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DRAINAGE PLAN
FOR
COPPER GATE NORTH ADDITION

WICHITA, SEDGWICK COUNTY, KANSAS

March 29, 2004

SUMMARY

INTRODUCTION

This Drainage Plan is for the proposed development known as Copper Gate North Addition. The site is located in the SE ¼ of Section 11, Township 27S, Range 2W. The proposed plat is 36 acres with 105 lots planned. Modifications to drainage features and structures, and the site grading may be made as necessary during the final design.

SITE DATA

Current land use is agricultural. The land drains predominately to the southeast with the stormwater runoff passing through two existing 36" culverts under 135th Street West.

Per the Soil Conservation Service "Soil Survey of Sedgwick County", the existing soil types are predominately Ba and Bb, Blanket. The off-site area that contributes runoff is also soil type Ba. These soils are hydrologic soil group type C. The applicable page of the Soil Survey is attached later in this report. Runoff coefficients and curve numbers are partially based on the soil type.

An excerpt of the USGS quadrangle map is enclosed, showing the site location and the off-site drainage area.

CONCEPTUAL PLAN

The site takes approximately 10 acres of off-site runoff from the west.

The drainage plan calls for a pond in the south-central portion of the site. This pond is located next to the existing drainage course. This pond will collect runoff from the

northern portion of the site, the western portion of the site, the southern portion of the site, and the off-site runoff to the west.

The pond holds and then releases the flow via a new drainage channel to the existing double 36" diameter CMP culverts under 135th Street West. Runoff from the various areas is routed to the pond through two pipe systems that collect the flow from the areas stated above. The stormwater piping reaches the piping network through curb and gutter flow to inlets in the new streets. In addition, the stormwater piping extends into the back lot areas behind the houses to pick up the overland flow in the drainage easement at the back of the lots.

Flows for the stormwater piping systems were determined based on the Rational Method with time of concentration based on the S.C.S. TR-55 Method. A minimum time of concentration of 15 minutes was considered.

A pipe system collects runoff from the northeast corner of the site. A separate system collects runoff from the extreme eastern portion of the site. Both of these systems discharge to the new channel downstream of the new pond.

RESULTS

Enclosed are the Drainage Plan and the Grading Plan. Also attached are the Stormcad analyses for the stormwater piping systems, HY8 calculations for the culverts, Flowmaster calculations for the drainage channels, and pond routing calculations for the pond.

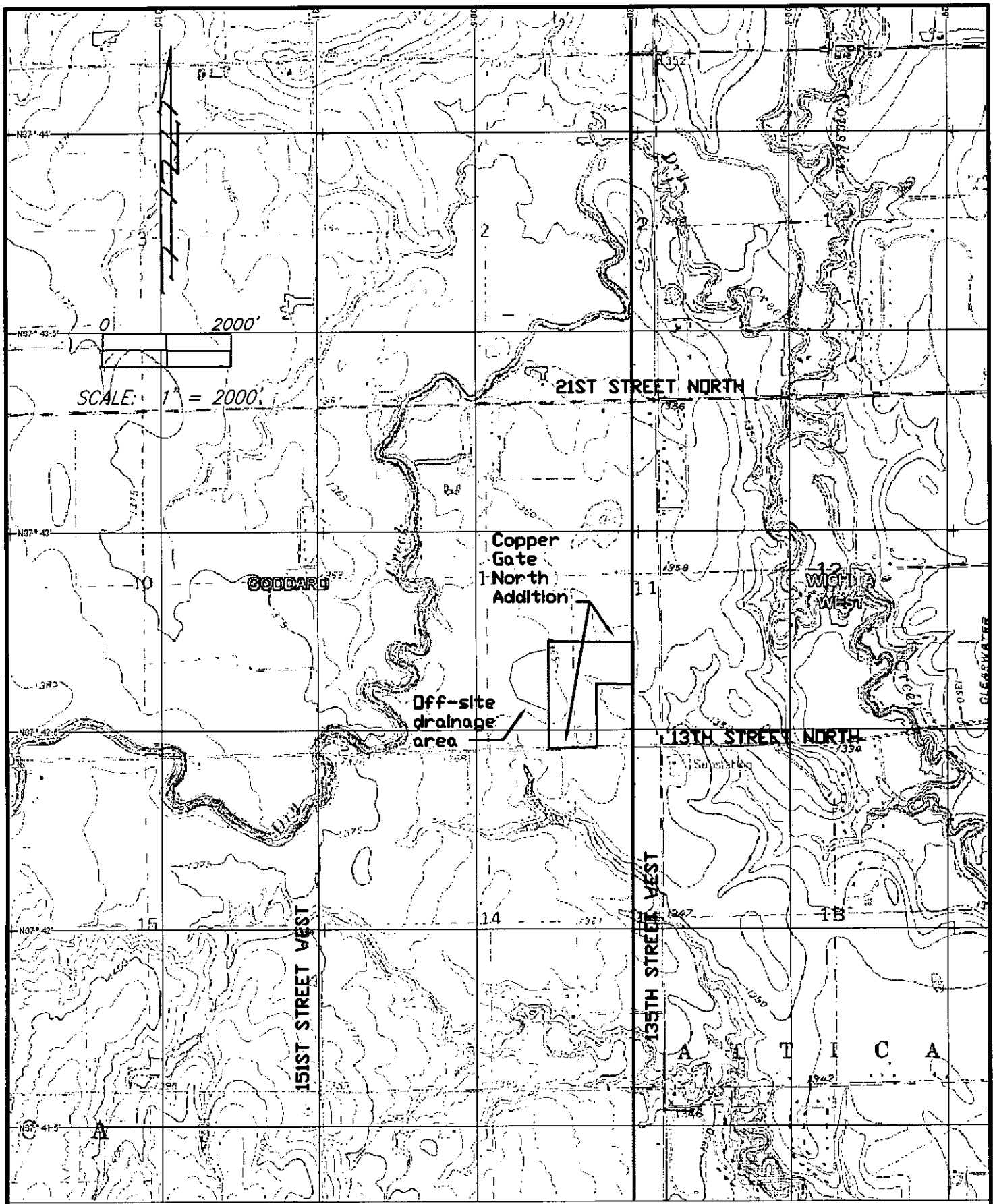
Total post-developed flow in the new channel to the two existing 36" diameter culverts is well below that of the pre-development flow to these same culverts. The pond calculations show results for the 2 yr., 5 yr., and 100 yr. return events.

The new culvert at the entrance of Autumn Ridge off of 135th St. West will pass the new 100 yr. flow. The existing ditch upstream of this culvert will also convey the new 100 yr. flow.

The new culvert at the entrance of Aksarben off of 13th St. North will also pass the new 100 yr. flow.

The pipe network which collects the off-site drainage to the west will prevent back-up of flow on the property to the west.

USGS QUADRANGLE MAP



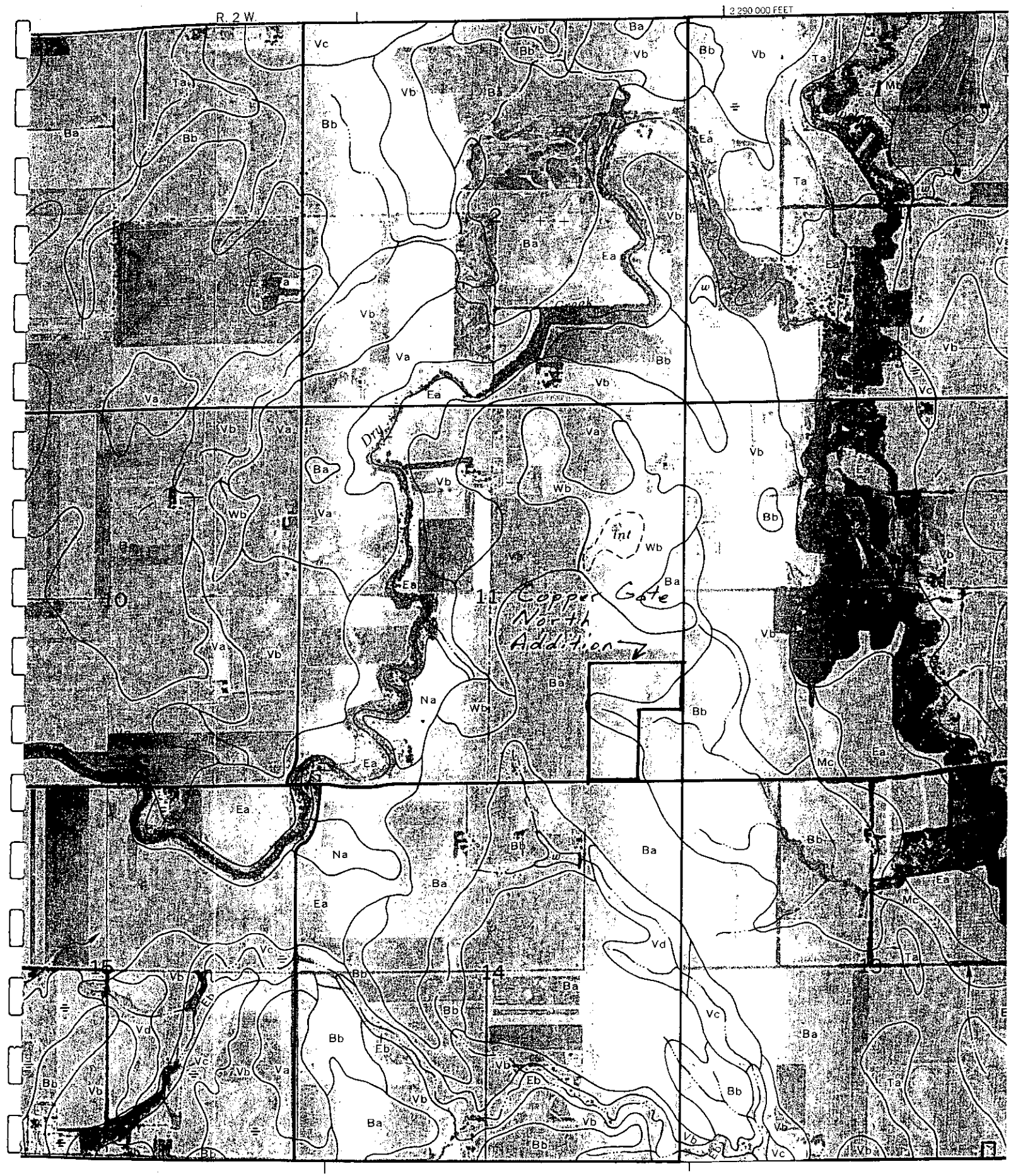
693 ft Scale: 1 : 24,000 Detail: 13-3 Datum: NAD27

Copper Gate North Addition
Area Map

BAUGHMAN COMPANY, P.A.
ENGINEERING, SURVEYING, & PLANNING
316-262-7271 • 315 ELLIS • WICHITA, KANSAS 67211

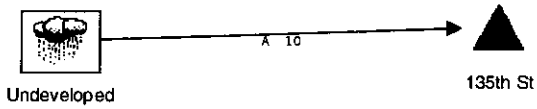
SCS AERIAL WITH SOIL TYPES

EDGWICK COUNTY, KANSAS — SHEET NUMBER 32



CALCULATIONS

PRE-DEVELOPMENT RUNOFF


A 10
Undeveloped
135th St

MASTER DESIGN STORM SUMMARY

Default Network Design Storm File, ID WICHITA.RNQ WICHITA

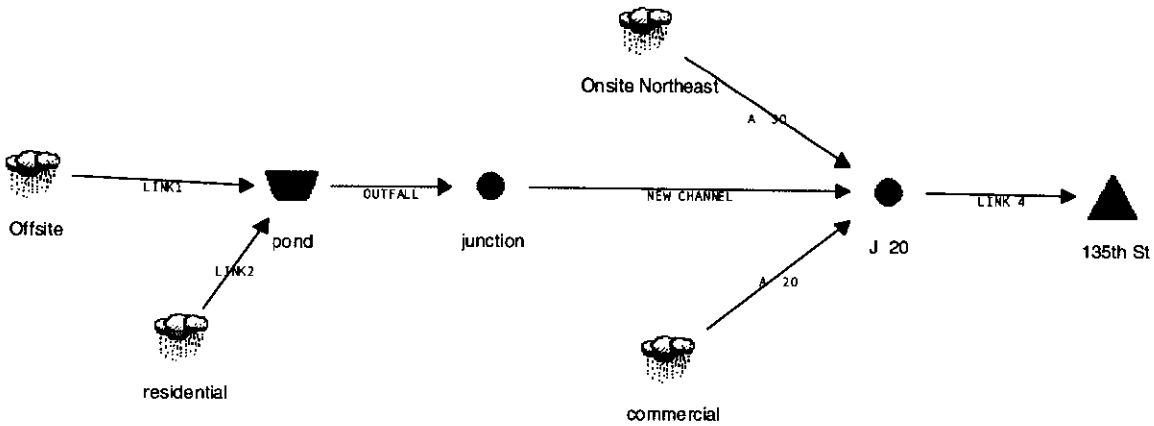
Return Event	Total Depth in	Rainfall Type	RNF File	RNF ID
2-yr	3.6000	Synthetic Curve	SCSTYPES	TypeII 24hr
5-yr	4.5600	Synthetic Curve	SCSTYPES	TypeII 24hr
100-yr	7.6800	Synthetic Curve	SCSTYPES	TypeII 24hr

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	9.071		12.3000	78.09		
*135TH ST	JCT	5	13.074		12.3000	112.90		
*135TH ST	JCT	100	27.018		12.2500	230.41		
UNDEVELOPED	AREA	2	9.071		12.3000	78.09		
UNDEVELOPED	AREA	5	13.074		12.3000	112.90		
UNDEVELOPED	AREA	100	27.018		12.2500	230.41		

POST-DEVELOPMENT POND ROUTING


Onsite Northeast
A 30
LINK1
OUTFALL
NEW CHANNEL
LINK 4
Offsite
pond
junction
J 20
135th St
LINK2
A 20
residential
commercial

