

August 2, 2023

Michael Grabczyk  
20120 E. Mainstreet  
Parker, CO 80138

RE: In-N-Out Burger – Parker Rd & Pine Ln - Drainage Conformance Letter

Dear Michael,

This Drainage Conformance Letter has been prepared for the proposed In-N-Out Burger Restaurant located at the southwest corner of Parker Rd and Pine Lane on Lot 1 of Parker and Pine Filing No. 1, Amendment 1, in Parker, CO. The purpose of this letter is to show that the proposed development conforms to the Storm Drainage and Environmental Criteria Manual for the Town of Parker and the Parker & Pine Retail Final Drainage Report Version 1 prepared by Kimley Horn dated November 2019 (herein referred to as FDR)

The project consists of Lot 1 or Parker & Pine Filing No. 1, located in the Southwest Quarter of Section 10, Township 6 South, Range 66 West of the 6<sup>th</sup> Principal Meridian, Town of Parker, County of Douglas, State of Colorado. The site is bounded by South Parker Road (State Highway No. 83) to the east, Pine Lane to north, undeveloped commercial lots to the west and southwest, and a Murphy Oil fuel center to the southeast. The site is currently vacant.

The existing site generally slopes to the southwest. In the existing conditions sheet flow overland to an existing private access road, with various inlets along the roadway to collect runoff. The existing underground storm drain system conveys stormwater to an existing public detention pond located southwest of Parker and Pine Filing No. 2, which ultimately discharges into Baldwin Gulch. The proposed Site occupies approximately 1.67 acres of vacant land covered mostly by native grasses and weeds. An on-site storm sewer system is proposed to convey stormwater to the southwest corner of the site where it will connect to an existing storm drain stub which has been sized to receive flows from the developed property. Inlet capacity calculations are included with this memo (Attachment A). runoff from the site is then conveyed offsite to the existing detention facility.

The project site was studied in the Parker & Pine Retail Final Drainage Report Version 1 prepared by Kimley Horn dated November 2019. Per said report, this site lies within Basin 3.0. The impervious percentage assigned to this basin was 85%. The impervious percentage for the proposed Site is calculated to be 68%. Since the proposed development is below the 85% imperviousness estimated by the Parker & Pine Final Drainage Report Version 1, the existing drainage facilities should be sufficient to safely convey the runoff from the proposed Site and not negatively impact adjacent properties.

Sincerely,  
**GALLOWAY**

Phil Dalrymple, PE  
Civil Engineering Project Manager  
[PhilDalrymple@GallowayUS.com](mailto:PhilDalrymple@GallowayUS.com)



**APPENDIX A**  
**Exhibits & Figures**

VICINITY MAP



IN-N-Out Parker, CO  
August 2, 2023

# **APPENDIX B**

## **Hydrologic Computations**

BASIN SUMMARY TABLE						
Tributary Sub-basin	Area (acres)	C <sub>5</sub>	C <sub>100</sub>	t <sub>c</sub> (min)	Q <sub>5</sub> (cfs)	Q <sub>100</sub> (cfs)
A1	0.24	0.34	0.63	5.00	0.3	1.3
A2	0.42	0.35	0.63	5.00	0.5	2.3
A3	0.80	0.72	0.82	5.65	1.9	5.6
R1	0.14	0.76	0.84	5.00	0.4	1.0
OS1	0.05	0.52	0.72	5.00	0.1	0.3
OS2	0.22	0.72	0.82	5.00	0.5	1.6

## COMPOSITE % IMPERVIOUS CALCULATIONS

**Subdivision:** Parker & Pine Filing No. 1 Lot 1  
**Location:** CO, Parker

**Project Name:** In-N-Out Parker  
**Project No.:** INO000014.20  
**Calculated By:** EKM  
**Checked By:** PJD  
**Date:** 12/6/22

Basin ID	Total Area (ac)	Paved Roads			Lawns			Roofs			Basins Total Weighted % Imp.
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	
A1	0.24	100	0.10	42.0	2	0.14	1.2	90	0.00	0.00	43.2
A2	0.42	100	0.13	31.1	2	0.24	1.1	90	0.05	11.40	43.6
A3	0.80	100	0.63	78.7	2	0.12	0.3	90	0.05	6.00	85.0
R1	0.14	100	0.00	0.00	2	0.00	0.00	90	0.14	90.00	90.00
OS1	0.05	100	0.03	61.9	2	0.02	0.8	90	0.00	0.00	62.7
OS2	0.22	100	0.19	84.7	2	0.03	0.3	90	0.00	0.00	85.0
Onsite:	1.60	100	0.86	53.8	2	0.49	0.6	90	0.25	13.80	68.2
Total:	1.87	100	1.08	57.7	2	0.55	0.6	90	0.25	11.80	70.1

**STANDARD FORM SF-2  
TIME OF CONCENTRATION**

**Subdivision:** Parker & Pine Filing No. 1 Lot 1  
**Location:** CO, Parker

**Project Name:** In-N-Out Parker  
**Project No.:** INO000014.20  
**Calculated By:** EKM  
**Checked By:** PJD  
**Date:** 12/6/22

SUB-BASIN						INITIAL/OVERLAND			TRAVEL TIME					T <sub>c</sub> CHECK			FINAL
DATA						(T <sub>i</sub> )			(T <sub>t</sub> )					(URBANIZED BASINS)			
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C <sub>100</sub>	C <sub>5</sub>	L (FT)	S (%)	T <sub>i</sub> (MIN)	L (FT)	S (%)	C <sub>v</sub>	VEL. (FPS)	T <sub>t</sub> (MIN)	COMP. T <sub>c</sub> (MIN)	TOTAL LENGTH (FT)	Urbanized T <sub>c</sub> (MIN)	T <sub>c</sub> (MIN)
A1	0.24	B	43.2	0.63	0.34	30	25.0	2.6	110	1.0	20.0	2.0	0.9	3.5	140.0	10.8	5.0
A2	0.42	B	43.6	0.63	0.35	30	25.0	2.6	270	1.0	20.0	2.0	2.3	4.8	300.0	11.7	5.0
A3	0.80	B	85.0	0.82	0.72	100	2.5	5.1	100	2.5	20.0	3.2	0.5	5.7	200.0	11.1	5.7
R1	0.14	B	90.0	0.84	0.76	65	2.0	4.0	0	1.0	20.0	2.0	0.0	4.0	65.0	10.4	5.0
OS1	0.05	B	62.7	0.72	0.52	20	2.0	3.8	100	2.5	20.0	3.2	0.5	4.3	120.0	10.7	5.0
OS2	0.22	B	85.0	0.82	0.72	45	2.0	3.7	165	2.0	20.0	2.8	1.0	4.7	210.0	11.2	5.0

**NOTES:**

$T_i = (0.395 * (1.1 - C_5) * (L)^{0.5}) / ((S)^{0.33})$ , S in ft/ft

$T_t = L / 60V$  (Velocity From Fig. 501)

Velocity  $V = C_v * S^{0.5}$ , S in ft/ft

$T_c \text{ Check} = 10 + L / 180$

For Urbanized basins a minimum T<sub>c</sub> of 5.0 minutes is required.

