

DRAFT DRAINAGE MEMORANDUM

FOR

**Jones & Valley View Corridor Improvements
CLV Hansen No. 38800**

Prepared for:



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I. GENERAL LOCATION AND DEVELOPMENT DESCRIPTION

SCOPE

The scope of this study is to provide hydraulic analysis for the storm drain improvements within Valley View Blvd. These improvements are to collect storm water from Valley View Blvd and portions of Oakey Blvd. Collected runoff will be conveyed to the Oakey storm drain extension currently under design by Parson Brinkerhoff. This study analyzes approximately 920' of storm drain design within Valley View Blvd and includes approximately 220' of storm drain facilities within Oakey Blvd.

The 10 and 100-year storm flows affecting the site are referenced from the *90% Design Report for the Oakey Storm Drain Cahlan Drive to Barnard Drive by Parsons Brinckerhoff; dated November 2010*. Flows from Valley View Blvd are ultimately conveyed to the existing Clark County Regional Flood Control District's (CCRFCD) flood control facility located within Oaky Blvd.

Design recommendations for the drainage facilities necessary to convey these flows are in accordance with the minimum standards as established by Clark County Regional Flood Control District (CCRFCD) and The City of Las Vegas Flood Control.

LOCATION OF PROPERTY

Proposed improvements are located within the City of Las Vegas. The project is located west of Interstate-15 within Valley View Blvd; located between Sahara Avenue and Oaky Blvd. The project area is contained entirely within the study area of the Oakey Storm Drain Cahlan Drive to Barnard Drive Study completed by Parsons Brinkerhoff.

Refer to Attachments A-2 and B-1 for project vicinity and basin layout information.

II. HYDROLOGIC ANALYSIS

OFFSITE DRAINAGE DESCRIPTION

A hydrological analysis was not completed as a part of this analysis. All flows referenced within this study are referenced from the hydrological analysis completed for the Oakey Storm Drain, Cahlan Drive to Barnard Drive 90% documents; completed by Parsons Brinkerhoff, dated November 2010. Drainage patterns, concentration points, and basin delineations detailed in Appendix A, Figure 11 of the Oakey Storm Drain documents were used to develop flows at multiple cross sections along Valley View Blvd. Concentration points were used to calculate these flows as documented and referenced in Attachment B-1.

III. PROPOSED DRAINAGE FACILITIES

GENERAL DESCRIPTION

Hydraulic calculations along the main alignment of the proposed Valley View improvements were performed utilizing the Water Surface and Pressure Gradient Hydraulic Analysis System (WSPGW). All laterals along the Valley View alignment were analyzed using Bentley's Flow Master and the hydraulic calculation methods described in Section 804 of the CCRFCD Hydraulic

Criteria and Drainage Design Manual. All drainage inlets calculations and cross-section calculations are completed utilizing Bentley's Flow Master.

The proposed storm drain line is designed to collect and convey the 100-year flows summarized in Attachment A-1 of this document. Flows collected by the Valley View system are designed to discharge into the CCRFCD facility within Oakey Blvd. Peak 100-year discharge rates from the Valley View improvements described within this document will discharge a maximum of 288 cfs to the downstream regional facility. These maximum flow rates are based on the hydrological analysis provided within the Oakey Storm Drain Study.

CALCULATIONS

a) HYDRAULIC SECTIONS ANALYSIS

For design purposes, flow rates were calculated at various cross-sections along the drainage corridor. These cross-sections are detailed in Attachment A-1 and detail the surface flows to be collected from the contributing basins and conveyed by the proposed improvements. Flow rates at each cross-section are calculated based on off-site flow rates, drop inlet efficiency, and the basin routing provided in the Oakey Storm Drain Study. Peak 10-year and 100-year flows from the study are summarized in Attachment A-1 and provided in Table 1. Runoff rates at each inlet are estimated based on contributing concentration points from the Parson Brinkerhoff study, collected and bypassed flows; calculations for each cross section are summarized in the Source Runoff column in Table 1.

Table 1

HYDRAULIC CALCULATION SUMMARY									
Hydraulic Section	Q ₁₀ (cfs)	D ₁₀ (ft)	V ₁₀ (fps)	D ₁₀ × V ₁₀ (≤6)	Q ₁₀₀ (cfs)	D ₁₀₀ (ft)	V ₁₀₀ (fps)	D ₁₀₀ × V ₁₀₀ (≤8)	Source Runoff*
A	30	0.67	2.4	1.6	104	0.97	4.4	4.3	PB CP2N
A2	4	0.38	1.6	0.6	32	0.68	2.6	1.8	PB CP2N - VV01/VV02 IN
B	26	0.63	2.1	1.3	81	0.87	2.9	2.5	PB OFF4 + SECTION A2 +35% PB OFF5
B2	3	0.34	1.3	0.4	22	0.6	2	1.2	SECTION B - VV03/VV04 IN
C	3	0.33	1.6	0.5	22	0.6	2.4	1.4	SECTION B - VV03/VV04 IN
D	90	0.91	4.6	4.2	196	1.13	5.6	6.3	PB CPO
E	27	0.65	2.6	1.7	85	0.87	3.5	3.0	PB CPO - OAK01/OAK02 IN
F	27	0.54	3.3	1.8	85	0.72	4.4	3.2	PB CPO - OAK01/OAK02 IN
G	20	0.49	3.4	1.7	70	0.68	4.3	2.9	SECTION F - OAK03 IN

* PB SOURCE FLOWS ARE BASED ON THE PARSON BRINKERHOFF HYDROLOGY PERFORMED FOR THE OAKEY STORM DRAIN -CAHLAN TO BARNARD; DATED NOVEMBER 12, 2010

Design flows at each cross-section were analyzed using Bentley's Flow Master Program to determine depth of flow and velocity within the roadway cross-section. Depth calculations were analyzed to ensure a 12-ft dry lane was maintained during the 10-year runoff event. Street capacity is determined based on manning's value, geometry, cross slope, longitudinal slope, and cross section flow rates. Cross-section geometry is based on survey information available at the time of this study.

b) DROP INLET ANALYSIS

Drop inlets are designed to collect surface runoff. Calculations are based on CCRFCD criteria and sized to ensure the storm drain system will collect flows from a 100-year storm event while providing a 12-foot dry lane during a 10-year storm event. Performance of the drop inlets is evaluated using Bentley's Flow Master Program. Results of this analysis are used to determine

spread, inlet efficiency and great length. Inlet size, efficiency, and flow rates are summarized in Table 2 provided below and in Attachment B-2.

Table 2

Inlet	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)	Length (ft)	Efficiency ₁₀ (%)	Efficiency ₁₀₀ (%)	Q ₁₀ IN (cfs)	Q ₁₀₀ IN (cfs)	Q ₁₀ BYPASS (cfs)	Q ₁₀ BYPASS (cfs)
VV01	15	52	12.5	87.1	68.8	13	36	2	16
VV02	15	52	12.5	87.1	68.8	13	36	2	16
VV03	13	40.5	12.5	88.8	72.3	11.5	29.5	1.5	11
VV04	13	40.5	12.5	88.8	72.3	11.5	29.5	1.5	11
VV05	1.5	11	5	94.8	55.6	1.5	6	0	5
VV06	3	25	15	NA	NA	3	25	NA	NA
OAK01	55	107	17.5	68.3	57.7	38	62	17	45
OAK02	35	89	12.5	70	54.5	25	49	11	40
OAK03	13.5	42.5	7.5	53.7	34.6	7	15	6.5	28

c) STORM DRAIN ANALYSIS

Hydraulic calculations of the storm drain alignment were completed utilizing WSPGW for 100-year peak runoff rates. Flows at various locations are based on inlet efficiency and cross-section flow rates, as detailed in section 2.a of this document and provided in Attachment B-2. The proposed storm drain system is designed to collect and convey 288 cfs to the downstream CCRFCD facility. Information provided by Parson Brinkerhoff was used to model the downstream CCRFCR facility extension within the WSPGS model to provide an accurate HGL within the Valley View model completed for this study. A summary of the Valley View model and the PB information is provided in Attachment A-4. Results of the WSPGW analysis are provided in Attachment A-4 with a summary of the main storm drain layout provided in Table 3 below:

Table 3

Pipe ID	Length (ft)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)	Size
VVP3	165	26	72	6'X3'
VVP6	244	49	131	5'X4'
VVP8	78	51.5	137	5'X4'
VVP10	415	53.5	162	5'X4'
OAKP3	45	63	111	5'X3'
OAKP4	107	116.5	273	7'X5'
OAKP6	72	123.5	288	7'X5'

Lateral pipes are designed to convey flows from the drop inlet to the main storm drain interceptor. The minimum pipe size and slope used for all lateral design is 18-inch and 0.25%, respectively. Calculations are performed utilizing Section 804 of the CCRFCD Hydraulic Criteria and Drainage Design Manual with flow capacities assessed using Bentleys Flow Master. Calculations use the Energy Grade Line (EGL) and Hydraulic Grade Line (HGL) computed within the main line WSPGS model as the downstream condition. Lateral design calculations are provided in Attachment A-4 and summarized in Table 4 below.

Table 4

Inlet	Q ₁₀₀ (cfs)	HGL ₁₀₀	Appx. Grate Elevation	Difference (ft)
VV01	52	2152.37	2155.1	2.73
VV02	52	2151.97	2154.5	2.53
VV03	40.5	2152.06	2154.51	2.45
VV04	40.5	2151.45	2153.89	2.44
VV05	11	2150.68	2153.06	2.38
VV06	25	2150.16	2151.54	1.38
OAK01	107	2149.72	2153.09	3.37
OAK02	89	2148.53	2152.99	4.46
OAK03	42.5	2147.11	2150.44	3.33

IV. Conclusion

The proposed storm drain improvements are designed to convey the 100-year storm event. Flow rates are derived from the hydrological study completed for the Oakey Storm Drain Cahlan Drive to Barnard Drive by Parsons Brinckerhoff, dated November 2010. A Hydraulic analysis was performed in accordance with the City of Las Vegas and CCRFCD standards. Proposed improvements are designed to provide a 12-foot dry lane during a 10-year storm event.

APPENDIX A

ATTACHMENT A-1
ATTACHMENT A-2
ATTACHMENT A-3
ATTACHMENT A-4

HYDRAULIC SECTIONS CALCULATIONS
LOCATION MAP
DROP INLET CALCULATIONS
STORM DRAIN CALCULATIONS

Attachment A-1 (Hydraulic Sections Calculations)

Section A - Valley View_100-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.40 %
Discharge 104.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.55
0+05.5	0.50
0+06.0	0.50
0+06.0	0.00
0+07.5	0.13
0+07.5	0.17
0+28.5	0.78
0+28.5	1.28
0+30.5	1.28
0+30.5	0.78
0+40.0	1.05
0+72.0	0.17
0+72.0	0.13
0+73.5	0.00
0+73.5	0.50
0+74.0	0.50
0+79.7	0.56

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.55)	(0+07.5, 0.13)	0.013
(0+07.5, 0.13)	(0+28.5, 0.78)	0.016
(0+28.5, 0.78)	(0+30.5, 0.78)	0.013
(0+30.5, 0.78)	(0+72.0, 0.13)	0.016

OKAY
for streets
Typical Use 0.016

Section A - Valley View_100-yr

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+72.0, 0.13)	(0+79.7, 0.56)	0.013

Options

Current Roughness weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.97	ft
Elevation Range	0.00 to 1.28	ft
Flow Area	30.62	ft ²
Wetted Perimeter	74.10	ft
Hydraulic Radius	0.41	ft
Top Width	71.79	ft
Normal Depth	0.97	ft
Critical Depth	0.94	ft
Critical Slope	0.00482	ft/ft
Velocity	3.40	ft/s
Velocity Head	0.18	ft
Specific Energy	1.15	ft
Froude Number	0.92	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.97	ft
Critical Depth	0.94	ft

Section A - Valley View_10-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.40 %
Discharge 30.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.55
0+05.5	0.50
0+06.0	0.50
0+06.0	0.00
0+07.5	0.13
0+07.5	0.17
0+28.5	0.78
0+28.5	1.28
0+30.5	1.28
0+30.5	0.78
0+40.0	1.05
0+72.0	0.17
0+72.0	0.13
0+73.5	0.00
0+73.5	0.50
0+74.0	0.50
0+79.7	0.56

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.55)	(0+07.5, 0.13)	0.013
(0+07.5, 0.13)	(0+28.5, 0.78)	0.016
(0+28.5, 0.78)	(0+30.5, 0.78)	0.013
(0+30.5, 0.78)	(0+72.0, 0.13)	0.016

Section A - Valley View 10-yr

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+72.0, 0.13)	(0+79.7, 0.56)	0.013

Options

Current Roughness weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.67	ft
Elevation Range	0.00 to 1.28	ft
Flow Area	12.49	ft ²
Wetted Perimeter	52.02	ft
Hydraulic Radius	0.24	ft
Top Width	50.68	ft
Normal Depth	0.67	ft
Critical Depth	0.64	ft
Critical Slope	0.00564	ft/ft
Velocity	2.40	ft/s
Velocity Head	0.09	ft
Specific Energy	0.76	ft
Froude Number	0.85	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.67	ft
Critical Depth	0.64	ft

Section A - Valley View 10-yr

GVF Output Data

Channel Slope	0.40	%
Critical Slope	0.00564	ft/ft

Section A2 - Valley View_100-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.40 %
Discharge 32.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.55
0+05.5	0.50
0+06.0	0.50
0+06.0	0.00
0+07.5	0.13
0+07.5	0.17
0+28.5	0.78
0+28.5	1.28
0+30.5	1.28
0+30.5	0.78
0+40.0	1.05
0+72.0	0.17
0+72.0	0.13
0+73.5	0.00
0+73.5	0.50
0+74.0	0.50
0+79.7	0.56

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.55)	(0+07.5, 0.13)	0.013
(0+07.5, 0.13)	(0+28.5, 0.78)	0.016
(0+28.5, 0.78)	(0+30.5, 0.78)	0.013
(0+30.5, 0.78)	(0+72.0, 0.13)	0.016