MASTER DESIGN STORM SUMMARY

Default Network Design Storm File, ID WICHITA.RNQ WICHITA

Return Event	Total Depth in	Rainfall Type	RNF File	RNF ID
2-yr	3.6000	Synthetic Curve	SCSTYPES	TypeII 24hr
5-yr	4.5600	Synthetic Curve	SCSTYPES	TypeII 24hr
100-yr	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	10.644		12.0400	59.16		
*135TH ST	JCT	5	15.401		12.0400	84.55		
*135TH ST	JCT	100	32.072		12.0400	178.85		
COMMERCIAL	AREA	2	2.151		12.0400	31.23		
COMMERCIAL	AREA	5	3.008		12.0400	43.27		
COMMERCIAL	AREA	100	5.921		12.0400	82.58		
J 20	JCT	2	10.644		12.0400	59.16		
J 20	JCT	5	15.401		12.0400	84.55		
J 20	JCT	100	32.072		12.0400	178.85		
JUNCTION	JCT	2	6.653		13.4000	6.93		
JUNCTION	JCT	5	9.713		12.8800	13.32		
JUNCTION	JCT	100	20.519		12.5400	44.86		
OFFSITE	AREA	2	1.555		12.0800	20.66		
OFFSITE	AREA	5	2.241		12.0800	29.73		
OFFSITE	AREA	100	4.631		12.0800	60.13		
ONSITE NORTHEAST	AREA	2	1.841		12.0400	26.81		
ONSITE NORTHEAST	AREA	5	2.681		12.0400	39.06		
ONSITE NORTHEAST	AREA	100	5.631		12.0400	80.46		

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	6.969		12.0600	98.93		
POND	IN POND	5	10.106		12.0400	143.54		
POND	IN POND	100	21.089		12.0400	294.13		
POND	OUT POND	2	6.653		13.4000	6.93	169.92	3.86
POND	OUT POND	5	9.713		12.8800	13.32	170.31	5.49
POND	OUT POND	100	20.519		12.5400	44.86	171.65	11.11
RESIDENTIAL	AREA	2	5.414		12.0400	78.88		
RESIDENTIAL	AREA	5	7.865		12.0400	114.57		
RESIDENTIAL	AREA	100	16.459		12.0400	234.89		

Conc. Flume, NE prtn. of prprty.- 2 yr.
Worksheet for Triangular Channel

Project Description	
Project File	c:\my documents\coppergate\concflum.fm2
Worksheet	wwwww
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.005000	ft/ft
Left Side Slope	2.250000	H : V
Right Side Slope	2.250000	H : V
Discharge	3.00	cfs

Results		
Depth	0.62	ft
Flow Area	0.86	ft^2
Wetted Perimeter	3.05	ft
Top Width	2.78	ft
Critical Depth	0.64	ft
Critical Slope	0.004053	ft/ft
Velocity	3.48	ft/s
Velocity Head	0.19	ft
Specific Energy	0.81	ft
Froude Number	1.10	
Flow is supercritical.		

Conc. Flume, NE prtn. of prprty.-100 yr.
Worksheet for Triangular Channel

Project Description	
Project File	c:\my documents\coppergate\concflum.fm2
Worksheet	wwwww
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.005000	ft/ft
Left Side Slope	2.250000	H : V
Right Side Slope	2.250000	H : V
Discharge	9.00	cfs

Results		
Depth	0.93	ft
Flow Area	1.96	ft^2
Wetted Perimeter	4.60	ft
Top Width	4.20	ft
Critical Depth	1.00	ft
Critical Slope	0.003500	ft/ft
Velocity	4.58	ft/s
Velocity Head	0.33	ft
Specific Energy	1.26	ft
Froude Number	1.18	
Flow is supercritical.		

NE Ditch along 135th St. - ex. condtns.
Worksheet for Triangular Channel

Project Description	
Project File	c:\my documents\coppergate\eastditc.fm2
Worksheet	Northeast Ditch
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.040	
Channel Slope	0.003110	ft/ft
Depth	1.75	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V

Results		
Discharge	16.81	cfs
Flow Area	9.19	ft²
Wetted Perimeter	11.07	ft
Top Width	10.50	ft
Critical Depth	1.14	ft
Critical Slope	0.030137	ft/ft
Velocity	1.83	ft/s
Velocity Head	0.05	ft
Specific Energy	1.80	ft
Froude Number	0.34	
Flow is subcritical.		

CULVERT CALCULATIONS

NEW CULVERT UNDER AUTUMN RIDGE

CURRENT DATE: 03-09-2004
CURRENT TIME: 10:19:51

FILE DATE: 03-09-2004
FILE NAME: TTTTTT2

****
********** FHWA CULVERT ANALYSIS **********
********** HY-8, VERSION 4.1 **********
****

CULV #	SITE DATA: INLET ELEV. (FT)	SITE DATA: OUTLET ELEV. (FT)	SITE DATA: CULVERT LENGTH (FT)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (FT)	RISE (FT)	MANNING n	INLET TYPE
1	166.10	165.80	60.00	1 RCPE	2.50	1.58	.012	CONVENTIONAL
2								
3								
4								
5								
6								

****

SUMMARY OF CULVERT FLOWS (CFS) FILE: TTTTTT2 DATE: 03-09-2004

ELEV (FT)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
167.50	0	0	0	0	0	0	0	0	1
167.51	1	1	0	0	0	0	0	0	1
167.52	3	3	0	0	0	0	0	0	1
167.55	4	4	0	0	0	0	0	0	1
167.59	6	6	0	0	0	0	0	0	1
167.60	6	6	0	0	0	0	0	0	1
167.70	8	8	0	0	0	0	0	0	1
167.77	10	10	0	0	0	0	0	0	1
167.85	11	11	0	0	0	0	0	0	1
167.95	13	13	0	0	0	0	0	0	1
168.05	14	14	0	0	0	0	0	0	1
169.70	28	28	0	0	0	0	0	OVERTOPPING	

****

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: TTTTTT2 DATE: 03-09-2004

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
167.50	0.00	0	0	0.00
167.51	0.00	1	0	0.00
167.52	0.00	3	0	0.00
167.55	0.00	4	0	0.00
167.59	0.00	6	0	0.00
167.60	0.00	6	0	0.00
167.70	0.00	8	0	0.00
167.77	0.00	10	0	0.00
167.85	0.00	11	0	0.00
167.95	0.00	13	0	0.00
168.05	0.00	14	0	0.00

```
*******************************************************************************
  <1> TOLERANCE (FT) = 0.010                    <2> TOLERANCE (%) = 1.000
*******************************************************************************
```

CURRENT DATE: 03-09-2004 FILE DATE: 03-09-2004
CURRENT TIME: 10:19:51 FILE NAME: TTTTTT2

****

PERFORMANCE CURVE FOR CULVERT # 1 - 1 (2.5 BY 1.583333) RCPE

****

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRITICAL DEPTH (ft)	OUTLET VEL. (fps)	OUTLET DEPTH (ft)	TAILWATER VEL. (fps)	TAILWATER DEPTH (ft)
0	167.50	0.00	1.40	0-NF	0.00	0.00	0.00	0.00	0.00	1.70
1	167.51	0.43	1.41	1-S1f	0.31	0.33	0.44	1.58	0.00	1.70
3	167.52	0.62	1.42	1-S1f	0.43	0.48	0.88	1.58	0.00	1.70
4	167.55	0.78	1.45	1-S1f	0.53	0.59	1.31	1.58	0.00	1.70
6	167.59	0.96	1.49	1-S1f	0.62	0.68	1.75	1.58	0.00	1.70
6	167.60	1.01	1.50	1-S1f	0.65	0.71	1.89	1.58	0.00	1.70
8	167.70	1.24	1.60	4-FFt	0.78	0.85	2.63	1.58	0.00	1.70
10	167.77	1.36	1.67	4-FFt	0.85	0.93	3.07	1.58	0.00	1.70
11	167.85	1.47	1.75	4-FFt	0.92	1.00	3.50	1.58	0.00	1.70
13	167.95	1.59	1.85	4-FFt	1.00	1.07	3.94	1.58	0.00	1.70
14	168.05	1.70	1.95	4-FFt	1.07	1.13	4.38	1.58	0.00	1.70

****

El. inlet face invert 166.10 ft El. outlet invert 165.80 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

****

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION (FT)	100.00
INLET ELEVATION (FT)	166.10
OUTLET STATION (FT)	160.00
OUTLET ELEVATION (FT)	165.80
NUMBER OF BARRELS	1
SLOPE (V-FT/H-FT)	0.0050
CULVERT LENGTH ALONG SLOPE (FT)	60.00

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	ELLIPTICAL
BARREL SPAN	2.50 FT
BARREL RISE	1.58 FT
BARREL MATERIAL	CONCRETE
BARREL MANNING'S N	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	GROOVED END PROJECTING
INLET DEPRESSION	NONE

****

CURRENT DATE: 03-09-2004 FILE DATE: 03-09-2004
CURRENT TIME: 10:19:51 FILE NAME: TTTTTT2

****
********** TAILWATER **********
****
****

CONSTANT WATER SURFACE ELEVATION
167.50

****
********** ROADWAY OVERTOPPING DATA **********
****

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH (FT)	30.00
CREST LENGTH (FT)	30.00
OVERTOPPING CREST ELEVATION (FT)	169.70

****

NEW CULVERT UNDER AKSARBEN

CURRENT DATE: 03-10-2004
CURRENT TIME: 13:09:37

FILE DATE: 03-09-2004
FILE NAME: TTTTTT4

****
********** FHWA CULVERT ANALYSIS **********
********** HY-8, VERSION 4.1 **********
****

CULV #	SITE DATA: INLET ELEV. (FT)	SITE DATA: OUTLET ELEV. (FT)	SITE DATA: CULVERT LENGTH (FT)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (FT)	RISE (FT)	MANNING n	INLET TYPE
1	175.90	175.70	60.00	1 RCP	1.25	1.25	.012	CONVENTIONAL
2								
3								
4								
5								
6								

****

SUMMARY OF CULVERT FLOWS (CFS) FILE: TTTTTT4 DATE: 03-09-2004

ELEV (FT)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
176.50	0	0	0	0	0	0	0	0	1
176.61	1	1	0	0	0	0	0	0	1
176.59	1	1	0	0	0	0	0	0	1
176.67	2	2	0	0	0	0	0	0	1
176.72	2	2	0	0	0	0	0	0	1
176.90	3	3	0	0	0	0	0	0	1
176.99	3	3	0	0	0	0	0	0	1
177.10	4	4	0	0	0	0	0	0	1
177.41	4	4	0	0	0	0	0	0	1
177.53	5	5	0	0	0	0	0	0	1
177.67	5	5	0	0	0	0	0	0	1
178.40	8	8	0	0	0	0	0	OVERTOPPING	

****

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: TTTTTT4 DATE: 03-09-2004

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
176.50	0.00	0	0	0.00
176.61	0.00	1	0	0.00
176.59	0.00	1	0	0.00
176.67	0.00	2	0	0.00
176.72	0.00	2	0	0.00
176.90	0.00	3	0	0.00
176.99	0.00	3	0	0.00
177.10	0.00	4	0	0.00
177.41	0.00	4	0	0.00
177.53	0.00	5	0	0.00
177.67	0.00	5	0	0.00

```
*******************************************************************************
  <1> TOLERANCE (FT) = 0.010                    <2> TOLERANCE (%) = 1.000
*******************************************************************************
```

CURRENT DATE: 03-10-2004 FILE DATE: 03-09-2004
CURRENT TIME: 13:09:37 FILE NAME: TTTTTT4

****

PERFORMANCE CURVE FOR CULVERT # 1 - 1 (1.25 BY 1.25) RCP

****

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRITICAL DEPTH (ft)	OUTLET VEL. (fps)	OUTLET DEPTH (ft)	TAILWATER VEL. (fps)	TAILWATER DEPTH (ft)
0	176.50	0.00	0.60	0-NF	0.00	0.00	0.00	0.00	0.00	0.80
1	176.61	0.34	0.71	3-M1t	0.30	0.28	0.65	0.80	0.00	0.80
1	176.59	0.54	0.69	3-M1t	0.44	0.41	1.30	0.80	0.00	0.80
2	176.67	0.70	0.77	3-M1t	0.55	0.50	1.96	0.80	0.00	0.80
2	176.72	0.77	0.82	3-M1t	0.60	0.55	2.29	0.80	0.00	0.80
3	176.90	0.94	1.00	3-M1t	0.75	0.66	3.26	0.80	0.00	0.80
3	176.99	1.05	1.09	3-M2t	0.85	0.72	3.91	0.80	0.00	0.80
4	177.10	1.15	1.20	3-M2t	0.96	0.78	4.56	0.80	0.00	0.80
4	177.41	1.25	1.51	6-FFn	1.19	0.84	3.52	1.25	0.00	0.80
5	177.53	1.35	1.63	6-FFn	1.25	0.89	3.96	1.25	0.00	0.80
5	177.67	1.46	1.77	6-FFn	1.25	0.94	4.40	1.25	0.00	0.80

****

El. inlet face invert 175.90 ft El. outlet invert 175.70 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

****

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION (FT)	100.00
INLET ELEVATION (FT)	175.90
OUTLET STATION (FT)	160.00
OUTLET ELEVATION (FT)	175.70
NUMBER OF BARRELS	1
SLOPE (V-FT/H-FT)	0.0033
CULVERT LENGTH ALONG SLOPE (FT)	60.00

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	1.25 FT
BARREL MATERIAL	CONCRETE
BARREL MANNING'S N	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	BEVELED EDGE (1.5:1)
INLET DEPRESSION	NONE

