

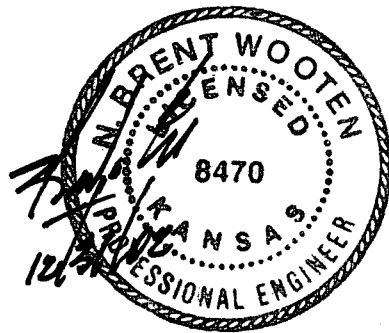
**DRAINAGE PLAN  
NORTHRIDGE ADDITION  
WICHITA, SEDGWICK COUNTY, KANSAS**

*December 30, 2002*



**DRAINAGE PLAN  
NORTHRIDGE ADDITION  
WICHITA, SEDGWICK COUNTY, KANSAS**

*December 30, 2002*



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## INTRODUCTION

This report provides information and supporting documentation for the "Drainage Plan" located in Section 28, T-26-S, R-1-W in Wichita, Sedgwick County, Kansas. The "Drainage Plan" being submitted herein is intended to serve as a guide for the design of streets, stormwater sewers, and site grading to the proposed development. Modifications to structures, pipes, etc. may be made as necessary during the final design in order to obtain the most economical design and construction possible.

## INITIAL DATA

The plat is a 21.2 ac. proposed residential subdivision. The site's current use is agricultural with some non-farmed acreage. The existing topography gradually drains to the east and south to the bridge along 37<sup>th</sup> Street North.

The existing soil types per S.C.S. "Soil Survey of Sedgwick County" is Lesho Loam and Plevna Fine Sandy loam. The hydrologic soil types are C and D respectively. The rational method's runoff coefficients have been selected based on this information.

The tract of land is located in a Federal Emergency Management Agency (FEMA) Zone C and A2 as mapped on the Flood Insurance Rate Map (FIRM) community-panel number 200321 0125A, effective date June 3, 1986.

The time of concentration ( $T_c$ ) for the site was determined using the S.C.S method TR-55 and the standard fifteen-minute minimum.

## COMPUTATIONS

The residential subdivision stormwater sewer system has been designed to convey all stormwater in the pipe during a two-year storm event at the minimum. The two-year storm event is defined for which there is a 50 percent probability of occurrence in any given year. In the event a 100-year storm event occurs, the plat has been graded to maintain positive drainage away from the proposed homes and elevations set to protect the structures. There may be a short period of ponding in the street right-of-ways at the sump locations for storm events greater than a two-year design storm. We have developed a computer model using StormCad to determine the hydraulic grade lines in the system for the two-year design storm or greater as noted. Lines two and three were modeled using both the normal static pool for a tailwater and the 100-year tailwater from the Big Slough North. The models indicate that the stormwater sewer system is adequately sized for the 2-year design storm when the design storm and Big Slough North peak flow rate do not coincide. The peak flow rate, using the rational method was entered into the model for each inlet.

The drainage plan calls for the installation of two 30" RCP entrance culverts along 37<sup>th</sup> Street North. The existing ditch will require some re-grading to get antique cover over the pipe. The pipe sizes maybe subject to change due to the currently planned residential subdivision to the west. The culvert crossing was sized using the Federal Highway Administration's HY-8 software program. For specific details see the HY-8 Culvert Routing section of the report.

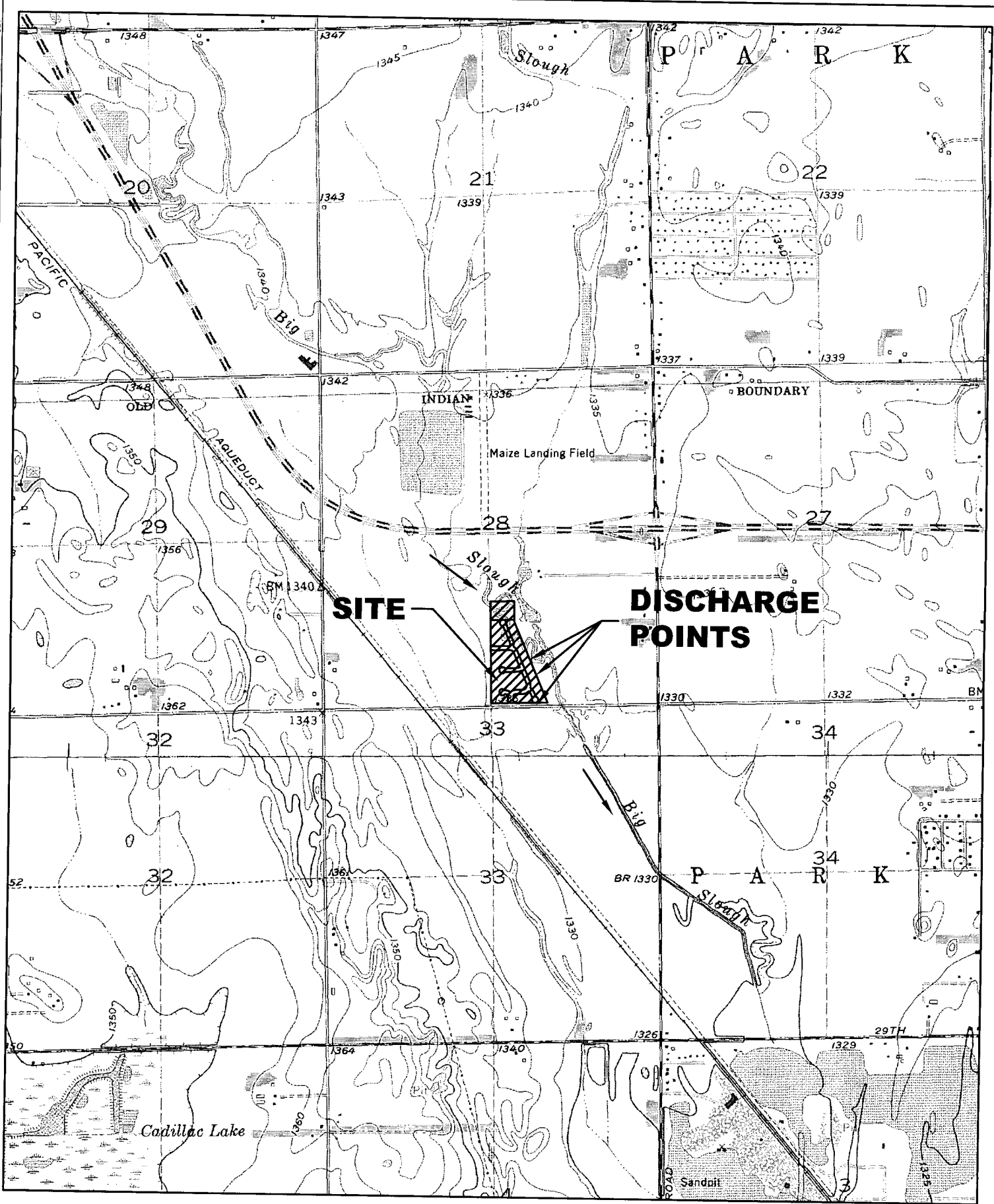
The proposed off-site pond to the east has been sized to provide adequate detention value for post-developed flowrates.

**SITE AERIAL MAP**

# NORTHRIDGE ADDITION WICHITA, SEDGWICK COUNTY, KANSAS



**USGS QUADRANGLE MAP**



LOCATION MAP:

**NORTHRIDGE ADDITION**  
**WICHITA, SEDGWICK COUNTY, KANSAS**

MAIZE & WEST WICHITA USGS QUADRANGLES



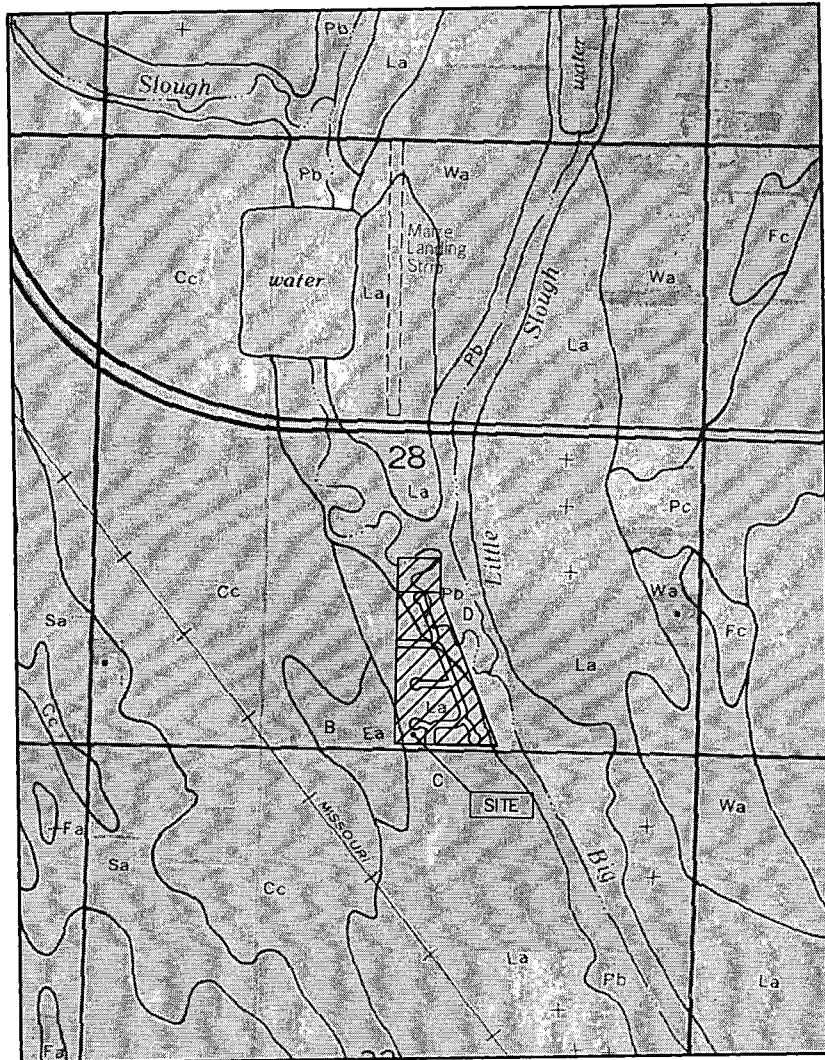
**BAUGHMAN COMPANY P.A.**  
 ENGINEERING, SURVEYING, & PLANNING  
 210-200-7777 • 200 E. 10th • WICHITA, KANSAS 67202