Section A2 - Valley View_100-yr

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+72.0, 0.13)	(0+79.7, 0.56)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.68	ft
Elevation Range	0.00 to 1.28	ft
Flow Area	13.07	ft²
Wetted Perimeter	52.85	ft
Hydraulic Radius	0.25	ft
Top Width	51.49	ft
Normal Depth	0.68	ft
Critical Depth	0.65	ft
Critical Slope	0.00559	ft/ft
Velocity	2.45	ft/s
Velocity Head	0.09	ft
Specific Energy	0.78	ft
Froude Number	0.86	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.68	ft
Critical Depth	0.65	ft

Section A2 - Valley View 100-yr

GVF Output Data

Channel Slope	0.40	%
Critical Slope	0.00559	ft/ft

Section A2 - Valley View_10-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.40 %
Discharge 4.00 ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.55
0+05.5	0.50
0+06.0	0.50
0+06.0	0.00
0+07.5	0.13
0+07.5	0.17
0+28.5	0.78
0+28.5	1.28
0+30.5	1.28
0+30.5	0.78
0+40.0	1.05
0+72.0	0.17
0+72.0	0.13
0+73.5	0.00
0+73.5	0.50
0+74.0	0.50
0+79.7	0.56

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.55)	(0+07.5, 0.13)	0.013
(0+07.5, 0.13)	(0+28.5, 0.78)	0.016
(0+28.5, 0.78)	(0+30.5, 0.78)	0.013
(0+30.5, 0.78)	(0+72.0, 0.13)	0.016

Section A2 - Valley View_10-yr

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+72.0, 0.13)	(0+79.7, 0.56)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.38	ft
Elevation Range	0.00 to 1.28 ft	
Flow Area	2.51	ft ²
Wetted Perimeter	18.75	ft
Hydraulic Radius	0.13	ft
Top Width	17.90	ft
Normal Depth	0.38	ft
Critical Depth	0.35	ft
Critical Slope	0.00739	ft/ft
Velocity	1.59	ft/s
Velocity Head	0.04	ft
Specific Energy	0.42	ft
Froude Number	0.75	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.38	ft
Critical Depth	0.35	ft

Section A2 - Valley View_10-yr

GVF Output Data

Channel Slope	0.40	%
Critical Slope	0.00739	ft/ft

Project Description

Solve For	Normal Depth
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Input Data

Discharge	81.00	ft ³ /s
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Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.55
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+06.5	0.09
0+06.5	0.13
0+37.5	0.90
0+37.5	1.40
0+39.0	1.40
0+39.0	0.90
0+72.2	0.17
0+72.2	0.13
0+73.7	0.00
0+73.7	0.50
0+74.2	0.50
0+79.4	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.55)	(0+06.5, 0.09)	0.013
(0+06.5, 0.09)	(0+37.5, 0.90)	0.016
(0+37.5, 0.90)	(0+39.0, 0.90)	0.013
(0+39.0, 0.90)	(0+72.2, 0.13)	0.016
(0+72.2, 0.13)	(0+79.4, 0.55)	0.013

Section B - Valley View 100-yr

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.87	ft
Elevation Range	0.00 to 1.40	ft
Flow Area	27.94	ft²
Wetted Perimeter	76.90	ft
Hydraulic Radius	0.36	ft
Top Width	75.16	ft
Normal Depth	0.87	ft
Critical Depth	0.82	ft
Critical Slope	0.00512	ft/ft
Velocity	2.90	ft/s
Velocity Head	0.13	ft
Specific Energy	1.00	ft
Froude Number	0.84	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.87	ft
Critical Depth	0.82	ft
Channel Slope	0.35	%
Critical Slope	0.00512	ft/ft

Section B - Valley View_10-yr

Options

Current Roughness weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.63	ft
Elevation Range	0.00 to 1.40	ft
Flow Area	12.33	ft²
Wetted Perimeter	55.78	ft
Hydraulic Radius	0.22	ft
Top Width	54.52	ft
Normal Depth	0.63	ft
Critical Depth	0.59	ft
Critical Slope	0.00598	ft/ft
Velocity	2.11	ft/s
Velocity Head	0.07	ft
Specific Energy	0.70	ft
Froude Number	0.78	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.63	ft
Critical Depth	0.59	ft
Channel Slope	0.35	%
Critical Slope	0.00598	ft/ft

Section B2 - Valley View 100-yr

Options

Current Roughness weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.60	ft
Elevation Range	0.00 to 1.40	ft
Flow Area	10.98	ft²
Wetted Perimeter	53.55	ft
Hydraulic Radius	0.20	ft
Top Width	52.35	ft
Normal Depth	0.60	ft
Critical Depth	0.56	ft
Critical Slope	0.00612	ft/ft
Velocity	2.00	ft/s
Velocity Head	0.06	ft
Specific Energy	0.66	ft
Froude Number	0.77	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.60	ft
Critical Depth	0.56	ft
Channel Slope	0.35	%
Critical Slope	0.00612	ft/ft

Section B2 - Valley View_10-yr

Options

Current Roughness weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.34	ft
Elevation Range	0.00 to 1.40	ft
Flow Area	2.24	ft ²
Wetted Perimeter	19.39	ft
Hydraulic Radius	0.12	ft
Top Width	18.62	ft
Normal Depth	0.34	ft
Critical Depth	0.30	ft
Critical Slope	0.00792	ft/ft
Velocity	1.34	ft/s
Velocity Head	0.03	ft
Specific Energy	0.37	ft
Froude Number	0.68	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.34	ft
Critical Depth	0.30	ft
Channel Slope	0.35	%
Critical Slope	0.00792	ft/ft

Section C - Valley View 100-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.50 %
Discharge 22.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.55
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+06.5	0.09
0+06.5	0.13
0+27.5	0.75
0+27.5	1.25
0+29.0	1.25
0+29.0	0.75
0+40.0	1.08
0+70.5	0.17
0+70.5	0.13
0+72.0	0.00
0+72.0	0.50
0+72.5	0.50
0+77.5	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.55)	(0+06.5, 0.09)	0.013
(0+06.5, 0.09)	(0+27.5, 0.75)	0.016
(0+27.5, 0.75)	(0+29.0, 0.75)	0.013
(0+29.0, 0.75)	(0+70.5, 0.13)	0.016

Section C - Valley View_100-yr

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+70.5, 0.13)	(0+77.5, 0.55)	0.013

Options

Current Roughness weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.60	ft
Elevation Range	0.00 to 1.25	ft
Flow Area	9.17	ft ²
Wetted Perimeter	45.23	ft
Hydraulic Radius	0.20	ft
Top Width	44.02	ft
Normal Depth	0.60	ft
Critical Depth	0.59	ft
Critical Slope	0.00588	ft/ft
Velocity	2.40	ft/s
Velocity Head	0.09	ft
Specific Energy	0.69	ft
Froude Number	0.93	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.60	ft
Critical Depth	0.59	ft

Section C - Valley View_100-yr

GVF Output Data

Channel Slope	0.50	%
Critical Slope	0.00588	ft/ft

Project Description

Input Data

Station (ft)	Elevation (ft)
100	100
200	200
300	300
400	400
500	500
600	600
700	700
800	800
900	900
1000	1000
1100	1100
1200	1200
1300	1300
1400	1400
1500	1500
1600	1600
1700	1700
1800	1800
1900	1900
2000	2000
2100	2100
2200	2200
2300	2300
2400	2400
2500	2500
2600	2600
2700	2700
2800	2800
2900	2900
3000	3000
3100	3100
3200	3200
3300	3300
3400	3400
3500	3500
3600	3600
3700	3700
3800	3800
3900	3900
4000	4000
4100	4100
4200	4200
4300	4300
4400	4400
4500	4500
4600	4600
4700	4700
4800	4800
4900	4900
5000	5000
5100	5100
5200	5200
5300	5300
5400	5400
5500	5500
5600	5600
5700	5700
5800	5800
5900	5900
6000	6000
6100	6100
6200	6200
6300	6300
6400	6400
6500	6500
6600	6600
6700	6700
6800	6800
6900	6900
7000	7000
7100	7100
7200	7200
7300	7300
7400	7400
7500	7500
7600	7600
7700	7700
7800	7800
7900	7900
8000	8000
8100	8100
8200	8200
8300	8300
8400	8400
8500	8500
8600	8600
8700	8700
8800	8800
8900	8900
9000	9000
9100	9100
9200	9200
9300	9300
9400	9400
9500	9500
9600	9600
9700	9700
9800	9800
9900	9900
10000	10000

Roughness Segment Definitions

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Section C - Valley View 10-yr

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+70.5, 0.13)	(0+77.5, 0.55)	0.013

Options

Current Roughness weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.33	ft
Elevation Range	0.00 to 1.25	ft
Flow Area	1.84	ft ²
Wetted Perimeter	15.61	ft
Hydraulic Radius	0.12	ft
Top Width	14.85	ft
Normal Depth	0.33	ft
Critical Depth	0.31	ft
Critical Slope	0.00765	ft/ft
Velocity	1.63	ft/s
Velocity Head	0.04	ft
Specific Energy	0.37	ft
Froude Number	0.82	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.31	ft

Section C - Valley View 10-yr

GVF Output Data

Channel Slope	0.50	%
Critical Slope	0.00765	ft/ft

Section D - Oakey_100-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.00 %
Discharge 196.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.75
0+05.0	0.70
0+05.5	0.70
0+05.5	0.20
0+07.0	0.33
0+07.0	0.37
0+42.9	1.13
0+68.4	0.17
0+68.4	0.13
0+69.9	0.00
0+69.9	0.50
0+70.4	0.50
0+75.4	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.75)	(0+07.0, 0.33)	0.013
(0+07.0, 0.33)	(0+68.4, 0.13)	0.016
(0+68.4, 0.13)	(0+75.4, 0.55)	0.013

Options

Current Roughness weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Section D - Oakey 100-yr

Results

Normal Depth	1.14	ft
Elevation Range	0.00 to 1.13	ft
Flow Area	34.74	ft ²
Wetted Perimeter	77.49	ft
Hydraulic Radius	0.45	ft
Top Width	75.40	ft
Normal Depth	1.14	ft
Critical Depth	1.27	ft
Critical Slope	0.00430	ft/ft
Velocity	5.64	ft/s
Velocity Head	0.49	ft
Specific Energy	1.63	ft
Froude Number	1.47	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.14	ft
Critical Depth	1.27	ft
Channel Slope	1.00	%
Critical Slope	0.00430	ft/ft

Section D - Oakey_10-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.00 %
Discharge 90.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.75
0+05.0	0.70
0+05.5	0.70
0+05.5	0.20
0+07.0	0.33
0+07.0	0.37
0+42.9	1.13
0+68.4	0.17
0+68.4	0.13
0+69.9	0.00
0+69.9	0.50
0+70.4	0.50
0+75.4	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.75)	(0+07.0, 0.33)	0.013
(0+07.0, 0.33)	(0+68.4, 0.13)	0.016
(0+68.4, 0.13)	(0+75.4, 0.55)	0.013

Options

Current Roughness weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Section D - Oakey_10-yr

Results

Normal Depth	0.91	ft
Elevation Range	0.00 to 1.13 ft	
Flow Area	19.68	ft²
Wetted Perimeter	60.95	ft
Hydraulic Radius	0.32	ft
Top Width	59.32	ft
Normal Depth	0.91	ft
Critical Depth	1.01	ft
Critical Slope	0.00485	ft/ft
Velocity	4.57	ft/s
Velocity Head	0.33	ft
Specific Energy	1.24	ft
Froude Number	1.40	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.91	ft
Critical Depth	1.01	ft
Channel Slope	1.00	%
Critical Slope	0.00485	ft/ft

SOUTH Section D - Oakey 100-yr

Project Description

Friction Method Manning Formula
Solve For Discharge

Input Data

Channel Slope 1.00 %
Normal Depth 0.93 ft
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.75
0+05.0	0.70
0+05.5	0.70
0+05.5	0.20
0+07.0	0.33
0+07.0	0.37
0+42.9	1.13

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.75)	(0+07.0, 0.33)	0.013
(0+07.0, 0.33)	(0+42.9, 1.13)	0.016

Options

Current Roughness weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Results

Discharge 88.19 ft³/s
Elevation Range 0.20 to 1.13 ft
Flow Area 17.18 ft²
Wetted Perimeter 43.83 ft
Hydraulic Radius 0.39 ft

SOUTH Section D - Oakey 100-yr

Results

Top Width	42.90	ft
Normal Depth	0.93	ft
Critical Depth	1.04	ft
Critical Slope	0.00455	ft/ft
Velocity	5.13	ft/s
Velocity Head	0.41	ft
Specific Energy	1.34	ft
Froude Number	1.43	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.93	ft
Critical Depth	1.04	ft
Channel Slope	1.00	%
Critical Slope	0.00455	ft/ft

SOUTH Section D - OK 10-yr

Project Description

Friction Method Manning Formula
Solve For Discharge

Input Data

Channel Slope 1.00 %
Normal Depth 0.71 ft
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.75
0+05.0	0.70
0+05.5	0.70
0+05.5	0.20
0+07.0	0.33
0+07.0	0.37
0+42.9	1.13

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.75)	(0+07.0, 0.33)	0.013
(0+07.0, 0.33)	(0+42.9, 1.13)	0.016

Options

Current Roughness Weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Results

Discharge 35.68 ft³/s
Elevation Range 0.20 to 1.13 ft
Flow Area 8.88 ft²
Wetted Perimeter 33.22 ft
Hydraulic Radius 0.27 ft

SOUTH Section D - OK 10-yr

Results

Top Width	32.51	ft
Normal Depth	0.71	ft
Critical Depth	0.78	ft
Critical Slope	0.00521	ft/ft
Velocity	4.02	ft/s
Velocity Head	0.25	ft
Specific Energy	0.96	ft
Froude Number	1.35	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.71	ft
Critical Depth	0.78	ft
Channel Slope	1.00	%
Critical Slope	0.00521	ft/ft

