Las Vegas Boulevard Improvements

from Stewart Ave. to Sahara Ave. Phase 1

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Prepared for

CITY OF LAS VEGAS

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1.0 INTRODUCTION

1.1 STUDY OVERVIEW AND PURPOSE

VTN Nevada has been contracted by CA Group to provide drainage analysis and design services for the proposed Las Vegas Boulevard Improvements from Stewart Avenue to Sahara Avenue Phase 1. Phase 1 includes Charleston Boulevard to Stewart Avenue. *Refer to Figure 1, Vicinity Map*. The scope of drainage services required includes:

- Review of previously submitted drainage studies
- Prepare detailed hydraulic analysis for the proposed storm drain system
- Models to provide hydraulic grade line, energy grade line, flow velocity, and depth
- Storm drain design provides for 10-year street dry lane criteria
- Preparation and compilation drainage calculations and supporting documentation
- Preparation 70% Drainage Design Report

The purpose of the 70% Drainage Design Report is to document analysis performed for utilization in the technical design of the roadway and storm drain facilities.

1.2 SITE LOCATION

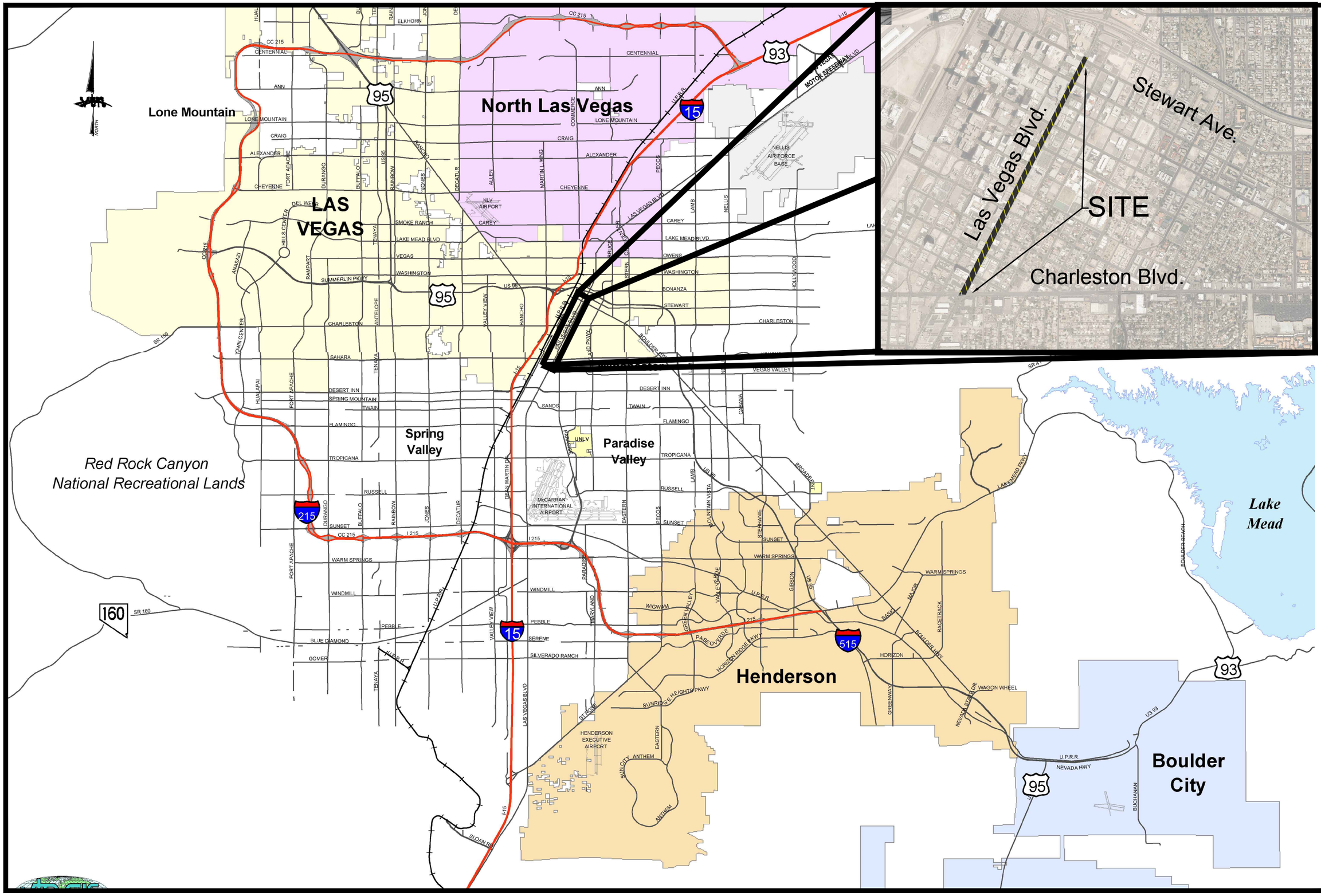
The Las Vegas Boulevard Improvement Project is located in the City of Las Vegas, Nevada within Section 3 of Township 21 South, Range 61 East, and Section 34 of Township 20 South, Range 61 East M.D.M., Clark County, Nevada. The project limits extend from the intersection of Las Vegas Boulevard and Charleston Boulevard to the intersection of Las Vegas Boulevard and Stewart Avenue. *Refer to Figure 2, Site Description Map* for the general location of the proposed project site.

1.3 SITE DESCRIPTION

A master plan study was completed for the area in the 2005 City of Las Vegas Central Neighborhood Flood Control Master Plan, by PBS&J. The hydrologic basins within that study were used as the basis for the analysis conducted for this project (*Refer to Figure 4, Basin Map*). Topography of the area slopes down from west to east at an approximate 1% slope. The offsite

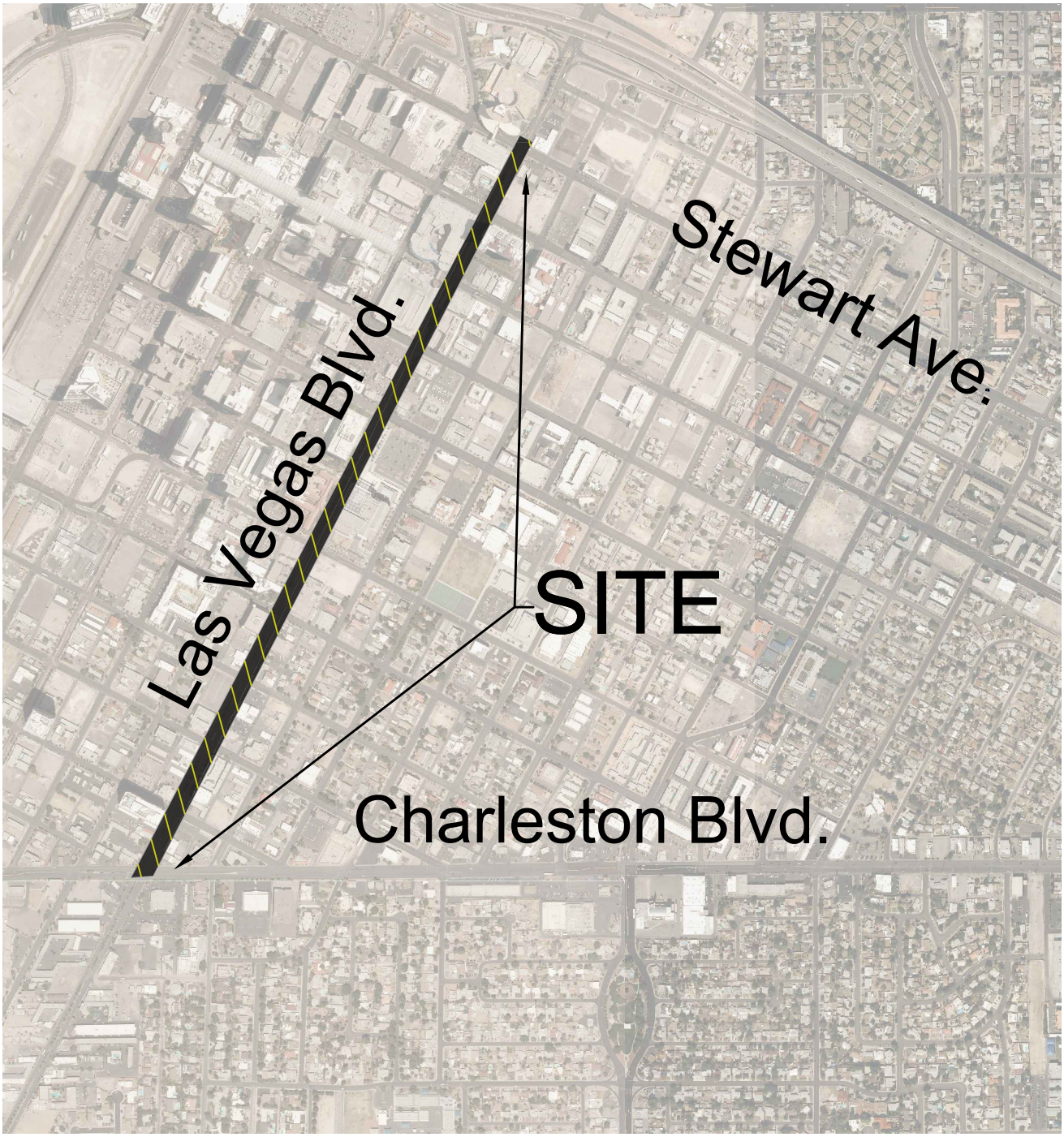
FIGURE 1: VICINITY MAP
LAS VEGAS BOULEVARD IMPROVEMENTS FROM STEWART AVE. TO SAHARA AVE. PHASE 1

W.O.#:	7517-1
DATE:	FEBRUARY 2017
BY:	PLM
SCALE:	N.T.S
SHEET	OF



2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NV 89146-5148

H:\7517-1 Las Vegas Blvd Improvements\Drainage\A_Figures & Exhibits\7517 - Figures 1 and 2.dwg;paulm; Feb 16, 2017 - 9:20am



GRAPHIC SCALE

1000 0 500 1000 2000

1" = 1000'

NORTH

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NV 89146-5148

LAS VEGAS BOULEVARD IMPROVEMENTS FROM STEWART AVE. TO SAHARA AVE. PART 1

SITE DESCRIPTION MAP
FIGURE 2

SCALE	HORZ. **1"=2000'**
	VERT.
W.O. NO.	**7517-1**
DRAWN BY:	**PLM**
DATE:	**FEBRUARY 2017**
SHEET	OF

area is generally bounded by the UPRR Railroad berm to the west, Charleston Boulevard to the south, Stewart Avenue to the north, and Las Vegas Boulevard to the east. Field reconnaissance of the tributary watershed to the west indicates multiple flow split locations at the many intersections of the surrounding cross-streets to the west of the project site. The area is also crossed by multiple storm drains with very limited design information available.

1.4 PREVIOUS HYDROLOGY STUDIES

The approved drainage studies utilized in the preparation of this study include:

- *City of Las Vegas, Central Neighborhood Flood Control Master Plan,* by PBS&J, March 2005, hereinafter referred to as CNFCMP

This approved study establishes the subbasin hydrologic parameters and in many cases the subbasin delineation. Referenced existing and future condition drainage maps have been included in Appendix D.

1.5 FLOODPLAIN INFORMATION

The Las Vegas Boulevard Improvements is located within Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Community Panel Number 32003C12170F, Clark County Nevada and Incorporated Areas, revised November 16, 2011. According to the map, the proposed project site is not located within a Special Flood Hazard Area. *Refer to Appendix A, Exhibit A: FEMA FIRM Map.*

1.6 REGIONAL FLOOD CONTROL MASTER PLAN INFORMATION

The Las Vegas Boulevard Improvements project at its southernmost boundary is adjacent to Clark County Regional Flood Control District (CCRFCD) Master Planned Facilities FLBN 0281 a proposed 10'x7' RCB and FLBN 0321 a proposed 7'x4' RCB both in Charleston Boulevard. The limits of the proposed project site are shown on Figure F-32 from the CCRFCD Las Vegas Valley Flood Control *Master Plan Update* (MPU). *Refer to Appendix A, Exhibit B2: CCRFCD 2013 MPU Facility Maps.*

2.0 HYDROLOGIC ANALYSIS

Offsite subbasins have been directly referenced from the CNFCMP (Central Neighborhood Flood Control Master Plan). Basin delineation was established with the intent of showing the flowrates occurring at each of the major and intermediate intersections along the Las Vegas Boulevard Improvements project.

2.1 METHOD OF OFFSITE ANALYSIS

The HEC-1 Flood Hydrograph Computer Model was developed by the U.S. Army Corps of Engineers Hydrologic Engineering Center in the late 1970's, and then adopted by the CCRFCD (Clark County Regional Flood Control District) HCDDM (Hydrologic Criteria and Drainage Design Manual) in 1999 for rainfall and runoff predictions. The model is used to simulate the surface runoff response of a watershed to a design rainfall event. Each subbasin in the watershed is described by a set of parameters that specify the subbasin drainage and storm characteristics. Modified hydrologic parameters were determined in accordance with the HCDDM.

To use the HEC-1 computer model, the drainage system in a watershed is converted into a node-link type of system. A node is placed at the subbasin outlet or at the design point along the watercourse. Links between nodes represent conveyance elements in the drainage system. Hydrographs are computed for each subbasin and are placed at the subbasin outlet node. These hydrographs are then routed and/or combined according to the drainage basin network configuration through links.

2.2 RAINFALL CALCULATIONS

The following HEC-1 parameters were obtained from the CCRFCD HCDDM, and utilized in the hydraulic modeling for the project.

2.2.1 Point Precipitation Values

The Las Vegas Boulevard Improvements project site lies within the McCarran Rainfall Area per HCDDM Figure 513. The 10-year and 100-year point precipitation values in the McCarran Rainfall area are 1.58 inches and 2.77 inches, respectively, according to HCDDM Table 505.

2.2.2 Rainfall Pattern

The Percent of Total Depth tabulation recommended by the USACE, Los Angeles District in 1988, was adopted for rainfall/runoff predictions in the Las Vegas Valley. All storm drain facilities and design points for the Las Vegas Boulevard Improvement project are within a tributary watershed less than eight square miles, and therefore the SDN3 distribution has been used, per CCRFCD HCDDM Table 503 – Six-Hour Storm Distributions. Depth area reduction factors used in both the 10-year and the 100-year event models have been referenced from the HEC-1 model labeled FSW310.DAT in the CNFCMP.

2.3 RUNOFF COMPUTATIONS

Major precipitation losses are a result of infiltration as determined by the soil type and land uses. Additional losses calculated by the model include the Initial Abstraction (IA). The IA value accounts for the precipitation losses prior to the initiation of rainfall. Infiltration losses occur throughout the storm event, while the (IA) losses only occur during the initial period of the storm. The difference between the total precipitation volume and the loss volume is the direct runoff volume.

The SCS curve number method was developed to compute both types of precipitation losses. This method uses a curve number (CN) index to relate precipitation losses to soil type, land use, and vegetative cover conditions.

2.3.3 Curve Numbers

The curve numbers (CN) used for this study were referenced from the CNFCMP HEC-1 model FSW310. *Refer to Appendix D, CNFCMP Information.*

2.3.4 Lag Time Calculations

Lag time calculations were required for the subbasins included in both of the HEC-1 models. Subbasin LC22 from the CNFCMP model was also subdivided for this study in LVB-N_10.OUT and LVB-N_100.OUT Velocities used in Standard Form 4 have been calculated using the equation V = 1/2CS from the Manual. The coefficient C = 14.8 represents wide channel flow with D = 0.25 and n = 0.04 for undeveloped conditions. The coefficient C = 29.4 represents wide channel flow with D = 0.7 and n = 0.04 for undeveloped conditions. The coefficient C = 20.2 represents street flow with n = 0.016 and a depth in the gutter of 0.3 feet for developed conditions. The coefficient C = 30.6 represents curb height street flow for developed conditions. *Refer to Appendix D, CNFCMP Information.*

Existing Conditions	**Developed Conditions**
$V_1 = 14.8*(S/100)^{1/2}$ $V_2 = 29.4*(S/100)^{1/2}$	$V_1 = 20.2*(S/100)^{1/2}$ $V_2 = 30.6*(S/100)^{1/2}$

3.0 ONSITE AND OFFSITE BASIN ANALYSIS

3.1 EXISTING/PROPOSED CONDITION HYDROLOGY MODEL

The drainage area contributing runoff to the proposed Las Vegas Boulevard Improvements is fully developed for the existing condition. Therefore, there is no change from the existing to the proposed condition flowrates. The hydrologic models used in this study are based on the Developed Condition model FSW310.dat as shown in the CNFCMP. The subbasins used to evaluate the localized flows for the area extending from Charleston Boulevard to Stewart Avenue were prorated to account for flows at the intersection of Las Vegas Boulevard and Hoover Avenue, Gass Avenue, Garces Avenue, Bonneville Avenue, Clark Avenue, Bridger Avenue, Carson Avenue, Fremont Street, Ogden Avenue, and Stewart Avenue. The HEC-1 models used to develop the prorated flowrates are labeled LVB_N_10.dat and LVB_N_100.dat. *Refer to Appendix B.3, for the HEC-1 models and B.4 for subbasin prorating analysis.*

There are several local storm drain facilities in the area. Additionally, numerous flow splits have been assumed in the drainage basin upstream of the section of Las Vegas Boulevard from Charleston Boulevard to Stewart Avenue. To determine discharge points impacting Las Vegas Boulevard at the multiple cross street interception points from the west tributary area, the following generalized assumptions were made:

- 50/50 flows splits were assumed for all intersections within the western tributary area where no valley gutters or noticeable high points were observed that would route flows in one dominate direction. The flow determined at each of these intersections was split with 50% going north and 50% going east.
- Several intersections in the western tributary area contained valley gutters which would direct flows in one dominated direction. At these locations all flows were routed in the dominate flow direction.
- All storm drains within the western tributary area that do not cross Las Vegas Boulevard or connect into the storm drain facilities within Las Vegas Boulevard were assumed to have small capacities and were not taken into consideration in the hydrologic analysis. Field reconnaissance verified that most of these systems have very small drop inlets with limited capacity.

- Storm drains that cross Las Vegas Boulevard or connect into the storm drain in Las Vegas Boulevard were evaluated to determine the inflow rates to new storm drains in Las Vegas Boulevard. Information concerning the geometry of these existing storm drains was taken from a number of sources, and as-built information was not available in many cases. The plans for Bonneville/Clark One-way Couplet Phase II Improvement Plans were used to reference the existing storm drain in Bonneville. Therefore, the analyses used for determining these flowrates were based on a hierarchy of methods. In all cases drop inlet information was easily obtainable through field investigation. In the event that there was not additional information obtainable flowrates where calculated using the standard FHWA HEC-22 equations. This provided a conservative approach where the maximum flowrates would be input into the new storm drain system. The second method used field data from manhole measurements to determine pipe slopes and sizes. This information was then used to evaluate the pipe using normal depth calculations. The third method used takes the pipe size into consideration and assumes the street slope above as the pipe slope. This information was then used to develop the normal depth calculations. Table 3.1 provides a summary of the existing storm drains and the methods that were used to evaluate each different condition.

Table 3.1 Existing Storm Drain Facilities

Cross Street	Pipe Size	Method	Q_{10}	Q_{100}
Bonneville Avenue	36 Inch	Drop Inlet	15.9	15.9
Bridger Avenue	18 Inch	Street Slope	7.4	7.4
Carson Avenue	18 Inch	Street Slope	7.9	7.9
Fremont Street	24 Inch	Street Slope	11.8	11.8
Fremont Street	24 Inch	Street Slope	20.0	20.0
Fremont Street	18 Inch	Street Slope	2.1	2.1
Ogden Avenue	12 Inch	Street Slope	4.7	4.7
Ogden Avenue	15 Inch	Street Slope	8.6	8.6
Stewart Avenue	18 Inch	Street Slope	5.6	5.6

Refer to Appendix A: Figure 4 - Basin Map, Appendix B.2: Standard Form 4, and Appendix B.3: and HEC-1 Analysis.