**SCS AERIAL PHOTOGRAPH**

# SEDGWICK COUNTY SOIL SURVEY FOR NORTHRIDGE ADDITION

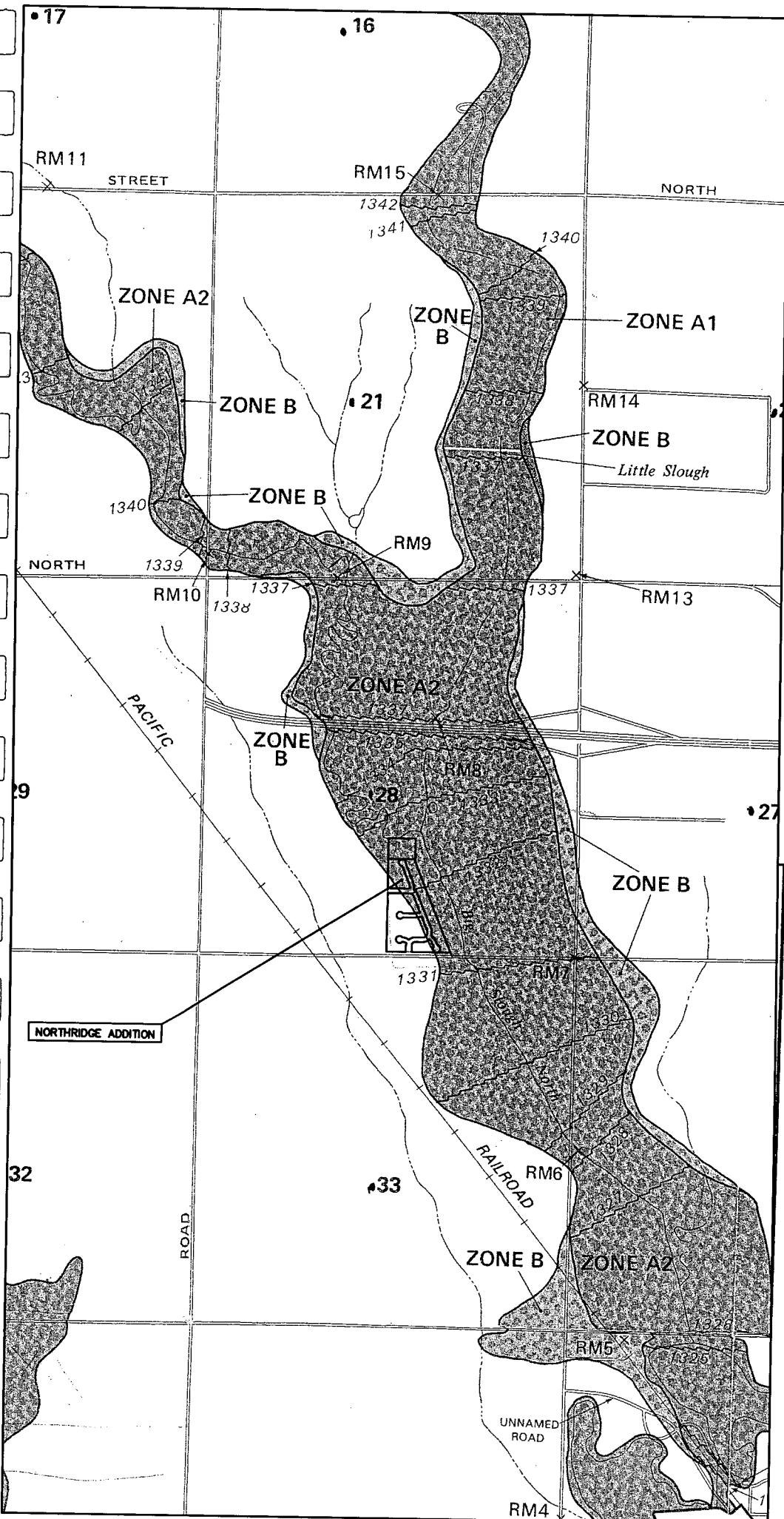


Scale - 1:20000



La : Lesho loam - Hydrologic Group C  
 Pb : Plevna Fine Sandy Loam - Hydrologic Group D

**F.E.M.A. LOCATION MAP**



NATIONAL FLOOD INSURANCE PROGRAM

**FIRM**  
FLOOD INSURANCE RATE MAP

SEDGWICK,  
COUNTY,  
KANSAS  
(UNINCORPORATED AREAS)

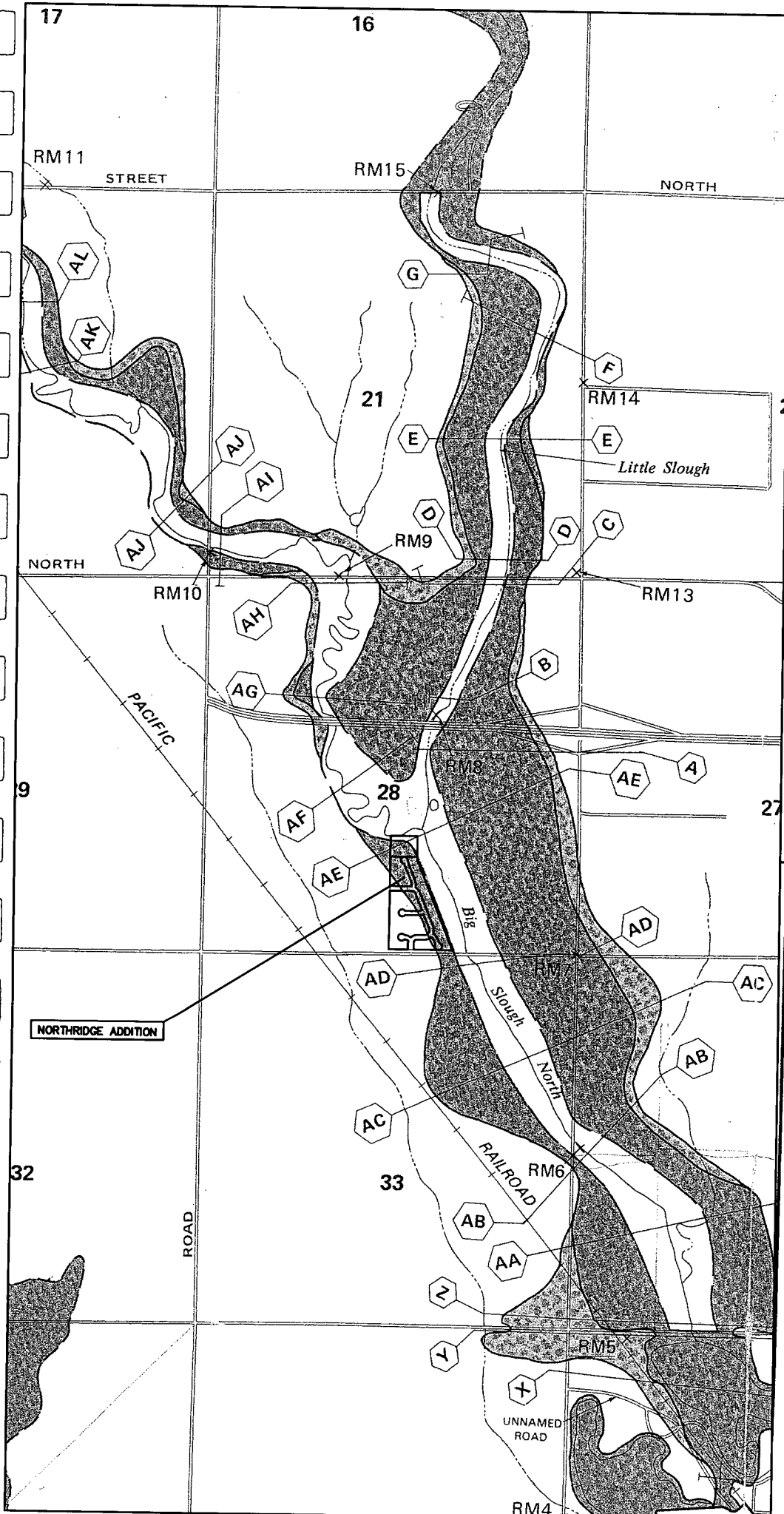
PANEL 125 OF 300

COMMUNITY-PANEL NUMBER  
200321 0125 A

EFFECTIVE DATE:  
JUNE 3, 1986



Federal Emergency Management Agency



NATIONAL FLOOD INSURANCE PROGRAM

**FLOODWAY**  
 FLOOD BOUNDARY AND  
 FLOODWAY MAP

SEDGWICK,  
 COUNTY,  
 KANSAS  
 (UNINCORPORATED AREAS)

PANEL 125 OF 300  
 (SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER  
 200321 0125

