

DRAINAGE PLAN  
FOR  
COPPER GATE NORTH ADDITION  
WICHITA, SEDGWICK COUNTY, KANSAS

SCANNED

Prepared By



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March 29, 2004

*Baughman Company, P.A.*

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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 135<sup>th</sup> 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 135<sup>th</sup> 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.

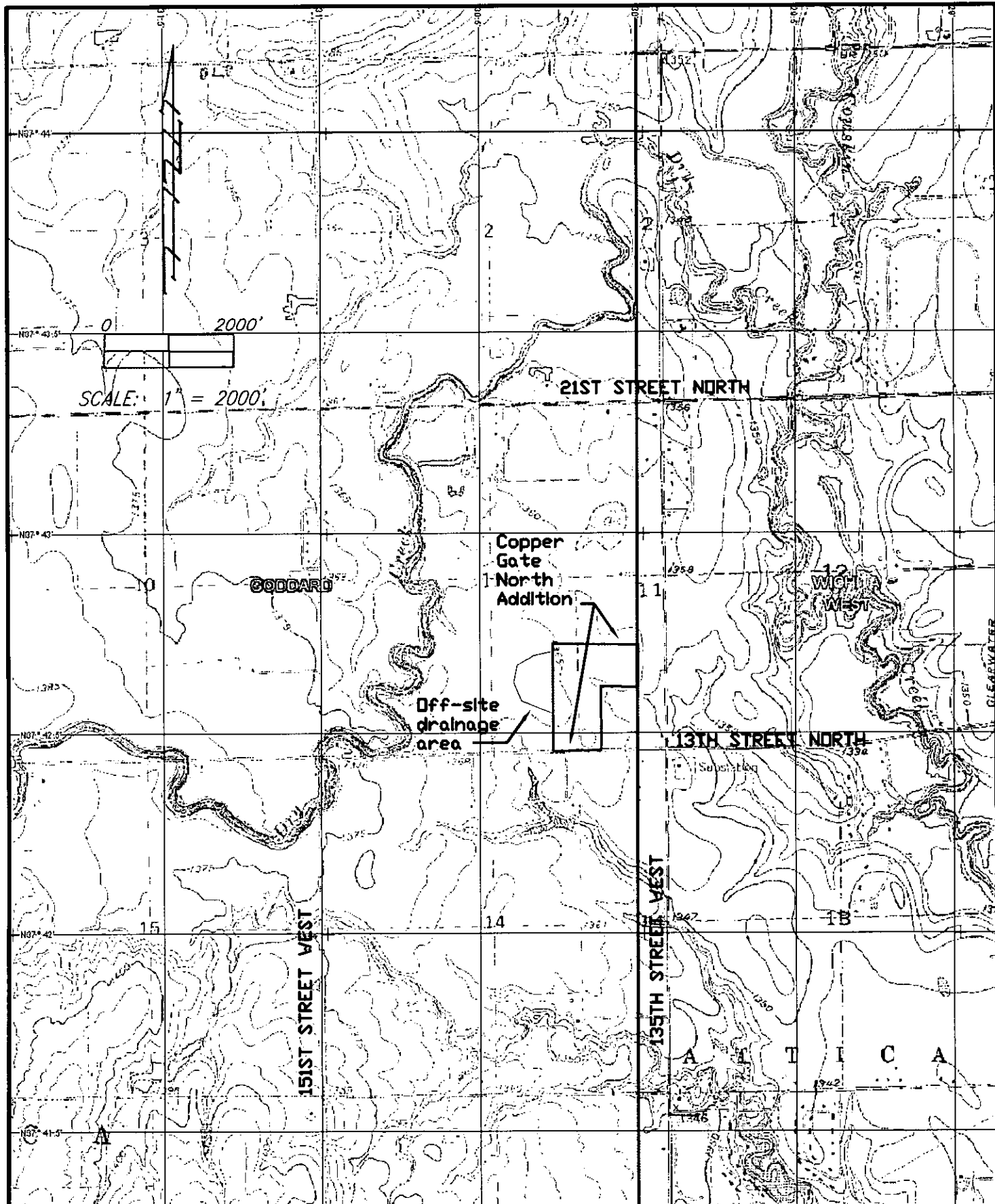
Total post-developed flow in the new channel to the two existing 36" diameter culverts is well below that of the pre-development flow to these same culverts. The pond calculations show results for the 2 yr., 5 yr., and 100 yr. return events.

The new culvert at the entrance of Autumn Ridge off of 135<sup>th</sup> 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 13<sup>th</sup> 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



8-D Topo Quads Copyright © 1999 DeLorme Yarmouth, ME 04096 Source Data: USGS 693 ft Scale: 1 : 24,000 Detail: 13-3 Datum: NAD27

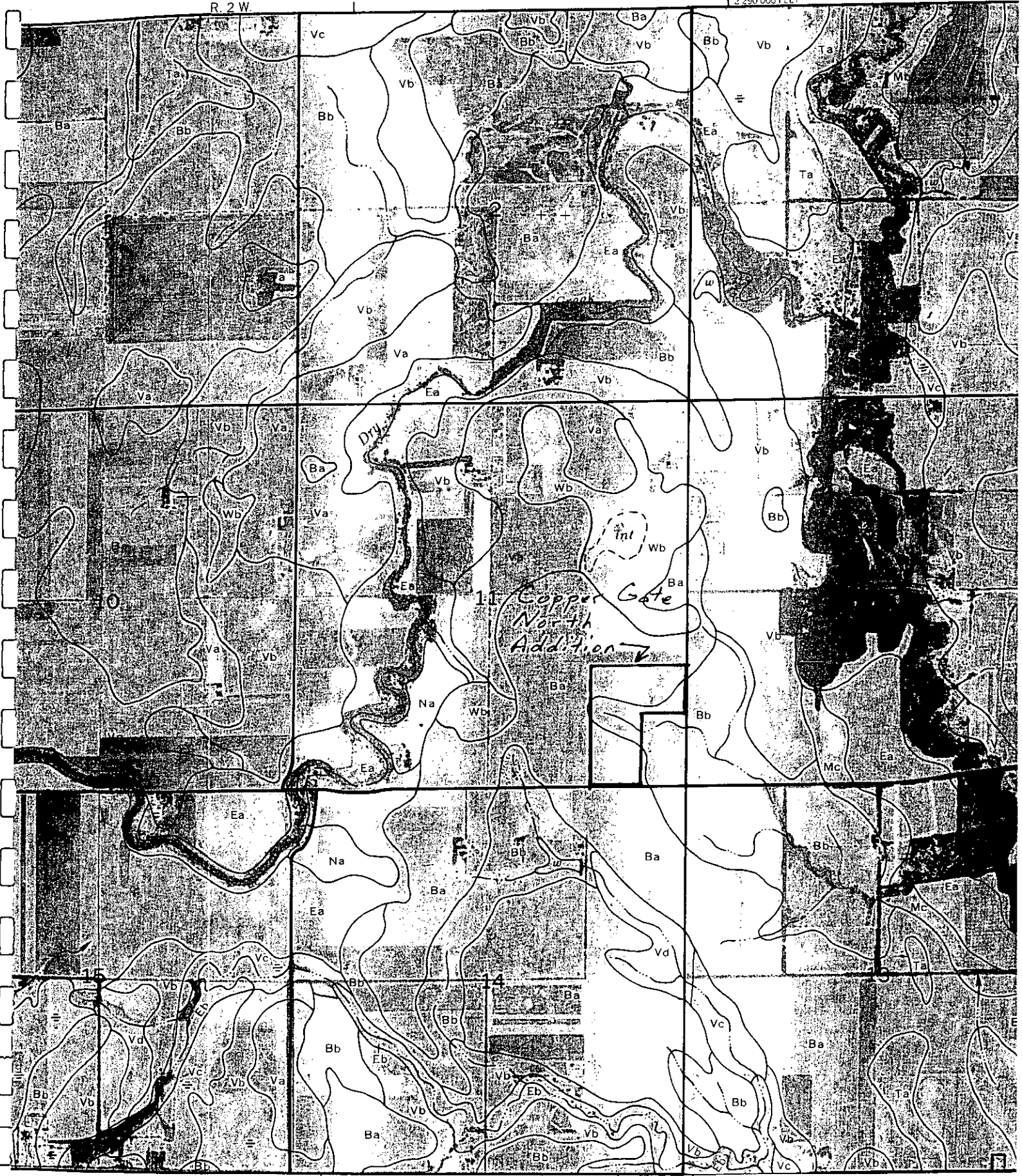
Copper Gate North Addition  
Area Map

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SCS AERIAL WITH SOIL TYPES

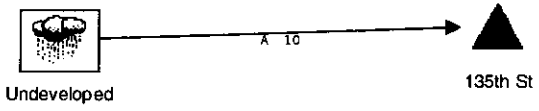
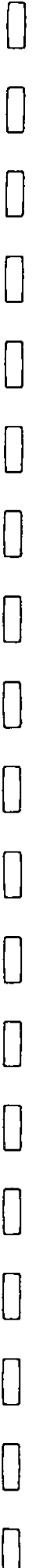
R. 2 W

2 290 000 FEET



CALCULATIONS

PRE-DEVELOPMENT RUNOFF



MASTER DESIGN STORM SUMMARY

Default Network Design Storm File, ID WICHITA.RNQ WICHITA

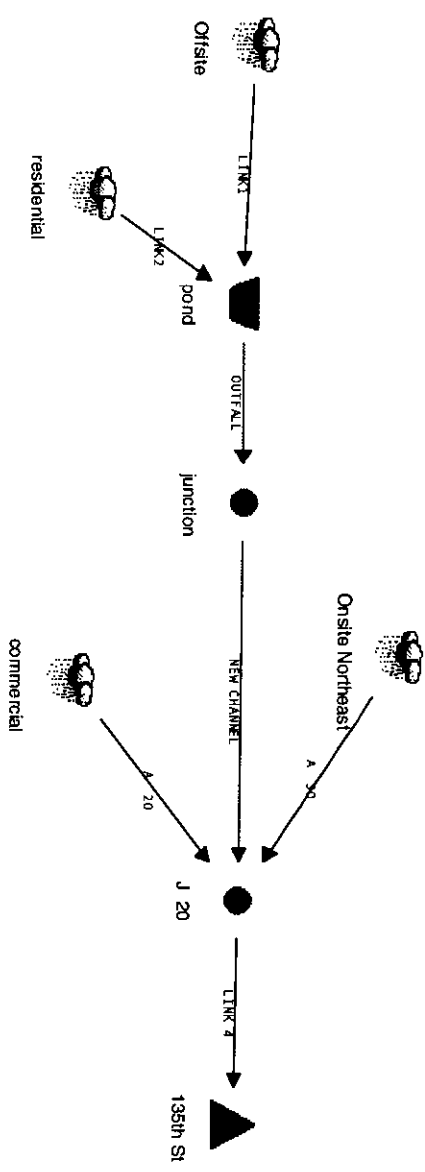
Return Event	Total Depth in	Rainfall Type	RNF File	RNF ID
2-yr	3.6000	Synthetic Curve	SCSTYPES	TypeII 24hr
5-yr	4.5600	Synthetic Curve	SCSTYPES	TypeII 24hr
100-yr	7.6800	Synthetic Curve	SCSTYPES	TypeII 24hr

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	Return Type	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



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	Return Type	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

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Project Description

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

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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

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Results

Depth	0.62	ft
Flow Area	0.86	ft <sup>2</sup>
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.

