Galloway
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December 20, 2022

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, 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 6th 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

APPENDIX A

Exhibits & Figures

VICINITY MAP

APPENDIX B

Hydrologic Computations

BASIN SUMMARY TABLE						
Tributary Sub-basin	Area (acres)	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (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

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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

		Paved Roads			Lawns			Roofs			
Basin ID	**Total Area (ac)**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**Basins Total 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

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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 DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					Tc CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C_{100}	C_5	L (FT)	S (%)	T_i (MIN)	L (FT)	S (%)	Cv	VEL. (FPS)	T_t (MIN)	COMP. T_c (MIN)	TOTAL LENGTH (FT)	Urbanized T_c (MIN)	T_c (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=Cv*S^0.5, S in ft/ft

Tc Check = 10+L/180

For Urbanized basins a minimum T_c of 5.0 minutes is required.

For non-urbanized basins a minimum T_c of 10.0 minutes is required

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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 (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	0.34	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.: INO000014.20
Calculated By: EKM
Checked By: PJD
Date: 12/6/22

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	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)	REMARKS
	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	5.0	0.53	8.82	4.7									Roof Drains Proposed Manhole
	3	A3	0.80	0.82	5.7	0.66	8.53	5.6	5.7	1.19	8.53	10.2									Proposed 5' Type R Inlet
	E1	OS2	0.22	0.82	5.0	0.18	8.82	1.6	5.0	1.37	8.82	12.1									Runoff from Lot 5 Existing Manhole
	O1	OS1	0.05	0.72	5.0	0.04	8.82	0.4				0.4									Offsite runoff

APPENDIX C

Hydraulic Computations

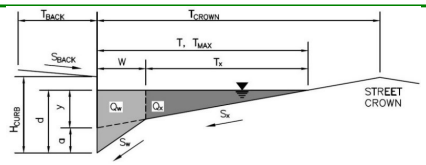
MHFD-Inlet, Version 5.02 (August 2022)

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 B1 (Basin A1)**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	2.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.100	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} =	30.0	ft
Gutter Width	W =	1.50	ft
Street Transverse Slope	S_X =	0.017	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.017	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	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	30.0	30.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	3.5	3.5	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

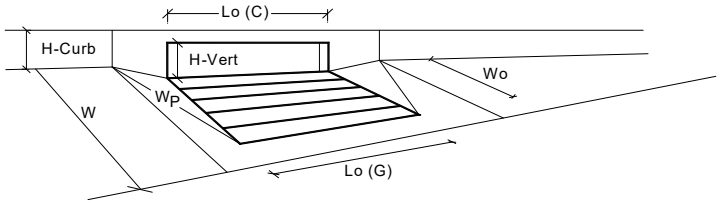
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.02 (August 2022)



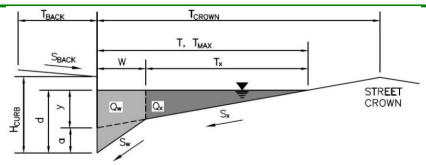
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	3.5	3.5	inches
Grate Information		MINOR	MAJOR	Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.50	1.50	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.27	0.27	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.99	0.99	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.4**	**3.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	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)**



Gutter Geometry:

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	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

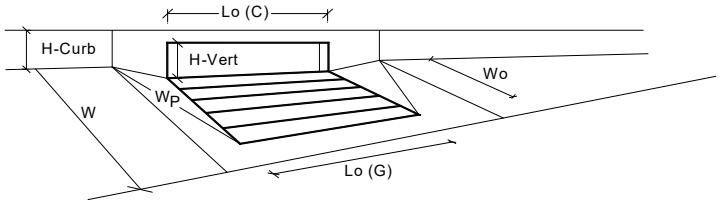
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**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	Type =	CDOT/Denver 13 Combination		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	3.6	3.6	inches
Grate Information		MINOR	MAJOR	Override Depths
Length of a Unit Grate	L_o (G) =	3.00	3.00	feet
Width of a Unit Grate	W_o =	1.73	1.73	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	0.43	0.43	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	3.30	3.30	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	0.60	0.60	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	3.00	3.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.50	6.50	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	5.25	5.25	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	0.00	0.00	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.70	3.70	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.66	0.66	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	0.38	0.38	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.26	0.26	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	0.42	0.42	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	N/A	N/A	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.42	0.42	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**2.6**	**2.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	0.5	2.3	cfs

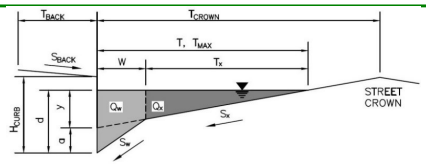
MHFD-Inlet, Version 5.02 (August 2022)

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	T_{BACK} =	20.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	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} =	28.0	ft
Gutter Width	W =	1.50	ft
Street Transverse Slope	S_X =	0.030	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.030	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	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	28.0	28.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

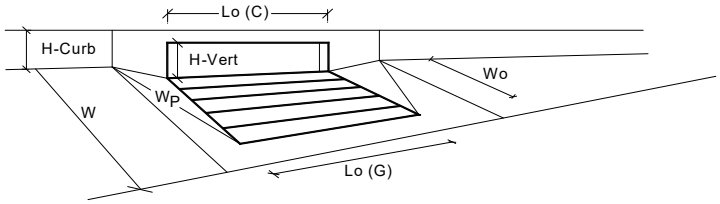
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