****

CURRENT DATE: 03-10-2004 FILE DATE: 03-09-2004
CURRENT TIME: 13:09:37 FILE NAME: TTTTTT4

****
********** TAILWATER **********
****
****

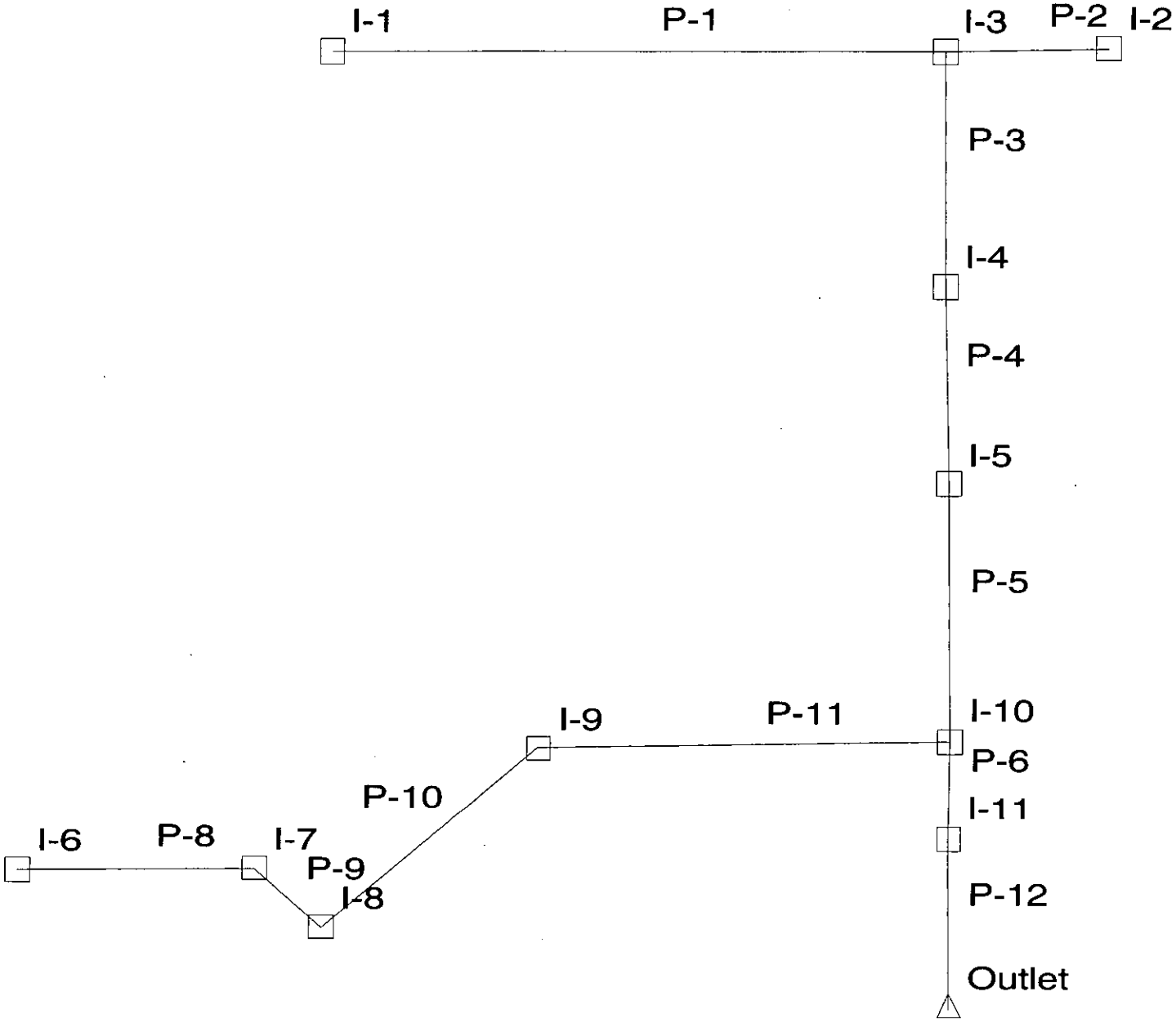
CONSTANT WATER SURFACE ELEVATION
176.50

****
********** ROADWAY OVERTOPPING DATA **********
****

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH (FT)	30.00
CREST LENGTH (FT)	40.00
OVERTOPPING CREST ELEVATION (FT)	178.40

****

STORMWATER PIPE ANALYSIS
SYSTEM #1



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

System Report

Pipe	-Section- Shape Size	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	Additional Flow (cfs)	Length (ft)	Carryover (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	System Flow Time (min)	Average Velocity (ft/s)	Discharge (cfs)	Upstream Invert Elevation (ft)
P-8	Circular	172.40	169.98	9.00	135.00	0.00	9.00	I-6	0.00	2.02	9.00	168.00
	30 inch	174.80	169.94					I-7				
P-9	Circular	174.80	169.90	1.30	40.00	0.00	10.30	I-7	1.11	2.11	10.30	167.50
	30 inch	174.80	169.88					I-8				
P-10	Circular	174.80	169.84	1.30	80.00	0.00	11.60	I-8	1.43	2.36	11.60	167.20
	30 inch	174.10	169.77					I-9				
P-11	Circular	174.10	169.72	1.10	215.00	0.00	12.70	I-9	1.99	2.59	12.70	166.90
	30 inch	172.60	169.51					I-10				
P-2	Circular	174.40	170.00	0.40	42.00	0.00	0.40	I-2	0.00	0.39	0.40	169.10
	15 inch	174.40	170.00					I-3				
P-1	Circular	172.90	170.42	1.70	165.00	0.00	1.70	I-1	0.00	2.52	1.70	169.90
	15 inch	174.40	170.00					I-3				
P-3	Circular	174.40	169.97	0.90	170.00	0.00	3.00	I-3	1.80	1.79	3.00	168.70
	18 inch	175.20	169.84					I-4				
P-4	Circular	175.20	169.81	0.70	127.00	0.00	3.70	I-4	3.39	2.09	3.70	168.00
	18 inch	172.30	169.65					I-5				
P-5	Circular	172.30	169.62	2.60	137.00	0.00	6.30	I-5	4.40	2.01	6.30	167.50
	24 inch	172.60	169.51					I-10				
P-6	Circular	172.60	169.38	1.30	40.00	0.00	20.30	I-10	5.54	4.14	20.30	166.30
	30 inch	172.90	169.28					I-11				
P-12	Circular	172.90	169.19	3.70	150.00	0.00	24.00	I-11	5.70	3.40	24.00	166.00
	36 inch	171.00	169.00					Outlet				

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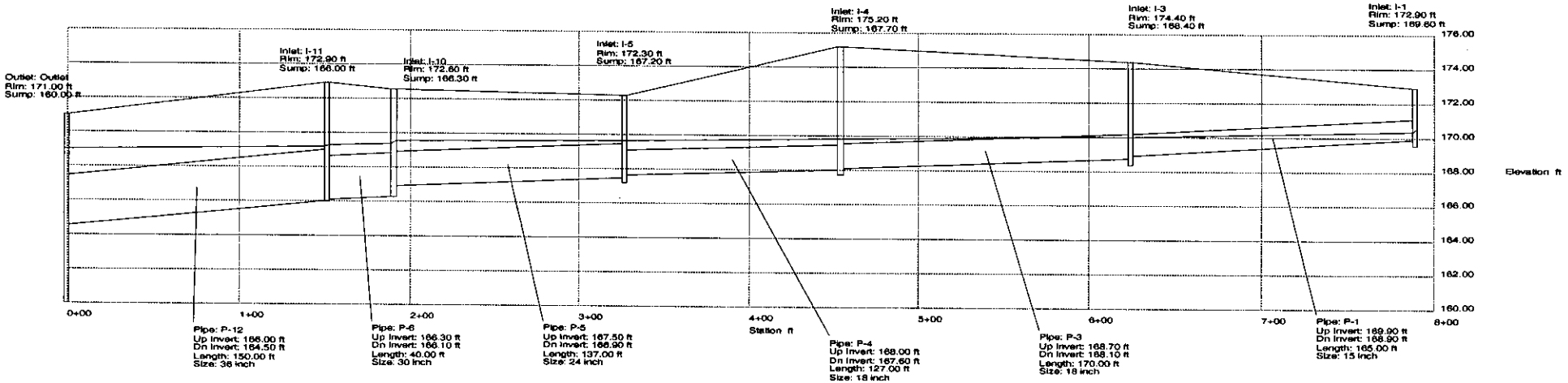
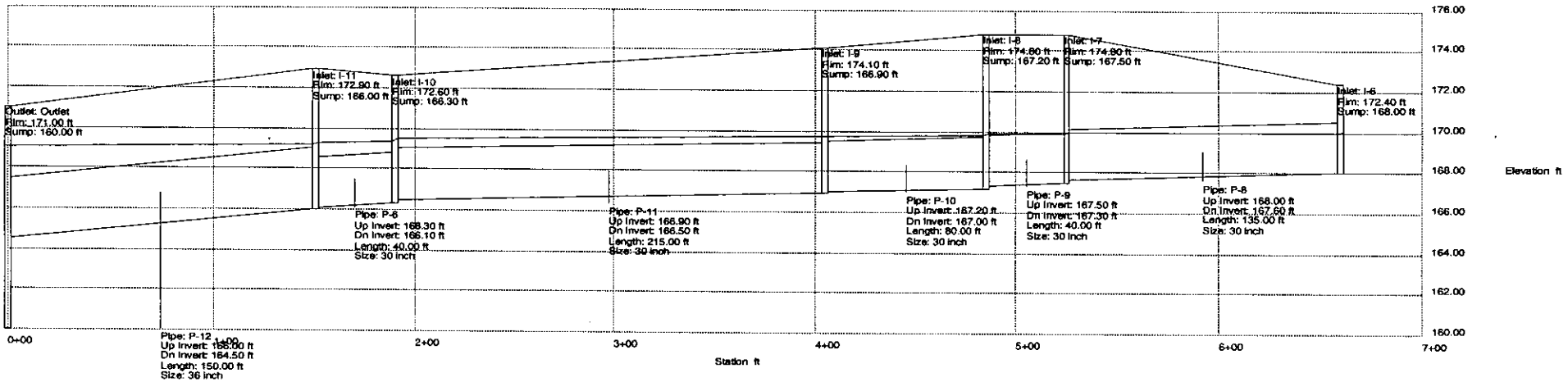
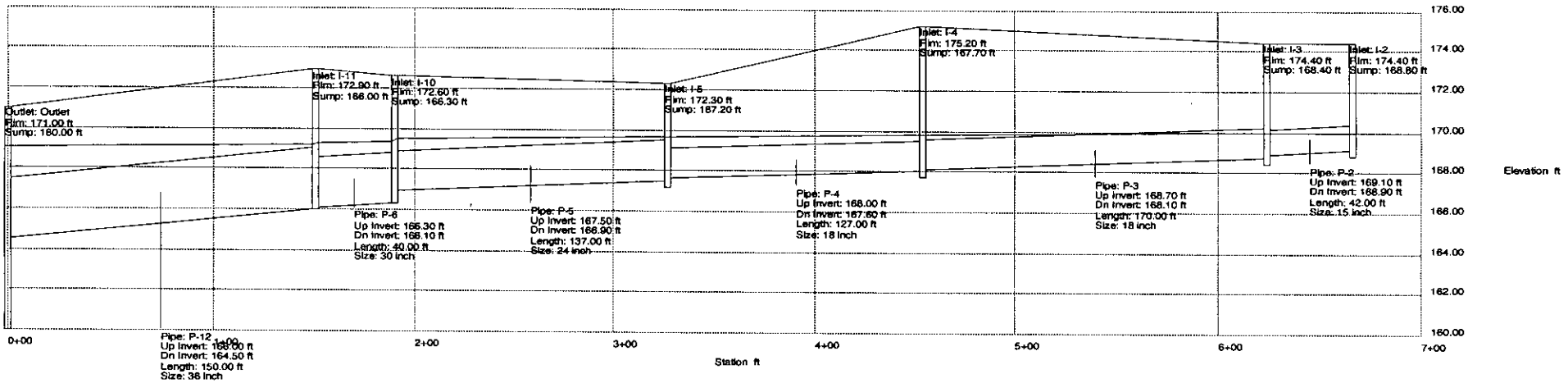

Outlet: Outlet
Rim: 171.00 ft
Sump: 160.00 ft
Inlet: I-11
Rim: 172.90 ft
Sump: 166.00 ft
Inlet: I-10
Rim: 172.60 ft
Sump: 166.30 ft
Inlet: I-5
Rim: 172.30 ft
Sump: 167.20 ft
Inlet: I-4
Rim: 175.20 ft
Sump: 167.70 ft
Inlet: I-3
Rim: 174.40 ft
Sump: 168.40 ft
Inlet: I-1
Rim: 172.90 ft
Sump: 169.80 ft
Pipe: P-12
Up Invert: 166.00 ft
Dn Invert: 164.50 ft
Length: 150.00 ft
Size: 36 inch
Pipe: P-6
Up Invert: 166.30 ft
Dn Invert: 166.10 ft
Length: 40.00 ft
Size: 30 inch
Pipe: P-5
Up Invert: 167.50 ft
Dn Invert: 166.90 ft
Length: 137.00 ft
Size: 24 inch
Pipe: P-4
Up Invert: 168.00 ft
Dn Invert: 167.60 ft
Length: 127.00 ft
Size: 18 inch
Pipe: P-3
Up Invert: 168.70 ft
Dn Invert: 168.10 ft
Length: 170.00 ft
Size: 18 inch
Pipe: P-1
Up Invert: 169.90 ft
Dn Invert: 168.90 ft
Length: 165.00 ft
Size: 15 inch
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
Station ft
176.00
174.00
172.00
170.00
168.00
166.00
164.00
162.00
160.00
Elevation ft


Outlet: Outlet
Elm: 171.00 ft
Sump: 160.00 ft
Inlet: I-11
Elm: 172.90 ft
Sump: 166.00 ft
Inlet: I-10
Elm: 172.60 ft
Sump: 166.30 ft
Inlet: I-9
Elm: 174.10 ft
Sump: 166.90 ft
Inlet: I-8
Elm: 174.80 ft
Sump: 167.20 ft
Inlet: I-7
Elm: 174.80 ft
Sump: 167.50 ft
Inlet: I-6
Elm: 172.40 ft
Sump: 168.00 ft
Pipe: P-12
Up Invert: 165.50 ft
Dn Invert: 164.50 ft
Length: 150.00 ft
Size: 36 inch
Pipe: P-6
Up Invert: 168.30 ft
Dn Invert: 166.10 ft
Length: 40.00 ft
Size: 30 inch
Pipe: P-11
Up Invert: 166.90 ft
Dn Invert: 166.50 ft
Length: 215.00 ft
Size: 30 inch
Pipe: P-10
Up Invert: 167.20 ft
Dn Invert: 167.00 ft
Length: 80.00 ft
Size: 30 inch
Pipe: P-9
Up Invert: 167.50 ft
Dn Invert: 167.30 ft
Length: 40.00 ft
Size: 30 inch
Pipe: P-8
Up Invert: 168.00 ft
Dn Invert: 167.60 ft
Length: 135.00 ft
Size: 30 inch
176.00
174.00
172.00
170.00
168.00
166.00
164.00
162.00
160.00
Elevation ft
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
Station ft