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

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Project Description

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

---

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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

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Results

Depth	0.93	ft
Flow Area	1.96	ft <sup>2</sup>
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

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Project Description

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

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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

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Results

Discharge	16.81	cfs
Flow Area	9.19	ft <sup>2</sup>
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: TTTT2

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

C U L V #	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (FT)	OUTLET ELEV. (FT)	CULVERT LENGTH (FT)	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
2								
3								
4								
5								
6								

\*\*\*\*\*  
 SUMMARY OF CULVERT FLOWS (CFS) FILE: TTTT2 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: TTTT2 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



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> (ft)	NORMAL DEPTH (ft)	CRITICAL DEPTH (ft)	OUTLET VEL. (fps)	DEPTH (ft)	TAILWATER VEL. (fps)	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  
CURRENT TIME: 10:19:51

FILE DATE: 03-09-2004  
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 \*\*\*\*\*  
 \*\*\*\*\*

C U L V #	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (FT)	OUTLET ELEV. (FT)	CULVERT LENGTH (FT)	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





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

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

\*\*\*\*\*  
\*\*\*\*\* TAILWATER \*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*

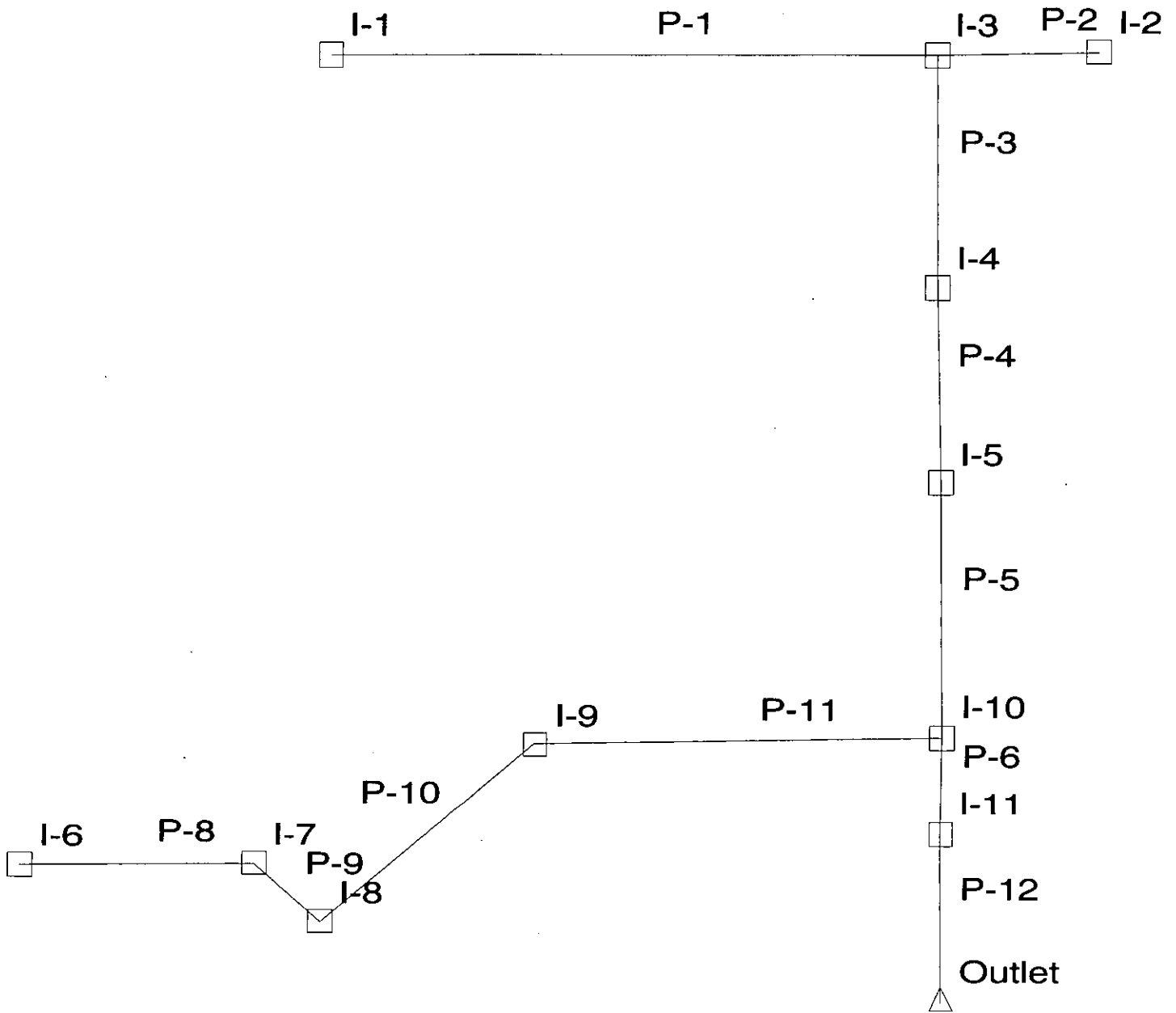
CONSTANT WATER SURFACE ELEVATION  
176.50

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

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

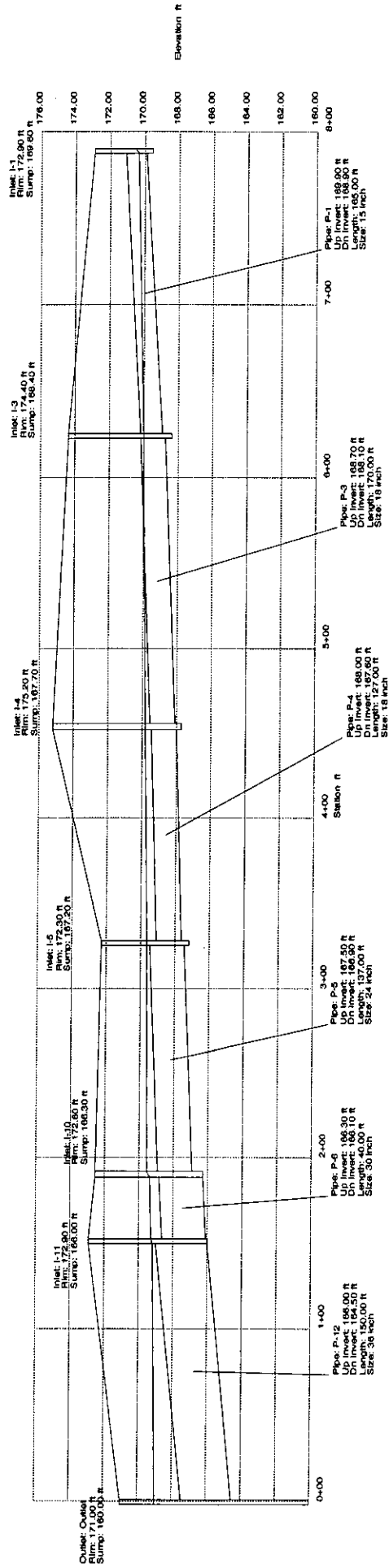
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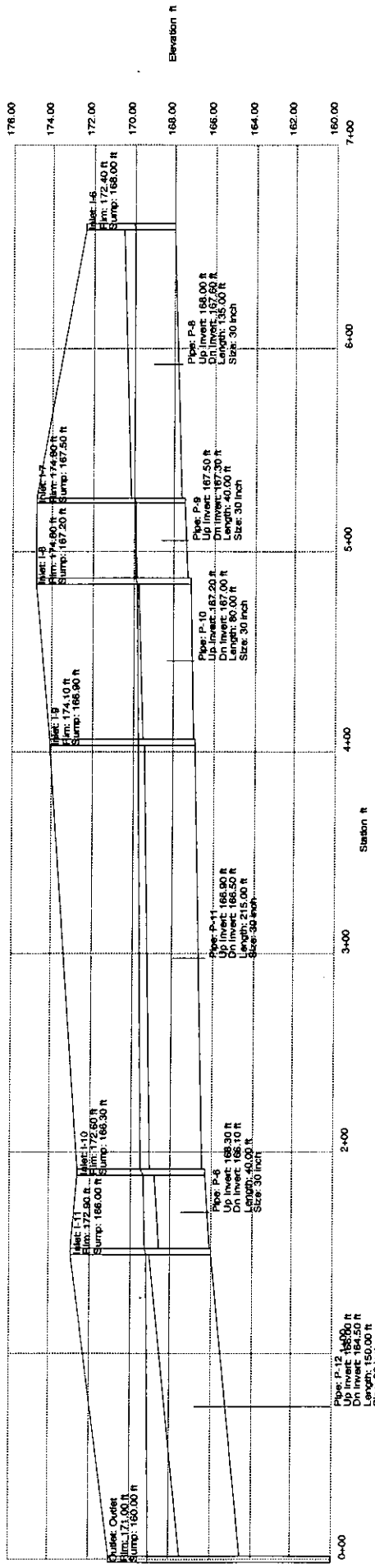
**STORMWATER PIPE ANALYSIS  
SYSTEM #1**

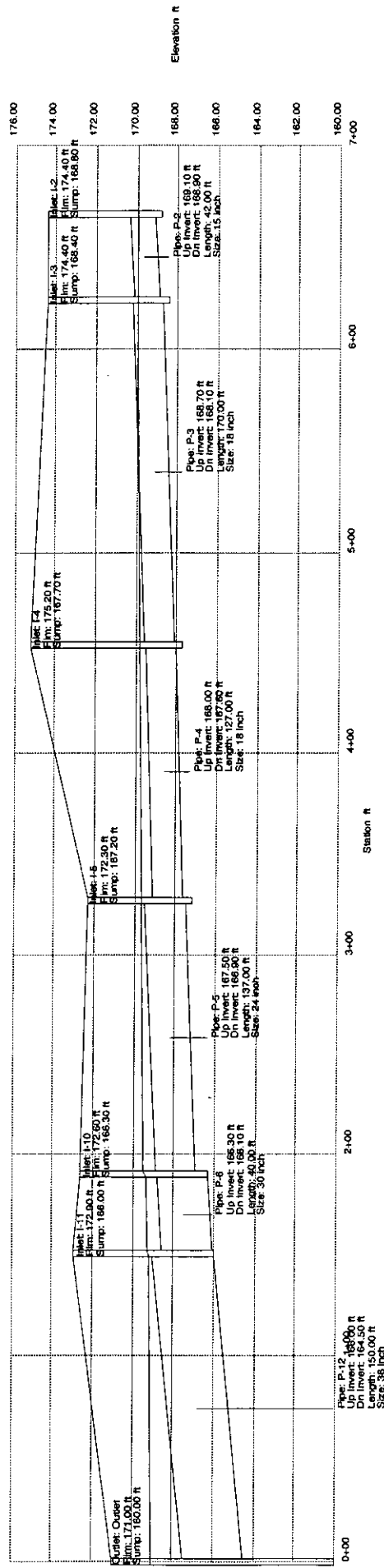


## System Report

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 30 inch	172.40 174.80	169.98 169.94	9.00	135.00	0.00	9.00	I-6 I-7	0.00	2.02	9.00	168.00
P-9	Circular 30 inch	174.80 174.80	169.90 169.88	1.30	40.00	0.00	10.30	I-7 I-8	1.11	2.11	10.30	167.50
P-10	Circular 30 inch	174.80 174.10	169.84 169.77	1.30	80.00	0.00	11.60	I-8 I-9	1.43	2.36	11.60	167.20
P-11	Circular 30 inch	174.10 172.60	169.72 169.51	1.10	215.00	0.00	12.70	I-9 I-10	1.99	2.59	12.70	166.90
P-2	Circular 15 inch	174.40 174.40	170.00 170.00	0.40	42.00	0.00	0.40	I-2 I-3	0.00	0.39	0.40	169.10
P-1	Circular 15 inch	172.90 174.40	170.42 170.00	1.70	165.00	0.00	1.70	I-1 I-3	0.00	2.52	1.70	169.90
P-3	Circular 18 inch	174.40 175.20	169.97 169.84	0.90	170.00	0.00	3.00	I-3 I-4	1.80	1.79	3.00	168.70
P-4	Circular 18 inch	175.20 172.30	169.81 169.65	0.70	127.00	0.00	3.70	I-4 I-5	3.39	2.09	3.70	168.00
P-5	Circular 24 inch	172.30 172.60	169.62 169.51	2.60	137.00	0.00	6.30	I-5 I-10	4.40	2.01	6.30	167.50
P-6	Circular 30 inch	172.60 172.90	169.38 169.28	1.30	40.00	0.00	20.30	I-10 I-11	5.54	4.14	20.30	166.30
P-12	Circular 36 inch	172.90 171.00	169.19 169.00	3.70	150.00	0.00	24.00	I-11 Outlet	5.70	3.40	24.00	166.00