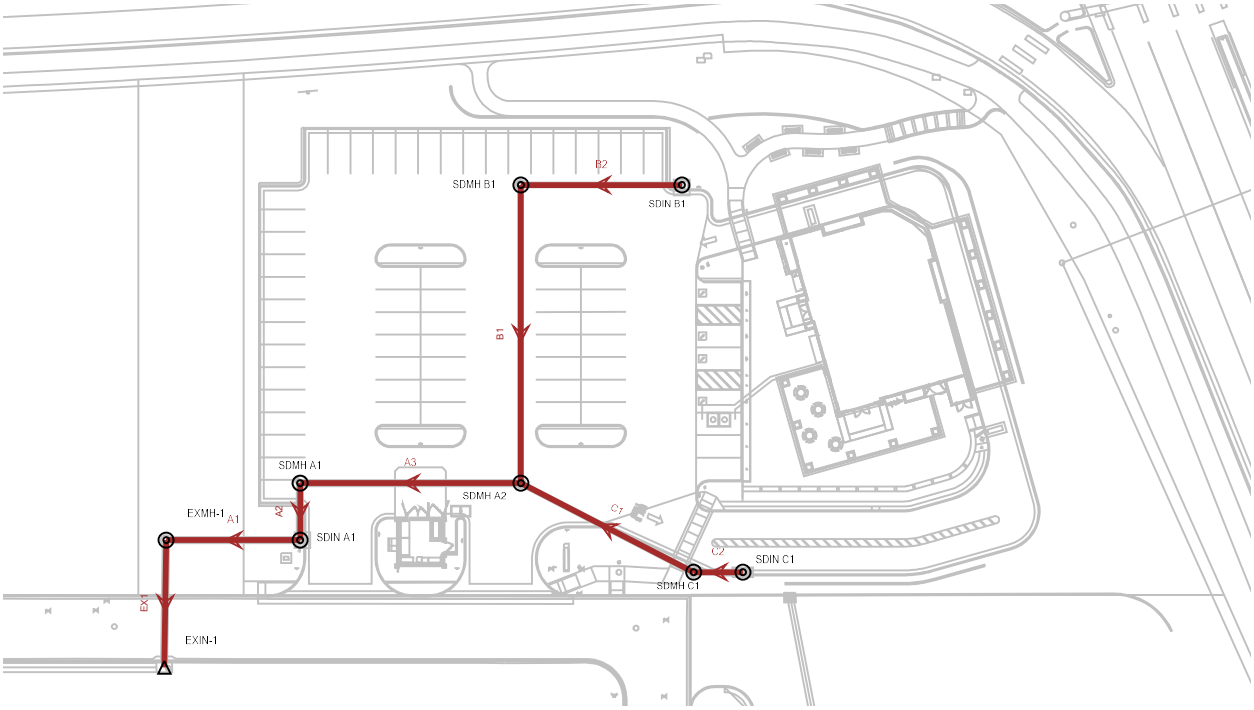
INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.02 (August 2022)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.50	1.50	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.46	0.46	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**7.6**	**7.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	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	5,791.04	5,790.79	5,791.18	5,791.43	1.10	3.88	24.6	0.010	Circle	18.0	Concrete	0.013	10.60	0.33
A3	SDMH A2	SDMH A1	5,792.31	5,791.34	5,791.66	5,792.70	1.10	3.99	88.1	0.011	Circle	18.0	Concrete	0.013	11.02	0.32
B1	SDMH B1	SDMH A2	5,795.19	5,792.81	5,792.98	5,795.42	0.30	3.54	117.2	0.020	Circle	12.0	Concrete	0.013	5.08	0.16
B2	SDIN B1	SDMH B1	5,796.77	5,795.49	5,795.66	5,797.00	0.30	3.52	64.2	0.020	Circle	12.0	Concrete	0.013	5.03	0.17
C1	SDMH C1	SDMH A2	5,793.66	5,792.81	5,793.06	5,793.95	0.50	3.29	78.4	0.011	Circle	12.0	Concrete	0.013	3.71	0.25
C2	SDIN C1	SDMH C1	5,794.08	5,793.86	5,794.11	5,794.37	0.50	3.33	19.7	0.011	Circle	12.0	Concrete	0.013	3.77	0.25
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

\\galfs1.graa.lcl\dwgs\In-N-Out\CO, Parker (SWC Parker & Pine)\0CIV\Drain Reports\Prop\StormCAD\INO014_StormCAD.stsw

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	5,801.48	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	5,805.98	(N/A)	(N/A)	5,796.77	0.30	5,797.00	5,797.00	Box Structure	-	3.00	5.00	Standard	5' TYPE R INLETIN SUMP (PRIVATE)
SDIN C1	5,804.89	(N/A)	(N/A)	5,794.08	0.50	5,794.37	5,794.37	Box Structure	-	2.00	8.33	Standard	DOUBLE TYPE 13 COMBO INLET IN SUMP (PRIVATE)
SDMH A1	5,802.06	5,791.34	(N/A)	5,791.04	1.10	5,791.43	5,791.62	Circular Structure	72.0	-	-	Standard	MH-ECCENTRIC (6' %%c)
SDMH A2	5,803.52	5,792.81	5,792.81	5,792.31	1.10	5,792.70	5,792.86	Circular Structure	48.0	-	-	Standard	MH-ECCENTRIC (4' %%c)
SDMH B1	5,805.86	5,795.49	(N/A)	5,795.19	0.30	5,795.42	5,795.52	Circular Structure	48.0	-	-	Standard	MH-ECCENTRIC (4' %%c)
SDMH C1	5,805.46	5,793.86	(N/A)	5,793.66	0.50	5,793.95	5,794.00	Circular Structure	48.0	-	-	Standard	MH-ECCENTRIC (4' %%c)