For non-urbanized basins a minimum T<sub>c</sub> of 10.0 minutes is required

**STANDARD FORM SF-3**  
**STORM DRAINAGE SYSTEM DESIGN**  
(RATIONAL METHOD PROCEDURE)

Subdivision: Parker & Pine Filing No. 1 Lot 1  
Location: CO, Parker  
Design Storm: 2-Year

Project Name: In-N-Out Parker  
Project No.: INO000014.20  
Calculated By: EKM  
Checked By: PJD  
Date: 12/6/22

STREET	Design Point	DIRECT RUNOFF						TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C* A (Ac)	I (in/hr)	Q <sub>d</sub> (cfs)	Tc (min)	C* A (Ac)	I (in/hr)	Q <sub>d</sub> (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	
	1	A1	0.24	0.34	5.0	0.08	3.36	0.3				0.3								Proposed 5' Type R Inlet
	2	A2	0.42	0.35	5.0	0.15	3.36	0.5				0.5								Proposed Single Type 13 Combo Inlet
	J1	R1	0.14	0.76	5.0	0.11	3.36	0.4	5.0	0.34	3.36	1.1								Roof Drains Proposed Manhole
	3	A3	0.80	0.72	5.7	0.58	3.25	1.9	5.7	0.92	3.25	3.0								Proposed 5' Type R Inlet
	E1	OS2	0.22	0.72	5.0	0.16	3.36	0.5	5.0	1.08	3.36	3.6								Runoff from Lot 5 Existing Manhole
	O1	OS1	0.05	0.52	5.0	0.03	3.36	0.1				0.1								Offsite runoff

**STANDARD FORM SF-3**  
**STORM DRAINAGE SYSTEM DESIGN**  
(RATIONAL METHOD PROCEDURE)

Subdivision: Parker & Pine Filing No. 1 Lot 1  
Location: CO, Parker  
Design Storm: 100-Year

Project Name: In-N-Out Parker  
Project No.: INO00014.20  
Calculated By: EKM  
Checked By: PJD  
Date: 12/6/22

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C* A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C* A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
	1	A1	0.24	0.63	5.0	0.15	8.82	1.3					1.3								Proposed 5' Type R Inlet
	2	A2	0.42	0.63	5.0	0.26	8.82	2.3					2.3								Proposed Single Type 13 Combo Inlet
	J1	R1	0.14	0.84	5.0	0.12	8.82	1.1													Roof Drains Proposed Manhole
	3	A3	0.80	0.82	5.7	0.66	8.53	5.6	5.0	0.53	8.82	4.7									Proposed 5' Type R Inlet
	E1	OS2	0.22	0.82	5.0	0.18	8.82	1.6	5.7	1.19	8.53	10.2									Runoff from Lot 5 Existing Manhole
	O1	OS1	0.05	0.72	5.0	0.04	8.82	0.4	5.0	1.37	8.82	12.1									Offsite runoff

IN-N-Out Parker, CO  
August 2, 2023

# **APPENDIX C**

## **Hydraulic Computations**

# INLET MANAGEMENT

Worksheet Protected

INLET NAME	SDIN B1 (Basin A1)	SDIN C1 (Basin A2)	SDIN A1 (Basin A3)
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT/Denver 13 Combination	CDOT Type R Curb Opening

## USER-DEFINED INPUT

### User-Defined Design Flows

Minor $Q_{Known}$ (cfs)	0.3	0.5	1.9
Major $Q_{Known}$ (cfs)	1.3	2.3	5.6

### Bypass (Carry-Over) Flow from Upstream Inlets must be organized from upstream (left) to downstream (right) in order for bypass flows to be linked.

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, $Q_b$ (cfs)	0.0	0.0	0.0
Major Bypass Flow Received, $Q_b$ (cfs)	0.0	0.0	0.0

### Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

### Watershed Profile

Overland Slope (ft/ft)			
Overland Length (ft)			
Channel Slope (ft/ft)			
Channel Length (ft)			

### Minor Storm Rainfall Input

Design Storm Return Period, $T_r$ (years)			
One-Hour Precipitation, $P_1$ (inches)			

### Major Storm Rainfall Input

Design Storm Return Period, $T_r$ (years)			
One-Hour Precipitation, $P_1$ (inches)			

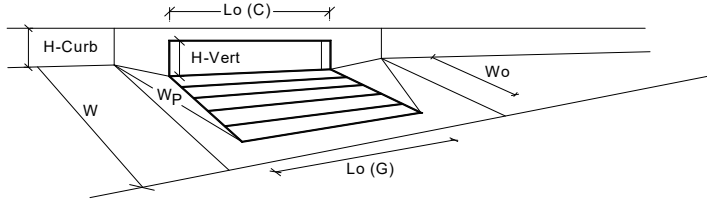
## CALCULATED OUTPUT

<b>Minor Total Design Peak Flow, <math>Q</math> (cfs)</b>	<b>0.3</b>	<b>0.5</b>	<b>1.9</b>
<b>Major Total Design Peak Flow, <math>Q</math> (cfs)</b>	<b>1.3</b>	<b>2.3</b>	<b>5.6</b>
Minor Flow Bypassed Downstream, $Q_b$ (cfs)	N/A	N/A	N/A
Major Flow Bypassed Downstream, $Q_b$ (cfs)	N/A	N/A	N/A



# INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.02 (August 2022)

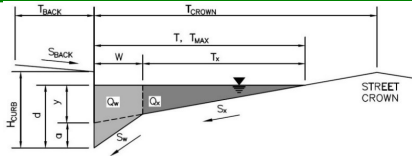


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	3.5	3.5	inches
<b>Grate Information</b>			
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
<b>Curb Opening Information</b>			
Length of a Unit Curb Opening	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	1.50	1.50	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>			
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.27	0.27	ft
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	0.99	0.99	
Combination Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>			
<b>Inlet Capacity IS GOOD for Minor and Major Storms (&gt;Q Peak)</b>	<b>3.4</b>	<b>3.4</b>	<b>cfs</b>
Q PEAK REQUIRED =	0.3	1.3	cfs

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

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

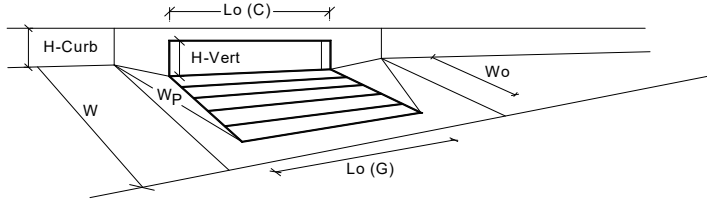
**Project:**  
**Inlet ID: SDIN C1 (Basin A2)**



<b>Gutter Geometry:</b>						
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 5.0$ ft					
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.180$ ft/ft					
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.020$					
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches					
Distance from Curb Face to Street Crown	$T_{CROWN} = 25.0$ ft					
Gutter Width	$W = 2.00$ ft					
Street Transverse Slope	$S_X = 0.020$ ft/ft					
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_W = 0.020$ ft/ft					
Street Longitudinal Slope - Enter 0 for sump condition	$S_O = 0.000$ ft/ft					
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.012$					
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td rowspan="2" style="text-align: right;">ft</td> </tr> <tr> <td style="text-align: center;"><math>T_{MAX} = 15.0</math></td> <td style="text-align: center;"><math>15.0</math></td> </tr> </table>	Minor Storm	Major Storm	ft	$T_{MAX} = 15.0$	$15.0$
Minor Storm	Major Storm	ft				
$T_{MAX} = 15.0$	$15.0$					
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td rowspan="2" style="text-align: right;">inches</td> </tr> <tr> <td style="text-align: center;"><math>d_{MAX} = 6.0</math></td> <td style="text-align: center;"><math>6.0</math></td> </tr> </table>	Minor Storm	Major Storm	inches	$d_{MAX} = 6.0$	$6.0$
Minor Storm	Major Storm	inches				
$d_{MAX} = 6.0$	$6.0$					
Check boxes are not applicable in SUMP conditions	<input type="checkbox"/> <input type="checkbox"/>					
MINOR STORM Allowable Capacity is not applicable to Sump Condition						
MAJOR STORM Allowable Capacity is not applicable to Sump Condition						
<b>Q<sub>allow</sub> =</b>	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td rowspan="2" style="text-align: right;">cfs</td> </tr> <tr> <td style="text-align: center;"><b>SUMP</b></td> <td style="text-align: center;"><b>SUMP</b></td> </tr> </table>	Minor Storm	Major Storm	cfs	<b>SUMP</b>	<b>SUMP</b>
Minor Storm	Major Storm	cfs				
<b>SUMP</b>	<b>SUMP</b>					

