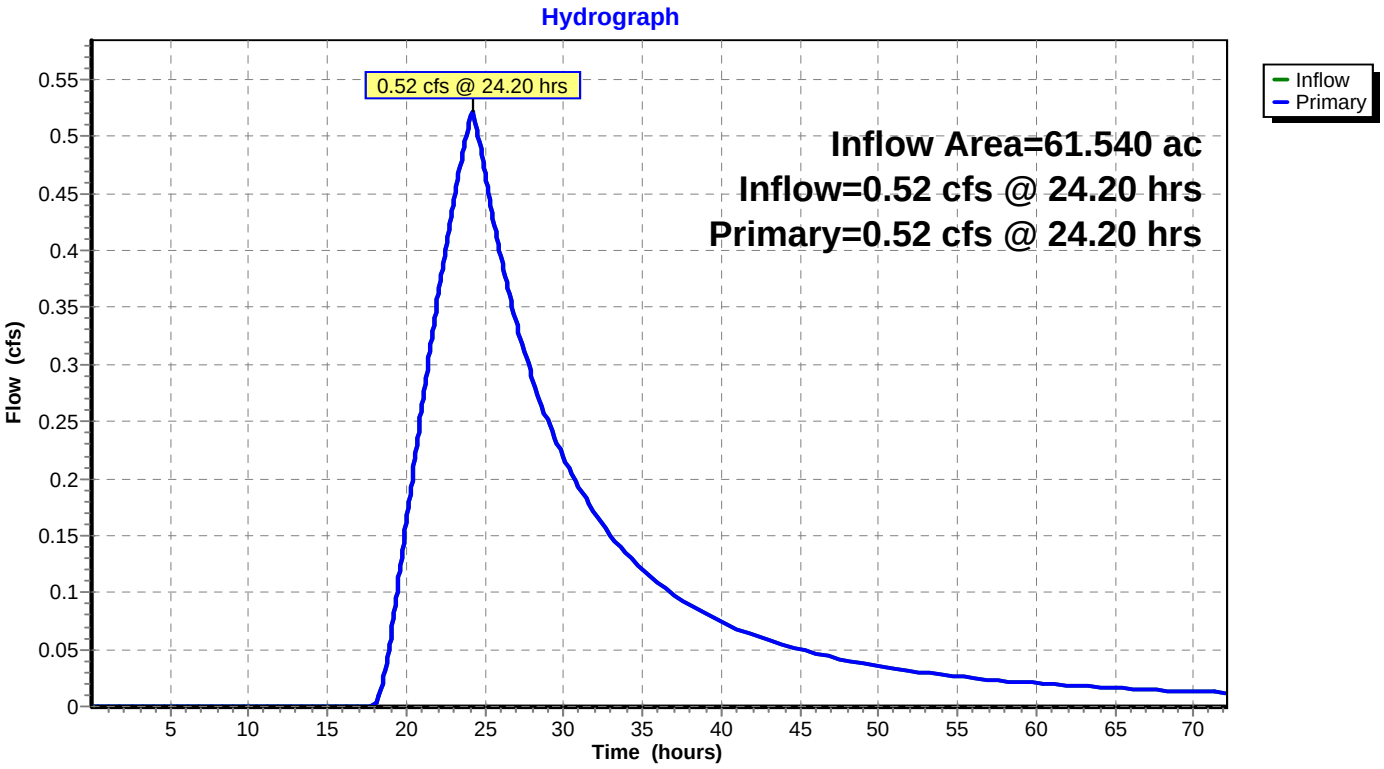


Summary for Link DP-1: DP-1

Inflow Area = 61.540 ac, 0.00% Impervious, Inflow Depth > 0.10" for 100-Year event
Inflow = 0.52 cfs @ 24.20 hrs, Volume= 0.488 af
Primary = 0.52 cfs @ 24.20 hrs, Volume= 0.488 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs

Link DP-1: DP-1



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Feb 21 2022

Iron Wheel Pond 100 outlet pipe

Circular

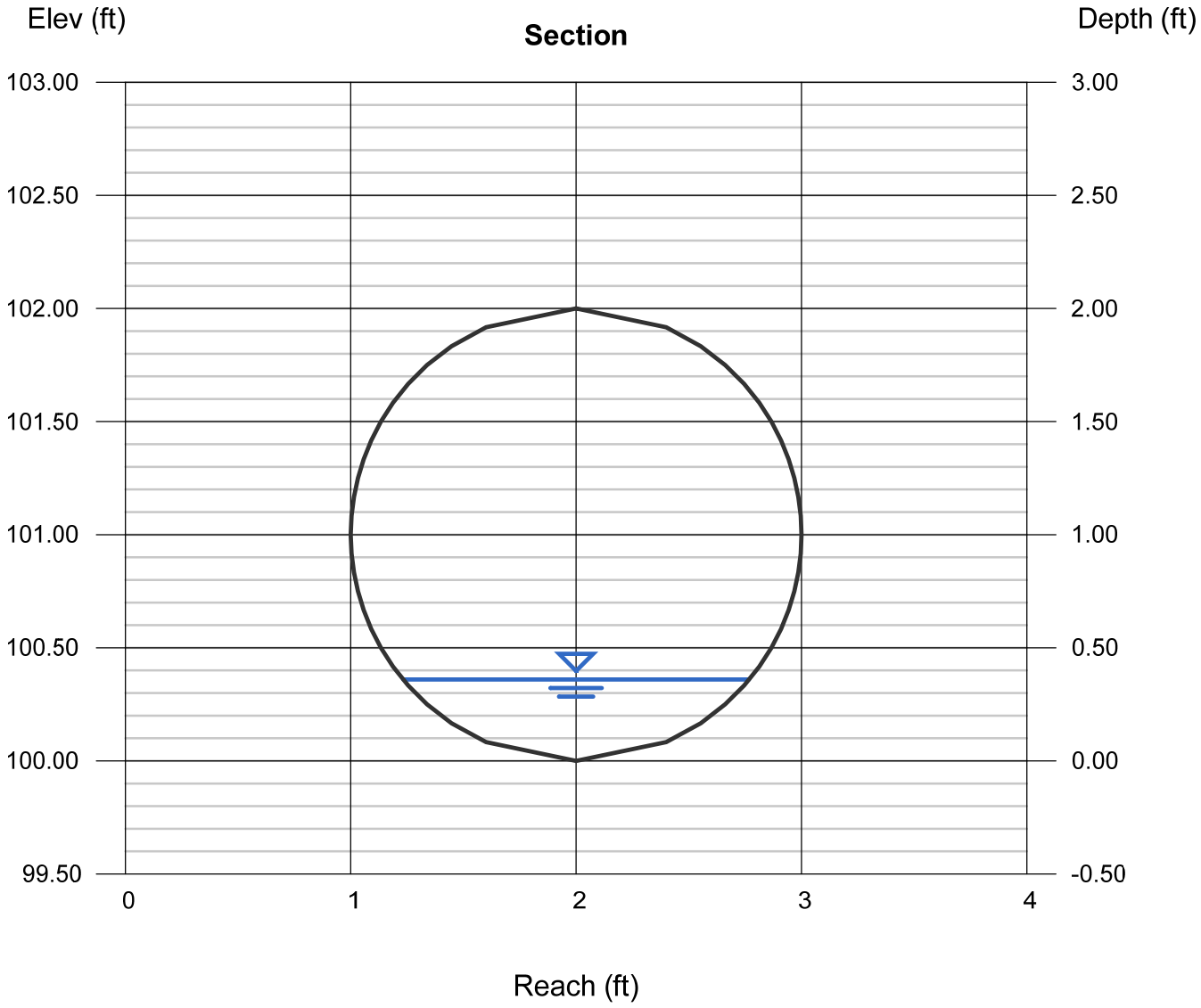
Diameter (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.15
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.72

Highlighted

Depth (ft)	= 0.36
Q (cfs)	= 0.720
Area (sqft)	= 0.39
Velocity (ft/s)	= 1.85
Wetted Perim (ft)	= 1.76
Crit Depth, Yc (ft)	= 0.29
Top Width (ft)	= 1.54
EGL (ft)	= 0.41



Barmesa® Pumps

SUBMERSIBLE SOLIDS HANDLING PUMP

Series: 2BSE411 & 2BSE511
0.4 & 0.5 HP / 1750 RPM
Discharge: 2"
Spherical solids handling: 2"

DISCHARGE
2" NPT, female, vertical.

LIQUID TEMPERATURE
104 °F (40 °C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: open, double vane.
Material: cast iron ASTM A-48 class 30, dynamically balanced, ISO G6.3.

SHAFT
416 series stainless steel.

O-RINGS
Square shaped Buna-N.

PAINT
Air dry enamel, water based.

SEAL
Design: single, mechanical, oil filled chamber.
Material: silicon carbide, Buna-N elastomer and stainless steel hardware.

HARDWARE
300 series stainless steel.

CORD ENTRY
30 ft of neoprene cord SJTOW 14/3, sealed against moisture.

BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

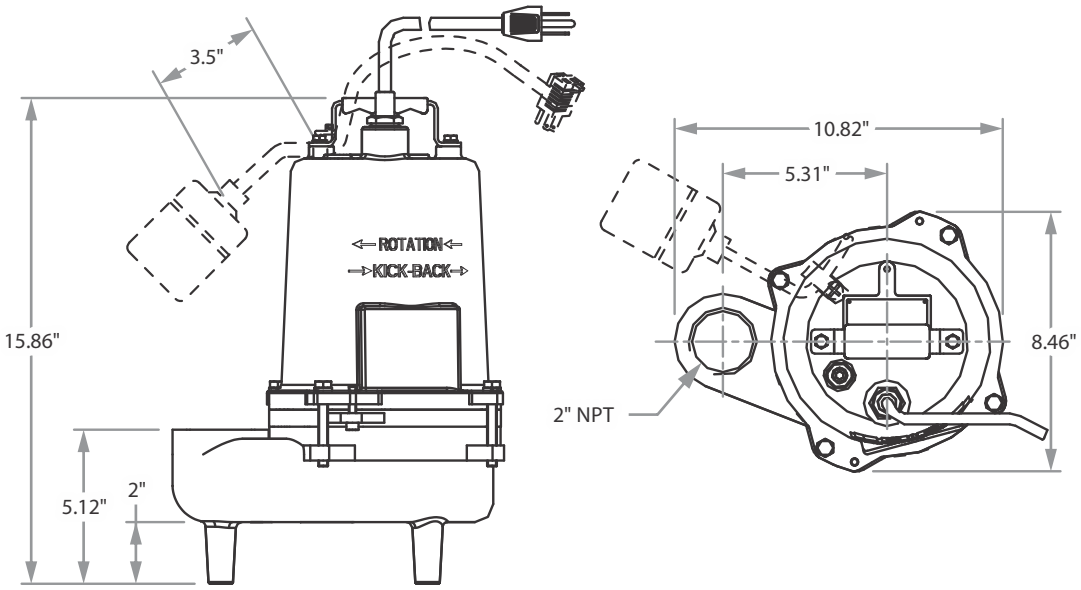
MOTOR
NEMA L, single phase, permanent split capacitor, 115 & 230 volts, 60 Hz, 1750 RPM, oil filled, with overload protection in motor.