NORTH Section D - Oakey_100-yr

Project Description

Friction Method Manning Formula
Solve For Discharge

Input Data

Channel Slope 1.00 %
Normal Depth 1.13 ft
Section Definitions

Station (ft)	Elevation (ft)
0+42.9	1.13
0+68.4	0.17
0+68.4	0.13
0+69.9	0.00
0+69.9	0.50
0+70.4	0.50
0+75.4	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+42.9, 1.13)	(0+68.4, 0.13)	0.016
(0+68.4, 0.13)	(0+75.4, 0.55)	0.013

Options

Current Roughness weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Results

Discharge 106.34 ft³/s
Elevation Range 0.00 to 1.13 ft
Flow Area 17.18 ft²
Wetted Perimeter 33.64 ft
Hydraulic Radius 0.51 ft

NORTH Section D - Oakey_100-yr

Results

Top Width	32.50	ft
Normal Depth	1.13	ft
Critical Depth	1.29	ft
Critical Slope	0.00411	ft/ft
Velocity	6.19	ft/s
Velocity Head	0.60	ft
Specific Energy	1.73	ft
Froude Number	1.50	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.13	ft
Critical Depth	1.29	ft
Channel Slope	1.00	%
Critical Slope	0.00411	ft/ft

NORTH Section D - Oakey_10-yr

Project Description

Friction Method Manning Formula
Solve For Discharge

Input Data

Channel Slope 1.00 %
Normal Depth 0.91 ft
Section Definitions

Station (ft)	Elevation (ft)
0+42.9	1.13
0+68.4	0.17
0+68.4	0.13
0+69.9	0.00
0+69.9	0.50
0+70.4	0.50
0+75.4	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+42.9, 1.13)	(0+68.4, 0.13)	0.016
(0+68.4, 0.13)	(0+75.4, 0.55)	0.013

Options

Current Roughness weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Results

Discharge 55.37 ft³/s
Elevation Range 0.00 to 1.13 ft
Flow Area 10.67 ft²
Wetted Perimeter 27.58 ft
Hydraulic Radius 0.39 ft

NORTH Section D - Oakey_10-yr

Results

Top Width	26.66	ft
Normal Depth	0.91	ft
Critical Depth	1.03	ft
Critical Slope	0.00452	ft/ft
Velocity	5.19	ft/s
Velocity Head	0.42	ft
Specific Energy	1.33	ft
Froude Number	1.45	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.91	ft
Critical Depth	1.03	ft
Channel Slope	1.00	%
Critical Slope	0.00452	ft/ft

Section E - OK_100-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.60 %
Discharge 85.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.55
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+43.0	0.85
0+68.4	0.37
0+68.4	0.33
0+69.9	0.20
0+69.9	0.70
0+70.4	0.70
0+75.4	0.75

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.55)	(0+07.0, 0.13)	0.013
(0+07.0, 0.13)	(0+68.4, 0.33)	0.016
(0+68.4, 0.33)	(0+75.4, 0.75)	0.013

Options

Current Roughness Weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Section E - OK_100-yr

Results

Normal Depth	0.87	ft
Elevation Range	0.00 to 0.85	ft
Flow Area	24.47	ft²
Wetted Perimeter	76.94	ft
Hydraulic Radius	0.32	ft
Top Width	75.40	ft
Normal Depth	0.87	ft
Critical Depth	0.89	ft
Critical Slope	0.00512	ft/ft
Velocity	3.47	ft/s
Velocity Head	0.19	ft
Specific Energy	1.06	ft
Froude Number	1.08	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.87	ft
Critical Depth	0.89	ft
Channel Slope	0.60	%
Critical Slope	0.00512	ft/ft

Section E - OK 10-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.60 %
Discharge 27.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.55
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+43.0	0.85
0+68.4	0.37
0+68.4	0.33
0+69.9	0.20
0+69.9	0.70
0+70.4	0.70
0+75.4	0.75

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.55)	(0+07.0, 0.13)	0.013
(0+07.0, 0.13)	(0+68.4, 0.33)	0.016
(0+68.4, 0.33)	(0+75.4, 0.75)	0.013

Options

Current Roughness Weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Section E - OK_10-yr

Results

Normal Depth	0.65	ft
Elevation Range	0.00 to 0.85	ft
Flow Area	10.36	ft²
Wetted Perimeter	49.94	ft
Hydraulic Radius	0.21	ft
Top Width	48.79	ft
Normal Depth	0.65	ft
Critical Depth	0.65	ft
Critical Slope	0.00603	ft/ft
Velocity	2.61	ft/s
Velocity Head	0.11	ft
Specific Energy	0.76	ft
Froude Number	1.00	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.65	ft
Critical Depth	0.65	ft
Channel Slope	0.60	%
Critical Slope	0.00603	ft/ft

SOUTH Section E - Oakey_100-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.60 %
Discharge 45.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.55
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+43.0	0.86

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.55)	(0+07.0, 0.13)	0.013
(0+07.0, 0.13)	(0+43.0, 0.86)	0.016

Options

Current Roughness weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth 0.80 ft
Elevation Range 0.00 to 0.86 ft
Flow Area 12.97 ft²
Wetted Perimeter 40.66 ft
Hydraulic Radius 0.32 ft

SOUTH Section E - Oakey 100-yr

Results

Top Width	39.85	ft
Normal Depth	0.80	ft
Critical Depth	0.82	ft
Critical Slope	0.00515	ft/ft
Velocity	3.47	ft/s
Velocity Head	0.19	ft
Specific Energy	0.99	ft
Froude Number	1.07	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.80	ft
Critical Depth	0.82	ft
Channel Slope	0.60	%
Critical Slope	0.00515	ft/ft

SOUTH Section E - Oakey 10-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.60 %
Discharge 17.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.55
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+43.0	0.86

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.55)	(0+07.0, 0.13)	0.013
(0+07.0, 0.13)	(0+43.0, 0.86)	0.016

Options

Current Roughness weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth 0.61 ft
Elevation Range 0.00 to 0.86 ft
Flow Area 6.42 ft²
Wetted Perimeter 30.70 ft
Hydraulic Radius 0.21 ft

SOUTH Section E - Oakey_10-yr

Results

Top Width	30.09	ft
Normal Depth	0.61	ft
Critical Depth	0.61	ft
Critical Slope	0.00587	ft/ft
Velocity	2.65	ft/s
Velocity Head	0.11	ft
Specific Energy	0.72	ft
Froude Number	1.01	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.61	ft
Critical Depth	0.61	ft
Channel Slope	0.60	%
Critical Slope	0.00587	ft/ft

NORTH Section E - OK_10-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.60 %
Discharge 10.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+43.0	0.86
0+68.4	0.37
0+68.4	0.33
0+69.9	0.20
0+69.9	0.70
0+70.4	0.70
0+75.4	0.75

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+43.0, 0.86)	(0+68.4, 0.33)	0.016
(0+68.4, 0.33)	(0+75.4, 0.75)	0.013

Options

Current Roughness Weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth 0.54 ft
Elevation Range 0.20 to 0.86 ft
Flow Area 4.34 ft²
Wetted Perimeter 25.61 ft
Hydraulic Radius 0.17 ft

NORTH Section E - OK_10-yr

Results

Top Width	25.06	ft
Normal Depth	0.54	ft
Critical Depth	0.53	ft
Critical Slope	0.00630	ft/ft
Velocity	2.30	ft/s
Velocity Head	0.08	ft
Specific Energy	0.62	ft
Froude Number	0.98	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.54	ft
Critical Depth	0.53	ft
Channel Slope	0.60	%
Critical Slope	0.00630	ft/ft

NORTH Section E - Oakey_100-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.60 %
Discharge 40.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.55
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+43.0	0.85
0+68.4	0.37
0+68.4	0.33
0+69.9	0.20
0+69.9	0.70
0+70.4	0.70
0+75.4	0.75

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.55)	(0+07.0, 0.13)	0.013
(0+07.0, 0.13)	(0+68.4, 0.33)	0.016
(0+68.4, 0.33)	(0+75.4, 0.75)	0.013

Options

Current Roughness Weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

NORTH Section E - Oakey 100-yr

Results

Normal Depth	0.72	ft
Elevation Range	0.00 to 0.85 ft	
Flow Area	14.11	ft²
Wetted Perimeter	60.19	ft
Hydraulic Radius	0.23	ft
Top Width	58.92	ft
Normal Depth	0.72	ft
Critical Depth	0.73	ft
Critical Slope	0.00574	ft/ft
Velocity	2.84	ft/s
Velocity Head	0.12	ft
Specific Energy	0.85	ft
Froude Number	1.02	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.72	ft
Critical Depth	0.73	ft
Channel Slope	0.60	%
Critical Slope	0.00574	ft/ft

Section F - Oakey_100-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.20 %
Discharge 85.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.55
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+38.4	0.77
0+67.4	0.17
0+67.4	0.13
0+68.9	0.00
0+68.9	0.50
0+69.4	0.50
0+74.4	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.55)	(0+07.0, 0.13)	0.013
(0+07.0, 0.13)	(0+67.4, 0.13)	0.016
(0+67.4, 0.13)	(0+74.4, 0.55)	0.013

Options

Current Roughness Weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Section F - Oakey 100-yr

Results

Normal Depth	0.72	ft
Elevation Range	0.00 to 0.77 ft	
Flow Area	19.15	ft²
Wetted Perimeter	70.49	ft
Hydraulic Radius	0.27	ft
Top Width	69.06	ft
Normal Depth	0.72	ft
Critical Depth	0.81	ft
Critical Slope	0.00508	ft/ft
Velocity	4.44	ft/s
Velocity Head	0.31	ft
Specific Energy	1.02	ft
Froude Number	1.49	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.72	ft
Critical Depth	0.81	ft
Channel Slope	1.20	%
Critical Slope	0.00508	ft/ft

Section F - OK 10-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.20 %
Discharge 27.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.55
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+38.4	0.77
0+67.4	0.17
0+67.4	0.13
0+68.9	0.00
0+68.9	0.50
0+69.4	0.50
0+74.4	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.55)	(0+07.0, 0.13)	0.013
(0+07.0, 0.13)	(0+67.4, 0.13)	0.016
(0+67.4, 0.13)	(0+74.4, 0.55)	0.013

Options

Current Roughness weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Section F - OK 10-yr

Results

Normal Depth	0.54	ft
Elevation Range	0.00 to 0.77 ft	
Flow Area	8.30	ft ²
Wetted Perimeter	49.00	ft
Hydraulic Radius	0.17	ft
Top Width	47.90	ft
Normal Depth	0.54	ft
Critical Depth	0.58	ft
Critical Slope	0.00606	ft/ft
Velocity	3.25	ft/s
Velocity Head	0.16	ft
Specific Energy	0.70	ft
Froude Number	1.38	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.54	ft
Critical Depth	0.58	ft
Channel Slope	1.20	%
Critical Slope	0.00606	ft/ft

Section G - Oakey_100-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.25 %
Discharge 70.00 ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.55
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+38.4	0.80
0+67.4	0.17
0+67.4	0.13
0+68.9	0.00
0+68.9	0.50
0+69.4	0.50
0+74.4	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.55)	(0+07.0, 0.13)	0.013
(0+07.0, 0.13)	(0+67.4, 0.13)	0.016
(0+67.4, 0.13)	(0+74.4, 0.55)	0.013

Options

Current Roughness Weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Section G - Oakey_100-yr

Results

Normal Depth	0.68	ft
Elevation Range	0.00 to 0.80	ft
Flow Area	16.22	ft²
Wetted Perimeter	64.53	ft
Hydraulic Radius	0.25	ft
Top Width	63.16	ft
Normal Depth	0.68	ft
Critical Depth	0.77	ft
Critical Slope	0.00522	ft/ft
Velocity	4.32	ft/s
Velocity Head	0.29	ft
Specific Energy	0.97	ft
Froude Number	1.50	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.68	ft
Critical Depth	0.77	ft
Channel Slope	1.25	%
Critical Slope	0.00522	ft/ft

Section G - OK 10-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.25 %
Discharge 20.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.55
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+38.4	0.80
0+67.4	0.17
0+67.4	0.13
0+68.9	0.00
0+68.9	0.50
0+69.4	0.50
0+74.4	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.55)	(0+07.0, 0.13)	0.013
(0+07.0, 0.13)	(0+67.4, 0.13)	0.016
(0+67.4, 0.13)	(0+74.4, 0.55)	0.013

Options

Current Roughness Weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Section G - OK_10-yr

Results

Normal Depth	0.49	ft
Elevation Range	0.00 to 0.80	ft
Flow Area	6.02	ft²
Wetted Perimeter	34.28	ft
Hydraulic Radius	0.18	ft
Top Width	33.21	ft
Normal Depth	0.49	ft
Critical Depth	0.55	ft
Critical Slope	0.00663	ft/ft
Velocity	3.32	ft/s
Velocity Head	0.17	ft
Specific Energy	0.66	ft
Froude Number	1.38	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.49	ft
Critical Depth	0.55	ft
Channel Slope	1.25	%
Critical Slope	0.00663	ft/ft

Attachment A-2 (Location Map)

Attachment A-3 (Drop Inlet Calculations)

DI #OAK01_100-yr

Project Description

Solve For Efficiency

Input Data

Discharge	107.00	ft ³ /s
Slope	1.00	%
Gutter Width	1.50	ft
Gutter Cross Slope	8.67	%
Road Cross Slope	2.10	%
Roughness Coefficient	0.015	
Local Depression	2.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	17.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	17.50	ft

Typ Change to Vals Grates
Curved

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	57.74	%
Intercepted Flow	61.78	ft ³ /s
Bypass Flow	45.22	ft ³ /s
Spread	39.22	ft
Depth	0.92	ft
Flow Area	16.23	ft ²
Gutter Depression	0.10	ft
Total Depression	0.27	ft
Velocity	6.59	ft/s
Splash Over Velocity	25.03	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.41	
Grate Flow Ratio	0.11	
Equivalent Cross Slope	0.04010	ft/ft
Active Grate Length	8.75	ft
Length Factor	0.10	
Total Interception Length	91.83	ft

DI #OAK01_100-yr

Messages

Messages

Grate Length should be within the
defined range of HEC-22's Chart 5
(approx. 0.5-4.5 ft / 0.15-1.35 m).

