

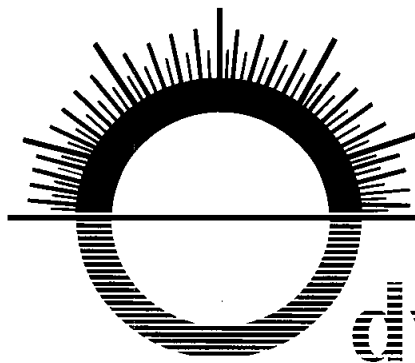
HYDROLOGY REPORT

FOR

STEAMBOAT PARKWAY NORTH & SOUTH ROADWAY IMPROVEMENTS

PREPARED FOR

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INCORPORATED

DECEMBER, 2000

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PROFESSIONAL ENGINEER STATE OF NEVADA
BRETT D. HAMMOND
CIVIL
No. 8904

01/02/01

STEAMBOAT PARKWAY NORTH & SOUTH
FROM STATION "SP" 21+68.45 TO "SP" 81+49.48
STATION "ML" 0+00.00 TO "ML" 40+26.86
STATION "MLR" 0+00.00 TO "MLR" 12+05.02
HYDROLOGY REPORT

INTRODUCTION

The following report represents the hydrological analysis for Steamboat Parkway North from Station "SP" 21+68.45 to Station "SP" 81+49.48, which connects into Steamboat Parkway South, which then heads south from Station "ML" 0+00.00 to Station "ML" 40+26.86. Mira Loma Road will be constructed from Station "MLR" 0+00.00 (Station "ML" 39+54.72), along the Southern boundary of the Damonte Ranch High School Site, connecting into the existing Mira Loma Road. The Steamboat Parkway North section consists of approximately 5,981 L.F. of street improvements, the Steamboat Parkway South section consists of approximately 4,027 L.F. of street improvements, and the Mira Loma Road section consists of approximately 1,205 L.F. of street improvements. Steamboat Parkway North will be constructed as a four lane minor arterial which will measure 73' from front face of curb to front face of curb, and will be centered within a 98' wide right-of-way. Steamboat Parkway South, from Station "ML" 0+00.00 TO Station "ML" 20+92.48 and Station 25+70.49 to "ML" 40+26.86, (excluding the widened section to accommodate the intersection at Steamboat Parkway North and Steamboat Parkway South), will be constructed as a two lane minor arterial which will measure 37' from front face of curb to front face of curb, centered within a 90' wide right-of-way. The section of Steamboat Parkway South from Station "ML" 22+14.89 to Station "ML" 24+20.90 will be constructed as a two lane minor arterial with a median and a right turn lane in front of the proposed Damonte Ranch High School, which will measure 36.5' from centerline to the left (East) front face of curb, and 25.5' from centerline to the right (West) front face of curb, and will be centered within a 90' wide right-of-way. Mira Loma Road will be constructed as a two lane collector street, which will measure 37' from front face of curb to front face of curb, centered within a 52' wide right-of-way. The project site is located in Sections 14 and 15, T.18N., R.20E., M.D.M. (Ref. Figure 1 ~ Vicinity Map)

STORM DRAINAGE CALCULATION METHODOLOGY

The Rational Method was used in conjunction with Manning's Formula for all flow calculations. The parameters are as follows:

Rational Method:

Design Flow = $Q = CiA$ where:

Q = Runoff (cubic feet per second)

C = Runoff Coefficient

i = Rainfall Intensity (inches per hour)

A = Watershed Area (acres)

C values were taken from the Washoe County Design Manual for the 10 year and 100 year storms. (Ref. Table 701) The land use for the actual improvements will be roadway improvements, and in order to properly size the stubs and proceeding systems, the land uses and areas were taken from the Southeast Truckee Meadows Specific Plan. Values for the 10 year and the 100 year storms are as follows:

	10 year (C_{10})	100 year (C_{100})
<u>Streets/Roads:</u>		
Paved	.90	.93
<u>Business/Commercial:</u>		
Neighborhood Areas	.70	.80
<u>Residential:</u>		
¼ Acre Average Lot Size	.55	.65

The Neenah Inlet Grate Capacity was used to calculate the inlet capacities of all catch basins in a sump condition, and the maximum half-lane flow was used to calculate the inlet capacities of catch basins in a continuous grade condition. The equation used for the continuous grade condition was:

$$Q = KD^{(5/3)}$$

Where "K" was taken from the hydraulic performance chart for a Neenah R-3067 Diagonal Reversible Grate, and the depth (D) was calculated from the half-lane flow.

Per the Washoe County Hydrologic Criteria and Drainage Design Manual, rainfall intensity curves were used to determine the average intensity (Ref. Figure 605). The time of concentration with a minimum buildup time of ten minutes is expressed as follows:

T_c = Time of Concentration at Calculation Point (minutes)

L = Length of Watershed (feet)

V = Flow Velocity (feet per second)

Since the time of concentration values were calculated to be less than 10 minutes for the areas in the roadway improvements, the 10 minute minimum time was used. A conservative assumption had to be made for the contributions of the future improvements to the storm drain systems via the stubs, so the same intensities were used to calculate the flows to the stubs.

The 10 year storm rainfall intensity is $i_{10} = 2.0$ in/hr, and the 100 year storm rainfall intensity is

$i_{100} = 4.25$ in/hr.

EXISTING CONDITIONS

The existing conditions are as shown on the enclosed "Existing Drainage Conditions" map. The entire area consists of fields and unimproved areas, and the drainage follows several small channels and irrigation ditches and drains toward the north.

PROPOSED ON-SITE DRAINAGE

The developed roadway was broken down into several subareas to determine the amount of water flowing to each analysis point. These subareas are shown in the drainage maps accompanying each storm drain system's analysis, as well as on the enclosed "Overall Drainage Map." Proposed 10 year flows throughout the development will be piped within the storm drain infrastructure while the 100 year storm will travel overland within the roadway network. Storm flows for each catch basin and drainage area can be found in Table 1 and are shown on the improvement plans. Detailed analysis is shown for each storm drain system in the STORMCAD STORM DRAIN ANALYSIS Section. Please note that systems 8 and 9 were analyzed in combination with the adjacent portion of the proposed Damonte Ranch High School in order to satisfy the requirements of both projects.

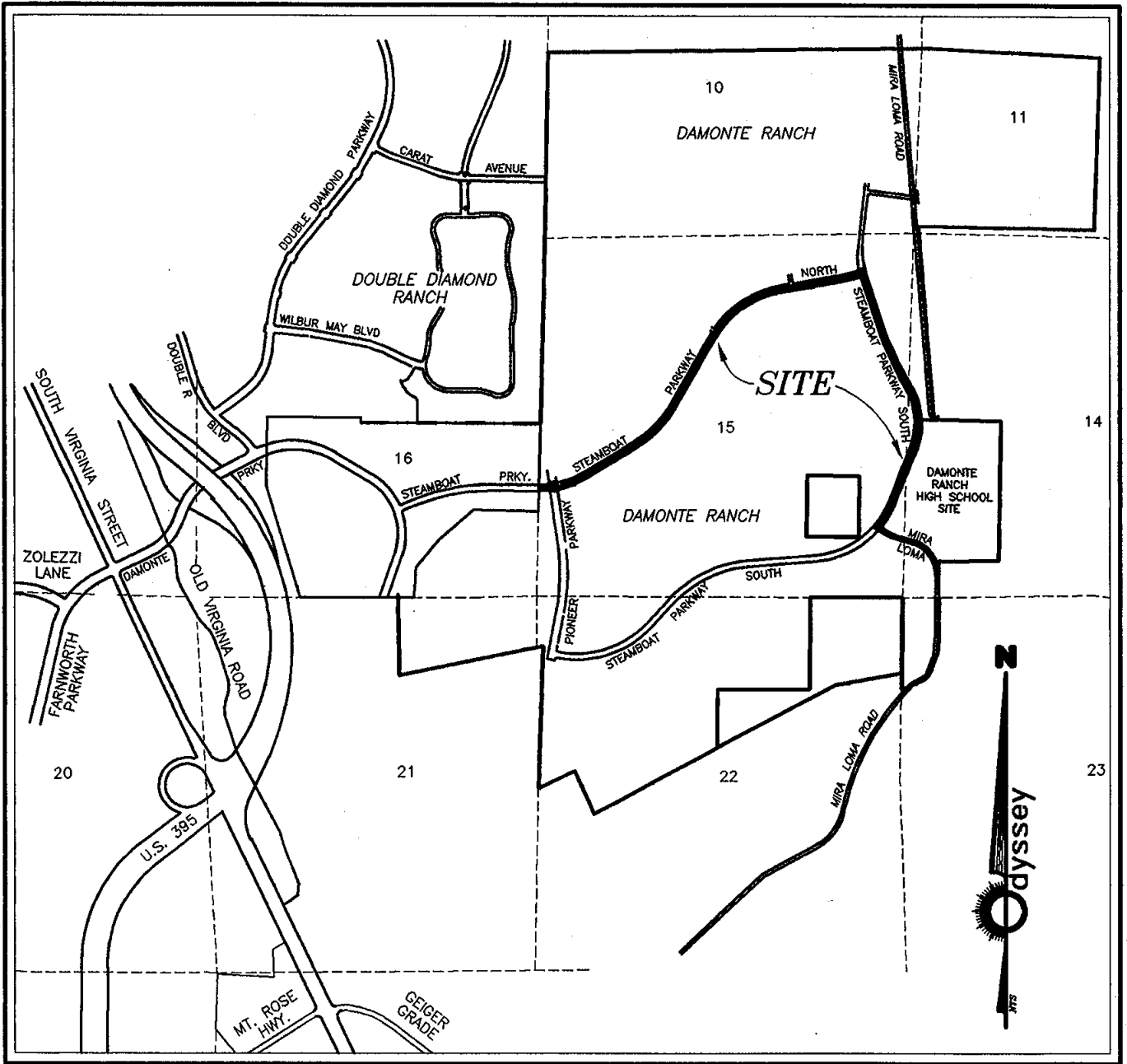
All storm drain systems will eventually discharge into either the relocated Steamboat Creek adjacent to the proposed Pioneer Parkway, or to the flood control channel downstream of the culvert crossing near the intersection of Steamboat Parkway North and Steamboat Parkway South. In the interim, however, temporary v-ditches ($S=0.002$ ft/ft) shall be constructed to convey the

flow from Systems 3 and 4 away from the roadway improvements until a daylight point is reached.

With regard to detention, the total site area was included in the analysis for Southeast Truckee Meadows Specific Plan (SETMSP) Flood Control Master Plan, therefore additional detention for this project will not be required. Included in the improvement plans for Steamboat Parkway North & South are the grading plans for four of the flood control basins per the Flood Control Master Plan, as well as the culvert crossing near the intersection of Steamboat Parkway North and Steamboat Parkway South.

CONCLUSION

The grading and drainage design for Steamboat Parkway North & South provides drainage protection for future development, and will maintain existing drainage patterns within the watershed area. The drainage design also satisfies the conditions of the SETMSP Flood Control Master Plan.



VICINITY MAP

FIGURE 1

WASHOE COUNTY
HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RATIONAL FORMULA METHOD
RUNOFF COEFFICIENTS

Land Use or Surface Characteristics	Aver. % Impervious Area	Runoff Coefficients	
		10-year (C ₁₀)	100-year (C ₁₀₀)
<u>Business/Commercial:</u>			
Downtown Areas	85	.88	.89
Neighborhood Areas	70	.70	.80
<u>Residential:</u>			
(Average Lot Size)			
1/8 Acre or Less (Multi-Unit)	65	.68	.78
1/4 Acre	38	.55	.65
1/3 Acre	30	.50	.60
1/2 Acre	25	.45	.55
1 Acre	20	.40	.50
<u>Industrial:</u>	72	.72	.82
<u>Open Space:</u>			
Lawns, Parks, Golf Courses)	5	.10	.30
<u>Undeveloped Areas:</u>			
Range	0	.25	.50
Forest	0	.10	.30
<u>Streets/Roads:</u>			
Paved	100	.90	.93
Gravel	20	.40	.50
<u>Drives/Walks:</u>	95	.88	.89
<u>Roofs:</u>	90	.85	.87

Notes:

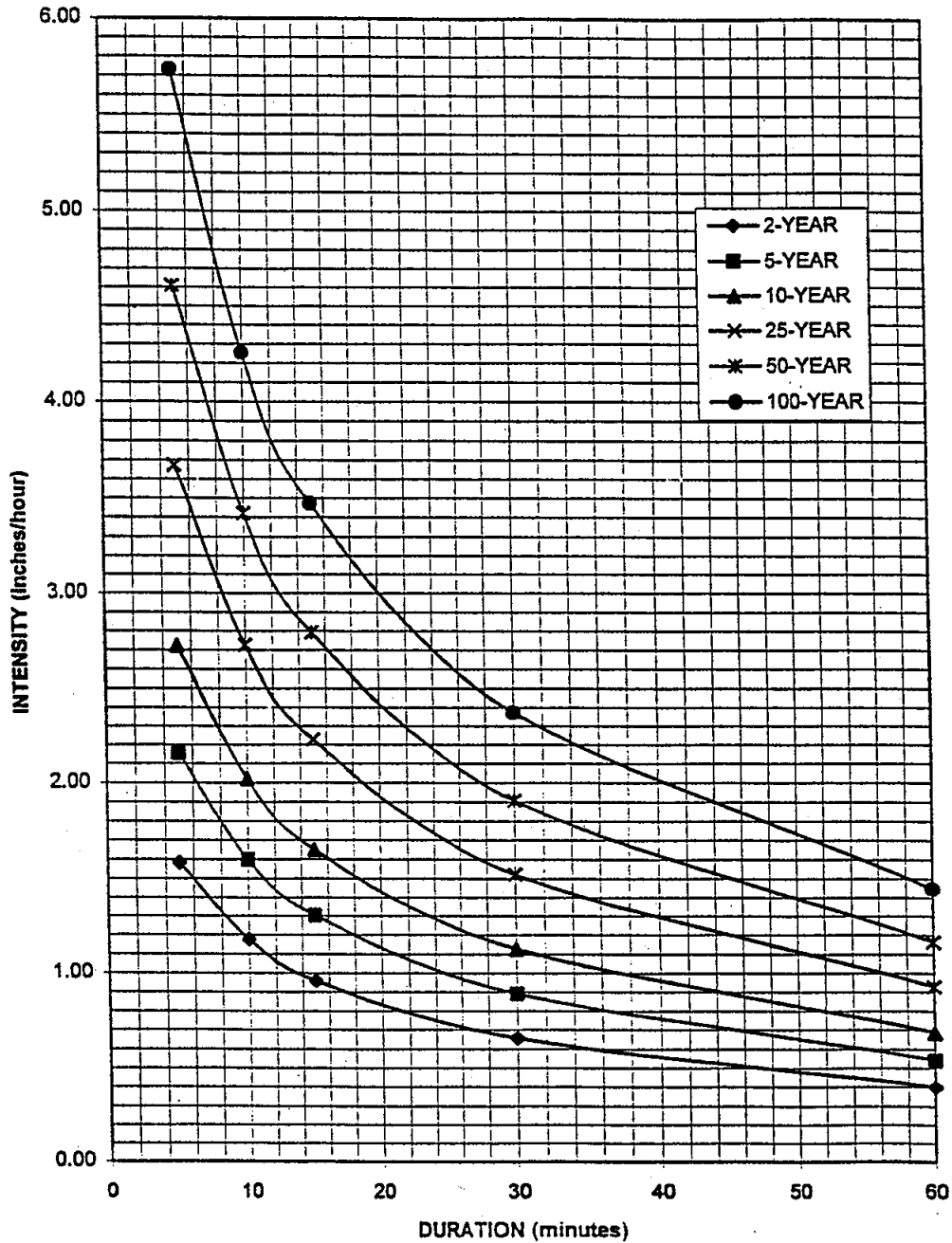
1. Composite runoff coefficients shown for Residential, Industrial, and Business/Commercial Areas assume irrigated grass landscaping for all previous areas. For development with landscaping other than irrigated grass, the designer must develop project specific composite runoff coefficients from the surface characteristics presented in this table.

VERSION: December 2, 1996	REFERENCE: USDCM, DRCOG, 1969 (with modifications)	TABLE 701
WRC ENGINEERING, INC.		

WASHOE COUNTY

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

ZONE I TIME-INTENSITY-FREQUENCY CURVES



107605 6/19/96

VERSION: 00-00-0000

REFERENCE:

WRC ENGINEERING, INC.

FIGURE

605

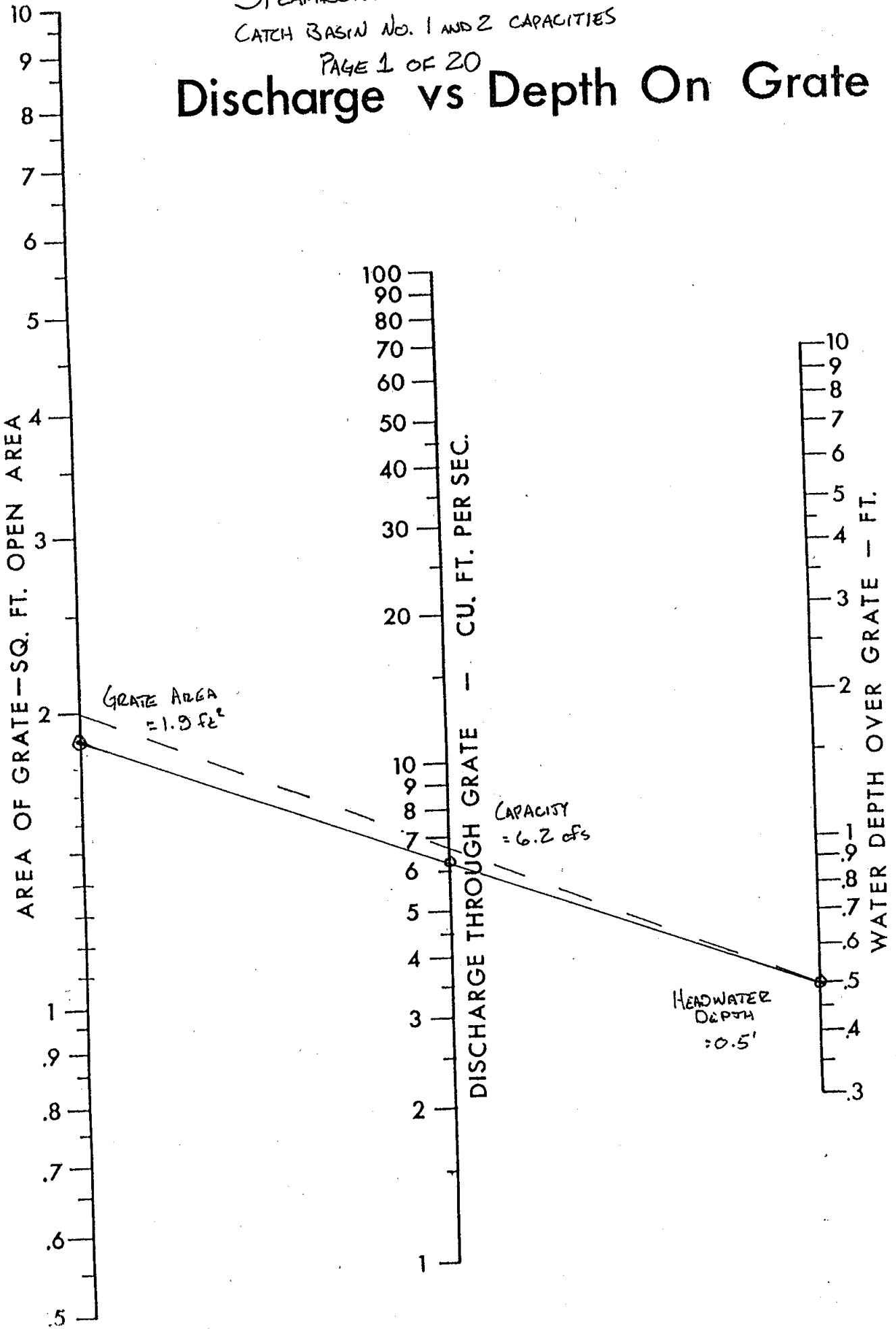
Table 1
Steamboat Parkway North & South
Rational Method Parameters

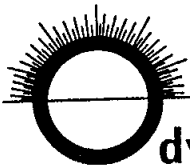
Analysis Area/ Catch Basin No.	Area (AC)	Tc (min)	Runoff Coefficient 10 year	Runoff Coefficient 100 year	i10 (in./hr.)	i100 (in./hr.)	Q10 (cfs)	Q100 (cfs)	CB Capacity (cfs)
1	0.68	10	0.90	0.93	2.00	4.25	1.22	2.69	6.20
2	0.67	10	0.90	0.93	2.00	4.25	1.21	2.65	6.20
3	0.36	10	0.90	0.93	2.00	4.25	0.65	1.42	5.04
4	0.09	10	0.90	0.93	2.00	4.25	0.16	0.36	6.20
5	0.09	10	0.90	0.93	2.00	4.25	0.16	0.36	6.20
6	0.59	10	0.90	0.93	2.00	4.25	1.06	2.33	2.26
7	0.75	10	0.90	0.93	2.00	4.25	1.35	2.96	5.04
8	0.48	10	0.90	0.93	2.00	4.25	0.86	1.90	2.26
9	0.11	10	0.90	0.93	2.00	4.25	0.20	0.43	6.20
10	0.09	10	0.90	0.93	2.00	4.25	0.16	0.36	6.20
11	0.39	10	0.90	0.93	2.00	4.25	0.70	1.54	2.26
12	0.36	10	0.90	0.93	2.00	4.25	0.65	1.42	5.04
13	0.09	10	0.90	0.93	2.00	4.25	0.16	0.36	6.20
14	0.09	10	0.90	0.93	2.00	4.25	0.16	0.36	6.20
15	0.46	10	0.90	0.93	2.00	4.25	0.83	1.82	2.26
16	0.5	10	0.90	0.93	2.00	4.25	0.90	1.98	5.04
17	0.1	10	0.90	0.93	2.00	4.25	0.18	0.40	6.20
18	0.09	10	0.90	0.93	2.00	4.25	0.16	0.36	6.20
19	0.45	10	0.90	0.93	2.00	4.25	0.81	1.78	2.26
20	0.94	10	0.90	0.93	2.00	4.25	1.69	3.72	5.04
21	0.41	10	0.90	0.93	2.00	4.25	0.74	1.62	2.26
22	0.11	10	0.90	0.93	2.00	4.25	0.20	0.43	6.20
23	0.1	10	0.90	0.93	2.00	4.25	0.18	0.40	6.20
24	1.2	10	0.90	0.93	2.00	4.25	2.16	4.74	2.11
25	1.15	10	0.90	0.93	2.00	4.25	2.07	4.55	4.72
26	0.1	10	0.90	0.93	2.00	4.25	0.18	0.40	6.20
27	0.09	10	0.90	0.93	2.00	4.25	0.16	0.36	6.20
28	0.99	10	0.90	0.93	2.00	4.25	1.78	3.91	2.11
29	0.99	10	0.90	0.93	2.00	4.25	1.78	3.91	4.41
30	0.07	10	0.90	0.93	2.00	4.25	0.13	0.28	6.20
31	0.09	10	0.90	0.93	2.00	4.25	0.16	0.36	6.20
32	0.71	10	0.90	0.93	2.00	4.25	1.28	2.81	6.20
33	0.73	10	0.90	0.93	2.00	4.25	1.31	2.89	6.20
34	0.59	10	0.90	0.93	2.00	4.25	1.06	2.33	2.55
35	0.22	10	0.90	0.93	2.00	4.25	0.40	0.87	6.20
36	0.2	10	0.90	0.93	2.00	4.25	0.36	0.79	6.20
37	0.51	10	0.90	0.93	2.00	4.25	0.92	2.02	6.20
38	0.23	6.3	0.66	0.74	2.54	5.35	0.39	0.92	6.20
39	0.66	9.9	0.90	0.93	2.03	4.29	1.22	2.65	2.55
40	1.37	13.7	0.67	0.75	1.75	3.68	1.62	3.81	4.72
41	1.02	10.8	0.70	0.77	1.96	4.12	1.41	3.26	4.72
42	0.48	9.5	0.90	0.93	2.09	4.41	0.91	1.98	2.55
43	0.51	7.7	0.90	0.93	2.34	4.94	1.08	2.36	4.72
44	1.72	14.5	0.55	0.65	1.69	3.56	1.61	4.01	6.20
45	0.74	6.7	0.90	0.93	2.47	5.23	1.66	3.63	6.20
STUB #1	5	10	0.70	0.8	2.00	4.25	7.00	17.00	N/A
STUB #2	19.5	10	0.55	0.65	2.00	4.25	21.45	53.87	N/A
STUB #3	8	10	0.70	0.8	2.00	4.25	11.20	27.20	N/A
STUB #4	7.95	10	0.55	0.65	2.00	4.25	8.75	21.96	N/A
STUB #5	21.39	10	0.55	0.65	2.00	4.25	23.53	59.09	N/A
STUB #6	20.48	10	0.55	0.65	2.00	4.25	22.53	56.58	N/A
STUB #7	19.94	10	0.55	0.65	2.00	4.25	21.93	55.08	N/A
STUB #8	3	10	0.70	0.8	2.00	4.25	4.20	10.20	N/A
STUB #9	CONTRIBUTION FROM DAMONTE RANCH HIGH SCHOOL						2.09	4.88	N/A
STUB #10	CONTRIBUTION FROM DAMONTE RANCH HIGH SCHOOL						1.25	5.29	N/A

Note: Catch Basins 38 through 45 and Stubs 9 and 10 were analyzed as parts of combined systems in Steamboat Parkway South, Mira Loma Road, and the Damonte Ranch High School (See StormCAD output of Systems 8 and 9)

CATCH BASIN CAPACITIES

Discharge vs Depth On Grate



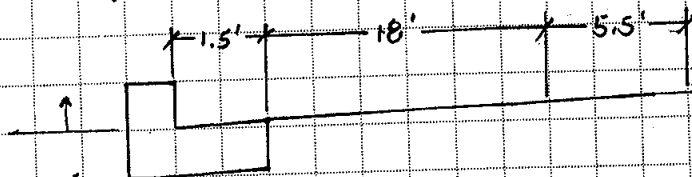


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SHEET NO. 2 OF 20
CALCULATED BY RTS DATE 11/15/2K
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SCALE _____

CATCH BASIN No. 3



TOTAL DEPTH @ HALF LANE = 0.595'

MAX DEPTH OF FLOW = 0.5'

$S = 0.71\%$ → "K" VALUE FROM NEENAH CHART = 16

CATCH BASIN CAPACITY (Q_{CAP}) = $KD^{(5/3)}$

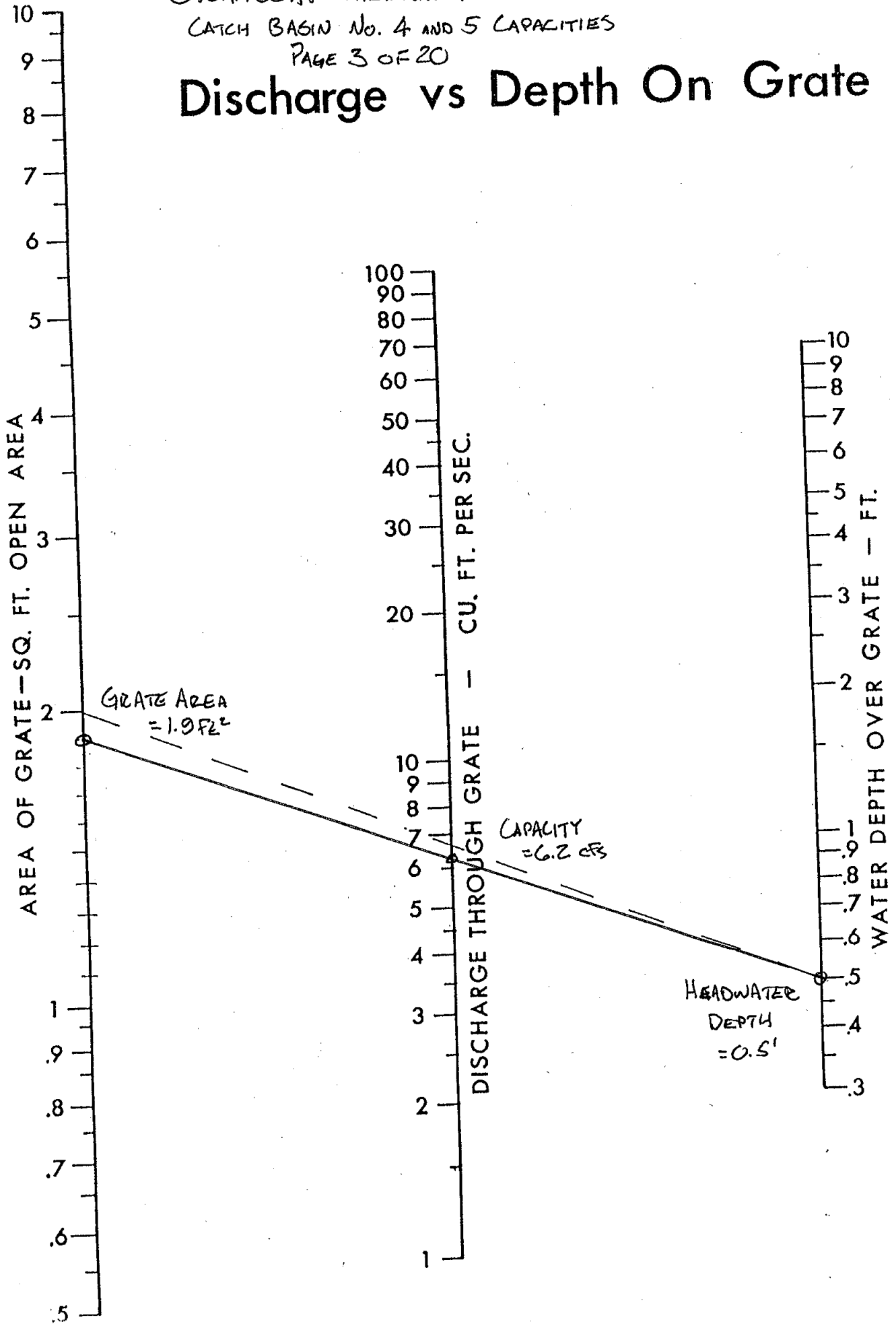
$Q_{CAP} = 5.04 \text{ cfs}$

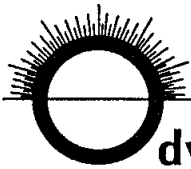
STEAMBOAT PARKWAY NORTH/SOUTH

CATCH BASIN No. 4 AND 5 CAPACITIES

PAGE 3 OF 20

Discharge vs Depth On Grate





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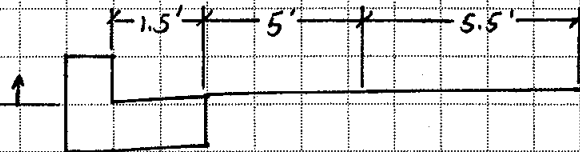
SHEET NO. 4 OF 20

CALCULATED BY RTS DATE 11/15/2K

CHECKED BY _____ DATE _____

SCALE _____

CATCH BASIN No. 6



TOTAL DEPTH = 0.335'

$S = 0.50\%$ "K" VALUE FROM NEENAH CHART = 14

$$Q_{CAP} = KD^{(5/3)}$$

$$Q_{CAP} = 2.26 \text{ cfs}$$

CATCH BASIN No. 7

DEPTH OF FLOW = 0.5' $S = 0.73\%$ "K" VALUE FROM NEENAH CHART = 16

$$Q_{CAP} = KD^{(5/3)}$$

$$Q_{CAP} = 5.04 \text{ cfs}$$

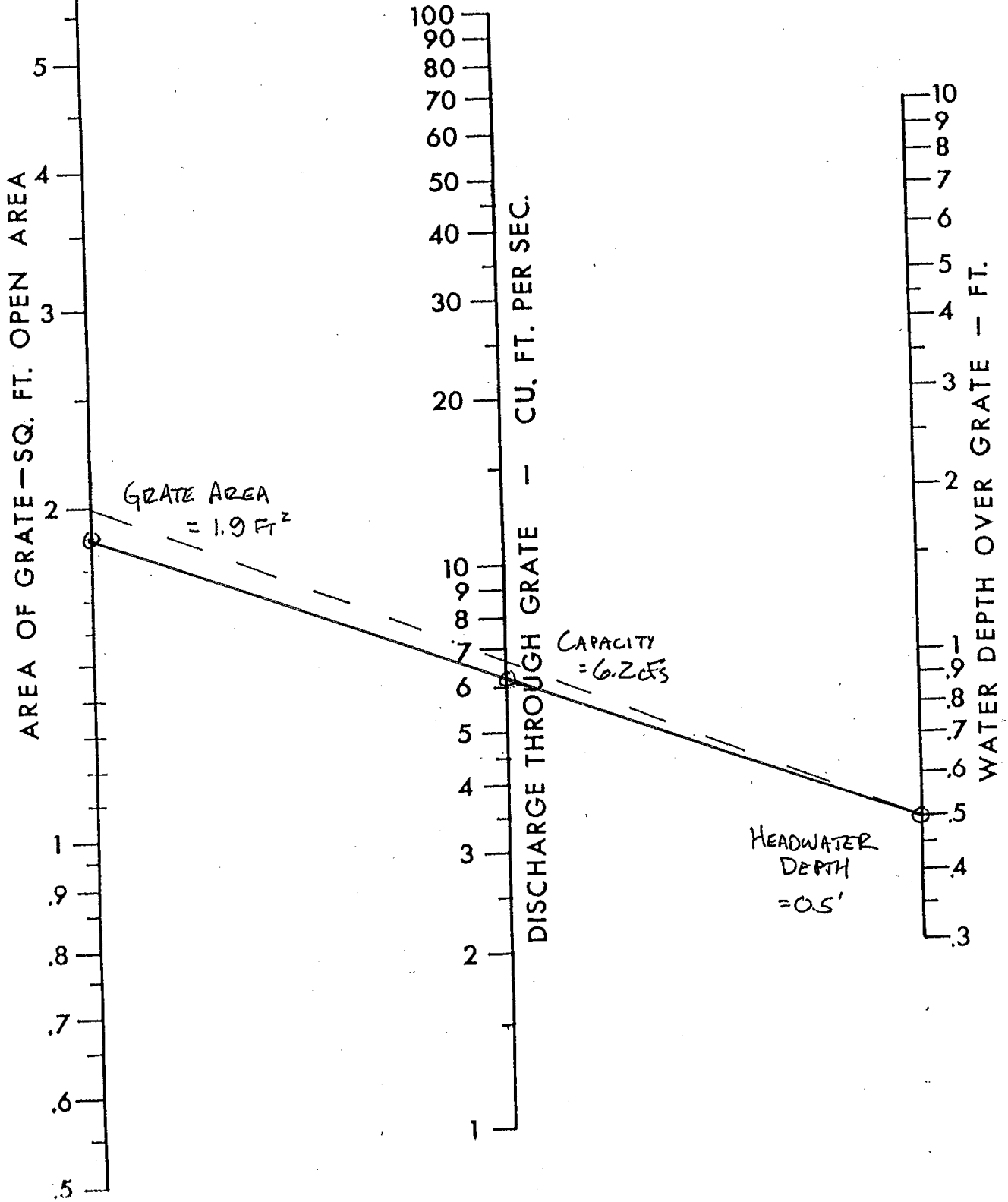
CATCH BASIN No. 8

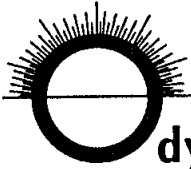
DEPTH OF FLOW = 0.335' $S = 0.50\%$ "K" VALUE FROM NEENAH CHART = 14

$$Q_{CAP} = KD^{(5/3)}$$

$$Q_{CAP} = 2.26 \text{ cfs}$$

Discharge vs Depth On Grate





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SHEET NO. 6 OF 20

CALCULATED BY RTS DATE 11/15/2K

CHECKED BY _____ DATE _____

SCALE _____

CATCH BASIN No. 11

DEPTH OF FLOW = 0.335' S = 0.50% "K" VALUE FROM NEENAH CHART = 14

$$Q_{CAP} = KD^{(5/3)}$$

$$Q_{CAP} = 2.26 \text{ cfs}$$

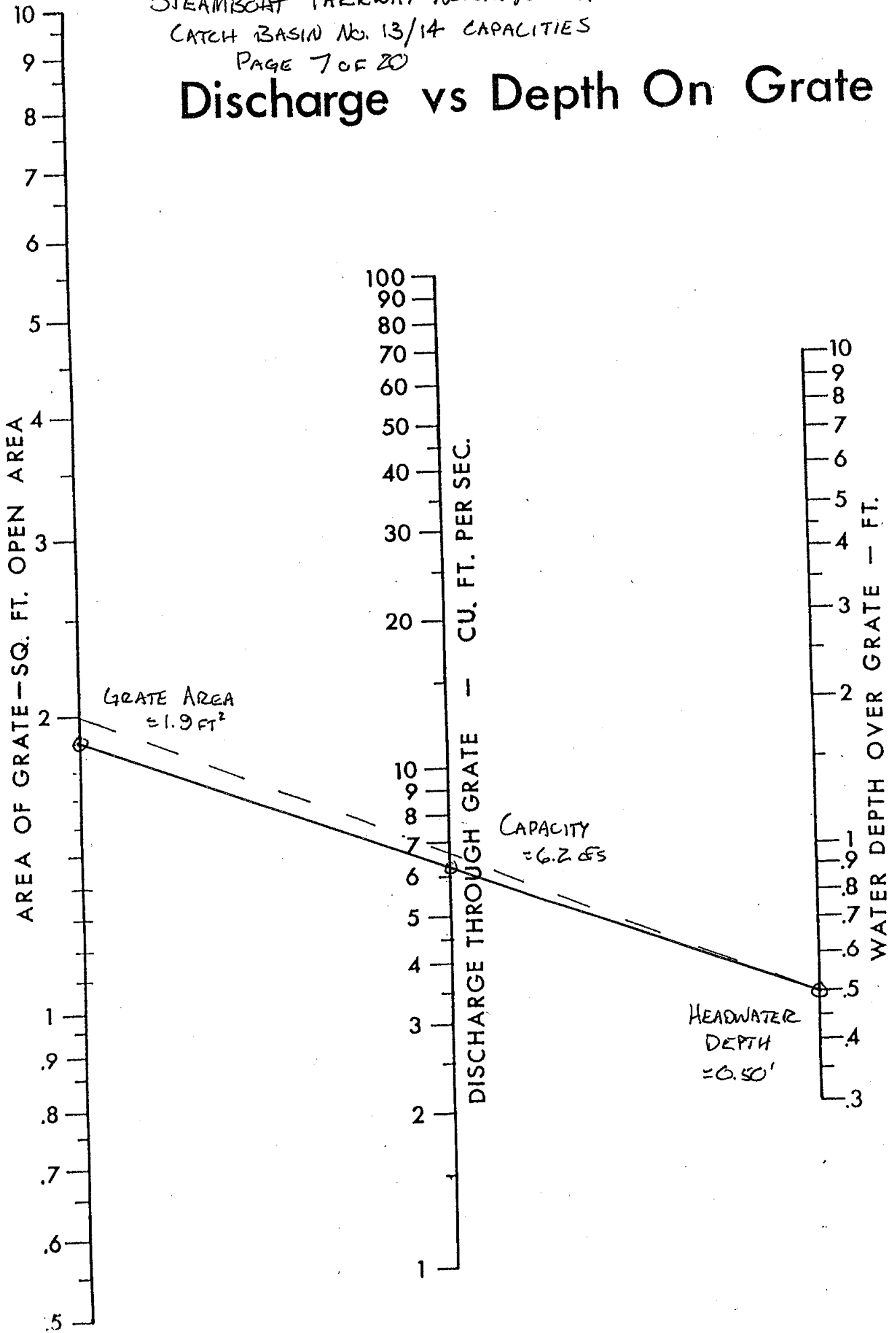
CATCH BASIN No. 12

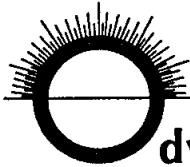
DEPTH OF FLOW = 0.5' S = 0.71% "K" VALUE FROM NEENAH CHART = 16

