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June 11th, 2025

Town of Castle Rock – Stormwater Division
Brian Kelley
175 Kellogg Court
Castle Rock, CO 80109

Subject: SDP25-0005, O'Reilly Auto Parts- Drainage Conformance Letter

This drainage conformance letter has been prepared for Lot 5 of Founders Marketplace Filing No. 1. The purpose of this letter is to show that the proposed drainage for Lot 5 is in conformance with the Phase III Drainage Report for Founders Marketplace, Filing No.1 prepared by CLC Associates, Inc. dated November 23, 2004, hereon referred to as the Master report, Cherry Creek Basin Regulations, and the current Town of Castle Rock Storm Drainage Design and Technical Criteria Manual.

The site is owned by Kings Bank LLC and is bordered by existing King Soopers to the north, an electric substation owned and operated by the Intermountain Rural Electric Association to the east, and North Ridge Road to the south and west. The proposed project encompasses 1.212 acres and includes a 6,721-square-foot O'Reilly Auto Parts Store. The development will also feature associated parking, driveways, and landscaping. Utility easements, as required, will be provided during the final design and construction phases in compliance with the Town's standards regarding type, location, and size.

FEMA Firm Panel: Per the FEMA flood insurance rate maps (FIRM), map no. 08035C0302G, having a map effective date of March 16, 2016, indicates the subject property to be designated as zone x (outside 0.2% chance of flood). Refer to the FEMA map in the appendix.

NRCS Soils: Per the NRCS Web Soil Survey, the subject site has been determined to consist of soils within the hydrologic soil group "C". Soil group "C" were utilized for rational method calculations.

The existing site is mainly undeveloped and includes a portion of the existing private drive and an existing retaining wall. The site in general drains to the northeast at ~2% with the southern portion of the site containing steeper slopes up to 3:1. The existing drainage system is split into three basins, one on-site basin, and two off-site basins. The proposed drainage system has been split into six on-site basins and the two off-site basins remain unchanged and continue to contribute flows onto the site.

Basin 51A, 0.32 acres, encompasses the northeast side of the site including the landscape and parking near the driveway entrance. This basin is expected to have an impervious value of 43.9%, which resulted in a runoff coefficient of 0.39 and 0.66 for the 5-yr and 100-yr storm event, respectively. This basin generated 0.61cfs and 1.87cfs in the 5-yr and 100-yr storm events, respectively. Runoff from this basin will be conveyed via sheet flow to the northwest behind the King Soopers building per the master drainage report.

Basin 11A, 0.36 acres, encompasses the south side of the site including the landscape and parking southeast of the building. This basin is expected to have an impervious value of 42.7%, which resulted in a runoff coefficient of 0.39 and 0.66 for the 5-yr and 100-yr storm event, respectively. This basin generated 0.53cfs and 1.33cfs in the 5-yr and 100-yr storm events, respectively. Runoff from this basin will be conveyed via sheet flow to the proposed 2'x2' curb storm drain inlet. Flows will then be conveyed via the proposed underground storm sewer system and will ultimately discharge to the existing storm sewer system located within the private drive.



Basin 11B, 0.01 acres, encompasses a portion of the sidewalk along the northern side of the building. This basin is expected to have an impervious value of 95.0%, which resulted in a runoff coefficient of 0.81 and 0.87 for the 5-yr and 100-yr storm event respectively. This basin generated 0.04cfs and 0.08cfs in the 5-yr and 100-yr storm events respectively. Flows for this basin will be collected in the proposed u-gutter along the base of the wall and are conveyed to the proposed area inlet. Flows will then be conveyed via the proposed underground storm sewer system and will ultimately be discharged to the existing storm sewer system located within the private drive.

Basin 11C, 1.33 acres, contains an existing electrical station and associated infrastructure. This basin has an impervious value of 5.6%, which resulted in a runoff coefficient of 0.08 and 0.51 for the 5-yr and 100-yr storm events, respectively. The 5-year and 100-yr basin flows are 0.52 cfs and 5.95 cfs, respectively. Runoff will be collected by a 2'x2' grate highway storm inlet.

Basin 11D, 0.13 acres, encompasses the center portion of the site including the landscape and parking in front of the building. This basin is expected to have an impervious value of 95%, which resulted in a runoff coefficient of 0.81 and 0.87 for the 5-yr and 100-yr storm event, respectively. This basin generated 0.51cfs and 1.00cfs in the 5-yr and 100-yr storm events, respectively. Runoff from this basin will be conveyed via sheet flow to the proposed 2'x2' curb storm drain inlet. Flows will then be conveyed via the proposed underground storm sewer system and will ultimately discharge to the existing storm sewer system located within the private drive.

Basin 12A, 0.25 acres, encompasses the roof, u-gutter, and landscaping. This basin is expected to have an impervious value of 69.9%, which resulted in a runoff coefficient of 0.61 and 0.77 for the 5-yr and 100-yr storm event, respectively. This basin generated 0.73cfs and 1.70cfs in the 5-yr and 100-yr storm events, respectively. Runoff from this basin will be conveyed via the proposed u-gutter and conveyed towards the proposed 2'x2' grate highway storm inlet. Flows will then be conveyed via the proposed underground storm sewer system and will ultimately be discharged to the existing storm sewer system located within the private drive.

Basin 13A, 0.13 acres, encompasses the north side of the site including the sidewalk and half of the existing private road. This basin is expected to have an impervious value of 88.5%, which resulted in a runoff coefficient of 0.76 and 0.84 for the 5-yr and 100-yr storm event, respectively. This basin generated 0.48cfs and 0.97cfs in the 5-yr and 100-yr storm events, respectively. Runoff from this basin is captured by the existing and proposed curb and gutter and is conveyed to the northeast where it enters the existing storm sewer system.

Design point 1 represents the total flow leaving the site in the proposed storm sewer system. Basins 11A-11D as well as Basin 12A contribute to DP1 in the proposed condition. In the Master Report Basins 11 and 12 combine at DP1. Refer to the Design Point Comparison table below for applicable flow.

Design point 2 represents the total flow that will enter the existing inlet near the fueling station northwest of the site. This inlet is referred to as Inlet 13 in the Master Report. Refer to the Design Point Comparison table below for applicable flow.

Design point 3 represents the total flow that will enter the existing inlet in the King Soopers parking lot northeast of the site. This inlet is referred to as Inlet 51 in the Master Report. Refer to the Design Point Comparison table below for applicable flow.



Basins Comparison Table

Report	Basin ID	Area (ac)	Imp %	C5	C100	Q5 (cfs)	Q100 (cfs)
TAIT	51 A	0.32	43.9%	0.39	0.66	0.61	1.87
Master	51*	0.5	40.6%	0.45	0.69	1.10	3.04
TAIT	13 A	0.13	88.2%	0.75	0.84	0.48	0.97
Master	13*	0.19	71.1%	0.62	0.76	0.57	1.27
TAIT	12 A	0.25	69.9%	0.60	0.77	0.73	1.70
Master	12	0.14	90.0%	0.75	0.83	0.51	1.02
TAIT	11 A	0.36	42.7%	0.38	0.66	0.53	1.67
TAIT	11 B	0.01	95.0%	0.81	0.87	0.04	0.08
TAIT	11 C	1.33	5.6%	0.08	0.51	0.52	3.98
TAIT	11D	0.13	95.0%	0.81	0.87	0.51	1.00
TAIT	11 (Total)	1.89	19.9%	0.20	0.56	1.60	6.73
Master	11	1.33	8.6%	0.20	0.53	1.65	4.57
TAIT	Total	2.53	31.3%	0.29	0.61	3.42	11.27
Master	Toal	2.60	23.7%	0.31	0.59	3.83	9.90

Design Point Comparison Table

Design Point	Master Area (ac)	TAIT Area (ac)	100-year Master Flow (cfs)	100-year TAIT Flow (cfs)
1	1.91	2.33	5.59	8.43
2	0.19	0.13	1.27	0.97
3	0.5	0.32	3.04	1.87
Total	2.6	3.42	9.90	11.27

The overall imperviousness of Lot 5 has been calculated at 31.3%, which exceeds the 23.7% imperviousness value derived from the Phase III Drainage Report for Founders Marketplace, Filing No. 1. This comparison is based on drainage areas determined by the proposed lot layout.

Due to the revised criteria the lot does show an increase in imperviousness, however this does not indicate an increase in water quality or quantity. To account for the change in criteria the site has been designed to route flows through pervious areas, where possible, to promote infiltration and reduce runoff pollutants.

Summary

Runoff flows were calculated per the Mile High Flood District criteria, and the current Town of Castle Rock Storm Drainage Design and Technical Criteria Manual. This report is in conformance with Cherry Creek Basin regulations. The proposed storm sewer system has been designed to handle 100-year flows. There is an existing regional pond that has been designed to treat the development of this site. No additional water quality or detention is required for the site and the proposed design is in conformance with the Phase III Drainage Report for Founders Marketplace, Filing No.1. There are no negative downstream impacts anticipated from the development of this site.



Appendix

- 1- Rational Calculations
- 2- Hydraulic Calculations
- 3- FEMA Map
- 4- Soils Report
- 5- Incorporated Phase III Drainage Report for Founders Marketplace, Filing No.1
- 6- MS4 Permit
- 7- Drainage Maps

Sincerely,



Timothy Uhrlik, PE
TAIT & Associates, Inc.

RUNOFF COEFFICIENT CALCULATIONS

Project Name: OA12460, CASTLE ROCK, CO (CR2) O'Reilly Auto Parts
Calculated By: BK
Check By: APL
Date: 6/11/2025

RECOMMENDED RUNOFF COEFFICIENT FOR TYPE C/D SOILS			
LAND USE	C Value	C Value	Imperviousness
	5 YEAR	100 YEAR	
Landscape - Undisturbed	0.08	0.50	5%
Landscape - Disturbed	0.2	0.57	20%
Drives and Walks	0.81	0.87	95%
Roofs	0.81	0.87	95%

POST-DEVELOPMENT CONDITIONS:

AREA DESIGN	A(LAND- UNDISTURBED)	A(LAND.) DIST	A(D&W)	A(ROOFS)	A(TOTAL)	C Value	C Value	Imperviousness
	AC	AC	AC	AC	AC	C5	C100	
13A	0.00	0.01	0.12	0.00	0.13	0.76	0.84	88.5%
51A	0.15	0.05	0.13	0.00	0.32	0.39	0.66	43.9%
12A	0.00	0.08	0.01	0.16	0.25	0.61	0.77	69.9%
11A	0.12	0.10	0.14	0.00	0.36	0.39	0.66	42.7%
11B	0.00	0.00	0.01	0.00	0.01	0.81	0.87	95.0%
11 C	1.28	0.05	0.00	0.00	1.33	0.08	0.50	5.6%
11D	0.00	0.00	0.13	0.00	0.13	0.81	0.87	95.0%
TOTAL	1.55	0.30	0.53	0.16	2.54	0.29	0.61	31.3%

MASTER-DEVELOPMENT CONDITIONS:

AREA DESIGN	Undeveloped	Landscape	Drive/walk	Roof	Total	C5	C100	Imperviousness
13*	0	0.04	0.1	0.05	0.19	0.62	0.76	71.00%
51*	0.15	0.15	0.20	0	0.50	0.45	0.69	40.60%
12	0	0	0	0.14	0.14	0.75	0.83	90.00%
11	1.29	0.34	0.14	0	1.77	0.2	0.53	8.58%
Total	1.44	0.53	0.44	0.19	2.6	0.31	0.59	23.68%

NOTE: Values in the table above were taken from Phase III Drainage Report for Founders Marketplace Filing No. 1, Block 1. Dated Oct 2nd 2004
* Values were modified for comparisons to proposed basins, refer to additional calculations presented in this report.

TABLE 6-3. RECOMMENDED IMPERVIOUSNESS BY SURFACE TYPES

SURFACE TYPES		IMPERVIOUSNESS
Roadways and Paved Streets		95%
Concrete Driveways and Walks		95%
Roofs		95%
Gravel	No Traffic (Pedestrian Use)	40%
	Low-traffic Areas (Maintenance Paths and Substations)	60%
	High-traffic Areas (Roadways and Parking)	80%
Disturbed Soil (Including Lawns, Managed/Active Turf, Landscaped Areas with Water-Wise Vegetation, and Uncompacted Gravel/Mulch Planting Beds)		20%
Undisturbed or Decompacted Soil (Native Grasses and Open Space Areas)		5%
Artificial Turfs ¹	Landscape Applications (without Subgrade Drainage Layer)	25% – 45%
	Sport Fields (with Underdrain Pipe System)	60% – 80%
Water Surfaces (Lakes/Reservoirs/Irrigation Ponds)		100%
Solar Fields ¹	Grass Cover (Varies with Panel Orientation Relative to Ground Contours)	10% – 45%
	Gravel Cover (Varies with Panel Orientation Relative to Ground Contours)	50% – 75%
Historic Flow Analysis, Greenbelts, Agricultural		5%
Newly Graded Areas		65%
Stormwater Control Measures ¹	Retention Ponds & Constructed Wetland Ponds	100%
	Rooftop Systems – Blue Roofs	95%
	Rooftop Systems – Green Roofs (extensive)	65%
	Rooftop Systems – Green Roofs (intensive)	50%
	Permeable Pavement – CGP/PGP/RGP	55%
	Permeable Pavement – PICP	45%
	Extended Detention Basins	25%
	Receiving Pervious Areas (incl. Grass Buffers & Grass Swales)	20%
	Bioretention & Sand Filters	10%

¹ Runoff Chapter 6

TABLE 6-8. RUNOFF COEFFICIENTS, C, NRCS HSG C/D

TOTAL OR EFFECTIVE % IMPERVIOUS	NRCS HSG C/D						
	WQFE & 2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year
2%	0.01	0.05	0.15	0.33	0.40	0.49	0.59
5%	0.03	0.08	0.17	0.35	0.42	0.50	0.60
10%	0.06	0.12	0.21	0.38	0.44	0.52	0.62
15%	0.10	0.16	0.24	0.40	0.47	0.55	0.64
20%	0.14	0.20	0.28	0.43	0.49	0.57	0.65
25%	0.18	0.24	0.32	0.46	0.52	0.59	0.67
30%	0.22	0.28	0.35	0.49	0.54	0.61	0.68
35%	0.26	0.32	0.39	0.52	0.57	0.63	0.70
40%	0.30	0.36	0.43	0.54	0.59	0.65	0.71
45%	0.34	0.40	0.46	0.57	0.62	0.67	0.73
50%	0.38	0.44	0.50	0.60	0.64	0.69	0.75
55%	0.43	0.48	0.54	0.63	0.66	0.71	0.76
60%	0.47	0.53	0.57	0.66	0.69	0.73	0.78
65%	0.51	0.56	0.61	0.68	0.71	0.75	0.79
70%	0.56	0.61	0.65	0.71	0.74	0.77	0.81
75%	0.60	0.65	0.68	0.74	0.76	0.79	0.82
80%	0.63	0.69	0.72	0.77	0.79	0.81	0.84
85%	0.69	0.73	0.76	0.80	0.81	0.83	0.86
90%	0.74	0.77	0.79	0.82	0.84	0.85	0.87
95%	0.79	0.81	0.83	0.85	0.86	0.87	0.89
100%	0.84	0.86	0.87	0.88	0.89	0.89	0.90

Calculation of Peak Runoff using Rational Method									
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$$Q(cfs) = CIA$$

Subcatchment Name	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C							Overland (Initial) Flow Time					Channelized (Travel) Flow Time						Time of Concentration			Rainfall Intensity, I (in/hr)								Peak Flow, Q (cfs)							
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	Overland Flow Length L _i (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Overland Flow Slope S _i (ft/ft)	Overland Flow Time t _i (min)	Channelized Flow Length L _i (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Channelized Flow Slope S _i (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V _i (ft/sec)	Channelized Flow Time t _i (min)	Computed t _c (min)	Regional t _c (min)	Selected t _c (min)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	
51*	0.50	C	40.6	0.30	0.37	0.43	0.55	0.59	0.65	0.72														5.00	3.60	4.85	5.63		7.67	8.82		0.55	1.10	1.22		2.29	3.04			
13*	0.19	C	71.1	0.57	0.61	0.65	0.72	0.74	0.77	0.81														5.00	3.60	4.85	5.63		7.67	8.82		0.39	0.57	0.70		1.08	1.27			
12	0.14	C	90.0	0.74	0.77	0.79	0.82	0.84	0.85	0.87														5.00	3.60	4.85	5.63		7.67	8.82		0.37	0.51	0.61		0.90	1.02			
11	1.77	C	8.6	0.05	0.10	0.20	0.37	0.44	0.52	0.62														21.90	1.99	2.68	3.11		4.24	4.87		0.19	0.95	1.65		3.26	4.57			
Master Total	2.60	C	23.7	0.17	0.23	0.31	0.45	0.51	0.58	0.66														5.00	3.60	4.85	5.63		7.67	8.82		1.55	2.88	4.49		10.18	13.33			
																								5.00	3.60	4.85	5.63		7.67	8.82										
51A	0.32	C	43.9	0.33	0.39	0.45	0.56	0.61	0.66	0.73														5.00	3.60	4.85	5.63		7.67	8.82		0.38	0.61	0.82		1.50	1.87			
13A	0.13	C	88.5	0.73	0.76	0.78	0.81	0.83	0.85	0.87														5.00	3.60	4.85	5.63		7.67	8.82		0.34	0.48	0.57		0.83	0.97			
12A	0.25	C	69.9	0.56	0.60	0.65	0.71	0.74	0.77	0.81														5.00	3.60	4.85	5.63		7.67	8.82		0.50	0.73	0.91		1.41	1.70			
11A	0.36	C	42.7	0.32	0.38	0.45	0.56	0.60	0.66	0.72														10.00	2.87	3.87	4.49		6.11	7.03		0.33	0.53	0.72		1.33	1.67			
11B	0.01	C	95.0	0.79	0.81	0.83	0.85	0.86	0.87	0.89														5.00	3.60	4.85	5.63		7.67	8.82		0.03	0.04	0.05		0.07	0.08			
11C	1.33	C	5.6	0.03	0.08	0.17	0.35	0.42	0.51	0.61														15.00	2.41	3.25	3.77		5.13	5.90		0.11	0.35	0.87		2.87	3.98			
11D	0.13	C	95.0	0.79	0.81	0.83	0.85	0.86	0.87	0.89														5.00	3.60	4.85	5.63		7.67	8.82		0.37	0.51	0.61		0.86	1.00			
Proposed Total	2.53	C	31.3	0.23	0.29	0.36	0.49	0.55	0.61	0.69														5.00	3.60	4.85	5.63		7.67											

Weighted Runoff Coefficients
Job Name: Founders Marketplace, Block 1
Job Number: 03.0292
Individual Concentration Times
[For Inlet Design and Detention Volume Calculation]

Date: 11/18/04

By: J Tompkins

	IMP%	Runoff Coefficient		
		C5	C10	C100
Roof.....	90	0.75	0.77	0.83
Drive / Walk.....	90	0.75	0.77	0.83
Street.....	100	0.90	0.92	0.96
Landscape.....	0	0.15	0.25	0.50
Undeveloped.....	2	0.16	0.26	0.51
Commercial.....	95	0.82	0.84	0.89

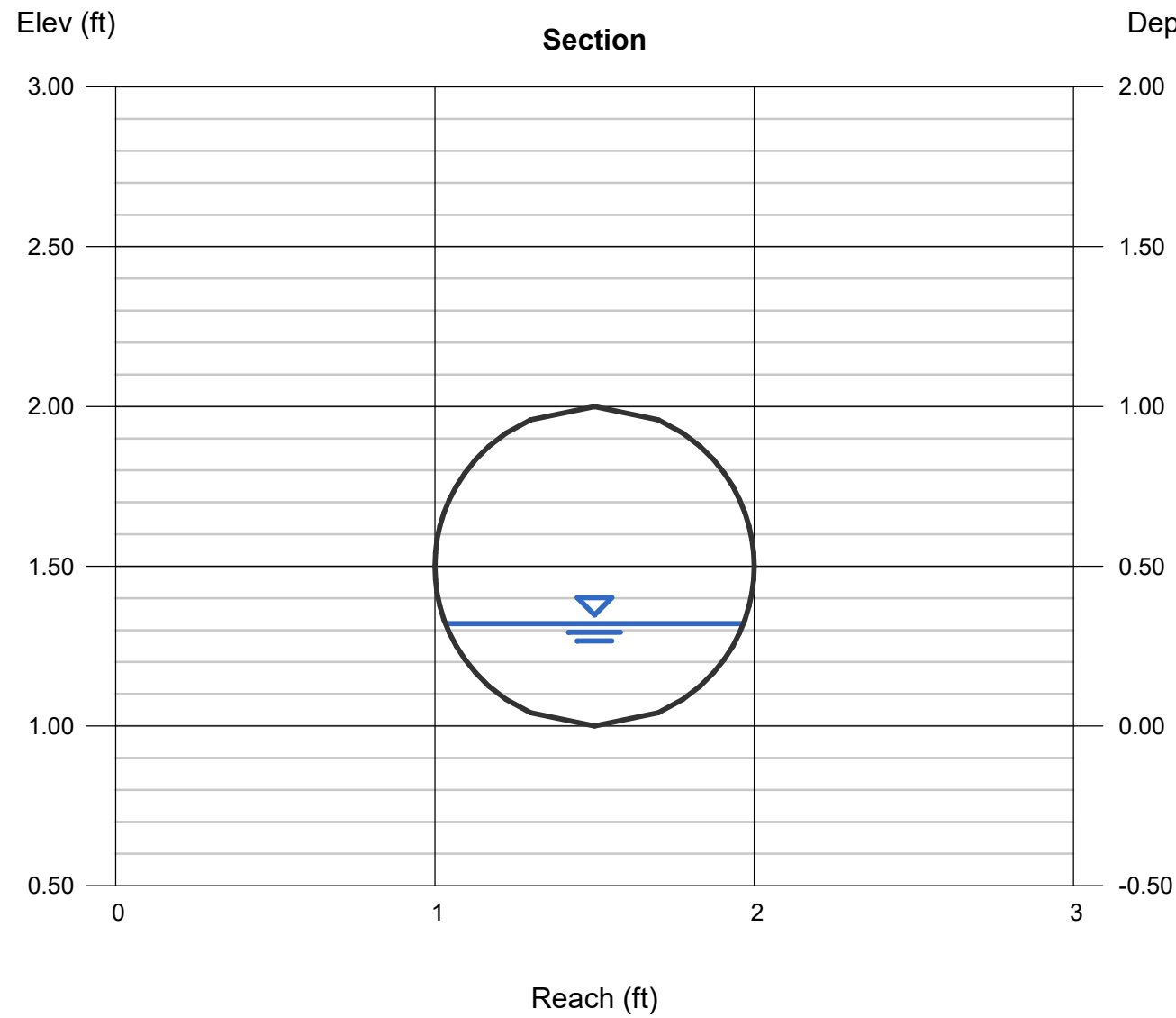
Land Use (Acres)							Weighted Runoff Coefficient ¹				
Basin	Roof	Drive/walk	Streets	Landscape	Undev.	Commercial	Total	C5	C10	C100	IMP%
11	0.00	0.14	0.00	0.34	1.29	0.00	1.77	0.20	0.30	0.53	8.58
12	0.14	0.00	0.00	0.00	0.00	0.00	0.14	0.75	0.77	0.83	90.00
13	0.05	0.47	0.00	0.16	0.00	0.00	0.68	0.52	0.57	0.67	68.82
14	0.00	0.10	1.03	0.09	1.19	0.00	2.41	0.38	0.45	0.60	47.46
15	0.00	0.29	0.00	0.04	0.00	0.00	0.33	0.62	0.65	0.74	79.09
16	0.09	1.72	0.00	0.28	0.00	0.00	2.09	0.60	0.64	0.73	77.94
17	0.00	0.30	0.00	0.04	0.00	0.00	0.34	0.62	0.66	0.74	79.41
18	0.00	0.07	0.52	0.04	2.42	0.00	3.05	0.26	0.35	0.55	20.70
19	0.00	0.29	0.00	0.09	0.00	0.00	0.38	0.52	0.57	0.67	68.68
20	0.00	0.17	0.00	0.20	0.00	0.00	0.37	0.35	0.42	0.59	41.35
13*	0.05	0.1		0.04			0.19	0.62		0.76	71.05
21	0.00	0.41	0.00	0.19	0.00	0.00	0.60	0.47	0.52	0.64	61.50
30	0.00	0.00	0.18	0.00	2.04	0.00	2.22	0.21	0.30	0.53	9.95
31	0.00	0.00	0.24	0.00	2.18	0.00	2.42	0.22	0.31	0.54	11.72
32	0.00	0.15	1.04	0.54	0.00	0.00	1.73	0.51	0.56	0.67	67.92
40	0.00	0.30	0.00	0.05	0.00	0.00	0.35	0.60	0.63	0.72	77.14
41	0.00	0.33	0.00	0.03	0.00	0.00	0.36	0.65	0.69	0.76	82.50
42	0.18	0.00	0.00	0.00	0.00	0.00	0.18	0.75	0.77	0.83	90.00
43	0.00	0.06	0.00	0.02	0.00	0.00	0.08	0.51	0.56	0.66	67.50
44	0.15	0.00	0.00	0.00	0.00	0.00	0.15	0.75	0.77	0.83	90.00
45	0.00	0.11	0.23	0.77	0.00	0.00	1.11	0.30	0.38	0.57	29.64
50	1.31	0.00	0.00	0.00	0.00	0.00	1.31	0.75	0.77	0.83	90.00
51	0.00	1.18	0.00	0.21	0.15	0.00	1.54	0.52	0.57	0.67	69.16
52	0.00	0.63	0.00	0.11	0.00	0.00	0.74	0.59	0.63	0.72	76.62
53	0.00	0.08	0.00	0.90	4.19	0.00	5.17	0.17	0.27	0.51	3.01
54	0.00	0.05	0.47	0.43	0.00	0.00	0.95	0.42	0.48	0.61	54.21
Total	1.92	6.85	3.71	4.53	13.46	0.00	30.47	0.34	0.41	0.58	38.96
51*	0	0.2	0	0.15	0.15	0	0.5	.453		0.687	40.6

