DRAINAGE PLAN
FOR
STEVE KELLEY 5TH ADDITION

WICHITA, SEDGWICK COUNTY, KANSAS

Prepared By

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October, 2003

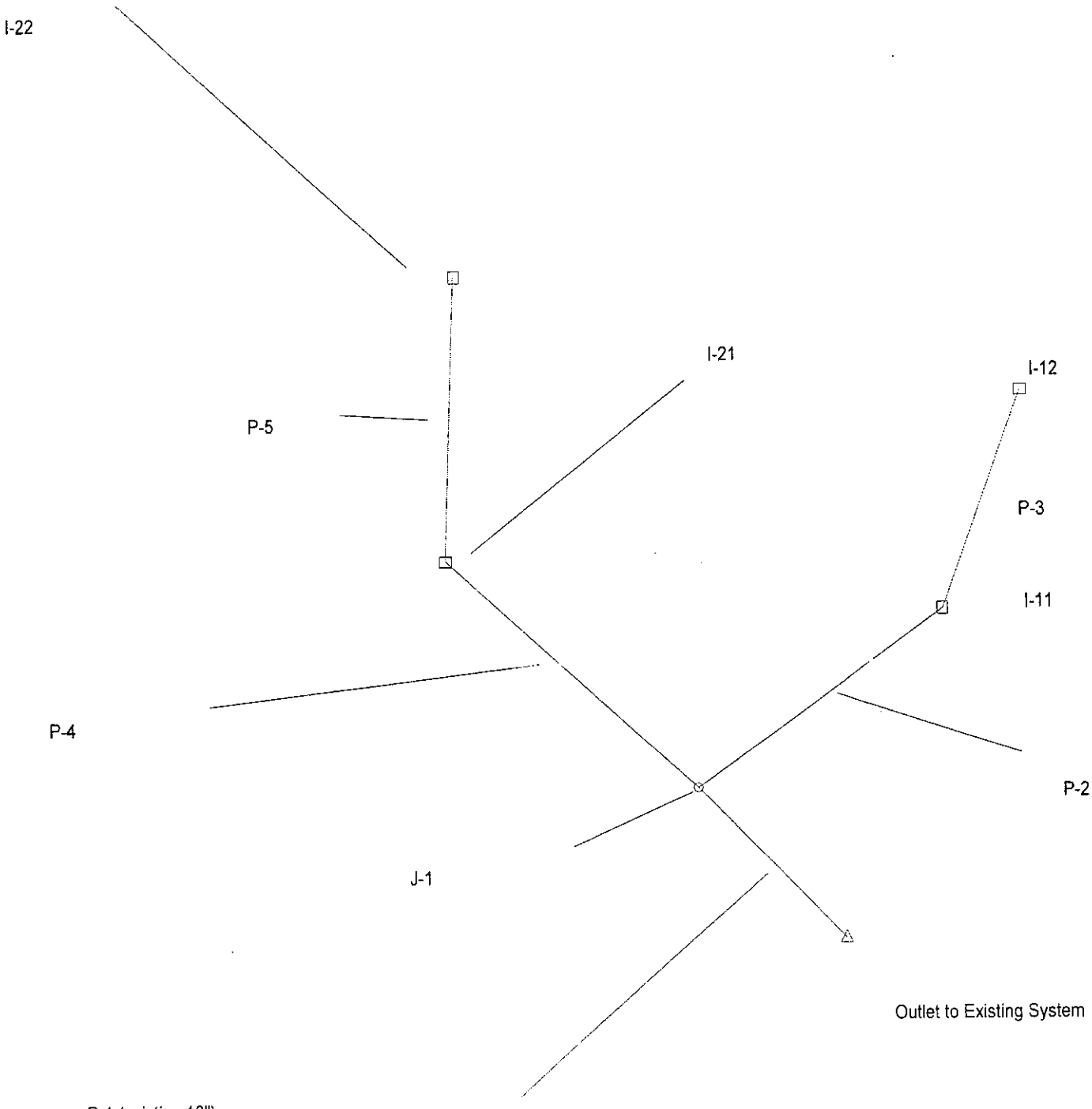
This drainage plan is for the proposed Steve Kelley 5th Addition. This proposed addition is located just south of 13th Street North and east of Interstate 235. It is located in the north ½ of the NW ¼ of Section 14, Township 27 South, Range 1 West. This residential development will provide for 32 home sites on lots ranging in size from 1/6 acres to 1/3 acres.