PUMP OPERATION
Manual or automatic float switch.

OPTIONAL EQUIPMENT
Slide rail coupling (SRC-2).

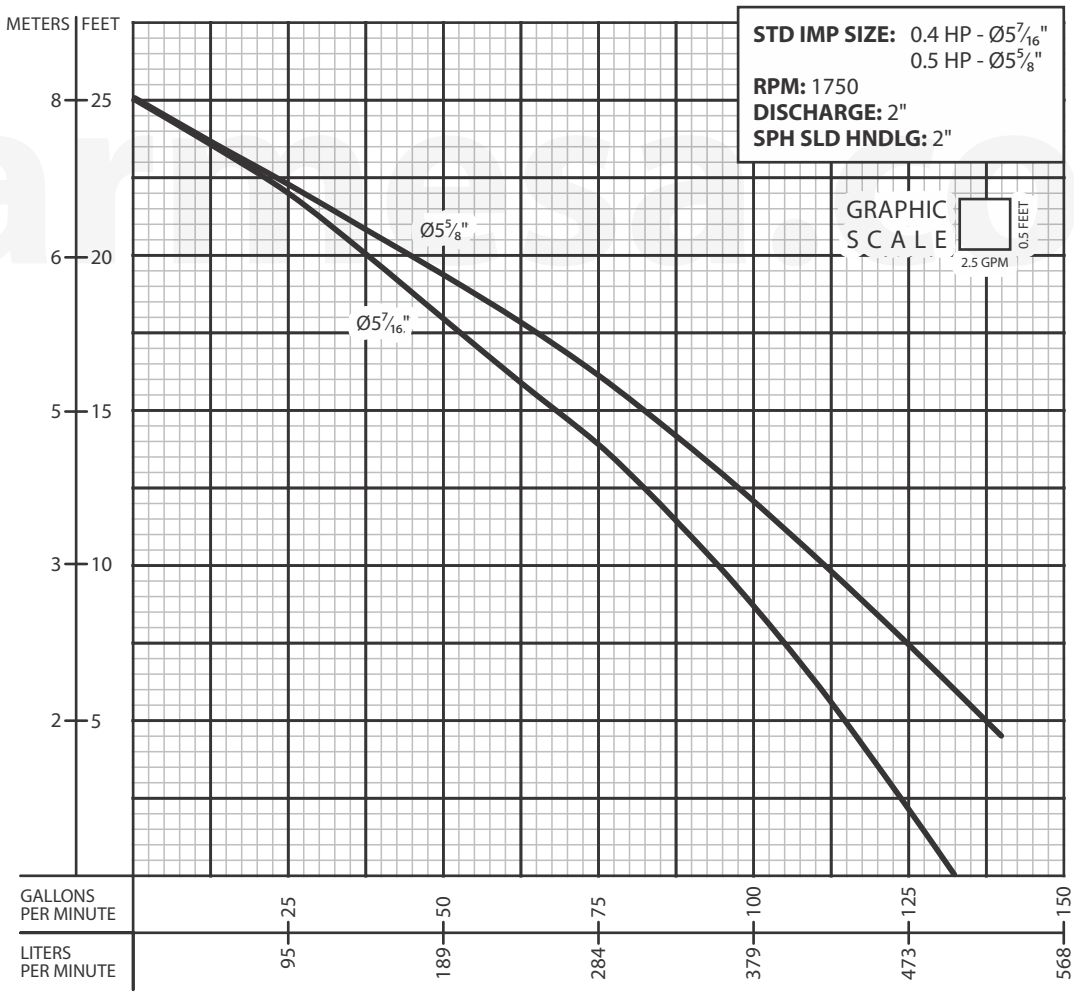
SPECIFICATIONS

SPECIFICATIONS



MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	CORD SIZE	CORD TYPE	WEIGHT (pounds)
2BSE411	62180401	0.4	115	1	1750	12	22.5	14/3	SJTOW	53
2BSE411A	62180402	0.4	115	1	1750	12	22.5	14/3	SJTOW	55
2BSE421	62180403	0.4	230	1	1750	6.1	9.3	14/3	SJTOW	53
2BSE511A	62180404	0.5	115	1	1750	12	22.5	14/3	SJTOW	55

A = Automatic Float Switch.



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

Appendix D
FEMA FIRM Maps

MAP SCALE 1" = 500'

250 0 500 1000 FEET

METE

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0439F

FIRM

FLOOD INSURANCE RATE MAP
MESA COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 439 OF 1725

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FRUITA, CITY OF	080194	0439	F
MESA COUNTY	080115	0439	F

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

MAP NUMBER
08077C0439F

EFFECTIVE DATE
JULY 6, 2010

Federal Emergency Management Agency

Appendix E
Drainage report and Drainage Map Checklist

Table 302
Stormwater Management Manual
Drainage Report Checklist

IRON WHEEL

Instructions:
1. Applicant to identify with a "check-mark" if information is provided with report. If applicant believes information is not required, indicate with "n/a" and attach separate sheet with explanation
2. The reviewer will determine if information labeled "n/a" is required and whether information must be submitted.
3. Those items noted with an "asterisk" are not typically required for conceptual/ preliminary report. Applicant shall confirm this with local jurisdiction.
4. Submit three (3) copies of report and include copy of check list bound with report.