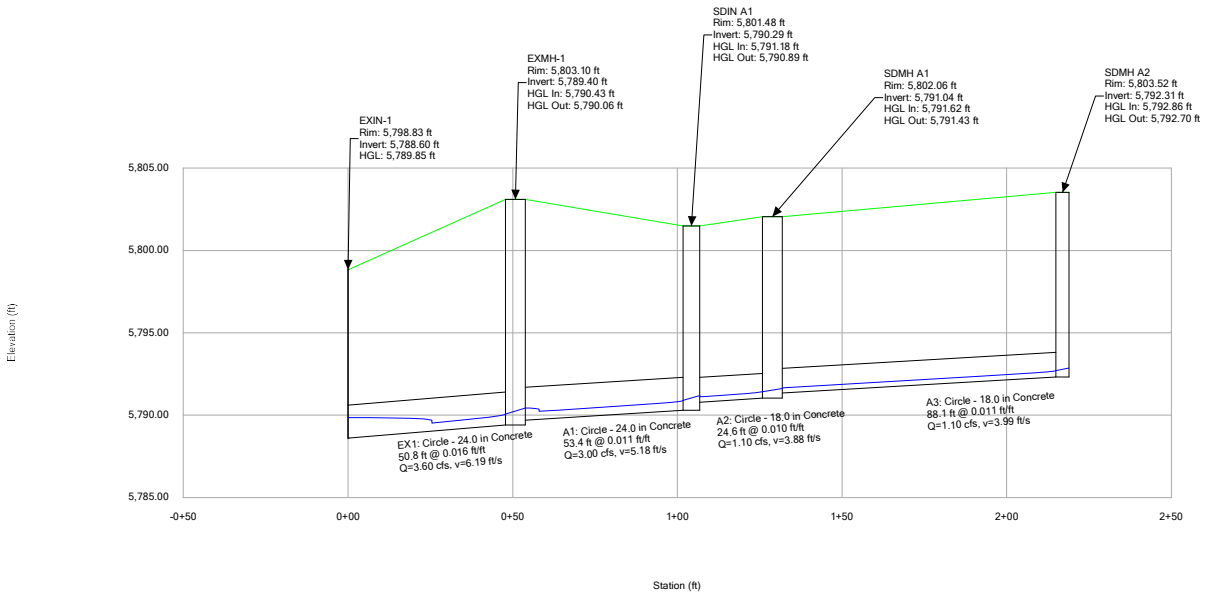
\\galfs1.graa.lcl\dwgs\In-N-Out\CO, Parker (SWC Parker & Pine)\0CIV\Drain Reports\Prop\StormCAD\INO014_StormCAD.stsw

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

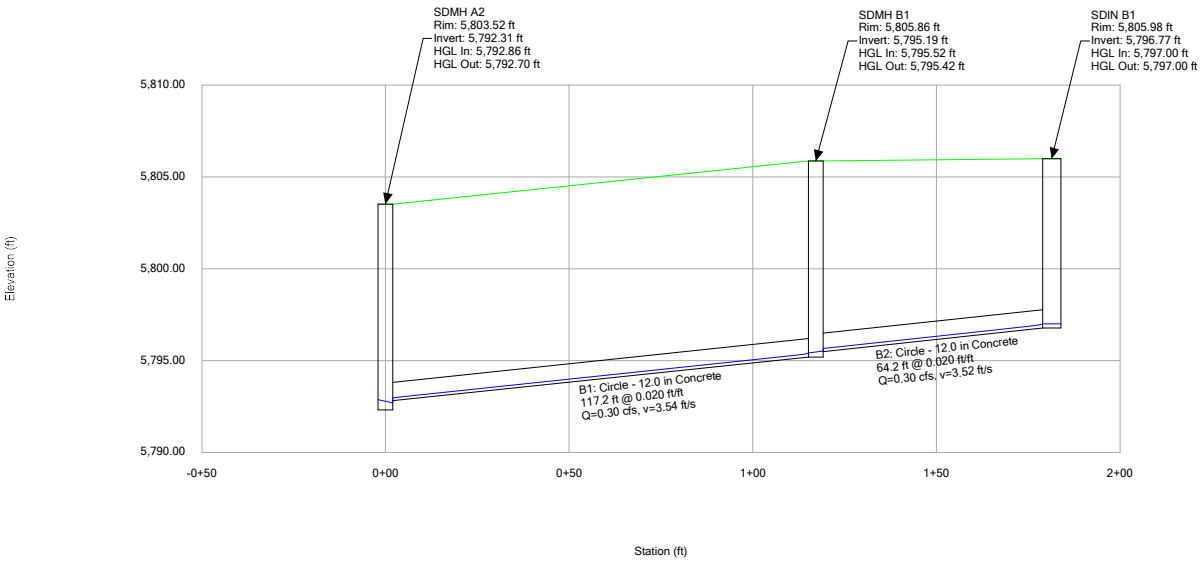
Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)
EXIN-1	5,798.83	5,788.60	User Defined Tailwater	5,789.85	5,789.85	3.60

\\galfs1.graa.lcl\dwgs\In-N-Out\CO, Parker (SWC Parker & Pine)\0CIV\Drain Reports\Prop\StormCAD\INO014_StormCAD.stsw