$$Q_{CAP} = KD^{(5/3)}$$

$$Q_{CAP} = 5.04 \text{ cfs}$$

Discharge vs Depth On Grate





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SHEET NO. 8 OF 20

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SCALE _____

CATCH BASIN No. 15

DEPTH OF FLOW = 0.335' S = 0.50% "K" VALUE FROM NEENAH CHART = 14

$$Q_{CAP} = K D^{5/3}$$

$$Q_{CAP} = 2.26 \text{ cfs}$$

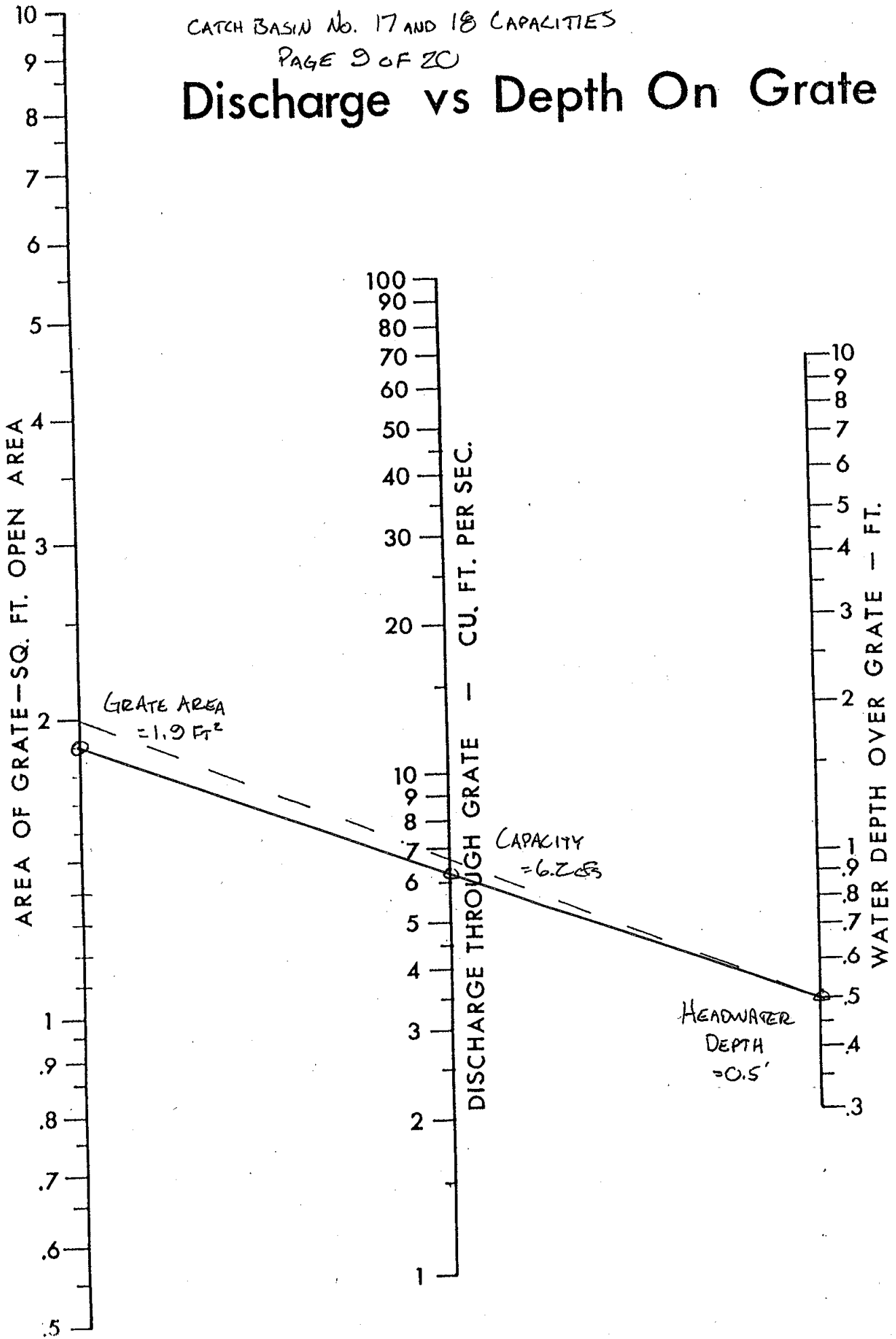
CATCH BASIN No. 16

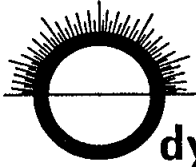
DEPTH OF FLOW = 0.5' S = 0.73% "K" VALUE FROM NEENAH CHART = 16

$$Q_{CAP} = K D^{5/3}$$

$$Q_{CAP} = 5.04 \text{ cfs}$$

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SHEET NO. 10

OF 20

CALCULATED BY RTS

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DATE _____

SCALE _____

CATCH BASIN No. 19

DEPTH OF FLOW = 0.335' S = 0.50% "K" VALUE FROM NEENAH CHART = 14

$$Q_{CAP} = KD^{5/3}$$

$$Q_{CAP} = 2.26 \text{ cfs}$$

CATCH BASIN No. 20

DEPTH OF FLOW = 0.50' S = 0.73% "K" VALUE FROM NEENAH CHART = 16

$$Q_{CAP} = KD^{5/3}$$

$$Q_{CAP} = 5.04 \text{ cfs}$$

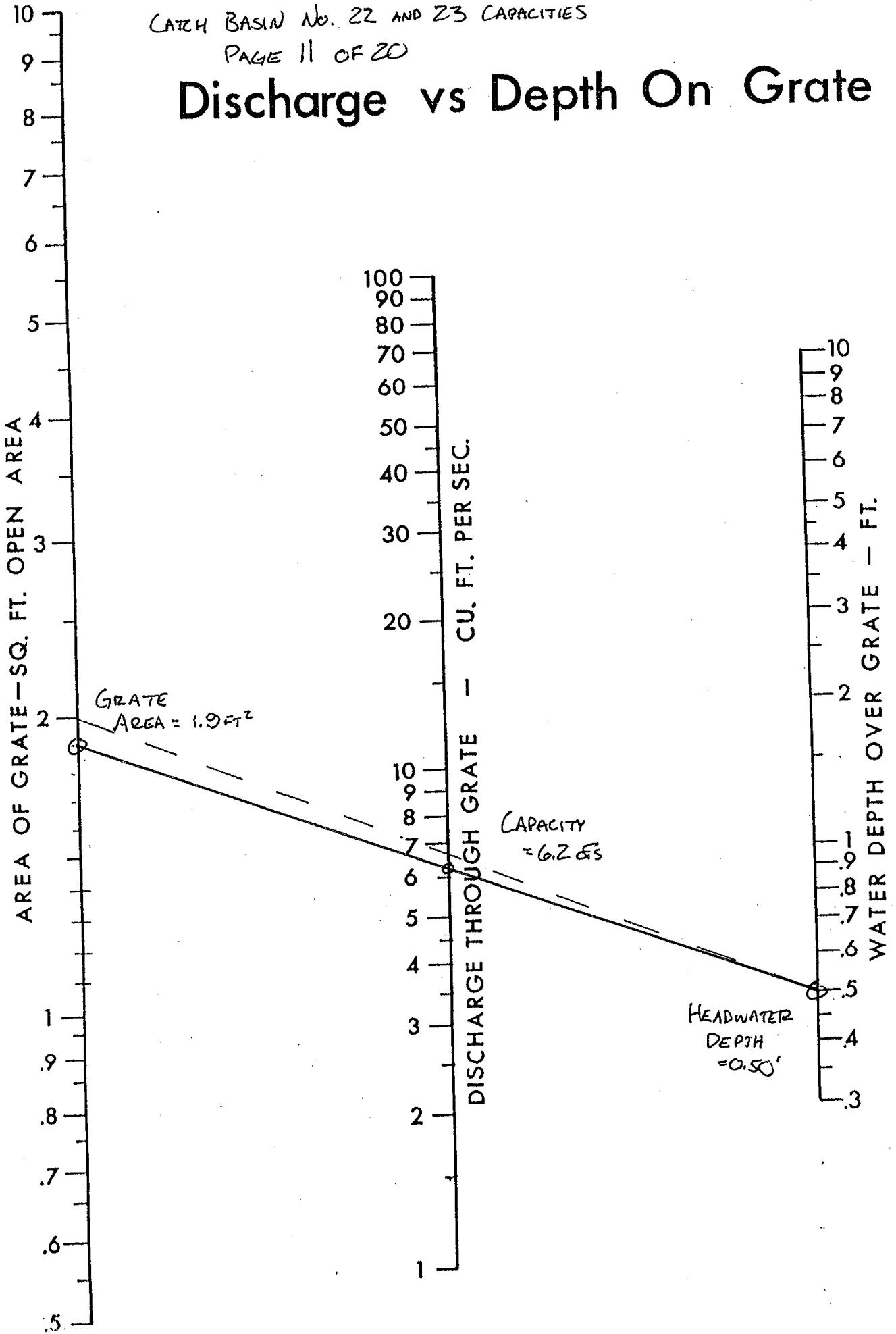
CATCH BASIN No. 21

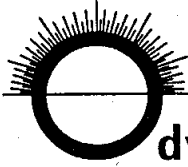
DEPTH OF FLOW = 0.335' S = 0.50% "K" VALUE FROM NEENAH CHART = 14

$$Q_{CAP} = KD^{5/3}$$

$$Q_{CAP} = 2.26 \text{ cfs}$$

Discharge vs Depth On Grate





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SHEET NO. 12 OF 20

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SCALE _____

CATCH BASIN No. 24

DEPTH OF FLOW = 0.335' S = 0.40% "K" VALUE FROM NEENAH CHART = 13

$$Q_{CAP} = K D^{(5/3)}$$

$$Q_{CAP} = 2.11 \text{ cfs}$$

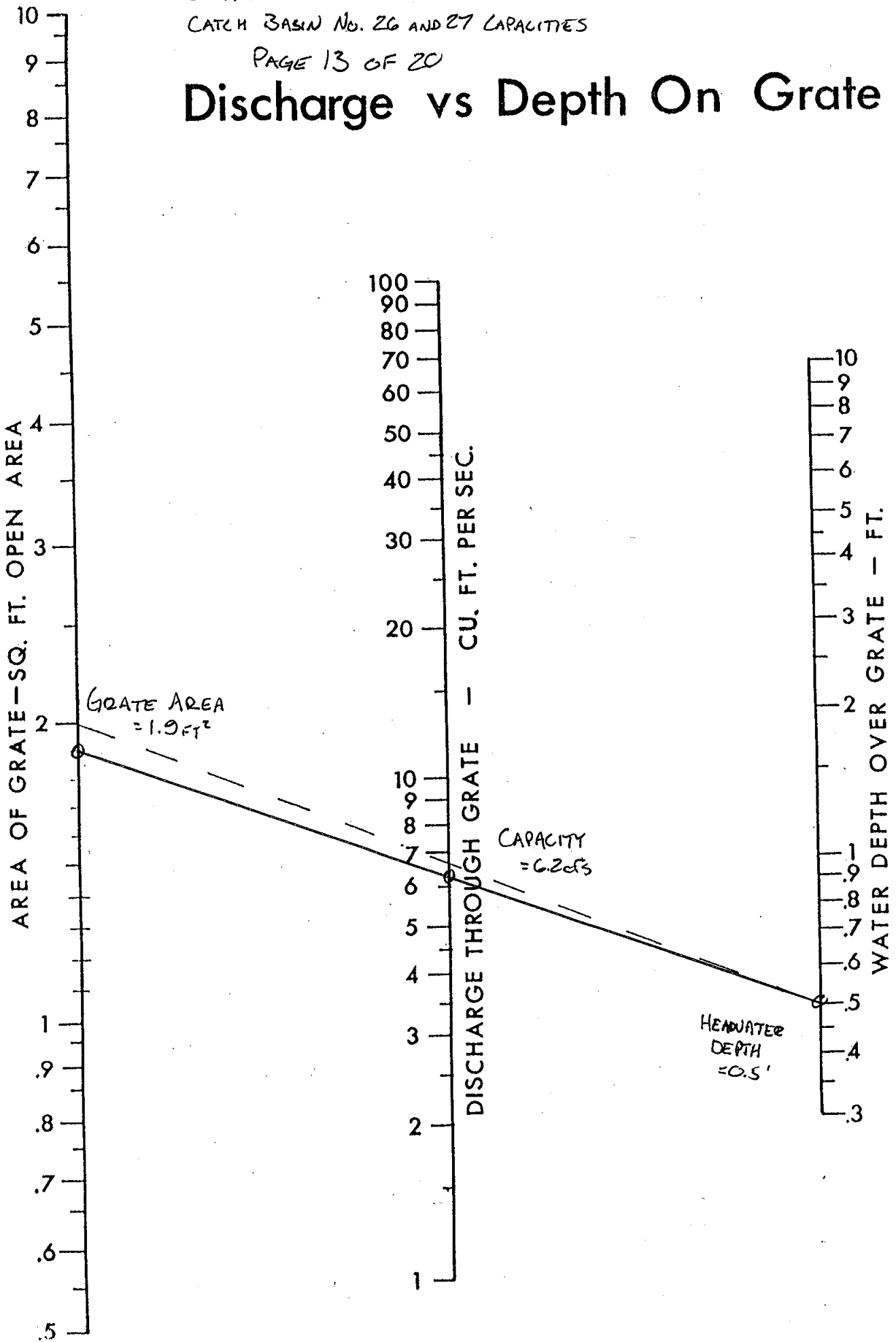
CATCH BASIN No. 25

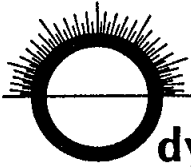
DEPTH OF FLOW = 0.5' S = 0.63% "K" VALUE FROM NEENAH CHART = 15

$$Q_{CAP} = K D^{(5/3)}$$

$$Q_{CAP} = 4.72 \text{ cfs}$$

Discharge vs Depth On Grate





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INCORPORATED

JOB STEAMBOAT PARKWAY NORTH/SOUTH

SHEET NO. 14 OF 20

CALCULATED BY RTS DATE 11/15/2K

CHECKED BY _____ DATE _____

SCALE _____

CATCH BASIN No. 28

DEPTH OF FLOW = 0.335' S = 0.40% "K" VALUE FROM NEENAH CHART = 13

$$Q_{CAP} = KD^{5/3}$$

$$Q_{CAP} = 2.11 \text{ cfs}$$

CATCH BASIN No. 29

DEPTH OF FLOW = 0.50' S = 0.58% "K" VALUE FROM NEENAH CHART = 14

$$Q_{CAP} = KD^{5/3}$$

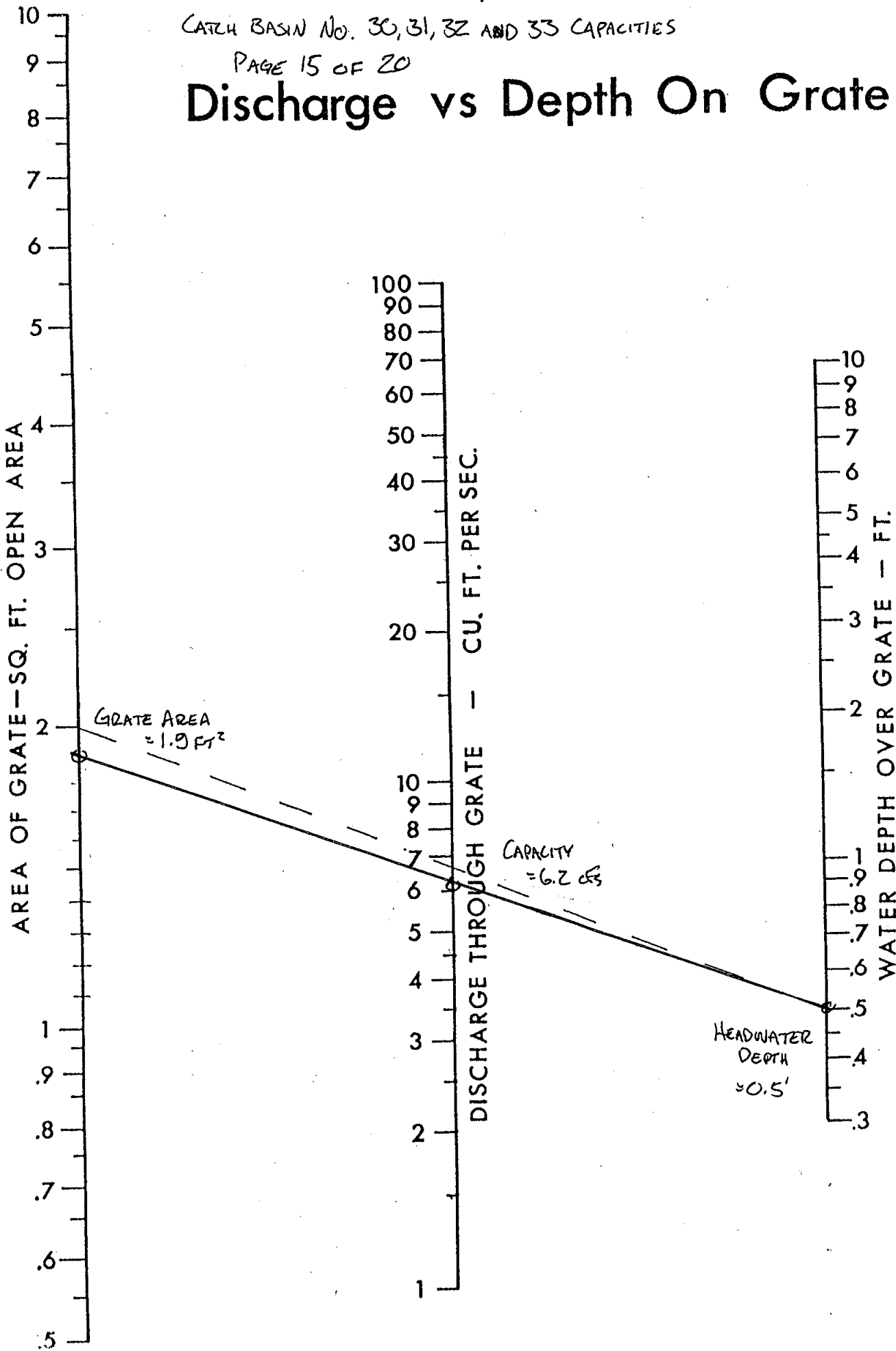
$$Q_{CAP} = 4.41 \text{ cfs}$$

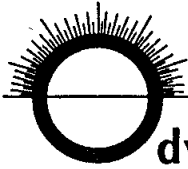
STEAMBOAT PARKWAY NORTH/SOUTH

CATCH BASIN No. 30, 31, 32 AND 33 CAPACITIES

PAGE 15 OF 20

Discharge vs Depth On Grate





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JOB STEAMBOAT PARKWAY NORTH/SOUTH

SHEET NO. 16

OF 20

CALCULATED BY RTS

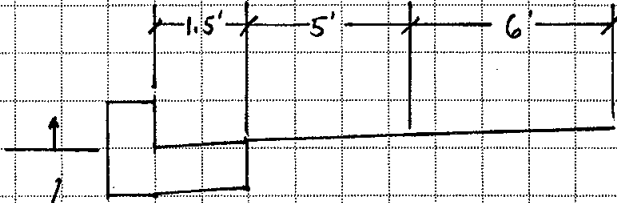
DATE 11/15/2K

CHECKED BY _____

DATE _____

SCALE _____

CATCH BASIN No. 34 AND 35



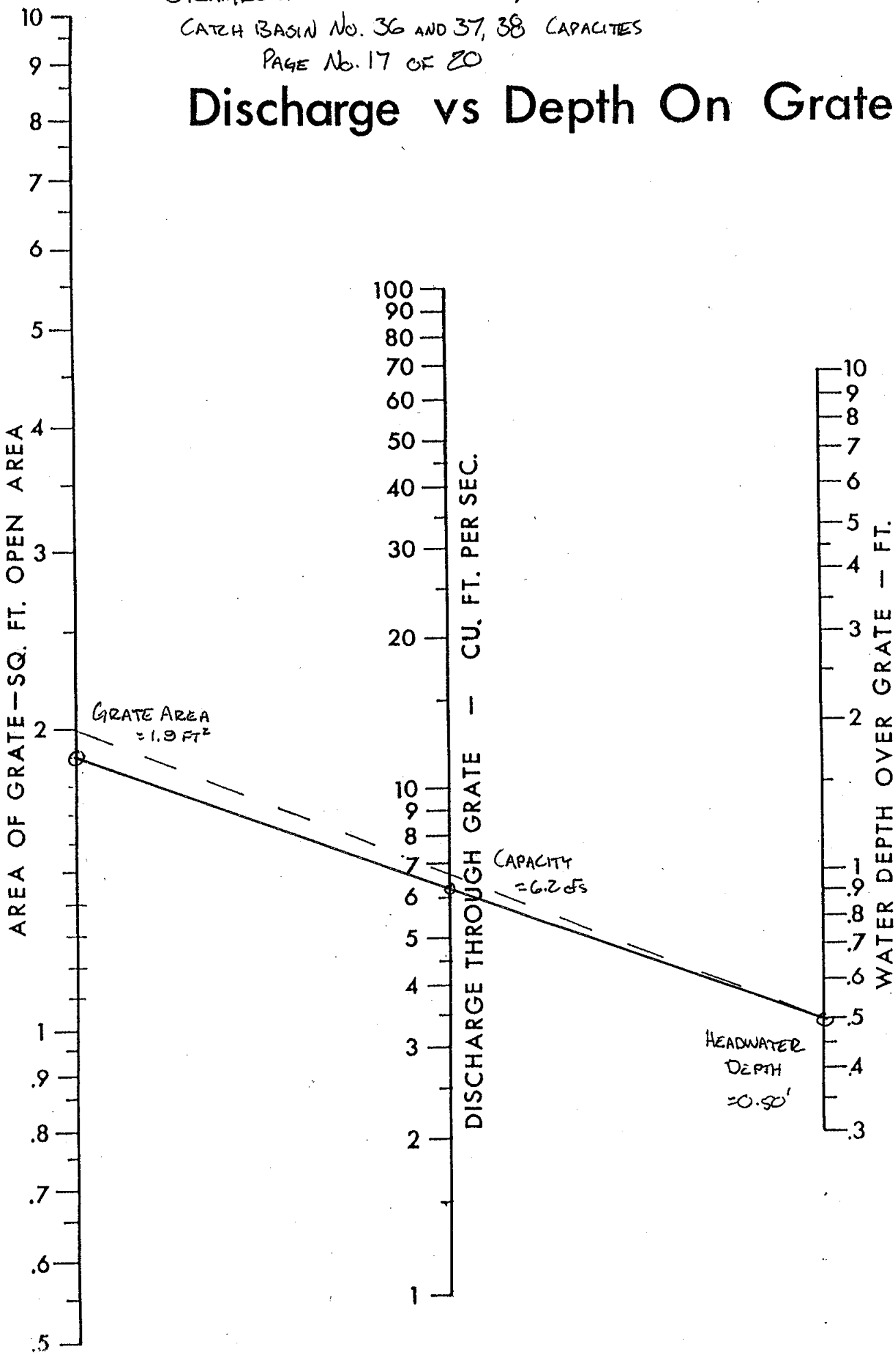
TOTAL DEPTH @ HALF LAKE = 0.345'

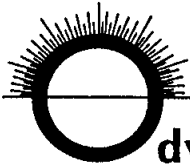
$S = 0.55\%$ "K" VALUE FROM NEENAH CHART = 15

$$Q_{CAP} = KD^{(5/3)}$$

$$Q_{CAP} = 2.55 \text{ cfs}$$

Discharge vs Depth On Grate





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JOB STEAMBOAT PARKWAY NORTH/SOUTH

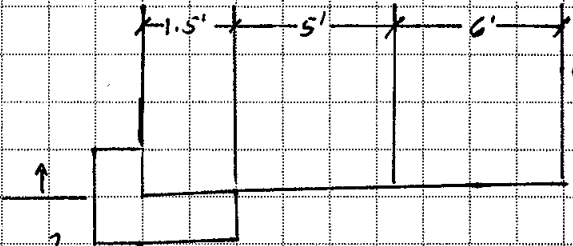
SHEET NO. 18 OF 20

CALCULATED BY RTS DATE 11/15/2K

CHECKED BY _____ DATE _____

SCALE _____

CATCH BASIN No. 39

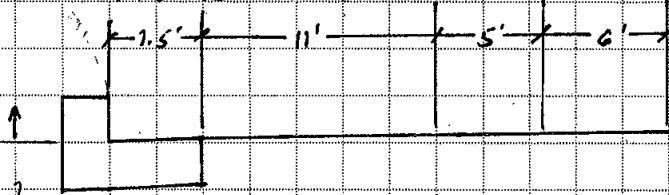


TOTAL DEPTH = 0.345' S = 0.55% "K" VALUE FROM NEENAH CHART = 15

$$Q_{CAP} = KD^{(5/3)}$$

$$Q_{CAP} = 2.55 \text{ cfs}$$

CATCH BASIN No. 40



TOTAL DEPTH @ HALF LANG = 0.565 → CURB = 0.5'

DEPTH OF FLOW = 0.50' S = 0.55% "K" VALUE FROM NEENAH CHART = 15

$$Q_{CAP} = KD^{(5/3)}$$

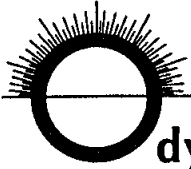
$$Q_{CAP} = 4.72 \text{ cfs}$$

CATCH BASIN No. 41

DEPTH OF FLOW = 0.50' S = 0.55% "K" VALUE FROM NEENAH CHART = 15

$$Q_{CAP} = KD^{(5/3)}$$

$$Q_{CAP} = 4.72 \text{ cfs}$$



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JOB STEAMBOAT PARLWAY NORTH/SOUTH

SHEET NO. 19 OF 20

CALCULATED BY RTS DATE 11/15/2K

CHECKED BY _____ DATE _____

SCALE _____

CATCH BASIN No. 42

DEPTH OF FLOW = 0.345' S = 0.55% "K" VALUE FROM NEENAH CHART = 15

$$Q_{CAP} = K D^{5/3}$$

$$Q_{CAP} = 2.55 \text{ cfs}$$

CATCH BASIN No. 43

DEPTH OF FLOW = 0.50' S = 0.55% "K" VALUE FROM NEENAH CHART = 15

$$Q_{CAP} = K D^{5/3}$$

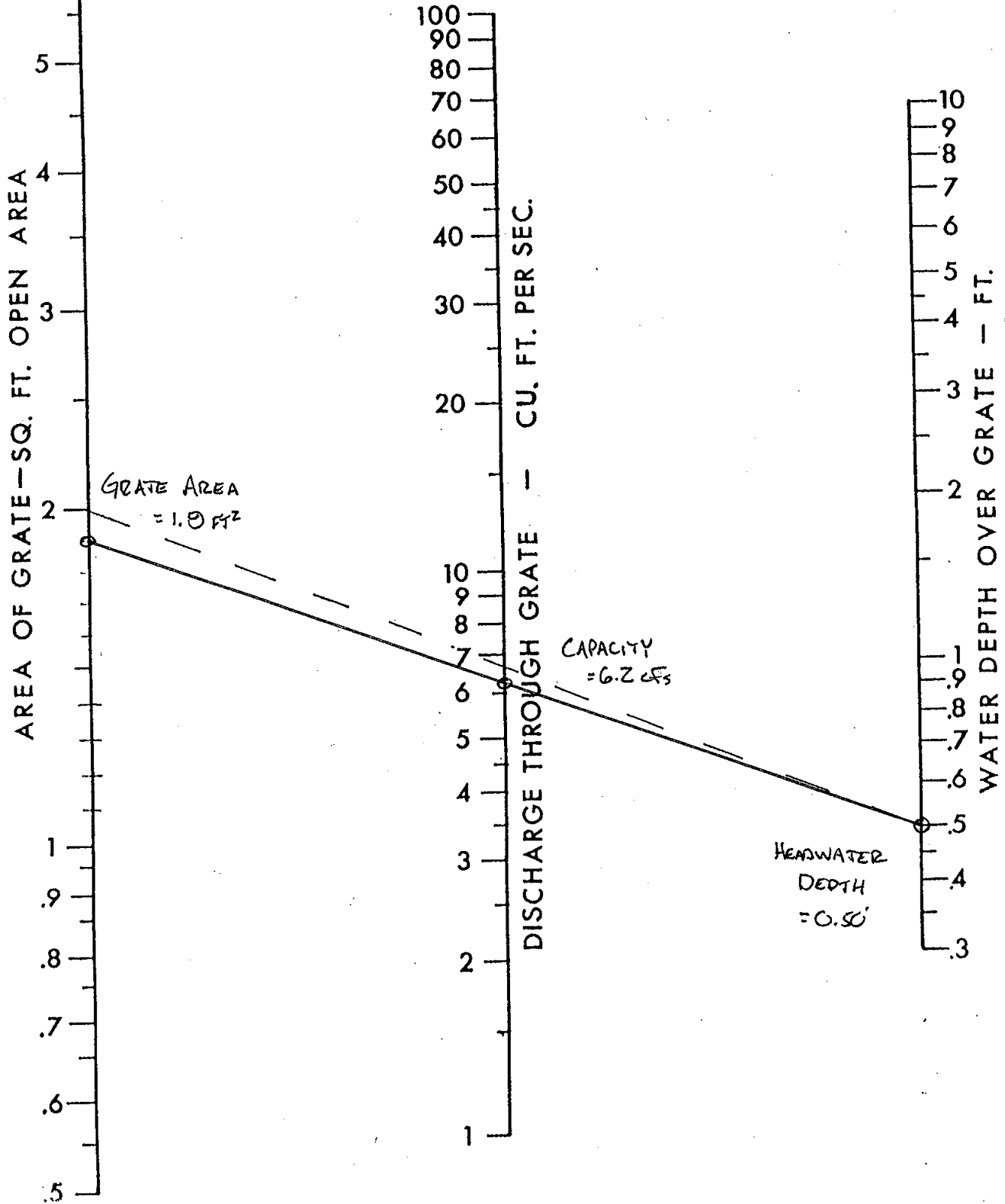
$$Q_{CAP} = 4.72 \text{ cfs}$$

STEAMBOAT PARKWAY NORTH / SOUTH

CATCH BASIN No. 44 AND 45 CAPACITIES

PAGE 20 OF 20

Discharge vs Depth On Grate



STREET FLOWS

NO DOCUMENTS
BEHIND TAB
@ SCAN

STEAMBOAT NORTH HALF LANE

Steamboat North, 1/2 Lane Cap. (S=0.50%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	HALF LANE CAPACITY, S=0.50%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

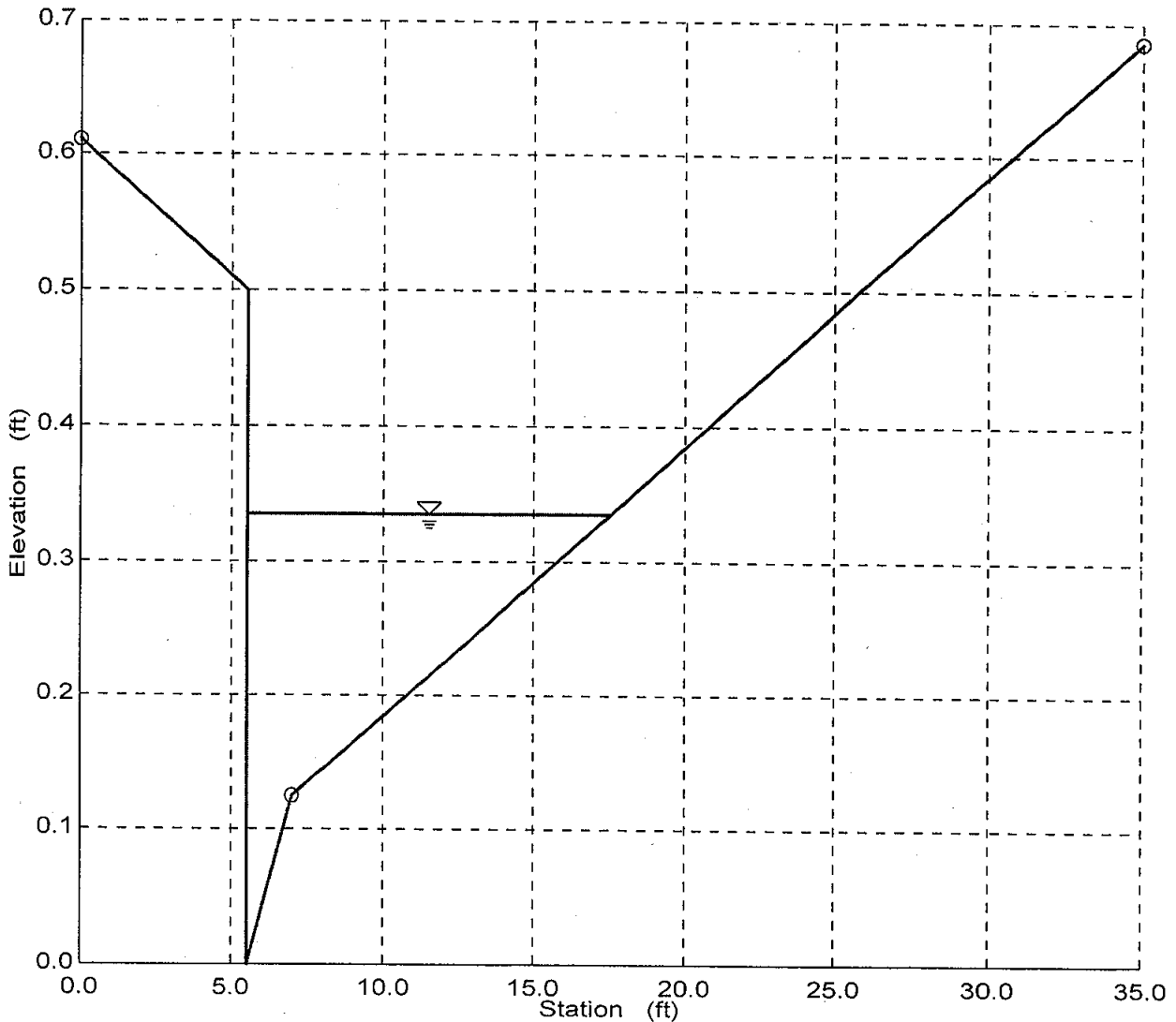
Input Data					
Channel Slope		0.005000	ft/ft		
Water Surface Elevation		0.34	ft		
Elevation range: 0.00 ft to 0.69 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	0.61	0.00	7.00	0.014	
5.50	0.50	7.00	35.00	0.016	
5.50	0.00				
7.00	0.13				
35.00	0.69				

Results		
Wtd. Mannings Coefficient	0.014	
Discharge	2.74	cfs
Flow Area	1.51	ft ²
Wetted Perimeter	12.34	ft
Top Width	12.00	ft
Height	0.34	ft
Critical Depth	0.32	ft
Critical Slope	0.006179	ft/ft
Velocity	1.81	ft/s
Velocity Head	0.05	ft
Specific Energy	0.39	ft
Froude Number	0.90	
Flow is subcritical.		

Steamboat North, Half Lane Capacity (S=0.50%)
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	HALF LANE CAPACITY, S=0.50%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.014
Channel Slope	0.005000 ft/ft
Water Surface Elevation	0.34 ft
Discharge	2.74 cfs



Steamboat North, 1/2 Lane Cap. (S=0.40%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\frnw\steamboa.fm2
Worksheet	HALF LANE CAPACITY, S=0.40%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

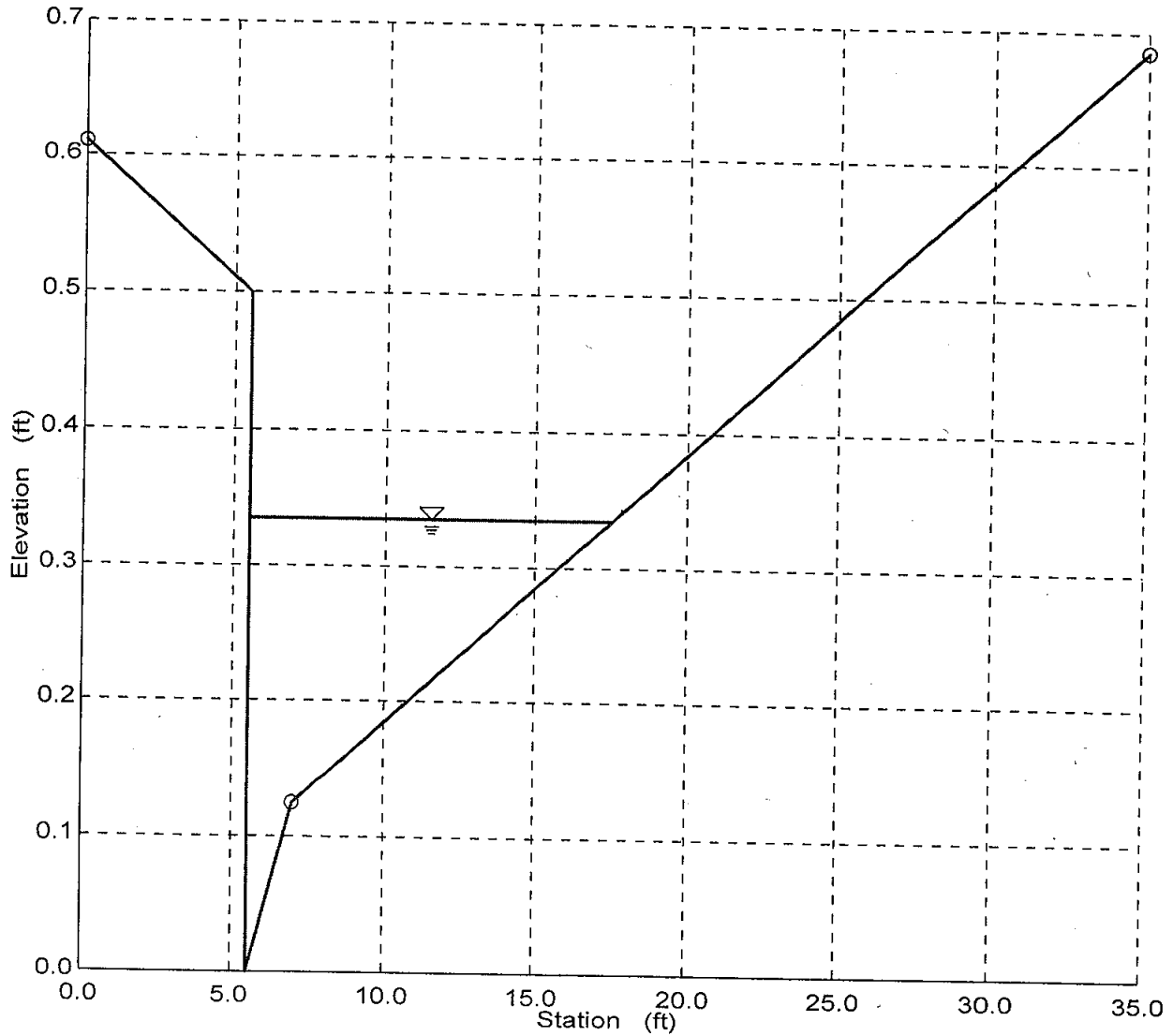
Input Data					
Channel Slope	0.004000 ft/ft				
Water Surface Elevation	0.34 ft				
Elevation range: 0.00 ft to 0.69 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	0.61	0.00	7.00	0.014	
5.50	0.50	7.00	35.00	0.016	
5.50	0.00				
7.00	0.13				
35.00	0.69				

Results		
Wtd. Mannings Coefficient	0.014	
Discharge	2.45	cfs
Flow Area	1.51	ft ²
Wetted Perimeter	12.34	ft
Top Width	12.00	ft
Height	0.34	ft
Critical Depth	0.31	ft
Critical Slope	0.006174	ft/ft
Velocity	1.62	ft/s
Velocity Head	0.04	ft
Specific Energy	0.38	ft
Froude Number	0.80	
Flow is subcritical.		

Steamboat North, Half Lane Capacity (S=0.40%)
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	HALF LANE CAPACITY, S=0.40%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.014
Channel Slope	0.004000 ft/ft
Water Surface Elevation	0.34 ft
Discharge	2.45 cfs



STEAMBOAT NORTH FULL FLOW

Steamboat North, Full Flow Cap (S=0.50%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	FULL FLOW CAPACITY, S=0.50%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

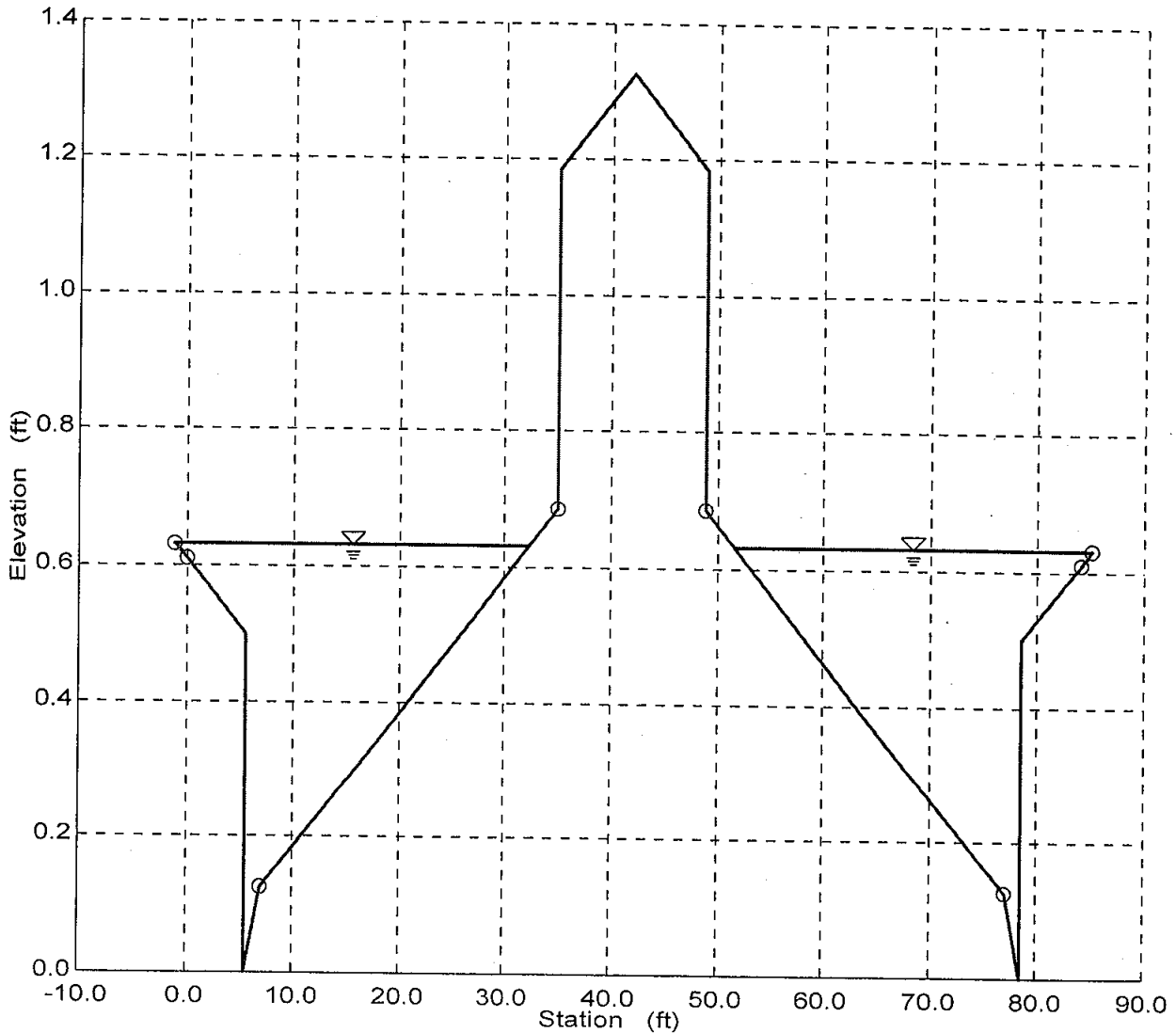
Input Data					
Channel Slope	0.005000 ft/ft				
Water Surface Elevation	0.63 ft				
Elevation range: 0.00 ft to 1.32 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
-1.00	0.63	-1.00	0.00	0.030	
0.00	0.61	0.00	7.00	0.014	
5.50	0.50	7.00	35.00	0.016	
5.50	0.00	35.00	49.00	0.014	
7.00	0.13	49.00	77.00	0.016	
35.00	0.69	77.00	84.00	0.014	
35.00	1.18	84.00	85.00	0.030	
42.00	1.32				
49.00	1.18				
49.00	0.69				
77.00	0.13				
78.50	0.00				
78.50	0.50				
84.00	0.61				
85.00	0.63				

Results		
Wtd. Mannings Coefficient	0.015	
Discharge	39.23	cfs
Flow Area	15.30	ft ²
Wetted Perimeter	67.52	ft
Top Width	66.50	ft
Height	0.63	ft
Critical Depth	0.62	ft
Critical Slope	0.005750 ft/ft	
Velocity	2.56	ft/s
Velocity Head	0.10	ft
Specific Energy	0.73	ft
Froude Number	0.94	
Flow is subcritical.		
Flow is divided.		

