Galloway
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Greenwood Village, CO 80111
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10/30/2024
Town of Parker
Engineering Department
20120 East Mainstreet
Parker, CO 80138

RE: Mister Car Wash – Parker Pointe Subdivision – Parker, CO

Introduction
This drainage conformance letter is for the proposed Mister Car Wash (MCW) pad development on Lot 13 of the Parker Pointe overall development in Parker, Colorado. The objective is to show that the proposed drainage design for the site conforms with the *"Final Drainage Report – Parker Pointe"* (Overall Report) prepared by Perception Design. Excerpts from the Overall Report are included in Appendix E of this report.

The proposed MCW development site is 1.35 acres. The existing site is overlot graded sloping from west to east with an existing storm sewer inlet provided from the storm main in the private drive to the east. The proposed improvements include a 5,440 sf car wash facility, parking areas, drive aisles, pos canopy, attendant hut, landscaping and sidewalks. Runoff from the building roof will be collected in roof drains and rounded via underground storm sewer. Ground runoff will be collected by an on-site storm sewer system which will connect to the existing storm system. Drainage for the Mister Car Wash site is consistent and meets the assumptions of the Overall Report. During development of the overall site, a storm sewer stub was provided to convey developed runoff to the extended detention basin at the southeast corner of the overall site that provides both detention and water quality facilities.

Drainage Narrative
Per the Overall Report, the car wash site is the Overall Report Basin L13 and a portion of Basin L14, which were both 0.73 acres and assumed to have an imperviousness of 95% for both basins. The expected runoff for the MCW site, per the overall report for each basin, is 2.78 cfs and 5.69 cfs in the 5- and 100-yr events, respectively.

The proposed MCW development is 1.35 acres and has an imperviousness of 73.7%. Runoff flows generated by the site are 2.56 cfs in the 5-year storm and 5.38 cfs in the 100-year storm.

A curb inlet in the shared drive to the east with a storm stub was provided at the southeast end of the carwash site for connection to onsite storm system. Due to the location of the proposed MCW site entrance that existing inlet is proposed to be replaced with a manhole and a new curb inlet is proposed north of the site entrance. Since the existing inlet was an on-grade inlet, relocating it slightly will have no adverse impact on the overall development.

On the MCW site, a proposed storm sewer system will collect onsite flows and convey them to proposed connection to existing location. The existing storm conveys the flows to the Water Quality and Detention Pond southeast of the MCW site that is designed to accommodate the majority of the Parker Pointe Development (see Appendix E). Ultimately pond outflows discharge to Kinney Creek.

NRCS Web Soil survey results indicated the site's native soils are Hydrologic Group A. A copy of the WSS is included in Appendix C.

Drainage Analysis & Details
The proposed MCW drainage plan includes three (5) onsite basins as described below. Please refer to Appendix D for a copy of the Drainage Map, and Appendix A for hydrologic calculations.

- Basin MCW-1 (0.18 ac, 7.66% impervious) –The landscaped area west of the proposed car wash building will continue following existing drainage patterns and flow offsite to Parker Rd.

The site is not able to be lowered enough to capture these flows as it is constrained by storm cover and an existing Magellan gas line on the west side of the site. This conforms with the Overall Report, which describes this constrained condition for their Basins L10 through L15. Additionally, since the undeveloped lot currently drains offsite towards Parker Road, and no impervious surface is proposed in the basin, Basin MCW-1 should have no adverse impacts to the offsite stormwater conditions.

- Basin MCW-2 (0.14 ac, 90.3% impervious) – The majority of the basin encompasses the car wash flows through roof drains. These are connected to storm sewer infrastructure that ultimately gets conveyed to the southeast corner of the site to the existing inlet. This existing inlet will be resized to capture the entire site's runoff. The remaining flow within this basin is comprised of paved areas that all sheet flows to the trench drain at the south end of the basin.

- Basin MCW-3 (0.30 ac, 79.7% impervious) – The majority of this basin is pavement that sheet flows to the curb and gutters conveying the flow to the curb inlet on the north side of the site.

- Basin MCW-4 (0.42 ac, 87.6% impervious) – This basin is comprised of primarily pavement and landscaping including the center and southeast portion of the site. Flows sheet flow into a concrete valley pan adjacent to the parking stalls that is conveyed southwest to a curb inlet.

- Basin MCW-5 (0.02 ac, 100.00% impervious) – This basin is a portion of the sidewalk along the shared drives. Flows from this basin will drain south in the shared drive to an existing inlet as designed with the overall report.

The proposed car wash storm sewer system was analyzed using Bently Storm CAD and Inlet capacities were calculated using the MHFD UD-Inlet spread sheet. Please refer to Appendix B for results.

Conclusions:
The drainage design for the Mister Car Wash follows the Overall Report. The actual design for the onsite drainage area is 1.35 acres with an imperviousness of 73.7% which is less than what was assumed in the overall report. The Mister Car Wash Development does not create additional flows or cause adverse impacts to the overall drainage. Therefore, the Mister Car Wash development and drainage design is in conformance.

Sincerely,
GALLOWAY

Michael Kracov
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303.770.8884

Appendices:

Appendix A – Hydrologic Computations

Appendix B – StormCAD Results & Inlet Capacities

Appendix C – Web Soil Survey

Appendix D – Proposed Drainage Plan

Appendix E – Excerpts from “Final Drainage Report – Parker Pointe”

Appendix A: Hydrologic Computations

BASIN SUMMARY TABLE						
Tributary Sub-basin	Area (acres)	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
MCW-1	0.18	0.03	0.17	11.19	0.04	0.20
MCW-2	0.14	0.76	0.81	7.09	0.47	0.96
MCW-3	0.30	0.64	0.73	9.45	0.73	1.58
MCW-4	0.42	0.73	0.79	7.72	1.28	2.55
MCW-5	0.02	0.86	0.89	5.00	0.05	0.09

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COMPOSITE % IMPERVIOUS CALCULATIONS

Subdivision: Parker Point
Location: CO, Parker

Project Name: Mister Car Wash
Project No.: TEC04
Calculated By: KML
Checked By: MRK
Date: 7/26/24

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.	
MCW-1	0.18	100	0.01	7.7	0	0.17	0.0	90	0.00	0.00	7.66
MCW-2	0.14	100	0.02	12.3	0	0.00	0.0	90	0.12	78.00	90.26
MCW-3	0.30	100	0.22	74.5	0	0.06	0.0	90	0.02	5.20	79.67
MCW-4	0.42	100	0.37	87.6	0	0.05	0.0	90	0.00	0.00	87.63
MCW-5	0.02	100	0.02	100.0	0	0.00	0.0	90	0.00	0.00	100.00
Total MCW	1.06	100	0.64		0	0.28		100	0.14		73.71

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STANDARD FORM SF-2
TIME OF CONCENTRATION

Subdivision: Parker Point
Location: CO, Parker

Project Name: Mister Car Wash
Project No.: TEC04
Calculated By: KML
Checked By: MRK
Date: 7/26/24

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)
MCW-1	0.18	A	7.7	0.17	0.03	215	1.5	25.1	0	1.5	20.0	2.4	0.0	25.1	215.0	11.2	11.2
MCW-2	0.14	A	90.3	0.81	0.76	170	1.5	7.1	0	1.5	20.0	2.4	0.0	7.1	170.0	10.9	7.1
MCW-3	0.30	A	79.7	0.73	0.64	165	1.5	9.5	0	1.5	20.0	2.4	0.0	9.5	165.0	10.9	9.5
MCW-4	0.42	A	87.6	0.79	0.73	170	1.5	7.7	0	1.5	20.0	2.4	0.0	7.7	170.0	10.9	7.7
MCW-5	0.02	A	100.0	0.89	0.86	55	1.5	2.8	0	1.5	20.0	2.4	0.0	2.8	55.0	10.3	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

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

Subdivision: Parker Point
Location: CO, Parker
Design Storm: 5-Year

Project Name: Mister Car Wash
Project No.: TEC04
Calculated By: KML
Checked By: MRK
Date: 7/26/24

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	MCW-1	0.18	0.03	11.2	0.01	3.59	0.04													
	2	MCW-2	0.14	0.76	7.1	0.11	4.26	0.47													
	3	MCW-3	0.30	0.64	9.5	0.19	3.84	0.73													
	4	MCW-4	0.42	0.73	7.7	0.31	4.14	1.28													
	5	MCW-5	0.02	0.86	5.0	0.01	4.71	0.05													

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

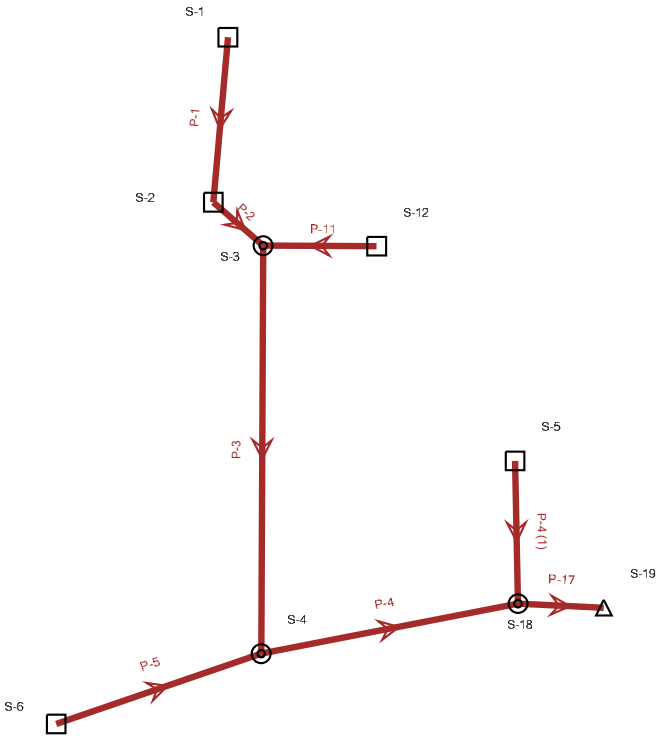
Subdivision: Parker Point
Location: CO, Parker
Design Storm: 100-Year

Project Name: Mister Car Wash
Project No.: TEC04
Calculated By: KML
Checked By: MRK
Date: 7/26/24

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	MCW-1	0.18	0.17	11.19	0.03	6.72	0.20													
	2	MCW-2	0.14	0.81	7.09	0.12	7.96	0.96													
	3	MCW-3	0.30	0.73	9.45	0.22	7.19	1.58													
	4	MCW-4	0.42	0.79	7.72	0.33	7.74	2.55													
	5	MCW-5	0.02	0.89	5.00	0.01	8.82	0.09													