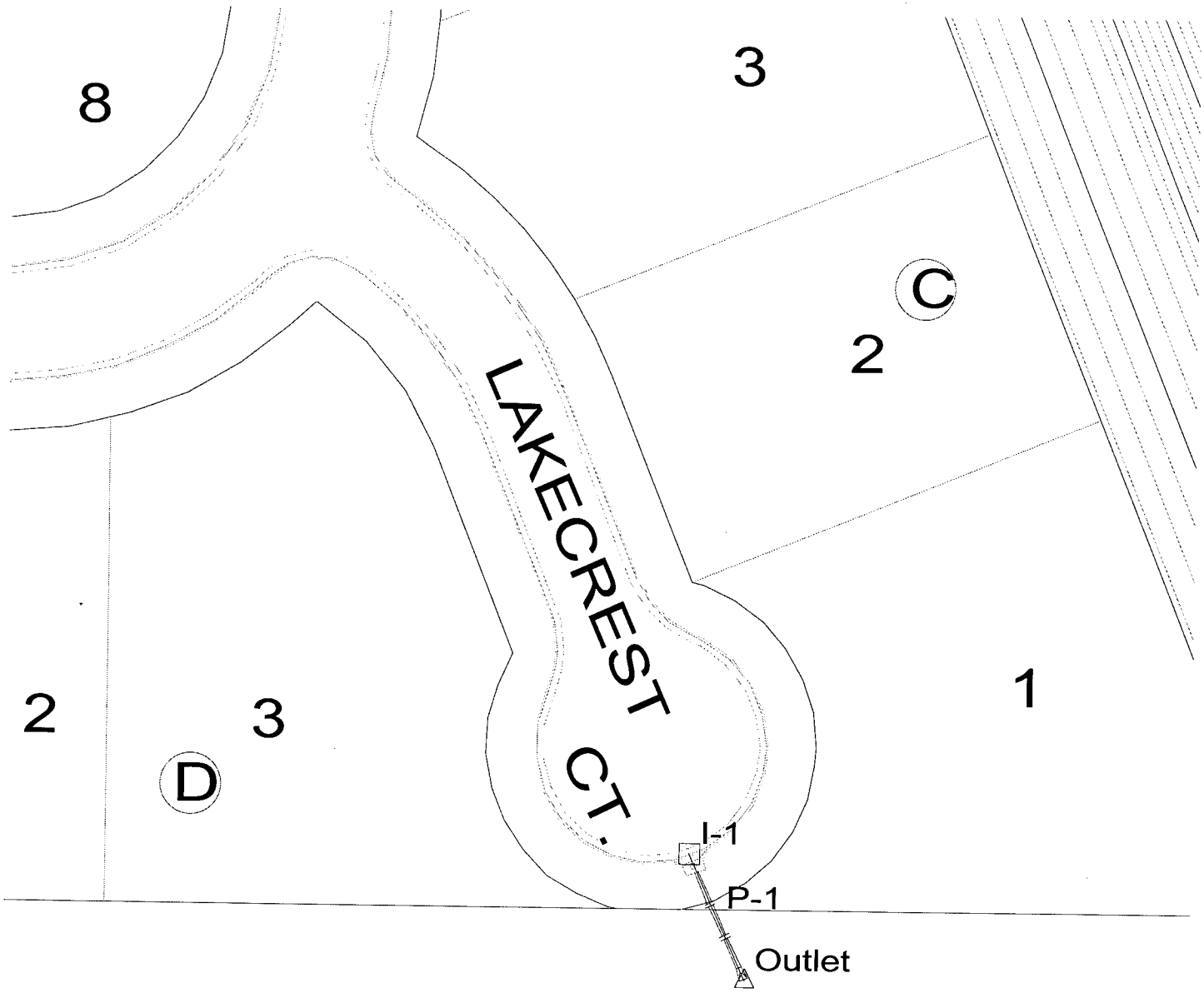
EFFECTIVE DATE:  
 JUNE 3, 1986



Federal Emergency Management Agency

**SWS LINE #1**

100-yr Routing w/100-yr Tailwater

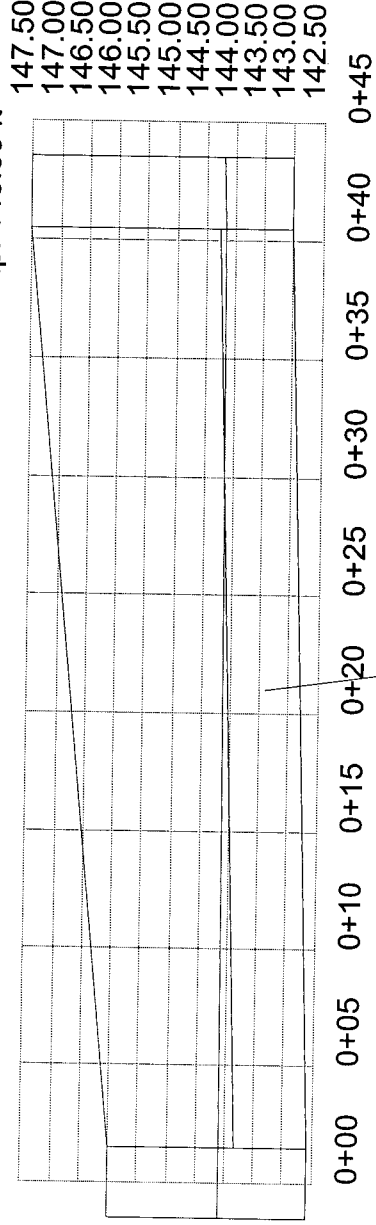


# 37TH STREET NORTH

## Combined Pipe & Node Report

Pipe	Upstream Node	Downstream Node	Length (ft)	Inlet Area (acres)	Inlet TC (min)	Weighted Roughness Coefficient	Discharge (cfs)	Section Size	Roughness	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	Upstream Rim Elevation (ft)	Downstream Rim Elevation (ft)	Upstream HGL (ft)	Downstream HGL (ft)
P-1	I-1	Outlet	42.00	0.54	15.00	0.68	2.70	15 inch	0.013	143.00	142.60	0.009524	147.50	146.00	144.17	144.10

Inlet: I-1  
 Rim: 147.50 ft  
 Sump: 143.00 ft



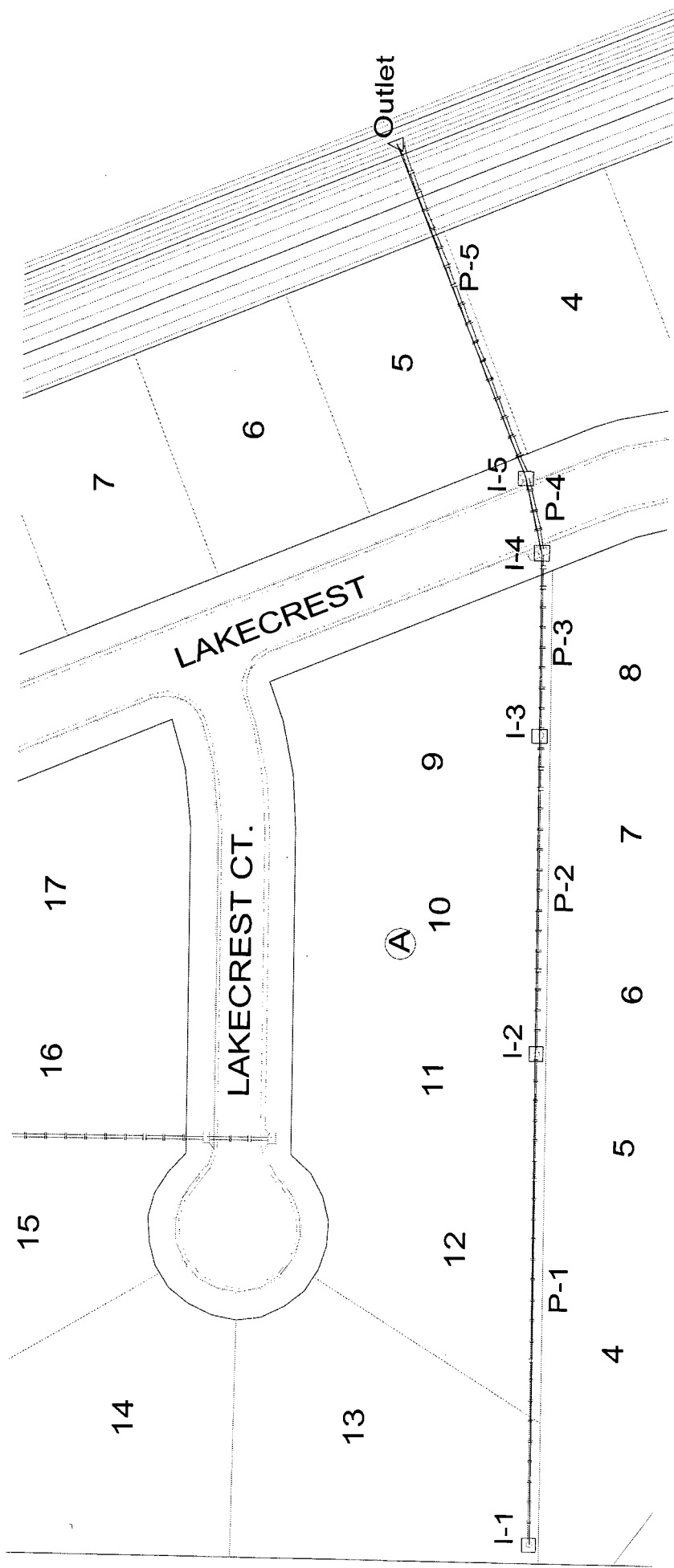
Elevation ft

Outlet: Outlet  
 Rim: 146.00 ft  
 Sump: 142.60 ft

Pipe: P-1  
 Up Invert: 143.00 ft  
 Dn Invert: 142.60 ft  
 Length: 42.00 ft  
 Size: 15 inch

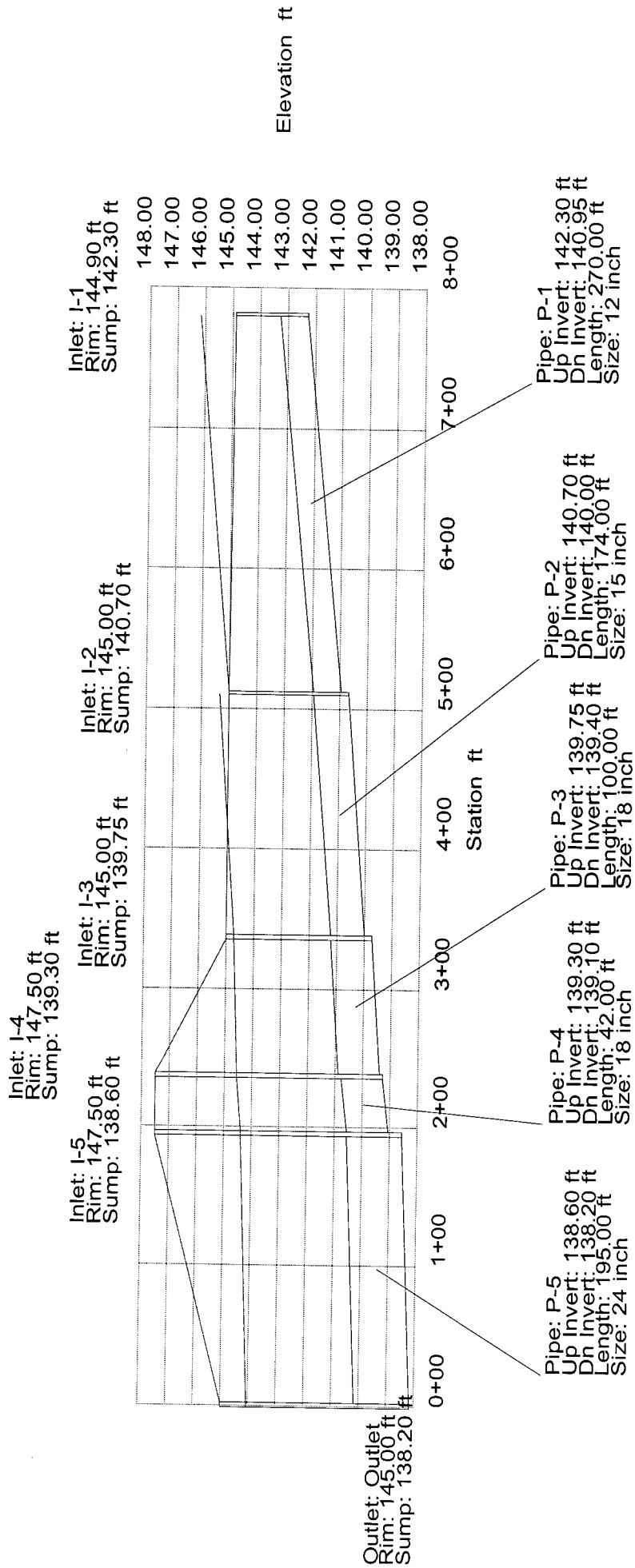
**SWS LINE #2**

(2-yr Design Storm w/100-yr Tailwater)  
&  
(2-yr Design Storm w/Static Pool as Tailwater)