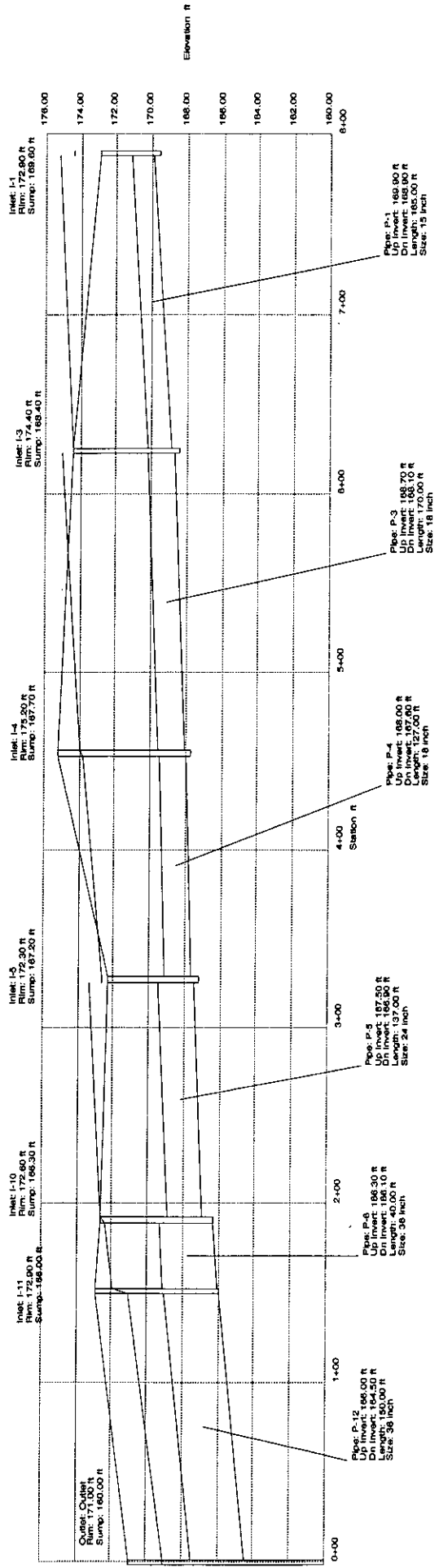


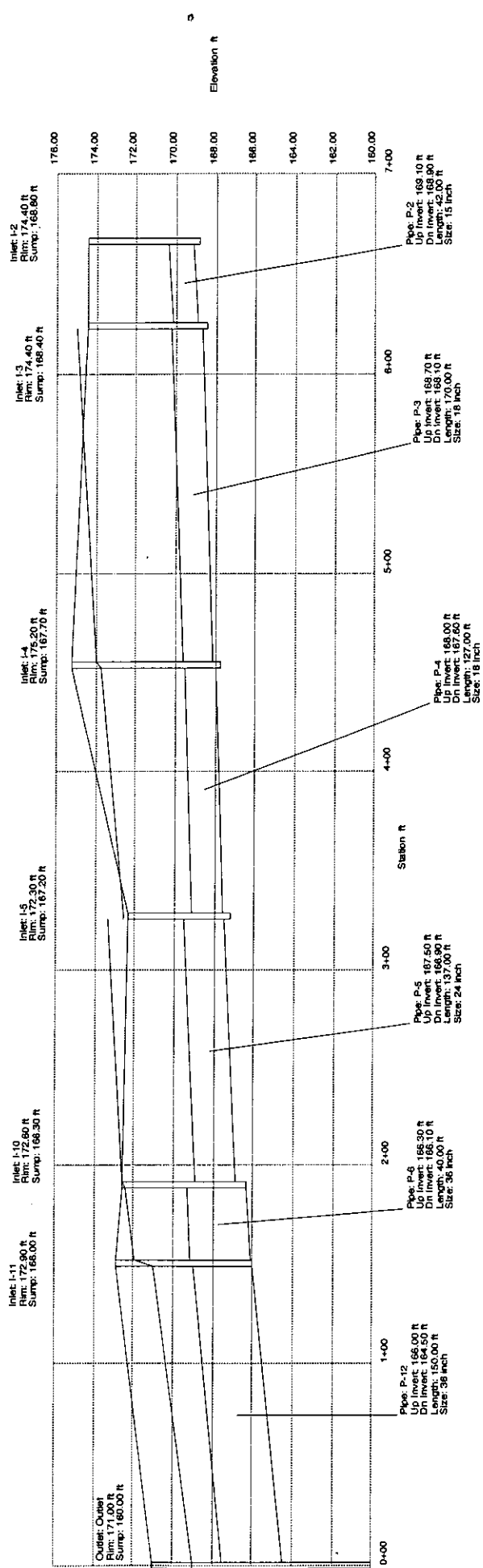


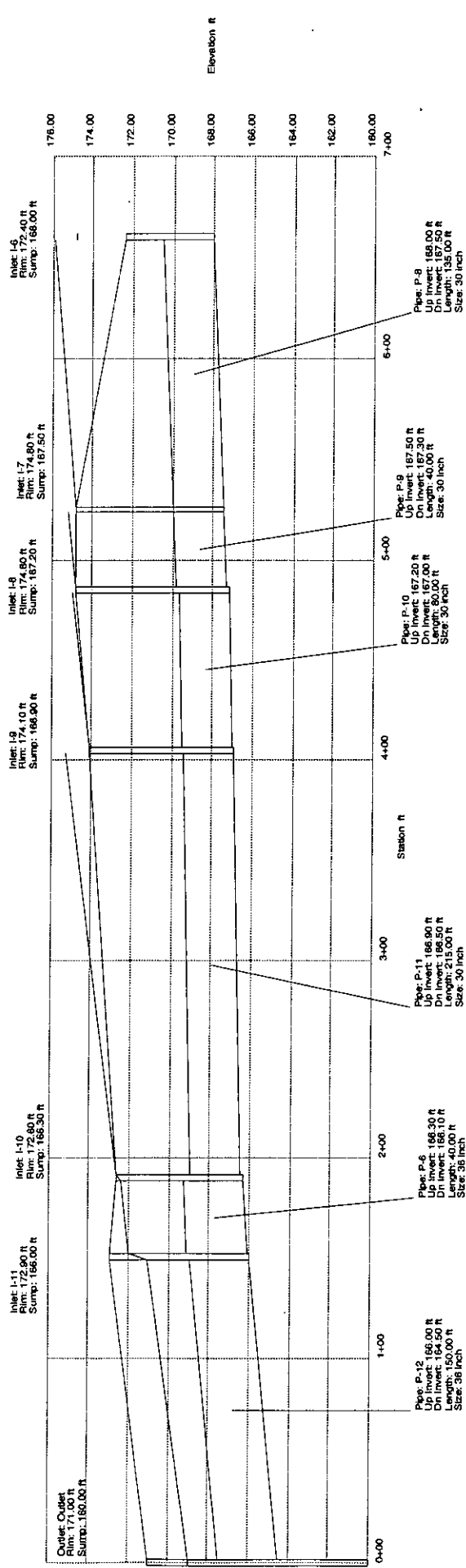


## System Report

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 30 inch	172.40 174.80	175.92 174.80	37.40	135.00	0.00	37.40	I-6 I-7	0.00	7.62	37.40	168.00
P-9	Circular 30 inch	174.80 174.80	175.18 174.80	2.80	40.00	0.00	40.20	I-7 I-8	0.30	8.19	40.20	167.50
P-10	Circular 30 inch	174.80 174.10	174.98 174.10	2.80	80.00	0.00	43.00	I-8 I-9	0.38	8.76	43.00	167.20
P-11	Circular 30 inch	174.10 172.60	175.26 172.60	2.60	215.00	0.00	45.60	I-9 I-10	0.53	9.29	45.60	166.90
P-2	Circular 15 inch	174.40 174.40	174.41 174.40	1.00	42.00	0.00	1.00	I-2 I-3	0.00	0.81	1.00	169.10
P-1	Circular 15 inch	172.90 174.40	175.20 174.40	4.50	165.00	0.00	4.50	I-1 I-3	0.00	3.67	4.50	169.90
P-3	Circular 18 inch	174.40 175.20	174.99 174.00	2.50	170.00	0.00	8.00	I-3 I-4	0.86	4.53	8.00	168.70
P-4	Circular 18 inch	175.20 172.30	173.75 172.60	2.00	127.00	0.00	10.00	I-4 I-5	1.48	5.66	10.00	168.00
P-5	Circular 24 inch	172.30 172.60	173.37 172.60	7.00	137.00	0.00	17.00	I-5 I-10	1.86	5.41	17.00	167.50
P-6	Circular 36 inch	172.60 172.90	172.37 171.97	4.20	40.00	0.00	66.80	I-10 I-11	2.28	9.45	66.80	166.30
P-12	Circular 36 inch	172.90 171.00	171.03 169.00	10.80	150.00	0.00	77.60	I-11 Outlet	2.35	10.98	77.60	166.00







**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

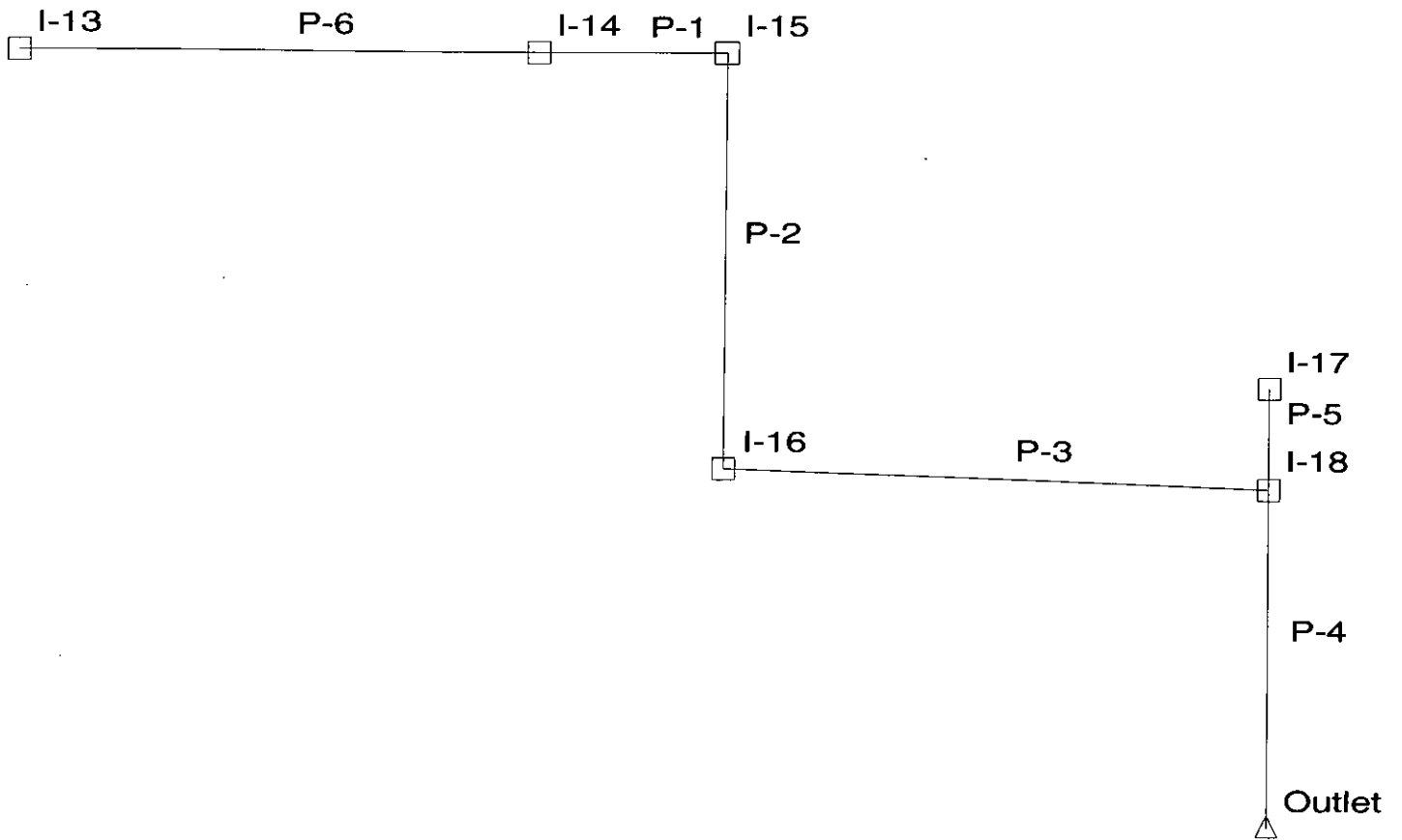
	2-yr	5-yr	100-yr
Rainfall Intensity, in/hr	3.83	4.56	7.37
Rational "C"	0.48	0.51	0.68
Flowrate, cfs	1.7	2.1	4.5
Additional Flow, cfs	0.0	0.0	0.0
Total Flowrate, cfs	1.7	2.1	4.5
depth of flow, ft	0.26	0.28	0.37
Flow width, ft	8.17	8.92	11.90
Froude Number	0.73472	0.74560	0.78225
Length 1, ft	5.28	5.86	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

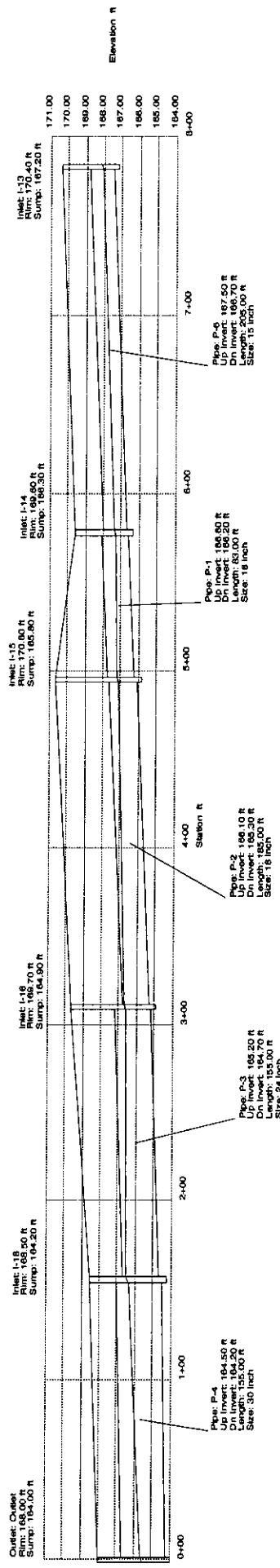
	2-yr	5-yr	100-yr
Rainfall Intensity, in/hr	3.83	4.56	7.37
Rational "C"	0.48	0.51	0.68
Flowrate, cfs	0.7	0.9	2.0
Additional Flow, cfs	0.4	0.0	1.8
Total Flowrate, cfs	1.1	0.9	3.8
depth of flow, ft	0.23	0.21	0.36
Flow width, ft	7.34	6.81	11.55
Froude Number	0.65885	0.65069	0.71057
Length 1, ft	4.26	3.90	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