Outlet: Outlet
Elm: 171.00 ft
Sump: 160.00 ft
Inlet: I-11
Elm: 172.90 ft
Sump: 166.00 ft
Inlet: I-10
Elm: 172.60 ft
Sump: 166.30 ft
Inlet: I-5
Elm: 172.30 ft
Sump: 167.20 ft
Inlet: I-4
Elm: 175.20 ft
Sump: 167.70 ft
Inlet: I-3
Elm: 174.40 ft
Sump: 168.40 ft
Inlet: I-2
Elm: 174.40 ft
Sump: 168.80 ft
Pipe: P-12
Up Invert: 160.00 ft
Dn Invert: 164.50 ft
Length: 150.00 ft
Size: 36 inch
Pipe: P-6
Up Invert: 166.30 ft
Dn Invert: 166.10 ft
Length: 40.00 ft
Size: 30 inch
Pipe: P-5
Up Invert: 167.50 ft
Dn Invert: 166.90 ft
Length: 137.00 ft
Size: 24 inch
Pipe: P-4
Up Invert: 168.00 ft
Dn Invert: 167.60 ft
Length: 127.00 ft
Size: 18 inch
Pipe: P-3
Up Invert: 168.70 ft
Dn Invert: 168.10 ft
Length: 170.00 ft
Size: 18 inch
Pipe: P-2
Up Invert: 169.10 ft
Dn Invert: 168.90 ft
Length: 42.00 ft
Size: 15 inch
176.00
174.00
172.00
170.00
168.00
166.00
164.00
162.00
160.00
Elevation ft
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
Station ft

System Report

Pipe	-Section- Shape Size	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	Additional Flow (cfs)	Length (ft)	Carryover (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	System Flow Time (min)	Average Velocity (ft/s)	Discharge (cfs)	Upstream Invert Elevation (ft)
P-8	Circular	172.40	175.92	37.40	135.00	0.00	37.40	I-6	0.00	7.62	37.40	168.00
	30 inch	174.80	174.80					I-7				
P-9	Circular	174.80	175.18	2.80	40.00	0.00	40.20	I-7	0.30	8.19	40.20	167.50
	30 inch	174.80	174.80					I-8				
P-10	Circular	174.80	174.98	2.80	80.00	0.00	43.00	I-8	0.38	8.76	43.00	167.20
	30 inch	174.10	174.10					I-9				
P-11	Circular	174.10	175.26	2.60	215.00	0.00	45.60	I-9	0.53	9.29	45.60	166.90
	30 inch	172.60	172.60					I-10				
P-2	Circular	174.40	174.41	1.00	42.00	0.00	1.00	I-2	0.00	0.81	1.00	169.10
	15 inch	174.40	174.40					I-3				
P-1	Circular	172.90	175.20	4.50	165.00	0.00	4.50	I-1	0.00	3.67	4.50	169.90
	15 inch	174.40	174.40					I-3				
P-3	Circular	174.40	174.99	2.50	170.00	0.00	8.00	I-3	0.86	4.53	8.00	168.70
	18 inch	175.20	174.00					I-4				
P-4	Circular	175.20	173.75	2.00	127.00	0.00	10.00	I-4	1.48	5.66	10.00	168.00
	18 inch	172.30	172.60					I-5				
P-5	Circular	172.30	173.37	7.00	137.00	0.00	17.00	I-5	1.86	5.41	17.00	167.50
	24 inch	172.60	172.60					I-10				
P-6	Circular	172.60	172.37	4.20	40.00	0.00	66.80	I-10	2.28	9.45	66.80	166.30
	36 inch	172.90	171.97					I-11				
P-12	Circular	172.90	171.03	10.80	150.00	0.00	77.60	I-11	2.35	10.98	77.60	166.00
	36 inch	171.00	169.00					Outlet				

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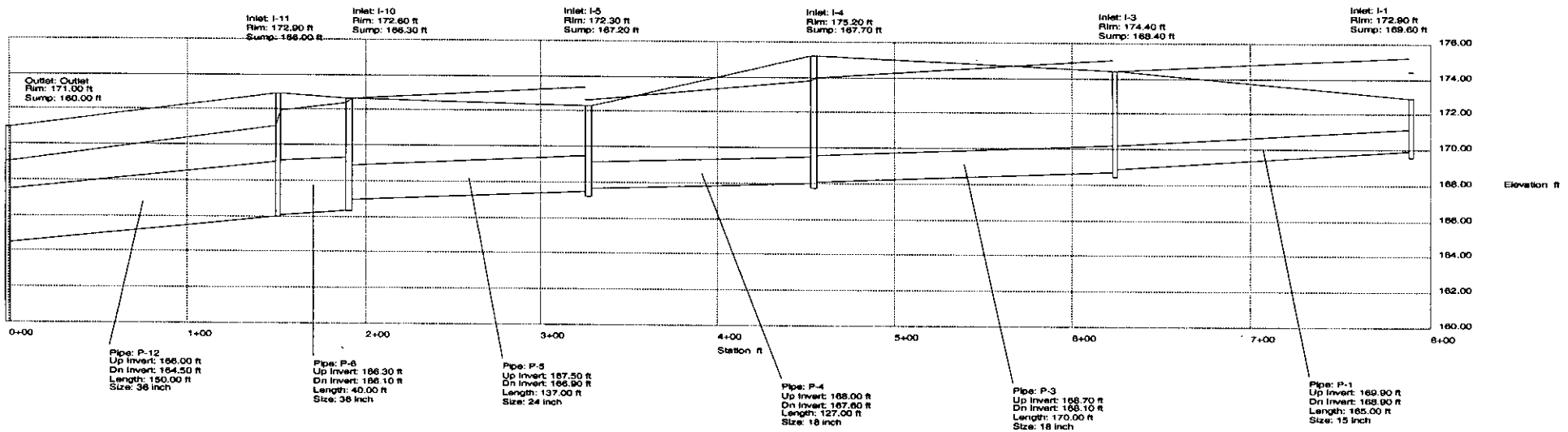
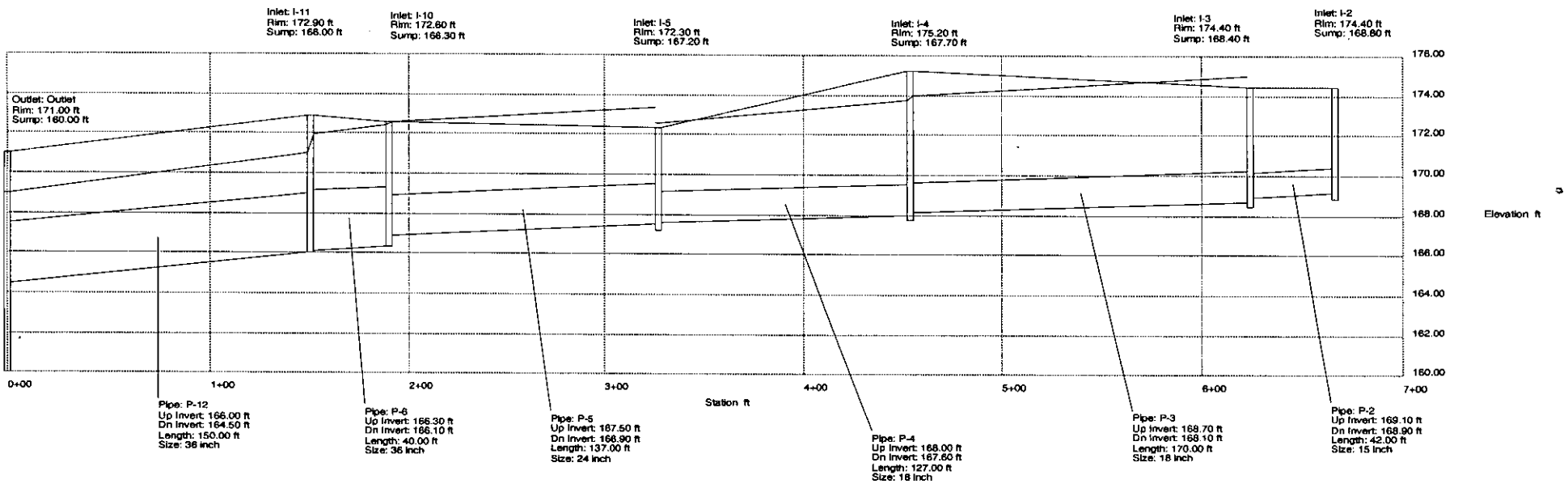
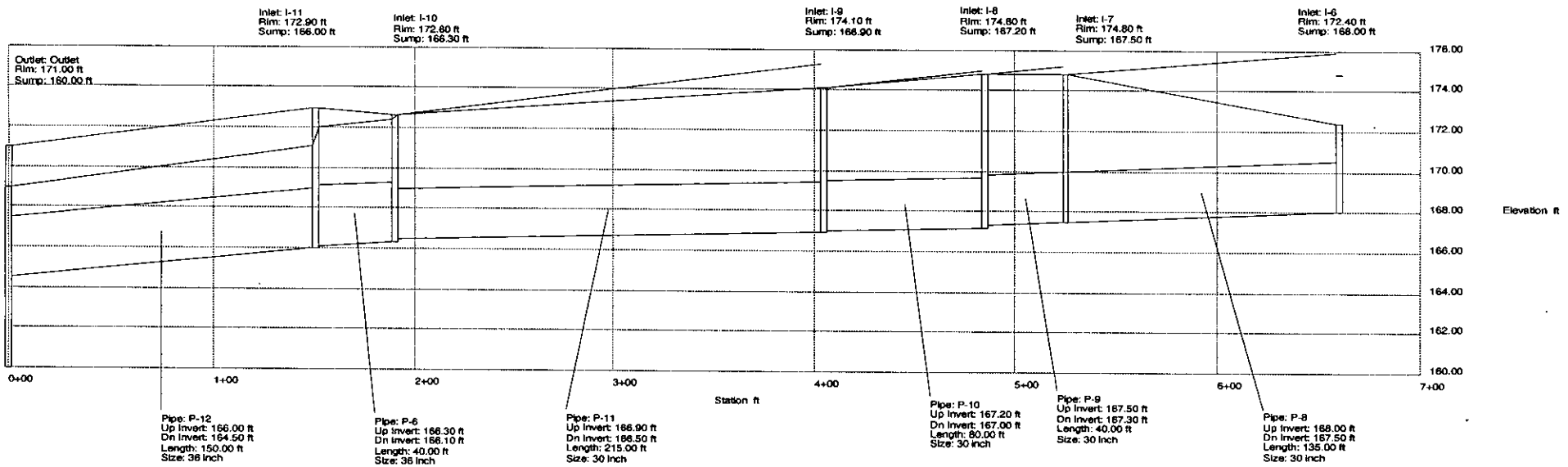



Inlet: I-11
Rim: 172.90 ft
Sump: 168.00 ft
Inlet: I-10
Rim: 172.60 ft
Sump: 168.30 ft
Inlet: I-5
Rim: 172.30 ft
Sump: 167.20 ft
Inlet: I-4
Rim: 175.20 ft
Sump: 167.70 ft
Inlet: I-3
Rim: 174.40 ft
Sump: 168.40 ft
Inlet: I-2
Rim: 174.40 ft
Sump: 168.80 ft
Outlet: Outlet
Rim: 171.00 ft
Sump: 160.00 ft
176.00
174.00
172.00
170.00
168.00
166.00
164.00
162.00
160.00
Elevation ft
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
Station ft
Pipe: P-12
Up Invert: 166.00 ft
Dn Invert: 164.50 ft
Length: 150.00 ft
Size: 36 inch
Pipe: P-6
Up Invert: 166.30 ft
Dn Invert: 166.10 ft
Length: 40.00 ft
Size: 36 inch
Pipe: P-5
Up Invert: 167.50 ft
Dn Invert: 166.90 ft
Length: 137.00 ft
Size: 24 inch
Pipe: P-4
Up Invert: 168.00 ft
Dn Invert: 167.60 ft
Length: 127.00 ft
Size: 18 inch
Pipe: P-3
Up Invert: 169.70 ft
Dn Invert: 169.10 ft
Length: 170.00 ft
Size: 18 inch
Pipe: P-2
Up Invert: 169.10 ft
Dn Invert: 168.90 ft
Length: 42.00 ft
Size: 15 inch


Inlet: I-11
Rim: 172.90 ft
Sump: 166.00 ft
Inlet: I-10
Rim: 172.80 ft
Sump: 166.30 ft
Inlet: I-9
Rim: 174.10 ft
Sump: 166.90 ft
Inlet: I-8
Rim: 174.80 ft
Sump: 167.20 ft
Inlet: I-7
Rim: 174.80 ft
Sump: 167.50 ft
Inlet: I-6
Rim: 172.40 ft
Sump: 168.00 ft
Outlet: Outlet
Rim: 171.00 ft
Sump: 160.00 ft
176.00
174.00
172.00
170.00
168.00
166.00
164.00
162.00
160.00
Elevation ft
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
Station ft
Pipe: P-12
Up Invert: 166.00 ft
Dn Invert: 164.50 ft
Length: 150.00 ft
Size: 36 inch
Pipe: P-6
Up Invert: 166.30 ft
Dn Invert: 166.10 ft
Length: 40.00 ft
Size: 36 inch
Pipe: P-11
Up Invert: 166.90 ft
Dn Invert: 166.50 ft
Length: 215.00 ft
Size: 30 inch
Pipe: P-10
Up Invert: 167.20 ft
Dn Invert: 167.00 ft
Length: 80.00 ft
Size: 30 inch
Pipe: P-9
Up Invert: 167.50 ft
Dn Invert: 167.30 ft
Length: 40.00 ft
Size: 30 inch
Pipe: P-8
Up Invert: 168.00 ft
Dn Invert: 167.50 ft
Length: 135.00 ft
Size: 30 inch

Bypass at inlet I-7 (5' length)