# INLET IN A SUMP OR SAG LOCATION

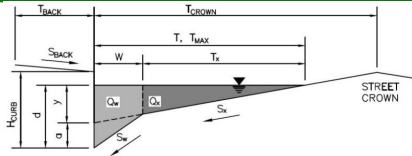
MHFD-Inlet, Version 5.02 (August 2022)



Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT/Denver 13 Combination		
Local Depression (additional to continuous gutter depression 'a' from above)	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	2	2	
Water Depth at Flowline (outside of local depression)	3.6	3.6	inches
<b>Grate Information</b>			
Length of a Unit Grate	3.00	3.00	feet
Width of a Unit Grate	1.73	1.73	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	0.43	0.43	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)	3.30	3.30	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	0.60	0.60	
<b>Curb Opening Information</b>			
Length of a Unit Curb Opening	3.00	3.00	feet
Height of Vertical Curb Opening in Inches	6.50	6.50	inches
Height of Curb Orifice Throat in Inches	5.25	5.25	inches
Angle of Throat (see USDCM Figure ST-5)	0.00	0.00	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.70	3.70	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.66	0.66	
<b>Low Head Performance Reduction (Calculated)</b>			
Depth for Grate Midwidth	0.38	0.38	ft
Depth for Curb Opening Weir Equation	0.26	0.26	ft
Grated Inlet Performance Reduction Factor for Long Inlets	0.42	0.42	
Curb Opening Performance Reduction Factor for Long Inlets	N/A	N/A	
Combination Inlet Performance Reduction Factor for Long Inlets	0.42	0.42	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>			
<b>Inlet Capacity IS GOOD for Minor and Major Storms (&gt;Q Peak)</b>	<b>2.6</b>	<b>2.6</b>	<b>cfs</b>
Q PEAK REQUIRED =	0.5	2.3	cfs

**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)**  
 (Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

**Project:**  
**Inlet ID: SDIN A1 (Basin A3)**



**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb  
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)  
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)  
 Height of Curb at Gutter Flow Line  
 Distance from Curb Face to Street Crown  
 Gutter Width  
 Street Transverse Slope  
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)  
 Street Longitudinal Slope - Enter 0 for sump condition  
 Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$T_{BACK} = 20.0$  ft  
 $S_{BACK} = 0.020$  ft/ft  
 $n_{BACK} = 0.020$

$H_{CURB} = 6.00$  inches  
 $T_{CROWN} = 28.0$  ft  
 $W = 1.50$  ft  
 $S_X = 0.030$  ft/ft  
 $S_W = 0.030$  ft/ft  
 $S_O = 0.000$  ft/ft  
 $n_{STREET} = 0.012$

Max. Allowable Spread for Minor & Major Storm  
 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm  
 Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX}$	28.0	28.0	ft
$d_{MAX}$	6.0	6.0	inches
	<input type="checkbox"/>	<input type="checkbox"/>	

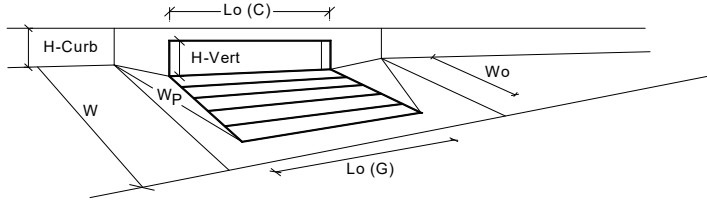
MINOR STORM Allowable Capacity is not applicable to Sump Condition  
 MAJOR STORM Allowable Capacity is not applicable to Sump Condition

$Q_{allow} =$ 

Minor Storm	Major Storm	
SUMP	SUMP	cfs

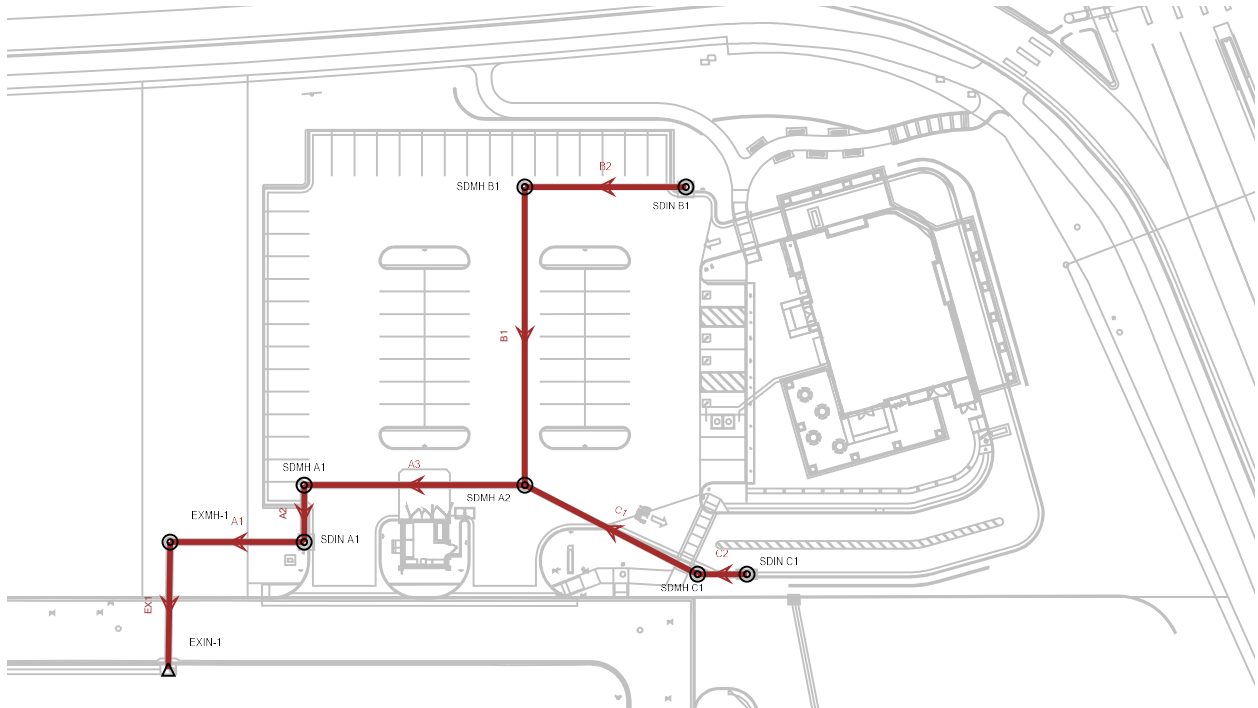
# INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.02 (August 2022)



Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	6.0	6.0	inches
<b>Grate Information</b>			
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
<b>Curb Opening Information</b>			
Length of a Unit Curb Opening	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	1.50	1.50	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>			
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.46	0.46	ft
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)	<b>7.6</b>	<b>7.6</b>	<b>cfs</b>
<b>Inlet Capacity IS GOOD for Minor and Major Storms (&gt;Q Peak)</b>	1.9	5.6	cfs

**Scenario: 100-Year**  
**Active Scenario: 100-Year**



**Scenario: 5-Year**  
**Current Time Step: 0.000Hr**  
**FlexTable: Conduit Table**

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Flow (cfs)	Velocity (ft/s)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Section Type	Diameter (in)	Material	Manning's n	Capacity (Full Flow) (cfs)	Depth (Normal) (ft)
A1	SDIN A1	EXMH-1	5,790.29	5,789.70	5,790.43	5,790.89	3.00	5.18	53.4	0.011	Circle	24.0	Concrete	0.013	23.77	0.48
A2	SDMH A1	SDIN A1	5,791.08	5,790.79	5,791.18	5,791.47	1.10	3.95	27.0	0.011	Circle	18.0	Concrete	0.013	10.89	0.32
A3	SDMH A2	SDMH A1	5,792.18	5,791.38	5,791.71	5,792.57	1.10	3.85	80.2	0.010	Circle	18.0	Concrete	0.013	10.49	0.33
B1	SDMH B1	SDMH A2	5,794.95	5,792.48	5,792.73	5,795.15	0.30	3.34	123.7	0.020	Circle	18.0	Concrete	0.013	14.84	0.15
B2	SDIN B1	SDMH B1	5,796.69	5,795.25	5,795.40	5,796.89	0.30	3.34	72.2	0.020	Circle	18.0	Concrete	0.013	14.84	0.15
C1	SDMH C1	SDMH A2	5,793.37	5,792.48	5,792.70	5,793.63	0.50	3.15	81.4	0.011	Circle	18.0	Concrete	0.013	10.98	0.22
C2	SDIN C1	SDMH C1	5,793.83	5,793.57	5,793.79	5,794.09	0.50	3.15	23.8	0.011	Circle	18.0	Concrete	0.013	10.98	0.22
EX1	EXMH-1	EXIN-1	5,789.40	5,788.60	5,789.85	5,790.06	3.60	6.19	50.8	0.016	Circle	24.0	Concrete	0.013	28.38	0.48

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**Scenario: 5-Year**  
**Current Time Step: 0.000Hr**  
**FlexTable: Manhole Table**

Label	Elevation (Rim) (ft)	Elevation (Invert in 1) (ft)	Elevation (Invert in 2) (ft)	Elevation (Invert Out) (ft)	Flow (Total Out) (cfs)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Structure Type	Diameter (in)	Width (ft)	Length (ft)	Headloss Method	Notes
EXMH-1	5,803.10	5,789.70	(N/A)	5,789.40	3.60	5,790.06	5,790.43	Circular Structure	72.0	-	-	Standard	EX SDMH (PRIVATE)
SDIN A1	5,801.33	5,790.79	(N/A)	5,790.29	3.00	5,790.89	5,791.18	Box Structure	-	3.00	5.00	Standard	5' TYPE R INLETIN SUMP (PRIVATE)
SDIN B1	5,805.93	(N/A)	(N/A)	5,796.69	0.30	5,796.89	5,796.89	Box Structure	-	3.00	5.00	Standard	5' TYPE R INLETIN SUMP (PRIVATE)
SDIN C1	5,804.75	(N/A)	(N/A)	5,793.83	0.50	5,794.09	5,794.09	Box Structure	-	2.00	8.33	Standard	DOUBLE TYPE 13 COMBO INLET IN SUMP (PRIVATE)
SDMH A1	5,801.68	5,791.38	(N/A)	5,791.08	1.10	5,791.47	5,791.66	Circular Structure	48.0	-	-	Standard	MH-ECCENTRIC (6' %%c)
SDMH A2	5,803.16	5,792.48	5,792.48	5,792.18	1.10	5,792.57	5,792.73	Circular Structure	48.0	-	-	Standard	MH-ECCENTRIC (4' %%c)
SDMH B1	5,806.10	5,795.25	(N/A)	5,794.95	0.30	5,795.15	5,795.24	Circular Structure	48.0	-	-	Standard	MH-ECCENTRIC (4' %%c)
SDMH C1	5,805.61	5,793.57	(N/A)	5,793.37	0.50	5,793.63	5,793.67	Circular Structure	48.0	-	-	Standard	MH-ECCENTRIC (4' %%c)

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**Scenario: 5-Year**  
**Current Time Step: 0.000Hr**  
**FlexTable: Outfall Table**

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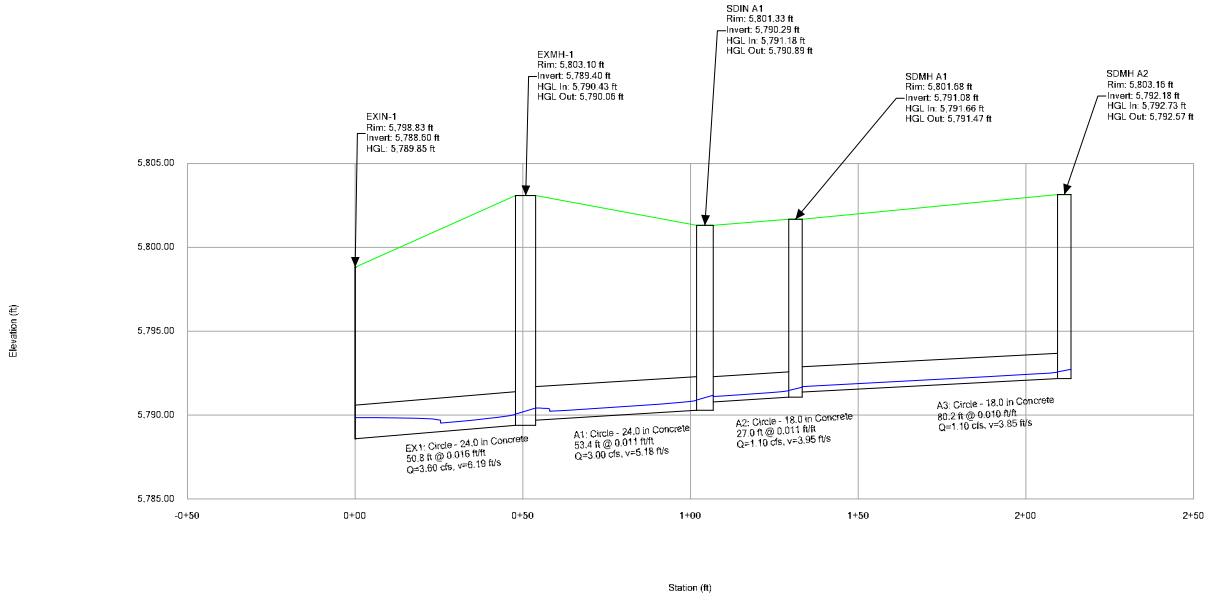
Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)
EXIN-1	5,798.83	5,788.60	User Defined Tailwater	5,789.85	5,789.85	3.60