¹See UD&FCD Table RO-5 in Appendix G

Channel Report

Basin 11A - 12 in ADS N-12 HDPE PIPE

Circular		Highlighted	
Diameter (ft)	= 1.00	Depth (ft)	= 0.32
		Q (cfs)	= 1.670
		Area (sqft)	= 0.22
Invert Elev (ft)	= 1.00	Velocity (ft/s)	= 7.67
Slope (%)	= 3.90	Wetted Perim (ft)	= 1.20
N-Value	= 0.012	Crit Depth, Yc (ft)	= 0.55
		Top Width (ft)	= 0.93
		EGL (ft)	= 1.23
Calculations			
Compute by:	Known Q		
Known Q (cfs)	= 1.67		



Channel Report

Basin 11B - 12 in ADS N-12 HDPE PIPE

Circular

Diameter (ft) = 1.00

Invert Elev (ft) = 1.00

Slope (%) = 6.00

N-Value = 0.012

Calculations

Compute by: Known Q

Known Q (cfs) = 0.08

Highlighted

Depth (ft) = 0.07

Q (cfs) = 0.080

Area (sqft) = 0.02

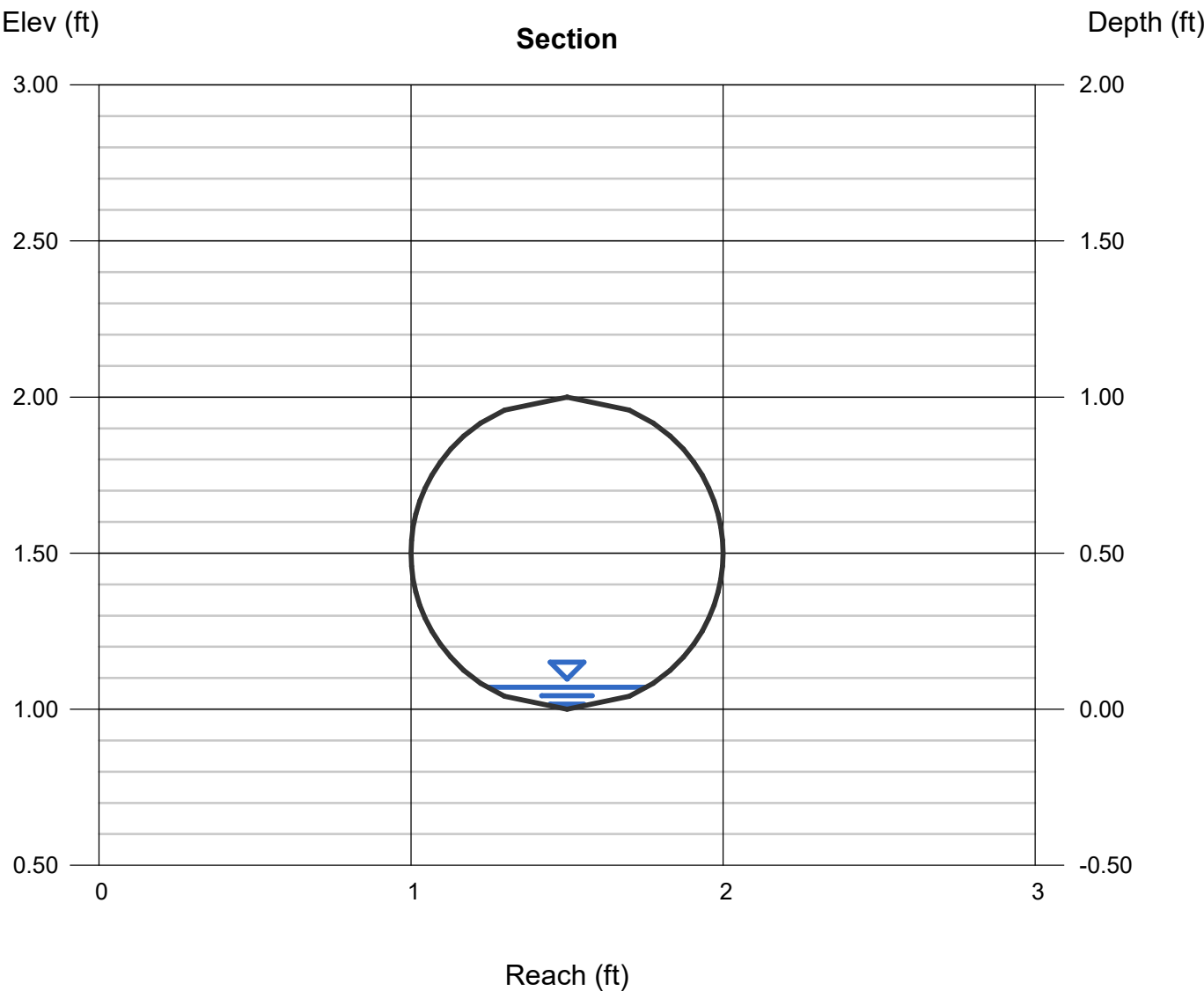
Velocity (ft/s) = 3.23

Wetted Perim (ft) = 0.54

Crit Depth, Yc (ft) = 0.12

Top Width (ft) = 0.51

EGL (ft) = 0.23



Channel Report

BASIN 12A - U GUTTER

Rectangular

Bottom Width (ft) = 2.00
Total Depth (ft) = 0.50

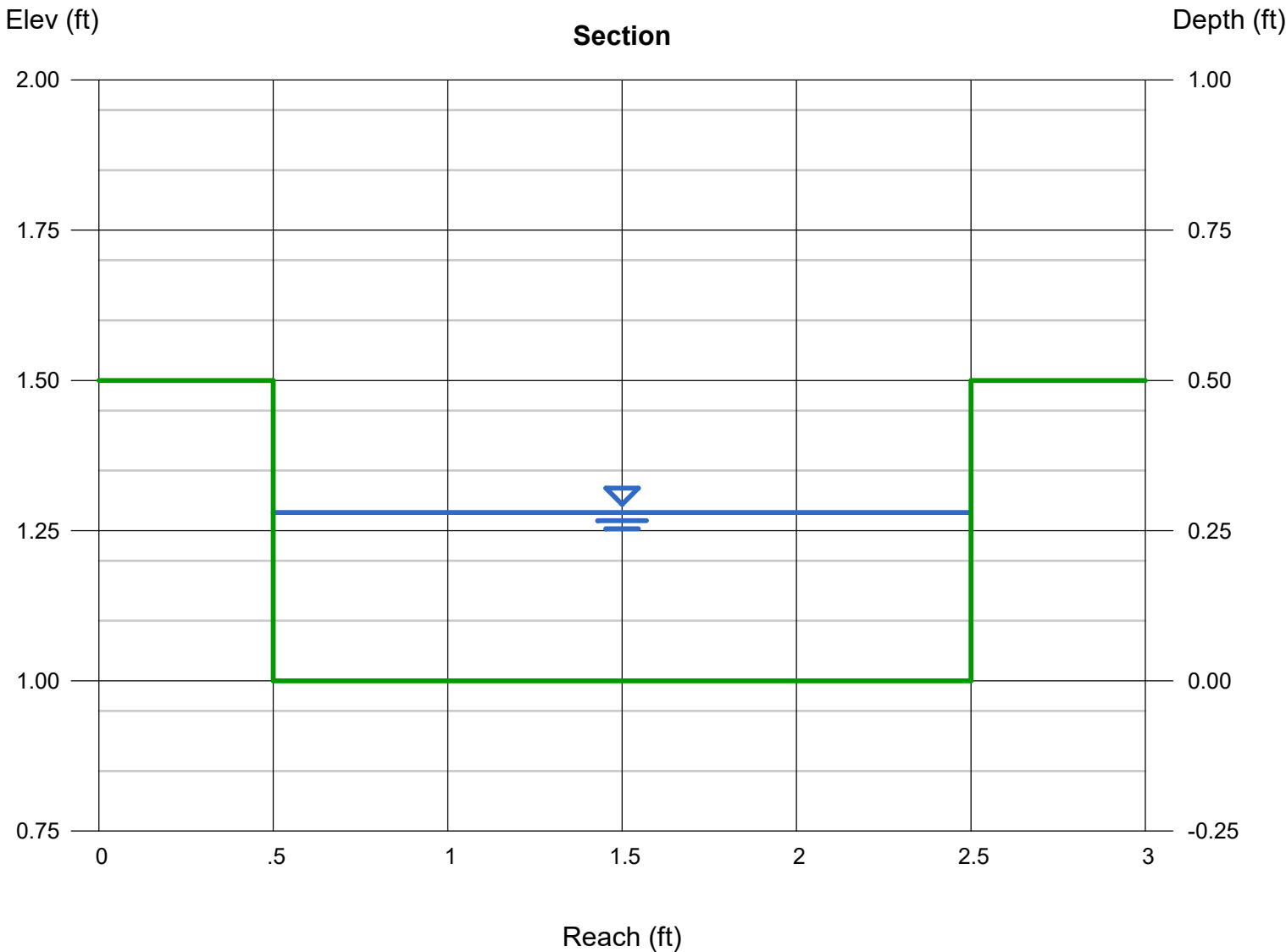
Invert Elev (ft) = 1.00
Slope (%) = 0.50
N-Value = 0.012

Calculations

Compute by: Known Q
Known Q (cfs) = 1.70

Highlighted

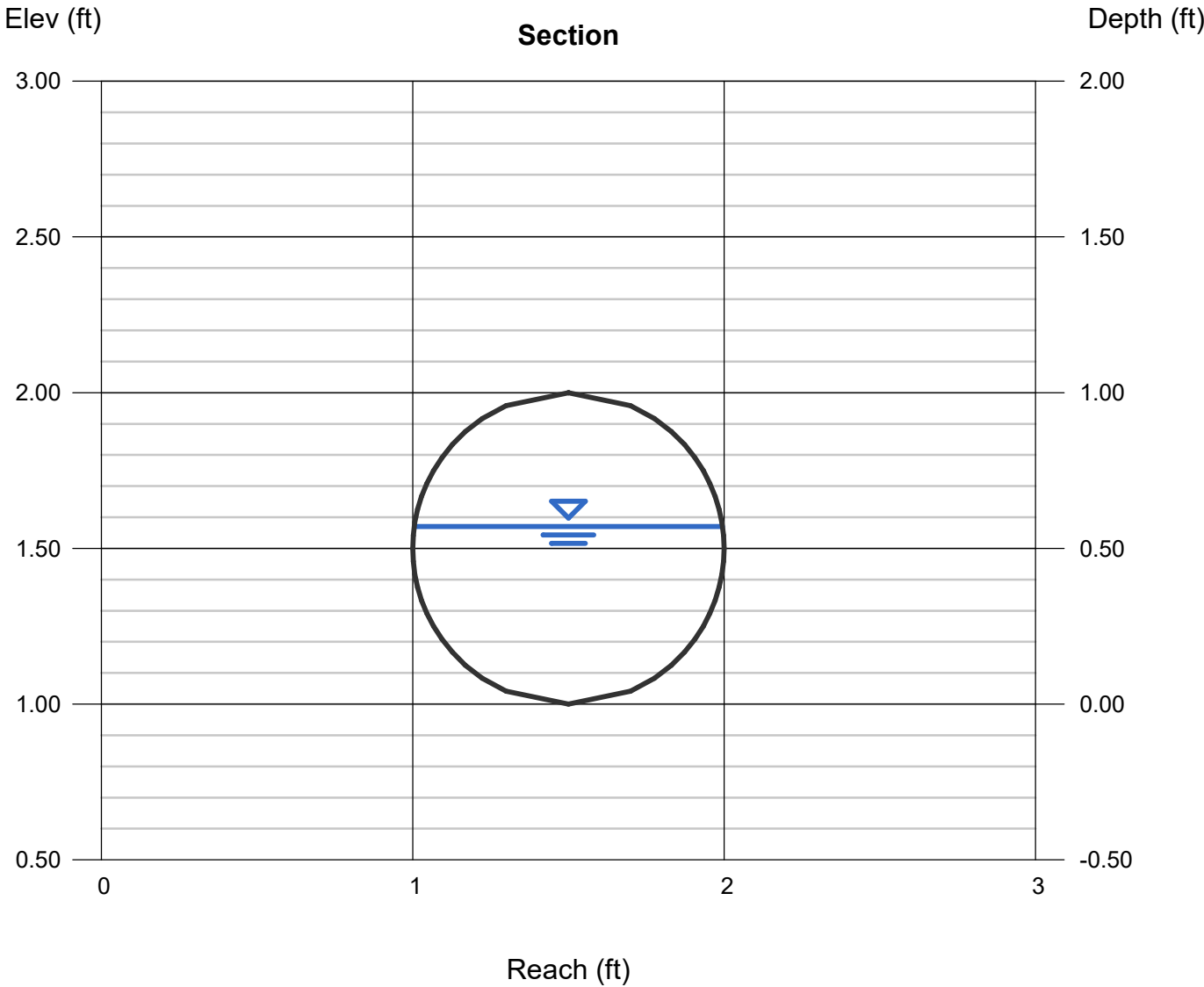
Depth (ft) = 0.28
Q (cfs) = 1.700
Area (sqft) = 0.56
Velocity (ft/s) = 3.04
Wetted Perim (ft) = 2.56
Crit Depth, Yc (ft) = 0.29
Top Width (ft) = 2.00
EGL (ft) = 0.42



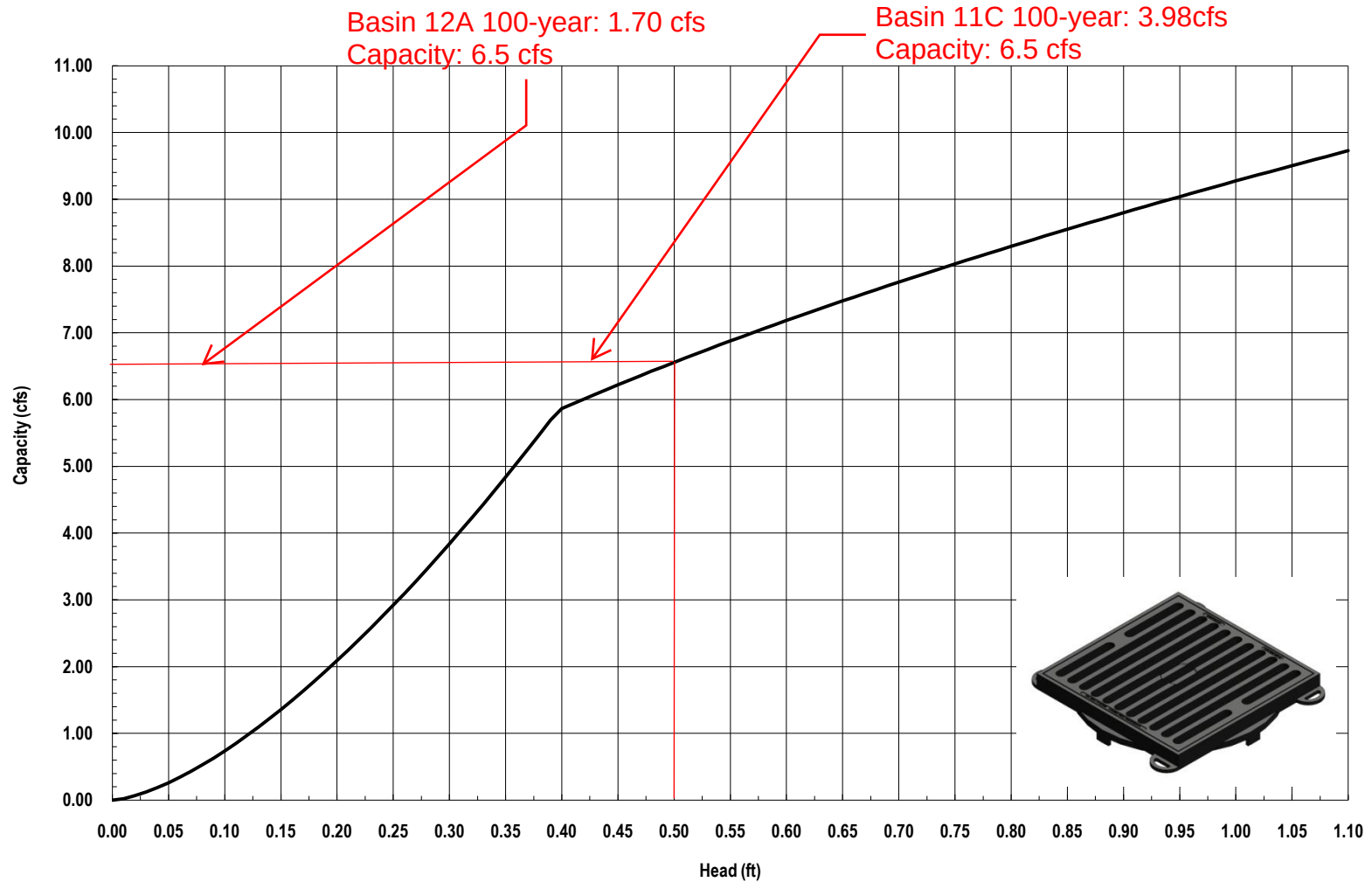
Channel Report

Basin 12A - 12 in ADS N-12 HDPE PIPE

Circular		Highlighted	
Diameter (ft)	= 1.00	Depth (ft)	= 0.57
		Q (cfs)	= 1.700
		Area (sqft)	= 0.46
Invert Elev (ft)	= 1.00	Velocity (ft/s)	= 3.66
Slope (%)	= 0.50	Wetted Perim (ft)	= 1.71
N-Value	= 0.012	Crit Depth, Yc (ft)	= 0.56
		Top Width (ft)	= 0.99
		EGL (ft)	= 0.78
Calculations			
Compute by:	Known Q		
Known Q (cfs)	= 1.70		



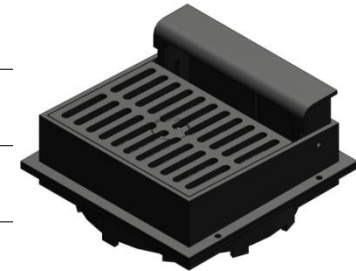
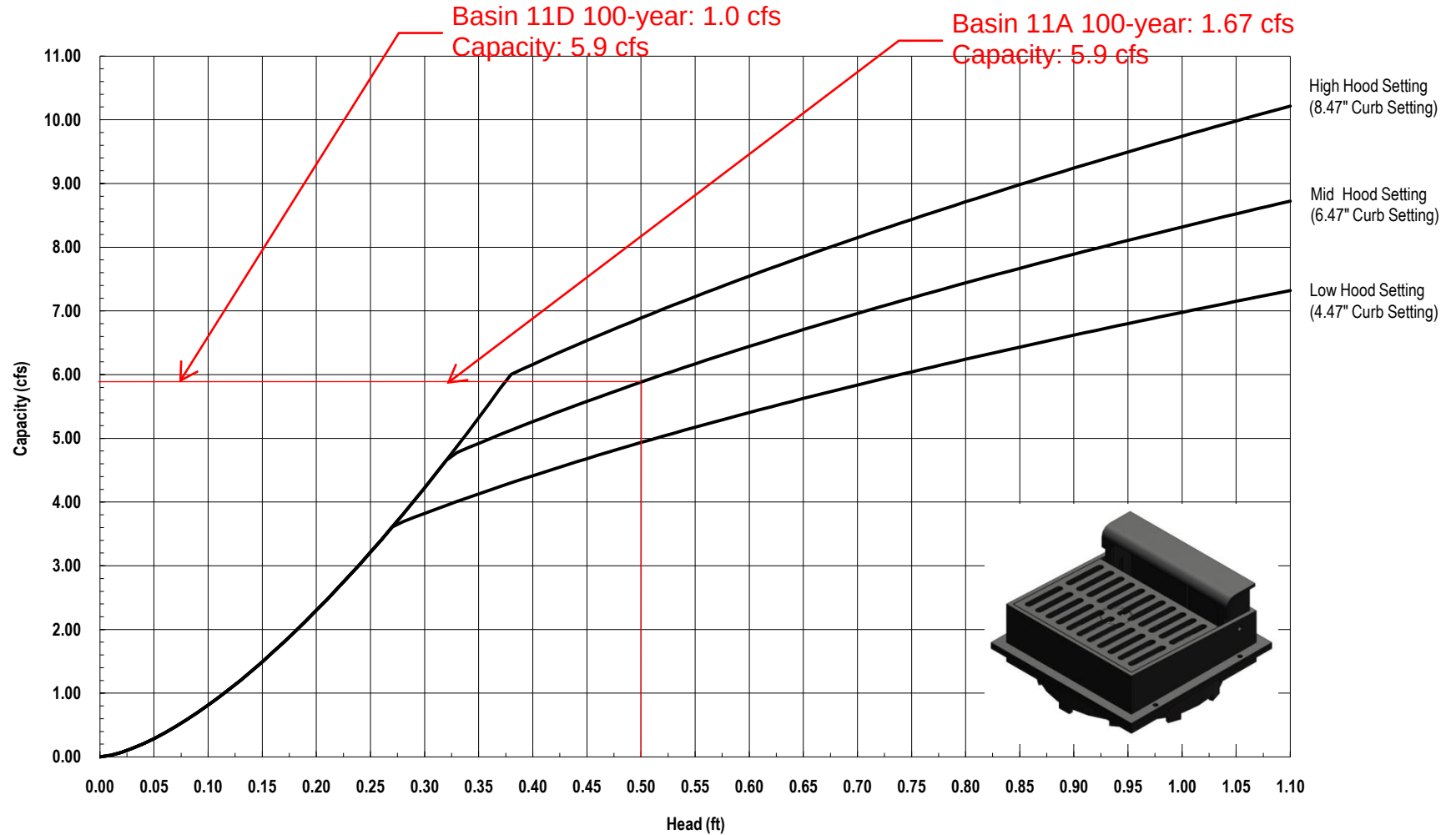
Nyloplast 2' x 2' Road & Highway Grate Inlet Capacity Chart



Nyloplast

3130 Verona Avenue • Buford, GA 30518
(866) 888-8479 / (770) 932-2443 • Fax: (770) 932-2490
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Nyloplast 2' x 2' Curb Inlet Standard Grate Inlet Capacity Chart



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National Flood Hazard Layer FIRMMette



104°49'56"W 39°22'41"N



0 250 500 1,000 1,500 2,000 Feet 1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
MAP PANELS		Unmapped
		The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/30/2024 at 11:06 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



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**



January 17, 2025

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Soil Map may not be valid at this scale.



Map Scale: 1:795 if printed on A portrait (8.5" x 11") sheet.

0 10 20 40 60 Meters

0 35 70 140 210 Feet

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

Custom Soil Resource Report

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 17, Aug 29, 2024

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

Date(s) aerial images were photographed: Mar 1, 2023—Sep 1, 2023

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
FoD	Fondis clay loam, 3 to 9 percent slopes	1.1	100.0%
Totals for Area of Interest		1.1	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.

Custom Soil Resource Report

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

FoD—Fondis clay loam, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: jqyp
Elevation: 5,500 to 6,800 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Fondis and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fondis

Setting

Landform: Ridges, buttes, mesas
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits over coarse-silty outwash derived from arkose

Typical profile

H1 - 0 to 7 inches: clay loam
H2 - 7 to 24 inches: clay
H3 - 24 to 60 inches: sandy clay loam

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum 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 9.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R049XB208CO - Clayey Foothill
Hydric soil rating: No

Minor Components

Kutch

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

Custom Soil Resource Report

Englewood

Percent of map unit: 5 percent

Hydric soil rating: No

Denver

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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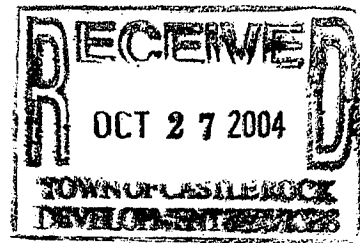
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**PHASE III DRAINAGE REPORT
FOR
FOUNDERS MARKETPLACE
FILING NO. 1, BLOCK 1
TOWN OF CASTLE ROCK, COLORADO**

**PHASE III DRAINAGE REPORT
FOR
FOUNDERS MARKETPLACE
FILING NO. 1, BLOCK 1
TOWN OF CASTLE ROCK, COLORADO**

October 8, 2004
Revised November 23, 2004

Prepared for:

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(CLC Job No. 03.0292)

**PHASE III DRAINAGE REPORT
FOR
FOUNDERS MARKETPLACE
FILING NO. 1, BLOCK 1
TOWN OF CASTLE ROCK, COLORADO**

between the access points grading will require approximately 125,000 cubic yards of import to complete.

The following basins are defined for the developed condition:

2.01.01 Basin 11 is the south portion of the Retail C parking field and a large area of off-site open space. The open space includes a portion of the IREA substation; though the structures and towers therein do not constitute any substantial impervious cover. Runoff will sheet down the proposed cut slopes to the parking area and be directed to a sump condition 3-foot Type 13C inlet in the curb and gutter.

2.01.02 Basin 12 consists of the roof top area of the Retail C. Roof runoff will be collected in downspouts and tight-lined (e.g. there will be no splash pads) in 6" PVC to the underground drain system via the Type 13C inlet in Basin 11.

2.01.03 Basin 13 is roughly half the area of the King Soopers Gas Pad, which will be a canopied, self-service facility. The area also includes peripheral drive and landscaping. Runoff will be collected in a sump condition 3-foot Type 13C curb inlet.