## System Report

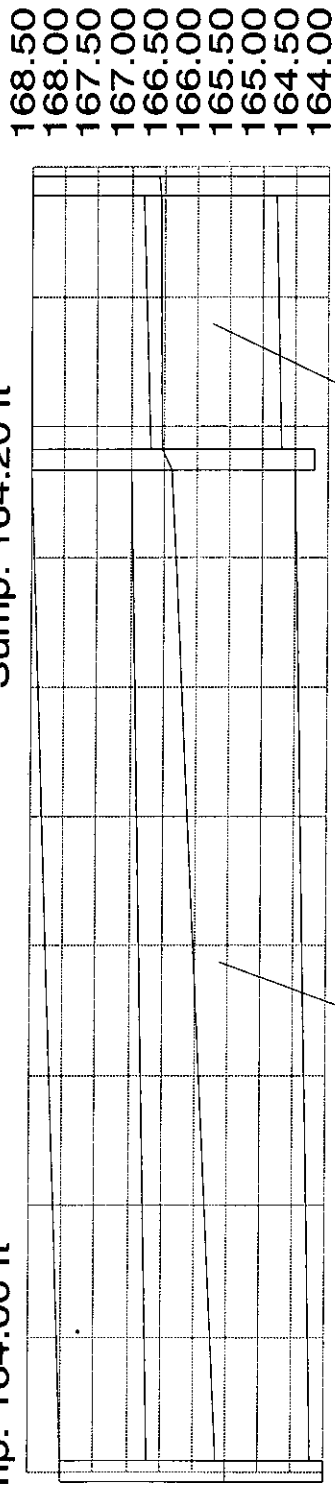
Pipe	-Section- Shape Size	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	Additional Flow (cfs)	Length (ft)	Carryover (cfs)	Structure Discharge (cfs)	-Node- Upstream Downstream	System Flow Time (min)	Average Velocity (ft/s)	Discharge (cfs)	Upstream Invert Elevation (ft)
P-5	Circular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



**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



0+00 0+20 0+40 0+60 0+80 1+00 1+20 1+40 1+60 1+80 2+00

Station ft

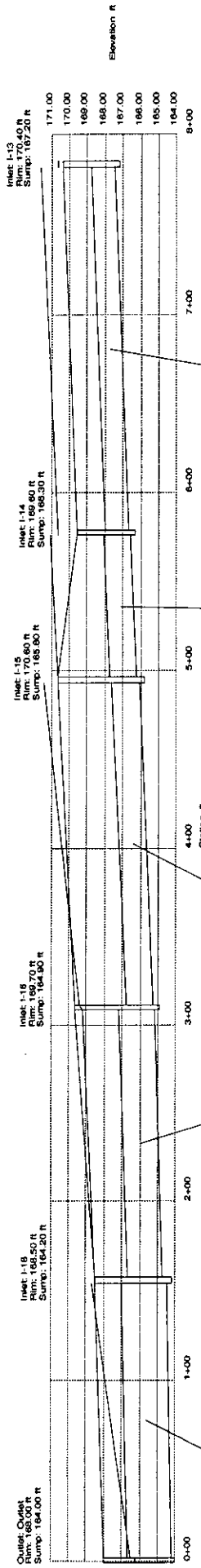
**Pipe: P-4**  
 Up Invert: 164.50 ft  
 Dn Invert: 164.20 ft  
 Length: 155.00 ft  
 Size: 30 inch

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

Elevation 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-5	Circular 24 inch	168.50 168.50	168.74 168.50	17.00	42.00	0.00	17.00	I-17 I-18	0.00	5.41	17.00	164.80
P-6	Circular 15 inch	170.40 169.60	171.59 170.60	4.50	205.00	0.00	4.50	I-13 I-14	0.00	3.67	4.50	167.50
P-1	Circular 18 inch	169.60 170.60	171.08 170.60	3.50	83.00	0.00	8.00	I-14 I-15	0.93	4.53	8.00	166.60
P-2	Circular 18 inch	170.60 169.70	171.45 169.42	3.00	185.00	0.00	11.00	I-15 I-16	1.24	6.22	11.00	166.10
P-3	Circular 24 inch	169.70 168.50	169.23 168.50	4.50	155.00	0.00	15.50	I-16 I-18	1.73	4.93	15.50	165.20
P-4	Circular 30 inch	168.50 168.00	168.68 166.47	15.00	155.00	0.00	47.50	I-18 Outlet	2.26	9.92	47.50	164.50



Pipe: P-4  
 Up Invert: 164.50 ft  
 Dn Invert: 164.20 ft  
 Length: 205.00 ft  
 Size: 15 inch

Pipe: P-1  
 Up Invert: 169.80 ft  
 Dn Invert: 166.30 ft  
 Length: 35.00 ft  
 Size: 18 inch

Pipe: P-2  
 Up Invert: 168.10 ft  
 Dn Invert: 164.70 ft  
 Length: 33.40 ft  
 Size: 19 inch

Pipe: P-3  
 Up Invert: 166.20 ft  
 Dn Invert: 164.70 ft  
 Length: 15.50 ft  
 Size: 24 inch

Pipe: P-4  
 Up Invert: 164.50 ft  
 Dn Invert: 164.20 ft  
 Length: 35.00 ft  
 Size: 30 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**



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

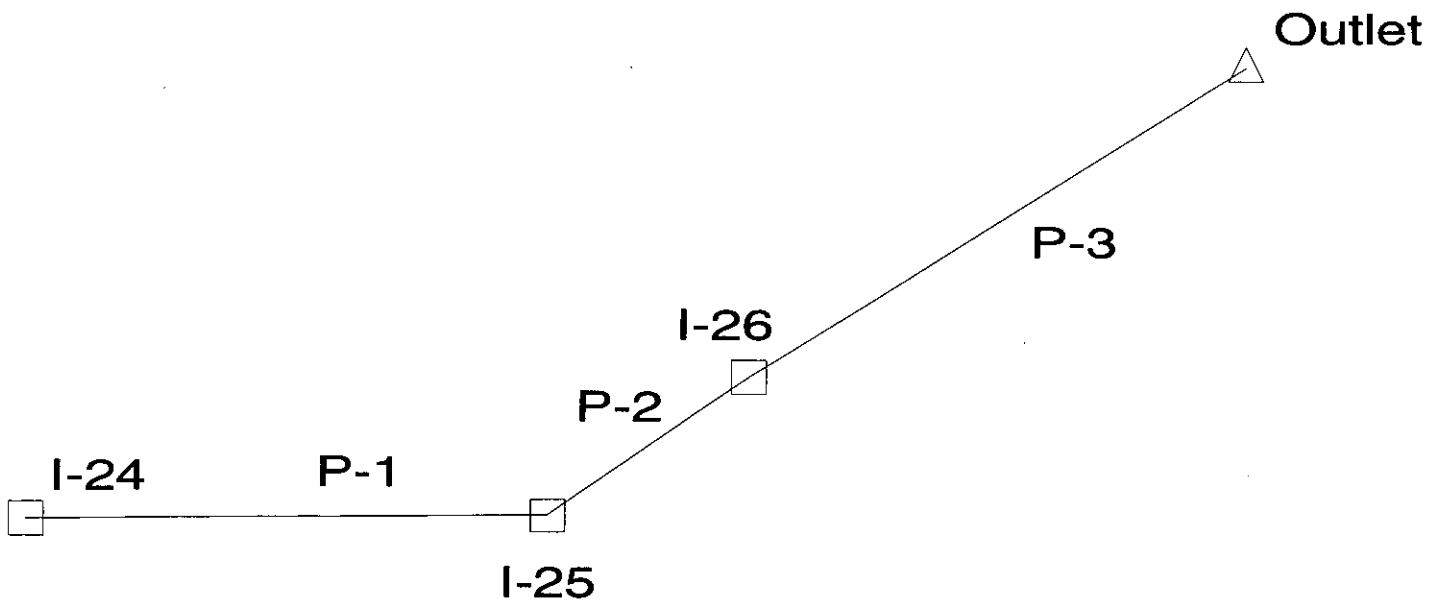
**Pipe: P-5**  
**Up Invert: 164.80 ft**  
**Dn Invert: 164.70 ft**  
**Length: 42.00 ft**  
**Size: 24 inch**

**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

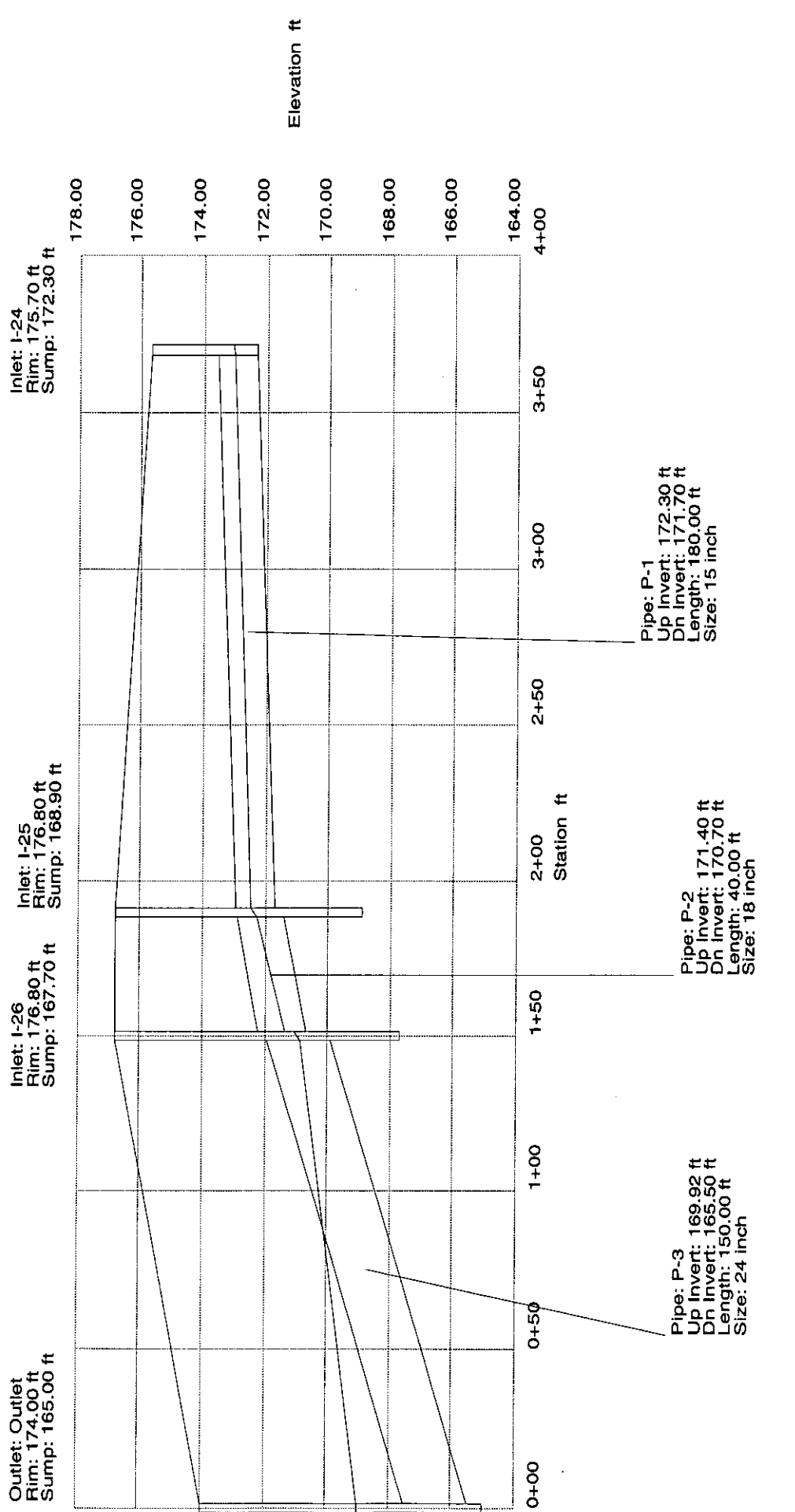
	2-yr	5-yr	100-yr
Rainfall Intensity, in/hr	3.83	4.56	7.37
Rational "C"	0.48	0.51	0.68
Flowrate, cfs	2.2	2.8	6.0
Additional Flow, cfs	0.0	0.0	0.0
Total Flowrate, cfs	2.2	2.8	6.0
depth of flow, ft	0.27	0.30	0.40
Flow width, ft	8.70	9.51	12.68
Froude Number	0.83571	0.84808	0.88976
Length 1, ft	6.40	7.10	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**