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# Profile Report

## Engineering Profile - Profile A (INO014\_StormCAD.stsw)

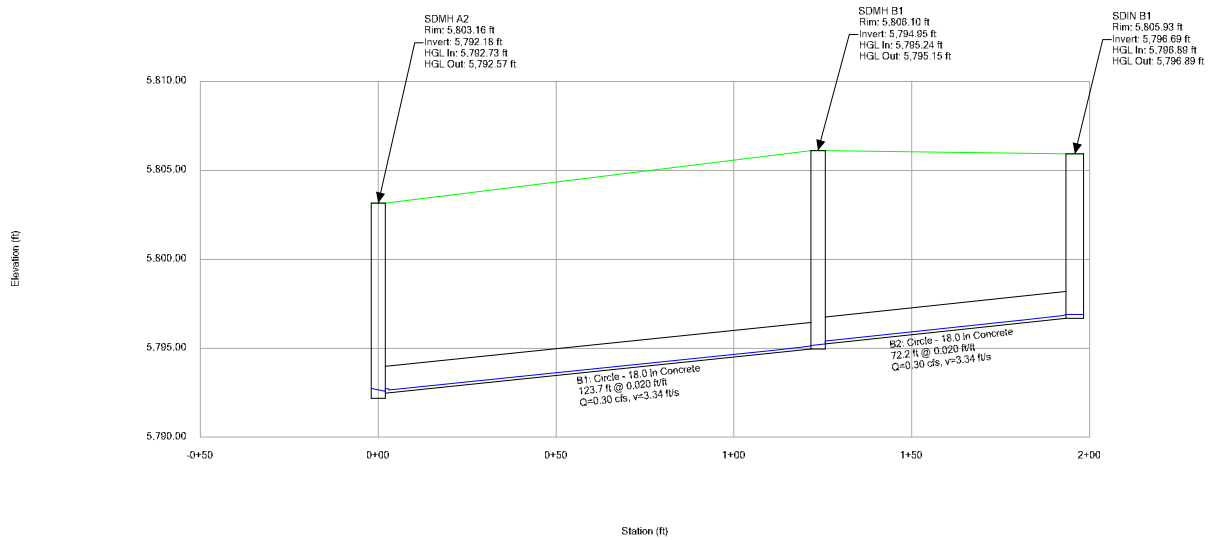
### Active Scenario: 5-Year



# Profile Report

## Engineering Profile - Profile B (INO014\_StormCAD.stsw)

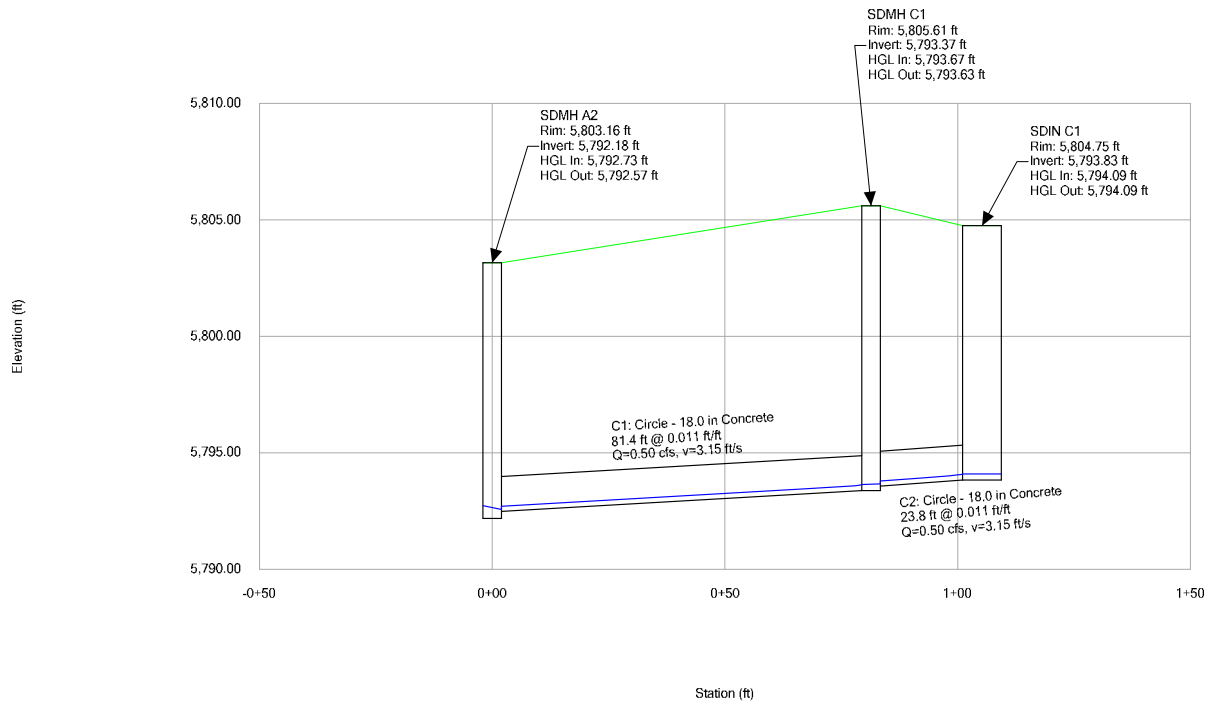
### Active Scenario: 5-Year



# Profile Report

## Engineering Profile - Profile C (INO014\_StormCAD.stsw)

### Active Scenario: 5-Year



**Scenario: 100-Year**  
**Current Time Step: 0.000Hr**  
**FlexTable: Conduit Table**

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Flow (cfs)	Velocity (ft/s)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Section Type	Diameter (in)	Material	Manning's n	Capacity (Full Flow) (cfs)	Depth (Normal) (ft)
A1	SDIN A1	EXMH-1	5,790.29	5,789.70	5,791.46	5,791.43	10.20	7.28	53.4	0.011	Circle	24.0	Concrete	0.013	23.77	0.92
A2	SDMH A1	SDIN A1	5,791.08	5,790.79	5,792.05	5,791.99	4.70	5.93	27.0	0.011	Circle	18.0	Concrete	0.013	10.89	0.69
A3	SDMH A2	SDMH A1	5,792.18	5,791.38	5,792.35	5,793.01	4.70	5.77	80.2	0.010	Circle	18.0	Concrete	0.013	10.49	0.70
B1	SDMH B1	SDMH A2	5,794.95	5,792.48	5,793.41	5,795.38	1.30	5.17	123.7	0.020	Circle	18.0	Concrete	0.013	14.84	0.30
B2	SDIN B1	SDMH B1	5,796.69	5,795.25	5,795.55	5,797.12	1.30	5.16	72.2	0.020	Circle	18.0	Concrete	0.013	14.84	0.30
C1	SDMH C1	SDMH A2	5,793.37	5,792.48	5,793.41	5,793.94	2.30	4.92	81.4	0.011	Circle	18.0	Concrete	0.013	10.98	0.47
C2	SDIN C1	SDMH C1	5,793.83	5,793.57	5,794.04	5,794.40	2.30	4.91	23.8	0.011	Circle	18.0	Concrete	0.013	10.98	0.47
EX1	EXMH-1	EXIN-1	5,789.40	5,788.60	5,790.21	5,790.65	12.10	8.67	50.8	0.016	Circle	24.0	Concrete	0.013	28.38	0.91

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Scenario: 100-Year  
 Current Time Step: 0.000Hr  
 FlexTable: Manhole Table