Table 3.1.2 provides a summary of the basins and concentration points referenced from the CNFCMP. Additionally basins were divided into subbasins to determine flows at specific design locations along Las Vegas Boulevard. *Refer to Appendix B.4* for a summary of subbasin delineation and prorating.

Table 3.1.2 HEC-1 Summary

Basin/ Concentration Point	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)	Basin/ Concentration Point	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
LC22-3	19.4	51	26	CH58-3	16.6	38	19
CH59-4	18.6	42	21	CCH58-3	-	432	215
CCH59-4	-	91	46	CH58-4	29.4	60	27
CH59-5	25	55	28	LC22-6	6.1	19	10
CCH59-5	-	145	73	CCH58-4	-	78	36
CH59-6	18.6	41	21	LC22-1	27.6	64	32
CCH59-6	-	186	93	CH54-1	21.8	48	24
LC22-4	10.2	30	15	CCH54-1	-	111	56
CH59-7	9.6	25	13	CH54-2	22.4	52	26
CCH59-7	-	54	28	CH54-3	12.2	30	15
CH59-8	12.8	33	17	CCH54-3	-	187	93
CCH59-8	-	85	42	LC22-2	13.5	35	18
CH59-9	9.6	25	13	CH59-1	12.8	31	15
CCH59-9	-	286	144	CCH59-1	-	64	32
LC22-5	16	42	21	CH59-2	16.6	39	19
CH58-1	15.4	36	18	CCH59-2	-	101	50
CCH58-1	-	76	38	CH59-3	12.2	29	14
CH58-2	20.5	46	23	CCH59-3	19.4	129	63
CCH58-2	-	121	61				

Table 3.2 HEC-1 Summary							
Basin/ Concentration Point	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)	Basin/ Concentration Point	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
LC22-3	19.4	51	26	CH58-3	16.6	38	19
CH59-4	18.6	42	21	CCH58-3	-	432	215
CCH59-4	-	91	46	CH58-4	29.4	60	27
CH59-5	25	55	28	LC22-6	6.1	19	10
CCH59-5	-	145	73	CCH58-4	-	78	36
CH59-6	18.6	41	21	LC22-1	27.6	64	32
CCH59-6	-	186	93	CH54-1	21.8	48	24
LC22-4	10.2	30	15	CCH54-1	-	111	56
CH59-7	9.6	25	13	CH54-2	22.4	52	26
CCH59-7	-	54	28	CH54-3	12.2	30	15
CH59-8	12.8	33	17	CCH54-3	-	187	93
CCH59-8	-	85	42	LC22-2	13.5	35	18
CH59-9	9.6	25	13	CH59-1	12.8	31	15
CCH59-9	-	286	144	CCH59-1	-	64	32
LC22-5	16	42	21	CH59-2	16.6	39	19
CH58-1	15.4	36	18	CCH59-2	-	101	50
CCH58-1	-	76	38	CH59-3	12.2	29	14
CH58-2	20.5	46	23	CCH59-3	19.4	129	63
CCH58-2	-	121	61				

BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
LC22-1	27.6		32	64
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
MS2	5.4	20%	6	13
BASIN	AREA		Q10	Q100
LC22-1	27.6		32	64
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
MS3	2.8	10%	3	7
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH54-1	21.8		24	48
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
54A	8.2	38%	9	18
54C	6.2	28%	7	14
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH54-2	22.4		26	52
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
54B	5.5	24%	6	13
54D	8.3	37%	10	19
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH54-3	12.2		15	21
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
54E	4.6	38%	6	8
54I	0.4	3%	1	1
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
LC22-1	27.6		32	64
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
CS8	22.6	82%	26	52
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
LC22-1	27.6		32	62
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
MS4	2.8	10%	3	6
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH54-1	21.8		24	48
CH59-1	12.8		15	31
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
54F	5.6	26%	7	14
	0.8	7%		
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH54-2	22.4		26	52
CH59-2	16.6		19	39
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
54G	8.0	36%	10	21
	1.0	6%		

BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH54-3	12.2		15	30
CH59-3	12.2		14	29
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
54H	3.7	30%	5	10
	0.5	4%		
54J	0.4	3%	1	1
	0.1	0%		
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
LC22-2	13.5		18	36
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
MS6A	2.6	19%	3	7
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-1	12.8		15	31
LC22-2	13.5		18	35
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59I	6.4	50%	9	19
	1.3	9%		
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-2	16.6		19	39
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59J	8.3	50%	9	19
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-3	12.2		14	29
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59K	4.2	35%	5	10
59Y	0.5	4%	1	1
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
LC22-2	13.5		18	36
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
MS6B	5.1	38%	7	14
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-1	12.8		15	31
LC22-2	13.5		18	36
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59L	5.9	46%	8	17
	1.2	9%		
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-2	16.6		19	39
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59M	7.6	46%	9	18
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-3	12.2		14	29
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59N	3.9	32%	4	9
59Z	0.4	4%	1	1

BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
LC22-3	19.4		26	51
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
MS9	4.5	23%	6	12
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-4	18.6		21	42
LC22-3	19.4		26	51
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59O	6.6	36%	9	18
	1.2	6%		
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-5	25.0		28	55
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59P	8.9	36%	10	20
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-6	18.6		21	41
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59Q	4.6	25%	5	10
59AA	0.6	3%	1	1
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
LC22-3	19.4		26	51
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
MS10	5.1	26%	7	13
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
LC22-3	19.4		26	51
SUB BASIN	SUB AREA	SUB AREA	SUB Q10	SUB Q100
MS11	5.8	30%	8	15
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-4	18.6		21	42
LC22-3	19.4		26	51
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59R	12.1	65%	18	36
	3.4	18%		
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-5	25.0		28	55
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59S	8.2	33%	9	18
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-5	25.0		28	55
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59T	7.5	30%	8	17
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-6	18.6		21	41
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59U	8.1	44%	9	18
59AB	1.0	5%	1	2

BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
LC22-4	10.2		15	30
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
MS12	5.8	56%	8	17
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-7	9.6		13	25
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59V	2.4	25%	3	6
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-7	9.6		13	15
LC22-4	10.2		15	30
LC22-5	16.0		21	42
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59V2	6.7	70%	15	22
	2.8	27%		
	1.3	8%		
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-8	12.8		17	33
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59W	9.1	71%	12	23
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-8	12.8		17	33
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59W2	3.7	29%	5	10
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH59-9	9.6		13	25
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
59X	4.7	49%	6	12
59AC	0.5	6%	1	1
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
LC22-5	16.0		21	42
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
MS13	10.2	64%	13	27
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH58-1	15.4		18	36
LC22-5	16.0		21	42
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
58Y	9.4	61%	13	26
	1.53	10%		
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH58-2	20.5		23	46
CH59-8	12.8		17	33
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
58Z	12.8	63%	16	32
	1.1	9%		

BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH58-3	16.6		19	38
CH59-9	9.6		13	25
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
58AA	2.1	13%	5	9
	1.6	16%		
58AH	0.3	2%	1	1
	0.2	2%		
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH58-3	16.6		19	35
CH59-9	9.6		13	25
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
58AB	4.7	28%	6	10
	0.2	2%		
58AI	0.5	3%	1	1
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
LC22-5	16.0		21	42
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
MS14	5.8	36%	8	15
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH58-1	15.4		18	36
LC22-5	16.0		21	42
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
58AC	5.8	37%	9	18
	1.8	11%		
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
LC22-6	6.1		10	19
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
MS15	4.5	73%	7	14
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH58-4	29.4		27	60
LC22-6	6.1		10	19
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
58AD	3.6	12%	7	14
	2.0	33%		
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH58-2	20.5		23	46
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
58AE	7.7	38%	9	17
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH58-4	29.4		27	60
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
58AF	8.1	27%	7	16
BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH58-3	16.6		19	38
SUB BASIN	SUB AREA (ac)	SUB AREA (ac)	SUB Q10 (cfs)	SUB Q100 (cfs)
58AG	4.0	24%	5	9
58AJ	0.43	3%	0	1

REVISION

REV	DATE	BY

####

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH. (702) 873-7550 FAX (702) 362-2597 WEB WWW.VTNNV.COM
CONSULTING ENGINEERS ● PLANNERS ● LAND SURVEYORS

FIGURE 3
BASIN MAP

LAS VEGAS BOULEVARD IMPROVEMENTS FROM STEWART AVE. TO SAHARA AVE. PHASE 1

DRAWN BY: ####
DESIGNED BY: ####
CHECKED BY: ####
PROJECT NO: ####
SCALE: #### HORIZ. #### VERT.

SHEET
OF ########SHEETS

DRAWING NO.
####

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4.0 ROADWAY AND FACILITY DESIGN

The purpose of the Las Vegas Boulevard Improvements is to design a hydraulically efficient roadway and stormwater conveyance facility that meets the 10-year dry lane design criteria presented in the CCRFCD HCDDM. Hydraulic analysis has been performed using the Water Surface Pressure Gradient for Windows (WSPGW) software to model the storm drain mainlines. The lateral pipes have been modeled using the Clark County Standard Form 6. Roadway capacities have been checked using the Manning's normal depth calculation included in the FlowMaster software. Inlet calculations have been performed based on FHWA HEC-22 with clogging factors derived from the CCRFCD HCDDM.

4.1 STREET FLOW

Street flow calculations were performed, based on the results of the offsite and onsite hydrology, to ensure the CCRFCD street flow criteria is being met normal depth calculations using FlowMaster Manning's equation based software was used to perform these calculations, included in *Appendix C.1.* Manning's equations were used to determine both 10-year dry lane capacity for each section of Las Vegas Boulevard and west half street capacity. Table 4.1a provides a summary of the 10-year flow within Las Vegas Boulevard and required flow interception at proposed inlets to meet dry lane criteria. Please note that at several location for the east side of Las Vegas Boulevard inlets are not proposed when excess flow in Las Vegas Boulevard is to be conveyed east in the side street at that location. Due to a majority of offsite flow impacting Las Vegas Boulevard from the west half street capacity equations were developed to determine at what flowrate water would overtop the centerline of Las Vegas Boulevard and move to the east side of the street. Table 4.1b provides a summary of the Las Vegas Boulevard half street capacity. The application of the 10-year dry lane criteria and half street capacity results can be found in the Approach-Intercept-Bypass summary located in *Appendix C.4*.

Refer to Appendix C.1.1 for the 10-year street calculations. The maximum half street capacity calculation is included in Appendix C.2.

Table 4.1a Las Vegas Boulevard Dry Lane Capacity				
Location	**Q10**	**Street Capacity**	**Interception Required**	**Actual Interception**
Cross Street	**(cfs)**	**(cfs)**	**(cfs)**	**(cfs)**
9L Hoover Avenue	17.9	1.4	16.5	16.8
9R Hoover Avenue	1	1.4	0	0.3
10L Gass Avenue	21.5	2	19.5	19.5
10R Gass Avenue	1	1.9	0	0.3
11L Garces Avenue	27.2	1.2	26	26.1
11R Garces Avenue	1	1.3	0	0.2
12L Bonneville Avenue (LP)	29.8	0.5	29.3	29.8
12R Bonneville Avenue (LP)	2	0.6	1.4	0*
13L Clark Avenue	24.3	0.7	23.6	23.8
13R Clark Avenue	1.2	0.8	0.4	0*
14L Bridger Avenue	0.3	1.6	0	0
14R Bridger Avenue	0	1.4	0	0
15L Carson Avenue	34.2	1.3	32.9	33
15R Carson Avenue	1	0.7	0.3	0.3
16L Fremont Street	6.2	1	5.2	5.3
16R Fremont Street	1	1.2	0	0.4
17L Ogden Avenue	35.7	0.7	35	35.2
17R Ogden Avenue	1	0.6	0.4	0*
18L Stewart Avenue	31.2	0.7	30.5	4.8**
18R Stewart Avenue	0	0.6	0	0*

*Flow splits downstream to the east.
**Project downstream boundary

Table 4.1b - Las Vegas Boulevard Half Street Capacity					
Cross Section ID	**Slope**	**Discharge**	**Normal Depth**	**Velocity**	
Street Location	**(%)**	**(cfs)**	**(ft)**	**(fps)**	**DxV**
9L Hoover LT Capacity	0.49	26.30	0.70	2.67	1.87
10L Gass LT Capacity	0.75	32.50	0.70	3.31	2.32
11L Garces LT Capacity	0.46	25.40	0.70	2.59	1.81
12L Bonneville LT Capacity	0.34	25.60	0.70	2.18	1.53
13L Clark LT Capacity	0.14	14.00	0.70	1.43	1.00
14L Bridger LT Capacity	0.24	18.40	0.70	1.87	1.31
15L Carson Capacity	0.13	13.50	0.70	1.38	0.97
16L Fremont LT Capacity	0.22	17.60	0.70	1.79	1.25
17L Ogden LT Capacity	0.36	22.50	0.70	2.29	1.60
18L Stewart LT Capacity	0.63	34.30	0.70	3.05	2.14
12.5L Between Clark & Bridger LT Capacity	0.14	71.80	1.20	2.78	3.34

4.2 STORM DRAIN

Where drop inlets are needed to meet CCRFCD street flow criteria, inlets were designed using procedures described in HEC-22 and the CCRFCD HCDDM. Spreadsheets have been developed to perform these drop inlet calculations, and are included in *Appendix C.2*. Due to the storm drain being design ted to convey 10-year flows it was assumed that in the 100-year storm event flows greater than the 10-year interception flows would not be intercepted due to capacity limits for the storm drain. Instead 10-year interception flows have been applied to drop inlets in the 100-year storm event to determine bypass, overtop, and flow split flows. Refer to Appendix C.3 for the size, type, location, and interception of all drop inlets. *Refer to Appendix C.5 for the WSPG input and output files and Appendix C.6 for Standard Form 6 calculations.*

Lane width restrictions on Las Vegas Boulevard require that only curb opening inlets could be proposed on Las Vegas Boulevard. Due to a decrease in efficiency by no longer utilizing grate inlets on Las Vegas Boulevard inlets and in order to avoid excessive inlets in Las Vegas Boulevard, inlets with grates are now proposed on the upstream side streets to decrease the total flow impacting Las Vegas Boulevard and meet dry lane criteria. Since all flow impacts Las Vegas Boulevard from the west these grated inlets are proposed on the west side streets of the roadway and will connect into the storm drain system proposed in Las Vegas Boulevard.

A method was developed to determine approach, interception, and bypass flows for the proposed inlets in Las Vegas Boulevard. This method was used to account for flow impacting various inlets from the Las Vegas Boulevard street basins, offsite basins to the west, flow impacting from side streets, bypass flow from upstream inlets, flow overtopping to the east side of Las Vegas Boulevard from the west, and flow splits from the east side of Las Vegas Boulevard to the downstream side streets.

1. Flow approaching inlets on the upstream side of each intersection are impacted by bypass flows from upstream drop inlets at the previous intersection plus flows from street basins and offsite basins.
2. Bypass flow from inlets on upstream side of intersection are joined by flows from the side streets that bypasses proposed or existing side street inlets.
3. If the combination of flow now on the west side of Las Vegas Boulevard between bypass and side street flow is greater than the half street capacity as determined by Manning's

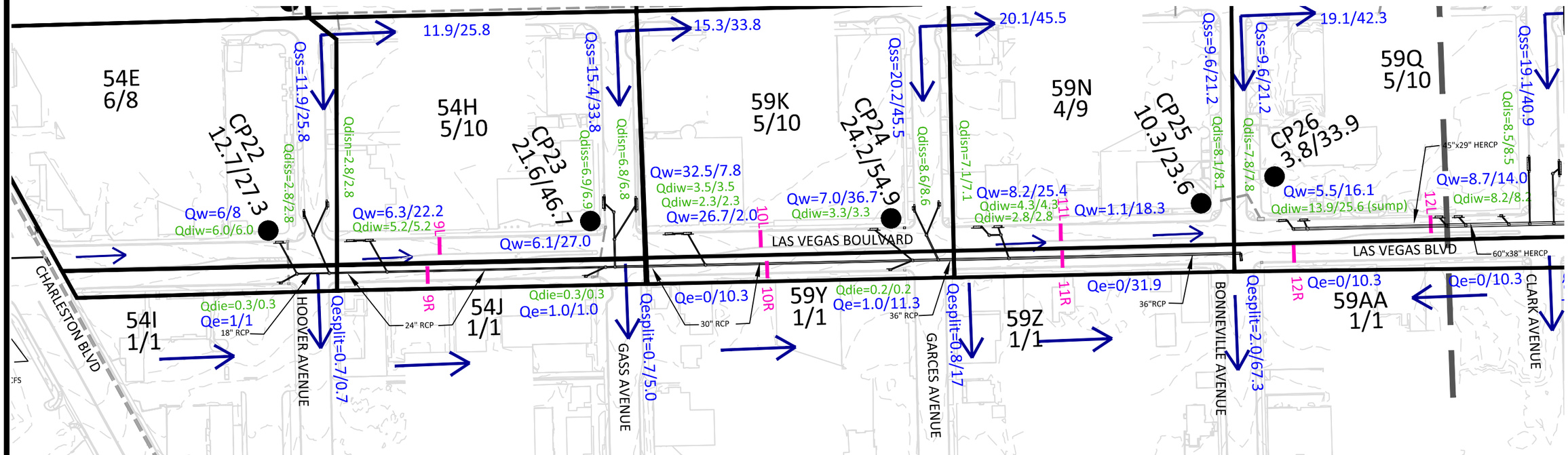
normal depth equations then it is assumed all flow in excess of half street capacity overtops the centerline of Las Vegas Boulevard and moves to the east side of the roadway.

4. Flow remaining on west side of street approaches inlets on downstream side of the intersection where interception calculations are performed so that the roadway meets dry lane criteria.
5. Bypass flow from the upstream inlets on the east side of Las Vegas Boulevard joins with overtopping flow from the west side. If this combined flow is above the highpoint of Las Vegas Boulevard then a Pima County Flow Split equation is used to determine the amount of flow that splits off and goes down the side street. If the flow is below the high point of the roadway then it is assumed that all flow goes down the side street.