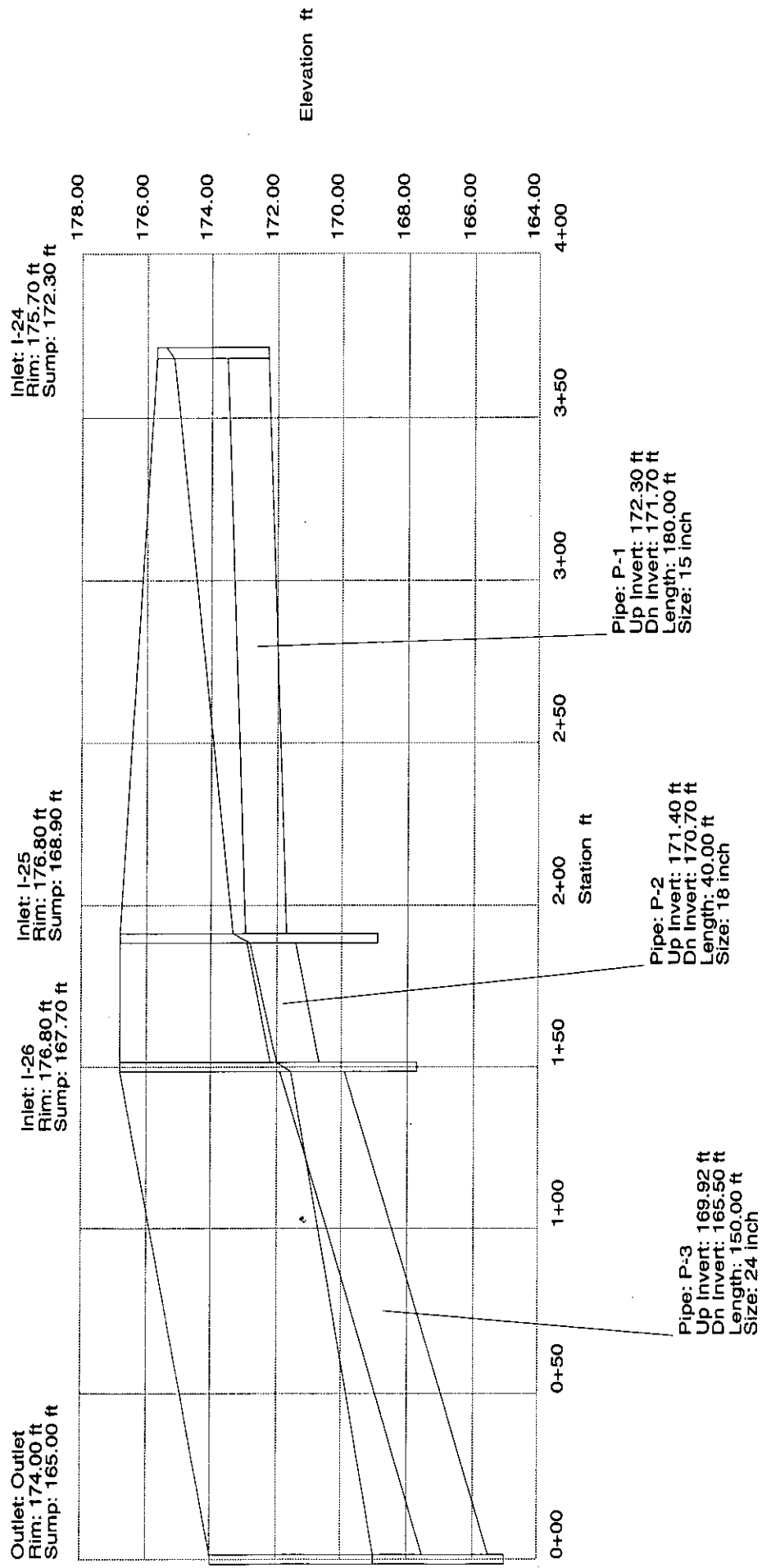
## System Report

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 15 inch	175.70 176.80	173.03 172.47	2.40	180.00	0.00	2.40	I-24 I-25	0.00	3.12	2.40	172.30
P-2	Circular 18 inch	176.80 176.80	172.29 171.36	2.90	40.00	0.00	5.30	I-25 I-26	0.96	5.98	5.30	171.40
P-3	Circular 24 inch	176.80 174.00	170.89 169.00	2.20	150.00	0.00	7.50	I-26 Outlet	1.07	3.66	7.50	169.92

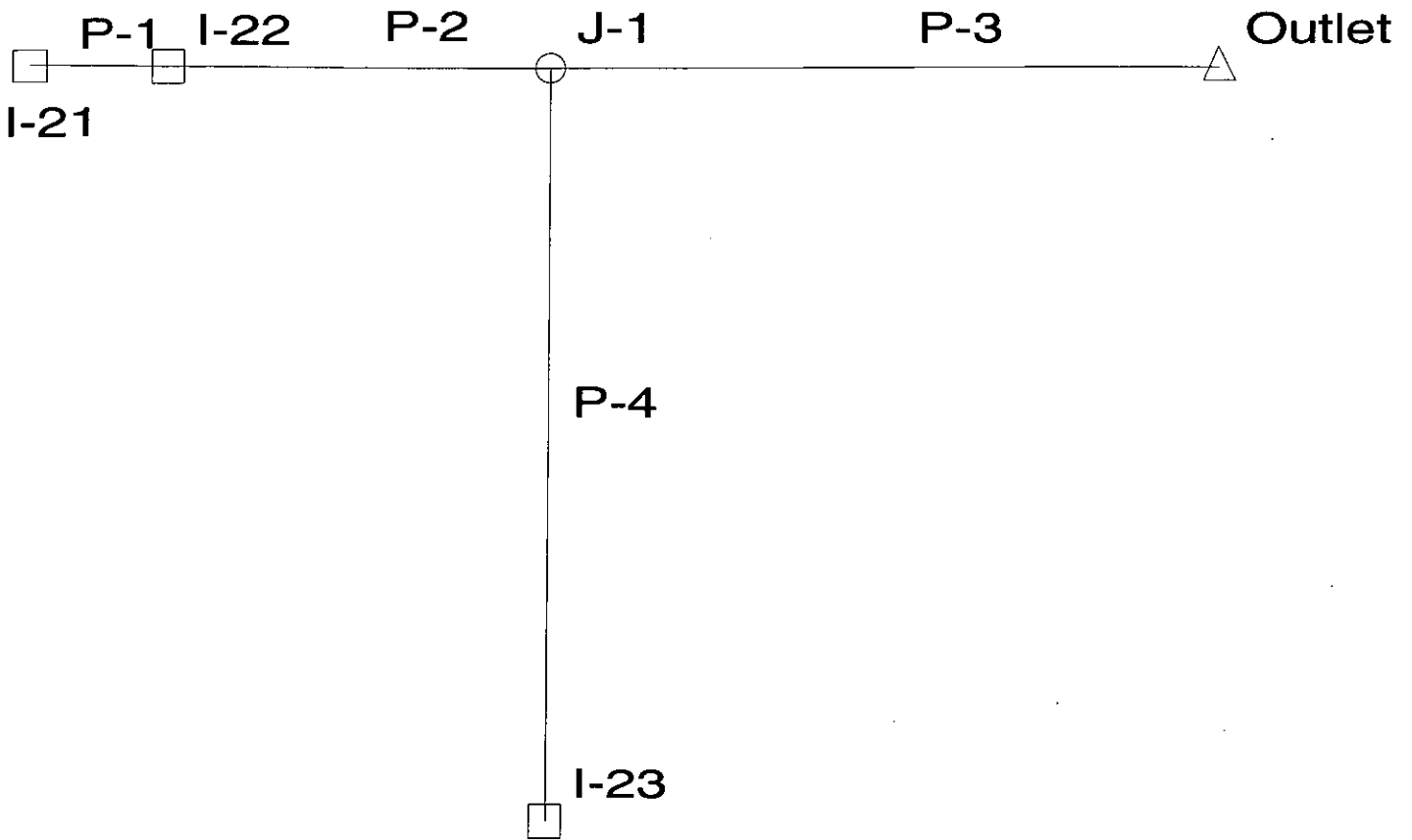


## System Report

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 15 inch	175.70 176.80	175.17 173.35	6.50	180.00	0.00	6.50	I-24 I-25	0.00	5.30	6.50	172.30
P-2	Circular 18 inch	176.80 176.80	172.79 172.01	8.00	40.00	0.00	14.50	I-25 I-26	0.57	8.66	14.50	171.40
P-3	Circular 24 inch	176.80 174.00	171.54 169.00	6.00	150.00	0.00	20.50	I-26 Outlet	0.64	7.01	20.50	169.92

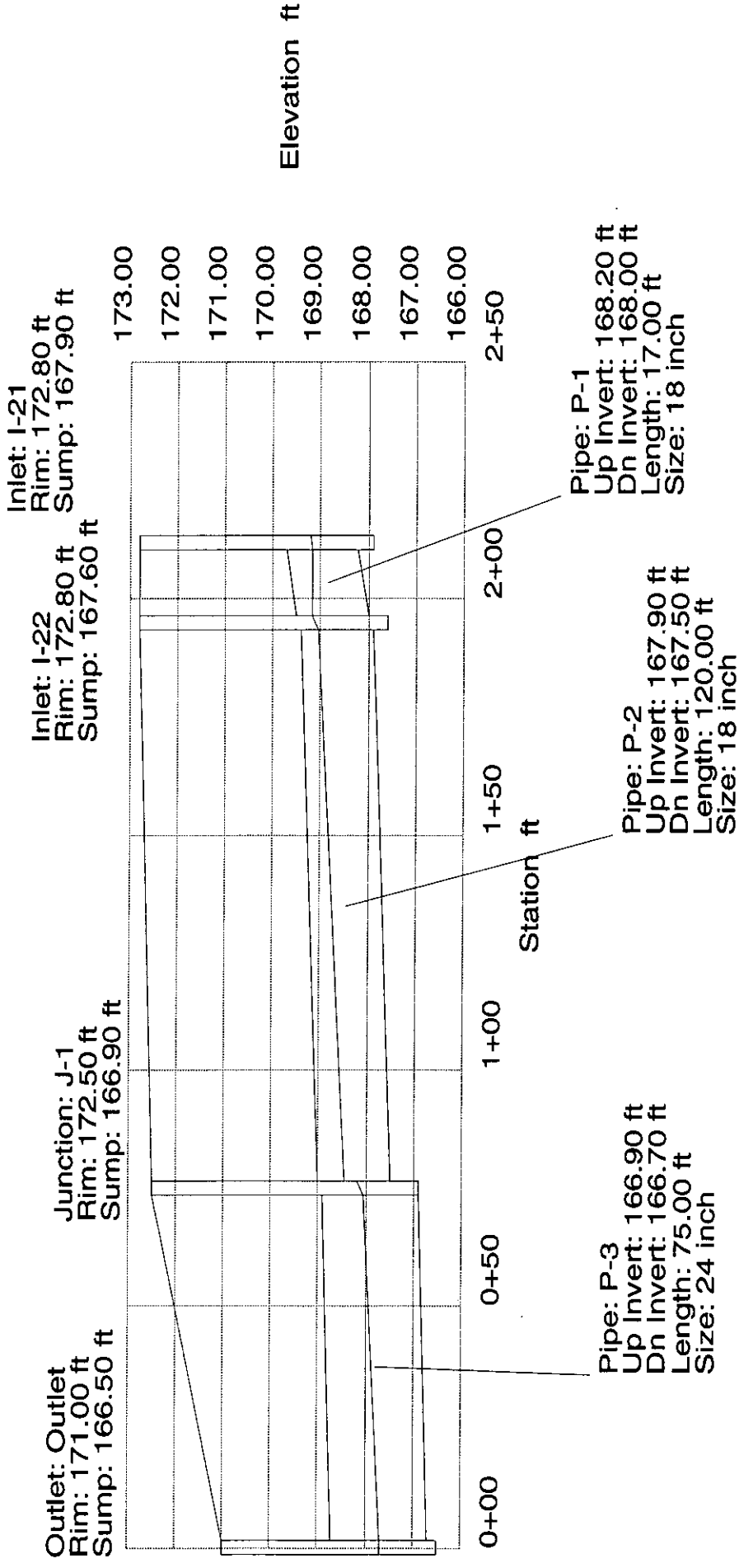


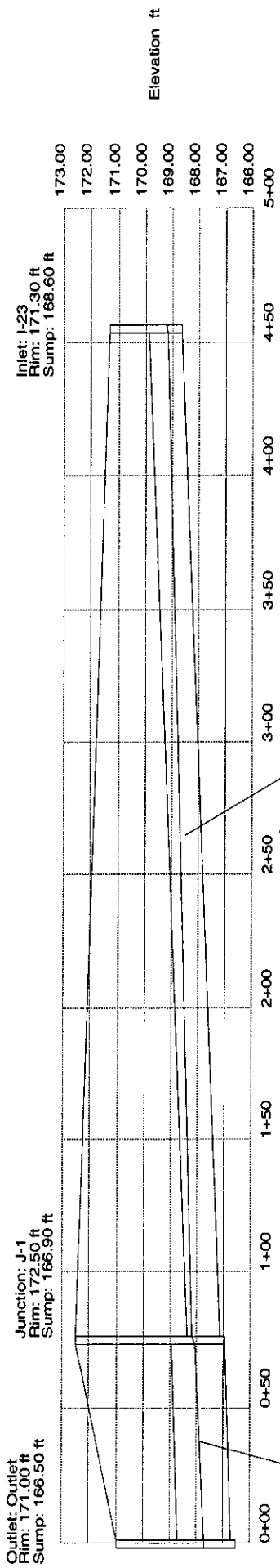
STORMWATER PIPE ANALYSIS  
SYSTEM #4



## 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 15 inch	171.30 172.50	169.16 168.18	1.70	380.00	0.00	1.70	I-23 J-1	2.34	1.70	168.60	167.10
P-1	Circular 18 inch	172.80 172.80	169.18 169.19	2.40	17.00	0.00	2.40	I-21 I-22	1.78	2.40	168.20	168.00
P-2	Circular 18 inch	172.80 172.50	169.06 168.44	3.50	120.00	0.00	5.90	I-22 J-1	4.55	5.90	167.90	167.50
P-3	Circular 24 inch	172.50 171.00	168.05 167.68	N/A	75.00	N/A	7.60	J-1 Outlet	4.52	7.60	166.90	166.70