Label	Elevation (Rim) (ft)	Elevation (Invert in 1) (ft)	Elevation (Invert in 2) (ft)	Elevation (Invert Out) (ft)	Flow (Total Out) (cfs)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Structure Type	Diameter (in)	Width (ft)	Length (ft)	Headloss Method	Notes
EXMH-1	5,803.10	5,789.70	(N/A)	5,789.40	12.10	5,790.65	5,791.46	Circular Structure	72.0	-	-	Standard	EX SDMH (PRIVATE)
SDIN A1	5,801.33	5,790.79	(N/A)	5,790.29	10.20	5,791.43	5,792.05	Box Structure	-	3.00	5.00	Standard	5' TYPE R INLETIN SUMP (PRIVATE)
SDIN B1	5,805.93	(N/A)	(N/A)	5,796.69	1.30	5,797.12	5,797.12	Box Structure	-	3.00	5.00	Standard	5' TYPE R INLETIN SUMP (PRIVATE)
SDIN C1	5,804.75	(N/A)	(N/A)	5,793.83	2.30	5,794.40	5,794.40	Box Structure	-	2.00	8.33	Standard	DOUBLE TYPE 13 COMBO INLET IN SUMP (PRIVATE)
SDMH A1	5,801.68	5,791.38	(N/A)	5,791.08	4.70	5,791.99	5,792.35	Circular Structure	48.0	-	-	Standard	MH-ECCENTRIC (6' %%c)
SDMH A2	5,803.16	5,792.48	5,792.48	5,792.18	4.70	5,793.01	5,793.41	Circular Structure	48.0	-	-	Standard	MH-ECCENTRIC (4' %%c)
SDMH B1	5,806.10	5,795.25	(N/A)	5,794.95	1.30	5,795.38	5,795.58	Circular Structure	48.0	-	-	Standard	MH-ECCENTRIC (4' %%c)
SDMH C1	5,805.61	5,793.57	(N/A)	5,793.37	2.30	5,793.94	5,794.03	Circular Structure	48.0	-	-	Standard	MH-ECCENTRIC (4' %%c)

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**Scenario: 100-Year**  
**Current Time Step: 0.000Hr**  
**FlexTable: Outfall Table**

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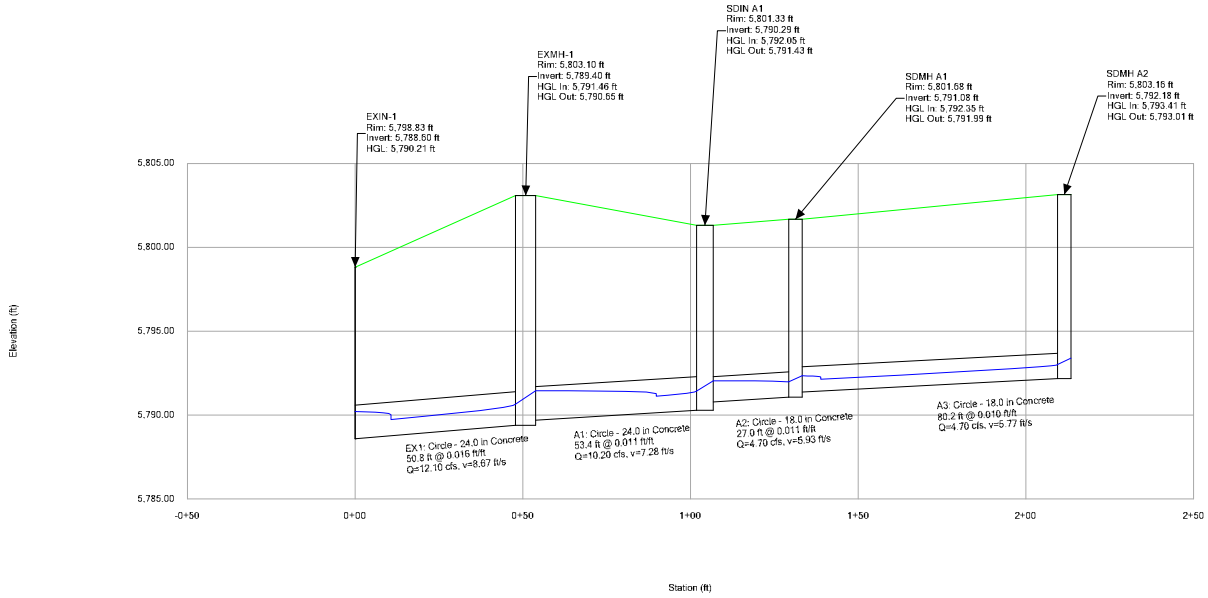
Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)
EXIN-1	5,798.83	5,788.60	User Defined Tailwater	5,790.21	5,790.21	12.10