Appendix B: StormCAD Results & Inlet Capacities

Scenario: 5-YR

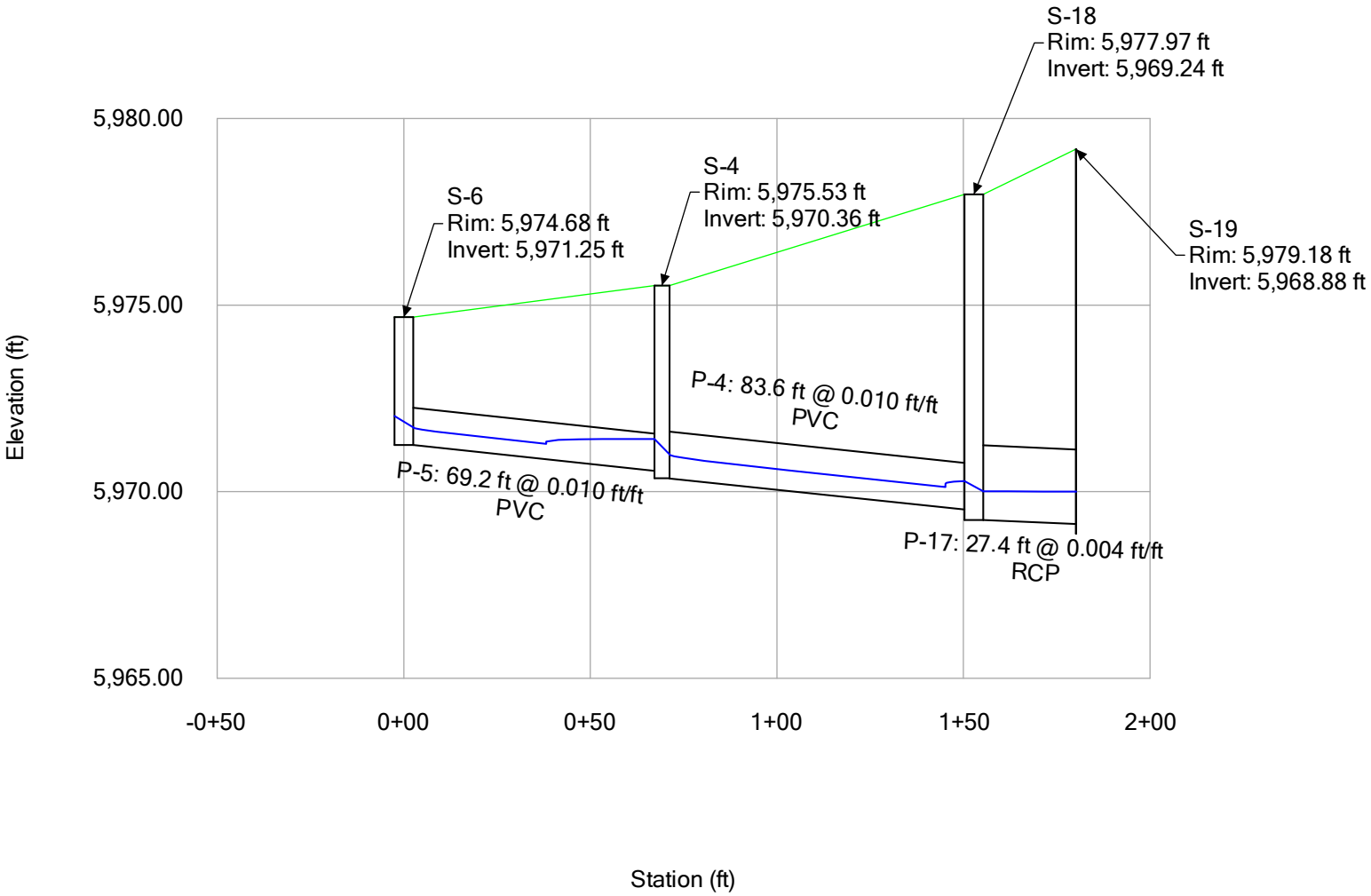


Scenario: 5-YR Flextable: Conduit Table																
Label	Start Node	Invert (Start)(ft)	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Section Type	Diameter (in)	Manning's n	Slope (Calculated) (ft/ft)	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
P-17	S-18	5,969.24	S-19	5,969.13	27.4	Circle	24	0.013	0.004	3.68	3.82	14.33	5,970.01	5,970.00	5,970.18	5,970.12
P-4 (1)	S-18	5,969.88	S-5	5,969.44	44.1	Circle	15	0.013	0.01	1.1	0.9	6.46	5,970.47	5,970.30	5,970.49	5,970.45
P-4	S-4	5,970.36	S-18	5,969.52	83.6	Circle	15	0.013	0.01	2.58	4.97	6.46	5,971.00	5,970.28	5,971.26	5,970.45
P-11	S-12	5,972.79	S-3	5,972.06	36.2	Circle	8	0.013	0.02	0.1	2.67	1.71	5,972.93	5,972.41	5,972.98	5,972.42
P-2	S-2	5,972.00	S-3	5,971.83	21.1	Circle	12	0.013	0.008	1.2	3.77	3.19	5,972.46	5,972.41	5,972.64	5,972.51
P-3	S-3	5,971.63	S-4	5,970.56	130.4	Circle	12	0.013	0.008	1.3	3.89	3.23	5,972.11	5,971.41	5,972.30	5,971.46
P-1	S-1	5,972.61	S-2	5,972.19	52.9	Circle	12	0.013	0.008	0.73	3.29	3.19	5,972.97	5,972.75	5,973.10	5,972.79
P-5	S-6	5,971.25	S-4	5,970.56	69.2	Circle	12	0.013	0.01	1.28	4.17	3.56	5,971.73	5,971.41	5,971.91	5,971.46

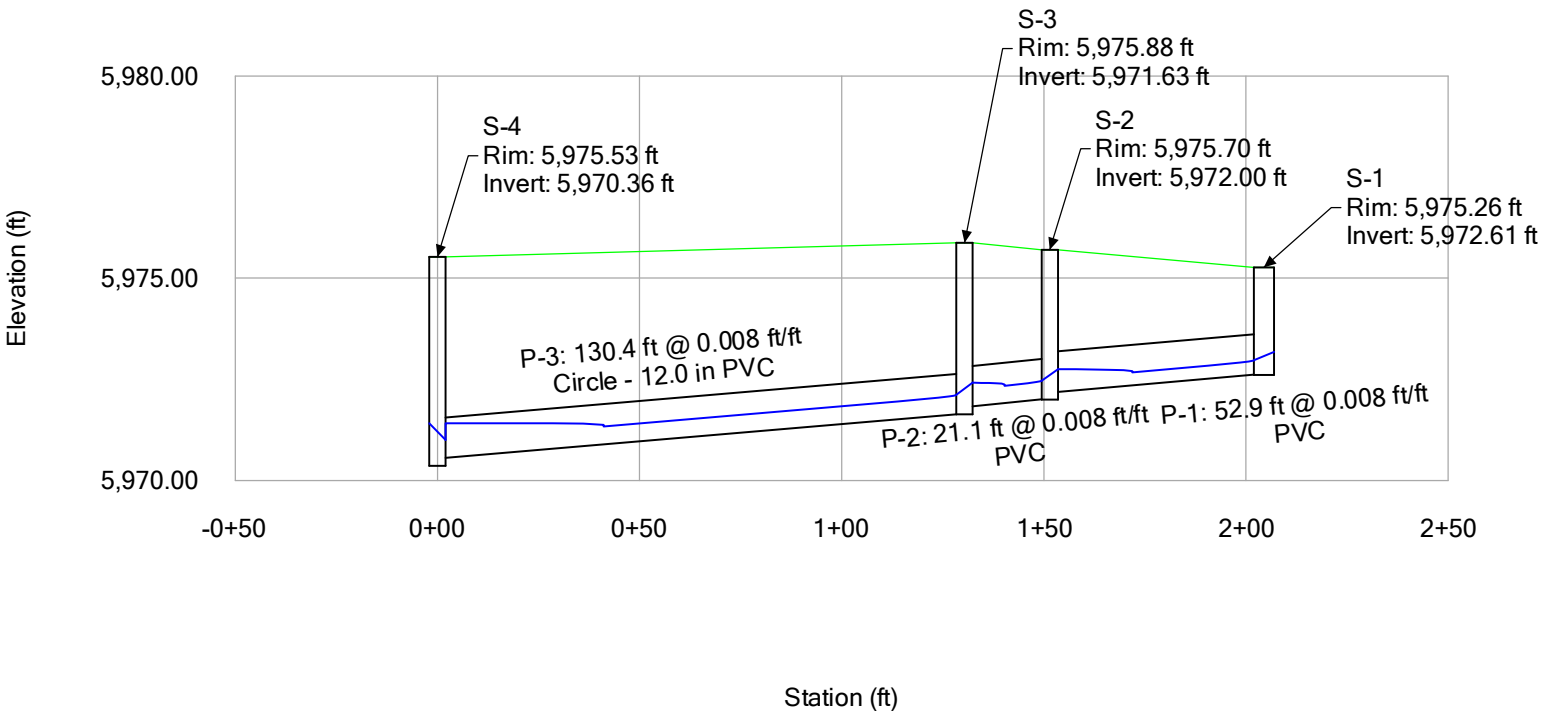
Scenario: 5-YR Flextable: Catch Basin								
Label	Flow (Additional Subsurface) (cfs)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method	Headloss Coefficient (Standard)
S-1	0.73	5,975.26	5,972.61	0.73	5,973.18	5,972.97	Standard	1.6
S-12	0.1	5,976.76	5,972.79	0.1	5,973.01	5,972.93	Standard	1.6
S-6	1.28	5,974.68	5,971.25	1.28	5,972.02	5,971.73	Standard	1.6
S-5	1.1	5,978.59	5,969.44	1.1	5,970.50	5,970.47	Standard	1.6
S-2	0.47	5,975.70	5,972.00	1.2	5,972.75	5,972.46	Standard	1.6

Scenario: 5-YR Flextable: Manhole								
Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method	Headloss Coefficient (Standard)
S-18	5,977.97	5,969.24	3.68	0.77	5,970.28	5,970.01	Standard	1.6
S-3	5,975.88	5,971.63	1.3	0.48	5,972.41	5,972.11	Standard	1.6
S-4	5,975.53	5,970.36	2.58	0.64	5,971.41	5,971.00	Standard	1.6

Profile Report
Engineering Profile - STORM LINE 1 (TEC04_StormCAD.stsw)



Profile Report
Engineering Profile - STORM LINE 2 (TEC04_StormCAD.stsw)

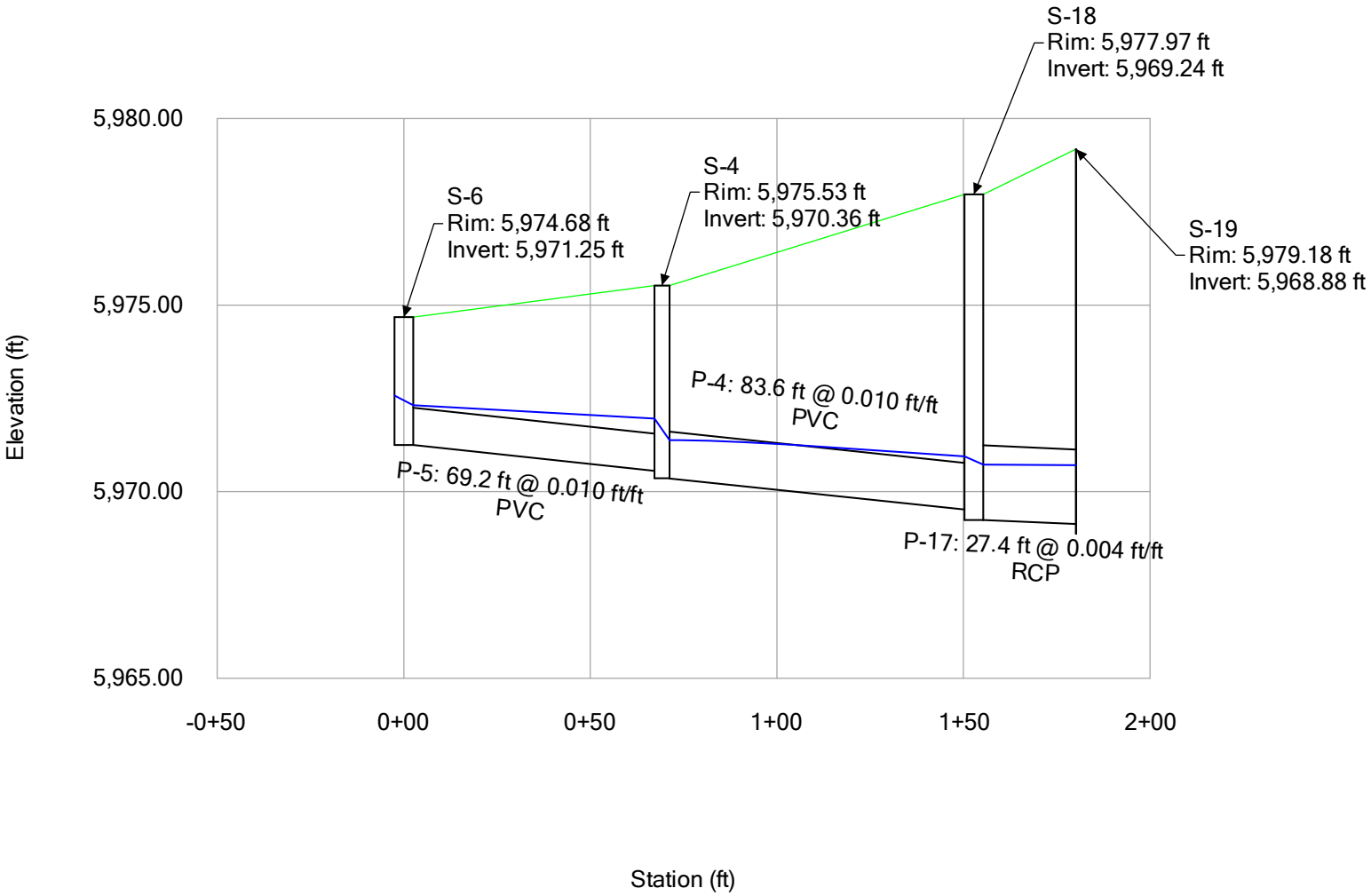


Scenario: 100-YR Flextable: Conduit Table																
Label	Start Node	Invert (Start)(ft)	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Section Type	Diameter (in)	Manning's n	Slope (Calculated) (ft/ft)	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
P-17	S-18	5,969.24	S-19	5,969.13	27.4	Circle	24	0.013	0.004	7.4	4.6	14.33	5,970.73	5,970.71	5,970.86	5,970.83
P-4 (1)	S-18	5,969.88	S-5	5,969.44	44.1	Circle	15	0.013	0.01	2.21	1.8	6.46	5,971.01	5,970.95	5,971.06	5,971.01
P-4	S-4	5,970.36	S-18	5,969.52	83.6	Circle	15	0.013	0.01	5.19	5.86	6.46	5,971.38	5,970.95	5,971.74	5,971.22
P-11	S-12	5,972.79	S-3	5,972.06	36.2	Circle	8	0.013	0.02	0.3	3.69	1.71	5,973.04	5,972.96	5,973.13	5,972.97
P-2	S-2	5,972.00	S-3	5,971.83	21.1	Circle	12	0.013	0.008	2.34	2.98	3.19	5,973.05	5,972.96	5,973.19	5,973.10
P-3	S-3	5,971.63	S-4	5,970.56	130.4	Circle	12	0.013	0.008	2.64	3.36	3.23	5,972.68	5,971.96	5,972.85	5,972.14
P-1	S-1	5,972.61	S-2	5,972.19	52.9	Circle	12	0.013	0.008	1.38	3.91	3.19	5,973.31	5,973.27	5,973.40	5,973.32
P-5	S-6	5,971.25	S-4	5,970.56	69.2	Circle	12	0.013	0.01	2.55	3.25	3.56	5,972.31	5,971.96	5,972.48	5,972.12