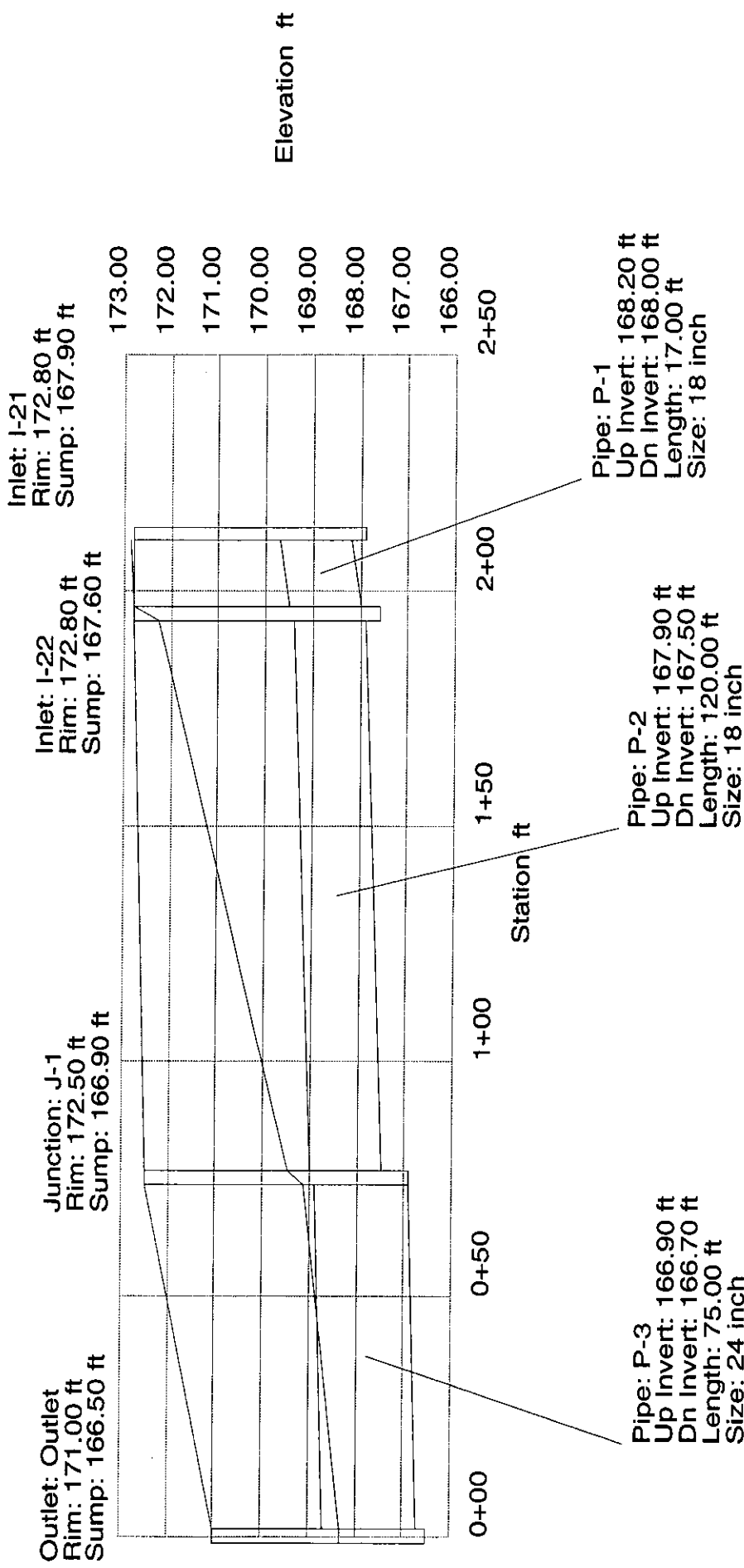


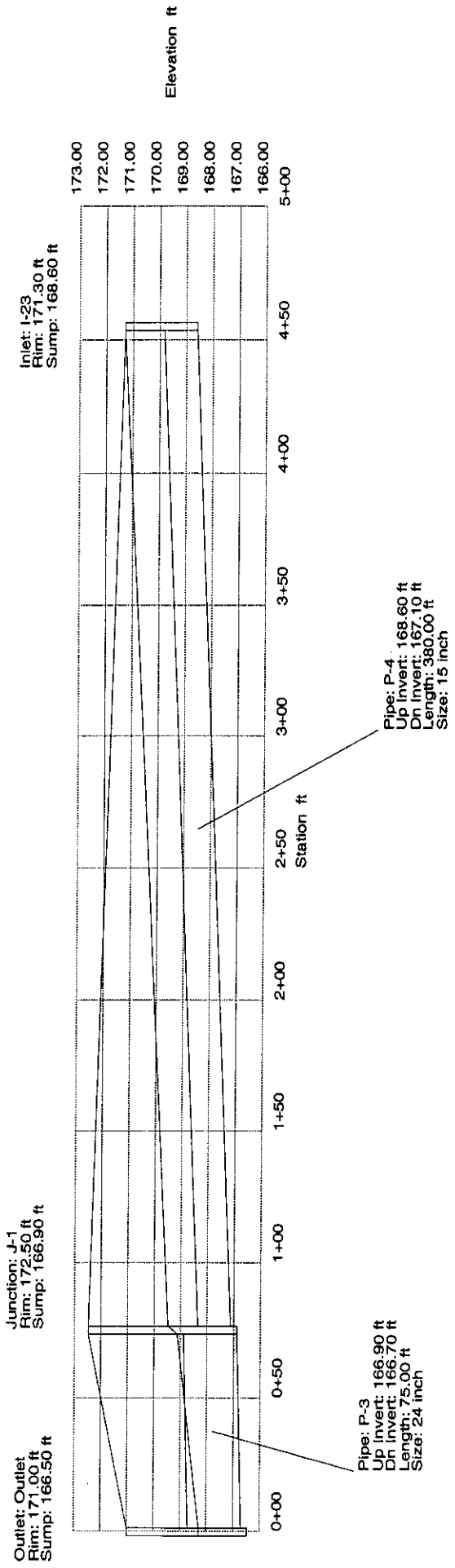
Pipe: P-4  
 Up Invert: 168.60 ft  
 Dn Invert: 167.10 ft  
 Length: 380.00 ft  
 Size: 15 inch

Pipe: P-3  
 Up Invert: 166.90 ft  
 Dn Invert: 166.70 ft  
 Length: 75.00 ft  
 Size: 24 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 15 inch	171.30 172.50	171.30 169.46	4.50	380.00	0.00	4.50	I-23 J-1	3.67	4.50	168.60	167.10
P-1	Circular 18 inch	172.80 172.80	172.87 172.80	6.50	17.00	0.00	6.50	I-21 I-22	3.68	6.50	168.20	168.00
P-2	Circular 18 inch	172.80 172.50	172.24 169.46	9.50	120.00	0.00	16.00	I-22 J-1	9.05	16.00	167.90	167.50
P-3	Circular 24 inch	172.50 171.00	169.13 168.32	N/A	75.00	N/A	20.50	J-1 Outlet	7.01	20.50	166.90	166.70





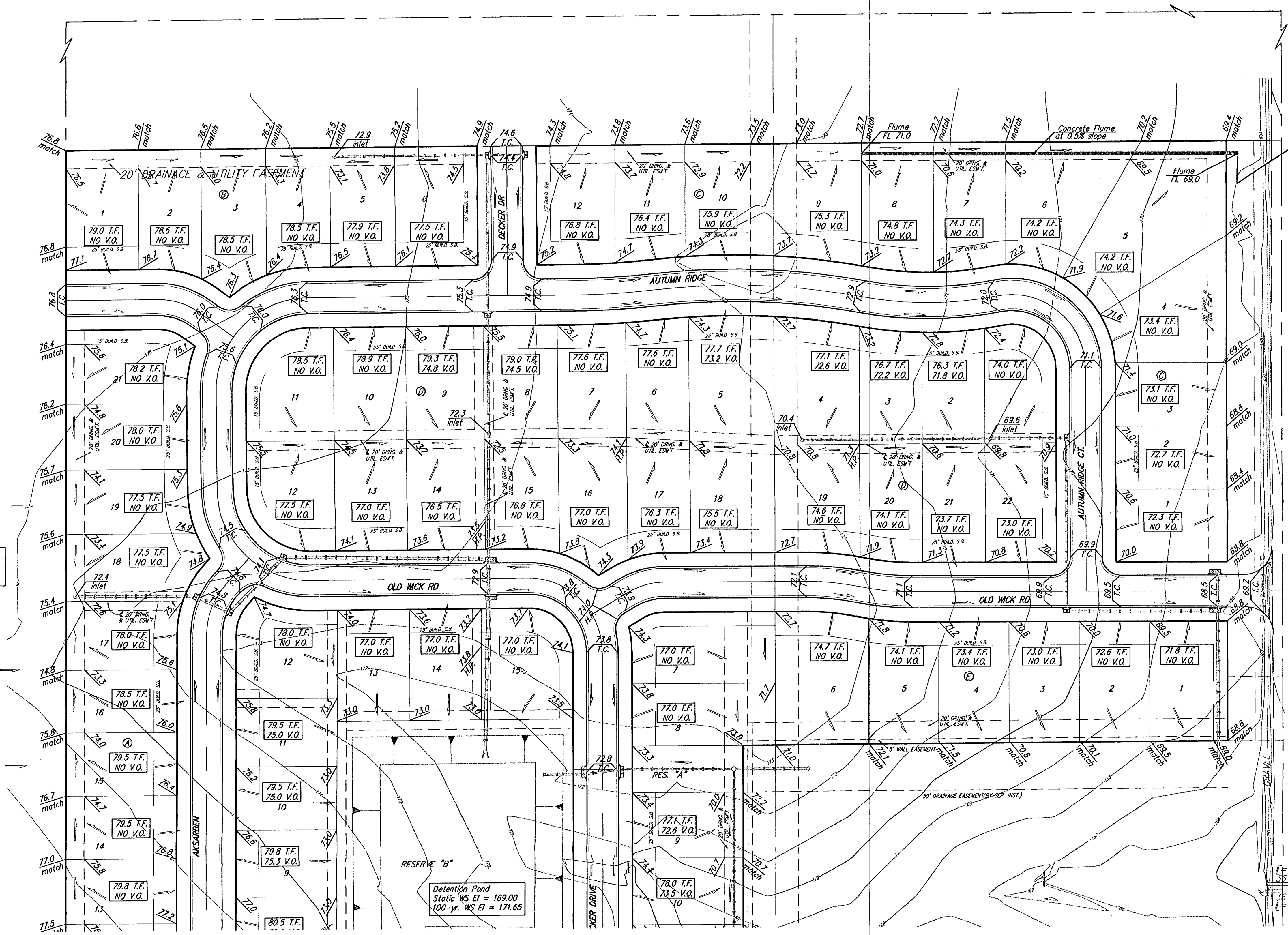
**Copper Gate North Addition -- Post-Development Flows**

Area #	D. A. (ac)	$t_c$ (min)	$C_2$	$C_5$	$C_{100}$	$I_2$ (in/hr)	$I_5$ (in/hr)	$I_{100}$ (in/hr)	$Q_2$ (cfs)	$Q_5$ (cfs)	$Q_{100}$ (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**