Drainage area, acres	0.9
Li = Inlet Length	5
So = street grade, ft/ft	0.006
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"	0.48	0.51	0.68
Flowrate, cfs	1.7	2.1	4.5
Additional Flow, cfs	0.0	0.0	0.0
Total Flowrate, cfs	1.7	2.1	4.5
depth of flow, ft	0.26	0.28	0.37
Flow width, ft	8.17	8.92	11.90
Froude Number	0.73472	0.74560	0.78225
Length 1, ft	5.28	5.86	8.19
Length 2, ft	3.47	3.85	5.38
Length 3, ft	9.90	10.98	15.36
case 1, Li < L2 intercepted flow bypassed flow	NO GOOD 1.6 0.1	NO GOOD 1.8 0.3	VALID 2.8 1.8
case 2, Li > L2 intercepted flow bypassed flow	VALID 1.3 0.4	VALID 1.5 0.6	NO GOOD 2.9 1.6

Bypass at inlet I-8 (5' length)

Drainage area, acres	0.9
Li = Inlet Length	5
So = street grade, ft/ft	0.006
Sx = 'cross slope, ft/ft	0.03125
Manning's n	0.022
Z in Izzard's Eq. = 1/Sx	32

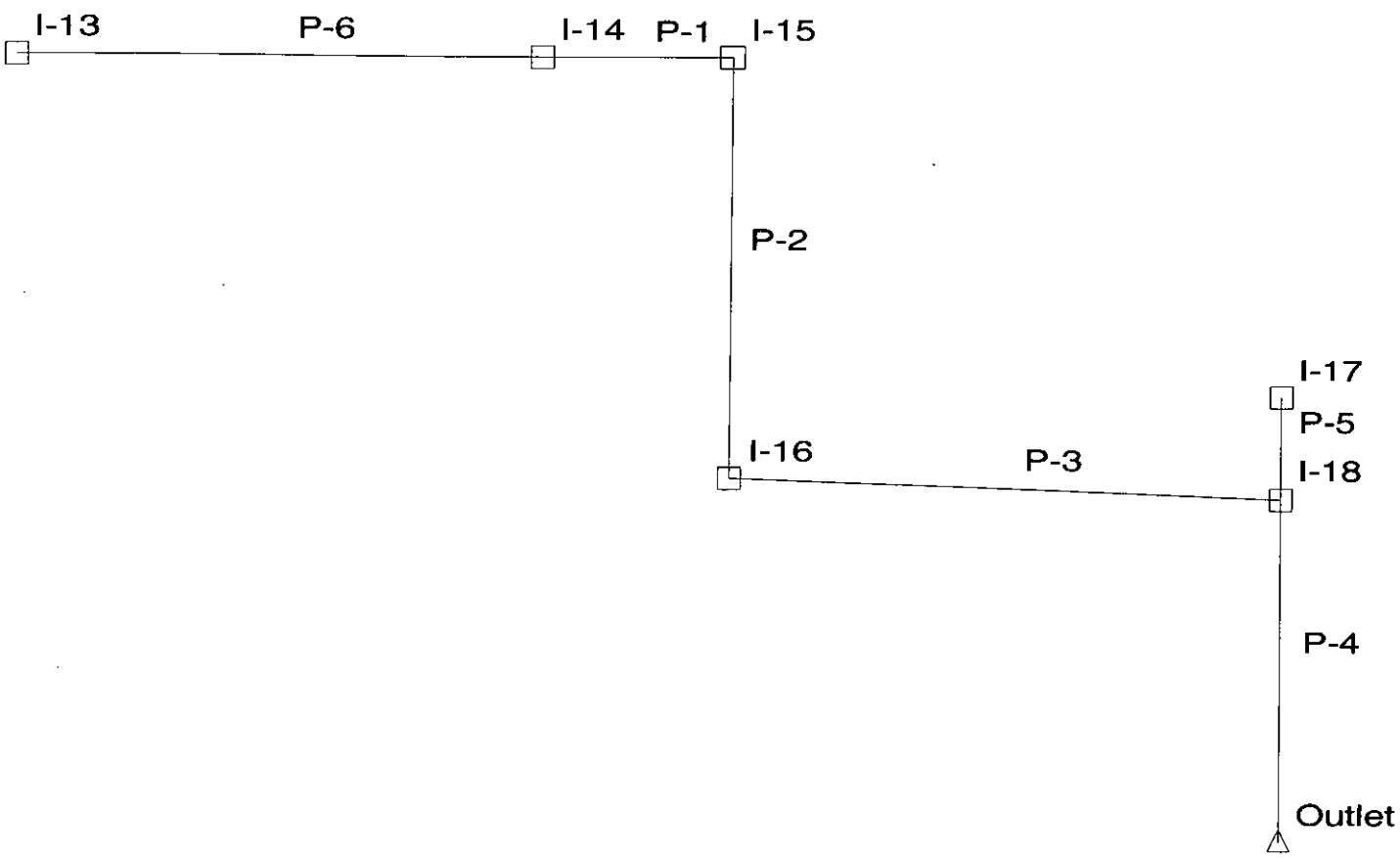
	2-yr	5-yr	100-yr
Rainfall Intensity, in/hr	3.83	4.56	7.37
Rational "C"	0.48	0.51	0.68
Flowrate, cfs	1.7	2.1	4.5
Additional Flow, cfs	0.0	0.0	0.0
Total Flowrate, cfs	1.7	2.1	4.5
depth of flow, ft	0.26	0.28	0.37
Flow width, ft	8.17	8.92	11.90
Froude Number	0.73472	0.74560	0.78225
Length 1, ft	5.28	5.86	8.19
Length 2, ft	3.47	3.85	5.38
Length 3, ft	9.90	10.98	15.36
case 1, Li < L2 intercepted flow bypassed flow	NO GOOD 1.6 0.1	NO GOOD 1.8 0.3	VALID 2.8 1.8
case 2, Li > L2 intercepted flow bypassed flow	VALID 1.3 0.4	VALID 1.5 0.6	NO GOOD 2.9 1.6

Bypass at inlet I-9 (5' length)

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

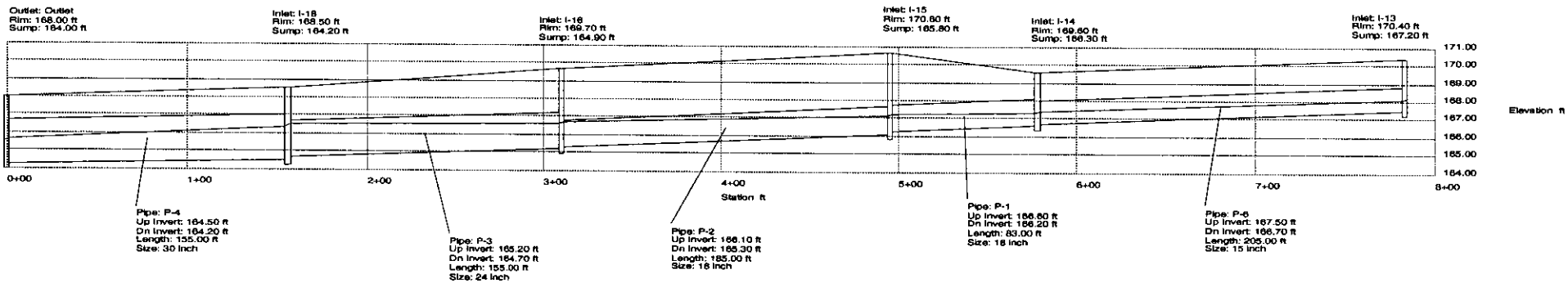
	2-yr	5-yr	100-yr
Rainfall Intensity, in/hr	3.83	4.56	7.37
Rational "C"	0.48	0.51	0.68
Flowrate, cfs	0.7	0.9	2.0
Additional Flow, cfs	0.4	0.0	1.8
Total Flowrate, cfs	1.1	0.9	3.8
depth of flow, ft	0.23	0.21	0.36
Flow width, ft	7.34	6.81	11.55
Froude Number	0.65885	0.65069	0.71057
Length 1, ft	4.26	3.90	7.23
Length 2, ft	2.80	2.56	4.74
Length 3, ft	7.98	7.31	13.54
case 1, Li < L2 intercepted flow bypassed flow	NO GOOD 1.3 0.0	NO GOOD 1.2 0.0	NO GOOD 2.6 1.2
case 2, Li > L2 intercepted flow bypassed flow	VALID 0.9 0.2	VALID 0.8 0.1	VALID 2.6 1.3

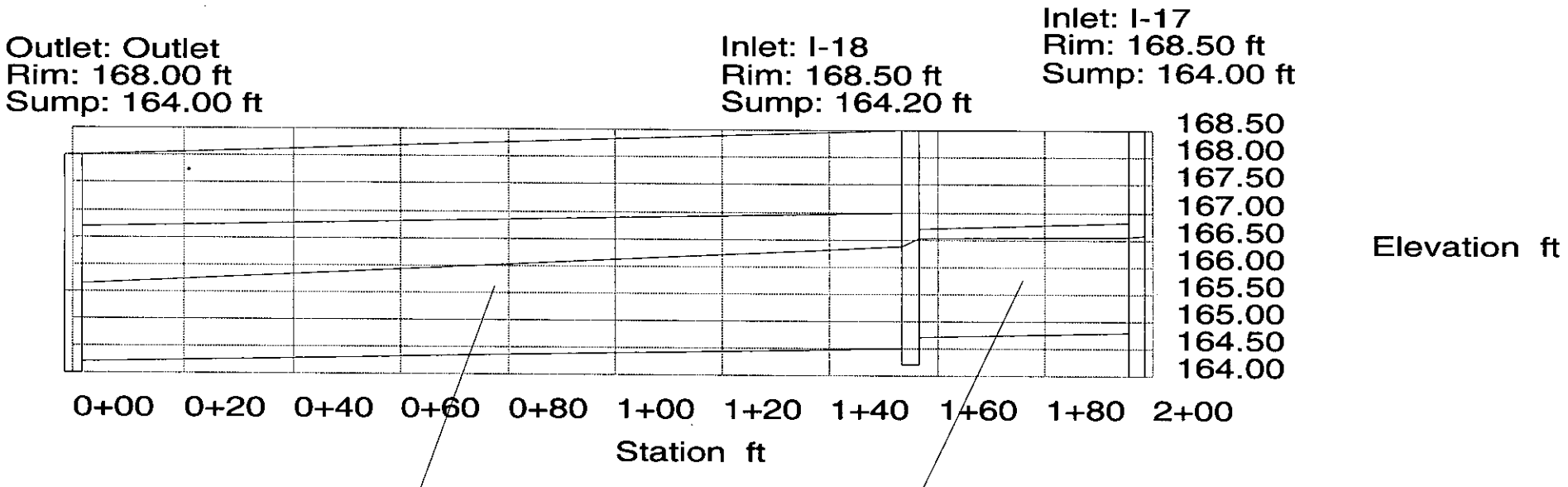
STORMWATER PIPE ANALYSIS
SYSTEM #2


I-13
P-6
I-14
P-1
I-15
P-2
I-17
P-5
I-16
P-3
I-18
P-4
Outlet

System Report

Pipe	-Section- Shape Size	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	Additional Flow (cfs)	Length (ft)	Carryover (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	System Flow Time (min)	Average Velocity (ft/s)	Discharge (cfs)	Upstream Invert Elevation (ft)
P-5	Circular	168.50	166.55	5.80	42.00	0.00	5.80	I-17	0.00	1.96	5.80	164.80
	24 inch	168.50	166.52					I-18				
P-6	Circular	170.40	168.07	1.70	205.00	0.00	1.70	I-13	0.00	2.77	1.70	167.50
	15 inch	169.60	167.40					I-14				
P-1	Circular	169.60	167.29	1.30	83.00	0.00	3.00	I-14	1.23	3.04	3.00	166.60
	18 inch	170.60	167.23					I-15				
P-2	Circular	170.60	167.10	2.20	185.00	0.00	5.20	I-15	1.69	3.60	5.20	166.10
	18 inch	169.70	166.69					I-16				
P-3	Circular	169.70	166.63	1.70	155.00	0.00	6.90	I-16	2.55	2.58	6.90	165.20
	24 inch	168.50	166.52					I-18				
P-4	Circular	168.50	166.36	5.50	155.00	0.00	18.20	I-18	3.55	5.42	18.20	164.50
	30 inch	168.00	165.65					Outlet				

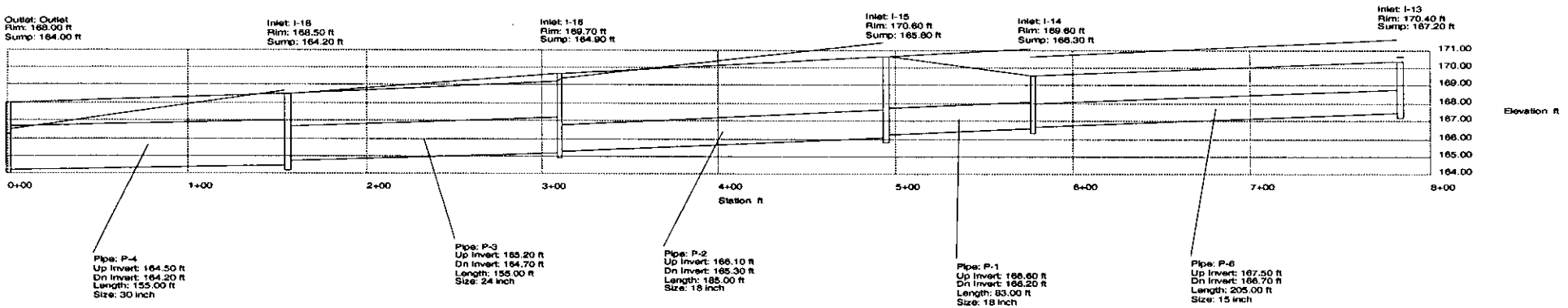

Outlet: Outlet
Rim: 168.00 ft
Sump: 164.00 ft
Inlet: I-18
Rim: 168.50 ft
Sump: 164.20 ft
Inlet: I-16
Rim: 169.70 ft
Sump: 164.90 ft
Inlet: I-15
Rim: 170.80 ft
Sump: 165.80 ft
Inlet: I-14
Rim: 169.80 ft
Sump: 166.30 ft
Inlet: I-13
Rim: 170.40 ft
Sump: 167.20 ft
171.00
170.00
169.00
168.00
167.00
166.00
165.00
164.00
Elevation ft
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
Station ft
Pipe: P-4
Up Invert: 164.50 ft
Dn Invert: 164.20 ft
Length: 155.00 ft
Size: 30 inch
Pipe: P-3
Up Invert: 165.20 ft
Dn Invert: 164.70 ft
Length: 155.00 ft
Size: 24 inch
Pipe: P-2
Up Invert: 166.10 ft
Dn Invert: 165.30 ft
Length: 185.00 ft
Size: 18 inch
Pipe: P-1
Up Invert: 166.60 ft
Dn Invert: 166.20 ft
Length: 83.00 ft
Size: 18 inch
Pipe: P-6
Up Invert: 167.50 ft
Dn Invert: 166.70 ft
Length: 205.00 ft
Size: 15 inch