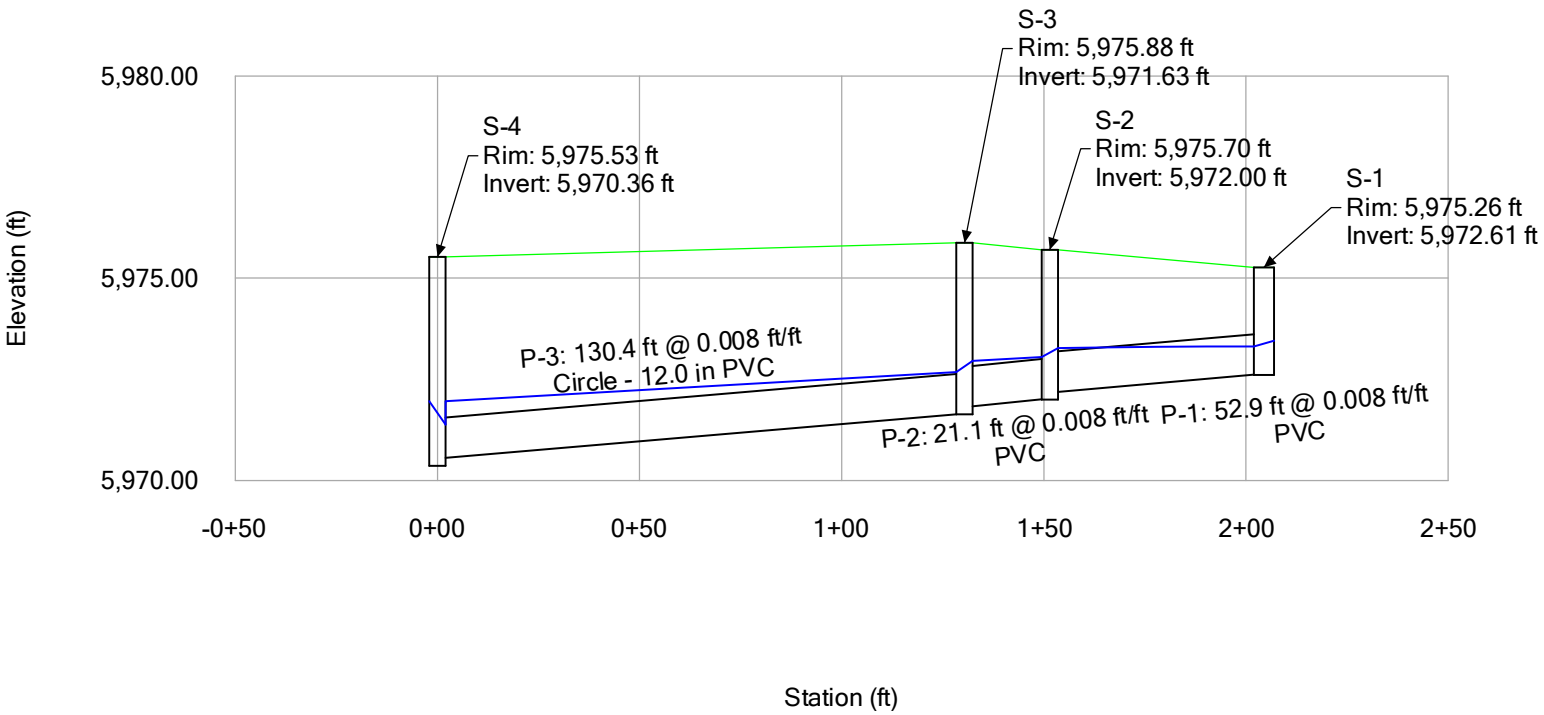
Scenario: 100-YR Flextable: Catch Basin								
Label	Flow (Additional Subsurface) (cfs)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method	Headloss Coefficient (Standard)
S-1	1.38	5,975.26	5,972.61	1.38	5,973.45	5,973.31	Standard	1.6
S-12	0.3	5,976.76	5,972.79	0.3	5,973.19	5,973.04	Standard	1.6
S-6	2.55	5,974.68	5,971.25	2.55	5,972.58	5,972.31	Standard	1.6
S-5	2.21	5,978.59	5,969.44	2.21	5,971.09	5,971.01	Standard	1.6
S-2	0.96	5,975.70	5,972.00	2.34	5,973.27	5,973.05	Standard	1.6

Scenario: 100-YR Flextable: Manhole								
Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method	Headloss Coefficient (Standard)
S-18	5,977.97	5,969.24	7.4	1.49	5,970.95	5,970.73	Standard	1.6
S-3	5,975.88	5,971.63	2.64	1.04	5,972.96	5,972.68	Standard	1.6
S-4	5,975.53	5,970.36	5.19	1.03	5,971.96	5,971.38	Standard	1.6

Profile Report
Engineering Profile - STORM LINE 1 (TEC04_StormCAD.stsw)



Profile Report
Engineering Profile - STORM LINE 2 (TEC04_StormCAD.stsw)



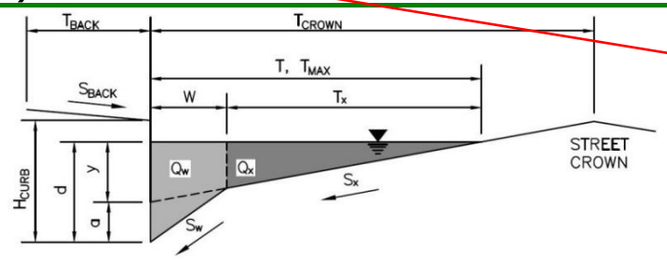
MHFD-Inlet, Version 5.03 (August 2023)

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

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

Project: Mister Car Wash - Parker, CO

Inlet ID: Inlet S-6 (Basin MCW4)



Worst Case of the two basins with Type R inlets

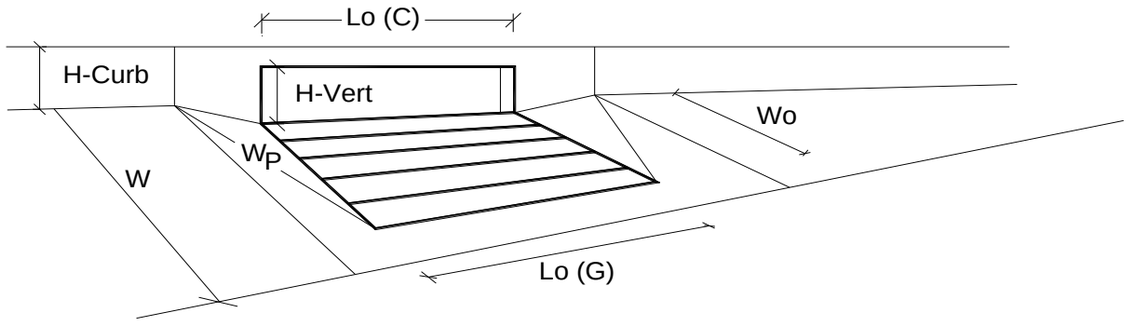
Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.015	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.018	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.030	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	18.0	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	5.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is not applicable to Sump Condition				
MAJOR STORM Allowable Capacity is not applicable to Sump Condition	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



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 =	4.0	5.0	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	Theta =	63.40	63.40	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) =	3.60	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} =	0.17	0.25	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 =**	**1.9**	**3.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.3	2.6	cfs

Worst Case of the two basins with
Type R inlets (Basin MCW4)

Appendix C: Web Soil Survey

United States Department of Agriculture

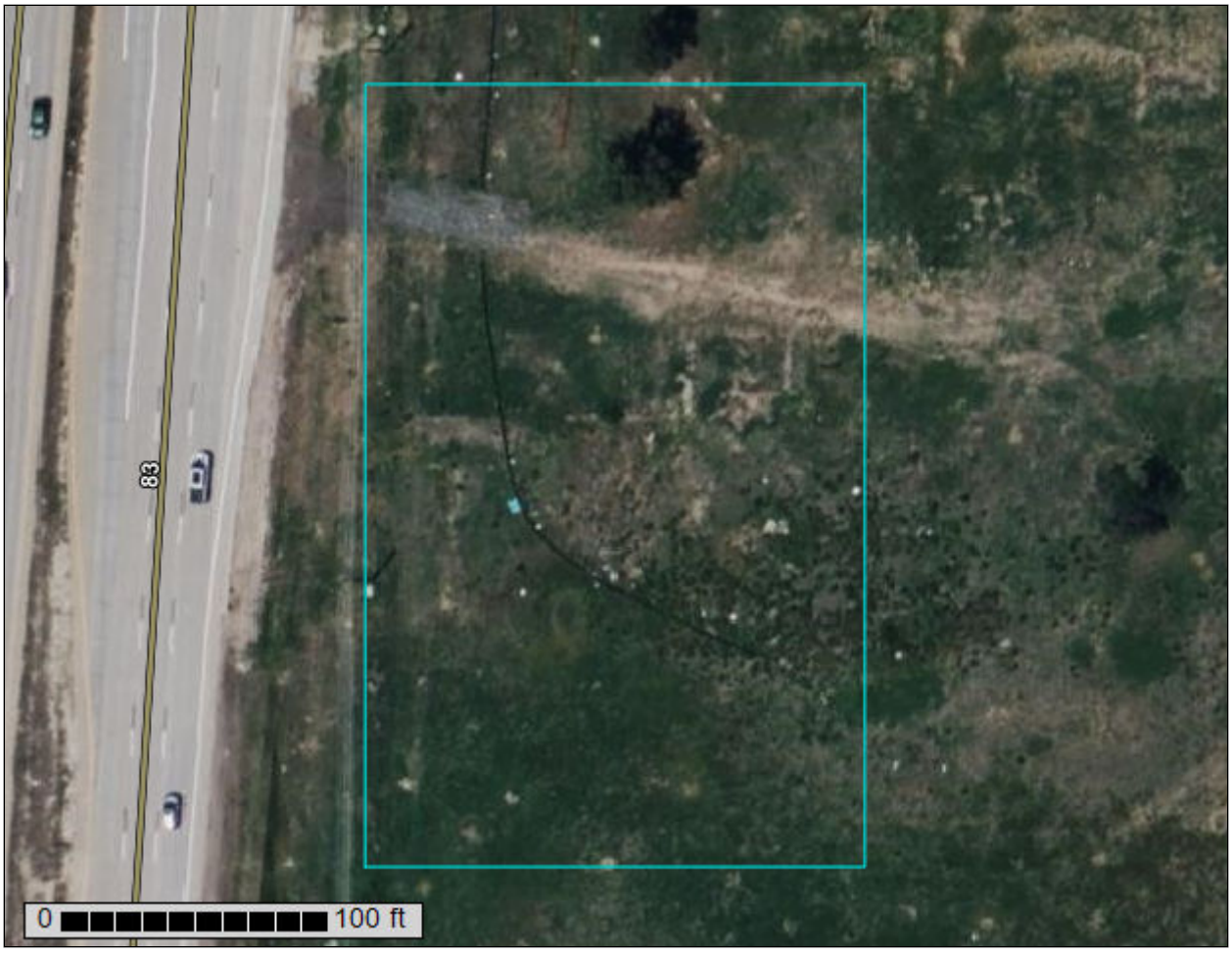
NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Castle Rock Area, Colorado

Mister Car Wash - Parker Pointe



January 15, 2024

Custom Soil Resource Report
Soil Map

Map Scale: 1:522 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 5 10 20 30

Feet: 0 25 50 100 150

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Castle Rock Area, Colorado
Survey Area Data: Version 16, Aug 24, 2023

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

Date(s) aerial images were photographed: Jun 9, 2021—Jun 12, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BtE HYDROLOGIC SOIL GROUP: A	Bresser-Truckton sandy loams, 5 to 25 percent slopes	0.8	64.1%
Sa HYDROLOGIC SOIL GROUP: B	Sampson loam	0.5	35.9%
Totals for Area of Interest		**1.3**	**100.0%**

Map Unit Descriptions

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

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

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

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

Castle Rock Area, Colorado

BtE—Bresser-Truckton sandy loams, 5 to 25 percent slopes

Map Unit Setting

National map unit symbol: jqy9
Elevation: 5,500 to 6,600 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 47 to 52 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Bresser and similar soils: 50 percent
Truckton and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bresser

Setting

Landform: Terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy eolian deposits

Typical profile

H1 - 0 to 8 inches: sandy loam
H2 - 8 to 30 inches: sandy clay loam
H3 - 30 to 60 inches: loamy sand

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately 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
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Description of Truckton

Setting

Landform: Terraces
Landform position (three-dimensional): Riser, tread

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkosic sedimentary rock

Typical profile
H1 - 0 to 4 inches: sandy loam
H2 - 4 to 19 inches: sandy loam
H3 - 19 to 60 inches: sandy loam

Properties and qualities
Slope: 10 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 6.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Newlin
Percent of map unit: 5 percent
Hydric soil rating: No

Blakeland
Percent of map unit: 5 percent
Hydric soil rating: No

Stapleton
Percent of map unit: 4 percent
Hydric soil rating: No

Aquic haplustolls
Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Sa—Sampson loam

Map Unit Setting
National map unit symbol: jr02

Elevation: 5,500 to 6,600 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Sampson

Setting

Landform: Stream terraces on drainageways
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Weathered alluvium derived from arkose

Typical profile

H1 - 0 to 9 inches: loam
H2 - 9 to 28 inches: clay loam
H3 - 28 to 38 inches: loam
H4 - 38 to 60 inches: silt loam

Properties and qualities

Slope: 1 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: B
Ecological site: R049XC202CO - Loamy Foothill 14-19 PZ
Hydric soil rating: No