TITLE PAGE

A. Type of report (Conceptual/Preliminary or Final Drainage Report).
B. Project Name.
C. Preparer name, firm, address, number, and date.
D. Professional Engineer's seal of preparer.
E. Certifications (see SWMM Section 303.1)

I. INTRODUCTION

A. Background
- X 1. Identify report preparer and purpose.
- X 2. Identify date of letter with previous County comments.

B. Project Location
- X 1. Identify Township, Range, and Section.
- X 2. Identify adjacent street and subdivision names.
- X 3. Reference to General Location Map.

C. Property Description
- X 1. Identify area in acres of entire contiguous ownership.
- X 2. Describe existing ground cover, vegetation, soils, topography and slopes.
- X 3. Describe existing drainage facilities, such as channels, detention areas, or structures.
- X 4. Describe existing irrigation facilities, such as ditches, head-gates, or diversions.
- X 5. Identify proposed types of land use and encumbrances.

D. Previous Investigations
- X 1. Identify drainage master plans that include the project area, including floodplain studies.
- X 2. Identify drainage reports for adjacent development.

II. DRAINAGE SYSTEM DESCRIPTION

A. Existing Drainage Conditions
- X 1. Describe existing topography and provide map with contours extending a minimum of 100 feet beyond property limits.
- X 2. Identify major drainageway or outfall drainageway and describe map showing location of proposed development within the drainageways.
- X 3. Identify pre-developed drainage patterns and describe map showing pre-developed sub-basins and concentrated discharge locations. Provide calculations of pre-developed peak flows entering and leaving the site.

B. Master Drainage Plan
- X 1. Describe location of the project relative to a previously prepared master drainage plan, including drainage plans prepared for adjacent development.

C. Offsite Tributary Area

1. Identify all offsite drainage basins that are tributary to the project.
2. Identify assumptions regarding existing and future land use and effects of offsite detention on peak flows.

D. Proposed Drainage System Description

1. Identify how offisite stormwater is collected and conveyed through the site and ultimately to the receiving water(s).
2. Identify sub-basins and describe, in general terms, how onsite stormwater is collected and conveyed through the site for each location where stormwater is discharged from the site.
3. Describe detention volumes, release rates and pool elevations.
4. Identify the difference in elevation between pond invert and the groundwater table.
5. Describe how stormwater is discharged from the site, including both concentrated and dispersed discharges and rates.
6. Describe stormwater quality facilities.
7. Describe maintenance access aspects of design.
8. Describe easements and tracts for drainage purposes, including limitation on use.

E. Drainage Facility Maintenance

1. Identify responsible parties for maintenance of each drainage and water quality facility.
2. Identify general maintenance activities and schedules.

III. DRAINAGE ANALYSIS AND DESIGN CRITERIA

A. Regulations

1. Identify that analysis and design was prepared in accordance with the provisions of the Manual.
2. Identify other regulations or criteria which have been used to prepare analysis and design.

B. Development Criteria

1. Identify drainage constraints placed on the project, such as by a major drainage study, floodplain study or other drainage reports relevant to the project.
2. Identify drainage constraints placed on the project, such as from major street alignments, utilities, existing structures, and other developments.

C. Hydrologic Criteria

(If Manual was followed without deviation, then a statement to that effect is all that is required. Otherwise provide the following information where the criteria used deviates from the Manual.)

1. Identify developed storm runoff peak flows and volumes and how they were determined, including rainfall intensity or design storm.
2. Identify which storm events were used for minor and major flood analysis and design.
3. Identify how and why any other deviations from the Manual occurred.

D. Hydraulic Criteria

(If Manual was followed without deviation, then a statement to that effect is all that is required. Otherwise provide the following information where the criteria used deviates from the Manual.)

1. Identify type(s) of streets within and adjacent to development and source for allowable street capacity.
2. Identify which type(s) of storm inlets were analyzed or designed and source for allowable capacity.
3. Identify which type of storm sewers which were analyzed or designed and

X * Manning's n-values used.

4. Identify which method was used to determine detention volume requirements and how allowable release rates were determined.

X * 5. Identify how the capacity of open channels and culverts were determined.

X * 6. Identify any special analysis or design requirements not contained with the Manual.

NA 7. Identify how and why any other deviations from the Manual occurred.

E. Variance from Criteria

NA 1. Identify any provisions of the Manual for which a variance is requested.

NA 2. Identify pre-existing conditions which cause the variance request.

*IV. **POST CONSTRUCTION STORMWATER MANAGEMENT. See Manual Section 1600 for requirements.**

Note: This section of the Final Drainage Report identifies additional information required by Mesa County's, City of Grand Junction's, and Town of Palisade's, Permit for Stormwater Discharges Associated with Municipal Separate Storm Sewer Systems (MS4s), permit No. COR-090000. The Final Drainage Plan and the Construction SWMP (see SWMM Section 1500) meets the requirements of the MS4s Permit. In general, this section identifies permanent BMP practices to control the discharge of pollutants after construction is complete.

*A. Stormwater Quality Control Measures

X * 1. Describe the post-construction BMPs to control discharge of pollutants from the project site.

X * 2. If compensating detention is provided, discuss practices to address water quality from area not tributary to detention area.

NA * 3. If underground detention is proposed, discuss how water quality facilities will be provided on the surface.

X 4. If proprietary BMPs are proposed, provide the justification and sizing requirements (see SWMM Section 1603.3).

*B. Calculations

X 1. Provide methods and calculations for WQCV, sediment storage, and water quality outlet structure.