DI #OAK01 10-yr

Project Description

Solve For Efficiency

Input Data

Discharge	55.00	ft ³ /s
Slope	1.00	%
Gutter Width	1.50	ft
Gutter Cross Slope	8.67	%
Road Cross Slope	2.10	%
Roughness Coefficient	0.015	
Local Depression	2.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	17.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	17.50	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	68.29	%
Intercepted Flow	37.56	ft ³ /s
Bypass Flow	17.44	ft ³ /s
Spread	30.49	ft
Depth	0.74	ft
Flow Area	9.84	ft ²
Gutter Depression	0.10	ft
Total Depression	0.27	ft
Velocity	5.59	ft/s
Splash Over Velocity	25.03	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.48	
Grate Flow Ratio	0.14	
Equivalent Cross Slope	0.04587	ft/ft
Active Grate Length	8.75	ft
Length Factor	0.14	
Total Interception Length	64.05	ft

DI #OAK01_10-yr

Messages

Messages

Grate Length should be within the
defined range of HEC-22's Chart 5
(approx. 0.5-4.5 ft / 0.15-1.35 m).

DI #OAK02_100-yr

Project Description

Solve For Efficiency

Input Data

Discharge	89.00	ft ³ /s
Slope	1.00	%
Gutter Width	1.50	ft
Gutter Cross Slope	8.67	%
Road Cross Slope	3.80	%
Roughness Coefficient	0.015	
Local Depression	2.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	12.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	12.50	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	54.53	%
Intercepted Flow	48.54	ft ³ /s
Bypass Flow	40.46	ft ³ /s
Spread	25.26	ft
Depth	1.03	ft
Flow Area	12.18	ft ²
Gutter Depression	0.07	ft
Total Depression	0.24	ft
Velocity	7.31	ft/s
Splash Over Velocity	15.63	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.32	
Grate Flow Ratio	0.16	
Equivalent Cross Slope	0.06342	ft/ft
Active Grate Length	6.25	ft
Length Factor	0.10	
Total Interception Length	64.55	ft

DI #OAK02_100-yr

Messages

Messages

Grate Length should be within the
defined range of HEC-22's Chart 5
(approx. 0.5-4.5 ft / 0.15-1.35 m).

DI #OAK02 10-yr

Project Description

Solve For Efficiency

Input Data

Discharge	35.00	ft ³ /s
Slope	1.00	%
Gutter Width	1.50	ft
Gutter Cross Slope	8.67	%
Road Cross Slope	3.80	%
Roughness Coefficient	0.015	
Local Depression	2.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	12.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	12.50	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	70.02	%
Intercepted Flow	24.51	ft ³ /s
Bypass Flow	10.49	ft ³ /s
Spread	17.74	ft
Depth	0.75	ft
Flow Area	6.04	ft ²
Gutter Depression	0.07	ft
Total Depression	0.24	ft
Velocity	5.80	ft/s
Splash Over Velocity	15.63	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.42	
Grate Flow Ratio	0.23	
Equivalent Cross Slope	0.07407	ft/ft
Active Grate Length	6.25	ft
Length Factor	0.16	
Total Interception Length	39.74	ft

DI #OAK02_10-yr

Messages

Messages

Grate Length should be within the
defined range of HEC-22's Chart 5
(approx. 0.5-4.5 ft / 0.15-1.35 m).

DI #OAK03_100-yr

Project Description

Solve For Efficiency

Input Data

Discharge	42.50	ft ³ /s
Slope	1.20	%
Gutter Width	1.50	ft
Gutter Cross Slope	8.67	%
Road Cross Slope	2.00	%
Roughness Coefficient	0.015	
Local Depression	2.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	7.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	7.50	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	34.63	%
Intercepted Flow	14.72	ft ³ /s
Bypass Flow	27.78	ft ³ /s
Spread	27.53	ft
Depth	0.65	ft
Flow Area	7.65	ft ²
Gutter Depression	0.10	ft
Total Depression	0.27	ft
Velocity	5.55	ft/s
Splash Over Velocity	11.14	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.11	
Grate Flow Ratio	0.16	
Equivalent Cross Slope	0.04806	ft/ft
Active Grate Length	3.75	ft
Length Factor	0.06	
Total Interception Length	59.03	ft

DI #OAK03_100-yr

Messages

Messages

Grate Length should be within the
defined range of HEC-22's Chart 5
(approx. 0.5-4.5 ft / 0.15-1.35 m).

DI #OAK03_10-yr

Project Description

Solve For Efficiency

Input Data

Discharge	13.50	ft ³ /s
Slope	1.20	%
Gutter Width	1.50	ft
Gutter Cross Slope	8.67	%
Road Cross Slope	2.00	%
Roughness Coefficient	0.015	
Local Depression	2.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	7.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	7.50	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	53.70	%
Intercepted Flow	7.25	ft ³ /s
Bypass Flow	6.25	ft ³ /s
Spread	17.70	ft
Depth	0.45	ft
Flow Area	3.21	ft ²
Gutter Depression	0.10	ft
Total Depression	0.27	ft
Velocity	4.21	ft/s
Splash Over Velocity	11.14	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.17	
Grate Flow Ratio	0.25	
Equivalent Cross Slope	0.06477	ft/ft
Active Grate Length	3.75	ft
Length Factor	0.12	
Total Interception Length	30.49	ft

DI #OAK03_10-yr

Messages

Messages

Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m).

DI #VV01 & VV02_100-yr

Project Description

Solve For Efficiency

Input Data

Discharge	52.00	ft ³ /s
Slope	0.40	%
Gutter Width	1.50	ft
Gutter Cross Slope	8.67	%
Road Cross Slope	2.75	%
Roughness Coefficient	0.015	
Local Depression	2.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	12.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	12.50	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	68.82	%
Intercepted Flow	35.78	ft ³ /s
Bypass Flow	16.22	ft ³ /s
Spread	30.00	ft
Depth	0.91	ft
Flow Area	12.44	ft ²
Gutter Depression	0.09	ft
Total Depression	0.26	ft
Velocity	4.18	ft/s
Splash Over Velocity	15.63	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.49	
Grate Flow Ratio	0.14	
Equivalent Cross Slope	0.05105	ft/ft
Active Grate Length	6.25	ft
Length Factor	0.14	
Total Interception Length	44.57	ft

DI #VV01 & VV02_100-yr

Messages

Messages

Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m).

DI #VV01 & VV02 @ 10-yr

Project Description

Solve For Efficiency

Input Data

Discharge	15.00	ft ³ /s
Slope	0.40	%
Gutter Width	1.50	ft
Gutter Cross Slope	8.67	%
Road Cross Slope	2.75	%
Roughness Coefficient	0.015	
Local Depression	2.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	12.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	12.50	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	87.05	%
Intercepted Flow	13.06	ft ³ /s
Bypass Flow	1.94	ft ³ /s
Spread	18.70	ft
Depth	0.60	ft
Flow Area	4.87	ft ²
Gutter Depression	0.09	ft
Total Depression	0.26	ft
Velocity	3.08	ft/s
Splash Over Velocity	15.63	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.62	
Grate Flow Ratio	0.22	
Equivalent Cross Slope	0.06569	ft/ft
Active Grate Length	6.25	ft
Length Factor	0.27	
Total Interception Length	22.73	ft

DI #VV01 & VV02 @ 10-yr

Messages

Messages

Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m).

DI#VV 03 & VV04_100-yr

Project Description

Solve For

Efficiency

Input Data

Discharge	40.50	ft ³ /s
Slope	0.35	%
Gutter Width	1.50	ft
Gutter Cross Slope	8.67	%
Road Cross Slope	2.50	%
Roughness Coefficient	0.015	
Local Depression	2.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	12.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	12.50	ft

Options

Calculation Option

Use Both

Grate Flow Option

Exclude None

Results

Efficiency	72.79	%
Intercepted Flow	29.48	ft ³ /s
Bypass Flow	11.02	ft ³ /s
Spread	29.71	ft
Depth	0.84	ft
Flow Area	11.10	ft ²
Gutter Depression	0.09	ft
Total Depression	0.26	ft
Velocity	3.65	ft/s
Splash Over Velocity	15.63	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.52	
Grate Flow Ratio	0.14	
Equivalent Cross Slope	0.04941	ft/ft
Active Grate Length	6.25	ft
Length Factor	0.16	
Total Interception Length	39.32	ft

DI#VV 03 & VV04_100-yr

Messages

Messages

Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m).

DI#VV 03 & VV04_10-yr

Project Description

Solve For Efficiency

Input Data

Discharge	13.00	ft ³ /s
Slope	0.35	%
Gutter Width	1.50	ft
Gutter Cross Slope	8.67	%
Road Cross Slope	2.50	%
Roughness Coefficient	0.015	
Local Depression	2.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	12.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	12.50	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	88.79	%
Intercepted Flow	11.54	ft ³ /s
Bypass Flow	1.46	ft ³ /s
Spread	19.27	ft
Depth	0.57	ft
Flow Area	4.71	ft ²
Gutter Depression	0.09	ft
Total Depression	0.26	ft
Velocity	2.76	ft/s
Splash Over Velocity	15.63	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.64	
Grate Flow Ratio	0.22	
Equivalent Cross Slope	0.06317	ft/ft
Active Grate Length	6.25	ft
Length Factor	0.30	
Total Interception Length	21.05	ft

DI#VV 03 & VV04_10-yr

Messages

Messages

Grate Length should be within the
defined range of HEC-22's Chart 5
(approx. 0.5-4.5 ft / 0.15-1.35 m).

DI#VV05 100-yr

Project Description

Solve For Efficiency

Input Data

Discharge	11.00	ft ³ /s
Slope	0.50	%
Gutter Width	1.50	ft
Gutter Cross Slope	8.67	%
Road Cross Slope	3.00	%
Roughness Coefficient	0.015	
Local Depression	2.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	55.63	%
Intercepted Flow	6.12	ft ³ /s
Bypass Flow	4.88	ft ³ /s
Spread	15.06	ft
Depth	0.54	ft
Flow Area	3.47	ft ²
Gutter Depression	0.09	ft
Total Depression	0.25	ft
Velocity	3.17	ft/s
Splash Over Velocity	9.11	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.17	
Grate Flow Ratio	0.27	
Equivalent Cross Slope	0.07612	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.13	
Total Interception Length	19.53	ft

DI#VV05_100-yr

Messages

Messages

Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m).

DI#VV05_10-yr

Project Description

Solve For Efficiency

Input Data

Discharge	1.50	ft ³ /s
Slope	0.50	%
Gutter Width	1.50	ft
Gutter Cross Slope	8.67	%
Road Cross Slope	3.00	%
Roughness Coefficient	0.015	
Local Depression	2.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	94.83	%
Intercepted Flow	1.42	ft ³ /s
Bypass Flow	0.08	ft ³ /s
Spread	6.74	ft
Depth	0.29	ft
Flow Area	0.74	ft ²
Gutter Depression	0.09	ft
Total Depression	0.25	ft
Velocity	2.01	ft/s
Splash Over Velocity	9.11	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.32	
Grate Flow Ratio	0.58	
Equivalent Cross Slope	0.12735	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.40	
Total Interception Length	6.21	ft

DI#VV05 10-yr

Messages

Messages

Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m).

DI#VV06_100-yr

Project Description

Solve For Spread

Input Data

Discharge	25.00	ft ³ /s
Left Side Slope	64.00	ft/ft (H:V)
Right Side Slope	64.00	ft/ft (H:V)
Bottom Width	0.00	ft
Grate Width	2.00	ft
Grate Length	15.00	ft
Local Depression	2.00	in
Local Depression Width	2.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%

Results

Spread	30.86	ft
Depth	0.24	ft
Wetted Perimeter	30.87	ft
Top Width	30.86	ft
Open Grate Area	13.50	ft ²
Active Grate Weir Length	32.00	ft

check
design
details

DI#VV06 10-yr

Project Description

Solve For Spread

Input Data

Discharge	3.00	ft ³ /s
Left Side Slope	64.00	ft/ft (H:V)
Right Side Slope	64.00	ft/ft (H:V)
Bottom Width	0.00	ft
Grate Width	2.00	ft
Grate Length	15.00	ft
Local Depression	2.00	in
Local Depression Width	2.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%

Results

Spread	2.00	ft
Depth	-0.07	ft
Wetted Perimeter	-8.64	ft
Top Width	-8.63	ft
Open Grate Area	13.50	ft ²
Active Grate Weir Length	32.00	ft

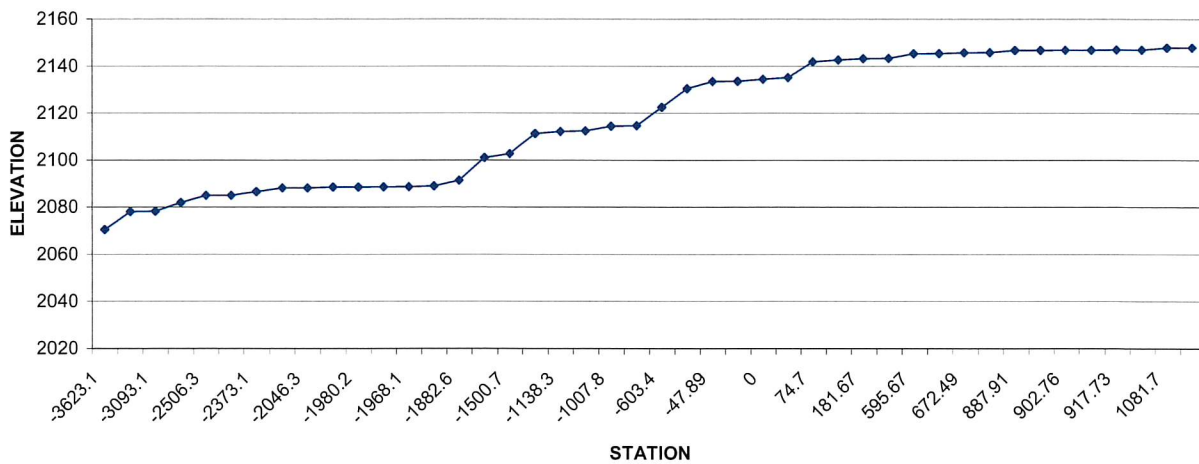
Attachment A-4 (Storm Drain Calculations)