Steamboat North, Full Flow Capacity (S=0.50%)
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	FULL FLOW CAPACITY, S=0.50%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.015
Channel Slope	0.005000 ft/ft
Water Surface Elevation	0.63 ft
Discharge	39.23 cfs



Steamboat North, Full Flow Cap (S=0.40%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	FULL FLOW CAPACITY, S=0.40%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

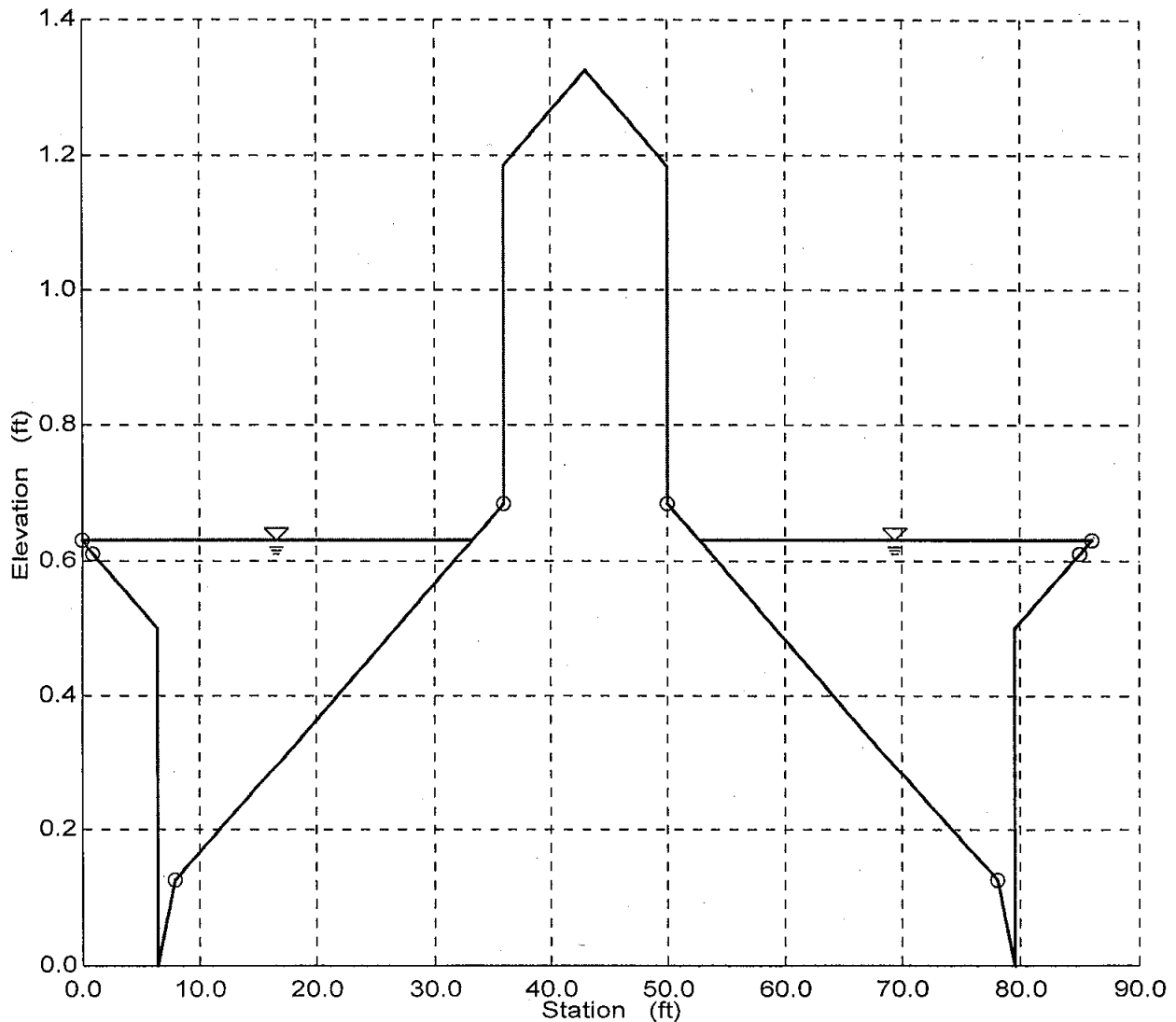
Input Data					
Channel Slope	0.004000 ft/ft				
Water Surface Elevation	0.63	ft			
Elevation range: 0.00 ft to 1.32 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	0.63	0.00	1.00	0.030	
1.00	0.61	1.00	8.00	0.014	
6.50	0.50	8.00	36.00	0.016	
6.50	0.00	36.00	50.00	0.014	
8.00	0.13	50.00	78.00	0.016	
36.00	0.69	78.00	85.00	0.014	
36.00	1.18	85.00	86.00	0.030	
43.00	1.32				
50.00	1.18				
50.00	0.69				
78.00	0.13				
79.50	0.00				
79.50	0.50				
85.00	0.61				
86.00	0.63				

Results		
Wtd. Mannings Coefficient	0.015	
Discharge	35.09	cfs
Flow Area	15.30	ft ²
Wetted Perimeter	67.52	ft
Top Width	66.50	ft
Height	0.63	ft
Critical Depth	0.60	ft
Critical Slope	0.005923	ft/ft
Velocity	2.29	ft/s
Velocity Head	0.08	ft
Specific Energy	0.71	ft
Froude Number	0.84	
Flow is subcritical.		
Flow is divided.		

Steamboat North, Full Flow Capacity (S=0.40%)
 Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	FULL FLOW CAPACITY, S=0.40%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.015
Channel Slope	0.004000 ft/ft
Water Surface Elevation	0.63 ft
Discharge	35.09 cfs



STEAMBOAT SOUTH HALF LANE

Steamboat South, 1/2 Lane Cap. (S=0.55%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	SOUTH HALF LANE, S=0.55%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

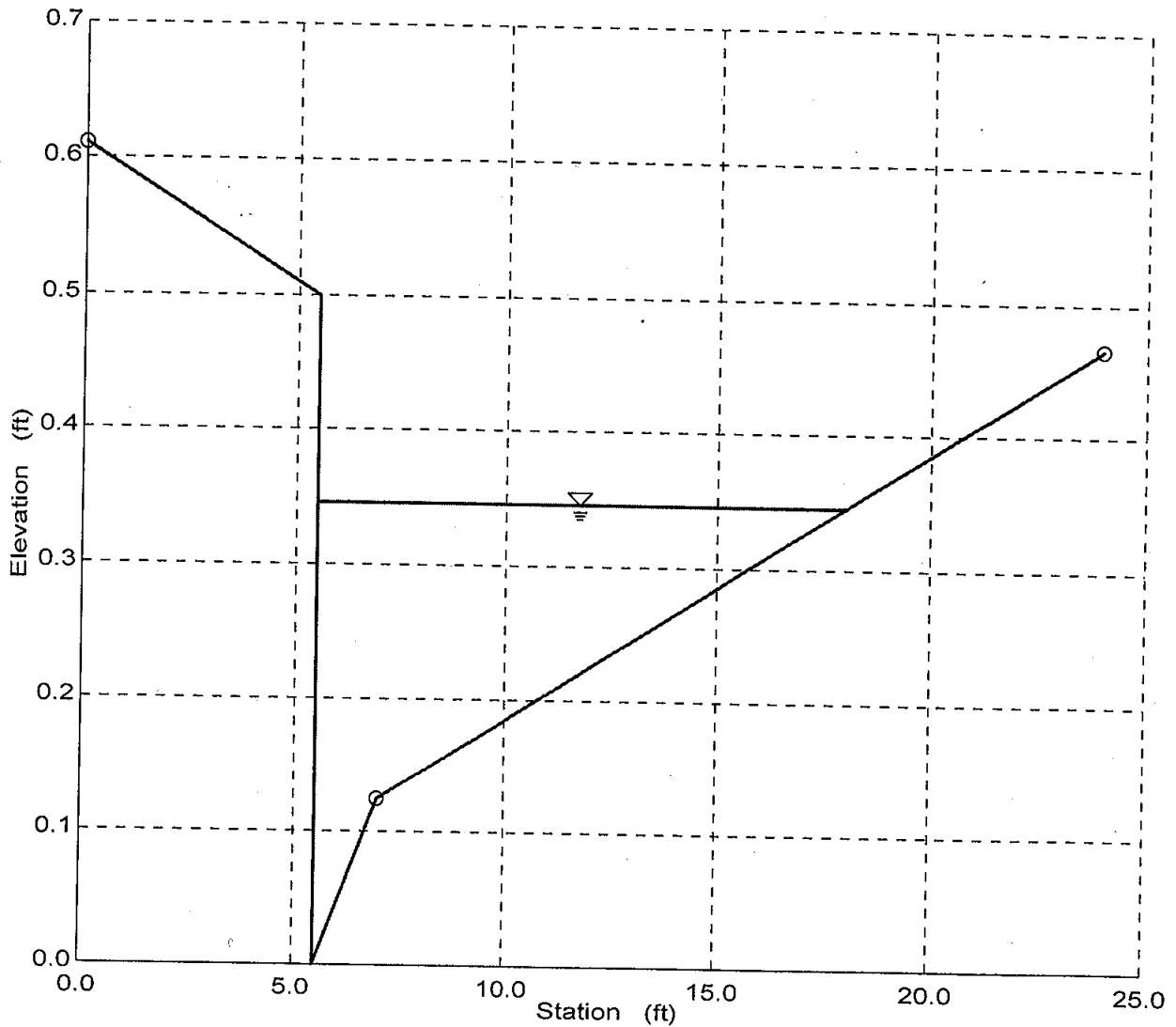
Input Data				
Channel Slope	0.005500 ft/ft			
Water Surface Elevation	0.35 ft			
Elevation range: 0.00 ft to 0.61 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	0.61	0.00	7.00	0.014
5.50	0.50	7.00	24.00	0.016
5.50	0.00			
7.00	0.13			
24.00	0.47			

Results	
Wtd. Mannings Coefficient	0.014
Discharge	3.16 cfs
Flow Area	1.63 ft ²
Wetted Perimeter	12.85 ft
Top Width	12.50 ft
Height	0.35 ft
Critical Depth	0.34 ft
Critical Slope	0.006179 ft/ft
Velocity	1.94 ft/s
Velocity Head	0.06 ft
Specific Energy	0.40 ft
Froude Number	0.94
Flow is subcritical.	

Steamboat South, 1/2 Lane Capacity (S=0.55%)
 Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	SOUTH HALF LANE, S=0.55%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.014
Channel Slope	0.005500 ft/ft
Water Surface Elevation	0.35 ft
Discharge	3.16 cfs



STEAMBOAT SOUTH FULL FLOW

Steamboat South, Full Flow Cap (S=0.55%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	SOUTH FULL FLOW, S=0.55%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

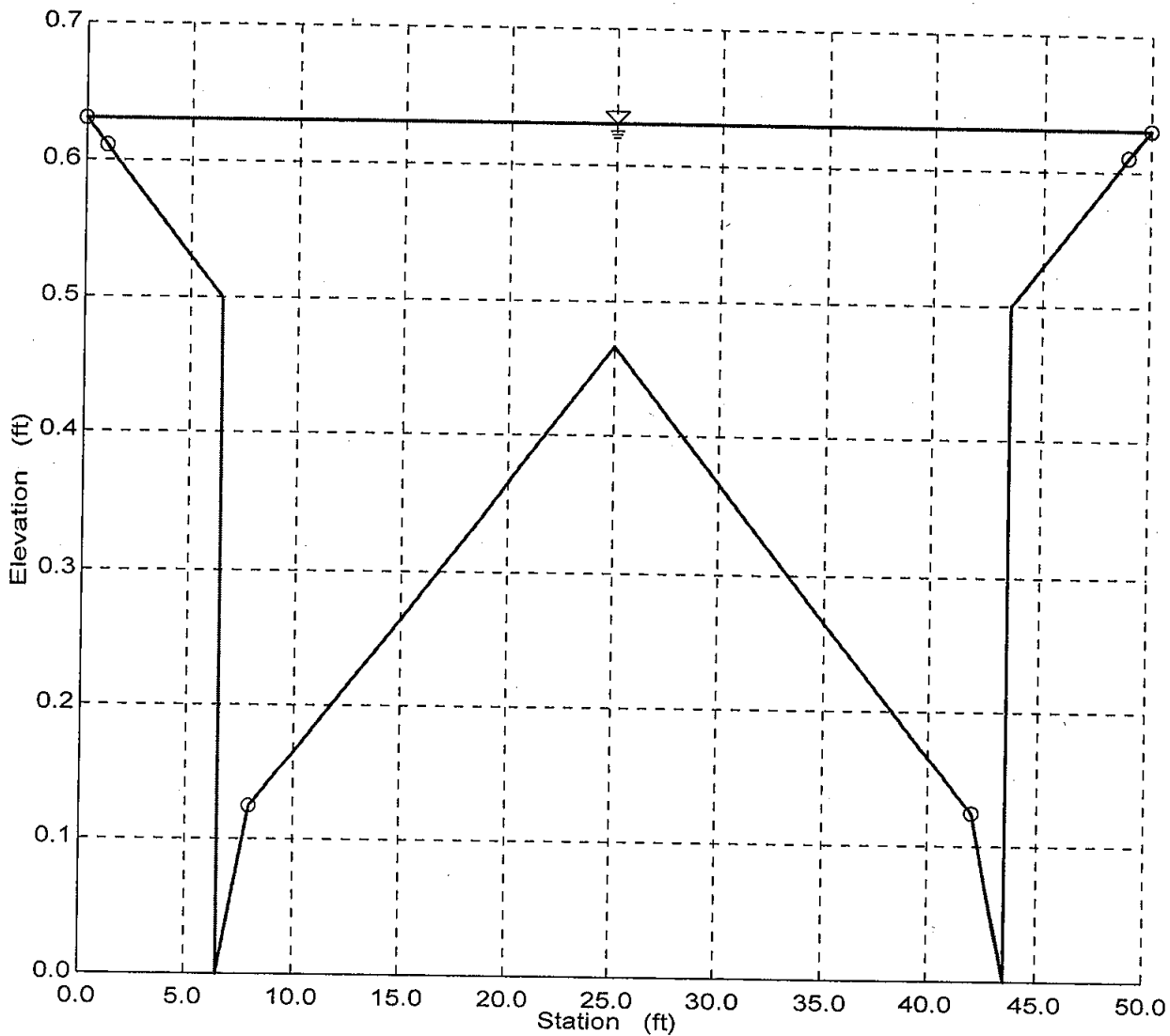
Input Data					
Channel Slope	0.005500 ft/ft				
Water Surface Elevation	0.63 ft				
Elevation range: 0.00 ft to 0.63 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	0.63	0.00	1.00	0.030	
1.00	0.61	1.00	8.00	0.014	
6.50	0.50	8.00	42.00	0.016	
6.50	0.00	42.00	49.00	0.014	
8.00	0.13	49.00	50.00	0.030	
25.00	0.47				
42.00	0.13				
43.50	0.00				
43.50	0.50				
49.00	0.61				
50.00	0.63				

Results		
Wtd. Mannings Coefficient	0.015	
Discharge	43.90	cfs
Flow Area	13.94	ft ²
Wetted Perimeter	51.02	ft
Top Width	50.00	ft
Height	0.63	ft
Critical Depth	0.64	ft
Critical Slope	0.004951	ft/ft
Velocity	3.15	ft/s
Velocity Head	0.15	ft
Specific Energy	0.78	ft
Froude Number	1.05	
Flow is supercritical.		

Steamboat South, Full Flow Capacity (S=0.55%)
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	SOUTH FULL FLOW, S=0.55%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.015
Channel Slope	0.005500 ft/ft
Water Surface Elevation	0.63 ft
Discharge	43.90 cfs



STEAMBOAT SOUTH HALF LANE
(TYPE III IMPROVEMENTS)

Type III (DRHS) Left Half-Lane (S=0.55%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	DRHS LEFT HALF, S=0.55%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

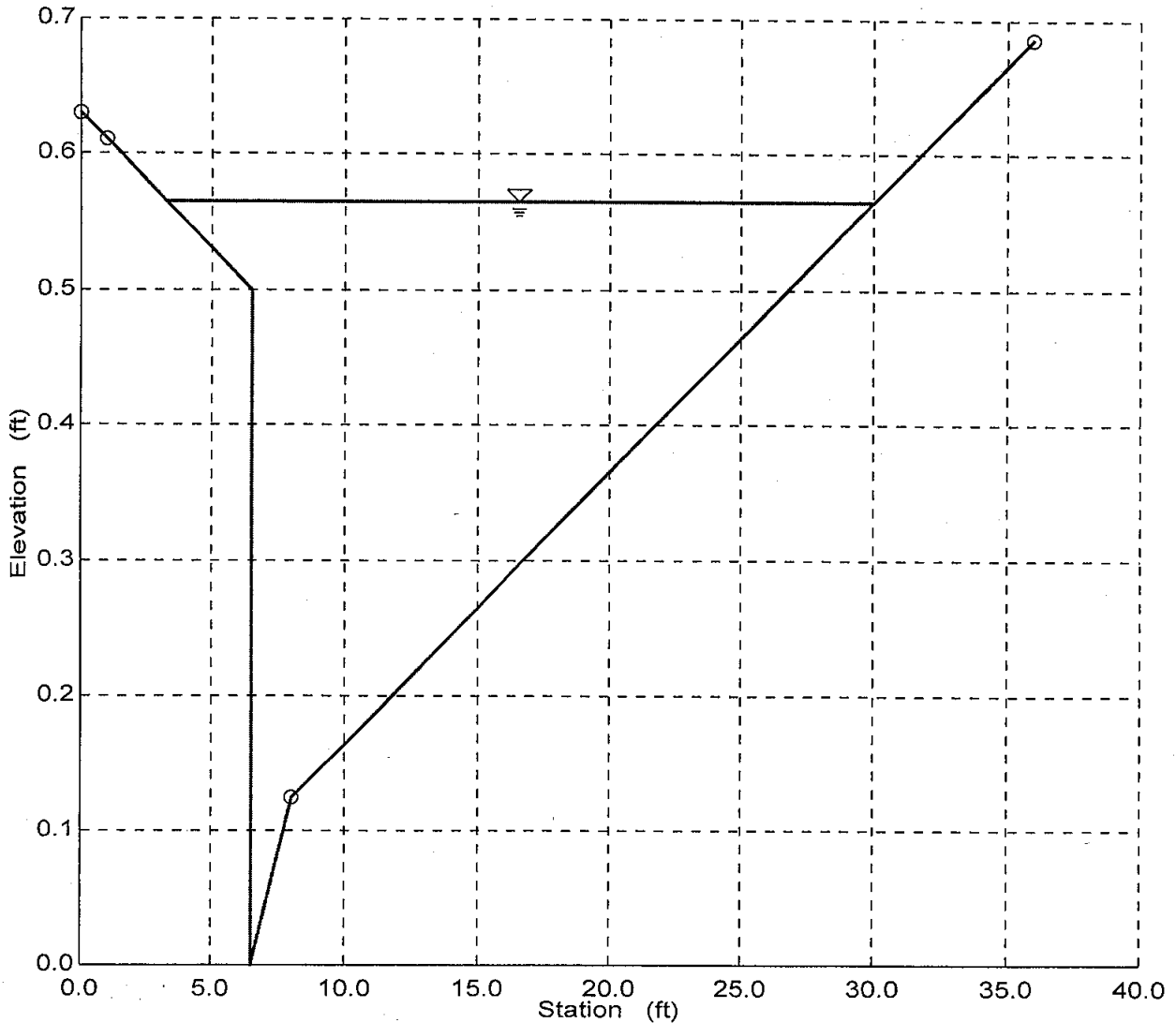
Input Data					
Channel Slope	0.005500 ft/ft				
Water Surface Elevation	0.56 ft				
Elevation range: 0.00 ft to 0.69 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	0.63	0.00	1.00	0.030	
1.00	0.61	1.00	8.00	0.014	
6.50	0.50	8.00	36.00	0.016	
6.50	0.00				
8.00	0.13				
36.00	0.69				

Results		
Wtd. Mannings Coefficient	0.016	
Discharge	14.17	cfs
Flow Area	5.70	ft ²
Wetted Perimeter	27.26	ft
Top Width	26.75	ft
Height	0.56	ft
Critical Depth	0.55	ft
Critical Slope	0.006150 ft/ft	
Velocity	2.49	ft/s
Velocity Head	0.10	ft
Specific Energy	0.66	ft
Froude Number	0.95	
Flow is subcritical.		

Type III (DRHS) Left Side Half-Lane, (S=0.55%)
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	DRHS LEFT HALF, S=0.55%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.016
Channel Slope	0.005500 ft/ft
Water Surface Elevation	0.56 ft
Discharge	14.17 cfs



Type III (DRHS), Rt. Half-Lane (S=0.55%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	DRHS RIGHT HALF, S=0.55%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

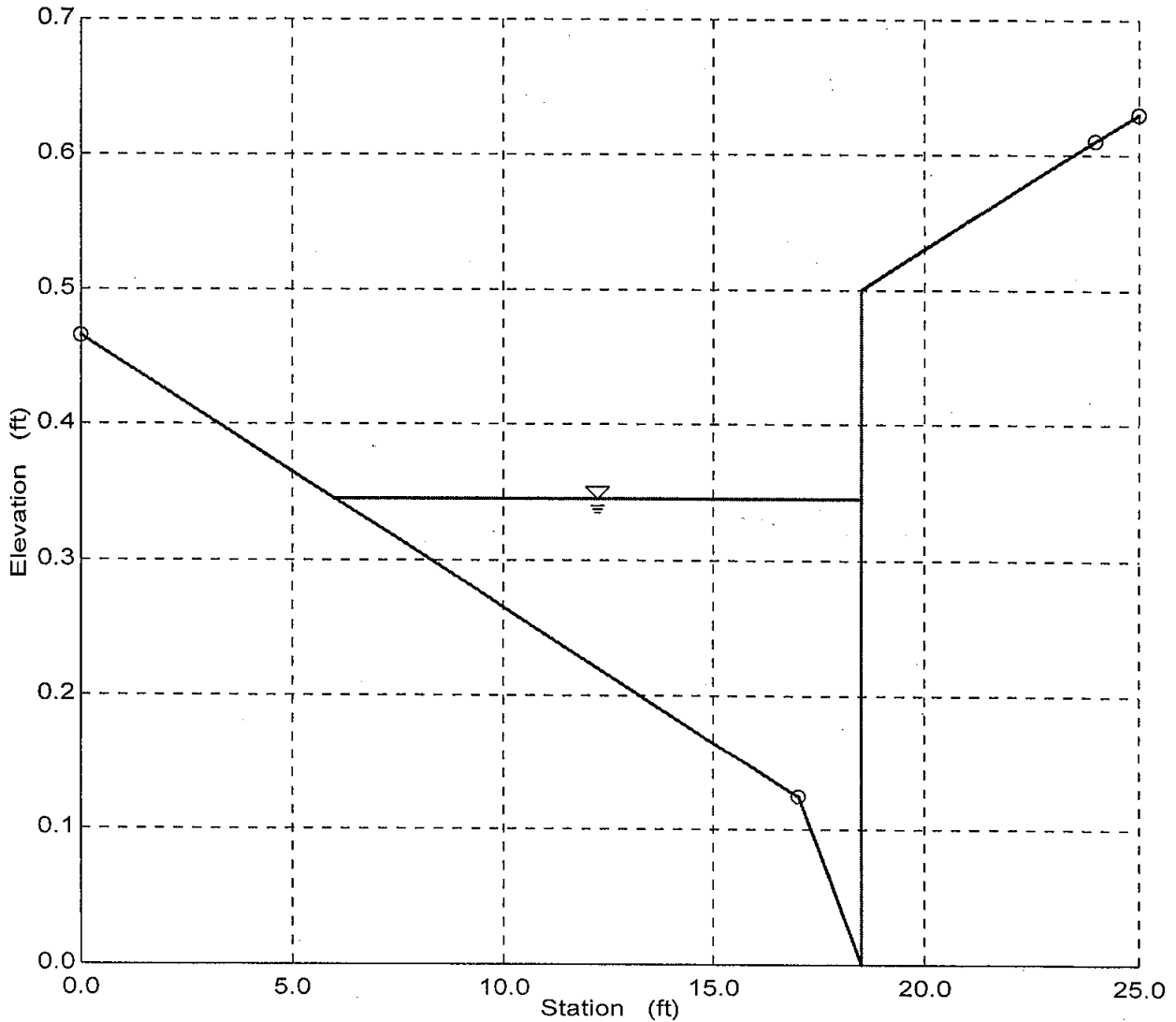
Input Data					
Channel Slope	0.005500 ft/ft				
Water Surface Elevation	0.35 ft				
Elevation range: 0.00 ft to 0.63 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	0.47	0.00	17.00	0.016	
17.00	0.13	17.00	24.00	0.014	
18.50	0.00	24.00	25.00	0.030	
18.50	0.50				
24.00	0.61				
25.00	0.63				

Results		
Wtd. Mannings Coefficient	0.014	
Discharge	3.16	cfs
Flow Area	1.63	ft ²
Wetted Perimeter	12.85	ft
Top Width	12.50	ft
Height	0.35	ft
Critical Depth	0.34	ft
Critical Slope	0.006179 ft/ft	
Velocity	1.94	ft/s
Velocity Head	0.06	ft
Specific Energy	0.40	ft
Froude Number	0.94	
Flow is subcritical.		

Type III (DRHS) Right Half-Lane Capacity (S=0.55%)
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	DRHS RIGHT HALF, S=0.55%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.014
Channel Slope	0.005500 ft/ft
Water Surface Elevation	0.35 ft
Discharge	3.16 cfs



STEAMBOAT SOUTH FULL FLOW
(TYPE III IMPROVEMENTS)

Type III Full Flow-Left Side (S=0.55%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Type III Full Flow Capacity (S=0.55%)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

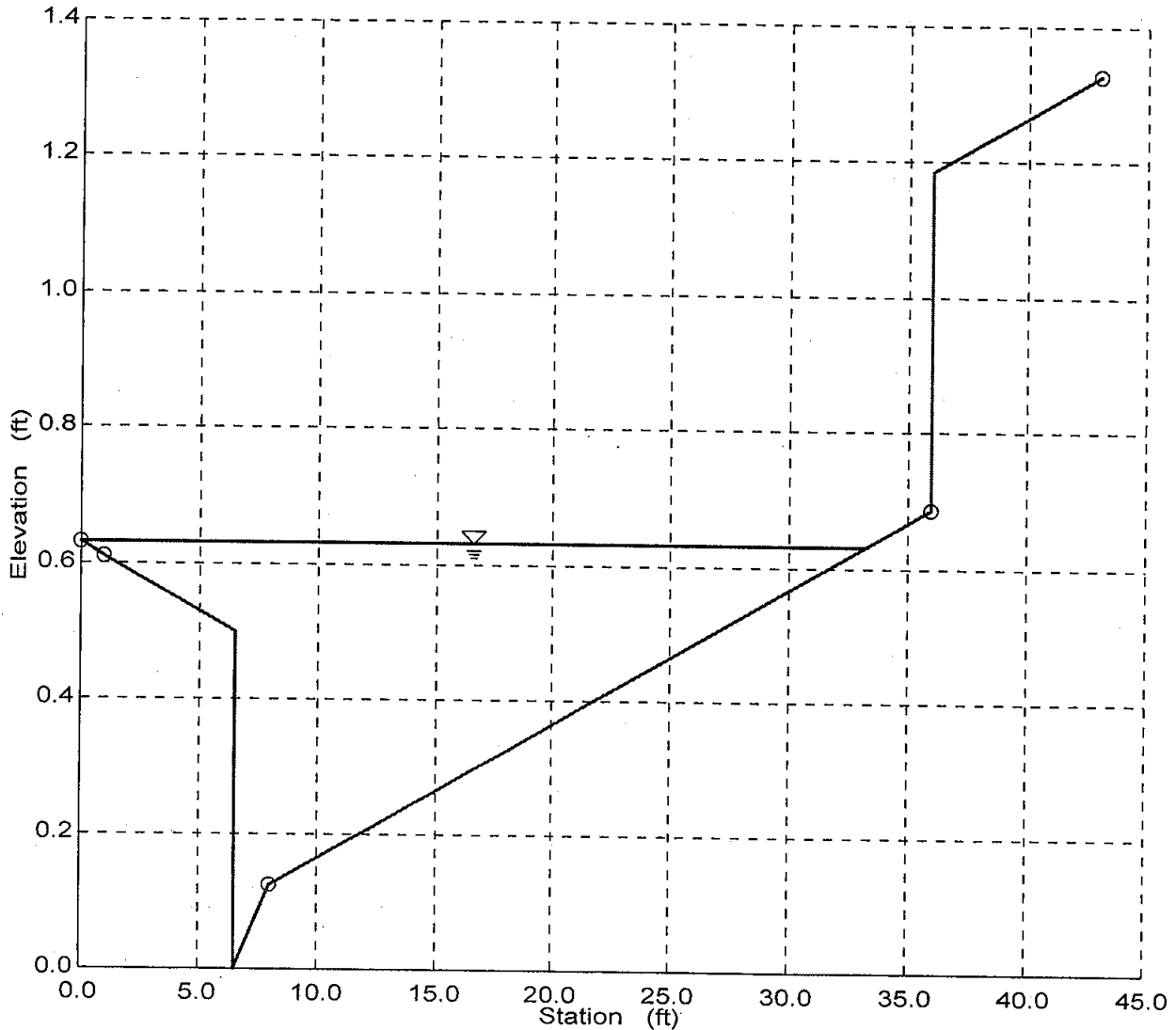
Input Data				
Channel Slope	0.005500 ft/ft			
Water Surface Elevation	0.63 ft			
Elevation range: 0.00 ft to 1.32 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	0.63	0.00	1.00	0.030
1.00	0.61	1.00	8.00	0.014
6.50	0.50	8.00	36.00	0.016
6.50	0.00	36.00	43.00	0.014
8.00	0.13			
36.00	0.69			
36.00	1.18			
43.00	1.32			

Results	
Wtd. Mannings Coefficient	0.015
Discharge	20.57 cfs
Flow Area	7.65 ft ²
Wetted Perimeter	33.76 ft
Top Width	33.25 ft
Height	0.63 ft
Critical Depth	0.63 ft
Critical Slope	0.005649 ft/ft
Velocity	2.69 ft/s
Velocity Head	0.11 ft
Specific Energy	0.74 ft
Froude Number	0.99
Flow is subcritical.	

Type III Full Flow-Left Side (S=0.55%)
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Type III Full Flow Capacity (S=0.55%)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.015
Channel Slope	0.005500 ft/ft
Water Surface Elevation	0.63 ft
Discharge	20.57 cfs



Type III Full Flow-Right Side (S=0.55%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Type III Full Flow-Right Side, S=0.55%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

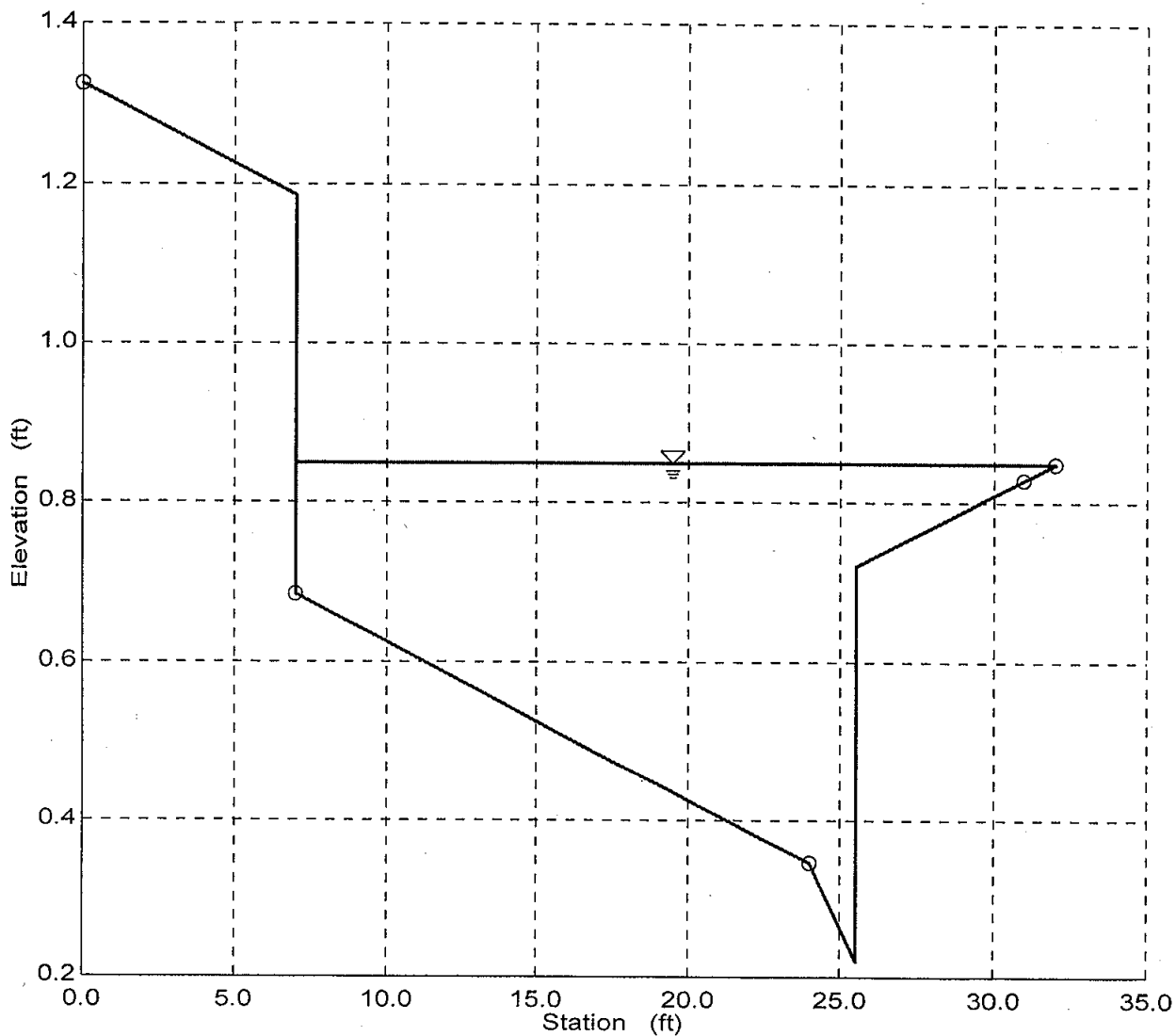
Input Data				
Channel Slope	0.005500 ft/ft			
Water Surface Elevation	0.85 ft			
Elevation range: 0.22 ft to 1.32 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	1.32	0.00	7.00	0.014
7.00	1.18	7.00	24.00	0.016
7.00	0.69	24.00	31.00	0.014
24.00	0.35	31.00	32.00	0.030
25.50	0.22			
25.50	0.72			
31.00	0.83			
32.00	0.85			

Results	
Wtd. Mannings Coefficient	0.015
Discharge	21.85 cfs
Flow Area	6.97 ft ²
Wetted Perimeter	25.67 ft
Top Width	25.00 ft
Height	0.63 ft
Critical Depth	0.86 ft
Critical Slope	0.005001 ft/ft
Velocity	3.14 ft/s
Velocity Head	0.15 ft
Specific Energy	1.00 ft
Froude Number	1.05
Flow is supercritical.	

Type III Full Flow-Right Side (S=0.55%)
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Type III Full Flow-Right Side, S=0.55%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.015
Channel Slope	0.005500 ft/ft
Water Surface Elevation	0.85 ft
Discharge	21.85 cfs



MIRA LOMA ROAD HALF LANE

Mira Loma Half-Lane Capacity (S=1.00%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Mira Loma, Half Lane Capacity, S=1.00%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

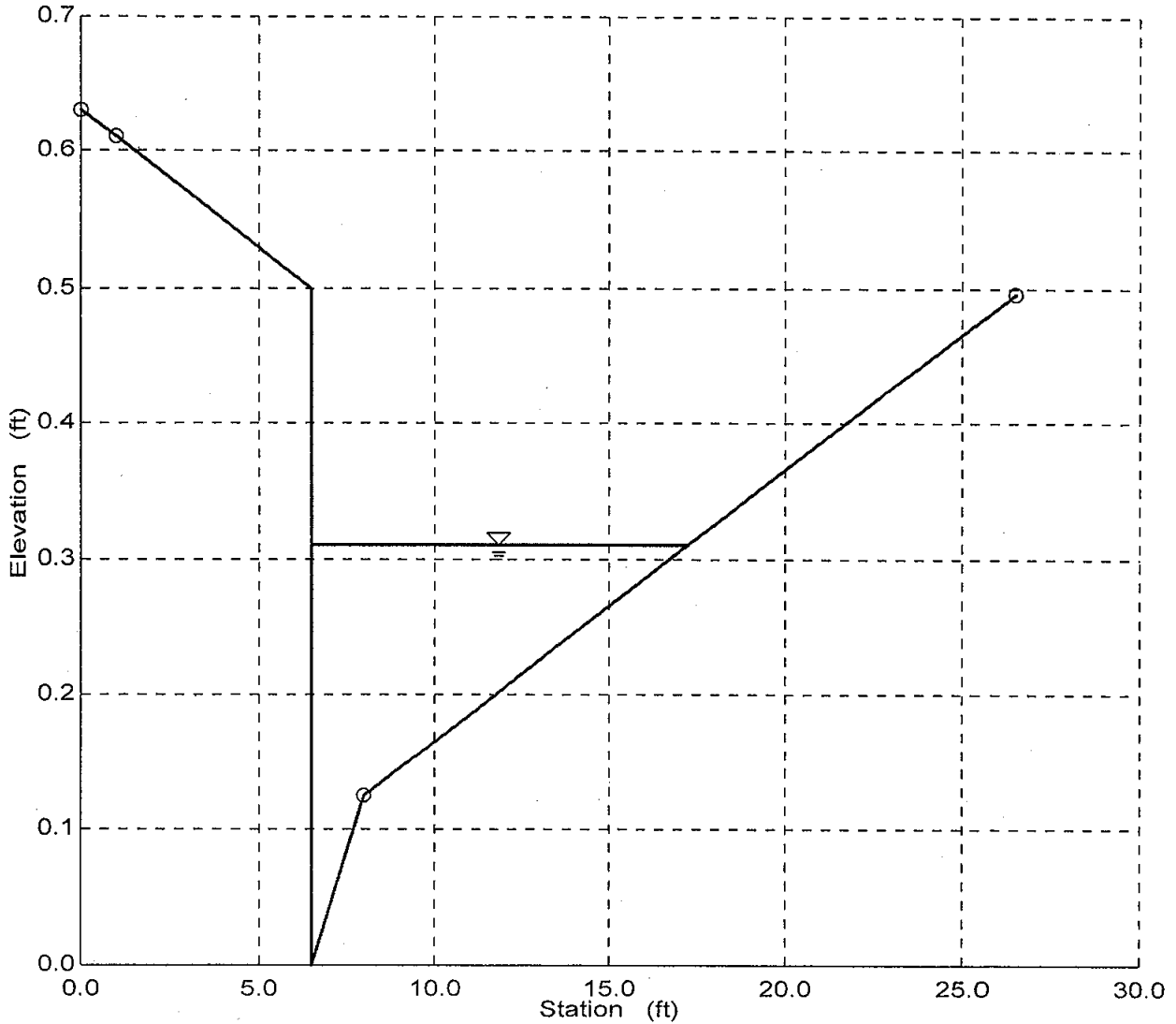
Input Data				
Channel Slope	0.010000 ft/ft			
Water Surface Elevation	0.31 ft			
Elevation range: 0.00 ft to 0.63 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	0.63	0.00	1.00	0.030
1.00	0.61	1.00	8.00	0.014
6.50	0.50	8.00	26.50	0.016
6.50	0.00			
8.00	0.13			
26.50	0.50			

Results	
Wtd. Mannings Coefficient	0.014
Discharge	2.99 cfs
Flow Area	1.23 ft ²
Wetted Perimeter	11.07 ft
Top Width	10.75 ft
Height	0.31 ft
Critical Depth	0.33 ft
Critical Slope	0.006181 ft/ft
Velocity	2.44 ft/s
Velocity Head	0.09 ft
Specific Energy	0.40 ft
Froude Number	1.27
Flow is supercritical.	