V. **CONCLUSIONS**

A. Compliance with Manual

X Compliance with Manual and other approved documents, such as drainage plans and floodplain studies.

B. Design Effectiveness

X Effectiveness of drainage design to control impacts of storm runoff.

C. Areas in Flood Hazard Zone

X Meet requirements of Floodplain Regulations: Mesa County Land Development Code, Section 7.13; City of Grand Junction Zoning and Development Code, Section 7.1.

D. Variances from Manual

NA Applicant shall identify any requested variances and provide basis for approving variance. If no variances are requested, applicant shall state that none are requested.

VII. **REFERENCES**

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

TABLES

X Include copy of all tables prepared for report.

FIGURES

X A. General Location Map (See Section 303.2a)

B. Flood Plain Information
C. Drainage Plan (See Section 303.2b)
D. Other pertinent figures.

APPENDICIES

A. DESIGN CHARTS
   1. Provide copy of all design charts (i.e.: tables, figures, charts from other criteria) used for the report.

B. HYDROLOGIC CALCULATIONS (see Manual Sections 600 and 700)
   1. Land use assumptions for off-site runoff calculations.
   2. Time of concentration and runoff coefficients for pre-existing and post development conditions.
   3. Pre-developed hydrologic computations.
   4. Developed conditions hydrologic computations.

C. HYDRAULIC CALCULATIONS
   1. Capacity of existing channels, streets, storm sewers, inlets, culverts and other facilities.
   2. Calculations for existing storm sewer and open channel.
   3. Irrigation ditch flows and ditch system capacity.
   4. Detention pond design (see Manual, Section 1400 for requirements).
      a. Storage volume, release rates, and pool elevations for 10-year and 100-year storm.
      b. Outlet structure dimensions, orifice diameter, weir lengths, pipe headwater and other data.
      c. Outlet velocity and energy dissipation requirements.
      d. Routing of outlet flows and emergency spillway flows.
   5. Street capacity calculations, if data in Manual not used (see Section 1100).
   6. Storm inlet capacity calculations, if data in Manual not used (see Section 1100).
   7. Storm sewer capacity calculations, if data in Manual not used (see Section 1000).
   8. Channel capacity calculations, if data in Manual not used (see Section 800).
   9. Culvert capacity calculations (see Manual, Section 1200).
   10. Other hydraulic structure calculations (see Manual, Section 900).

D. STORMWATER QUALITY CALCULATIONS
   1. Water Quality Capture Volume (WQCV).
   2. Storage volume for sediment volume and pool elevations for WQCV.
   3. Outlet calculations for required area per row, diameter of individual holes, number of holes per row, and number of holes per column.

CERTIFICATION – PROFESSIONAL ENGINEER'S SEAL AND SIGNATURE

ACKNOWLEDGEMENTS

Drainage Report checklist was prepared by: SSM

Table 303
Stormwater Management Manual
Drainage Plan Checklist IRON WHEEL

Instructions:
1. Applicant to identify with a "check-mark" if information is provided. If applicant believes information is not required, indicate with "n/a".
2. County will determine if information labeled "n/a" is required and whether information must be submitted.

I. EXISTING FACILITIES

A. Contours at two foot intervals, based on USGS datum. Contours to extend at least 50 feet past property line.
B. Location and elevation of USGS benchmarks or benchmarks referenced to USGS.
C. Property lines.
D. Drainage easements.
E. Street names.
F. Major and minor channels and floodplains.
G. A historic drainage plan including historic basin boundaries and flow paths.

II. PROPOSED FACILITIES

A. Contours at two-foot intervals, based on USGS datum.
B. Property lines.
C. Drainage easements.
D. Street names and grades.
E. Right of way and easement.
F. Finished floor elevations for protection from major storm run-off.
G. Detention pond information:
   1. Location of each detention pond with site at 1"=50' scale or larger with 2-foot contour intervals.
   2. Inlet and outlet structure, and trickle channel design details.
   3. Details of emergency spillway and channel.
   4. Landscape information, including side slopes, vegetation and planting requirements.
   5. Details of water quality outlet structure.
H. Channel Information:
   1. Profiles with existing and proposed grades.
   2. Cross sections on 100-foot stations showing existing and proposed topography and required rights of way.
   3. Locations and size of all existing and proposed structures.
   4. Locations and profiles of adjacent utilities.
   5. Typical channel section and lining details.
I. Storm sewer information:
   1. Alignment and location of manholes, inlets, and outlet structures.
   2. Profile of invert and pipe crown.
   3. Invert elevations at manholes and inlets.
   4. Lengths and grades between manholes and inlets.
   5. Locations and elevations of utilities adjacent to and crossing storm sewer.
   6. Easement and other O&M access geometry.
   7. Outlet details, such as end sections, headwall and wingwalls, erosion control, and vegetation.
J. Street cross sections with design 100-year flood depth.
K. Other drainage related structures and facilities, including underdrains and sump pump discharge lines.
L. Other permanent BMP measures to control pollutant discharges to the County's MS4 system.

III. HYDRAULIC AND HYDROLOGIC INFORMATION

A. Routing and accumulative runoff peaks at upstream and downstream ends of the site and at various critical points onsite for initial and major storms. Inflow and outflow from each subbasin shall be shown for both initial and major storms.

B. Street cross sections showing 100-year flood levels.

C. Major and minor channels and floodplains.

D. Detention pond data:

1. Release rates for 10- and 100-year storm events.
2. Required and provided volumes for 10- and 100-year storm events.
3. Design depths for 10- and 100-year storm events.
4. Water quality capture volume and pool elevation.