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

System Report

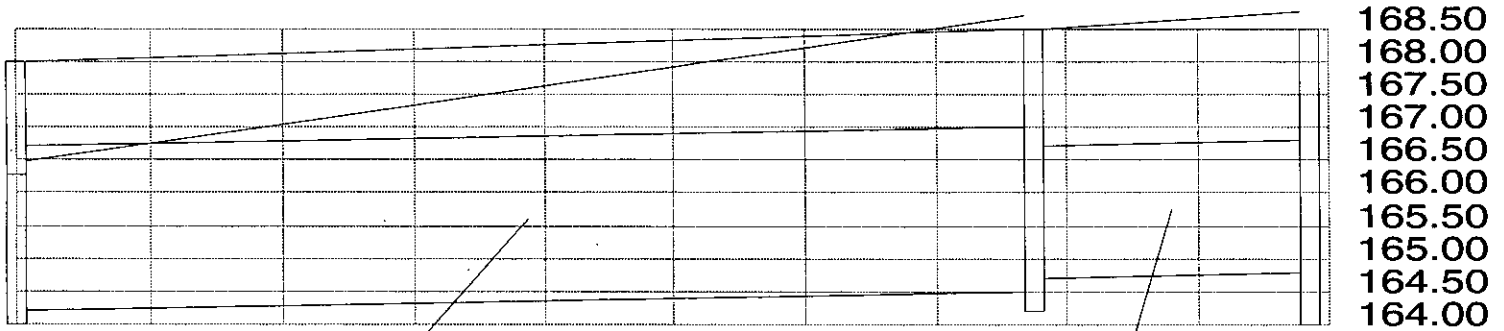
Pipe	-Section- Shape Size	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	Additional Flow (cfs)	Length (ft)	Carryover (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	System Flow Time (min)	Average Velocity (ft/s)	Discharge (cfs)	Upstream Invert Elevation (ft)
P-5	Circular	168.50	168.74	17.00	42.00	0.00	17.00	I-17	0.00	5.41	17.00	164.80
	24 inch	168.50	168.50					I-18				
P-6	Circular	170.40	171.59	4.50	205.00	0.00	4.50	I-13	0.00	3.67	4.50	167.50
	15 inch	169.60	170.60					I-14				
P-1	Circular	169.60	171.08	3.50	83.00	0.00	8.00	I-14	0.93	4.53	8.00	166.60
	18 inch	170.60	170.60					I-15				
P-2	Circular	170.60	171.45	3.00	185.00	0.00	11.00	I-15	1.24	6.22	11.00	166.10
	18 inch	169.70	169.42					I-16				
P-3	Circular	169.70	169.23	4.50	155.00	0.00	15.50	I-16	1.73	4.93	15.50	165.20
	24 inch	168.50	168.50					I-18				
P-4	Circular	168.50	168.68	15.00	155.00	0.00	47.50	I-18	2.26	9.92	47.50	164.50
	30 inch	168.00	166.47					Outlet				


Outlet: Outlet
Rim: 168.00 ft
Sump: 164.00 ft
Inlet: I-18
Rim: 168.50 ft
Sump: 164.20 ft
Inlet: I-16
Rim: 169.70 ft
Sump: 164.90 ft
Inlet: I-15
Rim: 170.60 ft
Sump: 165.80 ft
Inlet: I-14
Rim: 169.60 ft
Sump: 166.30 ft
Inlet: I-13
Rim: 170.40 ft
Sump: 167.20 ft
171.00
170.00
169.00
168.00
167.00
166.00
165.00
164.00
Elevation ft
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
Station ft
Pipe: P-4
Up Invert: 164.50 ft
Dn Invert: 164.20 ft
Length: 155.00 ft
Size: 30 inch
Pipe: P-3
Up Invert: 165.20 ft
Dn Invert: 164.70 ft
Length: 155.00 ft
Size: 24 inch
Pipe: P-2
Up Invert: 166.10 ft
Dn Invert: 165.30 ft
Length: 185.00 ft
Size: 18 inch
Pipe: P-1
Up Invert: 166.60 ft
Dn Invert: 166.20 ft
Length: 83.00 ft
Size: 18 inch
Pipe: P-6
Up Invert: 167.50 ft
Dn Invert: 166.70 ft
Length: 205.00 ft
Size: 15 inch

Outlet: Outlet
Rim: 168.00 ft
Sump: 164.00 ft

Inlet: I-18
Rim: 168.50 ft
Sump: 164.20 ft

Inlet: I-17
Rim: 168.50 ft
Sump: 164.00 ft



Elevation ft

Pipe: P-4
Up Invert: 164.50 ft
Dn Invert: 164.20 ft
Length: 155.00 ft
Size: 30 inch

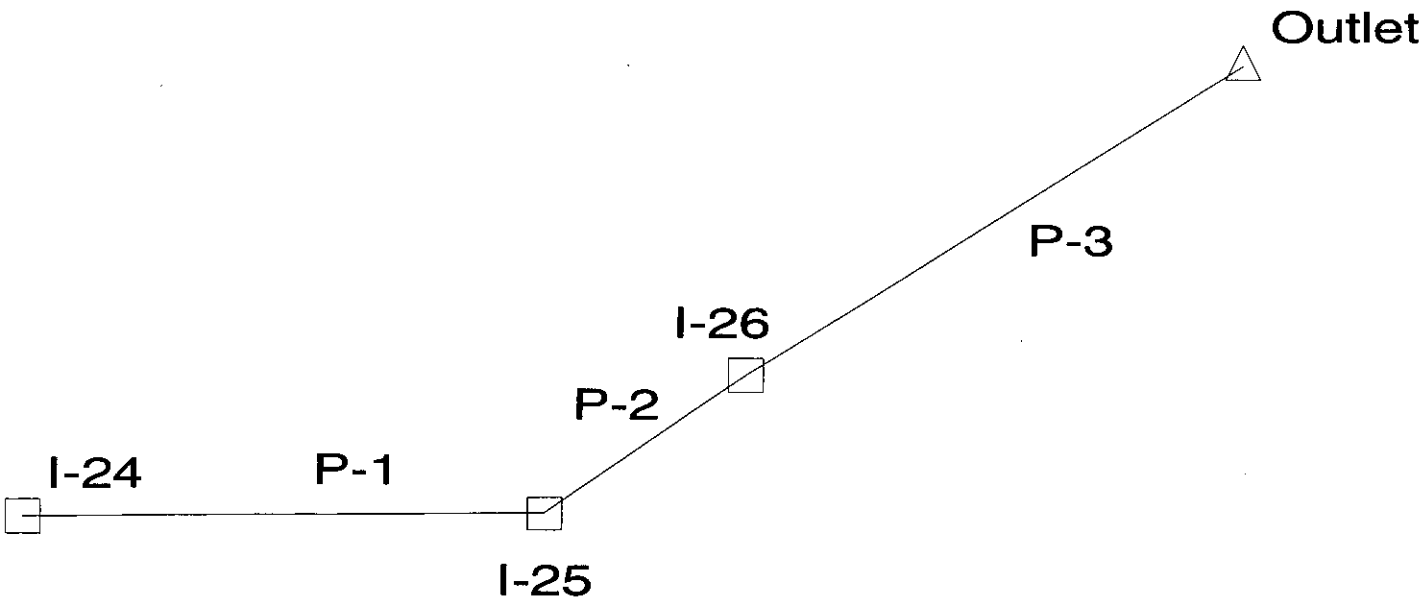
Pipe: P-5
Up Invert: 164.80 ft
Dn Invert: 164.70 ft
Length: 42.00 ft
Size: 24 inch

Bypass at inlet I-15 (5' length)

Drainage area, acres	1.2
Li = Inlet Length	5
So = street grade, ft/ft	0.0076
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"	0.48	0.51	0.68
Flowrate, cfs	2.2	2.8	6.0
Additional Flow, cfs	0.0	0.0	0.0
Total Flowrate, cfs	2.2	2.8	6.0
depth of flow, ft	0.27	0.30	0.40
Flow width, ft	8.70	9.51	12.68
Froude Number	0.83571	0.84808	0.88976
Length 1, ft	6.40	7.10	9.93
Length 2, ft	4.21	4.66	6.52
Length 3, ft	12.00	13.30	18.61
case 1, Li < L2 intercepted flow bypassed flow	NO GOOD 1.7 0.5	NO GOOD 2.0 0.8	VALID 3.0 3.0
case 2, Li > L2 intercepted flow bypassed flow	VALID 1.6 0.7	VALID 1.9 0.9	NO GOOD 3.6 2.5