Mira Loma Half-Lane Capacity (S=1.00%)
 Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Mira Loma, Half Lane Capacity, S=1.00%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.014
Channel Slope	0.010000 ft/ft
Water Surface Elevation	0.31 ft
Discharge	2.99 cfs



Mira Loma Half Lane Capacity (S=3.34%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Mira Loma, Half Lane Capacity, S=3.34%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

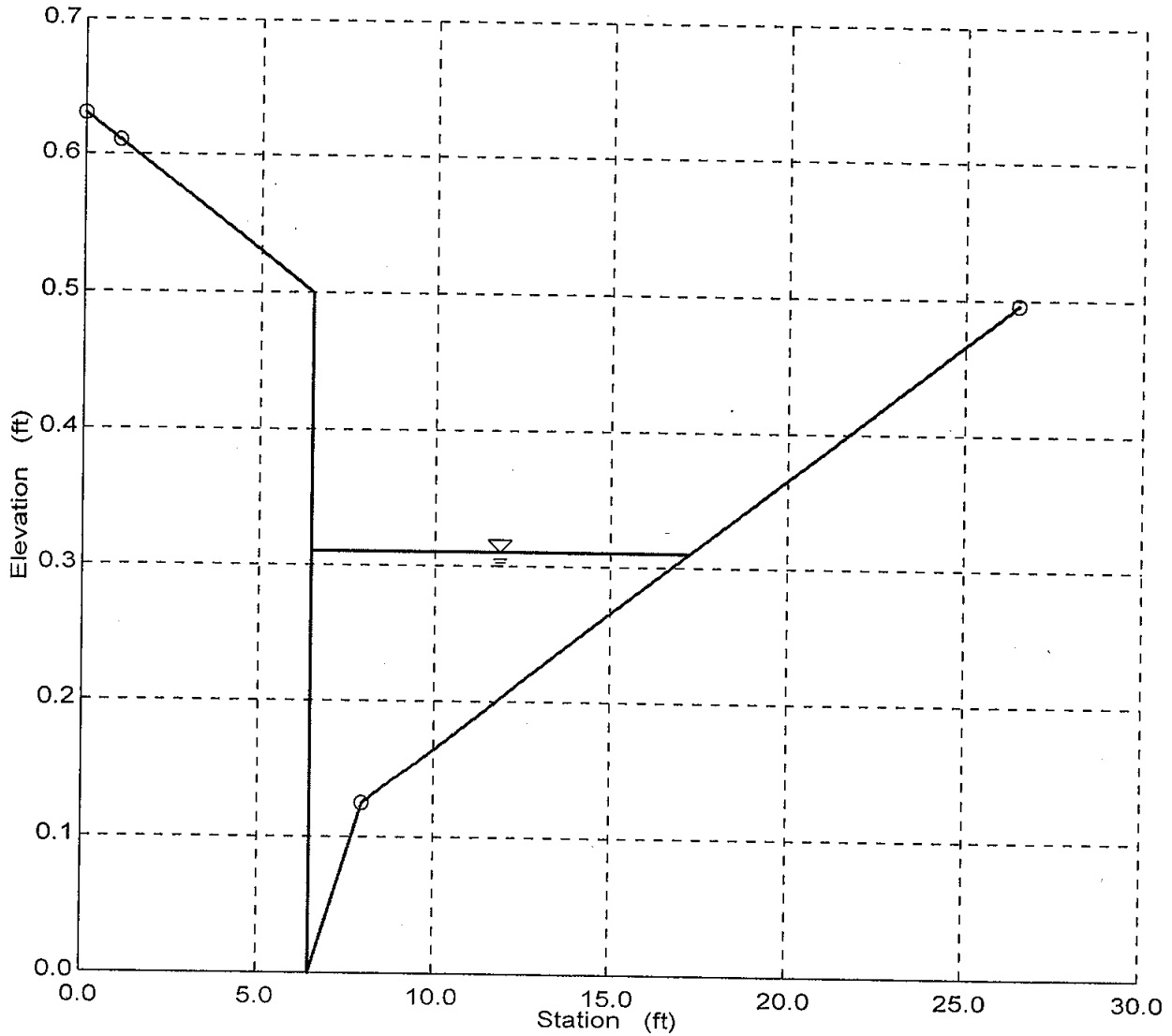
Input Data					
Channel Slope	0.033400 ft/ft				
Water Surface Elevation	0.31 ft				
Elevation range: 0.00 ft to 0.63 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	0.63	0.00	1.00	0.030	
1.00	0.61	1.00	8.00	0.014	
6.50	0.50	8.00	26.50	0.016	
6.50	0.00				
8.00	0.13				
26.50	0.50				

Results		
Wtd. Mannings Coefficient	0.014	
Discharge	5.47	cfs
Flow Area	1.23	ft ²
Wetted Perimeter	11.07	ft
Top Width	10.75	ft
Height	0.31	ft
Critical Depth	0.40	ft
Critical Slope	0.006103	ft/ft
Velocity	4.46	ft/s
Velocity Head	0.31	ft
Specific Energy	0.62	ft
Froude Number	2.33	
Flow is supercritical.		

Mira Loma Half Lane Capacity (S=3.34%)
 Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Mira Loma, Half Lane Capacity, S=3.34%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.014
Channel Slope	0.033400 ft/ft
Water Surface Elevation	0.31 ft
Discharge	5.47 cfs



Mira Loma Half Lane Capacity (S=1.64%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Mira Loma Half Lane Capacity, S=1.64%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

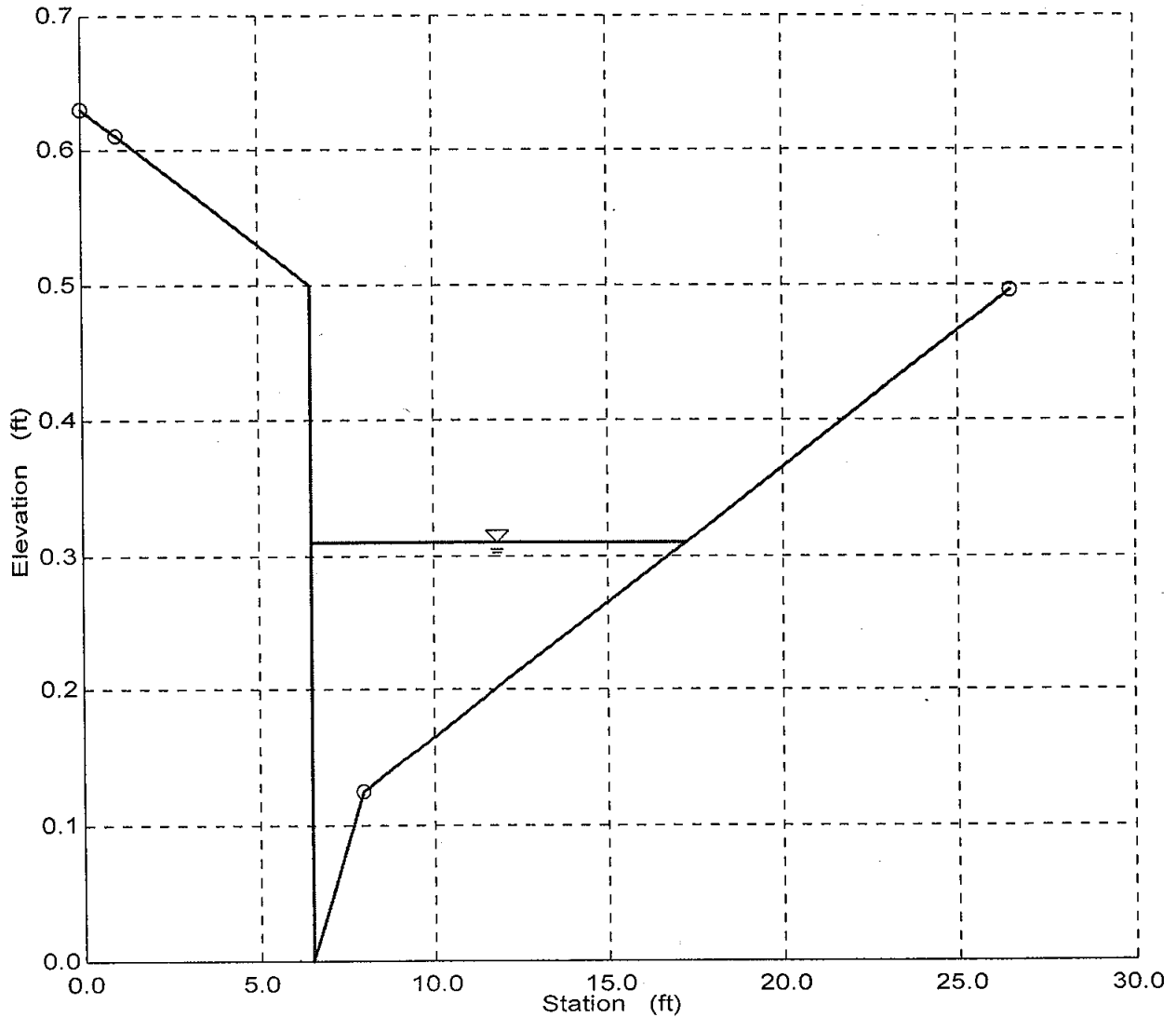
Input Data					
Channel Slope	0.016400 ft/ft				
Water Surface Elevation	0.31 ft				
Elevation range: 0.00 ft to 0.63 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	0.63	0.00	1.00	0.030	
1.00	0.61	1.00	8.00	0.014	
6.50	0.50	8.00	26.50	0.016	
6.50	0.00				
8.00	0.13				
26.50	0.50				

Results		
Wtd. Mannings Coefficient	0.014	
Discharge	3.83	cfs
Flow Area	1.23	ft ²
Wetted Perimeter	11.07	ft
Top Width	10.75	ft
Height	0.31	ft
Critical Depth	0.36	ft
Critical Slope	0.006165	ft/ft
Velocity	3.12	ft/s
Velocity Head	0.15	ft
Specific Energy	0.46	ft
Froude Number	1.63	
Flow is supercritical.		

Mira Loma Half Lane Capacity (S=1.64%)
 Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Mira Loma Half Lane Capacity, S=1.64%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.014
Channel Slope	0.016400 ft/ft
Water Surface Elevation	0.31 ft
Discharge	3.83 cfs



MIRA LOMA ROAD FULL FLOW

Mira Loma Full Flow Capacity (S=1.00%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Mira Loma Full Flow Capacity, S=1.00%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

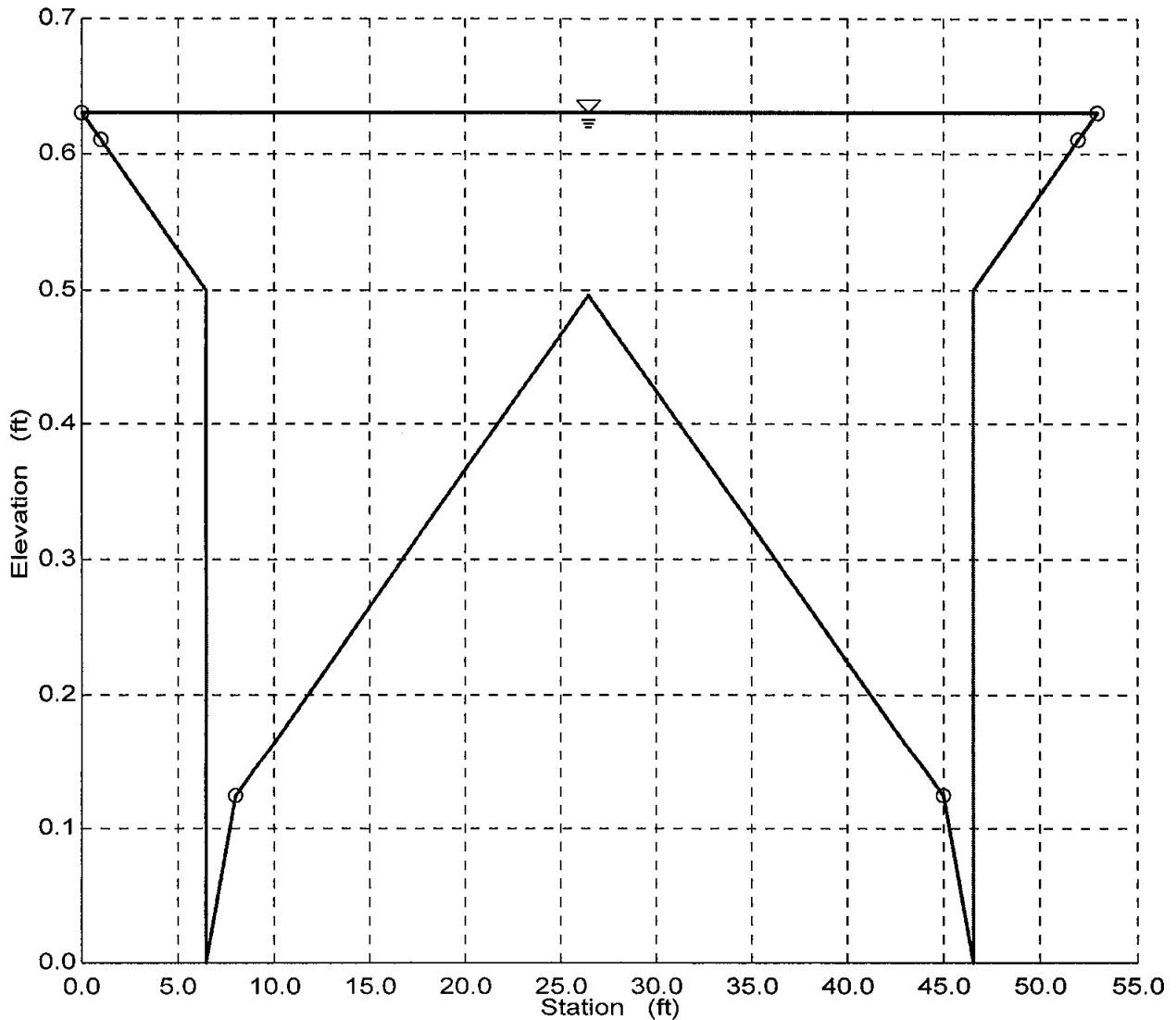
Input Data					
Channel Slope	0.010000 ft/ft				
Water Surface Elevation	0.63 ft				
Elevation range: 0.00 ft to 0.63 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	0.63	0.00	1.00	0.030	
1.00	0.61	1.00	8.00	0.014	
6.50	0.50	8.00	45.00	0.016	
6.50	0.00	45.00	52.00	0.014	
8.00	0.13	52.00	53.00	0.030	
26.50	0.50				
45.00	0.13				
46.50	0.00				
46.50	0.50				
52.00	0.61				
53.00	0.63				

Results		
Wtd. Mannings Coefficient	0.015	
Discharge	59.62	cfs
Flow Area	14.39	ft ²
Wetted Perimeter	54.02	ft
Top Width	53.00	ft
Height	0.63	ft
Critical Depth	0.70	ft
Critical Slope	0.004893	ft/ft
Velocity	4.14	ft/s
Velocity Head	0.27	ft
Specific Energy	0.90	ft
Froude Number	1.40	
Flow is supercritical.		

Mira Loma Full Flow Capacity (S=1.00%)
 Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Mira Loma Full Flow Capacity, S=1.00%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.015
Channel Slope	0.010000 ft/ft
Water Surface Elevation	0.63 ft
Discharge	59.62 cfs



Mira Loma Full Flow Capacity (S=3.34%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Mira Loma Full Flow Capacity, S=3.34%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

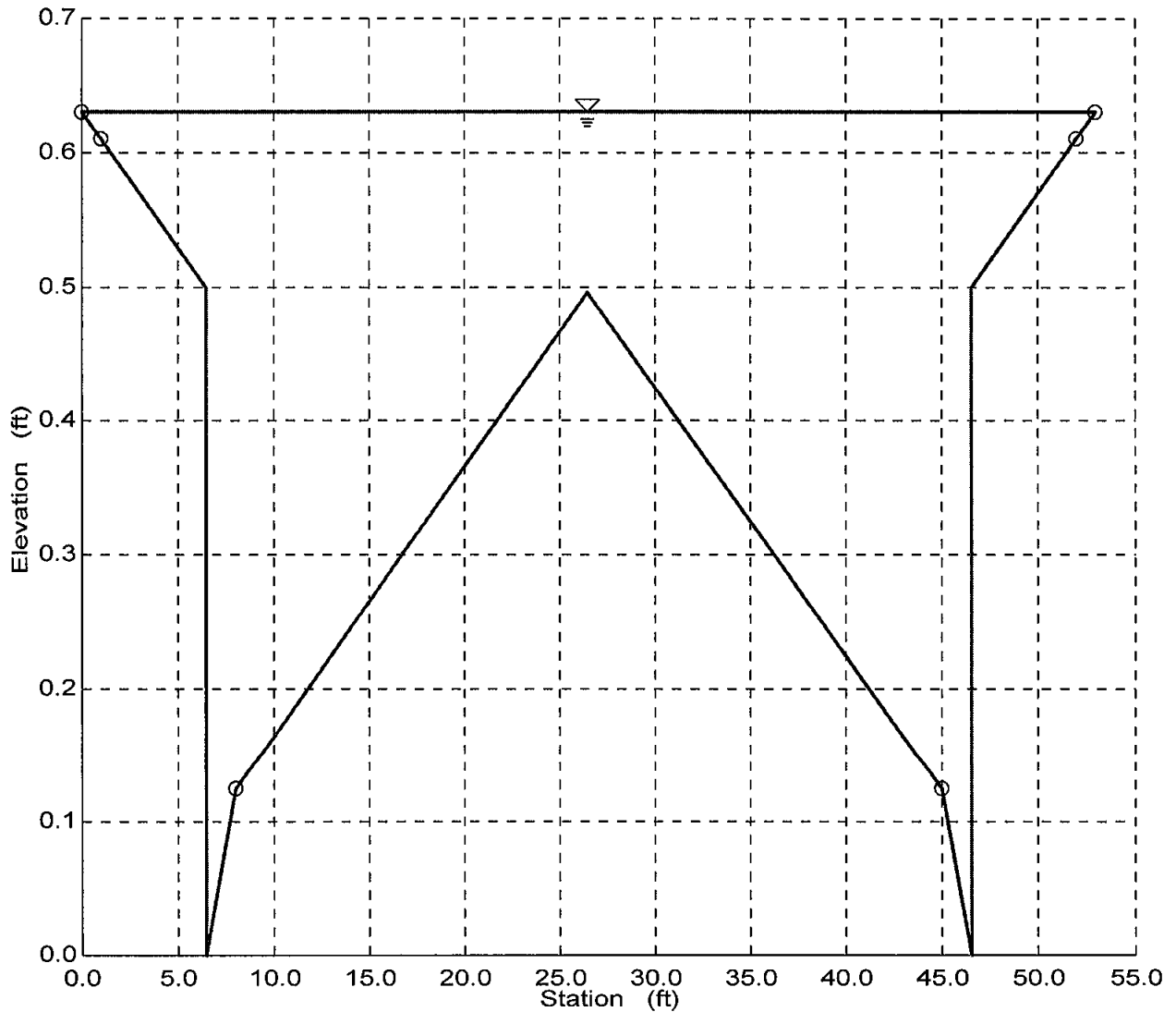
Input Data					
Channel Slope	0.033400 ft/ft				
Water Surface Elevation	0.63 ft				
Elevation range: 0.00 ft to 0.63 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	0.63	0.00	1.00	0.030	
1.00	0.61	1.00	8.00	0.014	
6.50	0.50	8.00	45.00	0.016	
6.50	0.00	45.00	52.00	0.014	
8.00	0.13	52.00	53.00	0.030	
26.50	0.50				
45.00	0.13				
46.50	0.00				
46.50	0.50				
52.00	0.61				
53.00	0.63				

Results		
Wtd. Mannings Coefficient	0.015	
Discharge	108.96	cfs
Flow Area	14.39	ft ²
Wetted Perimeter	54.02	ft
Top Width	53.00	ft
Height	0.63	ft
Critical Depth	0.87	ft
Critical Slope	0.004446 ft/ft	
Velocity	7.57	ft/s
Velocity Head	0.89	ft
Specific Energy	1.52	ft
Froude Number	2.56	
Flow is supercritical.		

Mira Loma Full Flow Capacity (S=3.34%)
 Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Mira Loma Full Flow Capacity, S=3.34%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.015
Channel Slope	0.033400 ft/ft
Water Surface Elevation	0.63 ft
Discharge	108.96 cfs



Mira Loma Full Flow Capacity (S=1.64%)
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Mira Loma Full Flow Capacity, S=1.64%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

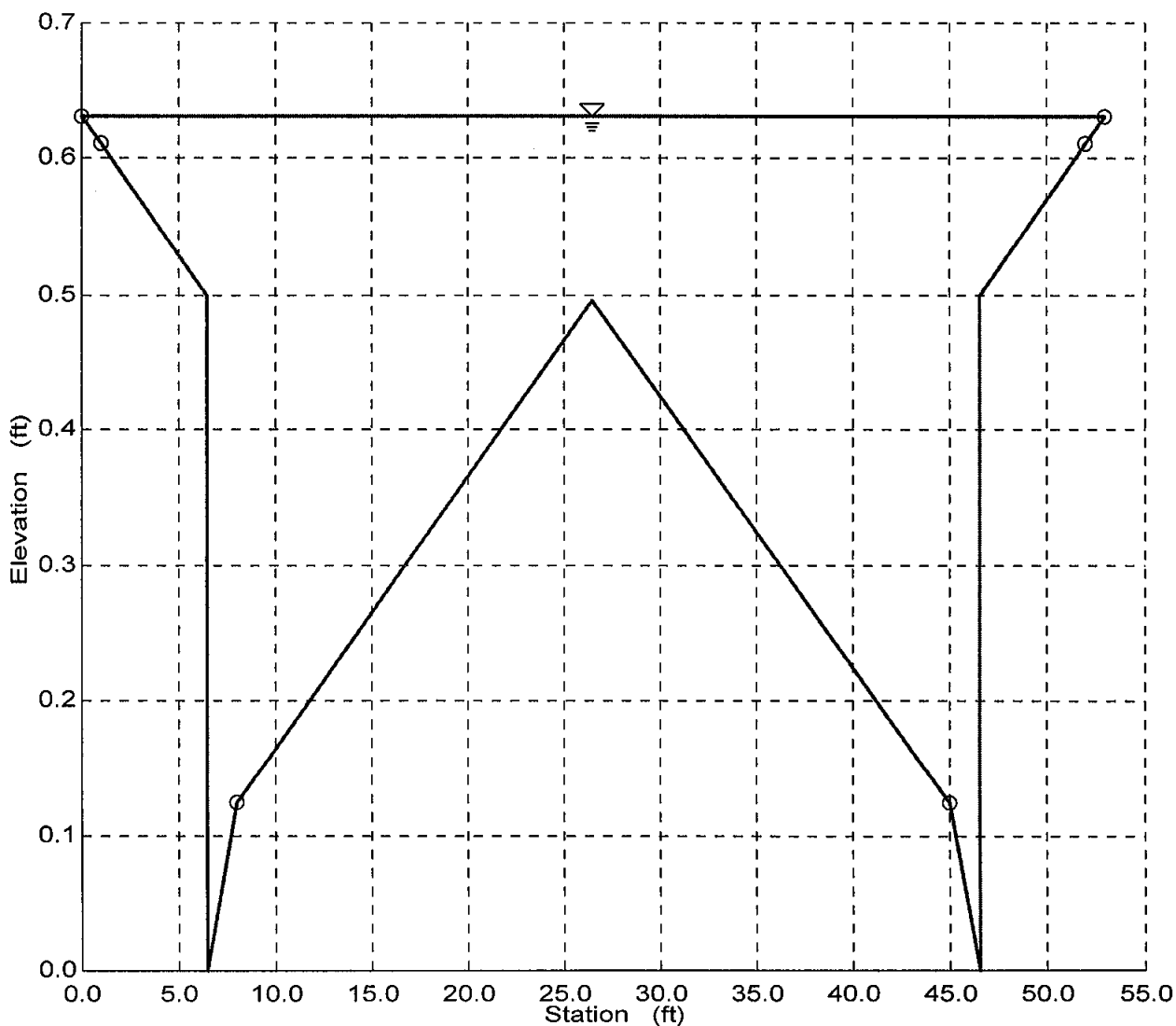
Input Data					
Channel Slope	0.016400 ft/ft				
Water Surface Elevation	0.63 ft				
Elevation range: 0.00 ft to 0.63 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	0.63	0.00	1.00	0.030	
1.00	0.61	1.00	8.00	0.014	
6.50	0.50	8.00	45.00	0.016	
6.50	0.00	45.00	52.00	0.014	
8.00	0.13	52.00	53.00	0.030	
26.50	0.50				
45.00	0.13				
46.50	0.00				
46.50	0.50				
52.00	0.61				
53.00	0.63				

Results		
Wtd. Mannings Coefficient	0.015	
Discharge	76.35	cfs
Flow Area	14.39	ft ²
Wetted Perimeter	54.02	ft
Top Width	53.00	ft
Height	0.63	ft
Critical Depth	0.76	ft
Critical Slope	0.004719	ft/ft
Velocity	5.31	ft/s
Velocity Head	0.44	ft
Specific Energy	1.07	ft
Froude Number	1.80	
Flow is supercritical.		

Mira Loma Full Flow Capacity (S=1.64%)
 Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\steamboa.fm2
Worksheet	Mira Loma Full Flow Capacity, S=1.64%
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.015
Channel Slope	0.016400 ft/ft
Water Surface Elevation	0.63 ft
Discharge	76.35 cfs

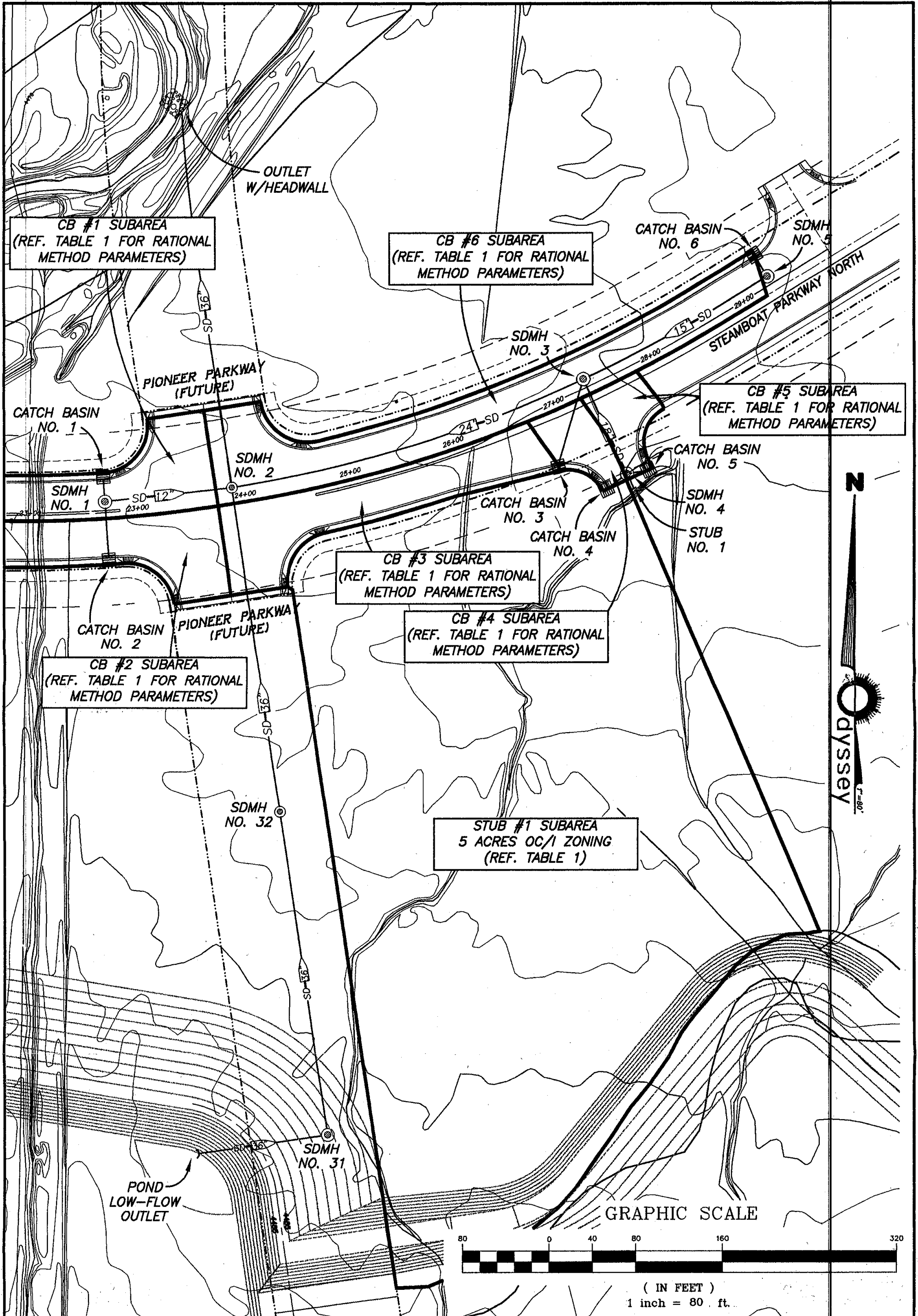


STORMCAD STORM DRAIN ANALYSIS

NO DOCUMENTS
BEHIND TAB
@ SCAN

SYSTEM 1

NO DOCUMENTS
BEHIND TAB
@ SCAN

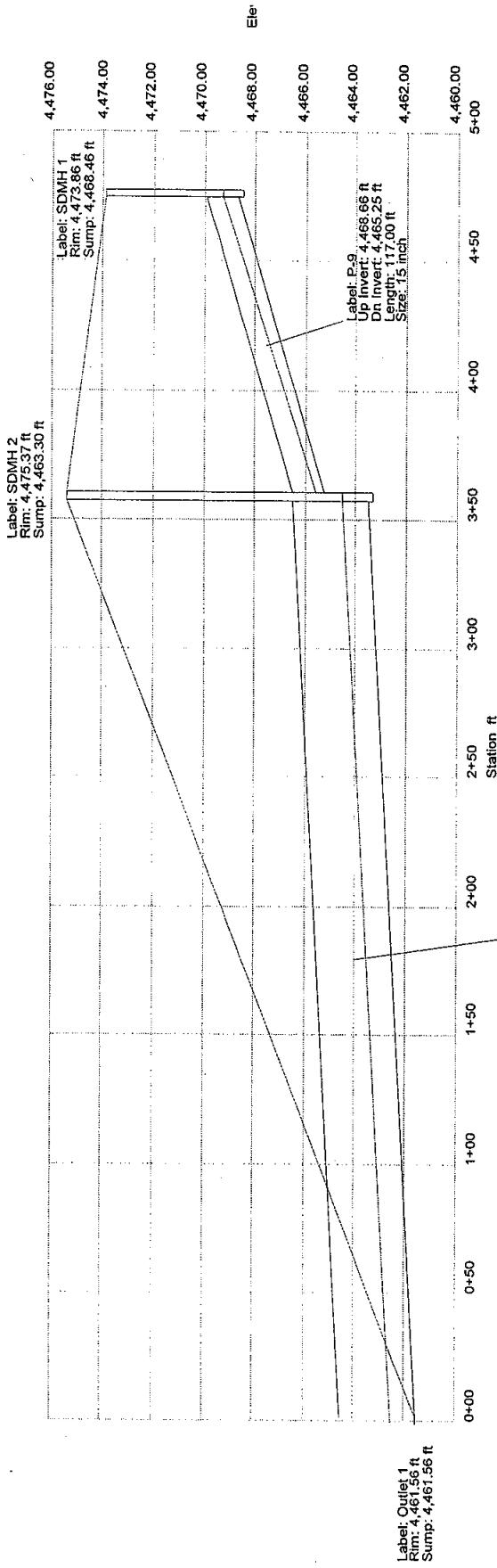


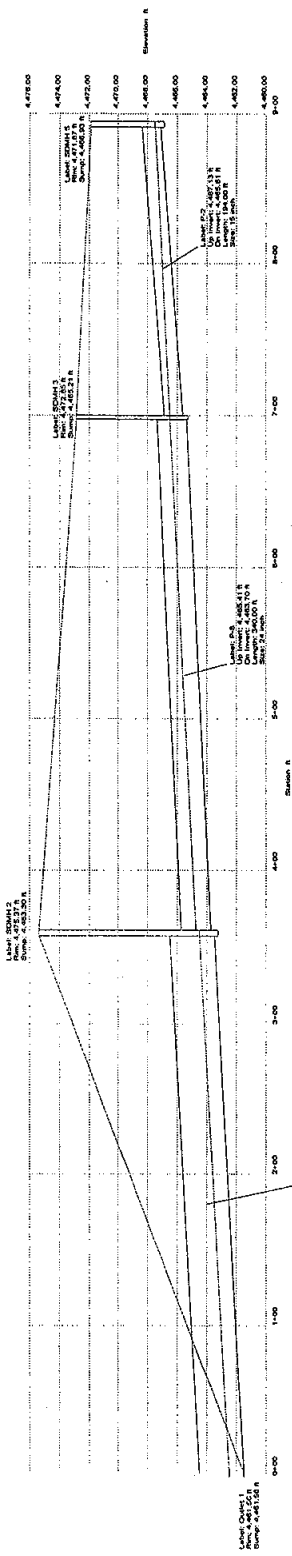
(IN FEET)
1 inch = 80 . ft.

	980 ROBERTS LANE, SUITE 104, SPRING VALLEY, NV 89457 (775) 398-3300 FAX (775) 398-3322		STEAMBOAT PARKWAY NORTH & SOUTH ROADWAY IMPROVEMENTS PROPOSED STORM DRAIN SYSTEM 1 DISPLAY MAP WASHOE COUNTY NEVADA		DATE: DECEMBER 2000	REV. DATE DESCRIPTION BY JAPPD
	DRAWN BY: ACAR14		DESIGNED BY: R.S.		1	1
	CHECKED BY: B.H.		2		2	2
	3		3		3	3

STORMCAD RESULTS 10-YEAR

Upstream Node	Downstream Node	Pipe	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
CB 6	SDMH 5	P-1	12 inch	1.07	0.072381	21.00	5.54	4,467.33	4,471.87	4,467.56	4,468.51	4,468.85	4,471.85	4,469.28	4,469.44
CB 5	SDMH 4	P-5	12 inch	0.16	0.115789	19.00	1.07	4,466.69	4,471.86	4,467.44	4,467.44	4,468.89	4,471.89	4,469.05	4,469.11
CB 4	SDMH 4	P-6	12 inch	0.16	0.095652	23.00	1.07	4,466.69	4,471.86	4,467.44	4,467.44	4,468.89	4,471.89	4,469.05	4,469.11
I-1	SDMH 4	P-4	18 inch	7.00	0.006000	15.00	5.25	4,466.39	4,471.86	4,467.44	4,467.88	4,466.48	4,470.00	4,467.55	4,467.97
CB 1	SDMH 1	P-10	12 inch	0.92	0.091905	21.00	5.70	4,468.91	4,473.86	4,469.11	4,470.18	4,470.84	4,473.84	4,471.24	4,471.38
CB 2	SDMH 1	P-11	12 inch	1.21	0.037115	52.00	4.95	4,468.91	4,473.86	4,469.19	4,469.86	4,470.84	4,473.84	4,471.30	4,471.47
SDMH 5	SDMH 3	P-2	15 inch	1.07	0.007835	194.00	2.13	4,465.61	4,472.85	4,466.48	4,466.51	4,467.13	4,471.87	4,467.54	4,467.69
CB 3	SDMH 3	P-7	12 inch	0.66	0.042073	82.00	4.27	4,466.41	4,472.85	4,466.61	4,467.12	4,469.86	4,472.86	4,470.19	4,470.32
SDMH 4	SDMH 3	P-3	18 inch	7.32	0.008125	96.00	5.73	4,465.61	4,472.85	4,466.60	4,467.14	4,466.39	4,471.86	4,467.44	4,467.92
SDMH 1	SDMH 2	P-9	15 inch	2.13	0.029145	117.00	5.37	4,465.25	4,475.37	4,465.62	4,466.37	4,468.66	4,473.86	4,469.24	4,469.47
SDMH 3	SDMH 2	P-8	24 inch	9.05	0.005029	340.00	5.26	4,463.70	4,475.37	4,464.77	4,465.20	4,465.41	4,472.85	4,466.48	4,466.91
SDMH 2	Outlet 1	P-12	36 inch	11.18	0.005404	359.00	5.31	4,461.56	4,461.56	4,462.53	4,463.02	4,463.50	4,475.37	4,464.56	4,464.95

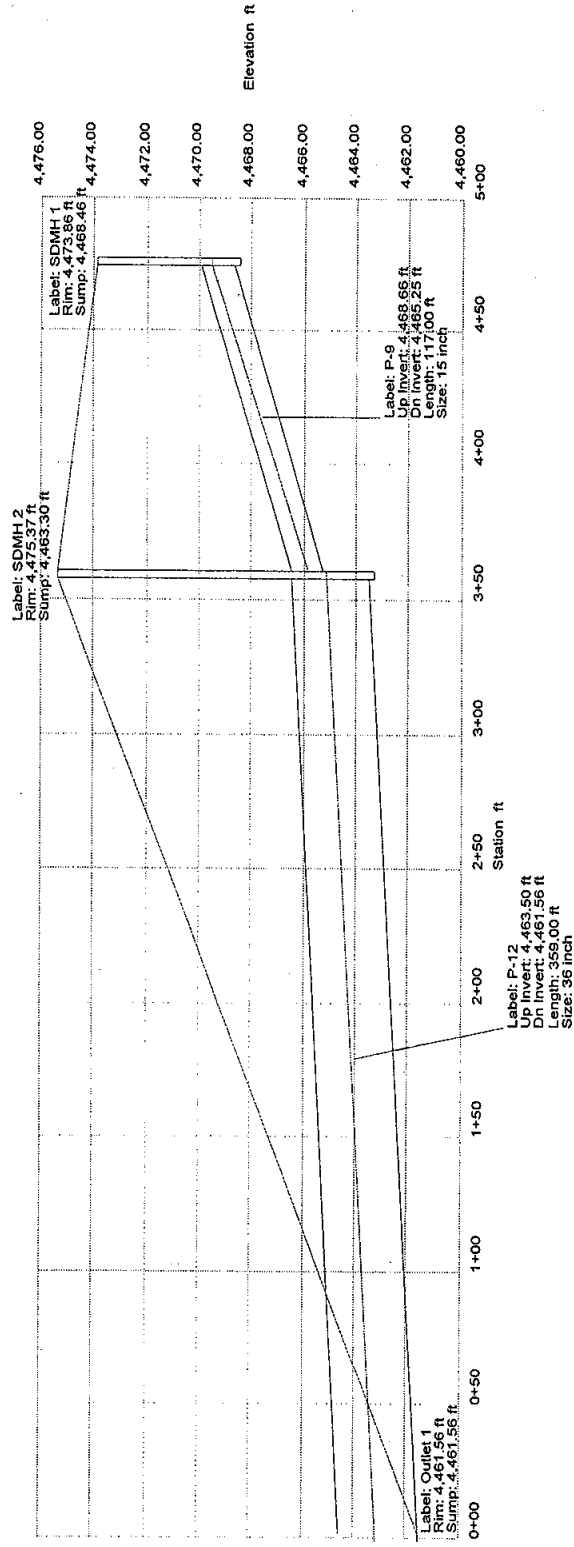




STORMCAD RESULTS

100 - YEAR

Upstream Node	Downstream Node	Pipe Size	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
CB 4	SDMH 4	P-6	12 inch	0.36	0.095652	23.00	0.42	4,466.69	4,471.86	4,471.32	4,471.32	4,468.89	4,471.89	4,471.32	4,471.32
CB 5	SDMH 4	P-5	12 inch	0.36	0.115789	19.00	0.42	4,466.69	4,471.86	4,471.32	4,471.32	4,468.89	4,471.89	4,471.32	4,471.32
I-1	SDMH 4	P-4	18 inch	17.00	0.006000	15.00	9.62	4,466.39	4,471.86	4,471.32	4,472.76	4,466.48	4,470.00	4,471.71	4,473.15
CB 6	SDMH 5	P-1	12 inch	2.34	0.072381	21.00	3.48	4,467.33	4,471.87	4,468.84	4,468.96	4,468.85	4,471.85	4,469.50	4,469.77
CB 2	SDMH 1	P-11	12 inch	2.65	0.037115	52.00	6.29	4,468.91	4,473.86	4,469.33	4,470.37	4,470.84	4,473.84	4,471.53	4,471.83
CB 1	SDMH 1	P-10	12 inch	2.02	0.091905	21.00	3.88	4,468.91	4,473.86	4,469.54	4,469.76	4,470.84	4,473.84	4,471.44	4,471.69
CB 3	SDMH 3	P-7	12 inch	1.44	0.042073	82.00	2.62	4,466.41	4,472.85	4,468.59	4,468.63	4,469.86	4,472.86	4,470.36	4,470.56
SDMH 4	SDMH 3	P-3	18 inch	17.72	0.008125	96.00	10.03	4,465.61	4,472.85	4,468.59	4,470.15	4,466.39	4,471.86	4,471.32	4,472.88
SDMH 5	SDMH 3	P-2	15 inch	2.34	0.007835	194.00	1.91	4,465.61	4,472.85	4,468.59	4,468.64	4,467.13	4,471.87	4,468.84	4,468.90
SDMH 1	SDMH 2	P-9	15 inch	4.67	0.029145	117.00	6.85	4,465.25	4,475.37	4,465.82	4,466.97	4,468.66	4,473.86	4,469.54	4,469.94
SDMH 3	SDMH 2	P-8	24 inch	21.50	0.005029	340.00	7.28	4,463.70	4,475.37	4,465.36	4,466.28	4,465.41	4,472.85	4,468.59	4,469.31
SDMH 2	Outlet 1	P-12	36 inch	26.17	0.005404	359.00	6.80	4,461.56	4,461.56	4,463.12	4,463.89	4,463.50	4,475.37	4,465.15	4,465.82