E. Channel data:

1. Water surface profiles.
2. Representative 100-year flow velocity and Froude number.

F. Storm sewer data:

1. Profile of water surface for design flow rate.
2. Peak flows for design flow, 2-year and 100-year storm events.

IV. STANDARD NOTES

A. No building, structure, or fill will be placed in the detention areas and no changes or alterations affecting the hydraulic characteristics of the detention areas will be made without the approval of the County.

B. Maintenance and operation of the detention and water quality areas is the responsibility of property owner. If owner fails in this responsibility, the County has the right to enter the property, maintain the detention areas, and be reimbursed for costs incurred.

C. Detention pond volumes, all drainage appurtenances, and basin boundaries shall be verified. As-built drawings shall be prepared by a registered professional engineer prior to issuance of certificate of occupancy for any structure within the development.

D. Permission to reproduce these plans is hereby given to Mesa County for County purposes associated with plan review, approval, permitting, inspection and construction of work.

V. PROFESSIONAL ENGINEER'S SEAL AND SIGNATURE

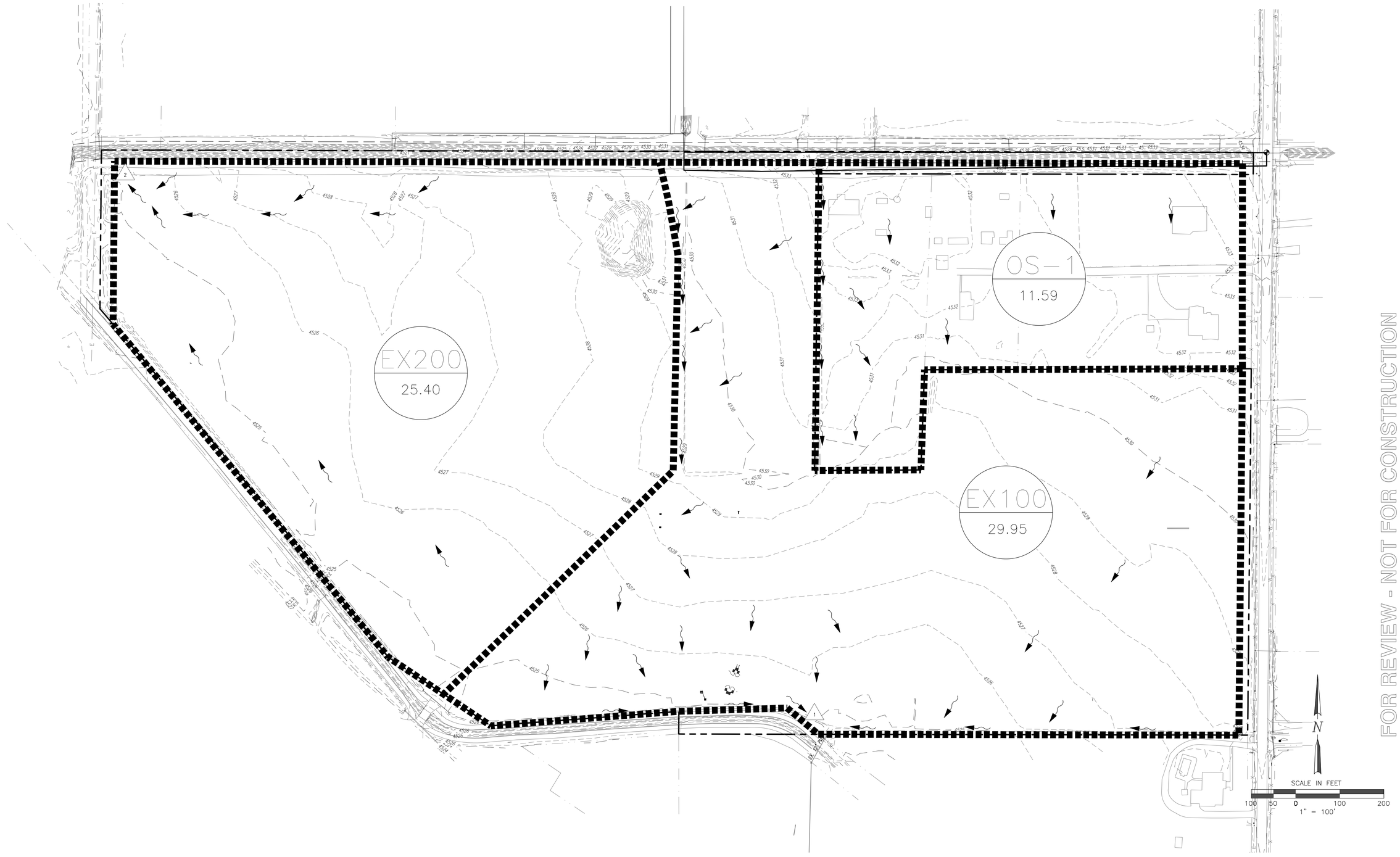
VI. OTHER

A. Horizontal and vertical control information and ties to existing and proposed features.

ACKNOWLEDGEMENTS

Drainage Plan checklist was prepared by: SSA

Appendix F
Drainage Map



FOR REVIEW - NOT FOR CONSTRUCTION

BASIN RUNOFF

BASIN	AREA (AC)	2 YEAR RUNOFF (CFS)	100 YEAR RUNOFF (CFS)
EX100	29.90	0.00	4.10
EX200	25.40	0.00	0.36
OS-1	11.59	0.00	1.19
DP-1	41.49	0.00	4.88
DP-2	25.40	0.00	0.36