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# Profile Report

## Engineering Profile - Profile A (INO014\_StormCAD.stsw)

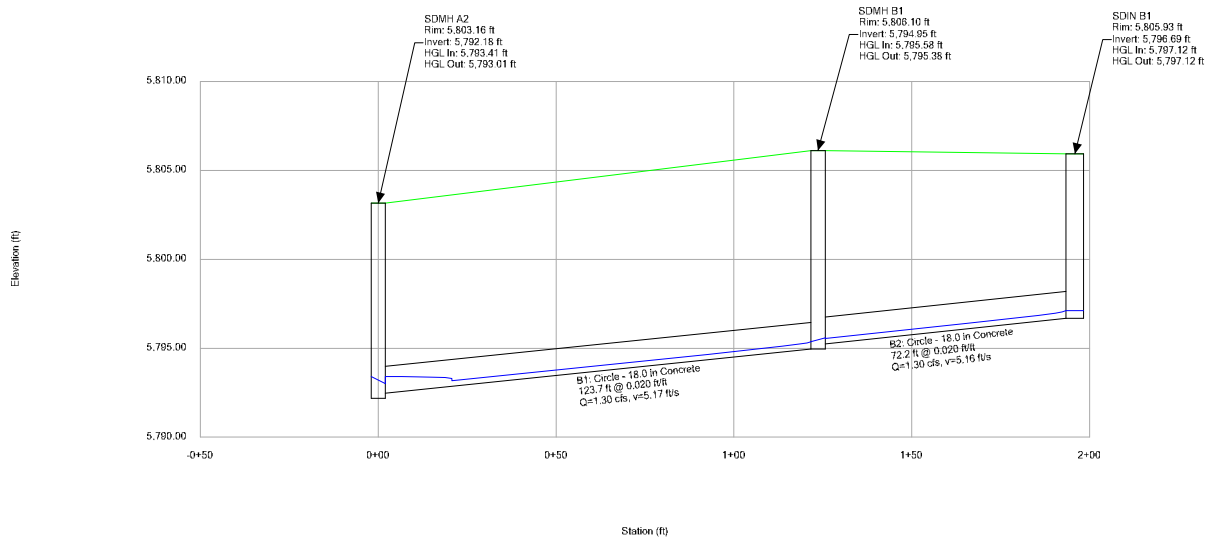
### Active Scenario: 100-Year



# Profile Report

## Engineering Profile - Profile B (INO014\_StormCAD.stsw)

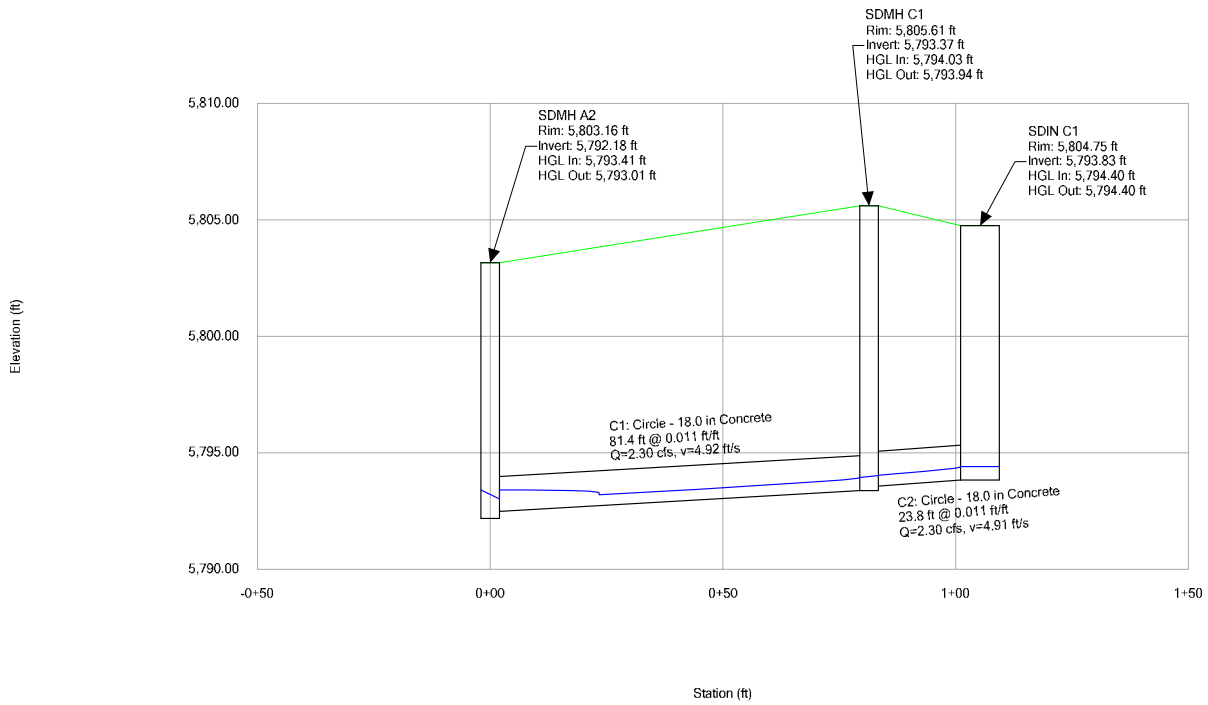
### Active Scenario: 100-Year



# Profile Report

## Engineering Profile - Profile C (INO014\_StormCAD.stsw)

### Active Scenario: 100-Year



IN-N-Out Parker, CO  
August 2, 2023

## **APPENDIX D**

### **Excerpts from Parker & Pine Retail Final Drainage Report**

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Town of Parker

Parker Auto Plaza Filing No. 1

Lot 1, Block 3

Parker & Pine Retail  
Final Drainage Report

NOVEMBER 2019 | VERSION 1

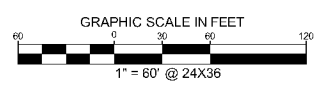
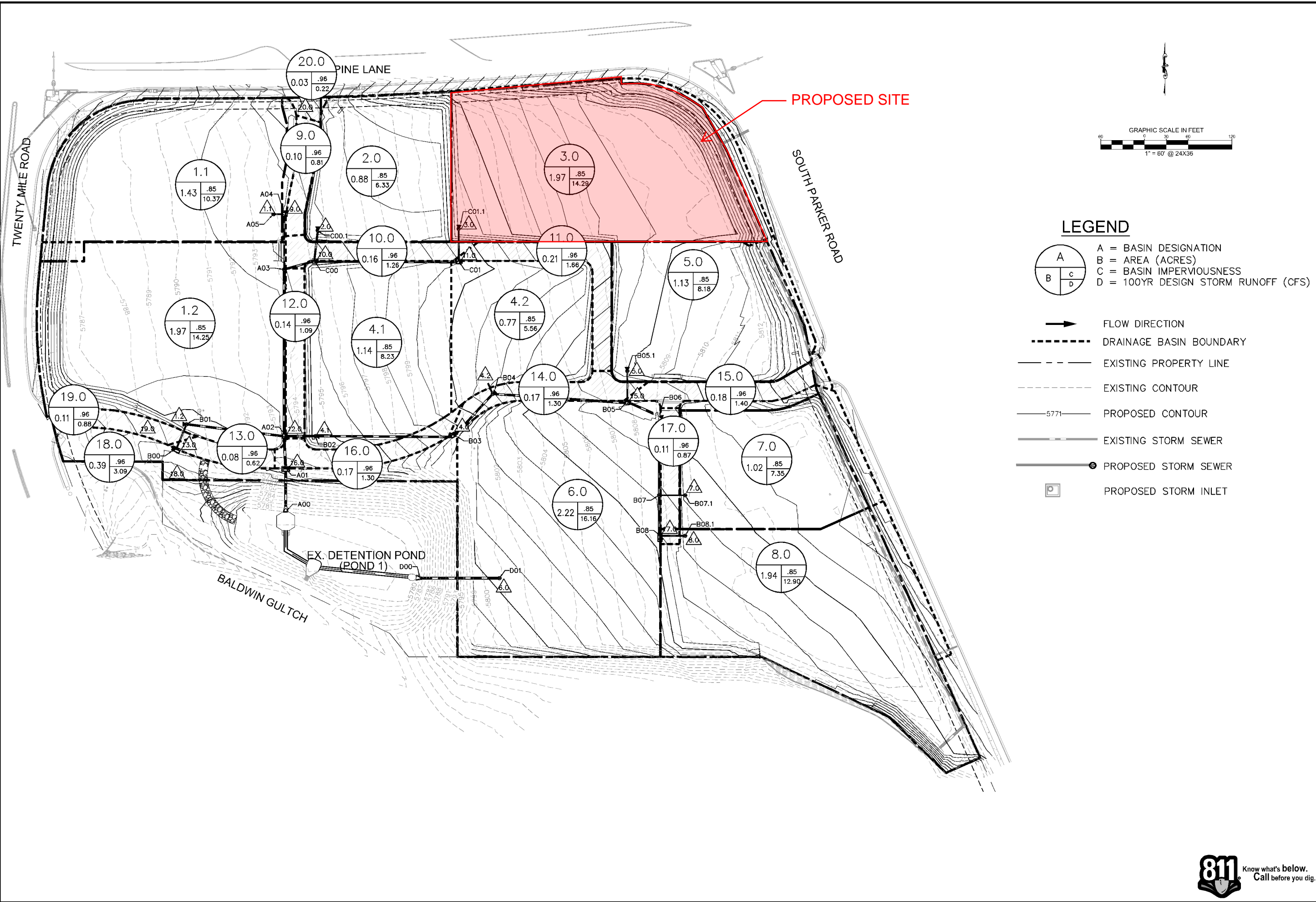
Prepared By:

**Kimley»»Horn**

4582 South Ulster Street, Suite 1500

Denver, CO 80237

K:\DEN\_Civil\096502001 - Mixed Use Parker Rd\CADD\PlanSheets\096502001DRM.dwg - Zematlis, Even 10/5/2019 10:57 AM  
 THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, IS AN INSTRUMENT OF SERVICE AS DEFINED IN THE PROFESSIONAL ENGINEERING AND ARCHITECTURE ACT, AND SHALL BE WITHOUT LIABILITY TO KIMLEY-HORN AND ASSOCIATES, INC.