Minor Components

Englewood

Percent of map unit: 8 percent
Hydric soil rating: No

Bresser

Percent of map unit: 7 percent
Hydric soil rating: No

Loamy alluvial land

Percent of map unit: 4 percent
Hydric soil rating: No

Aquic haplustolls

Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

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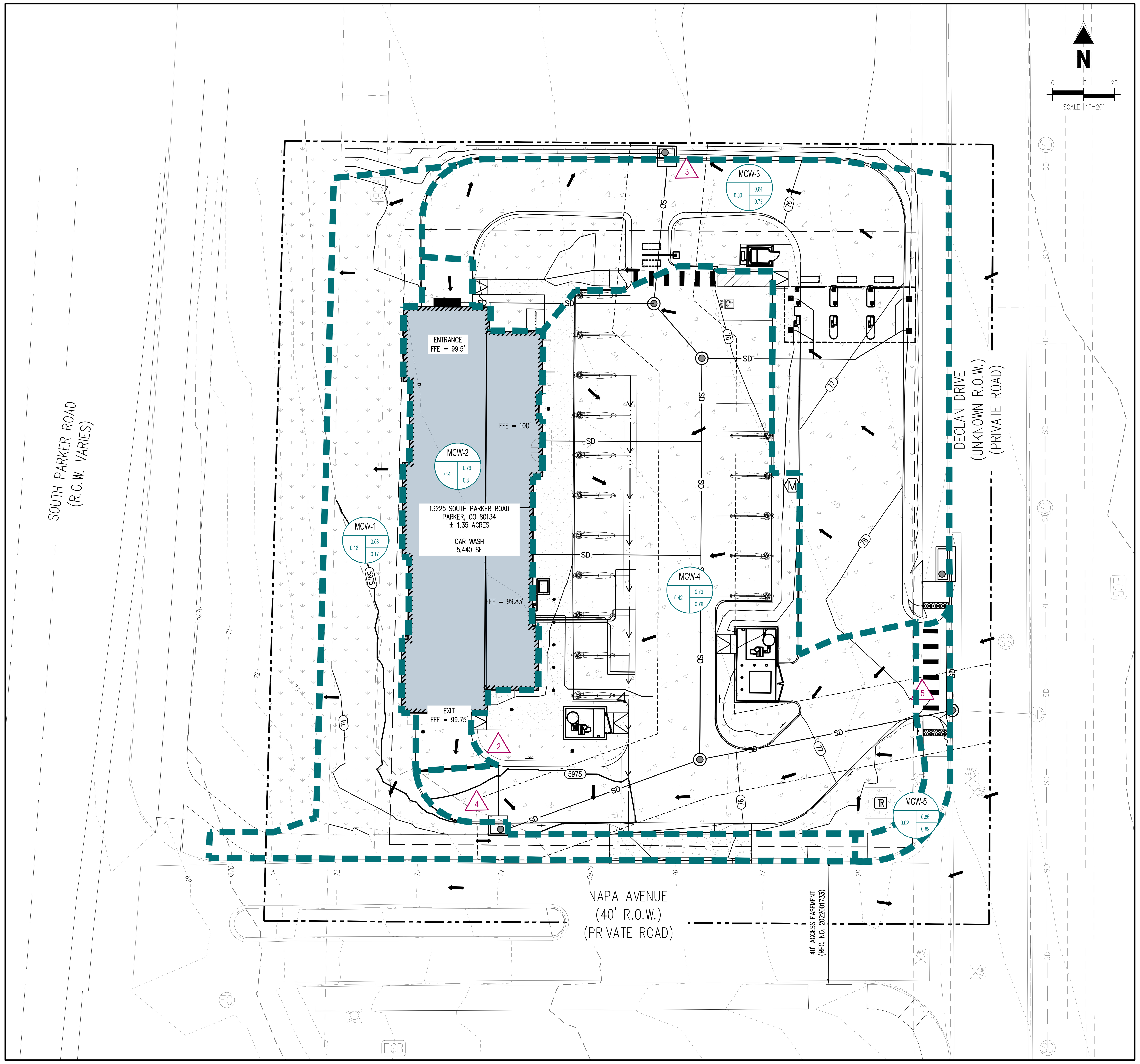
Appendix D: Proposed Drainage Map

MISTER CAR WASH

13225 SOUTH PARKER ROAD
PARKER, CO 80134
LOCATED IN THE NORTHEAST QUARTER OF SECTION 3, TOWNSHIP 7 SOUTH, RANGE 66 WEST OF THE 6TH P.M.
TOWN OF PARKER, DOUGLAS COUNTY, STATE OF COLORADO

SITE CONSTRUCTION PLANS



SITE LEGEND

- ZONE LOT BOUNDARY
- ADJACENT PROPERTY BOUNDARY LINE
- EASEMENT LINE
- PROPOSED CURB AND GUTTER
- EXISTING CURB AND GUTTER
- EXISTING SIGN
- PROPOSED SIGN
- PROPOSED ADA PARKING SYMBOL
- PROPOSED TRANSFORMER
- EXISTING LIGHT POLE
- PROPOSED SITE LIGHTING
- PROPOSED SANITARY SEWER MANHOLE
- EXISTING SANITARY SEWER MANHOLE
- EXISTING STORM SEWER MANHOLE
- PROPOSED STORM SEWER MANHOLE
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- PROPOSED WATER METER
- PROPOSED STORM INLET
- EXISTING ELECTRIC BOX
- CAR VACUUM EQUIPMENT
- PROPOSED CONCRETE PAVEMENT PER GEOTECH
- PROPOSED CONCRETE SIDEWALK PER GEOTECH
- PROPOSED LANDSCAPING PER LANDSCAPE
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- SLOPE DIRECTION LABEL
- DRAINAGE BASIN BOUNDARY
- BASIN DESIGNATION
- 100-YEAR C COEFFICIENT
- 5-YEAR C COEFFICIENT
- BASIN AREA IN ACRES
- DESIGN POINT

DRAINAGE BASIN SUMMARY TABLE

TRIBUTARY SUB-BASIN	AREA (ACRES)	C_5	C_{100}	T_C (MIN)	Q_5	Q_{100}
MCW-1	0.18	0.03	0.17	11.19	0.04	0.20
MCW-2	0.14	0.76	0.81	7.09	0.47	0.96
MCW-3	0.30	0.64	0.73	9.45	0.73	1.58
MCW-4	0.42	0.73	0.79	7.72	1.28	2.55
MCW-5	0.02	0.86	0.89	5.00	0.05	0.09

THE TOWN OF PARKER REVIEW CONSTITUTES GENERAL COMPLIANCE WITH THE TOWN'S STANDARDS AND APPROVED VARIANCES, SUBJECT TO THESE PLANS BEING STAMPED, SIGNED, AND DATED BY THE PROFESSIONAL ENGINEER OF RECORD. REVIEW BY THE TOWN DOES NOT CONSTITUTE APPROVAL OF THE PLAN DESIGN OR ACCURACY AND CORRECTNESS OF ENGINEERING CALCULATIONS. ERRORS IN THE DESIGN OR CALCULATIONS REMAIN THE RESPONSIBILITY OF THE REGISTERED PROFESSIONAL ENGINEER WHOSE STAMP AND SIGNATURE ARE AFFIXED TO THIS DOCUMENT.

THIS REVIEW DOES NOT CONSTITUTE APPROVAL OF ANY PRIVATE ON-SITE IMPROVEMENTS WHICH MAY BE SHOWN. CONSTRUCTION CANNOT COMMENCE UNTIL ALL REQUIRED DRAINAGE/TRAFFIC REPORT(S), FINAL DEVELOPMENT PLAN(S), SPECIAL REVIEW(S), GRADING PERMIT, AND/OR OTHER PERMITS ARE COMPLETE, APPROVED AND ON FILE WITH THE TOWN OF PARKER.

TOWN OF PARKER, DIRECTOR OF ENGINEERING/PUBLIC WORKS DATE

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

NOT FOR CONSTRUCTION

MISTER CAR WASH
13225 SOUTH PARKER ROAD
PARKER, CO 80134

PARKER POINT AMD 1 L34
SITE PLAN SUBMITTAL

#	Date	Issue / Description	Init.
1	7/10/2024	1ST CITY SUBMITTAL	MRK
2	10/30/2024	2ND CITY SUBMITTAL	MRK

Project No:	TEC000004.20
Drawn By:	KML
Checked By:	MRK
Date:	10/30/2024

DRAINAGE MAP

DR-1

Appendix E: Excerpts from “Final Drainage Report – Parker Pointe”

FINAL DRAINAGE REPORT
PARKER POINTE
PARKER, COLORADO

PREPARED FOR:
PARKER & STROH, LLC
975 LINCOLN STREET, SUITE 204
DENVER, CO 80203

CONTACT: DAN YACOVETTA
303-699-3368

Perception design group, inc.

6901 SOUTH PIERCE STREET, SUITE 315
LITTLETON, CO 80128
CONTACT: JERRY DAVIDSON, P.E.
(303) 232-5255

JOB #2015-015

NOVEMBER 28, 2018

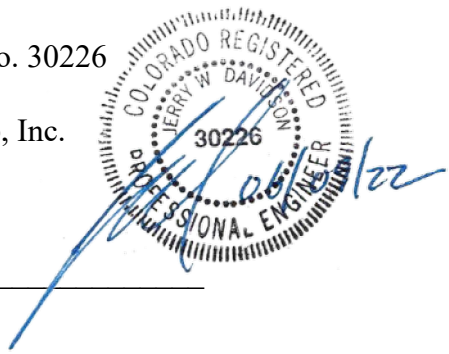
FINAL DRAINAGE REPORT
PARKER POINTE
PARKER, COLORADO

I. CERTIFICATION PAGE

This report for the final design of (Name of Development) was prepared by me or under my direct supervision in accordance with the provisions of the Town of Parker Storm Drainage and Environmental Criteria Manual. I understand that the Town of Parker and its designated town authority do not and will not assume liability for drainage facilities designed by others.

_____

Jerry W. Davidson, P.E.
Colorado P.E. License No. 30226
For and on Behalf of
Perception Design Group, Inc.



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Seal and Date

FINAL DRAINAGE REPORT
PARKER POINTE
PARKER, COLORADO

II GENERAL LOCATION AND DESCRIPTION

A. Site Location:

This Final Drainage Report is prepared by Perception Design Group, Inc. as part of the Construction Plan / Final Plat submittal process for the Parker Pointe project proposed in Parker, Colorado. Parker Pointe, (Project / Site) is located on an unplatted parcel of land situated at the southeast corner of South Parker Road and Stroh Road. See appendix for vicinity map. The Site lies within the southwest quarter of Section 3, Township 7 South, Range 66 West of the 6th Prime Meridian, Douglas County, State of Colorado. The site is bounded by South Parker Road to the west, and Stroh Road to the north. Adjacent developments include the Colorado Golf club in Douglas County to the east, new commercial and residential development in the Town of Parker on the north side of Stroh Road, Commercial development in Parker on the west side of Parker Road, and undeveloped open space in Douglas County south of the property.

B. Site Location:

The Site occupies approximately 14.7 acres. Ground cover consists of pasture grasses. Site topography generally slopes from a tall mound in the northerly portion of the site down to the southwest towards Kinney Creek. Runoff north of the mound flows northwesterly towards the intersection of Stroh Road and Parker Road. Slopes vary widely from 3:1 on the mound to 6% over flatter portions of the site.

Site soils as shown by the USDA Web Soil Survey indicate that primarily Sampson Loam and Bresser Truckton Sandy Loam soil is present. This soil is sandy clay loam in nature. It is a type B hydrologic soil. Additionally Loamy Alluvial Land soils are present to a lesser extent. This soil is also clay loam in nature. It is a type C hydrologic soil.

The site falls within the Cherry Creek basin. The Kinney Creek tributary lies along the southern border of the site. This tributary has a delineated floodplain which encroaches on the extreme southwest corner of the site.

There are no irrigation canals or ditches on site. Additionally, there are no significant geologic features on site.

The site is presently partially developed with a house and barns. These structures are to be removed as a part of the proposed development. As a part of this application, the site will be developed with graded pad sites for commercial and retail businesses, drives, and utilities.

FINAL DRAINAGE REPORT
PARKER POINTE
PARKER, COLORADO

III DRAINAGE BASINS AND SUB-BASINS

A. Major Drainage Basins:

The site falls within two major drainage basins. The southerly portion of the site is tributary to Kinney Creek. Areas from the peak of the aforementioned mound and to the north are tributary to Stroh Gulch. The southerly line of basin H1 defines the historic break between the two basins. Per the Town of Parker, the majority of this runoff to Stroh Gulch is captured and conveyed via storm sewer to the new detention pond and ultimately to Kinney Creek. A final drainage report was prepared for Stroh Crossing Filing No. 1 by Calibre Engineering. This is the development on the north side of Stroh Road. This report anticipated runoff from the Parker Pointe property and made allowance to handle the flow. Basin ST-2b from the Calibre report quantifies 18.9 cfs for the basin. Basin SR2 in this report indicates 4.1 cfs tributary to Stroh Road downstream of the newly placed inlet on Stroh Road for Basin SR1plus carryover from Inlet SR1 of 3.2 cfs for a total tributary to Stroh Gulch of 7.3 cfs.

Kinney Creek was studied by WRC Engineering Inc. in a report entitled “Flood Hazard Area Delineation for Kinney Creek Fonder Draw and Tributaries” date April 2004. Floodplain was determined along the southwest corner of the site. Minor grading is proposed in the floodplain along Parker Road. Roadway widening encroaches upon and places fill in the floodplain. To mitigate this the shoulder borrow ditch is shifted east in similar size to replace filled floodplain with like volume and shape.

B. Minor Drainage Basins:

To facilitate design, the site is divided into multiple sub-basins described as follows:

Basins L1 thru L15 are used to represent each of the proposed lots. As development conditions are not yet determined, an assumed 95% imperviousness is established for each basin. A storm sewer stub is provided for each lot to convey developed runoff to the extended detention basin at the southeast corner of the site providing both detention and water quality facilities. While Basins L10 thur L15 drain towards Parker road in the overlot condition, it is required that these lots convey site runoff to the mainline storm sewer down the center access drive. Due to the presence of the Magellan gas pipeline and it’s limited cover requirements as well as site visibility lines to the easterly lots, The west side of lots 10 thru 15 will remain below the center access drive. The storm sewer has been placed at maximum depth to accommodate these lots “bucking” grade with the storm sewer system.

Basins L1A thru L5A represents the easterly portion of Lots 1 thru 5. Runoff from these

basins flow overland to the east to the drainage swale along the east property line thence into the extended detention facility. As development conditions are not yet determined, an assumed 95% imperviousness is established for each basin.

Basins IN1 thru IN3 are established to quantify runoff collected in a series of inlets along the central north-south access drive. This runoff is piped to the extended detention basin at the southeast corner of the site providing both detention and water quality facilities.

Basin SR1 is used to quantify runoff to Stroh Road from the road itself as well as offsite areas to the east. Detention and water quality are provided for this basin. See additional discussion under Major Basins above.

Basin SR2 (along with basin U4) is used to quantify runoff to the new inlet at the intersection of Stroh Road and Parker Road. Detention and water quality are not provided for this basin.

Basin PR1 combines with Basins U2 and PR2 to define runoff to the new pair of inlets located at the low point of Parker Road. Basin PR1 is separated to quantify new paved area requiring water quality treatment. Treatment for Basin PR1 combined with Basin U2 is provided in a grass swale in the ROW of Parker Road leading down to Kinney Creek.

Basin PR2 is used to quantify runoff from existing Parker Road improvements to the new pair of inlets located at the low point of Parker Road. Water quality is not provided for this basin. Total flow to the inlets is a combination of Basins PR1, PR2, and U2.

Basin PR3 is not illustrated on the plan. This basin is used to quantify new paved areas in Parker Road north of Stroh Road. This basin encompasses the new left turn bay on Prker Road to Stroh Road. Runoff from this basin is treated for water quality in the existing grass buffer along the west side of Parker Road.