2.01.04 Basin 14 is one of the areas primarily associated with the peripheral public rights-of-way to Founders Marketplace proper. Basin 14 accounts for approximately 700 LF of South Ridge Road. Ridge Road is being widened to the east to provide curb and gutter at a location compliant to the Town's ultimate improvement plan. This excessive widening, for this interim condition, will be striped to provide adequate turn and deceleration lanes to service Founders Marketplace. Also included is a relatively large area of open space on the west side of Ridge Road. That open space is in a native condition and contributes storm runoff directly to the road in an un-concentrated manner. An on-grade ten-foot Type R inlet set in the east curb line of Ridge Road will intercept storm runoff. The bypass will continue down the east curb line to the next inlet at Basin 18.

2.01.05 Basin 15 is approximately 225 LF of the main drive off of the southwest corner of the King Soopers. Storm runoff will collect against the west side curb line and be conveyed to a 3-foot Type 13C curb inlet set in a sump condition at a landscape aisle. Should any bypass occur due to a clogged condition that overflow would continue to the inlet in Basin 16.

2.01.06 Basin 16 is the bulk of the parking field at the front (southwest) of the King Soopers. Included therein are associated drive and landscaping as well as a portion of the self-service gas facility. Runoff will be directed to a sump condition six-foot Type 13C inlet in a parking lot landscape island at the far northwest corner of that basin. For a clogged inlet condition or an event in excess of the 100-year return period overflow into the adjacent inlet in Basin 17 will occur.

**PHASE III DRAINAGE REPORT
FOR
FOUNDERS MARKETPLACE
FILING NO. 1, BLOCK 1
TOWN OF CASTLE ROCK, COLORADO**

southeast corners of the building. Scuppers will be used only for events in excess of the 100-year return period or for drain plugged conditions.

2.01.22 Basin 51 consists of a large parking field and associated drive, walk, and landscaping on the south side of the King Soopers grocery. Storm runoff will sheet across the parking field to the south curb line and then be directed to a sump condition 6-foot Type 13C inlet in the drive aisle on the northeast end of the basin.

2.01.23 Basin 52 is the drive aisle and truck maneuvering area off of the north rear corner of the King Soopers. Runoff will be collected in a sump condition 6-foot Type 13C Inlet in the curb and gutter.

2.01.24 Basin 53 is a comparatively large area of open space including the IREA substation and portion of Castle Oaks Filing No. 1. In the existing condition all runoff from these areas flow to the bar ditch in the Highway 86 right-of-way at the northeast corner of the Founders Marketplace parcel. The bar ditch then directs that runoff to the existing 36-inch culvert under the highway. Grading for the marketplace will fill the bar ditch and bury the existing culvert. A low point Type D inlet is being installed on the marketplace property proximal to the existing bar ditch location to intercept runoff therefrom and carry it underground to the Highway 86 crossing point.

2.01.25 Basin 54 consists of the south side of Highway 86 between the Founders Marketplace access and the basin divide high point in the road approximately 130 feet east hereof. Runoff from this area as well as bypass flows contributed from Basins 20, 21, and 46 will be collected at a sump condition ten-foot Type R inlet set in the new curb and gutter. This inlet will provide for 100 percent capture of both the 5- and 100-year rainfall runoff directed to it.

2.02 Regional Drainage Basins

The "Regional" basins include all areas tributary to the detention facility at the southwest corner of existing Castle Oaks and Valley View Drives. SCS Soil Types within these larger basins continue to be predominately of the Coni and Fondis series with some additional stoney steep lands; the latter maintain similar hydrologic characteristics with the previous two. In the analysis and design of the detention pond structure these Basins are defined by the appropriate CUHP and UDSWM parameters which do not necessarily provide a direct correlation to the Rational Method parameters used in the on-site runoff analysis and storm drain design.

2.02.01 Basin A are all those areas defined by "On-Site" Basins 1 through 54 above. The Basin is identified in both historic and developed conditions.

2.02.02 Basin B is an area of Castle Oaks Estates east of Founders Marketplace and south of Highway 86 that contributes north without first being directed to the 36-inch Highway 86 culvert immediately adjacent to Block 1. This basin is modeled only in

**PHASE III DRAINAGE REPORT
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FILING NO. 1, BLOCK 1
TOWN OF CASTLE ROCK, COLORADO**

One quandary associated with the large open tracts included in some of the catchments is their tendency to greatly increase the times of concentration of the overall system. That has the effect of reducing the rainfall rates associated with design nodes. To determine if the peaks at the design nodes was artificially decreased by the longer times of concentration associated with the open spaces it was necessary to analyze a comparison model which "capped" the system time of concentration while also reducing the contributing areas by a proportional amount. The two scenarios, their assumptions, and how they were used are described in detail below.

3.02.01 Scenario 1 - Individual Concentration Times

For this analysis all times of concentration and contributing areas were left unmodified. As mentioned this had the effect of dragging down the design node times of concentration. For example the first basin in the set (Basin 11; REF. Appendix B) has a 21.9-minute Tc while the remaining downstream basins in that series have concentration times of 5 to 7 minutes. Because of the increased Tc for Basin 11 all downstream design nodes are analyzed at a 22.3 minute Tc (Pipe travel times are considered negligible).

3.02.02 Scenario 2 - Restricted Concentration Times

In this analysis the times of concentration for basins with large open spaces contributing were reduced along with an equivalent reduction to the total area of the catchment. To determine an appropriate time of concentration to use as a cap it was assumed that the largest node flows would be associated with maximum impervious area contribution. Reviewing the SF-1 and SF-2 sheets (REF. Appendix B) for trends it was observed that Basins 28 and 29 did not have large open spaces included but were indicative of the remaining cover types associated with those basins that did; namely, streets. Also, a note was made that most of the on-site Founders Marketplace basins tended to have the 5 to 7 minute Tc's. Therefore, it was decided to use 7 minutes as the Tc cap, that being between the Tc's of Basins 32 and 46 and at the upper limit of the on-site basins.

The contributing area of those basins with large open spaces included was reduced to be in line with the ratio of the capped concentration time to their original concentration time. For instance, Basin 18 was determined to have an original Tc of 15.9 minutes and a contributing area of 3.05 acres. With the capped Tc of 7 minutes the ratio is $7/15.9$ or 0.44; therefore, final contributing area for the basin becomes 0.44×3.05 or 1.34 acres. Finally, all reductions to contributing area were taken exclusively from the open space portion; all paved areas remained and "C" values increased correspondingly. Comprehensive basin reduction calculations can be found in Appendix B.

**PHASE III DRAINAGE REPORT
FOR
FOUNDERS MARKETPLACE
FILING NO. 1, BLOCK 1
TOWN OF CASTLE ROCK, COLORADO**

3.02.03 Effects on Analysis

With few exceptions the runoff from any given basin was greatest for the analysis which included the individualized concentration time and the entire contributing area. Where that was not the case the differences were quite minor and offset by the greater increases to other basins. Therefore, the inlet and street capacity analysis (REF. Appendix C) was performed using the runoff data associated with the "Individual Concentration Times."

On the other hand, the design node analysis demonstrated greater flows in association with the "Restricted Concentration Times" numbers. The difference was most pronounced for the initial event; but held true for the major event as well. Flow at the furthest downstream and on-site node (128) increased from 31.96 cfs to 40.49 cfs for the 5-year event while the 100-year event only increased from 95.33 cfs to 102.59 cfs. Total contributing area difference in the two analysis was 10.17 acres. Therefore, the storm drain design (REF. Appendix D) was performed using the runoff data associated with the latter concentration time assumption.

Detailed hydrologic analysis is presented in Appendix B of this report while storm drain hydraulics is in Appendix C.

3.03 Site Discharge

The existing 36-inch CMP under Highway 86 will continue to be utilized as the ultimate receiving point for storm runoff from Founders Marketplace Block 1 and contiguous basins as described in Section 2.00. That pipe provides adequate capacity for the 100-year developed condition as demonstrated in Appendix C.

Immediately downstream of the Highway 86 culvert runoff enters an existing channel with a general alignment to the north-northeast. The channel provides catchment for parts of Founders Marketplace Filing No. 1, Block 2 and the Highway 86 ROW as described in Section 2.27. Founders Marketplace Filing No. 1, Block 2 is owned by Linden Investments, LTD.

An existing stock pond approximately 2400 feet downstream and a part of Castle Oaks Estates will be improved to provide detention for this development (See Section 3.04). The ultimate receiving body for runoff from this development is McMurdo Gulch a distance of approximately 1.2 miles north of Highway 86.

3.04 Detention

Increased runoff will result from the addition of significant impervious area to Founders Marketplace Block 1 and Ridge Road as detailed in the construction improvement plans. To mitigate this effect the developer is typically required to provide a detention pond prior to discharging stormwater to drainageways off property. In order to utilize the existing stock pond mentioned in Section 3.03 it will be necessary to increase flows across approximately 1900 feet of existing drainageway downstream of Founders Marketplace Filing No. 1, a portion

Weighted Runoff Coefficients**Job Name: Founders Marketplace, Block 1****Job Number: 03.0292**

Individual Concentration Times

[For Inlet Design and Detention Volume Calculation]

Date: 11/18/04

By: J Tompkins

	IMP%	Runoff Coefficient		
		C5	C10	C100
Roof.....	90	0.75	0.77	0.83
Drive / Walk.....	90	0.75	0.77	0.83
Street.....	100	0.90	0.92	0.96
Landscape.....	0	0.15	0.25	0.50
Undeveloped.....	2	0.16	0.26	0.51
Commercial.....	95	0.82	0.84	0.89

Land Use (Acres)							Weighted Runoff Coefficient ¹				
Basin	Roof	Drive/walk	Streets	Landscape	Undev.	Commercial	Total	C5	C10	C100	IMP%
11	0.00	0.14	0.00	0.34	1.29	0.00	1.77	0.20	0.30	0.53	8.58
12	0.14	0.00	0.00	0.00	0.00	0.00	0.14	0.75	0.77	0.83	90.00
13	0.05	0.47	0.00	0.16	0.00	0.00	0.68	0.52	0.57	0.67	68.82
14	0.00	0.10	1.03	0.09	1.19	0.00	2.41	0.38	0.45	0.60	47.46
15	0.00	0.29	0.00	0.04	0.00	0.00	0.33	0.62	0.65	0.74	79.09
16	0.09	1.72	0.00	0.28	0.00	0.00	2.09	0.60	0.64	0.73	77.94
17	0.00	0.30	0.00	0.04	0.00	0.00	0.34	0.62	0.66	0.74	79.41
18	0.00	0.07	0.52	0.04	2.42	0.00	3.05	0.26	0.35	0.55	20.70
19	0.00	0.29	0.00	0.09	0.00	0.00	0.38	0.52	0.57	0.67	68.68
20	0.00	0.17	0.00	0.20	0.00	0.00	0.37	0.35	0.42	0.59	41.35
21	0.00	0.41	0.00	0.19	0.00	0.00	0.60	0.47	0.52	0.64	61.50
30	0.00	0.00	0.18	0.00	2.04	0.00	2.22	0.21	0.30	0.53	9.95
31	0.00	0.00	0.24	0.00	2.18	0.00	2.42	0.22	0.31	0.54	11.72
32	0.00	0.15	1.04	0.54	0.00	0.00	1.73	0.51	0.56	0.67	67.92
40	0.00	0.30	0.00	0.05	0.00	0.00	0.35	0.60	0.63	0.72	77.14
41	0.00	0.33	0.00	0.03	0.00	0.00	0.36	0.65	0.69	0.76	82.50
42	0.18	0.00	0.00	0.00	0.00	0.00	0.18	0.75	0.77	0.83	90.00
43	0.00	0.06	0.00	0.02	0.00	0.00	0.08	0.51	0.56	0.66	67.50
44	0.15	0.00	0.00	0.00	0.00	0.00	0.15	0.75	0.77	0.83	90.00
45	0.00	0.11	0.23	0.77	0.00	0.00	1.11	0.30	0.38	0.57	29.64
50	1.31	0.00	0.00	0.00	0.00	0.00	1.31	0.75	0.77	0.83	90.00
51	0.00	1.18	0.00	0.21	0.15	0.00	1.54	0.52	0.57	0.67	69.16
52	0.00	0.63	0.00	0.11	0.00	0.00	0.74	0.59	0.63	0.72	76.62
53	0.00	0.08	0.00	0.90	4.19	0.00	5.17	0.17	0.27	0.51	3.01
54	0.00	0.05	0.47	0.43	0.00	0.00	0.95	0.42	0.48	0.61	54.21
Total	1.92	6.85	3.71	4.53	13.46	0.00	30.47	0.34	0.41	0.58	38.96

¹See UD&FCD Table RO-5 in Appendix G

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

[Individual Basins]

Subdivision: Founders Marketplace, Block 1

Calculated by: J Tompkins

Date: 11/18/04

Job no: 03.0292

Sub-Basin Data			Initial/Overland Time (Ti)			Travel Time (Sh. Conc / Gutter) Tt				Tc Check Urbanized Basin		Final Tc	Remarks
Desig (1)	C5 (2)	Area Ac (3)	Length Ft (4)	Slope % (5)	Ti Min (6)	Length Ft (7)	Slope % (8)	Vel FPS (9)	Tt Min (10)	Tot Len Ft (11)	Tc Min (12)	Min (13)	
11	0.20	1.77	300	2.08	21.9	0	0.00	0.00	0.0	300	11.7	21.9	Basin not urbanized
12	0.75	0.14	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
13	0.52	0.68	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
14	0.38	2.41	315	4.95	13.4	0	0.00	0.00	0.0	315	11.8	13.4	Basin not urbanized
15	0.62	0.33	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
16	0.60	2.09	200	3.00	8.8	0	0.00	0.00	0.0	200	11.1	8.8	
17	0.62	0.34	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
18	0.26	3.05	340	5.30	15.9	0	0.00	0.00	0.0	340	11.9	15.9	Basin not urbanized
19	0.52	0.38	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
20	0.35	0.37	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
21	0.47	0.60	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
30	0.21	2.22	340	9.80	13.8	0	0.00	0.00	0.0	340	11.9	13.8	Basin not urbanized
31	0.22	2.42	460	9.70	15.9	0	0.00	0.00	0.0	460	12.6	15.9	Basin not urbanized
32	0.51	1.73	85	10.80	4.4	0	0.00	0.00	0.0	85	10.5	5.0	
40	0.60	0.35	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
41	0.65	0.36	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
42	0.75	0.18	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
43	0.51	0.08	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
44	0.75	0.15	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
45	0.30	1.11	85	10.80	6.0	290	0.65	1.61	3.0	375	12.1	9.0	
50	0.75	1.31	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
51	0.52	1.54	200	10.00	6.8	430	3.00	4.00	1.8	630	13.5	8.6	
52	0.59	0.74	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
53	0.17	5.17	500	6.00	20.6	510	5.90	1.80	4.7	1010	15.6	20.6	Basin not urbanized
54	0.42	0.95	25	12.80	2.6	400	0.25	1.50	4.4	425	12.4	7.1	

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD - Individual Concentration Times)

Calculated by: J Tompkins

Date: 11/18/04

Checked by:

Job No: 03.0292

Project: Founders Marketplace, Block 1

Design Storm: 5-yr

Design Point	Direct Runoff							Total Runoff				Remarks
	Area Desig	Area (Ac)	Runoff Coeff	Tc (min)	CA	I (in/hr)	Q (cfs)	Tc (min)	Total CA	I (in/hr)	Q (cfs)	
101	11	1.77	0.20	21.9	0.36	2.83	1.02					
	12	0.14	0.75	5.0	0.10	4.90	0.51					
								21.9	0.46	2.83	1.31	
102	13	0.68	0.52	5.0	0.35	4.90	1.74					
								21.9	0.82	2.83	2.31	
	14	2.41	0.38	13.4	0.93	3.42	3.17					
103								21.9	1.74	2.83	4.94	
	15	0.33	0.62	5.0	0.20	4.90	1.00					
104								21.9	1.95	2.83	5.52	
	16	2.09	0.60	8.8	1.26	4.16	5.25					
105								21.9	3.21	2.83	9.09	
	17	0.34	0.62	5.0	0.21	4.90	1.03					
106								21.9	3.42	2.83	9.69	
	18	3.05	0.26	15.9	0.80	3.13	2.51					
107								21.9	4.22	2.83	11.96	
	19	0.38	0.52	5.0	0.20	4.90	0.97					
108								21.9	4.42	2.83	12.52	
	20	0.37	0.35	5.0	0.13	4.90	0.64					
	21	0.60	0.47	5.0	0.28	4.90	1.37					
109								21.9	4.83	2.83	13.69	
	30	2.22	0.21	13.8	0.47	3.37	1.57					
	31	2.42	0.22	15.9	0.53	3.13	1.66					
111								15.9	1.00	3.13	3.12	
	32	1.73	0.51	5.0	0.89	4.90	4.36					
112								15.9	1.89	3.13	5.90	
	40	0.35	0.60	5.0	0.21	4.90	1.02					
	41	0.36	0.65	5.0	0.24	4.90	1.15					
114								5.0	0.44	4.90	2.17	
	42	0.18	0.75	5.0	0.13	4.90	0.66					
	43	0.08	0.51	5.0	0.04	4.90	0.20					
115								5.0	0.62	4.90	3.03	
	44	0.15	0.75	5.0	0.11	4.90	0.55					
116								5.0	0.73	4.90	3.58	
	45	1.11	0.30	9.0	0.34	4.12	1.39					
118								15.9	2.95	3.13	9.24	and DP 112 + DP 116
120								21.9	7.79	2.83	22.05	DP 109 + DP 118
	50	1.31	0.75	5.0	0.98	4.90	4.78					
	1/2 50	0.66	0.75	5.0	0.49	4.90	2.39					
	51	1.54	0.52	8.6	0.81	4.18	3.37					
122								8.6	1.30	4.18	5.41	
	1/2 50	0.66	0.75	5.0	0.49	4.90	2.39					
	52	0.74	0.59	5.0	0.44	4.90	2.14					
124								8.6	2.22	4.18	9.28	and DP 122
	53	5.17	0.17	20.6	0.88	2.83	2.48					
125								20.6	3.10	2.83	8.77	
	54	0.95	0.42	7.1	0.40	4.50	1.80					
126								20.6	3.50	2.83	9.91	
128								21.9	11.28	2.83	31.96	DP 120 + DP 126

(RATIONAL METHOD - Individual Concentration Times)

Date: 11/18/04

Checked by:

Project: Founders Marketplace, Block 1

Design Storm: 10-yr

RATIONAL METHOD - Individual Concentration Times)								Checked by:		Design Storm: 10-yr		Remarks
Design Point	Area Desig	Area (Ac)	Runoff Coeff	Tc (min)	CA	I (in/hr)	Q (cfs)	Tc (min)	Total CA	I (in/hr)	Q (cfs)	
101	11	1.77	0.30	21.9	0.52	3.38	1.77					
	12	0.14	0.77	5.0	0.11	5.75	0.62					
	13	0.68	0.57	5.0	0.39	5.75	2.21	21.9	0.63	3.38	2.14	
102								21.9	1.02	3.38	3.44	
103	14	2.41	0.45	13.4	1.08	4.09	4.40	21.9	2.09	3.38	7.07	
104	15	0.33	0.65	5.0	0.22	5.75	1.24	21.9	2.31	3.38	7.80	
105	16	2.09	0.64	8.8	1.34	4.90	6.57	21.9	3.65	3.38	12.34	
106	17	0.34	0.66	5.0	0.22	5.75	1.28	21.9	3.87	3.38	13.09	
107	18	3.05	0.35	15.9	1.06	3.76	3.98	21.9	4.93	3.38	16.67	
108	19	0.38	0.57	5.0	0.21	5.75	1.23	21.9	5.15	3.38	17.39	
109	20	0.37	0.42	5.0	0.16	5.75	0.90					
	21	0.60	0.52	5.0	0.31	5.75	1.79	21.9	5.61	3.38	18.97	
111	30	2.22	0.30	13.8	0.67	4.03	2.70					
	31	2.42	0.31	15.9	0.75	3.76	2.82	15.9	1.42	3.76	5.34	
112	32	1.73	0.56	5.0	0.97	5.75	5.57	15.9	2.39	3.76	8.99	
114	40	0.35	0.63	5.0	0.22	5.75	1.28					
	41	0.36	0.69	5.0	0.25	5.75	1.42	5.0	0.47	5.75	2.70	
	42	0.18	0.77	5.0	0.14	5.75	0.80					
115	43	0.08	0.56	5.0	0.04	5.75	0.26	5.0	0.65	5.75	3.76	
116	44	0.15	0.77	5.0	0.12	5.75	0.67	5.0	0.77	5.75	4.42	
118	45	1.11	0.38	9.0	0.42	4.85	2.04	15.9	3.58	3.76	13.46	and DP 112 + DP 116
120								21.9	9.19	3.38	31.07	DP 109 + DP 118
	50	1.31	0.77	5.0	1.01	5.75	5.83					
122	1/2 50	0.66	0.77	5.0	0.51	5.75	2.91					
	51	1.54	0.57	8.6	0.88	4.92	4.31	8.6	1.38	4.92	6.80	
124	1/2 50	0.66	0.77	5.0	0.51	5.75	2.91					
	52	0.74	0.63	5.0	0.47	5.75	2.68	8.6	2.35	4.92	11.59	and DP 122
125	53	5.17	0.27	20.6	1.38	3.38	4.67	20.6	3.74	3.38	12.63	
126	54	0.95	0.48	7.1	0.45	5.29	2.40	20.6	4.19	3.38	14.16	
128								21.9	13.38	3.38	45.23	DP 120 + DP 126

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD - Individual Concentration Times)

Calculated by: J Tompkins

Date: 11/18/04

Checked by:

Job No: 03.0292

Project: Founders Marketplace, Block 1

Design Storm: 100-yr

Design Point	Direct Runoff							Total Runoff				Remarks
	Area Desig	Area (Ac)	Runoff Coeff	Tc (min)	CA'	I (in/hr)	Q (cfs)	Tc (min)	Total CA	I (in/hr)	Q (cfs)	
	11	1.77	0.53	21.9	0.93	5.15	4.81					
	12	0.14	0.83	5.0	0.12	9.00	1.05					
101								21.9	1.05	5.15	5.41	
102	13	0.68	0.67	5.0	0.46	9.00	4.11	21.9	1.51	5.15	7.77	
	14	2.41	0.60	13.4	1.44	6.33	9.11					
103								21.9	2.95	5.15	15.18	
	15	0.33	0.74	5.0	0.24	9.00	2.19					
104								21.9	3.19	5.15	16.43	
	16	2.09	0.73	8.8	1.52	7.63	11.61					
105								21.9	4.71	5.15	24.27	
	17	0.34	0.74	5.0	0.25	9.00	2.26					
106								21.9	4.96	5.15	25.56	
	18	3.05	0.55	15.9	1.69	5.80	9.78					
107								21.9	6.65	5.15	34.25	
	19	0.38	0.67	5.0	0.25	9.00	2.29					
108								21.9	6.91	5.15	35.57	
	20	0.37	0.59	5.0	0.22	9.00	1.95					
	21	0.60	0.64	5.0	0.38	9.00	3.45					
109								21.9	7.50	5.15	36.66	
	30	2.22	0.53	13.8	1.18	6.24	7.36					
	31	2.42	0.54	15.9	1.30	5.80	7.51					
111								15.9	2.46	5.80	14.35	
	32	1.73	0.67	5.0	1.15	9.00	10.39					
112								15.9	3.63	5.80	21.04	
	40	0.35	0.72	5.0	0.25	9.00	2.28					
	41	0.36	0.76	5.0	0.27	9.00	2.47					
114								5.0	0.53	9.00	4.75	
	42	0.18	0.83	5.0	0.15	9.00	1.35					
	43	0.08	0.66	5.0	0.05	9.00	0.48					
115								5.0	0.73	9.00	6.58	
	44	0.15	0.83	5.0	0.13	9.00	1.13					
116								5.0	0.86	9.00	7.71	
	45	1.11	0.57	9.0	0.63	7.56	4.76					
118								15.9	5.12	5.80	29.65	and DP 112 + DP 116
120								21.9	12.62	5.15	65.00	DP 109 + DP 118
	50	1.31	0.83	5.0	1.09	9.00	9.84					
	1/2 50	0.66	0.83	5.0	0.55	9.00	4.92					
	51	1.54	0.67	8.6	1.04	7.67	7.95					
122								8.6	1.58	7.67	12.14	
	1/2 50	0.66	0.83	5.0	0.55	9.00	4.92					
	52	0.74	0.72	5.0	0.53	9.00	4.79					
124								8.6	2.66	7.67	20.41	and DP 122
	53	5.17	0.51	20.6	2.64	5.15	13.61					
125								20.6	5.30	5.15	27.32	
	54	0.95	0.61	7.1	0.58	8.26	4.82					
126								20.6	5.89	5.15	30.32	
128								21.9	18.51	5.15	95.33	DP 120 + DP 126

Basin Reduction Factor**Job Name: Founders Marketplace, Block 1****Job Number: 03.0292**

Restricted Concentration Times

[For Pipe Design]

Date: 11/19/04

By: J Tompkins

Basin ID	Independent Tc (min)	A 7 min / Tc(Ind) (ratio)	B Total Area (acre)	Area Reduction ¹ B-[A*B] (acre)
11	21.9	0.32	1.77	1.20
14	13.4	0.52	2.41	1.15
18	15.9	0.44	3.05	1.71
30	13.8	0.51	2.22	1.09
31	15.9	0.44	2.42	1.35
45	9.0	0.78	1.11	0.25
53	20.6	0.34	5.17	3.41
54	7.1	0.99	0.95	0.01

¹Area reductions from undeveloped (highest priority) or landscape ONLY.