100-YEAR

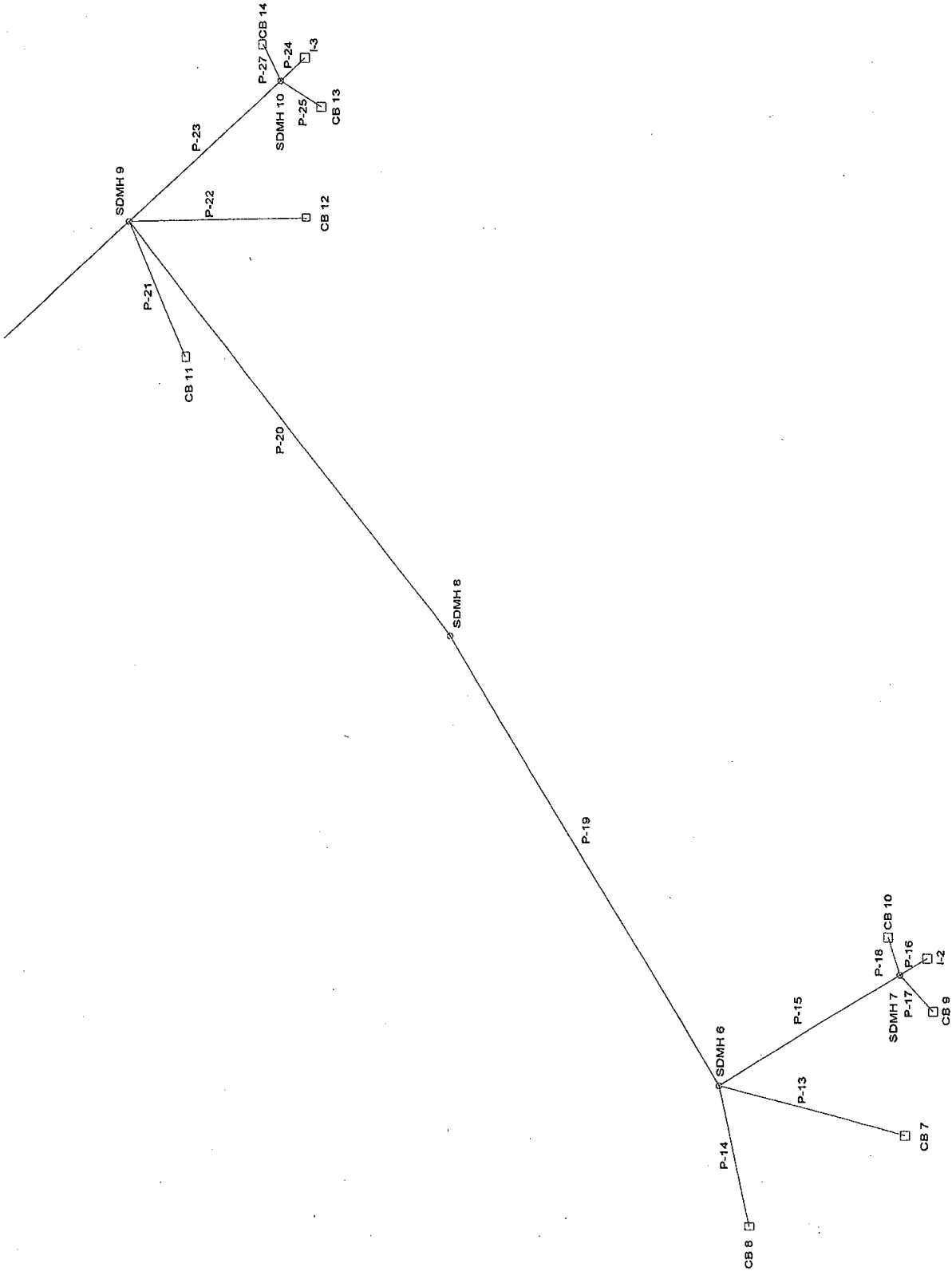
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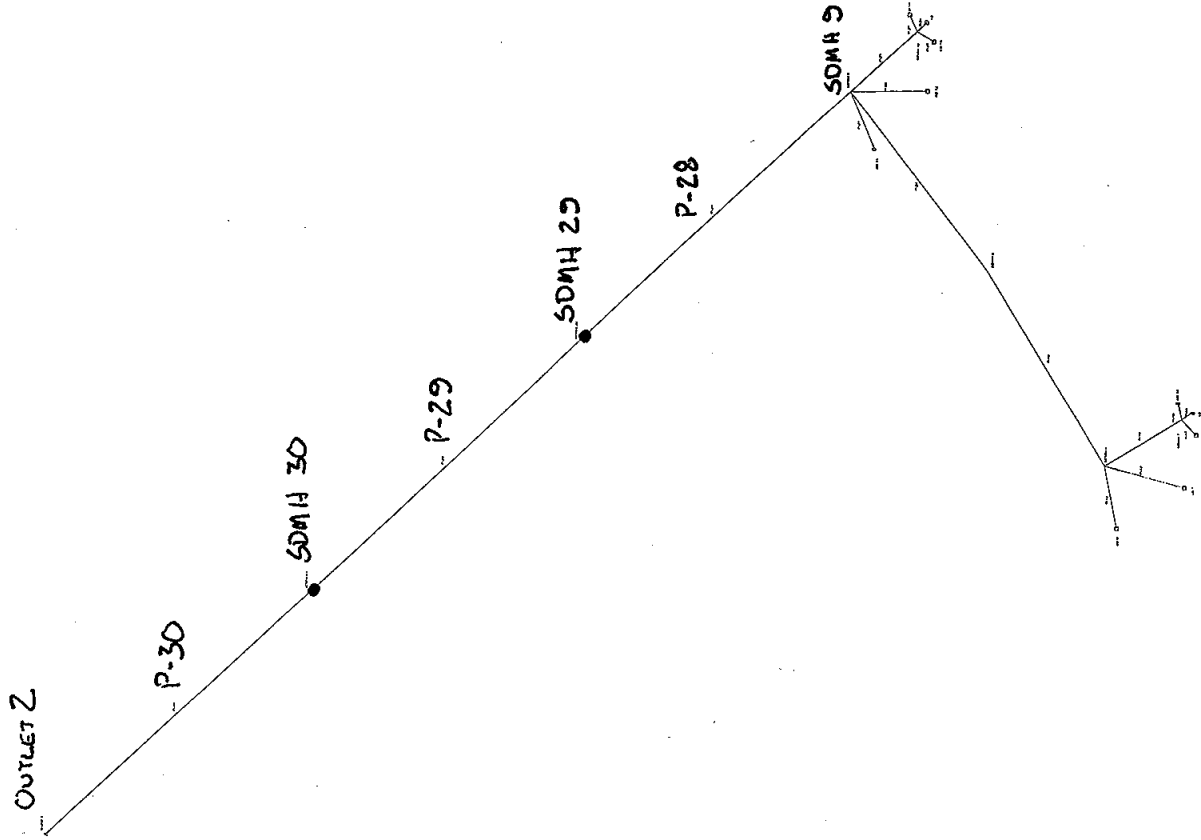
ODYSSEY ENGINEERING INC

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Project Engineer: ODYSSEY ENGINEERING
 StormCAD v1.5 [158]
 Page 1 of 1

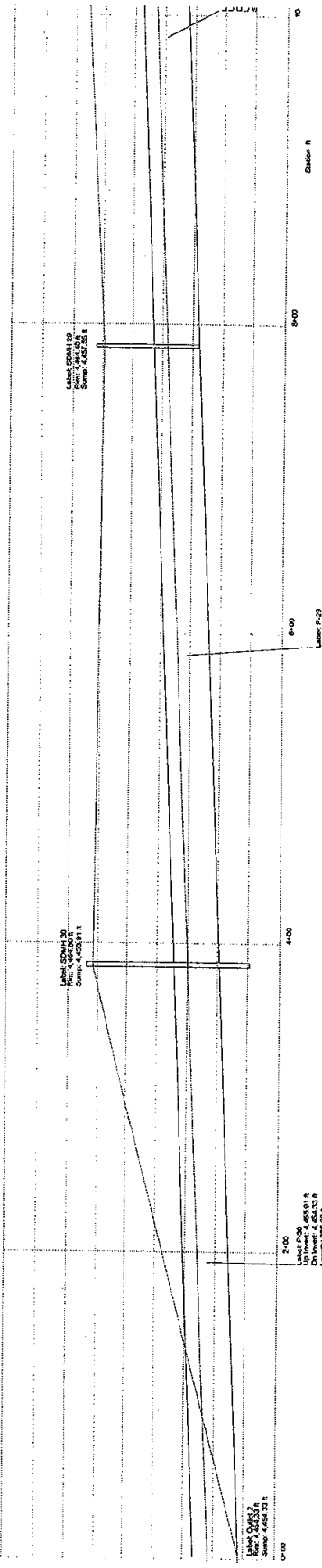
SYSTEM 2





STORMCAD RESULTS 10 - Year

Upstream Node	Downstream Node	Pipe	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
I-2	SDMH 7	P-16	24 inch	21.50	0.012000	15.00	8.06	4,463.59	4,467.53	4,465.11	4,466.20	4,463.77	4,465.30	4,465.43	4,466.35
CB 9	SDMH 7	P-17	12 inch	0.19	0.017826	23.00	0.32	4,464.09	4,467.53	4,465.06	4,465.06	4,464.50	4,467.50	4,465.06	4,465.06
CB 10	SDMH 7	P-18	12 inch	0.16	0.021579	19.00	0.27	4,464.09	4,467.53	4,465.06	4,465.06	4,464.50	4,467.50	4,465.06	4,465.06
CB 8	SDMH 6	P-14	12 inch	0.86	0.028824	68.00	4.23	4,463.82	4,468.48	4,464.07	4,464.53	4,465.78	4,468.78	4,466.16	4,466.31
SDMH 7	SDMH 6	P-15	24 inch	21.85	0.013980	98.00	8.61	4,462.02	4,468.48	4,463.40	4,464.78	4,463.39	4,467.53	4,465.06	4,466.00
CB 7	SDMH 6	P-13	12 inch	1.36	0.019333	90.00	4.42	4,463.82	4,468.48	4,464.17	4,464.62	4,465.56	4,468.56	4,466.05	4,466.24
SDMH 6	SDMH 8	P-19	36 inch	24.07	0.005021	243.00	6.54	4,460.60	4,467.26	4,462.12	4,462.82	4,461.82	4,468.48	4,463.40	4,464.03
CB 13	SDMH 10	P-25	12 inch	0.16	0.033636	22.00	0.35	4,461.34	4,465.08	4,462.50	4,462.50	4,462.08	4,465.08	4,462.50	4,462.50
CB 14	SDMH 10	P-27	12 inch	0.16	0.038947	19.00	0.35	4,461.34	4,465.08	4,462.50	4,462.50	4,462.08	4,465.08	4,462.50	4,462.50
I-3	SDMH 10	P-24	18 inch	11.20	0.014667	15.00	6.68	4,461.04	4,465.08	4,462.50	4,463.13	4,461.26	4,463.50	4,462.54	4,463.30
CB 11	SDMH 9	P-21	12 inch	0.70	0.031618	68.00	4.06	4,461.19	4,466.04	4,461.41	4,461.85	4,463.34	4,466.34	4,463.68	4,463.81
SDMH 8	SDMH 9	P-20	36 inch	24.07	0.004979	243.00	5.40	4,459.19	4,466.04	4,461.34	4,461.65	4,460.40	4,467.26	4,461.98	4,462.61
SDMH 10	SDMH 9	P-23	18 inch	11.52	0.015104	96.00	6.52	4,459.39	4,466.04	4,461.42	4,462.00	4,460.84	4,465.08	4,462.50	4,463.16
CB 12	SDMH 9	P-22	12 inch	0.65	0.022410	83.00	3.68	4,461.19	4,466.04	4,461.42	4,461.75	4,463.05	4,466.05	4,463.38	4,463.50
SDMH 9	SDMH 29	P-28	36 inch	36.94	0.004100	400.00	6.80	4,457.55	4,463.90	4,459.70	4,460.42	4,459.19	4,466.04	4,461.34	4,462.06
SDMH 29	SDMH 30	P-29	36 inch	36.94	0.004100	400.00	6.80	4,455.91	4,464.30	4,458.07	4,458.78	4,457.55	4,463.90	4,459.70	4,460.42
SDMH 30	Outlet 2	P-30	36 inch	36.94	0.004093	386.00	7.14	4,454.33	4,454.33	4,456.31	4,457.18	4,455.91	4,464.30	4,458.07	4,458.78

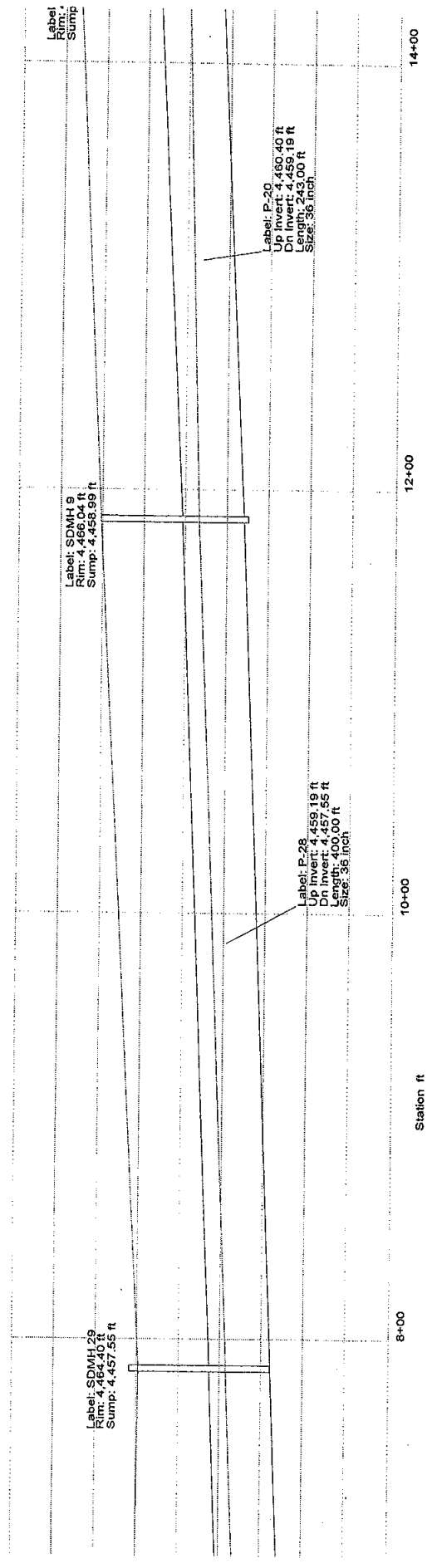


10-YEAR
1/3

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Project Engineer: ODYSSEY ENGINEERING
 StormCAD v1.5 [158]
 Page 1 of 1



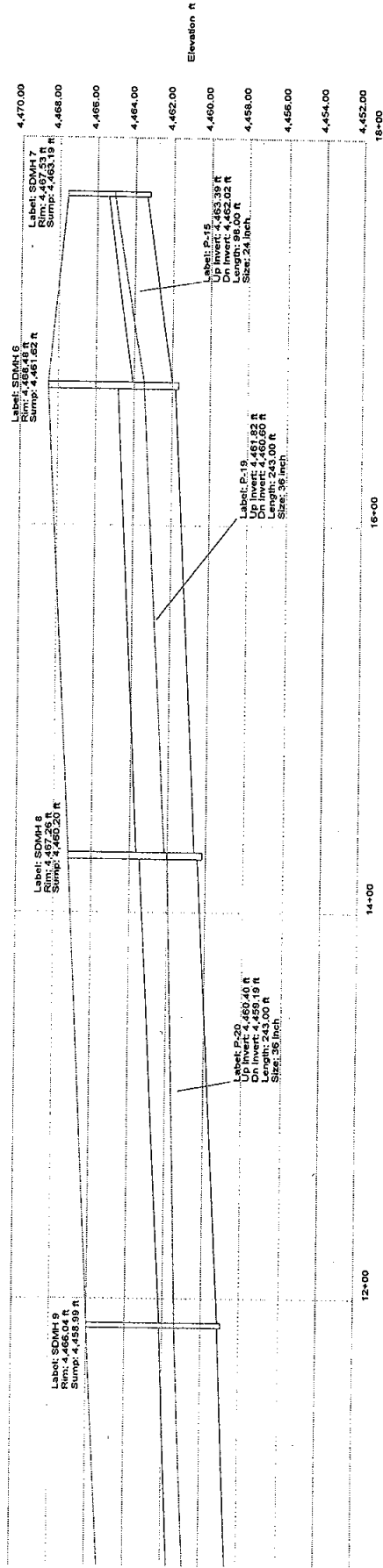
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Project Engineer: ODYSSEY ENGINEERING
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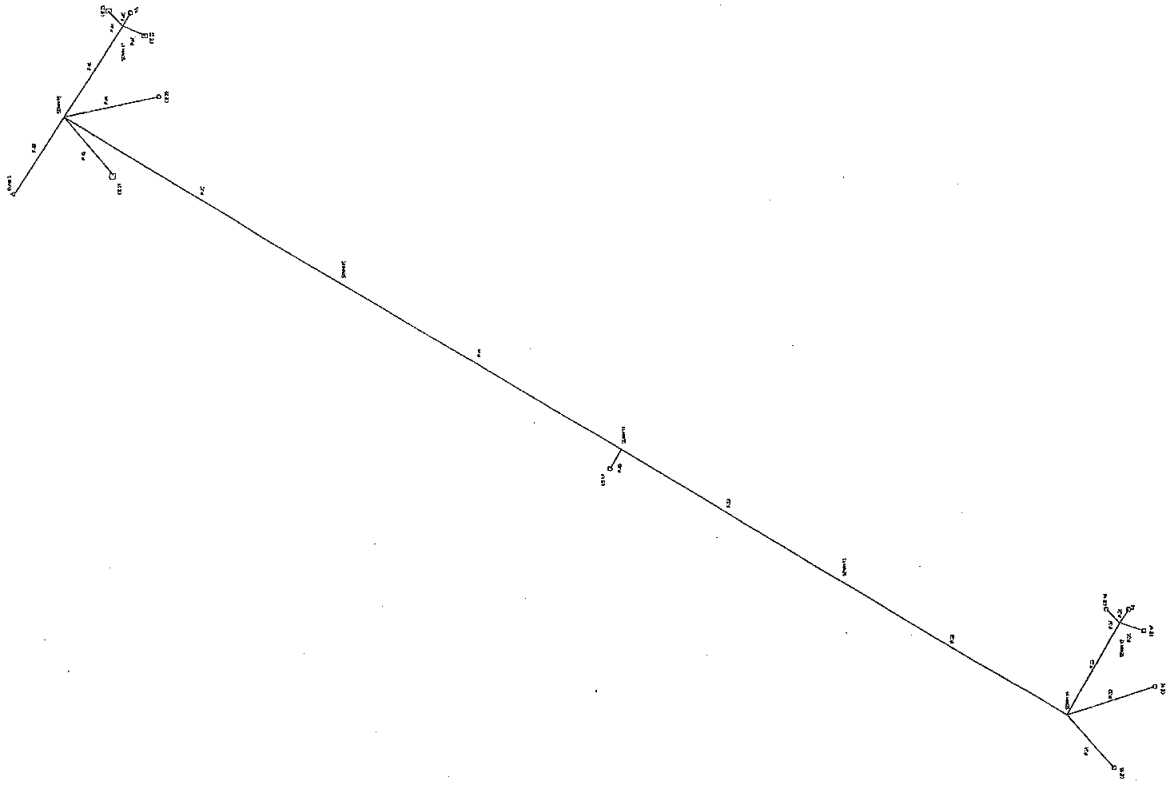
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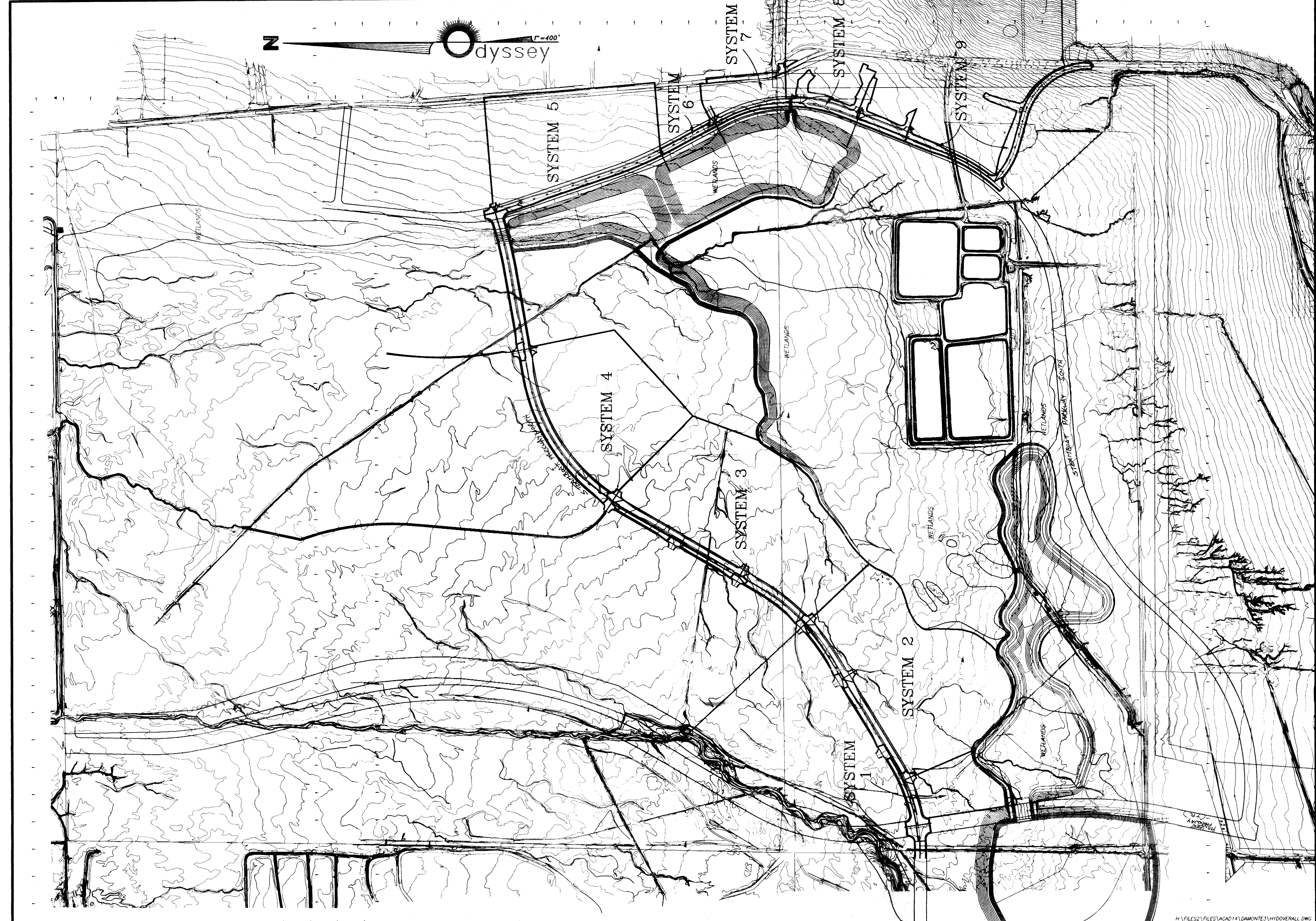
STORMCAD RESULTS

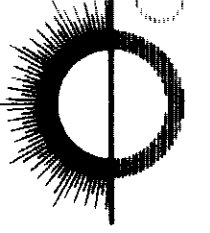
100 - YEAR

Upstream Node	Downstream Node	Pipe	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
I-2	SDMH 7	P-16	24 inch	53.87	0.012000	15.00	17.15	4,463.59	4,467.53	4,480.99	4,485.56	4,463.77	4,465.30	4,489.50	4,494.07
CB 9	SDMH 7	P-17	12 inch	0.42	0.017826	23.00	0.49	4,464.09	4,467.53	4,480.99	4,481.00	4,464.50	4,467.50	4,488.65	4,488.65
CB 10	SDMH 7	P-18	12 inch	0.36	0.021579	19.00	0.42	4,464.09	4,467.53	4,480.99	4,480.99	4,464.50	4,467.50	4,488.65	4,488.65
CB 8	SDMH 6	P-14	12 inch	1.90	0.028824	68.00	2.23	4,463.82	4,468.48	4,480.99	4,481.07	4,465.78	4,468.78	4,483.08	4,483.16
SDMH 7	SDMH 6	P-15	24 inch	54.65	0.013980	98.00	17.40	4,462.02	4,468.48	4,480.99	4,485.69	4,463.39	4,467.53	4,488.65	4,493.35
CB 7	SDMH 6	P-13	12 inch	2.98	0.019333	90.00	3.50	4,463.82	4,468.48	4,480.99	4,481.18	4,465.56	4,468.56	4,483.43	4,483.62
CB 13	SDMH 10	P-25	12 inch	0.36	0.033636	22.00	0.42	4,461.34	4,465.08	4,471.71	4,471.71	4,462.08	4,465.08	4,485.84	4,485.84
CB 14	SDMH 10	P-27	12 inch	0.35	0.038947	19.00	0.41	4,461.34	4,465.08	4,471.71	4,471.71	4,462.08	4,465.08	4,485.84	4,485.84
I-3	SDMH 10	P-24	18 inch	27.20	0.014667	15.00	15.39	4,461.04	4,465.08	4,471.71	4,475.39	4,461.26	4,463.50	4,486.84	4,490.52
SDMH 6	SDMH 8	P-19	36 inch	59.53	0.005021	243.00	8.42	4,460.60	4,467.26	4,479.06	4,480.16	4,461.82	4,468.48	4,482.93	4,484.03
CB 11	SDMH 9	P-21	12 inch	1.53	0.031618	68.00	1.80	4,461.19	4,466.04	4,471.71	4,471.76	4,463.34	4,466.34	4,479.16	4,479.21
SDMH 10	SDMH 9	P-23	18 inch	27.91	0.015104	96.00	15.79	4,459.39	4,466.04	4,471.71	4,475.59	4,460.84	4,465.08	4,485.83	4,489.71
SDMH 8	SDMH 9	P-20	36 inch	59.53	0.004979	243.00	8.42	4,459.19	4,466.04	4,471.71	4,472.81	4,460.40	4,467.26	4,480.99	4,482.09
CB 12	SDMH 9	P-22	12 inch	1.42	0.022410	83.00	1.67	4,461.19	4,466.04	4,471.71	4,471.75	4,463.05	4,466.05	4,479.16	4,479.21
SDMH 9	SDMH 29	P-28	36 inch	90.39	0.004100	400.00	12.79	4,457.55	4,463.90	4,464.40	4,466.94	4,459.19	4,466.04	4,479.06	4,481.60
SDMH 29	SDMH 30	P-29	36 inch	90.39	0.004100	400.00	12.79	4,455.91	4,464.30	4,464.36	4,466.90	4,457.55	4,463.90	4,471.71	4,474.25
SDMH 30	Outlet 2	P-30	36 inch	90.39	0.004093	386.00	12.91	4,454.33	4,454.33	4,457.18	4,459.82	4,455.91	4,464.30	4,464.36	4,466.90

SYSTEM 3





 865 ROBERTA LANE SUITE 104 SPANISH VALLEY, CA 91761 (714) 359-1303 FAX (714) 359-3329 odyssey ENGINEERING INCORPORATED		DATE: DECEMBER, 2000 DRAWN BY: ACAD14 DESIGNED BY: R.S. CHECKED BY: B.H.	REV. DATE DESCRIPTION BY APP'D
STEAMBOAT PARKWAY NORTH & SOUTH ROADWAY IMPROVEMENTS OVERALL PROPOSED CONDITIONS DISPLAY MAP WASHOE COUNTY, NEVADA			
SCALE HORIZ. 1" = 400' VERT. --- JOB NO. 2327			
SHEET 1 OF 1			

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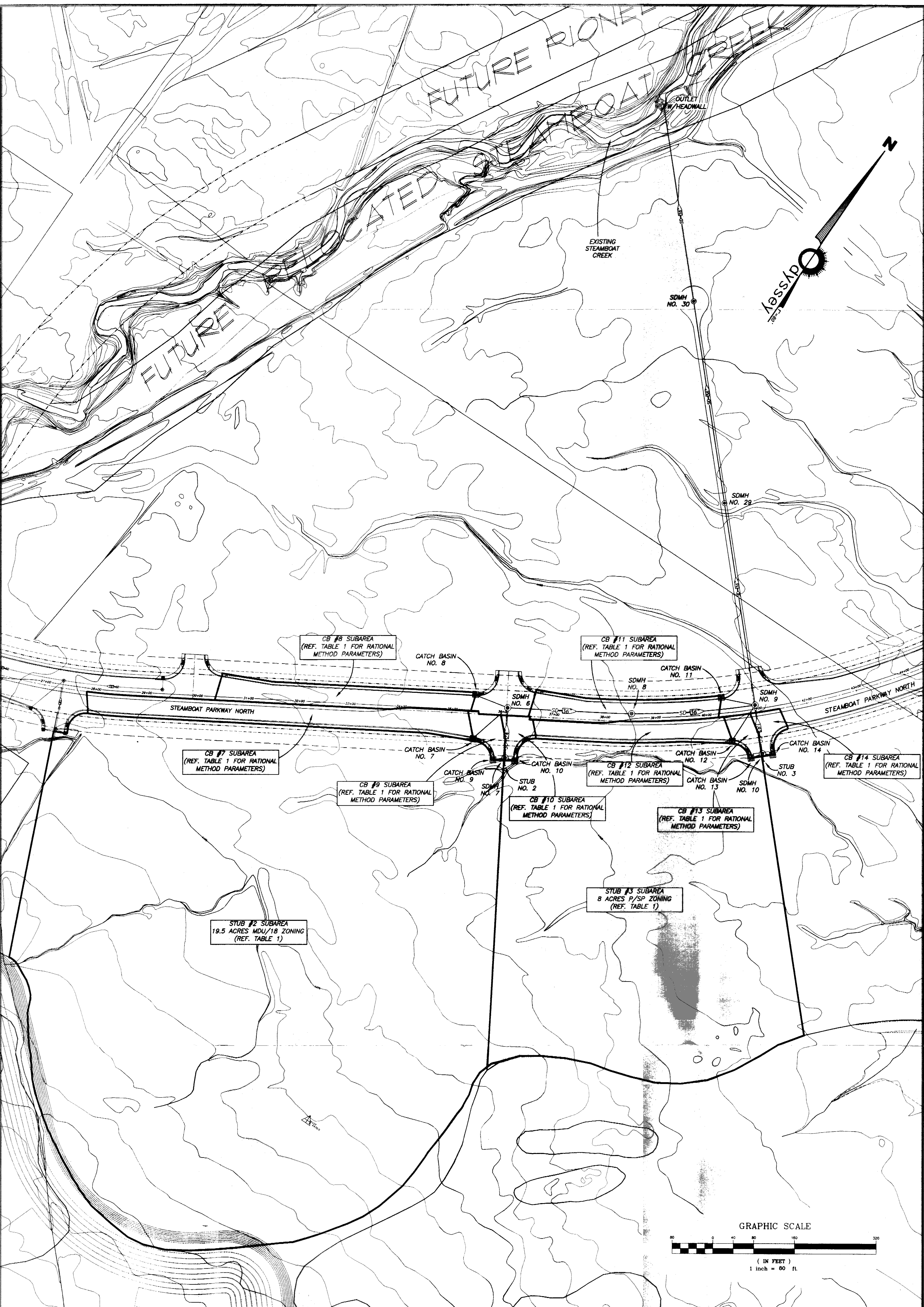
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 SHEET 1 OF 1
 JOB NO. 2327
 VERT. SCALE 1"=400'
 HORIZ. SCALE 1"=400'

dysssey
 ENGINEERING
 INCORPORATED
 995 ROBERTA LANE, SUITE 104, SPARKS, NV 89431
 (775) 359-3003 FAX (775) 359-5329

STEAMBOAT PARKWAY NORTH & SOUTH ROADWAY IMPROVEMENTS
 EXISTING HYDROLOGICAL CONDITIONS
DISPLAY MAP
 WASHOE COUNTY, NEVADA

DATE: DECEMBER, 2000
 DRAWN BY: ACAD14
 DESIGNED BY: R.S.
 CHECKED BY: B.H.

REV.	DATE	DESCRIPTION	BY
			APP'D



SCALE
HORIZ. = 80'
VERT. = N/A
JOB NO.
5327

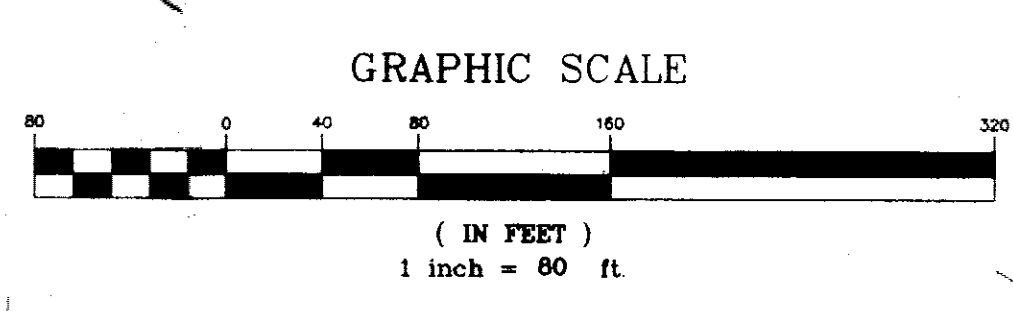
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(775) 359-3303 FAX (775) 359-3329

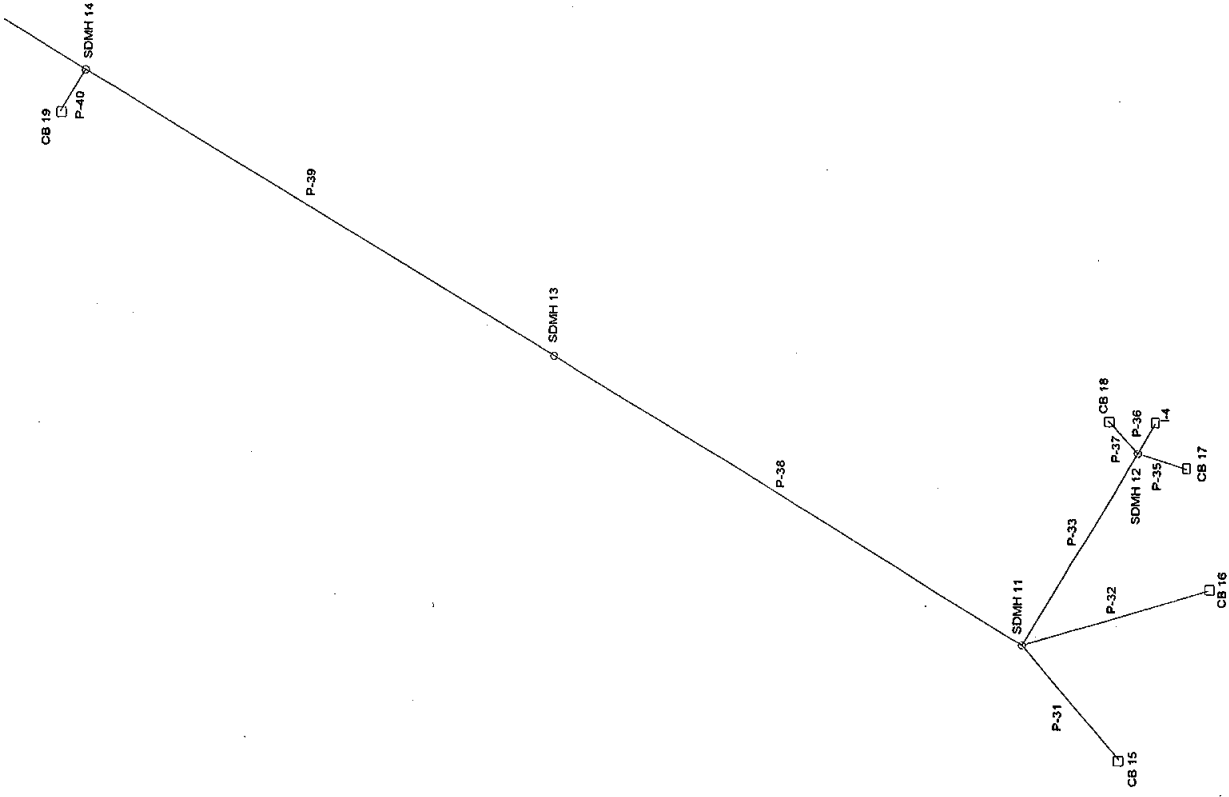
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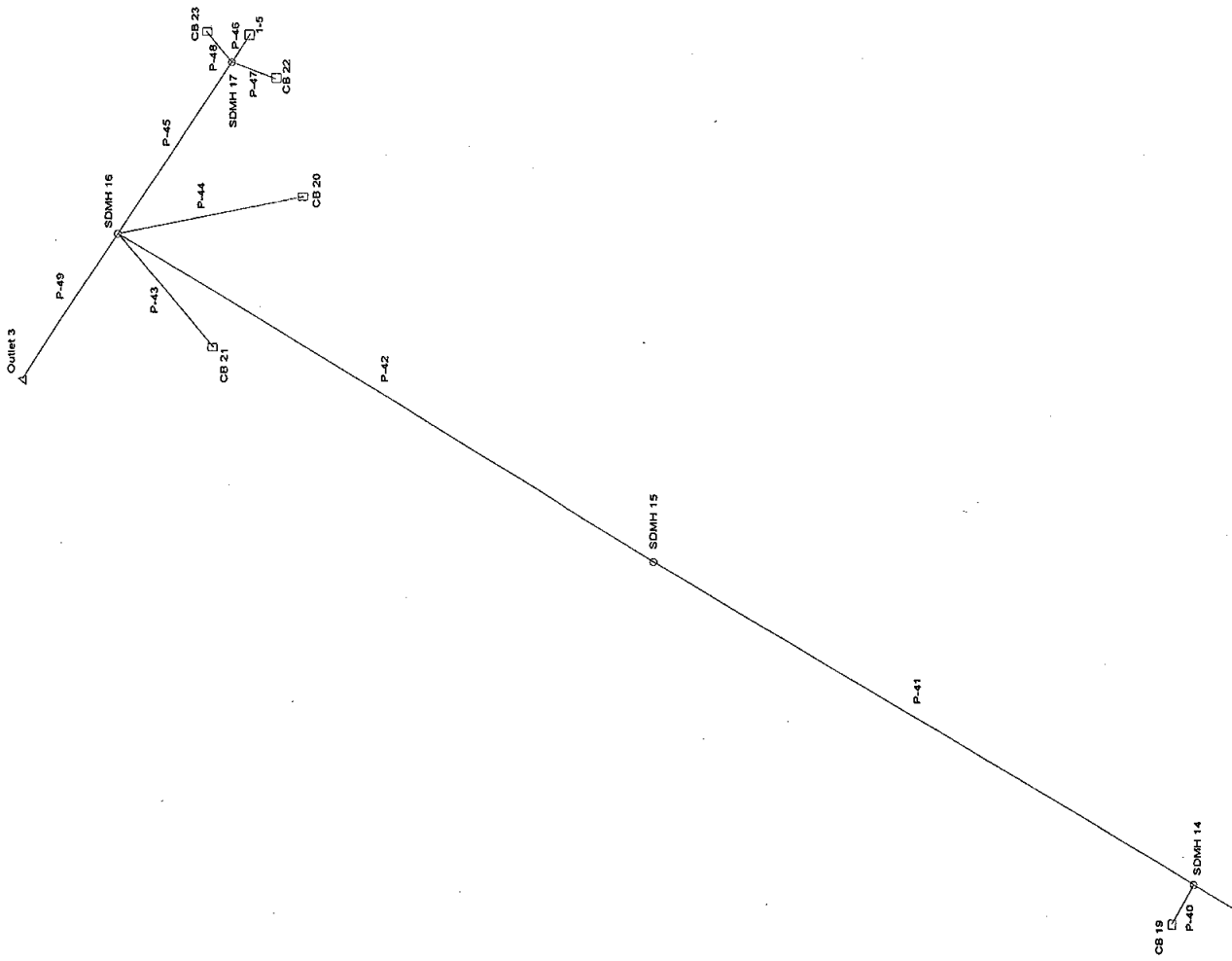
STEAMBOAT PARKWAY NORTH & SOUTH ROADWAY IMPROVEMENTS
PROPOSED STORM DRAIN SYSTEM 2
DISPLAY MAP
WASHOE COUNTY NEVADA

DATE: DECEMBER, 2000
DRAWN BY: ACAD14
DESIGNED BY: R.S.
CHECKED BY: B.H.