Basin U1 is on-site area that is not tributary to the detention / water quality facility. This basin encompasses Tracts A and B which are floodplain and mouse habitat areas. Detention and water quality are not provided for this basin.

Basin U2 is on-site area that is not tributary to the detention / water quality facility. This basin quantifies runoff escaping the site down the access road to Parker Road. Detention is not provided for this basin, however, water quality is provided in the grass swale referenced above in the PR1 basin description.

Basin U3 is on-site area that is not tributary to the detention / water quality facility. Runoff from this basin adjacent to Parker Road flows overland into Parker Road.

Detention and water quality are not provided for this basin.

Basin U4 is on-site area that is not tributary to the detention / water quality facility. Runoff from this basin enters Stroh Road and is collected in inlet SR2.

Basin H1 is a historic basin quantifying historic runoff to Stroh Road. It is used as a check for Calibre basin ST-2b. Basin H1 indicates runoff of 17.0 cfs while basin ST2-b indicates 18.9 cfs. Variance is due to more accurate topography available for the Parker Pointe site and better defined drainage basin as well as differences in time of concentration.

Basin OS1 quantifies flows entering the extended detention pond from offsite flows from the Colorado Golf Club property east of the Parker Pointe property. Detention and water quality are provided for this offsite flow area in its present condition.

IV DRAINAGE DESIGN CRITERIA

A. Regulations:

Design calculations and methodologies are based upon the Town of Parker Storm Drainage and Environmental Criteria Manual. Additionally, the Urban Drainage Storm Drainage Criteria Manual Volumes 1 thru 3 are utilized.

B. Drainage Studies, Outfall System Plans:

The Final Drainage Report for Stroh Crossing Filing No. 1 by Calibre Engineering is used to identify allowable site discharge to Stroh Gulch. The WRC Engineering Inc. report entitled “Flood Hazard Area Delineation for Kinney Creek Fonder Draw and Tributaries” date April 2004 was utilized to map the floodplain elevations along the south property line. This study has negligible impact on the design presented.

C. Hydrology:

Runoff is calculated for both the 5 year and 100 year storms using the rational method. On-site basins utilize a 5 minute time of concentration with 5 year intensity of 4.7 in/hr and 100 year at 8.85 in/hr. Detention storage volumes are calculated using the UDFCD ver 3.07 UD-Detention spreadsheet. This spreadsheet is also utilized to calculate allowable release rates.

D. Hydraulics:

Storm sewer capacities are calculated using Hydraflow Storm Sewers extension for AutoCAD Civil 3D ver 2017. The system is designed such to provide minimal surcharge for the 100 year event, and no surcharge for the 5 year event. The Hydraflow software is also used to calculate hydraulic grade lines for the storm sewer.

E. Water Quality Enhancement:

Water quality is achieved in an extended detention facility designed to EURV specifications using UDFCD ver 3.07 UD-Detention spreadsheet.

V STORMWATER MANAGEMENT FACILITY DESIGN

A. Stormwater Conveyance Facilities:

Developed stormwater is generally conveyed towards the central north south driveway where stubs are provided that connect to a storm sewer mainline. The storm main runs in a southerly then easterly direction to the proposed EDB detention facility. Total developed site runoff tributary to the EDB is 146.51 cfs. Storm sewer outfall into the EDB occurs at a concrete forebay. Outfall from the EDB is controlled to code levels and discharged via storm sewer pipe to Kinney Creek where riprap is provided to control erosion. Storm sewer is placed in an easement for perpetual maintenance. Do to the depth of the pond and invert of the adjacent Kinney Creek, outfall is piped westerly to discharge near the box culvert under Parker Road where more favorable elevations exist.

B. Stormwater Storage Facilities:

Stormwater storage on site is accomplished in an extended detention basin located offsite near the southeast corner of the site. Required pond design elements are summarized below:

Volume Element	Volume	Elevation	Release Rate
WQCV	0.566 Ac-Ft	5966.12	41 hours
EURV + WQCV	1.472 Ac-Ft	5968.03	70 hours
100 year	2.753 Ac-Ft	5970.05	36.7 cfs
Storage Provided	2.753 Ac-Ft	5970.05	

Outflow metering is accomplished in a concrete outlet structure. 2 orifices are used. One for WQ and EURV while a second is used covering the outfall pipe to limit the 100 year flow. A double type D inlet is proposed to provide sufficient weir flow to accommodate

the 100 year release rate. Micropool and trash racks are provided. Emergency overflow occurs directly into Kinney Creek via overflow weir and riprap embankment.

Allowable 100 year discharge must be reduced to allow for uncaptured basin U1 thru U4 and PR1. The combined 100 year un-detained flow from basins U1 thru U4 is 4.4 cfs. Basin PR1 is 3.2 cfs. Combined reduction in allowable discharge is 7.6 cfs. Allowable detention discharge as shown on the UDFCD spreadsheet is 44.5 cfs. The outlet structure design limits discharge to 36.7 cfs. Calculating the allowable discharge results in 44.5 – 7.6 = 36.9cfs. The design discharge is less than allowable therefore this provides adequate compensation for the uncaptured flows.

A maintenance access is provided entering at the northwest corner of the pond. Roadbase surfacing is provided and slopes not exceeding 10% are employed to enhance access for maintenance. An easement is provided over the pond should Town access, inspection, or repairs be required.

C. Water quality Enhancement Best Management Practices:

The EDB pond design includes water quality capture volume. Developed flows are conveyed via underground storm sewer to a single discharge point into the pond. At this point, a concrete forebay is provided to capture heavier particulate material.

Water quality treatment is also provided for the new paved areas of Parker Road. Basin PR1 is treated in a grass swale with discharge to Kinney Creek. Basin PR3 is treated in the existing grass buffer along the west side of Parker Road north of Stroh Road. UDFCD spreadsheets are provided for each treatment facility in the appendix.

D. Floodplain Modification:

Minor grading is proposed in the floodplain along Parker Road. Roadway widening encroaches upon and places fill in the floodplain. To mitigate this the shoulder borrow ditch is shifted east in similar size to replace filled floodplain with like volume and shape. A floodplain development permit will be required for this work as well as disturbances due to outfall construction. A no rise analysis has been performed and the results indicating compliance are included in the appendix.

E. Additional Permitting Requirements:

State stormwater permit for discharges during construction.
Town of Parker permits.
Douglas County permits.

FINAL DRAINAGE REPORT
PARKER POINTE
PARKER, COLORADO

V CONCLUSIONS

A. Compliance with Standards:

The plans and calculations presented are in compliance with Town of Parker, Douglas County, and Urban Drainage requirements.

B. Variances:

No variances are requested.

V REFERNCES

Urban Drainage and Flood Control District Drainage Criteria Manual, Current addition.
Town of Parker Storm Drainage Criteria Manual
Town of Parker Construction Best Management Practices
Douglas County Storm Drainage Design and Technical Criteria Manual
USDA Web Soil Survey

FINAL DRAINAGE REPORT
PARKER POINTE
PARKER, COLORADO

APPENDICES

Perception Design Group, Inc.
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Littleton, Colorado 80128
(303) 232-8088 Fax (303) 232-5255

Designed by: JWD
Checked by: JWD
Date: 18-Sep-17
Job Number: 2015-015

Project: Parker Pointe

COMPOSITE RUNOFF COEFFICIENTS

TYPE B SOILS

	FUTURE COMMERCIAL		DRIVES/WALKS/ROOF		LANDSCAPING				
Catchment	Area (Ac.)	C	Area (Ac.)	C	Area (Ac.)	C	Composite C	Catchment Area (Ac.)	Imperviousness
	Imperviousness = 95%		Imperviousness = 100%		Imperviousness = 2%				
L12 (5 YR)	0.56	0.81	0.00	0.90	0.00	0.09	**0.81**	0.56	95.0%
L12 (100 YR)	0.56	0.88	0.00	0.96	0.00	0.36	**0.88**	0.56	
L13 (5 YR)	0.73	0.81	0.00	0.90	0.00	0.09	**0.81**	0.73	95.0%
L13 (100 YR)	0.73	0.88	0.00	0.96	0.00	0.36	**0.88**	0.73	
L14 (5 YR)	0.73	0.81	0.00	0.90	0.00	0.09	**0.81**	0.73	95.0%
L14 (100 YR)	0.73	0.88	0.00	0.96	0.00	0.36	**0.88**	0.73	
L15 (5 YR)	0.72	0.81	0.00	0.90	0.00	0.09	**0.81**	0.72	95.0%
L15 (100 YR)	0.72	0.88	0.00	0.96	0.00	0.36	**0.88**	0.72	
IN1 (5 YR)	0.00	0.81	0.26	0.90	0.00	0.09	**0.90**	0.26	100.0%
IN1 (100 YR)	0.00	0.88	0.26	0.96	0.00	0.36	**0.96**	0.26	
IN2 (5 YR)	0.00	0.81	0.53	0.90	0.00	0.09	**0.90**	0.53	100.0%
IN2 (100 YR)	0.00	0.88	0.53	0.96	0.00	0.36	**0.96**	0.53	
IN3 (5 YR)	0.00	0.81	0.11	0.90	0.00	0.09	**0.90**	0.11	100.0%
IN3 (100 YR)	0.00	0.88	0.11	0.96	0.00	0.36	**0.96**	0.11	
OS1 (5 YR)	0.00	0.81	1.21	0.90	22.13	0.09	**0.13**	23.34	7.1%
OS1 (100 YR)	0.00	0.88	1.21	0.96	22.13	0.36	**0.39**	23.34	
SR1 (5 YR)	0.00	0.81	0.40	0.90	3.35	0.09	**0.18**	3.75	12.5%

STANDARD FORM SF-2

TIME OF CONCENTRATION

PROJECT Parker Pointe
JN ASP-2015-015
CALCULATED BY JWD
DATE 18-Sep-17

SUB -BASIN DATA			INITIAL/OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK			FINAL (Tc)	REMARKS
DESIGN	Area (ac)	C5	LENGTH Li (ft)	SLOPE (ft/ft)	Ti (min)	LENGTH - Lt (ft)	SLOPE %	K Conveyance Factor	VEL (fps)	Tt (min)	COMP (TC)	Basin Imp. (decimal)	Tc=(UDFCD Eq 6-5) (min)	MIN	
SR1	3.23	0.27	375.0	0.030	20.4	540.0	2.50	20	3.16	2.8	23.3	0.241	22.4	22.4	22.4
H1	10.52	0.09	530.0	0.050	24.9	550.0	2.75	10	1.66	5.5	30.5	0.020	26.3	26.3	26.3
OS1	24.54	0.13	290.0	0.070	15.8	1425.0	6.00	10	2.45	9.7	25.5	0.020	26.7	25.5	25.5

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Project: Parker Pointe

RUNOFF CALCULATIONS

(RATIONAL METHOD)

Design Storm: 2-Yr.

		Direct Runoff						
	Design	Basin	Area	Runoff	CA	Tc	I	Q
	Point	Desig.	(Acres)	Coefficient		(min)	(in/hr)	(cfs)
		U2	0.30	0.72	0.22	5.0	3.40	0.73
		PR1	0.42	0.75	0.32	5.0	3.40	1.07
		PR3	0.22	0.89	0.20	5.0	3.40	0.67

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RUNOFF CALCULATIONS

(RATIONAL METHOD)

Design Storm: 5-Yr.

		Direct Runoff						
	Design	Basin	Area	Runoff	CA	Tc	I	Q
	Point	Desig.	(Acres)	Coefficient		(min)	(in/hr)	(cfs)
		H1	10.52	0.09	0.95	26.0	2.30	2.18
		L1	0.71	0.81	0.58	5.0	4.70	2.70
		L2	0.50	0.81	0.41	5.0	4.70	1.90
		L2A	0.19	0.81	0.15	5.0	4.70	0.72
		L3	0.43	0.81	0.35	5.0	4.70	1.64
		L3A	0.16	0.81	0.13	5.0	4.70	0.61
		L4	0.63	0.81	0.51	5.0	4.70	2.40
		L4A	0.24	0.81	0.19	5.0	4.70	0.91
		L5	0.63	0.81	0.51	5.0	4.70	2.40
		L5A	0.24	0.81	0.19	5.0	4.70	0.91
		L6	0.78	0.81	0.63	5.0	4.70	2.97
		L7	0.68	0.81	0.55	5.0	4.70	2.59
		L8	0.87	0.81	0.70	5.0	4.70	3.31
		L9	0.71	0.81	0.58	5.0	4.70	2.70
		L10	0.88	0.81	0.71	5.0	4.70	3.35
		L11	0.92	0.81	0.75	5.0	4.70	3.50
		L12	0.56	0.81	0.45	5.0	4.70	2.13
		L13	0.73	0.81	0.59	5.0	4.70	2.78
		L14	0.73	0.81	0.59	5.0	4.70	2.78
		L15	0.72	0.81	0.58	5.0	4.70	2.74
		IN1	0.26	0.90	0.23	5.0	4.70	1.10
		IN2	0.53	0.90	0.48	5.0	4.70	2.24
		IN3	0.11	0.9	0.10	5.0	4.70	0.47
		SR1	3.75	0.18	0.68	22.4	2.60	1.76
		SR2	0.32	0.87	0.28	5.0	4.70	1.31
		PR1	0.42	0.77	0.32	5.0	4.70	1.52
		PR2	0.91	0.96	0.87	5.0	4.70	4.11
		U1	1.37	0.09	0.12	5.0	4.70	0.58
		U2	0.3	0.74	0.22	5.0	4.70	1.04
		U3	0.17	0.09	0.02	5.0	4.70	0.07
		U4	0.23	0.58	0.13	5.0	4.70	0.63
		OS1	23.34	0.13	3.03	25.5	2.50	7.59

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Job Number: 2015-015

Project: Parker Pointe

RUNOFF CALCULATIONS

(RATIONAL METHOD)

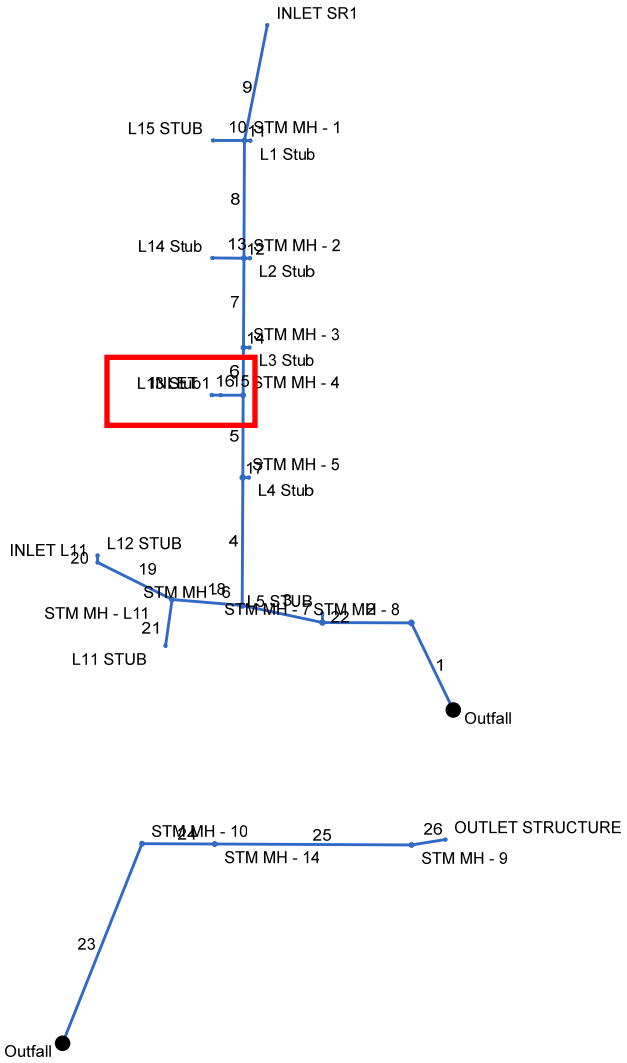
Design Storm: 100-Yr.