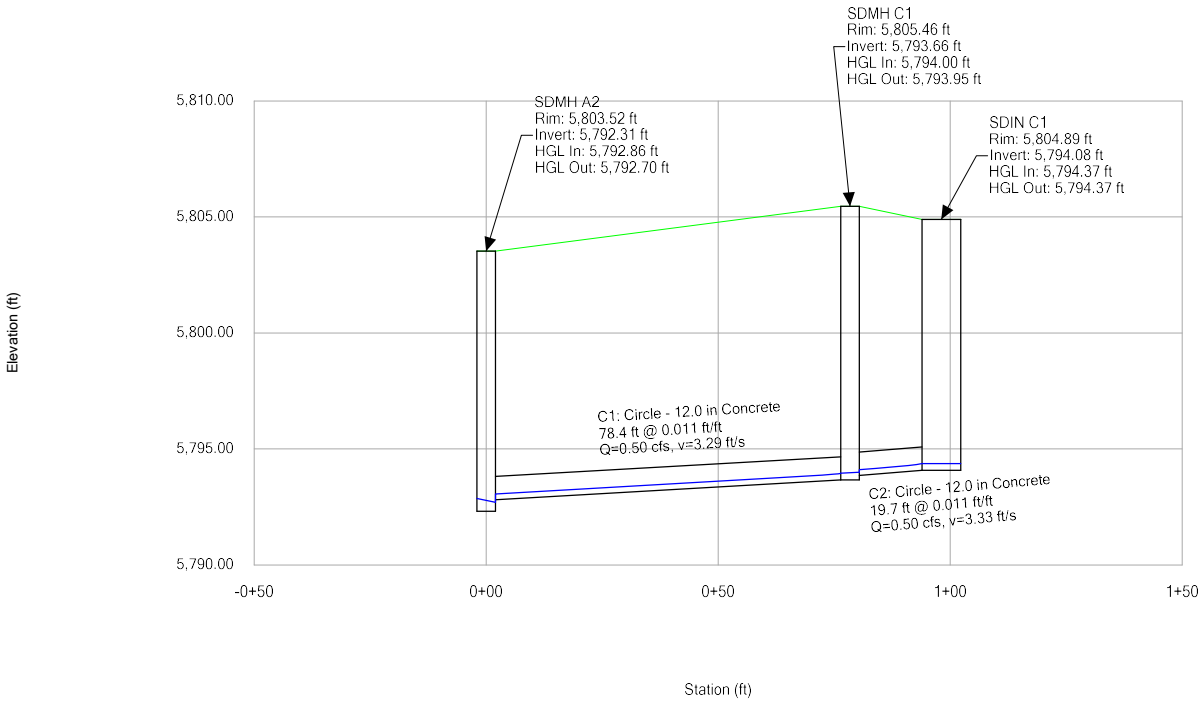
Profile Report
Engineering Profile - Profile A (INO014_StormCAD.stsw)
Active Scenario: 5-Year



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	5,791.04	5,790.79	5,792.05	5,792.02	4.70	5.82	24.6	0.010	Circle	18.0	Concrete	0.013	10.60	0.70
A3	SDMH A2	SDMH A1	5,792.31	5,791.34	5,792.32	5,793.14	4.70	5.99	88.1	0.011	Circle	18.0	Concrete	0.013	11.02	0.68
B1	SDMH B1	SDMH A2	5,795.19	5,792.81	5,793.54	5,795.67	1.30	5.41	117.2	0.020	Circle	12.0	Concrete	0.013	5.08	0.35
B2	SDIN B1	SDMH B1	5,796.77	5,795.49	5,795.84	5,797.25	1.30	5.37	64.2	0.020	Circle	12.0	Concrete	0.013	5.03	0.35
C1	SDMH C1	SDMH A2	5,793.66	5,792.81	5,793.54	5,794.31	2.30	4.97	78.4	0.011	Circle	12.0	Concrete	0.013	3.71	0.57
C2	SDIN C1	SDMH C1	5,794.08	5,793.86	5,794.43	5,794.73	2.30	5.03	19.7	0.011	Circle	12.0	Concrete	0.013	3.77	0.56
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	5,801.65	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	5,805.98	(N/A)	(N/A)	5,796.77	1.30	5,797.25	5,797.25	Box Structure	-	3.00	5.00	Standard	5' TYPE R INLETIN SUMP (PRIVATE)
SDIN C1	5,804.89	(N/A)	(N/A)	5,794.08	2.30	5,794.73	5,794.73	Box Structure	-	2.00	8.33	Standard	DOUBLE TYPE 13 COMBO INLET IN SUMP (PRIVATE)
SDMH A1	5,802.03	5,791.34	(N/A)	5,791.04	4.70	5,792.01	5,792.32	Circular Structure	72.0	-	-	Standard	MH-ECCENTRIC (6' %%c)
SDMH A2	5,803.67	5,792.81	5,792.81	5,792.31	4.70	5,793.14	5,793.54	Circular Structure	48.0	-	-	Standard	MH-ECCENTRIC (4' %%c)
SDMH B1	5,805.87	5,795.49	(N/A)	5,795.19	1.30	5,795.67	5,795.92	Circular Structure	48.0	-	-	Standard	MH-ECCENTRIC (4' %%c)
SDMH C1	5,805.46	5,793.86	(N/A)	5,793.66	2.30	5,794.31	5,794.42	Circular Structure	48.0	-	-	Standard	MH-ECCENTRIC (4' %%c)