REV.	DATE	DESCRIPTION	BY	APP'D

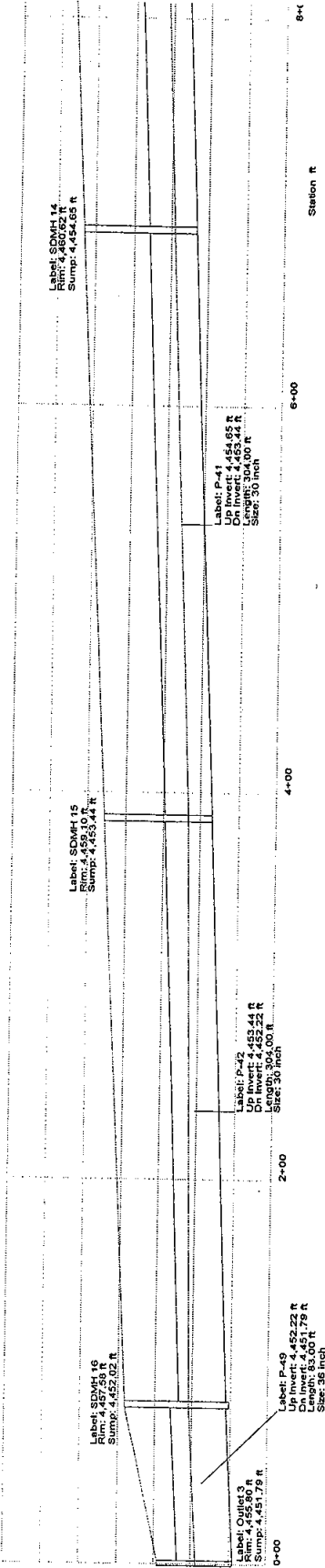




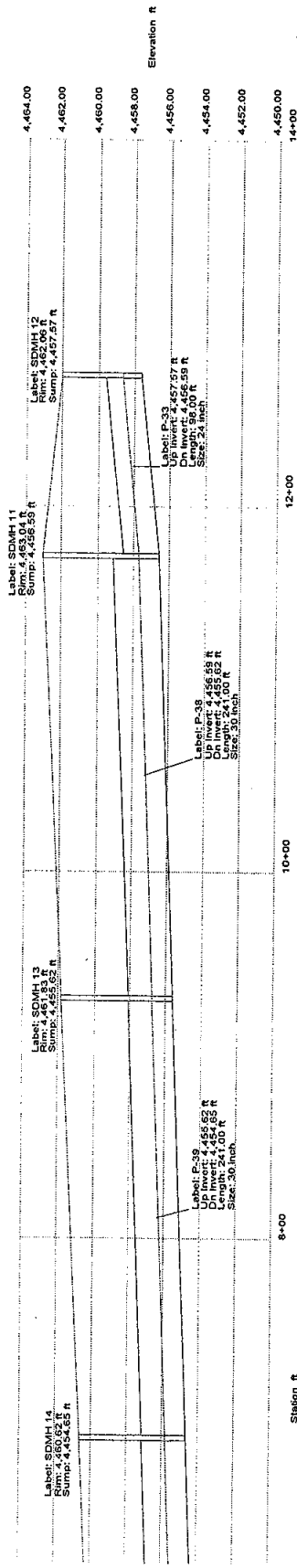


STORMCAD RESULTS 10- Year

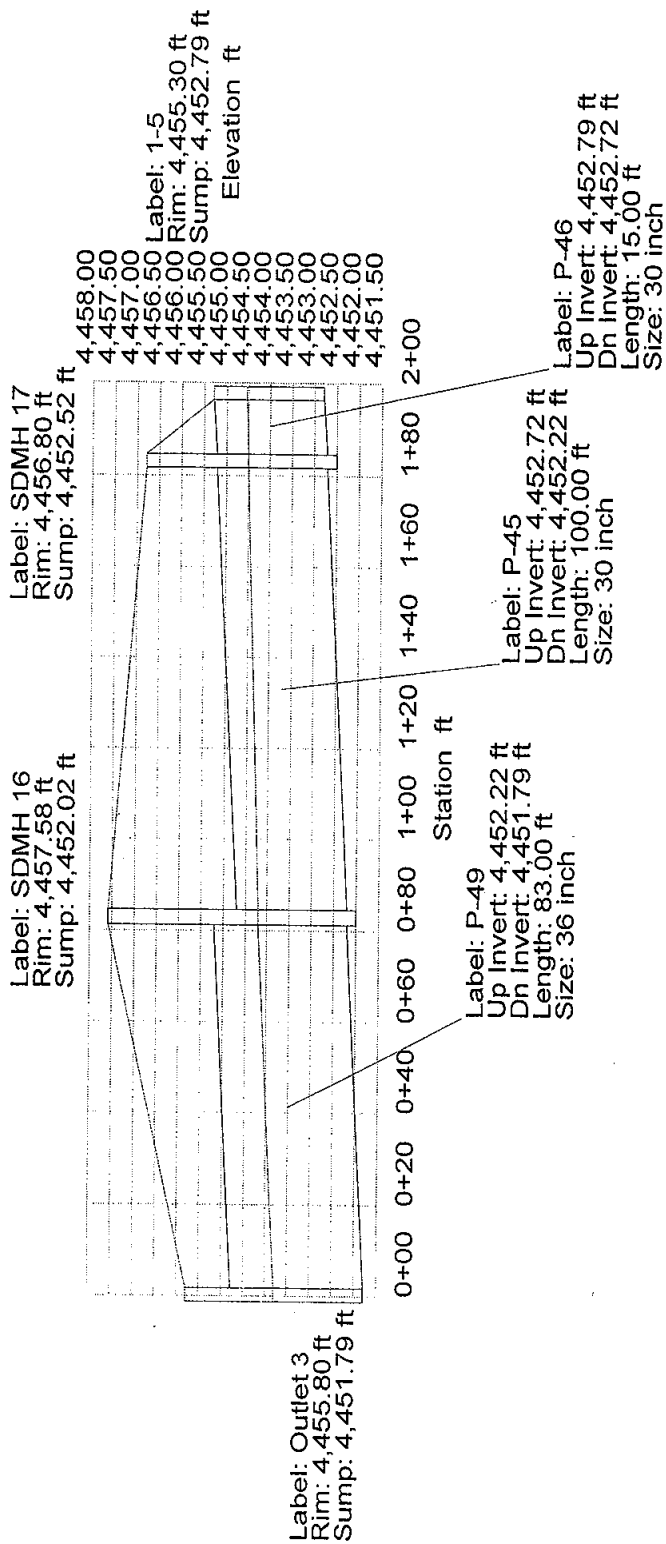
Upstream Node	Downstream Node	Pipe	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
I-4	SDMH 12	P-36	24 inch	8.75	0.010000	15.00	5.14	4,457.57	4,462.06	4,458.65	4,459.05	4,457.72	4,460.80	4,458.78	4,459.20
CB 18	SDMH 12	P-37	12 inch	0.17	0.025789	19.00	2.58	4,458.57	4,462.06	4,458.69	4,458.85	4,459.06	4,462.06	4,459.23	4,459.28
CB 17	SDMH 12	P-35	12 inch	0.18	0.022609	23.00	2.55	4,458.57	4,462.06	4,458.69	4,458.85	4,459.09	4,462.06	4,459.26	4,459.32
CB 16	SDMH 11	P-32	12 inch	0.90	0.023294	85.00	4.08	4,458.09	4,463.04	4,458.36	4,458.77	4,460.07	4,463.07	4,460.46	4,460.61
CB 15	SDMH 11	P-31	12 inch	0.83	0.034697	66.00	4.36	4,458.09	4,463.04	4,458.33	4,458.84	4,460.38	4,463.38	4,460.76	4,460.90
SDMH 12	SDMH 11	P-33	24 inch	9.10	0.010000	98.00	5.14	4,456.59	4,463.04	4,457.71	4,458.10	4,457.57	4,462.06	4,458.65	4,459.08
SDMH 11	SDMH 13	P-38	30 inch	10.83	0.004025	241.00	5.06	4,455.62	4,461.83	4,456.74	4,457.14	4,456.59	4,463.04	4,457.71	4,458.11
CB 19	SDMH 14	P-40	12 inch	0.81	0.069048	21.00	5.10	4,456.15	4,460.62	4,456.35	4,457.16	4,457.60	4,460.60	4,457.97	4,458.11
SDMH 13	SDMH 14	P-39	30 inch	10.83	0.004025	241.00	4.92	4,454.65	4,460.62	4,455.83	4,456.18	4,455.62	4,461.83	4,456.74	4,457.14
CB 22	SDMH 17	P-47	12 inch	0.20	0.017826	23.00	0.29	4,453.42	4,456.80	4,454.50	4,454.50	4,453.83	4,456.83	4,454.50	4,454.50
1-5	SDMH 17	P-46	30 inch	23.53	0.004667	15.00	6.32	4,452.72	4,456.80	4,454.50	4,455.11	4,452.79	4,455.30	4,454.56	4,455.18
CB 23	SDMH 17	P-48	12 inch	0.17	0.021579	19.00	0.25	4,453.42	4,456.80	4,454.50	4,454.50	4,453.83	4,456.83	4,454.50	4,454.50
SDMH 14	SDMH 15	P-41	30 inch	11.64	0.003980	304.00	5.14	4,453.44	4,459.10	4,454.61	4,455.02	4,454.65	4,460.62	4,455.83	4,456.23
CB 20	SDMH 16	P-44	12 inch	1.69	0.010330	91.00	4.13	4,453.72	4,457.58	4,454.19	4,454.51	4,454.66	4,457.66	4,455.21	4,455.42
SDMH 17	SDMH 16	P-45	30 inch	23.90	0.005000	100.00	6.02	4,452.22	4,457.58	4,454.23	4,454.73	4,452.72	4,456.80	4,454.50	4,455.13
SDMH 15	SDMH 16	P-42	30 inch	11.64	0.004013	304.00	3.95	4,452.22	4,457.58	4,454.23	4,454.35	4,453.44	4,459.10	4,454.61	4,455.02
CB 21	SDMH 16	P-43	12 inch	0.74	0.016857	70.00	2.33	4,453.72	4,457.58	4,454.23	4,454.28	4,454.90	4,457.90	4,455.25	4,455.38
SDMH 16	Outlet 3	P-49	36 inch	37.97	0.005181	83.00	7.55	4,451.79	4,455.80	4,453.80	4,454.68	4,452.22	4,457.58	4,454.23	4,455.11



10-YEAR 1/3



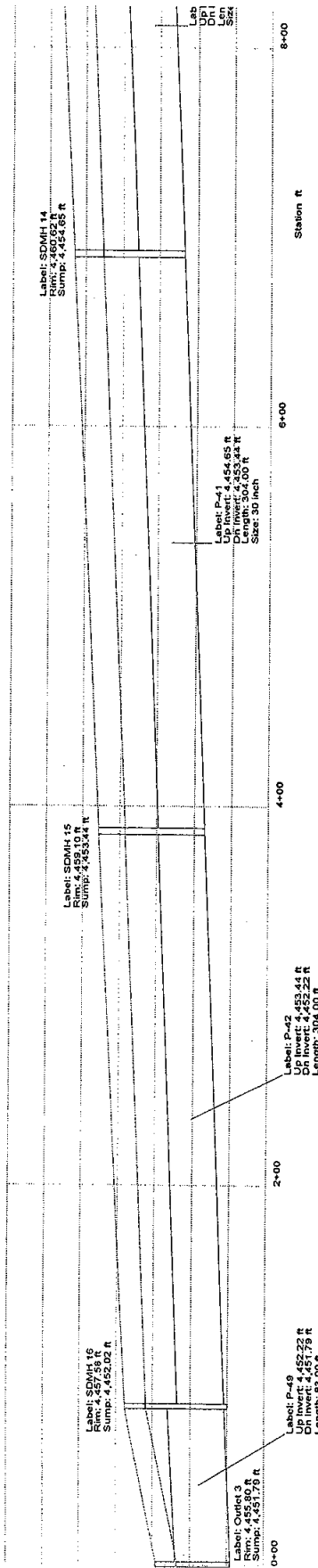
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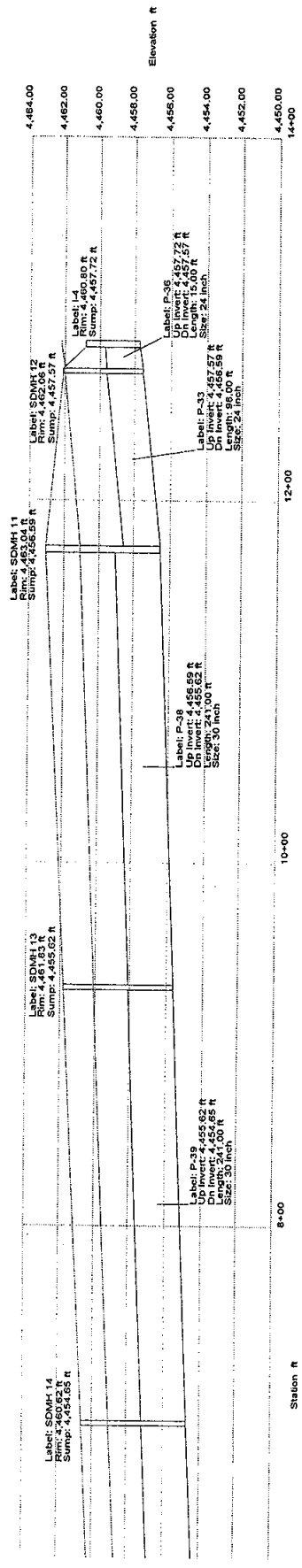
10-YEAR 3/3

STORMCAD RESULTS 100 - YEAR

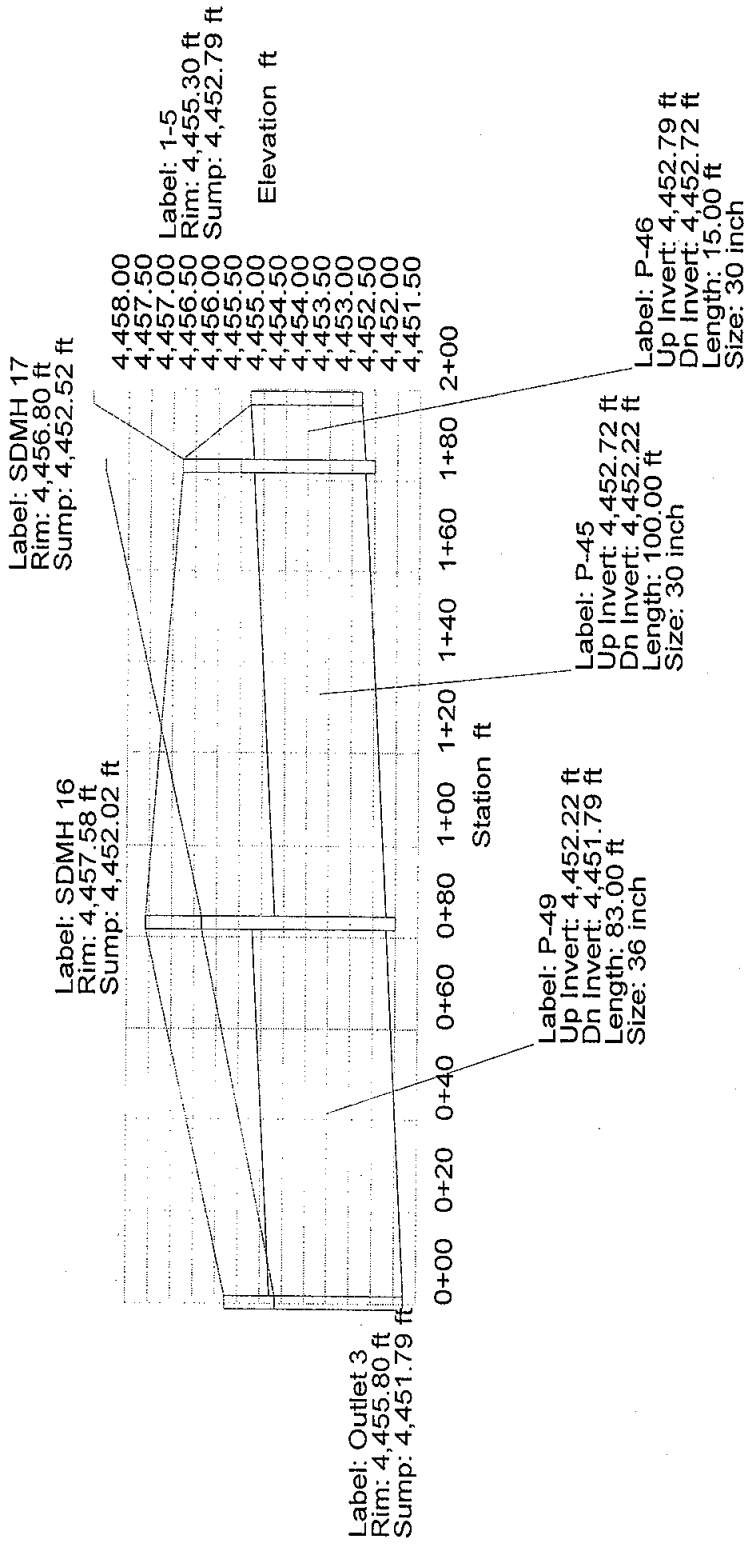
Upstream Node	Downstream Node	Pipe	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
CB 17	SDMH 12	P-35	12 inch	0.39	0.022609	23.00	0.46	4,458.57	4,462.06	4,462.03	4,462.04	4,459.09	4,462.06	4,462.04	4,462.04
I-4	SDMH 12	P-36	24 inch	21.96	0.010000	15.00	6.99	4,457.57	4,462.06	4,462.03	4,462.79	4,457.72	4,460.80	4,462.18	4,462.93
CB 18	SDMH 12	P-37	12 inch	0.36	0.025789	19.00	0.42	4,458.57	4,462.06	4,462.03	4,462.04	4,459.06	4,462.06	4,462.04	4,462.04
SDMH 12	SDMH 11	P-33	24 inch	22.71	0.010000	98.00	7.23	4,456.59	4,463.04	4,461.05	4,461.86	4,457.57	4,462.06	4,462.03	4,462.85
CB 16	SDMH 11	P-32	12 inch	1.98	0.023294	85.00	2.32	4,458.09	4,463.04	4,461.05	4,461.13	4,460.07	4,463.07	4,461.26	4,461.34
CB 15	SDMH 11	P-31	12 inch	1.82	0.034697	66.00	2.44	4,458.09	4,463.04	4,461.05	4,461.12	4,460.38	4,463.38	4,461.14	4,461.26
SDMH 11	SDMH 13	P-38	30 inch	26.51	0.004025	241.00	5.40	4,455.62	4,461.83	4,460.04	4,460.49	4,456.59	4,463.04	4,461.05	4,461.50
SDMH 13	SDMH 14	P-39	30 inch	26.51	0.004025	241.00	5.40	4,454.65	4,460.62	4,459.03	4,459.49	4,455.62	4,461.83	4,460.04	4,460.49
CB 19	SDMH 14	P-40	12 inch	0.81	0.069048	21.00	0.95	4,456.15	4,460.62	4,459.03	4,459.05	4,457.60	4,460.60	4,459.04	4,459.06
CB 23	SDMH 17	P-48	12 inch	0.38	0.021579	19.00	0.45	4,453.42	4,456.80	4,456.80	4,456.80	4,453.83	4,456.83	4,458.47	4,458.47
1-5	SDMH 17	P-46	30 inch	59.09	0.004667	15.00	12.04	4,452.72	4,456.80	4,456.80	4,459.05	4,452.79	4,455.30	4,458.78	4,461.03
CB 22	SDMH 17	P-47	12 inch	0.43	0.017826	23.00	0.50	4,453.42	4,456.80	4,456.80	4,456.80	4,453.83	4,456.83	4,458.47	4,458.47
SDMH 14	SDMH 15	P-41	30 inch	27.32	0.003980	304.00	5.57	4,453.44	4,459.10	4,457.68	4,458.16	4,454.65	4,460.62	4,459.03	4,459.51
SDMH 17	SDMH 16	P-45	30 inch	59.90	0.005000	100.00	12.20	4,452.22	4,457.58	4,456.33	4,458.65	4,452.72	4,456.80	4,458.47	4,460.78
CB 21	SDMH 16	P-43	12 inch	1.62	0.016857	70.00	1.90	4,453.72	4,457.58	4,456.33	4,456.39	4,454.90	4,457.90	4,456.45	4,456.51
CB 20	SDMH 16	P-44	12 inch	3.71	0.010330	91.00	4.35	4,453.72	4,457.58	4,456.33	4,456.63	4,454.66	4,457.66	4,457.13	4,457.42
SDMH 15	SDMH 16	P-42	30 inch	27.32	0.004013	304.00	5.57	4,452.22	4,457.58	4,456.33	4,456.82	4,453.44	4,459.10	4,457.68	4,458.16
SDMH 16	Outlet 3	P-49	36 inch	92.55	0.005181	83.00	13.20	4,451.79	4,455.80	4,454.65	4,457.41	4,452.22	4,457.58	4,456.33	4,459.00



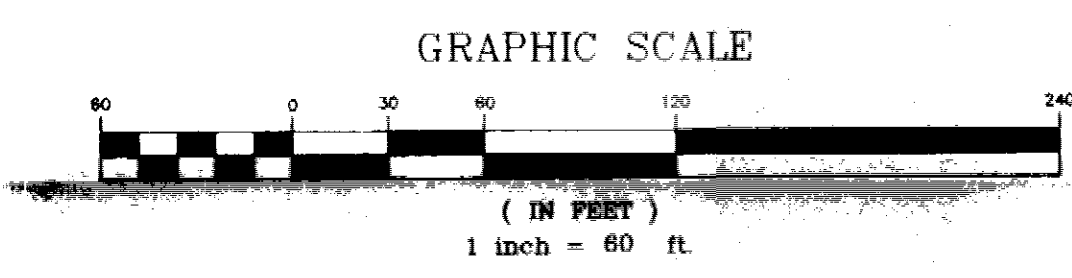
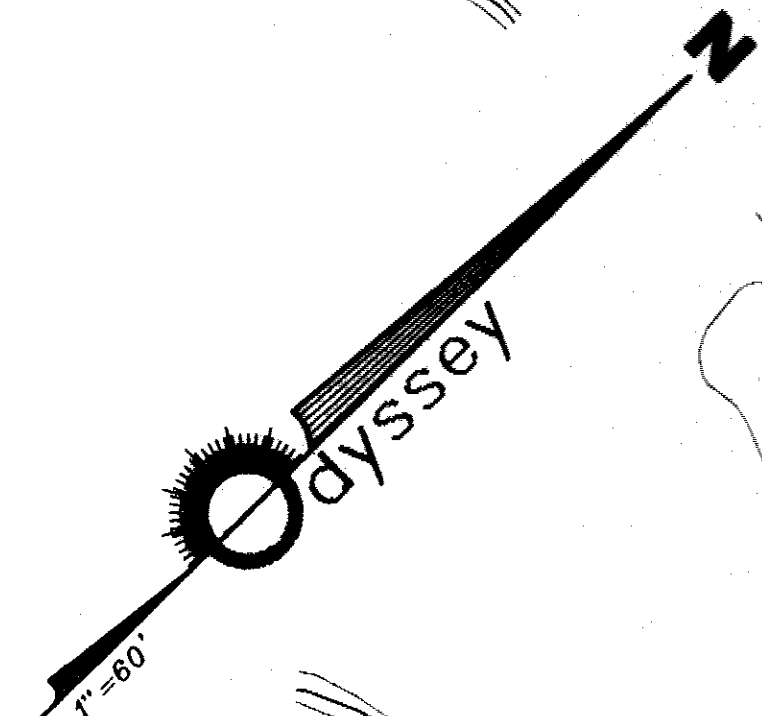
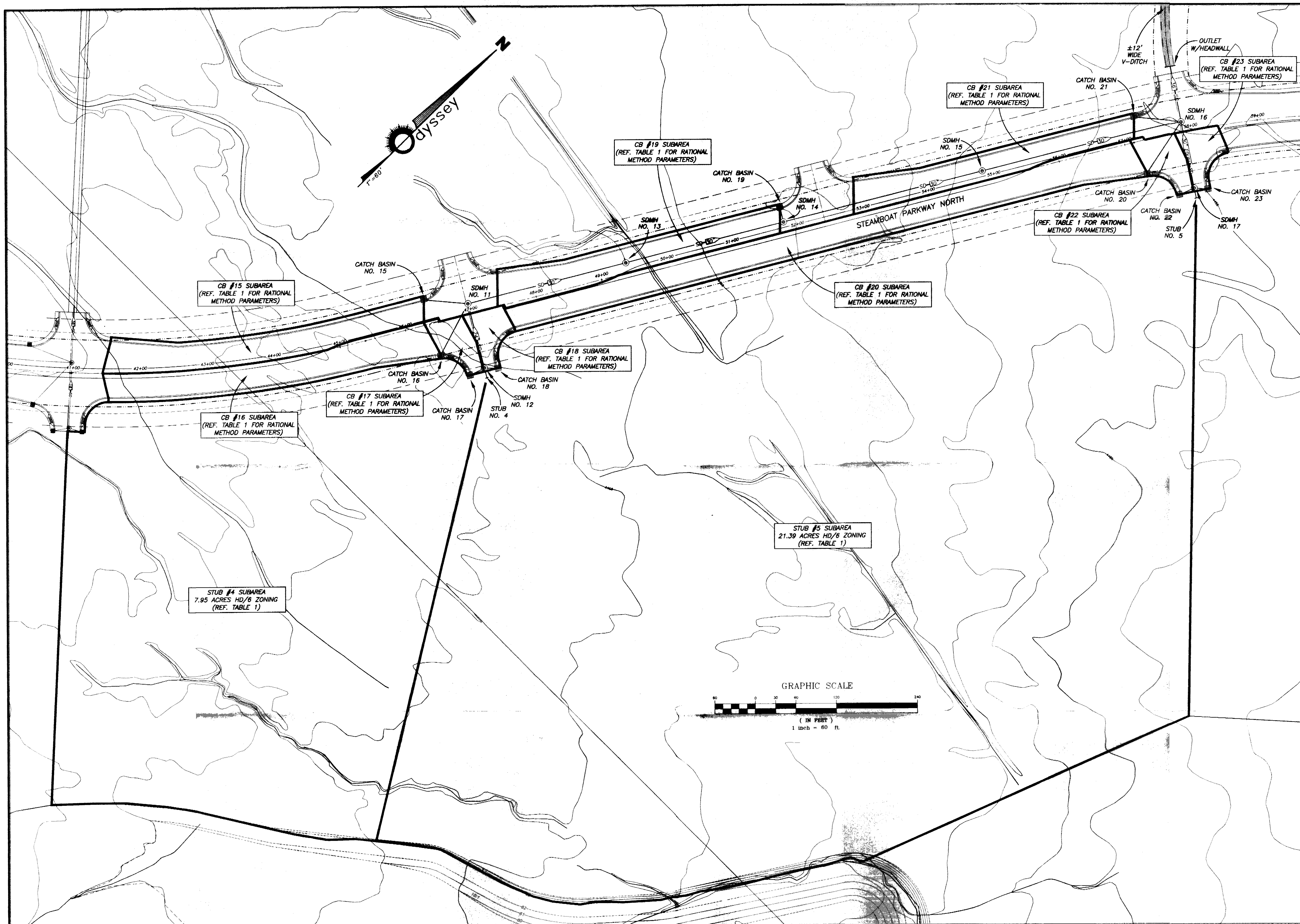
100 YEAR 1/3



100 - YEAR 2/3

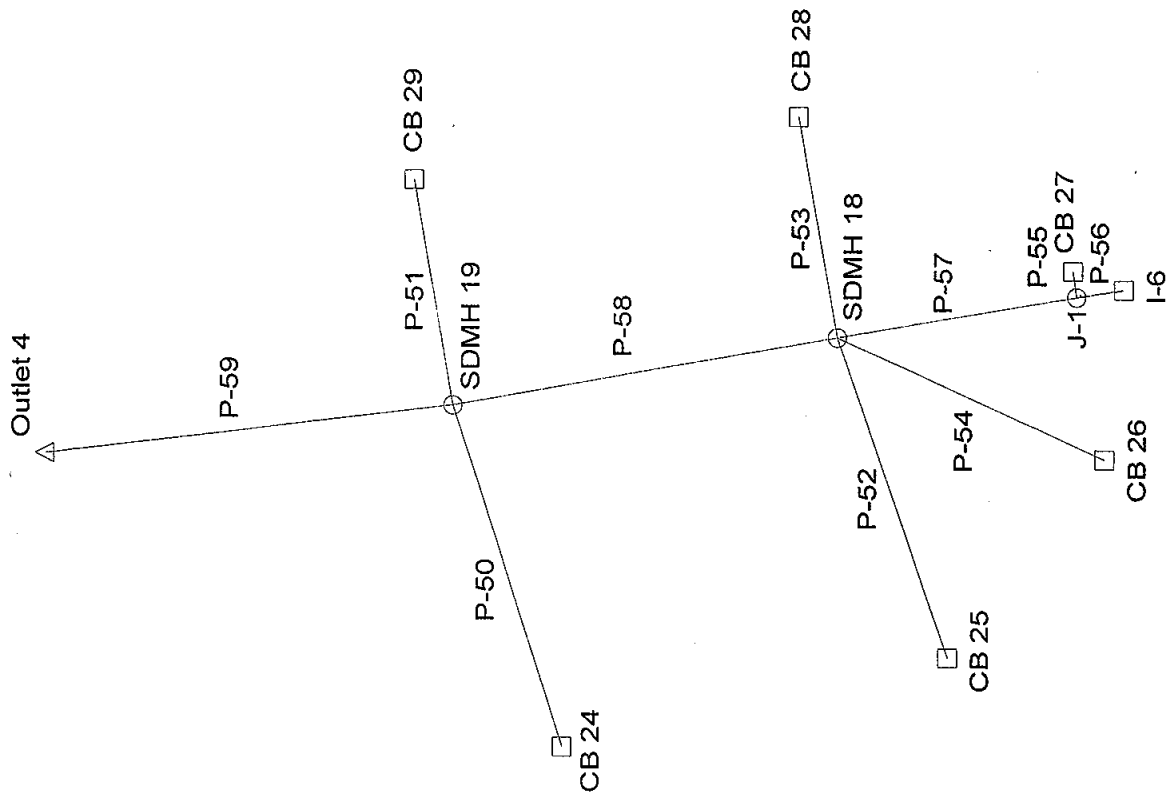


100 YEAR 3/3



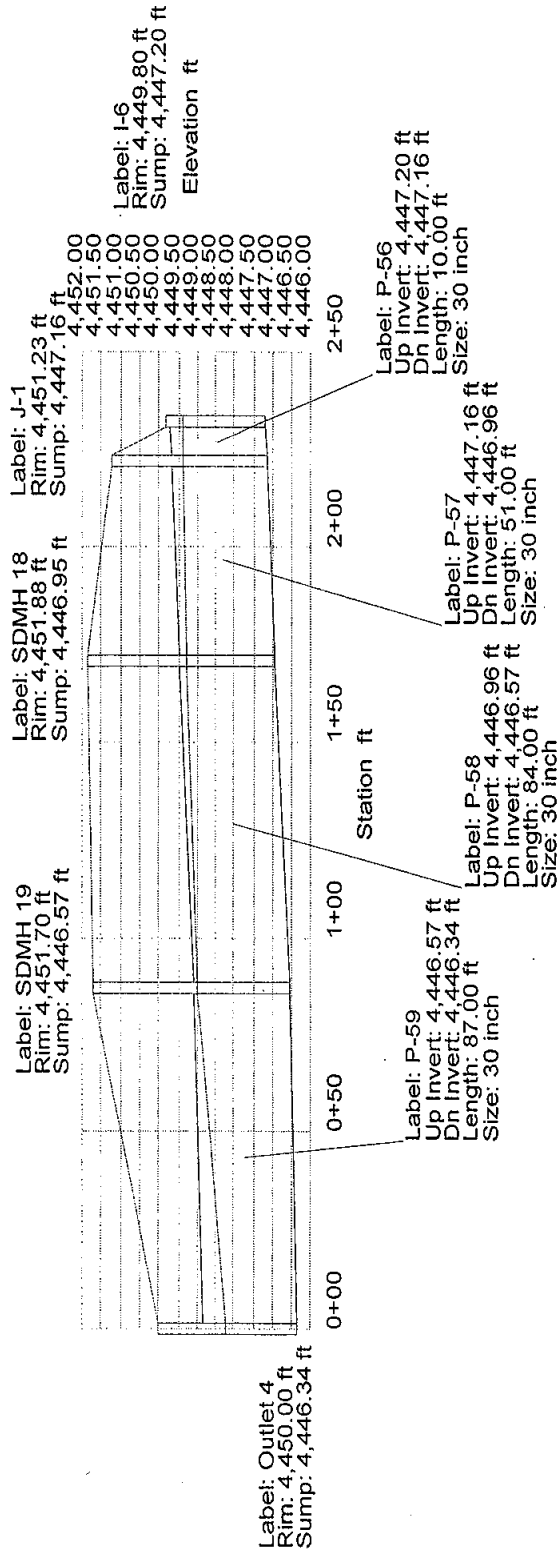
BY APP'D	DESCRIPTION
REV.	DATE
DATE:	DECEMBER, 2000
DRAWN BY:	ACAD14
DESIGNED BY:	R.S.
CHECKED BY:	E.H.
STEAMBOAT PARKWAY NORTH & SOUTH ROADWAY IMPROVEMENTS	
PROPOSED STORM DRAIN SYSTEM 3	
DISPLAY MAP	
WASHOE COUNTY NEVADA	
895 ROBERTA LANE, SUITE 104, SPARKS, NV 89431 (775) 359-3303 FAX (775) 359-3329	
dissey ENGINEERING INCORPORATED	
SCALE	HORIZ 1" = 60'
VERT.	N/A
JOB NO.	2327
SHEET	1
OF	1

SYSTEM 4



STORMCAD RESULTS 10 - YEAR

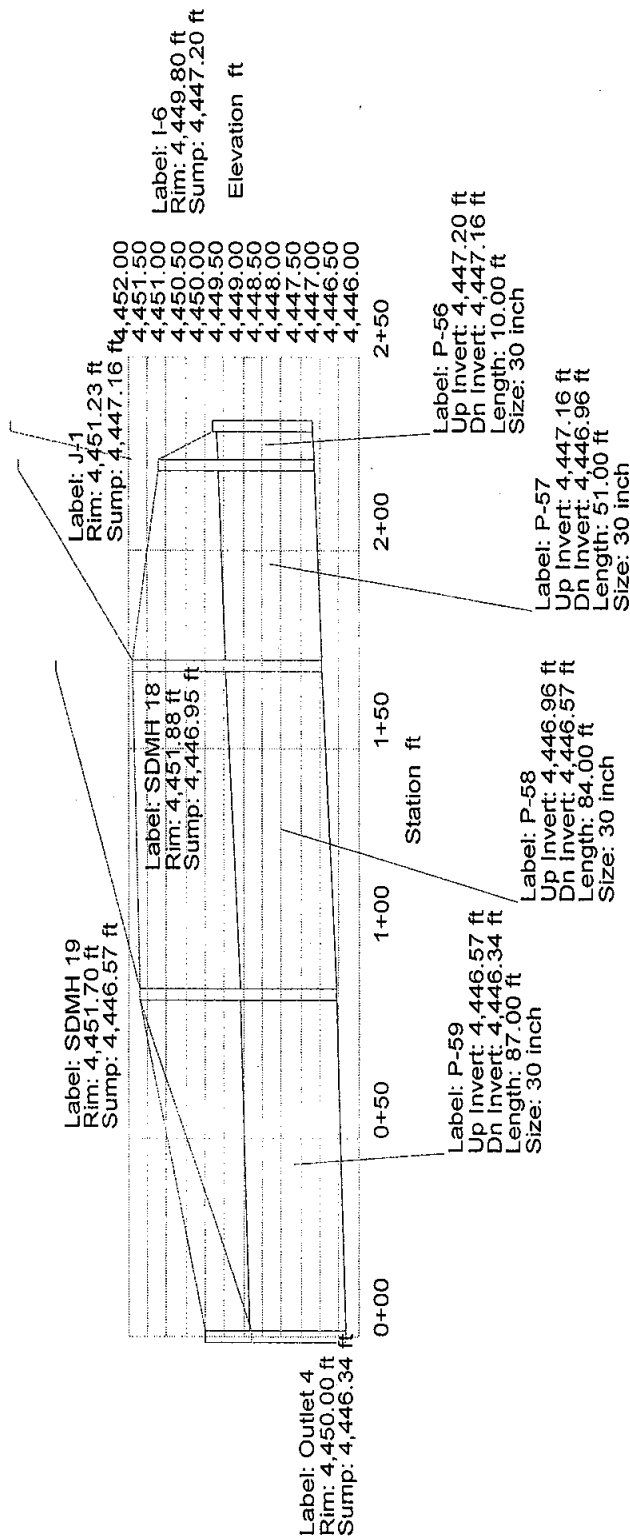
Upstream Node	Downstream Node	Pipe	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
CB 27	J-1	P-55	12 inch	0.17	0.274000	5.00	0.21	4,447.16	4,451.23	4,449.38	4,449.38	4,448.53	4,451.53	4,449.38	4,449.38
I-6	J-1	P-56	30 inch	22.53	0.004000	10.00	4.91	4,447.16	4,451.23	4,449.38	4,449.75	4,447.20	4,449.80	4,449.40	4,449.78
CB 25	SDMH 18	P-52	12 inch	2.07	0.010704	71.00	3.48	4,448.46	4,451.88	4,449.26	4,449.39	4,449.22	4,452.22	4,449.83	4,450.08
J-1	SDMH 18	P-57	30 inch	22.70	0.003922	51.00	4.87	4,446.96	4,451.88	4,449.26	4,449.62	4,447.16	4,451.23	4,449.38	4,449.75
CB 28	SDMH 18	P-53	12 inch	1.78	0.048298	47.00	2.95	4,447.21	4,451.88	4,449.26	4,449.33	4,449.48	4,452.48	4,450.04	4,450.27
CB 26	SDMH 18	P-54	12 inch	0.18	0.025323	62.00	0.25	4,446.96	4,451.88	4,449.26	4,449.26	4,448.53	4,451.53	4,449.26	4,449.26
CB 29	SDMH 19	P-51	12 inch	1.78	0.056042	48.00	2.95	4,446.57	4,451.70	4,448.97	4,449.04	4,449.26	4,452.26	4,449.82	4,450.05
SDMH 18	SDMH 19	P-58	30 inch	26.73	0.004643	84.00	5.59	4,446.57	4,451.70	4,448.97	4,449.45	4,446.96	4,451.88	4,449.26	4,449.76
CB 24	SDMH 19	P-50	12 inch	2.16	0.038667	75.00	3.31	4,446.57	4,451.70	4,448.97	4,449.07	4,449.47	4,452.47	4,450.09	4,450.35
SDMH 19	Outlet 4	P-59	30 inch	30.67	0.002644	87.00	7.02	4,446.34	4,450.00	4,448.23	4,449.15	4,446.57	4,451.70	4,448.97	4,449.60



STORMCAD RESULTS

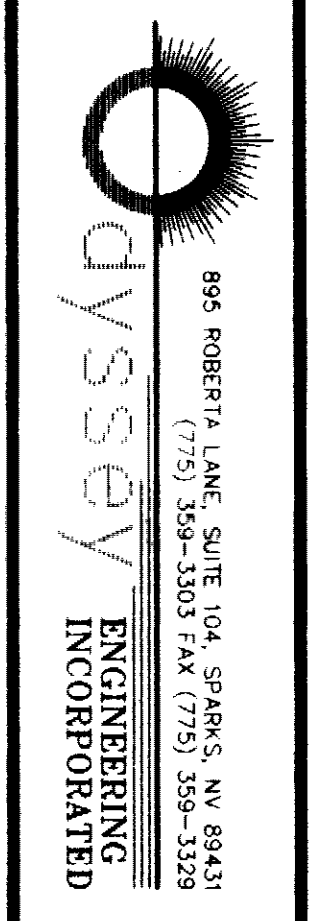
100 - Year

Upstream Node	Downstream Node	Pipe	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
CB 27	J-1	P-55	12 inch	0.37	0.274000	5.00	0.43	4,447.16	4,451.23	4,453.86	4,453.86	4,448.53	4,451.53	4,454.84	4,454.84
I-6	J-1	P-56	30 inch	56.58	0.004000	10.00	11.53	4,447.16	4,451.23	4,453.86	4,455.92	4,447.20	4,449.80	4,455.03	4,457.09
CB 25	SDMH 18	P-52	12 inch	4.55	0.010704	71.00	5.34	4,448.46	4,451.88	4,451.88	4,452.32	4,449.22	4,452.22	4,454.79	4,455.23
CB 26	SDMH 18	P-54	12 inch	0.40	0.025323	62.00	0.47	4,446.96	4,451.88	4,451.88	4,451.88	4,448.53	4,451.53	4,453.86	4,453.87
CB 28	SDMH 18	P-53	12 inch	3.92	0.048298	47.00	4.60	4,447.21	4,451.88	4,451.88	4,452.21	4,449.48	4,452.48	4,454.31	4,454.64
J-1	SDMH 18	P-57	30 inch	56.95	0.003922	51.00	11.60	4,446.96	4,451.88	4,451.88	4,453.97	4,447.16	4,451.23	4,454.84	4,456.93
CB 24	SDMH 19	P-50	12 inch	4.75	0.038667	75.00	5.57	4,446.57	4,451.70	4,451.69	4,452.18	4,449.47	4,452.47	4,452.76	4,453.25
SDMH 18	SDMH 19	P-58	30 inch	65.82	0.004643	84.00	13.41	4,446.57	4,451.70	4,451.69	4,454.49	4,446.96	4,451.88	4,453.86	4,456.65
CB 29	SDMH 19	P-51	12 inch	3.91	0.056042	48.00	4.59	4,446.57	4,451.70	4,451.69	4,452.02	4,449.26	4,452.26	4,452.16	4,452.48
SDMH 19	Outlet 4	P-59	30 inch	74.48	0.002644	87.00	15.21	4,446.34	4,450.00	4,448.79	4,452.40	4,446.57	4,451.70	4,451.69	4,455.27



1
OF
1
SHEET

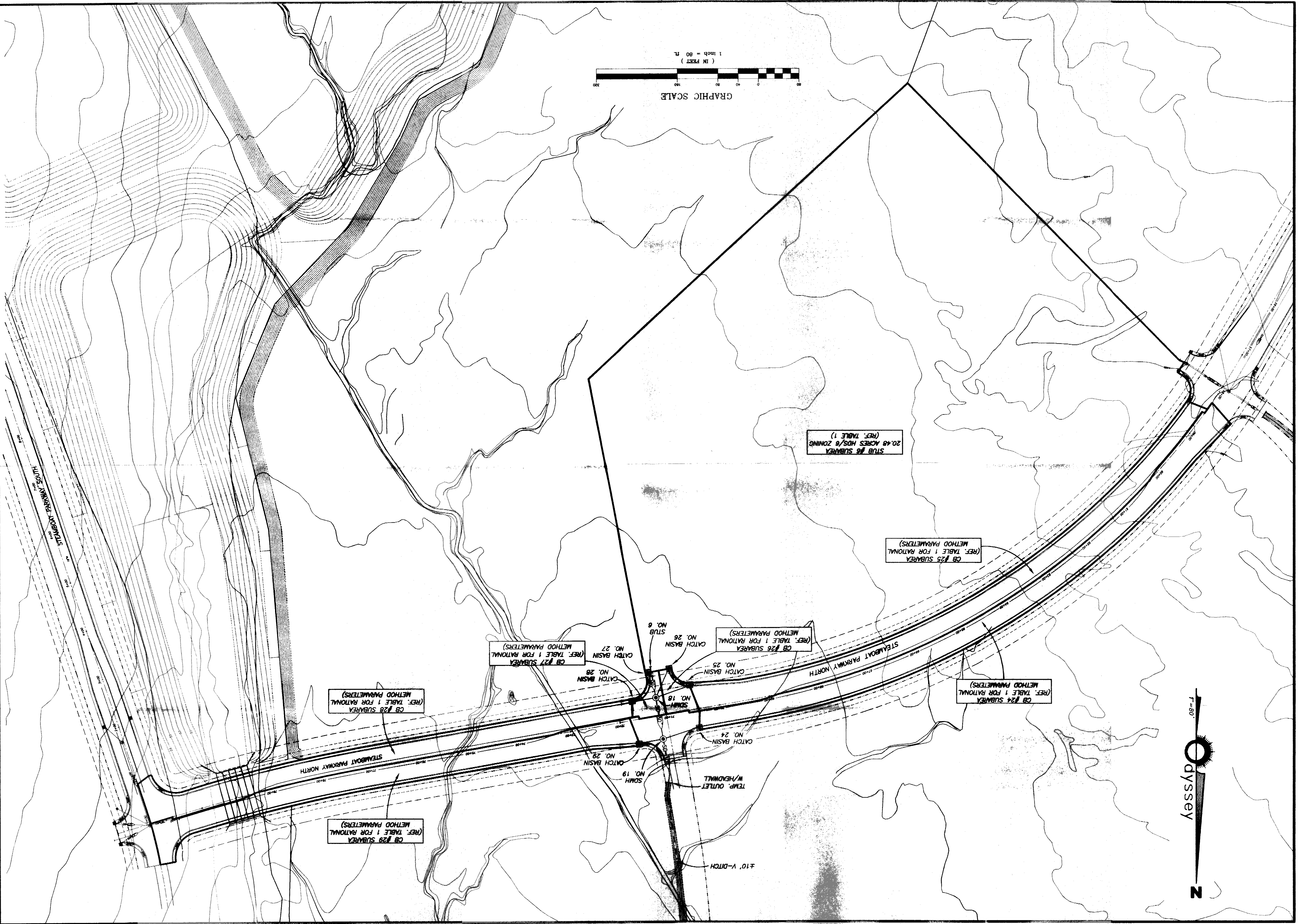
SCALE
HORIZ. 1"=80'
VERT. N/A
JOB NO. 2327



STEAMBOAT PARKWAY NORTH & SOUTH ROADWAY IMPROVEMENTS
PROPOSED STORM DRAIN SYSTEM 4
DISPLAY MAP
WASHOE COUNTY NEVADA

DATE: DECEMBER, 2000
DRAWN BY: A.CAD14
DESIGNED BY: R.S.
CHECKED BY: B.H.