		Direct Runoff						
	Design	Basin	Area	Runoff	CA	Tc	I	Q
	Point	Desig.	(Acres)	Coefficient		(min)	(in/hr)	(cfs)
		H1	10.52	0.36	3.79	26.0	4.50	17.04
		L1	0.71	0.88	0.62	5.0	8.85	5.53
		L2	0.50	0.88	0.44	5.0	8.85	3.89
		L2A	0.19	0.88	0.17	5.0	8.85	1.48
		L3	0.43	0.88	0.38	5.0	8.85	3.35
		L3A	0.16	0.88	0.14	5.0	8.85	1.25
		L4	0.63	0.88	0.55	5.0	8.85	4.91
		L4A	0.24	0.88	0.21	5.0	8.85	1.87
		L5	0.63	0.88	0.55	5.0	8.85	4.91
		L5A	0.24	0.88	0.21	5.0	8.85	1.87
		L6	0.78	0.88	0.69	5.0	8.85	6.07
		L7	0.68	0.88	0.60	5.0	8.85	5.30
		L8	0.87	0.88	0.77	5.0	8.85	6.78
		L9	0.71	0.88	0.62	5.0	8.85	5.53
		L10	0.88	0.88	0.77	5.0	8.85	6.85
		L11	0.92	0.88	0.81	5.0	8.85	7.16
		L12	0.56	0.88	0.49	5.0	8.85	4.36
		L13	0.73	0.88	0.64	5.0	8.85	5.69
		L14	0.73	0.88	0.64	5.0	8.85	5.69
		L15	0.72	0.88	0.63	5.0	8.85	5.61
		IN1	0.26	0.96	0.25	5.0	8.85	2.21
		IN2	0.53	0.96	0.51	5.0	8.85	4.50
		IN3	0.11	0.96	0.11	5.0	8.85	0.93
		SR1	3.75	0.42	1.58	22.4	4.90	7.72
TOTAL FLOW TO FOREBAY								103.45
		OS1	23.34	0.39	9.10	25.5	4.50	40.96
TOTAL TO POND			39.30					144.41
		U1	1.37	0.36	0.49	25.5	4.50	2.22
		U2	0.3	0.84	0.25	25.5	4.50	1.13
		U3	0.17	0.36	0.06	25.5	4.50	0.28
		U4	0.23	0.73	0.17	25.5	4.50	0.76
UN-CAPTURED SITE RUNOFF								4.38
		SR2	0.32	0.94	0.30	5.0	8.85	2.66
		PR1	0.42	0.86	0.36	5.0	8.85	3.20
		PR2	0.91	0.96	0.87	5.0	8.85	7.73

FINAL DRAINAGE REPORT
PARKER POINTE
PARKER, COLORADO

APPENDIX C HYDRAULIC CALCULATIONS

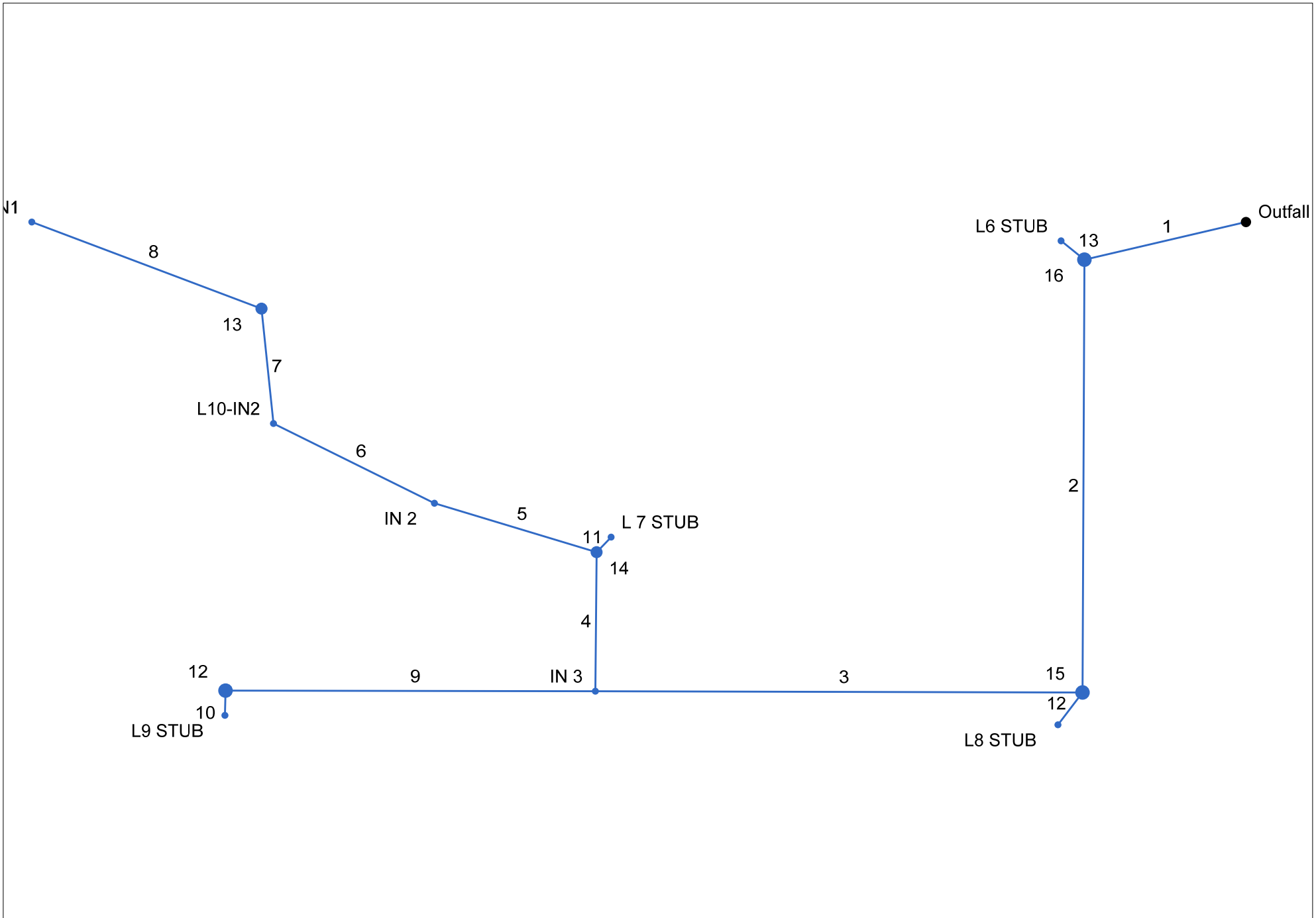
Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: Storm Line A 100 yr.stm	Number of lines: 26	Date: 3/1/2018

Line No.	Line Size	Flow Rate	Vel Ave	Depth Up	Depth Dn	HGL Up	HGL Dn	Line ID
	(in)	(cfs)	(ft/s)	(ft)	(ft)	(ft)	(ft)	
1	42	61.03	8.31	2.49	2.50	5967.48	5966.84	P-22
2	42	61.03	6.74	2.99	3.28	5968.77	5968.47	P-21
3	42	56.12	5.91	3.29	3.50	5969.82	5969.53	P-19
4	42	44.60	4.83	3.04	3.50	5970.63	5970.36	P-14
5	42	39.69	5.72	1.96**	3.23	5970.30	5971.02	P-12
6	36	31.79	7.11	1.83**	1.80	5970.99	5970.64	P-9
7	30	28.44	6.73	2.01	2.01	5972.27	5971.67	P-7
8	30	18.86	4.18	1.98	2.50	5973.23	5972.97	P-4
9	21	7.72	4.34	1.03**	1.55	5974.21 j	5973.55	P-1
10	18	5.61	3.17	1.50	1.50	5973.67	5973.55	P-2
11	18	5.53	3.13	1.50	1.50	5973.57	5973.55	P-3
12	18	3.89	2.20	1.50	1.50	5972.98	5972.97	P-6
13	18	5.69	3.22	1.50	1.50	5973.10	5972.97	P-5
14	18	3.35	3.40	0.70**	1.02	5970.83	5970.99	P-8
15	18	7.90	4.73	1.35	1.35	5970.64	5970.49	P-11
16	18	5.69	3.82	1.16	1.20	5970.71	5970.69	P-10
17	18	4.91	2.78	1.50	1.50	5971.04	5971.02	P-13
18	24	11.52	3.67	2.00	2.00	5970.61	5970.36	P-18
19	18	4.36	2.47	1.50	1.50	5971.01	5970.82	P-16
20	18	4.36	2.47	1.50	1.50	5971.11	5971.09	P-15
21	18	7.16	4.05	1.50	1.50	5971.11	5970.82	P-17
22	18	4.91	2.78	1.50	1.50	5969.55	5969.53	P-20
23	36	36.00	7.34	1.98	1.95	5961.42	5959.95	STM PIPE - 37
24	36	36.00	6.00	2.23	2.55	5962.36	5962.19	STM PIPE - 38
25	36	36.00	7.06	1.95**	2.13	5963.59 j	5962.45	STM PIPE - 39
26	36	36.00	6.66	2.14	2.15	5964.17	5963.99	STM PIPE - 40

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: Storm 2 100 yr.stm	Number of lines: 13	Date: 3/1/2018

Line No.	Line Size	Flow Rate	Vel Ave	Depth Up	Depth Dn	HGL Up	HGL Dn	Line ID
	(in)	(cfs)	(ft/s)	(ft)	(ft)	(ft)	(ft)	
1	36	35.96	7.35	1.96	1.96	5966.63	5966.30	Pipe - (6)
2	36	29.89	5.75	1.77**	2.58	5967.50	5967.45	Pipe - (5)
3	36	23.11	6.23	1.55**	1.57	5968.44	5967.50	Pipe - (4)
4	24	16.65	5.78	1.72	1.72	5969.89	5969.62	Pipe - (10)
5	24	11.35	3.69	1.84	2.00	5970.54	5970.40	Pipe - (14)
6	18	6.85	4.18	1.26	1.38	5970.82	5970.58	Pipe - (15)
7	18	6.85	4.28	1.24	1.31	5971.23	5971.07	Pipe - (16)
8	18	6.85	4.40	1.17	1.31	5971.86	5971.50	Pipe - (17)
9	18	5.53	4.61	0.96	0.96	5970.09	5969.35	Pipe - (3)
10	18	5.53	4.05	1.07	1.10	5970.44	5970.42	Pipe - (9)
11	18	5.30	3.00	1.50	1.50	5970.42	5970.40	Pipe - (18)
12	18	6.78	5.85	1.01**	0.88	5968.40	5968.11	Pipe - (11)
13	18	6.07	4.46	0.95**	1.28	5967.36	5967.45	Pipe - (12)

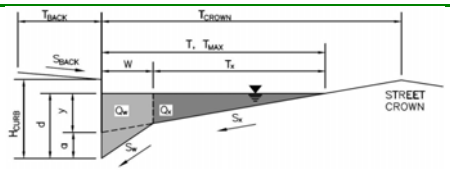
Version 4.05 Released March 2017

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

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

Project: Parker Pointe

Inlet ID: IN 1



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.005	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

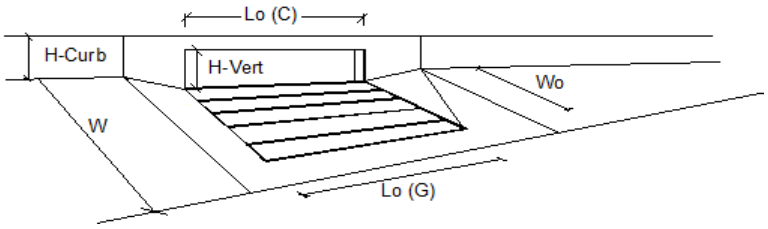
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.0**	**12.0**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.1**	**2.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

SEE SHEET DP3

STROH ROAD

Lot 1 43,517 SF
Lot 2 32,105 SF
Lot 3 27,579 SF
Lot 4 40,105 SF
Lot 5 39,997 SF
Lot 6 36,117 SF
Lot 7 35,252 SF
Lot 8 41,881 SF
Lot 9 30,055 SF
Lot 10 47,349 SF
Lot 11 50,792 SF
Lot 12 36,806 SF
Lot 13 45,143 SF
Lot 14 37,474 SF
Lot 15 44,534 SF