VORTEX ENGINEERING, INC.
• CONSTRUCTION MANAGERS & SITE PLANNERS
• PROJECT MANAGERS
• CIVIL & CONSULTING ENGINEERS
2394 Patterson Road, Suite 201
Grand Junction, CO 81505
Phone: (970) 245-9051
Fax (970) 245-7639

James C. Atkinson
PROFESSIONAL ENGINEER
COLORADO LICENSE No. 18828

REV.	DATE	COMMENT	BY
1	12/14/18	REVISED PER CITY COMMENTS DATED 11/09/18	SSM
1	04/20/18	REVISED PER CITY COMMENTS DATED 04/05/18	SSM

Drainage Map - Existing Conditions

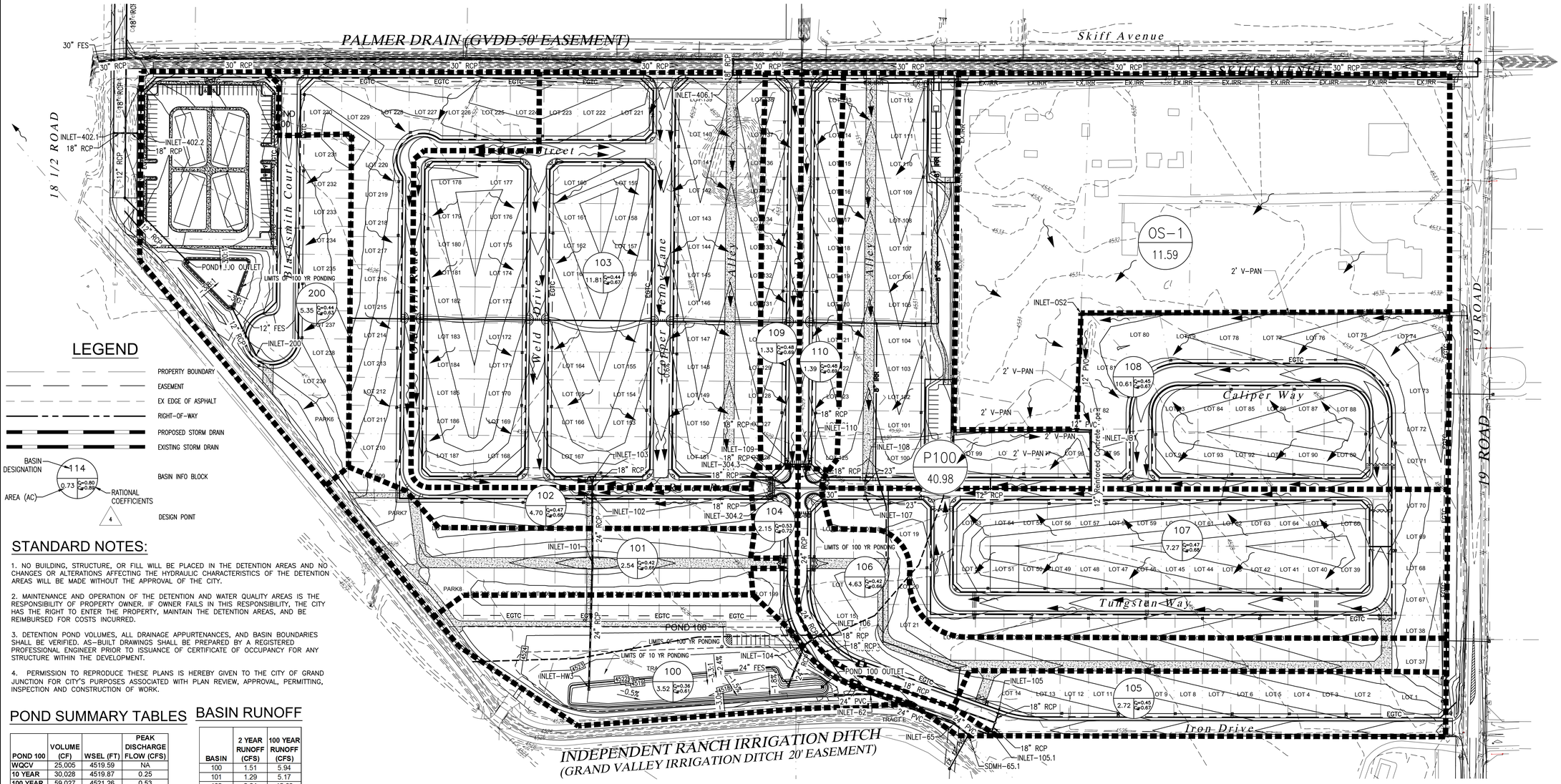
Iron Wheel Subdivision

-

953 19 Road
Fruita, Colorado

PROJECT NO: F10-053
DATE: 02/07/17
SCALE: see plan
CAD ID: ironwheel-drainagemap.dwg

~SHEET~
1/2



LEGEND

- PROPERTY BOUNDARY
- EASEMENT
- EX EDGE OF ASPHALT
- RIGHT-OF-WAY
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- BASIN INFO BLOCK (BASIN DESIGNATION, AREA (AC), RATIONAL COEFFICIENTS)
- DESIGN POINT

STANDARD NOTES:

1. NO BUILDING, STRUCTURE, OR FILL WILL BE PLACED IN THE DETENTION AREAS AND NO CHANGES OR ALTERATIONS AFFECTING THE HYDRAULIC CHARACTERISTICS OF THE DETENTION AREAS WILL BE MADE WITHOUT THE APPROVAL OF THE CITY.