WSPGS SUMMARY

Date: January 20, 2011

	ID	Jacobs Sta	PB Sta	Elevation	Pipe Size	Lateral 1 Size	Lateral 1 Invert/Angle/Flow	Lateral 2 Size	Lateral 2 Invert/Angle/Flow	HGL	EGL
PB MODEL	SO	-3623.05	-3834.65	2070.46	5X5					2075.19	2080.91
	R	-3103.05	-3314.65	2078.09	5X5					2083.09	2088.21
	TS	-3093.05	-3304.65	2078.21	5x6					2084.93	2088.49
	R	-2773.05	-2964.65	2081.92	5x6					2088.64	2092.2
	R	-2506.25	-2717.85	2085.02	5x6					2091.74	2095.29
	JX	-2504.75	-2716.35	2085.03	5x6	1.91x1.6	2087.6/45/6			2091.93	2095.39
	R	-2373.05	-2564.65	2086.56	5x6					2093.42	2096.88
	R	-2047.63	-2259.23	2088.16	5x6					2096.79	2100.25
	JX	-2046.27	-2257.67	2088.17	5x6	1.5 Dia	2088.7/45/3			2097.2	2100.61
	R	-1982.63	-2194.23	2088.48	5x6					2097.9	2101.32
	JX	-1980.21	-2191.81	2088.49	5x6	4 Dia	2089.4/90/67			2099.83	2102.29
	R	-1973.05	-2184.65	2088.56	5x6					2099.89	2102.35
	R	-1968.05	-2179.65	2088.63	5x6					2099.93	2102.39
	TS	-1958.05	-2169.65	2089	5x6					2099.16	2102.71
	R	-1882.61	-2094.21	2091.37	5x5					2100.15	2103.69
	R	-1573.05	-1784.65	2101	5X5					2104.37	2112.18
	R	-1500.69	-1712.29	2102.72	5X5					2106.09	2113.9
	R	-1171.46	-1383.96	2111.28	5X5					2115.51	2120.48
	R	-1138.28	-1349.88	2112.14	5X5					2116.82	2120.88
	R	-1012.59	-1224.19	2112.42	5X5					2116.08	2122.71
	JX	-1007.81	-1219.41	2114.43	5X5	5X5	2114.8/45/44			2117.7	2124.19
	R	-1003.4	-1215	2114.58	5X5					2117.87	2124.28
	R	-603.4	-815	2122.5	5X5					2125.78	2132.2
	R	-203.4	-415	2130.42	5X5					2133.8	2139.86
	R	-47.89	-259.49	2133.51	5X5					2137.06	2142.55
	JX	-45.25	-256.85	2133.52	5X5	2 Dia	2134.06/45/23	2 Dia	2134.06/-45/23	2136.01	2144.33
	R	0	-211.6	2134.46	5X5					2136.86	2145.78
JACOBS MODEL	TS	7		2135.15	7x5					2136.83	2146.18
	R	74.7		2141.82	7x5					2144.73	2147.84
	JX	82		2142.61	7x5	1.5 Dia	2143.86/68/15			2145.83	2148.11
	R	181.67		2143.2	7x5					2146.81	2148.62
	JX	188.67		2143.3	5x4	5x3	2143.30/-90/111			2147.96	2148.98
	R	595.67		2145.32	5x4					2149.73	2150.86
	JX	598.17		2145.37	5x4	1.5 Dia	2145.37/70/25			2150.14	2150.86
	R	672.49		2145.7	5x4					2150.37	2151.1
	JX	675.49		2145.75	5x4	1.5 Dia	2148.00/-73/6			2150.49	2151.16
	R	887.91		2146.75	5x4					2151.1	2151.76
	JX	890.41		2146.76	5x4	2.5 Dia	2147.93/30/29.5			2151.4	2151.8
	R	902.76		2146.81	6x3					2151.42	2151.82
	JX	905.26		2146.82	6x3	2.5 Dia	2147.93/-73/29.5			2151.74	2151.94
	R	917.73		2146.95	6x3					2151.75	2151.95
	JX	922.07		2146.97	6x3					2151.71	2151.96
	R	1081.7		2147.8	6x3					2151.9	2152.15
	SH	1081.7		2147.9	6x3		Q=72 CFS			2151.9	2152.15

VALLEY VIEW & OAKLEY FACILITY PROFILE



WATER SURFACE PRESSURE GRADIENT ANALYSIS (PLAN & PROFILE)

2136.000
2134.000
2132.000
2130.000
2148.000
2146.000
2144.000
2142.000
2140.000
2138.000
2136.000
2134.000
ELEVATIONS

CHUNK
SUPER E
CRITICAL
WATER
INVERT

11	STATION	7.000
20	STATION	13.999
43	STATION	25.807
53	STATION	34.868
63	STATION	48.496
73	STATION	49.810
100	STATION	59.261
101	STATION	59.907
153	STATION	82.700
163	STATION	132.139
173	STATION	173.365
180	STATION	181.670
193	STATION	188.670

200	STATION	595.670
223	STATION	678.490
243	STATION	887.910
263	STATION	908.760
280	STATION	922.090
303	STATION	1081.300
313	STATION	1087.500

Q =	288.000	Ft ³ /S, V =	24.191	Ft/S
Q =	288.000	Ft ³ /S, V =	24.549	Ft/S
Q =	288.000	Ft ³ /S, V =	23.927	Ft/S
Q =	288.000	Ft ³ /S, V =	22.813	Ft/S
Q =	288.000	Ft ³ /S, V =	21.738	Ft/S
Q =	288.000	Ft ³ /S, V =	20.729	Ft/S
Q =	288.000	Ft ³ /S, V =	19.774	Ft/S
Q =	288.000	Ft ³ /S, V =	18.870	Ft/S
Q =	288.000	Ft ³ /S, V =	17.140	Ft/S
Q =	273.000	Ft ³ /S, V =	12.106	Ft/S
Q =	273.000	Ft ³ /S, V =	11.874	Ft/S
Q =	273.000	Ft ³ /S, V =	11.321	Ft/S
Q =	273.000	Ft ³ /S, V =	10.791	Ft/S
Q =	162.000	Ft ³ /S, V =	8.100	Ft/S

Q =	162.000	Ft ³ /S, V =	8.100	Ft/S
Q =	137.000	Ft ³ /S, V =	6.850	Ft/S

Q =	131.000	Ft ³ /S, V =	6.350	Ft/S
Q =	101.500	Ft ³ /S, V =	5.075	Ft/S
Q =	78.000	Ft ³ /S, V =	3.688	Ft/S

Q =	78.000	Ft ³ /S, V =	4.000	Ft/S
Q =	78.000	Ft ³ /S, V =	4.000	Ft/S

Provide Enlarged print that is legible

WATER SURFACE PROFILE LISTING

Date: 1-25-2011 Time:11:38:55
Valley View Blvd

Water Surface Profile

Critical Station	Invert Flow Top Elev	Depth Height/ (FT)	Water Base Wt/ Elev	Q No Wth (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev		
Depth	Width	Dia.	-FT or I.D.	ZL	Prs/Pip					
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
L/Elem	Ch Slope						SF Ave	HF	SE	
Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type	Ch			

-3623.050	2070.460	4.732	2075.192	454.00	19.19	5.72	2080.91	.00		
5.00	5.00	5.000	5.000	.00	0	.0				
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
266.353	.0147					.0145	3.86	4.73		
1.55	4.73	.013	.00	.00	BOX					
----- WARNING - Flow depth near top of box										
-3356.697	2074.368	4.766	2079.135	454.00	19.05	5.64	2084.77	.00		
5.00	5.00	5.000	5.000	.00	0	.0				
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
253.647	.0147					.0136	3.44	4.77		
1.54	4.73	.013	.00	.00	BOX					
----- WARNING - Flow depth near top of box										
-3103.050	2078.090	5.000	2083.090	454.00	18.16	5.12	2088.21	.00		
5.00	5.00	5.000	5.000	.00	0	.0				
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
TRANS STR	.0120					.0116	.12	5.00		
1.43	.013	.00	.00	BOX						
----- WARNING - Flow depth near top of box										
-3093.050	2078.210	6.723	2084.933	454.00	15.13	3.56	2088.49	.00		
6.00	5.00	6.000	5.000	.00	0	.0				
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
320.000	.0116					.0116	3.71	6.72		

FILE: VVOV.WSW

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WATER SURFACE PROFILE LISTING

Water Surface Profile

Page 2

- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT	STR	.0004						.0111	.32	8.62	
1.07		.013	.00	.00	BOX						
-2046.270	2088.170	9.025	2097.195	445.00	14.83	3.42	2100.61	.00			
6.00	5.00	6.000	5.000	.00	0	.0					
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
63.640	.0049						.0111	.71	9.02		
1.07	6.00	.013	.00	.00	BOX						
-1982.630	2088.480	9.423	2097.903	445.00	14.83	3.42	2101.32	.00			
6.00	5.00	6.000	5.000	.00	0	.0					
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT	STR	.0041					.0080	.02	9.42		
1.07		.013	.00	.00	BOX						
-1980.210	2088.490	11.339	2099.829	378.00	12.60	2.47	2102.29	.00			
5.62	5.00	6.000	5.000	.00	0	.0					
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
7.160	.0098						.0080	.06	11.34		
.91	4.80	.013	.00	.00	BOX						
-1973.050	2088.560	11.327	2099.887	378.00	12.60	2.47	2102.35	.00			
5.62	5.00	6.000	5.000	.00	0	.0					
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5.000	.0140						.0080	.04	11.33		
.91	4.16	.013	.00	.00	BOX						
-1968.050	2088.630	11.297	2099.927	378.00	12.60	2.47	2102.39	.00			
5.62	5.00	6.000	5.000	.00	0	.0					
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
TRANS	STR	.0370					.0080	.08	11.30		
.91		.013	.00	.00	BOX						
-1958.050	2089.000	10.164	2099.164	378.00	15.12	3.55	2102.71	.00			
5.00	5.00	5.000	5.000	.00	0	.0					
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
75.440	.0314						.0130	.98	10.16		
1.19	3.03	.013	.00	.00	BOX						

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Program Package Serial Number: 1267

Date: 1-25-2011 Time:11:38:55
Valley View Blvd

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vovv.txt

Critical Station	Invert Flow Top Elev	Depth Height/ (FT)	Water Base Wt Elev	Q No Wth (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev
Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip			
- -	- -	- -	- -	- -	- -	- -	- -	- -
L/Elem	Ch slope						SF Ave	HF SE
Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type	Ch	

*****|*****|*****|*****|*****|*****|*****|*****|*****|*
*****|*****|*****|*****|*****|*****|*****|*****|*****|*

-1882.610	2091.370	8.774	2100.145	378.00	15.12	3.55	2103.69	.00
5.00	5.00	5.000	5.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
57.435	.0311					.0130	.75	8.77
1.19	3.04	.013	.00	.00	BOX			
-1825.175	2093.157	7.733	2100.890	378.00	15.12	3.55	2104.44	.00
5.00	5.00	5.000	5.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
HYDRAULIC JUMP								

-1825.175	2093.157	3.125	2096.282	378.00	24.19	9.09	2105.37	.00
5.00	5.00	5.000	5.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
144.283	.0311					.0279	4.02	3.13
2.41	3.04	.013	.00	.00	BOX			
-1680.893	2097.645	3.214	2100.859	378.00	23.52	8.59	2109.45	.00
5.00	5.00	5.000	5.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
107.843	.0311					.0253	2.73	3.21
2.31	3.04	.013	.00	.00	BOX			
-1573.050	2101.000	3.371	2104.371	378.00	22.43	7.81	2112.18	.00
5.00	5.00	5.000	5.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
72.360	.0238					.0238	1.72	3.37
2.15	3.37	.013	.00	.00	BOX			
-1500.690	2102.720	3.372	2106.092	378.00	22.42	7.80	2113.90	.00
5.00	5.00	5.000	5.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
124.854	.0260					.0227	2.84	3.37
2.15	3.26	.013	.00	.00	BOX			

vvov.txt

-1375.836	2105.966	3.492	2109.458	378.00	21.65	7.28	2116.74	.00
5.00	5.00	5.000	5.000	.00	0	.0	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -
88.826	.0260					.0205	1.82	3.49
2.04	3.26	.013	.00	.00	BOX			
-1287.010	2108.276	3.663	2111.938	378.00	20.64	6.62	2118.55	.00
5.00	5.00	5.000	5.000	.00	0	.0	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -
53.744	.0260					.0181	.97	3.66
1.90	3.26	.013	.00	.00	BOX			
-1233.266	2109.673	3.842	2113.515	378.00	19.68	6.01	2119.53	.00
5.00	5.00	5.000	5.000	.00	0	.0	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -
36.209	.0260					.0161	.58	3.84
1.77	3.26	.013	.00	.00	BOX			

□ FILE: vvov.WSW

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WATER SURFACE PROFILE LISTING

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Valley View Blvd

Water Surface Profile

Critical Station	Invert Elev	Depth (FT)	Water Base Elev	Q No with (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev
Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip			
- -	- -	- -	- -	- -	- -	- -	- -	- -
L/Elem	Ch Slope						SF Ave	HF SE
Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch		