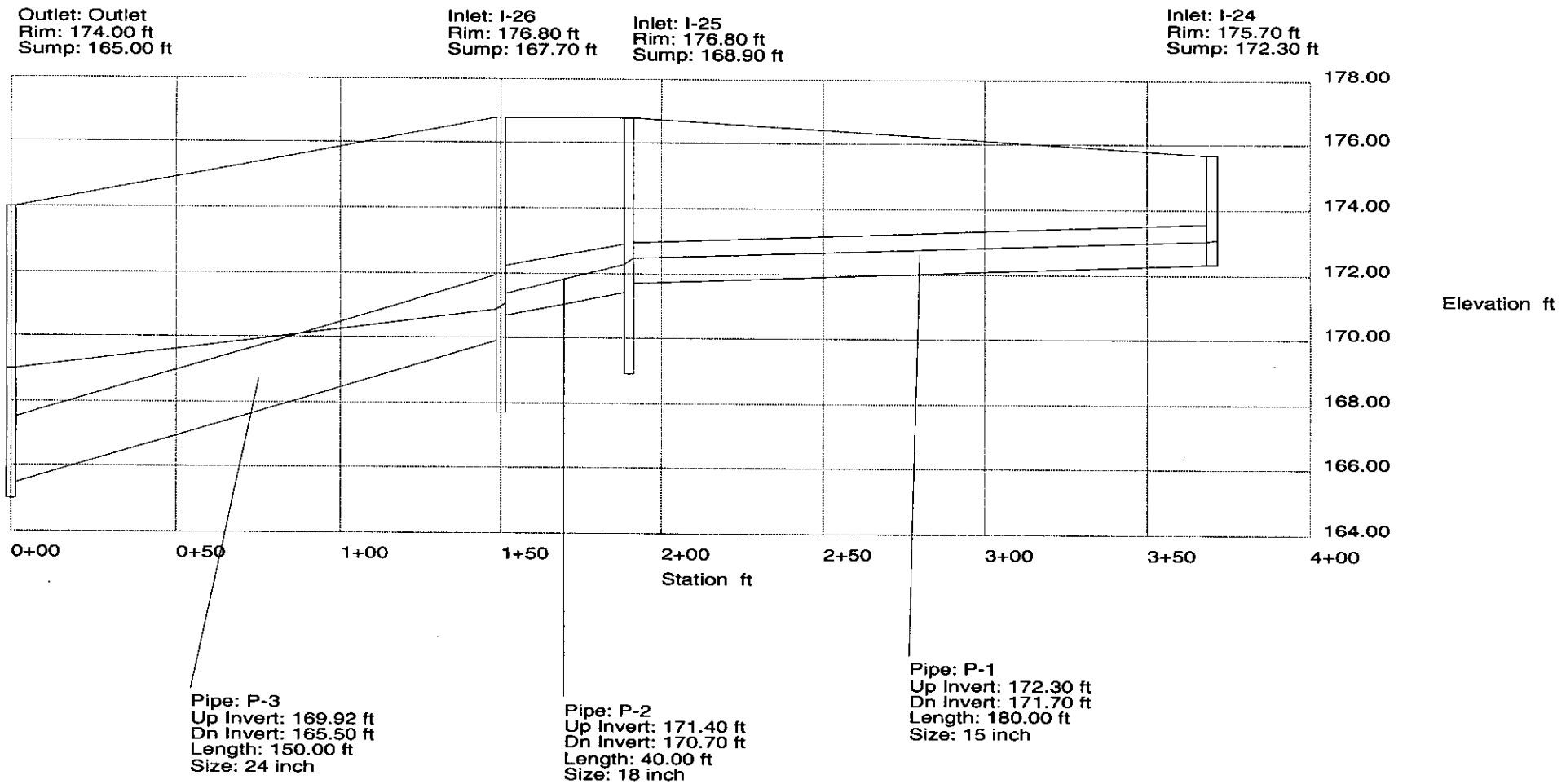
STORMWATER PIPE ANALYSIS
SYSTEM #3



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

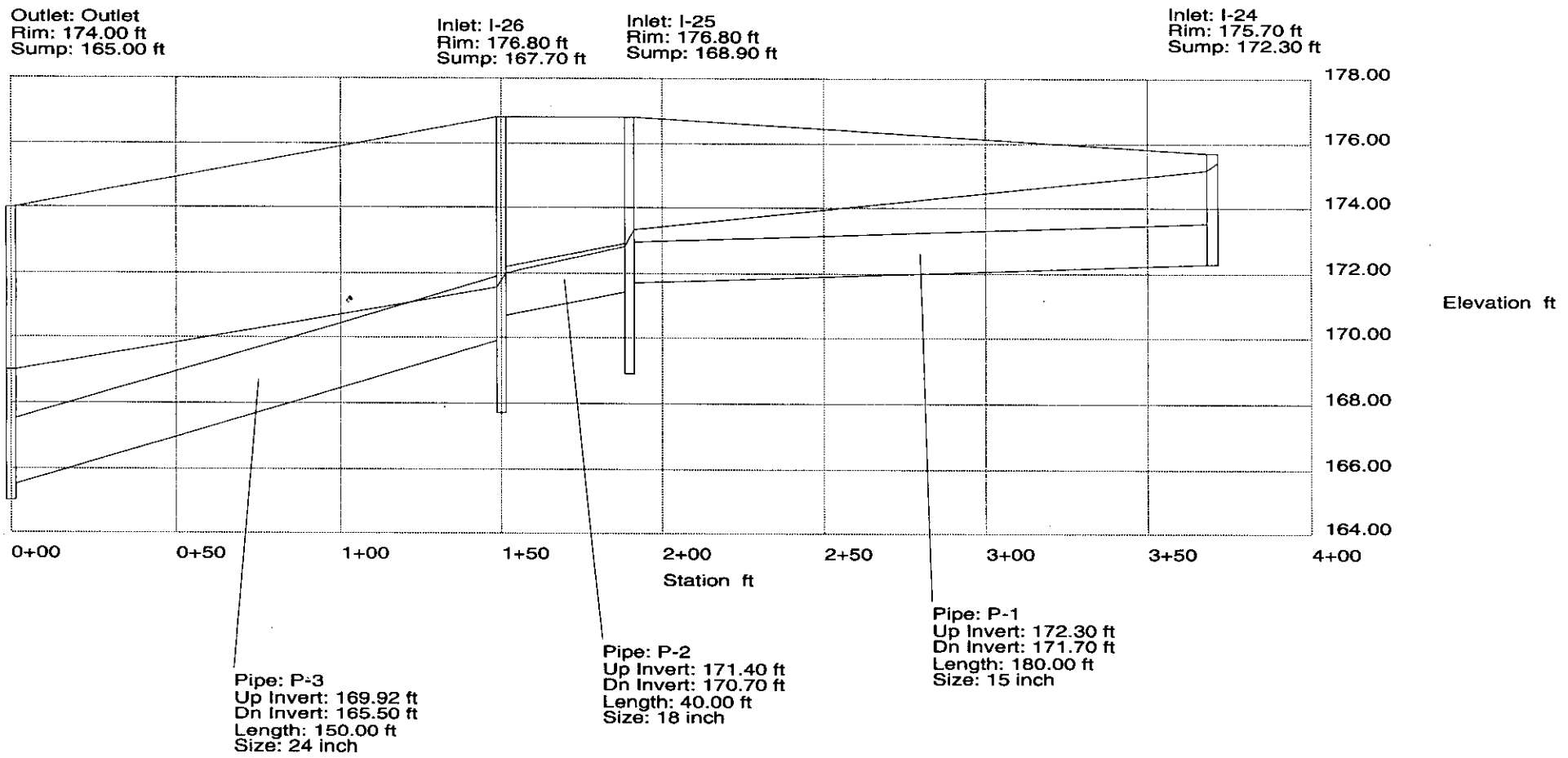
System Report

Pipe	-Section- Shape Size	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	Additional Flow (cfs)	Length (ft)	Carryover (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	System Flow Time (min)	Average Velocity (ft/s)	Discharge (cfs)	Upstream Invert Elevation (ft)
P-1	Circular	175.70	173.03	2.40	180.00	0.00	2.40	I-24	0.00	3.12	2.40	172.30
	15 inch	176.80	172.47					I-25				
P-2	Circular	176.80	172.29	2.90	40.00	0.00	5.30	I-25	0.96	5.98	5.30	171.40
	18 inch	176.80	171.36					I-26				
P-3	Circular	176.80	170.89	2.20	150.00	0.00	7.50	I-26	1.07	3.66	7.50	169.92
	24 inch	174.00	169.00					Outlet				


Outlet: Outlet
Rim: 174.00 ft
Sump: 165.00 ft
Inlet: I-26
Rim: 176.80 ft
Sump: 167.70 ft
Inlet: I-25
Rim: 176.80 ft
Sump: 168.90 ft
Inlet: I-24
Rim: 175.70 ft
Sump: 172.30 ft
178.00
176.00
174.00
172.00
170.00
168.00
166.00
164.00
Elevation ft
0+00
0+50
1+00
1+50
2+00
2+50
3+00
3+50
4+00
Station ft
Pipe: P-3
Up Invert: 169.92 ft
Dn Invert: 165.50 ft
Length: 150.00 ft
Size: 24 inch
Pipe: P-2
Up Invert: 171.40 ft
Dn Invert: 170.70 ft
Length: 40.00 ft
Size: 18 inch
Pipe: P-1
Up Invert: 172.30 ft
Dn Invert: 171.70 ft
Length: 180.00 ft
Size: 15 inch

System Report

Pipe	-Section- Shape Size	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	Additional Flow (cfs)	Length (ft)	Carryover (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	System Flow Time (min)	Average Velocity (ft/s)	Discharge (cfs)	Upstream Invert Elevation (ft)
P-1	Circular	175.70	175.17	6.50	180.00	0.00	6.50	I-24	0.00	5.30	6.50	172.30
	15 inch	176.80	173.35					I-25				
P-2	Circular	176.80	172.79	8.00	40.00	0.00	14.50	I-25	0.57	8.66	14.50	171.40
	18 inch	176.80	172.01					I-26				
P-3	Circular	176.80	171.54	6.00	150.00	0.00	20.50	I-26	0.64	7.01	20.50	169.92
	24 inch	174.00	169.00					Outlet				



 Baughman Company, P.A.
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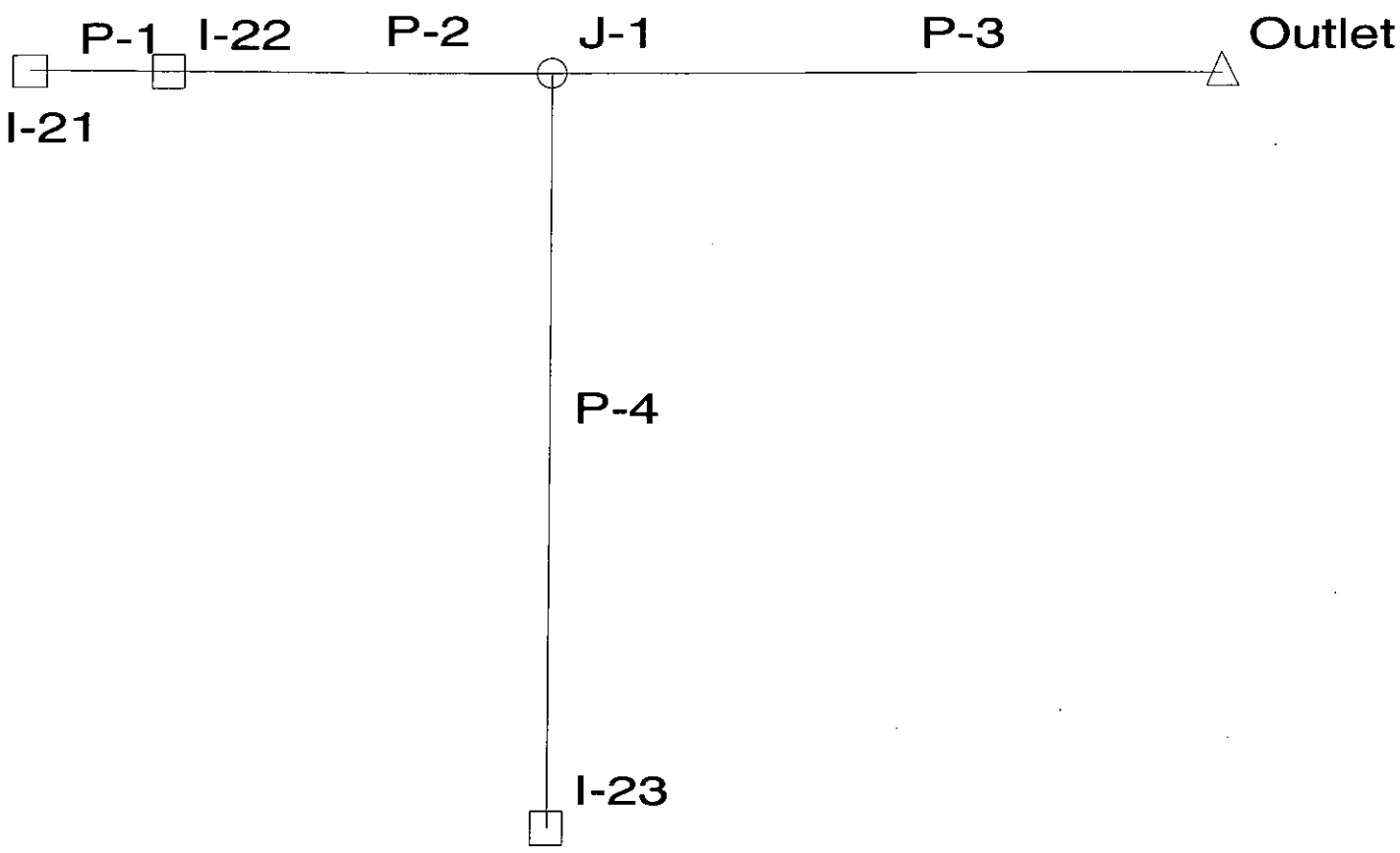
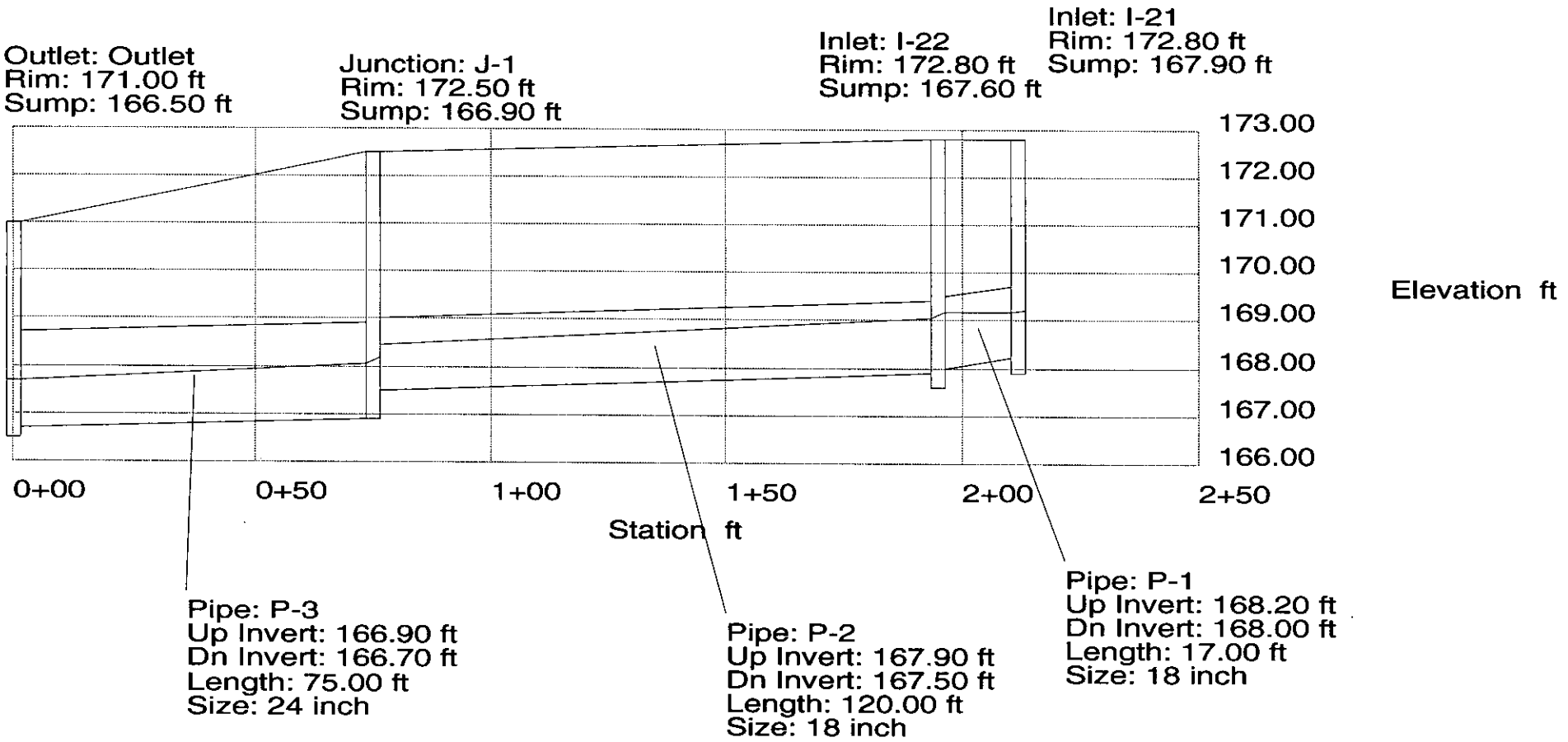
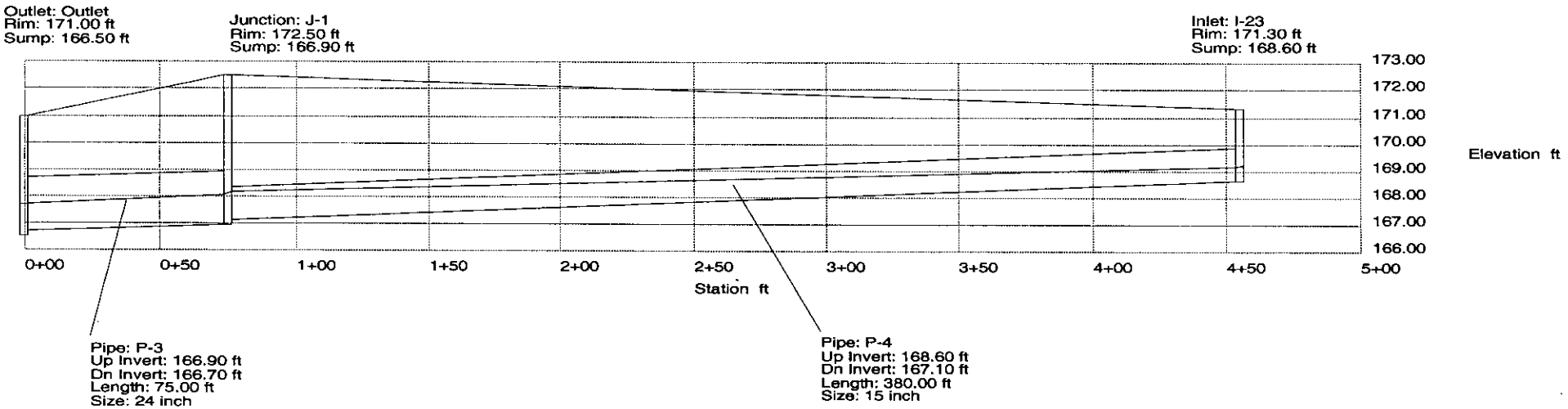
STORMWATER PIPE ANALYSIS
SYSTEM #4