Weighted Runoff Coefficients

Job Name: Founders Marketplace, Block 1

Job Number: 03.0292

Restricted Concentration Times

[For Pipe Design]

Date: 11/19/04

By: J Tompkins

	IMP%	Runoff Coefficient		
		C5	C10	C100
Roof.....	90	0.75	0.77	0.83
Drive / Walk.....	90	0.75	0.77	0.83
Street.....	100	0.90	0.92	0.96
Landscape.....	0	0.15	0.25	0.50
Undeveloped.....	2	0.16	0.26	0.51
Commercial.....	95	0.82	0.84	0.89

	Land Use (Acres)						Weighted Runoff Coefficient ¹				
Basin	Roof	Drive/walk	Streets	Landscape	Undev.	Commercial	Total	C5	C10	C100	IMP%
11	0.00	0.14	0.00	0.34	0.09	0.00	0.57	0.27	0.35	0.56	22.42
12	0.14	0.00	0.00	0.00	0.00	0.00	0.14	0.75	0.77	0.83	90.00
13	0.05	0.47	0.00	0.16	0.00	0.00	0.68	0.52	0.57	0.67	68.82
14	0.00	0.10	1.03	0.09	0.04	0.00	1.26	0.73	0.76	0.82	88.95
15	0.00	0.29	0.00	0.04	0.00	0.00	0.33	0.62	0.65	0.74	79.09
16	0.09	1.72	0.00	0.28	0.00	0.00	2.09	0.60	0.64	0.73	77.94
17	0.00	0.30	0.00	0.04	0.00	0.00	0.34	0.62	0.66	0.74	79.41
18	0.00	0.07	0.52	0.04	0.71	0.00	1.34	0.37	0.43	0.59	44.57
19	0.00	0.29	0.00	0.09	0.00	0.00	0.38	0.52	0.57	0.67	68.68
20	0.00	0.15	0.00	0.18	0.00	0.00	0.33	0.35	0.42	0.58	40.91
21	0.00	0.41	0.00	0.19	0.00	0.00	0.60	0.47	0.52	0.64	61.50
30	0.00	0.00	0.18	0.00	0.95	0.00	1.13	0.25	0.33	0.55	17.61
31	0.00	0.00	0.24	0.00	0.83	0.00	1.07	0.28	0.36	0.56	23.98
32	0.00	0.15	1.04	0.54	0.00	0.00	1.73	0.51	0.56	0.67	67.92
40	0.00	0.30	0.00	0.05	0.00	0.00	0.35	0.60	0.63	0.72	77.14
41	0.00	0.33	0.00	0.03	0.00	0.00	0.36	0.65	0.69	0.76	82.50
42	0.18	0.00	0.00	0.00	0.00	0.00	0.18	0.75	0.77	0.83	90.00
43	0.00	0.06	0.00	0.02	0.00	0.00	0.08	0.51	0.56	0.66	67.50
44	0.15	0.00	0.00	0.00	0.00	0.00	0.15	0.75	0.77	0.83	90.00
45	0.00	0.11	0.23	0.52	0.00	0.00	0.86	0.34	0.41	0.58	38.26
50	1.31	0.00	0.00	0.00	0.00	0.00	1.31	0.75	0.77	0.83	90.00
51	0.00	1.18	0.00	0.21	0.15	0.00	1.54	0.52	0.57	0.67	69.16
52	0.00	0.63	0.00	0.11	0.00	0.00	0.74	0.59	0.63	0.72	76.62
53	0.00	0.08	0.00	0.90	0.78	0.00	1.76	0.18	0.28	0.52	4.98
54	0.00	0.05	0.47	0.42	0.00	0.00	0.94	0.42	0.48	0.62	54.79
Total	1.92	6.83	3.71	4.25	3.55	0.00	20.26	0.44	0.49	0.62	57.53

¹See UD&FCD Table RO-5 in Appendix G

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

[Restricted Basins]

Subdivision: Founders Marketplace, Block 1

Calculated by: J Tompkins

Date: 11/19/04

Job no: 03.0292

Sub-Basin Data			Initial/Overland Time (Ti)			Travel Time (Sh. Conc / Gutter) Tt				Tc Check Urbanized Basin		Final Tc	Remarks
Desig (1)	C5 (2)	Area Ac (3)	Length Ft (4)	Slope % (5)	Ti Min (6)	Length Ft (7)	Slope % (8)	Vel FPS (9)	Tt Min (10)	Tot Len Ft (11)	Tc Min (12)	Min (13)	
11	0.27	0.57	300	2.08	20.2	0	0.00	0.00	0.0	300	11.7	7.0	Basin not urbanized
12	0.75	0.14	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
13	0.52	0.68	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
14	0.73	1.26	315	4.95	6.9	0	0.00	0.00	0.0	315	11.8	7.0	Basin not urbanized
15	0.62	0.33	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
16	0.60	2.09	200	3.00	8.8	0	0.00	0.00	0.0	200	11.1	8.8	
17	0.62	0.34	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
18	0.37	1.34	340	5.30	13.9	0	0.00	0.00	0.0	340	11.9	7.0	Basin not urbanized
19	0.52	0.38	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
20	0.35	0.33	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
21	0.47	0.60	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
30	0.25	1.13	340	9.80	13.2	0	0.00	0.00	0.0	340	11.9	7.0	Basin not urbanized
31	0.28	1.07	460	9.70	14.9	0	0.00	0.00	0.0	460	12.6	7.0	Basin not urbanized
32	0.51	1.73	85	10.80	4.4	0	0.00	0.00	0.0	85	10.5	5.0	
40	0.60	0.35	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
41	0.65	0.36	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
42	0.75	0.18	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
43	0.51	0.08	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
44	0.75	0.15	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
45	0.34	0.86	85	10.80	5.7	290	0.65	1.61	3.0	375	12.1	7.0	
50	0.75	1.31	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
51	0.52	1.54	200	10.00	6.8	430	3.00	4.00	1.8	630	13.5	8.6	
52	0.59	0.74	0	0.00	0.0	0	0.00	0.00	0.0	0	10.0	5.0	Use Min reg. Tc
53	0.18	1.76	500	6.00	20.3	510	5.90	1.80	4.7	1010	15.6	7.0	Basin not urbanized
54	0.42	0.94	25	12.80	2.6	400	0.25	1.50	4.4	425	12.4	7.0	

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD - Restricted Concentration Times)

Calculated by: J Tompkins

Date: 11/19/04

Checked by:

Job No: 03.0292

Project: Founders Marketplace, Block 1

Design Storm: 5-yr

Design Point	Direct Runoff							Total Runoff				Remarks
	Area Desig	Area (Ac)	Runoff Coeff	Tc (min)	CA	I (in/hr)	Q (cfs)	Tc (min)	Total CA	I (in/hr)	Q (cfs)	
101	11	0.57	0.27	7.0	0.15	4.50	0.70					
	12	0.14	0.75	5.0	0.10	4.90	0.51					
	13	0.68	0.52	5.0	0.35	4.90	1.74	7.0	0.26	4.50	1.17	
102								7.0	0.61	4.50	2.76	
	14	1.26	0.73	7.0	0.92	4.50	4.15					
103								7.0	1.54	4.50	6.91	
	15	0.33	0.62	5.0	0.20	4.90	1.00					
104								7.0	1.74	4.50	7.82	
	16	2.09	0.60	8.8	1.26	4.16	5.25					
105								8.8	3.00	4.16	12.48	
	17	0.34	0.62	5.0	0.21	4.90	1.03					
106								8.8	3.21	4.16	13.36	
	18	1.34	0.37	7.0	0.50	4.50	2.23					
107								8.8	3.71	4.16	15.42	
	19	0.38	0.52	5.0	0.20	4.90	0.97					
108								8.8	3.91	4.16	16.25	
	20	0.33	0.35	5.0	0.12	4.90	0.57					
	21	0.60	0.47	5.0	0.28	4.90	1.37					
109								8.8	4.30	4.16	17.90	
	30	1.13	0.25	7.0	0.28	4.50	1.27					
	31	1.07	0.28	7.0	0.30	4.50	1.34					
111								7.0	0.58	4.50	2.61	
	32	1.73	0.51	5.0	0.89	4.90	4.36					
112								7.0	1.47	4.50	6.61	
	40	0.35	0.60	5.0	0.21	4.90	1.02					
	41	0.36	0.65	5.0	0.24	4.90	1.15					
114								5.0	0.44	4.90	2.17	
	42	0.18	0.75	5.0	0.13	4.90	0.66					
	43	0.08	0.51	5.0	0.04	4.90	0.20					
115								5.0	0.62	4.90	3.03	
	44	0.15	0.75	5.0	0.11	4.90	0.55					
116								5.0	0.73	4.90	3.58	
	45	0.86	0.34	7.0	0.29	4.50	1.32					
118								7.0	2.49	4.50	11.21	and DP 112 + DP 116
120								8.8	6.79	4.16	28.26	DP 109 + DP 118
	50	1.31	0.75	5.0	0.98	4.90	4.78					
	1/2 50	0.66	0.75	5.0	0.49	4.90	2.39					
	51	1.54	0.52	8.6	0.81	4.18	3.37					
122								8.6	1.30	4.18	5.41	
	1/2 50	0.66	0.75	5.0	0.49	4.90	2.39					
	52	0.74	0.59	5.0	0.44	4.90	2.14					
124								8.6	2.22	4.18	9.28	and DP 122
	53	1.76	0.18	7.0	0.32	4.50	1.44					
125								8.6	2.54	4.18	10.62	
	54	0.94	0.42	7.0	0.40	4.50	1.80					
126								8.6	2.94	4.18	12.29	
128								8.8	9.73	4.16	40.49	DP 120 + DP 126

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD - Restricted Concentration Times)

Calculated by: J Tompkins

Date: 11/19/04

Checked by:

Job No: 03.0292

Project: Founders Marketplace, Block 1

Design Storm: 10-yr

Design Point	Direct Runoff							Total Runoff				Remarks
	Area Desig	Area (Ac)	Runoff Coeff	Tc (min)	CA	I (in/hr)	Q (cfs)	Tc (min)	Total CA	I (in/hr)	Q (cfs)	
	11	0.57	0.35	7.0	0.20	5.29	1.07					
	12	0.14	0.77	5.0	0.11	5.75	0.62					
101								7.0	0.31	5.29	1.64	
	13	0.68	0.57	5.0	0.39	5.75	2.21					
102								7.0	0.69	5.29	3.67	
	14	1.26	0.76	7.0	0.96	5.29	5.07					
103								7.0	1.65	5.29	8.74	
	15	0.33	0.65	5.0	0.22	5.75	1.24					
104								7.0	1.87	5.29	9.88	
	16	2.09	0.64	8.8	1.34	4.90	6.57					
105								8.8	3.21	4.90	15.72	
	17	0.34	0.66	5.0	0.22	5.75	1.28					
106								8.8	3.43	4.90	16.81	
	18	1.34	0.43	7.0	0.58	5.29	3.08					
107								8.8	4.01	4.90	19.67	
	19	0.38	0.57	5.0	0.21	5.75	1.23					
108								8.8	4.23	4.90	20.72	
	20	0.33	0.42	5.0	0.14	5.75	0.80					
	21	0.60	0.52	5.0	0.31	5.75	1.79					
109								8.8	4.68	4.90	22.92	
	30	1.13	0.33	7.0	0.38	5.29	2.00					
	31	1.07	0.36	7.0	0.38	5.29	2.03					
111								7.0	0.76	5.29	4.03	
	32	1.73	0.56	5.0	0.97	5.75	5.57					
112								7.0	1.73	5.29	9.16	
	40	0.35	0.63	5.0	0.22	5.75	1.28					
	41	0.36	0.69	5.0	0.25	5.75	1.42					
114								5.0	0.47	5.75	2.70	
	42	0.18	0.77	5.0	0.14	5.75	0.80					
	43	0.08	0.56	5.0	0.04	5.75	0.26					
115								5.0	0.65	5.75	3.76	
	44	0.15	0.77	5.0	0.12	5.75	0.67					
116								5.0	0.77	5.75	4.42	
	45	0.86	0.41	7.0	0.35	5.29	1.87					
118								7.0	2.85	5.29	15.09	and DP 112 + DP 116
120								8.8	7.53	4.90	36.90	DP 109 + DP 118
	50	1.31	0.77	5.0	1.01	5.75	5.83					
	1/2 50	0.66	0.77	5.0	0.51	5.75	2.91					
	51	1.54	0.57	8.6	0.88	4.92	4.31					
122								8.6	1.38	4.92	6.80	
	1/2 50	0.66	0.77	5.0	0.51	5.75	2.91					
	52	0.74	0.63	5.0	0.47	5.75	2.68					
124								8.6	2.35	4.92	11.59	and DP 122
	53	1.76	0.28	7.0	0.49	5.29	2.59					
125								8.6	2.84	4.92	14.00	
	54	0.94	0.48	7.0	0.45	5.29	2.39					
126								8.6	3.30	4.92	16.22	
128								8.8	10.83	4.90	53.04	DP 120 + DP 126

(RATIONAL METHOD - Restricted Concentration Times)

Checked by:

Design Storm: 100-yr

NATIONAL METHOD - Restricted Concentration Policy								Checked By:		Design Storm: 100-yr		Remarks
Design Point	Area Desig	Area (Ac)	Runoff Coeff	Tc (min)	CA	I (in/hr)	Q (cfs)	Tc (min)	Total CA	I (in/hr)	Q (cfs)	
101	11	0.57	0.56	7.0	0.32	8.26	2.62					
	12	0.14	0.83	5.0	0.12	9.00	1.05					
	13	0.68	0.67	5.0	0.46	9.00	4.11	7.0	0.43	8.26	3.58	
102								7.0	0.89	8.26	7.36	
	14	1.26	0.82	7.0	1.04	8.26	8.57					
103								7.0	1.93	8.26	15.93	
	15	0.33	0.74	5.0	0.24	9.00	2.19					
104								7.0	2.17	8.26	17.94	
	16	2.09	0.73	8.8	1.52	7.63	11.61					
105								8.8	3.69	7.63	28.18	
	17	0.34	0.74	5.0	0.25	9.00	2.26					
106								8.8	3.94	7.63	30.10	
	18	1.34	0.59	7.0	0.79	8.26	6.54					
107								8.8	4.74	7.63	36.14	
	19	0.38	0.67	5.0	0.25	9.00	2.29					
108								8.8	4.99	7.63	38.09	
	20	0.33	0.58	5.0	0.19	9.00	1.74					
	21	0.60	0.64	5.0	0.38	9.00	3.45					
109								8.8	5.57	7.63	42.48	
	30	1.13	0.55	7.0	0.62	8.26	5.11					
	31	1.07	0.56	7.0	0.60	8.26	4.94					
111								7.0	1.22	8.26	10.05	
	32	1.73	0.67	5.0	1.15	9.00	10.39					
112								7.0	2.37	8.26	19.58	
	40	0.35	0.72	5.0	0.25	9.00	2.28					
	41	0.36	0.76	5.0	0.27	9.00	2.47					
114								5.0	0.53	9.00	4.75	
	42	0.18	0.83	5.0	0.15	9.00	1.35					
	43	0.08	0.66	5.0	0.05	9.00	0.48					
115								5.0	0.73	9.00	6.58	
	44	0.15	0.83	5.0	0.13	9.00	1.13					
116								5.0	0.86	9.00	7.71	
	45	0.86	0.58	7.0	0.50	8.26	4.12					
118								7.0	3.73	8.26	30.78	and DP 112 + DP 116
120								8.8	9.29	7.63	70.91	DP 109 + DP 118
	50	1.31	0.83	5.0	1.09	9.00	9.84					
	1/2 50	0.66	0.83	5.0	0.55	9.00	4.92					
	51	1.54	0.67	8.6	1.04	7.67	7.95					
122								8.6	1.58	7.67	12.14	
	1/2 50	0.66	0.83	5.0	0.55	9.00	4.92					
	52	0.74	0.72	5.0	0.53	9.00	4.79					
124								8.6	2.66	7.67	20.41	and DP 122
	53	1.76	0.52	7.0	0.91	8.26	7.52					
125								8.6	3.57	7.67	27.39	
	54	0.94	0.62	7.0	0.58	8.26	4.78					
126								8.6	4.15	7.67	31.83	
128								8.8	13.44	7.63	102.59	DP 120 + DP 126

Inlet Sizing Calculations

Job Name: Founders Marketplace, Block 1

Job Number: 03.0292

Date: 11/19/04

by: .Tompkins

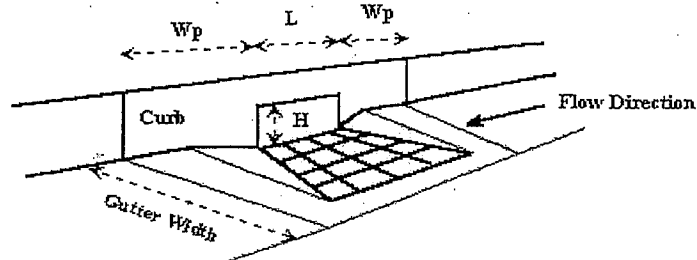
Inlet ID ¹	Basin Contribution		Upstream Contribution		Condition	Logitudinal Grade	Inlet Type	Inlet Interception		Bypass		Notes
	5-year Runoff	100-year Runoff	5-year Runoff	100-year Runoff				5-year Runoff	100-year Runoff	5-year Runoff	100-year Runoff	
11	1.0	4.8	-	-	Sump	-	Single (3') Type 13C Inlet	100%	100%	-	-	
13	1.7	4.1	-	-	Sump	-	Single (3') Type 13C Inlet	100%	100%	-	-	
14	3.2	9.1	-	-	On-Grade	3.35%	Ten-Foot Type R Inlet	2.8	5.1	0.4	4.0	bypass to I-18
15	1.0	2.2	-	-	Sump	-	Single (3') Type 13C Inlet	100%	100%	-	-	
16	5.3	11.6	-	-	Sump	-	Double (6') Type 13C Inlet	100%	100%	-	-	
17	1.0	2.3	-	-	Sump	-	Double (6') Type 13C Inlet	100%	100%	-	-	
18	2.5	9.8	0.4	4.0	On-Grade	3.35%	Ten-Foot Type R Inlet	2.6	6.2	0.3	7.5	bpass to I-32
19	1.0	2.3	-	-	Sump	-	Single (3') Type 13C Inlet	100%	100%	-	-	
20	0.6	2.0	-	-	On-Grade	6.10%	Five-Foot Type R Inlet	0.5	1.2	0.1	0.8	bypass to I-54
21	1.4	3.5	-	-	On-Grade	6.10%	Five-Foot Type R Inlet	1.0	1.6	0.4	1.8	bypass to I-54
30	1.6	7.4	-	-	On-Grade	3.16%	Ten-Foot Type R Inlet	100%	4.3	-	3.0	bypass to I-31
31	1.7	7.5	-	3.0	On-Grade	2.02%	Ten-Foot Type R Inlet	100%	6.6	-	3.9	bypass to I-32
32	4.4	10.4	0.3	11.4	On-Grade	1.80%	Ten-Foot Type R Inlet	3.9	8.6	0.8	13.2	bypass to I-45
40	1.0	2.3	-	-	Sump	-	Single (3') Type 13C Inlet	100%	100%	-	-	
41	1.2	2.5	-	-	Sump	-	Single (3') Type 13C Inlet	100%	100%	-	-	
43	0.2	0.5	-	-	Sump	-	Single (3') Type 13C Inlet	100%	100%	-	-	
45	1.4	4.8	0.8	13.2	On-Grade	0.83%	Ten-Foot Type R Inlet	100%	11.0	-	7.0	bypass to I-54
51	3.4	8.0	-	-	Sump	-	Double (6') Type 13C Inlet	100%	100%	-	-	
52	2.1	4.8	-	-	Sump	-	Double (6') Type 13C Inlet	100%	100%	-	-	
53	2.5	13.6	-	-	Sump	-	Type D Inlet	100%	100%	-	-	
54	1.8	4.8	0.5	9.6	Sump	-	Ten-Foot Type R Inlet	100%	100%	-	-	

¹Inlet and contributing basin have the same ID.

COMBINATION INLET IN A SUMP

Project = Founders Marketplace, Block 1

Inlet ID = Inlet 11 - Initial



Design Information (Input)

Length of a Unit Inlet

$L_o = 3.00$ ft

Local Depression, if any (not part of upstream Composite Gutter)

$a_{local} = 3.00$ inches

Number of Unit Inlets

$N_o = 1$

Grate Information

Width of a Unit Grate

$W_o = 1.86$ ft

Area Opening Ratio for a Grate (typical values 0.60-0.90)

$A = 0.38$

Clogging Factor for a Single Grate (typical value 0.50)

$C_o (G) = 0.50$

Grate Orifice Coefficient (typical value 0.67)

$C_d (G) = 0.67$

Grate Weir Coefficient (typical value 3.00)

$C_w (G) = 3.00$

Curb Opening Information

Height of Curb Opening in Inches

$H = 8.00$ inches

Angle of Throat (see USDCM Figure ST-5)

$\Theta = 0.0$ degrees

Side Width for Depression Pan

$W_p = 3.00$ ft

Clogging Factor for a Single Curb Opening (typical value 0.10)

$C_o (C) = 0.10$

Curb Opening Orifice Coefficient (typical value 0.67)

$C_d (C) = 0.67$

Curb Opening Weir Coefficient (typical value 2.30-3.00)

$C_w (C) = 3.00$

Grate Inlet Capacity in a Sump (Calculated)

Design Discharge on the Street (from Street Hy)

$Q_o = 1.0$ cfs

Water Depth for Design Condition

$Y_d = 5.1$ inches

Total Length of Combination Inlet

$L = 3.00$ ft

As a Weir

Capacity as a Weir without Clogging

$Q_{wi} = 5.6$ cfs

Clogging Coefficient for Multiple Units

$Coef = 1.00$

Clogging Factor for Multiple Units

$Clog = 0.50$

Capacity as a Weir with Clogging

$Q_{wa} = 4.3$ cfs

As an Orifice

Capacity as an Orifice without Clogging

$Q_{oi} = 7.4$ cfs

Capacity as an Orifice with Clogging

$Q_{oa} = 3.7$ cfs

Grate Capacity for Design with Clogging

$Q_{a-Grate} = 3.7$ cfs

Curb Opening Inlet Capacity in a Sump

As a Weir

Capacity as a Weir without Clogging

$Q_{wi} = 7.0$ cfs

Clogging Coefficient for Multiple Units

$Coef = 1.00$

Clogging Factor for Multiple Units

$Clog = 0.10$

Capacity as a Weir with Clogging

$Q_{wa} = 6.3$ cfs

As an Orifice

Capacity as an Orifice without Clogging

$Q_{oi} = 7.0$ cfs

Capacity as an Orifice with Clogging

$Q_{oa} = 6.3$ cfs

Curb Opening Capacity for Design with Clogging

$Q_{a-Curb} = 6.3$ cfs

Combination Inlet Capacity with Clogging

$Q_a = 10.0$ cfs

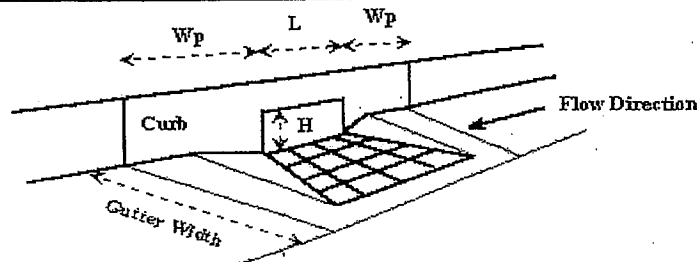
Capture Percentage for the Combination Inlet

$C\% = 100.00\%$

Note: Unless additional ponding depth or spilling over the curb is acceptable, a capture percentage of less than 100% in a sump may indicate the need for additional inlet units.

COMBINATION INLET IN A SUMP

Project = **Founders Marketplace, Block 1**
 Inlet ID = **Inlet 11 - Major**



Design Information (Input)

Length of a Unit Inlet
 Local Depression, if any (not part of upstream Composite Gutter)
 Number of Unit Inlets

$L_o = 3.00$ ft
 $a_{local} = 3.00$ inches
 $N_o = 1$

Grate Information

Width of a Unit Grate
 Area Opening Ratio for a Grate (typical values 0.60-0.90)
 Clogging Factor for a Single Grate (typical value 0.50)
 Grate Orifice Coefficient (typical value 0.67)
 Grate Weir Coefficient (typical value 3.00)

$W_o =$ ft
 $A = 0.38$
 $C_o(G) = 0.50$
 $C_d(G) = 0.67$
 $C_w(G) = 3.00$

Curb Opening Information

Height of Curb Opening in Inches
 Angle of Throat (see USDCM Figure ST-5)
 Side Width for Depression Pan
 Clogging Factor for a Single Curb Opening (typical value 0.10)
 Curb Opening Orifice Coefficient (typical value 0.67)
 Curb Opening Weir Coefficient (typical value 2.30-3.00)

$H = 8.00$ inches
 $\Theta = 0.0$ degrees
 $W_p = 3.00$ ft
 $C_o(C) = 0.10$
 $C_d(C) = 0.67$
 $C_w(C) = 3.00$

Grate Inlet Capacity in a Sump (Calculated)

Design Discharge on the Street (from Street Hy)

Water Depth for Design Condition
 Total Length of Combination Inlet

$Q_o = 4.8$ cfs
 $Y_d = 6.8$ inches
 $L = 3.00$ ft

As a Weir

Capacity as a Weir without Clogging
 Clogging Coefficient for Multiple Units
 Clogging Factor for Multiple Units
 Capacity as a Weir with Clogging

$Q_{wi} = 3.8$ cfs
 $Coef = 1.00$
 $Clog = 0.50$
 $Q_{wa} = 1.9$ cfs

As an Orifice

Capacity as an Orifice without Clogging
 Capacity as an Orifice with Clogging

$Q_{oi} = 0.0$ cfs
 $Q_{oa} = 0.0$ cfs
 $Q_{a-grate} = 0.0$ cfs

Grate Capacity for Design with Clogging

Curb Opening Inlet Capacity in a Sump

As a Weir

Capacity as a Weir without Clogging
 Clogging Coefficient for Multiple Units
 Clogging Factor for Multiple Units
 Capacity as a Weir with Clogging

$Q_{wi} = 10.7$ cfs
 $Coef = 1.00$
 $Clog = 0.10$
 $Q_{wa} = 10.3$ cfs

As an Orifice

Capacity as an Orifice without Clogging
 Capacity as an Orifice with Clogging

$Q_{oi} = 8.1$ cfs
 $Q_{oa} = 7.3$ cfs
 $Q_{a-curb} = 7.3$ cfs

Curb Opening Capacity for Design with Clogging

Combination Inlet Capacity with Clogging

$Q_s =$ cfs

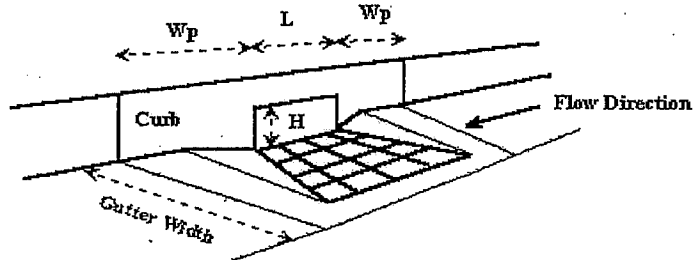
Capture Percentage for the Combination Inlet

$C\% =$ %

Note: Unless additional ponding depth or spilling over the curb is acceptable, a capture percentage of less than 100% in a sump may indicate the need for additional inlet units.