The Local Storm Drain Systems consist of a series of drop inlets and laterals to intercept the flow and meet CCRFCD street flow criteria. Combination drop inlets that are any larger than 20 feet tend to lose interception efficiency and get expensive to construct, therefore, have not considered a viable solution in capturing large amounts of storm flow. *Refer to Appendix C.2 for the drop inlet calculations.* Figures 5.1 and 5.2 have been created to provide a visual representation of the approach/intercept/bypass analysis for the proposed inlets with this project. Figures 5.1 and 5.2 additionally show proposed mainline storm drain sizes along with hydrologic design concentration points. *Refer to Appendix A: Figure 5.1 & 5.2.*

4.3 INTERIM BUBBLER

In the Interim Condition the proposed storm drain from Bonneville Avenue to Stewart Avenue does not tie into a storm drain with enough downstream capacity to convey all the flow intercepted in the 10-year storm event. A series of bubbler inlets are proposed at the intersection of Las Vegas Boulevard and Stewart Avenue to work with the existing 48” RCP to bubble out and convey the required flow. Orifice equations were used to determine the amount of inlets required for the bubbler system to work. The amount of head on the inlets was determined as the difference in elevation from the manhole rim at the end of the 5’x6’ RCB in Las Vegas Boulevard and the proposed inlets. Additionally an orifice equation was used to determine the flow that would be conveyed in to the existing 48” RCP downstream of Stewart Avenue via a 30” RCP orifice. A 30” RCP was used to connect into the existing 48” RCP storm drain in an attempt to not overload the existing system at its upstream end. *Refer to Appendix C.7 for bubbler system*



LEGEND

- SUB BASIN BOUNDARY
- 51A — SUB BASIN NAME
- STREET FLOW ARROW
- CP1 — COMBINATION POINT
- 6/12 — 10/100 YR FLOW IN CFS
- 15R — STREET CROSS-SECTION

Qw	FLOW ON WEST SIDE OF LV BLVD
Qe	FLOW ON EAST SIDE OF LV BLVD
Qdiw	FLOW DISCHARGED INTO DI ON WEST SIDE OF LV BLVD
Qdie	FLOW DISCHARGED INTO DI ON EAST SIDE OF LV BLVD
Qdis	FLOW DISCHARGED INTO DI ON SIDE STREET
Qss	FLOW ENTERING LV BLVD FROM SIDE STREET
Qesplit	FLOW SPLIT OFF LV BLVD INTO SIDE STREET

NORTH

GRAPHIC SCALE

160 0 80 160 320

1" = 160'

W.O.#: 7517-2
DATE: FEBRUARY 2017
BY: PLM
SCALE: 1"=160'
SHEET 3 OF 4

FIGURE 4.1
FACILITY EXHIBIT
CHARLESTON BOULEVARD TO CLARK AVENUE

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NV 89146-5148

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FIGURE 4.2
FACILITY EXHIBIT
CLARK AVENUE TO STEWART AVENUE

W.O.#:	7517-2
DATE:	FEBRUARY 2017
BY:	PLM
SCALE:	1"=160'
SHEET	4 OF 4

4TH ST
LAS VEGAS BLVD
MATCHLINE
BONNEVILLE AVENUE
CLARK AVENUE
BRIDGER AVENUE
CARSON AVE
FREMONT STREET
OGDEN AVENUE
STEWART AVENUE

59Q 5/10
59U 9/18
59X 6/12
58 5
59AA 1/1
59AB 1/2
59AC 1/1
58AA 5/9
58AB 6/10
58AG 5/9
58AH 1/1
58AI 1/1
58AJ 0/1

CP25 10.3/23.6
CP26 3.8/33.9
CP27 15.8/36.0
CP28 7.6/18.6
CP29 5.7/10.7
CP30 22.1/52.5
CP31 59.4/10.8

Qss=9.6/21.2
Qdis=8.1/8.1
Qdis=7.8/7.8
Qss=19.1/40.9
Qdis=8.5/8.5
Qdis=7.1/7.1
Qss=15.1/30.2
Qdiss=14.0/14.0
Qss=15.1/30.1
Qdisn=12.0/12.0
Qdiss=12.2/12.2
Qss=26.8/51.9
Qdisn=12.0/12.0
Qss=28.8/53.5
Qdiss=10.7/10.7
Qdisn=12.6/12.6
Qss=25.7/45.1

19.1/42.3
19.1/40.9
32.6/68.7
30.1/60.3
26.7/51.8
30.1/60.3
26.7/51.8
28.8/53.5

Qw=5.5/16.1
Qdiw=13.9/25.6 (sump)
Qw=8.7/14.0
Qdiw=8.2/8.2
Qw=5.2/29.3
Qw=4.8/24.4
Qdiw=4.1/4.1
Qw=0.3/15.4
Qw=3.1/18.1
Qdiw=1.7/1.7
Qw=7.4/28.4
Qw=10.0/13.5
Qdiw=5.2/5.2
Qdiw=3.2/3.2
Qdiw=0.4/0.4
Qw=0.3/15.4
Qw=5.2/9.2
Qdiw=4.3/4.3
Qw=6.9/14.9
Qw=6.2/10.2
Qdiw=1.0/1.0
Qw=12.4/22.5
Qdiw=7.7/7.7
Qdiw=4.2/4.2
Qw=5.5/19.6
Qdiw=4.8/4.8
Qw=34.3/34.3

Qe=0/10.3
Qe=0/10.3
Qesplit=2.0/67.3
Qesplit=1.2/32.0
Qe=1.2/1.7
Qdie=0.3/0.3
Qe=0.5/1.0
Qe=0/0
Qe=0/0
Qdie=0.3/0.3
Qe=1.0/1.0
Qesplit=0.7/27.0
Qe=0/16.3
Qe=0/0
Qdie=0.3/0.3
Qe=1.0/1.0
Qdie=0.4/0.4
Qe=1.0/17.3
Qesplit=0.6/16.9
Qe=0/0
Qw=1.0/1.0
Qesplit=1/14
Qe=0/9.6
Qe=0/10.6
Qesplit=0/21
Qe=0/0

12L 12R 13L 13R 14L 14R 15L 15R 16L 16R 17L 17R 18L 18R

60"x38" HERCP
75"x29" HERCP
68"x43" HERCP
6'x5' RCB
36"RCP
EXISTING 18" STORM DRAIN Q10=7.4CFS
EXISTING 18" STORM DRAIN Q10=7.9CFS
EXISTING 24" STORM DRAIN Q10=20CFS
EXISTING 24" STORM DRAIN Q10=11.8CFS
EXISTING 12" and 15" STORM DRAIN Q10=13.3CFS
EXISTING 18" STORM DRAIN Q10=5.6CFS
EXISTING 18" STORM DRAIN Q10=2.1CFS
6'x5' RCB END PROJECT CONNECT TO EX 48" RCP VIA 30" RCP
SET OF DROP INLETS FUNCTIONS AS A BUBBLER AND DISCHARGES 69 CFS

LEGEND

- SUB BASIN BOUNDARY
- 51A SUB BASIN NAME
- STREET FLOW ARROW
- CP1 COMBINATION POINT
- 6/12 10/100 YR FLOW IN CFS
- 15R STREET CROSS-SECTION

Qw	FLOW ON WEST SIDE OF LV BLVD
Qe	FLOW ON EAST SIDE OF LV BLVD
Qdiw	FLOW DISCHARGED INTO DI ON WEST SIDE OF LV BLVD
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Qdis	FLOW DISCHARGED INTO DI ON SIDE STREET
Qss	FLOW ENTERING LV BLVD FROM SIDE STREET
Qesplit	FLOW SPLIT OFF LV BLVD INTO SIDE STREET

NORTH

GRAPHIC SCALE
160 0 80 160 320
1" = 160'

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NV 89146-5148

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calculations. Due to the use of the bubbler system in the interim condition manholes at and upstream of the bubbler do not meet HGL criteria of being 1-foot below finish grade. To address this slotted and bolt down manholes with concrete collars to avoid collar blow outs are proposed at all manholes where the interim condition HGL is less than 18-inches below finish grade as requested by the City.

4.4 36" STORM DRAIN IN BONNEVILLE AVENUE

The proposed storm drain system from Charleston Boulevard to the Bonneville Avenue discharges into the existing 36" RCP in Bonneville Avenue. Reference as-built plans for the existing 36" storm drain have been provided in Appendix D.2. A full flow capacity equation was used to determine the capacity of the 36" RCP at its existing slope (*Refer to Appendix C.1.3).* It was determined that at full flow capacity the existing storm drain can convey 77-cfs. To meet 10-year dry lane requirements 79-cfs is required to be conveyed into the Bonneville Avenue storm drain. It was determined that the existing facility can sufficiently convey the required flow while meeting criteria due to the system being over 5-ft underground.

5.0 CONCLUSION AND RECOMMENDATIONS

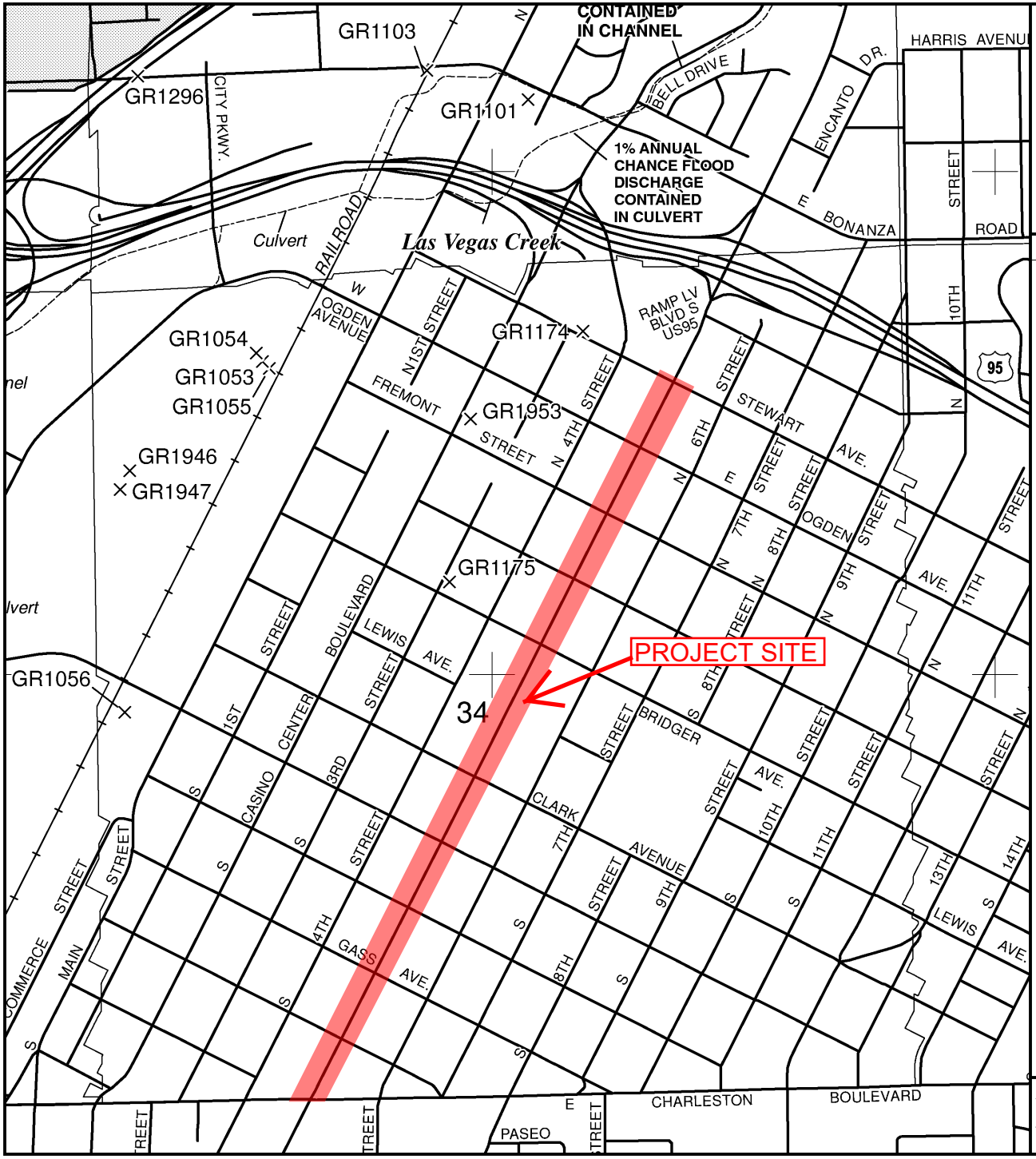
The following conclusions have been determined:

- Offsite hydrologic analysis has been performed and design point flow rates established for design of proposed storm drain facilities. A Future Developed Condition Hydrology model has been referenced for the project.
- The hydrologic analysis, along with street flow calculations, have been provided and used to determine stormwater interception locations, and inlet sizing.
- Hydraulic analysis and design has been performed based on connection to a future downstream facility that will accept full storm drain capacity to meet the 10-year dry lane criteria. Analysis has also been performed for laterals. Hydraulic grade lines have been incorporated into the storm drain plan profiles based on the results of mainline and lateral hydraulic analysis.
- Slotted bolt down storm drain manhole covers are recommended for all manholes where the HGL is less than 18-inches below the top of manhole elevation in the interim condition due to the proposed bubbler system.

The proposed Las Vegas Boulevard Improvements Charleston Boulevard to Stewart Avenue design has been developed in accordance with criteria established in the Manual, and the local entity. Storm drain drop inlets and facility pipe sizes have been designed to meet 10-year dry lane criteria in Las Vegas Boulevard.

APPENDIX A

EXHIBITS



National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2170F

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA

AND INCORPORATED AREAS

PANEL 2170 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	320003	2170	F
LAS VEGAS, CITY OF	325276	2170	F
NORTH LAS VEGAS, CITY OF	320007	2170	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C2170F

MAP REVISED
NOVEMBER 16, 2011

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

REGIONAL FLOOD CONTROL DISTRICT

2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE H- 32
HYDROLOGIC SUMMARY

LEGEND

- Ultimate Development Boundary
- Watershed Boundary
- Subbasin Boundary
- Drought Ordinance Boundary
- Flow Arrows

Flood Control Facilities

- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Category A Remove & Replace/ Parallel Facilities
- Category B Remove & Replace/ Parallel Facilities

Type Hydrologic Soil Groups

- A Low Runoff Potential
- B Moderately Low Runoff Potential
- C Moderately High Runoff Potential
- D High Runoff Potential/Rock Outcrops

Typical Land Use

	1	Undeveloped Land, Open Desert
	2	Parks, Golf Courses
	3	Rural
	4 / 14*	Low Density Residential
	5 / 15*	Medium Density Residential
	6 / 16*	High Density Residential
	7 / 17*	Public Facility, Residential
	8 / 18*	Very High Density Residential
	9 / 19*	Commerical, Retail, Casino, High Rise Condominiums
	10 / 20*	Light Industrial
	11 / 21*	Heavy Industrial
	12 / 22*	Schools
	13	Lakes

* Drought Ordinance Applied

N

0 500 1,000 2,000 3,000
Feet

Scale: 1 inch = 2,000 feet

Refer to Figure G-2 for Aerial Source(s)

US95 I-15 I-215

1	2	3								
4	5	6								
		7	8	9	10					
11	12	13	14	15	16	17				
		18	19	20	21	22	23			
		24	25	26	27	28				
		29	30	31	32	33	34			
		35	36	37	38	39	40			
		41	42	43	44	45	46			
		47	48	49	50	51	52			
		53	54	55	56					
		57	58	59						

PBS&J PB

PROJECT SITE

REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 32
FLOOD CONTROL FACILITIES

LEGEND

- Ultimate Development Boundary
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Local Existing Facilities
- Local Proposed Facilities
- Detention Basin
- Stormdrain
- Lined Channel
- Unlined Channel
- Levee/Dike
- Natural Wash/Floodway
- ID-Mile Separator

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

N

0 500 1,000 2,000 3,000
Feet

Scale: 1 inch = 2,000 feet

Refer to Figure G-2 for Aerial Source(s)

US95 I-15 I-215

	1	2	3		A1	A2
	4	5	6		A3	A4
		7	8	9	10	A5	A6
11	12	13	14	15	16	17
	18	19	20	21	22	23
	24	25	26	27	28	
	29	30	31	32	33	34
	35	36	37	38	39	40
	41	42	43	44	45	46
	47	48	49	50	51	52
	53	54	55	56		
	57	58	59			

SITE

BONANZA RD
SAHARA AV
CHARLESTON BLVD
STEWART AV
OAKEY BLVD
WYOMING AV
ST LOUIS AV
KAREN AV.
VEGAS VALLEY DR
DESERT INN RD
TWAIN AV
SANDS AV
FREMONT ST
MAIN ST
4TH ST
UPRR
BRUCE ST
COMMERCE ST
MARYLAND PKWY
15TH ST
SPENCER ST
BURNHAM AV
EASTERN AV
MOJAVE RD
SANDHILL RD
LAMB BLVD
PAGE ST
MCLEOD DR
PECOS RD
WALNUT RD
ARDEN ST
MOUNTAIN VISTA ST
BOULDER HWY
PARADISE RD
95

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
BHSA		**BOULDER HIGHWAY SAHARA AVENUE**						
0000	P2	14' X 10' RCB	1350	3837	CSA13*	SW3	7.93	0.50
0026	P1	14' X 11' RCB	4000	3837	CSA13*	SW3	7.93	1.30
0075	P1	12' X 11' RCB	5280	3837	CSA13*	SW3	7.93	2.11
0175	P1	14' X 14' RCB	6000	3837	CSA13	SW3	7.93	0.67
CABZ		**CEDAR AVENUE - BONANZA**						
0000	E	72" RCP	525					0.30
0010	E	60" RCP	1450					0.30
CACH		**CEDAR AVENUE CHANNEL**						
0000	E	Conc Chnl 10'W 8'D 1.5:1 SS	1681	1544	CCA10-C	SW3	1.81	0.20
0027	E	2: 15'X5' RCBC @ Marion	82	1544	CCA10-C	SW3	1.81	0.35
0029	E	Conc Chnl 10'W 8'D 1.5:1 SS	1284	1544	CCA10-C	SW3	1.81	0.37
0051	E	2: 15'X5' RCBC @ Page	64	1544	CCA10-C	SW3	1.81	0.38
0053	E	Conc Chnl 10'W 6'D 1.5:1 SS	1275	1544	CCA10-C	SW3	1.81	0.38
0079	E	2: 12' X 6' RCBC @ Lamb	100	1387	CCA08-C	SW3	1.61	0.38
0081	E	Conc Chnl 12'W 6'D 1.5:1 SS	2562	1387	CCA08-C	SW3	1.61	0.20
0127	E	3: 12'X4' RCBC @ Sandhill	80	1387	CCA08-C	SW3	1.61	0.20
0129	E	Conc Chnl 10'W 8'D 1.5:1 SS	971	1387	CCA08-C	SW3	1.61	0.26
0146	E	2: 12' X 5.5' RCBC @ Honolulu	62	1387	CCA08-C	SW3	1.61	0.53
0148	E	Conc Chnl 10'W 8'D 1.5:1 SS	959	1387	CCA08-C	SW3	1.61	0.53
CACN		**CEDAR AVENUE - CHARLESTON**						
0000	E	72" RCP (Replace w/ CACN0001)	1867	933	CCA05	SW3	0.96	0.41
0001	P1	10 'X 9' RCB (Replaces CACN0000)	1867	933	CCA05	SW3	0.96	0.41
0034	E	2: 48" RCP (Replace w/ CACN0035)	685	254	CA05	SW3	0.24	0.30
0035	P0	6' X 6' RCB (Replaces CACN0034)	685	254	CA05	SW3	0.24	0.30
0049	E	66" RCP (Replace w/ CACN0050)	2146	254	CA05	SW3	0.24	0.60
0050	P0	6' X 5' RCB (Replaces CACN0049)	2146	254	CA05	SW3	0.24	0.60
CNST		**CEDAR AVENUE CHANNEL - STEWART**						
0000	P1	8' X 7' RCB	2120	690	CCA04	SW3	0.72	0.90
COLM		**COLORADO / LAMB**						
0000	E	72" RCP	1500	470	CCH94	SW3	0.63	0.87
FLAG		**FLAMINGO WASH - ALGONQUIN**						
0000	E	72" RCP	1080	513	FW21	FLAM3A	0.47	0.50
0020	E	66" RCP	460	513	FW21	FLAM3A	0.47	1.00
FLBN		**FLAMINGO - BOULDER HIGHWAY NORTH**						
0001	E	5: 10' X 6' RCB	350	4784	CCFR03	BOULDER4	11.13	0.58
0008	E	3: 14' X 12' RCB	1055	4784	CCFR03	BOULDER4	11.13	0.20
0028	E	3: 14' X 12' RCB	275	4784	CCFR03	BOULDER4	11.13	0.20
0033	E	3: 14' X 12' RCB	500	4784	CCFR03	BOULDER4	11.13	0.20
0038	P1	15' X 10' RCB	6600	2448	CFR03	SW3	3.46	0.59
0167	P1	2: 10' X 6' RCB	700	2046	CCH68-C	SW3	2.86	1.14
0180	P1	2: 10' X 6' RCB	1300	1799	CCCH67-C	SW3	2.55	1.31
0205	P1	10' X 6' RCB	4000	1461	CCH63-C	SW3	1.88	2.30
0281	P1	10' X 7' RCB	3100	1259	CCH56	SW3	1.64	1.33
0312	P1	7' X 4' RCB	1800	555	CCH52	SW3	0.55	4.20
0342	P1	7' X 4" RCB	2500	555	CCH52	SW3	0.55	4.20
FLBS		**FLAMINGO - BOULDER HIGHWAY SOUTH**						
0000	E	Unlined Median Chnl 0'W 6.5'D 4.5:1 SS	4060	945	CB4	FLAM3A	1.38	1.30
0167	E	Unlined Median Chnl 0'W 3.5'D 9:1 SS	8850	452	CB4N	FLAM3A	0.63	0.90
FLDN		**DESERT INN DRAIN EAST**						
0000	E	60" RCP (Replace w/ FLDN0001)	6160	1267	CFW30AW	FLAM3A	2.12	1.22
0001	P0	12' X 6' RCB (Replaces FLDN0000)	6160	1267	CFW30AW	FLAM3A	2.12	1.22
0116	E	54" RCP (Replace w/ FLDN0117)	2330	1178	CFW29	FLAM3A	1.82	1.77
0117	P0	10' X 6' RCB (Replaces FLDN0116)	2330	1178	CFW29	FLAM3A	1.82	1.77
0160	E	48" RCP (Replace w/ FLDN0160)	2950	906	CFW28	FLAM3A	1.51	1.28
0161	P0	10' X 6' RCB (Replaces FLDN0161)	2950	906	CFW28	FLAM3A	1.51	1.28