P-1
I-22
P-2
J-1
P-3
Outlet
I-21
P-4
I-23

System Report

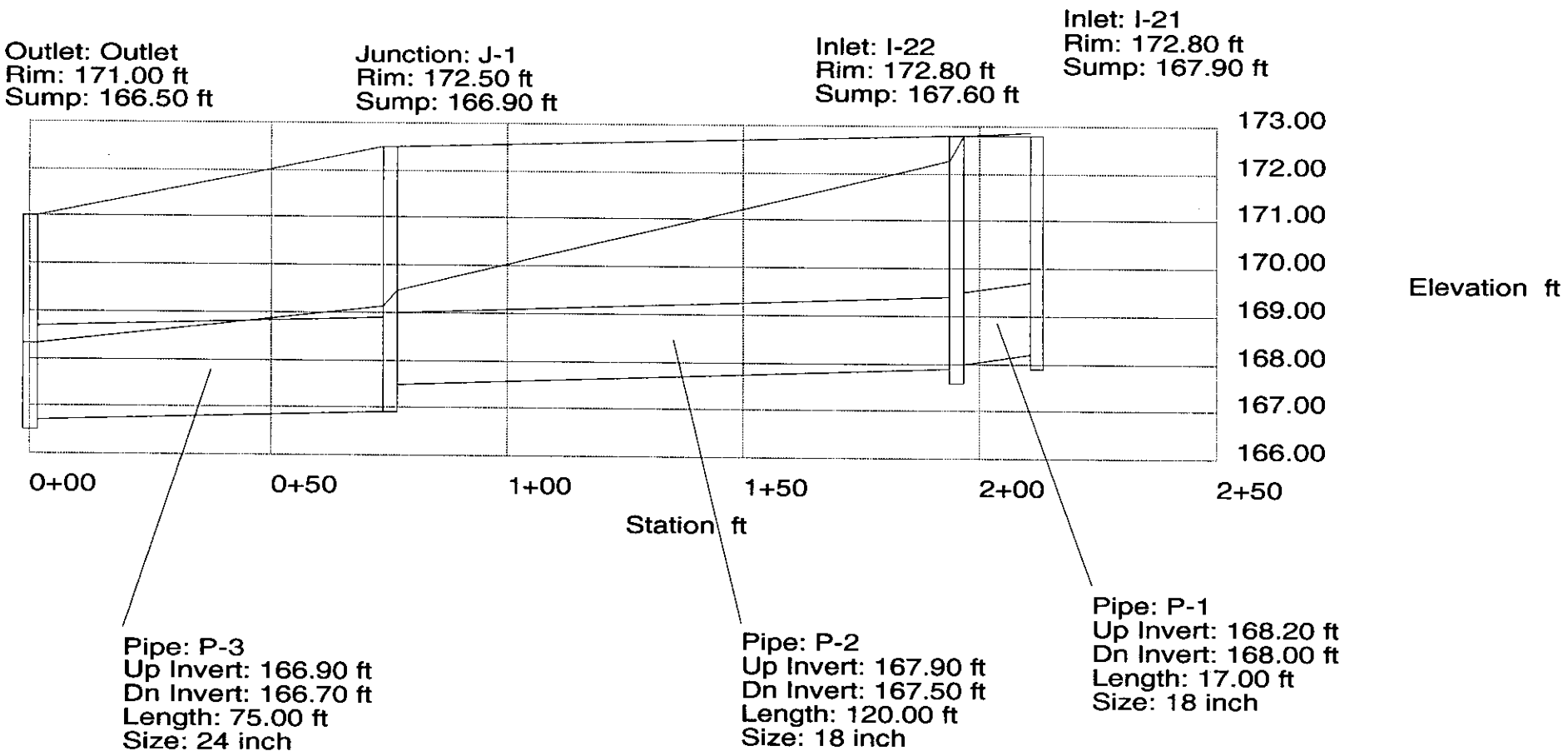
Pipe	-Section- Shape Size	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	Additional Flow (cfs)	Length (ft)	Carryover (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	Average Velocity (ft/s)	Discharge (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)
P-4	Circular	171.30	169.16	1.70	380.00	0.00	1.70	I-23	2.34	1.70	168.60	167.10
	15 inch	172.50	168.18					J-1				
P-1	Circular	172.80	169.18	2.40	17.00	0.00	2.40	I-21	1.78	2.40	168.20	168.00
	18 inch	172.80	169.19					I-22				
P-2	Circular	172.80	169.06	3.50	120.00	0.00	5.90	I-22	4.55	5.90	167.90	167.50
	18 inch	172.50	168.44					J-1				
P-3	Circular	172.50	168.05	N/A	75.00	N/A	7.60	J-1	4.52	7.60	166.90	166.70
	24 inch	171.00	167.68					Outlet				

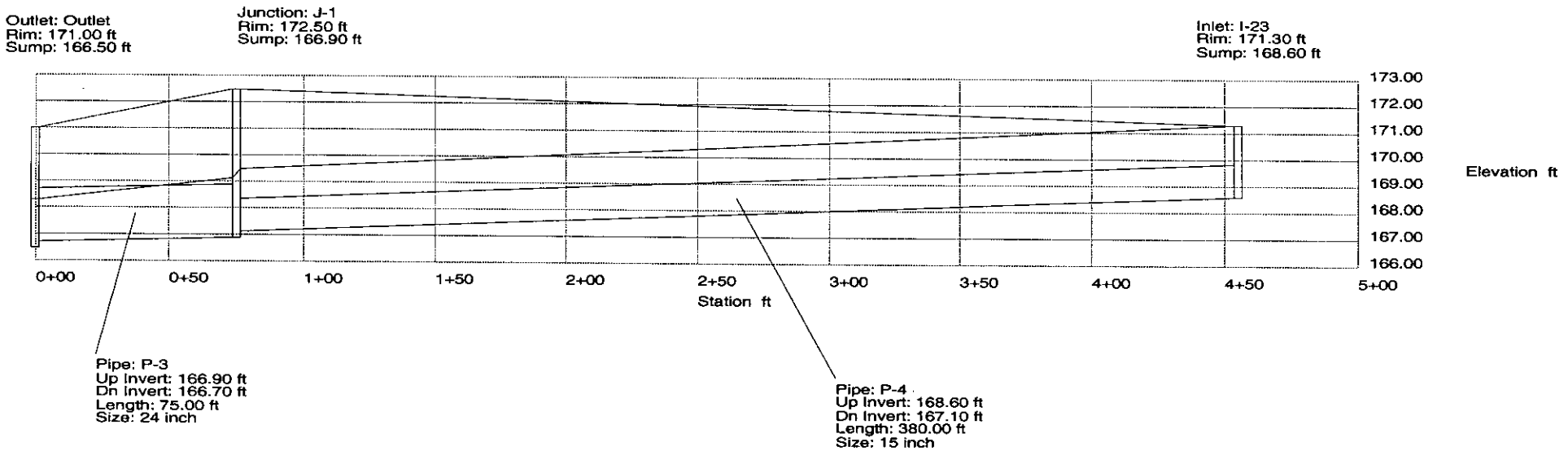

Outlet: Outlet
Rim: 171.00 ft
Sump: 166.50 ft
Junction: J-1
Rim: 172.50 ft
Sump: 166.90 ft
Inlet: I-22
Rim: 172.80 ft
Sump: 167.60 ft
Inlet: I-21
Rim: 172.80 ft
Sump: 167.90 ft
173.00
172.00
171.00
170.00
169.00
168.00
167.00
166.00
Elevation ft
0+00
0+50
1+00
1+50
2+00
2+50
Station ft
Pipe: P-3
Up Invert: 166.90 ft
Dn Invert: 166.70 ft
Length: 75.00 ft
Size: 24 inch
Pipe: P-2
Up Invert: 167.90 ft
Dn Invert: 167.50 ft
Length: 120.00 ft
Size: 18 inch
Pipe: P-1
Up Invert: 168.20 ft
Dn Invert: 168.00 ft
Length: 17.00 ft
Size: 18 inch


Outlet: Outlet
Rim: 171.00 ft
Sump: 166.50 ft
Junction: J-1
Rim: 172.50 ft
Sump: 166.90 ft
Inlet: I-23
Rim: 171.30 ft
Sump: 168.60 ft
173.00
172.00
171.00
170.00
169.00
168.00
167.00
166.00
Elevation ft
0+00
0+50
1+00
1+50
2+00
2+50
3+00
3+50
4+00
4+50
5+00
Station ft
Pipe: P-3
Up Invert: 166.90 ft
Dn Invert: 166.70 ft
Length: 75.00 ft
Size: 24 inch
Pipe: P-4
Up Invert: 168.60 ft
Dn Invert: 167.10 ft
Length: 380.00 ft
Size: 15 inch

System Report

Pipe	-Section- Shape Size	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	Additional Flow (cfs)	Length (ft)	Carryover (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	Average Velocity (ft/s)	Discharge (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)
P-4	Circular	171.30	171.30	4.50	380.00	0.00	4.50	I-23	3.67	4.50	168.60	167.10
	15 inch	172.50	169.46					J-1				
P-1	Circular	172.80	172.87	6.50	17.00	0.00	6.50	I-21	3.68	6.50	168.20	168.00
	18 inch	172.80	172.80					I-22				
P-2	Circular	172.80	172.24	9.50	120.00	0.00	16.00	I-22	9.05	16.00	167.90	167.50
	18 inch	172.50	169.46					J-1				
P-3	Circular	172.50	169.13	N/A	75.00	N/A	20.50	J-1	7.01	20.50	166.90	166.70
	24 inch	171.00	168.32					Outlet				


Outlet: Outlet
Rim: 171.00 ft
Sump: 166.50 ft
Junction: J-1
Rim: 172.50 ft
Sump: 166.90 ft
Inlet: I-22
Rim: 172.80 ft
Sump: 167.60 ft
Inlet: I-21
Rim: 172.80 ft
Sump: 167.90 ft
173.00
172.00
171.00
170.00
169.00
168.00
167.00
166.00
Elevation ft
0+00
0+50
1+00
1+50
2+00
2+50
Station ft
Pipe: P-3
Up Invert: 166.90 ft
Dn Invert: 166.70 ft
Length: 75.00 ft
Size: 24 inch
Pipe: P-2
Up Invert: 167.90 ft
Dn Invert: 167.50 ft
Length: 120.00 ft
Size: 18 inch
Pipe: P-1
Up Invert: 168.20 ft
Dn Invert: 168.00 ft
Length: 17.00 ft
Size: 18 inch



Copper Gate North Addition – Post-Development Flows

Area #	D. A. (ac)	tc (min)	C2	C5	C100	I2 (in/hr)	I5 (in/hr)	I100 (in/hr)	Q2 (cfs)	Q5 (cfs)	Q100 (cfs)
1	0.9	15	0.48	0.51	0.68	3.83	4.56	7.37	1.7	2.1	4.5
2	0.2	15	0.48	0.51	0.68	3.83	4.56	7.37	0.4	0.5	1.0
3	0.5	15	0.48	0.51	0.68	3.83	4.56	7.37	0.9	1.2	2.5
4	0.4	15	0.48	0.51	0.68	3.83	4.56	7.37	0.7	0.9	2.0
5	1.4	15	0.48	0.51	0.68	3.83	4.56	7.37	2.6	3.3	7.0
6	1.2	15	0.48	0.51	0.68	3.83	4.56	7.37	2.2	2.8	6.0
7	0.9	15	0.48	0.51	0.68	3.83	4.56	7.37	1.7	2.1	4.5
8	0.9	15	0.48	0.51	0.68	3.83	4.56	7.37	1.7	2.1	4.5
9	0.4	15	0.48	0.51	0.68	3.83	4.56	7.37	0.7	0.9	2.0
10	0.6	15	0.48	0.51	0.68	3.83	4.56	7.37	1.1	1.4	3.0
11	1.8	15	0.48	0.51	0.68	3.83	4.56	7.37	3.3	4.2	9.0
12	2.2	15	0.48	0.51	0.68	3.83	4.56	7.37	4.0	5.1	11.0
13	0.9	15	0.48	0.51	0.68	3.83	4.56	7.37	1.7	2.1	4.5

Copper Gate North Addition – Post-Development Flows

Area #	D. A. (ac)	tc (min)	C2	C5	C100	I2 (in/hr)	I5 (in/hr)	I100 (in/hr)	Q2 (cfs)	Q5 (cfs)	Q100 (cfs)
14	0.7	15	0.48	0.51	0.68	3.83	4.56	7.37	1.3	1.6	3.5
15	1.2	15	0.48	0.51	0.68	3.83	4.56	7.37	2.2	2.8	6.0
16	0.9	15	0.48	0.51	0.68	3.83	4.56	7.37	1.7	2.1	4.5
17	2.8	15	0.48	0.51	0.68	3.83	4.56	7.37	5.1	6.5	14.0
18	3.0	15	0.48	0.51	0.68	3.83	4.56	7.37	5.5	7.0	15.0
19	1.6	15	0.48	0.51	0.68	3.83	4.56	7.37	2.9	3.7	8.0
20	4.8	15	0.48	0.51	0.68	3.83	4.56	7.37	8.8	11.2	24.1
21	1.3	15	0.48	0.51	0.68	3.83	4.56	7.37	2.4	3.0	6.5
22	1.9	15	0.48	0.51	0.68	3.83	4.56	7.37	3.5	4.4	9.5
23	0.9	15	0.48	0.51	0.68	3.83	4.56	7.37	1.7	2.1	4.5
24	1.3	15	0.48	0.51	0.68	3.83	4.56	7.37	2.4	3.0	6.5
25	1.6	15	0.48	0.51	0.68	3.83	4.56	7.37	2.9	3.7	8.0
26	1.2	15	0.48	0.51	0.68	3.83	4.56	7.37	2.2	2.8	6.0
27	0.8	15	0.48	0.51	0.68	3.83	4.56	7.37	1.5	1.9	4.0
28	1.1	15	0.48	0.51	0.68	3.83	4.56	7.37	2.0	2.6	5.5
Off - site	10.0	19	0.2	0.23	0.47	3.42	4.10	6.68	6.8	9.4	31.4

DRAINAGE PLAN
&
GRADING PLAN