**LEGEND**

- |       |
|-------|
| A     |
| B   C |
| D     |

 A = BASIN DESIGNATION
- B = AREA (ACRES)
- C = BASIN IMPERVIOUSNESS
- D = 100YR DESIGN STORM RUNOFF (CFS)
- FLOW DIRECTION
- DRAINAGE BASIN BOUNDARY
- EXISTING PROPERTY LINE
- EXISTING CONTOUR
- PROPOSED CONTOUR
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- PROPOSED STORM INLET

NO.	REVISION	BY	DATE	APPR.

**Kimley»Horn**  
 2019 KIMLEY-HORN AND ASSOCIATES, INC.  
 1080 South U.S. Hwy. 1500  
 Denver, Colorado 80237 (303) 728-3700

DESIGNED BY: DLS  
 DRAWN BY: ECZ  
 CHECKED BY: DLS  
 DATE: 11/11/19

**PARKER & PINE**  
 PARKER, CO  
 CONSTRUCTION DOCUMENTS  
**PRELIMINARY DRAINAGE AREA MAP**

**PRELIMINARY**  
 FOR REVIEW ONLY  
 NOT FOR  
 CONSTRUCTION  
**Kimley»Horn**  
 Kimley-Horn and Associates, Inc.

PROJECT NO.  
096502001  
 DRAWING NAME  
096502001DRM  
**DRAINAGE**



**5-Year Design Storm Runoff Calculations**  
(Rational Method Procedure)

BASIN INFORMATION				DIRECT RUNOFF				TOTAL RUNOFF				REMARKS
DESIGN POINT	DRAIN BASIN	AREA Ac	RUNOFF COEFF	T(c) Min	C x A	I In/Hr	Q CFS	T(c) Min	SUM C x A	I In/Hr	Q CFS	
1	1.1	1.43	0.73	5.0	1.05	4.71	4.93	5.0	1.05	4.7	4.93	
1	1.2	1.97	0.73	5.0	1.44	4.71	6.77	5.0	2.5	4.7	11.71	
1	2.0	0.88	0.73	5.0	0.64	4.71	3.00	5.0	3.1	4.7	14.71	
1	3.0	1.97	0.73	5.0	1.44	4.71	6.80	5.0	4.6	4.7	21.50	
1	4.1	1.14	0.73	5.0	0.83	4.71	3.91	5.0	5.4	4.7	25.42	
1	4.2	0.77	0.73	5.0	0.56	4.71	2.65	5.0	6.0	4.7	28.07	
1	5.0	1.13	0.73	5.0	0.83	4.71	3.89	5.0	6.8	4.7	31.96	
1	6.0	2.22	0.73	5.0	1.62	4.71	7.62	5.0	8.4	4.7	39.58	
1	7.0	1.02	0.73	5.0	0.74	4.71	3.48	5.0	9.1	4.7	43.06	
1	8.0	1.94	0.73	6.8	1.41	4.34	6.13	5.0	10.5	4.7	49.72	
1	9.0	0.10	0.86	5.0	0.09	4.71	0.42	5.0	10.6	4.7	50.14	
1	10.0	0.16	0.86	5.0	0.14	4.71	0.65	5.0	10.8	4.7	50.79	
1	11.0	0.21	0.86	5.0	0.18	4.71	0.86	5.0	11.0	4.7	51.64	
1	12.0	0.14	0.86	5.0	0.12	4.71	0.57	5.0	11.1	4.7	52.21	
1	13.0	0.08	0.86	5.0	0.07	4.71	0.32	5.0	11.1	4.7	52.53	
1	14.0	0.17	0.86	5.0	0.14	4.71	0.67	5.0	11.3	4.7	53.20	
1	15.0	0.18	0.86	5.0	0.15	4.71	0.72	5.0	11.4	4.7	53.92	
1	16.0	0.17	0.86	5.0	0.14	4.71	0.67	5.0	11.6	4.7	54.60	
1	17.0	0.11	0.86	5.0	0.10	4.71	0.45	5.0	11.7	4.7	55.05	
1	18.0	0.39	0.86	5.0	0.34	4.71	1.59	5.0	12.0	4.7	56.64	
1	19.0	0.11	0.86	5.0	0.10	4.71	0.45	5.0	12.1	4.7	57.10	
1	20.0	0.03	0.86	5.0	0.02	4.71	0.11	5.0	12.1	4.7	57.21	

**100-Year Design Storm Runoff Calculations**  
(Rational Method Procedure)

BASIN INFORMATION				DIRECT RUNOFF				TOTAL RUNOFF				REMARKS
DESIGN POINT	DRAIN BASIN	AREA Ac	RUNOFF COEFF	T(c) Min	C x A	I In/Hr	Q CFS	T(c) Min	SUM C x A	I In/Hr	Q CFS	
1	1.1	1.43	0.82	5.0	1.18	8.82	10.37	5.0	1.18	8.8	10.37	
1	1.2	1.97	0.82	5.0	1.62	8.82	14.25	5.0	2.8	8.8	24.62	
1	2.0	0.88	0.82	5.0	0.72	8.82	6.33	5.0	3.5	8.8	30.95	
1	3.0	1.97	0.82	5.0	1.62	8.82	14.29	5.0	5.1	8.8	45.24	
1	4.1	1.14	0.82	5.0	0.93	8.82	8.23	5.0	6.1	8.8	53.46	
1	4.2	0.77	0.82	5.0	0.631	8.82	5.56	5.0	6.7	8.8	59.03	
1	5.0	1.13	0.82	5.0	0.928	8.82	8.18	5.0	7.6	8.8	67.21	
1	6.0	2.22	0.82	5.0	1.822	8.82	16.06	5.0	9.4	8.8	83.27	
1	7.0	1.02	0.82	5.0	0.834	8.82	7.35	5.0	10.3	8.8	90.63	
1	8.0	1.94	0.82	6.8	1.589	8.12	12.90	5.0	11.9	8.8	104.64	
1	9.0	0.10	0.89	5.0	0.091	8.82	0.81	5.0	12.0	8.8	105.44	
1	10.0	0.16	0.89	5.0	0.143	8.82	1.26	5.0	12.1	8.8	106.70	
1	11.0	0.21	0.89	5.0	0.188	8.82	1.66	5.0	12.3	8.8	108.36	
1	12.0	0.14	0.89	5.0	0.124	8.82	1.09	5.0	12.4	8.8	109.46	
1	13.0	0.08	0.89	5.0	0.071	8.82	0.62	5.0	12.5	8.8	110.08	
1	14.0	0.17	0.89	5.0	0.147	8.82	1.30	5.0	12.6	8.8	111.38	
1	15.0	0.18	0.89	5.0	0.158	8.82	1.40	5.0	12.8	8.8	112.78	
1	16.0	0.17	0.89	5.0	0.148	8.82	1.30	5.0	12.9	8.8	114.08	
1	17.0	0.11	0.89	5.0	0.099	8.82	0.87	5.0	13.0	8.8	114.95	
1	18.0	0.39	0.89	5.0	0.350	8.82	3.09	5.0	13.4	8.8	118.04	
1	19.0	0.11	0.89	5.0	0.100	8.82	0.88	5.0	13.5	8.8	118.92	
1	20.0	0.03	0.89	5.0	0.025	8.82	0.22	5.0	13.5	8.8	119.14	

IN-N-Out Parker, CO  
August 2, 2023

**APPENDIX E**  
**Proposed Drainage Map**