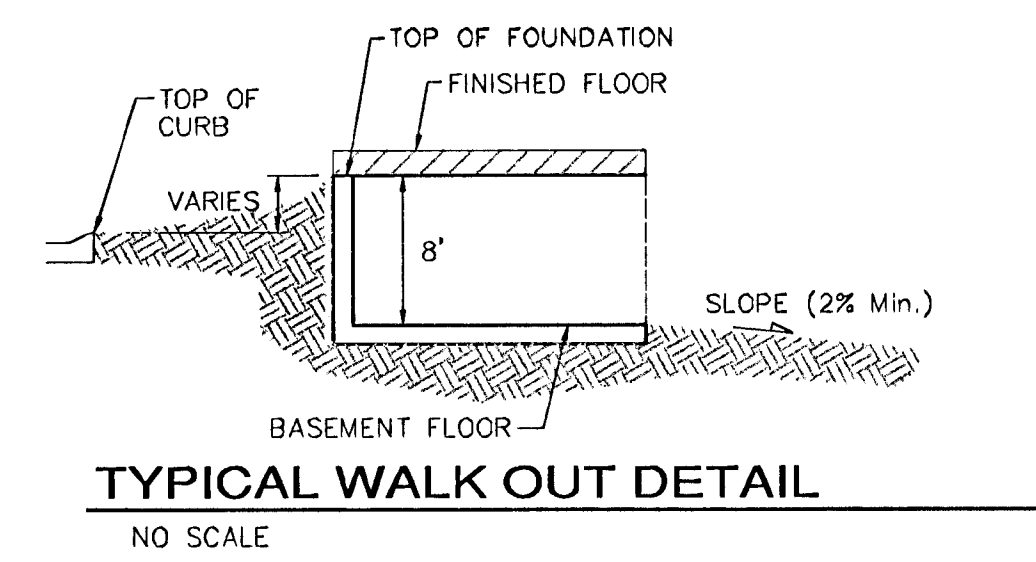
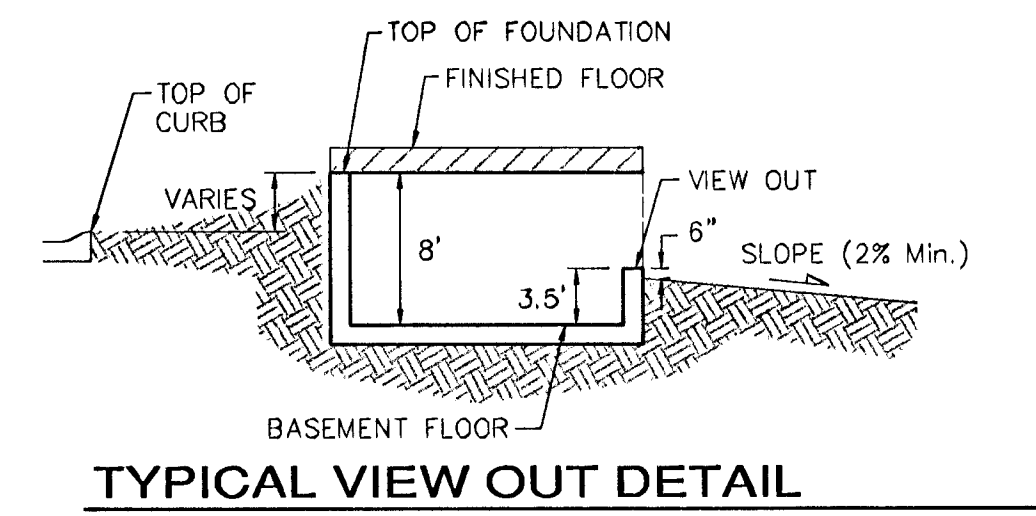
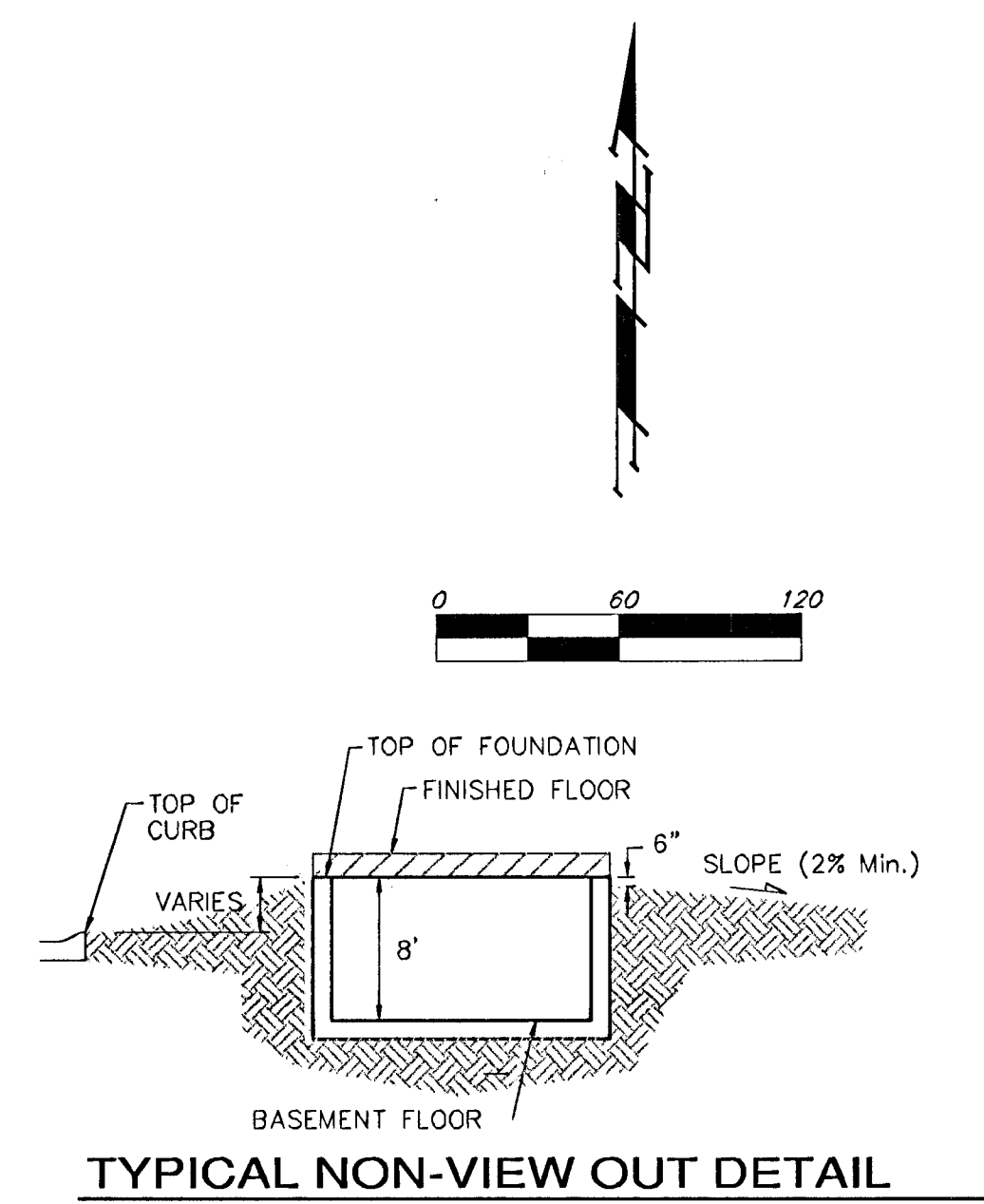
Area #	D. A. (ac)	tc (min)	C2	C5	C100	I2 (in/hr)	I5 (in/hr)	I100 (in/hr)	Q2 (cfs)	Q5 (cfs)	Q100 (cfs)
14	0.7	15	0.48	0.51	0.68	3.83	4.56	7.37	1.3	1.6	3.5
15	1.2	15	0.48	0.51	0.68	3.83	4.56	7.37	2.2	2.8	6.0
16	0.9	15	0.48	0.51	0.68	3.83	4.56	7.37	1.7	2.1	4.5
17	2.8	15	0.48	0.51	0.68	3.83	4.56	7.37	5.1	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



Off-Site Drainage  
 O1A = 10 Acres  
 O2 = 6.8 cfs  
 O3 = 3.4 cfs  
 O1D = 31.4 cfs

Retention Pond  
 Static MS EI = 169.00  
 100-yr. MS EI = 171.65



**NOTES:**  
 Proposed Top of Foundation Elevations Are Shown On Plans. Contractor to Set Finished Floor Elevations.  
 All Street Elevations Shown on Plans Are for Top of Curb (Full-Height).  
 This Grading Plan is Designed with View-Outs. Elevations Shown as XX.X V.O. Indicate View-Out structure elevation.  
 Lot dimensions have been omitted on this plan, refer to the recorded plat for this information.  
 Add 100 to finish grade elevations indicated to achieve city datum elevation. Existing grade elevations are in city datum.  
 \* Indicates that Extra Deep Foundation or Footing may be required.

PRELIMINARY PLAN  
 NOT FOR CONSTRUCTION

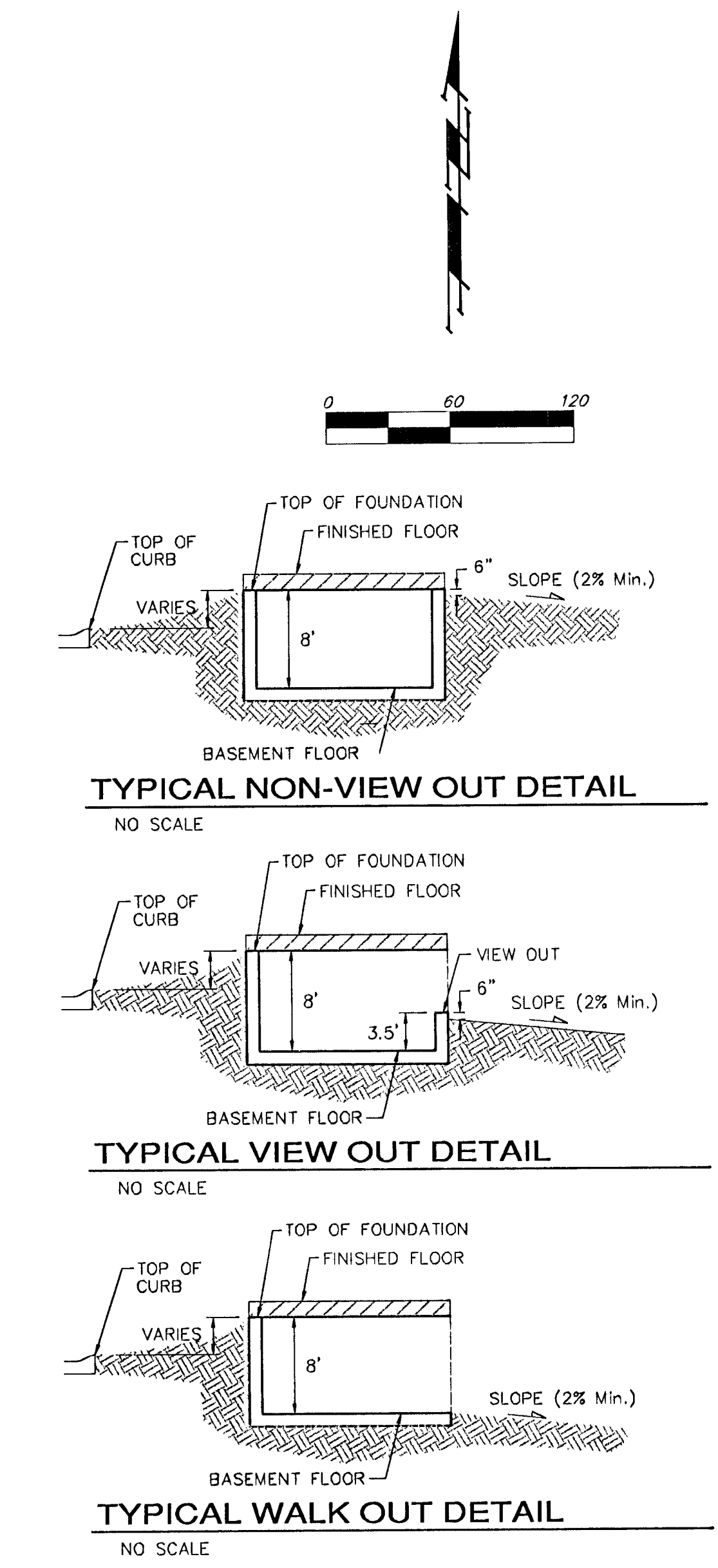
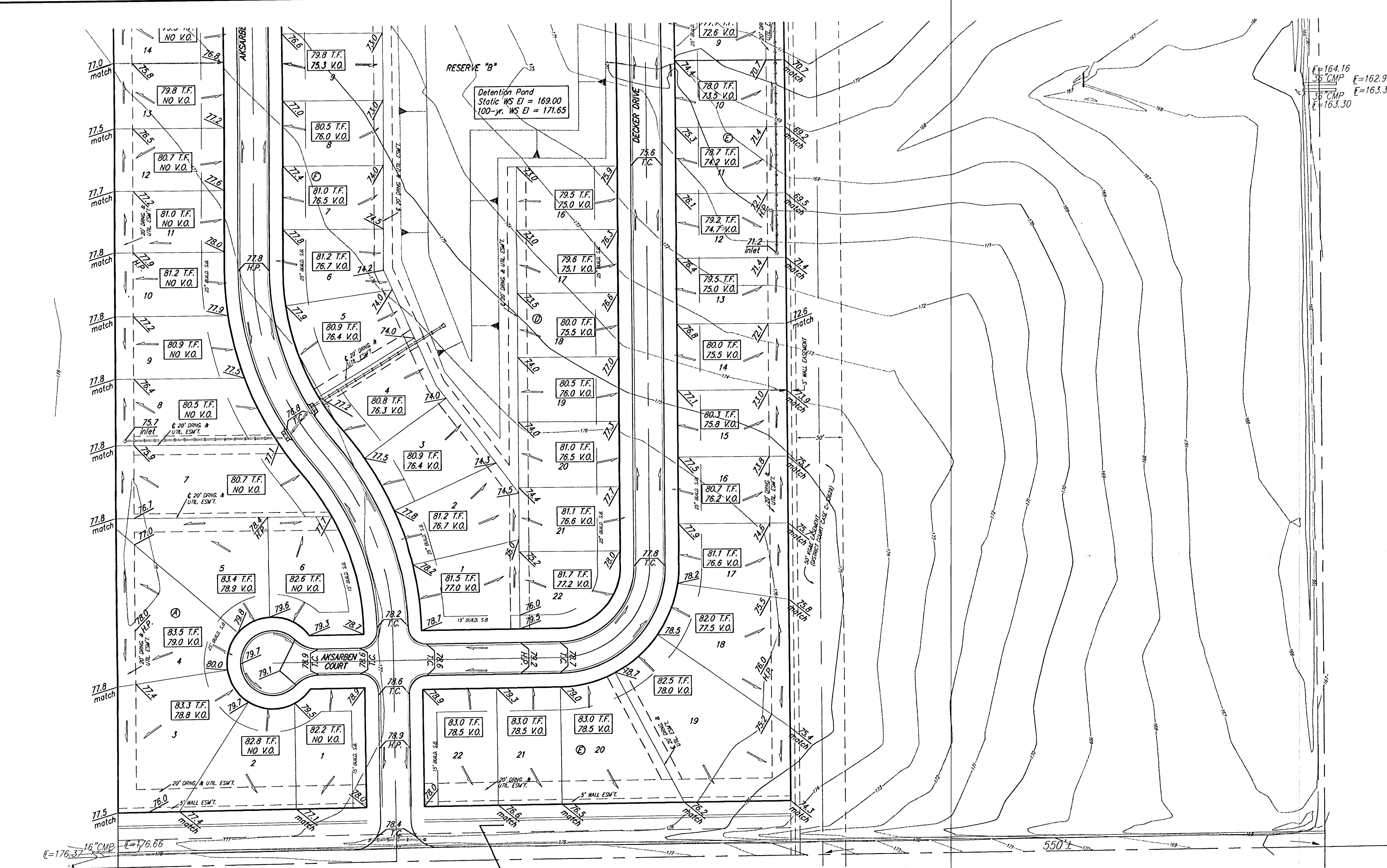
MINIMUM BUILDING PAD ELEVATIONS FOR LOWEST OPENING TO THE STRUCTURES		
LOT	BLOCK	ELEVATION
		CITY DATUM
2-11, 13-21	F	173.5