REV.	DATE	DESCRIPTION	BY	APP'D.



SYSTEM 5

CB #38 SUBAREA
(REF. TABLE 1 FOR RATIONAL
METHOD PARAMETERS)

CATCH BASIN
NO. 38

CATCH BASIN
NO. 40

CB #40 SUBAREA
(REF. TABLE 1 FOR RATIONAL
METHOD PARAMETERS)

DAMONTE RANCH HIGH
SCHOOL SITE

CB #39 SUBAREA
(REF. TABLE 1 FOR RATIONAL
METHOD PARAMETERS)

SDMH
NO. 24

CATCH BASIN
NO. 39

2 EA. 4'x10'
BOX CULVERTS

OUTLET INTO
BOX CULVERT

FLOOD CONTROL
IMPROVEMENTS
(REF. IMPROVEMENT PLANS)

N

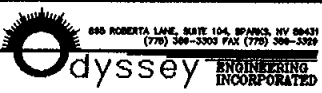


GRAPHIC SCALE

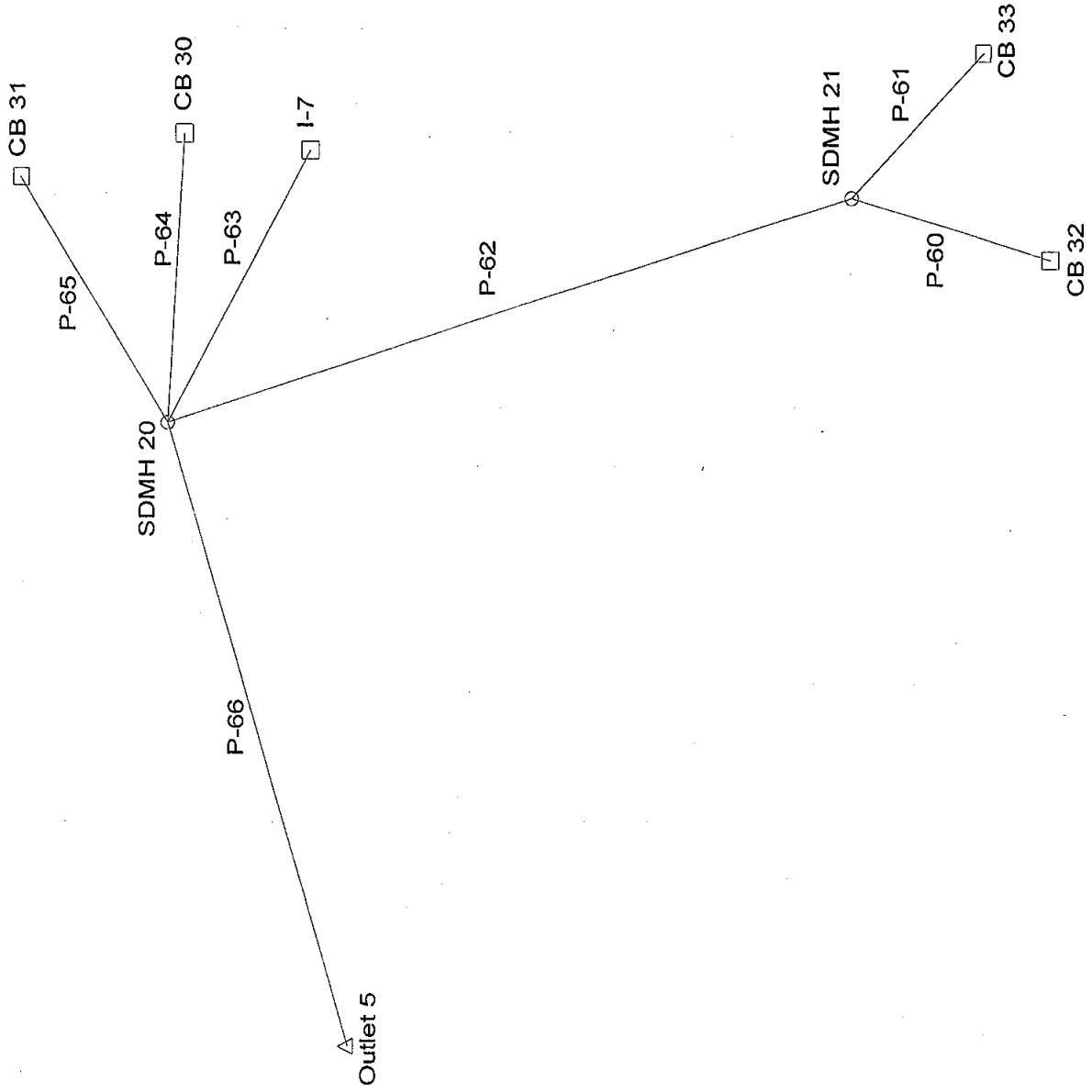
STEAMBOAT PARKWAY NORTH & SOUTH ROADWAY IMPROVEMENTS
PROPOSED STORM DRAIN SYSTEM 8
DISPLAY MAP
WASHOE COUNTY NEVADA

DATE: DECEMBER 2000
DRAWN BY: ACAB16
DESIGNED BY: R.S.
CHECKED BY: B.H.

REV.	DATE	DESCRIPTION	BY	APP'D



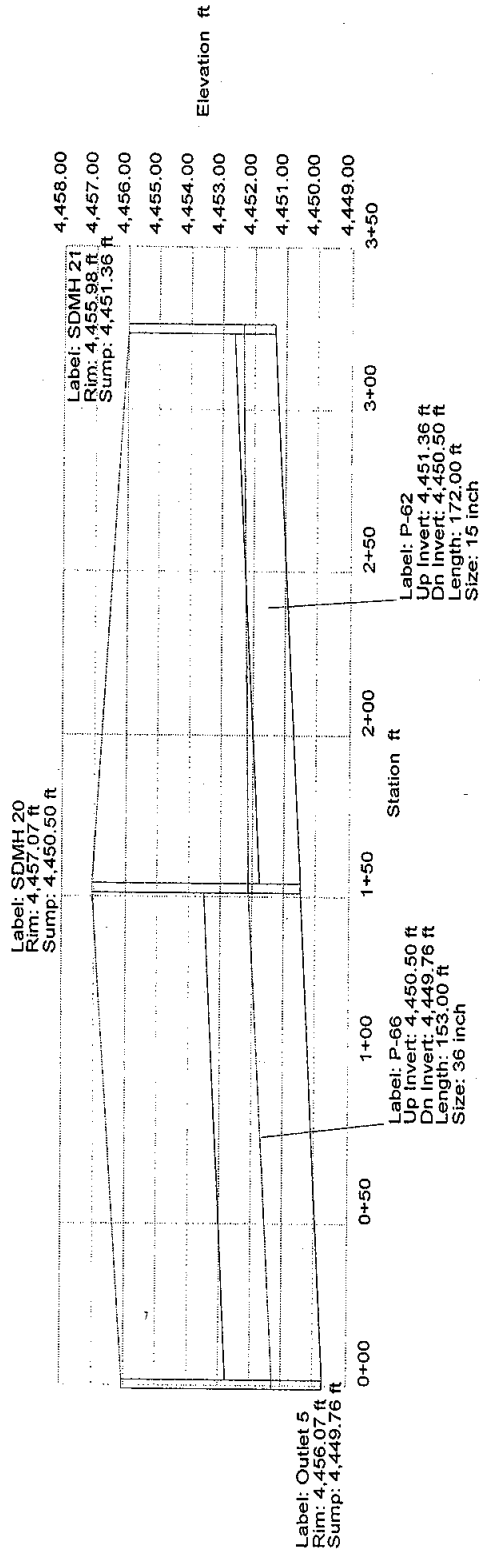
SCALE: AS SHOWN
SHEET NO. 1
OF 1



STORMCAD RESULTS

10 - Year

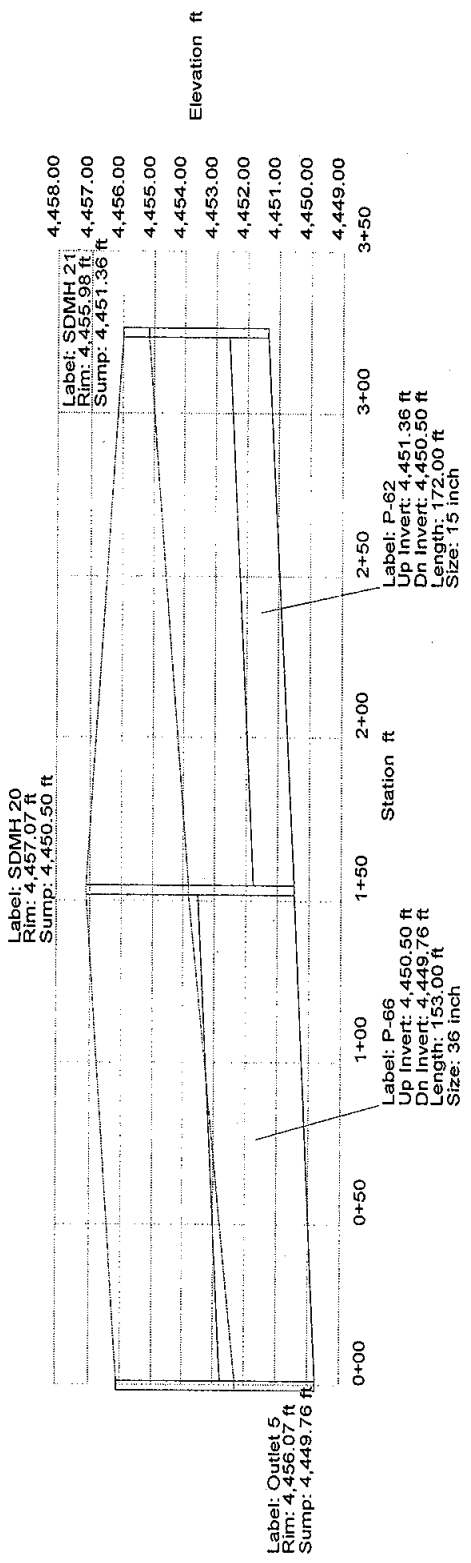
Upstream Node	Downstream Node	Pipe Size	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
CB 32	SDMH 21	P-60	12 inch	1.28	0.026122	49.00	2.69	4,451.61	4,455.98	4,452.35	4,452.41	4,452.89	4,455.69	4,453.36	4,453.54
CB 33	SDMH 21	P-61	12 inch	1.31	0.023478	46.00	2.73	4,451.61	4,455.98	4,452.35	4,452.41	4,452.69	4,455.69	4,453.17	4,453.35
I-7	SDMH 20	P-63	36 inch	21.93	0.004932	73.00	5.93	4,450.50	4,457.07	4,452.11	4,452.61	4,450.86	4,454.40	4,452.37	4,452.96
CB 30	SDMH 20	P-64	12 inch	0.12	0.010290	69.00	1.93	4,452.50	4,457.07	4,452.62	4,452.69	4,453.21	4,456.21	4,453.35	4,453.40
CB 31	SDMH 20	P-65	12 inch	0.15	0.010294	68.00	2.06	4,452.50	4,457.07	4,452.64	4,452.72	4,453.20	4,456.20	4,453.36	4,453.41
SDMH 21	SDMH 20	P-62	15 inch	2.59	0.005000	172.00	2.30	4,450.50	4,457.07	4,452.11	4,452.18	4,451.36	4,455.98	4,452.35	4,452.45
SDMH 20	Outlet 5	P-66	36 inch	24.79	0.004837	153.00	6.55	4,449.76	4,456.07	4,451.32	4,452.01	4,450.50	4,457.07	4,452.11	4,452.75

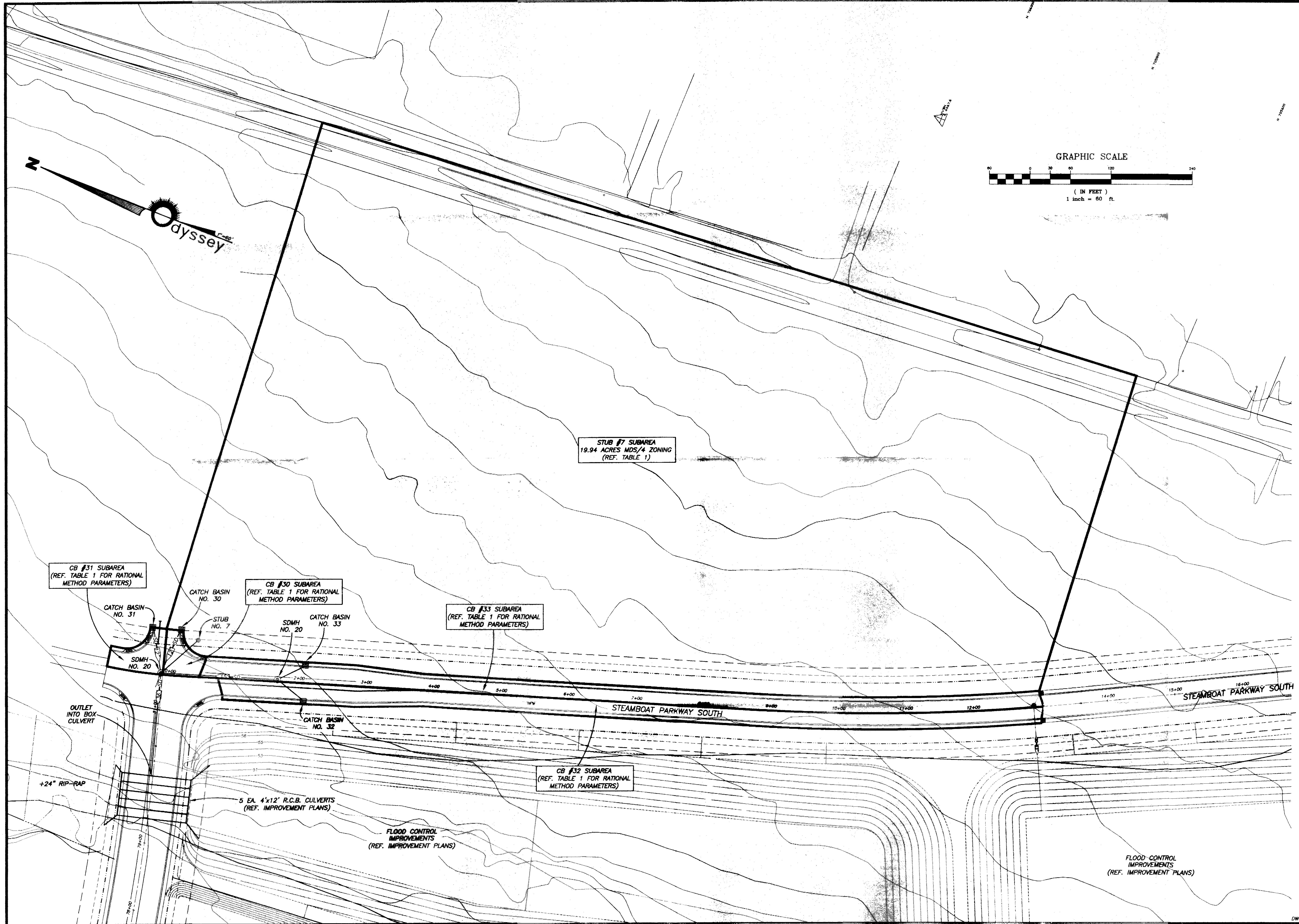


STORMCAD RESULTS

100 - YEAR

Upstream Node	Downstream Node	Pipe Size	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
CB 32	SDMH 21	P-60	12 inch	2.81	0.026122	49.00	3.30	4,451.61	4,455.98	4,455.14	4,455.30	4,452.89	4,455.69	4,455.38	4,455.55
CB 33	SDMH 21	P-61	12 inch	2.88	0.023478	46.00	3.38	4,451.61	4,455.98	4,455.14	4,455.31	4,452.69	4,455.69	4,455.38	4,455.55
CB 30	SDMH 20	P-64	12 inch	0.27	0.010290	69.00	0.43	4,452.50	4,457.07	4,453.80	4,453.80	4,453.21	4,456.21	4,453.80	4,453.81
SDMH 21	SDMH 20	P-62	15 inch	5.69	0.005000	172.00	4.64	4,450.50	4,457.07	4,453.80	4,454.14	4,451.36	4,455.98	4,455.14	4,455.47
CB 31	SDMH 20	P-65	12 inch	0.34	0.010294	68.00	0.53	4,452.50	4,457.07	4,453.80	4,453.80	4,453.20	4,456.20	4,453.80	4,453.81
I-7	SDMH 20	P-63	36 inch	55.08	0.004932	73.00	7.79	4,450.50	4,457.07	4,453.80	4,454.74	4,450.86	4,454.40	4,454.30	4,455.24
SDMH 20	Outlet 5	P-66	36 inch	61.38	0.004837	153.00	9.17	4,449.76	4,456.07	4,452.29	4,453.74	4,450.50	4,457.07	4,453.80	4,454.97





STUB #7 SUBAREA
19.94 ACRES MDS/4 ZONING
(REF. TABLE 1)

CB #31 SUBAREA
(REF. TABLE 1 FOR RATIONAL
METHOD PARAMETERS)

CB #30 SUBAREA
(REF. TABLE 1 FOR RATIONAL
METHOD PARAMETERS)

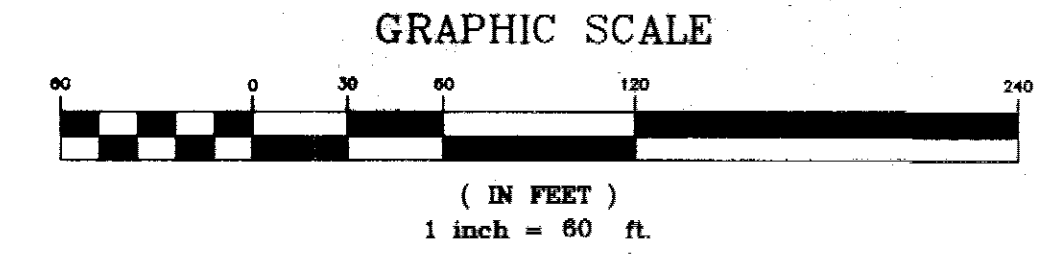
CB #33 SUBAREA
(REF. TABLE 1 FOR RATIONAL
METHOD PARAMETERS)

CB #32 SUBAREA
(REF. TABLE 1 FOR RATIONAL
METHOD PARAMETERS)

5 EA. 4x12' R.C.B. CULVERTS
(REF. IMPROVEMENT PLANS)

FLOOD CONTROL
IMPROVEMENTS
(REF. IMPROVEMENT PLANS)

FLOOD CONTROL
IMPROVEMENTS
(REF. IMPROVEMENT PLANS)



DATE: DECEMBER, 2000	REV.	DATE	DESCRIPTION	BY	APP'D
DRAWN BY: ACAD14					
DESIGNED BY: R.S.					
CHECKED BY: B.H.					

STEAMBOAT PARKWAY NORTH & SOUTH ROADWAY IMPROVEMENTS
PROPOSED STORM DRAIN SYSTEM 5
DISPLAY MAP
WASHOE COUNTY NEVADA

895 ROBERTA LANE, SUITE 104, SPARKS, NV 89431
(775) 359-1303 FAX (775) 359-3329

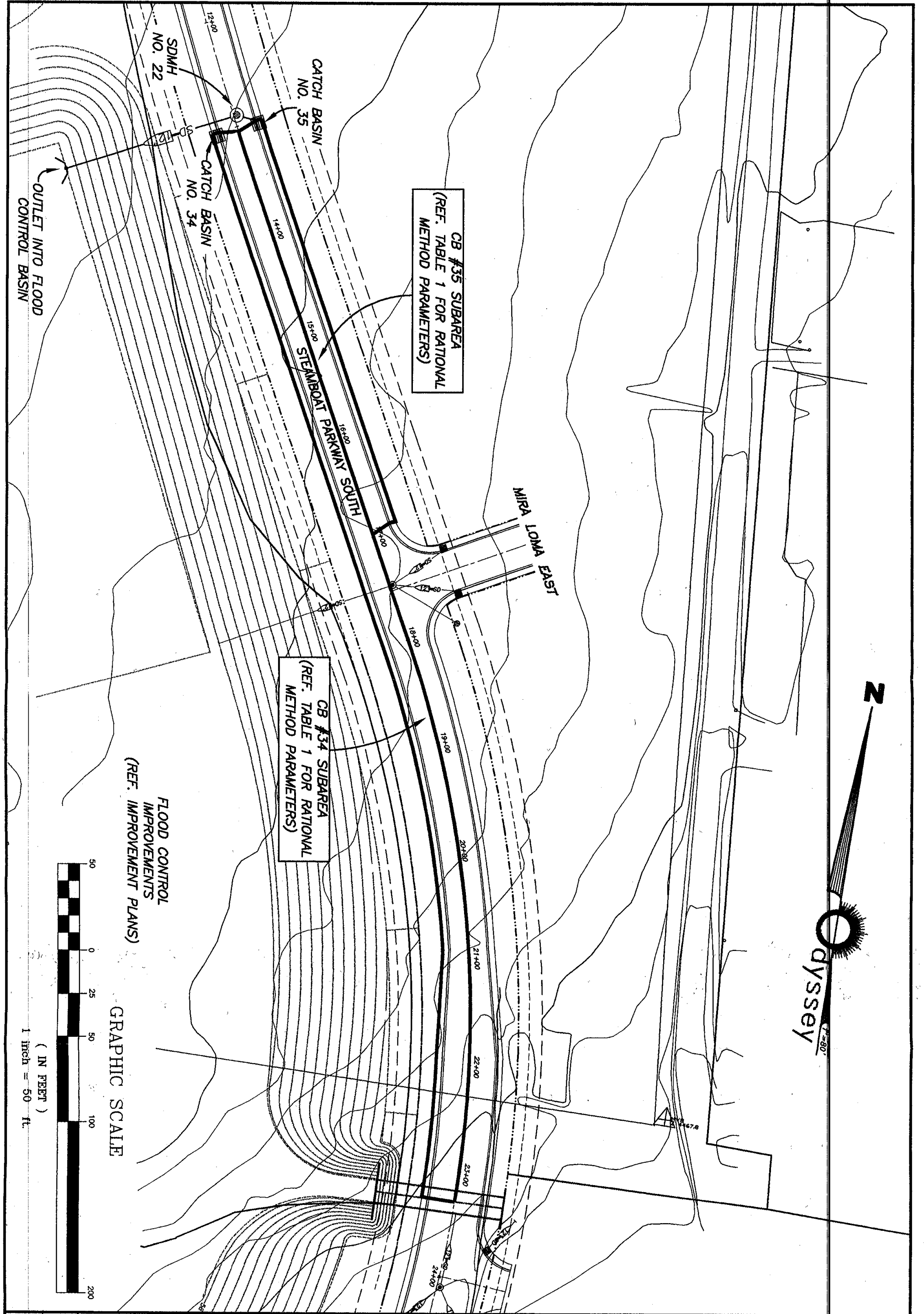
Odyssey
ENGINEERING
INCORPORATED

SCALE
HORIZ. 1" = 60'
VERT. N/A
JOB NO.
2327

SHEET
1
OF
1

DWC

SYSTEM 6

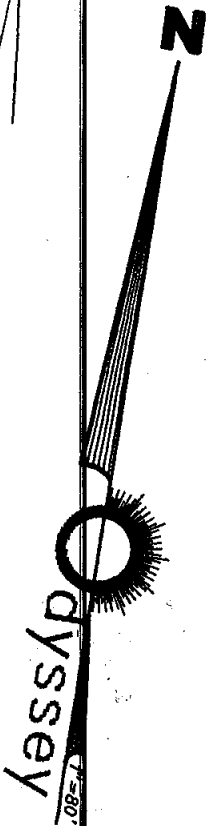
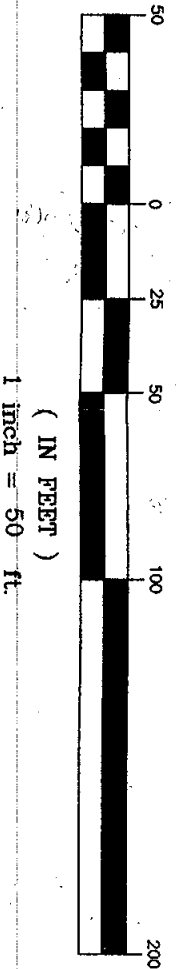


CB #35 SUBAREA
(REF. TABLE 1 FOR RATIONAL
METHOD PARAMETERS)

CB #34 SUBAREA
(REF. TABLE 1 FOR RATIONAL
METHOD PARAMETERS)

FLOOD CONTROL
IMPROVEMENTS
(REF. IMPROVEMENT PLANS)

GRAPHIC SCALE



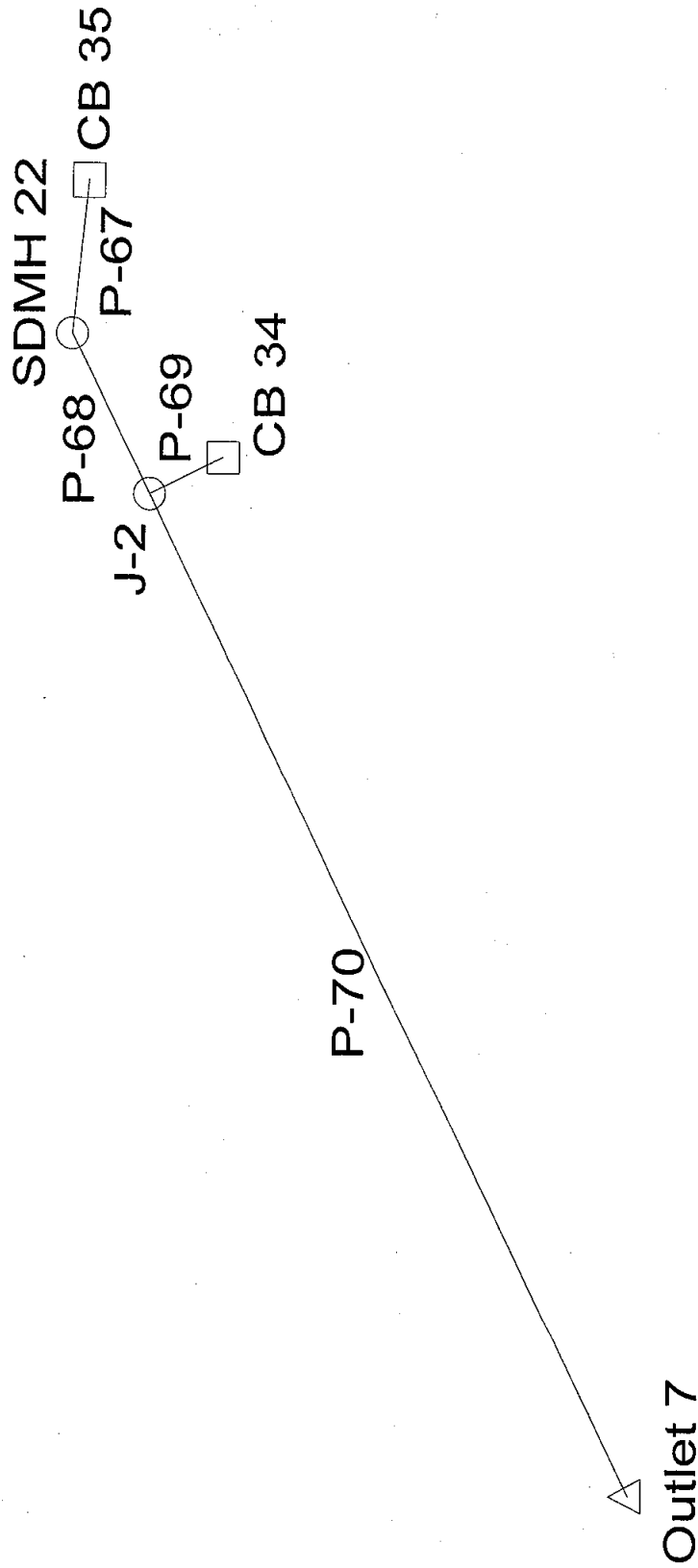
STEAMBOAT PARKWAY NORTH & SOUTH ROADWAY IMPROVEMENTS
PROPOSED STORM DRAIN SYSTEM 6
DISPLAY MAP
WASHOE COUNTY NEVADA

DATE: DECEMBER 2000
DRAWN BY: ACAD14
DESIGNED BY: E.S.
CHECKED BY: B.H.

REV.	DATE	DESCRIPTION	BY	APP'D.

odyssey ENGINEERING INCORPORATED
200 ROBERTA LANE, SUITE 104, SPANISH HAVEN, NV 89431
(702) 399-3300 FAX (702) 399-3329

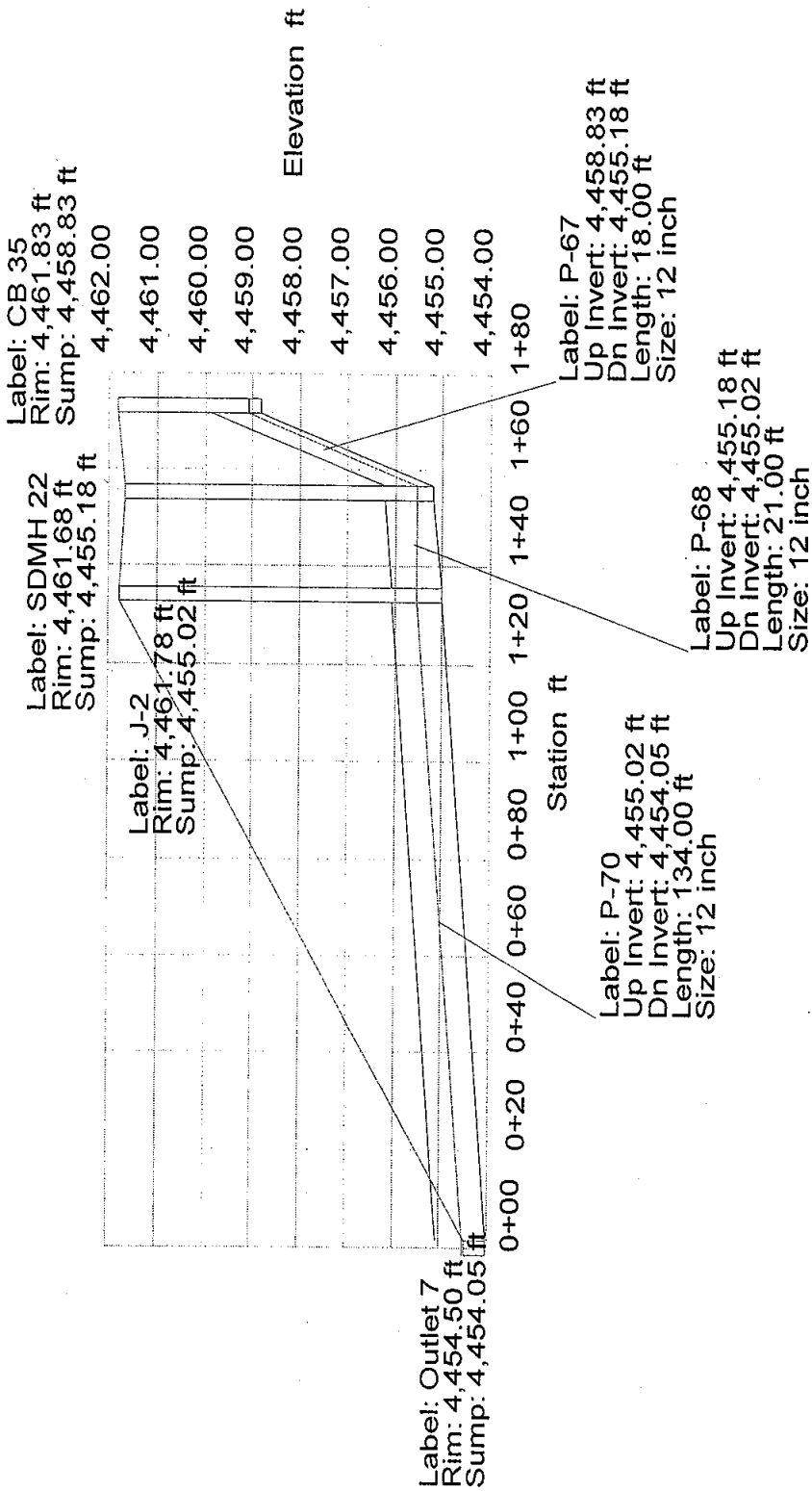
SCALE
1" = 50'
1" = 50'



STORMCAD RESULTS

10 - Year

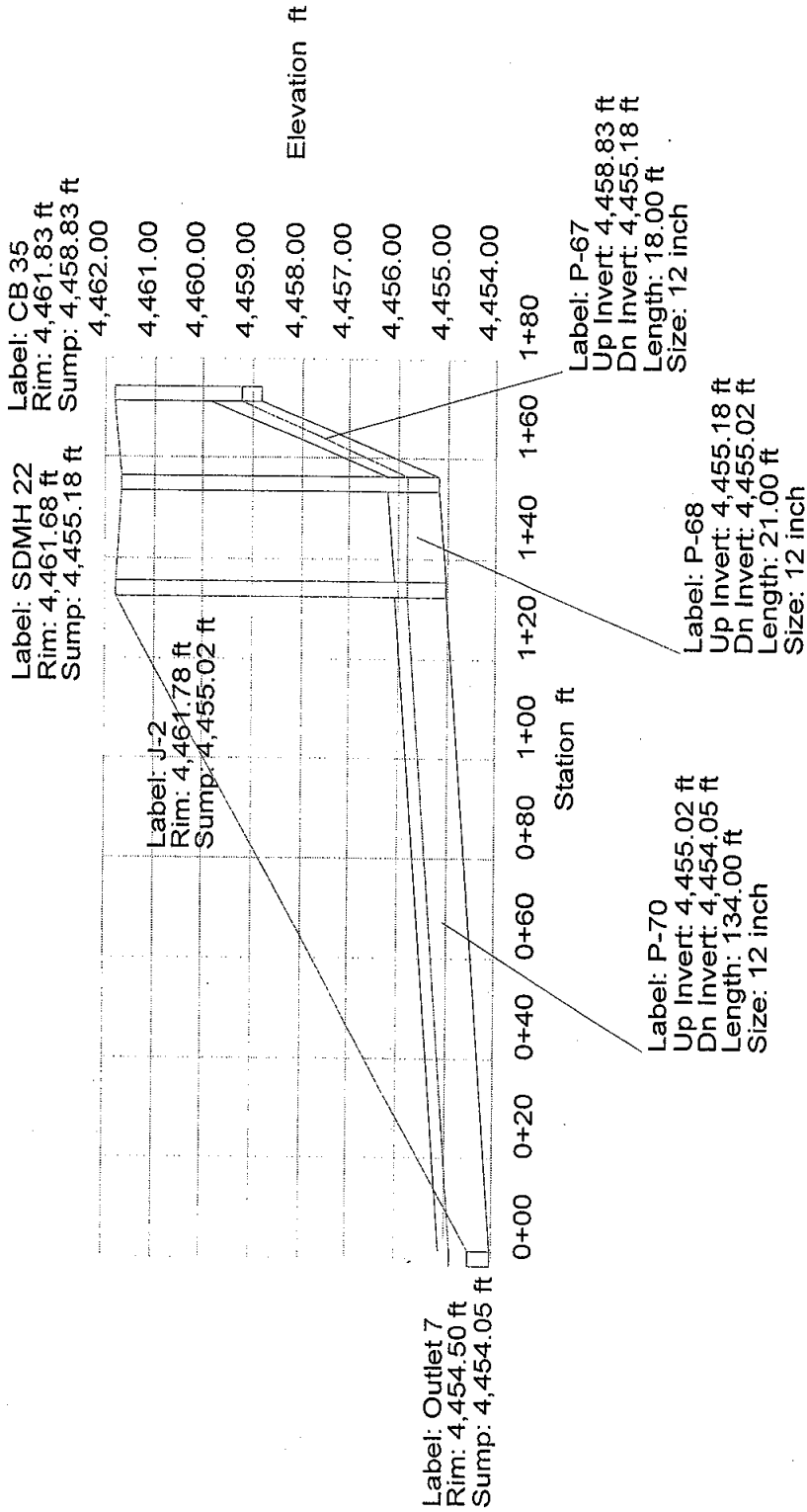
Upstream Node	Downstream Node	Pipe	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
CB 35	SDMH 22	P-67	12 inch	0.39	0.202778	18.00	2.02	4,455.18	4,461.68	4,455.52	4,455.56	4,458.83	4,461.83	4,459.08	4,459.18
SDMH 22	J-2	P-68	12 inch	0.39	0.007619	21.00	1.29	4,455.02	4,461.78	4,455.53	4,455.54	4,455.18	4,461.68	4,455.52	4,455.56
CB 34	J-2	P-69	12 inch	1.07	0.381000	10.00	2.92	4,455.02	4,461.78	4,455.53	4,455.63	4,458.83	4,461.83	4,459.26	4,459.42
J-2	Outlet 7	P-70	12 inch	1.46	0.007239	134.00	3.69	4,454.05	4,454.50	4,454.53	4,454.76	4,455.02	4,461.78	4,455.53	4,455.72



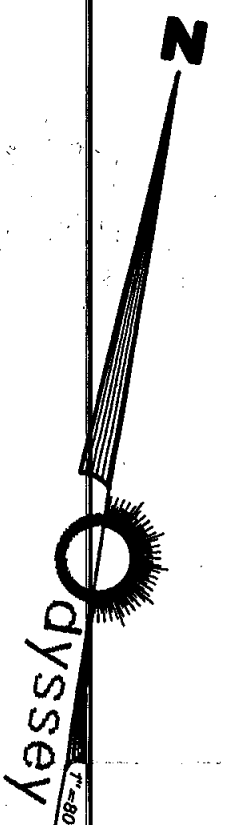
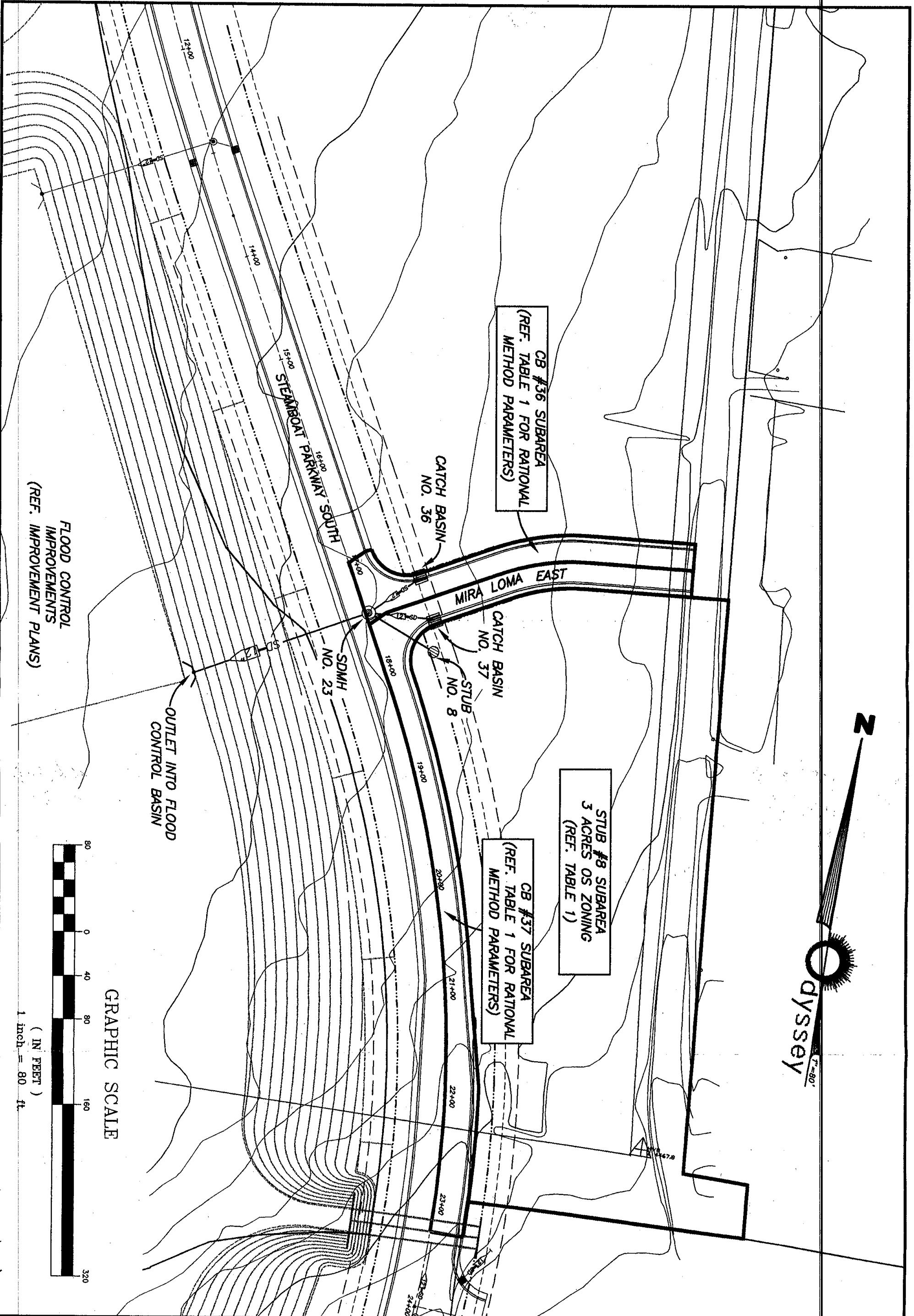
STORMCAD RESULTS