COMBINATION INLET IN A SUMP

Project = **Founders Marketplace, Block 1**
 Inlet ID = **Inlet 13 - Initial**



Design Information (Input)

Length of a Unit Inlet
 Local Depression, if any (not part of upstream Composite Gutter)
 Number of Unit Inlets
Grate Information
 Width of a Unit Grate
 Area Opening Ratio for a Grate (typical values 0.60-0.90)
 Clogging Factor for a Single Grate (typical value 0.50)
 Grate Orifice Coefficient (typical value 0.67)
 Grate Weir Coefficient (typical value 3.00)
Curb Opening Information
 Height of Curb Opening in Inches
 Angle of Throat (see USDCM Figure ST-5)
 Side Width for Depression Pan
 Clogging Factor for a Single Curb Opening (typical value 0.10)
 Curb Opening Orifice Coefficient (typical value 0.67)
 Curb Opening Weir Coefficient (typical value 2.30-3.00)

$L_o = 3.00$ ft
 $a_{local} = 3.00$ inches
 $N_o = 1$
 $W_o = 1.86$ ft
 $A = 0.38$
 $C_o(G) = 0.50$
 $C_d(G) = 0.67$
 $C_w(G) = 3.00$
 $H = 8.00$ inches
 $\Theta = 0.0$ degrees
 $W_p = 3.00$ ft
 $C_o(C) = 0.10$
 $C_d(C) = 0.67$
 $C_w(C) = 3.00$

Grate Inlet Capacity in a Sump (Calculated)

Design Discharge on the Street (from Street Hy)

Water Depth for Design Condition
 Total Length of Combination Inlet

$Q_o = 1.7$ cfs
 $Y_d = 6.1$ inches
 $L = 3.00$ ft

As a Weir

Capacity as a Weir without Clogging
 Clogging Coefficient for Multiple Units
 Clogging Factor for Multiple Units
 Capacity as a Weir with Clogging

$Q_{wi} = 7.4$ cfs
 $Coef = 1.00$
 $Clog = 0.50$
 $Q_{wa} = 5.7$ cfs

As an Orifice

Capacity as an Orifice without Clogging
 Capacity as an Orifice with Clogging

$Q_{oi} = 8.1$ cfs
 $Q_{oa} = 4.1$ cfs
 $Q_{a-Grate} = 4.1$ cfs

Grate Capacity for Design with Clogging

Curb Opening Inlet Capacity in a Sump

As a Weir

Capacity as a Weir without Clogging
 Clogging Coefficient for Multiple Units
 Clogging Factor for Multiple Units
 Capacity as a Weir with Clogging

$Q_{wi} = 9.2$ cfs
 $Coef = 1.00$
 $Clog = 0.10$
 $Q_{wa} = 8.9$ cfs

As an Orifice

Capacity as an Orifice without Clogging
 Capacity as an Orifice with Clogging

$Q_{oi} = 7.7$ cfs
 $Q_{oa} = 6.9$ cfs
 $Q_{a-curb} = 6.9$ cfs

Curb Opening Capacity for Design with Clogging

Combination Inlet Capacity with Clogging

$Q_a = 11.0$ cfs

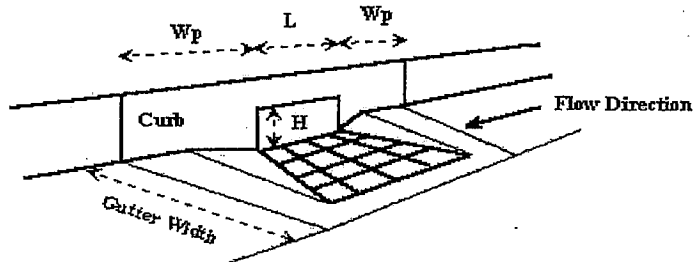
Capture Percentage for the Combination Inlet

$C\% = 100.00\%$

Note: Unless additional ponding depth or spilling over the curb is acceptable, a capture percentage of less than 100% in a sump may indicate the need for additional inlet units.

COMBINATION INLET IN A SUMP

Project = Founders Marketplace, Block 1
 Inlet ID = Inlet 13 - Major



Design Information (Input)

Length of a Unit Inlet
 Local Depression, if any (not part of upstream Composite Gutter)
 Number of Unit Inlets
Grate Information
 Width of a Unit Grate
 Area Opening Ratio for a Grate (typical values 0.60-0.90)
 Clogging Factor for a Single Grate (typical value 0.50)
 Grate Orifice Coefficient (typical value 0.67)
 Grate Weir Coefficient (typical value 3.00)
Curb Opening Information
 Height of Curb Opening in Inches
 Angle of Throat (see USDCM Figure ST-5)
 Side Width for Depression Pan
 Clogging Factor for a Single Curb Opening (typical value 0.10)
 Curb Opening Orifice Coefficient (typical value 0.67)
 Curb Opening Weir Coefficient (typical value 2.30-3.00)

$L_o = 3.00$ ft
 $a_{local} = 3.00$ inches
 $N_o = 1$
 $W_o = 1.86$ ft
 $A = 0.38$
 $C_o(G) = 0.50$
 $C_d(G) = 0.67$
 $C_w(G) = 3.00$
 $H = 8.00$ inches
 $\Theta = 0.0$ degrees
 $W_p = 3.00$ ft
 $C_o(C) = 0.10$
 $C_d(C) = 0.67$
 $C_w(C) = 3.00$

Grate Inlet Capacity in a Sump (Calculated)

Design Discharge on the Street (from Street Hy)
 Water Depth for Design Condition
 Total Length of Combination Inlet
As a Weir
 Capacity as a Weir without Clogging
 Clogging Coefficient for Multiple Units
 Clogging Factor for Multiple Units
 Capacity as a Weir with Clogging
As an Orifice
 Capacity as an Orifice without Clogging
 Capacity as an Orifice with Clogging
Grate Capacity for Design with Clogging

$Q_o = 4.1$ cfs
 $Y_d = 7.1$ inches
 $L = 3.00$ ft
 $Q_w = 9.2$ cfs
 $Coef = 1.00$
 $Clog = 0.50$
 $Q_{we} = 7.1$ cfs
 $Q_{oi} = 8.8$ cfs
 $Q_{os} = 4.4$ cfs
 $Q_{a-Grate} = 4.4$ cfs

Curb Opening Inlet Capacity in a Sump

As a Weir
 Capacity as a Weir without Clogging
 Clogging Coefficient for Multiple Units
 Clogging Factor for Multiple Units
 Capacity as a Weir with Clogging
As an Orifice
 Capacity as an Orifice without Clogging
 Capacity as an Orifice with Clogging
Curb Opening Capacity for Design with Clogging

$Q_w = 11.5$ cfs
 $Coef = 1.00$
 $Clog = 0.10$
 $Q_{we} = 11.1$ cfs
 $Q_{oi} = 8.3$ cfs
 $Q_{os} = 7.4$ cfs
 $Q_{a-curb} = 7.4$ cfs

Combination Inlet Capacity with Clogging

Capture Percentage for the Combination Inlet

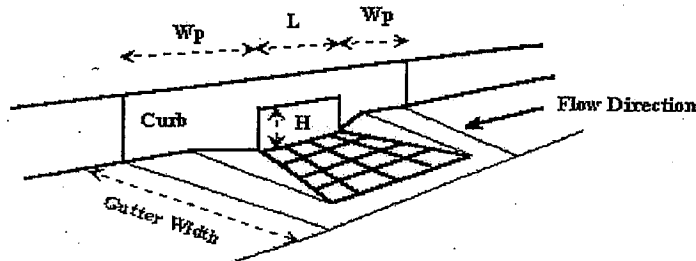
$Q_s = 11.8$ cfs
 $C\% = 100.00\%$

Note: Unless additional ponding depth or spilling over the curb is acceptable, a capture percentage of less than 100% in a sump may indicate the need for additional inlet units.

COMBINATION INLET IN A SUMP

Project = **Founders Marketplace, Block 1**

Inlet ID = **Inlet 51 - Initial**



Design Information (Input)

Length of a Unit Inlet
Local Depression, if any (not part of upstream Composite Gutter)
Number of Unit Inlets

$L_o = 6.00$ ft
 $a_{local} = 3.00$ inches
 $N_o = 1$

Grate Information

Width of a Unit Grate
Area Opening Ratio for a Grate (typical values 0.60-0.90)
Clogging Factor for a Single Grate (typical value 0.50)
Grate Orifice Coefficient (typical value 0.67)
Grate Weir Coefficient (typical value 3.00)

$W_o = 1.66$ ft
 $A = 0.38$
 $C_o (G) = 0.50$
 $C_d (G) = 0.67$
 $C_w (G) = 3.00$

Curb Opening Information

Height of Curb Opening in Inches
Angle of Throat (see USDCM Figure ST-5)
Side Width for Depression Pan
Clogging Factor for a Single Curb Opening (typical value 0.10)
Curb Opening Orifice Coefficient (typical value 0.67)
Curb Opening Weir Coefficient (typical value 2.30-3.00)

$H = 8.00$ inches
 $\Theta = 0.0$ degrees
 $W_p = 3.00$ ft
 $C_o (C) = 0.10$
 $C_d (C) = 0.67$
 $C_w (C) = 3.00$

Grate Inlet Capacity in a Sump (Calculated)

Design Discharge on the Street (from Street Hy)

Water Depth for Design Condition
Total Length of Combination Inlet

$Q_o = 3.4$ cfs
 $Y_d = 6.1$ inches
 $L = 6.00$ ft

As a Weir

Capacity as a Weir without Clogging
Clogging Coefficient for Multiple Units
Clogging Factor for Multiple Units
Capacity as a Weir with Clogging

$Q_{wf} = 10.6$ cfs
 $Coef = 1.00$
 $Clog = 0.50$
 $Q_{wn} = 7.3$ cfs

As an Orifice

Capacity as an Orifice without Clogging
Capacity as an Orifice with Clogging

$Q_{oi} = 16.3$ cfs
 $Q_{oa} = 8.1$ cfs

Grate Capacity for Design with Clogging

$Q_{a-Grate} = 7.3$ cfs

Curb Opening Inlet Capacity in a Sump

As a Weir

Capacity as a Weir without Clogging
Clogging Coefficient for Multiple Units
Clogging Factor for Multiple Units
Capacity as a Weir with Clogging

$Q_{wf} = 12.5$ cfs
 $Coef = 1.00$
 $Clog = 0.10$
 $Q_{wn} = 11.8$ cfs

As an Orifice

Capacity as an Orifice without Clogging
Capacity as an Orifice with Clogging

$Q_{oi} = 15.4$ cfs
 $Q_{oa} = 13.8$ cfs
 $Q_{a-Curb} = 0.0$ cfs

Curb Opening Capacity for Design with Clogging

(Curb Opening is ineffective while Grate is in weir flow.)

Combination Inlet Capacity with Clogging

$Q_a = 7.3$ cfs

Capture Percentage for the Combination Inlet

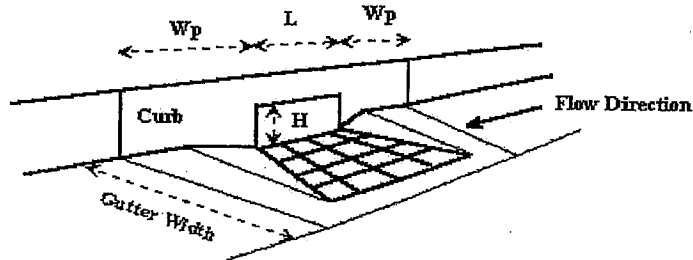
$C\% = 100.00$ %

Note: Unless additional ponding depth or spilling over the curb is acceptable, a capture percentage of less than 100% in a sump may indicate the need for additional inlet units.

COMBINATION INLET IN A SUMP

Project = Founders Marketplace, Block 1

Inlet ID = Inlet 51 - Major



Design Information (Input)

Length of a Unit Inlet

$L_o = 6.00$ ft

Local Depression, if any (not part of upstream Composite Gutter)

$a_{local} = 3.00$ inches

Number of Unit Inlets

$N_o = 1$

Grate Information

Width of a Unit Grate

$W_o = 1.86$ ft

Area Opening Ratio for a Grate (typical values 0.60-0.90)

$A = 0.36$

Clogging Factor for a Single Grate (typical value 0.50)

$C_o(G) = 0.50$

Grate Orifice Coefficient (typical value 0.67)

$C_d(G) = 0.67$

Grate Weir Coefficient (typical value 3.00)

$C_w(G) = 3.00$

Curb Opening Information

Height of Curb Opening in Inches

$H = 8.00$ inches

Angle of Throat (see USDCM Figure ST-5)

$\Theta = 0.0$ degrees

Side Width for Depression Pan

$W_p = 3.00$ ft

Clogging Factor for a Single Curb Opening (typical value 0.10)

$C_o(C) = 0.10$

Curb Opening Orifice Coefficient (typical value 0.67)

$C_d(C) = 0.67$

Curb Opening Weir Coefficient (typical value 2.30-3.00)

$C_w(C) = 3.00$

Grate Inlet Capacity in a Sump (Calculated)

Design Discharge on the Street (from Street Hy)

$Q_o = 8.0$ cfs

Water Depth for Design Condition

$Y_d = 7.1$ inches

Total Length of Combination Inlet

$L = 6.00$ ft

As a Weir

Capacity as a Weir without Clogging

$Q_{wi} = 13.2$ cfs

Clogging Coefficient for Multiple Units

$Coef = 1.00$

Clogging Factor for Multiple Units

$Clog = 0.50$

Capacity as a Weir with Clogging

$Q_{ws} = 9.1$ cfs

As an Orifice

Capacity as an Orifice without Clogging

$Q_{oi} = 17.5$ cfs

Capacity as an Orifice with Clogging

$Q_{os} = 8.7$ cfs

Grate Capacity for Design with Clogging

$Q_{a-Grate} = 8.7$ cfs

Curb Opening Inlet Capacity in a Sump

As a Weir

Capacity as a Weir without Clogging

$Q_{wi} = 15.4$ cfs

Clogging Coefficient for Multiple Units

$Coef = 1.00$

Clogging Factor for Multiple Units

$Clog = 0.10$

Capacity as a Weir with Clogging

$Q_{ws} = 14.6$ cfs

As an Orifice

Capacity as an Orifice without Clogging

$Q_{oi} = 16.5$ cfs

Capacity as an Orifice with Clogging

$Q_{os} = 14.6$ cfs

Curb Opening Capacity for Design with Clogging

$Q_{a-curb} = 14.6$ cfs

Combination Inlet Capacity with Clogging

$Q_a = 23.4$ cfs

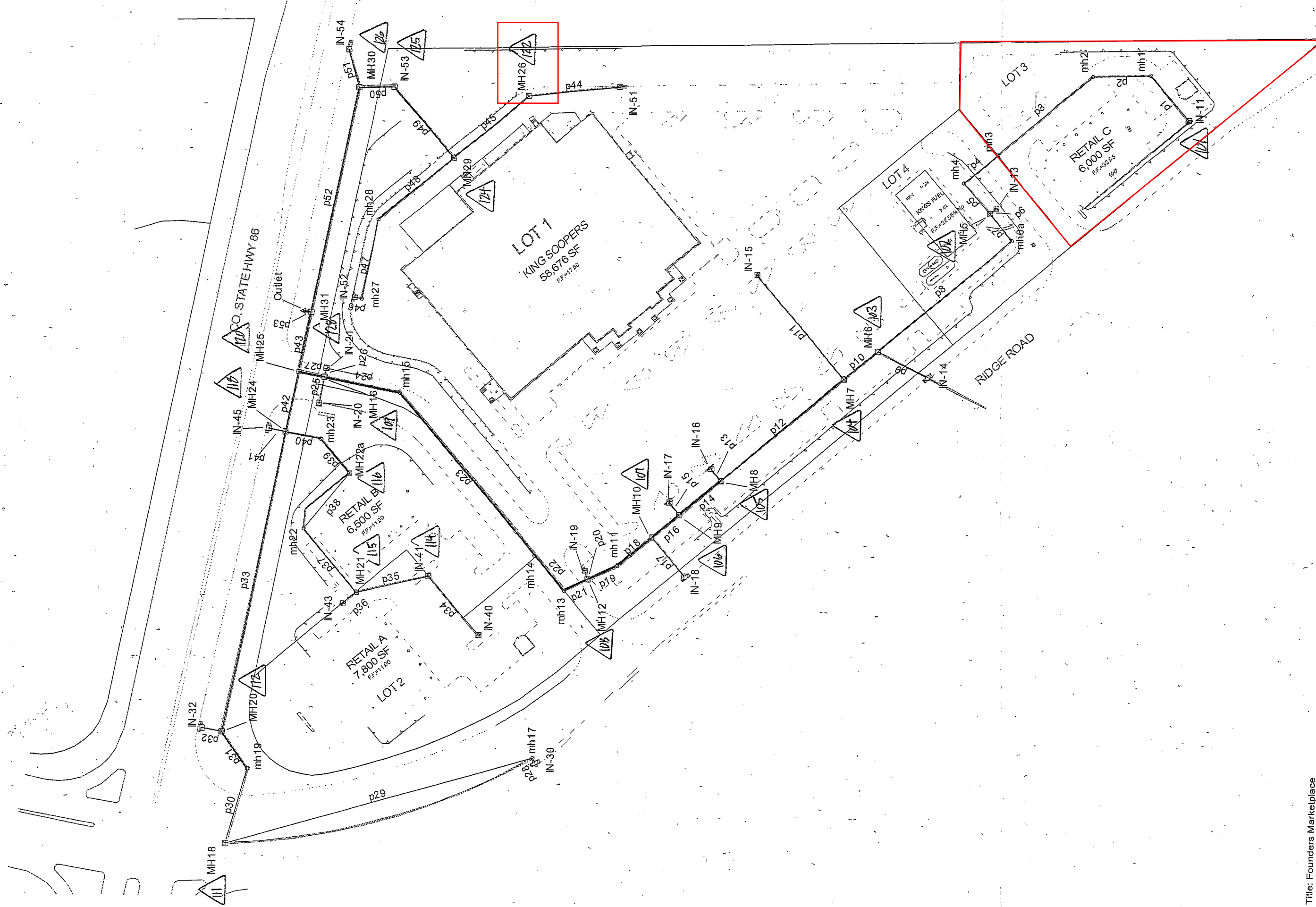
Capture Percentage for the Combination Inlet

$C\% = 100.00\%$

Note: Unless additional ponding depth or spilling over the curb is acceptable, a capture percentage of less than 100% in a sump may indicate the need for additional inlet units.

Scenario: Base

DESIGN POINT



Scenario: Base

5-YR Node Report

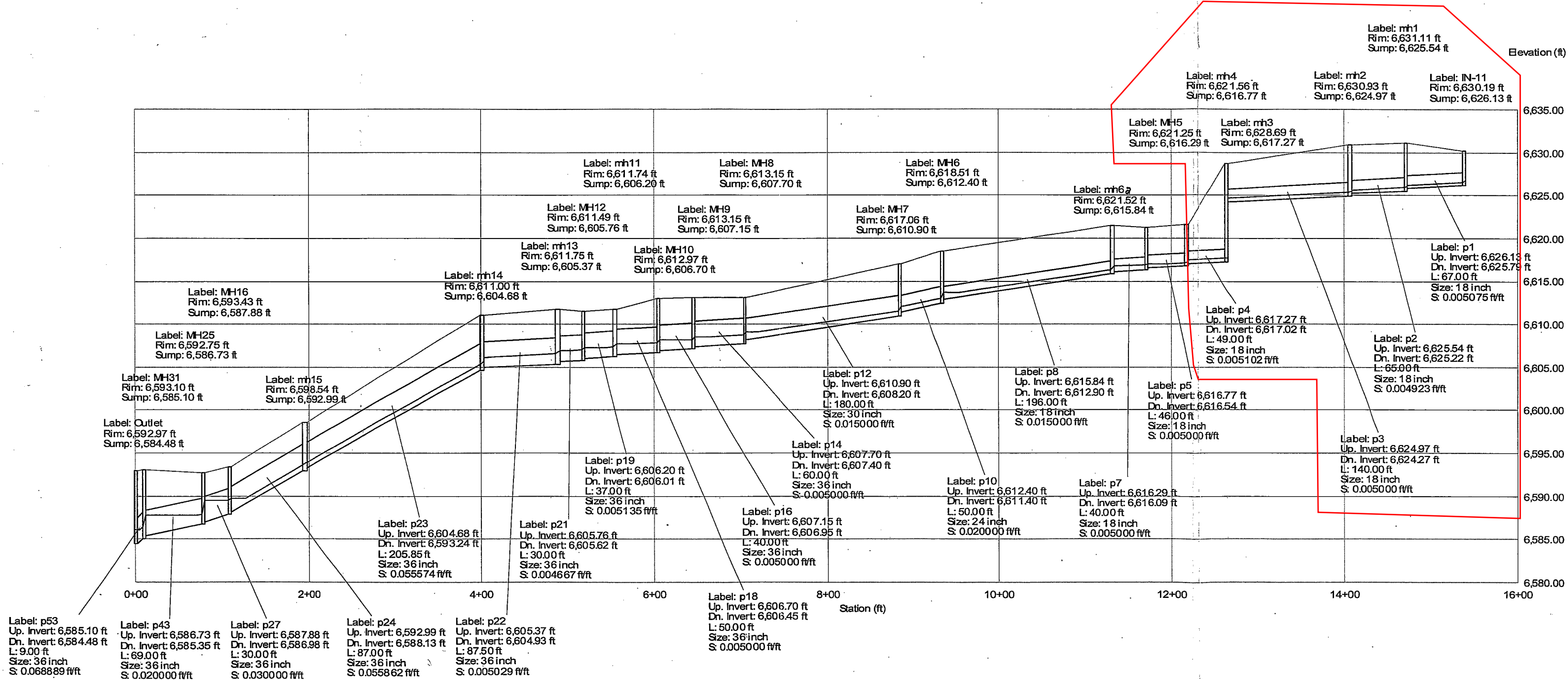
Label	Known Flow (cfs)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Velocity In (ft/s)	Rim Elevation (ft)	Depth In (ft)	Depth Out (ft)	Notes
IN-11	1.17	6,626.72	6,626.53	0.00	6,630.19	0.59	0.40	Design Point 101
IN-13	1.74	6,617.32	6,617.07	0.00	6,620.98	0.73	0.48	
IN-14	4.15	6,619.40	6,617.17	0.00	6,626.50	2.64	0.41	Design Point 114
IN-15	1.00	6,612.96	6,612.79	0.00	6,616.15	0.54	0.37	
IN-16	5.25	6,609.39	6,609.05	0.00	6,612.68	1.10	0.76	
IN-17	1.03	6,609.04	6,608.87	0.00	6,612.58	0.55	0.38	
IN-18	2.23	6,612.52	6,611.16	0.00	6,615.00	1.67	0.31	
IN-19	0.97	6,607.70	6,607.43	0.00	6,610.54	0.58	0.31	
IN-20	0.57	6,589.81	6,589.79	0.00	6,593.18	0.53	0.51	
IN-21	1.37	6,589.87	6,589.79	0.00	6,593.18	0.69	0.61	
IN-30	1.27	6,604.91	6,604.30	0.00	6,607.34	0.89	0.28	
IN-32	4.36	6,593.99	6,593.61	0.00	6,595.59	1.20	0.82	
IN-40	1.02	6,606.28	6,606.06	0.00	6,608.53	0.56	0.34	
IN-41	2.17	6,605.67	6,605.32	1.56	6,608.53	0.85	0.50	
IN-43	0.20	6,604.81	6,604.81	0.00	6,609.85	0.46	0.46	
IN-45	1.32	6,589.65	6,589.64	0.00	6,593.00	1.22	1.21	
IN-51	3.37	6,607.27	6,606.94	0.00	6,614.15	1.04	0.71	
IN-52	2.14	6,607.27	6,607.01	0.00	6,610.56	0.81	0.55	Design Point 125
IN-53	10.62	6,589.07	6,588.84	3.89	6,592.50	1.27	1.04	
IN-54	1.80	6,588.29	6,588.09	0.00	6,592.00	0.67	0.47	Design Point 102
mh1		6,626.03	6,625.94	4.45	6,631.11	0.49	0.40	
mh2		6,625.46	6,625.37	4.45	6,630.93	0.49	0.40	Design Point 103
mh3		6,617.74	6,617.67	2.18	6,628.69	0.47	0.40	
mh4		6,617.29	6,617.17	4.24	6,621.56	0.52	0.40	Design Point 104
MH5	2.76	6,617.06	6,616.92	2.46	6,621.25	0.77	0.63	
MH6	6.91	6,613.65	6,613.03	5.14	6,618.51	1.25	0.63	Design Point 105
mh6a		6,616.73	6,616.31	3.84	6,621.52	0.89	0.47	
MH7	7.82	6,612.08	6,611.57	4.70	6,617.06	1.18	0.67	Design Point 106
MH8	12.48	6,609.05	6,608.75	3.57	6,613.15	1.35	1.05	
MH9	13.36	6,608.55	6,608.24	4.83	6,613.15	1.40	1.09	Design Point 107
MH10	15.42	6,608.21	6,607.88	4.73	6,612.97	1.51	1.18	
mh11		6,607.71	6,607.37	5.47	6,611.74	1.51	1.17	Design Point 108
MH12	16.25	6,607.32	6,607.00	3.73	6,611.49	1.56	1.24	
mh13		6,606.93	6,606.58	5.50	6,611.75	1.56	1.21	Design Point 109
mh14		6,605.65	6,605.33	13.62	6,611.00	0.97	0.65	
mh15		6,593.96	6,593.64	13.65	6,598.54	0.97	0.65	Design Point 110
MH16	17.90	6,589.79	6,589.55	1.99	6,593.43	1.91	1.67	
mh17		6,604.16	6,603.87	4.70	6,607.58	0.57	0.28	Design Point 111
MH18	2.61	6,595.25	6,594.97	2.51	6,598.98	0.74	0.46	
mh19		6,593.93	6,593.47	5.87	6,597.97	0.78	0.32	Design Point 112
MH20	6.61	6,592.46	6,591.99	2.74	6,596.80	1.15	0.68	
MH21	3.03	6,604.81	6,604.61	1.78	6,610.17	0.87	0.67	Design Point 113
mh22		6,604.04	6,603.89	4.74	6,609.93	0.82	0.67	
MH22a	3.58	6,602.97	6,602.59	14.93	6,608.65	0.68	0.30	Design Point 114
mh23		6,593.44	6,592.24	7.17	6,598.01	1.51	0.31	
MH24	11.21	6,589.64	6,589.55	1.21	6,593.93	2.06	1.97	Design Point 115
MH25	28.26	6,589.55	6,587.86	5.21	6,592.75	2.82	1.13	
MH26	5.41	6,606.85	6,606.81	2.34	6,614.79	1.89	1.85	Design Point 116
mh27		6,606.89	6,606.81	4.27	6,611.00	0.73	0.65	
mh28		6,606.81	6,606.80	1.54	6,611.81	1.35	1.34	Design Point 117
MH29	9.28	6,606.77	6,604.32	12.55	6,613.09	2.86	0.41	