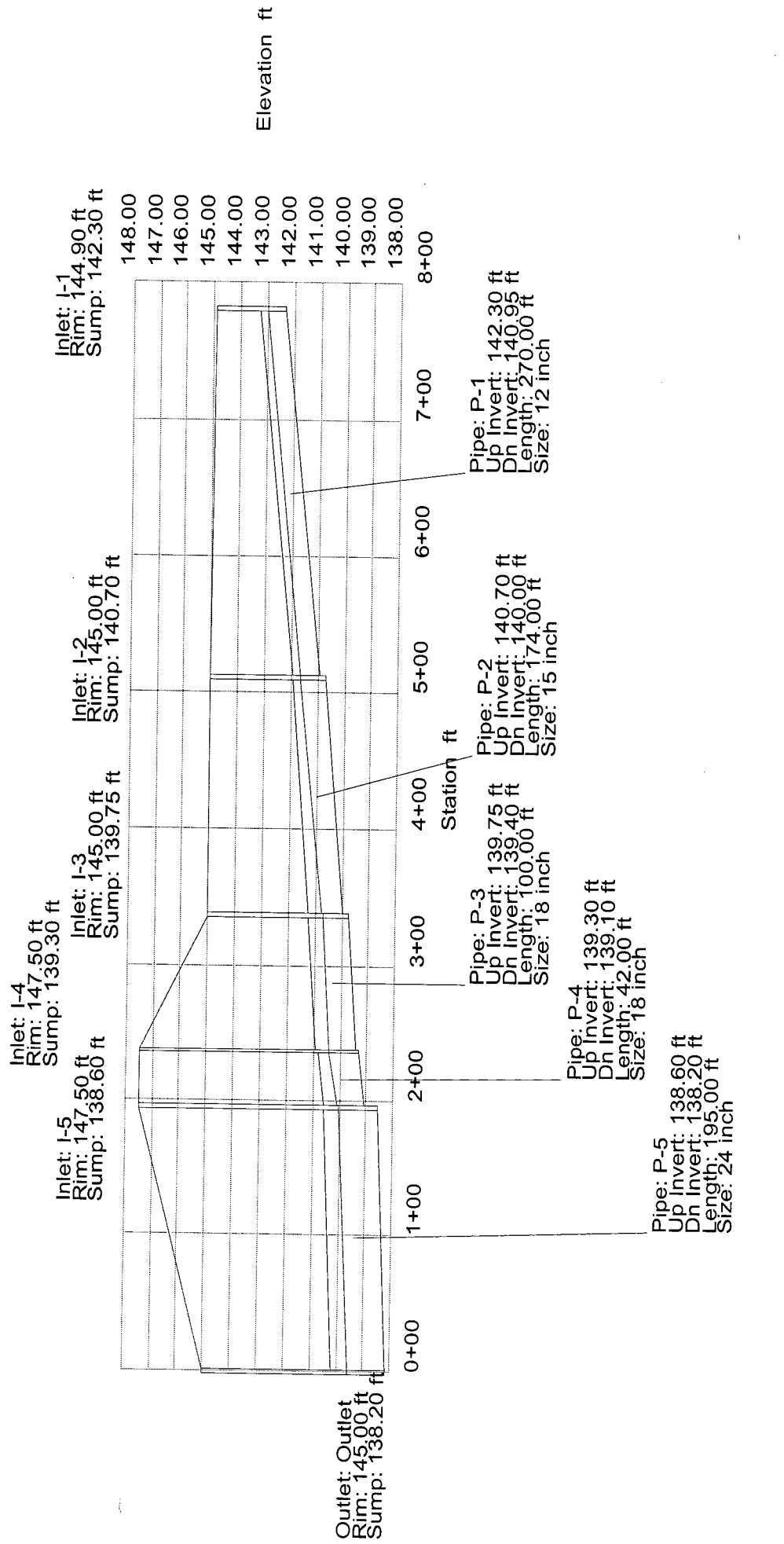
## Combined Pipe & Node Report

Pipe	Upstream Node	Downstream Node	Length (ft)	Inlet Area (acres)	Inlet TC (min)	Weighted Roughness Coefficient	Discharge (cfs)	Section Size	Roughness	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	Upstream Rim Elevation (ft)	Downstream Rim Elevation (ft)	Upstream HGL (ft)	Downstream HGL (ft)
P-1	I-1	I-2	270.00	1.09	15.00	0.48	2.00	12 inch	0.013	142.30	140.95	0.005000	144.90	145.00	146.20	145.00
P-2	I-2	I-3	174.00	0.93	15.00	0.48	3.70	15 inch	0.013	140.70	140.00	0.004023	145.00	145.00	145.35	144.77
P-3	I-3	I-4	100.00	0.52	15.00	0.48	4.70	18 inch	0.013	139.75	139.40	0.003500	145.00	147.50	144.77	144.57
P-4	I-4	I-5	42.00	0.54	15.00	0.48	6.60	18 inch	0.013	139.30	139.10	0.004762	147.50	147.50	144.57	144.41
P-5	I-5	Outlet	195.00	1.06	15.00	0.48	9.00	24 inch	0.013	138.60	138.20	0.002051	147.50	145.00	144.41	144.10



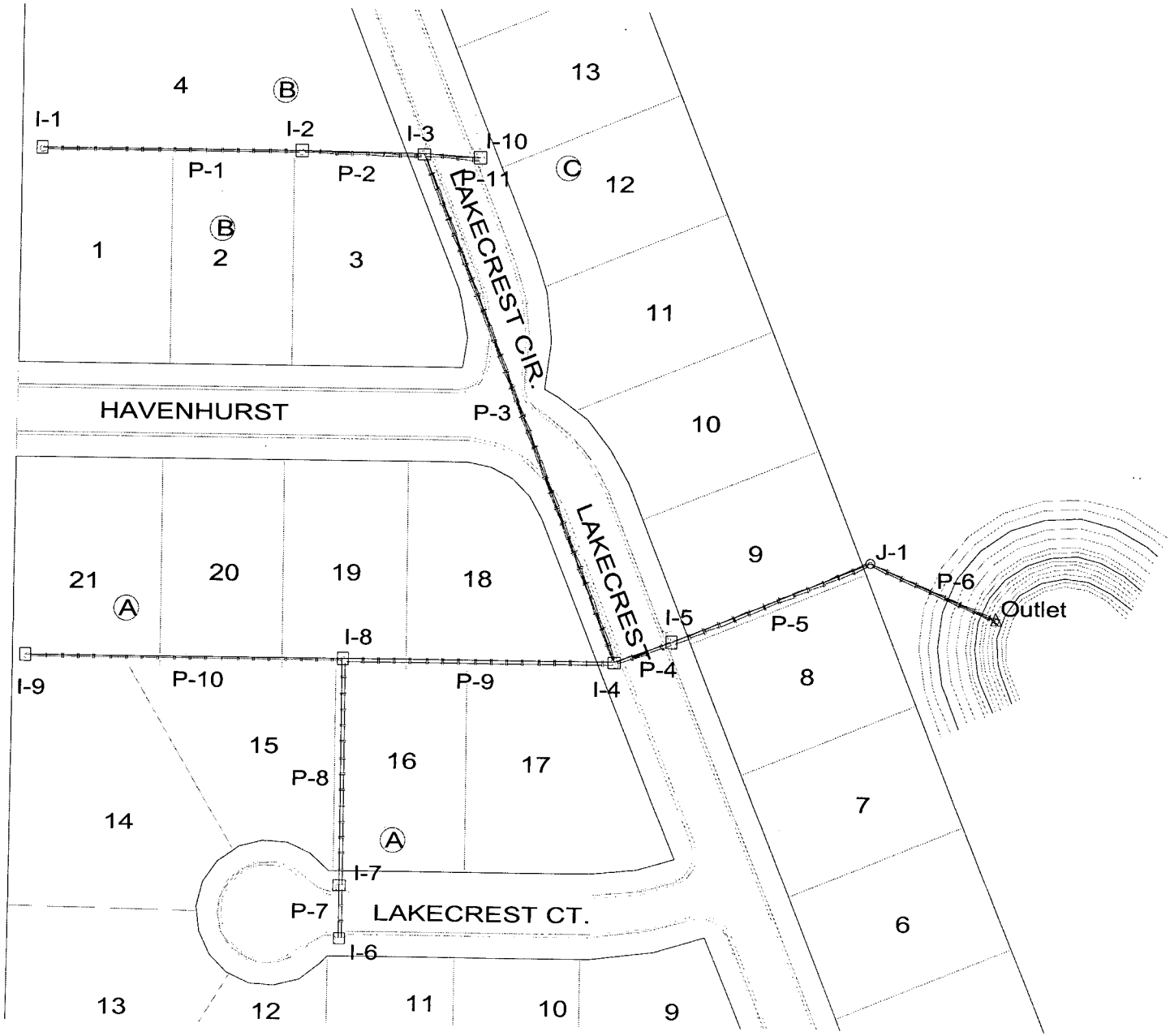
## Combined Pipe & Node Report

Pipe	Upstream Node	Downstream Node	Length (ft)	Inlet Area (acres)	Inlet TC (min)	Weighted Roughness Coefficient	Discharge (cfs)	Section Size	Roughness	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	Upstream Rim Elevation (ft)	Downstream Rim Elevation (ft)	Upstream HGL (ft)	Downstream HGL (ft)
P-1	I-1	I-2	270.00	1.09	15.00	0.48	2.00	12 inch	0.013	142.30	140.95	0.005000	144.90	145.00	142.97	141.63
P-2	I-2	I-3	174.00	0.93	15.00	0.48	3.70	15 inch	0.013	140.70	140.00	0.004023	145.00	145.00	141.63	140.78
P-3	I-3	I-4	100.00	0.52	15.00	0.48	4.70	18 inch	0.013	139.75	139.40	0.003500	145.00	147.50	140.73	140.41
P-4	I-4	I-5	42.00	0.54	15.00	0.48	6.60	18 inch	0.013	139.30	139.10	0.004762	147.50	147.50	140.41	140.09
P-5	I-5	Outlet	195.00	1.06	15.00	0.48	9.00	24 inch	0.013	138.60	138.20	0.002051	147.50	145.00	140.04	139.60