2. MAINTENANCE AND OPERATION OF THE DETENTION AND WATER QUALITY AREAS IS THE RESPONSIBILITY OF PROPERTY OWNER. IF OWNER FAILS IN THIS RESPONSIBILITY, THE CITY HAS THE RIGHT TO ENTER THE PROPERTY, MAINTAIN THE DETENTION AREAS, AND BE REIMBURSED FOR COSTS INCURRED.

3. DETENTION POND VOLUMES, ALL DRAINAGE APPURTENANCES, AND BASIN BOUNDARIES SHALL BE VERIFIED. AS-BUILT DRAWINGS SHALL BE PREPARED BY A REGISTERED PROFESSIONAL ENGINEER PRIOR TO ISSUANCE OF CERTIFICATE OF OCCUPANCY FOR ANY STRUCTURE WITHIN THE DEVELOPMENT.

4. PERMISSION TO REPRODUCE THESE PLANS IS HEREBY GIVEN TO THE CITY OF GRAND JUNCTION FOR CITY'S PURPOSES ASSOCIATED WITH PLAN REVIEW, APPROVAL, PERMITTING, INSPECTION AND CONSTRUCTION OF WORK.

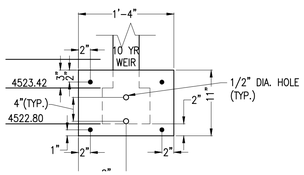
POND SUMMARY TABLES

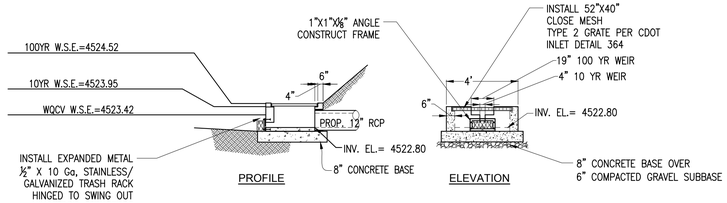
POND 100	VOLUME (CF)	WSEL (FT)	PEAK DISCHARGE FLOW (CFS)
WQCV	25,005	4519.59	NA
10 YEAR	30,028	4519.87	0.25
100 YEAR	59,027	4521.26	0.53

POND 200	VOLUME (CF)	WSEL (FT)	PEAK DISCHARGE FLOW (CFS)
WQCV	3,030	4523.42	40 hrs
10 YEAR	3,403	4523.95	0.5
100 YEAR	10,616	4524.52	2.3

BASIN RUNOFF

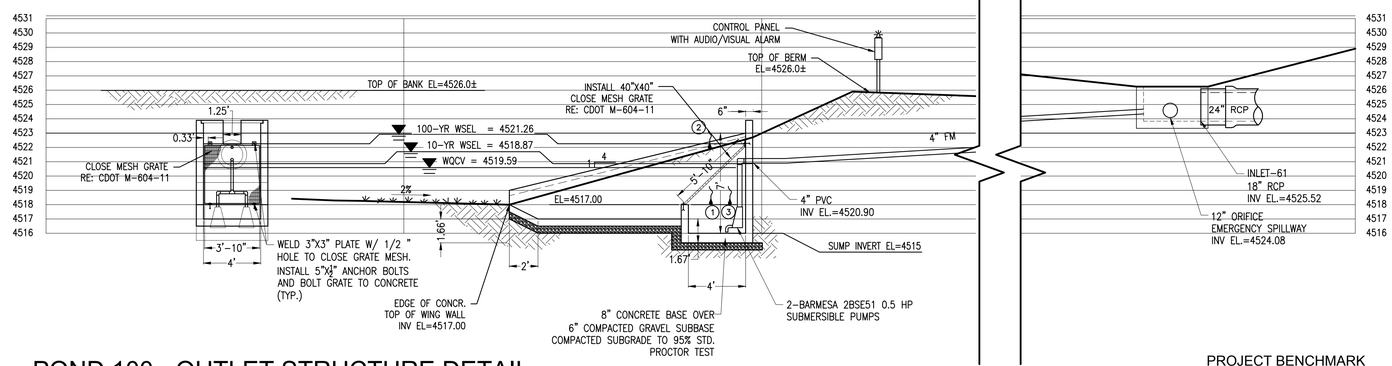
BASIN	2 YEAR RUNOFF (CFS)	100 YEAR RUNOFF (CFS)
100	1.51	5.94
101	1.29	5.17
102	2.64	15.03
103	6.30	36.95
104	0.60	3.00
105	1.46	8.55
106	1.55	9.67
107	4.10	23.31
108	5.77	33.48
200	2.81	15.75
OS-1	0.00	1.19





POND 200 - OUTLET STRUCTURE DETAIL

SCALE: HORIZONTAL AND VERTICAL
1"=5'



POND 100 - OUTLET STRUCTURE DETAIL

SCALE: HORIZONTAL AND VERTICAL
1"=5'

PROJECT BENCHMARK
xxxxx

FOR REVIEW

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• PLANNERS & SURVEYORS
• SITE PLANNERS
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Fax (970) 245-7639

STEPHEN E. SWINDELL
PROFESSIONAL ENGINEER
COLORADO LICENSE No. 37688

REV.	DATE	COMMENT	BY
3	02/09/22	POND 100 ENLARGED, WSEL REVISED	SSM
2	12/14/18	REVISED PER CITY COMMENTS DATED 11/09/18	SSM
1	04/20/18	REVISED PER CITY COMMENTS DATED 04/05/18	SSM

Drainage Map - Proposed Conditions

Iron Wheel Subdivision

-

953 19 Road
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CAD ID: ironwheel-drainagemap.dwg

~SHEET~
2/2