

**FINAL DRAINAGE REPORT ADDENDUM #1
FOR
PLATTE SELF STORAGE
COLORADO SPRINGS, COLORADO**

JUNE 2025

Prepared For:
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TNE Job No. 2419.00
County Job No. PPR2418

**FINAL DRAINAGE REPORT ADDENDUM #1
FOR
PLATTE SELF STORAGE
COLORADO SPRINGS, COLORADO**

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HYDRAULIC CALCULATIONS

DRAINAGE PLAN

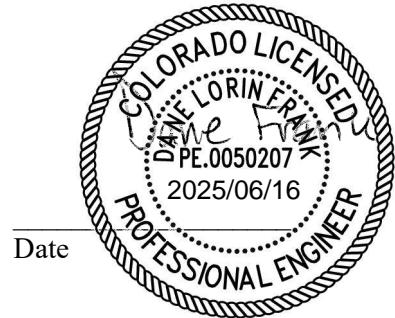
**FINAL DRAINAGE REPORT ADDENDUM #1
FOR
PLATTE SELF STORAGE
COLORADO SPRINGS, COLORADO**

DESIGN ENGINEER'S STATEMENT:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

Dane Frank

Dane Frank, P.E. 50207
On behalf of Terra Nova Engineering, Inc.



Date

OWNER/DEVELOPER'S STATEMENT:

I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

[Signature]

Authorized Signature

5/24/25

Date

JOSHUA PALMER, *PARTNER*

Printed Name, Title

PLATTE AVE STORAGE LLC

Business Name

12325 Oracle Blvd Suite 120. Colo Spgs, Co 80921

Address

EL PASO COUNTY:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

Joshua Palmer, P.E.
County Engineer / ECM Administrator

Date

Conditions:

**FINAL DRAINAGE REPORT ADDENDUM #1
FOR
PLATTE SELF STORAGE
COLORADO SPRINGS, COLORADO**

PURPOSE

The purpose of this Final Drainage Report Addendum #3 for Platte Self Storage is to show the changes to the proposed drainage conditions from regrading the site.

UPDATED PROPOSED DRAINAGE CONDITIONS

The site grading was changed to alter earthwork requirements. This resulted in lowering the east half of the site and changing embankment locations on the west half of the site. The driveway to the mini-storage area was moved as a result and the adjacent buildings have changed. Overall, the drainage patterns for the site remain similar, with small changes to some basin boundaries. Many of the storm pipe elevations were lowered, while the pattern of storm pipes remains the same. The stormwater pond remains the same.

The grading changes affect proposed basins PR-1, PR-2, PR-3B, PR-3C, and PR-3D.

Basin PR-1 consists of 0.10 acres of landscaping area located behind proposed Building B and its runoff ($Q_5=0.0$ cfs, $Q_{100}=0.2$ cfs) sheet flows west to Design Point 1 on the northern property line of the site. This basin is onsite and runoff flows into Basin OS-W and into a proposed public 18" RCP culvert with a grooved headwall under Motel Road, eventually entering Design Point W .

Basin PR-2 consists of 0.08 acres of landscaping area located behind proposed Build A and its runoff ($Q_5=0.0$ cfs, $Q_{100}=0.2$ cfs) sheet flows northwest to Design Point 2 on the northern property line of the site. This basin is onsite and runoff flows into Basin OS-W and eventually to Design Point W.

Basin PR-3B consists of 0.98 acres consists almost entirely of buildings and pavement central to the site. The runoff ($Q_5=4.4$ cfs, $Q_{100}=7.9$ cfs) flows via concrete cross-pans from the north and south to the center drive aisle. At Design Point 3B ($Q_5=6.9$ cfs, $Q_{100}=13.4$ cfs) the flow by from Design Point 3A and Basin PR-3B 3 private Type 13 inlets located in the proposed 4' concrete

crossspan captures ($Q_5=4.0$ cfs, $Q_{100}=5.7$ cfs), while the flow by ($Q_5=4.0$ cfs, $Q_{100}=9.5$ cfs) continues in the crossspan west to Design Point 3C. Pipe run PR#8 a private 30" RCP routes the combined flow ($Q_5=12.5$ cfs, $Q_{100}=26.7$ cfs) of the captured flow and Pipe Run #9's flow toward Design Point 3C.

Basin PR-3C consists of 1.10 acres consists almost entirely of buildings and pavement central to the site. The runoff ($Q_5=5.0$ cfs, $Q_{100}=8.9$ cfs) flows via concrete cross-pans from the north and south to the center drive aisle. At Design Point 3C ($Q_5=8.6$ cfs, $Q_{100}=17.7$ cfs) the flow by from Design Point 3B and Basin PR-3C 3 private Type 13 inlets located in the proposed 4' concrete crossspan captures ($Q_5=4.1$ cfs, $Q_{100}=6.1$ cfs), while the flow by ($Q_5=4.3$ cfs, $Q_{100}=11.1$ cfs) continues in the crossspan west to Design Point 3D. Pipe run PR#7 a private 30" RCP routes the combined flow ($Q_5=16.5$ cfs, $Q_{100}=32.7$ cfs) of the captured flow and Pipe Run #8's flow toward Design Point 3C.

Basin PR-3D consists of 0.94 acres consists almost entirely of buildings and pavement central to the site. The runoff ($Q_5=4.2$ cfs, $Q_{100}=7.6$ cfs) flows via concrete cross-pans from the north and south to the center drive aisle. At Design Point 3D ($Q_5=8.2$ cfs, $Q_{100}=18.2$ cfs) the flow by from Design Point 3C and Basin PR-3D 3 private Type 13 inlets located in the proposed 4' concrete crossspan captures ($Q_5=4.2$ cfs, $Q_{100}=6.5$ cfs), while the flow by ($Q_5=4.5$ cfs, $Q_{100}=12.4$ cfs) continues in the crossspan west to Design Point 3E. Pipe run PR#6 a private 30" RCP routes the combined flow ($Q_5=20.6$ cfs, $Q_{100}=39.0$ cfs) of the captured flow and Pipe Run #7's flow toward a junction with PR#11 (see below for discussion) Design Point 3C.

UPDATED HYDRAULIC CALCULATIONS

Hydraulic calculations were estimated using the Manning's Formula and the methods described in the El Paso County Storm Drainage Design Criteria Manual – Volumes 1 & 2, latest editions. The pertinent data sheets are included in the appendix of this report.

A culvert is proposed at one of the site entrances. Design calculations have been included for the proposed culvert.

The updated storm sewer HGL modeling has been included.

SUMMARY

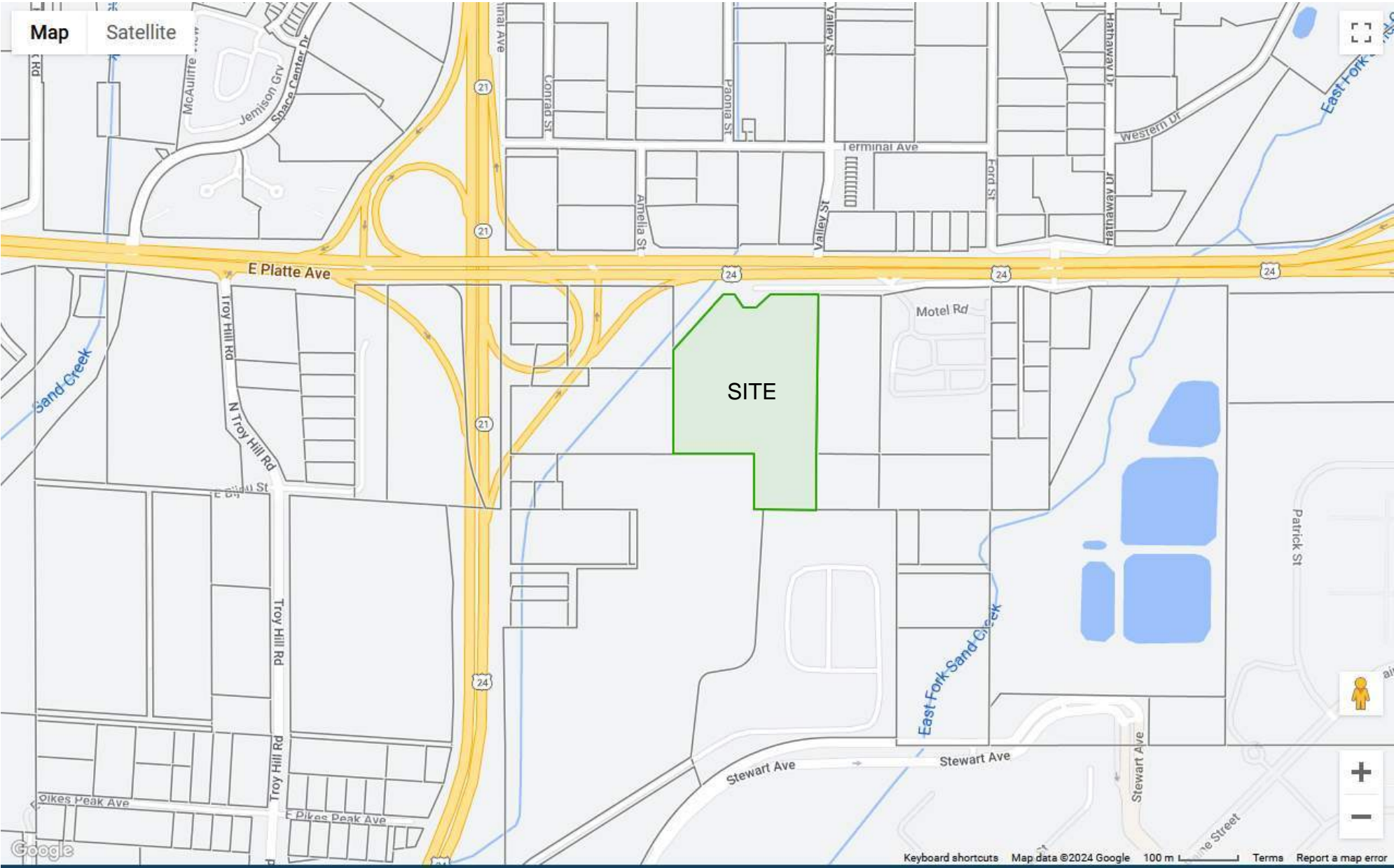
Development of this site will not adversely affect the surrounding development. Site runoff and storm drain appurtenances from the development will not adversely affect the downstream and surrounding developments and will be safely routed to the proposed extended detention basin reduced to the allowable pre-developed rates while slowly treating the water quality capture volume.

PREPARED BY:
TERRA NOVA ENGINEERING, INC.

Dane Frank, P.E.
Project Engineer

Jobs/2419.00/Drainage/241900 FDR Add #1.doc

VICINITY MAP



North is up ^^^

6001 E Platte Ave Subdivision - Location Map

Image Date Oct 2022



E Platte Ave / HWY 24

Motel Rd

Sand Creek

SITE

Google Earth



700 ft

HYDROLOGIC CALCULATIONS

PLATTE SELF STORAGE
AREA RUNOFF COEFFICIENT (C) SUMMARY
EXISTING

BASIN	TOTAL AREA (Acres)	DEVELOPED / IMPERVIOUS			UNDEVELOPED / NON-IMPERVIOUS			WEIGHTED		WEIGHTED CA	
		AREA (Acres)	C ₅	C ₁₀₀	AREA (Acres)	C ₅	C ₁₀₀	C ₅	C ₁₀₀	CA ₅	CA ₁₀₀
OS-Z	6.34	1.90	0.90	0.96	4.44	0.08	0.35	0.33	0.53	2.07	3.38
OS-Y	8.15	0.82	0.90	0.96	7.33	0.08	0.35	0.16	0.41	1.32	3.35
OS-X	1.20	0.02	0.90	0.96	1.18	0.08	0.35	0.09	0.36	0.11	0.43
OS-W	0.45	0.11	0.90	0.96	0.34	0.08	0.35	0.28	0.50	0.13	0.22
EX-A	0.30	0.05	0.90	0.96	0.25	0.08	0.35	0.22	0.45	0.07	0.14
EX-B	0.64	0.29	0.90	0.96	0.35	0.08	0.35	0.45	0.63	0.29	0.40
EX-C	15.4	7.70	0.90	0.96	7.70	0.08	0.35	0.49	0.66	7.55	10.09
EX-D	1.05	0.02	0.90	0.96	1.03	0.08	0.35	0.10	0.36	0.10	0.38
EX-E	0.16	0.00	0.90	0.96	0.16	0.08	0.35	0.08	0.35	0.01	0.06
EX-F	0.23	0.00	0.90	0.96	0.23	0.08	0.35	0.08	0.35	0.02	0.08
Total	33.92	10.91									
										Calc:	DLF
										Date:	5/12/2025
										Checked:	JS

**PLATTE SELF STORAGE
AREA RUNOFF COEFFICIENT (C) SUMMARY**

PROPOSED

BASIN	TOTAL AREA (Acres)	DEVELOPED / IMPERVIOUS			UNDEVELOPED / NON-IMPERVIOUS			WEIGHTED		WEIGHTED CA	
		AREA (Acres)	C ₅	C ₁₀₀	AREA (Acres)	C ₅	C ₁₀₀	C ₅	C ₁₀₀	CA ₅	CA ₁₀₀
OS-ZA	0.44	0.13	0.90	0.96	0.30	0.08	0.35	0.33	0.53	0.14	0.23
OS-ZB	0.22	0.06	0.90	0.96	0.15	0.08	0.35	0.33	0.53	0.07	0.12
OS-ZC	0.23	0.07	0.90	0.96	0.16	0.08	0.35	0.33	0.53	0.07	0.12
OS-ZD	0.86	0.26	0.90	0.96	0.60	0.08	0.35	0.33	0.53	0.28	0.46
OS-ZE	1.94	0.58	0.90	0.96	1.36	0.08	0.35	0.33	0.53	0.63	1.03
OS-ZF	0.56	0.17	0.90	0.96	0.39	0.08	0.35	0.33	0.53	0.18	0.30
OS-ZG	0.85	0.26	0.90	0.96	0.60	0.08	0.35	0.33	0.53	0.28	0.46
OS-ZH	1.24	0.37	0.90	0.96	0.87	0.08	0.35	0.33	0.53	0.40	0.66
OS-Y	8.15	0.82	0.90	0.96	7.33	0.08	0.35	0.16	0.41	1.32	3.35
OS-X	1.20	0.02	0.90	0.96	1.18	0.08	0.35	0.09	0.36	0.11	0.43
OS-W	0.45	0.11	0.90	0.96	0.34	0.08	0.35	0.28	0.50	0.13	0.22
PR-1	0.10	0.00	0.90	0.96	0.10	0.08	0.35	0.08	0.35	0.01	0.04
PR-2	0.08	0.00	0.90	0.96	0.08	0.08	0.35	0.08	0.35	0.01	0.03
PR-3A	1.10	1.10	0.90	0.96	0.00	0.08	0.35	0.90	0.96	0.99	1.05
PR-3B	0.98	0.98	0.90	0.96	0.00	0.08	0.35	0.90	0.96	0.88	0.94
PR-3C	1.10	1.10	0.90	0.96	0.00	0.08	0.35	0.90	0.96	0.99	1.06
PR-3D	0.94	0.94	0.90	0.96	0.00	0.08	0.35	0.90	0.96	0.85	0.90
PR-3E	1.01	1.01	0.90	0.96	0.00	0.08	0.35	0.90	0.96	0.91	0.97
PR-4	3.66	2.38	0.90	0.96	1.28	0.08	0.35	0.61	0.75	2.24	2.73
PR-5	0.56	0.01	0.90	0.96	0.55	0.08	0.35	0.09	0.36	0.05	0.20
PR-6	6.64	0.66	0.90	0.96	5.98	0.08	0.35	0.16	0.41	1.07	2.73
PR-7	0.34	0.01	0.90	0.96	0.33	0.08	0.35	0.10	0.37	0.04	0.13
PR-8	0.30	0.01	0.90	0.96	0.29	0.08	0.35	0.11	0.37	0.03	0.11
PR-9	0.59	0.01	0.90	0.96	0.58	0.08	0.35	0.09	0.36	0.06	0.21
PR-10A	0.06	0.00	0.90	0.96	0.06	0.08	0.35	0.08	0.35	0.00	0.02
PR-10B	0.03	0.00	0.90	0.96	0.03	0.08	0.35	0.08	0.35	0.00	0.01
PR-10C	0.04	0.00	0.90	0.96	0.04	0.08	0.35	0.08	0.35	0.00	0.01
PR-10D	0.04	0.00	0.90	0.96	0.04	0.08	0.35	0.08	0.35	0.00	0.02
PR-10E	0.09	0.00	0.90	0.96	0.09	0.08	0.35	0.08	0.35	0.01	0.03
PR-10F	0.04	0.00	0.90	0.96	0.04	0.08	0.35	0.08	0.35	0.00	0.01
PR-10G	0.05	0.00	0.90	0.96	0.05	0.08	0.35	0.08	0.35	0.00	0.02
PR-10H	0.06	0.00	0.90	0.96	0.06	0.08	0.35	0.08	0.35	0.00	0.02
Total	33.94	11.06								Calc:	DLF
										Date:	5/12/2025
										Checked:	JS

**PLATTE SELF STORAGE
RUNOFF SUMMARY
EXISTING**

BASIN	AREA TOTAL (Acres)	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				T _c	INTENSITY		TOTAL FLOWS		
		C ₅	C ₁₀₀	C ₅	Length (ft)	Slope (ft/ft)	T _i (min)	Length (ft)	Slope (%)	Velocity (fps)	T _i (min)	TOTAL (min)	I ₅ (in/hr)	I ₁₀₀ (in/hr)	Q ₅ (c.f.s.)	Q ₁₀₀ (c.f.s.)	
		* For Calcs See Runoff Summary															
OS-Z	6.34	0.33	0.53	0.33	300	0.02	19.3	230	2.0%	1.4	2.7	22.0	2.9	4.9	6.1	16.7	
OS-Y	8.15	0.16	0.41	0.16	300	0.03	20.4	505	3.0%	1.7	4.9	25.3	2.7	4.6	3.6	15.4	
OS-X	1.20	0.09	0.36	0.09	300	0.05	18.5	0	5.0%	2.2	0.0	18.5	3.2	5.4	0.4	2.3	
OS-W	0.45	0.28	0.50	0.28	300	0.07	13.5	160	7.0%	2.6	1.0	14.5	3.6	6.0	0.5	1.3	
EX-A	0.30	0.22	0.45	0.22	300	0.07	14.5	0	7.0%	2.6	0.0	14.5	3.6	6.0	0.2	0.8	
EX-B	0.64	0.45	0.63	0.45	300	0.07	10.7	250	7.0%	2.6	1.6	12.2	3.8	6.4	1.1	2.6	
EX-C	15.4	0.49	0.66	0.49	300	0.07	10.0	330	7.0%	2.6	2.1	12.1	3.8	6.4	29.0	65.0	
EX-D	1.05	0.10	0.36	0.10	300	0.03	21.9	40	3.0%	1.7	0.4	22.2	2.9	4.9	0.3	1.9	
EX-E	0.16	0.08	0.35	0.08	30	0.40	3.0	0	40.0%	6.3	0.0	5.0	5.2	8.7	0.1	0.5	
EX-F	0.23	0.08	0.35	0.08	35	0.24	3.8	0	24.0%	4.9	0.0	5.0	5.2	8.7	0.1	0.7	
																Calc:	DLF
																Date:	5/12/2025
																Checked:	JS

PLATTE SELF STORAGE RUNOFF SUMMARY

PROPOSED

BASIN	AREA TOTAL (Acres)	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				T _c	INTENSITY		TOTAL FLOWS		
		C ₅	C ₁₀₀	C ₅	Length (ft)	Slope (ft/ft)	T _t (min)	Length (ft)	Slope (%)	Velocity (fps)	T _t (min)	TOTAL (min)	I ₅ (in/hr)	I ₁₀₀ (in/hr)	Q ₅ (c.f.s.)	Q ₁₀₀ (c.f.s.)	
		* For Calcs See Runoff Summary															
OS-ZA	0.44	0.33	0.53	0.33	300	0.02	19.3	230	2.0%	1.4	2.7	22.0	2.9	4.9	0.4	1.1	
OS-ZB	0.22	0.33	0.53	0.33	300	0.02	19.3	231	2.0%	1.4	2.7	22.0	2.9	4.9	0.2	0.6	
OS-ZC	0.23	0.33	0.53	0.33	300	0.02	19.3	232	2.0%	1.4	2.7	22.0	2.9	4.9	0.2	0.6	
OS-ZD	0.86	0.33	0.53	0.33	300	0.02	19.3	233	2.0%	1.4	2.7	22.0	2.9	4.9	0.8	2.3	
OS-ZE	1.94	0.33	0.53	0.33	300	0.02	19.3	234	2.0%	1.4	2.8	22.0	2.9	4.9	1.9	5.1	
OS-ZF	0.56	0.33	0.53	0.33	300	0.02	19.3	235	2.0%	1.4	2.8	22.0	2.9	4.9	0.5	1.5	
OS-ZG	0.85	0.33	0.53	0.33	300	0.02	19.3	236	2.0%	1.4	2.8	22.0	2.9	4.9	0.8	2.3	
OS-ZH	1.24	0.33	0.53	0.33	300	0.02	19.3	237	2.0%	1.4	2.8	22.0	2.9	4.9	1.2	3.3	
OS-Y	8.15	0.16	0.41	0.16	300	0.03	20.4	505	3.0%	1.7	4.9	25.3	2.7	4.6	3.6	15.4	
OS-X	1.20	0.09	0.36	0.09	300	0.05	18.5	0	5.0%	2.2	0.0	18.5	3.2	5.4	0.4	2.3	
OS-W	0.45	0.28	0.50	0.28	300	0.07	13.5	160	7.0%	2.6	1.0	14.5	3.6	6.0	0.5	1.3	
PR-1	0.10	0.08	0.35	0.08	150	0.10	10.5	0	10.0%	3.2	0.0	10.5	4.0	6.8	0.0	0.2	
PR-2	0.08	0.08	0.35	0.08	45	0.25	4.3	0	25.0%	5.0	0.0	5.0	5.2	8.7	0.0	0.2	
PR-3A	1.10	0.90	0.96	0.90	100	0.02	2.9	450	2.0%	2.8	2.7	5.5	5.0	8.4	5.0	8.9	
PR-3B	0.98	0.90	0.96	0.90	100	0.02	2.9	451	2.0%	2.8	2.7	5.5	5.0	8.4	4.4	7.9	
PR-3C	1.10	0.90	0.96	0.90	100	0.02	2.9	452	2.0%	2.8	2.7	5.5	5.0	8.4	5.0	8.9	
PR-3D	0.94	0.90	0.96	0.90	100	0.02	2.9	453	2.0%	2.8	2.7	5.5	5.0	8.4	4.2	7.6	
PR-3E	1.01	0.90	0.96	0.90	100	0.02	2.9	454	2.0%	2.8	2.7	5.5	5.0	8.4	4.5	8.1	
PR-4	3.66	0.61	0.75	0.61	100	0.02	7.0	400	2.0%	1.0	6.7	13.7	3.7	6.1	8.2	16.8	
PR-5	0.56	0.09	0.36	0.09	300	0.02	25.0	0	2.0%	1.0	0.0	25.0	2.8	4.6	0.1	0.9	
PR-6	6.64	0.16	0.41	0.16	300	0.02	23.3	0	2.0%	1.0	0.0	23.3	2.9	4.8	3.1	13.1	
PR-7	0.34	0.10	0.37	0.10	25	0.33	2.8	0	33.0%	4.0	0.0	5.0	5.2	8.7	0.2	1.1	
PR-8	0.30	0.11	0.37	0.11	35	0.33	3.3	0	33.0%	4.0	0.0	5.0	5.2	8.7	0.2	1.0	
PR-9	0.59	0.09	0.36	0.09	100	0.06	10.1	0	6.0%	1.7	0.0	10.1	4.1	6.9	0.2	1.5	
PR-10A	0.06	0.08	0.35	0.08	100	0.06	10.2	1	1.0%	1.7	0.0	10.2	4.1	6.9	0.0	0.1	
PR-10B	0.03	0.08	0.35	0.08	100	0.06	10.2	2	1.0%	1.7	0.0	10.2	4.1	6.9	0.0	0.1	
PR-10C	0.04	0.08	0.35	0.08	100	0.06	10.2	3	1.0%	1.7	0.0	10.2	4.1	6.9	0.0	0.1	
PR-10D	0.04	0.08	0.35	0.08	100	0.06	10.2	4	1.0%	1.7	0.0	10.2	4.1	6.9	0.0	0.1	
PR-10E	0.09	0.08	0.35	0.08	100	0.06	10.2	5	1.0%	1.7	0.0	10.2	4.1	6.9	0.0	0.2	
PR-10F	0.04	0.08	0.35	0.08	100	0.06	10.2	6	1.0%	1.7	0.1	10.3	4.1	6.9	0.0	0.1	
PR-10G	0.05	0.08	0.35	0.08	100	0.06	10.2	7	1.0%	1.7	0.1	10.3	4.1	6.9	0.0	0.1	
PR-10H	0.06	0.08	0.35	0.08	100	0.06	10.2	8	1.0%	1.7	0.1	10.3	4.1	6.9	0.0	0.1	
															Calc:	DLF	
															Date:	5/12/2025	
															Checked:	JS	

PLATTE SELF STORAGE SURFACE ROUTING SUMMARY

EXISTING

<i>Design Point(s)</i>	<i>Contributing Basins</i>	<i>Area (ac)</i>	<i>Flow (cfs)</i>	
			<i>Q₅</i>	<i>Q₁₀₀</i>
<i>Z</i>	OS-Z	6.34	6.1	16.7
<i>Y</i>	OS-Y	8.15	3.6	15.4
<i>X</i>	OS-X & DP D	2.25	0.7	4.2
<i>W</i>	OS-W & DP A	0.75	0.7	2.2
<i>A</i>	EX-A	0.30	0.2	0.8
<i>B</i>	EX-B & DP W	1.39	1.8	4.7
<i>C</i>	EX-C, DP D, DP X, & DP Y	26.85	33.6	86.5
<i>D</i>	EX-D	1.05	0.3	1.9
<i>E</i>	EX-E	0.16	0.1	0.5
<i>F</i>	EX-F	0.23	0.1	0.7
			Calc:	DLF
			Date:	5/12/2025
			Checked:	JS

PLATTE SELF STORAGE SURFACE ROUTING SUMMARY

PROPOSED

<i>Design Point(s)</i>	<i>Contributing Basins</i>	<i>Area (ac)</i>	<i>Flow (cfs)</i>	
			<i>Q₅</i>	<i>Q₁₀₀</i>
1	PR-1	0.10	0.0	0.2
2	PR-2	0.08	0.0	0.2
3A	PR-3A	1.10	5.0	8.9
3B	PR-3B & PR 3A FLOW BY	0.98	6.9	13.4
3C	PR-3C & PR 3B FLOW BY	1.10	8.6	17.7
3D	PR-3D & PR 3C FLOW BY	0.94	8.2	18.2
3E	PR-3E & PR 3D FLOW BY	1.01	8.8	20.2
4	PR-4 & DP Y	11.81	11.8	32.2
5	PR-5 & DP X	1.76	0.5	3.3
6	PR-6 & PR#1	7.74	44.3	104.5
7	PR-7	0.34	0.2	1.1
8	PR-8	0.30	0.2	1.0
9	PR-9	0.59	0.2	1.5
10A	PR-10A & OS-ZA	0.49	0.4	1.3
10B	PR-10B & OS-ZB	0.25	0.2	0.6
10C	PR-10C & OS-ZC	0.27	0.2	0.7
10D	PR-10D & OS-ZD	0.90	0.8	2.4
10E	PR-10E & OS-ZE	2.03	1.9	5.3
10F	PR-10F & OS-ZF	0.60	0.6	1.6
10G	PR-10G & OS-ZG	0.90	0.8	2.4
10H	PR-10H & OS-ZH	1.30	1.2	3.4
W	OS-W, DP 1 & DP 2	0.63	0.5	1.8
X	OS-X	1.20	0.4	2.3
Y	OS-Y	8.15	3.6	15.4
			Calc:	DLF
			Date:	5/12/2025
			Checked:	JS

PLATTE SELF STORAGE PIPE ROUTING SUMMARY

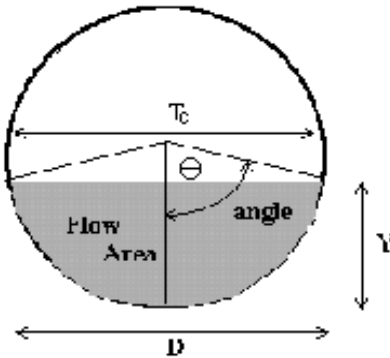
<i>Pipe Run</i>	<i>Inlet #</i>	<i>Contributing Flow Sources</i>	<i>5 Year Flow (cfs)</i>	<i>100 Year Flow (cfs)</i>	<i>Slope</i>	<i>Pipe Size & Type</i>	<i>Owner</i>
<i>PR#1</i>	<i>-</i>	PR#2	41.2	91.4	2.7%	48" RCP	PVT
<i>PR#2</i>	<i>-</i>	PR#3	41.2	91.4	2.2%	48" RCP	PVT
<i>PR#3</i>	<i>#1</i>	DP 3E & PR#4	41.2	91.4	2.2%	42" RCP	PVT
<i>PR#4</i>	<i>#2</i>	PR#5	32.4	71.2	1.7%	42" RCP	PVT
<i>PR#5</i>	<i>#3</i>	PR#6 & PR#11	32.4	71.2	2.1%	42" RCP	PVT
<i>PR#6</i>	<i>#4</i>	DP 3D & PR#7	20.6	39.0	5.0%	30" RCP	PVT
<i>PR#7</i>	<i>#5</i>	DP 3C & PR#8	16.5	32.7	1.9%	30" RCP	PVT
<i>PR#8</i>	<i>#6</i>	DP 3B & PR#9	12.5	26.7	1.9%	30" RCP	PVT
<i>PR#9</i>	<i>#7</i>	DP3A & PR#13	8.7	21.1	1.9%	24" RCP	PVT
<i>PR#10</i>	<i>#10</i>	PR#13	6.2	17.7	1.7%	24" RCP	PVT
<i>PR#11</i>	<i>#8</i>	PR#12	11.8	32.2	1.0%	36" RCP	PVT
<i>PR#12</i>	<i>#9</i>	DP 4	11.8	32.2	1.0%	36" RCP	PVT
<i>PR#13</i>	<i>#11</i>	DP 10E & PR#17 & 20	6.2	17.7	1.0%	24" RCP	PVT
<i>PR#14</i>	<i>#12</i>	DP 10A	0.4	1.3	1.0%	12" HDPE	PVT
<i>PR#15</i>	<i>#13</i>	DP 10B & PR#14	0.7	1.9	1.0%	15" HDPE	PVT
<i>PR#16</i>	<i>#14</i>	DP 10C & PR#15	0.9	2.6	1.0%	15" HDPE	PVT
<i>PR#17</i>	<i>#15</i>	DP 10D & PR#16	1.7	5.0	1.0%	18" HDPE	PVT
<i>PR#18</i>	<i>#16</i>	DP 10H	1.2	3.4	1.0%	12" HDPE	PVT
<i>PR#19</i>	<i>#17</i>	DP 10G & PR#18	2.0	5.8	1.0%	15" HDPE	PVT
<i>PR#20</i>	<i>#18</i>	DP 10F & PR#19	2.6	7.4	1.0%	15" HDPE	PVT
<i>PR#90</i>	<i>-</i>	Pond outlet	0.4	21.6	1.4%	18" HDPE	PVT
						Calc:	DLF
						Date:	5/12/2025
						Checked:	JS

HYDRAULIC CALCULATIONS

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

Project: **Humphrey Self Storage**

Pipe ID: **18" RCP Culvert (Basin OS-W)**



Design Information (Input)

Pipe Invert Slope	$S_o =$	0.0130	ft/ft
Pipe Manning's n-value	$n =$	0.0130	
Pipe Diameter	$D =$	18.00	inches
Design discharge	$Q =$	1.30	cfs

Full-flow Capacity (Calculated)

Full-flow area	$A_f =$	1.77	sq ft
Full-flow wetted perimeter	$P_f =$	4.71	ft
Half Central Angle	$\theta =$	3.14	radians
Full-flow capacity	$Q_f =$	12.01	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \theta < 3.14$)	$\theta =$	0.98	radians
Flow area	$A_n =$	0.29	sq ft
Top width	$T_n =$	1.25	ft
Wetted perimeter	$P_n =$	1.47	ft
Flow depth	$Y_n =$	0.33	ft
Flow velocity	$V_n =$	4.45	fps
Discharge	$Q_n =$	1.30	cfs
Percent Full Flow	$\text{Flow} =$	10.8%	of full flow
Normal Depth Froude Number	$Fr_n =$	1.62	supercritical

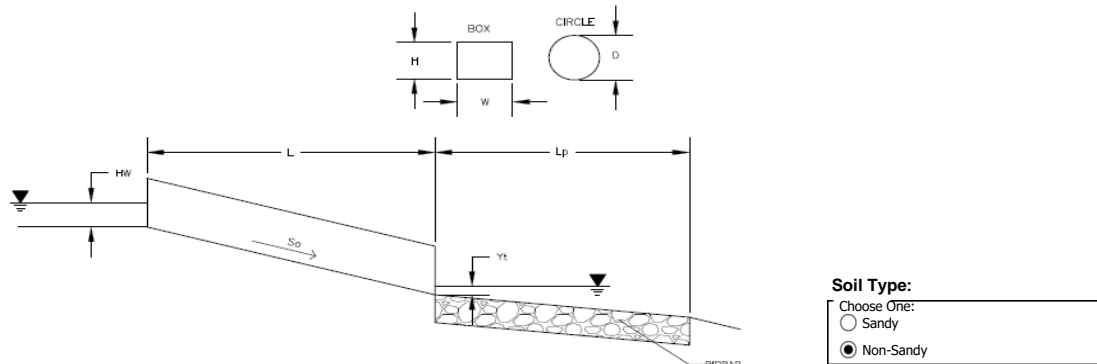
Calculation of Critical Flow Condition

Half Central Angle ($0 < \theta_c < 3.14$)	$\theta_c =$	1.13	radians
Critical flow area	$A_c =$	0.41	sq ft
Critical top width	$T_c =$	1.35	ft
Critical flow depth	$Y_c =$	0.43	ft
Critical flow velocity	$V_c =$	3.14	fps
Critical Depth Froude Number	$Fr_c =$	1.00	

Determination of Culvert Headwater and Outlet Protection

Project: **Humphrey Self Storage**

Basin ID: **18" RCP Culvert (Basin OS-W)**



Supercritical Flow! Using D_a to calculate protection type.

Design Information (Input):

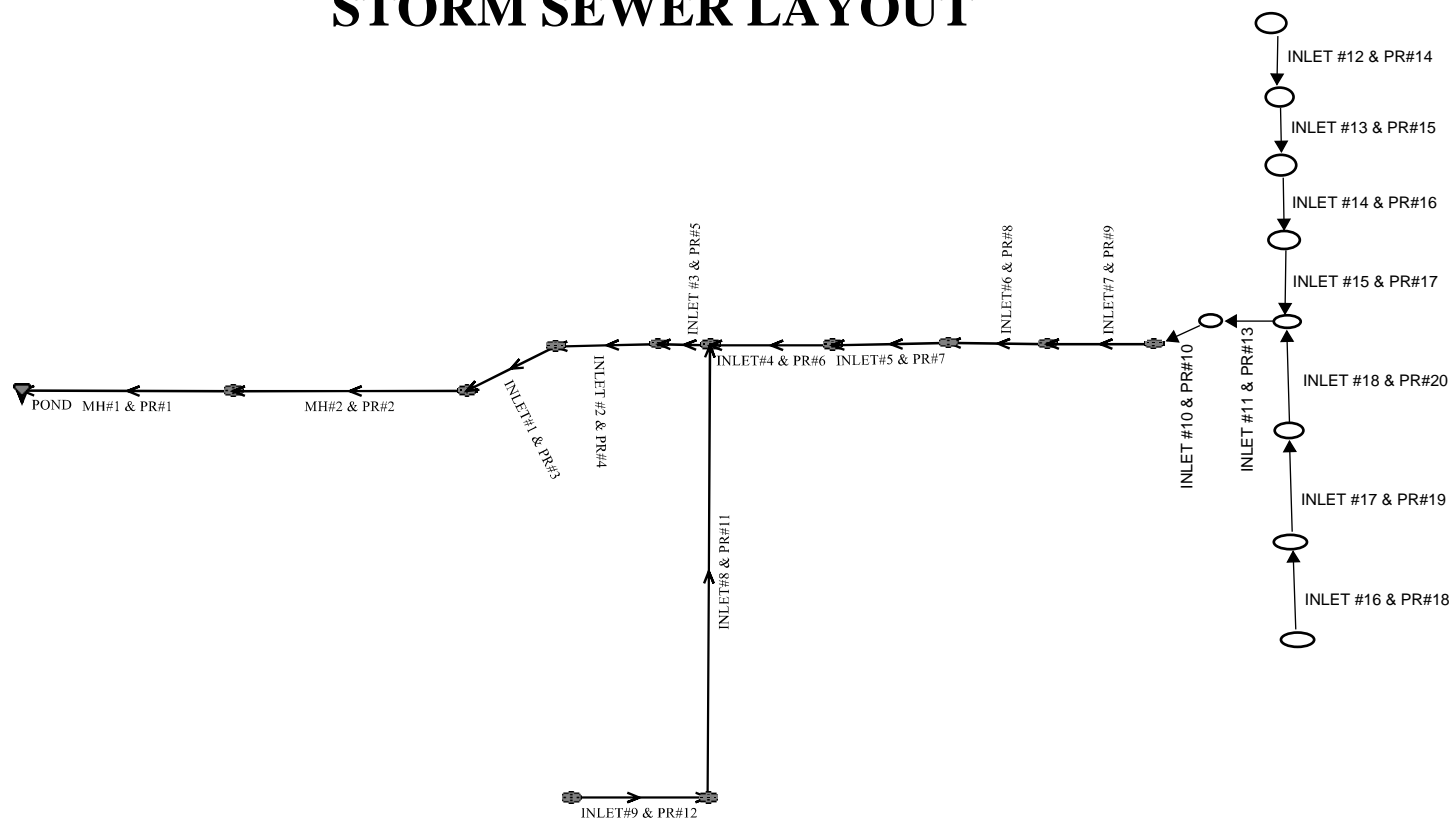
Design Discharge	Q =	<input type="text" value="1.3"/>	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	<input type="text" value="18"/>	inches
Inlet Edge Type (Choose from pull-down list)		Grooved End with Headwall	
Box Culvert:			
Barrel Height (Rise) in Feet	Height (Rise) =	<input type="text"/>	ft
Barrel Width (Span) in Feet	Width (Span) =	<input type="text"/>	ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	No =	<input type="text" value="1"/>	
Inlet Elevation	Elev IN =	<input type="text" value="6240"/>	ft
Outlet Elevation OR Slope	Elev OUT =	<input type="text" value="6239"/>	ft
Culvert Length	L =	<input type="text" value="46"/>	ft
Manning's Roughness	n =	<input type="text" value="0.013"/>	
Bend Loss Coefficient	k_b =	<input type="text" value="0"/>	
Exit Loss Coefficient	k_x =	<input type="text" value="1"/>	
Tailwater Surface Elevation	Elev Y_t =	<input type="text"/>	ft
Max Allowable Channel Velocity	V =	<input type="text" value="7"/>	ft/s

Required Protection (Output):

Tailwater Surface Height	Y_t =	<input type="text" value="0.60"/>	ft
Flow Area at Max Channel Velocity	A_t =	<input type="text" value="0.19"/>	ft ²
Culvert Cross Sectional Area Available	A =	<input type="text" value="1.77"/>	ft ²
Entrance Loss Coefficient	k_e =	<input type="text" value="0.20"/>	
Friction Loss Coefficient	k_f =	<input type="text" value="0.83"/>	
Sum of All Losses Coefficients	k_s =	<input type="text" value="2.03"/>	
Culvert Normal Depth	Y_n =	<input type="text" value="0.29"/>	ft
Culvert Critical Depth	Y_c =	<input type="text" value="0.43"/>	ft
Tailwater Depth for Design	d =	<input type="text" value="0.96"/>	ft
Adjusted Diameter OR Adjusted Rise	D_a =	<input type="text" value="0.90"/>	ft
Expansion Factor	$1/(2*\tan(\Theta))$ =	<input type="text" value="6.70"/>	
Flow/Diameter ^{2.5} OR Flow/(Span * Rise ^{1.5})	$Q/D^{2.5}$ =	<input type="text" value="0.47"/>	ft ^{0.5} /s
Froude Number	Fr =	<input type="text" value="2.08"/>	
Tailwater/Adjusted Diameter OR Tailwater/Adjusted Rise	Y_t/D =	<input type="text" value="0.67"/>	
Inlet Control Headwater	HW_i =	<input type="text" value="0.57"/>	ft
Outlet Control Headwater	HW_o =	<input type="text" value="-0.02"/>	ft
Design Headwater Elevation	HW =	<input type="text" value="6,240.57"/>	ft
Headwater/Diameter OR Headwater/Rise Ratio	HW/D =	<input type="text" value="0.38"/>	
Minimum Theoretical Riprap Size	d_{50} =	<input type="text" value="1"/>	in
Nominal Riprap Size	d_{50} =	<input type="text" value="6"/>	in
UDFCD Riprap Type	Type =	<input type="text" value="VL"/>	
Length of Protection	L_p =	<input type="text" value="5"/>	ft
Width of Protection	T =	<input type="text" value="3"/>	ft

The flow for this culvert is very small, so keeping the froude number below 0.9 would not be realistic. Also, this flow is inside a concrete pipe.

STORM SEWER LAYOUT



Program: UDSEWER Math Model Interface 2.1.1.4 Run Date: 5/14/2025 9:25:11 AM	UDSewer Results Summary Project Title: 6001 E Platte Storage - 5 Year Project Description: East System
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System Input Summary

Rainfall Parameters

Rainfall Return Period: 5
Rainfall Calculation Method: Formula

One Hour Depth (in): 1.50
Rainfall Constant "A": 28.5
Rainfall Constant "B": 10
Rainfall Constant "C": 0.786

Rational Method Constraints

Minimum Urban Runoff Coeff.: 0.20
Maximum Rural Overland Len. (ft): 300
Maximum Urban Overland Len. (ft): 100
Used UDFCD Tc. Maximum: Yes

Sizer Constraints

Minimum Sewer Size (in): 6.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.0
Minimum Flow Velocity (fps): 3.0

Backwater Calculations:

Tailwater Elevation (ft): 6208.12

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)
POND	6211.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MH#1 & PR#1	6217.90	41.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH#2 & PR#2	6223.50	41.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#1 & PR#3	6228.50	41.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #2 & PR#4	6229.00	32.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #3 & PR#5	6229.40	32.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#8 & PR#11	6232.45	11.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#9 & PR#12	6231.85	11.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#4 & PR#6	6230.60	20.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#5 & PR#7	6231.90	16.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#6 & PR#8	6233.10	12.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#7 & PR#9	6234.30	8.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#10 & PR#10	6234.85	6.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #11 & PR#13	6240.75	6.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #18 & PR#20	6241.75	2.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #17 & PR#19	6242.25	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #16 & PR#18	6242.75	1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #15 & PR#17	6241.75	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #14 & PR#16	6242.25	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #13 & PR#15	6242.75	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #12 & PR#14	6243.25	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					Total Design Flow				
Element Name	Overland Time (min)	Gutter Time (min)	Basin Tc (min)	Intensity (in/hr)	Local Contrib (cfs)	Coeff. Area	Intensity (in/hr)	Manhole Tc (min)	Peak Flow (cfs)	Comment
POND	0.00	0.00	0.00	0.00	0.00	5.96	6.92	0.15	41.20	
MH#1 & PR#1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.20	
MH#2 & PR#2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.20	
INLET#1 & PR#3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.20	
INLET #2 & PR#4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.40	
INLET #3 & PR#5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.40	
INLET#8 & PR#11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.80	
INLET#9 & PR#12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.80	
INLET#4 & PR#6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.60	
INLET#5 & PR#7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.50	
INLET#6 & PR#8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.50	
INLET#7 & PR#9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.70	
INLET#10 & PR#10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.20	
INLET #11 & PR#13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.20	
INLET #18 & PR#20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	
INLET #17 & PR#19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	
INLET #16 & PR#18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	
INLET #15 & PR#17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.70	
INLET #14 & PR#16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90	
INLET #13 & PR#15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	
INLET #12 & PR#14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	

Sewer Input Summary:

	Elevation				Loss Coefficients			Given Dimensions		
Element Name	Sewer Length (ft)	Downstream Invert (ft)	Slope (%)	Upstream Invert (ft)	Mannings n	Bend Loss	Lateral Loss	Cross Section	Rise (ft or in)	Span (ft or in)
MH#1 & PR#1	29.50	6205.00	2.7	6205.80	0.013	0.03	0.00	CIRCULAR	48.00 in	48.00 in
MH#2 & PR#2	222.50	6211.00	2.2	6216.00	0.013	0.05	0.00	CIRCULAR	48.00 in	48.00 in
INLET#1 & PR#3	45.00	6216.80	2.2	6217.80	0.013	0.24	0.00	CIRCULAR	42.00 in	42.00 in
INLET #2 & PR#4	24.00	6220.50	1.7	6220.90	0.013	0.24	0.00	CIRCULAR	42.00 in	42.00 in
INLET #3 & PR#5	7.00	6222.00	2.1	6222.15	0.013	0.05	0.00	CIRCULAR	42.00 in	42.00 in
INLET#8 & PR#11	352.00	6222.75	1.0	6226.25	0.013	1.00	0.25	CIRCULAR	36.00 in	36.00 in
INLET#9 & PR#12	31.00	6226.55	1.0	6226.85	0.013	1.00	0.00	CIRCULAR	36.00 in	36.00 in
INLET#4 & PR#6	47.00	6223.15	5.0	6225.50	0.013	0.05	0.00	CIRCULAR	30.00 in	30.00 in
INLET#5 & PR#7	57.00	6225.60	1.9	6226.70	0.013	0.05	0.00	CIRCULAR	30.00 in	30.00 in
INLET#6 & PR#8	62.00	6226.80	1.9	6228.00	0.013	0.05	0.00	CIRCULAR	30.00 in	30.00 in
INLET#7 & PR#9	57.00	6228.60	1.9	6229.70	0.013	0.05	0.00	CIRCULAR	24.00 in	24.00 in
INLET#10 & PR#10	24.00	6230.00	1.7	6230.40	0.013	0.11	0.00	CIRCULAR	24.00 in	24.00 in

INLET #11 & PR#13	32.00	6230.70	1.9	6231.30	0.013	0.11	0.00	CIRCULAR	24.00 in	24.00 in
INLET #18 & PR#20	98.00	6236.70	1.0	6237.70	0.012	1.00	0.00	CIRCULAR	15.00 in	15.00 in
INLET #17 & PR#19	74.00	6237.85	1.0	6238.60	0.012	0.05	0.00	CIRCULAR	15.00 in	15.00 in
INLET #16 & PR#18	74.00	6238.75	1.0	6239.50	0.012	0.05	0.00	CIRCULAR	12.00 in	12.00 in
INLET #15 & PR#17	98.00	6236.30	1.0	6237.30	0.012	1.00	0.00	CIRCULAR	18.00 in	18.00 in
INLET #14 & PR#16	74.00	6237.45	1.0	6238.20	0.012	0.05	0.00	CIRCULAR	15.00 in	15.00 in
INLET #13 & PR#15	74.00	6238.35	1.0	6239.10	0.012	0.05	0.00	CIRCULAR	15.00 in	15.00 in
INLET #12 & PR#14	74.00	6239.25	1.0	6240.00	0.012	0.05	0.00	CIRCULAR	12.00 in	12.00 in

Sewer Flow Summary:

	Full Flow Capacity		Critical Flow		Normal Flow						
Element Name	Flow (cfs)	Velocity (fps)	Depth (in)	Velocity (fps)	Depth (in)	Velocity (fps)	Froude Number	Flow Condition	Flow (cfs)	Surcharged Length (ft)	Comment
MH#1 & PR#1	236.67	18.83	23.00	6.92	13.55	14.14	2.77	Supercritical	41.20	0.00	
MH#2 & PR#2	215.91	17.18	23.00	6.92	14.21	13.24	2.53	Supercritical	41.20	0.00	
INLET#1 & PR#3	150.38	15.63	23.97	7.26	15.02	13.33	2.45	Supercritical	41.20	0.00	
INLET #2 & PR#4	130.22	13.53	21.14	6.68	14.28	11.24	2.12	Supercritical	32.40	0.00	
INLET #3 & PR#5	147.63	15.34	21.14	6.68	13.37	12.30	2.41	Supercritical	32.40	0.00	
INLET#8 & PR#11	66.69	9.43	13.08	5.09	10.25	7.11	1.60	Supercritical	11.80	0.00	
INLET#9 & PR#12	65.82	9.31	13.08	5.09	10.32	7.05	1.58	Supercritical	11.80	0.00	
INLET#4 & PR#6	91.97	18.74	18.50	6.49	9.65	15.10	3.48	Supercritical	20.60	0.00	
INLET#5 & PR#7	57.14	11.64	16.47	5.98	11.04	10.07	2.15	Supercritical	16.50	0.00	
INLET#6 & PR#8	57.22	11.66	14.24	5.44	9.53	9.33	2.17	Supercritical	12.50	0.00	
INLET#7 & PR#9	31.51	10.03	12.62	5.20	8.62	8.57	2.08	Supercritical	8.70	0.00	
INLET#10 & PR#10	29.28	9.32	10.57	4.65	7.50	7.40	1.94	Supercritical	6.20	0.00	

INLET #11 & PR#13	31.05	9.88	10.57	4.65	7.27	7.71	2.06	Supercritical	6.20	0.00	
INLET #18 & PR#20	7.09	5.78	7.75	4.06	6.29	5.33	1.49	Supercritical	2.60	0.00	
INLET #17 & PR#19	7.06	5.76	6.76	3.73	5.46	4.95	1.51	Supercritical	2.00	0.00	
INLET #16 & PR#18	3.90	4.96	5.54	3.38	4.57	4.37	1.45	Supercritical	1.20	0.00	
INLET #15 & PR#17	11.53	6.52	5.88	3.39	4.67	4.67	1.56	Supercritical	1.70	0.00	
INLET #14 & PR#16	7.06	5.76	4.47	2.94	3.62	3.95	1.51	Supercritical	0.90	0.00	
INLET #13 & PR#15	7.06	5.76	3.92	2.74	3.19	3.67	1.50	Supercritical	0.70	0.00	
INLET #12 & PR#14	3.90	4.96	3.14	2.45	2.60	3.20	1.45	Supercritical	0.40	0.00	

- A Froude number of 0 indicates that pressurized flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	Peak Flow (cfs)	Cross Section	Rise	Span	Rise	Span	Rise	Span	Area (ft ²)	Comment
MH#1 & PR#1	41.20	CIRCULAR	48.00 in	48.00 in	27.00 in	27.00 in	48.00 in	48.00 in	12.57	
MH#2 & PR#2	41.20	CIRCULAR	48.00 in	48.00 in	27.00 in	27.00 in	48.00 in	48.00 in	12.57	
INLET#1 & PR#3	41.20	CIRCULAR	42.00 in	42.00 in	27.00 in	27.00 in	42.00 in	42.00 in	9.62	
INLET #2 & PR#4	32.40	CIRCULAR	42.00 in	42.00 in	27.00 in	27.00 in	42.00 in	42.00 in	9.62	
INLET #3 & PR#5	32.40	CIRCULAR	42.00 in	42.00 in	24.00 in	24.00 in	42.00 in	42.00 in	9.62	
INLET#8 & PR#11	11.80	CIRCULAR	36.00 in	36.00 in	21.00 in	21.00 in	36.00 in	36.00 in	7.07	
INLET#9 & PR#12	11.80	CIRCULAR	36.00 in	36.00 in	21.00 in	21.00 in	36.00 in	36.00 in	7.07	
INLET#4 & PR#6	20.60	CIRCULAR	30.00 in	30.00 in	18.00 in	18.00 in	30.00 in	30.00 in	4.91	
INLET#5 & PR#7	16.50	CIRCULAR	30.00 in	30.00 in	21.00 in	21.00 in	30.00 in	30.00 in	4.91	
INLET#6 & PR#8	12.50	CIRCULAR	30.00 in	30.00 in	18.00 in	18.00 in	30.00 in	30.00 in	4.91	
INLET#7 & PR#9	8.70	CIRCULAR	24.00 in	24.00 in	15.00 in	15.00 in	24.00 in	24.00 in	3.14	
INLET#10 & PR#10	6.20	CIRCULAR	24.00 in	24.00 in	15.00 in	15.00 in	24.00 in	24.00 in	3.14	
INLET #11 & PR#13	6.20	CIRCULAR	24.00 in	24.00 in	15.00 in	15.00 in	24.00 in	24.00 in	3.14	
INLET #18 & PR#20	2.60	CIRCULAR	15.00 in	15.00 in	12.00 in	12.00 in	15.00 in	15.00 in	1.23	
INLET #17 & PR#19	2.00	CIRCULAR	15.00 in	15.00 in	12.00 in	12.00 in	15.00 in	15.00 in	1.23	
INLET #16 & PR#18	1.20	CIRCULAR	12.00 in	12.00 in	9.00 in	9.00 in	12.00 in	12.00 in	0.79	
INLET #15 & PR#17	1.70	CIRCULAR	18.00 in	18.00 in	9.00 in	9.00 in	18.00 in	18.00 in	1.77	
INLET #14 & PR#16	0.90	CIRCULAR	15.00 in	15.00 in	9.00 in	9.00 in	15.00 in	15.00 in	1.23	
INLET #13 & PR#15	0.70	CIRCULAR	15.00 in	15.00 in	9.00 in	9.00 in	15.00 in	15.00 in	1.23	

INLET #12 & PR#14	0.40	CIRCULAR	12.00 in	12.00 in	6.00 in	6.00 in	12.00 in	12.00 in	0.79	
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- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.
- All hydraulics were calculated using the 'Used' parameters.

Grade Line Summary:

Tailwater Elevation (ft): 6208.12

Element Name	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
	Downstream (ft)	Upstream (ft)	Bend Loss (ft)	Lateral Loss (ft)	Downstream (ft)	Upstream (ft)	Downstream (ft)	Friction Loss (ft)	Upstream (ft)
MH#1 & PR#1	6205.00	6205.80	0.00	0.00	6208.12	6209.01	6209.24	0.00	6209.24
MH#2 & PR#2	6211.00	6216.00	0.01	0.00	6212.18	6217.92	6214.91	3.76	6218.66
INLET#1 & PR#3	6216.80	6217.80	0.07	0.00	6218.23	6219.80	6220.16	0.46	6220.62
INLET #2 & PR#4	6220.50	6220.90	0.04	0.00	6221.89	6222.66	6223.18	0.18	6223.35
INLET #3 & PR#5	6222.00	6222.15	0.01	0.00	6223.11	6225.26	6225.46	0.00	6225.46
INLET#8 & PR#11	6222.75	6226.25	0.04	0.17	6225.63	6227.34	6225.67	2.07	6227.74
INLET#9 & PR#12	6226.55	6226.85	0.04	0.00	6227.41	6227.94	6228.18	0.16	6228.34
INLET#4 & PR#6	6223.15	6225.50	0.01	0.00	6225.28	6227.04	6227.50	0.20	6227.69
INLET#5 & PR#7	6225.60	6226.70	0.01	0.00	6227.05	6228.07	6228.09	0.53	6228.63
INLET#6 & PR#8	6226.80	6228.00	0.01	0.00	6228.08	6229.19	6228.95	0.70	6229.65
INLET#7 & PR#9	6228.60	6229.70	0.01	0.00	6229.32	6230.75	6230.46	0.71	6231.17
INLET#10 & PR#10	6230.00	6230.40	0.01	0.00	6230.76	6231.28	6231.47	0.14	6231.62
INLET #11 & PR#13	6230.70	6231.30	0.01	0.00	6231.31	6232.18	6232.23	0.29	6232.52
INLET #18 & PR#20	6236.70	6237.70	0.07	0.00	6237.22	6238.35	6237.67	0.94	6238.60
INLET #17 & PR#19	6237.85	6238.60	0.00	0.00	6238.35	6239.16	6238.69	0.69	6239.38
INLET #16 & PR#18	6238.75	6239.50	0.00	0.00	6239.17	6239.96	6239.43	0.71	6240.14

INLET #15 & PR#17	6236.30	6237.30	0.01	0.00	6236.69	6237.79	6237.03	0.94	6237.97
INLET #14 & PR#16	6237.45	6238.20	0.00	0.00	6237.79	6238.57	6237.99	0.71	6238.71
INLET #13 & PR#15	6238.35	6239.10	0.00	0.00	6238.62	6239.43	6238.83	0.72	6239.54
INLET #12 & PR#14	6239.25	6240.00	0.00	0.00	6239.47	6240.26	6239.63	0.73	6240.35

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * $V_{fi}^2 / (2 * g)$
- Lateral loss = $V_{fo}^2 / (2 * g)$ - Junction Loss K * $V_{fi}^2 / (2 * g)$.
- Friction loss is always Upstream EGL - Downstream EGL.

Excavation Estimate:

The trench side slope is 1.0 ft/ft

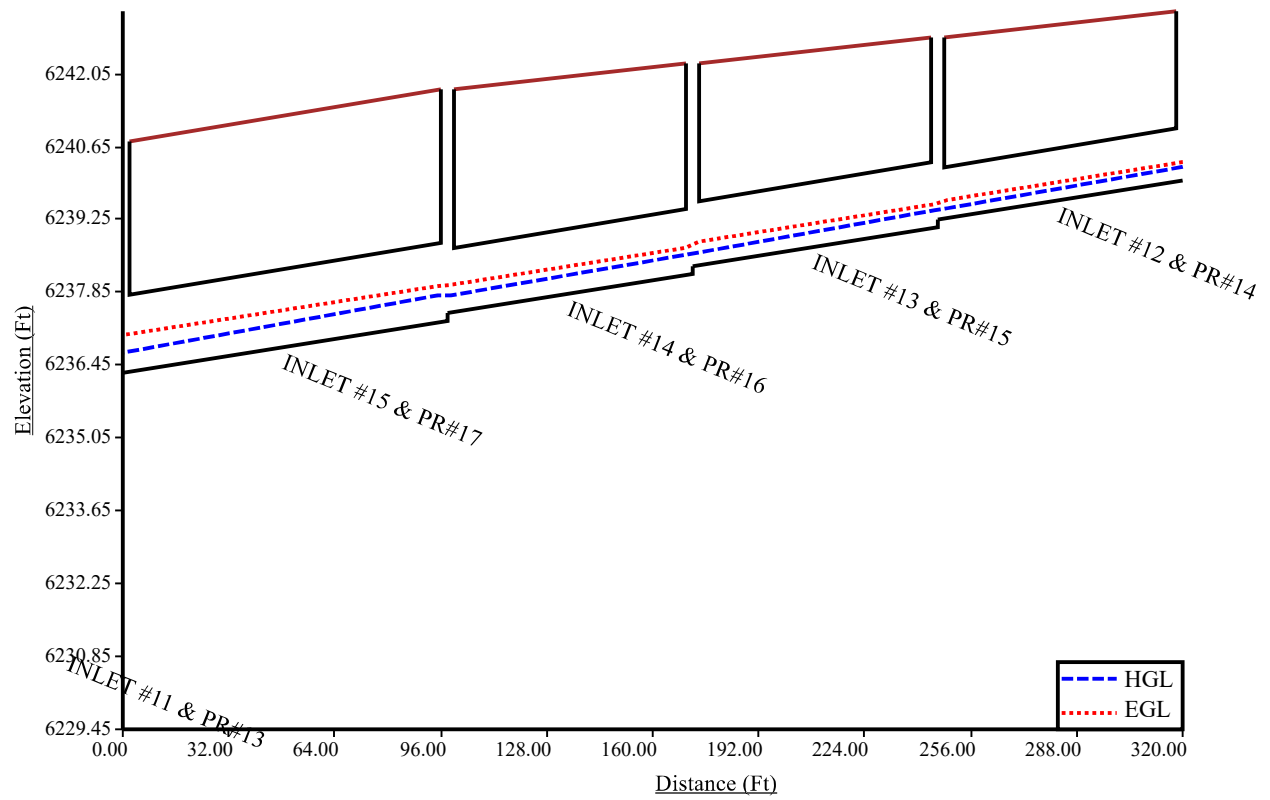
The minimum trench width is 1.00 ft

Element Name	Length (ft)	Wall (in)	Bedding (in)	Bottom Width (ft)	Downstream			Upstream			Volume (cu. yd)	Comment
					Top Width (ft)	Trench Depth (ft)	Cover (ft)	Top Width (ft)	Trench Depth (ft)	Cover (ft)		
MH#1 & PR#1	29.50	5.00	6.00	7.83	8.99	6.91	1.58	21.20	13.02	7.68	109.87	
MH#2 & PR#2	222.50	5.00	6.00	7.83	10.80	7.82	2.48	12.00	8.42	3.08	550.90	
INLET#1 & PR#3	45.00	4.50	6.00	7.25	10.90	7.58	2.83	18.90	11.58	6.83	146.75	
INLET #2 & PR#4	24.00	4.50	6.00	7.25	13.50	8.87	4.12	13.70	8.98	4.23	66.48	
INLET #3 & PR#5	7.00	4.50	6.00	7.25	11.50	7.87	3.12	12.00	8.13	3.38	16.35	
INLET#8 & PR#11	352.00	4.00	6.00	6.67	11.30	7.48	3.32	10.40	7.03	2.87	688.55	
INLET#9 & PR#12	31.00	4.00	6.00	6.67	9.80	6.73	2.57	8.00	5.83	1.67	49.76	
INLET#4 & PR#6	47.00	3.50	6.00	6.08	11.00	7.04	3.46	8.70	5.89	2.31	75.23	
INLET#5 & PR#7	57.00	3.50	6.00	6.08	8.50	5.79	2.21	8.90	5.99	2.41	79.30	
INLET#6 & PR#8	62.00	3.50	6.00	6.08	8.70	5.89	2.31	8.70	5.89	2.31	86.23	
INLET#7 & PR#9	57.00	3.00	4.00	5.50	8.00	5.08	2.25	8.20	5.18	2.35	63.18	
INLET#10 & PR#10	24.00	3.00	4.00	5.50	7.60	4.88	2.05	7.90	5.03	2.20	25.37	
INLET #11 & PR#13	32.00	3.00	4.00	5.50	7.30	4.73	1.90	17.90	10.03	7.20	71.39	
INLET #18 & PR#20	98.00	2.25	4.00	4.63	7.85	4.57	2.61	7.85	4.57	2.61	86.17	
INLET #17 & PR#19	74.00	2.25	4.00	4.63	7.55	4.42	2.46	7.05	4.17	2.21	59.40	
INLET #16 & PR#18	74.00	2.00	4.00	4.33	7.00	4.00	2.33	6.50	3.75	2.08	50.07	
INLET #15 & PR#17	98.00	2.50	4.00	4.92	8.40	4.99	2.74	8.40	4.99	2.74	100.09	
INLET #14 & PR#16	74.00	2.25	4.00	4.63	8.35	4.82	2.86	7.85	4.57	2.61	67.84	
INLET #13 & PR#15	74.00	2.25	4.00	4.63	7.55	4.42	2.46	7.05	4.17	2.21	59.40	
INLET #12 & PR#14	74.00	2.00	4.00	4.33	7.00	4.00	2.33	6.50	3.75	2.08	50.07	

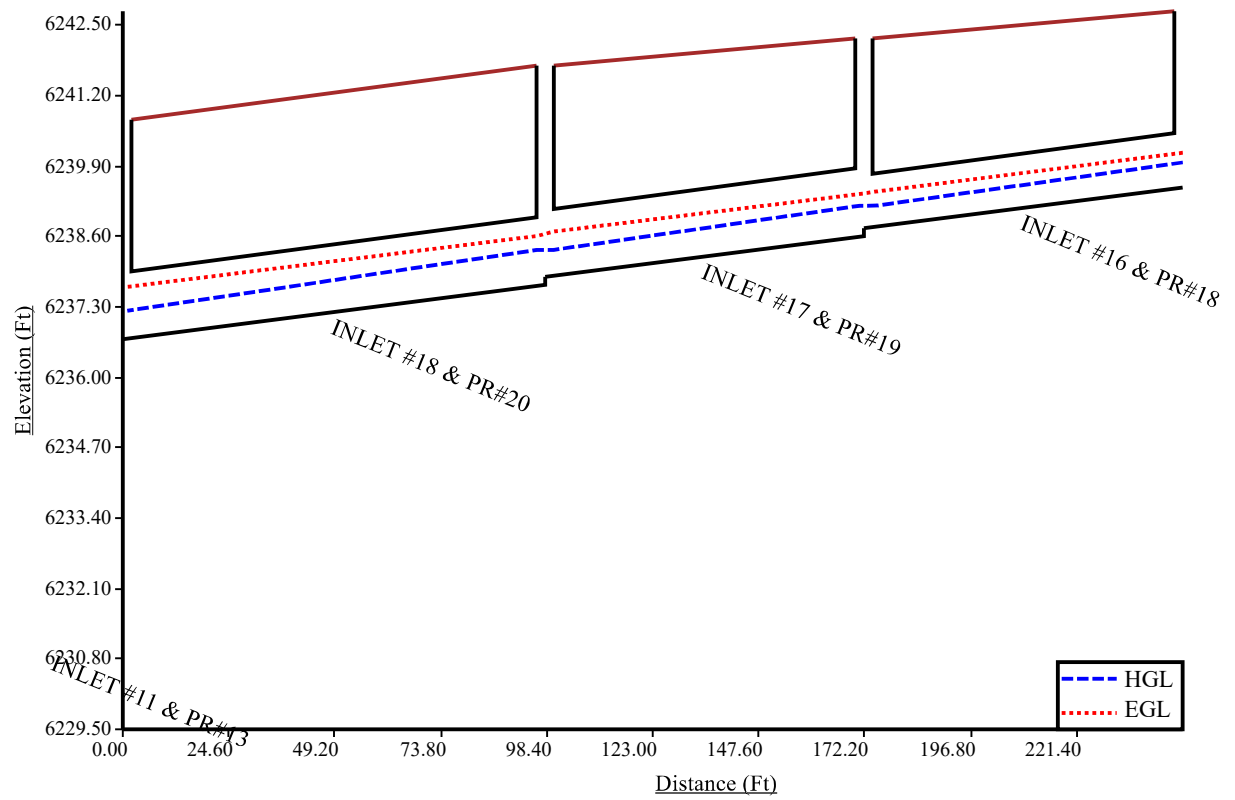
Total earth volume for sewer trenches = 2502 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: $(\text{equivalent diameter in inches}/12)+1$ inches
- The sewer bedding thickness is equal to:
 - Four inches for pipes less than 33 inches.
 - Six inches for pipes less than 60 inches.
 - Eight inches for all larger sizes.

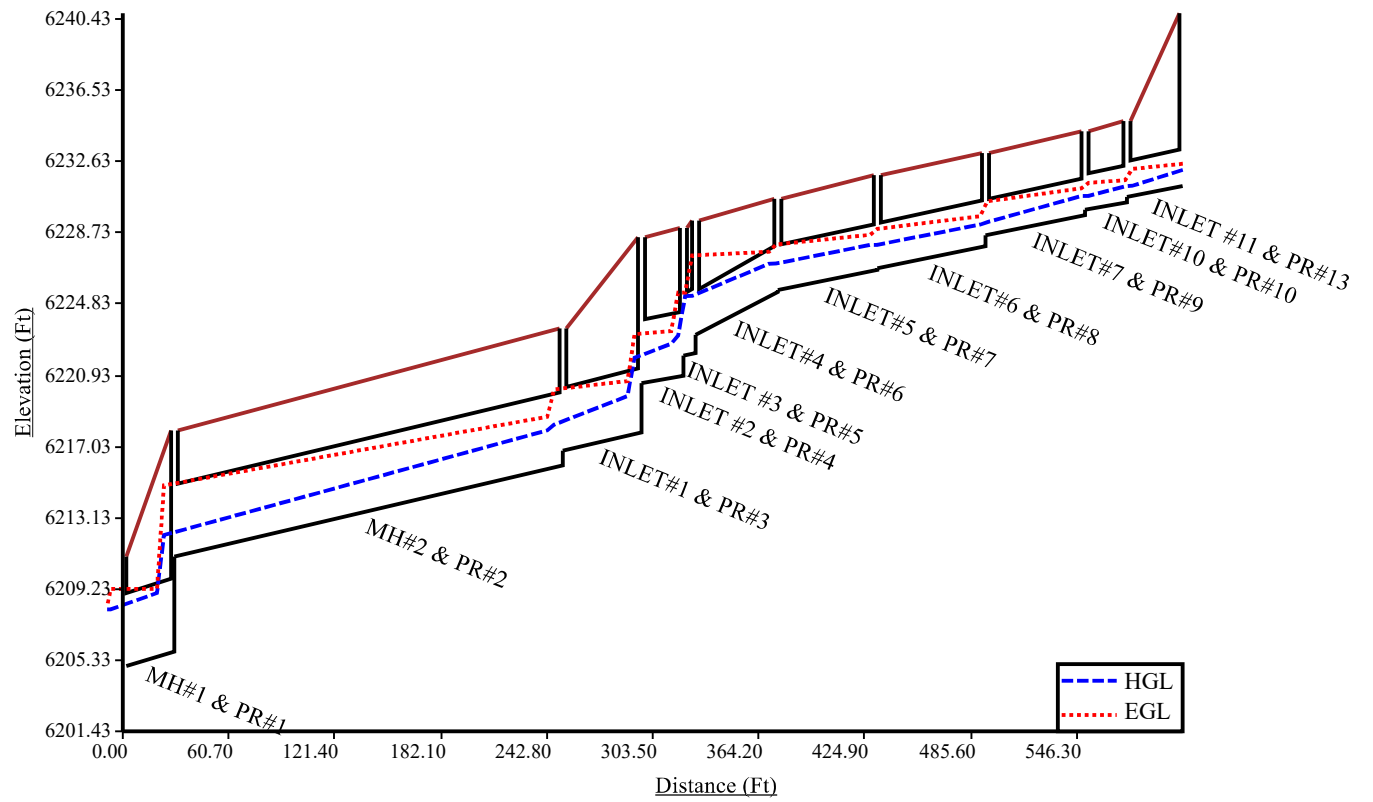
PR 14-13



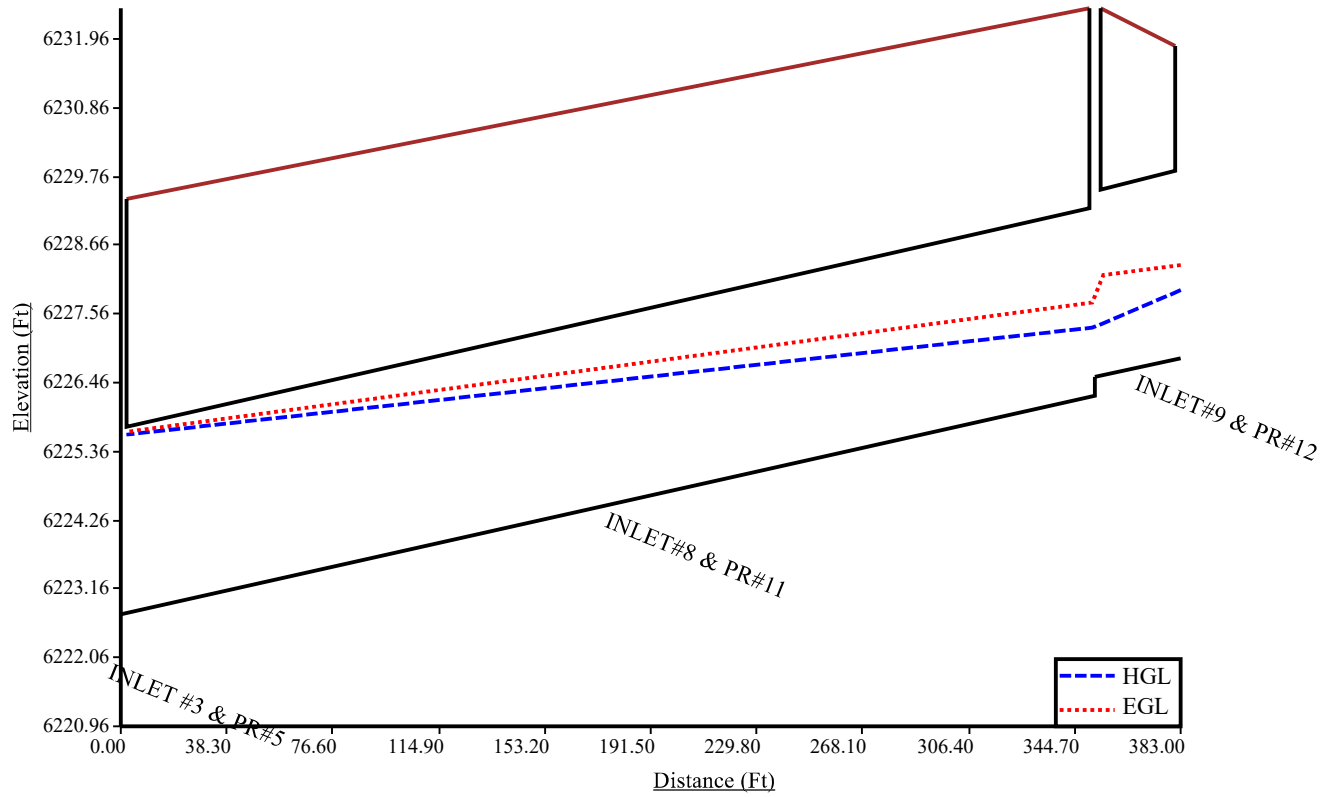
PR 18-13



PR 13-Pond



PR 11-12



Program: UDSEWER Math Model Interface 2.1.1.4 Run Date: 5/14/2025 8:48:53 AM	UDSewer Results Summary Project Title: 6001 E Platte Storage - 100 Year Project Description: East System
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System Input Summary

Rainfall Parameters

Rainfall Return Period: 100
Rainfall Calculation Method: Formula

One Hour Depth (in): 2.52
Rainfall Constant "A": 28.5
Rainfall Constant "B": 10
Rainfall Constant "C": 0.786

Rational Method Constraints

Minimum Urban Runoff Coeff.: 0.20
Maximum Rural Overland Len. (ft): 300
Maximum Urban Overland Len. (ft): 100
Used UDFCD Tc. Maximum: Yes

Sizer Constraints

Minimum Sewer Size (in): 6.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.0
Minimum Flow Velocity (fps): 3.0

Backwater Calculations:

Tailwater Elevation (ft): 6210.54

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)
POND	6211.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MH#1 & PR#1	6217.90	91.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH#2 & PR#2	6223.50	91.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#1 & PR#3	6228.50	91.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #2 & PR#4	6229.00	71.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #3 & PR#5	6229.40	71.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#8 & PR#11	6232.45	32.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#9 & PR#12	6231.85	32.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#4 & PR#6	6230.60	39.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#5 & PR#7	6231.90	32.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#6 & PR#8	6233.10	26.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#7 & PR#9	6234.30	21.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#10 & PR#10	6234.85	17.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #11 & PR#13	6240.75	17.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #18 & PR#20	6241.75	7.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #17 & PR#19	6242.25	5.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #16 & PR#18	6242.75	3.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #15 & PR#17	6241.75	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #14 & PR#16	6242.25	2.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #13 & PR#15	6242.75	1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #12 & PR#14	6243.25	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					Total Design Flow				
Element Name	Overland Time (min)	Gutter Time (min)	Basin Tc (min)	Intensity (in/hr)	Local Contrib (cfs)	Coeff. Area	Intensity (in/hr)	Manhole Tc (min)	Peak Flow (cfs)	Comment
POND	0.00	0.00	0.00	0.00	0.00	7.82	11.69	0.07	91.40	
MH#1 & PR#1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.40	
MH#2 & PR#2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.40	
INLET#1 & PR#3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.40	
INLET #2 & PR#4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71.20	
INLET #3 & PR#5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71.20	
INLET#8 & PR#11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.20	
INLET#9 & PR#12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.20	
INLET#4 & PR#6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.00	
INLET#5 & PR#7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.70	
INLET#6 & PR#8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.70	
INLET#7 & PR#9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.10	
INLET#10 & PR#10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.70	
INLET #11 & PR#13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.70	
INLET #18 & PR#20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40	
INLET #17 & PR#19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.80	
INLET #16 & PR#18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.40	
INLET #15 & PR#17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	
INLET #14 & PR#16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	
INLET #13 & PR#15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.90	
INLET #12 & PR#14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	

Sewer Input Summary:

	Elevation				Loss Coefficients			Given Dimensions		
Element Name	Sewer Length (ft)	Downstream Invert (ft)	Slope (%)	Upstream Invert (ft)	Mannings n	Bend Loss	Lateral Loss	Cross Section	Rise (ft or in)	Span (ft or in)
MH#1 & PR#1	29.50	6205.00	2.7	6205.80	0.013	0.03	0.00	CIRCULAR	48.00 in	48.00 in
MH#2 & PR#2	222.50	6211.00	2.2	6216.00	0.013	0.05	0.00	CIRCULAR	48.00 in	48.00 in
INLET#1 & PR#3	45.00	6216.80	2.2	6217.80	0.013	0.24	0.00	CIRCULAR	42.00 in	42.00 in
INLET #2 & PR#4	24.00	6220.50	1.7	6220.90	0.013	0.24	0.00	CIRCULAR	42.00 in	42.00 in
INLET #3 & PR#5	7.00	6222.00	2.1	6222.15	0.013	0.05	0.00	CIRCULAR	42.00 in	42.00 in
INLET#8 & PR#11	352.00	6222.75	1.0	6226.25	0.013	1.00	0.25	CIRCULAR	36.00 in	36.00 in
INLET#9 & PR#12	31.00	6226.55	1.0	6226.85	0.013	1.00	0.00	CIRCULAR	36.00 in	36.00 in
INLET#4 & PR#6	47.00	6223.15	5.0	6225.50	0.013	0.05	0.00	CIRCULAR	30.00 in	30.00 in
INLET#5 & PR#7	57.00	6225.60	1.9	6226.70	0.013	0.05	0.00	CIRCULAR	30.00 in	30.00 in
INLET#6 & PR#8	62.00	6226.80	1.9	6228.00	0.013	0.05	0.00	CIRCULAR	30.00 in	30.00 in
INLET#7 & PR#9	57.00	6228.60	1.9	6229.70	0.013	0.05	0.00	CIRCULAR	24.00 in	24.00 in
INLET#10 & PR#10	24.00	6230.00	1.7	6230.40	0.013	0.11	0.00	CIRCULAR	24.00 in	24.00 in

INLET #11 & PR#13	32.00	6230.70	1.9	6231.30	0.013	0.11	0.00	CIRCULAR	24.00 in	24.00 in
INLET #18 & PR#20	98.00	6236.70	1.0	6237.70	0.012	1.00	0.00	CIRCULAR	15.00 in	15.00 in
INLET #17 & PR#19	74.00	6237.85	1.0	6238.60	0.012	0.05	0.00	CIRCULAR	15.00 in	15.00 in
INLET #16 & PR#18	74.00	6238.75	1.0	6239.50	0.012	0.05	0.00	CIRCULAR	12.00 in	12.00 in
INLET #15 & PR#17	98.00	6236.30	1.0	6237.30	0.012	1.00	0.00	CIRCULAR	18.00 in	18.00 in
INLET #14 & PR#16	74.00	6237.45	1.0	6238.20	0.012	0.05	0.00	CIRCULAR	15.00 in	15.00 in
INLET #13 & PR#15	74.00	6238.35	1.0	6239.10	0.012	0.05	0.00	CIRCULAR	15.00 in	15.00 in
INLET #12 & PR#14	74.00	6239.25	1.0	6240.00	0.012	0.05	0.00	CIRCULAR	12.00 in	12.00 in

Sewer Flow Summary:

Element Name	Full Flow Capacity		Critical Flow		Normal Flow						
	Flow (cfs)	Velocity (fps)	Depth (in)	Velocity (fps)	Depth (in)	Velocity (fps)	Froude Number	Flow Condition	Flow (cfs)	Surcharged Length (ft)	Comment
MH#1 & PR#1	236.67	18.83	34.78	9.37	20.70	17.62	2.71	Pressurized	91.40	29.50	
MH#2 & PR#2	215.91	17.18	34.78	9.37	21.80	16.47	2.46	Supercritical	91.40	0.00	
INLET#1 & PR#3	150.38	15.63	35.55	10.52	23.64	16.39	2.28	Supercritical	91.40	0.00	
INLET #2 & PR#4	130.22	13.53	31.72	9.13	22.15	13.84	2.01	Supercritical	71.20	0.00	
INLET #3 & PR#5	147.63	15.34	31.72	9.13	20.56	15.21	2.32	Supercritical	71.20	0.00	
INLET#8 & PR#11	66.69	9.43	22.09	7.08	17.64	9.35	1.54	Supercritical Jump	32.20	304.73	
INLET#9 & PR#12	65.82	9.31	22.09	7.08	17.77	9.26	1.52	Supercritical	32.20	0.00	
INLET#4 & PR#6	91.97	18.74	25.28	8.84	13.64	17.96	3.39	Supercritical Jump	39.00	20.79	
INLET#5 & PR#7	57.14	11.64	23.36	7.97	16.27	12.03	2.03	Supercritical	32.70	0.00	
INLET#6 & PR#8	57.22	11.66	21.14	7.22	14.41	11.46	2.09	Supercritical	26.70	0.00	
INLET#7 & PR#9	31.51	10.03	19.74	7.63	14.37	10.75	1.89	Supercritical	21.10	0.00	
INLET#10 & PR#10	29.28	9.32	18.19	6.93	13.46	9.76	1.80	Supercritical	17.70	0.00	

INLET #11 & PR#13	31.05	9.88	18.19	6.93	12.98	10.21	1.93	Supercritical	17.70	0.00	
INLET #18 & PR#20	7.09	5.78	15.00	6.03	15.00	6.03	0.00	Pressurized	7.40	98.00	
INLET #17 & PR#19	7.06	5.76	11.70	5.65	10.35	6.42	1.28	Supercritical Jump	5.80	53.01	
INLET #16 & PR#18	3.90	4.96	9.46	5.12	8.68	5.59	1.20	Supercritical Jump	3.40	18.12	
INLET #15 & PR#17	11.53	6.52	10.32	4.77	8.29	6.29	1.52	Supercritical	5.00	0.00	
INLET #14 & PR#16	7.06	5.76	7.75	4.06	6.30	5.32	1.49	Supercritical	2.60	0.00	
INLET #13 & PR#15	7.06	5.76	6.58	3.67	5.31	4.88	1.51	Supercritical	1.90	0.00	
INLET #12 & PR#14	3.90	4.96	5.78	3.47	4.77	4.46	1.44	Supercritical	1.30	0.00	

- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	Peak Flow (cfs)	Cross Section	Rise	Span	Rise	Span	Rise	Span	Area (ft ²)	Comment
MH#1 & PR#1	91.40	CIRCULAR	48.00 in	48.00 in	36.00 in	36.00 in	48.00 in	48.00 in	12.57	
MH#2 & PR#2	91.40	CIRCULAR	48.00 in	48.00 in	36.00 in	36.00 in	48.00 in	48.00 in	12.57	
INLET#1 & PR#3	91.40	CIRCULAR	42.00 in	42.00 in	36.00 in	36.00 in	42.00 in	42.00 in	9.62	
INLET #2 & PR#4	71.20	CIRCULAR	42.00 in	42.00 in	36.00 in	36.00 in	42.00 in	42.00 in	9.62	
INLET #3 & PR#5	71.20	CIRCULAR	42.00 in	42.00 in	33.00 in	33.00 in	42.00 in	42.00 in	9.62	
INLET#8 & PR#11	32.20	CIRCULAR	36.00 in	36.00 in	30.00 in	30.00 in	36.00 in	36.00 in	7.07	
INLET#9 & PR#12	32.20	CIRCULAR	36.00 in	36.00 in	30.00 in	30.00 in	36.00 in	36.00 in	7.07	
INLET#4 & PR#6	39.00	CIRCULAR	30.00 in	30.00 in	24.00 in	24.00 in	30.00 in	30.00 in	4.91	
INLET#5 & PR#7	32.70	CIRCULAR	30.00 in	30.00 in	27.00 in	27.00 in	30.00 in	30.00 in	4.91	
INLET#6 & PR#8	26.70	CIRCULAR	30.00 in	30.00 in	24.00 in	24.00 in	30.00 in	30.00 in	4.91	

INLET#7 & PR#9	21.10	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
INLET#10 & PR#10	17.70	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
INLET #11 & PR#13	17.70	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
INLET #18 & PR#20	7.40	CIRCULAR	15.00 in	15.00 in	18.00 in	18.00 in	15.00 in	15.00 in	1.23	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/ Rise
The engineer has checked and this pipe is sized correctly. UDSEWER's suggestions are not helpful in this situation.										
INLET #17 & PR#19	5.80	CIRCULAR	15.00 in	15.00 in	15.00 in	15.00 in	15.00 in	15.00 in	1.23	
INLET #16 & PR#18	3.40	CIRCULAR	12.00 in	12.00 in	12.00 in	12.00 in	12.00 in	12.00 in	0.79	
INLET #15 & PR#17	5.00	CIRCULAR	18.00 in	18.00 in	15.00 in	15.00 in	18.00 in	18.00 in	1.77	
INLET #14 & PR#16	2.60	CIRCULAR	15.00 in	15.00 in	12.00 in	12.00 in	15.00 in	15.00 in	1.23	
INLET #13 & PR#15	1.90	CIRCULAR	15.00 in	15.00 in	12.00 in	12.00 in	15.00 in	15.00 in	1.23	
INLET #12 & PR#14	1.30	CIRCULAR	12.00 in	12.00 in	9.00 in	9.00 in	12.00 in	12.00 in	0.79	

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.
- All hydraulics where calculated using the 'Used' parameters.

Grade Line Summary:

Tailwater Elevation (ft): 6210.54

Element Name	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
	Downstream (ft)	Upstream (ft)	Bend Loss (ft)	Lateral Loss (ft)	Downstream (ft)	Upstream (ft)	Downstream (ft)	Friction Loss (ft)	Upstream (ft)
MH#1 & PR#1	6205.00	6205.80	0.00	0.00	6210.54	6210.66	6211.36	0.12	6211.48
MH#2 & PR#2	6211.00	6216.00	0.04	0.00	6212.82	6218.90	6217.03	3.24	6220.26
INLET#1 & PR#3	6216.80	6217.80	0.34	0.00	6219.23	6221.54	6222.94	0.00	6222.94
INLET #2 & PR#4	6220.50	6220.90	0.20	0.00	6222.70	6223.54	6224.64	0.20	6224.84

INLET #3 & PR#5	6222.00	6222.15	0.04	0.00	6223.71	6226.45	6227.30	0.00	6227.30
INLET#8 & PR#11	6222.75	6226.25	0.32	0.77	6228.07	6228.67	6228.40	0.71	6229.10
INLET#9 & PR#12	6226.55	6226.85	0.32	0.00	6229.00	6229.00	6229.42	0.13	6229.55
INLET#4 & PR#6	6223.15	6225.50	0.05	0.00	6226.50	6227.61	6227.48	1.34	6228.82
INLET#5 & PR#7	6225.60	6226.70	0.03	0.00	6227.64	6228.65	6229.20	0.43	6229.63
INLET#6 & PR#8	6226.80	6228.00	0.02	0.00	6228.67	6229.76	6230.04	0.53	6230.57
INLET#7 & PR#9	6228.60	6229.70	0.04	0.00	6229.80	6231.34	6231.59	0.66	6232.25
INLET#10 & PR#10	6230.00	6230.40	0.05	0.00	6231.40	6231.92	6232.60	0.06	6232.66
INLET #11 & PR#13	6230.70	6231.30	0.05	0.00	6231.97	6232.82	6233.40	0.16	6233.56
INLET #18 & PR#20	6236.70	6237.70	0.56	0.00	6237.95	6239.04	6238.51	1.09	6239.60
INLET #17 & PR#19	6237.85	6238.60	0.02	0.00	6239.28	6239.57	6239.62	0.45	6240.07
INLET #16 & PR#18	6238.75	6239.50	0.01	0.00	6239.79	6240.29	6240.08	0.61	6240.70
INLET #15 & PR#17	6236.30	6237.30	0.12	0.00	6236.99	6238.16	6237.61	0.91	6238.51
INLET #14 & PR#16	6237.45	6238.20	0.00	0.00	6238.42	6238.85	6238.52	0.59	6239.10
INLET #13 & PR#15	6238.35	6239.10	0.00	0.00	6238.85	6239.65	6239.16	0.69	6239.86
INLET #12 & PR#14	6239.25	6240.00	0.00	0.00	6239.65	6240.48	6239.96	0.71	6240.67

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * $V_{fi}^2 / (2 * g)$
- Lateral loss = $V_{fo}^2 / (2 * g)$ - Junction Loss K * $V_{fi}^2 / (2 * g)$.
- Friction loss is always Upstream EGL - Downstream EGL.

Excavation Estimate:

The trench side slope is 1.0 ft/ft

The minimum trench width is 1.00 ft

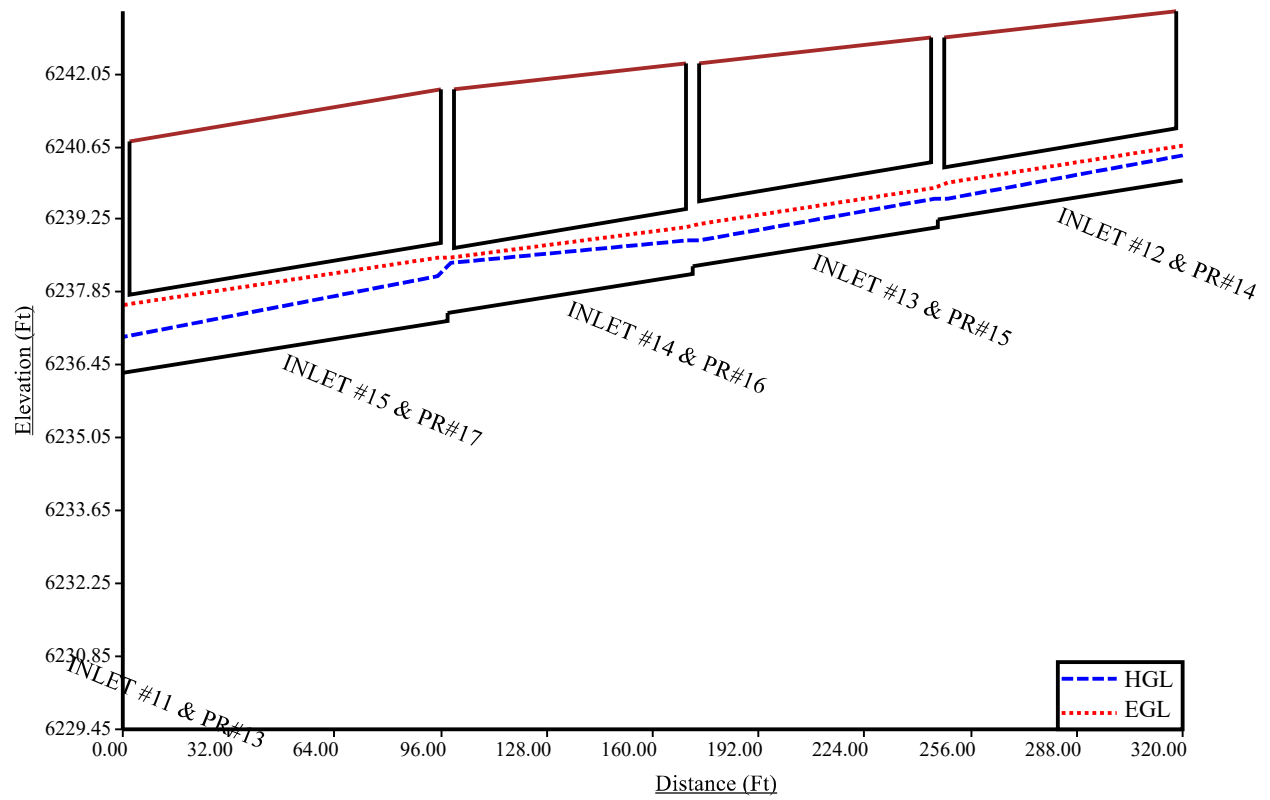
					Downstream			Upstream				
Element Name	Length (ft)	Wall (in)	Bedding (in)	Bottom Width (ft)	Top Width (ft)	Trench Depth (ft)	Cover (ft)	Top Width (ft)	Trench Depth (ft)	Cover (ft)	Volume (cu. yd)	Comment
MH#1 & PR#1	29.50	5.00	6.00	7.83	8.99	6.91	1.58	21.20	13.02	7.68	109.87	

MH#2 & PR#2	222.50	5.00	6.00	7.83	10.80	7.82	2.48	12.00	8.42	3.08	550.90	
INLET#1 & PR#3	45.00	4.50	6.00	7.25	10.90	7.58	2.83	18.90	11.58	6.83	146.75	
INLET #2 & PR#4	24.00	4.50	6.00	7.25	13.50	8.87	4.12	13.70	8.98	4.23	66.48	
INLET #3 & PR#5	7.00	4.50	6.00	7.25	11.50	7.87	3.12	12.00	8.13	3.38	16.35	
INLET#8 & PR#11	352.00	4.00	6.00	6.67	11.30	7.48	3.32	10.40	7.03	2.87	688.55	
INLET#9 & PR#12	31.00	4.00	6.00	6.67	9.80	6.73	2.57	8.00	5.83	1.67	49.76	
INLET#4 & PR#6	47.00	3.50	6.00	6.08	11.00	7.04	3.46	8.70	5.89	2.31	75.23	
INLET#5 & PR#7	57.00	3.50	6.00	6.08	8.50	5.79	2.21	8.90	5.99	2.41	79.30	
INLET#6 & PR#8	62.00	3.50	6.00	6.08	8.70	5.89	2.31	8.70	5.89	2.31	86.23	
INLET#7 & PR#9	57.00	3.00	4.00	5.50	8.00	5.08	2.25	8.20	5.18	2.35	63.18	
INLET#10 & PR#10	24.00	3.00	4.00	5.50	7.60	4.88	2.05	7.90	5.03	2.20	25.37	
INLET #11 & PR#13	32.00	3.00	4.00	5.50	7.30	4.73	1.90	17.90	10.03	7.20	71.39	
INLET #18 & PR#20	98.00	2.25	4.00	4.63	7.85	4.57	2.61	7.85	4.57	2.61	86.17	
INLET #17 & PR#19	74.00	2.25	4.00	4.63	7.55	4.42	2.46	7.05	4.17	2.21	59.40	
INLET #16 & PR#18	74.00	2.00	4.00	4.33	7.00	4.00	2.33	6.50	3.75	2.08	50.07	
INLET #15 & PR#17	98.00	2.50	4.00	4.92	8.40	4.99	2.74	8.40	4.99	2.74	100.09	
INLET #14 & PR#16	74.00	2.25	4.00	4.63	8.35	4.82	2.86	7.85	4.57	2.61	67.84	
INLET #13 & PR#15	74.00	2.25	4.00	4.63	7.55	4.42	2.46	7.05	4.17	2.21	59.40	
INLET #12 & PR#14	74.00	2.00	4.00	4.33	7.00	4.00	2.33	6.50	3.75	2.08	50.07	

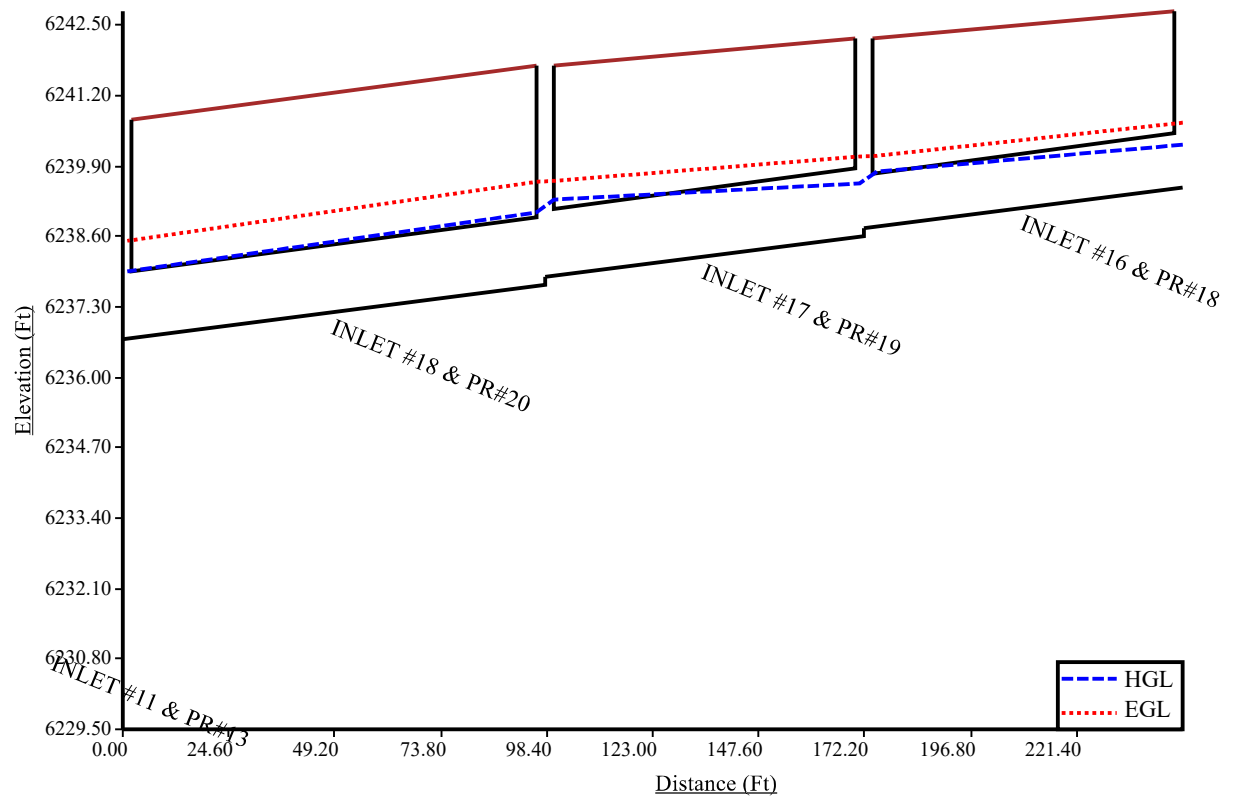
Total earth volume for sewer trenches = 2502 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:
 - Four inches for pipes less than 33 inches.
 - Six inches for pipes less than 60 inches.
 - Eight inches for all larger sizes.

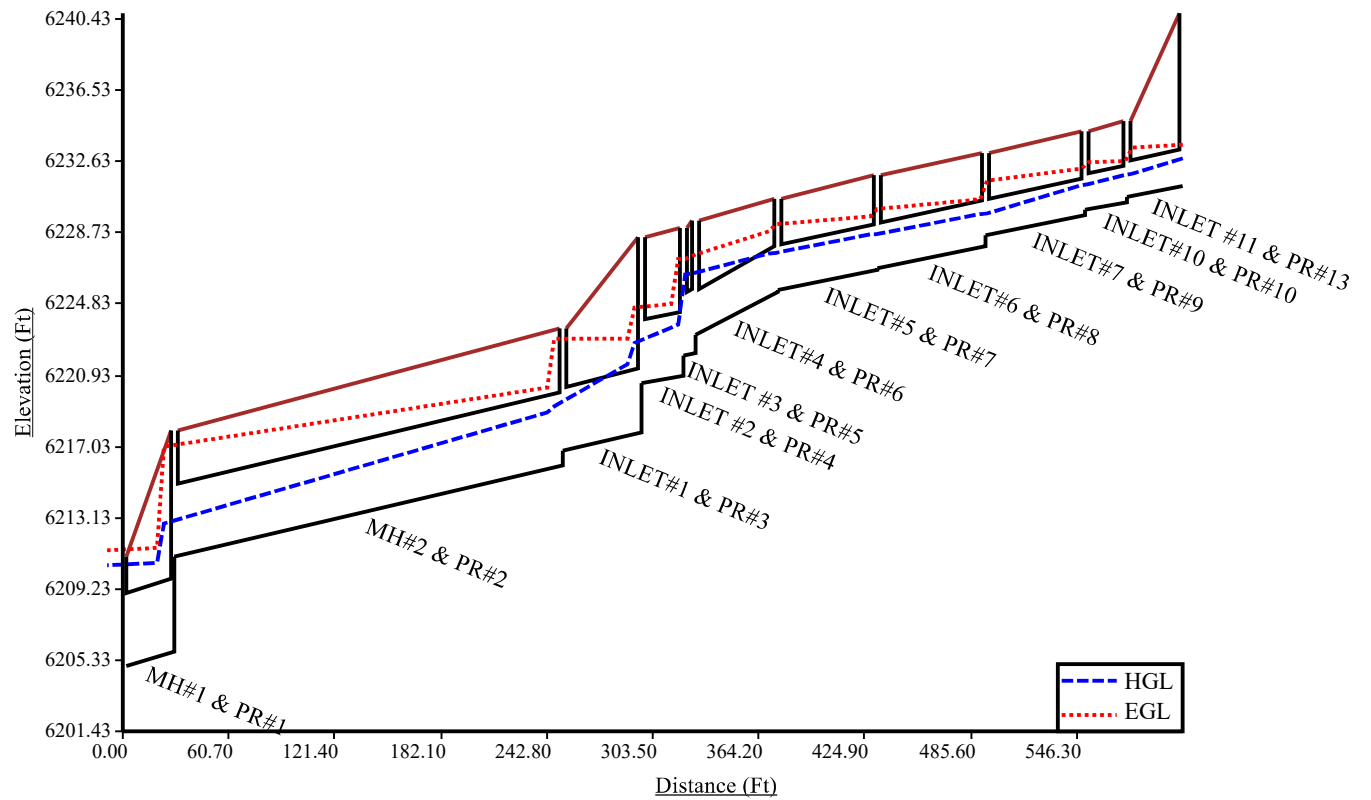
PR 14-13



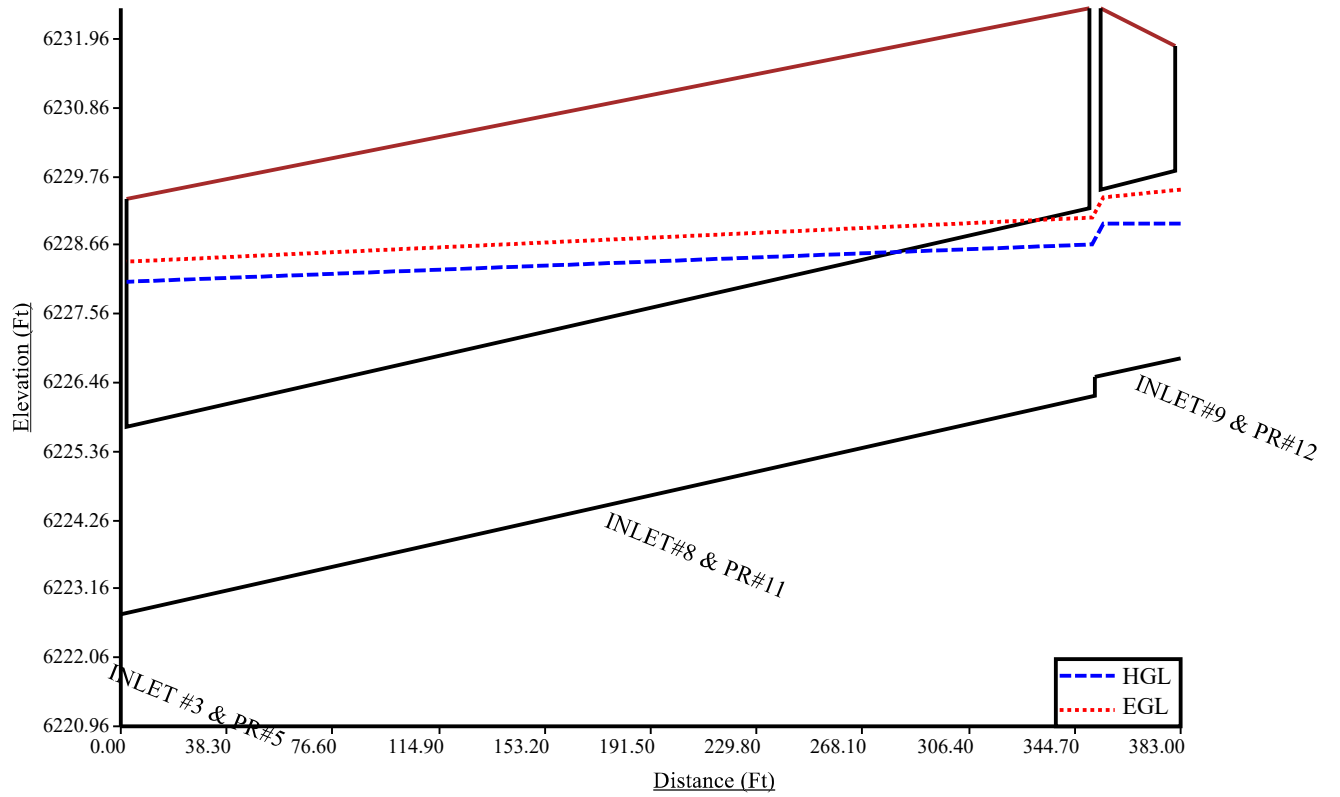
PR 18-13



PR 13-Pond



PR 11-12



DRAINAGE MAPS

Note: The County wouldn't allow EDB Plans to be included in this report.

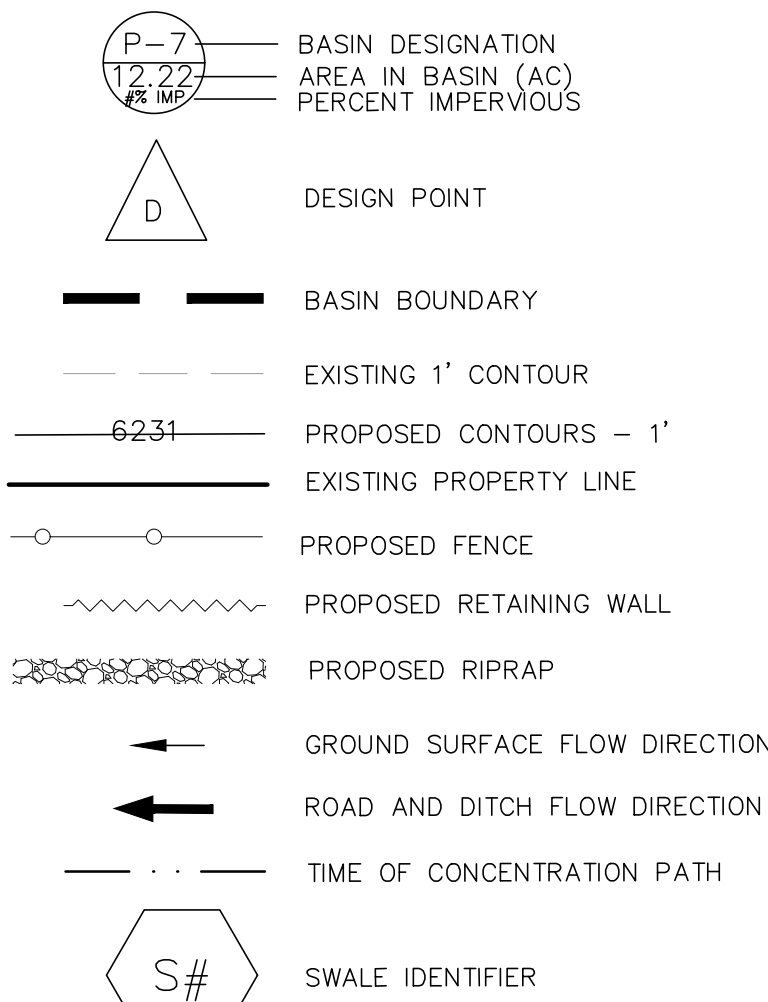
PLATTE SELF STORAGE

SITE DEVELOPMENT PLAN

PROPOSED DRAINAGE MAP

MAY 2025

LEGEND



NOTES

1. BROWN GROUND SURFACE CONTOURS ARE LIDAR DATA DOWNLOADED FROM THE COLORADO HAZARD MAPPING & RISK MAP PORTAL, DATA SET: 2018 3DEP EAST CO EL PASO. THIS DATA IS APPROXIMATE. LIDAR DATA IS FROM 2018 AND AT 2' INTERVALS.

PIPE RUN SUMMARY

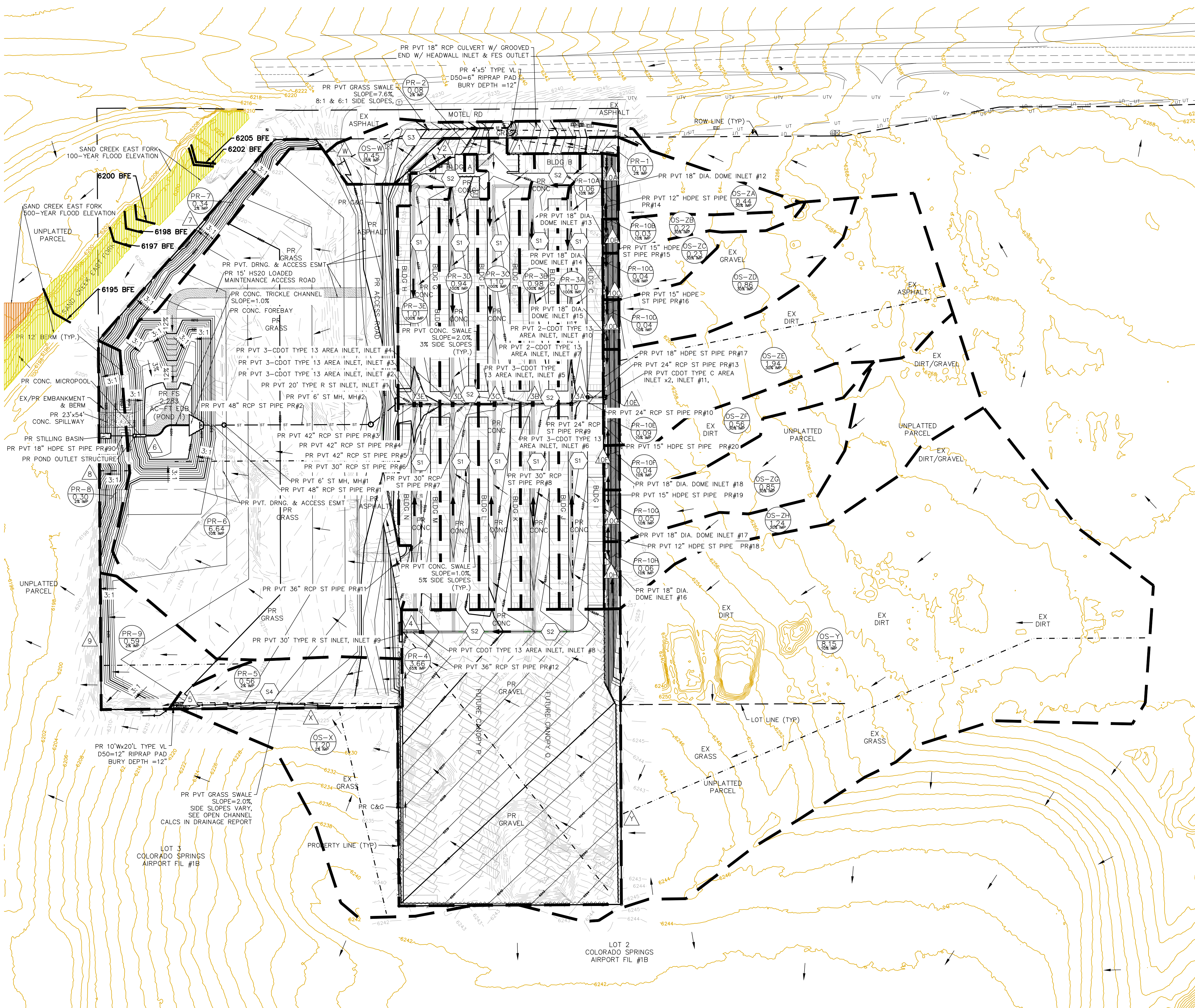
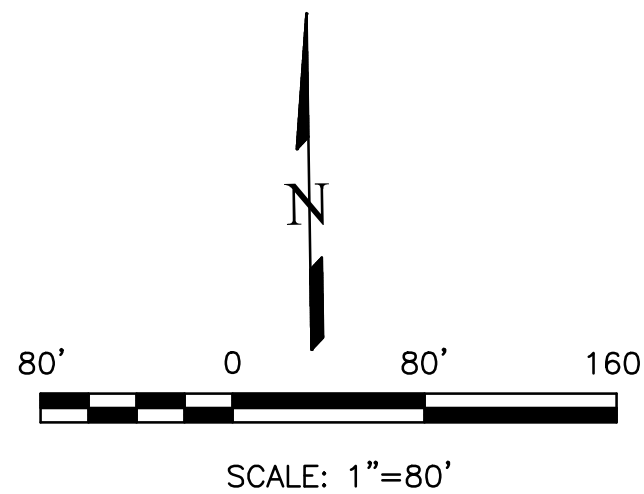
Pipe Run	Inlet #	Contributing Flow Sources	5 Year Flow (cfs)	100 Year Flow (cfs)	Slope	Pipe Size & Type	Owner
PR#1	-	PR#2	41.2	91.4	2.7%	48" RCP	PVT
PR#2	-	PR#3	41.2	91.4	2.2%	48" RCP	PVT
PR#3	#1	DP 3E & PR#4	41.2	91.4	2.2%	42" RCP	PVT
PR#4	#2	PR#5	32.4	71.2	1.7%	42" RCP	PVT
PR#5	#3	PR#6 & PR#11	32.4	71.2	2.1%	42" RCP	PVT
PR#6	#4	DP 3D & PR#7	20.6	39.0	5.0%	30" RCP	PVT
PR#7	#5	DP 3C & PR#8	16.5	32.7	1.9%	30" RCP	PVT
PR#8	#6	DP 3B & PR#9	12.5	26.7	1.9%	30" RCP	PVT
PR#9	#7	DP3A & PR#13	8.7	21.1	1.9%	24" RCP	PVT
PR#10	#10	PR#13	6.2	17.7	1.7%	24" RCP	PVT
PR#11	#8	PR#12	11.8	32.2	1.0%	36" RCP	PVT
PR#12	#9	DP 4	11.8	32.2	1.0%	36" RCP	PVT
PR#13	#11	DP 10E & PR#17 & 20	6.2	17.7	1.0%	24" RCP	PVT
PR#14	#12	DP 10A	0.4	1.3	1.0%	12" HDPE	PVT
PR#15	#13	DP 10B & PR#14	0.7	1.9	1.0%	15" HDPE	PVT
PR#16	#14	DP 10C & PR#15	0.9	2.6	1.0%	15" HDPE	PVT
PR#17	#15	DP 10D & PR#16	1.7	5.0	1.0%	18" HDPE	PVT
PR#18	#16	DP 10H	1.2	3.4	1.0%	12" HDPE	PVT
PR#19	#17	DP 10G & PR#18	2.0	5.8	1.0%	15" HDPE	PVT
PR#20	#18	DP 10F & PR#19	2.6	7.4	1.0%	15" HDPE	PVT
PR#90	-	Pond outlet	0.5	#NAME?	1.4%	18" HDPE	PVT

BASIN SUMMARY

BASIN	AREA TOTAL (ac)	Q ₅ (cfs)	Q ₁₀₀ (cfs)
OS-ZA	0.44	0.4	1.1
OS-ZB	0.22	0.2	0.6
OS-ZC	0.23	0.2	0.6
OS-ZD	0.86	0.8	2.3
OS-ZE	1.94	1.9	5.1
OS-ZF	0.56	0.5	1.5
OS-ZG	0.85	0.8	2.3
OS-ZH	1.24	1.2	3.3
OS-ZI	8.15	7.6	15.4
OS-X	1.20	0.4	2.3
OS-W	0.45	0.5	1.3
PR-1	0.10	0.0	0.2
PR-2	0.08	0.0	0.2
PR-3A	1.10	5.0	8.9
PR-3B	0.98	4.4	7.9
PR-3C	1.10	5.0	8.9
PR-3D	0.94	4.2	7.6
PR-3E	1.01	4.5	8.1
PR-4	1.86	8.2	18.2
PR-5	0.56	0.1	0.9
PR-6	6.64	3.1	13.1
PR-7	0.34	0.2	1.1
PR-8	0.30	0.2	1.0
PR-9	0.59	0.2	1.5
PR-10A	0.06	0.0	0.1
PR-10B	0.09	0.0	0.1
PR-10C	0.04	0.0	0.1
PR-10D	0.04	0.0	0.1
PR-10E	0.09	0.0	0.2
PR-10F	0.04	0.0	0.1
PR-10G	0.05	0.0	0.1
PR-10H	0.06	0.0	0.1

DESIGN POINT SUMMARY

Design Point(s)	Contributing Basins	Area (ac)	Flow (cfs)
1	PR-1	0.10	0.0 0.2
2	PR-2	0.08	0.0 0.2
3A	PR-3A	1.10	5.0 8.9
3B	PR-3B & PR-3A FLOW BY	0.98	6.9 13.4
3C	PR-3C & PR-3B FLOW BY	1.10	8.6 17.7
3D	PR-3D & PR-3C FLOW BY	0.94	8.2 18.2
3E	PR-3E & PR-3D FLOW BY	1.01	8.8 20.2
4	PR-4 & DP 1	11.81	11.8 32.2
5	PR-5 & DP 2	1.76	0.5 3.3
6	PR-6 & PR 11	7.74	44.3 104.5
7	PR-7	0.34	0.2 1.1
8	PR-8	0.30	0.2 1.0
9	PR-9	0.59	0.2 1.5
10A	PR-10A & OS-ZA	0.49	0.4 1.3
10B	PR-10B & OS-ZB	0.25	0.2 0.6
10C	PR-10C & OS-ZC	0.27	0.2 0.7
10D	PR-10D & OS-ZD	0.90	0.8 2.4
10E	PR-10E & OS-ZE	2.03	1.9 5.3
10F	PR-10F & OS-ZF	1.60	0.6 2.6
10G	PR-10G & OS-ZG	0.90	0.8 2.4
10H	PR-10H & OS-ZH	1.30	1.2 3.4
W	OS-W, DP 1 & DP 2	0.63	0.5 1.8
X	OS-X	1.20	0.4 2.3
Y	OS-Y	0.15	3.6 15.4



REVISIONS

NO.	DESCRIPTION	DATE

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE REVIEWING AGENCIES, THE TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED BY WRITTEN AUTHORIZATION.

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PLATTE SELF STORAGE

PROPOSED DRAINAGE MAP

DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY LD

H-SCALE AS SHOWN
V-SCALE N/A

JOB NO. 2419.00
DATE ISSUED 05/16/25
SHEET NO. 1 OF 1