TRACT A 22,043 SF
TRACT B 23,177 SF

L1 L2 L2A L3 L3A L4 L4A L5 L5A L6 L7 L8 L9 L10 L11 L12 L13 L14 L15
IN1 IN2 IN3
U1 U2 U3 U4
SR1 SR2
PR1 PR2

LIMIT OF FLOODPLAIN
SWR EASEMENT
CONCRETE

SOUTH PARKER ROAD
(PUBLIC R.O.W. VARIES)

45+04
42+24 WSEL=63.8
41+48.28

100 YEAR RUNOFF SUMMARY

Design Point	Basin Desig.	Area (Acres)	Runoff Coefficient	CA	Tc (min)	I (in/hr)	Q (cfs)
	H1	10.52	0.36	3.79	26.0	4.50	17.04
	L1	0.71	0.88	0.62	5.0	8.85	5.53
	L2	0.50	0.88	0.44	5.0	8.85	3.89
	L2A	0.19	0.88	0.17	5.0	8.85	1.48
	L3	0.43	0.88	0.38	5.0	8.85	3.35
	L3A	0.16	0.88	0.14	5.0	8.85	1.25
	L4	0.63	0.88	0.55	5.0	8.85	4.91
	L4A	0.24	0.88	0.21	5.0	8.85	1.87
	L5	0.63	0.88	0.55	5.0	8.85	4.91
	L5A	0.24	0.88	0.21	5.0	8.85	1.87
	L6	0.78	0.88	0.69	5.0	8.85	6.07
	L7	0.68	0.88	0.60	5.0	8.85	5.30
	L8	0.87	0.88	0.77	5.0	8.85	6.78
	L9	0.71	0.88	0.62	5.0	8.85	5.53
	L10	0.88	0.88	0.77	5.0	8.85	6.85
	L11	0.92	0.88	0.81	5.0	8.85	7.16
	L12	0.56	0.88	0.49	5.0	8.85	4.36
	L13	0.73	0.88	0.64	5.0	8.85	5.69
	L14	0.73	0.88	0.64	5.0	8.85	5.69
	L15	0.72	0.88	0.63	5.0	8.85	5.61
	IN1	0.26	0.96	0.25	5.0	8.85	2.21
	IN2	0.53	0.96	0.51	5.0	8.85	4.50
	IN3	0.11	0.96	0.11	5.0	8.85	0.93
	SR1	3.75	0.42	1.58	22.4	4.90	7.72
TOTAL FLOW TO FOREBAY							103.45
	OS1	23.34	0.39	9.10	25.5	4.50	40.96
TOTAL TO POND		39.30					144.41
	U1	1.37	0.36	0.49	25.5	4.50	2.22
	U2	0.3	0.84	0.25	25.5	4.50	1.13
	U3	0.17	0.36	0.06	25.5	4.50	0.28
	U4	0.23	0.73	0.17	25.5	4.50	0.76
UN-CAPTURED SITE RUNOFF							4.38
	SR2	0.32	0.94	0.30	5.0	8.85	2.66
	PR1	0.42	0.86	0.36	5.0	8.85	3.20
	PR2	0.91	0.96	0.87	5.0	8.85	7.73

DETENTION SUMMARY

ZONE	VOLUME	ELEVATION	RELEASE RATE
WQCV	0.566 AC-FT		41 HOURS
EURV+WQCV	1.472 AC-FT	5968.03	70 HOURS
100 YEAR	2.753 AC-FT	5970.05	36.7 CFS

LEGEND

- 5340 — EXISTING CONTOUR
- 42 — PROPOSED CONTOUR
- R1 (0.20 | 0.75 | 0.83) — BASIN DESIGNATION; 5 YR RUNOFF COEFFICIENT; 100 YR RUNOFF COEFFICIENT; BASIN AREA
- BASIN BOUNDARY LINE
- 1 — DESIGN POINT

GRAPHIC SCALE
40 0 20 40 80
(IN FEET)
1 inch = 40 ft.

BENCHMARK

BENCHMARK: DOUGLAS COUNTY SURVEY CONTROL MONUMENT TT15A – 3" DIAMETER DOUGLAS COUNTY GIS ALUMINUM CAP AT THE NE CORNER OF STROH ROAD AND SOUTH PARKER ROAD (US HIGHWAY 83)
ELEVATION: 5970.79 FEET (NAVD 1988 DATUM)

THE TOWN OF PARKER REVIEW CONSTITUTES GENERAL COMPLIANCE WITH THE TOWN'S STANDARDS AND APPROVED VARIANCES, SUBJECT TO THESE PLANS BEING STAMPED, SIGNED, AND DATED BY THE PROFESSIONAL ENGINEER OF RECORD. REVIEW BY THE TOWN DOES NOT CONSTITUTE APPROVAL OF THE PLAN DESIGN OR ACCURACY AND CORRECTNESS OF ENGINEERING CALCULATIONS. ERRORS IN THE DESIGN OR CALCULATIONS REMAIN THE RESPONSIBILITY OF THE REGISTERED PROFESSIONAL ENGINEER WHOSE STAMP AND SIGNATURE ARE AFFIXED TO THIS DOCUMENT.

THIS REVIEW DOES NOT CONSTITUTE APPROVAL OF ANY PRIVATE ON-SITE IMPROVEMENTS WHICH MAY BE SHOWN. CONSTRUCTION CANNOT COMMERCE UNTIL ALL REQUIRED DRAINAGE/ TRAFFIC REPORT(S), FINAL DEVELOPMENT PLAN(S), SPECIAL REVIEW(S), GRADING PERMIT, AND/OR OTHER PERMITS ARE COMPLETE, APPROVED AND ON THE FILE WITH THE TOWN OF PARKER.

TOWN OF PARKER, DIRECTOR OF ENGINEERING — DATE

PERCEPTION
DESIGN GROUP, INC.
6901 SOUTH PIERCE STREET, SUITE 315 . LITTLETON, CO 80128 . 303-232-8868
WWW.PERCEPTIONDESIGNGROUP.COM

PREPARED UNDER THE DIRECT SUPERVISION OF
JERRY W. DAVIDSON, P.E.
COLORADO REG # 30226
FOR AND ON BEHALF OF
PERCEPTION DESIGN GROUP, INC.

DATE	DESCRIPTION
11/01/18	SIXTH SUBMITTAL
08/31/18	FOURTH SUBMITTAL
05/25/18	THIRD SUBMITTAL
03/19/18	PWSD SUBMITTAL
02/28/18	SECOND SUBMITTAL
10/24/17	INITIAL SUBMITTAL

REVISIONS

DRAINAGE PLAN WEST

PARKER POINTE
LOTS 1 THRU 15 AND TRACTS A AND B, PARKER POINTE FILING NO. 1
SOUTHEAST CORNER PARKER ROAD AND STROH ROAD
PARKER, COLORADO

design by: JWD
approved by: JWD
project no.: 2015-015
date: 10/01/17

SHEET
DP2

\\PDG-NAS\PUBLIC\PROJECTS\2015-015 PARKER AND STROH\DWG\2015-015 DRAINAGE MAP.DWG 11/28/2018 10:26 AM

SEE SHEET DP2

LEGEND

5340 EXISTING CONTOUR

42 PROPOSED CONTOUR

R1 — BASIN DESIGNATION
0.75 — 5 YR RUNOFF COEFFICIENT
0.83 — 100 YR RUNOFF COEFFICIENT
0.20 — BASIN AREA

BASIN BOUNDARY LINE

1 DESIGN POINT

GRAPHIC SCALE

40 0 20 40 80

(IN FEET)
1 inch = 40ft.

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

CAUTION: NOTICE TO CONTRACTOR THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE LOCAL UTILITY LOCATION CENTER AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF THE UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.

BENCHMARK

BENCHMARK: DOUGLAS COUNTY SURVEY CONTROL MONUMENT TT15A – 3" DIAMETER DOUGLAS COUNTY GIS ALUMINUM CAP AT THE NE CORNER OF STROH ROAD AND SOUTH PARKER ROAD (US HIGHWAY 83)
ELEVATION: 5970.79 FEET (NAVD 1988 DATUM)

THE TOWN OF PARKER REVIEW CONSTITUTES GENERAL COMPLIANCE WITH THE TOWN'S STANDARDS AND APPROVED VARIANCES, SUBJECT TO THESE PLANS BEING STAMPED, SIGNED, AND DATED BY THE PROFESSIONAL ENGINEER OF RECORD. REVIEW BY THE TOWN DOES NOT CONSTITUTE APPROVAL OF THE PLAN DESIGN OR ACCURACY AND CORRECTNESS OF ENGINEERING CALCULATIONS. ERRORS IN THE DESIGN OR CALCULATIONS REMAIN THE RESPONSIBILITY OF THE REGISTERED PROFESSIONAL ENGINEER WHOSE STAMP AND SIGNATURE ARE AFFIXED TO THIS DOCUMENT.

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TOWN OF PARKER, DIRECTOR OF ENGINEERING DATE

PERCEPTION
DESIGN GROUP, INC.
6901 SOUTH PIERCE STREET, SUITE 315, LITTLETON, CO 80128 303-232-8088
WWW.PERCEPTIONDESIGNGROUP.COM

PREPARED UNDER THE DIRECT SUPERVISION OF
JERRY W. DAVIDSON, P.E.
COLORADO REG # 30226
FOR AND ON BEHALF OF
PERCEPTION DESIGN GROUP, INC.

REVISIONS

DATE	DESCRIPTION
10/24/17	INITIAL SUBMITTAL
02/28/18	SECOND SUBMITTAL
03/19/18	PWSD SUBMITTAL
05/25/18	THIRD SUBMITTAL
08/31/18	FOURTH SUBMITTAL
11/01/18	SIXTH SUBMITTAL

DRAINAGE PLAN EAST

PARKER POINTE
LOTS 1 THRU 15 AND TRACTS A AND B, PARKER POINTE FILING NO. 1
SOUTHEAST CORNER PARKER ROAD AND STROH ROAD
PARKER, COLORADO

design by: JWD
approved by: JWD
project no.: 2015-015
date: 10/01/17

SHEET
DP3

FINAL DRAINAGE REPORT AMENDMENT
PARKER POINTE
PARKER, COLORADO

PREPARED FOR:

PARKER & STROH, LLC
PO BOX 867
CRESTED BUTTE, CO 81224

CONTACT: BRAD WILLETT
970-366-1271

6901 SOUTH PIERCE STREET, SUITE 315
LITTLETON, CO 80128
CONTACT: JERRY DAVIDSON, P.E.
(303) 232-5255

JOB #2015-015

DECEMBER 14, 2023

FINAL DRAINAGE REPORT AMENDMENT
PARKER POINTE
PARKER, COLORADO

I. CERTIFICATION PAGE

This report for the final design of Parker Pointe was prepared by me or under my direct supervision in accordance with the provisions of the Town of Parker Storm Drainage and Environmental Criteria Manual. I understand that the Town of Parker and its designated town authority do not and will not assume liability for drainage facilities designed by others.

_____

Jerry W. Davidson, P.E.
Colorado P.E. License No. 30226
For and on Behalf of
Perception Design Group, Inc.

_____

Seal and Date

FINAL DRAINAGE REPORT AMENDMENT
PARKER POINTE
PARKER, COLORADO

II GENERAL LOCATION AND DESCRIPTION

Site Location and Purpose:

This Final Drainage Report Amendment is prepared by Perception Design Group, Inc. as part of the Re-Plat submittal process for the Parker Pointe project proposed in Parker, Colorado. The re-plat area encompasses Lots 7 thru 15 of Parker Pointe Subdivision Filing No. 1.

The Re-Plat occupies approximately 8.5 acres. Its purpose is to reconfigure / combine the original 9 lots into 6 new lots.

III DRAINAGE BASINS

Drainage Basins:

Basins L7 thru L15 represent lots 7 thru 15 in the original study. In this amendment basins L7 thru L10, IN2 and IN3, and a portion of basin L11 defined as new basin L11B are now combined to a single collection point at design point 25. Previous upstream collection piping is eliminated from this amendment. Basin L11B represents additional flow to design point 25 not accommodated in the original report. New calculations are attached indicating the provided stub to design point 25 is adequate to carry this additional flow.

The balance of original basin L11, now defined as L11A continues to flow to the original collection stub at design point 14. Since flow is reduced by basin L11B, the system downstream is adequate to accommodate this revision.

While basins L13 thru L15 experience minor changes to lot line locations, runoff to the main line system remains un-changed.

IV CONCLUSIONS

The existing storm sewer system is adequate to carry amended flows as illustrated by the attached calculations. No additional analysis is needed for the detention and water quality facility as overall runoff and imperviousness is unchanged.

Perception Design Group, Inc.
6901 South Pierce Street, Suite 315
Littleton, Colorado 80128
(303) 232-8088 Fax (303) 232-5255

Designed by: JWD
Checked by: JWD
Date: 18-Sep-17
Job Number: 2015-015

Project: Parker Pointe

RUNOFF CALCULATIONS

(RATIONAL METHOD)

Design Storm: 5-Yr.