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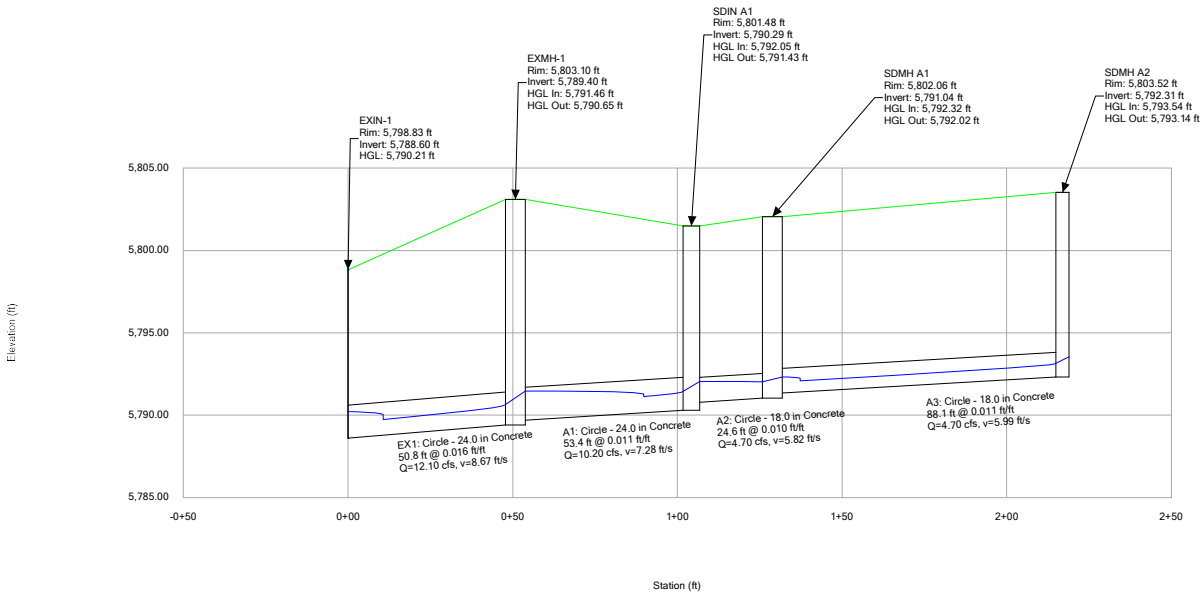
Scenario: 100-Year
Current Time Step: 0.000Hr
FlexTable: Outfall Table

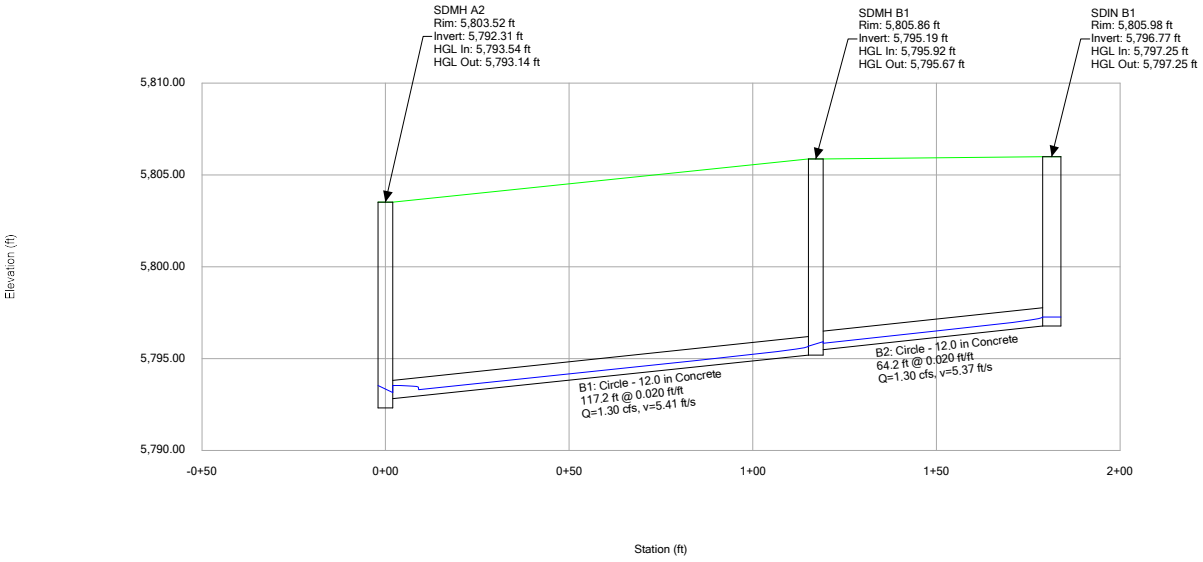
Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)
EXIN-1	5,798.83	5,788.60	User Defined Tailwater	5,790.21	5,790.21	12.10

\\galfs1.graa.lcl\dwgs\In-N-Out\CO, Parker (SWC Parker & Pine)\0CIV\Drain Reports\Prop\StormCAD\INO014_StormCAD.stsw