The majority of the site drainage will be directed to the existing stormwater curb and gutter system along 13th Street which runs on the north side of the addition. Runoff will be directed to the 13th Street system by two means: 1)a stormwater pipe system which runs from the north end of the addition and ties into the 13th Street system, and 2)by curb and gutter flow to inlets which will tie directly into the 13th Street system.

The remaining on-site drainage will be directed to the south. A portion will be directed by curb and gutter to a paved channel, then to an existing curb and gutter system in Doris Street approximately 330 feet to the south. The rest will be collected by concrete flumes at the back of some of the properties and directed to curb and gutter flow. Then it will be sent by curb and gutter flow to the existing curb and gutter system of Clara Street that will be tied into at the south property line.

Calculations were performed for the 2 yr. and 100 yr. precipitation events. Results of the Stormcad analysis for the piping systems, and the Flowmaster calculations for the concrete flume are attached. The Drainage Plan drawing and the Grading Plan drawing are also attached. Pipe sizes and sizes of the concrete flumes are indicated on the Drainage Plan.

2-YEAR RETURN EVENT CALCULATIONS



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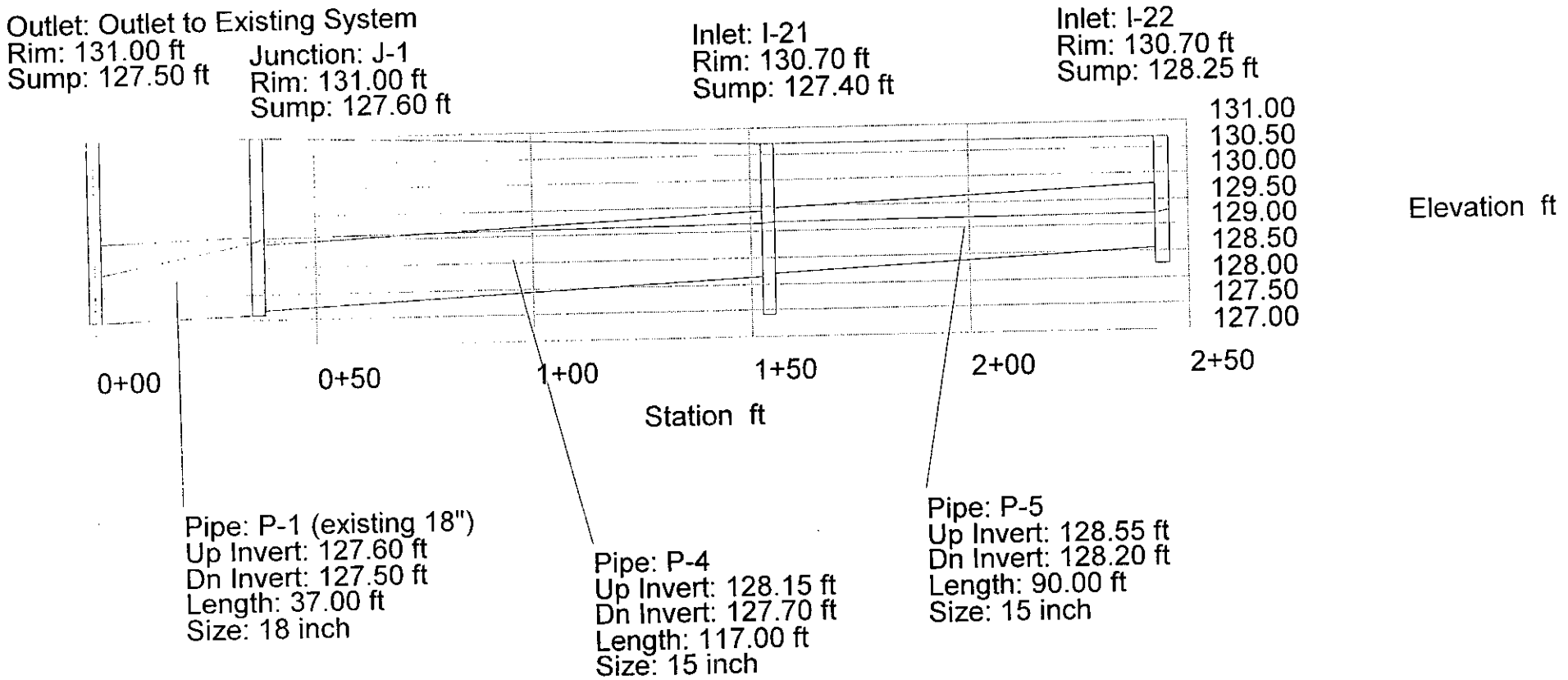
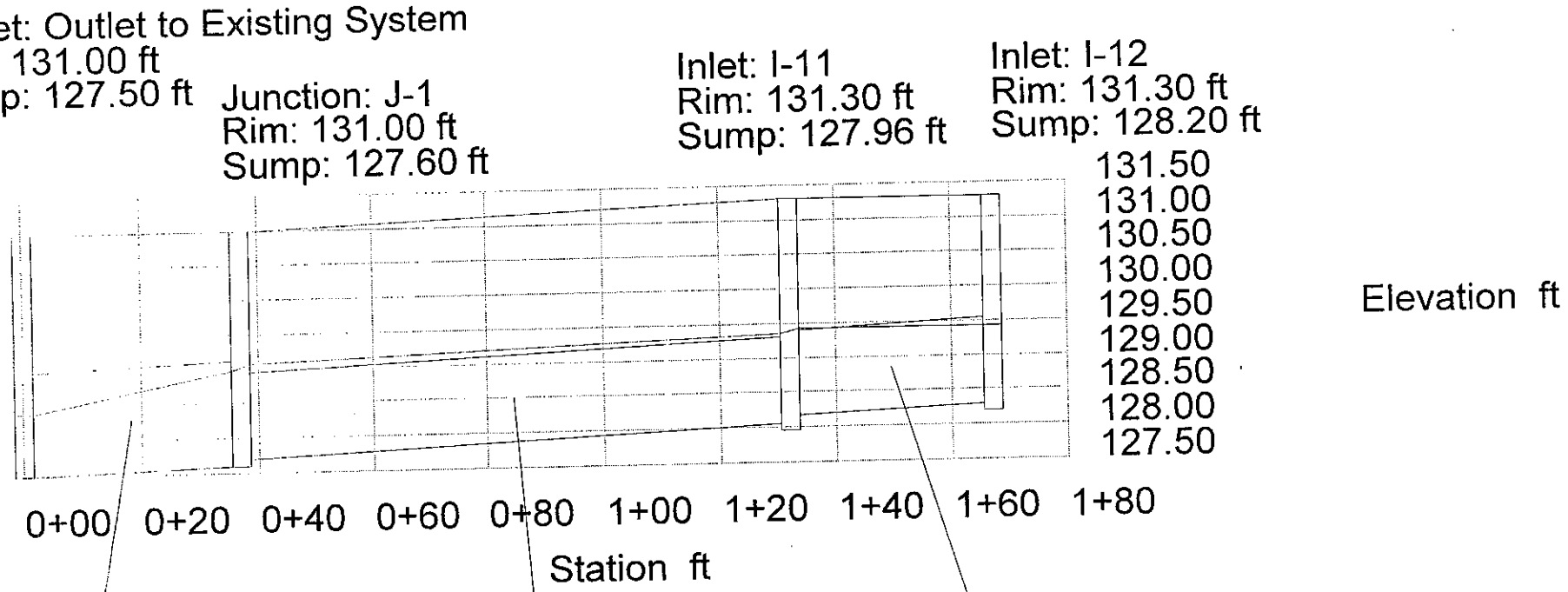
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666