-1197.057	2110.615	4.029	2114.644	378.00	18.76	5.47	2120.11	.00
5.00	5.00	5.000	5.000	.00	0	.0	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -
25.597	.0260					.0143	.37	4.03
1.65	3.26	.013	.00	.00	BOX			
-1171.460	2111.280	4.226	2115.506	378.00	17.89	4.97	2120.48	.00
5.00	5.00	5.000	5.000	.00	0	.0	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -

vvov.txt

- -	2.667	- -	.0259	- -	- -	- -	.0133	.04	4.23
1.53	3.26	.013	.00	.00	BOX				
-1168.793	2111.349	4.250	2115.600	378.00	17.79	4.91	2120.51	.00	
5.00	5.00	5.000	5.000	.00	0	.0			
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
17.803	.0259					.0125	.22	4.25	
1.52	3.26	.013	.00	.00	BOX				
-1150.990	2111.811	4.458	2116.269	378.00	16.96	4.47	2120.73	.00	
5.00	5.00	5.000	5.000	.00	0	.0			
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
12.710	.0259					.0111	.14	4.46	
1.42	3.26	.013	.00	.00	BOX				
-1138.280	2112.140	4.675	2116.815	378.00	16.17	4.06	2120.88	.00	
5.00	5.00	5.000	5.000	.00	0	.0			
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.998	.0022					.0105	.03	4.68	
1.32	5.00	.013	.00	.00	BOX				

WARNING - Flow depth near top of box

-1135.282	2112.146	4.642	2116.789	378.00	16.29	4.12	2120.91	.00	
5.00	5.00	5.000	5.000	.00	0	.0			
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
21.605	.0022					.0113	.24	4.64	
1.33	5.00	.013	.00	.00	BOX				

WARNING - Flow depth near top of box

-1113.677	2112.195	4.426	2116.621	378.00	17.08	4.53	2121.15	.00	
5.00	5.00	5.000	5.000	.00	0	.0			
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
23.572	.0022					.0127	.30	4.43	
1.43	5.00	.013	.00	.00	BOX				

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WATER SURFACE PROFILE LISTING

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Water Surface Profile

Invert	Depth	Water	Q	Vel	Vel	Energy	Super
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vvov.txt

Critical Station	Flow Top Elev	Height/ (FT)	Base Wt/ Elev	No Wth (CFS)	(FPS)	Head	Grd.El.	Elev
Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip			
- -	- -	- -	- -	- -	- -	- -	- -	- -
L/Elem	Ch slope					SF Ave	HF	SE
Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type	Ch	
*****	*****	*****	*****	*****	*****	*****	*****	*****
*****	*****	*****	*****	*****	*****	*****	*****	*****
-1090.104	2112.247	4.220	2116.467	378.00	17.91	4.98	2121.45	.00
5.00	5.00	5.000	5.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
24.983	.0022					.0143	.36	4.22
1.54	5.00	.013	.00	.00	BOX			
-1065.122	2112.303	4.024	2116.326	378.00	18.79	5.48	2121.81	.00
5.00	5.00	5.000	5.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
25.954	.0022					.0161	.42	4.02
1.65	5.00	.013	.00	.00	BOX			
-1039.168	2112.361	3.837	2116.197	378.00	19.71	6.03	2122.23	.00
5.00	5.00	5.000	5.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
26.578	.0022					.0182	.48	3.84
1.77	5.00	.013	.00	.00	BOX			
-1012.590	2112.420	3.658	2116.078	378.00	20.67	6.63	2122.71	.00
5.00	5.00	5.000	5.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.4205					.0197	.09	3.66
1.90	.013	.00	.00	BOX				
-1007.810	2114.430	3.266	2117.696	334.00	20.45	6.49	2124.19	.00
5.00	5.00	5.000	5.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
4.410	.0340					.0200	.09	3.27
1.99	2.67	.013	.00	.00	BOX			
-1003.400	2114.580	3.287	2117.867	334.00	20.32	6.41	2124.28	.00
5.00	5.00	5.000	5.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
400.000	.0198					.0198	7.92	3.29
1.98	3.29	.013	.00	.00	BOX			
-603.400	2122.500	3.287	2125.787	334.00	20.32	6.41	2132.20	.00
5.00	5.00	5.000	5.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -

Case	Case No.	Case Name	Case Type	Case Status	Case Date	Case Time	Case Location	Case Description	Case Details	Case Notes	Case Actions	Case Results	Case Comments
1	28.003	1.98	3.29	.0198	.013	.00	.00	BOX	.0198	.55	3.29		
2	575.397	5.00	5.00	2123.054	5.000	3.287	2126.342	334.00	20.32	6.41	2132.75	.00	
3	371.997	1.98	3.29	.0198	.013	.00	.00	BOX	.0191	7.10	3.29		
4	203.400	5.00	5.00	2130.420	5.000	3.384	2133.803	334.00	19.74	6.05	2139.86	.00	
5	8.821	1.89	3.28	.0199	.013	.00	.00	BOX	.0183	.16	3.38		

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Valley View Blvd

Water Surface Profile

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*****
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Critical Station	Invert Flow Top Elev	Depth Height/ (FT)	Water Base Wt Elev	Q No Wth (CFS)	Vel (FPS)	Vel Head	Energy Grd.E.L.	Super Elev
Depth	width	Dia.-FT	or I.D.	ZL	Prs/Pip			
- -	- -	- -	- -	- -	- -	- -	- -	- -
L/Elem	Ch Slope						SF Ave	HF SE
Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch		

[illegible]

	-194.579	2130.595	3.389	2133.984	334.00	19.71	6.03	2140.02	.00
	5.00	5.00	5.000	5.000	.00	0 .0			
	- -	- -	- -	- -	- -	- -	- -	- -	- -
	146.689	.0199					.0173	2.53	3.39
	1.89	3.28	.013	.00	.00	BOX			
	-47.890	2133.510	3.554	2137.064	334.00	18.79	5.48	2142.55	.00
	5.00	5.00	5.000	5.000	.00	0 .0			
	- -	- -	- -	- -	- -	- -	- -	- -	- -
	JUNCT STR	.0038					.0234	.06	3.55
	1.76	.013	.00	.00	BOX				

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-45.250	2133.520	2.488	2136.008	288.00	23.15	8.32	2144.33	.00			
4.69	5.00	5.000	5.000	.00	0	.0	- -	- -	- -	- -	
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	
45.250	.0208						.0321	1.45	2.49		
2.59	2.88	.013	.00	.00	BOX						
.000	2134.460	2.403	2136.863	288.00	23.97	8.92	2145.78	.00			
4.69	5.00	5.000	5.000	.00	0	.0	- -	- -	- -	- -	
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	
TRANS STR	.0986						.0363	.25	2.40		
2.72	.013	.00	.00	BOX							
7.000	2135.150	1.676	2136.826	288.00	24.55	9.36	2146.18	.00			
3.75	7.00	5.000	7.000	.00	0	.0	- -	- -	- -	- -	
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	
6.999	.0985						.0376	.26	1.68		
3.34	1.22	.013	.00	.00	BOX						
13.999	2135.840	1.720	2137.559	288.00	23.93	8.89	2146.45	.00			
3.75	7.00	5.000	7.000	.00	0	.0	- -	- -	- -	- -	
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	
11.208	.0985						.0339	.38	1.72		
3.22	1.22	.013	.00	.00	BOX						
25.207	2136.944	1.803	2138.747	288.00	22.81	8.08	2146.83	.00			
3.75	7.00	5.000	7.000	.00	0	.0	- -	- -	- -	- -	
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	
9.376	.0985						.0296	.28	1.80		
2.99	1.22	.013	.00	.00	BOX						
34.583	2137.868	1.891	2139.759	288.00	21.75	7.35	2147.11	.00			
3.75	7.00	5.000	7.000	.00	0	.0	- -	- -	- -	- -	
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	
7.913	.0985						.0258	.20	1.89		
2.79	1.22	.013	.00	.00	BOX						
42.496	2138.647	1.984	2140.631	288.00	20.74	6.68	2147.31	.00			
3.75	7.00	5.000	7.000	.00	0	.0	- -	- -	- -	- -	
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	
6.714	.0985						.0225	.15	1.98		
2.59	1.22	.013	.00	.00	BOX						

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WATER SURFACE PROFILE LISTING

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Water Surface Profile
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Critical Station	Invert Flow Top Elev	Depth Height/ (FT)	Water Base Wt Elev	Q No Wth (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev
Depth	Width	Dia.-FT or I.D.	ZL	Prs/Pip				
L/Elem Dpth	Ch Slope Froude N	Norm Dp	"N"	X-Fall	ZR	Type	Ch	SF Ave
								HF
								SE

49.210	2139.309	2.081	2141.389	288.00	19.77	6.07	2147.46	.00
3.75	7.00	5.000	7.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
5.711	.0985					.0197	.11	2.08
2.42	1.22	.013	.00	.00	BOX			
54.921	2139.871	2.182	2142.053	288.00	18.85	5.52	2147.57	.00
3.75	7.00	5.000	7.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
4.860	.0985					.0172	.08	2.18
2.25	1.22	.013	.00	.00	BOX			
59.781	2140.350	2.289	2142.639	288.00	17.98	5.02	2147.66	.00
3.75	7.00	5.000	7.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
4.126	.0985					.0150	.06	2.29
2.09	1.22	.013	.00	.00	BOX			
63.907	2140.757	2.400	2143.157	288.00	17.14	4.56	2147.72	.00
3.75	7.00	5.000	7.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
3.486	.0985					.0132	.05	2.40
1.95	1.22	.013	.00	.00	BOX			
67.392	2141.100	2.518	2143.618	288.00	16.34	4.15	2147.76	.00
3.75	7.00	5.000	7.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -
2.921	.0985					.0115	.03	2.52
1.82	1.22	.013	.00	.00	BOX			
70.314	2141.388	2.640	2144.028	288.00	15.58	3.77	2147.80	.00
3.75	7.00	5.000	7.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -

vvov.txt

1.69	2.419	1.22	.0985	.013	.00	.00	BOX	.0101	.02	2.64
72.732	2141.626	2.769	2144.396	288.00	14.86	3.43	2147.82	.00		
3.75	7.00	5.000	7.000	.00	0	.0	- -	- -	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.57	1.968	1.22	.0985	.013	.00	.00	BOX	.0089	.02	2.77
74.700	2141.820	2.905	2144.725	288.00	14.17	3.12	2147.84	.00		
3.75	7.00	5.000	7.000	.00	0	.0	- -	- -	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0988							.0070	.06	2.90
1.46			.013	.00	.00	BOX				
82.700	2142.610	3.222	2145.832	273.00	12.11	2.28	2148.11	.00		
3.61	7.00	5.000	7.000	.00	0	.0	- -	- -	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
49.439	.0060							.0055	.27	3.22
1.19	3.15	.013	.00	.00	BOX					

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WATER SURFACE PROFILE LISTING

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Water Surface Profile

Critical Station	Invert Flow Top Elev	Depth Height/ (FT)	Water Base Wt/ Elev	Q No Wth (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev
Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip	- -	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -
L/Elem	Ch Slope						SF Ave	HF
Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch		SE

132.139	2142.905	3.285	2146.189	273.00	11.87	2.19	2148.38	.00
3.61	7.00	5.000	7.000	.00	0	.0	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -
41.227	.0060							.0050
1.15	3.15	.013	.00	.00	BOX			.21
173.366	2143.150	3.445	2146.595	273.00	11.32	1.99	2148.59	.00

vvov.txt

3.61	7.00	5.000	7.000	.00	0	.0	- -	- -	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
8.304	.0060							.0044	.04	3.44
1.07	3.15	.013	.00	.00	BOX					
181.670	2143.200	3.614	2146.814	273.00	10.79	1.81	2148.62	5.00		
3.61	7.00	5.000	7.000	.00	0	.0	- -	- -	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0143							.0044	.03	5.00
1.00	.013	.00	.00	BOX						
188.670	2143.300	4.658	2147.958	162.00	8.10	1.02	2148.98	.00		
3.19	5.00	4.000	5.000	.00	0	.0	- -	- -	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
407.000	.0050							.0044	1.78	4.66
.71	3.21	.013	.00	.00	BOX					
595.670	2145.320	4.414	2149.734	162.00	8.10	1.02	2150.75	.00		
3.19	5.00	4.000	5.000	.00	0	.0	- -	- -	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0200							.0031	.01	4.41
.71	.013	.00	.00	BOX						
598.170	2145.370	4.765	2150.135	137.00	6.85	.73	2150.86	.00		
2.86	5.00	4.000	5.000	.00	0	.0	- -	- -	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
74.320	.0044							.0031	.23	4.77
.60	2.94	.013	.00	.00	BOX					
672.490	2145.700	4.667	2150.367	137.00	6.85	.73	2151.10	.00		
2.86	5.00	4.000	5.000	.00	0	.0	- -	- -	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0167							.0029	.01	4.67
.60	.013	.00	.00	BOX						
675.490	2145.750	4.742	2150.492	131.00	6.55	.67	2151.16	.00		
2.77	5.00	4.000	5.000	.00	0	.0	- -	- -	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
212.420	.0047							.0029	.61	4.74
.58	2.78	.013	.00	.00	BOX					
887.910	2146.750	4.348	2151.098	131.00	6.55	.67	2151.76	.00		
2.77	5.00	4.000	5.000	.00	0	.0	- -	- -	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0040							.0017	.00	4.35
.58	.013	.00	.00	BOX						

□ FILE: vvov.WSW

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-3366.69	.				
-3334.65	.	I	H	E	R
-3302.60	.				
-3270.56	.				
-3238.52	.				
-3206.47	.				
-3174.43	.				
-3142.38	.				
-3110.34	.				
-3078.29	.	I	H	E	TX
-3046.25	.	I	HW	E	R
-3014.20	.				
-2982.16	.				
-2950.11	.				
-2918.07	.				
-2886.03	.				

vvov.txt

-2853.98 .

-2821.94 .

-2789.89 .

-2757.85 .

I HW E
R

-2725.80 .

-2693.76 .

-2661.71 .

-2629.67 .

-2597.62 .

-2565.58 .

-2533.53 .

-2501.49 .

I HW E
JX

-2469.45 .

I HW E
R

-2437.40 .

-2405.36 .

vvov.txt

-2373.31 .

.

-2341.27 .

. I R HW E

-2309.22 .

.

-2277.18 .

.

-2245.13 .

.

-2213.09 .

.

-2181.04 .

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-2149.00 .

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-2116.96 .

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-2084.91 .

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-2052.87 .

. I H W E
JX

-2020.82 .

. I H W E
R

-1988.78 .

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-1956.73 .

. I H W E
JX

-1924.69 .