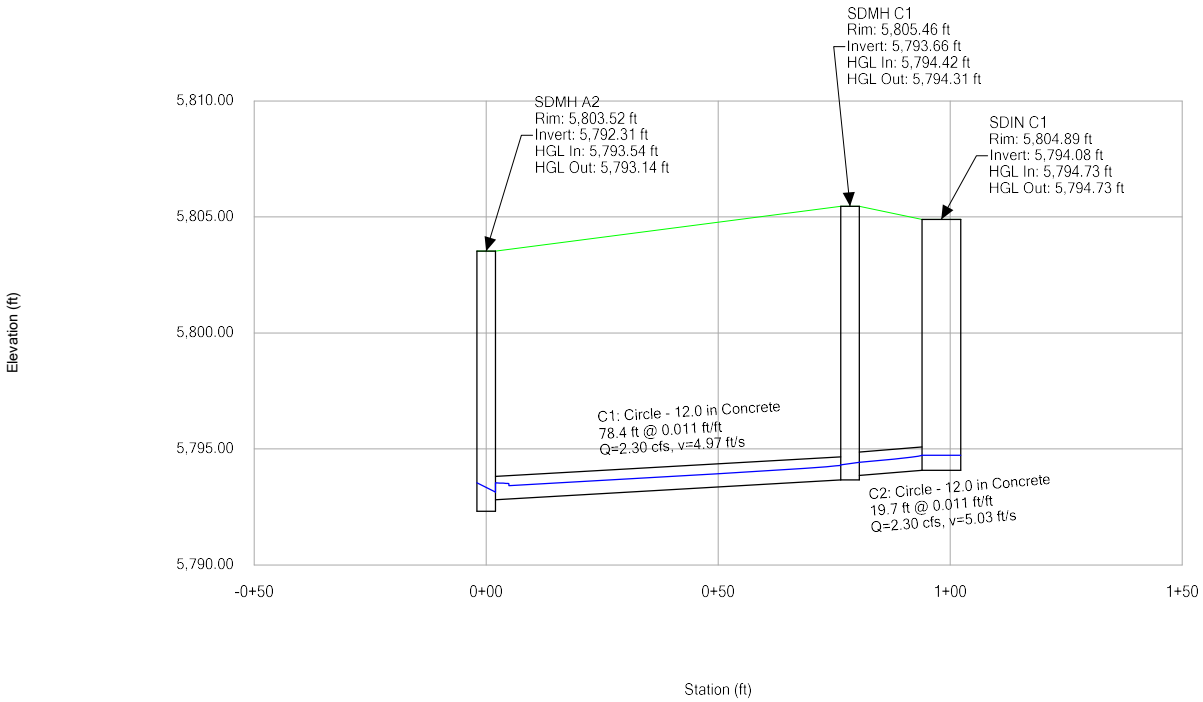
Profile Report
Engineering Profile - Profile A (INO014_StormCAD.stsw)
Active Scenario: 100-Year