HARVEST RIDGE ADDITION  
**GRADING PLAN**  
 WICHITA, SEDGWICK COUNTY, KANSAS

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

PROJECT NUMBER: \_\_\_\_\_ SHEET: **2** OF **2**

DESIGN: JUD DRAWN: JUD APPROVED: \_\_\_\_\_ DATE: 03/29/04 SCALE: 1"=60'



**NOTES:**  
 Proposed Top of Foundation Elevations Are Shown On Plans. Contractor to Set Finished Floor Elevations.  
 All Street Elevations Shown on Plans Are for Top of Curb (Full-Height).  
 This Grading Plan is Designed with View-Outs. Elevations Shown as XX.X V.O. Indicate View-Out structure elevation.  
 Lot dimensions have been omitted on this plan, refer to the recorded plat for this information.  
 Add 100 to finish grade elevations indicated to achieve city datum elevation. Existing grade elevations are in city datum.  
 \* Indicates that Extra Deep Foundation or Footing may be required.

1321.60'(M) N89°35'25"E  
 13TH ST. NORTH 589'35'25"W  
 1321.69'(M)

PRELIMINARY PLAN  
 NOT FOR CONSTRUCTION

MINIMUM BUILDING PAD ELEVATIONS FOR LOWEST OPENING TO THE STRUCTURES		
LOT	BLOCK	ELEVATION CITY DATUM
2-11, 13-21	F	173.5

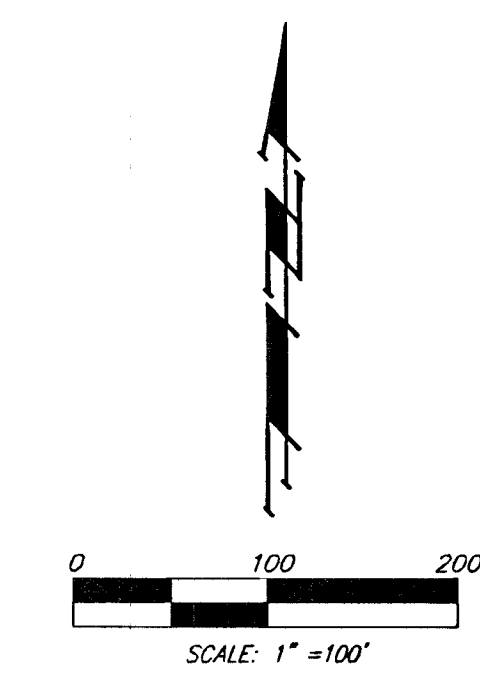
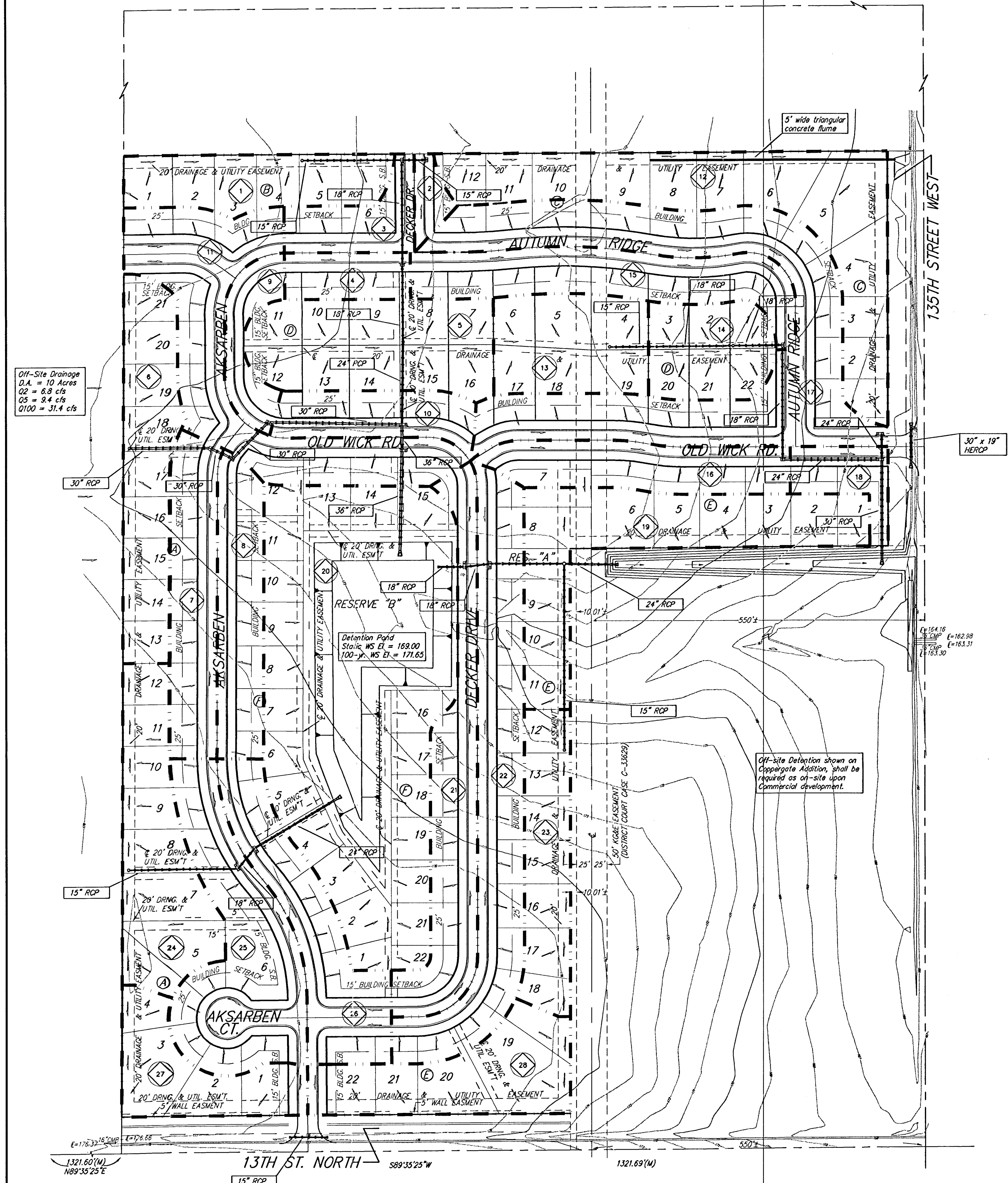
HARVEST RIDGE ADDITION  
**GRADING PLAN**  
 WICHITA, SEDGWICK COUNTY, KANSAS

**BAUGHMAN COMPANY P.A.**  
 ENGINEERING, SURVEYING, & PLANNING  
 316-282-7271 • 315 ELLIS • WICHITA, KANSAS 67211

PROJECT NUMBER: \_\_\_\_\_ SHEET **1** OF **2**

DESIGN: J.D. DRAWN: J.D. APPROVED: \_\_\_\_\_ DATE: 03/29/04 SCALE: 1"=60'

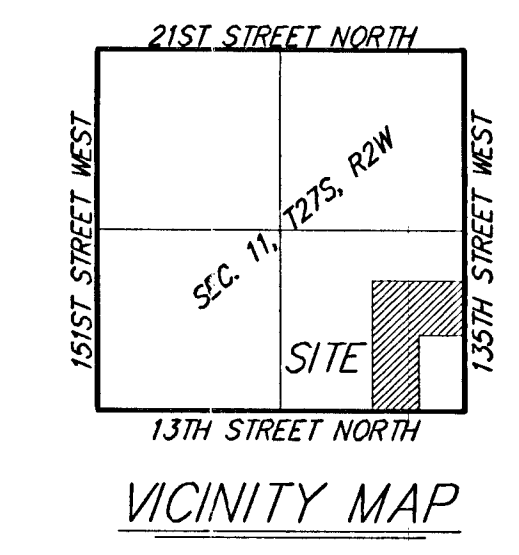
# DRAINAGE PLAN COPPER GATE NORTH ADDITION WICHITA, SEDGWICK COUNTY, KANSAS



- LEGEND**
- = AREA INLET
  - ▭ = CATCH BASIN
  - = DRAINAGE PIPE
  - = CONCRETE DRAINAGE FLUME
  - - - = DRAINAGE BASIN DELINEATOR
  - ⊙ = DRAINAGE BASIN IDENTIFIER
  - = EXISTING CONTOURS
  - = DIRECTION OF STORMWATER FLOW
  - = NEW CONTOURS

**COPPER GATE NORTH ADDITION: STORMWATER FLOWS**

BASIN #	BASIN ARCA (acres)	Time of Concen-tration (min)	RUNOFF COEFFICIENTS			PEAK FLOWRATE		
			2-yr C	5-yr C	100-yr C	2-yr cfs	5-yr cfs	100-yr cfs
1	0.9	15	0.48	0.51	0.68	1.7	2.1	4.5
2	0.2	15	0.48	0.51	0.68	0.4	0.5	1.0
3	0.5	15	0.48	0.51	0.68	0.9	1.2	2.5
4	0.4	15	0.48	0.51	0.68	0.7	0.9	2.0
5	1.4	15	0.48	0.51	0.68	2.6	3.3	7.0
6	1.2	15	0.48	0.51	0.68	2.2	2.8	6.0
7	0.9	15	0.48	0.51	0.68	1.7	2.1	4.5
8	0.9	15	0.48	0.51	0.68	1.7	2.1	4.5
9	0.4	15	0.48	0.51	0.68	0.7	0.9	2.0
10	0.6	15	0.48	0.51	0.68	1.1	1.4	3.0
11	1.8	15	0.48	0.51	0.68	3.3	4.2	9.0
12	2.2	15	0.48	0.51	0.68	4.0	5.1	11.0
13	0.9	15	0.48	0.51	0.68	1.7	2.1	4.5
14	0.7	15	0.48	0.51	0.68	1.3	1.6	3.5
15	1.2	15	0.48	0.51	0.68	2.2	2.8	6.0
16	0.9	15	0.48	0.51	0.68	1.7	2.1	4.5
17	2.8	15	0.48	0.51	0.68	5.1	6.5	14.0
18	3.0	15	0.48	0.51	0.68	5.5	7.0	15.0
19	1.6	15	0.48	0.51	0.68	2.9	3.7	8.0
20	4.8	15	0.48	0.51	0.68	8.8	11.2	24.1
21	1.3	15	0.48	0.51	0.68	2.4	3.0	6.5
22	1.9	15	0.48	0.51	0.68	3.5	4.4	9.5
23	0.9	15	0.48	0.51	0.68	1.7	2.1	4.5
24	1.3	15	0.48	0.51	0.68	2.4	3.0	6.5
25	1.6	15	0.48	0.51	0.68	2.9	3.7	8.0
26	1.2	15	0.48	0.51	0.68	2.2	2.8	6.0
27	0.8	15	0.48	0.51	0.68	1.5	1.9	4.0
28	1.1	15	0.48	0.51	0.68	2.0	2.6	5.5



MINIMUM BUILDING PAD ELEVATIONS FOR LOWEST OPENING TO THE STRUCTURES

LOT	BLOCK	ELEVATION CITY DATUM
2-11, 13-21	F	173.5