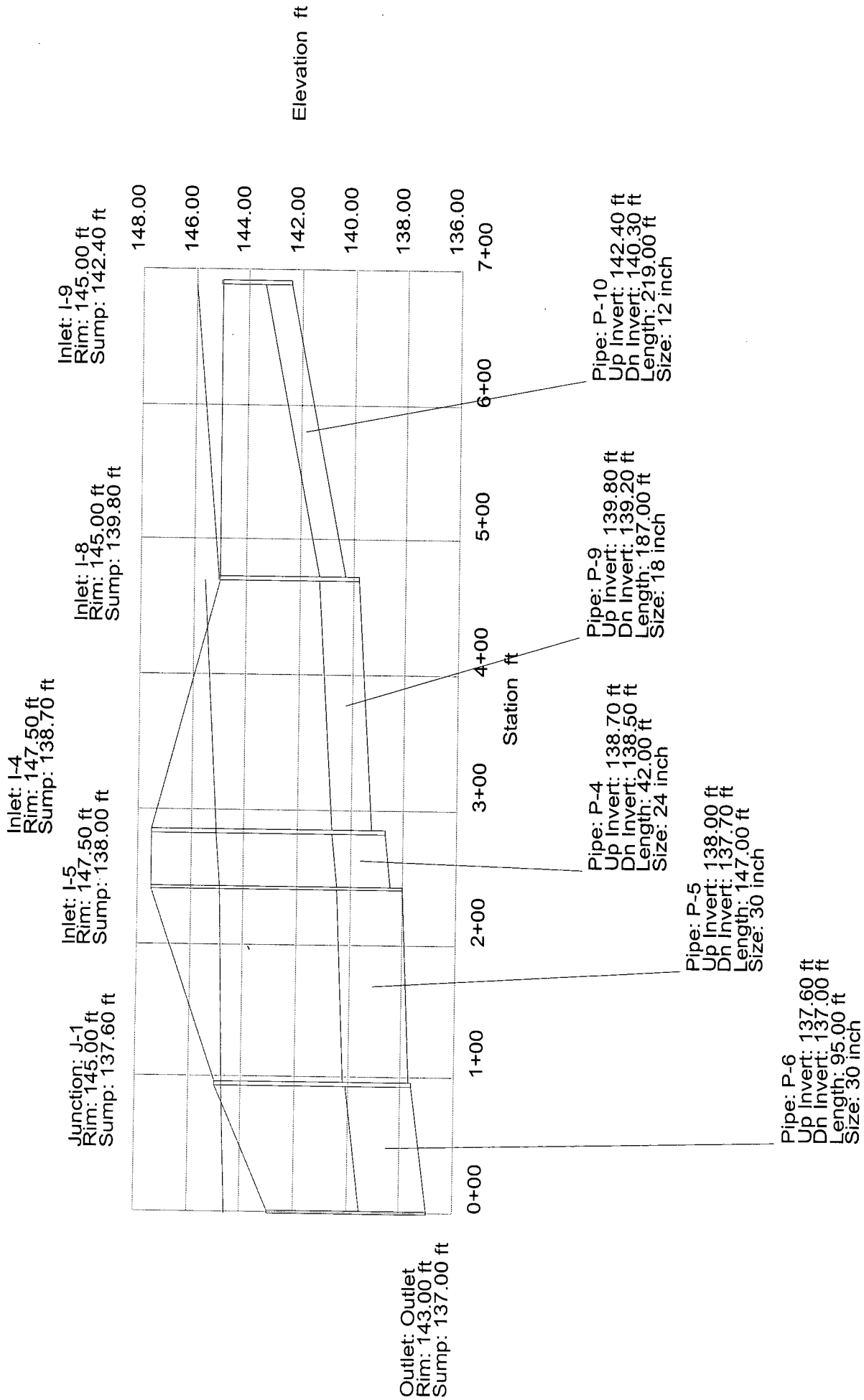
**SWS LINE #3**

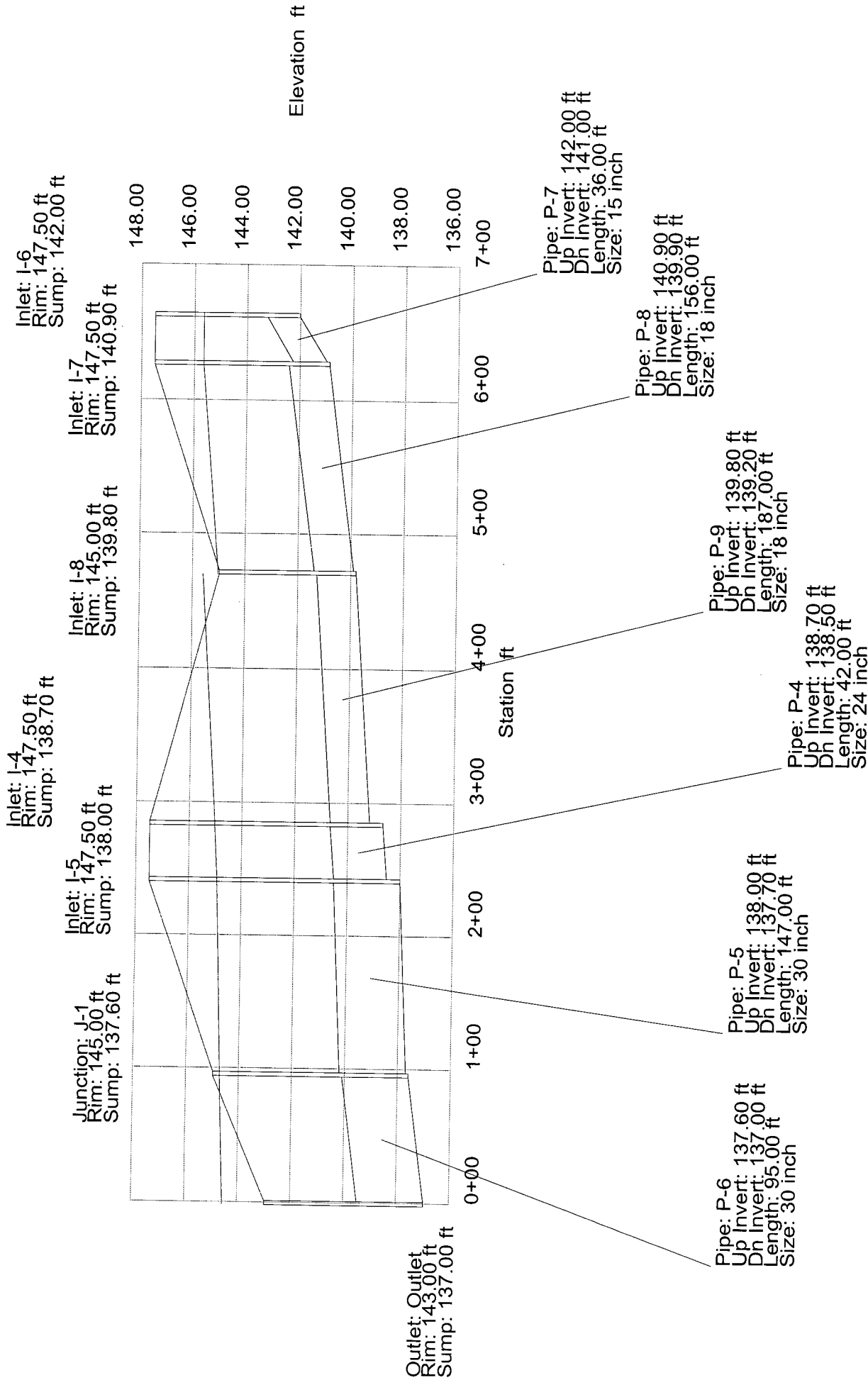
(2-yr Design Storm w/100-yr Tailwater)  
&  
(2-yr Design Storm w/Static Pool as Tailwater)

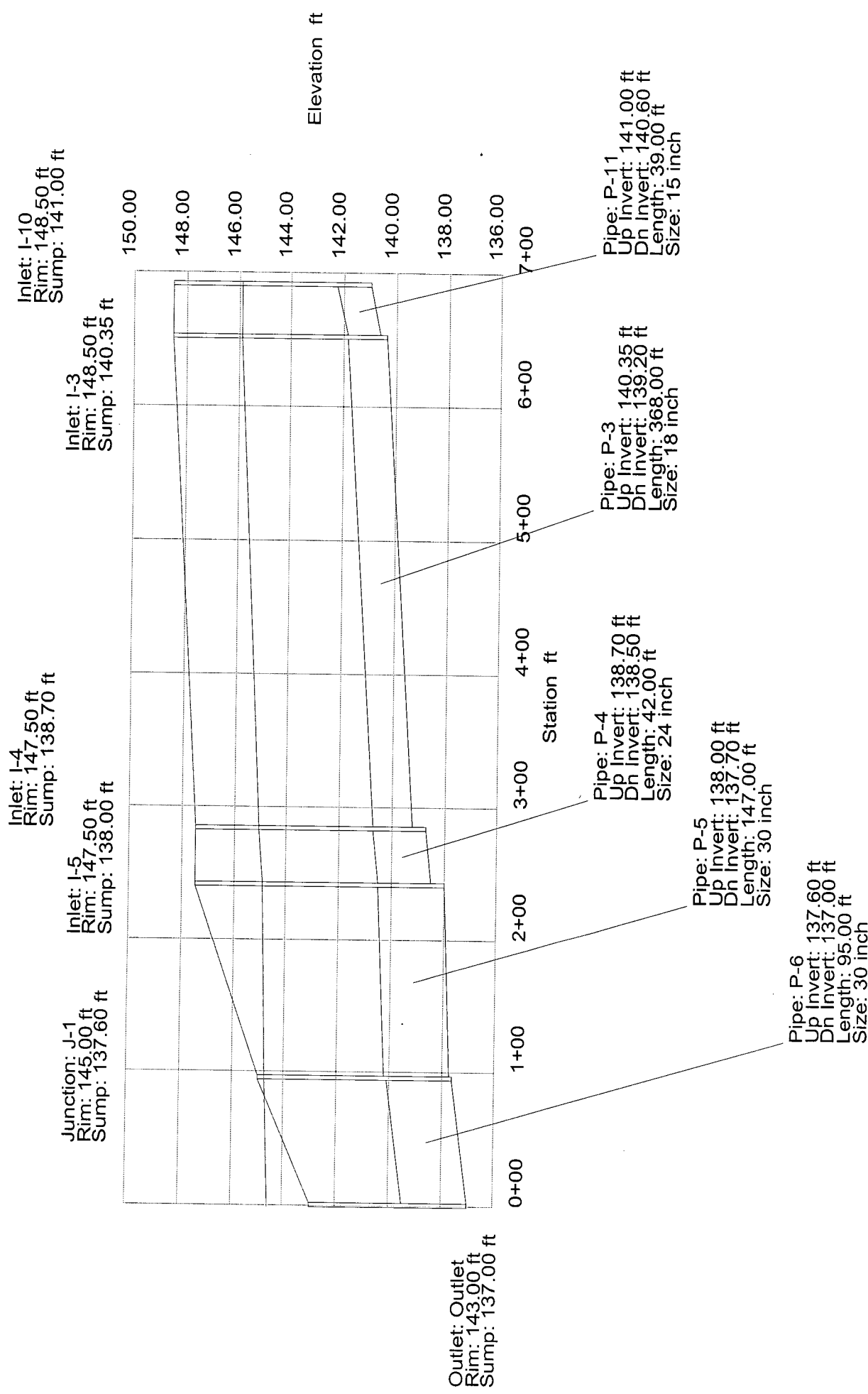


## Combined Pipe & Node Report

Pipe	Upstream Node	Downstream Node	Length (ft)	Inlet Area (acres)	Inlet TC (min)	Weighted Roughness Coefficient	Discharge (cfs)	Section Size	Roughness	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	Upstream Rim Elevation (ft)	Downstream Rim Elevation (ft)	Upstream HGL (ft)	Downstream HGL (ft)
P-10	I-9	I-8	219.00	0.79	15.00	0.48	1.50	12 inch	0.013	142.40	140.30	0.009589	145.00	145.00	145.97	145.05
P-7	I-6	I-7	36.00	0.64	15.00	0.48	1.10	15 inch	0.013	142.00	141.00	0.027778	147.50	147.50	145.66	145.65
P-8	I-7	I-8	156.00	0.60	15.00	0.48	2.30	18 inch	0.013	140.90	139.90	0.006410	147.50	145.00	145.65	145.05
P-9	I-8	I-4	187.00	0.99	15.00	0.48	5.60	18 inch	0.013	139.80	139.20	0.003209	145.00	147.50	145.58	145.05
P-11	I-10	I-3	39.00	0.72	15.00	0.48	1.30	15 inch	0.013	141.00	140.60	0.010256	148.50	148.50	145.90	145.88
P-1	I-1	I-2	179.00	0.75	15.00	0.48	1.40	12 inch	0.013	142.10	141.20	0.005028	144.60	145.60	146.26	145.88
P-2	I-2	I-3	84.00	0.49	15.00	0.48	2.30	15 inch	0.013	140.95	140.60	0.004167	145.60	148.50	145.99	145.88
P-3	I-3	I-4	368.00	0.76	15.00	0.48	5.00	18 inch	0.013	140.35	139.20	0.003125	148.50	147.50	145.88	145.05
P-4	I-4	I-5	42.00	1.02	15.00	0.48	12.50	24 inch	0.013	138.70	138.50	0.004762	147.50	147.50	145.05	144.92
P-5	I-5	J-1	147.00	1.30	15.00	0.48	14.90	30 inch	0.013	138.00	137.70	0.002041	147.50	145.00	144.92	144.73
P-6	J-1	Outlet	95.00	N/A	N/A	N/A	14.90	30 inch	0.013	137.60	137.00	0.006316	145.00	143.00	144.73	144.60







Inlet: I-10  
Rim: 148.50 ft  
Sump: 141.00 ft

Inlet: I-3  
Rim: 148.50 ft  
Sump: 140.35 ft

Inlet: I-4  
Rim: 147.50 ft  
Sump: 138.70 ft

Inlet: I-5  
Rim: 147.50 ft  
Sump: 138.00 ft

Junction: J-1  
Rim: 145.00 ft  
Sump: 137.60 ft

Outlet: Outlet  
Rim: 143.00 ft  
Sump: 137.00 ft

150.00

148.00

146.00

144.00

142.00

140.00

138.00

136.00

7+00

6+00

5+00

4+00

3+00

2+00

1+00

0+00

Station ft

Elevation ft

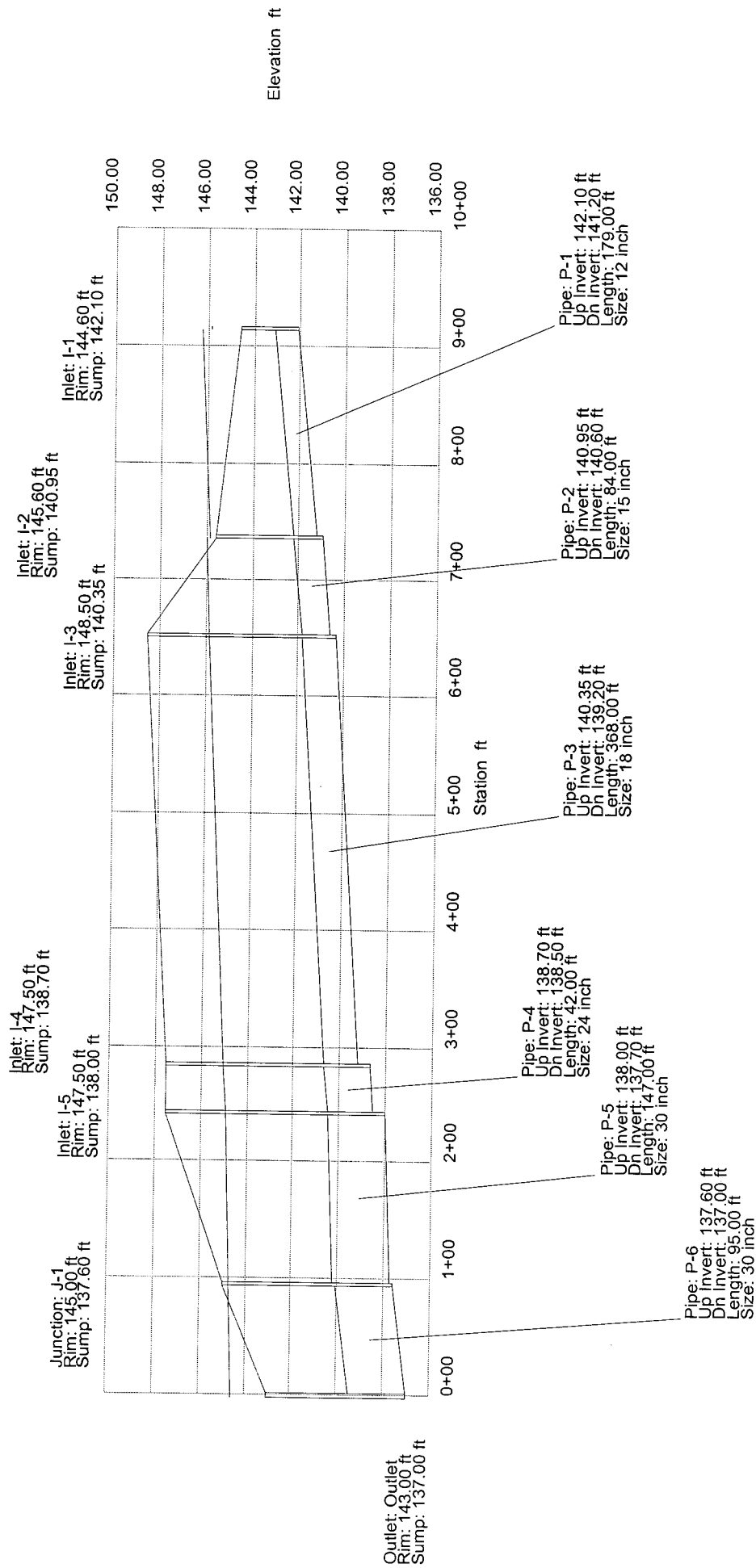
Pipe: P-11  
Up Invert: 141.00 ft  
Dn Invert: 140.60 ft  
Length: 39.00 ft  
Size: 15 inch

Pipe: P-3  
Up Invert: 140.35 ft  
Dn Invert: 139.20 ft  
Length: 368.00 ft  
Size: 18 inch

Pipe: P-4  
Up Invert: 138.70 ft  
Dn Invert: 138.50 ft  
Length: 42.00 ft  
Size: 24 inch

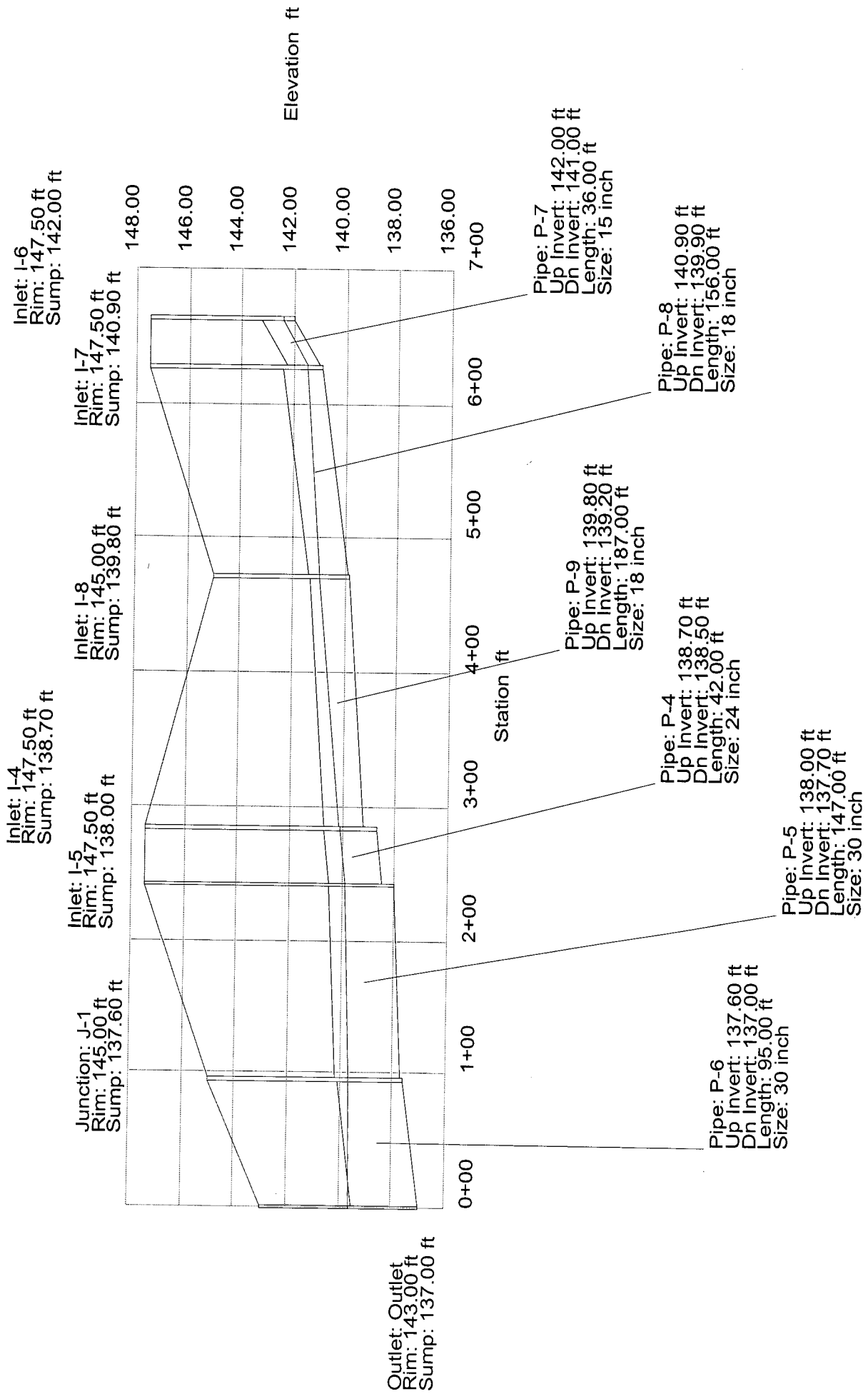
Pipe: P-5  
Up Invert: 138.00 ft  
Dn Invert: 137.70 ft  
Length: 147.00 ft  
Size: 30 inch

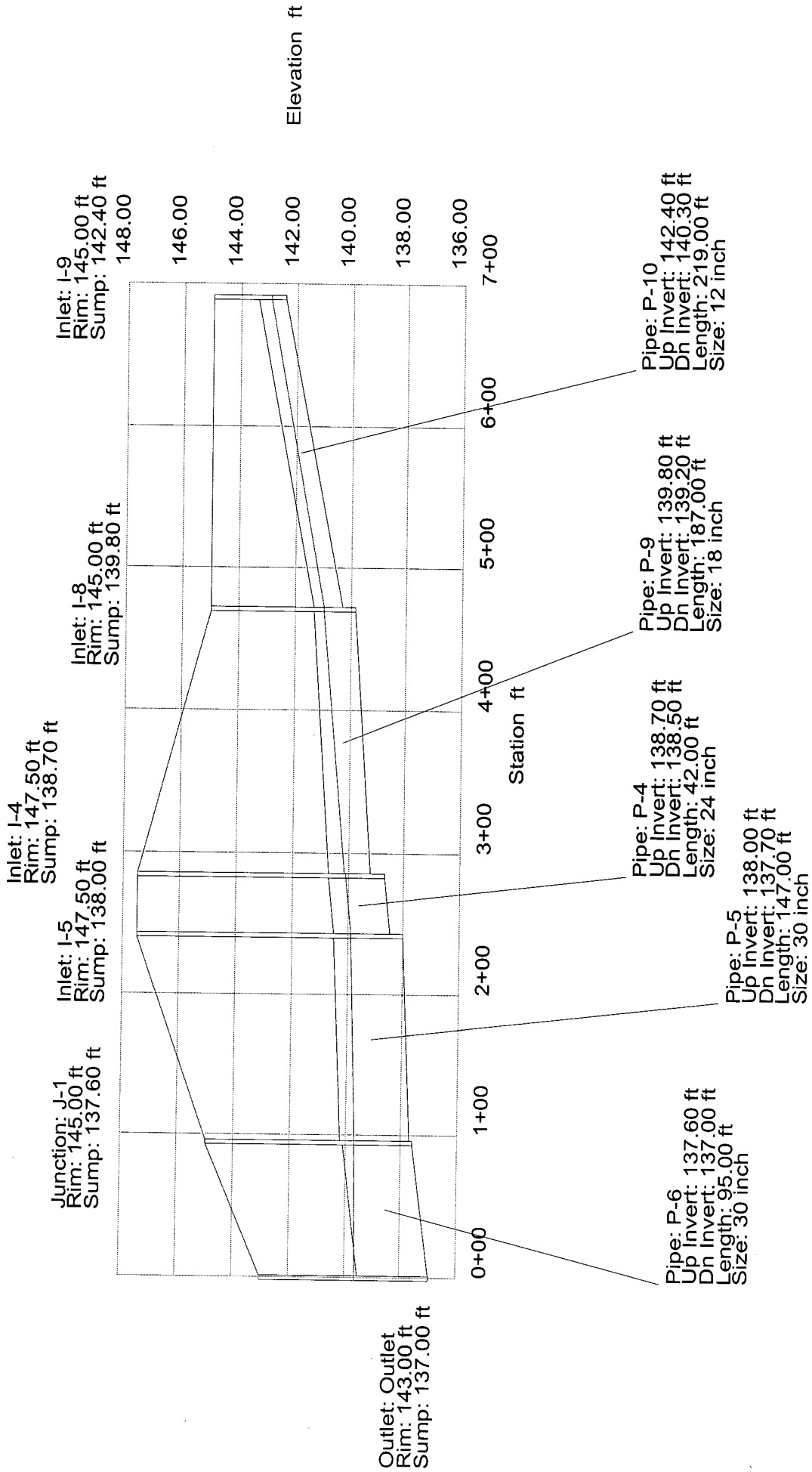
Pipe: P-6  
Up Invert: 137.60 ft  
Dn Invert: 137.00 ft  
Length: 95.00 ft  
Size: 30 inch

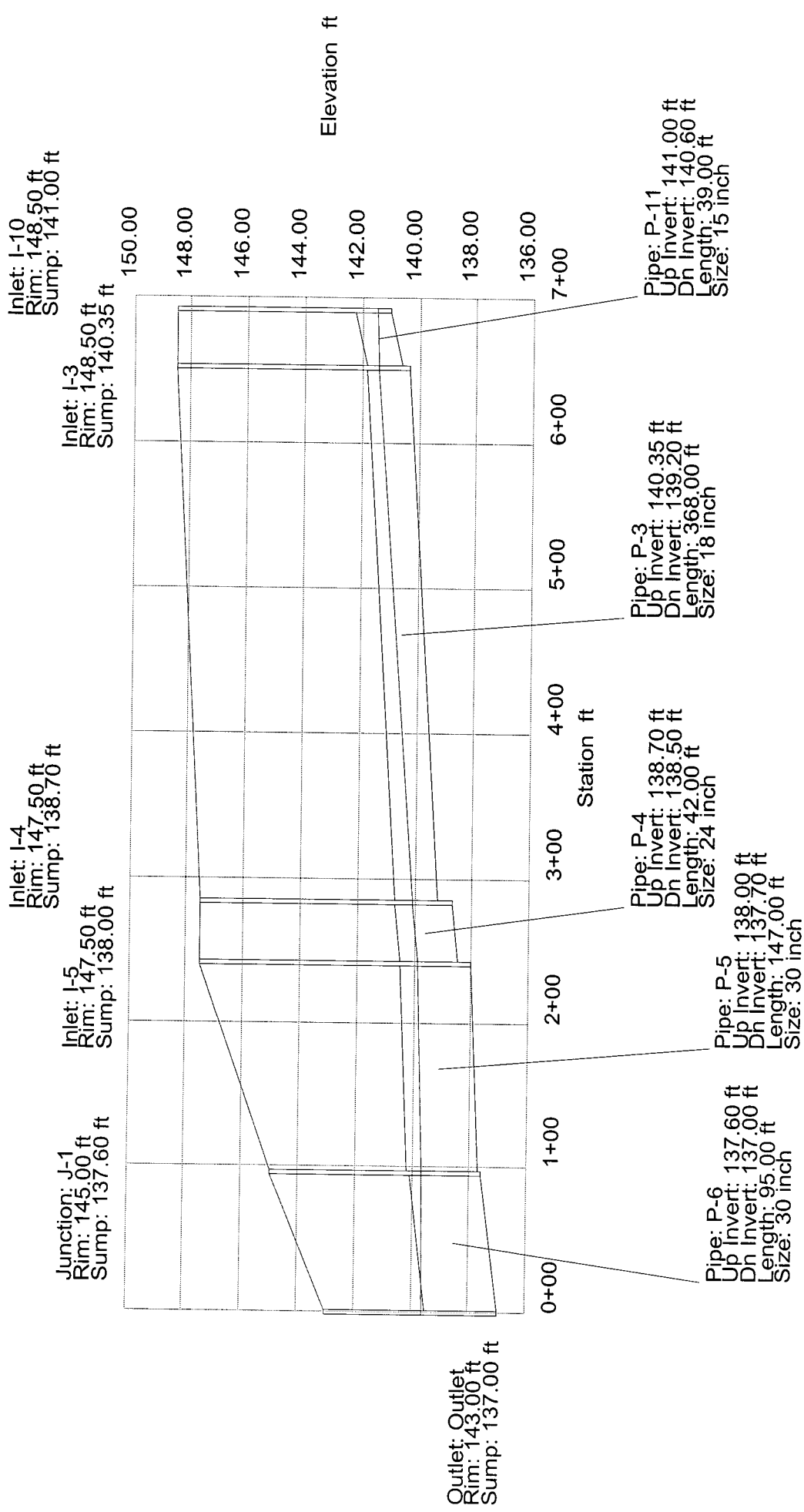


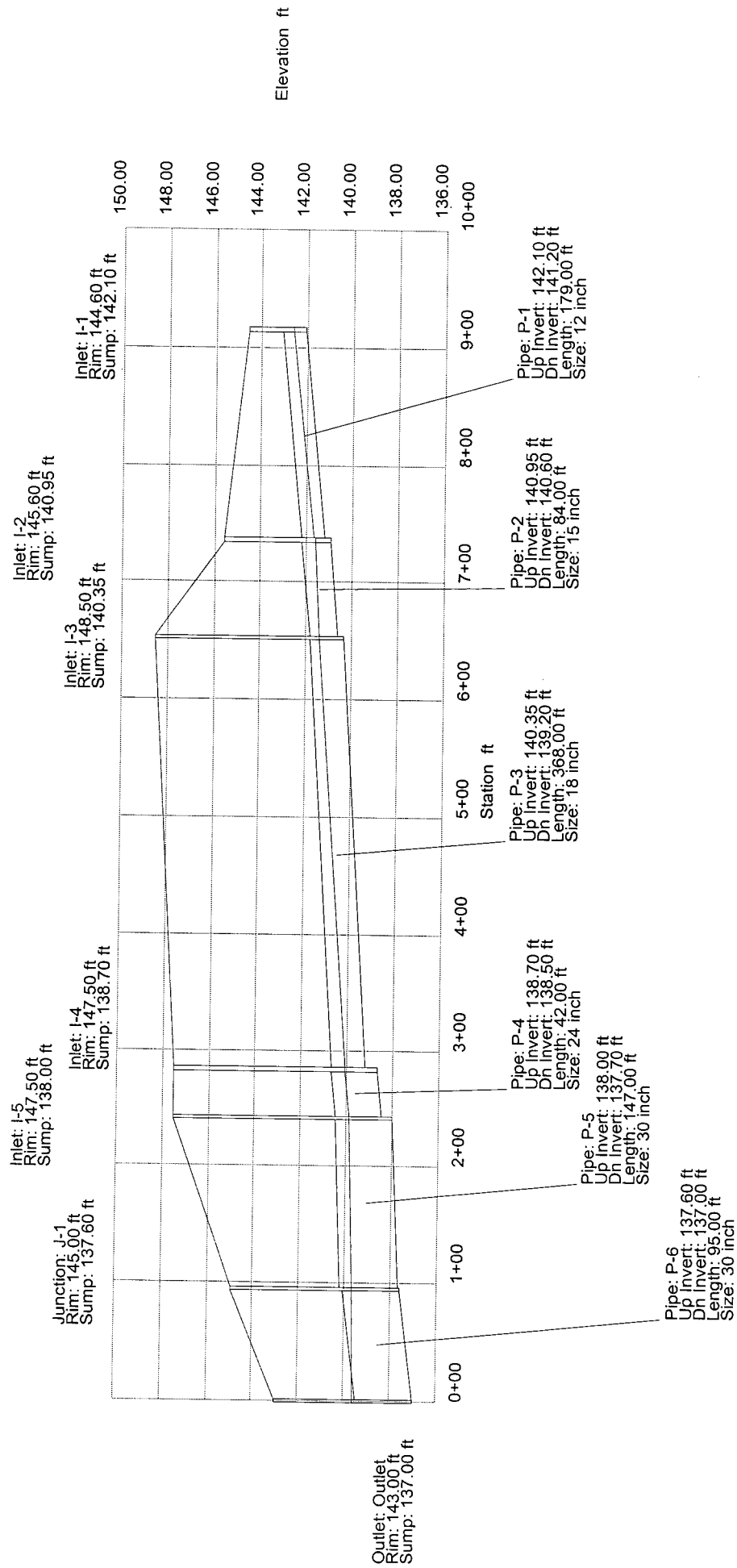
## Combined Pipe & Node Report

Pipe	Upstream Node	Downstream Node	Length (ft)	Inlet Area (acres)	Inlet TC (min)	Weighted Roughness Coefficient	Discharge (cfs)	Section Size	Roughness	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	Upstream Rim Elevation (ft)	Downstream Rim Elevation (ft)	Upstream HGL (ft)	Downstream HGL (ft)
P-10	I-9	I-8	219.00	0.79	15.00	0.48	1.50	12 inch	0.013	142.40	140.30	0.009589	145.00	145.00	142.92	140.95
P-7	I-6	I-7	36.00	0.64	15.00	0.48	1.10	15 inch	0.013	142.00	141.00	0.027778	147.50	147.50	142.41	141.47
P-8	I-7	I-8	156.00	0.60	15.00	0.48	2.30	18 inch	0.013	140.90	139.90	0.006410	147.50	145.00	141.47	140.95
P-9	I-8	I-4	187.00	0.99	15.00	0.48	5.60	18 inch	0.013	139.80	139.20	0.003209	145.00	147.50	140.95	140.11
P-11	I-10	I-3	39.00	0.72	15.00	0.48	1.30	15 inch	0.013	141.00	140.60	0.010256	148.50	148.50	141.45	141.41
P-1	I-1	I-2	179.00	0.75	15.00	0.48	1.40	12 inch	0.013	142.10	141.20	0.005028	144.60	145.60	142.63	141.70
P-2	I-2	I-3	84.00	0.49	15.00	0.48	2.30	15 inch	0.013	140.95	140.60	0.004167	145.60	148.50	141.62	141.41
P-3	I-3	I-4	368.00	0.76	15.00	0.48	5.00	18 inch	0.013	140.35	139.20	0.003125	148.50	147.50	141.41	140.06
P-4	I-4	I-5	42.00	1.02	15.00	0.48	12.50	24 inch	0.013	138.70	138.50	0.004762	147.50	147.50	140.06	139.88
P-5	I-5	J-1	147.00	1.30	15.00	0.48	14.90	30 inch	0.013	138.00	137.70	0.002041	147.50	145.00	139.88	139.68
P-6	J-1	Outlet	95.00	N/A	N/A	N/A	14.90	30 inch	0.013	137.60	137.00	0.006316	145.00	143.00	139.68	139.60









**HY-8 Culvert Routing**

37<sup>th</sup> Street North Entrance Pipe Sizing

CURRENT DATE: 12-29-2002  
 CURRENT TIME: 14:52:15

FILE DATE: 12-29-2002  
 FILE NAME: NRIDGE

\*\*\*\*\*  
 \*\*\*\*\* FHWA CULVERT ANALYSIS \*\*\*\*\*  
 \*\*\*\*\* HY-8, VERSION 6.1 \*\*\*\*\*  
 \*\*\*\*\*

C U L V N O.	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	141.30	141.00	100.00	2 RCP	2.50	2.50	.012	CONVENTIONAL
2								
3								
4								
5								
6								

\*\*\*\*\*

\*\*\*\*\*  
 SUMMARY OF CULVERT FLOWS (cfs) FILE: NRIDGE DATE: 12-29-2002

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
141.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
142.12	6.2	6.2	0.0	0.0	0.0	0.0	0.0	0.00	1
142.48	12.4	12.4	0.0	0.0	0.0	0.0	0.0	0.00	1
142.77	18.6	18.6	0.0	0.0	0.0	0.0	0.0	0.00	1
143.03	24.8	24.8	0.0	0.0	0.0	0.0	0.0	0.00	1
143.26	31.0	31.0	0.0	0.0	0.0	0.0	0.0	0.00	1
143.49	37.2	37.2	0.0	0.0	0.0	0.0	0.0	0.00	1
143.71	43.4	43.4	0.0	0.0	0.0	0.0	0.0	0.00	1
143.93	49.6	49.6	0.0	0.0	0.0	0.0	0.0	0.00	1
144.16	55.8	55.8	0.0	0.0	0.0	0.0	0.0	0.00	1
144.40	62.0	62.0	0.0	0.0	0.0	0.0	0.0	0.00	1
144.50	63.9	63.9	0.0	0.0	0.0	0.0	0.0	0.00	1

\*\*\*\*\* OVERTOPPING \*\*\*\*\*

\*\*\*\*\*  
 SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: NRIDGE DATE: 12-29-2002

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
141.30	0.000	0.00	0.00	0.00
142.12	0.000	6.20	0.00	0.00
142.48	0.000	12.40	0.00	0.00
142.77	0.000	18.60	0.00	0.00
143.03	0.000	24.80	0.00	0.00
143.26	0.000	31.00	0.00	0.00
143.49	0.000	37.20	0.00	0.00
143.71	0.000	43.40	0.00	0.00
143.93	0.000	49.60	0.00	0.00
144.16	0.000	55.80	0.00	0.00
144.40	0.000	62.00	0.00	0.00

\*\*\*\*\*

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

\*\*\*\*\*

CURRENT DATE: 12-29-2002  
 CURRENT TIME: 14:52:15

FILE DATE: 12-29-2002  
 FILE NAME: NRIDGE

\*\*\*\*\*  
 PERFORMANCE CURVE FOR CULVERT 1 - 2( 2.50 (ft) BY 2.50 (ft)) RCP  
 \*\*\*\*\*

DIS-CHARGE FLOW (cfs)	HEAD- ELEV. (ft)	INLET DEPTH (ft)	OUTLET DEPTH (ft)	CONTROL TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	141.30	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
6.20	142.12	0.73	0.82	2-M2c	0.59	0.57	0.57	0.00	3.68	0.00
12.40	142.48	1.11	1.18	2-M2c	0.85	0.82	0.82	0.00	4.43	0.00
18.60	142.77	1.42	1.47	2-M2c	1.07	1.02	1.02	0.00	4.97	0.00
24.80	143.03	1.68	1.73	2-M2c	1.26	1.18	1.18	0.00	5.45	0.00
31.00	143.26	1.91	1.96	2-M2c	1.45	1.32	1.32	0.00	5.88	0.00
37.20	143.49	2.12	2.19	2-M2c	1.64	1.46	1.46	0.00	6.26	0.00
43.40	143.71	2.32	2.41	2-M2c	1.84	1.58	1.58	0.00	6.65	0.00
49.60	143.93	2.53	2.63	2-M2c	2.11	1.69	1.69	0.00	7.02	0.00
55.80	144.16	2.75	2.86	2-M2c	2.50	1.80	1.80	0.00	7.38	0.00
62.00	144.40	2.99	3.10	2-M2c	2.50	1.89	1.89	0.00	7.80	0.00

\*\*\*\*\*  
 El. inlet face invert 141.30 ft El. outlet invert 141.00 ft  
 El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft  
 \*\*\*\*\*

\*\*\*\*\* SITE DATA \*\*\*\*\* CULVERT INVERT \*\*\*\*\*  
 INLET STATION 0.00 ft  
 INLET ELEVATION 141.30 ft  
 OUTLET STATION 100.00 ft  
 OUTLET ELEVATION 141.00 ft  
 NUMBER OF BARRELS 2  
 SLOPE (V/H) 0.0030  
 CULVERT LENGTH ALONG SLOPE 100.00 ft

\*\*\*\*\* CULVERT DATA SUMMARY \*\*\*\*\*  
 BARREL SHAPE CIRCULAR  
 BARREL DIAMETER 2.50 ft  
 BARREL MATERIAL CONCRETE  
 BARREL MANNING'S n 0.012  
 INLET TYPE CONVENTIONAL  
 INLET EDGE AND WALL GROOVED END PROJECTION  
 INLET DEPRESSION NONE

\*\*\*\*\*

CURRENT DATE: 12-29-2002  
CURRENT TIME: 14:52:15

FILE DATE: 12-29-2002  
FILE NAME: NRIDGE

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

CONSTANT WATER SURFACE ELEVATION  
141.00

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

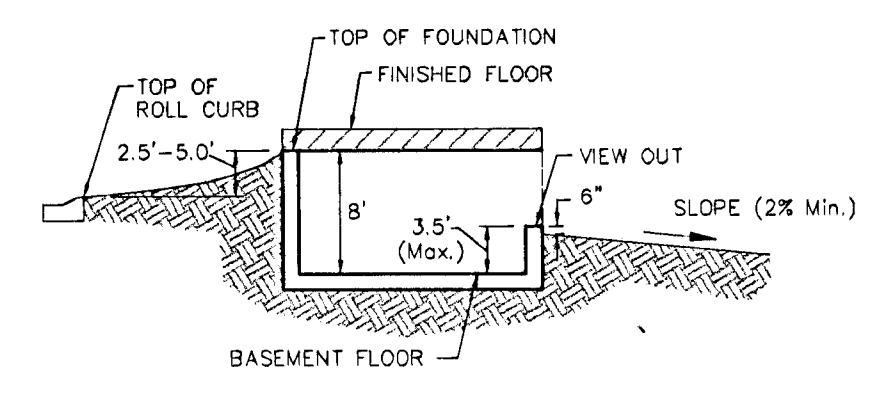
ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	60.00 ft
CREST LENGTH	60.00 ft
OVERTOPPING CREST ELEVATION	144.50 ft

\*\*\*\*\*

**DRAINAGE PLAN**

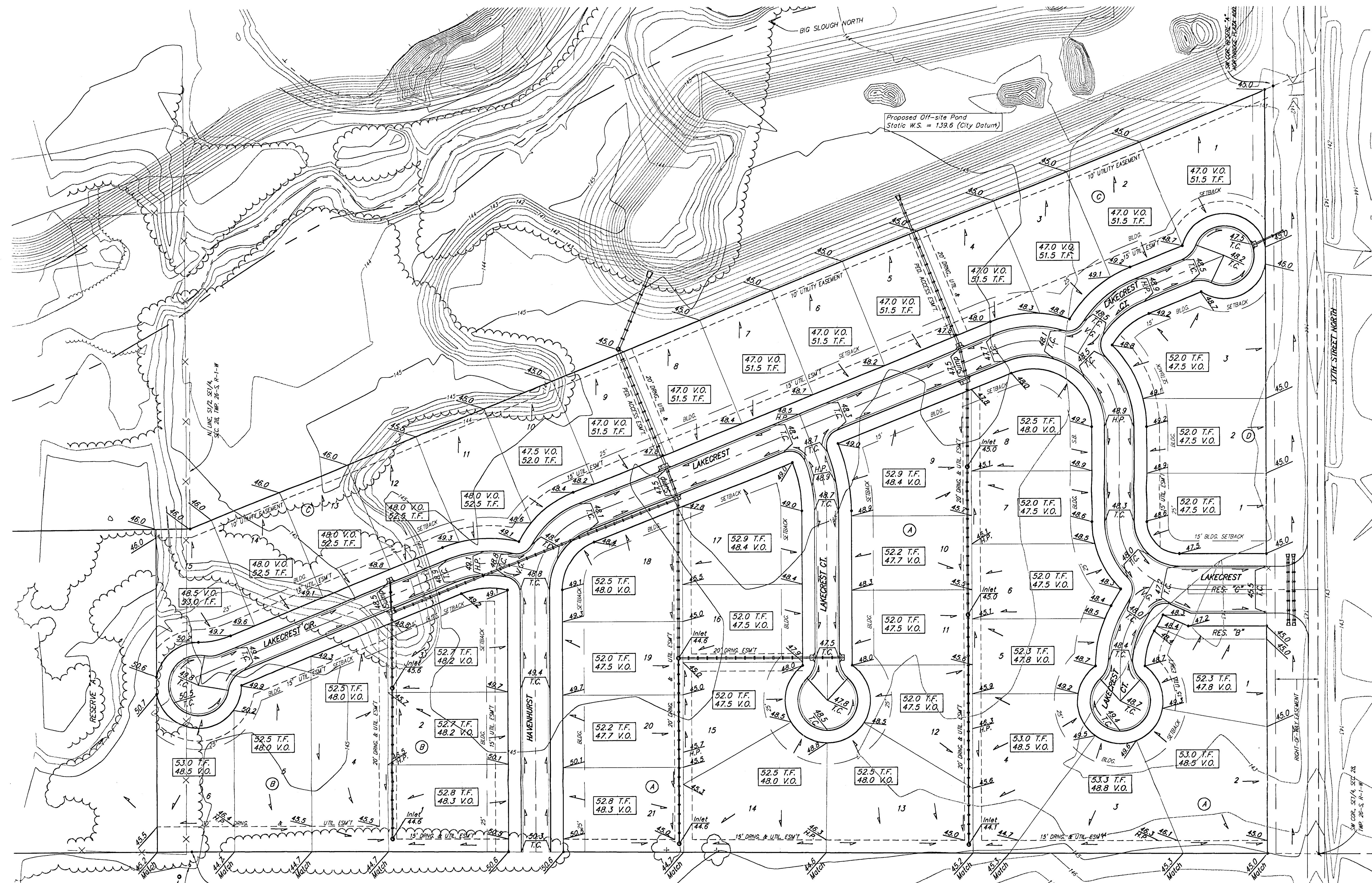
SCALE: 1" = 60'  
 • = Iron

**BENCHMARK:**  
 □ on Subguard of R.C.B.C., 73' west of  
 S<sup>1</sup> Cor., S71/4, Sec. 28, Twp. 26-S., R-1-W.  
 Elev. = 1331.52 NGVD29  
 Elev. = 144.12 City Datum



**TYPICAL VIEW OUT**  
 NO SCALE (V.O.)

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.  
 This Grading Plan is Designed with View-Outs.  
 Elevations Shown at Rear of House (XX.X V.O.)  
 Lot dimensions have been omitted on this plan, refer to the recorded plat for this information.



1" IRON (FOUND)  
 1.73' W. & 1.99' N.  
 OF TRUE CORNER

1/4 REAR W/ MASON CAP (FOUND) OF TRUE CORNER  
 NW COR., S1/2, SE1/4, SEC. 28, TWP. 26-S., R-1-W

NORTHBRIDGE ADDITION  
**MASTER GRADING PLAN**  
 CITY OF WICHITA

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

PROJECT NUMBER				SHEET
DESIGN	DRAWN	APPROVED	DATE	SCALE
SCL	SCL	NBW	12/30/02	1"=60'
				1 OF 1

GRADING.DWG