		Direct Runoff						
	Design	Basin	Area	Runoff	CA	Tc	I	Q
	Point	Desig.	(Acres)	Coefficient		(min)	(in/hr)	(cfs)
		H1	10.52	0.09	0.95	26.0	2.30	2.18
		L1	0.71	0.81	0.58	5.0	4.70	2.70
		L2	0.50	0.81	0.41	5.0	4.70	1.90
		L2A	0.19	0.81	0.15	5.0	4.70	0.72
		L3	0.43	0.81	0.35	5.0	4.70	1.64
		L3A	0.16	0.81	0.13	5.0	4.70	0.61
		L4	0.63	0.81	0.51	5.0	4.70	2.40
		L4A	0.24	0.81	0.19	5.0	4.70	0.91
		L5	0.63	0.81	0.51	5.0	4.70	2.40
		L5A	0.24	0.81	0.19	5.0	4.70	0.91
		L6	0.78	0.81	0.63	5.0	4.70	2.97
		L7	0.68	0.81	0.55	5.0	4.70	2.59
		L8	0.87	0.81	0.70	5.0	4.70	3.31
		L9	0.71	0.81	0.58	5.0	4.70	2.70
		L10	0.88	0.81	0.71	5.0	4.70	3.35
		L11A	0.50	0.81	0.41	5.0	4.70	1.90
		L11B	0.42	0.81	0.34	5.0	4.70	1.60
		L12	0.56	0.81	0.45	5.0	4.70	2.13
		L13	0.73	0.81	0.59	5.0	4.70	2.78
		L14	0.73	0.81	0.59	5.0	4.70	2.78
		L15	0.72	0.81	0.58	5.0	4.70	2.74
		IN1	0.26	0.90	0.23	5.0	4.70	1.10
		IN2	0.53	0.90	0.48	5.0	4.70	2.24
		IN3	0.11	0.9	0.10	5.0	4.70	0.47
		SR1	3.75	0.18	0.68	22.4	2.60	1.76
		SR2	0.32	0.87	0.28	5.0	4.70	1.31
		PR1	0.42	0.77	0.32	5.0	4.70	1.52
		PR2	0.91	0.96	0.87	5.0	4.70	4.11
		U1	1.37	0.09	0.12	5.0	4.70	0.58
		U2	0.3	0.74	0.22	5.0	4.70	1.04
		U3	0.17	0.09	0.02	5.0	4.70	0.07
		U4	0.23	0.58	0.13	5.0	4.70	0.63
		OS1	23.34	0.13	3.03	25.5	2.50	7.59

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Designed by: JWD
Checked by: JWD
Date: 18-Sep-17
Job Number: 2015-015

Project: Parker Pointe

RUNOFF CALCULATIONS

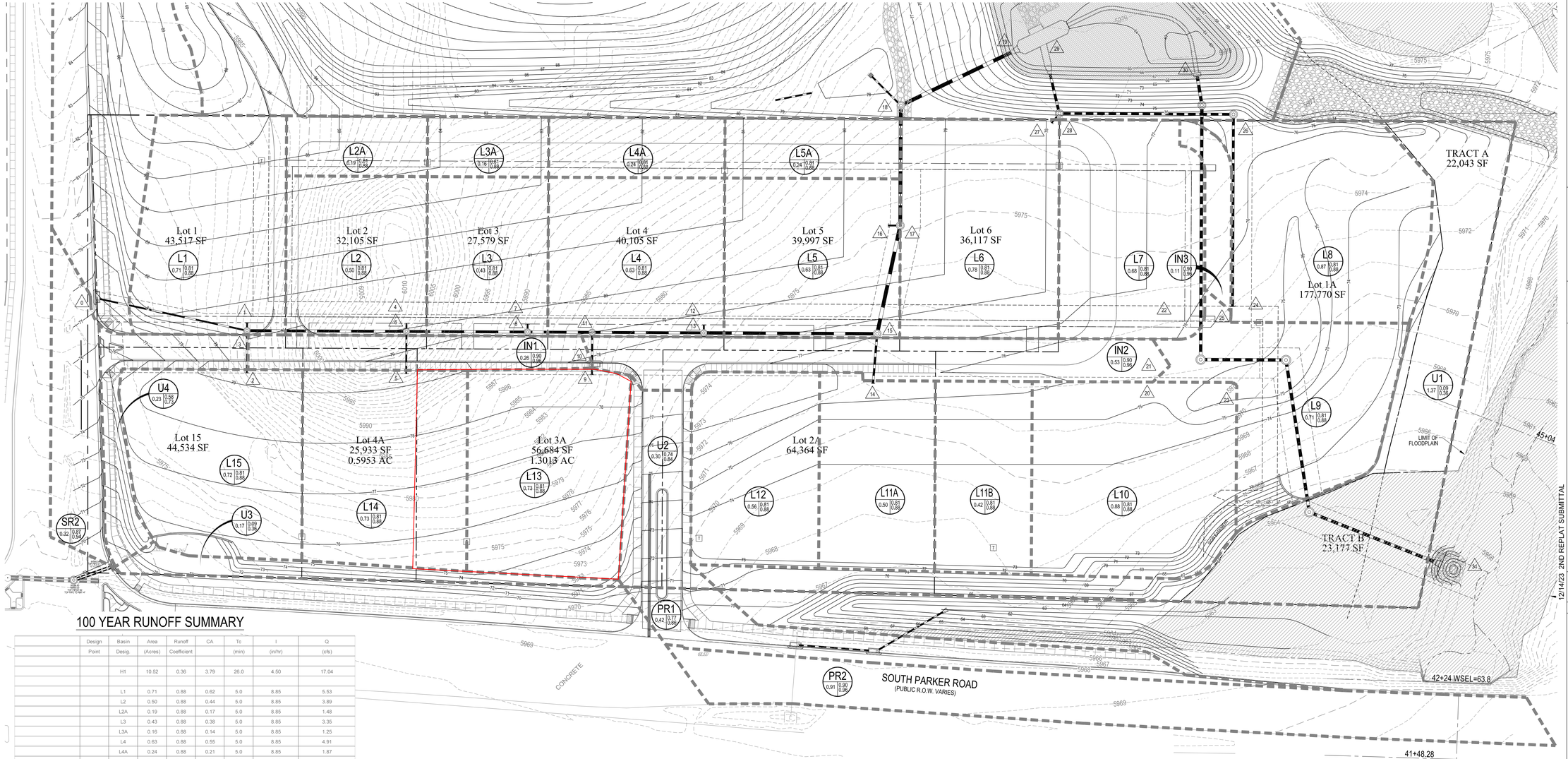
(RATIONAL METHOD)

Design Storm: 100-Yr.

		Direct Runoff						
	Design	Basin	Area	Runoff	CA	Tc	I	Q
	Point	Desig.	(Acres)	Coefficient		(min)	(in/hr)	(cfs)
		H1	10.52	0.36	3.79	26.0	4.50	17.04
		L1	0.71	0.88	0.62	5.0	8.85	5.53
		L2	0.50	0.88	0.44	5.0	8.85	3.89
		L2A	0.19	0.88	0.17	5.0	8.85	1.48
		L3	0.43	0.88	0.38	5.0	8.85	3.35
		L3A	0.16	0.88	0.14	5.0	8.85	1.25
		L4	0.63	0.88	0.55	5.0	8.85	4.91
		L4A	0.24	0.88	0.21	5.0	8.85	1.87
		L5	0.63	0.88	0.55	5.0	8.85	4.91
		L5A	0.24	0.88	0.21	5.0	8.85	1.87
		L6	0.78	0.88	0.69	5.0	8.85	6.07
		L7	0.68	0.88	0.60	5.0	8.85	5.30
		L8	0.87	0.88	0.77	5.0	8.85	6.78
		L9	0.71	0.88	0.62	5.0	8.85	5.53
		L10	0.88	0.88	0.77	5.0	8.85	6.85
		L11A	0.50	0.88	0.44	5.0	8.85	3.89
		L11B	0.42	0.88	0.37	5.0	8.85	3.27
		L12	0.56	0.88	0.49	5.0	8.85	4.36
		L13	0.73	0.88	0.64	5.0	8.85	5.69
		L14	0.73	0.88	0.64	5.0	8.85	5.69
		L15	0.72	0.88	0.63	5.0	8.85	5.61
		IN1	0.26	0.96	0.25	5.0	8.85	2.21
		IN2	0.53	0.96	0.51	5.0	8.85	4.50
		IN3	0.11	0.96	0.11	5.0	8.85	0.93
		SR1	3.75	0.42	1.58	22.4	4.90	7.72
TOTAL FLOW TO FOREBAY								103.45
		OS1	23.34	0.39	9.10	25.5	4.50	40.96
TOTAL TO POND			39.30					144.41
		U1	1.37	0.36	0.49	25.5	4.50	2.22
		U2	0.3	0.84	0.25	25.5	4.50	1.13
		U3	0.17	0.36	0.06	25.5	4.50	0.28
		U4	0.23	0.73	0.17	25.5	4.50	0.76
UN-CAPTURED SITE RUNOFF								4.38
		SR2	0.32	0.94	0.30	5.0	8.85	2.66
		PR1	0.42	0.86	0.36	5.0	8.85	3.20
		PR2	0.91	0.96	0.87	5.0	8.85	7.73

SEE SHEET DP3

STROH ROAD



100 YEAR RUNOFF SUMMARY

Design Point	Basin Desig.	Area (Acres)	Runoff Coefficient	CA	Tc (min)	I (in/hr)	Q (cfs)
	H1	10.52	0.36	3.79	26.0	4.50	17.04
	L1	0.71	0.88	0.62	5.0	8.85	5.53
	L2	0.50	0.88	0.44	5.0	8.85	3.89
	L2A	0.19	0.88	0.17	5.0	8.85	1.48
	L3	0.43	0.88	0.38	5.0	8.85	3.35
	L3A	0.16	0.88	0.14	5.0	8.85	1.25
	L4	0.63	0.88	0.55	5.0	8.85	4.91
	L4A	0.24	0.88	0.21	5.0	8.85	1.87
	L5	0.63	0.88	0.55	5.0	8.85	4.91
	L5A	0.24	0.88	0.21	5.0	8.85	1.87
	L6	0.78	0.88	0.69	5.0	8.85	6.07
	L7	0.68	0.88	0.60	5.0	8.85	5.30
	L8	0.87	0.88	0.77	5.0	8.85	6.78
	L9	0.71	0.88	0.62	5.0	8.85	5.53
	L10	0.88	0.88	0.77	5.0	8.85	6.85
	L11A	0.50	0.88	0.44	5.0	8.85	3.89
	L11B	0.42	0.88	0.37	5.0	8.85	3.27
	L12	0.56	0.88	0.49	5.0	8.85	4.36
	L13	0.73	0.88	0.64	5.0	8.85	5.69
	L14	0.73	0.88	0.64	5.0	8.85	5.69
	L15	0.72	0.88	0.63	5.0	8.85	5.61
	IN1	0.26	0.96	0.25	5.0	8.85	2.21
	IN2	0.53	0.96	0.51	5.0	8.85	4.50
	IN3	0.11	0.96	0.11	5.0	8.85	0.93
	SR1	3.75	0.42	1.58	22.4	4.90	7.72
TOTAL FLOW TO FOREBAY							103.45
	OS1	23.34	0.39	9.10	25.5	4.50	40.96
TOTAL TO POND		39.30					144.41
	U1	1.37	0.36	0.49	25.5	4.50	2.22
	U2	0.3	0.84	0.25	25.5	4.50	1.13
	U3	0.17	0.36	0.06	25.5	4.50	0.28
	U4	0.23	0.73	0.17	25.5	4.50	0.76
UN-CAPTURED SITE RUNOFF							4.38
	SR2	0.32	0.94	0.30	5.0	8.85	2.66
	PR1	0.42	0.86	0.36	5.0	8.85	3.20
	PR2	0.91	0.96	0.87	5.0	8.85	7.73

DETENTION SUMMARY

ZONE	VOLUME	ELEVATION	RELEASE RATE
WQCV	0.566 AC-FT		41 HOURS
EURV+WQCV	1.472 AC-FT	5968.03	70 HOURS
100 YEAR	2.753 AC-FT	5970.05	36.7 CFS

LEGEND

- 5340 — EXISTING CONTOUR
- 42 — PROPOSED CONTOUR
- R1 / 0.20 / 0.75 / 0.83 — BASIN DESIGNATION; 5 YR RUNOFF COEFFICIENT; 100 YR RUNOFF COEFFICIENT; BASIN AREA
- BASIN BOUNDARY LINE
- 1 — DESIGN POINT

GRAPHIC SCALE

40 0 20 40 80

(IN FEET)
1 inch = 40 ft.

BENCHMARK

BENCHMARK: DOUGLAS COUNTY SURVEY CONTROL MONUMENT TT15A – 3" DIAMETER DOUGLAS COUNTY GIS ALUMINUM CAP AT THE NE CORNER OF STROH ROAD AND SOUTH PARKER ROAD (US HIGHWAY 83)
ELEVATION: 5970.79 FEET (NAVD 1988 DATUM)

THE TOWN OF PARKER REVIEW CONSTITUTES GENERAL COMPLIANCE WITH THE TOWN'S STANDARDS AND APPROVED VARIANCES, SUBJECT TO THESE PLANS BEING STAMPED, SIGNED, AND DATED BY THE PROFESSIONAL ENGINEER OF RECORD. REVIEW BY THE TOWN DOES NOT CONSTITUTE APPROVAL OF THE PLAN DESIGN OR ACCURACY AND CORRECTNESS OF ENGINEERING CALCULATIONS. ERRORS IN THE DESIGN OR CALCULATIONS REMAIN THE RESPONSIBILITY OF THE REGISTERED PROFESSIONAL ENGINEER WHOSE STAMP AND SIGNATURE ARE AFFIXED TO THIS DOCUMENT.

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TOWN OF PARKER, DIRECTOR OF ENGINEERING — DATE

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PREPARED UNDER THE DIRECT SUPERVISION OF
JERRY W. DAVIDSON, P.E.
COLORADO REG # 30226
FOR AND ON BEHALF OF
PERCEPTION DESIGN GROUP, INC.

DATE	DESCRIPTION
12/14/23	2ND REPLAT SUBMITTAL
06/01/23	SECOND CDOT NTP SUBMITTAL
04/21/23	CDOT NTP SUBMITTAL / RE-PLAT SUBMITTAL
04/15/22	RESUBMITTAL
11/01/18	SIXTH SUBMITTAL
08/31/18	FOURTH SUBMITTAL
05/25/18	THIRD SUBMITTAL
10/24/17	INITIAL SUBMITTAL

REVISIONS

DRAINAGE PLAN WEST

PARKER POINTE
LOTS 1 THRU 15 AND TRACTS A AND B, PARKER POINTE FILING NO. 1
SOUTHEAST CORNER PARKER ROAD AND STROH ROAD
PARKER, COLORADO

design by: JWD
approved by: JWD
project no.: 2015-015

date: 10/01/17

SHEET
DP2