Outlet: Outlet to Existing System
Rim: 131.00 ft
Sump: 127.50 ft
Junction: J-1
Rim: 131.00 ft
Sump: 127.60 ft
Inlet: I-21
Rim: 130.70 ft
Sump: 127.40 ft
Inlet: I-22
Rim: 130.70 ft
Sump: 128.25 ft
131.00
130.50
130.00
129.50
129.00
128.50
128.00
127.50
127.00
Elevation ft
0+00
0+50
1+00
1+50
2+00
2+50
Station ft
Pipe: P-1 (existing 18")
Up Invert: 127.60 ft
Dn Invert: 127.50 ft
Length: 37.00 ft
Size: 18 inch
Pipe: P-4
Up Invert: 128.15 ft
Dn Invert: 127.70 ft
Length: 117.00 ft
Size: 15 inch
Pipe: P-5
Up Invert: 128.55 ft
Dn Invert: 128.20 ft
Length: 90.00 ft
Size: 15 inch



System Report

Pipe	-Section- Shape Size	-Node- Upstream Downstream	Inlet TC (min)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	Additional Flow (cfs)	-Section- Discharge Capacity (cfs)	Length (ft)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Structure Discharge (cfs)	System Flow Time (min)	Average Velocity (ft/s)	Discharge (cfs)
P-3	Circular	I-12	0.00	131.30	129.42	1.10	1.10	35.00	128.30	128.16	1.10	0.00	0.92	1.10
	15 inch	I-11		131.30	129.41		4.09							
P-2	Circular	I-11	0.00	131.30	129.35	2.40	3.50	95.00	128.06	127.70	3.50	0.63	2.85	3.50
	15 inch	J-1		131.00	129.07		3.98							
P-5	Circular	I-22	0.00	130.70	129.23	1.50	1.50	90.00	128.55	128.20	1.50	0.00	1.82	1.50
	15 inch	I-21		130.70	129.18		4.03							
P-4	Circular	I-21	0.00	130.70	129.15	0.40	1.90	117.00	128.15	127.70	1.90	0.83	1.67	1.90
	15 inch	J-1		131.00	129.07		4.01							
P-1 (existing 18")	Circular	J-1	N/A	131.00	128.98	N/A	5.40	37.00	127.60	127.50	5.40	1.99	4.04	5.40
	18 inch	Outlet to Existing Syste		131.00	128.40		2.96							

East Flume - S. Kelley 5th Addtn.- 2 yr
Worksheet for Triangular Channel

Project Description	
Project File	c:\haestad\fmw\skelley.fm2
Worksheet	Steve Kelley 5th Concrete Flume
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.002400	ft/ft
Left Side Slope	2.250000	H : V
Right Side Slope	2.250000	H : V
Discharge	2.00	cfs

Results		
Depth	0.61	ft
Flow Area	0.84	ft^2
Wetted Perimeter	3.00	ft
Top Width	2.74	ft
Critical Depth	0.55	ft
Critical Slope	0.004277	ft/ft
Velocity	2.39	ft/s
Velocity Head	0.09	ft
Specific Energy	0.70	ft
Froude Number	0.76	
Flow is subcritical.		