100 - Year

Upstream Node	Downstream Node	Pipe	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
CB 35	SDMH 22	P-67	12 inch	0.85	0.202778	18.00	2.27	4,455.18	4,461.68	4,455.83	4,455.86	4,458.83	4,461.83	4,459.21	4,459.35
SDMH 22	J-2	P-68	12 inch	0.85	0.007619	21.00	1.37	4,455.02	4,461.78	4,455.83	4,455.85	4,455.18	4,461.68	4,455.83	4,455.86
CB 34	J-2	P-69	12 inch	2.34	0.381000	10.00	3.76	4,455.02	4,461.78	4,455.83	4,456.00	4,458.83	4,461.83	4,459.48	4,459.75
J-2	Outlet 7	P-70	12 inch	3.19	0.007239	134.00	4.51	4,454.05	4,454.50	4,454.86	4,455.17	4,455.02	4,461.78	4,455.83	4,456.14

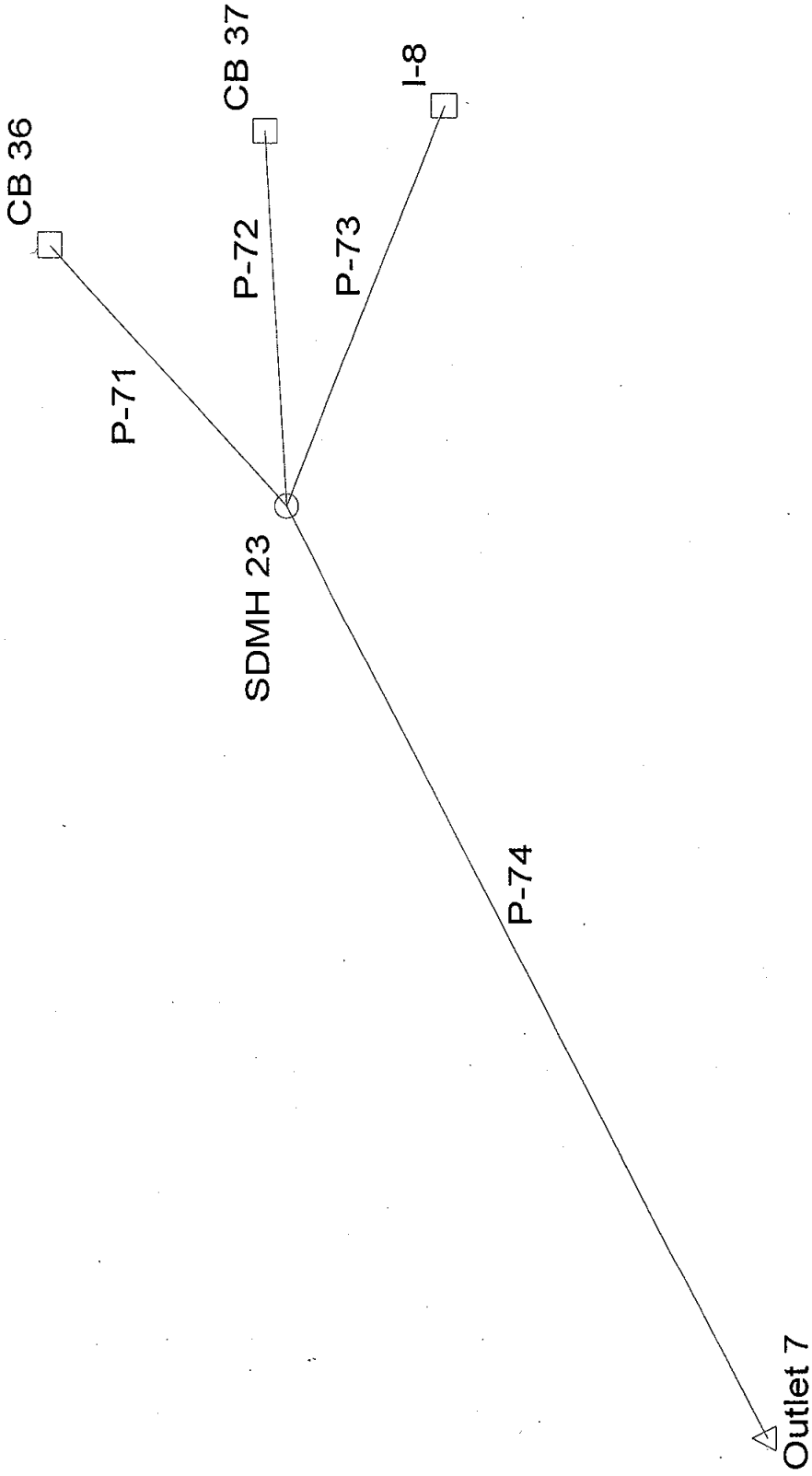


SYSTEM 7



GRAPHIC SCALE

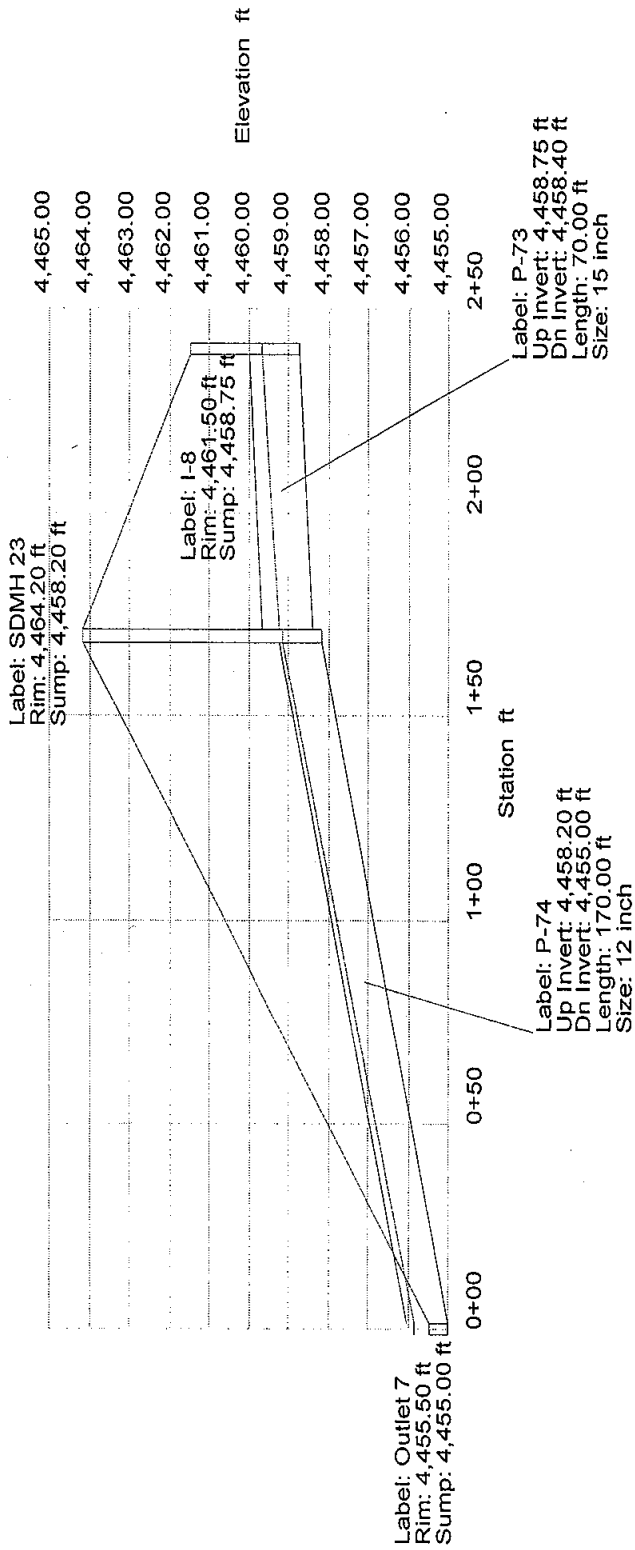
(IN FEET)
1 inch = 80 ft.



STORMCAD RESULTS

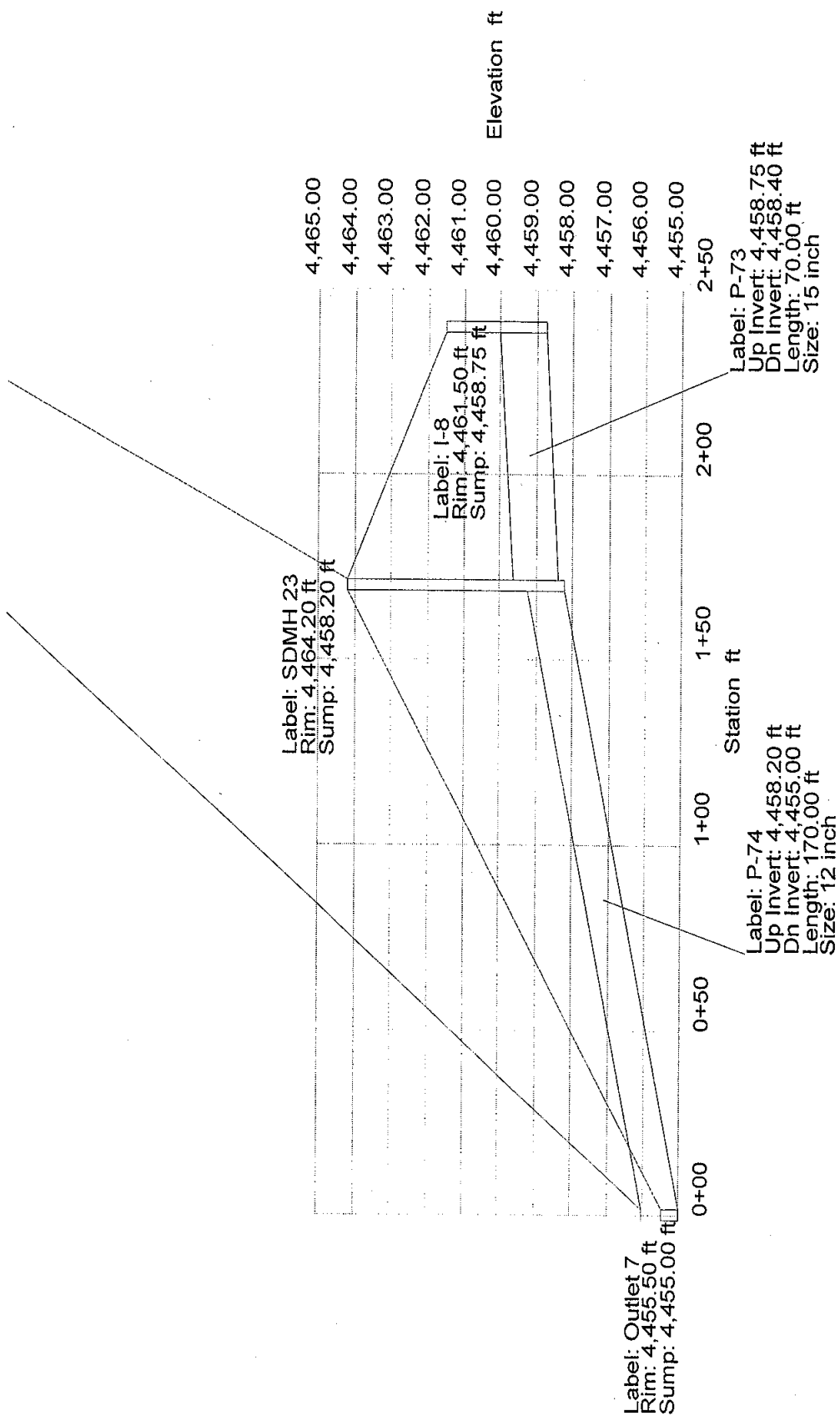
10 - Year

Upstream Node	Downstream Node	Pipe	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
CB 36	SDMH 23	P-71	12 inch	0.36	0.037368	57.00	1.45	4,458.40	4,464.20	4,459.15	4,459.16	4,460.53	4,463.53	4,460.77	4,460.86
I-8	SDMH 23	P-73	15 inch	4.20	0.005000	70.00	4.54	4,458.40	4,464.20	4,459.23	4,459.60	4,458.75	4,461.50	4,459.69	4,459.97
CB 37	SDMH 23	P-72	12 inch	0.92	0.034918	61.00	2.24	4,458.40	4,464.20	4,459.15	4,459.18	4,460.53	4,463.53	4,460.93	4,461.07
SDMH 23	Outlet 7	P-74	12 inch	5.48	0.018824	170.00	7.00	4,455.00	4,455.50	4,455.86	4,456.68	4,458.20	4,464.20	4,459.15	4,459.85



STORMCAD RESULTS 100 - Year

Upstream Node	Downstream Node	Pipe	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
I-8	SDMH 23	P-73	15 inch	10.20	0.005000	70.00	8.31	4,458.40	4,464.20	4,464.20	4,465.27	4,458.75	4,461.50	4,476.05	4,477.12
CB 37	SDMH 23	P-72	12 inch	2.02	0.034918	61.00	2.37	4,458.40	4,464.20	4,464.20	4,464.29	4,460.53	4,463.53	4,474.46	4,474.55
CB 36	SDMH 23	P-71	12 inch	0.80	0.037368	57.00	0.94	4,458.40	4,464.20	4,464.20	4,464.21	4,460.53	4,463.53	4,474.33	4,474.34
SDMH 23	Outlet 7	P-74	12 inch	13.02	0.018824	170.00	15.28	4,455.00	4,455.50	4,456.04	4,459.67	4,458.20	4,464.20	4,474.31	4,477.93



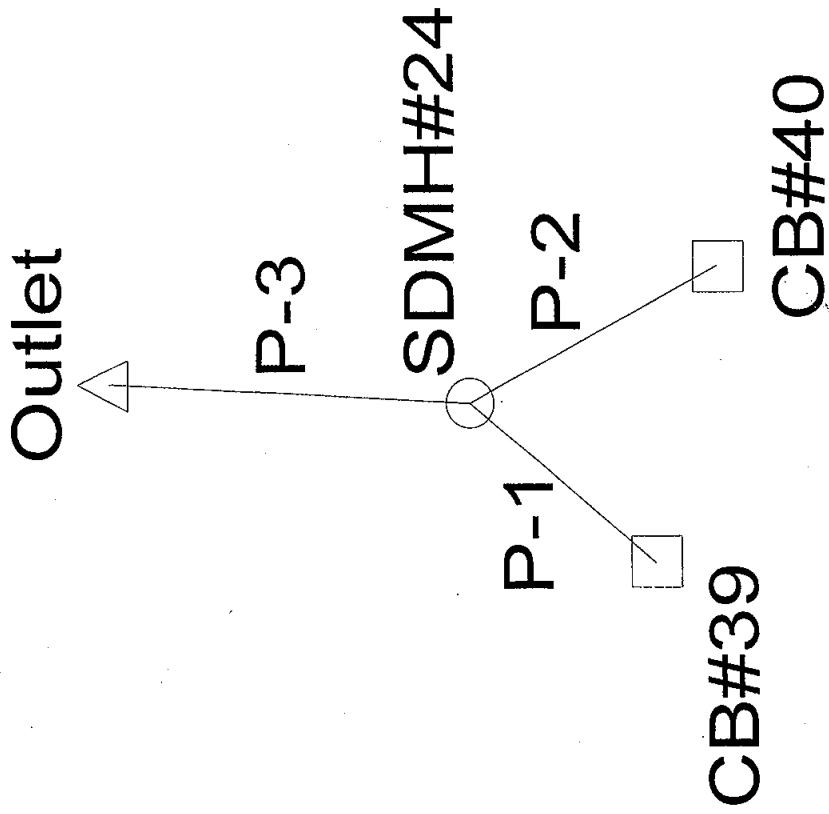
100 - YEAR

Project Title: DAMONTE 3 SYSTEM 7
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 12/10/00 12:37:12 PM

© Haeslad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666
 ODYSSEY ENGINEERING INC

Project Engineer: ODYSSEY ENGINEERING
 StormCAD v1.5 [158]
 Page 1 of 1

SYSTEM 8

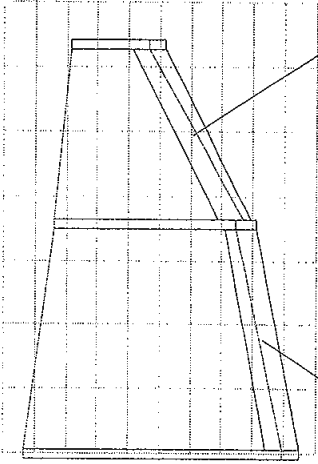


STORMCAD RESULTS

10 - Year

Upstream Node	Downstream Node	Pipe	Section Size	Discharge (cfs)	Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
CB#40	SDMH#24	P-2	12 inch	1.62	0.049821	56.00	6.61	4,460.06	4,466.36	4,460.32	4,461.74	4,462.85	4,465.85	4,463.38	4,463.59
CB#39	SDMH#24	P-1	12 inch	1.22	0.062708	48.00	3.23	4,460.06	4,466.36	4,460.55	4,460.70	4,463.07	4,466.07	4,463.53	4,463.71
SDMH#24	Outlet	P-3	12 inch	2.65	0.018451	71.00	5.36	4,458.55	4,467.35	4,459.06	4,459.68	4,459.86	4,466.36	4,460.55	4,460.85

Label: SDMH#24
 Rim: 4,466.36 ft
 Sump: 4,459.86 ft



Label: Outlet
 Rim: 4,467.35 ft
 Sump: 4,458.55 ft

4,468.00
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 4,462.00
 4,461.00
 4,460.00
 4,459.00
 4,458.00

Label: CB#40
 Rim: 4,465.85 ft
 Sump: 4,462.85 ft

Elevation ft

~~0+00-20-40-60-80-100-200-400~~

Station ft

Label: P-2
 Up Invert: 4,462.85 ft
 Dn Invert: 4,460.06 ft
 Length: 56.00 ft
 Size: 12 inch

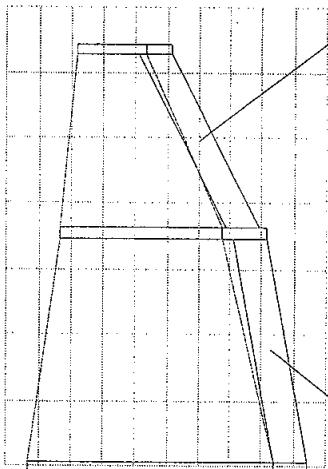
Label: P-3
 Up Invert: 4,459.86 ft
 Dn Invert: 4,458.55 ft
 Length: 71.00 ft
 Size: 12 inch

STORMCAD RESULTS

100 - Year

Upstream Node	Downstream Node	Pipe Size	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
CB#39	SDMH#24	P-1	12 inch	2.65	0.062708	48.00	3.77	4,460.06	4,466.36	4,461.24	4,461.39	4,463.07	4,466.07	4,463.76	4,464.06
CB#40	SDMH#24	P-2	12 inch	3.81	0.049821	56.00	4.87	4,460.06	4,466.36	4,461.24	4,461.55	4,462.85	4,465.85	4,463.68	4,464.11
SDMH#24	Outlet	P-3	12 inch	6.04	0.018451	71.00	7.09	4,458.55	4,467.35	4,459.59	4,460.37	4,459.86	4,466.36	4,461.24	4,462.02

Label: SDMH#24
 Rim: 4,466.36 ft
 Sump: 4,459.86 ft



Label: Outlet
 Rim: 4,467.35 ft
 Sump: 4,458.55 ft

4,468.00
 4,467.00
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 4,459.00
 4,458.00

Label: CB#40
 Rim: 4,465.85 ft
 Sump: 4,462.85 ft

Elevation ft

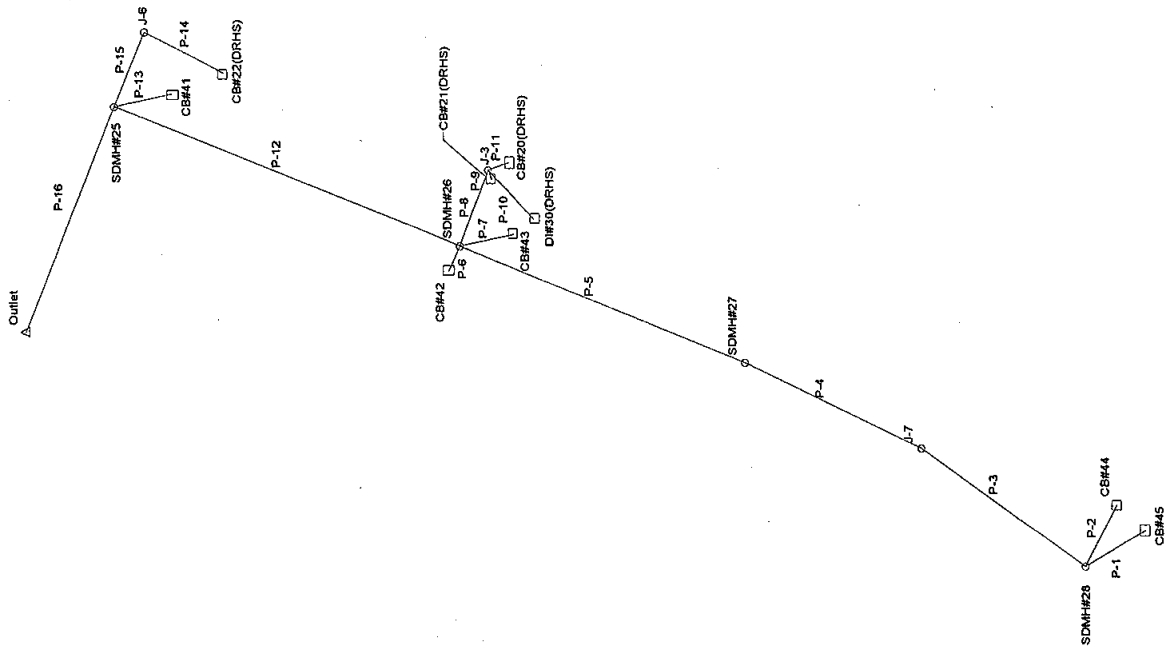
~~0+00~~ ~~20+00~~ ~~60+80~~ ~~00-20~~ ~~40~~
 Station ft

Label: P-3
 Up Invert: 4,459.86 ft
 Dn Invert: 4,458.55 ft
 Length: 71.00 ft
 Size: 12 inch

Label: P-2
 Up Invert: 4,462.85 ft
 Dn Invert: 4,460.06 ft
 Length: 56.00 ft
 Size: 12 inch

100-YEAR

SYSTEM 9

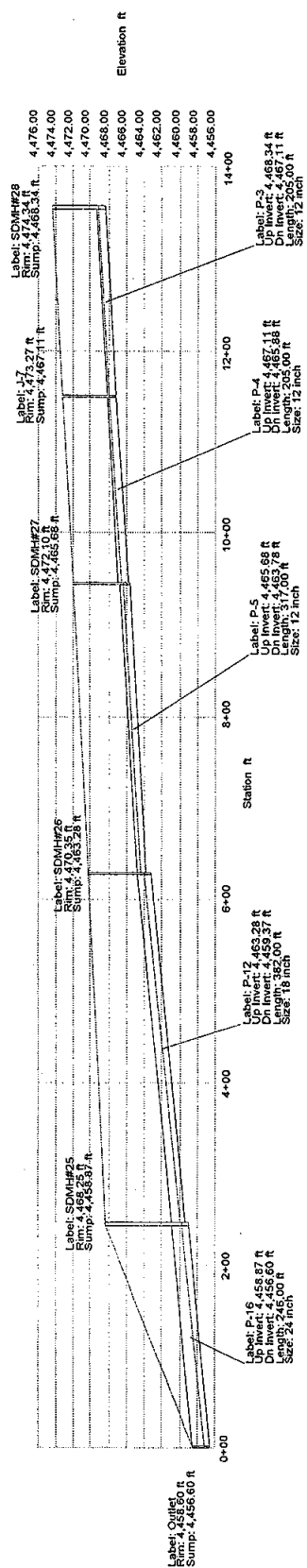


System 9

10 - YEAR

Upstream Node	Downstream Node	Pipe	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
CB#45	SDMH#28	P-1	12 inch	1.66	0.028028	71.00	3.64	4,468.54	4,474.34	4,469.10	4,469.30	4,470.53	4,473.53	4,471.07	4,471.28
CB#44	SDMH#28	P-2	12 inch	1.61	0.028429	70.00	3.57	4,468.54	4,474.34	4,469.10	4,469.28	4,470.53	4,473.53	4,471.06	4,471.27
SDMH#28	J-7	P-3	12 inch	2.70	0.006000	205.00	4.11	4,467.11	4,473.27	4,467.85	4,468.12	4,468.34	4,474.34	4,469.10	4,469.35
CB#21(DRHS)	J-3	P-9	12 inch	0.26	0.334000	10.00	6.45	4,465.03	4,471.41	4,465.10	4,466.89	4,468.37	4,471.37	4,468.58	4,468.65
CB#20(DRHS)	J-3	P-11	12 inch	1.45	0.196364	22.00	8.67	4,465.03	4,471.41	4,465.22	4,468.17	4,469.35	4,472.35	4,469.85	4,470.05
DI#30(DRHS)	J-3	P-10	12 inch	0.61	0.019855	69.00	3.97	4,465.03	4,471.41	4,465.23	4,465.65	4,466.40	4,469.40	4,466.72	4,466.84
J-7	SDMH#27	P-4	12 inch	2.64	0.006000	205.00	4.24	4,465.88	4,472.10	4,466.57	4,466.87	4,467.11	4,473.27	4,467.85	4,468.11
CB#22(DRHS)	J-6	P-14	12 inch	2.11	0.073626	91.00	7.95	4,461.28	4,469.34	4,461.55	4,463.73	4,467.98	4,470.98	4,468.59	4,468.85
J-3	SDMH#26	P-8	15 inch	1.25	0.015060	83.00	3.05	4,463.53	4,470.35	4,464.01	4,464.14	4,464.78	4,471.41	4,465.22	4,465.38
SDMH#27	SDMH#26	P-5	12 inch	2.60	0.005994	317.00	4.22	4,463.78	4,470.35	4,464.46	4,464.76	4,465.68	4,472.10	4,466.41	4,466.67
CB#42	SDMH#26	P-6	12 inch	0.91	0.130741	27.00	7.13	4,463.78	4,470.35	4,463.94	4,465.88	4,467.31	4,470.31	4,467.71	4,467.85
CB#43	SDMH#26	P-7	12 inch	1.08	0.062632	57.00	6.22	4,463.78	4,470.35	4,463.98	4,465.30	4,467.35	4,470.35	4,467.78	4,467.95
J-6	SDMH#25	P-15	15 inch	2.09	0.020000	83.00	4.90	4,459.62	4,468.25	4,460.03	4,460.59	4,461.28	4,469.34	4,461.86	4,462.08
SDMH#26	SDMH#25	P-12	18 inch	3.69	0.010236	382.00	4.88	4,459.37	4,468.25	4,459.98	4,460.45	4,463.28	4,470.35	4,464.01	4,464.30
CB#41	SDMH#25	P-13	12 inch	1.41	0.090333	60.00	7.42	4,459.87	4,468.25	4,460.08	4,462.08	4,465.29	4,468.29	4,465.79	4,465.98
SDMH#25	Outlet	P-16	24 inch	5.22	0.009228	246.00	5.05	4,456.60	4,458.60	4,457.27	4,457.77	4,458.87	4,468.25	4,459.68	4,459.98

10 - YEAR

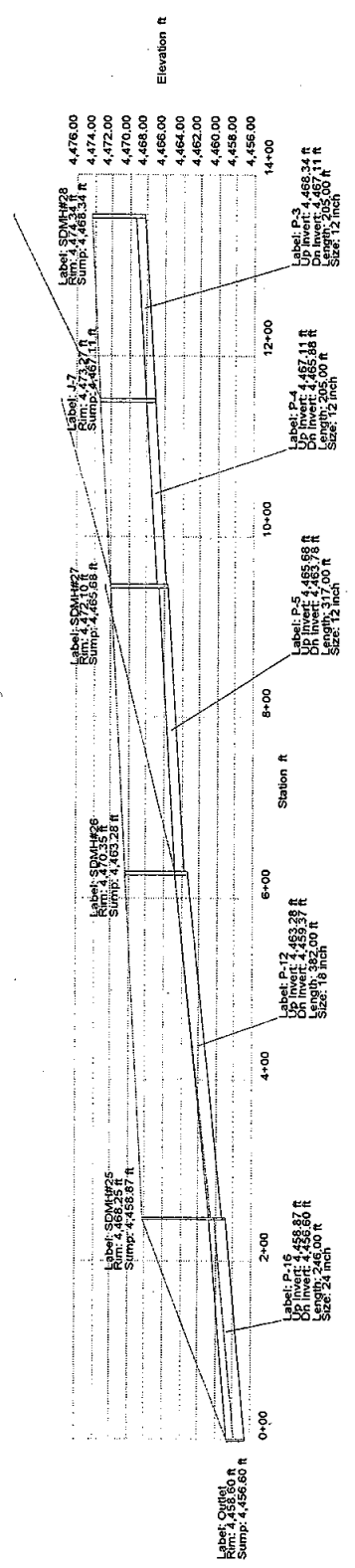


10-YEAR

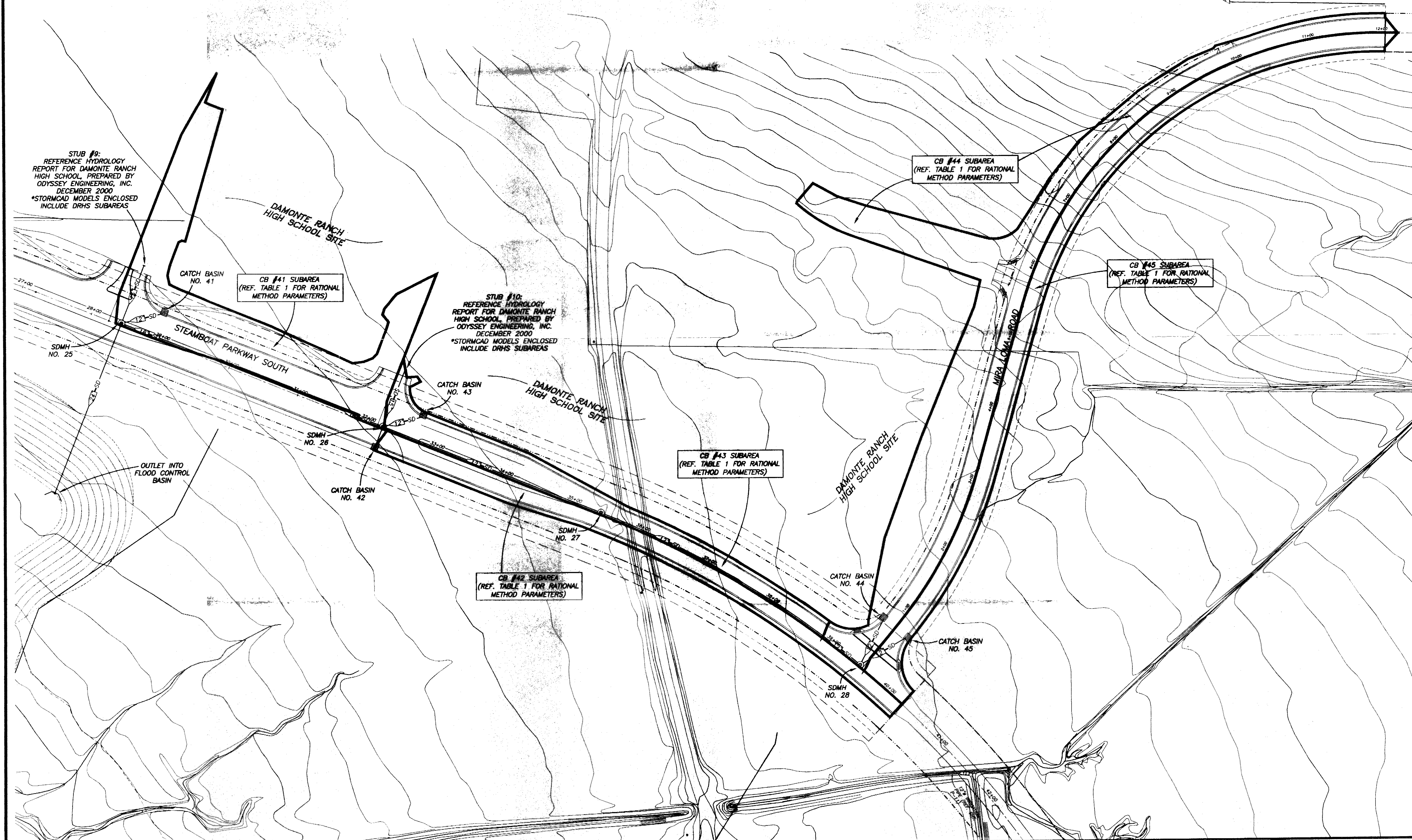
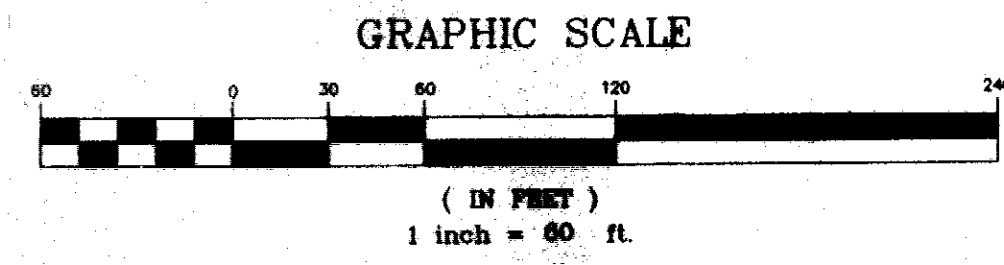
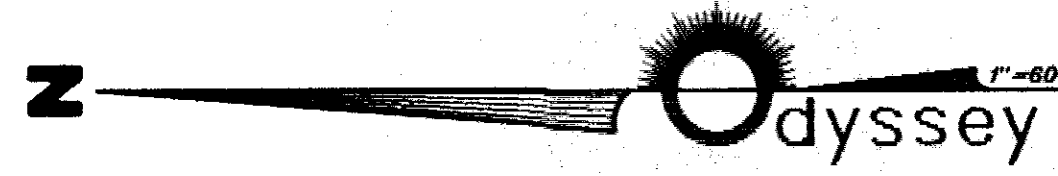
STORMCAD RESULTS

100 - YEAR

Upstream Node	Downstream Node	Pipe	Section Size	Discharge (cfs)	Constructed Slope (ft/ft)	Length (ft)	Average Velocity (ft/s)	Downstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Energy Grade (ft)	Upstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Energy Grade (ft)
CB#45	SDMH#28	P-1	12 inch	3.63	0.028028	71.00	4.26	4,468.54	4,474.34	4,477.81	4,478.09	4,470.53	4,473.53	4,483.49	4,483.77
CB#44	SDMH#28	P-2	12 inch	4.01	0.028429	70.00	4.71	4,468.54	4,474.34	4,477.81	4,478.15	4,470.53	4,473.53	4,483.56	4,483.91
SDMH#28	J-7	P-3	12 inch	6.41	0.006000	205.00	7.52	4,467.11	4,473.27	4,473.27	4,474.15	4,468.34	4,474.34	4,483.14	4,484.02
CB#20(DRHS)	J-3	P-11	12 inch	3.21	0.196364	22.00	10.18	4,465.03	4,471.41	4,465.33	4,469.09	4,469.35	4,472.35	4,470.11	4,470.47
D#30(DRHS)	J-3	P-10	12 inch	3.87	0.019855	69.00	6.86	4,465.03	4,471.41	4,465.58	4,466.68	4,466.40	4,469.40	4,467.23	4,467.67
CB#21(DRHS)	J-3	P-9	12 inch	0.60	0.334000	10.00	1.87	4,465.03	4,471.41	4,465.71	4,465.73	4,468.37	4,471.37	4,468.69	4,468.80
J-7	SDMH#27	P-4	12 inch	6.31	0.006000	205.00	7.40	4,465.88	4,472.10	4,472.10	4,472.95	4,467.11	4,473.27	4,477.81	4,478.66
J-3	SDMH#26	P-8	15 inch	5.29	0.015060	83.00	4.85	4,463.53	4,470.35	4,464.77	4,465.06	4,464.78	4,471.41	4,465.71	4,466.16
CB#43	SDMH#26	P-7	12 inch	2.36	0.062632	57.00	3.52	4,463.78	4,470.35	4,464.77	4,464.90	4,467.35	4,470.35	4,468.00	4,468.28
CB#42	SDMH#26	P-6	12 inch	1.98	0.130741	27.00	3.16	4,463.78	4,470.35	4,464.77	4,464.86	4,467.31	4,470.31	4,467.90	4,468.15
SDMH#27	SDMH#26	P-5	12 inch	6.25	0.005994	317.00	7.39	4,463.78	4,470.35	4,464.77	4,465.64	4,465.68	4,472.10	4,472.64	4,473.47
CB#22(DRHS)	J-6	P-14	12 inch	4.92	0.073626	91.00	10.59	4,461.28	4,469.34	4,461.71	4,465.20	4,467.98	4,470.98	4,468.90	4,469.49
SDMH#26	SDMH#25	P-12	18 inch	10.89	0.010236	382.00	6.50	4,459.37	4,468.25	4,460.64	4,461.36	4,463.28	4,470.35	4,464.78	4,465.37
J-6	SDMH#25	P-15	15 inch	4.88	0.020000	83.00	6.37	4,459.62	4,468.25	4,460.27	4,461.16	4,461.28	4,469.34	4,462.18	4,462.59
CB#41	SDMH#25	P-13	12 inch	3.26	0.090333	60.00	9.50	4,459.87	4,468.25	4,460.20	4,463.31	4,465.29	4,468.29	4,466.06	4,466.42
SDMH#25	Outlet	P-16	24 inch	14.47	0.009228	246.00	6.85	4,456.60	4,458.60	4,457.79	4,458.64	4,458.87	4,468.25	4,460.24	4,460.86



100-YEAR



STUB #9:
REFERENCE HYDROLOGY
REPORT FOR DAMONTE RANCH
HIGH SCHOOL, PREPARED BY
ODYSSEY ENGINEERING, INC.
DECEMBER 2000.
*STORMCAD MODELS ENCLOSED
INCLUDE DRHS SUBAREAS

DAMONTE RANCH
HIGH SCHOOL SITE

CATCH BASIN
NO. 41
CB #41 SUBAREA
(REF. TABLE 1 FOR RATIONAL
METHOD PARAMETERS)

STUB #10:
REFERENCE HYDROLOGY
REPORT FOR DAMONTE RANCH
HIGH SCHOOL, PREPARED BY
ODYSSEY ENGINEERING, INC.
DECEMBER 2000.
*STORMCAD MODELS ENCLOSED
INCLUDE DRHS SUBAREAS

DAMONTE RANCH
HIGH SCHOOL SITE

CATCH BASIN
NO. 43

CB #43 SUBAREA
(REF. TABLE 1 FOR RATIONAL
METHOD PARAMETERS)

DAMONTE RANCH
HIGH SCHOOL SITE

CATCH BASIN
NO. 44

CB #44 SUBAREA
(REF. TABLE 1 FOR RATIONAL
METHOD PARAMETERS)

CATCH BASIN
NO. 42

CB #42 SUBAREA
(REF. TABLE 1 FOR RATIONAL
METHOD PARAMETERS)

CB #45 SUBAREA
(REF. TABLE 1 FOR RATIONAL
METHOD PARAMETERS)

CATCH BASIN
NO. 45

DATE: DECEMBER, 2000	BY: APPD
DRAWN BY: ACAD14	DESCRIPTION:
DESIGNED BY: R.S.	REV. DATE:
CHECKED BY: B.H.	
STEAMBOAT PARKWAY NORTH & SOUTH ROADWAY IMPROVEMENTS	
PROPOSED STORM DRAIN SYSTEM 9	
DISPLAY MAP	
WASHOE COUNTY NEVADA	
885 ROBERTA LANE, SUITE 104, SPARKS, NV 89431 (775) 368-3663 FAX (775) 358-5329	
Odyssey ENGINEERING INCORPORATED	
SCALE HORIZAL = 60' VERT. N/A	
JOB NO. 2327	
SHEET 1 OF 1	