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



APPENDIX D

Excerpts from Parker & Pine Retail Final Drainage Report

Town of Parker

Parker Auto Plaza Filing No. 1

Lot 1, Block 3

Parker & Pine Retail
Final Drainage Report

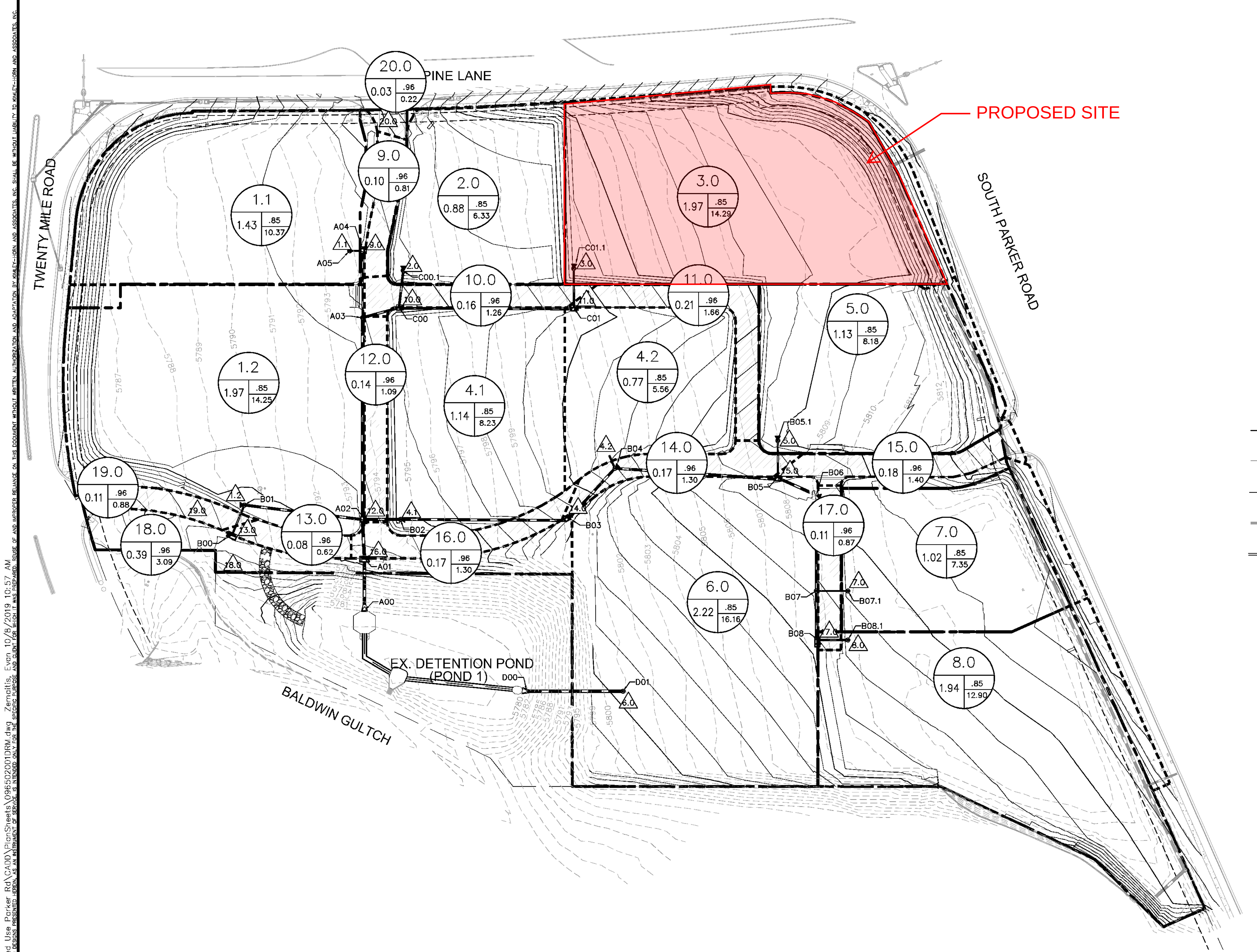
NOVEMBER 2019 | VERSION 1

Prepared By:

Kimley»Horn

4582 South Ulster Street, Suite 1500

Denver, CO 80237



LEGEND

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

Know what's below. Call before you dig.

NO. | REVISION | BY | DATE | APPR

Kimley»Horn

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 and Associates, Inc.

PROJECT NO.
096502001

DRAWING NAME
096502001DRM

DRAINAGE

K:\DEN_Civil\096502001 – Mixed Use Parker Rd\CADD\PlanSheets\096502001DRM.dwg Zemaitis, Evan 10/8/2019 10:57 AM

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	

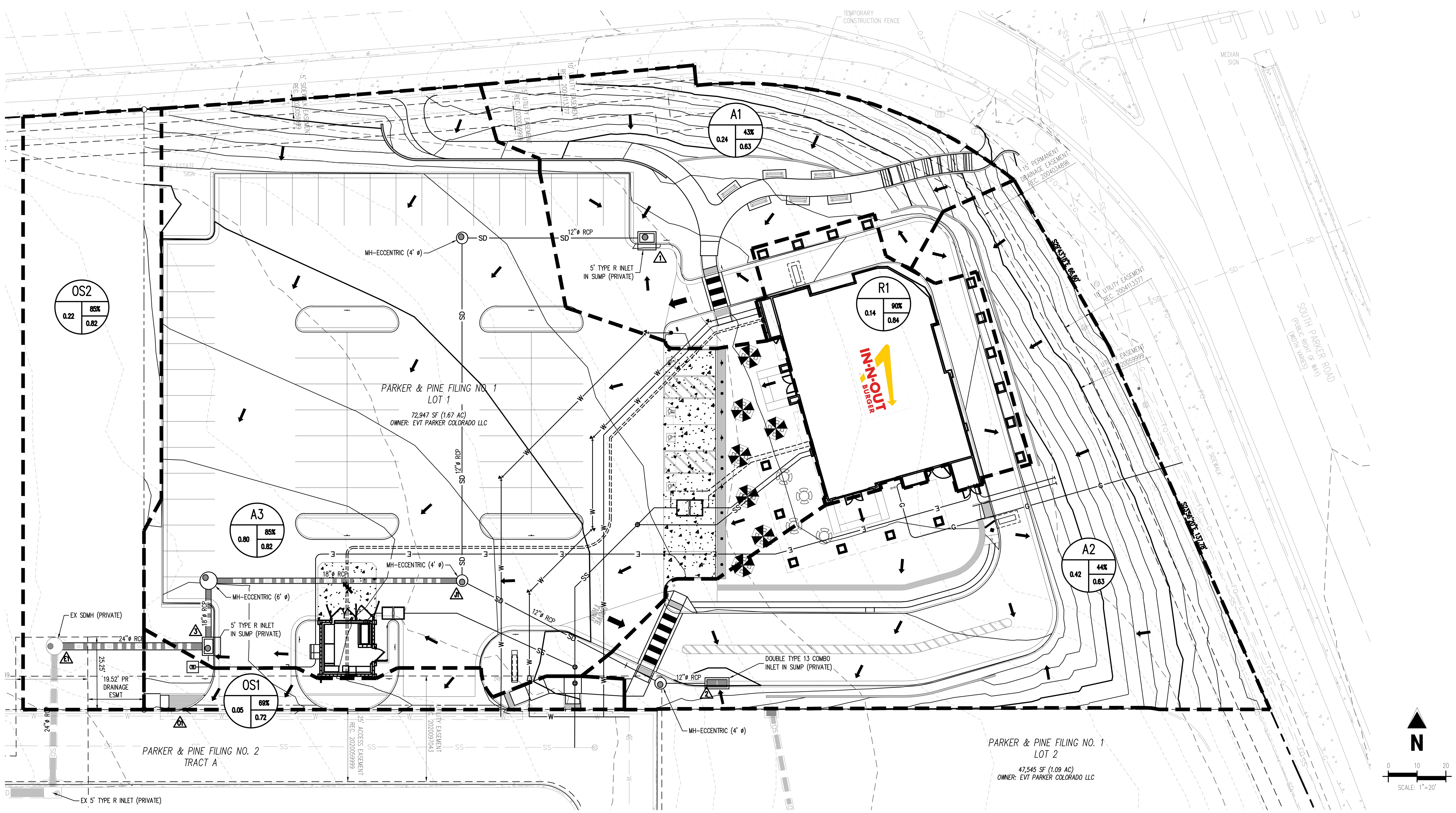
100-Year Design Storm Runoff Calculations