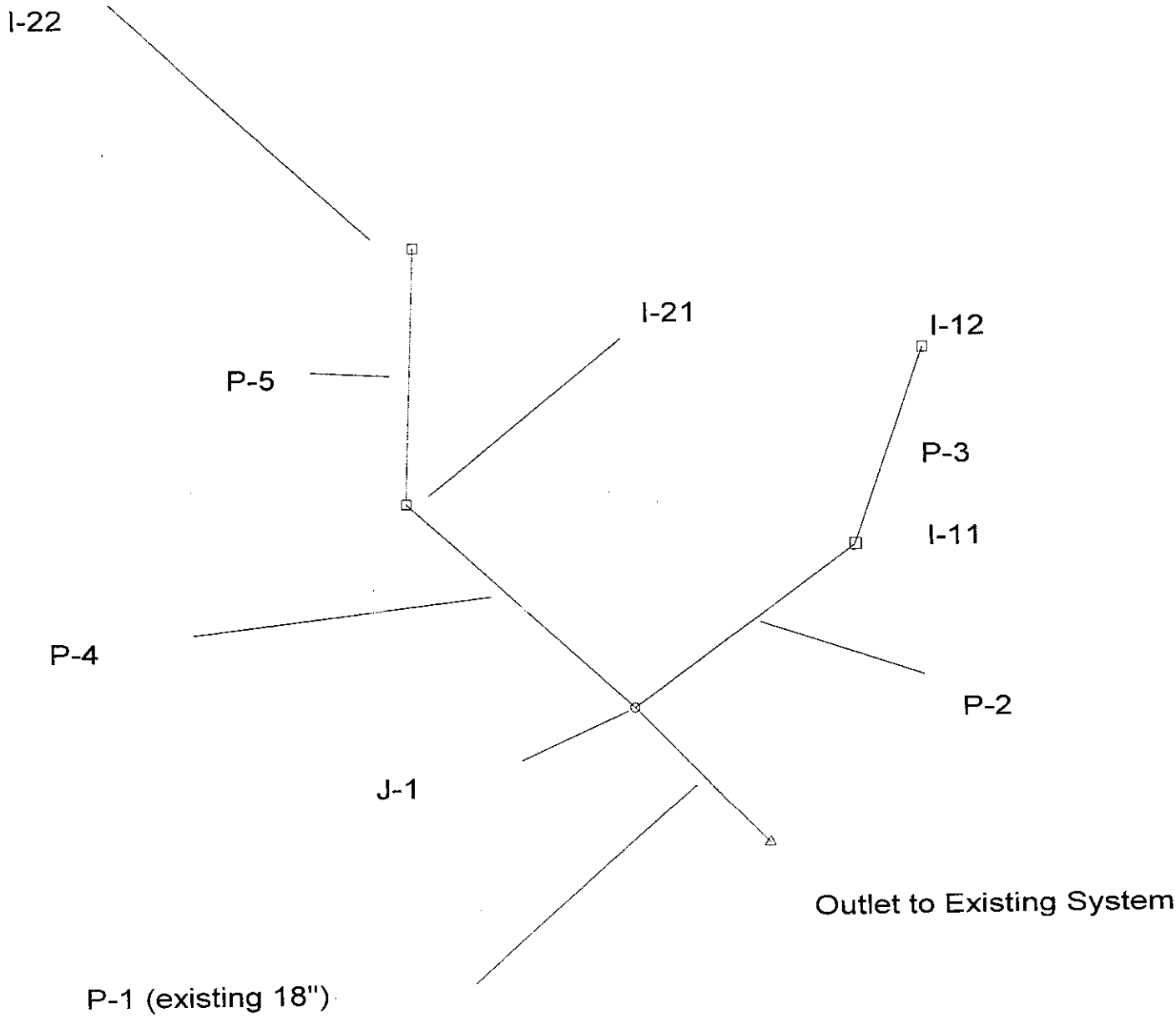
West Flume - S. Kelley 5th Addtn.- 2 yr
Worksheet for Triangular Channel

Project Description	
Project File	c:\haestad\fmw\skelley.fm2
Worksheet	Steve Kelley 5th Concrete Flume
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.002700	ft/ft
Left Side Slope	2.250000	H : V
Right Side Slope	2.250000	H : V
Discharge	2.60	cfs

Results		
Depth	0.66	ft
Flow Area	0.98	ft^2
Wetted Perimeter	3.24	ft
Top Width	2.96	ft
Critical Depth	0.61	ft
Critical Slope	0.004131	ft/ft
Velocity	2.67	ft/s
Velocity Head	0.11	ft
Specific Energy	0.77	ft
Froude Number	0.82	
Flow is subcritical.		