. I CH W E
R

-1892.64 .

. I H W E
R

vovv.txt

-1860.60	.	.	I	H	W	E
			TX			
-1828.55	.	.	I	H	W	E
			R			
-1796.51	.	.		I	H	W E
			R			
-1764.47	.	.		I	H	W E
			R			
-1732.42	.	.		I	W H	E
			R			
-1700.38	.	.				
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			R			
-1636.29	.	.				
-1604.24	.	.				
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			R			
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			R			
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vovv.txt

-1347.89	.	.	R	I	W	H	E
-1315.84	.	.					
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-1251.75	.	.					
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-1155.62	.	.	R	I	W	H	E
-1123.57	.	.	R	I	W	H	E
-1091.53	.	.	R	I	H		E
-1059.49	.	.	R	I	W	H	E
-1027.44	.	.	R	I	W	H	E
-995.40	.	.	R	I	W	H	E
-963.35	.	.	R	I	W	H	E
-931.31	.	.	R	I	W	H	E
-899.26	.	.	R	I	W	H	E
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vovv.txt
JX

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I W H E

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R

I W H E

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-578.82 .

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vvov.txt

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-290.42 .

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-226.33 .

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-194.28 .

I W H E

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-162.24 .

I W H E

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R

-130.19 .

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I W H E

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JX

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I W C H E

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R

30.03 .

I W H

E

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TX

62.07 .

I W C H

E

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R

94.12 .

I W C H

E

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R

126.16 .

I W C H

E

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R

vvov.txt

158.21	.	I	W	CH	E	.	R
190.25	.	I	W	CH	E	.	R
222.30	.	I	W	C	H	E	R
254.34	.	I	W	C	H	E	R
286.39	.	I	W	CH	E	.	R
318.43	.	I	W	C	H	E	R
350.48	.	I	W	CH	E	.	R
382.52	.	I	W	CH	E	.	R
414.56	.	I	W	C	H	E	R
446.61	.	I	W	C	H	E	JX
478.65	.	I	W	HE	.	R	
510.70	.	I	W	CHE	.	R	
542.74	.	I	W	H	.	R	
574.79	.	I	W	H	.	JX	
606.83	.	I	CH	E	.	R	
638.88	.	I	CHWE	.	JX		

vvov.txt

670.92 . I CHWE . R

702.97 . I CHWE . JX

735.01 . I C HE . R

767.05 . .

799.10 . .

831.14 . .

863.19 . .

895.23 . I C HE . JX

927.28 . I C HW . R

959.32 . I C HW . JX

991.37 . I C HW . R

1023.41 . I C HW . JX

1055.46 . I C H W . R

1087.50 . I C HWE. R

2070.460 2078.629 2086.798 2094.968 2103.137 2111.306 2119.475
2127.644 2135.813 2143.983 2152.151

vvov.txt

N O T E S

1. GLOSSARY

I = INVERT ELEVATION

C = CRITICAL DEPTH

W = WATER SURFACE ELEVATION

S = SUPER-ELEVATION

H = HEIGHT OF CHANNEL

E = ENERGY GRADE LINE

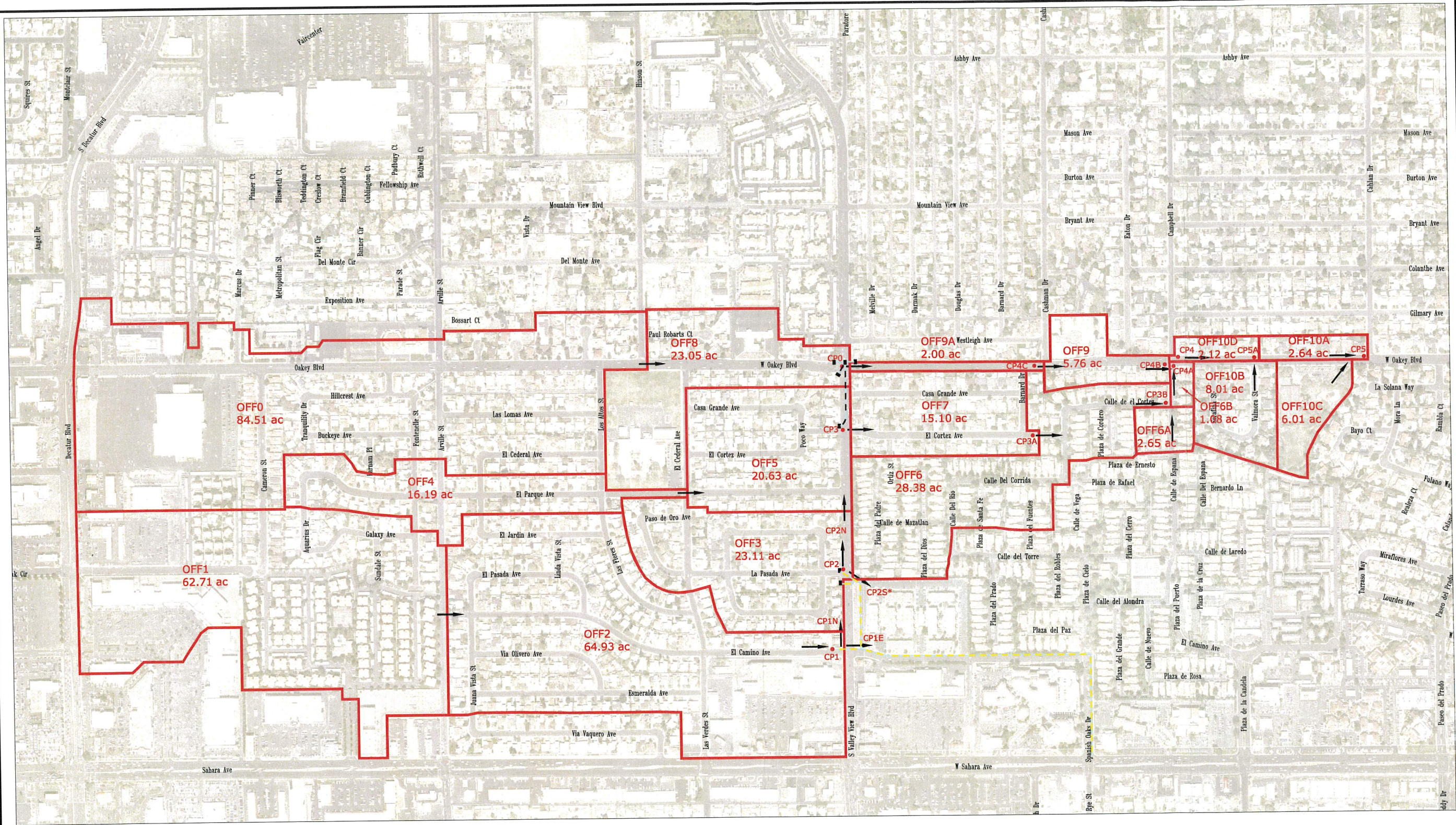
X = CURVES CROSSING OVER

B = BRIDGE ENTRANCE OR EXIT

Y = WALL ENTRANCE OR EXIT

2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

STORM DRAIN HYDRAULIC CALCULATIONS																									
Location: Valley View and Oakey												Calculated By: Derek Velarde, PE						Date: 26-Jan-11							
Conduit Data							Flow Data								Energy Loss Data						Energy and Hydraulic Data			Comments	
Station		Size		Inverts		Length Ft	A Ft ²	n	ψ	Q CFS	V F/S	H _v V ² /2g	S _f FT/FT	AVG S _f	Pipe H _f	Transitions						Pipe			Press
From	To	Ft		D/S	U/S											H _f	H _l	H _m	H _e	H _c	Total	U/S EGL	U/S HGL		Flow ?
		Width	Height													Starting Downstream HGL							2151.90		
DIVV01	MHVV01		2.50	2147.97	2148.48	61.50	4.91	0.013	0.0049	36	7.33	0.84	0.008	0.008	0.47						0.47	2153.21	2152.37	Yes	
																Starting Downstream HGL						2151.90			
DIVV02	MHVV01		2.50	2147.97	2149.89	8.90	4.91	0.013	0.0049	36	7.33	0.84	0.008	0.008	0.07						0.07	2152.80	2151.97	No	
																Starting Downstream HGL						2151.74			
DIVV03	±MHVV02		2.50	2147.93	2148.95	59.30	4.91	0.013	0.0049	30	6.11	0.58	0.005	0.005	0.32						0.32	2152.64	2152.06	Yes	
																Starting Downstream HGL						2151.40			
DIVV04	±MHVV02		2.50	2147.93	2149.67	9.50	4.91	0.013	0.0049	30	6.01	0.56	0.005	0.005	0.05						0.05	2152.01	2151.45	No	
						70.00										Starting Downstream HGL						2150.49			
DIVV05	MHVV03		1.50	2148.00	2148.49	57.50	1.77	0.013	0.0049	6	3.40	0.18	0.003	0.003	0.19						0.19	2150.86	2150.68	Yes	
																Starting Downstream HGL						2150.14			
DIVV06	MHVV04		2.50	2145.37	2145.99	6.20	4.91	0.013	0.0049	25	5.09	0.40	0.004	0.004	0.02						0.02	2150.57	2150.16	Yes	
																Starting Downstream HGL						2147.96			
MHOAK1	MHVV10	5.00	3.00	2143.30	2143.89	43.20	15.00	0.013	0.0049	111	7.40	0.85	0.005	0.014	0.59						0.59	2149.40	2148.55	Yes	
DIOAK01	MHOAK02		2.50	2144.14	2145.69	51.30	4.91	0.013	0.0049	62	12.63	2.48	0.023	0.023	1.17						1.17	2152.20	2149.72	Yes	
																Starting Downstream HGL						2147.96			
MHOAK1	MHVV10	5.00	3.00	2143.30	2143.89	43.20	15.00	0.013	0.0049	111	7.40	0.85	0.005	0.009	0.41						0.41	2149.22	2148.37	Yes	
DIOAK02	MHOAK01		2.50	2144.02	2144.19	11.50	4.91	0.013	0.0049	49	9.98	1.55	0.014	0.014	0.16						0.16	2150.08	2148.53	Yes	
																Starting Downstream HGL						2145.83			
DIOAK03	MHOAK03		1.50	2143.86	2146.31	8.00	1.77	0.013	0.0049	15	8.49	1.12	0.020	0.020	0.16						0.16	2147.11	2145.99	No	



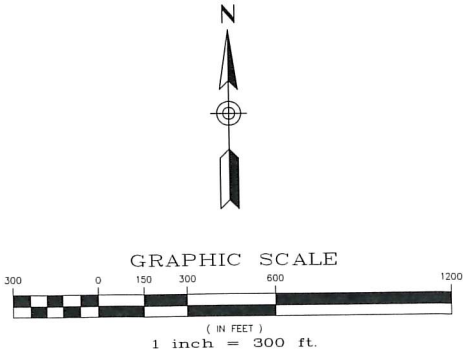
LEGEND:

- SUB-BASIN BOUNDARIES
- OFF-1** DRAINAGE BASIN ID
- FLOW DIRECTION
- COMBINATION POINT
- EXISTING VALLEY VIEW STORM DRAIN
- EXISTING NORTHERN VALLEY VIEW STORM DRAIN

SUB-BASIN DATA			
BASIN ID	AREA (ACRE)	Q10 (CFS)	Q100 (CFS)
OFF0	84.51	74	157
OFF1	62.71	67	138
OFF2	64.93	56	120
OFF3	23.11	26	56
OFF4	16.19	14	32
OFF5	20.63	23	50
OFF6	28.38	30	68
OFF6A	2.65	2	8
OFF6B	1.08	1	3
OFF7	15.10	17	37
OFF8	23.05	22	48
OFF9A	2.00	4	6
OFF9	5.76	5	14
OFF10A	2.64	2	6
OFF10B	8.01	8	19
OFF10C	6.01	6	14
OFF10D	2.12	2	5

CONCENTRATION POINT DATA		
CP#	Q10	Q100
CP0	90	196
CP1	123	255
CP1N	55	111
CP1E	68	143
CP2	68	142
CP2N	30	104
CP2S	38	38
CP3	54	167
CP3A	60	189
CP3B	72	237
CP4A	74	243
CP4B	91	197
CP4C	91	195
CP4	183	439
CP5A	167	449
CP5	169	454

NOTES:
THE TOPO IS OBTAINED FROM TOPO DEPOT
EXISTING INLETS SHOWN ARE AT APPROXIMATE LOCATIONS



REVISIONS

NO.	DATE	DESCRIPTION	APPROV

DEPARTMENT OF PUBLIC WORKS

ENGINEERING DESIGN SECTION

PROJECT MANAGER: DESIGNED BY: NA
DRAWN BY: NM
CHECKED BY: NA
DATE: 11-12-10

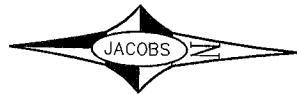
**PARSONS
BRINCKERHOFF**
Las Vegas, Nevada