Scenario: Base

5-YR Pipe Report

Label	Upstream Node	Downstream Node	Total System Flow (cfs)	Length (ft)	Constd Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Average Velocity (ft/s)
p1	IN-11	mh1	1.17	67.00	0.005075	18 inch	0.013	7.48	6,626.13	6,625.79	6,626.53	6,626.19	3.08
p6	IN-13	MH5	1.74	9.00	0.005556	18 inch	0.013	7.83	6,616.59	6,616.54	6,617.07	6,617.06	3.36
p9	IN-14	MH6	4.15	64.00	0.060313	18 inch	0.013	25.80	6,616.76	6,612.90	6,617.17	6,613.65	7.72
p11	IN-15	MH7	1.00	155.00	0.004968	18 inch	0.013	7.40	6,612.42	6,611.65	6,612.79	6,612.08	2.65
p13	IN-16	MH8	5.25	18.00	0.005000	30 inch	0.013	29.00	6,608.29	6,608.20	6,609.05	6,609.05	3.87
p15	IN-17	MH9	1.03	18.00	0.005000	18 inch	0.013	7.43	6,608.49	6,608.40	6,608.87	6,608.78	2.96
p17	IN-18	MH10	2.23	58.00	0.050000	18 inch	0.013	23.49	6,610.85	6,607.95	6,611.16	6,608.26	8.37
p20	IN-19	MH12	0.97	11.00	0.010000	18 inch	0.013	10.50	6,607.12	6,607.01	6,607.43	6,607.32	3.67
p25	IN-20	MH16	0.57	30.00	0.005000	18 inch	0.013	7.43	6,589.28	6,589.13	6,589.79	6,589.79	0.92
p26	IN-21	MH16	1.37	10.00	0.005000	18 inch	0.013	7.43	6,589.18	6,589.13	6,589.79	6,589.79	1.92
p28	IN-30	mh17	1.27	7.00	0.025714	18 inch	0.013	16.84	6,604.02	6,603.84	6,604.30	6,604.16	5.15
p32	IN-32	MH20	4.36	23.00	0.005217	18 inch	0.013	7.59	6,592.79	6,592.67	6,593.61	6,593.49	4.44
p34	IN-40	IN-41	1.02	88.00	0.007386	18 inch	0.013	9.03	6,605.72	6,605.07	6,606.06	6,605.67	2.47
p35	IN-41	MH21	2.17	83.00	0.007590	18 inch	0.013	9.15	6,604.82	6,604.19	6,605.32	6,604.81	3.71
p36	IN-43	MH21	0.20	19.00	0.004737	18 inch	0.013	7.23	6,604.35	6,604.26	6,604.81	6,604.81	0.39
p41	IN-45	MH24	1.32	20.00	0.010000	18 inch	0.013	10.50	6,588.43	6,588.23	6,589.64	6,589.64	0.82
p44	IN-51	MH26	3.37	105.00	0.004952	18 inch	0.013	7.39	6,606.23	6,605.71	6,606.94	6,606.85	3.21
p46	IN-52	mh27	2.14	8.00	0.005000	18 inch	0.013	7.43	6,606.46	6,606.42	6,607.01	6,606.97	3.63
p50	IN-53	MH30	10.62	39.00	0.005128	30 inch	0.013	29.37	6,587.80	6,587.60	6,588.84	6,588.64	5.50
p51	IN-54	MH30	1.80	44.00	0.005000	24 inch	0.013	16.00	6,587.62	6,587.40	6,588.09	6,588.09	2.52
p2	mh1	mh2	1.17	65.00	0.004923	18 inch	0.013	7.37	6,625.54	6,625.22	6,625.94	6,625.62	3.05
p3	mh2	mh3	1.17	140.00	0.005000	18 inch	0.013	7.43	6,624.97	6,624.27	6,625.37	6,624.67	3.07
p4	mh3	mh4	1.17	49.00	0.005102	18 inch	0.013	7.50	6,617.27	6,617.02	6,617.67	6,617.42	3.09
p5	mh4	MH5	1.17	46.00	0.005000	18 inch	0.013	7.43	6,616.77	6,616.54	6,617.17	6,617.06	2.60
p7	MH5	mh6a	2.76	40.00	0.005000	18 inch	0.013	7.43	6,616.29	6,616.09	6,616.92	6,616.73	3.87
p10	MH6	MH7	6.91	50.00	0.020000	24 inch	0.013	31.99	6,612.40	6,611.40	6,613.03	6,612.08	7.71
p8	mh6a	MH6	2.76	196.00	0.015000	18 inch	0.013	12.86	6,615.84	6,612.90	6,616.31	6,613.65	4.47
p12	MH7	MH8	7.82	180.00	0.015000	30 inch	0.013	50.23	6,610.90	6,608.20	6,611.57	6,609.05	6.38
p14	MH8	MH9	12.48	60.00	0.005000	36 inch	0.013	47.16	6,607.70	6,607.40	6,608.75	6,608.55	5.32
p16	MH9	MH10	13.36	40.00	0.005000	36 inch	0.013	47.16	6,607.15	6,606.95	6,608.24	6,608.21	5.23
p18	MH10	mh11	15.42	50.00	0.005000	36 inch	0.013	47.16	6,606.70	6,606.45	6,607.88	6,607.71	5.72
p19	mh11	MH12	15.42	37.00	0.005135	36 inch	0.013	47.79	6,606.20	6,606.01	6,607.37	6,607.32	5.61
p21	MH12	mh13	16.25	30.00	0.004667	36 inch	0.013	45.56	6,605.76	6,605.62	6,607.00	6,606.93	5.70
p22	mh13	mh14	16.25	87.50	0.005029	36 inch	0.013	47.29	6,605.37	6,604.93	6,606.58	6,606.14	6.07
p23	mh14	mh15	16.25	205.85	0.055574	36 inch	0.013	157.23	6,604.68	6,593.24	6,605.33	6,593.96	13.38
p24	mh15	MH16	16.25	87.00	0.055862	36 inch	0.013	157.63	6,592.99	6,588.13	6,593.64	6,589.79	9.22
p27	MH16	MH25	17.90	30.00	0.030000	36 inch	0.013	115.52	6,587.88	6,586.98	6,589.55	6,589.55	3.61
p29	mh17	MH18	1.27	361.00	0.024460	18 inch	0.013	16.43	6,603.59	6,594.76	6,603.87	6,595.25	4.01
p30	MH18	mh19	2.61	88.00	0.009773	24 inch	0.013	22.36	6,594.51	6,593.65	6,594.97	6,594.11	4.76
p31	mh19	MH20	2.61	51.00	0.031176	30 inch	0.013	72.42	6,593.15	6,591.56	6,593.47	6,592.46	4.31
p33	MH20	MH24	6.61	348.00	0.010000	30 inch	0.013	41.01	6,591.31	6,587.83	6,591.99	6,589.64	3.94
p37	MH21	mh22	3.03	95.00	0.004947	18 inch	0.013	7.39	6,603.94	6,603.47	6,604.61	6,604.14	3.97
p38	mh22	MH22a	3.03	86.47	0.004973	18 inch	0.013	7.41	6,603.22	6,602.79	6,603.89	6,603.46	3.98
p39	MH22a	mh23	3.58	50.22	0.201712	18 inch	0.013	47.17	6,602.31	6,592.18	6,602.59	6,593.44	9.00
p40	mh23	MH24	3.58	41.00	0.087805	24 inch	0.013	67.03	6,591.93	6,588.33	6,592.24	6,589.64	6.49
p42	MH24	MH25	11.21	70.00	0.005000	30 inch	0.013	29.00	6,587.58	6,587.23	6,589.55	6,589.55	2.53
p43	MH25	MH31	28.26	69.00	0.020000	36 inch	0.013	94.32	6,586.73	6,585.35	6,587.86	6,587.76	8.15
p45	MH26	MH29	5.41	109.00	0.005046	24 inch	0.013	16.07	6,604.96	6,604.41	6,606.81	6,606.77	1.75
p47	mh27	mh28	2.14	92.00	0.004960	18 inch	0.013	7.40	6,606.17	6,605.71	6,606.81	6,606.81	2.24
p48	mh28	MH29	2.14	109.00	0.005046	18 inch	0.013	7.46	6,605.46	6,604.91	6,606.80	6,606.77	1.25
p49	MH29	IN-53	9.28	106.00	0.151981	30 inch	0.013	159.90	6,603.91	6,587.80	6,604.32	6,589.07	10.72

Profile
Scenario: Base



Scenario: Base

100-YR Node Report <duplicate>

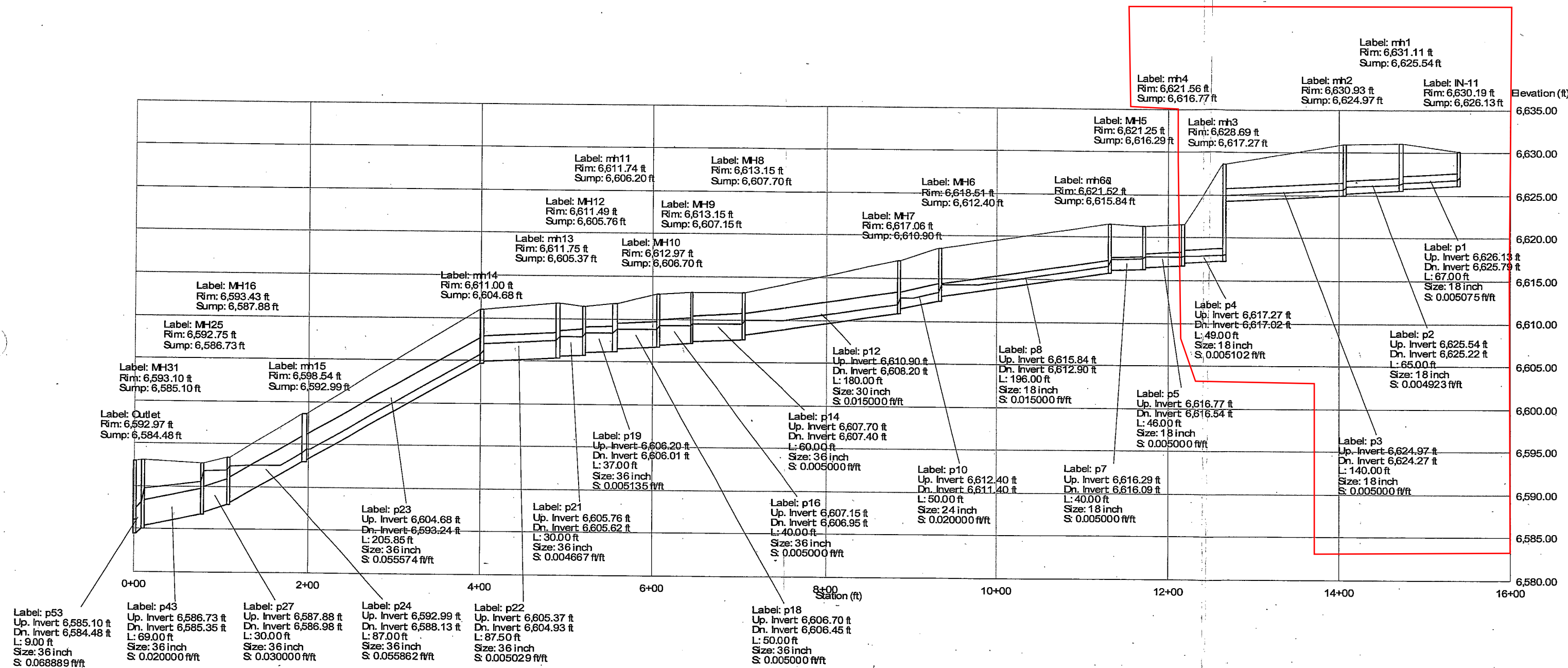
Label	Known Flow (cfs)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Velocity In (ft/s)	Rim Elevation (ft)	Depth In (ft)	Depth Out (ft)	Notes
IN-11	3.58	6,627.20	6,626.86	0.00	6,630.19	1.07	0.73	Design Point 101
IN-13	4.11	6,617.88	6,617.72	0.00	6,620.98	1.29	1.13	
IN-14	8.57	6,620.70	6,617.36	0.00	6,626.50	3.94	0.60	
IN-15	2.19	6,613.24	6,612.98	0.00	6,616.15	0.82	0.56	
IN-16	11.61	6,610.13	6,609.90	0.00	6,612.68	1.84	1.61	
IN-17	2.26	6,609.59	6,609.54	0.00	6,612.58	1.10	1.05	
IN-18	6.54	6,613.91	6,611.39	0.00	6,615.00	3.06	0.54	
IN-19	2.29	6,608.42	6,608.38	0.00	6,610.54	1.30	1.26	
IN-20	1.74	6,592.42	6,592.41	0.00	6,593.18	3.14	3.13	
IN-21	3.45	6,592.48	6,592.41	0.00	6,593.18	3.30	3.23	
IN-30	5.11	6,605.39	6,604.80	0.00	6,607.34	1.37	0.78	
IN-32	10.39	6,594.94	6,594.26	0.00	6,595.59	2.15	1.47	
IN-40	2.28	6,606.59	6,606.23	0.00	6,608.53	0.87	0.51	
IN-41	4.75	6,606.12	6,605.59	1.73	6,608.53	1.30	0.77	Design Point 114
IN-43	0.48	6,605.32	6,605.32	0.00	6,609.85	0.97	0.97	
IN-45	4.12	6,592.85	6,592.74	0.00	6,593.00	4.42	4.31	
IN-51	7.95	6,609.89	6,609.50	0.00	6,614.15	3.66	3.27	
IN-52	4.79	6,609.11	6,608.97	0.00	6,610.56	2.65	2.51	
IN-53	27.39	6,591.06	6,590.82	4.16	6,592.50	3.26	3.02	Design Point 125
IN-54	4.78	6,590.71	6,590.66	0.00	6,592.00	3.09	3.04	
mh1		6,626.44	6,626.28	4.79	6,631.11	0.90	0.74	
mh2		6,625.87	6,625.70	4.80	6,630.93	0.90	0.73	
mh3		6,618.14	6,618.00	2.97	6,628.69	0.87	0.73	
mh4		6,617.84	6,617.72	3.65	6,621.56	1.07	0.95	
MH5	7.36	6,617.72	6,617.51	3.03	6,621.25	1.43	1.22	Design Point 102
MH6	15.93	6,614.36	6,613.40	6.43	6,618.51	1.96	1.00	Design Point 103
mh6a		6,617.36	6,616.65	4.62	6,621.52	1.52	0.81	
MH7	17.94	6,612.75	6,611.93	5.93	6,617.06	1.85	1.03	Design Point 104
MH8	28.18	6,609.90	6,609.54	3.93	6,613.15	2.20	1.84	Design Point 105
MH9	30.10	6,609.54	6,609.23	3.65	6,613.15	2.39	2.08	Design Point 106
MH10	36.14	6,609.23	6,608.78	4.37	6,612.97	2.53	2.08	Design Point 107
mh11		6,608.78	6,608.38	6.13	6,611.74	2.58	2.18	
MH12	38.09	6,608.38	6,607.93	4.41	6,611.49	2.62	2.17	Design Point 108
mh13		6,607.93	6,607.41	6.53	6,611.75	2.56	2.04	
mh14		6,606.21	6,605.69	17.39	6,611.00	1.53	1.01	
mh15		6,594.52	6,593.99	17.42	6,598.54	1.53	1.00	
MH16	42.48	6,592.40	6,591.95	2.69	6,593.43	4.52	4.07	Design Point 109
mh17		6,604.80	6,604.16	5.23	6,607.58	1.21	0.57	
MH18	10.05	6,596.05	6,595.44	3.16	6,598.98	1.54	0.93	Design Point 111
mh19		6,594.78	6,593.78	6.56	6,597.97	1.63	0.63	
MH20	19.58	6,593.66	6,593.41	2.29	6,596.80	2.35	2.10	Design Point 112
MH21	6.58	6,605.32	6,605.04	2.11	6,610.17	1.38	1.10	Design Point 115
mh22		6,604.53	6,604.32	5.01	6,609.93	1.31	1.10	
MH22a	7.71	6,603.30	6,602.70	18.66	6,608.65	1.01	0.41	Design Point 116
mh23		6,593.13	6,592.74	6.54	6,598.01	1.20	0.81	
MH24	30.78	6,592.71	6,592.22	2.80	6,593.93	5.13	4.64	Design Point 118
MH25	70.91	6,591.83	6,590.58	6.01	6,592.75	5.10	3.85	Design Point 120
MH26	12.14	6,608.90	6,608.71	4.50	6,614.79	3.94	3.75	Design Point 122
mh27		6,608.95	6,608.89	2.71	6,611.00	2.79	2.72	
mh28		6,608.69	6,608.63	2.71	6,611.81	3.23	3.17	
MH29	20.41	6,608.40	6,604.51	15.81	6,613.09	4.49	0.60	Design Point 124

Scenario: Base

100-YR Pipe Report

Label	Upstream Node	Downstream Node	Total System Flow (cfs)	Length (ft)	Constd Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Average Velocity (ft/s)
p1	IN-11	mh1	3.58	67.00	0.005075	18 inch	0.013	7.48	6,626.13	6,625.79	6,626.86	6,626.52	4.19
p6	IN-13	MH5	4.11	9.00	0.005556	18 inch	0.013	7.83	6,616.59	6,616.54	6,617.72	6,617.72	2.81
p9	IN-14	MH6	8.57	64.00	0.060313	18 inch	0.013	25.80	6,616.76	6,612.90	6,617.36	6,614.36	9.00
p11	IN-15	MH7	2.19	155.00	0.004968	18 inch	0.013	7.40	6,612.42	6,611.65	6,612.98	6,612.75	2.61
p13	IN-16	MH8	11.61	18.00	0.005000	30 inch	0.013	29.00	6,608.29	6,608.20	6,609.90	6,609.90	3.38
p15	IN-17	MH9	2.26	18.00	0.005000	18 inch	0.013	7.43	6,608.49	6,608.40	6,609.54	6,609.54	1.65
p17	IN-18	MH10	6.54	58.00	0.050000	18 inch	0.013	23.49	6,610.85	6,607.95	6,611.39	6,609.23	7.73
p20	IN-19	MH12	2.29	11.00	0.010000	18 inch	0.013	10.50	6,607.12	6,607.01	6,608.38	6,608.38	1.40
p25	IN-20	MH16	1.74	30.00	0.005000	18 inch	0.013	7.43	6,589.28	6,589.13	6,592.41	6,592.40	0.98
p26	IN-21	MH16	3.45	10.00	0.005000	18 inch	0.013	7.43	6,589.18	6,589.13	6,592.41	6,592.40	1.95
p28	IN-30	mh17	5.11	7.00	0.025714	18 inch	0.013	16.84	6,604.02	6,603.84	6,604.80	6,604.80	4.90
p32	IN-32	MH20	10.39	23.00	0.005217	18 inch	0.013	7.59	6,592.79	6,592.67	6,594.26	6,594.04	6.02
p34	IN-40	IN-41	2.28	88.00	0.007386	18 inch	0.013	9.03	6,605.72	6,605.07	6,606.23	6,606.12	2.99
p35	IN-41	MH21	4.75	83.00	0.007590	18 inch	0.013	9.15	6,604.82	6,604.19	6,605.59	6,605.32	4.28
p36	IN-43	MH21	0.48	19.00	0.004737	18 inch	0.013	7.23	6,604.35	6,604.26	6,605.32	6,605.32	0.38
p41	IN-45	MH24	4.12	20.00	0.010000	18 inch	0.013	10.50	6,588.43	6,588.23	6,592.74	6,592.71	2.33
p44	IN-51	MH26	7.95	105.00	0.004952	18 inch	0.013	7.39	6,606.23	6,605.71	6,609.50	6,608.90	4.50
p46	IN-52	mh27	4.79	8.00	0.005000	18 inch	0.013	7.43	6,606.46	6,606.42	6,608.97	6,608.95	2.71
p50	IN-53	MH30	27.39	39.00	0.005128	30 inch	0.013	29.37	6,587.80	6,587.60	6,590.82	6,590.64	5.58
p51	IN-54	MH30	4.78	44.00	0.005000	24 inch	0.013	16.00	6,587.62	6,587.40	6,590.66	6,590.64	1.52
p2	mh1	mh2	3.58	65.00	0.004923	18 inch	0.013	7.37	6,625.54	6,625.22	6,626.28	6,625.96	4.14
p3	mh2	mh3	3.58	140.00	0.005000	18 inch	0.013	7.43	6,624.97	6,624.27	6,625.70	6,625.00	4.16
p4	mh3	mh4	3.58	49.00	0.005102	18 inch	0.013	7.50	6,617.27	6,617.02	6,618.00	6,617.84	3.92
p5	mh4	MH5	3.58	46.00	0.005000	18 inch	0.013	7.43	6,616.77	6,616.54	6,617.72	6,617.72	2.71
p7	MH5	mh6a	7.36	40.00	0.005000	18 inch	0.013	7.43	6,616.29	6,616.09	6,617.51	6,617.36	4.71
p10	MH6	MH7	15.93	50.00	0.020000	24 inch	0.013	31.99	6,612.40	6,611.40	6,613.40	6,612.75	8.61
p8	mh6a	MH6	7.36	196.00	0.015000	18 inch	0.013	12.86	6,615.84	6,612.90	6,616.65	6,614.36	-5.86
p12	MH7	MH8	17.94	180.00	0.015000	30 inch	0.013	50.23	6,610.90	6,608.20	6,611.93	6,609.90	7.22
p14	MH8	MH9	28.18	60.00	0.005000	36 inch	0.013	47.16	6,607.70	6,607.40	6,609.54	6,609.54	5.72
p16	MH9	MH10	30.10	40.00	0.005000	36 inch	0.013	47.16	6,607.15	6,606.95	6,609.23	6,609.23	5.50
p18	MH10	mh11	36.14	50.00	0.005000	36 inch	0.013	47.16	6,606.70	6,606.45	6,608.78	6,608.78	6.52
p19	mh11	MH12	36.14	37.00	0.005135	36 inch	0.013	47.79	6,606.20	6,606.01	6,608.38	6,608.38	6.30
p21	MH12	mh13	38.09	30.00	0.004667	36 inch	0.013	45.56	6,605.76	6,605.62	6,607.93	6,607.93	6.75
p22	mh13	mh14	38.09	87.50	0.005029	36 inch	0.013	47.29	6,605.37	6,604.93	6,607.41	6,606.97	7.44
p23	mh14	mh15	38.09	205.85	0.055574	36 inch	0.013	157.23	6,604.68	6,593.24	6,605.69	6,594.52	15.80
p24	mh15	MH16	38.09	87.00	0.055862	36 inch	0.013	157.63	6,592.99	6,588.13	6,593.99	6,592.40	11.88
p27	MH16	MH25	42.48	30.00	0.030000	36 inch	0.013	115.52	6,587.88	6,586.98	6,591.95	6,591.83	6.01
p29	mh17	MH18	5.11	353.00	0.025014	18 inch	0.013	16.61	6,603.59	6,594.76	6,604.16	6,596.05	5.72
p30	MH18	mh19	10.05	86.00	0.010000	24 inch	0.013	22.62	6,594.51	6,593.65	6,595.44	6,594.78	6.23
p31	mh19	MH20	10.05	51.00	0.031176	30 inch	0.013	72.42	6,593.15	6,591.56	6,593.78	6,593.66	6.33
p33	MH20	MH24	19.58	348.00	0.010000	30 inch	0.013	41.01	6,591.31	6,587.83	6,593.41	6,592.71	4.22
p37	MH21	mh22	6.58	95.00	0.004947	18 inch	0.013	7.39	6,603.94	6,603.47	6,605.04	6,604.57	4.72
p38	mh22	MH22a	6.58	86.47	0.004973	18 inch	0.013	7.41	6,603.22	6,602.79	6,604.32	6,603.89	4.74
p39	MH22a	mh23	7.71	50.22	0.201314	18 inch	0.013	47.13	6,602.29	6,592.18	6,602.70	6,593.13	13.10
p40	mh23	MH24	7.71	41.00	0.087805	24 inch	0.013	67.03	6,591.93	6,588.33	6,592.74	6,592.71	4.45
p42	MH24	MH25	30.78	70.00	0.005000	30 inch	0.013	29.00	6,587.58	6,587.23	6,592.22	6,591.83	6.27
p43	MH25	MH31	70.91	69.00	0.020000	36 inch	0.013	94.32	6,586.73	6,585.35	6,590.58	6,589.80	10.03
p45	MH26	MH29	12.14	109.00	0.005046	24 inch	0.013	16.07	6,604.96	6,604.41	6,608.71	6,608.40	3.86
p47	mh27	mh28	4.79	92.00	0.004960	18 inch	0.013	7.40	6,606.17	6,605.71	6,608.89	6,608.69	2.71
p48	mh28	MH29	4.79	109.00	0.005046	18 inch	0.013	7.46	6,605.46	6,604.91	6,608.63	6,608.40	2.71
p49	MH29	IN-53	20.41	106.00	0.151981	30 inch	0.013	159.90	6,603.91	6,587.80	6,604.51	6,591.06	13.26

Profile
Scenario: Base



Water Quality Capture Volume

Empirical Method

Date: 10/22/04

Job Name: Founders Marketplace, Block 1

Job Number: 03.0292

Contributing basin imperviousness (C_i , %) = 38.96

Developed tributary area (ac) = 30.47

Water Quality Capture Volume

$$WQCV \text{ (inches)} = 0.91i^3 - 1.19i^2 + 0.78i$$

$$\text{Required Volume, } W_q = (WQCV / 12) * \text{Area} * 1.2$$

$$= 23,504 \quad \text{Cubic Feet} \quad = \quad 0.54 \text{ acre ft}$$

Water Quality Pond Design
Stage-Storage Analysis
Job Name: Founders Marketplace, Block 1
Job Number: 03.0292

Date: 12/14/04
by: JDT

This design uses an existing pond just downstream of the Highway 86 culvert on Founders Marketplace Block 2. The existing pond is highly vegetated and has a level pool at an elevation of approximately 6556.0. That vegetation will remain in-place and pond parameters have been developed using constructed wetland basin nomographs.