100-YEAR RETURN EVENT CALCULATIONS



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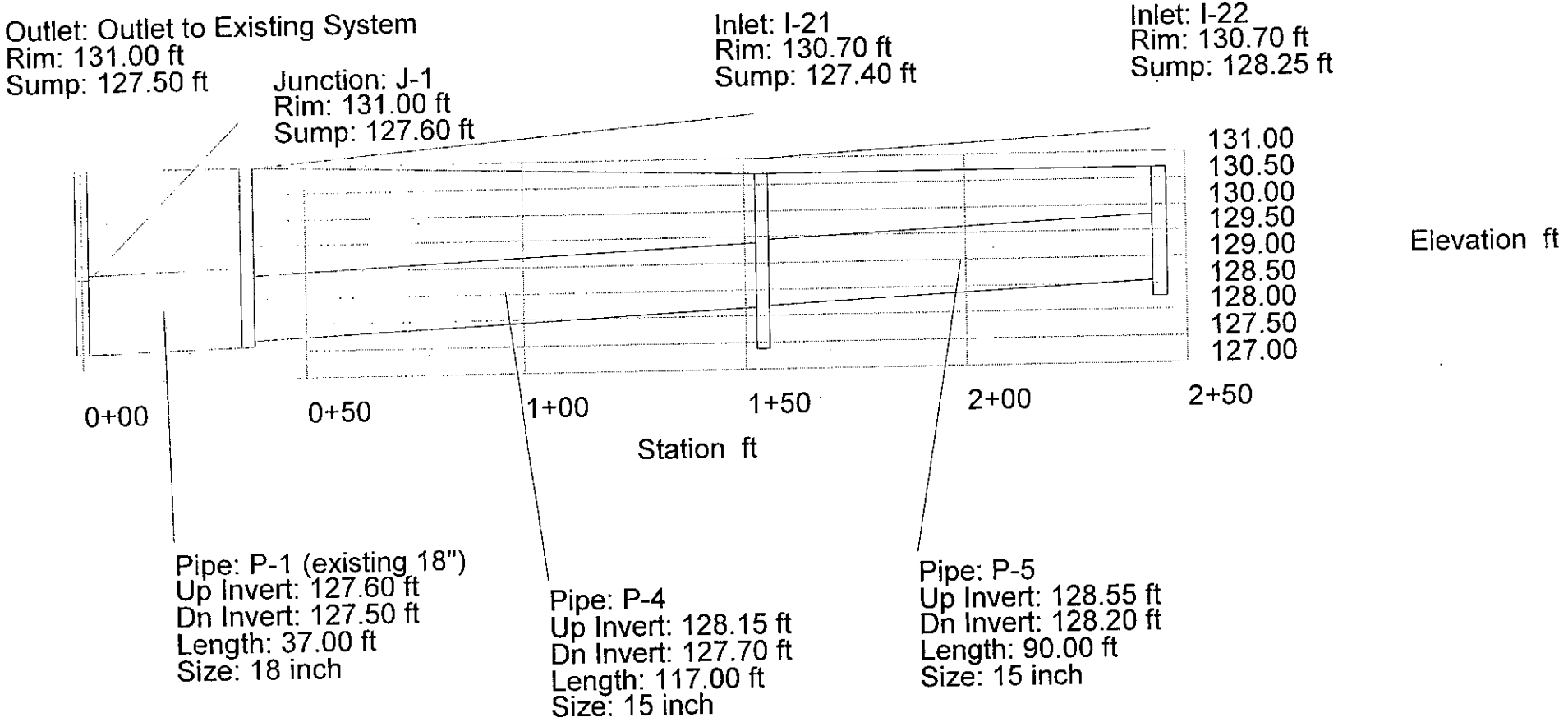
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Sump: 127.50 ft
Junction: J-1
Rim: 131.00 ft
Sump: 127.60 ft
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Rim: 130.70 ft
Sump: 127.40 ft
Inlet: I-22
Rim: 130.70 ft
Sump: 128.25 ft
131.00
130.50
130.00
129.50
129.00
128.50
128.00
127.50
127.00
Elevation ft
0+00
0+50
1+00
1+50
2+00
2+50
Station ft
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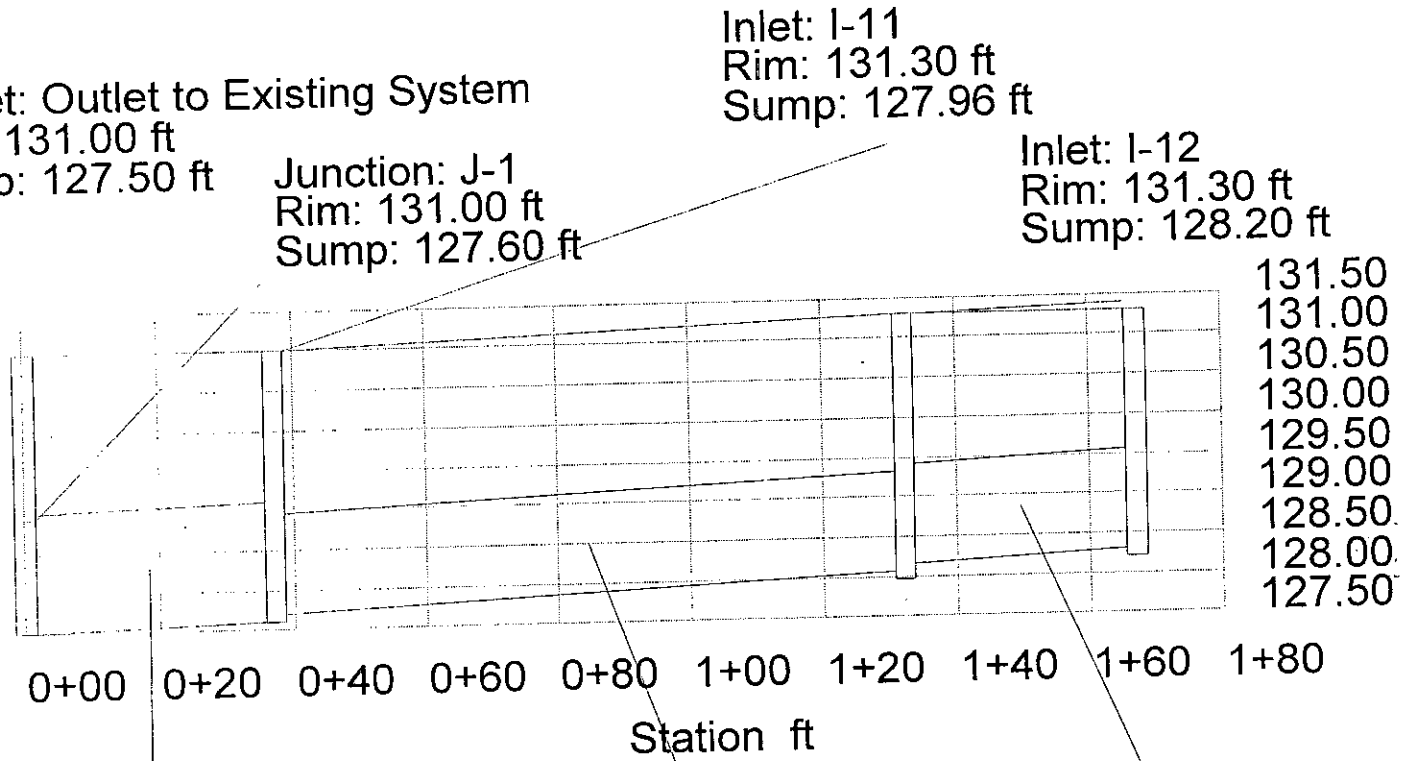
Up Invert: 127.60 ft
Dn Invert: 127.50 ft
Length: 37.00 ft
Size: 18 inch
Pipe: P-4
Up Invert: 128.15 ft
Dn Invert: 127.70 ft
Length: 117.00 ft
Size: 15 inch
Pipe: P-5
Up Invert: 128.55 ft
Dn Invert: 128.20 ft
Length: 90.00 ft
Size: 15 inch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Rim: 131.00 ft
Sump: 127.50 ft
Junction: J-1
Rim: 131.00 ft
Sump: 127.60 ft
Inlet: I-11
Rim: 131.30 ft
Sump: 127.96 ft
Inlet: I-12
Rim: 131.30 ft
Sump: 128.20 ft
131.50
131.00
130.50
130.00
129.50
129.00
128.50
128.00
127.50
Elevation ft
0+00
0+20
0+40
0+60
0+80
1+00
1+20
1+40
1+60
1+80
Station ft
Pipe: P-1 (existing 18")
Up Invert: 127.60 ft
Dn Invert: 127.50 ft
Length: 37.00 ft
Size: 18 inch
Pipe: P-2
Up Invert: 128.06 ft
Dn Invert: 127.70 ft
Length: 95.00 ft
Size: 15 inch
Pipe: P-3
Up Invert: 128.30 ft
Dn Invert: 128.16 ft
Length: 35.00 ft
Size: 15 inch

System Report

Pipe	-Section- Shape Size	-Node- Upstream Downstream	Inlet TC (min)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	Additional Flow (cfs)	-Section- Discharge Capacity (cfs)	Length (ft)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Structure Discharge (cfs)	System Flow Time (min)	Average Velocity (ft/s)	Discharge (cfs)
P-3	Circular	I-12	0.00	131.30	131.39	3.30	3.30	35.00	128.30	128.16	3.30	0.00	2.69	3.30
	15 inch	I-11		131.30	131.30		4.09							
P-2	Circular	I-11	0.00	131.30	133.46	7.10	10.40	95.00	128.06	127.70	10.40	0.22	8.47	10.40
	15 inch	J-1		131.00	131.00		3.98							
P-5	Circular	I-22	0.00	130.70	131.42	4.40	4.40	90.00	128.55	128.20	4.40	0.00	3.59	4.40
	15 inch	I-21		130.70	131.00		4.03							
P-4	Circular	I-21	0.00	130.70	131.85	1.10	5.50	117.00	128.15	127.70	5.50	0.42	4.48	5.50
	15 inch	J-1		131.00	131.00		4.01							
P-1 (existing 18")	Circular	J-1	N/A	131.00	131.86	N/A	15.90	37.00	127.60	127.50	15.90	0.85	9.09	15.90
	18 inch	Outlet to Existing Syste		131.00	128.92		2.96							

East Flume - S. Kelley 5th Addtn.- 100yr
Worksheet for Triangular Channel

Project Description	
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Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.002400	ft/ft
Left Side Slope	2.250000	H : V
Right Side Slope	2.250000	H : V
Discharge	6.00	cfs

Results		
Depth	0.92	ft
Flow Area	1.91	ft^2
Wetted Perimeter	4.54	ft
Top Width	4.14	ft
Critical Depth	0.85	ft
Critical Slope	0.003695	ft/ft
Velocity	3.14	ft/s
Velocity Head	0.15	ft
Specific Energy	1.07	ft
Froude Number	0.82	
Flow is subcritical.		

West Flume - S. Kelley 5th Addtn.- 100yr
Worksheet for Triangular Channel

Project Description	
Project File	c:\haestad\fmw\skelley.fm2
Worksheet	Steve Kelley 5th Concrete Flume
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.002700	ft/ft
Left Side Slope	2.250000	H : V
Right Side Slope	2.250000	H : V
Discharge	7.60	cfs

Results		
Depth	0.98	ft
Flow Area	2.18	ft^2
Wetted Perimeter	4.85	ft
Top Width	4.43	ft
Critical Depth	0.93	ft
Critical Slope	0.003580	ft/ft
Velocity	3.49	ft/s
Velocity Head	0.19	ft
Specific Energy	1.17	ft
Froude Number	0.88	
Flow is subcritical.		

DRAINAGE PLAN

GRADING PLAN