OAKLEY STORM DRAIN
CAHLAN TO BARNARD

SMALL BASIN MAP

90% SUBMITTAL

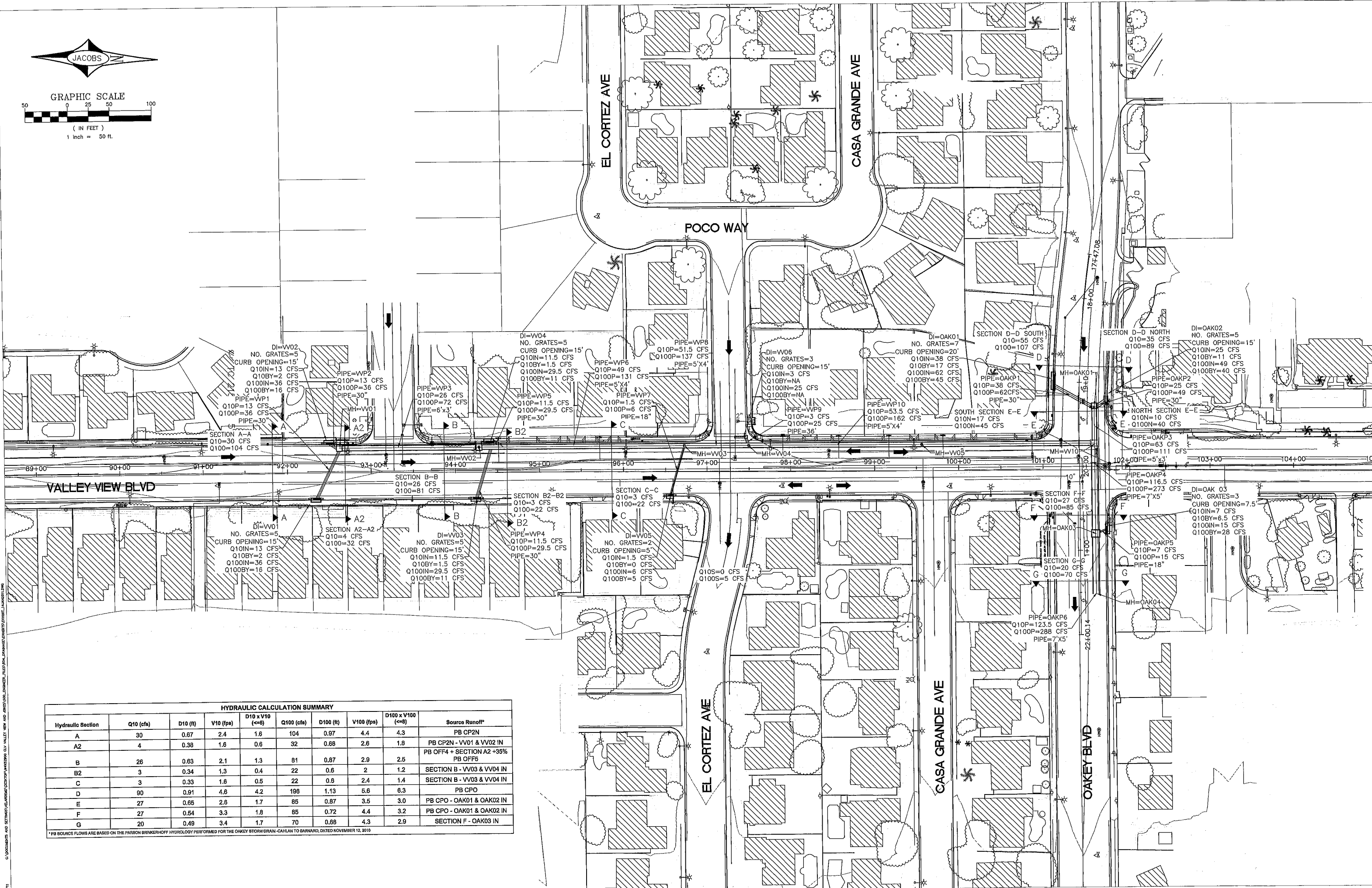
FIG. 11



GRAPHIC SCALE



(IN FEET)
1 inch = 50 ft.



HYDRAULIC CALCULATION SUMMARY

Hydraulic Section	Q10 (cfs)	D10 (ft)	V10 (fps)	D10 x V10 (cfs)	Q100 (cfs)	D100 (ft)	V100 (fps)	D100 x V100 (cfs)	Source Runoff*
A	30	0.67	2.4	1.6	104	0.97	4.4	4.3	PB CP2N
A2	4	0.38	1.6	0.6	32	0.68	2.6	1.8	PB CP2N - VV01 & VV02 IN
B	26	0.83	2.1	1.3	81	0.87	2.9	2.5	PB OFF4 + SECTION A2 +35% PB OFF5
B2	3	0.34	1.3	0.4	22	0.6	2	1.2	SECTION B - VV03 & VV04 IN
C	3	0.33	1.6	0.5	22	0.6	2.4	1.4	SECTION B - VV03 & VV04 IN
D	90	0.91	4.6	4.2	198	1.13	5.6	6.3	PB CPO
E	27	0.65	2.6	1.7	85	0.87	3.5	3.0	PB CPO - OAK01 & OAK02 IN
F	27	0.54	3.3	1.8	85	0.72	4.4	3.2	PB CPO - OAK01 & OAK02 IN
G	20	0.49	3.4	1.7	70	0.68	4.3	2.9	SECTION F - OAK03 IN

*PB SOURCE FLOWS ARE BASED ON THE PARSON BRINCKERHOFF HYDROLOGY PERFORMED FOR THE OAKLEY STORM DRAIN - CAHAN TO BARNARD, DATED NOVEMBER 12, 2010

PIPE OAKP1

Project Description

Friction Method Manning Formula
Solve For Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	3.02 %
Normal Depth	2.50 ft
Diameter	2.50 ft
Discharge	71.28 ft ³ /s

Results

Discharge	71.28	ft ³ /s
Normal Depth	2.50	ft
Flow Area	4.91	ft ²
Wetted Perimeter	7.85	ft
Hydraulic Radius	0.63	ft
Top Width	0.00	ft
Critical Depth	2.44	ft
Percent Full	100.0	%
Critical Slope	0.02693	ft/ft
Velocity	14.52	ft/s
Velocity Head	3.28	ft
Specific Energy	5.78	ft
Froude Number	0.00	
Maximum Discharge	76.67	ft ³ /s
Discharge Full	71.28	ft ³ /s
Slope Full	3.02	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

PIPE OAKP1

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.50	ft
Critical Depth	2.44	ft
Channel Slope	3.02	%
Critical Slope	0.02693	ft/ft

PIPE OAKP2

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	1.50 %
Normal Depth	2.50 ft
Diameter	2.50 ft
Discharge	50.23 ft ³ /s

Results

Discharge	50.23	ft ³ /s
Normal Depth	2.50	ft
Flow Area	4.91	ft ²
Wetted Perimeter	7.85	ft
Hydraulic Radius	0.63	ft
Top Width	0.00	ft
Critical Depth	2.30	ft
Percent Full	100.0	%
Critical Slope	0.01302	ft/ft
Velocity	10.23	ft/s
Velocity Head	1.63	ft
Specific Energy	4.13	ft
Froude Number	0.00	
Maximum Discharge	54.04	ft ³ /s
Discharge Full	50.23	ft ³ /s
Slope Full	1.50	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

PIPE OAKP2

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.50	ft
Critical Depth	2.30	ft
Channel Slope	1.50	%
Critical Slope	0.01302	ft/ft

PIPE OAKP3

Project Description

Friction Method Manning Formula
Solve For Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	1.36	%
Normal Depth	3.00	ft
Height	3.00	ft
Bottom Width	5.00	ft
Discharge	191.53	ft³/s

Results

Flow Area	15.00	ft²
Wetted Perimeter	16.00	ft
Hydraulic Radius	0.94	ft
Top Width	5.00	ft
Critical Depth	3.57	ft
Percent Full	100.0	%
Critical Slope	0.00526	ft/ft
Velocity	12.77	ft/s
Velocity Head	2.53	ft
Specific Energy	5.53	ft
Froude Number	1.30	
Discharge Full	191.53	ft³/s
Slope Full	0.01360	ft/ft
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

PIPE OAKP3

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	3.00	ft
Critical Depth	3.57	ft
Channel Slope	1.36	%
Critical Slope	0.00526	ft/ft

PIPE OAKP5

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	30.60 %
Normal Depth	1.50 ft
Diameter	1.50 ft
Discharge	58.10 ft ³ /s

Results

Discharge	58.10 ft ³ /s
Normal Depth	1.50 ft
Flow Area	1.77 ft ²
Wetted Perimeter	4.71 ft
Hydraulic Radius	0.38 ft
Top Width	0.00 ft
Critical Depth	1.50 ft
Percent Full	100.0 %
Critical Slope	0.29980 ft/ft
Velocity	32.88 ft/s
Velocity Head	16.80 ft
Specific Energy	18.30 ft
Froude Number	0.00
Maximum Discharge	62.50 ft ³ /s
Discharge Full	58.10 ft ³ /s
Slope Full	30.60 %
Flow Type	SubCritical

GVF Input Data

Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %

PIPE OAKP5

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.50	ft
Critical Depth	1.50	ft
Channel Slope	30.60	%
Critical Slope	0.29980	ft/ft

PIPE VVP1

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	0.83 %
Normal Depth	2.50 ft
Diameter	2.50 ft
Discharge	37.34 ft ³ /s

Results

Discharge	37.34 ft ³ /s
Normal Depth	2.50 ft
Flow Area	4.91 ft ²
Wetted Perimeter	7.85 ft
Hydraulic Radius	0.63 ft
Top Width	0.00 ft
Critical Depth	2.07 ft
Percent Full	100.0 %
Critical Slope	0.00815 ft/ft
Velocity	7.61 ft/s
Velocity Head	0.90 ft
Specific Energy	3.40 ft
Froude Number	0.00
Maximum Discharge	40.17 ft ³ /s
Discharge Full	37.34 ft ³ /s
Slope Full	0.83 %
Flow Type	SubCritical

GVF Input Data

Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %

PIPE VVP1

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.50	ft
Critical Depth	2.07	ft
Channel Slope	0.83	%
Critical Slope	0.00815	ft/ft

PIPE VVP2

Project Description

Friction Method Manning Formula
Solve For Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	21.60	%
Normal Depth	2.50	ft
Diameter	2.50	ft
Discharge	190.62	ft³/s

Results

Discharge	190.62	ft³/s
Normal Depth	2.50	ft
Flow Area	4.91	ft²
Wetted Perimeter	7.85	ft
Hydraulic Radius	0.63	ft
Top Width	0.00	ft
Critical Depth	2.50	ft
Percent Full	100.0	%
Critical Slope	0.21218	ft/ft
Velocity	38.83	ft/s
Velocity Head	23.43	ft
Specific Energy	25.93	ft
Froude Number	0.00	
Maximum Discharge	205.05	ft³/s
Discharge Full	190.62	ft³/s
Slope Full	21.60	%
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

PIPE VVP2

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.50	ft
Critical Depth	2.50	ft
Channel Slope	21.60	%
Critical Slope	0.21218	ft/ft

PIPE VVP4

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	1.72 %
Normal Depth	2.50 ft
Diameter	2.50 ft
Discharge	53.79 ft ³ /s

Results

Discharge	53.79 ft ³ /s
Normal Depth	2.50 ft
Flow Area	4.91 ft ²
Wetted Perimeter	7.85 ft
Hydraulic Radius	0.63 ft
Top Width	0.00 ft
Critical Depth	2.34 ft
Percent Full	100.0 %
Critical Slope	0.01486 ft/ft
Velocity	10.96 ft/s
Velocity Head	1.87 ft
Specific Energy	4.37 ft
Froude Number	0.00
Maximum Discharge	57.86 ft ³ /s
Discharge Full	53.79 ft ³ /s
Slope Full	1.72 %
Flow Type	SubCritical

GVF Input Data

Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %

PIPE VVP4

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.50	ft
Critical Depth	2.34	ft
Channel Slope	1.72	%
Critical Slope	0.01486	ft/ft

PIPE VVP5

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	18.30 %
Normal Depth	1.50 ft
Diameter	1.50 ft
Discharge	44.93 ft ³ /s

Results

Discharge	44.93 ft ³ /s
Normal Depth	1.50 ft
Flow Area	1.77 ft ²
Wetted Perimeter	4.71 ft
Hydraulic Radius	0.38 ft
Top Width	0.00 ft
Critical Depth	1.50 ft
Percent Full	100.0 %
Critical Slope	0.17848 ft/ft
Velocity	25.43 ft/s
Velocity Head	10.05 ft
Specific Energy	11.55 ft
Froude Number	0.00
Maximum Discharge	48.34 ft ³ /s
Discharge Full	44.93 ft ³ /s
Slope Full	18.30 %
Flow Type	SubCritical

G/F Input Data

Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

G/F Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %

PIPE VVP5

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.50	ft
Critical Depth	1.50	ft
Channel Slope	18.30	%
Critical Slope	0.17848	ft/ft

PIPE VVP7

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	0.85 %
Normal Depth	1.50 ft
Diameter	1.50 ft
Discharge	9.67 ft ³ /s

Results

Discharge	9.67 ft ³ /s
Normal Depth	1.50 ft
Flow Area	1.77 ft ²
Wetted Perimeter	4.71 ft
Hydraulic Radius	0.38 ft
Top Width	0.00 ft
Critical Depth	1.20 ft
Percent Full	100.0 %
Critical Slope	0.00886 ft/ft
Velocity	5.47 ft/s
Velocity Head	0.47 ft
Specific Energy	1.97 ft
Froude Number	0.00
Maximum Discharge	10.40 ft ³ /s
Discharge Full	9.67 ft ³ /s
Slope Full	0.85 %
Flow Type	SubCritical

GVF Input Data

Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %

PIPE VVP7

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.50	ft
Critical Depth	1.20	ft
Channel Slope	0.85	%
Critical Slope	0.00886	ft/ft

PIPE VVP9

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	10.00 %
Normal Depth	1.50 ft
Diameter	1.50 ft
Discharge	33.22 ft ³ /s

Results

Discharge	33.22 ft ³ /s
Normal Depth	1.50 ft
Flow Area	1.77 ft ²
Wetted Perimeter	4.71 ft
Hydraulic Radius	0.38 ft
Top Width	0.00 ft
Critical Depth	1.50 ft
Percent Full	100.0 %
Critical Slope	0.09555 ft/ft
Velocity	18.80 ft/s
Velocity Head	5.49 ft
Specific Energy	6.99 ft
Froude Number	0.00
Maximum Discharge	35.73 ft ³ /s
Discharge Full	33.22 ft ³ /s
Slope Full	10.00 %
Flow Type	SubCritical

GVF Input Data

Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %

PIPE VVP9

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.50	ft
Critical Depth	1.50	ft
Channel Slope	10.00	%
Critical Slope	0.09555	ft/ft

APPENDIX B

ATTACHMENT B-1
ATTACHMENT B-2

REFERENCED PB BASIN MAP
STORM DRAIN EXHIBIT

Attachment B-1 (Referenced PB Basin Map)