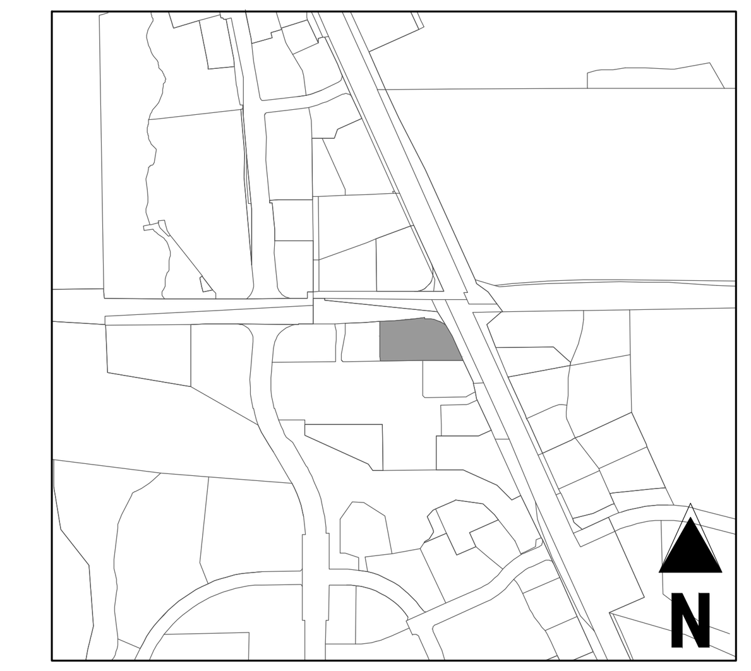
(Rational Method Procedure)

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	

APPENDIX E

Proposed Drainage Map





KEY MAP
NOT TO SCALE

DRAINAGE LEGEND

- PROPERTY BOUNDARY LINE
- ADJACENT PROPERTY BOUNDARY LINE
- RIGHT OF WAY BOUNDARY LINE
- ROAD CENTERLINE
- EXISTING EASEMENT LINE
- PROPOSED EASEMENT LINE
- SD — EXISTING STORM SEWER (LESS THAN 12"ø)
- SD — EXISTING STORM SEWER (12"ø AND LARGER)
- SD — PROPOSED STORM SEWER (LESS THAN 12"ø)
- SD — PROPOSED STORM SEWER (12"ø AND LARGER)
- 5460 — EXISTING MAJOR CONTOUR
- 52 — EXISTING MINOR CONTOUR
- 5465 — PROPOSED MAJOR CONTOUR
- 66 — PROPOSED MINOR CONTOUR
- MAJOR BASIN BOUNDARY LINE
- 5 — DESIGN POINT
- P1 — PIPE LABEL
- EXISTING FLOW ARROW
- PROPOSED FLOW ARROW
- 100 — BASIN DESIGNATION
- 5% — PERCENT IMPERVIOUS
- 0.00 — 100-YEAR RUNOFF COEFFICIENT
- 0.00 — BASIN AREA IN ACRES

BASIN SUMMARY TABLE						
Basin ID	Area (AC)	C5	C100	tc (min)	Q5 (cfs)	Q100 (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

LEGAL DESCRIPTION

LOT 1, PARKER & PINE FILING NO. 1, COUNTY OF DOUGLAS, STATE OF COLORADO

BENCHMARK

PUBLISHED BENCHMARK: ELEVATIONS ARE BASED ON A DOUGLAS COUNTY CONTROL MONUMENT, STATION NAME: CRAIN, BEING A BRASS DISK LOCATED AT 125 FEET NORTH OF THE CENTERLINE OF A DRIVEWAY, 84 FEET SOUTH OF A DOUBLE 36 IN CULVERT, 25 FEET WEST OF THE EDGE OF PARKER ROAD, AND 25 FEET EAST OF THE WEST RIGHT OF WAY FENCE.

ELEVATION = 5734.25 FEET (NAVD 88) PUBLISHED BY DOUGLAS COUNTY

BASIS OF BEARING

BASIS OF BEARING: ALL BEARINGS ARE GRID BEARINGS OF THE COLORADO STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM 1983. THE WEST LINE OF THE SOUTHWEST QUARTER OF SECTION 10, TOWNSHIP 6 SOUTH, RANGE 66 WEST BEARS N00°17'51"E, MONUMENTED BY THE SOUTHWEST CORNER OF SAID SECTION 10, BEING A 3-1/4 INCH ALUMINUM CAP STAMPED "LS 19003", AND MONUMENTED BY THE WEST QUARTER CORNER OF SAID SECTION 10, BEING A 3-1/4" ALUMINUM CAP STAMPED "PLS 22561", AS SHOWN HEREON.

CAUTION – NOTICE TO CONTRACTOR

1. ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
2. WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POTHOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.

Know what's below. Call before you dig.

Galloway
5500 Greenwood Plaza Blvd, Suite 200
Greenwood Village, CO 80111
303.770.8884
GallowayUS.com

PRELIMINARY
NOT FOR BIDDING
NOT FOR CONSTRUCTION

IN-N-OUT BURGER
CONSTRUCTION DOCUMENTS
PARKER & PINE FILING NO. 1, LOT 1

PARKER, CO 80134

#	Date	Issue / Description	Init.

Project No: INO000014.20
Drawn By:
Checked By:
Date: 12/6/2022

DRAINAGE MAP

DR01