Refer to Construction Sheet C4.20 for better detail and location (included in the back pocket of this report).

WQ Volume Calculated = 23,504 c.f.

Elev.	Square Ft	Volume (c.f.) Incremental	Cummulative	Water Surface Elevation
6556.0	7,363	22,692		
6558.0	15,867		22,692	6558.0

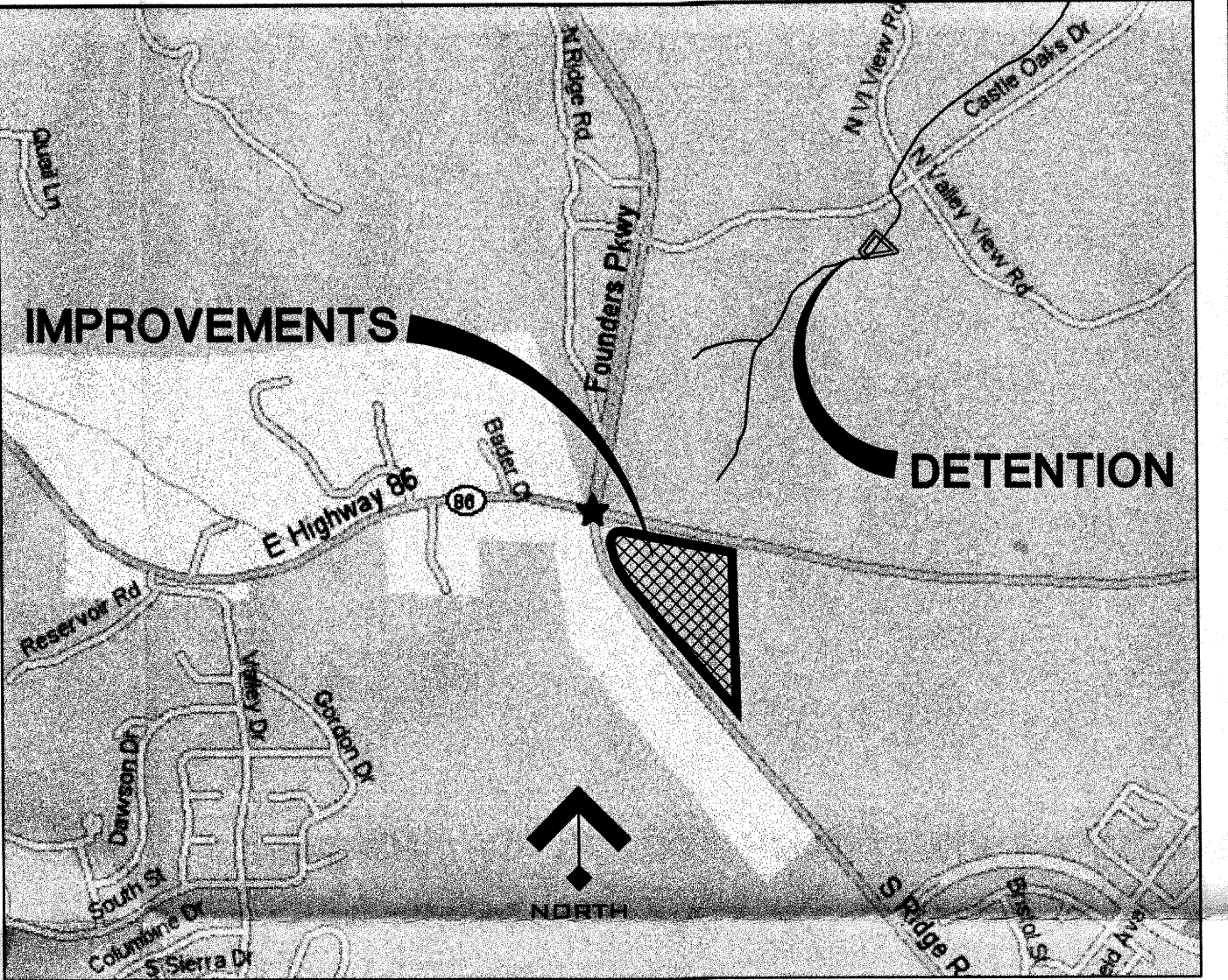
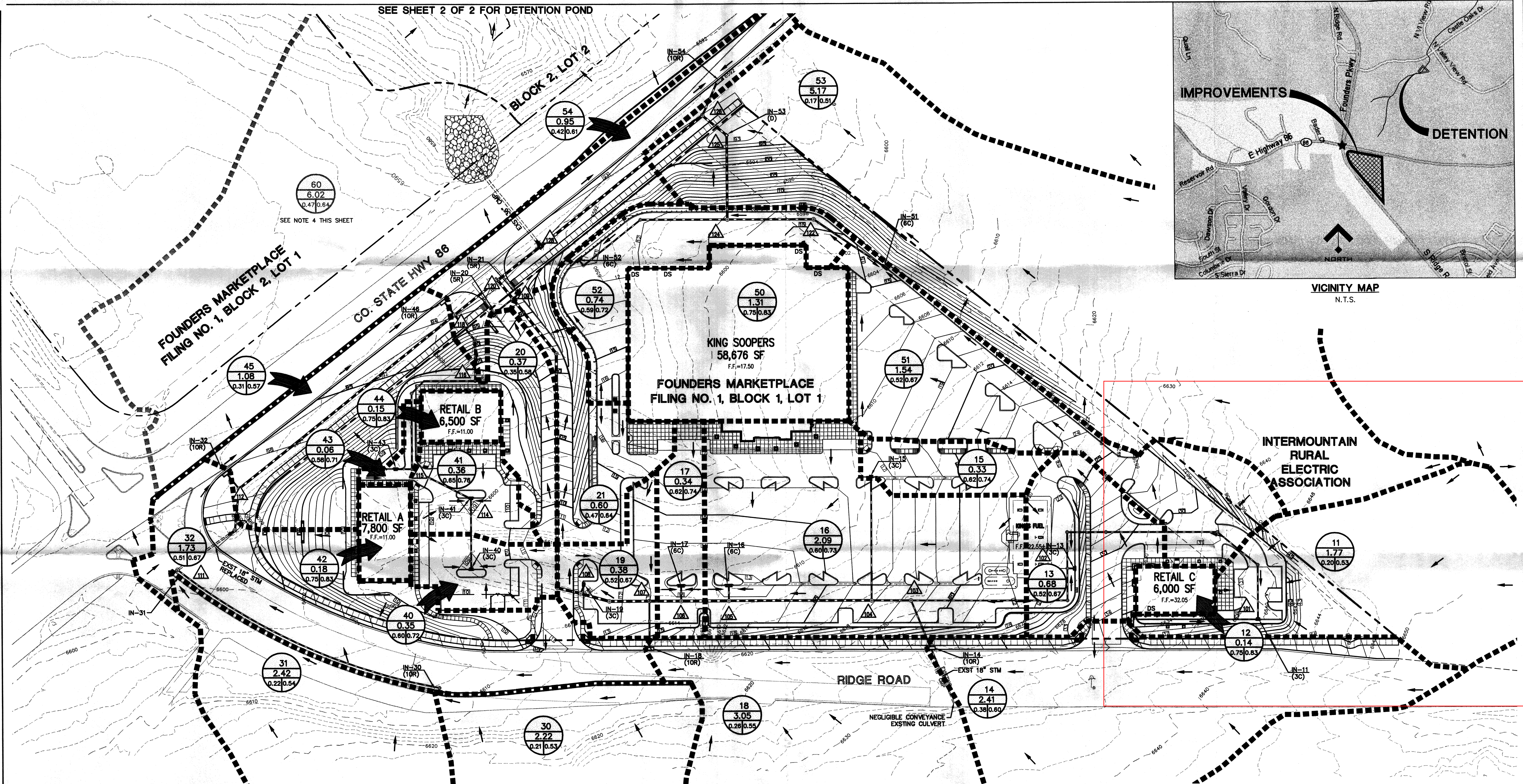
WQ Volume Provided = 22,692 c.f.

or 0.52 acre-ft

Providing for: $22,692 / 23,504 * 100$ or 96.55% of required.

Water Quality Outlet
[Refer to following pages]

Use three (3) 29/32-inch (1.94 in² total) holes per row.



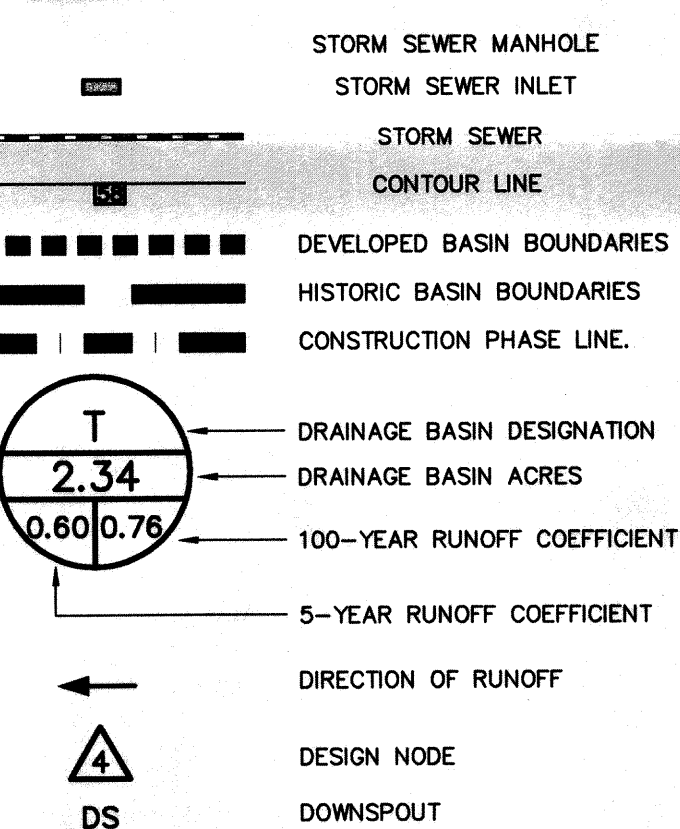
VICINITY MAP
N.T.S.

LEGEND

PROPOSED

EXISTING

INLET KEY



ID	DESCRIPTION
D	CDOT TYPE D INLET
3C	THREE-FOOT TYPE 13C INLET
6C	SIX-FOOT TYPE 13C INLET
5R	FIVE-FOOT TYPE R INLET
10R	TEN-FOOT TYPE R INLET

BASIN SUMMARY TABLE

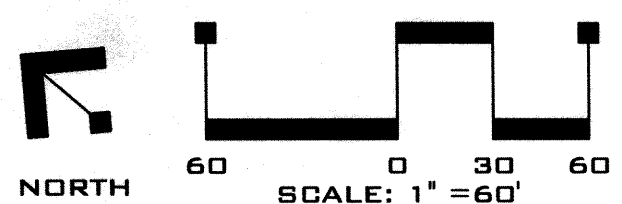
BASIN ID	TIME OF CONCENTRATION (MIN)	I ₅ (IN/HR)	I ₁₀₀ (IN/HR)	AREA (ACRES)	C _s	C ₁₀₀	Q ₅ (CFS)	Q ₁₀₀ (CFS)
11	21.9	2.83	5.15	1.77	0.20	0.53	1.02	4.81
12	5.0	4.90	9.00	0.14	0.75	0.83	0.51	1.05
13	5.0	4.90	9.00	0.68	0.52	0.67	1.74	4.11
14	13.4	3.42	6.33	2.41	0.38	0.60	3.17	9.11
15	5.0	4.90	9.00	0.33	0.62	0.74	1.00	2.19
16	8.8	4.16	7.63	2.09	0.60	0.73	5.25	11.61
17	5.0	4.90	9.00	0.34	0.62	0.74	1.03	2.26
18	15.9	3.13	5.80	3.05	0.26	0.55	2.51	9.78
19	5.0	4.90	9.00	0.38	0.52	0.67	0.97	2.29
20	5.0	4.90	9.00	0.37	0.35	0.59	0.64	1.95
21	5.0	4.90	9.00	0.60	0.47	0.64	1.37	3.45
30	13.8	3.37	6.24	2.22	0.21	0.53	1.57	7.36
31	15.9	3.13	5.80	2.42	0.22	0.54	1.66	7.51
32	5.0	4.90	9.00	1.73	0.51	0.67	4.36	10.39
40	5.0	4.90	9.00	0.35	0.60	0.72	1.02	2.28
41	5.0	4.90	9.00	0.36	0.65	0.76	1.15	2.47
42	5.0	4.90	9.00	0.18	0.75	0.83	0.66	1.35
43	5.0	4.90	9.00	0.08	0.51	0.66	0.20	0.48
44	5.0	4.90	9.00	0.15	0.75	0.83	0.55	1.13
45	9.0	4.10	7.52	1.11	0.30	0.57	1.39	4.76
50	5.0	4.90	9.00	1.31	0.75	0.83	4.78	9.84
51	8.6	4.18	7.67	1.54	0.52	0.67	3.37	7.95
52	5.0	4.90	9.00	0.74	0.59	0.72	2.14	4.79
53	20.6	2.83	5.15	5.17	0.17	0.51	2.48	13.61
54	7.1	4.50	8.26	0.95	0.42	0.61	1.80	4.82

DESIGN NODE SUMMARY TABLE

NODE ID	TIME OF CONCENTRATION (MIN)	5-YEAR			100-YEAR		
		CA	I (IN/HR)	Q (CFS)	CA	I (IN/HR)	Q (CFS)
101	7.0	0.26	4.50	1.17	0.43	8.26	3.58
102	7.0	0.61	4.50	2.76	0.89	8.26	7.36
103	7.0	1.54	4.50	6.91	1.93	8.26	15.93
104	7.0	1.74	4.50	7.82	2.17	8.26	17.94
105	8.8	3.00	4.16	12.48	3.69	7.63	28.18
106	8.8	3.21	4.16	13.36	3.94	7.63	30.10
107	8.8	3.71	4.16	15.42	4.74	7.63	36.14
108	8.8	3.91	4.16	16.25	4.99	7.63	38.09
109	8.8	4.30	4.16	17.90	5.57	7.63	42.48
111	7.0	0.58	4.50	2.61	1.22	8.26	10.05
112	7.0	1.47	4.50	6.61	2.37	8.26	19.58
114	5.0	0.44	4.90	2.17	0.53	9.00	4.75
115	5.0	0.62	4.90	3.03	0.73	9.00	6.58
116	5.0	0.73	4.90	3.58	0.86	9.00	7.71
118	7.0	2.49	4.50	11.21	3.73	8.26	30.78
120	8.8	6.79	4.16	28.26	9.29	7.63	70.91
122	8.6	1.30	4.18	5.41	1.58	7.67	12.14
124	8.6	2.22	4.18	9.28	2.66	7.67	20.41
125	8.6	2.54	4.18	10.62	3.57	7.67	27.39
126	8.6	2.94	4.18	12.29	4.15	7.67	31.83
128	8.8	9.73	4.16	40.49	13.44	7.63	102.59

GENERAL NOTES

1. THIS PLAN IS INTENDED TO BE USED AS REFERENCE IN CONJUNCTION WITH THE FINAL DRAINAGE REPORT. DO NOT USE THIS PLAN FOR CONSTRUCTION.
2. ALL STORM SEWER CONSTRUCTION (PIPE LINE, INLETS, MANHOLES) SHALL BE IN ACCORDANCE WITH TOWN OF CASTLE ROCK STANDARDS AND SPECIFICATIONS.
3. THE CONTRACTOR SHALL PHASE GRADING ACTIVITIES TO LIMIT THE POSSIBILITY OF EROSION.
4. BASIN 60 IS TRIBUTARY TO THE EXISTING POND BEING UTILIZED FOR CONSTRUCTION EROSION CONTROL BUT IS NOT INCLUDED AS A DEVELOPED BASIN FOR ANY ANALYSIS OR DESIGN.

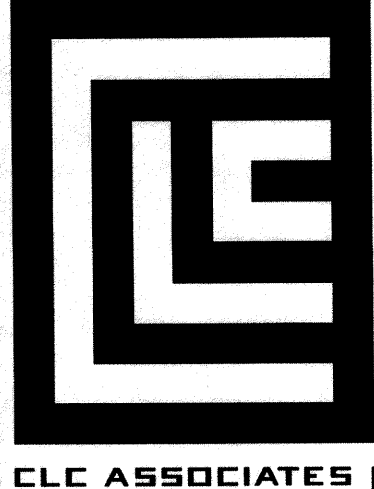


THIS DRAWING IS INTENDED
FOR REFERENCE ONLY
NOT TO BE USED FOR CONSTRUCTION

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.



CLC ASSOCIATES
8480 E. ORCHARD RD.
SUITE 3000
GREENWOOD VILLAGE
COLORADO 80111
P 303 770 5600
F 303 770 5349
CLC@CLC.COM

ARCHITECTURE
ENGINEERING PLANNING
LANDSCAPE ARCHITECTURE
LAND SURVEYING

DRAINAGE PLAN
FOUNDERS MARKETPLACE FILING NO. 1
BLOCK 1, LOT 1
SE CORNER - CO HWY. 86 AND RIDGE ROAD
CASTLE ROCK, CO

ON-SITE DRAINAGE PLAN
DATE: 10/08/04
DESCRIPTION: INITIAL APPROVAL
11/23/04
FDD 4-072 REVISION

PROJECT #: 03.0292
DRAWN BY: JLS
DESIGNED BY: JDT
CHECKED BY: JDT



Summary of Water Quality Conformance to MS4 Permit

The purpose of this worksheet is to document conformance with the Town of Castle Rock's MS4 permit with regard to permanent water quality on land disturbance projects.

Project Name O'Reilly Auto Parts

Project Owner Kings Bank LLC

Project Location 730 North Ridge Road, Castle Rock, Colorado 80104 - Founders Marketplace

ToCR Project Number TBD

Total Site Area 1.212 acres

Total Size of Common Plan of Development 12.03 acres

Check all that apply:

- ☐ Project within Plum Creek Basin
- ☒ Project within Cherry Creek Basin

Estimated construction completion date Early 2026

1. The water quality control measure(s) for applicable development sites shall meet one of the following base design standards as per the SDDTCM Section 14.4. Please select all design standards that were applied to meet conformance with the MS4 on this site.

- ☐ WQCV standard
- ☐ Pollutant removal standard
- ☐ Runoff reduction standard
- ☒ Applicable site draining to regional WQVC control measure (accepts drainage prior to discharging to WOTS)
- ☐ Applicable site draining to regional WQVC control facility (with receiving pervious area control measure upstream of WOTS)
- ☐ Constrained redevelopment sites standard
- Imperviousness of existing site _____/_____ (Imp. Ac/Site Ac) = ____%
 - Variance required TCV No. _____
- ☐ Existing control measure with WQCV per previous criteria standards
- Reference Construction Permit No. _____
- ☒ Cherry Creek Basin only, choose one: ☐ Tier 1 ☐ Tier 2 ☒ Tier 3
- ☐ No control measures provided (See Permanent WQ Worksheet for applicability)

Summary of Water Quality Conformance to MS4 Permit

2. Was an exclusion to water quality applied as per SDDTCM Section 13.1.5? ☐ Yes ☒ No

i. If yes, please select all that apply, provide total excluded impervious area(s) and submit variance, as applicable: TCV No. _____

- ☐ Pavement management site
Excluded impervious area: _____ acres
- ☐ Excluded roadway redevelopment
Excluded impervious area: _____ acres
- ☐ Excluded existing roadway areas
Excluded impervious area: _____ acres
- ☐ Above ground and below ground utilities
- ☐ Large lot single family home
- ☐ Non-residential and non-commercial infiltration
Excluded impervious area: _____ acres
- ☐ Land disturbance for land to remain undeveloped
Excluded impervious area: _____ acres
- ☐ Stream Stabilization Sites
Excluded impervious area: _____ acres
- ☐ Trails
Excluded impervious area: _____ acres
- ☐ Oil and Gas Exploration

3. For Development and Redevelopment sites, following any exclusions claimed above, was any portion of the site excluded up to 20% of the site and not to exceed one acre? ☐ Yes ☒ No

If yes, complete the following:

Excluded area: _____ acres
Total Site area: _____ acres, _____ % site excluded

4. For Constrained sites, was any portion of the site excluded up to 50% of the site and not to exceed 50% of the impervious area? ☐ Yes ☒ No

If yes, complete the following:

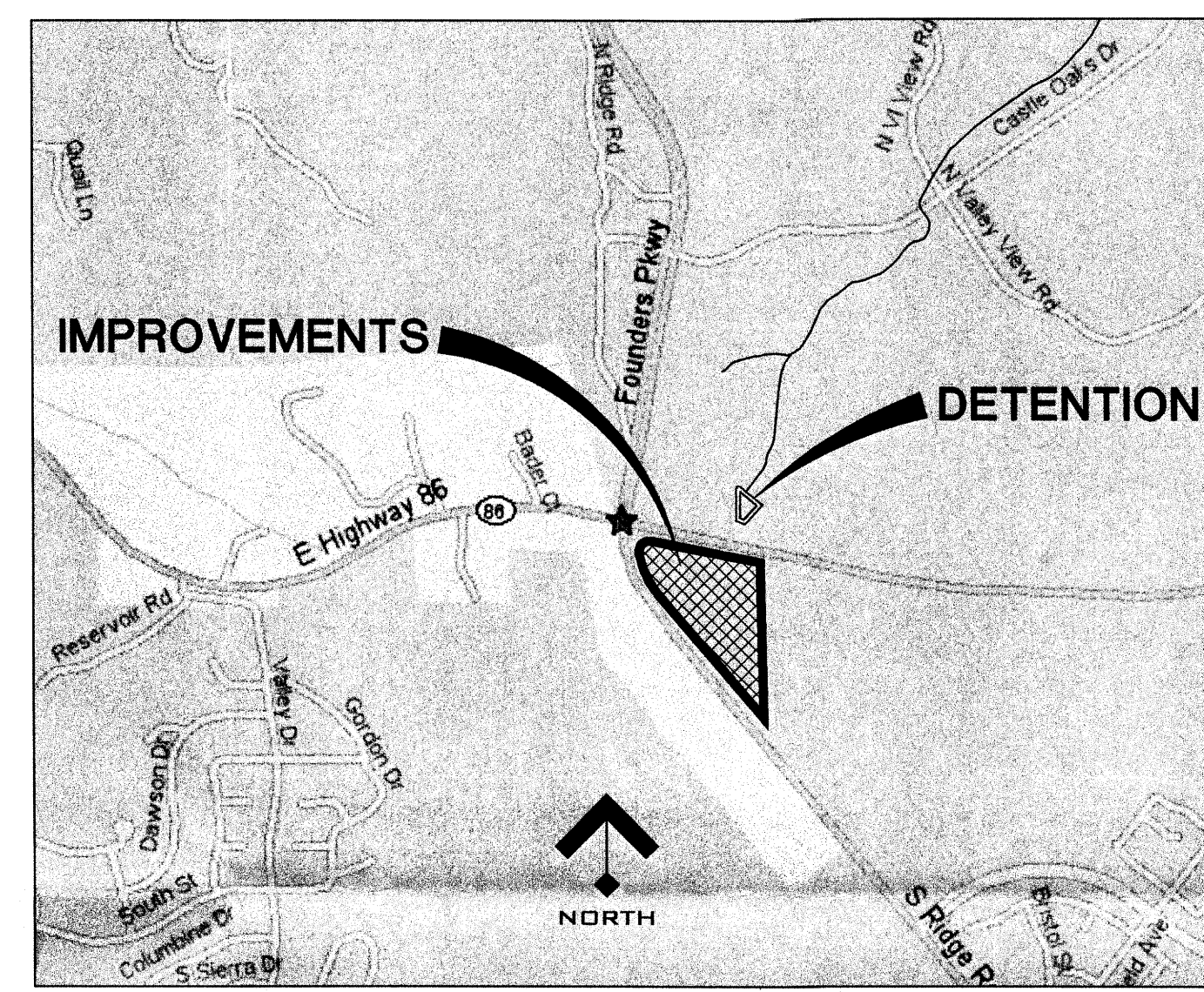
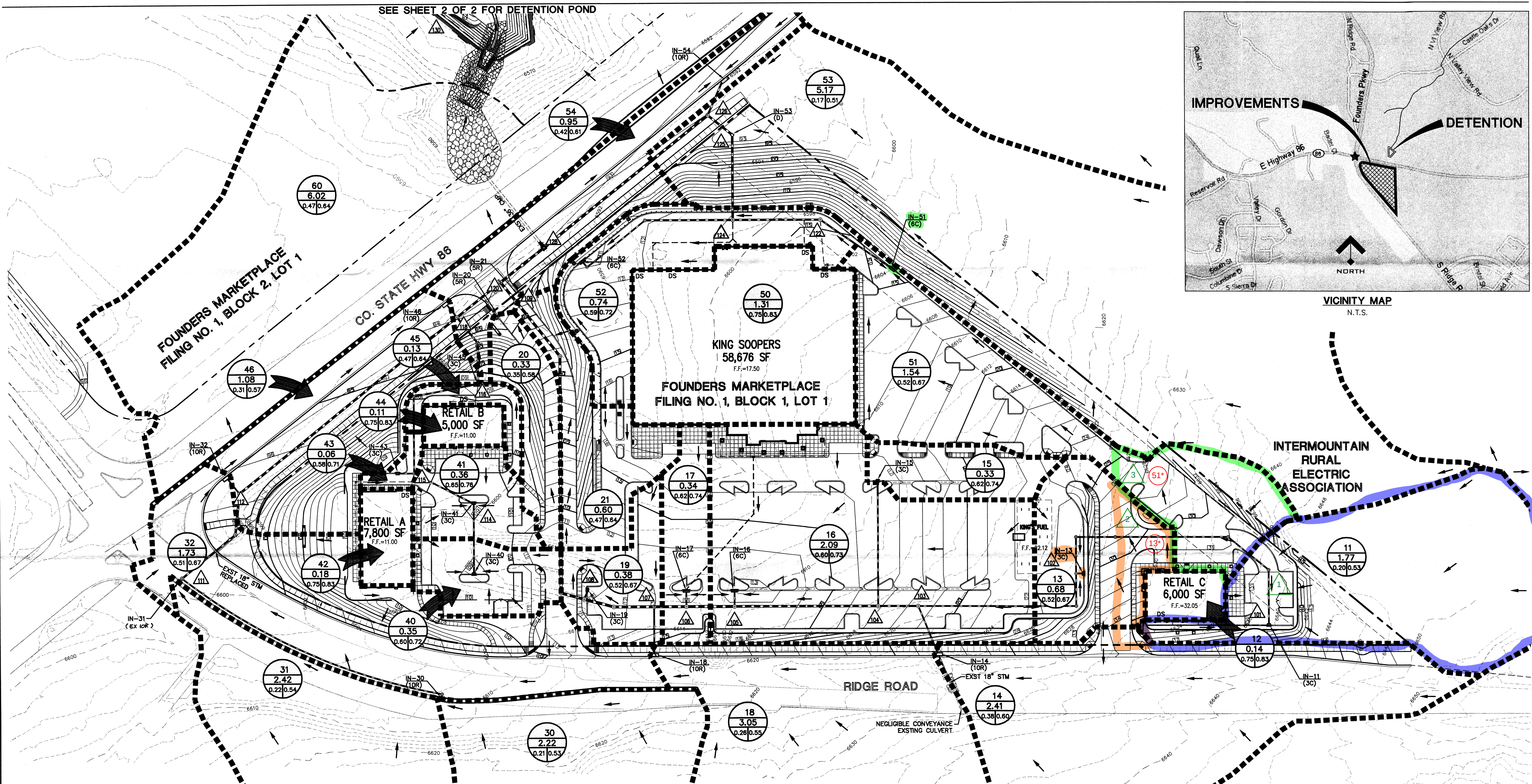
Excluded area: _____ acres
Excluded impervious area: _____ acres
Total Site area: _____ acres, _____ % site excluded
Total Impervious area: _____ acres, _____ % impervious excluded

Permanent Water Quality Determination Worksheet (Taken from 2019 SDDTCM Sections 13.1.4 and 13.1.5)

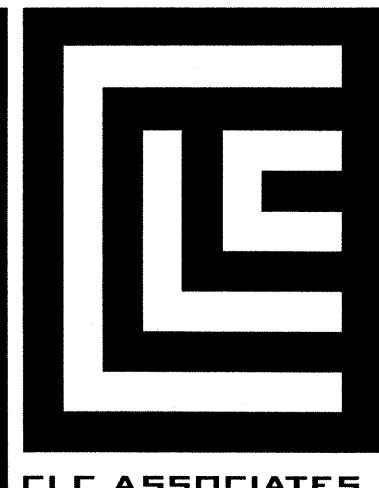
Project:		Project#		Applicant:
Section	Questions	Response	Check those that apply	Instructions
1	Non-applicable Sites			
1.1	Will the project result in a temporary disturbance of greater than one acre?	No Yes	☒ ☐	Proceed to section 1.2. Proceed to section 2.
1.2	Is the project part of a larger common plan of development or sale where multiple separate and distinct construction activities may be taking place at different times on different schedules, but remain related and are within 1/4 mile of each other? (A common plan of development will generally be documented on a site development plan, master plan, or equivalent, for the property/project)	No Yes	☐ ☒	Proceed to section 1.3. Proceed to section 2.
1.3	Is the project within the Cherry Creek Watershed?	Yes No	☒ ☐	Permanent water quality control measures may be required. Refer to Water Quality Control Regulation 72.7 for details and allowable exclusions. Permanent water quality control measures are not required.
2	Applicable Site Types and Exclusions by Variance			
2.1	Does the project have more than 35% impervious area on the existing site?	No Yes	☒ ☐	Project is an applicable Development Site. Proceed to section 3. Proceed to 2.2.
2.2	Does the project have greater than 75% impervious area on the existing site?	No Yes	☐ ☐	Project is an applicable Redevelopment Site. Proceed to section 3. Project is an applicable Constrained Redevelopment Site. Proceed to 2.3.
2.3	Will 100% of the runoff from the existing and proposed site be captured and treated using one or more of the allowable design standards for permanent water quality?	Yes No	☐ ☐	No further action required. Proceed to 2.4.
2.4	Do any other water quality exclusions apply to the site?	No Yes	☐ ☐	Portions of the project are excluded. Proceed with design in accordance with Constrained Redevelopment standards and apply for variance for <u>Constrained Redevelopment Sites</u> . Proceed to section 3. Following approval of other exclusions, design remaining site in accordance with Constrained Redevelopment standards and apply for variance for <u>Constrained Redevelopment Sites</u> .
3	Applicable Sites with Other Exclusions by Variance			
3.1	Category 1: Roadways, bridges and trails only			
3.1.1	Is the project a bike or pedestrian trail?	Yes No	☐ ☐	Proceed to next line. Proceed to 3.1.2.
	Is the trail for a roadway?	Yes No	☐ ☐	Proceed to 3.1.2. Project is excluded. Submit variance for <u>Trails Excluded from Permanent Water Quality Requirements</u> .
3.1.2	Is the project primarily used for parking or access to parking?	Yes No	☐ ☐	This exclusion does not apply. Permanent water quality is required. Proceed to 3.1.3.
3.1.3	Does the project add impervious area?	No Yes	☐ ☐	Project is excluded. Submit variance for <u>Pavement Management Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.1.4.

Section	Questions	Response	Check those that apply	Instructions
3.1.4	Does the project add more than 8.25 feet of paved width at any location to the existing roadway?	No Yes	☐ ☐	Project is excluded. Submit variance for <u>Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
	Does the project add more than one acre of paved area per mile to an existing roadway?	No Yes	☐ ☐	Project is excluded. Submit variance for <u>Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
	Does the project increase the width by two times or more, on average, of the original roadway area?	No Yes	☐ ☐	Existing areas of site are excluded only. Submit variance for <u>Existing Roadway Surfaces Only Excluded from Permanent Water Quality Requirements</u> . This exclusion does not apply. Permanent water quality is required.
3.2	Category 2: Non-residential and non-commercial projects only			
3.2.1	Is the project associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities, including activities necessary to prepare a site for drilling and the movement and placement of drilling equipment?	Yes No	☐ ☐	Project is excluded. Submit variance for <u>Oil and Gas Exploration Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.2.
3.2.2	Is the project for stream stabilization?	Yes No	☐ ☐	Project is excluded. Submit variance for <u>Stream Stabilization Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.3.
3.2.3	Is the project for installation or maintenance of aboveground or underground utilities or infrastructure that does not permanently alter the terrain, ground cover, or drainage patterns from those present prior to the construction activity including activities to install, replace or maintain utilities under roadways or other paved areas that return the surface to the same condition?	Yes No	☐ ☐	Project is excluded. Submit variance for <u>Aboveground and Underground Utilities Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.4.
3.2.4	Is the project on undeveloped land (land with no human-made structures such as buildings or pavement) that will remain undeveloped after the project?	Yes No	☐ ☐	Project is excluded. Submit variance for <u>Sites with Land Disturbances to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.5.
3.2.5	Will the post-project condition result in surface water discharge during the 80th percentile storm runoff event?	No Yes	☐ ☐	Project is excluded. Submit study along with variance for <u>Non-residential and Non-commercial Infiltration Conditions Excluded from Permanent Water Quality Requirements</u> . This exclusion does not apply. Permanent water quality is required.
3.3	Category 3: Residential, Agricultural and Commercial projects			
3.3.1	Is the project a single-family residential lot, or agricultural zoned lands, greater than or equal to 2.5 acres in size per dwelling unit?	Yes No	☐ ☒	Proceed to next line. Proceed to 3.3.2.
	Is the project site greater than 10% impervious?	No Yes	☐ ☐	Project is excluded. Submit variance for <u>Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
	Is the project site greater than 20% impervious?	Yes No	☐ ☐	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Will the post-project condition result in surface water discharge during the 80th percentile storm runoff event?	No Yes	☐ ☐	Project is excluded. Submit study along with variance for <u>Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements</u> . This exclusion does not apply. Permanent water quality is required.

Section	Questions	Response	Check those that apply	Instructions
3.3.2	Will 100% of the runoff from the residential or commercial site be captured?	Yes No	☒ ☐	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Is all or a portion of the site undeveloped or will it remain undeveloped after construction?	Yes No	☐ ☐	This portion of the project is excluded. Submit variance for <u>Sites with Land Disturbance to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements</u> . Proceed to next line. Proceed to next line.
	Is the remaining untreated impervious area greater than 20% of the site?	Yes No	☐ ☐	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Is the remaining untreated impervious area greater than one acre?	Yes No	☐ ☐	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Is it practicable to capture runoff from portions of the site that will not drain to a control measure?	No Yes	☐ ☐	Document justification demonstrating that it is not practicable to capture runoff from this portion of the site in the drainage report . No further action is needed. This exclusion does not apply. Permanent water quality is required.



VICINITY MAP
N.T.S.



CLC ASSOCIATES
8480 E. ORCHARD RD.
SUITE 2000
GREENWOOD VILLAGE
COLORADO 80111
P 303 770 5600
F 303 770 2349
CLC@CLC.COM

ARCHITECTURE
ENGINEERING PLANNING
LANDSCAPE ARCHITECTURE
LAND SURVEYING

DRAINAGE PLAN
FOUNDERS MARKETPLACE FILING NO. 1
BLOCK 1, LOT 1
SE CORNER - CO HWY. 86 AND RIDGE ROAD
CASTLE ROCK, CO

LEGEND

PROPOSED

- STORM SEWER MANHOLE
- STORM SEWER INLET
- STORM SEWER
- CONTOUR LINE
- DEVELOPED BASIN BOUNDARIES
- HISTORIC BASIN BOUNDARIES
- CONSTRUCTION PHASE LINE
- DRAINAGE BASIN DESIGNATION
- DRAINAGE BASIN ACRES
- 100-YEAR RUNOFF COEFFICIENT
- 5-YEAR RUNOFF COEFFICIENT
- DIRECTION OF RUNOFF
- DESIGN NODE
- DOWNSPOUT

EXISTING

- 5845

INLET KEY

ID	DESCRIPTION
D	CDOT TYPE D INLET
3C	THREE-FOOT TYPE 13C INLET
6C	SIX-FOOT TYPE 13C INLET
5R	FIVE-FOOT TYPE R INLET
10R	TEN-FOOT TYPE R INLET

BASIN SUMMARY TABLE

BASIN ID	TIME OF CONCENTRATION (MIN)	I ₅ (IN/HR)	I ₁₀₀ (IN/HR)	AREA (ACRES)	C _s	C ₁₀₀	Q ₅ (CFS)	Q ₁₀₀ (CFS)
11	21.9	2.83	5.15	1.77	0.20	0.53	1.02	4.81
12	5.0	4.90	9.00	0.14	0.75	0.83	0.51	1.05
13	5.0	4.90	9.00	0.68	0.52	0.67	1.74	4.11
14	13.4	3.42	6.33	2.41	0.38	0.60	3.17	9.11
15	5.0	4.90	9.00	0.33	0.82	0.74	1.00	2.19
16	8.8	4.16	7.63	2.09	0.60	0.73	5.25	11.61
17	5.0	4.90	9.00	0.34	0.62	0.74	1.03	2.26
18	15.9	3.13	5.80	3.05	0.26	0.55	2.51	9.78
19	5.0	4.90	9.00	0.38	0.52	0.67	0.97	2.29
20	5.0	4.90	9.00	0.33	0.35	0.58	0.57	1.74
21	5.0	4.90	9.00	0.60	0.47	0.64	1.37	3.45
30	13.8	3.37	6.24	2.22	0.21	0.53	1.57	7.36
31	15.9	3.13	5.80	2.42	0.22	0.54	1.66	7.51
32	5.0	4.90	9.00	1.73	0.51	0.67	4.36	10.39
40	5.0	4.90	9.00	0.35	0.60	0.72	1.02	2.28
41	5.0	4.90	9.00	0.36	0.65	0.76	1.15	2.47
42	5.0	4.90	9.00	0.18	0.75	0.83	0.66	1.35
43	5.0	4.90	9.00	0.06	0.58	0.71	0.17	0.38
44	5.0	4.90	9.00	0.11	0.75	0.83	0.40	0.83
45	5.0	4.90	9.00	0.13	0.47	0.64	0.30	0.75
46	9.0	4.10	7.52	1.08	0.30	0.57	1.33	4.60
50	5.0	4.90	9.00	1.31	0.75	0.83	4.81	9.79
51	8.6	4.18	7.67	1.54	0.52	0.67	3.37	7.95
52	5.0	4.90	9.00	0.74	0.59	0.72	2.14	4.79
53	20.6	2.83	5.15	5.17	0.17	0.51	2.48	13.61
54	7.1	4.50	8.26	0.95	0.42	0.61	1.80	4.82
60	10.2	3.89	7.13	6.02	0.47	0.64	10.99	27.47

DESIGN NODE SUMMARY TABLE

NODE ID	TIME OF CONCENTRATION (MIN)	5-YEAR		100-YEAR			
		CA	I (IN/HR)	Q (CFS)	CA	I (IN/HR)	Q (CFS)
101	7.0	0.26	4.50	1.17	0.43	8.26	3.58
102	7.0	0.61	4.50	2.76	0.89	8.26	7.36
103	7.0	1.54	4.50	6.93	1.93	8.26	15.93
104	7.0	1.74	4.50	7.84	2.17	8.26	17.94
105	8.8	3.01	4.16	12.50	3.69	7.63	28.19
106	8.8	3.22	4.16	13.38	3.95	7.63	30.10
107	8.8	3.71	4.16	15.44	4.74	7.63	36.15
108	8.8	3.91	4.16	16.26	4.99	7.63	38.09
109	8.8	4.31	4.16	17.91	5.57	7.63	42.49
111	5.0	0.58	4.90	2.60	1.21	8.26	10.01
112	7.0	1.47	4.50	6.60	2.37	8.26	19.54
114	5.0	0.44	4.90	2.17	0.53	9.00	4.75
115	5.0	0.61	4.90	3.00	0.72	9.00	6.48
116	5.0	0.76	4.90	3.70	0.90	9.00	8.06
118	7.0	2.52	4.50	11.32	3.78	8.26	31.25
120	8.8	6.82	4.16	28.38	9.35	7.63	71.36
122	8.6	1.30	4.18	5.41	1.58	7.67	12.14
124	8.6	2.22	4.18	9.28	2.66	7.67	20.41
125	8.6	2.54	4.18	10.62	3.57	7.67	27.39
126	8.6	2.94	4.18	12.29	4.15	7.67	31.83
128	8.8	9.76	4.16	40.61	13.50	7.63	103.04
130	10.2	12.59	3.89	48.93	17.36	7.13	123.68

- GENERAL NOTES**
- THIS PLAN IS INTENDED TO BE USED AS REFERENCE IN CONJUNCTION WITH THE FINAL DRAINAGE REPORT. DO NOT USE THIS PLAN FOR CONSTRUCTION.
 - ALL STORM SEWER CONSTRUCTION (PIPE LINE, INLETS, MANHOLES) SHALL BE IN ACCORDANCE WITH TOWN OF CASTLE ROCK STANDARDS AND SPECIFICATIONS.
 - THE CONTRACTOR SHALL PHASE GRADING ACTIVITIES TO LIMIT THE POSSIBILITY OF EROSION.

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.

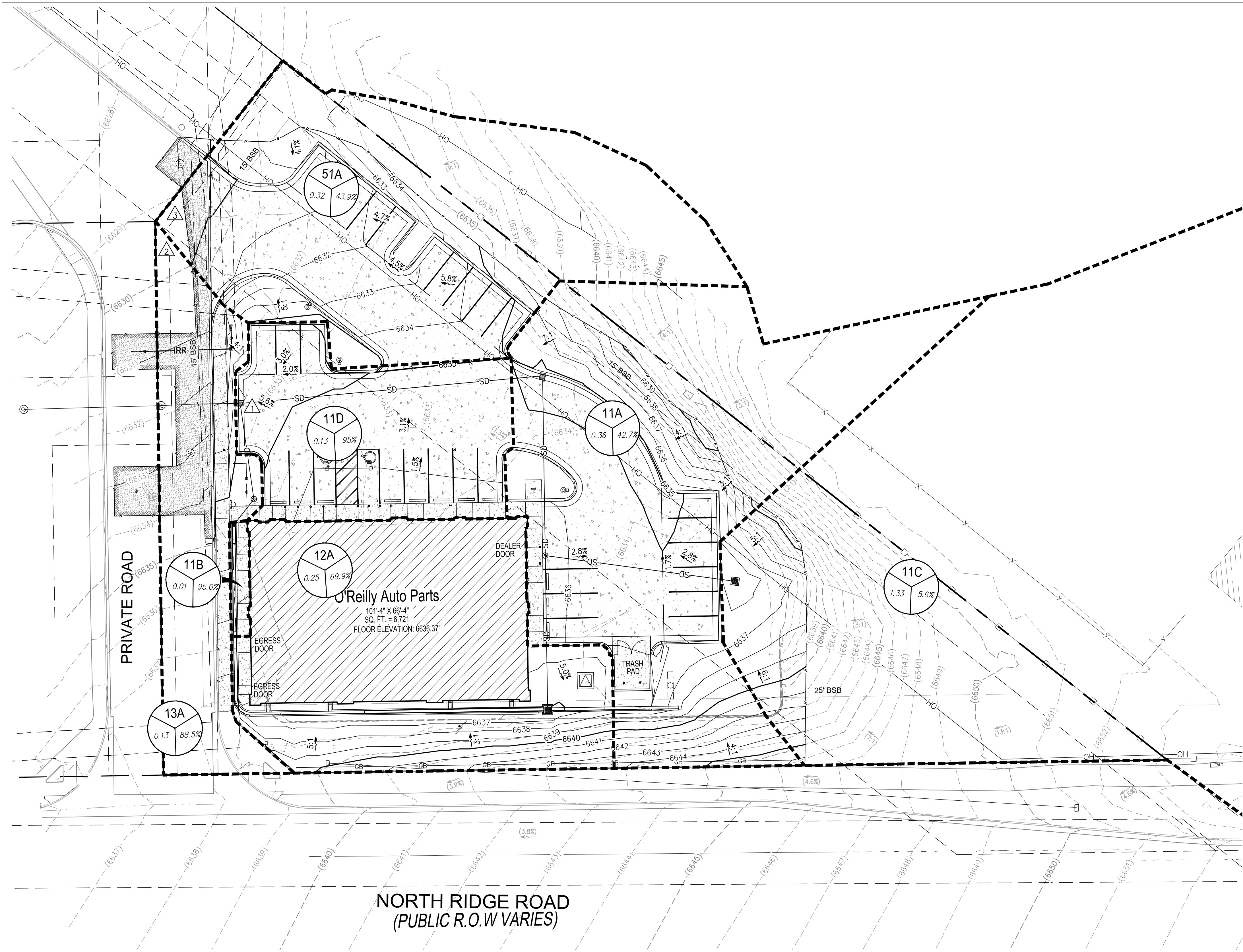
CAUTION: NOTICE TO CONTRACTOR

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.

THIS DRAWING IS INTENDED
FOR REFERENCE ONLY
NOT TO BE USED FOR CONSTRUCTION

DATE: 07/21/04
DESCRIPTION: INITIAL APPROVAL
PROJECT #: 03.0292
DRAWN BY: JLS
DESIGNED BY: JDT
CHECKED BY: JDT

SHEET 1 OF 2
DP

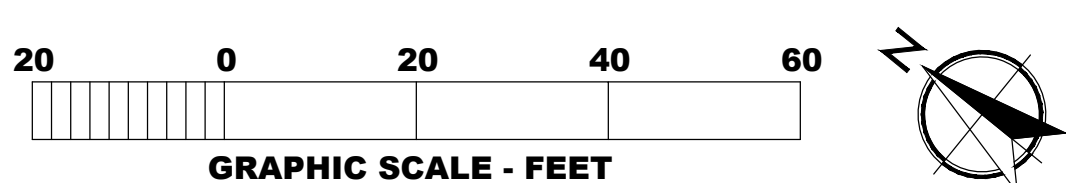


1

DR2

POST-DEVELOPMENT DRAINAGE

SCALE: 1" = 20'-0"



DRAINAGE LEGEND

- PROPOSED SLOPE2.0%
- EXISTING SLOPE(1.0%)
- PROPOSED BASIN LIMITS
- PROPOSED PROPERTY LINE
- A
B
C

A = BASIN DESIGNATION
B = AREA IN ACRES
C = % IMPERVIOUSNESS
- 6

DESIGN POINT

SUB BASIN RUNOFF TABLE			
BASIN DESIGN	CONTRIBUTING AREA (ACRES)	PEAK 5YR (CFS)	PEAK 100YR (CFS)
11A	0.36	0.53	1.67
11B	0.01	0.04	0.08
11C	1.33	0.52	3.98
11D	0.13	0.51	1.00
12A	0.25	0.73	1.70
13A	0.13	0.48	0.97
51A	0.32	0.61	1.87

CAUTION:
INFORMATION ON THIS DRAWING
CONCERNING TYPE AND LOCATION
OF UNDERGROUND AND OTHER
UTILITIES IS NOT GUARANTEED TO
BE ACCURATE OR ALL INCLUSIVE.
THE CONTRACTOR IS RESPONSIBLE
FOR MAKING HIS OWN
DETERMINATION AS TO THE TYPE
AND LOCATION OF UNDERGROUND
AND OTHER UTILITIES AS MAY BE
NECESSARY TO AVOID DAMAGE
THERE TO.



Know what's below
Call before you dig.

TIMOTHY M. GULLOT
ARCHITECT
1736 East Sunshine, Suite 417
Springfield, Missouri 65804
417.862.0558
Fax: 417.862.3265
e-mail: architect@esterlyschneider.com

PROJECT:
NEW O'REILLY AUTO PARTS STORE
N. RIDGE RD.
CASTLE ROCK, CO #2

O'Reilly AUTO PARTS
CORPORATE OFFICES
233 SOUTH PATTERSON
SPRINGFIELD, MISSOURI 65802
(417) 862-2674 TELEPHONE

COMM # 4880
DATE: 01/31/25
REVISION
DATE: