DRAINAGE PLAN

COPPER GATE ESTATES

TO

WICHITA, SEDGWICK COUNTY, KANSAS

Baughman Company, P.A.

DRAINAGE PLAN

COPPER GATE ESTATES

TO

WICHITA, SEDGWICK COUNTY, KANSAS

Prepared By

BAUGHMAN COMPANY, P.A.
ENGINEERING, SURVEYING & PLANNING
316/262-7271 FAX 316/262-0149 WICHITA, KANSAS 67211

July 22, 2002

INTRODUCTION

This report provides information and calculations to support the "Drainage Plan" for the property located in the Northeast Quarter of Section 14, T-27-S, R-2-W in Sedgwick County, Kansas.

The "Drainage Plan" being submitted herein in intended to serve as a guide for the design of detention facilities and storm water sewer improvements to the proposed developments. Modifications to structures, pipes, etc. may be necessary during the final design in order to obtain the most economical design and construction possible.

Hydrologic Summary

Return Period years	Existing Conditions Peak Discharge at 135th St. W. cfs	Devleoped Conditions Peak Discharge at 135th St. W. W/O Detention cfs	Devleoped Conditions Peak Discharge at 135th St. W. W/O Detention cfs
2	160	200	100
5	260	300	180
100	610	670	460

Existing Conditions Hydrologic Model

MASTER DESIGN STORM SUMMARY

Default Network Design Storm File, ID WICHITA.RNQ COW25100

Return Event	Total Depth in	Rainfall Type	RNF File	RNF ID
Pre..2	3.6000	Synthetic Curve	SCSTYPES	TypeII 24hr
Pre..5	4.5600	Synthetic Curve	SCSTYPES	TypeII 24hr
Pre100	7.6800	Synthetic Curve	SCSTYPES	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Storage Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond ac-ft
*135TH ST.	JCT	2	31.644		12.7000	163.33		
*135TH ST.	JCT	5	48.783		12.7000	260.20		
*135TH ST.	JCT	100	112.147		12.6500	612.69		
BASIN	AREA	2	31.644		12.7000	163.33		
BASIN	AREA	5	48.783		12.7000	260.20		
BASIN	AREA	100	112.147		12.6500	612.69		

Developed Conditions Without Detention Hydrologic Model

MASTER DESIGN STORM SUMMARY

Default Network Design Storm File, ID WICHITA.RNQ COW25100

Return Event	Total Depth in	Rainfall Type	RNF File	RNF ID
Dev..2	3.6000	Synthetic Curve	SCSTYPES	TypeII 24hr
Dev..5	4.5600	Synthetic Curve	SCSTYPES	TypeII 24hr
Dev100	7.6800	Synthetic Curve	SCSTYPES	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Storage Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond ac-ft
*135TH	JCT	2	33.500		12.1000	199.56		
*135TH	JCT	5	50.793		12.1000	303.32		
*135TH	JCT	100	114.069		12.1000	672.42		
MAJORBASIN	AREA	2	20.789		12.6000	114.64		
MAJORBASIN	AREA	5	32.350		12.6000	185.54		
MAJORBASIN	AREA	100	75.455		12.6000	445.12		
NODE	JCT	2	33.500		12.1000	199.56		
NODE	JCT	5	50.793		12.1000	303.32		
NODE	JCT	100	114.069		12.1000	672.42		
OFFSITE SOUTH	AREA	2	1.091		12.2000	10.73		
OFFSITE SOUTH	AREA	5	1.682		12.2000	17.00		
OFFSITE SOUTH	AREA	100	3.867		12.2000	39.59		
ONSITE DS	AREA	2	6.067		12.0500	88.07		
ONSITE DS	AREA	5	8.612		12.0500	124.07		
ONSITE DS	AREA	100	17.366		12.0500	242.79		
ONSITEUS	AREA	2	3.371		12.0500	48.93		
ONSITEUS	AREA	5	4.785		12.0500	68.93		
ONSITEUS	AREA	100	9.648		12.0500	134.88		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Storage Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond ac-ft
POND	IN POND	2	32.409		12.1000	190.23		
POND	IN POND	5	49.111		12.1000	288.17		
POND	IN POND	100	110.202		12.1000	636.00		
POND	OUT POND	2	32.409		12.1000	190.23		
POND	OUT POND	5	49.111		12.1000	288.17		
POND	OUT POND	100	110.202		12.1000	636.00		
RCBC	IN POND	2	26.342		12.5000	131.11		
RCBC	IN POND	5	40.499		12.5000	210.95		
RCBC	IN POND	100	92.837		12.4500	504.65		
RCBC	OUT POND	2	26.342		12.5000	131.11		
RCBC	OUT POND	5	40.499		12.5000	210.95		
RCBC	OUT POND	100	92.837		12.4500	504.65		
UPSTREAM	JCT	2	24.159		12.6000	121.27		
UPSTREAM	JCT	5	37.134		12.6000	194.56		
UPSTREAM	JCT	100	85.103		12.5000	463.71		
WEST OFFSITE	AREA	2	2.182		12.2000	21.47		
WEST OFFSITE	AREA	5	3.364		12.2000	34.01		
WEST OFFSITE	AREA	100	7.734		12.2000	79.17		

Developed Conditions
With Detention
Hydrologic Model

MASTER DESIGN STORM SUMMARY

Default Network Design Storm File, ID WICHITA.RNQ COW25100

Return Event	Total Depth in	Rainfall Type	RNF File	RNF ID
A....2	3.6000	Synthetic Curve	SCSTYPES	TypeII 24hr
A....5	4.5600	Synthetic Curve	SCSTYPES	TypeII 24hr
A..100	7.6800	Synthetic Curve	SCSTYPES	TypeII 24hr

ICPM CALCULATION TOLERANCES

Target Convergence= .000 cfs +/-
Max. Iterations = 35 loops
ICPM Time Step = .0500 hrs
Output Time Step = .0500 hrs
ICPM Ending Time = 35.0000 hrs

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

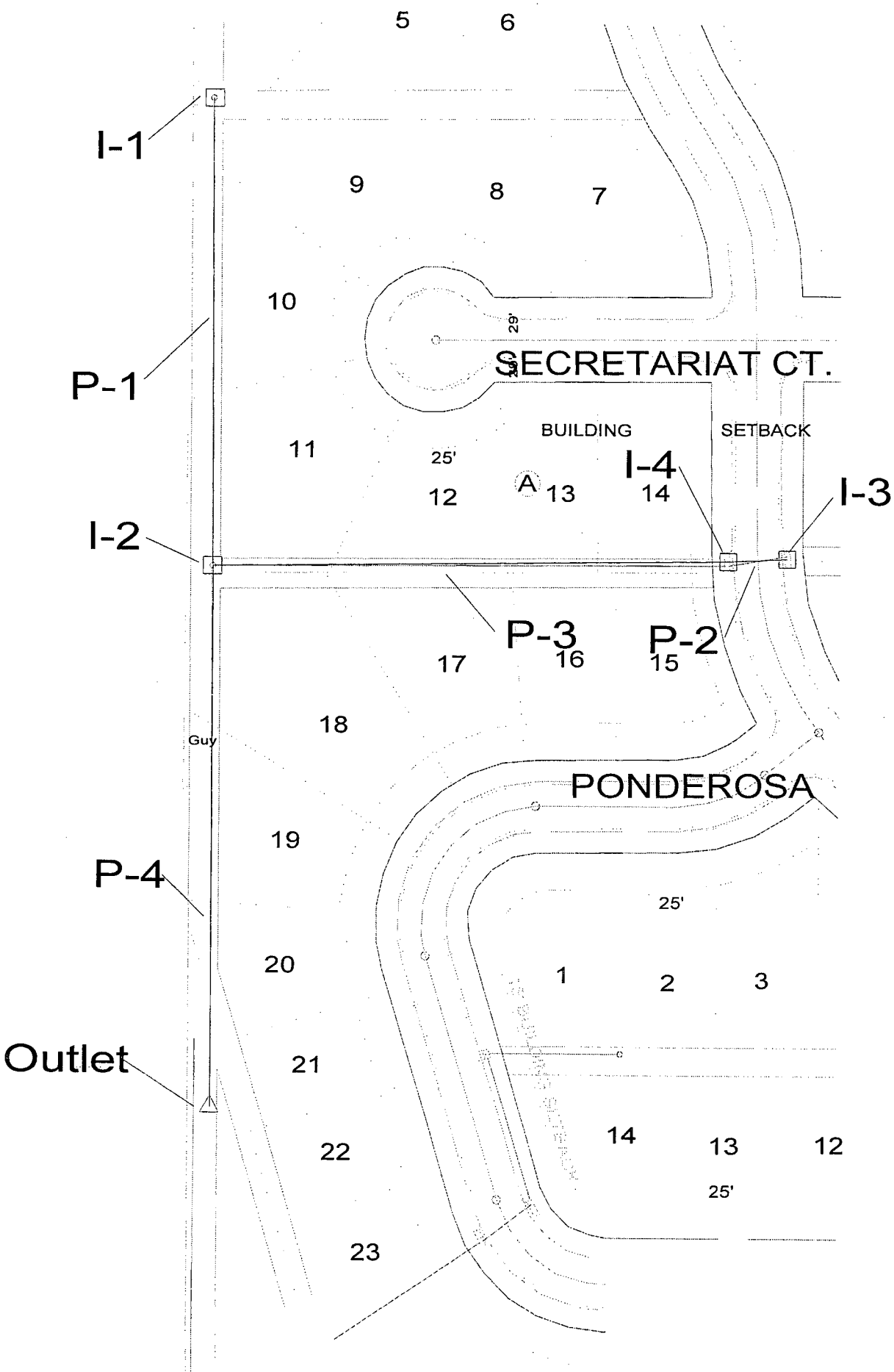
Storage Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond ac-ft
*135TH	JCT	2	33.498		13.1000	104.19		
*135TH	JCT	5	50.791		13.0000	176.32		
*135TH	JCT	100	114.065		12.8500	458.10		
MAJORBASIN	AREA	2	20.789		12.6000	114.64		
MAJORBASIN	AREA	5	32.350		12.6000	185.54		
MAJORBASIN	AREA	100	75.455		12.6000	445.12		
NODE	JCT	2	33.498		13.1000	104.19		
NODE	JCT	5	50.791		13.0000	176.32		
NODE	JCT	100	114.065		12.8500	458.10		
OFFSITE SOUTH	AREA	2	1.091		12.2000	10.73		
OFFSITE SOUTH	AREA	5	1.682		12.2000	17.00		
OFFSITE SOUTH	AREA	100	3.867		12.2000	39.59		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Storage Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond ac-ft
ONSITE DS	AREA	2	6.067		12.0500	88.07		
ONSITE DS	AREA	5	8.612		12.0500	124.07		
ONSITE DS	AREA	100	17.366		12.0500	242.79		
ONSITEUS	AREA	2	3.371		12.0500	48.93		
ONSITEUS	AREA	5	4.785		12.0500	68.93		
ONSITEUS	AREA	100	9.648		12.0500	134.88		
POND	POND	2	32.410		12.1000	152.53		
POND	POND	5	49.112		12.1000	237.77		
POND	POND	100	110.202		12.1000	543.53		
POND	OUT POND	2	32.407		13.1000	102.31	160.13	7.383
POND	OUT POND	5	49.108		13.0000	173.19	160.81	10.505
POND	OUT POND	100	110.198		12.9000	449.77	162.88	19.888
RCBC	POND	2	26.342		12.5000	131.11		
RCBC	POND	5	40.499		12.5000	210.95		
RCBC	POND	100	92.837		12.4500	504.65		
RCBC	OUT POND	2	26.343		12.6500	128.15	161.70	1.171
RCBC	OUT POND	5	40.500		12.6000	206.51	162.53	1.614
RCBC	OUT POND	100	92.837		12.5500	494.30	164.96	2.910
UPSTREAM	JCT	2	24.159		12.6000	121.27		
UPSTREAM	JCT	5	37.134		12.6000	194.56		
UPSTREAM	JCT	100	85.103		12.5000	463.71		
WEST OFFSITE	AREA	2	2.182		12.2000	21.47		
WEST OFFSITE	AREA	5	3.364		12.2000	34.01		
WEST OFFSITE	AREA	100	7.734		12.2000	79.17		

Stormwater Sewer Analysis
Developed Conditions



Baughman Company, P.A.
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

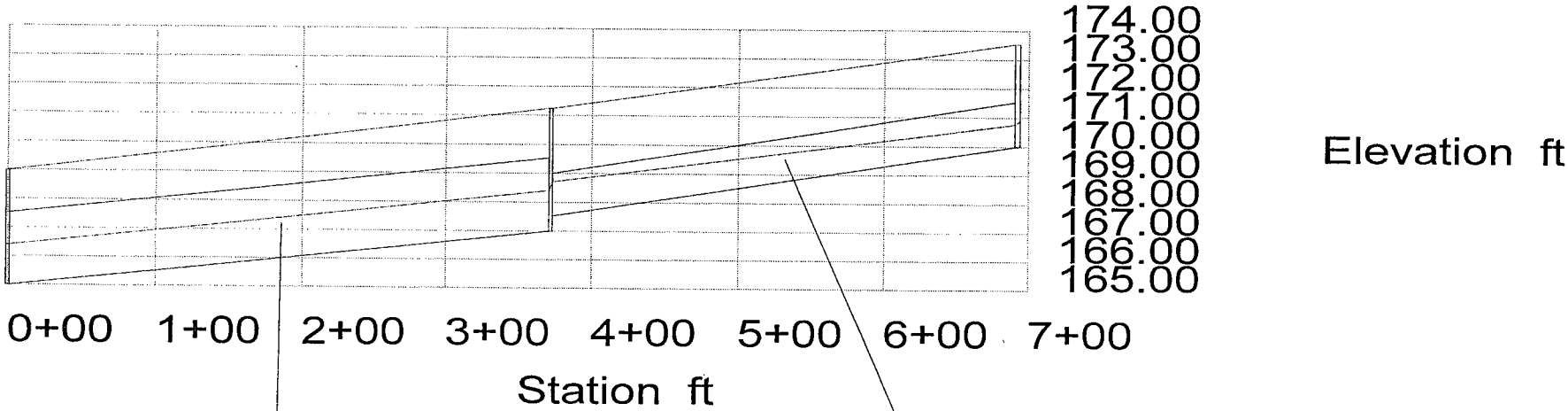
System Report

Pipe	Additional Flow (cfs)	Total Upstream Added (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	-Section- Shape Size	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	Length (ft)	Average Velocity (ft/s)	Description
P-2	4.50	0.00	4.50	I-3	Circular	170.50	170.00	174.40	171.31	0.007716	4.50	41.00	3.80	
				I-4	18 inch			174.40	171.19	0.012195	11.60			
P-3	5.80	4.50	10.30	I-4	Circular	169.80	167.50	174.40	170.95	0.006403	10.30	359.00	5.43	
				I-2	24 inch			171.20	168.68	0.006407	18.11			
P-1	3.80	0.00	3.80	I-1	Circular	170.00	167.50	173.50	170.75	0.007057	3.80	320.00	3.44	
				I-2	18 inch			171.20	168.68	0.007813	9.28			
P-4	2.90	14.10	17.00	I-2	Circular	167.00	165.00	171.20	168.39	0.005376	17.00	372.00	6.04	
				Outlet	30 inch			169.00	166.39	0.005376	30.07			

Inlet: I-1
Rim: 173.50 ft
Sump: 170.00 ft

Outlet: Outlet
Rim: 169.00 ft
Sump: 165.00 ft

Inlet: I-2
Rim: 171.20 ft
Sump: 167.00 ft



Pipe: P-4
Up Invert: 167.00 ft
Dn Invert: 165.00 ft
Length: 372.00 ft
Size: 30 inch

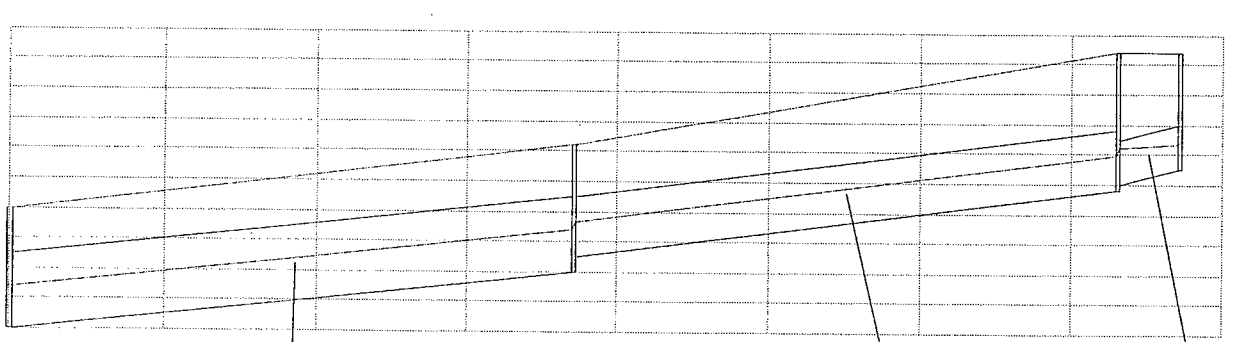
Pipe: P-1
Up Invert: 170.00 ft
Dn Invert: 167.50 ft
Length: 320.00 ft
Size: 18 inch

Inlet: I-3
Rim: 174.40 ft
Sump: 170.50 ft

Outlet: Outlet
Rim: 169.00 ft
Sump: 165.00 ft

Inlet: I-2
Rim: 171.20 ft
Sump: 167.00 ft

Inlet: I-4
Rim: 174.40 ft
Sump: 169.80 ft



Pipe: P-4
Up Invert: 167.00 ft
Dn Invert: 165.00 ft
Length: 372.00 ft
Size: 30 inch

Pipe: P-3
Up Invert: 169.80 ft
Dn Invert: 167.50 ft
Length: 359.00 ft
Size: 24 inch

Pipe: P-2
Up Invert: 170.50 ft
Dn Invert: 170.00 ft
Length: 41.00 ft
Size: 18 inch

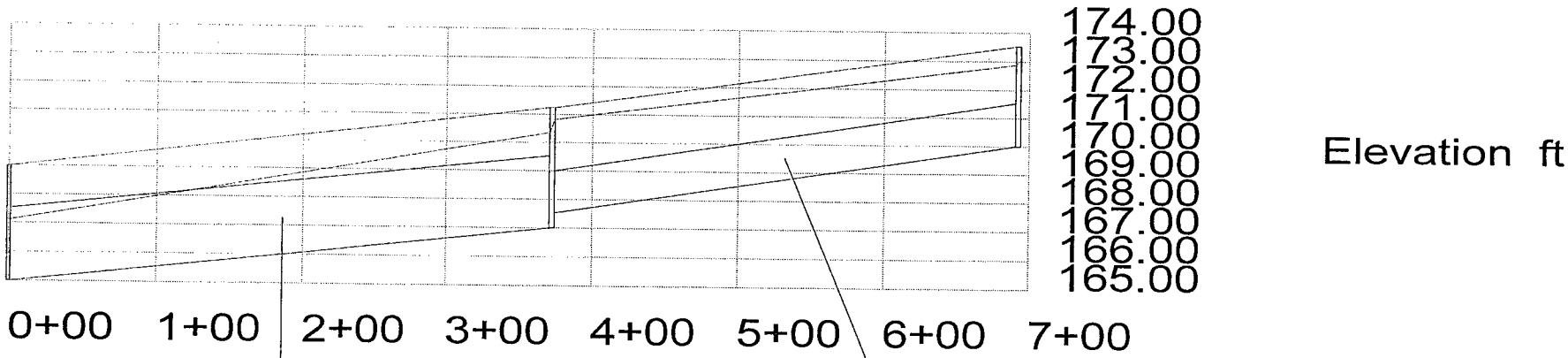
System Report

Pipe	Additional Flow (cfs)	Total Upstream Added (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	-Section- Shape Size	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	Length (ft)	Average Velocity (ft/s)	Description
P-2	9.90	0.00	9.90	I-3	Circular	170.50	170.00	174.40	174.76	0.008883	9.90	41.00	5.60	
				I-4	18 inch			174.40	174.40	0.012195	11.60			
P-3	12.80	9.90	22.70	I-4	Circular	169.80	167.50	174.40	174.43	0.010070	22.70	359.00	7.23	
				I-2	24 inch			171.20	170.81	0.006407	18.11			
P-1	8.40	0.00	8.40	I-1	Circular	170.00	167.50	173.50	172.86	0.006395	8.40	320.00	4.75	
				I-2	18 inch			171.20	170.81	0.007813	9.28			
P-4	6.40	31.10	37.50	I-2	Circular	167.00	165.00	171.20	170.36	0.008170	37.50	372.00	8.13	
				Outlet	30 inch			169.00	167.07	0.005376	30.07			

Outlet: Outlet
Rim: 169.00 ft
Sump: 165.00 ft

Inlet: I-2
Rim: 171.20 ft
Sump: 167.00 ft

Inlet: I-1
Rim: 173.50 ft
Sump: 170.00 ft



Pipe: P-4
Up Invert: 167.00 ft
Dn Invert: 165.00 ft
Length: 372.00 ft
Size: 30 inch

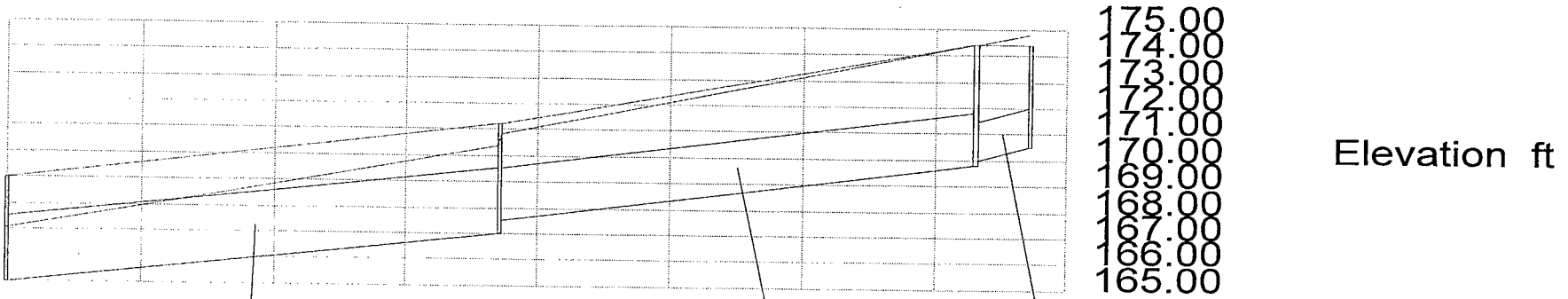
Pipe: P-1
Up Invert: 170.00 ft
Dn Invert: 167.50 ft
Length: 320.00 ft
Size: 18 inch

Inlet: I-3
Rim: 174.40 ft
Sump: 170.50 ft

Inlet: I-4
Rim: 174.40 ft
Sump: 169.80 ft

Inlet: I-2
Rim: 171.20 ft
Sump: 167.00 ft

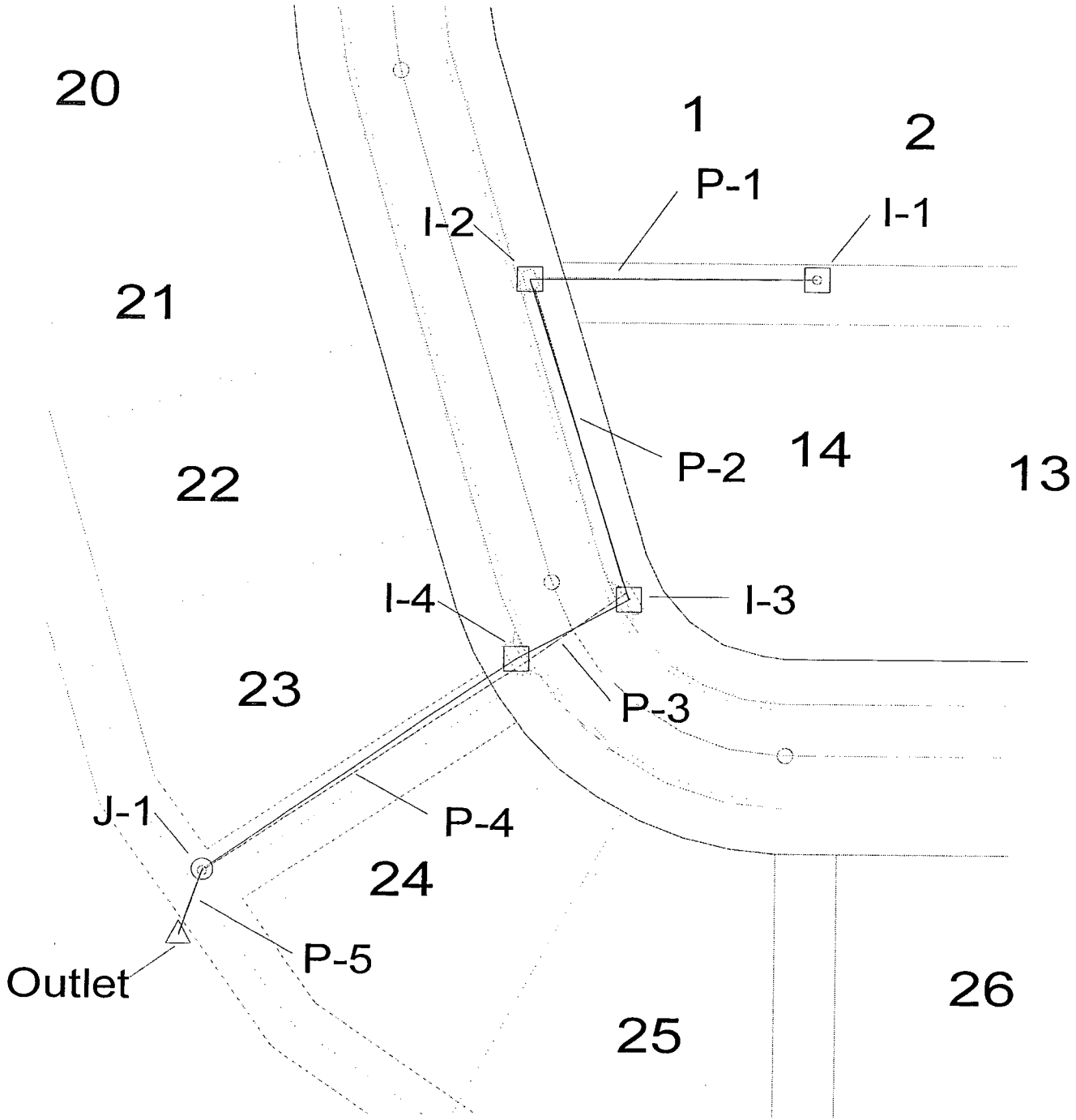
Outlet: Outlet
Rim: 169.00 ft
Sump: 165.00 ft



Pipe: P-2
Up Invert: 170.50 ft
Dn Invert: 170.00 ft
Length: 41.00 ft
Size: 18 inch

Pipe: P-4
Up Invert: 167.00 ft
Dn Invert: 165.00 ft
Length: 372.00 ft
Size: 30 inch

Pipe: P-3
Up Invert: 169.80 ft
Dn Invert: 167.50 ft
Length: 359.00 ft
Size: 24 inch



Project Title: Coppergate 2nd Addition
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Baughman Company, P.A.
 37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Project Engineer: Baughman Company, P.A.
StormCAD v1.0

Coppergate 2nd Addition
Stormwater Sewer System #2
Inlet I-2

Drainage area, acres	0.4
Li = Inlet Length	5
So = street grade, ft/ft	0.005
Sx = 'cross slope, ft/ft	0.03125
Manning's n	0.022
Z in Izzard's Eq. = 1/Sx	32

	2-yr	5-yr	100-yr
Rainfall Intensity, in/hr	3.83	4.56	7.37
Rational "C"	0.46	0.49	0.67
Flowrate, cfs	0.7	0.9	2.0
Additional Flow, cfs	0.0	0.0	0.0
Total Flowrate, cfs	0.7	0.9	2.0
depth of flow, ft	0.19	0.21	0.28
Flow width, ft	6.14	6.71	9.03
Froude Number	0.63950	0.64907	0.68205
Length 1, ft	3.46	3.83	5.42
Length 2, ft	2.27	2.52	3.56
Length 3, ft	6.48	7.19	10.17
case 1, Li < L2 intercepted flow bypassed flow	NO GOOD 1.0 0.0	NO GOOD 1.2 0.0	NO GOOD 1.8 0.2
case 2, Li > L2 intercepted flow bypassed flow	VALID 0.6 0.1	VALID 0.8 0.1	VALID 1.5 0.5

System Report

Pipe	Additional Flow (cfs)	Total Upstream Added (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	-Section- Shape Size	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	Length (ft)	Average Velocity (ft/s)	Description
P-1	4.20	0.00	4.20	I-1	Circular	164.40	164.00	167.90	165.25	0.004386	4.20	93.00	4.29	
				I-2	18 inch			168.50	164.79	0.004301	6.89			
P-2	0.80	4.20	5.00	I-2	Circular	163.50	163.10	168.50	164.51	0.003969	5.00	110.00	4.37	
				I-3	18 inch			169.40	163.96	0.003636	6.33			
P-3	1.90	5.00	6.90	I-3	Circular	162.60	162.40	169.40	163.71	0.002086	6.90	41.00	3.53	
				I-4	24 inch			169.40	163.70	0.004878	15.80			
P-4	4.90	6.90	11.80	I-4	Circular	162.20	161.00	169.40	163.43	0.009020	11.80	124.00	6.49	
				J-1	24 inch			168.10	162.04	0.009677	22.25			
P-5	N/A	11.80	11.80	J-1	Circular	160.50	160.00	168.10	161.88	0.002777	11.80	23.00	4.44	
				Outlet	24 inch			166.00	162.00	0.021739	33.35			

Junction: J-1
Rim: 168.10 ft
Sump: 160.50 ft

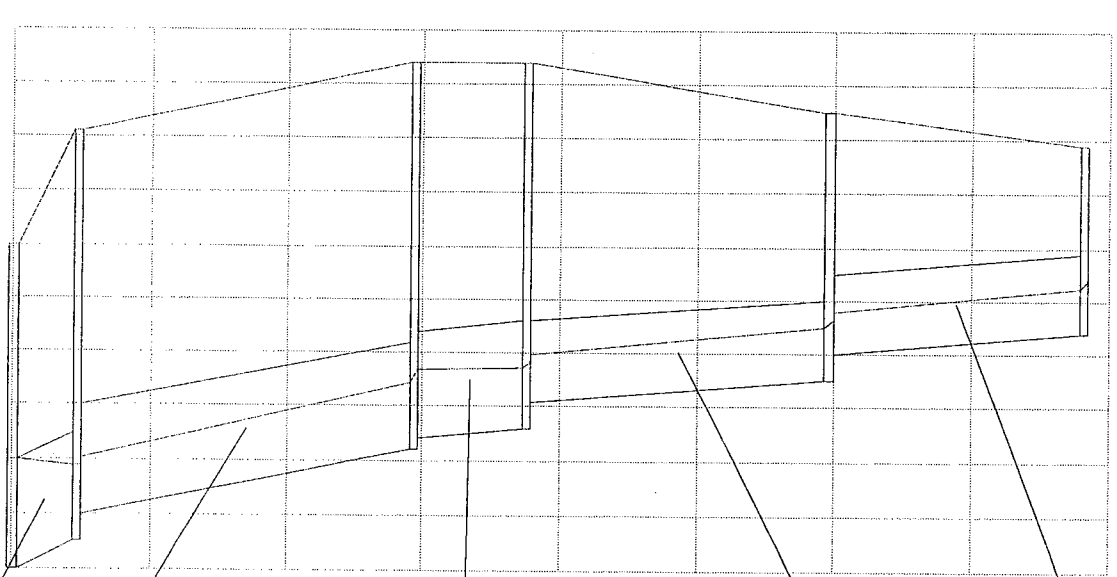
Inlet: I-3
Rim: 169.40 ft
Sump: 162.60 ft

Inlet: I-1
Rim: 167.90 ft
Sump: 164.40 ft

Inlet: I-4
Rim: 169.40 ft
Sump: 162.20 ft

Inlet: I-2
Rim: 168.50 ft
Sump: 163.50 ft

Outlet: Outlet
Rim: 166.00 ft
Sump: 160.00 ft



Pipe: P-1
Up Invert: 164.40 ft
Dn Invert: 164.00 ft
Length: 93.00 ft
Size: 18 inch

Pipe: P-2
Up Invert: 163.50 ft
Dn Invert: 163.10 ft
Length: 110.00 ft
Size: 18 inch

Pipe: P-3
Up Invert: 162.60 ft
Dn Invert: 162.40 ft
Length: 41.00 ft
Size: 24 inch

Pipe: P-4
Up Invert: 162.20 ft
Dn Invert: 161.00 ft
Length: 124.00 ft
Size: 24 inch

Pipe: P-5
Up Invert: 160.50 ft
Dn Invert: 160.00 ft
Length: 23.00 ft
Size: 24 inch

System Report

Pipe	Additional Flow (cfs)	Total Upstream Added (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	-Section- Shape Size	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	Length (ft)	Average Velocity (ft/s)	Description
P-1	9.40	0.00	9.40	I-1	Circular	164.40	164.00	167.90	167.68	0.008009	9.40	93.00	5.32	
				I-2	18 inch			168.50	166.93	0.004301	6.89			
P-2	1.50	9.40	10.90	I-2	Circular	163.50	163.10	168.50	166.64	0.010769	10.90	110.00	6.17	
				I-3	18 inch			169.40	165.45	0.003636	6.33			
P-3	4.40	10.90	15.30	I-3	Circular	162.60	162.40	169.40	165.27	0.004575	15.30	41.00	4.87	
				I-4	24 inch			169.40	165.08	0.004878	15.80			
P-4	10.90	15.30	26.20	I-4	Circular	162.20	161.00	169.40	164.54	0.013040	26.20	124.00	8.58	
				J-1	24 inch			168.10	162.79	0.009677	22.25			
P-5	N/A	26.20	26.20	J-1	Circular	160.50	160.00	168.10	162.29	0.018339	26.20	23.00	8.58	
				Outlet	24 inch			166.00	162.00	0.021739	33.35			

Junction: J-1
Rim: 168.10 ft
Sump: 160.50 ft

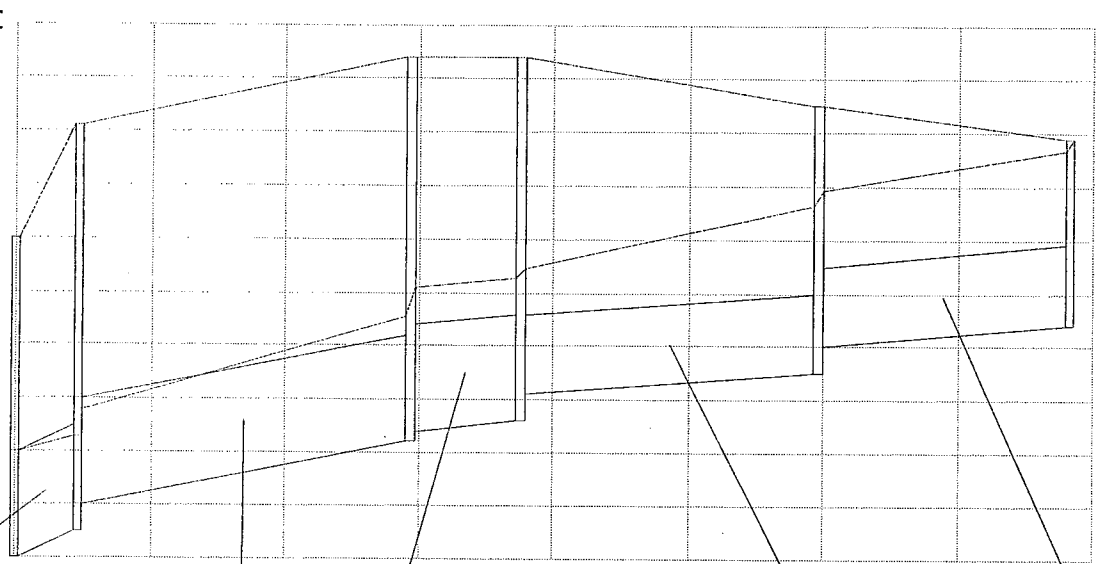
Inlet: I-3
Rim: 169.40 ft
Sump: 162.60 ft

Inlet: I-1
Rim: 167.90 ft
Sump: 164.40 ft

Inlet: I-4
Rim: 169.40 ft
Sump: 162.20 ft

Inlet: I-2
Rim: 168.50 ft
Sump: 163.50 ft

Outlet: Outlet
Rim: 166.00 ft
Sump: 160.00 ft



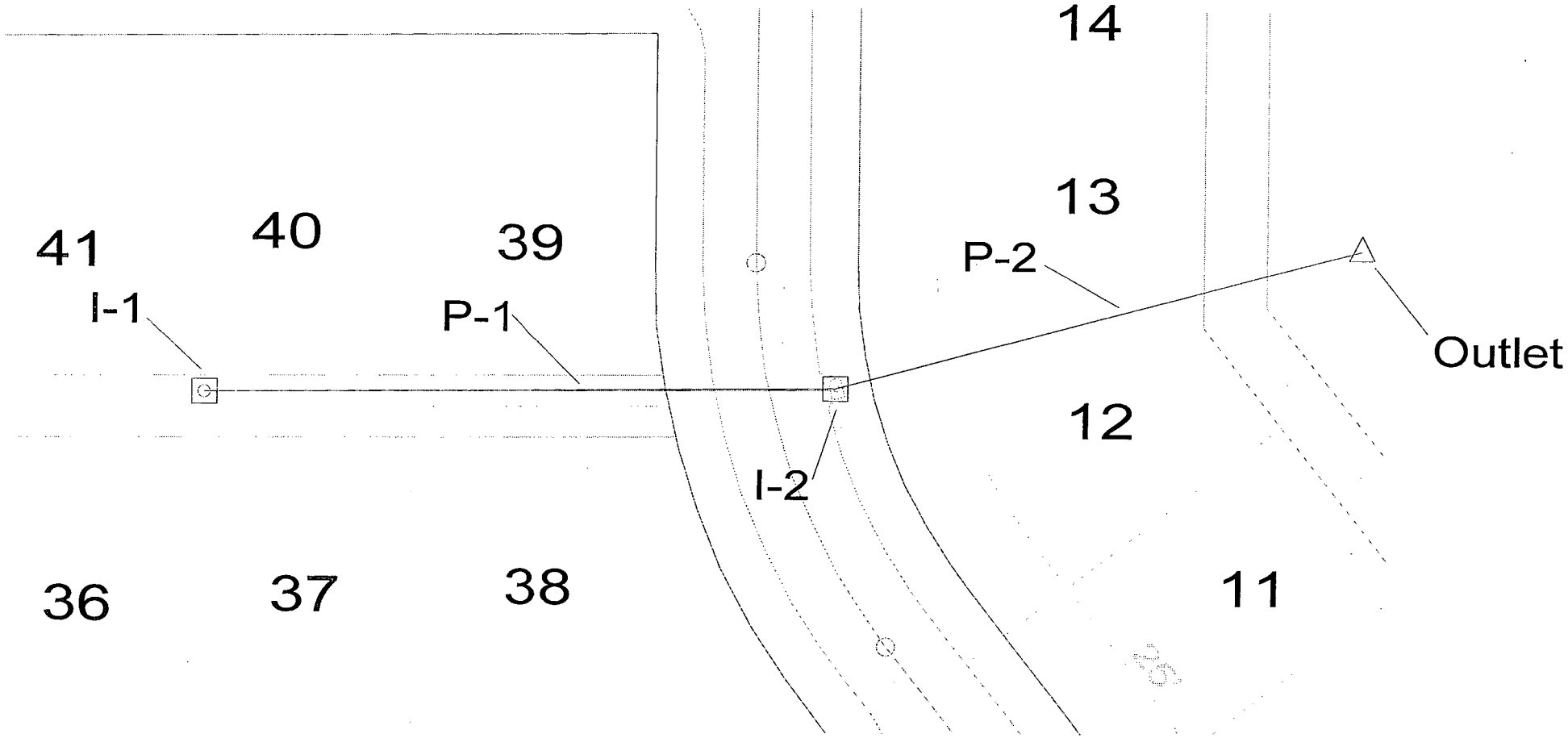
Pipe: P-5
Up Invert: 160.50 ft
Dn Invert: 160.00 ft
Length: 23.00 ft
Size: 24 inch

Pipe: P-4
Up Invert: 162.20 ft
Dn Invert: 161.00 ft
Length: 124.00 ft
Size: 24 inch

Pipe: P-3
Up Invert: 162.60 ft
Dn Invert: 162.40 ft
Length: 41.00 ft
Size: 24 inch

Pipe: P-2
Up Invert: 163.50 ft
Dn Invert: 163.10 ft
Length: 110.00 ft
Size: 18 inch

Pipe: P-1
Up Invert: 164.40 ft
Dn Invert: 164.00 ft
Length: 93.00 ft
Size: 18 inch



Project Title: Coppergate 2nd Addition
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07/18/02 09:13:08 AM

Baughman Company, P.A.
 37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Project Engineer: Baughman Company, P.A.
StormCAD v1.0

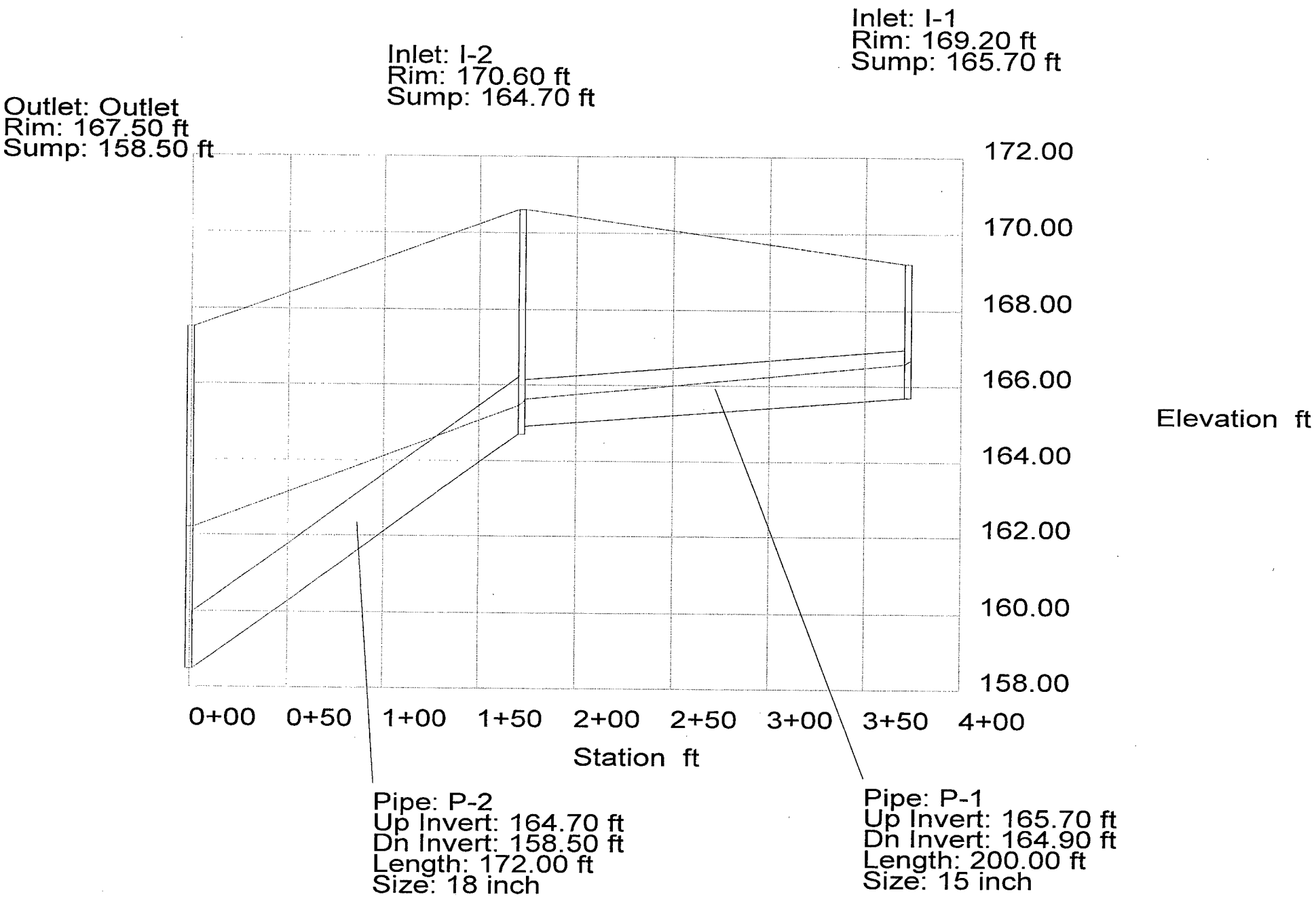
Coppergate 2nd Addition
Stormwater Sewer System #3
Inlet I-2

Drainage area, acres	0.2
Li = Inlet Length	5
So = street grade, ft/ft	0.00527
Sx = 'cross slope, ft/ft	0.03125
Manning's n	0.022
Z in Izzard's Eq. = 1/Sx	32

	2-yr	5-yr	100-yr
Rainfall Intensity, in/hr	3.83	4.56	7.37
Rational "C"	0.46	0.49	0.67
Flowrate, cfs	0.4	0.4	1.0
Additional Flow, cfs	0.0	0.0	0.0
Total Flowrate, cfs	0.4	0.4	1.0
depth of flow, ft	0.15	0.16	0.22
Flow width, ft	4.69	5.12	6.90
Froude Number	0.62767	0.63706	0.66943
Length 1, ft	2.59	2.87	4.06
Length 2, ft	1.70	1.89	2.67
Length 3, ft	4.85	5.39	7.62
case 1, Li < L2 intercepted flow bypassed flow	NO GOOD 0.7 0.0	NO GOOD 0.8 0.0	NO GOOD 1.2 0.0
case 2, Li > L2 intercepted flow bypassed flow	VALID 0.4 0.0	VALID 0.4 0.0	VALID 0.8 0.2

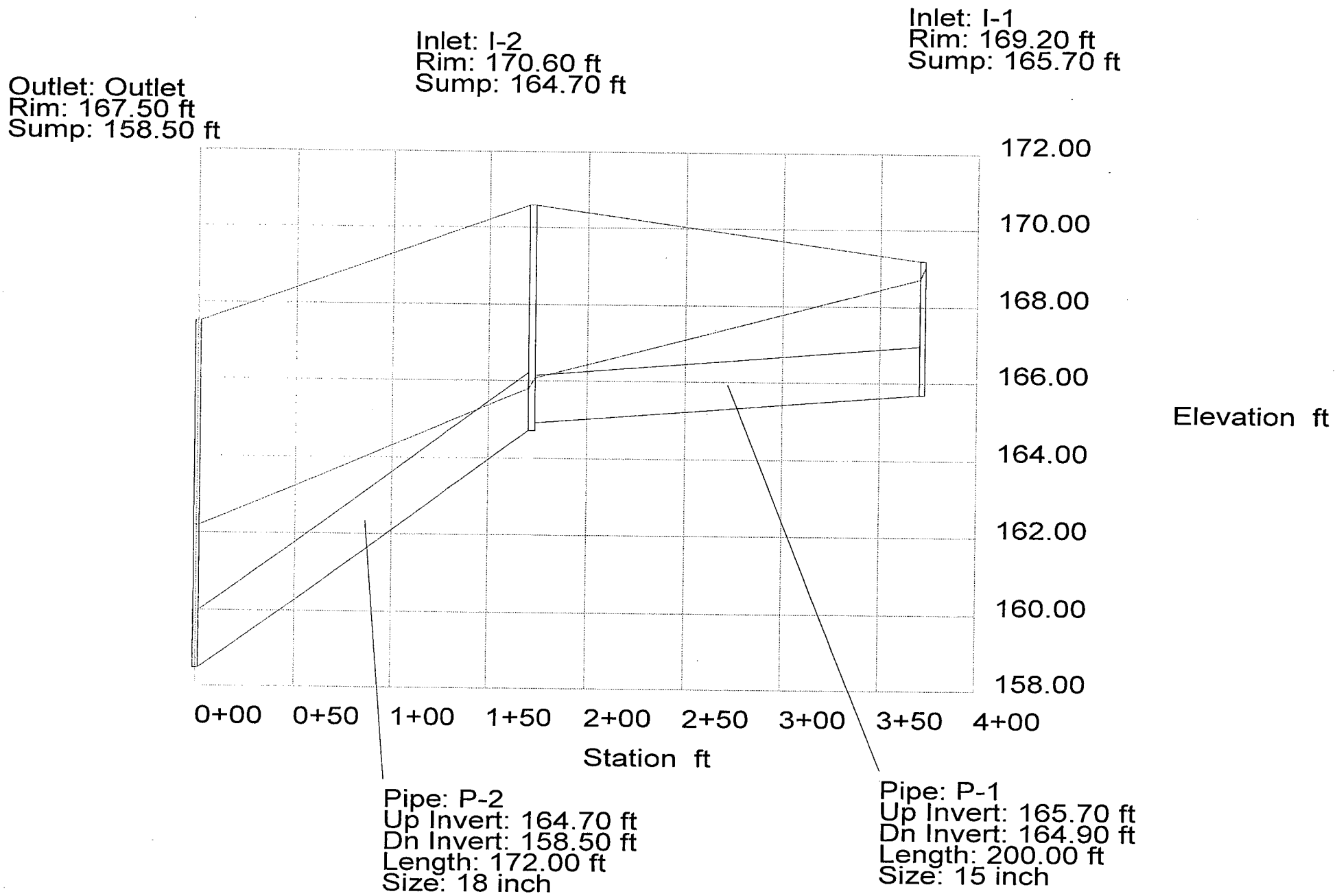
System Report

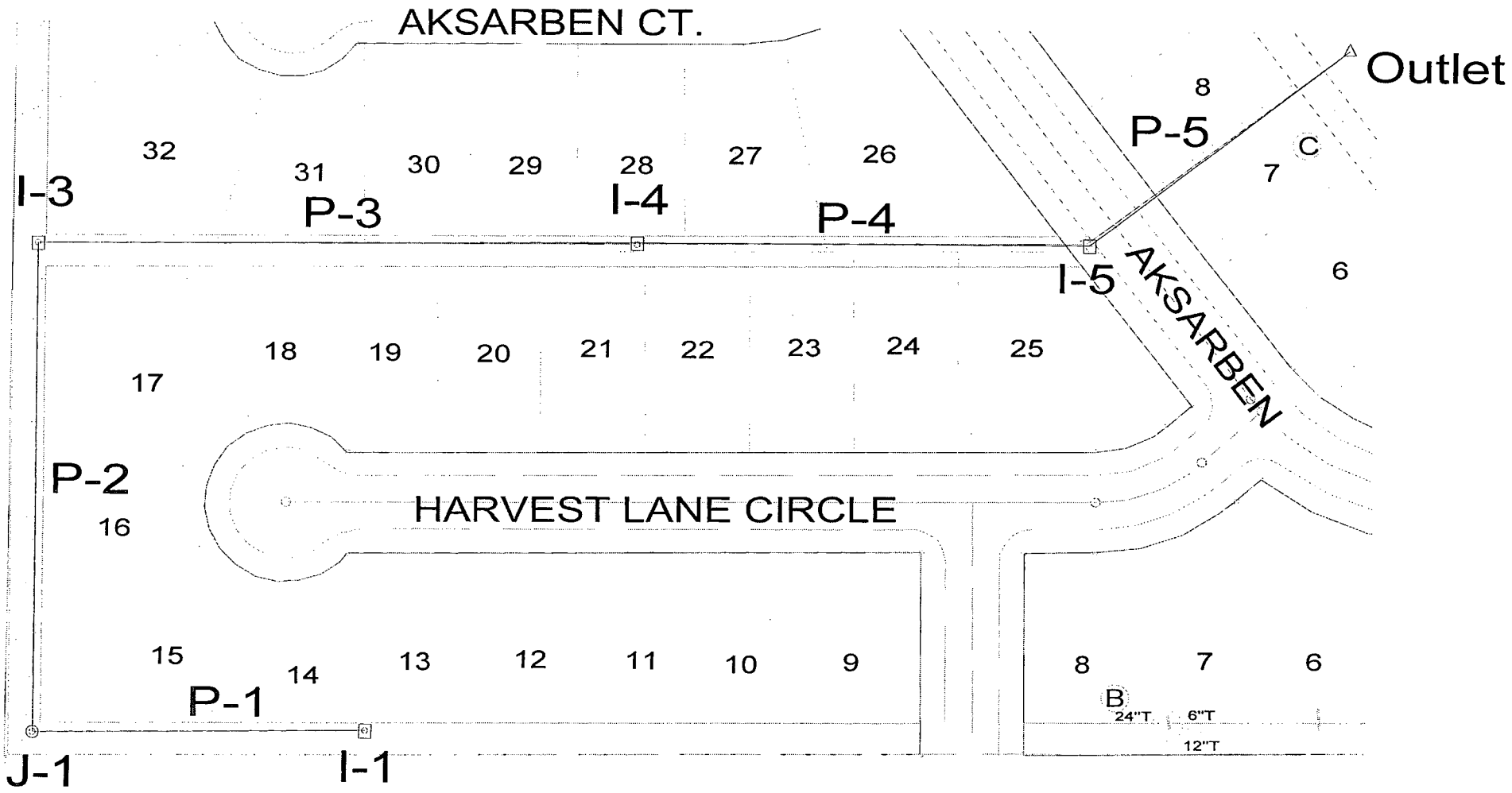
Pipe	Additional Flow (cfs)	Total Upstream Added (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	-Section- Shape Size	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	Length (ft)	Average Velocity (ft/s)	Description
P-1	3.40	0.00	3.40	I-1	Circular	165.70	164.90	169.20	166.57	0.004163	3.40	200.00	4.10	
				I-2	15 inch			170.60	165.64	0.004000	4.09			
P-2	0.40	3.40	3.80	I-2	Circular	164.70	158.50	170.60	165.45	0.020148	3.80	172.00	3.24	
				Outlet	18 inch			167.50	162.20	0.036047	19.94			


Inlet: I-1
Rim: 169.20 ft
Sump: 165.70 ft
Inlet: I-2
Rim: 170.60 ft
Sump: 164.70 ft
Outlet: Outlet
Rim: 167.50 ft
Sump: 158.50 ft
172.00
170.00
168.00
166.00
164.00
162.00
160.00
158.00
Elevation ft
0+00
0+50
1+00
1+50
2+00
2+50
3+00
3+50
4+00
Station ft
Pipe: P-2
Up Invert: 164.70 ft
Dn Invert: 158.50 ft
Length: 172.00 ft
Size: 18 inch
Pipe: P-1
Up Invert: 165.70 ft
Dn Invert: 164.90 ft
Length: 200.00 ft
Size: 15 inch

System Report

Pipe	Additional Flow (cfs)	Total Upstream Added (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	-Section- Shape Size	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	Length (ft)	Average Velocity (ft/s)	Description
P-1	7.40	0.00	7.40	I-1	Circular	165.70	164.90	169.20	168.72	0.013086	7.40	200.00	6.11	
				I-2	15 inch			170.60	166.08	0.004000	4.09			
P-2	0.80	7.40	8.20	I-2	Circular	164.70	158.50	170.60	165.81	0.022133	8.20	172.00	5.25	
				Outlet	18 inch			167.50	162.20	0.036047	19.94			


Inlet: I-1
Rim: 169.20 ft
Sump: 165.70 ft
Inlet: I-2
Rim: 170.60 ft
Sump: 164.70 ft
Outlet: Outlet
Rim: 167.50 ft
Sump: 158.50 ft
172.00
170.00
168.00
166.00
164.00
162.00
160.00
158.00
Elevation ft
0+00
0+50
1+00
1+50
2+00
2+50
3+00
3+50
4+00
Station ft
Pipe: P-2
Up Invert: 164.70 ft
Dn Invert: 158.50 ft
Length: 172.00 ft
Size: 18 inch
Pipe: P-1
Up Invert: 165.70 ft
Dn Invert: 164.90 ft
Length: 200.00 ft
Size: 15 inch


AKSARBEN CT.
Outlet
8
P-5
C
7
32
31
30
29
28
27
26
I-3
P-3
I-4
P-4
I-5
AKSARBEN
6
18
19
20
21
22
23
24
25
17
P-2
16
HARVEST LANE CIRCLE
15
14
13
12
11
10
9
8
7
6
B
24"T
6"T
12"T
P-1
J-1
I-1

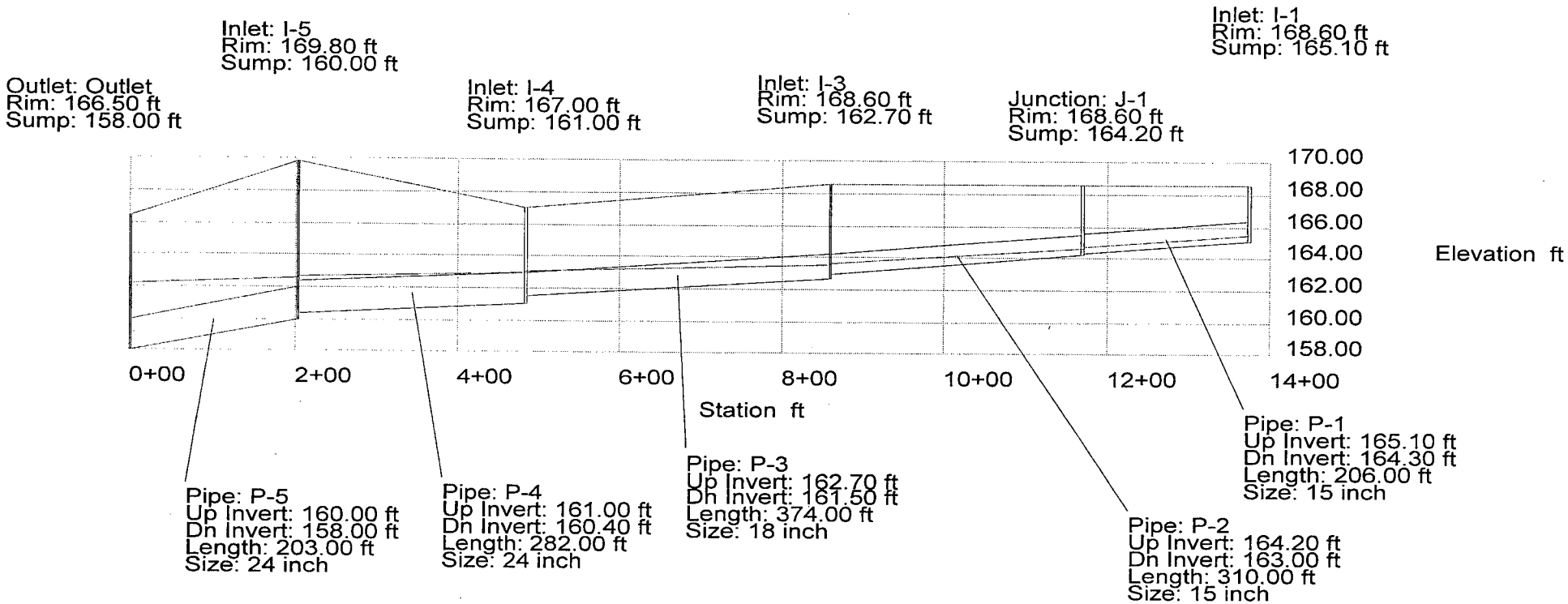
Coppergate 2nd Addition
Stormwater Sewer System #4
Inlet I-5

Drainage area, acres	1.1
Li = Inlet Length	10
So = street grade, ft/ft	0.01421
Sx = 'cross slope, ft/ft	0.03125
Manning's n	0.022
Z in Izzard's Eq. = 1/Sx	32

	2-yr	5-yr	100-yr
Rainfall Intensity, in/hr	3.83	4.56	7.37
Rational "C"	0.46	0.49	0.67
Flowrate, cfs	1.9	2.5	5.4
Additional Flow, cfs	0.0	0.0	0.0
Total Flowrate, cfs	1.9	2.5	5.4
depth of flow, ft	0.23	0.25	0.34
Flow width, ft	7.37	8.06	10.85
Froude Number	1.11156	1.12820	1.18552
Length 1, ft	7.22	8.01	11.33
Length 2, ft	4.74	5.26	7.44
Length 3, ft	13.52	15.01	21.23
case 1, Li < L2 intercepted flow bypassed flow	NO GOOD 2.7 0.0	NO GOOD 3.1 0.0	NO GOOD 4.8 0.6
case 2, Li > L2 intercepted flow bypassed flow	VALID 1.7 0.2	VALID 2.1 0.4	VALID 4.0 1.4

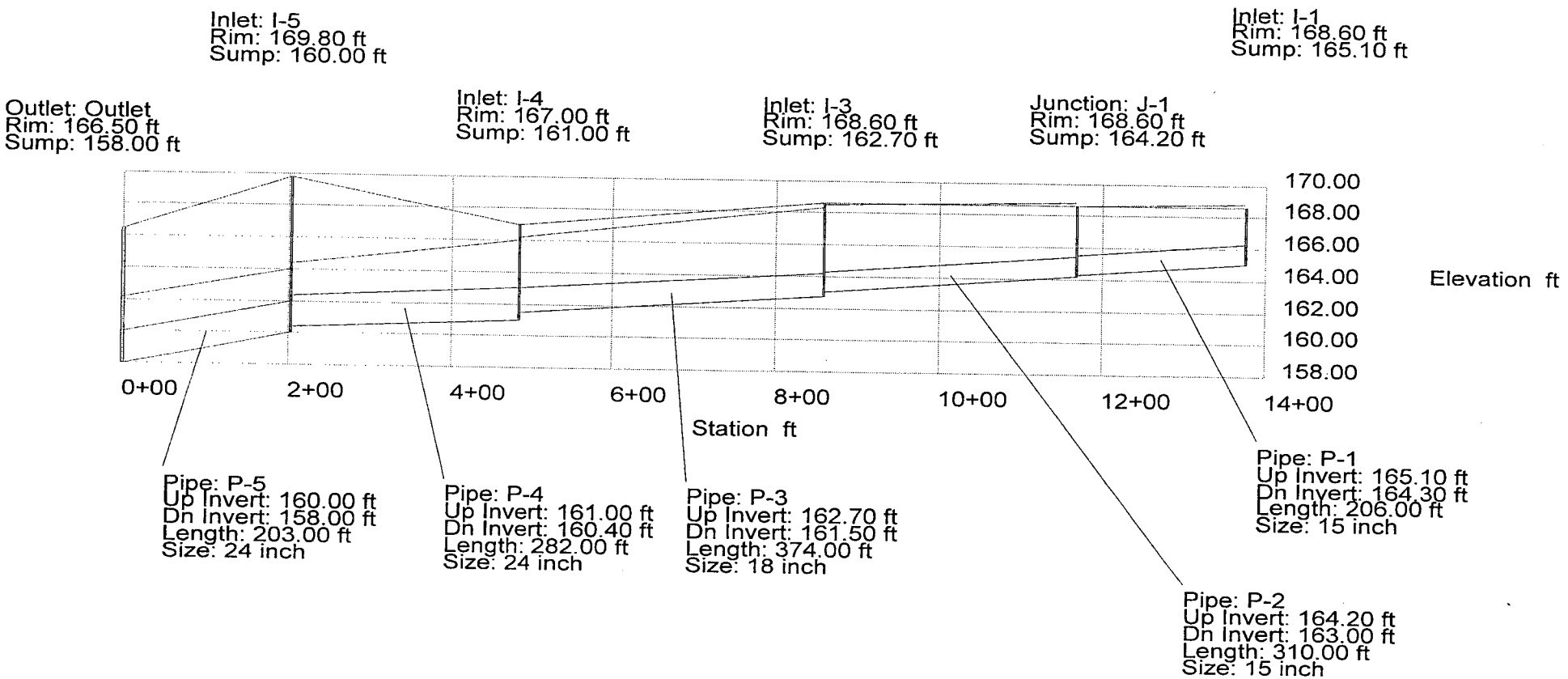
System Report

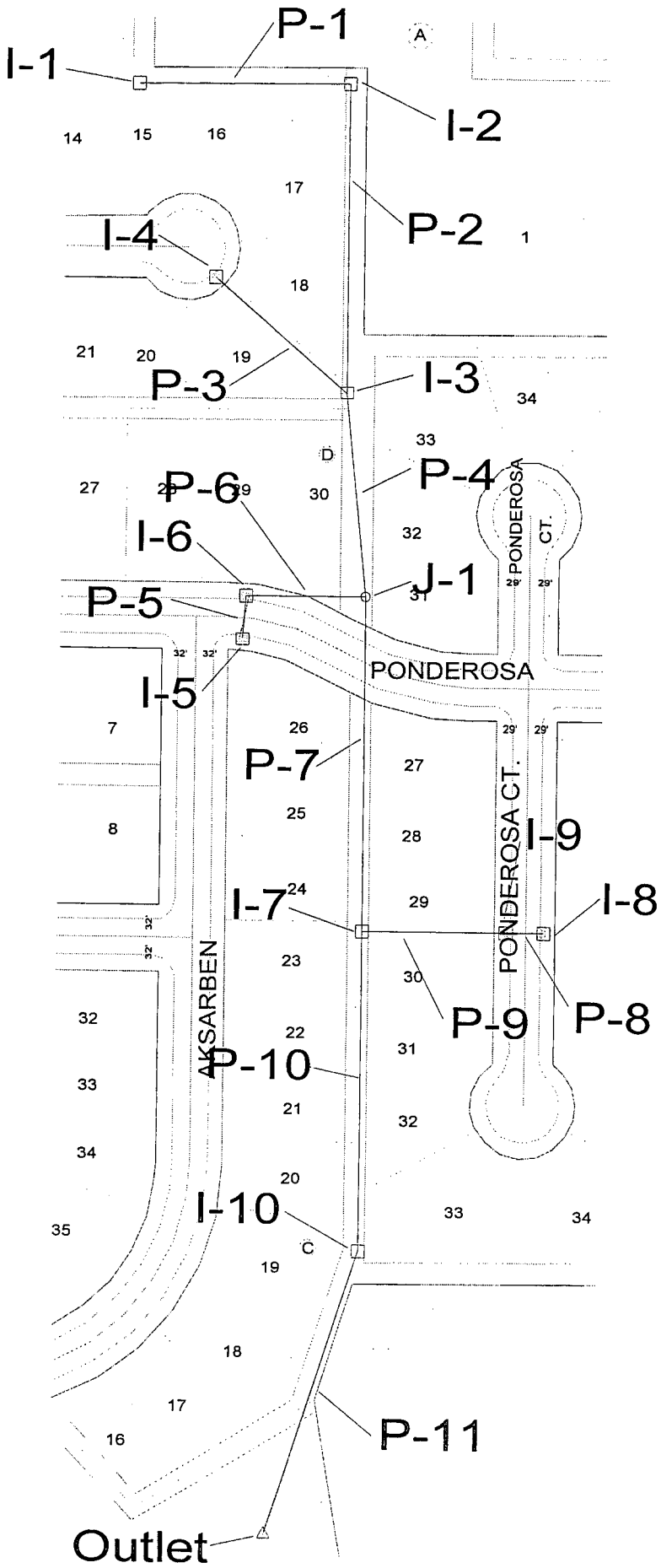
Pipe	Additional Flow (cfs)	Total Upstream Added (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	-Section- Shape Size	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	Length (ft)	Average Velocity (ft/s)	Description
P-1	0.90	0.00	0.90	I-1	Circular	165.10	164.30	168.60	165.50	0.003903	0.90	206.00	2.79	
				J-1	15 inch			168.60	164.67	0.003883	4.03			
P-2	N/A	0.90	0.90	J-1	Circular	164.20	163.00	168.60	164.60	0.003329	0.90	310.00	2.02	
				I-3	15 inch			168.60	163.65	0.003871	4.02			
P-3	2.70	0.90	3.60	I-3	Circular	162.70	161.50	168.60	163.55	0.001677	3.60	374.00	2.75	
				I-4	18 inch			167.00	163.05	0.003209	5.95			
P-4	4.20	3.60	7.80	I-4	Circular	161.00	160.40	167.00	163.00	0.001189	7.80	282.00	2.48	
				I-5	24 inch			169.80	162.67	0.002128	10.43			
P-5	2.10	7.80	9.90	I-5	Circular	160.00	158.00	169.80	162.59	0.001915	9.90	203.00	3.15	
				Outlet	24 inch			166.50	162.20	0.009852	22.45			



System Report

Pipe	Additional Flow (cfs)	Total Upstream Added (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	-Section- Shape Size	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	Length (ft)	Average Velocity (ft/s)	Description
P-1	2.00	0.00	2.00	I-1	Circular	165.10	164.30	168.60	168.80	0.000959	2.00	206.00	1.63	
				J-1	15 inch			168.60	168.60	0.003883	4.03			
P-2	N/A	2.00	2.00	J-1	Circular	164.20	163.00	168.60	168.81	0.000959	2.00	310.00	1.63	
				I-3	15 inch			168.60	168.51	0.003871	4.02			
P-3	5.90	2.00	7.90	I-3	Circular	162.70	161.50	168.60	168.36	0.005657	7.90	374.00	4.47	
				I-4	18 inch			167.00	166.24	0.003209	5.95			
P-4	9.40	7.90	17.30	I-4	Circular	161.00	160.40	167.00	166.01	0.005849	17.30	282.00	5.51	
				I-5	24 inch			169.80	164.36	0.002128	10.43			
P-5	4.00	17.30	21.30	I-5	Circular	160.00	158.00	169.80	164.00	0.008866	21.30	203.00	6.78	
				Outlet	24 inch			166.50	162.20	0.009852	22.45			





Baughman Company, P.A.
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

System Report

Pipe	Additional Flow (cfs)	Total Upstream Added (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	-Section- Shape Size	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	Length (ft)	Average Velocity (ft/s)	Description
P-8	1.80	0.00	1.80	I-8	Circular	166.50	166.30	170.40	167.09	0.002386	1.80	35.00	2.69	
				I-9	15 inch			170.40	167.09	0.005714	4.88			
P-9	2.20	1.80	4.00	I-9	Circular	166.10	162.50	170.40	166.91	0.022503	4.00	137.00	4.01	
				I-7	15 inch			170.50	164.01	0.026277	10.47			
P-5	2.20	0.00	2.20	I-5	Circular	168.50	168.30	172.40	169.14	0.003151	2.20	41.00	3.09	
				I-6	15 inch			172.40	169.09	0.004878	4.51			
P-6	1.80	2.20	4.00	I-6	Circular	168.10	165.00	172.40	168.91	0.023542	4.00	116.00	6.38	
				J-1	15 inch			172.80	165.53	0.026724	10.56			
P-3	2.90	0.00	2.90	I-4	Circular	169.30	164.50	173.20	169.98	0.027681	2.90	168.00	3.50	
				I-3	15 inch			168.60	165.49	0.028571	10.92			
P-1	3.80	0.00	3.80	I-1	Circular	169.30	165.30	172.80	170.09	0.018489	3.80	205.00	5.85	
				I-2	15 inch			168.80	165.87	0.019512	9.02			
P-2	1.10	3.80	4.90	I-2	Circular	165.00	164.10	168.80	165.87	0.001817	4.90	290.00	2.93	
				I-3	24 inch			168.60	165.49	0.003103	12.60			
P-4	6.70	7.80	14.50	I-3	Circular	164.00	163.40	168.60	165.30	0.003060	14.50	193.00	4.85	
				J-1	36 inch			172.80	164.74	0.003109	37.19			
P-7	N/A	18.50	18.50	J-1	Circular	162.90	162.20	172.80	164.57	0.001954	18.50	316.00	4.35	
				I-7	36 inch			170.50	164.01	0.002215	31.39			
P-10	2.50	22.50	25.00	I-7	Circular	161.70	161.20	170.50	163.85	0.002175	25.00	304.00	5.03	
				I-10	36 inch			169.00	163.06	0.001645	27.05			
P-11	2.90	25.00	27.90	I-10	Circular	161.00	157.00	169.00	162.71	0.003463	27.90	279.00	5.33	
				Outlet	36 inch			165.00	162.20	0.014337	79.86			

Inlet: I-10
Rim: 169.00 ft
Sump: 161.00 ft

Junction: J-1
Rim: 172.80 ft
Sump: 162.90 ft

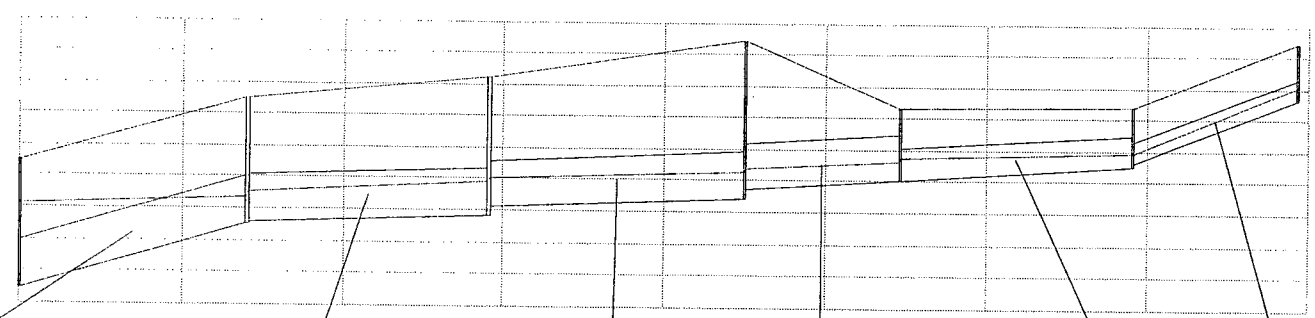
Inlet: I-2
Rim: 168.80 ft
Sump: 165.00 ft

Outlet: Outlet
Rim: 165.00 ft
Sump: 157.00 ft

Inlet: I-7
Rim: 170.50 ft
Sump: 161.70 ft

Inlet: I-3
Rim: 168.60 ft
Sump: 164.00 ft

Inlet: I-1
Rim: 172.80 ft
Sump: 169.30 ft



Pipe: P-11
Up Invert: 161.00 ft
Dn Invert: 157.00 ft
Length: 279.00 ft
Size: 36 inch

Pipe: P-10
Up Invert: 161.70 ft
Dn Invert: 161.20 ft
Length: 304.00 ft
Size: 36 inch

Pipe: P-7
Up Invert: 162.90 ft
Dn Invert: 162.20 ft
Length: 316.00 ft
Size: 36 inch

Pipe: P-4
Up Invert: 164.00 ft
Dn Invert: 163.40 ft
Length: 193.00 ft
Size: 36 inch

Pipe: P-2
Up Invert: 165.00 ft
Dn Invert: 164.10 ft
Length: 290.00 ft
Size: 24 inch

Pipe: P-1
Up Invert: 169.30 ft
Dn Invert: 165.30 ft
Length: 205.00 ft
Size: 15 inch

Inlet: I-6
Rim: 172.40 ft
Sump: 168.10 ft

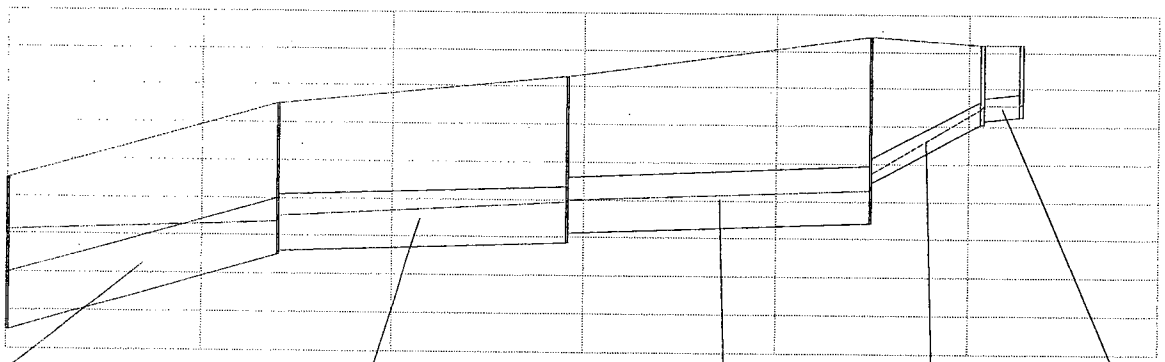
Inlet: I-7
Rim: 170.50 ft
Sump: 161.70 ft

Inlet: I-5
Rim: 172.40 ft
Sump: 168.50 ft

Outlet: Outlet
Rim: 165.00 ft
Sump: 157.00 ft

Inlet: I-10
Rim: 169.00 ft
Sump: 161.00 ft

Junction: J-1
Rim: 172.80 ft
Sump: 162.90 ft



Pipe: P-11
Up Invert: 161.00 ft
Dn Invert: 157.00 ft
Length: 279.00 ft
Size: 36 inch

Pipe: P-10
Up Invert: 161.70 ft
Dn Invert: 161.20 ft
Length: 304.00 ft
Size: 36 inch

Pipe: P-7
Up Invert: 162.90 ft
Dn Invert: 162.20 ft
Length: 316.00 ft
Size: 36 inch

Pipe: P-6
Up Invert: 168.10 ft
Dn Invert: 165.00 ft
Length: 116.00 ft
Size: 15 inch

Pipe: P-5
Up Invert: 168.50 ft
Dn Invert: 168.30 ft
Length: 41.00 ft
Size: 15 inch

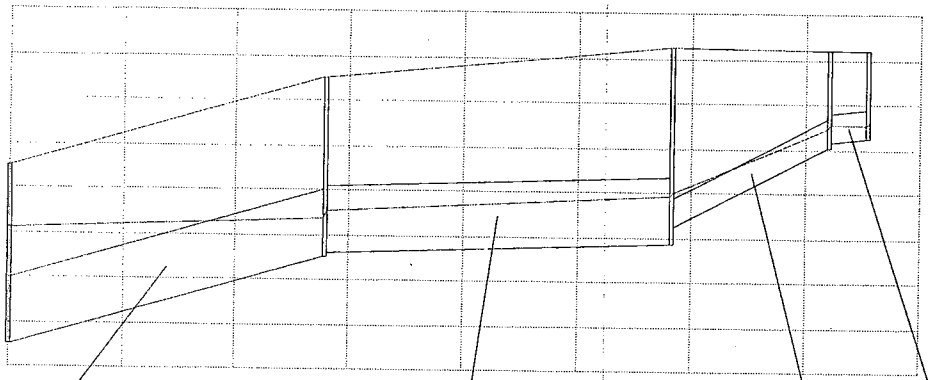
Inlet: I-7
Rim: 170.50 ft
Sump: 161.70 ft

Inlet: I-8
Rim: 170.40 ft
Sump: 166.50 ft

Outlet: Outlet
Rim: 165.00 ft
Sump: 157.00 ft

Inlet: I-10
Rim: 169.00 ft
Sump: 161.00 ft

Inlet: I-9
Rim: 170.40 ft
Sump: 166.10 ft



172.00
170.00
168.00
166.00
164.00
162.00
160.00
158.00
156.00

Elevation ft

0+001+002+003+004+005+006+007+008+00

Station ft

Pipe: P-8
Up Invert: 166.50 ft
Dn Invert: 166.30 ft
Length: 35.00 ft
Size: 15 inch

Pipe: P-11
Up Invert: 161.00 ft
Dn Invert: 157.00 ft
Length: 279.00 ft
Size: 36 inch

Pipe: P-10
Up Invert: 161.70 ft
Dn Invert: 161.20 ft
Length: 304.00 ft
Size: 36 inch

Pipe: P-9
Up Invert: 166.10 ft
Dn Invert: 162.50 ft
Length: 137.00 ft
Size: 15 inch

System Report

Pipe	Additional Flow (cfs)	Total Upstream Added (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	-Section- Shape Size	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	Length (ft)	Average Velocity (ft/s)	Description
P-8	4.00	0.00	4.00	I-8	Circular	166.50	166.30	170.40	170.53	0.003835	4.00	35.00	3.26	
				I-9	15 inch			170.40	170.40	0.005714	4.88			
P-9	4.90	4.00	8.90	I-9	Circular	166.10	162.50	170.40	170.35	0.018984	8.90	137.00	7.25	
				I-7	15 inch			170.50	167.75	0.026277	10.47			
P-5	4.90	0.00	4.90	I-5	Circular	168.50	168.30	172.40	172.05	0.005754	4.90	41.00	3.99	
				I-6	15 inch			172.40	171.81	0.004878	4.51			
P-6	4.00	4.90	8.90	I-6	Circular	168.10	165.00	172.40	171.40	0.018984	8.90	116.00	7.25	
				J-1	15 inch			172.80	169.20	0.026724	10.56			
P-3	6.40	0.00	6.40	I-4	Circular	169.30	164.50	173.20	170.85	0.009817	6.40	168.00	5.22	
				I-3	15 inch			168.60	169.20	0.028571	10.92			
P-1	8.40	0.00	8.40	I-1	Circular	169.30	165.30	172.80	172.67	0.016911	8.40	205.00	6.84	
				I-2	15 inch			168.80	169.20	0.019512	9.02			
P-2	2.50	8.40	10.90	I-2	Circular	165.00	164.10	168.80	169.87	0.002322	10.90	290.00	3.47	
				I-3	24 inch			168.60	169.20	0.003103	12.60			
P-4	14.80	17.30	32.10	I-3	Circular	164.00	163.40	168.60	169.65	0.002316	32.10	193.00	4.54	
				J-1	36 inch			172.80	169.20	0.003109	37.19			
P-7	N/A	41.00	41.00	J-1	Circular	162.90	162.20	172.80	168.94	0.003779	41.00	316.00	5.80	
				I-7	36 inch			170.50	167.75	0.002215	31.39			
P-10	5.40	49.90	55.30	I-7	Circular	161.70	161.20	170.50	167.27	0.006875	55.30	304.00	7.82	
				I-10	36 inch			169.00	165.18	0.001645	27.05			
P-11	6.40	55.30	61.70	I-10	Circular	161.00	157.00	169.00	164.59	0.008558	61.70	279.00	8.73	
				Outlet	36 inch			165.00	162.20	0.014337	79.86			

Inlet: I-10
Rim: 169.00 ft
Sump: 161.00 ft

Inlet: I-3
Rim: 168.60 ft
Sump: 164.00 ft

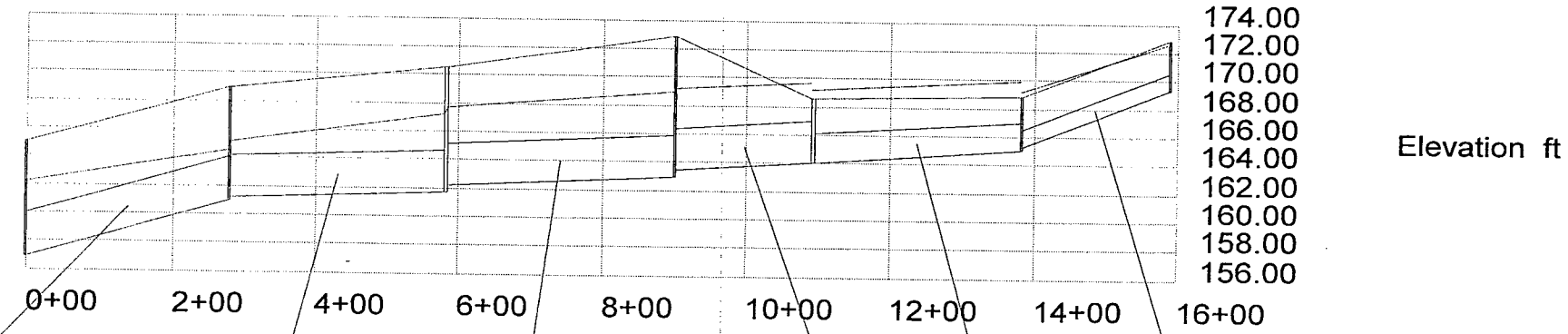
Inlet: I-1
Rim: 172.80 ft
Sump: 169.30 ft

Outlet: Outlet
Rim: 165.00 ft
Sump: 157.00 ft

Inlet: I-7
Rim: 170.50 ft
Sump: 161.70 ft

Junction: J-1
Rim: 172.80 ft
Sump: 162.90 ft

Inlet: I-2
Rim: 168.80 ft
Sump: 165.00 ft



Pipe: P-11
Up Invert: 161.00 ft
Dn Invert: 157.00 ft
Length: 279.00 ft
Size: 36 inch

Pipe: P-10
Up Invert: 161.70 ft
Dn Invert: 161.20 ft
Length: 304.00 ft
Size: 36 inch

Pipe: P-7
Up Invert: 162.90 ft
Dn Invert: 162.20 ft
Length: 316.00 ft
Size: 36 inch

Pipe: P-4
Up Invert: 164.00 ft
Dn Invert: 163.40 ft
Length: 193.00 ft
Size: 36 inch

Pipe: P-2
Up Invert: 165.00 ft
Dn Invert: 164.10 ft
Length: 290.00 ft
Size: 24 inch

Pipe: P-1
Up Invert: 169.30 ft
Dn Invert: 165.30 ft
Length: 205.00 ft
Size: 15 inch

Junction: J-1
Rim: 172.80 ft
Sump: 162.90 ft

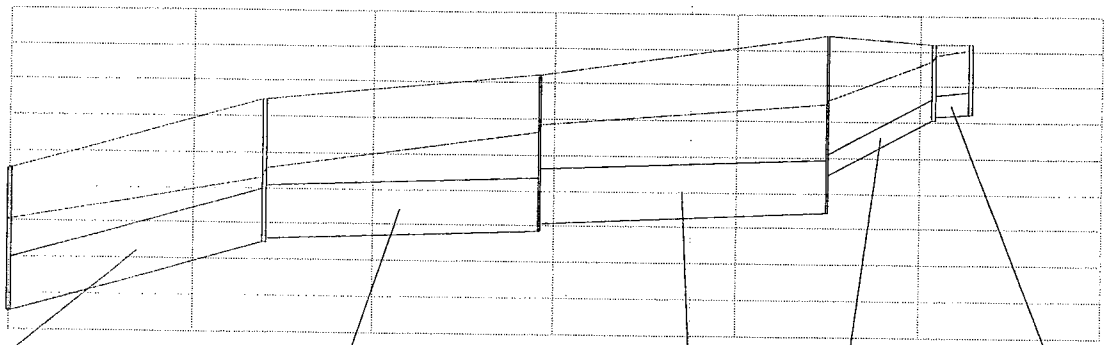
Inlet: I-10
Rim: 169.00 ft
Sump: 161.00 ft

Inlet: I-5
Rim: 172.40 ft
Sump: 168.50 ft

Inlet: I-6
Rim: 172.40 ft
Sump: 168.10 ft

Inlet: I-7
Rim: 170.50 ft
Sump: 161.70 ft

Outlet: Outlet
Rim: 165.00 ft
Sump: 157.00 ft



Pipe: P-11
Up Invert: 161.00 ft
Dn Invert: 157.00 ft
Length: 279.00 ft
Size: 36 inch

Pipe: P-10
Up Invert: 161.70 ft
Dn Invert: 161.20 ft
Length: 304.00 ft
Size: 36 inch

Pipe: P-7
Up Invert: 162.90 ft
Dn Invert: 162.20 ft
Length: 316.00 ft
Size: 36 inch

Pipe: P-6
Up Invert: 168.10 ft
Dn Invert: 165.00 ft
Length: 116.00 ft
Size: 15 inch

Pipe: P-5
Up Invert: 168.50 ft
Dn Invert: 168.30 ft
Length: 41.00 ft
Size: 15 inch

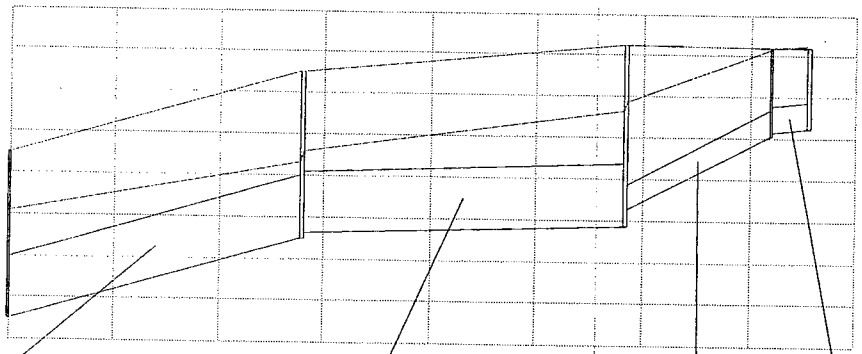
Inlet: I-9
Rim: 170.40 ft
Sump: 166.10 ft

Inlet: I-10
Rim: 169.00 ft
Sump: 161.00 ft

Inlet: I-8
Rim: 170.40 ft
Sump: 166.50 ft

Inlet: I-7
Rim: 170.50 ft
Sump: 161.70 ft

Outlet: Outlet
Rim: 165.00 ft
Sump: 157.00 ft



Pipe: P-8
Up Invert: 166.50 ft
Dn Invert: 166.30 ft
Length: 35.00 ft
Size: 15 inch

Pipe: P-11
Up Invert: 161.00 ft
Dn Invert: 157.00 ft
Length: 279.00 ft
Size: 36 inch

Pipe: P-10
Up Invert: 161.70 ft
Dn Invert: 161.20 ft
Length: 304.00 ft
Size: 36 inch

Pipe: P-9
Up Invert: 166.10 ft
Dn Invert: 162.50 ft
Length: 137.00 ft
Size: 15 inch