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
FLMP		**FLAMINGO WASH-MARYLAND PARKWAY SYSTEM**						
0000	P1	8' X 6' RCB	3800	492	CCH60A-C	SW3	0.75	0.49
FLSP		**FLAMINGO WASH - SPENCER**						
0000	E	48" RCP	420	513	FW21	FLAM3A	0.47	1.10
FLWA		**FLAMINGO WASH**						
0000	E	Grass Chnl 107'W 5'D 2:1 SS (Replace w/ FLWA0001)	4570	10952	CFW36*	FLAM5B	36.14	0.40
0001	P1	Conc Chnl 100'W 7.5'D 1:1 SS (Replaces FLWA0000)	4570	10952	CFW36*	FLAM5B	36.14	0.40
0078	E	3 Span Bridge 108.25'W 5.5'D @ Nellis	120	10952	CFW36	FLAM5B	36.14	0.70
0080	E	Conc Chnl 50'W 8.5'D 1:1 SS	5080	10952	CFW36	FLAM5B	36.14	1.20
0174	E	9: 10' X 6' RCBC @ Lamb	110	10822	CFW34	FLAM5B	35.66	1.40
0176	E	Conc Chnl 60'W 9'D 1:1 SS	1180	10822	CFW34	FLAM5B	35.66	0.70
0200	E	Conc Chnl 70'W 8'D to 12'D w/ Pier 0:1 SS	1245	10822	CFW34	FLAM5B	35.66	0.50
0226	E	Free Span Bridge 100'W 10'D @ I-515	170	10822	CFW34	FLAM5B	35.66	0.80
0228	E	Conc Chnl 70'W 8'D to 12'D 0:1 SS	1500	10788	CFW33	FLAM5B	35.36	0.80
0255	E	2 Span Bridge 150'W 9'D @ Boulder Hwy	65	10788	CFW33	FLAM5B	35.36	1.00
0256	E	Conc Chnl 60'W 7.5'D 0:1 SS	40	8146	CFW33W	FLAM5B	24.23	1.00
0257	E	2 Span Bridge 150'W 9'D @ Boulder Hwy	60	8146	CFW33W	FLAM5B	24.23	1.00
0258	E	Conc Chnl 60'W 7.5'D 0:1 SS	750	8146	CFW33W	FLAM5B	24.23	0.44
0273	E	Free Span Bridge 60'W 9'D @ MMMHP	20	8146	CFW33W	FLAM5B	24.23	0.40
0274	E	Conc Chnl 60'W 8.1'D 0:1 SS	1370	8146	CFW33W	FLAM5B	24.23	1.00
0295	E	Conc Chnl 60'W 8.1'D 0:1 SS	430	7669	CFW31	FLAM5B	22.62	0.80
0307	E	Conc Chnl 60'W 8.1'D 2:1 SS	410	7669	CFW31	FLAM5B	22.62	0.70
0314	E	Conc Chnl 60'W 8.1'D 2:1 SS	1500	7195	CFW30B	FLAM5B	21.25	0.90
0347	E	5: 10' X 8' RCBC @ Mojave	80	7195	CFW30B	FLAM5B	21.25	0.94
0348	E	Conc Chnl 30'W 12'D 1:1 SS	1150	7195	CFW30B	FLAM5B	21.25	0.70
0375	E	5: 10' X 8' RCBC @ Desert Inn	140	7102	CFW30A	FLAM5B	20.96	2.70
0377	E	Conc Chnl 50'W 9.5'D 0:1 SS	1372	6964	CFW23	FLAM5B	19.36	1.04
0399	E	Free Span Bridge 60'W 16'D @ McLeod	120	6964	CFW23	FLAM5B	19.36	0.50
0401	E	Conc Chnl 50'W 11.5'D 0:1 SS	123	6964	CFW23	FLAM5B	19.36	0.50
0406	E	Conc Chnl 33'W 11.5'D 0:1 SS	690	6964	CFW23	FLAM5B	19.36	1.01
0419	E	Conc Chnl 33'-50'W 9.8'D 0:1 SS	200	6964	CFW23	FLAM5B	19.36	2.00
0423	E	Conc Chnl 50'W 9.8'D 0:1 SS	1686	6964	CFW23	FLAM5B	19.36	0.76
0455	E	Conc Chnl 50'-75'W 9.8'D 0:1 SS	169	6964	CFW23	FLAM5B	19.36	1.83
0458	E	Conc Chnl 75'-80'W 9.8'D 0:1 SS	347	6964	CFW23	FLAM5B	19.36	1.50
0471	E	5: 10' X 8' RCBC @ Eastern	110	5781	CFW22W	FLAM5B	14.95	1.30
0472	P1	Add 1: 22' X 8' RCBC @ Eastern	110	5781	CFW22W	FLAM5B	14.95	0.50
0473	E	Grass Chnl 60'W 15'D 2:1 SS	100	5781	CFW22W	FLAM5B	14.95	0.47
0477	E	3 Span Bridge 47'W 15'D	10	5781	CFW22W	FLAM5B	14.95	0.80
0478	E	Grass Chnl 60'W 15'D 2:1 SS	520	5781	CFW22W	FLAM5B	14.95	0.47
0481	E	3: 90° CMAP @ Tioga (Replace w/ FLWA0482)	60	5781	CFW22W	FLAM5B	14.95	0.87
0482	P1	4: 20' X 8' RCBC @ Tioga (Replaces FLWA0481)	60	5781	CFW22W	FLAM5B	14.95	0.87
0483	E	Grass Chnl 60'W 15'D 2:1 SS	300	5781	CFW22W	FLAM5B	14.95	0.63
0492	E	3 Span Bridge 47'W 15'D	10	5781	CFW22W	FLAM5B	14.95	0.50
0493	E	Grass Chnl 60'W 15'D 2:1 SS	1520	5781	CFW22W	FLAM5B	14.95	0.46
0555	E	3 Span Bridge 47'W 15'D	10	5701	CFW21	FLAM5B	14.55	0.50
0556	E	Earth Chnl 60'W 15'D 2:1 SS (Replace w/ FLWA0557)	520	5701	CFW21	FLAM5B	14.55	0.54
0557	P1	Gabion Chnl 30'W 10.5'D 2:1 SS (Replaces FLWA0556)	520	5701	CFW21	FLAM5B	14.55	0.54
LVBZ		**LAS VEGAS WASH - BONANZA**						
0000	P1	2: 12' X 7' RCB	3400	1636	CBN15-C	SW3	2.40	0.40
0064	P1	2: 12' X 6' RCB	2630	1449	CBN12-C	SW3	2.12	0.40
0114	P1	2: 12' X 6' RCB	2740	1256	CBN10-C	SW3	1.79	0.40
0166	E	54" RCP (Replace w/ LVBZ0167)	1095	1051	CBN09	SW3	1.54	0.45
0167	P0	10' X 9' RCB (Replaces LVBZ0166)	1095	1051	CBN09	SW3	1.54	0.45
0187	E	48" RCP (Replace w/ LVBZ0188)	1235	1051	CBN09	SW3	1.54	0.71
0188	P0	9' X 9' RCB (Replaces LVBZ0187)	1235	1051	CBN09	SW3	1.54	0.71
0210	E	42" RCP (Replace w/ LVBZ0211)	704	911	CBN08	SW3	1.30	1.37
0211	P0	8' X 7' RCB (Replaces LVBZ0210)	704	911	CBN08	SW3	1.30	1.37
0223	E	36" RCP (Replace w/ LVBZ0224)	2275	722	CBN03	SW3	1.09	0.72
0224	P0	8' X 7' RCB (Replaces LVBZ0223)	2275	722	CBN03	SW3	1.09	0.72

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVCA		**LAS VEGAS WASH - CHARLESTON**						
0000	P1	12' X 9' RCB	4600	1104	CCH77-C	SW3	1.34	0.30
LVCO		**COLORADO AVENUE SYSTEM**						
0000	E	18' X 8' RCB	610	1015	CNEL06	SW3	1.30	0.24
0012	E	14' X 8' RCB	2560	1015	CNEL06	SW3	1.30	0.24
0064	E	10' X 8' RCB	2165	827	CCCH94	SW3	0.98	0.24
0106	E	10' X 8' RCB	590	394	CCH92-C	SW3	0.35	0.24
0109	E	10' X 5' RCB	2350	394	CCH92-C	SW3	0.35	0.67
LVMD		**LAS VEGAS WASH - MIDDLE**						
1032	E	Earth Chnl 75'W 10'-12'D 1:1 SS (Replace w/ LVMD1033)	715	15156	CNLWY	CLVWASH5	118.28	0.30
1033	P1	Conc Chnl 75'W 11'D 1:1 SS (Replaces LVMD1032)	739	15156	CNLWY	CLVWASH5	118.28	0.30
1045	E	5 Span Bridge 75'W 10'D 1:1 SS (Replace w/ LVMD1046)	120	15156	CNLWY	CLVWASH5	118.28	0.52
1046	P1	Bridge 75'W 9.5'D 1:1 SS @ Nellis (Replaces LVMD1045)	120	15156	CNLWY	CLVWASH5	118.28	0.52
1047	E	Earth Chnl 80'W 8'D 2:1 SS (Replace w/ LVMD1048)	340	15083	CCNEL06	CLVWASH5	117.81	0.50
1048	P1	Conc Chnl 120'W 8'D 0:1 SS (Replaces LVMD1047)	340	15083	CCNEL06	CLVWASH5	117.81	0.50
1053	E	Earth Chnl 80'W 8'D 2:1 SS (Replace w/ LVMD1054)	860	14811	CNEL04-2	CLVWASH5	116.51	0.50
1054	P1	Conc Chnl 120'W 8'D 0:1 SS (Replaces LVMD1053)	860	14811	CNEL04-2	CLVWASH5	116.51	0.50
1068	E	5 Span Bridge 90'W 6'D 2:1 SS (Replace w/ LVMD1069)	120	14438	CCST03-C	CLVWASH5	114.87	0.50
1069	P1	5 Span Bridge 110'W 8'D 2:1 SS (Replaces LVMD1068)	120	14438	CCST03-C	CLVWASH5	114.87	0.50
1070	E	Earth Chnl 90'W 10'-12'D 1.5:1 SS (Replace w/ LVMD1071)	2587	14438	CCST03-C	CLVWASH5	114.87	0.43
1071	P1	Conc Chnl 90'W 9'D 1.5:1 SS (Replaces LVMD1070)	2587	14438	CCST03-C	CLVWASH5	114.87	0.43
1119	E	5 Span Bridge 90'W 12'D 2:1 SS @ Stewart	120	14354	CCCA10-C	CLVWASH5	114.40	0.20
1120	E	Earth Chnl 90'W 12'D 1:1 SS (Replace w/ LVMD1121)	1400	14354	CCCA10-C	CLVWASH5	114.40	0.20
1121	P1	Conc Chnl 90'W 10.5'D 1:1 SS (Replaces LVMD1120)	1400	14354	CCCA10-C	CLVWASH5	114.40	0.20
1148	E	Earth Chnl 70'W 18'-20'D 1.5:1 SS (Replace w/ LVMD1149)	1675	13944	CCBN15-C	CLVWASH5	112.59	0.41
1149	P1	Conc Chnl 70'W 10'D 1.5:1 SS (Replaces LVMD1148)	1675	13944	CCBN15-C	CLVWASH5	112.59	0.41
1176	E	5 Span Bridge 110'W 20'D 2:1 SS @ Bonanza	120	12690	CLVW04-C	CLVWASH5	106.80	0.57
1178	E	Earth Chnl 30'W 18'-20'D 2:1 SS (Replace w/ LVMD1179)	1500	12690	CLVW04-C	CLVWASH5	106.80	0.57
1179	P1	Conc Chnl 60'W 9.5'D 2:1 SS (Replaces LVMD1178)	1500	12690	CLVW04-C	CLVWASH5	106.80	0.57
LVNE		**LAS VEGAS WASH - NELLIS**						
0000	P1	2: 13' X 10' RCB	4675	2303	CNEL02-C	WEST3	3.39	0.20
LVOE		**OWENS AVENUE - EAST**						
0345	P1	13' X 11' RCB	1685	2369	DLVOE	SW5	22.79	0.60
LVWH		**WASHINGTON AVENUE CHANNEL**						
0389	E	12' X 8' RCB	2110	1607	(1/2) CV1-C	SW5SC	15.16	0.90
0426	E	16' X 8' RCB	150	1607	(1/2) CV1-C	SW5SC	15.16	1.08
0429	E	Splitter Structure (2: 12' X 8' RCB)	190	2870	DCLC21	SW5	22.79	1.90
0431	E	3: 14.33' X 10' RCB	665	2870	DCLC21	SW5	22.79	0.15
0446	E	Junction Structure	69	2870	DCLC21	SW5	22.79	0.15
0447	E	3: 14.33' X 10' RCB	1955	4978	CCAL93	SW5	22.19	0.15
NLFL		**NELLIS FLAMINGO STORM DRAIN**						
0028	P0	Add 1: 7' X 6' RCB	1530	338^	CM3^	FLAM3A	1.27	0.39
0029	E	76" & 48" RCP	1530	391^	CM3^	FLAM3A	1.27	0.39
0059	E	60" RCP	1370	143^	CM3^	FLAM3A	1.27	0.30
0060	P0	Add 1: 12' X 6' RCB	1370	586^	CM3^	FLAM3A	1.27	0.34
0084	E	48" RCP	2490	79^	CM2^	FLAM3A	0.98	0.30
0085	P0	Add 1: 11' X 6' RCB	2490	505^	CM2^	FLAM3A	0.98	0.30
0131	E	42" RCP	650	350	M1	FLAM3A	0.51	0.23
0144	E	36" RCP	620	350	M1	FLAM3A	0.51	0.20
NLWY		**NELLIS - WYOMING CHANNEL**						
0000	E	Conc Chnl 8'W 4'D 1.3:1 SS	260	338	FW35	FLAM3A	0.47	1.71
0004	E	15' X 6' RCAC	80	338	FW35	FLAM3A	0.47	1.30
0006	E	Conc Chnl 8'W 4'D 1.3:1 SS	400	338	FW35	FLAM3A	0.47	0.38
0014	E	12' X 4' RCBC @ Winterwood	70	338	FW35	FLAM3A	0.47	0.40
0015	E	Conc Chnl 8'W 4'D 1.3:1 SS	720	338	FW35	FLAM3A	0.47	0.38
0028	E	12' X 4' RCBC @ Wyoming	90	338	FW35	FLAM3A	0.47	0.80
0030	E	Conc Chnl 8'W 4'D 1.3:1 SS	250	338	FW35	FLAM3A	0.47	0.38
SAEA		**SAHARA AVENUE - EASTERN LATERAL**						
0000	P1	10' X 8' RCB	1440	564	CFR02	SW3	0.66	0.20

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
VAVD		**VEGAS VALLEY DRIVE**						
0000	P1	8' X 6' RCB	1300	606	CFW32WW	FLAM3A	0.84	2.10
0025	P1	84" RCP	5300	606	CFW32WW	FLAM3A	0.84	1.60
VBCH		**VAN BUSKIRK CHANNEL**						
0000	E	12' X 3' RCB	500	888	CVB16	FLAM3A	1.16	1.00
0008	E	8' X 5' RCB	5490	888	CVB16	FLAM3A	1.16	1.00
VBEA		**VAN BUSKIRK - EASTERN AVE**						
0000	P1	14' X 6' RCB	3020	1561	CVB11	FLAM3A	3.35	1.30
VBMC		**VAN BUSKIRK - McLEOD DRIVE**						
0000	E	2: 8' X 8' RCB	3850	997	CVB13	FLAM3A	3.43	0.50
VBTW		**VAN BUSKIRK - TWAIN**						
0000	E	18" RCP	6640	541	CB2	FLAM3A	0.74	0.70
WAGC		**WASHINGTON AVENUE CHANNEL - GRAND CENTRAL**						
0000	E	2: 12' X 4' RCB	700	557	LC21	SW3	0.60	0.20
0014	E	1: 12' X 4' RCB and 1: 11' X 4' RCB	2440	557	LC21	SW3	0.60	0.20
WAPR		**WASHINGTON AVENUE CHANNEL PARALLEL**						
0132	E	2: 9' X 8' RCB	387	1607	(1/2) CV1-C	SW5SC	15.16	1.67

** The HEC-1 node shown identifies the controlling concentration point for the associated facility and is located upstream of this facility due to decreasing peak flow with increasing tributary area caused by storm distribution transitions, depth area reduction factors, or attenuation of flow from routing.*

*** As-built or design slopes were used when available. All other slopes are based on existing topography. The user should verify the facility slope listed prior to performing any facility specific analysis.*

^ For parallel facilities, the existing facility flow equals its normal depth capacity, and the proposed parallel facility flow equals the remaining flow (i.e., HEC-1 Node flow = existing facility normal depth capacity + proposed parallel facility flow).

REGIONAL FLOOD CONTROL DISTRICT

2013 LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FACILITY INVENTORY
FIGURE F - 32

LEGEND

ID (Facility Identifier) AABB
- Parent Stream Name
- Stream Name

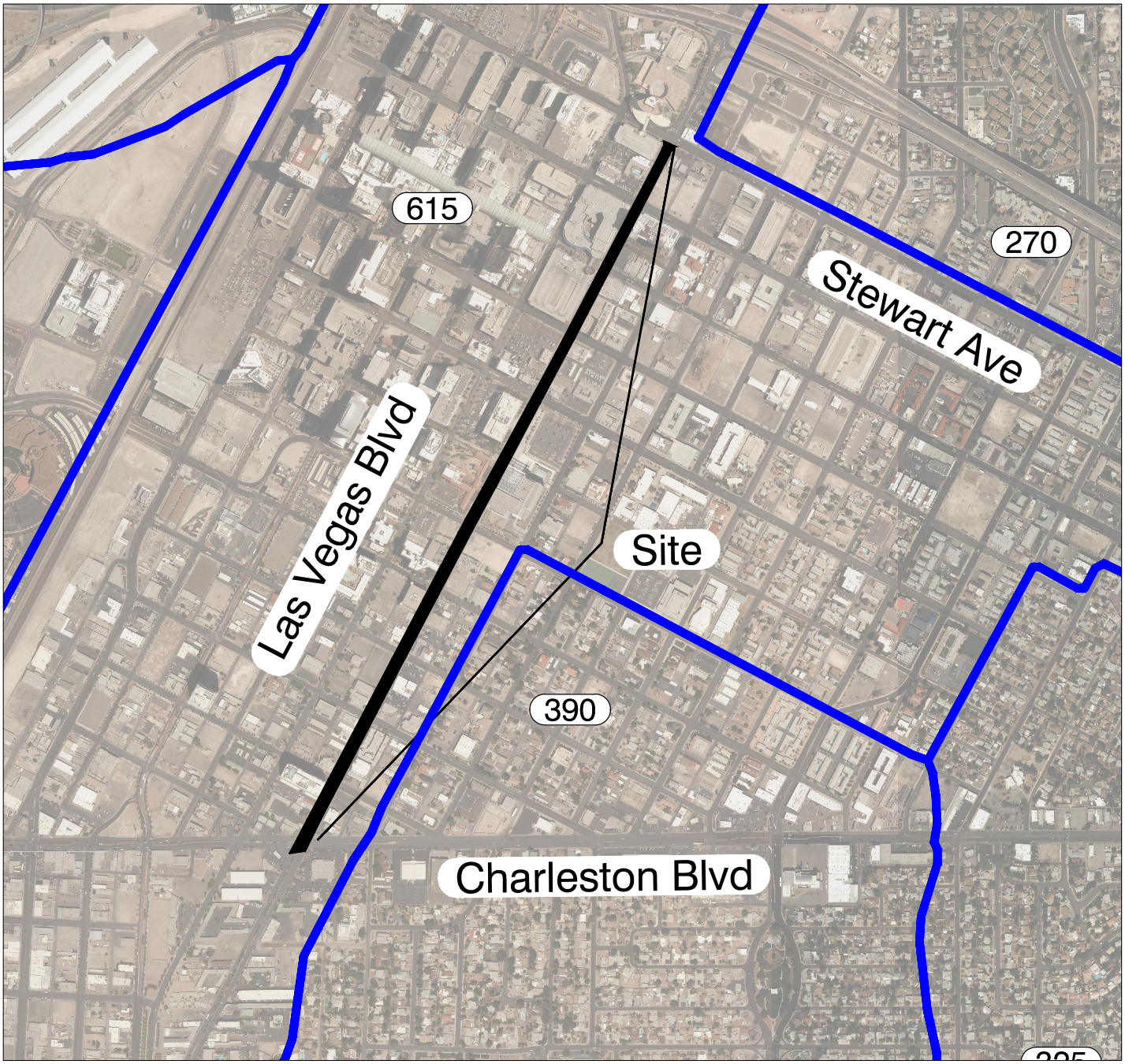
River Mile 0000
- Distance Above Confluence with Parent Stream (Miles)
- Miles in Hundredths

Existing Facility.....E
Proposed or Modified Facility.....P
Contingency Level
- Category B.....P0
- Master Plan.....P1
- Preliminary Design.....P2
- Design.....P3

Bottom Width.....W
Depth.....D
Side Slope, H:V.....SS

Construction Features

Cast in Place Concrete Pipe	CIPCP	Reinforced Concrete Arch Culvert	RCAC
Corrugated Metal Arch Pipe Culvert	CMAP	Reinforced Concrete Box	RCB
Corrugated Metal Pipe Culvert	CMPC	Reinforced Concrete Box Culvert	RCBC
High Density Polyethylene	HDPE	Reinforced Concrete Pipe	RCP
Horizontal Elliptical Reinforced Concrete Pipe	HERCP	Reinforced Concrete Pipe Culvert	RCPC
Reinforced Concrete Arch Pipe	RCAP	Storm Sewer Pipe	SSP



LEGEND

SITE BOUNDARY

615 SOIL NUMBER

SOIL BOUNDARY

NOTE:
1. This data was taken from the following website: http://websoilsurvey.nrcs.usda.gov
2. This data is in state plane coordinates

NORTH

GRAPHIC SCALE

1500 0 750 1500 3000

1" = 1500'

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NV 89146-5148

EXHIBIT C
SOILS MAP

LAS VEGAS BOULEVARD IMPROVEMENTS FROM STEWART AVE. TO SAHARA AVE. PHASE 1

SCALE	HORZ. 1"=1500
	VERT.
W.O. NO.	7517-2
DRAWN BY:	PLM
DATE:	FEBRUARY 2017
SHEET	1 OF 1

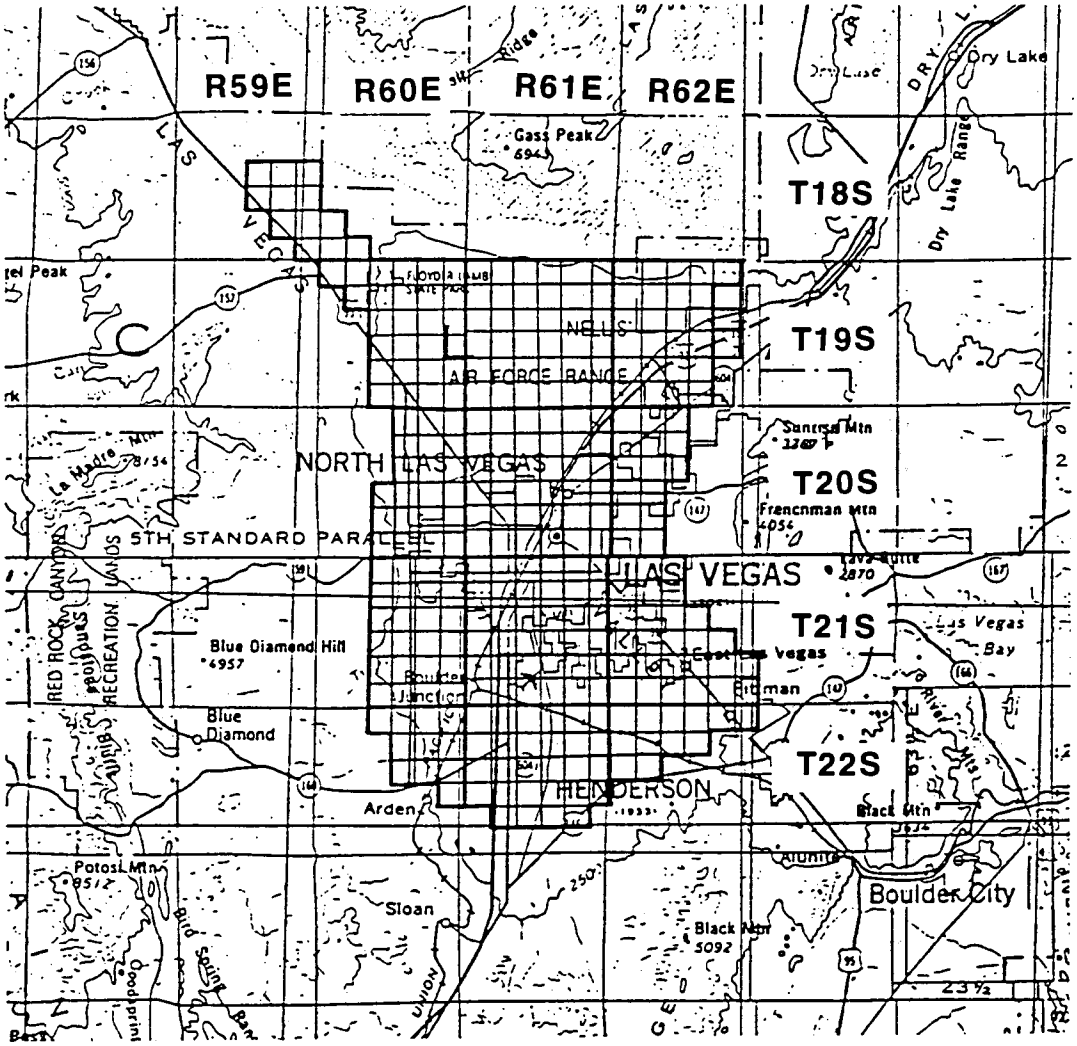
APPENDIX B

HYDROLOGIC ANALYSIS

B.1

CCRFCD PRECIPITATION FIGURE

McCARRAN AIRPORT RAINFALL AREA



TOWNSHIP	RANGE	SECTIONS	TOWNSHIP	RANGE	SECTIONS
18 South	59 East	13-15,22-26,36	20 South	62 East	4-9,16-20,29-32
18 South	60 East	30-32	21 South	60 East	1-4,9-16,21-28,33-36
19 South	60 East	1-6,8-16,21-28,33-36	21 South	61 East	ALL SECTIONS
19 South	61 East	ALL SECTIONS	21 South	62 East	4-9,15-23, 25-36
19 South	62 East	2-11,14-23,27-34	22 South	60 East	1-4,10-15,24
20 South	60 East	1-3,10-15,21-28,33-36	22 South	61 East	1-24,26-29
20 South	61 East	ALL SECTIONS	22 South	62 East	1-10,17-18

Notes:
1. Refer to Table 505 and Figure 516 Depth-Duration- Frequency values in the McCarran Airport Rainfall Area.
2. Refer to Table 506 and Figure 517 for Time-Intensity-Frequency values on the McCarran Airport Rainfall Area.

Revision	Date

WRC ENGINEERING

REFERENCE:
USACE, Los Angeles District, 1988

FIGURE 513

B.2

STANDARD FORM 4

LAS VEGAS BLVD- STEWART TO SAHARA
DEVELOPED CONDITION

WO 7617

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag	REMARKS
DESIG: (1)	DEV./EX. (D or E)	CN	K (2)	AREA Ac (3)	AREA Mi^2	INITIAL LENGTH Feet (4)	SLOPE % (5)	Ti Min (6)	TRAVEL LENGTH Feet (7)	SLOPE % (8)	V1 VELOCITY FPS (9a)	V2 VELOCITY FPS (9b)	Tt Min (10)	Min (13)	Min (14)	Tlag= 0.6Tc/60 Hours	RAINFALL Q100 Inches
S1AH	D	91.3	0.8152	61.23	0.096	100	1.0	5.1	2873	0.5	1.4	2.2	24.1	29.2	26.5	**0.265**	
51AS	D	91.3	0.8152	1.47	0.002	100	1.0	5.1	369	0.8	1.8	2.7	3.4	8.5	12.6	**0.085**	
51AT	D	91.3	0.8152	2.52	0.004	100	1.0	5.1	616	0.9	1.9	2.9	5.0	10.1	14.0	**0.101**	
51AU	D	91.3	0.8152	3.43	0.005	100	1.0	5.1	611	0.7	1.7	2.6	5.7	10.8	14.0	**0.108**	
LVAM	D	98.0	0.9036	3.51	0.005	45	2.0	1.9	1894	0.4	1.3	1.9	18.5	20.4	20.8	**0.204**	
53AI	D	94.1	0.8521	5.15	0.008	100	1.0	4.5	4412	1.4	2.4	3.6	21.6	26.0	35.1	**0.260**	
LVAN	D	98.0	0.9036	2.17	0.003	45	2.0	1.9	827	0.9	1.9	2.9	6.2	8.1	14.8	**0.081**	
LVAO	D	98.0	0.9036	0.76	0.001	45	2.0	1.9	970	0.4	1.3	1.9	10.6	12.5	15.6	**0.125**	
LVAP	D	98.0	0.9036	1.50	0.002	45	2.0	1.9	970	0.4	1.3	1.9	10.6	12.5	15.6	**0.125**	
53AJ	D	94.1	0.8521	1.27	0.002	100	1.0	4.5	580	0.5	1.4	2.2	6.5	10.9	13.8	**0.109**	
53AK	D	94.1	0.8521	3.57	0.006	100	1.0	4.5	435	0.7	1.7	2.6	4.3	8.8	13.0	**0.088**	
LVAQ	D	98.0	0.9036	2.46	0.004	45	2.0	1.9	1361	0.6	1.6	2.4	11.4	13.3	17.8	**0.133**	
53AL	D	94.1	0.8521	4.60	0.007	100	1.0	4.5	533	4.0	4.0	6.1	2.2	6.6	13.5	**0.066**	
LVAR	D	98.0	0.9036	1.51	0.002	45	2.0	1.9	657	0.5	1.4	2.2	7.0	8.9	13.9	**0.089**	
LC22-1	D	94.8	0.8614	27.62	0.043	500	1.0	9.6	1482	0.5	1.4	2.2	13.4	23.0	21.0	**0.210**	
LC22-2	D	94.8	0.8614	13.54	0.021	403	0.4	11.7	714	0.9	1.9	2.9	5.6	17.3	16.2	**0.162**	
LC22-3	D	94.8	0.8614	19.38	0.030	446	101.0	1.9	1177	0.4	1.3	1.9	12.4	14.3	19.0	**0.143**	
LC22-4	D	94.8	0.8614	10.21	0.016	197	2.0	4.8	544	0.9	1.9	2.9	4.6	9.4	14.1	**0.094**	
LC22-5	D	94.8	0.8614	15.99	0.025	500	1.0	9.6	697	0.9	1.9	2.9	5.5	15.1	16.7	**0.151**	
LC22-6	D	94.8	0.8614	6.12	0.010	45	2.0	2.3	657	0.5	1.4	2.2	7.0	9.3	13.9	**0.093**	

Tc = Ti + Tt Tlag = 0.6 Tc

Ti = 1.8 (1.1 - K) L^1/2 / S^1/3

K = 0.0132 (CN) - 0.39

Tc Check = L/180+10

For the travel time (Tt) calculations, V1 applies to the first 500 feet of travel distance; V2 applies to the remaining travel distance.

Existing V1 = 14.8*(S/100)^1/2 Developed V1 = 20.2*(S/100)^1/2

Existing V2 = 29.4*(S/100)^1/2 Developed V2 = 30.6*(S/100)^1/2

REFERENCE : **STANDARD FORM 4**

B.3

HEC-1 CALCULATIONS

B.3.1

Existing/Proposed Condition 10-Year

```
1****************************************
****************************************
 *                                      *                                                *
*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                                *    U.S. ARMY CORPS OF ENGINEERS
*
 *               JUN   1998             *                                                *    HYDROLOGIC ENGINEERING CENTER
*
 *            VERSION 4.1               *                                                *          609 SECOND STREET
*
 *                                      *                                                *       DAVIS, CALIFORNIA 95616
*
 *  RUN DATE   07OCT15  TIME  15:43:00  *                                                *            (916) 756-1104
*
 *                                      *                                                *
*
 ****************************************
****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                        *DIAGRAM
 *** FREE ***
             1          ID  ********************************************************************************
             2          ID
             3          ID    TECHNICAL DRAINAGE STUDY FOR LAS VEGAS BLVD.
             4          ID    CHARLESTON TO STEWART
             5          ID
             6          ID  ================================================================================
             7          ID
             8          ID    DEVELOPED CONDITION
             9          ID    10-YEAR EVENT
            10          ID    NORTH OF CHARLESTON
            11          ID
            12          ID  ********************************************************************************
            13          ID    PREPARED BY:  VTN NEVADA
            14          ID    DATE:  10/2015
            15          ID    FILE: LVB_N_10.DAT
            16          ID    WO# 7517-1
            17          ID    BY: WJM
            18          ID  ================================================================================
            19          ID           10-YR STORM
            20          ID    STORM DISTRIBUTION: SDN3
            21          ID    IN MCCARRAN AIRPORT RAINFALL AREA
            22          ID
            23          ID
            24          ID  ****************************************
            25          ID  JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
            26          ID
            27          ID  JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
            28          ID
            29          ID        CONCENTRATION   AREA    DARF
            30          ID        POINT           SQ. MI.
            31          ID                        0-0.5      0.564
            32          ID                        0.5-1      0.556
            33          ID                        1-2        0.542
            34          ID                        2-3        0.527
            35          ID                        3-4        0.522
            36          ID                        4-5        0.518
            37          ID                        5-6        0.515
            38          ID                        6-7        0.510
            39          ID                        7-8        0.504
            40          ID
            41          ID
            42          ID  JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
            43          ID  10-YEAR,  6-HOUR STORM,  SDN3
            44          ID
            45          IT       5       0       0     300
            46          IO       5       0       0
```

```
  47          IN       5       0       0
  48          JR    PREC   0.564   0.556   0.542   0.527   0.522   0.518   0.515
              *
1                                    HEC-1 INPUT                                    PAGE  2

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  49          KK  LC22-3
  50          BA   0.030
  51          PB    2.77
  52          PC   0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
  53          PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
  54          PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
  55          PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
  56          PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
  57          PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
  58          PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
  59          PC   0.997   0.999   1.000
  60          LS       0    94.8
  61          UD   0.143
              *
  62          KK RLC22-3
  63          KM  ROUTE LC22-6 TO CCH59-5
  64          KM  BRIDGER
  65          RD     495   0.006   0.016       0    TRAP       0      50
              *
  66          KK  CH59-4
  67          BA   0.029
  68          LS       0    94.4
  69          UD   0.217
              *
  70          KK CCH59-4
  71          KM   COMBINE LC22-6 WITH CH59-4
  72          HC       2
              *
  73          KKRCCH59-4
  74          KM  ROUTE CH59-4 TO CCH59-5
  75          KM  BRIDGER
  76          RD     760  0.0079   0.016       0    TRAP       0      50
              *
  77          KK  CH59-5
  78          BA   0.039
  79          LS       0    94.1
  80          UD   0.227
              *
  81          KK CCH59-5
  82          KM  COMBINE CH59-5 AND RCH59-4
  83          KM  FOURTH AND BRIDGER
  84          HC       2
              *
1                                    HEC-1 INPUT                                    PAGE  3

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  85          KK  CH59-6
  86          BA   0.029
  87          LS       0    94.0
  88          UD   0.217
              *
  89          KK CCH59-6
  90          KM  COMBINE CCH59-5 AND CH59-6
  91          KM  LAS VEGAS BOULEVARD AND BRIDGER
  92          HC       2
              *
  93          KK  LC22-4
  94          BA   0.016
  95          LS       0    94.8
  96          UD   0.094
              *
  97          KK RLC22-4
  98          KM  ROUTE LC22-4 TO CCH59-7
  99          KM  BRIDGER
 100          RD     525   0.004   0.016       0    TRAP       0      50
              *
 101          KK  CH59-7
 102          BA   0.015
 103          LS       0    94.6
 104          UD   0.143
              *
 105          KK CCH59-7
 106          KM   COMBINE LC22-4 WITH CH59-7
 107          HC       2
```

```
                *

 108            KK RCH59-7
 109            KM  ROUTE CH59-4 TO CCH59-5
 110            KM  BRIDGER
 111            RD     760  0.0079   0.016       0    TRAP       0      50
                *

 112            KK  CH59-8
 113            BA   0.020
 114            LS       0    94.3
 115            UD   0.152
                *

 116            KK CCH59-8
 117            KM  COMBINE CH59-8 AND RCH59-7
 118            KM  FOURTH AND CARSON
 119            HC       2
                *
1                                       HEC-1 INPUT                                                PAGE  4

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 120            KKRCCH59-8
 121            KM  ROUTE CCH59-8 TO CCH59-9
 122            KM  CARSON
 123            RD     600    0.01   0.016       0    TRAP       0      50
                *

 124            KK  CH59-9
 125            BA   0.015
 126            LS       0    94.0
 127            UD   0.130
                *

 128            KK CCH59-9
 129            KM  COMBINE CH59-9, CCH59-6, AND RCCH59-8
 130            KM  NEAR LV BOULEVARD AND CARSON
 131            HC       3
                *

 132            KKRCCH59-9
 133            KM  ROUTE DCH59 TO CCH58 IN LV BLVD DRAIN
 134            KM  LINING = RCP
 135            RD    1400   0.002   0.013       0    CIRC       4
                *

 136            KK  LC22-5
 137            BA   0.025
 138            LS       0    94.8
 139            UD   0.151
                *

 140            KK RLC22-5
 141            KM  ROUTE CH59-4 TO CCH59-5
 142            KM  STEWART
 143            RD     481   0.005   0.016       0    TRAP       0      50
                *

 144            KK  CH58-1
 145            BA   0.024
 146            LS       0    94.1
 147            UD   0.202
                *

 148            KK CCH58-1
 149            KM   CONMINE LC22-5 WITH CH58-1
 150            HC       2
                *

 151            KK RCH58-1
 152            KM  ROUTE CH59-4 TO CCH59-5
 153            KM  STEWART
 154            RD     760   0.009   0.016       0    TRAP       0      50
                *
1                                       HEC-1 INPUT                                                PAGE  5

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 155            KK  CH58-2
 156            BA   0.032
 157            LS       0    94.2
 158            UD   0.213
                *

 159            KK CCH58-2
 160            KM  COMBINE CH58-2 AND RCH58-1
 161            KM  FOURTH AND STEWART
 162            HC       2
                *

 163            KKRCCH58-2
 164            KM  ROUTE CCH58-2 TO CCH59-3
```

```
 165          KM  STEWART
 166          RD     630   0.011   0.016       0    TRAP       0      50
              *

 167          KK  CH58-3
 168          BA   0.026
 169          LS       0    94.1
 170          UD   0.208
              *

 171          KK CCH58-3
 172          KM  COMBINE CH58-3, RCCH59-3, AND RCCH58-2
 173          KM  NEAR LV BOULEVARD AND STEWART
 174          HC       3
              *

 175          KKRCCH58-3
 176          KM  ROUTE DDCH58 TO CW
 177          KM  LINING = RCP
 178          RD     700   0.002   0.013       0    CIRC       4
              *

 179          KK  CH58-4
 180          BA   0.046
 181          LS       0    91.9
 182          UD   0.244
              *

 183          KK  LC22-6
 184          KM   MODEIFIED SUBBASIN LC22 FROM NORTH NIEGHBORHOOD STUDY
 185          BA    0.01
 186          LS       0    94.8
 187          UD   0.093
              *
1                                      HEC-1 INPUT                                          PAGE  6

            LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 188          KK RLC22-6
 189          KM  ROUTE LC22-6 TO CCH58-4
 190          KM  CIVIC CENTER
 191          RD    1638   0.005   0.016       0    TRAP      50       0
              *

 192          KK CCH58-4
 193          KM  COMBINE CH58-4 AND RCCH58-3
 194          KM  NEAR LV BOULEVARD AND STEWART
 195          HC       2
              *

 196          KK  LC22-1
 197          KM   MODIFIED SUBBASIN FROM CENTRAL NEIGHBORHOOD STDY
 198          BA   0.043
 199          LS       0    94.8
 200          UD   0.210
              *

 201          KK RLC22-1
 202          KM  ROUTE LC22-1 TO CCH54-1
 203          KM  CIVIC CENTER
 204          RD     524   0.008   0.016       0    TRAP      14       0
              *

 205          KK  CH54-1
 206          BA   0.034
 207          LS       0    93.9
 208          UD   0.214
              *

 209          KK CCH54-1
 210          KM   COMBINE CH51-1 AND LC22-1
 211          HC       2
              *

 212          KKRCCH54-1
 213          KM  ROUTE CH54-1 TO CCH54-2
 214          KM  CIVIC CENTER
 215          RD     980   0.002   0.013       0    CIRC       3
              *

 216          KK  CH54-2
 217          BA   0.035
 218          LS       0    94.0
 219          UD   0.201
              *

 220          KK RCH54-2
 221          KM  ROUTE CH54-2 TO CCH54-3
 222          KM  GASS
 223          RD     550 0.00545   0.016       0    TRAP       0      50
              *
1                                      HEC-1 INPUT                                          PAGE  7

            LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
             224          KK  CH54-3
             225          BA   0.019
             226          LS       0    94.1
             227          UD   0.180
                          *

             228          KK CCH54-3
             229          KM  COMBINE CH54-3 AND RCH54-2
             230          KM  CHARLESTON AND GASS
             231          HC       3
                          *

             232          KKRCCH54-3
             233          KM  ROUTE CH54-3 TO CCH54-3
             234          KM  GASS
             235          RD    1550   0.011   0.016       0    TRAP       0      50
                          *

             236          KK  LC22-2
             237          BA   0.021
             238          LS       0    94.8
             239          UD   0.162
                          *

             240          KK RLC22-2
             241          KM   ROURE LC22-2 TO CCH59-1
             242          KM  BONNEVILLE
             243          RD     497   0.007   0.015       0    TRAP       0      50
                          *

             244          KK  CH59-1
             245          BA   0.020
             246          LS       0    94.0
             247          UD   0.190
                          *

             248          KK CCH59-1
             249          KM  COMBINE CH59-1 AND RCCH54-1
             250          KM  CIVIC CENTER AND BONNEVILLE
             251          HC       2
                          *

             252          KKRCCH59-1
             253          KM  ROUTE CCH59-1 TO CCH59-2
             254          KM  BONNEVILLE
             255          RD     760  0.0093   0.013       0    CIRC     2.5
                          *

             256          KK  CH59-2
             257          BA   0.026
             258          LS       0    94.0
             259          UD   0.196
                          *
1                                                HEC-1 INPUT                                                PAGE  8

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


             260          KK CCH59-2
             261          KM  COMBINE CH59-2 AND RCCH59-1
             262          KM  FOURTH AND BONNEVILLE
             263          HC       2
                          *

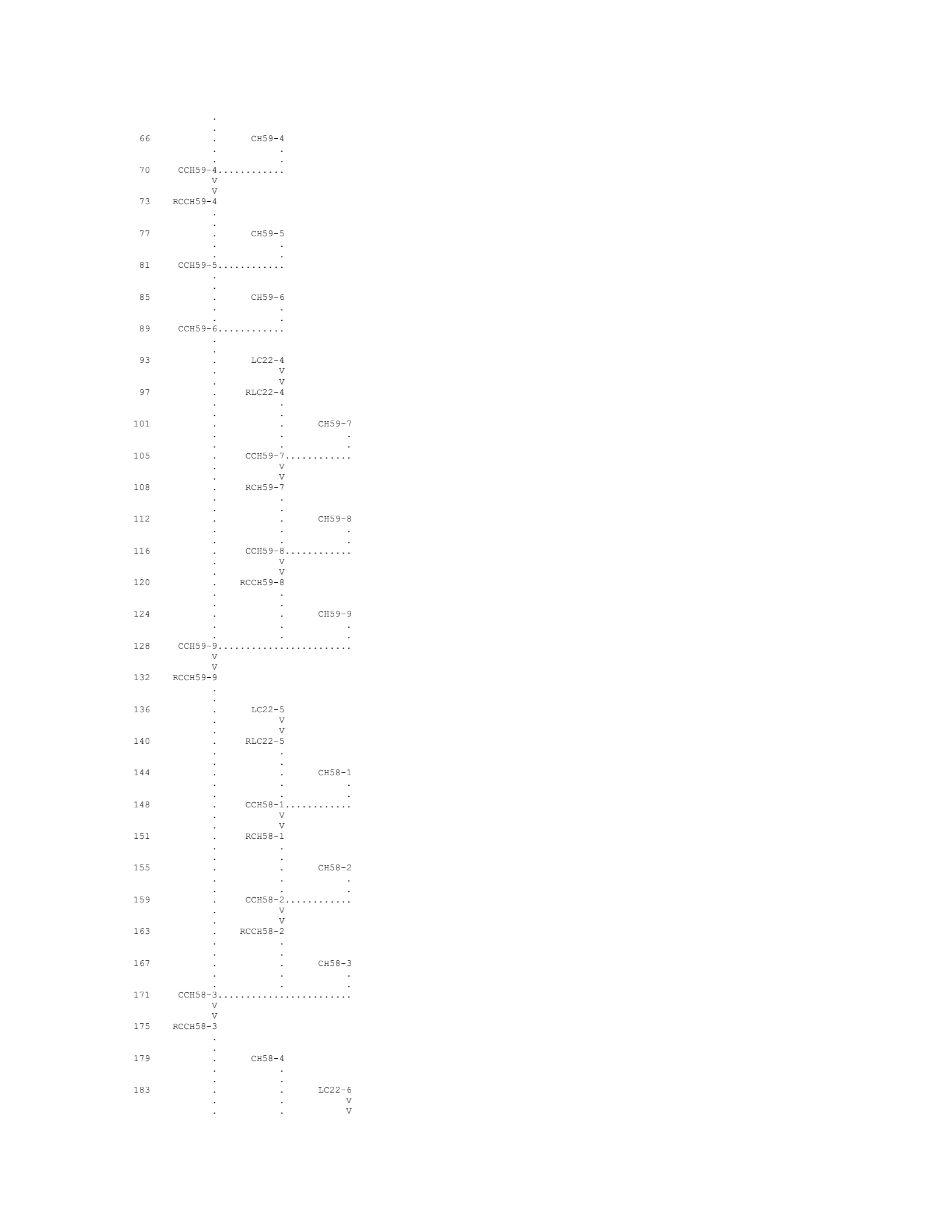
             264          KKRCCH59-2
             265          KM  ROUTE CCH59-2 TO CCH59-3
             266          KM  BONNEVILLE
             267          RD     400   0.013   0.013       0    CIRC       3
                          *

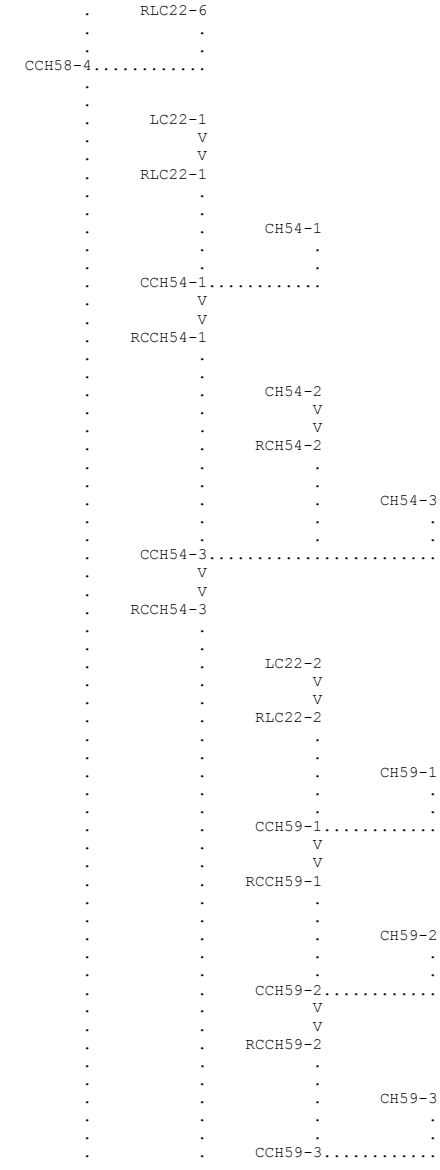
             268          KK  CH59-3
             269          BA   0.019
             270          LS       0    93.1
             271          UD   0.171
                          *

             272          KK CCH59-3
             273          KM  COMBINE CH59-3 AND CCH59-2
             274          KM  LAS VEGAS BOULEVARD AND BONNEVILLE
             275          HC       2
                          *
             276          ZZ
1
                  SCHEMATIC DIAGRAM OF STREAM NETWORK
  INPUT
   LINE      (V) ROUTING          (---->) DIVERSION OR PUMP FLOW

    NO.      (.) CONNECTOR        (<----) RETURN OF DIVERTED OR PUMPED FLOW

      49      LC22-3
                   V
                   V
      62     RLC22-3
```


66 CH59-4
70 CCH59-4
73 RCCH59-4
77 CH59-5
81 CCH59-5
85 CH59-6
89 CCH59-6
93 LC22-4
97 RLC22-4
101 CH59-7
105 CCH59-7
108 RCH59-7
112 CH59-8
116 CCH59-8
120 RCCH59-8
124 CH59-9
128 CCH59-9
132 RCCH59-9
136 LC22-5
140 RLC22-5
144 CH58-1
148 CCH58-1
151 RCH58-1
155 CH58-2
159 CCH58-2
163 RCCH58-2
167 CH58-3
171 CCH58-3
175 RCCH58-3
179 CH58-4
183 LC22-6



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********

****

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *	* U.S. ARMY CORPS OF ENGINEERS
* JUN 1998 *	* HYDROLOGIC ENGINEERING CENTER
* VERSION 4.1 *	* 609 SECOND STREET
*	* DAVIS, CALIFORNIA 95616
* RUN DATE 07OCT15 TIME 15:43:00 *	* (916) 756-1104

****

****

TECHNICAL DRAINAGE STUDY FOR LAS VEGAS BLVD.
CHARLESTON TO STEWART

==========

```
                              DEVELOPED CONDITION
                              10-YEAR EVENT
                              NORTH OF CHARLESTON

                             ********************************************************************************
                              PREPARED BY:  VTN NEVADA
                              DATE:  10/2015
                              FILE: LVB_N_10.DAT
                              WO# 7517-1
                              BY: WJM
                             ================================================================================
                               10-YR STORM
                              STORM DISTRIBUTION: SDN3
                              IN MCCARRAN AIRPORT RAINFALL AREA


                             ***************************************
                             JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)

                             JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:

                                   CONCENTRATION   AREA    DARF
                                   POINT           SQ. MI.
                                                   0-0.5      0.564
                                                   0.5-1      0.556
                                                   1-2        0.542
                                                   2-3        0.527
                                                   3-4        0.522
                                                   4-5        0.518
                                                   5-6        0.515
                                                   6-7        0.510
                                                   7-8        0.504


                             JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
                             10-YEAR,  6-HOUR STORM,  SDN3


   46 IO          OUTPUT CONTROL VARIABLES
                        IPRNT          5  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                         NMIN          5  MINUTES IN COMPUTATION INTERVAL
                        IDATE      1   0  STARTING DATE
                        ITIME       0000  STARTING TIME
                           NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      2   0  ENDING DATE
                       NDTIME       0055  ENDING TIME
                       ICENT         19  CENTURY MARK

                    COMPUTATION INTERVAL     .08 HOURS
                         TOTAL TIME BASE   24.92 HOURS

           ENGLISH UNITS
                DRAINAGE AREA         SQUARE MILES
                PRECIPITATION DEPTH   INCHES
                LENGTH, ELEVATION     FEET
                FLOW                  CUBIC FEET PER SECOND
                STORAGE VOLUME        ACRE-FEET
                SURFACE AREA          ACRES
                TEMPERATURE           DEGREES FAHRENHEIT

      JP          MULTI-PLAN OPTION
                        NPLAN          1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                      RATIOS OF PRECIPITATION
                      .56       .56       .54       .53       .52       .52       .51
1

               PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                                FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                                TIME TO PEAK IN HOURS


                                                                                    RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN                RATIO 1  RATIO 2  RATIO 3  RATIO 4  RATIO 5  RATIO 6  RATIO 7
                                                            .56      .56      .54      .53      .52      .52      .51

 HYDROGRAPH AT
+                LC22-3       .03     1   FLOW             26.      26.      25.      24.      24.      23.      23.
                                             TIME           3.58     3.58     3.58     3.58     3.58     3.58     3.58

 ROUTED TO
+                RLC22-3      .03     1   FLOW             25.      25.      24.      23.      22.      22.      22.
                                             TIME           3.58     3.58     3.58     3.58     3.58     3.58     3.58

 HYDROGRAPH AT
+                CH59-4       .03     1   FLOW             21.      21.      20.      19.      19.      19.      19.
                                             TIME           3.67     3.67     3.67     3.67     3.67     3.67     3.67

  2 COMBINED AT
```

+	CCH59-4	.06	1	FLOW	46.	45.	43.	42.	41.	41.	40.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RCCH59-4	.06	1	FLOW	45.	45.	43.	41.	41.	40.	40.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH59-5	.04	1	FLOW	28.	27.	26.	25.	25.	25.	24.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT											
+	CCH59-5	.10	1	FLOW	73.	72.	69.	66.	66.	65.	64.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH59-6	.03	1	FLOW	21.	20.	19.	19.	18.	18.	18.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT											
+	CCH59-6	.13	1	FLOW	93.	92.	88.	85.	84.	83.	82.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	LC22-4	.02	1	FLOW	15.	15.	14.	14.	14.	14.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO											
+	RLC22-4	.02	1	FLOW	15.	14.	14.	13.	13.	13.	13.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	CH59-7	.01	1	FLOW	13.	13.	12.	12.	12.	12.	11.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	CCH59-7	.03	1	FLOW	28.	27.	26.	25.	25.	25.	24.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RCH59-7	.03	1	FLOW	26.	25.	25.	23.	23.	23.	23.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH59-8	.02	1	FLOW	17.	16.	16.	15.	15.	15.	15.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	CCH59-8	.05	1	FLOW	42.	41.	40.	38.	38.	38.	37.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RCCH59-8	.05	1	FLOW	41.	40.	39.	38.	37.	37.	37.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH59-9	.01	1	FLOW	13.	12.	12.	12.	11.	11.	11.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	CCH59-9	.19	1	FLOW	144.	142.	137.	132.	130.	129.	128.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	RCCH59-9	.19	1	FLOW	137.	136.	130.	126.	124.	122.	121.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	LC22-5	.03	1	FLOW	21.	21.	20.	20.	19.	19.	19.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RLC22-5	.03	1	FLOW	20.	20.	19.	18.	18.	18.	18.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	CH58-1	.02	1	FLOW	18.	17.	17.	16.	16.	16.	15.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	CCH58-1	.05	1	FLOW	38.	37.	36.	34.	34.	34.	33.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RCH58-1	.05	1	FLOW	38.	37.	36.	34.	34.	34.	33.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH58-2	.03	1	FLOW	23.	23.	22.	21.	21.	21.	20.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT											
+	CCH58-2	.08	1	FLOW	61.	59.	58.	55.	55.	54.	53.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67

ROUTED TO											
+	RCCH58-2	.08	1	FLOW	59.	58.	56.	54.	53.	52.	52.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH58-3	.03	1	FLOW	19.	18.	18.	17.	17.	17.	17.
				TIME	3.58	3.58	3.67	3.67	3.67	3.67	3.67
3 COMBINED AT											
+	CCH58-3	.30	1	FLOW	215.	213.	204.	197.	194.	191.	189.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	RCCH58-3	.30	1	FLOW	207.	204.	197.	189.	187.	185.	183.
				TIME	3.67	3.67	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT											
+	CH58-4	.05	1	FLOW	27.	27.	26.	25.	24.	24.	24.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	LC22-6	.01	1	FLOW	10.	9.	9.	9.	9.	9.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO											
+	RLC22-6	.01	1	FLOW	9.	9.	8.	8.	8.	8.	8.
				TIME	3.67	3.67	3.67	3.67	3.75	3.75	3.75
2 COMBINED AT											
+	CCH58-4	.06	1	FLOW	36.	36.	34.	33.	32.	32.	32.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	LC22-1	.04	1	FLOW	32.	32.	30.	29.	29.	29.	29.
				TIME	3.58	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	RLC22-1	.04	1	FLOW	32.	31.	30.	29.	29.	29.	28.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH54-1	.03	1	FLOW	24.	24.	23.	22.	22.	21.	21.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT											
+	CCH54-1	.08	1	FLOW	56.	55.	53.	51.	51.	50.	50.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	RCCH54-1	.08	1	FLOW	54.	53.	52.	50.	49.	48.	48.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH54-2	.04	1	FLOW	26.	25.	24.	23.	23.	23.	22.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RCH54-2	.04	1	FLOW	25.	25.	24.	23.	23.	23.	22.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH54-3	.02	1	FLOW	15.	14.	14.	13.	13.	13.	13.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	CCH54-3	.13	1	FLOW	93.	92.	89.	85.	84.	83.	82.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	RCCH54-3	.13	1	FLOW	94.	92.	89.	86.	85.	84.	83.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT											
+	LC22-2	.02	1	FLOW	18.	17.	17.	16.	16.	16.	16.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RLC22-2	.02	1	FLOW	17.	16.	16.	15.	15.	15.	15.
				TIME	3.58	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH59-1	.02	1	FLOW	15.	15.	14.	14.	14.	13.	13.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	CCH59-1	.04	1	FLOW	32.	31.	30.	29.	29.	28.	28.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RCCH59-1	.04	1	FLOW	31.	31.	30.	29.	28.	28.	28.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH59-2	.03	1	FLOW	19.	19.	18.	18.	17.	17.	17.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58

```
  2 COMBINED AT
+               CCH59-2       .07     1   FLOW          50.      49.      47.      46.      45.      44.      44.
                                          TIME         3.67     3.67     3.67     3.67     3.67     3.67     3.67

 ROUTED TO
+               RCCH59-2      .07     1   FLOW          50.      49.      47.      45.      45.      44.      44.
                                          TIME         3.67     3.67     3.67     3.67     3.67     3.67     3.67

 HYDROGRAPH AT
+                CH59-3       .02     1   FLOW          14.      14.      13.      13.      13.      13.      12.
                                          TIME         3.58     3.58     3.58     3.58     3.58     3.58     3.58

  2 COMBINED AT
+               CCH59-3       .09     1   FLOW          63.      62.      59.      57.      56.      56.      55.
                                          TIME         3.58     3.58     3.58     3.67     3.67     3.67     3.67
1
                                        SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                            (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                                    INTERPOLATED TO
                                                                                 COMPUTATION INTERVAL
           ISTAQ    ELEMENT      DT       PEAK    TIME TO     VOLUME      DT       PEAK    TIME TO     VOLUME
                                                     PEAK                                     PEAK

                                (MIN)     (CFS)      (MIN)     (IN)     (MIN)     (CFS)     (MIN)       (IN)

          FOR PLAN = 1  RATIO=  .00
           RLC22-3  MANE         2.78     25.43    216.75      1.06      5.00     24.88    215.00        1.06


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1689E+01 EXCESS= .0000E+00 OUTFLOW= .1689E+01 BASIN STORAGE= .3537E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-3  MANE         2.79     25.02    217.75      1.04      5.00     24.69    215.00        1.04


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1658E+01 EXCESS= .0000E+00 OUTFLOW= .1658E+01 BASIN STORAGE= .3887E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-3  MANE         2.81     24.15    216.72      1.00      5.00     23.60    215.00        1.00


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1598E+01 EXCESS= .0000E+00 OUTFLOW= .1598E+01 BASIN STORAGE= .3658E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-3  MANE         2.84     23.24    215.86       .96      5.00     22.82    215.00         .96


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1539E+01 EXCESS= .0000E+00 OUTFLOW= .1539E+01 BASIN STORAGE= .3246E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-3  MANE         2.85     22.99    216.54       .95      5.00     22.44    215.00         .95


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1517E+01 EXCESS= .0000E+00 OUTFLOW= .1517E+01 BASIN STORAGE= .3901E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-3  MANE         2.86     22.79    217.08       .94      5.00     22.25    215.00         .94


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1501E+01 EXCESS= .0000E+00 OUTFLOW= .1501E+01 BASIN STORAGE= .3502E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-3  MANE         2.86     22.64    217.49       .93      5.00     22.17    215.00         .93


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1490E+01 EXCESS= .0000E+00 OUTFLOW= .1490E+01 BASIN STORAGE= .3152E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
          RCCH59-4  MANE         3.35     45.35    221.01      1.04      5.00     45.11    220.00        1.04


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3274E+01 EXCESS= .0000E+00 OUTFLOW= .3274E+01 BASIN STORAGE= .4642E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
          RCCH59-4  MANE         3.36     44.78    221.72      1.02      5.00     44.77    220.00        1.02
```

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3213E+01 EXCESS= .0000E+00 OUTFLOW= .3213E+01 BASIN STORAGE= .5627E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-4	MANE	3.39	43.00	220.58	.98	5.00	42.77	220.00	.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3095E+01 EXCESS= .0000E+00 OUTFLOW= .3095E+01 BASIN STORAGE= .5192E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-4	MANE	3.42	41.49	219.14	.95	5.00	41.38	220.00	.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2977E+01 EXCESS= .0000E+00 OUTFLOW= .2977E+01 BASIN STORAGE= .4984E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-4	MANE	3.44	40.92	219.98	.93	5.00	40.91	220.00	.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2938E+01 EXCESS= .0000E+00 OUTFLOW= .2939E+01 BASIN STORAGE= .5854E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-4	MANE	3.45	40.54	220.49	.92	5.00	40.33	220.00	.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2907E+01 EXCESS= .0000E+00 OUTFLOW= .2907E+01 BASIN STORAGE= .5365E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-4	MANE	3.45	40.31	220.80	.92	5.00	40.03	220.00	.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2883E+01 EXCESS= .0000E+00 OUTFLOW= .2884E+01 BASIN STORAGE= .5074E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-4	MANE	3.50	14.82	213.50	1.06	5.00	14.64	215.00	1.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9021E+00 EXCESS= .0000E+00 OUTFLOW= .9025E+00 BASIN STORAGE= .4258E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RLC22-4	MANE	3.50	14.54	213.50	1.04	5.00	14.37	215.00	1.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8846E+00 EXCESS= .0000E+00 OUTFLOW= .8850E+00 BASIN STORAGE= .4213E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RLC22-4	MANE	3.50	14.06	213.50	1.00	5.00	13.91	215.00	1.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8541E+00 EXCESS= .0000E+00 OUTFLOW= .8544E+00 BASIN STORAGE= .4132E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RLC22-4	MANE	3.50	13.54	213.50	.96	5.00	13.41	215.00	.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8214E+00 EXCESS= .0000E+00 OUTFLOW= .8217E+00 BASIN STORAGE= .4045E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RLC22-4	MANE	3.50	13.37	213.50	.95	5.00	13.25	215.00	.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8106E+00 EXCESS= .0000E+00 OUTFLOW= .8109E+00 BASIN STORAGE= .4016E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RLC22-4	MANE	3.50	13.23	213.50	.94	5.00	13.12	215.00	.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8019E+00 EXCESS= .0000E+00 OUTFLOW= .8022E+00 BASIN STORAGE= .3992E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RLC22-4	MANE	3.50	13.13	213.50	.93	5.00	13.02	215.00	.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7954E+00 EXCESS= .0000E+00 OUTFLOW= .7957E+00 BASIN STORAGE= .3974E-03 PERCENT ERROR= -
.1

FOR PLAN = 1 RATIO= .00

RCH59-7	MANE	3.80	26.27	216.42	1.05	5.00	25.80	220.00	1.05	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1733E+01 EXCESS= .0000E+00 OUTFLOW= .1733E+01 BASIN STORAGE= .4788E-03 PERCENT ERROR= -
.1

FOR PLAN = 1 RATIO= .00

RCH59-7	MANE	3.81	26.25	217.42	1.03	5.00	25.00	220.00	1.03	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1699E+01 EXCESS= .0000E+00 OUTFLOW= .1699E+01 BASIN STORAGE= .6013E-03 PERCENT ERROR= -
.1

FOR PLAN = 1 RATIO= .00

RCH59-7	MANE	3.85	25.42	219.22	.99	5.00	24.78	220.00	.99	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1641E+01 EXCESS= .0000E+00 OUTFLOW= .1642E+01 BASIN STORAGE= .6359E-03 PERCENT ERROR= -
.1

FOR PLAN = 1 RATIO= .00

RCH59-7	MANE	3.88	24.39	217.34	.95	5.00	23.36	220.00	.95	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1578E+01 EXCESS= .0000E+00 OUTFLOW= .1578E+01 BASIN STORAGE= .6462E-03 PERCENT ERROR= -
.1

FOR PLAN = 1 RATIO= .00

RCH59-7	MANE	3.89	24.32	218.02	.94	5.00	23.20	220.00	.94	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1558E+01 EXCESS= .0000E+00 OUTFLOW= .1559E+01 BASIN STORAGE= .5548E-03 PERCENT ERROR= -
.1

FOR PLAN = 1 RATIO= .00

RCH59-7	MANE	3.90	24.17	218.57	.93	5.00	23.23	220.00	.93	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1541E+01 EXCESS= .0000E+00 OUTFLOW= .1541E+01 BASIN STORAGE= .4876E-03 PERCENT ERROR= -
.1

FOR PLAN = 1 RATIO= .00

RCH59-7	MANE	3.91	24.00	218.99	.92	5.00	23.27	220.00	.93	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1528E+01 EXCESS= .0000E+00 OUTFLOW= .1529E+01 BASIN STORAGE= .4478E-03 PERCENT ERROR= -
.1

FOR PLAN = 1 RATIO= .00

RCCH59-8	MANE	2.47	41.50	219.91	1.04	5.00	41.41	220.00	1.04	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2820E+01 EXCESS= .0000E+00 OUTFLOW= .2821E+01 BASIN STORAGE= .3557E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCCH59-8	MANE	2.48	40.78	218.27	1.02	5.00	40.05	220.00	1.02	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2761E+01 EXCESS= .0000E+00 OUTFLOW= .2761E+01 BASIN STORAGE= .3940E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCCH59-8	MANE	2.50	39.52	217.62	.98	5.00	39.50	220.00	.98	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2670E+01 EXCESS= .0000E+00 OUTFLOW= .2670E+01 BASIN STORAGE= .3486E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCCH59-8	MANE	2.53	37.83	219.86	.94	5.00	37.70	220.00	.94	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2561E+01 EXCESS= .0000E+00 OUTFLOW= .2562E+01 BASIN STORAGE= .3852E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCCH59-8	MANE	2.53	37.56	217.81	.93	5.00	37.25	220.00	.93	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2530E+01 EXCESS= .0000E+00 OUTFLOW= .2530E+01 BASIN STORAGE= .3390E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-8	MANE	2.54	37.28	218.28	.92	5.00	36.77	220.00	.92	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2504E+01 EXCESS= .0000E+00 OUTFLOW= .2504E+01 BASIN STORAGE= .3079E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-8	MANE	2.54	37.06	218.69	.91	5.00	36.52	220.00	.91	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2485E+01 EXCESS= .0000E+00 OUTFLOW= .2485E+01 BASIN STORAGE= .3848E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-9	MANE	2.92	138.67	222.03	1.02	5.00	137.41	220.00	1.02	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1051E+02 EXCESS= .0000E+00 OUTFLOW= .1047E+02 BASIN STORAGE= .3845E-03 PERCENT ERROR= .4

FOR PLAN = 1 RATIO= .00

RCCH59-9	MANE	2.93	136.16	219.96	1.00	5.00	136.15	220.00	1.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1030E+02 EXCESS= .0000E+00 OUTFLOW= .1026E+02 BASIN STORAGE= .3146E-03 PERCENT ERROR= .4

FOR PLAN = 1 RATIO= .00

RCCH59-9	MANE	2.95	131.87	221.37	.96	5.00	130.11	220.00	.96	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9936E+01 EXCESS= .0000E+00 OUTFLOW= .9895E+01 BASIN STORAGE= .3222E-03 PERCENT ERROR= .4

FOR PLAN = 1 RATIO= .00

RCCH59-9	MANE	2.97	126.60	220.13	.92	5.00	126.26	220.00	.92	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9548E+01 EXCESS= .0000E+00 OUTFLOW= .9509E+01 BASIN STORAGE= .3074E-03 PERCENT ERROR= .4

FOR PLAN = 1 RATIO= .00

RCCH59-9	MANE	2.98	125.19	220.67	.91	5.00	123.88	220.00	.91	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9420E+01 EXCESS= .0000E+00 OUTFLOW= .9383E+01 BASIN STORAGE= .3787E-03 PERCENT ERROR= .4

FOR PLAN = 1 RATIO= .00

RCCH59-9	MANE	2.99	123.81	221.22	.90	5.00	122.12	220.00	.90	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9319E+01 EXCESS= .0000E+00 OUTFLOW= .9282E+01 BASIN STORAGE= .3388E-03 PERCENT ERROR= .4

FOR PLAN = 1 RATIO= .00

RCCH59-9	MANE	2.99	122.82	221.55	.89	5.00	121.04	220.00	.89	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9244E+01 EXCESS= .0000E+00 OUTFLOW= .9207E+01 BASIN STORAGE= .3140E-03 PERCENT ERROR= .4

FOR PLAN = 1 RATIO= .00

RLC22-5	MANE	3.04	20.73	218.55	1.06	5.00	20.28	215.00	1.06	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1408E+01 EXCESS= .0000E+00 OUTFLOW= .1408E+01 BASIN STORAGE= .3928E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-5	MANE	3.05	20.46	216.50	1.03	5.00	19.81	215.00	1.04	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1380E+01 EXCESS= .0000E+00 OUTFLOW= .1380E+01 BASIN STORAGE= .4399E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

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           RLC22-5  MANE         3.07     19.87    218.29      1.00      5.00     19.29    215.00        1.00


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1333E+01 EXCESS= .0000E+00 OUTFLOW= .1333E+01 BASIN STORAGE= .4252E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-5  MANE         3.10     19.17    217.19       .96      5.00     18.44    215.00         .96


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1282E+01 EXCESS= .0000E+00 OUTFLOW= .1282E+01 BASIN STORAGE= .3968E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-5  MANE         3.11     19.02    217.87       .95      5.00     18.32    215.00         .95


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1265E+01 EXCESS= .0000E+00 OUTFLOW= .1266E+01 BASIN STORAGE= .3429E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-5  MANE         3.12     18.70    218.42       .94      5.00     18.12    215.00         .94


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1252E+01 EXCESS= .0000E+00 OUTFLOW= .1252E+01 BASIN STORAGE= .4279E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-5  MANE         3.13     18.34    218.84       .93      5.00     17.91    215.00         .93


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1241E+01 EXCESS= .0000E+00 OUTFLOW= .1241E+01 BASIN STORAGE= .3966E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RCH58-1  MANE         3.34     37.69    220.41      1.03      5.00     37.53    220.00        1.03


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2689E+01 EXCESS= .0000E+00 OUTFLOW= .2689E+01 BASIN STORAGE= .4087E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RCH58-1  MANE         3.36     36.96    221.61      1.01      5.00     36.89    220.00        1.01


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2637E+01 EXCESS= .0000E+00 OUTFLOW= .2638E+01 BASIN STORAGE= .4501E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RCH58-1  MANE         3.38     35.82    219.92       .97      5.00     35.80    220.00         .97


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2545E+01 EXCESS= .0000E+00 OUTFLOW= .2545E+01 BASIN STORAGE= .4562E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RCH58-1  MANE         3.42     34.35    218.84       .94      5.00     34.32    220.00         .94


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2445E+01 EXCESS= .0000E+00 OUTFLOW= .2446E+01 BASIN STORAGE= .4107E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RCH58-1  MANE         3.43     34.04    219.37       .92      5.00     33.96    220.00         .92


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2412E+01 EXCESS= .0000E+00 OUTFLOW= .2413E+01 BASIN STORAGE= .5239E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RCH58-1  MANE         3.44     33.69    219.96       .91      5.00     33.69    220.00         .91


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2387E+01 EXCESS= .0000E+00 OUTFLOW= .2388E+01 BASIN STORAGE= .4690E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RCH58-1  MANE         3.45     33.31    220.52       .91      5.00     33.12    220.00         .91


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2366E+01 EXCESS= .0000E+00 OUTFLOW= .2367E+01 BASIN STORAGE= .4183E-03 PERCENT ERROR=
.0
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          FOR PLAN = 1  RATIO=  .00
          RCCH58-2  MANE         2.28     59.35    221.45      1.02      5.00     58.93    220.00        1.02


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .4412E+01 EXCESS= .0000E+00 OUTFLOW= .4412E+01 BASIN STORAGE= .3198E-03 PERCENT ERROR=
.0

          FOR PLAN = 1  RATIO=  .00
          RCCH58-2  MANE         2.29     58.53    222.45      1.00      5.00     58.16    220.00        1.00


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .4327E+01 EXCESS= .0000E+00 OUTFLOW= .4327E+01 BASIN STORAGE= .3261E-03 PERCENT ERROR=
.0

          FOR PLAN = 1  RATIO=  .00
          RCCH58-2  MANE         2.31     56.52    221.89       .97      5.00     56.16    220.00         .97


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .4175E+01 EXCESS= .0000E+00 OUTFLOW= .4175E+01 BASIN STORAGE= .3784E-03 PERCENT ERROR=
.0

          FOR PLAN = 1  RATIO=  .00
          RCCH58-2  MANE         2.33     54.26    221.82       .93      5.00     53.90    220.00         .93


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .4011E+01 EXCESS= .0000E+00 OUTFLOW= .4011E+01 BASIN STORAGE= .3914E-03 PERCENT ERROR=
.0

          FOR PLAN = 1  RATIO=  .00
          RCCH58-2  MANE         2.34     53.88    222.46       .92      5.00     53.32    220.00         .92


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3958E+01 EXCESS= .0000E+00 OUTFLOW= .3958E+01 BASIN STORAGE= .3366E-03 PERCENT ERROR=
.0

          FOR PLAN = 1  RATIO=  .00
          RCCH58-2  MANE         2.35     53.20    222.95       .91      5.00     52.49    220.00         .91


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3913E+01 EXCESS= .0000E+00 OUTFLOW= .3913E+01 BASIN STORAGE= .3957E-03 PERCENT ERROR=
.0

          FOR PLAN = 1  RATIO=  .00
          RCCH58-2  MANE         2.35     52.44    221.35       .90      5.00     51.84    220.00         .90


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3878E+01 EXCESS= .0000E+00 OUTFLOW= .3879E+01 BASIN STORAGE= .3447E-03 PERCENT ERROR=
.0

          FOR PLAN = 1  RATIO=  .00
          RCCH58-3  MANE         1.35    209.16    222.59      1.01      5.00    207.39    220.00        1.02


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1627E+02 EXCESS= .0000E+00 OUTFLOW= .1623E+02 BASIN STORAGE= .1593E-03 PERCENT ERROR=
.2

          FOR PLAN = 1  RATIO=  .00
          RCCH58-3  MANE         1.35    206.26    221.73       .99      5.00    203.93    220.00        1.00


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1596E+02 EXCESS= .0000E+00 OUTFLOW= .1592E+02 BASIN STORAGE= .1708E-03 PERCENT ERROR=
.2

          FOR PLAN = 1  RATIO=  .00
          RCCH58-3  MANE         1.36    198.59    222.22       .96      5.00    196.98    225.00         .96


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1538E+02 EXCESS= .0000E+00 OUTFLOW= .1535E+02 BASIN STORAGE= .1500E-03 PERCENT ERROR=
.2

          FOR PLAN = 1  RATIO=  .00
          RCCH58-3  MANE         1.37    191.50    222.35       .92      5.00    189.41    225.00         .92


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1478E+02 EXCESS= .0000E+00 OUTFLOW= .1475E+02 BASIN STORAGE= .1789E-03 PERCENT ERROR=
.2

          FOR PLAN = 1  RATIO=  .00
          RCCH58-3  MANE         1.38    188.82    221.70       .91      5.00    186.70    225.00         .91


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1459E+02 EXCESS= .0000E+00 OUTFLOW= .1456E+02 BASIN STORAGE= .1727E-03 PERCENT ERROR=
.2
```

FOR PLAN = 1 RATIO= .00
RCCH58-3 MANE 1.38 186.49 222.34 .90 5.00 185.25 225.00 .90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1443E+02 EXCESS= .0000E+00 OUTFLOW= .1439E+02 BASIN STORAGE= .1792E-03 PERCENT ERROR= .2

FOR PLAN = 1 RATIO= .00
RCCH58-3 MANE 1.38 184.83 222.77 .89 5.00 182.96 225.00 .89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1430E+02 EXCESS= .0000E+00 OUTFLOW= .1427E+02 BASIN STORAGE= .1619E-03 PERCENT ERROR= .2

FOR PLAN = 1 RATIO= .00
RLC22-6 MANE 3.50 9.22 220.50 1.06 5.00 9.01 220.00 1.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5639E+00 EXCESS= .0000E+00 OUTFLOW= .5676E+00 BASIN STORAGE= .4008E-02 PERCENT ERROR= -1.4

FOR PLAN = 1 RATIO= .00
RLC22-6 MANE 3.50 9.03 220.50 1.04 5.00 8.82 220.00 1.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5529E+00 EXCESS= .0000E+00 OUTFLOW= .5566E+00 BASIN STORAGE= .3985E-02 PERCENT ERROR= -1.4

FOR PLAN = 1 RATIO= .00
RLC22-6 MANE 3.50 8.70 220.50 1.01 5.00 8.49 220.00 1.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5338E+00 EXCESS= .0000E+00 OUTFLOW= .5373E+00 BASIN STORAGE= .3946E-02 PERCENT ERROR= -1.4

FOR PLAN = 1 RATIO= .00
RLC22-6 MANE 3.50 8.34 224.00 .97 5.00 8.13 220.00 .96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5134E+00 EXCESS= .0000E+00 OUTFLOW= .5167E+00 BASIN STORAGE= .3843E-02 PERCENT ERROR= -1.4

FOR PLAN = 1 RATIO= .00
RLC22-6 MANE 3.50 8.25 224.00 .96 5.00 8.01 225.00 .95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5066E+00 EXCESS= .0000E+00 OUTFLOW= .5098E+00 BASIN STORAGE= .3829E-02 PERCENT ERROR= -1.4

FOR PLAN = 1 RATIO= .00
RLC22-6 MANE 3.50 8.18 224.00 .95 5.00 7.94 225.00 .94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5012E+00 EXCESS= .0000E+00 OUTFLOW= .5044E+00 BASIN STORAGE= .3817E-02 PERCENT ERROR= -1.4

FOR PLAN = 1 RATIO= .00
RLC22-6 MANE 3.50 8.12 224.00 .94 5.00 7.89 225.00 .93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4971E+00 EXCESS= .0000E+00 OUTFLOW= .5003E+00 BASIN STORAGE= .3808E-02 PERCENT ERROR= -1.4

FOR PLAN = 1 RATIO= .00
RLC22-1 MANE 1.39 32.18 216.95 1.06 5.00 32.01 220.00 1.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2421E+01 EXCESS= .0000E+00 OUTFLOW= .2422E+01 BASIN STORAGE= .6229E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RLC22-1 MANE 1.40 31.61 217.18 1.04 5.00 31.48 220.00 1.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2374E+01 EXCESS= .0000E+00 OUTFLOW= .2375E+01 BASIN STORAGE= .6787E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RLC22-1 MANE 1.42 30.57 217.21 1.00 5.00 30.45 220.00 1.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2292E+01 EXCESS= .0000E+00 OUTFLOW= .2293E+01 BASIN STORAGE= .6817E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RLC22-1 MANE 1.44 29.48 217.52 .96 5.00 29.33 220.00 .96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2205E+01 EXCESS= .0000E+00 OUTFLOW= .2205E+01 BASIN STORAGE= .6606E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RLC22-1 MANE 1.45 29.07 217.16 .95 5.00 28.98 220.00 .95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2176E+01 EXCESS= .0000E+00 OUTFLOW= .2176E+01 BASIN STORAGE= .6208E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RLC22-1 MANE 1.45 28.83 218.04 .94 5.00 28.62 220.00 .94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2152E+01 EXCESS= .0000E+00 OUTFLOW= .2153E+01 BASIN STORAGE= .6840E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RLC22-1 MANE 1.46 28.56 217.25 .93 5.00 28.46 220.00 .93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2135E+01 EXCESS= .0000E+00 OUTFLOW= .2135E+01 BASIN STORAGE= .6166E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCCH54-1 MANE 2.57 54.56 220.88 1.02 5.00 54.18 220.00 1.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4212E+01 EXCESS= .0000E+00 OUTFLOW= .4200E+01 BASIN STORAGE= .2537E-03 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00
RCCH54-1 MANE 2.58 53.44 221.67 1.00 5.00 53.16 220.00 1.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4128E+01 EXCESS= .0000E+00 OUTFLOW= .4117E+01 BASIN STORAGE= .2765E-03 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00
RCCH54-1 MANE 2.59 51.82 220.58 .97 5.00 51.51 220.00 .97

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3984E+01 EXCESS= .0000E+00 OUTFLOW= .3973E+01 BASIN STORAGE= .2640E-03 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00
RCCH54-1 MANE 2.61 49.69 222.25 .93 5.00 49.66 220.00 .93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3831E+01 EXCESS= .0000E+00 OUTFLOW= .3820E+01 BASIN STORAGE= .2477E-03 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00
RCCH54-1 MANE 2.62 49.29 220.19 .92 5.00 49.16 220.00 .92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3780E+01 EXCESS= .0000E+00 OUTFLOW= .3770E+01 BASIN STORAGE= .2217E-03 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00
RCCH54-1 MANE 2.63 48.71 220.71 .91 5.00 48.37 220.00 .91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3736E+01 EXCESS= .0000E+00 OUTFLOW= .3726E+01 BASIN STORAGE= .2555E-03 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00
RCCH54-1 MANE 2.63 48.32 221.00 .90 5.00 47.91 220.00 .90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3704E+01 EXCESS= .0000E+00 OUTFLOW= .3694E+01 BASIN STORAGE= .2460E-03 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00
RCH54-2 MANE 3.22 25.37 218.91 .99 5.00 25.30 220.00 .99

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1856E+01 EXCESS= .0000E+00 OUTFLOW= .1856E+01 BASIN STORAGE= .4432E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCH54-2	MANE	3.24	24.93	219.98	.97	5.00	24.92	220.00	.97

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1819E+01 EXCESS= .0000E+00 OUTFLOW= .1819E+01 BASIN STORAGE= .3665E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCH54-2	MANE	3.26	24.03	218.66	.94	5.00	23.99	220.00	.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1753E+01 EXCESS= .0000E+00 OUTFLOW= .1754E+01 BASIN STORAGE= .4644E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCH54-2	MANE	3.30	23.17	220.81	.90	5.00	23.03	220.00	.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1683E+01 EXCESS= .0000E+00 OUTFLOW= .1684E+01 BASIN STORAGE= .4310E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCH54-2	MANE	3.31	22.88	221.55	.89	5.00	22.82	220.00	.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1661E+01 EXCESS= .0000E+00 OUTFLOW= .1661E+01 BASIN STORAGE= .3757E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCH54-2	MANE	3.32	22.57	218.84	.88	5.00	22.53	220.00	.88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1642E+01 EXCESS= .0000E+00 OUTFLOW= .1642E+01 BASIN STORAGE= .4566E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCH54-2	MANE	3.32	22.39	219.28	.87	5.00	22.34	220.00	.87

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1628E+01 EXCESS= .0000E+00 OUTFLOW= .1628E+01 BASIN STORAGE= .4249E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH54-3	MANE	5.00	93.51	225.00	1.01	5.00	93.51	225.00	1.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7071E+01 EXCESS= .0000E+00 OUTFLOW= .7074E+01 BASIN STORAGE= .8281E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCCH54-3	MANE	5.00	91.82	225.00	.99	5.00	91.82	225.00	.99

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6931E+01 EXCESS= .0000E+00 OUTFLOW= .6934E+01 BASIN STORAGE= .8135E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCCH54-3	MANE	5.00	88.90	225.00	.96	5.00	88.90	225.00	.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6687E+01 EXCESS= .0000E+00 OUTFLOW= .6690E+01 BASIN STORAGE= .8011E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCCH54-3	MANE	5.00	85.62	225.00	.92	5.00	85.62	225.00	.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6427E+01 EXCESS= .0000E+00 OUTFLOW= .6430E+01 BASIN STORAGE= .7944E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCCH54-3	MANE	5.00	84.85	225.00	.91	5.00	84.85	225.00	.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6343E+01 EXCESS= .0000E+00 OUTFLOW= .6345E+01 BASIN STORAGE= .7902E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCCH54-3	MANE	5.00	83.57	225.00	.90	5.00	83.57	225.00	.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6267E+01 EXCESS= .0000E+00 OUTFLOW= .6270E+01 BASIN STORAGE= .7803E-03 PERCENT ERROR= -
.1

FOR PLAN = 1 RATIO= .00

RCCH54-3	MANE	5.00	82.76	225.00	.89	5.00	82.76	225.00	.89	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6213E+01 EXCESS= .0000E+00 OUTFLOW= .6216E+01 BASIN STORAGE= .7854E-03 PERCENT ERROR= -
.1

FOR PLAN = 1 RATIO= .00

RLC22-2	MANE	2.76	17.18	218.39	1.06	5.00	16.65	215.00	1.05	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1182E+01 EXCESS= .0000E+00 OUTFLOW= .1182E+01 BASIN STORAGE= .3139E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RLC22-2	MANE	2.78	16.84	216.62	1.04	5.00	16.33	220.00	1.04	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1159E+01 EXCESS= .0000E+00 OUTFLOW= .1159E+01 BASIN STORAGE= .3424E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RLC22-2	MANE	2.80	16.31	218.42	1.00	5.00	15.81	220.00	1.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1120E+01 EXCESS= .0000E+00 OUTFLOW= .1120E+01 BASIN STORAGE= .3210E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RLC22-2	MANE	2.83	15.89	217.60	.96	5.00	15.38	220.00	.96	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1077E+01 EXCESS= .0000E+00 OUTFLOW= .1077E+01 BASIN STORAGE= .2849E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RLC22-2	MANE	2.83	15.59	218.29	.95	5.00	15.10	220.00	.95	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1063E+01 EXCESS= .0000E+00 OUTFLOW= .1063E+01 BASIN STORAGE= .3372E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RLC22-2	MANE	2.84	15.29	218.84	.94	5.00	14.89	220.00	.94	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1051E+01 EXCESS= .0000E+00 OUTFLOW= .1051E+01 BASIN STORAGE= .2999E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RLC22-2	MANE	2.85	15.18	216.41	.93	5.00	14.79	220.00	.93	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1042E+01 EXCESS= .0000E+00 OUTFLOW= .1042E+01 BASIN STORAGE= .3691E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCCH59-1	MANE	1.24	31.58	217.69	1.02	5.00	31.13	220.00	1.03	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2241E+01 EXCESS= .0000E+00 OUTFLOW= .2241E+01 BASIN STORAGE= .1003E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCCH59-1	MANE	1.24	30.99	217.40	1.01	5.00	30.55	220.00	1.01	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2199E+01 EXCESS= .0000E+00 OUTFLOW= .2198E+01 BASIN STORAGE= .1055E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCCH59-1	MANE	1.25	30.01	217.54	.97	5.00	29.59	220.00	.97	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2121E+01 EXCESS= .0000E+00 OUTFLOW= .2121E+01 BASIN STORAGE= .1038E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCCH59-1	MANE	1.26	28.85	217.91	.93	5.00	28.54	220.00	.93	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2040E+01 EXCESS= .0000E+00 OUTFLOW= .2039E+01 BASIN STORAGE= .9628E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-1	MANE	1.26	28.52	217.25	.92	5.00	28.13	220.00	.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2012E+01 EXCESS= .0000E+00 OUTFLOW= .2011E+01 BASIN STORAGE= .9651E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-1	MANE	1.27	28.11	217.81	.91	5.00	27.76	220.00	.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1988E+01 EXCESS= .0000E+00 OUTFLOW= .1988E+01 BASIN STORAGE= .9840E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-1	MANE	1.27	27.87	216.94	.90	5.00	27.53	220.00	.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1972E+01 EXCESS= .0000E+00 OUTFLOW= .1971E+01 BASIN STORAGE= .1032E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-2	MANE	.51	49.74	219.81	1.01	5.00	49.71	220.00	1.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3622E+01 EXCESS= .0000E+00 OUTFLOW= .3621E+01 BASIN STORAGE= .4490E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-2	MANE	.51	48.79	219.62	.99	5.00	48.78	220.00	.99

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3551E+01 EXCESS= .0000E+00 OUTFLOW= .3551E+01 BASIN STORAGE= .4386E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-2	MANE	.51	47.22	220.05	.96	5.00	47.22	220.00	.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3425E+01 EXCESS= .0000E+00 OUTFLOW= .3425E+01 BASIN STORAGE= .4252E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-2	MANE	.52	45.49	220.13	.92	5.00	45.48	220.00	.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3291E+01 EXCESS= .0000E+00 OUTFLOW= .3291E+01 BASIN STORAGE= .4183E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-2	MANE	.52	44.86	219.70	.91	5.00	44.85	220.00	.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3246E+01 EXCESS= .0000E+00 OUTFLOW= .3246E+01 BASIN STORAGE= .4400E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-2	MANE	.52	44.32	219.72	.90	5.00	44.31	220.00	.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3209E+01 EXCESS= .0000E+00 OUTFLOW= .3209E+01 BASIN STORAGE= .4400E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-2	MANE	.52	43.96	220.08	.89	5.00	43.96	220.00	.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3182E+01 EXCESS= .0000E+00 OUTFLOW= .3182E+01 BASIN STORAGE= .4272E-04 PERCENT ERROR= .0

*** NORMAL END OF HEC-1 ***

B.3.2

Existing/Proposed Condition 100-Year

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1****************************************
****************************************
 *                                      *                                                *
*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                                *    U.S. ARMY CORPS OF ENGINEERS
*
 *               JUN   1998             *                                                *    HYDROLOGIC ENGINEERING CENTER
*
 *            VERSION 4.1               *                                                *          609 SECOND STREET
*
 *                                      *                                                *       DAVIS, CALIFORNIA 95616
*
 *  RUN DATE   07OCT15  TIME  15:43:46  *                                                *           (916) 756-1104
*
 *                                      *                                                *
*
 ****************************************
****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                        *DIAGRAM
 *** FREE ***
             1          ID  ********************************************************************************
             2          ID
             3          ID    TECHNICAL DRAINAGE STUDY FOR LAS VEGAS BLVD.
             4          ID    CHARLESTON TO STEWART
             5          ID
             6          ID  ================================================================================
             7          ID
             8          ID    DEVELOPED CONDITION
             9          ID    100-YEAR EVENT
            10          ID    NORTH OF CHARLESTON
            11          ID
            12          ID  ********************************************************************************
            13          ID    PREPARED BY:  VTN NEVADA
            14          ID    DATE:  10/2015
            15          ID    FILE: LVB_N_100.DAT
            16          ID    WO# 7517-1
            17          ID    BY: WJM
            18          ID  ================================================================================
            19          ID           10-YR STORM
            20          ID    STORM DISTRIBUTION: SDN3
            21          ID    IN MCCARRAN AIRPORT RAINFALL AREA
            22          ID
            23          ID
            24          ID  ****************************************
            25          ID  JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
            26          ID
            27          ID  JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
            28          ID
            29          ID        CONCENTRATION   AREA    DARF
            30          ID        POINT           SQ. MI.
            31          ID                        0-0.5   0.99
            32          ID                        0.5-1   0.975
            33          ID                        1-2     0.95
            34          ID                        2-3     0.925
            35          ID                        3-4     0.915
            36          ID                        4-5     0.908
            37          ID                        5-6     0.903
            38          ID                        6-7     0.895
            39          ID                        7-8     0.885
            40          ID
            41          ID
            42          ID  JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
            43          ID  10-YEAR,  6-HOUR STORM,  SDN3
            44          ID
            45          IT       5       0       0     300
            46          IO       5       0       0
```

```
   47          IN       5       0       0
   48          JR    PREC    0.99   0.975    0.95   0.925   0.915   0.908   0.903
               *
1                                       HEC-1 INPUT                                                 PAGE  2

 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   49          KK  LC22-3
   50          BA   0.030
   51          PB    2.77
   52          PC   0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   53          PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   54          PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   55          PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   56          PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   57          PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   58          PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   59          PC   0.997   0.999   1.000
   60          LS       0    94.8
   61          UD   0.143
               *
   62          KK RLC22-3
   63          KM  ROUTE LC22-6 TO CCH59-5
   64          KM  BRIDGER
   65          RD     495   0.006   0.016       0    TRAP       0      50
               *
   66          KK  CH59-4
   67          BA   0.029
   68          LS       0    94.4
   69          UD   0.217
               *
   70          KK CCH59-4
   71          KM   COMBINE LC22-6 WITH CH59-4
   72          HC       2
               *
   73          KKRCCH59-4
   74          KM  ROUTE CH59-4 TO CCH59-5
   75          KM  BRIDGER
   76          RD     760  0.0079   0.016       0    TRAP       0      50
               *
   77          KK  CH59-5
   78          BA   0.039
   79          LS       0    94.1
   80          UD   0.227
               *
   81          KK CCH59-5
   82          KM  COMBINE CH59-5 AND RCH59-4
   83          KM  FOURTH AND BRIDGER
   84          HC       2
               *
1                                       HEC-1 INPUT                                                 PAGE  3

 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   85          KK  CH59-6
   86          BA   0.029
   87          LS       0    94.0
   88          UD   0.217
               *
   89          KK CCH59-6
   90          KM  COMBINE CCH59-5 AND CH59-6
   91          KM  LAS VEGAS BOULEVARD AND BRIDGER
   92          HC       2
               *
   93          KK  LC22-4
   94          BA   0.016
   95          LS       0    94.8
   96          UD   0.094
               *
   97          KK RLC22-4
   98          KM  ROUTE LC22-4 TO CCH59-7
   99          KM  BRIDGER
  100          RD     525   0.004   0.016       0    TRAP       0      50
               *
  101          KK  CH59-7
  102          BA   0.015
  103          LS       0    94.6
  104          UD   0.143
               *
  105          KK CCH59-7
  106          KM   COMBINE LC22-4 WITH CH59-7
  107          HC       2
```

```
                *

 108            KK RCH59-7
 109            KM  ROUTE CH59-4 TO CCH59-5
 110            KM  BRIDGER
 111            RD     760  0.0079   0.016       0    TRAP       0      50
                *

 112            KK  CH59-8
 113            BA   0.020
 114            LS       0    94.3
 115            UD   0.152
                *

 116            KK CCH59-8
 117            KM  COMBINE CH59-8 AND RCH59-7
 118            KM  FOURTH AND CARSON
 119            HC       2
                *
1                                       HEC-1 INPUT                                                PAGE  4

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 120            KKRCCH59-8
 121            KM  ROUTE CCH59-8 TO CCH59-9
 122            KM  CARSON
 123            RD     600    0.01   0.016       0    TRAP       0      50
                *

 124            KK  CH59-9
 125            BA   0.015
 126            LS       0    94.0
 127            UD   0.130
                *

 128            KK CCH59-9
 129            KM  COMBINE CH59-9, CCH59-6, AND RCCH59-8
 130            KM  NEAR LV BOULEVARD AND CARSON
 131            HC       3
                *

 132            KKRCCH59-9
 133            KM  ROUTE DCH59 TO CCH58 IN LV BLVD DRAIN
 134            KM  LINING = RCP
 135            RD    1400   0.002   0.013       0    CIRC       4
                *

 136            KK  LC22-5
 137            BA   0.025
 138            LS       0    94.8
 139            UD   0.151
                *

 140            KK RLC22-5
 141            KM  ROUTE CH59-4 TO CCH59-5
 142            KM  STEWART
 143            RD     481   0.005   0.016       0    TRAP       0      50
                *

 144            KK  CH58-1
 145            BA   0.024
 146            LS       0    94.1
 147            UD   0.202
                *

 148            KK CCH58-1
 149            KM   CONMINE LC22-5 WITH CH58-1
 150            HC       2
                *

 151            KK RCH58-1
 152            KM  ROUTE CH59-4 TO CCH59-5
 153            KM  STEWART
 154            RD     760   0.009   0.016       0    TRAP       0      50
                *
1                                       HEC-1 INPUT                                                PAGE  5

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 155            KK  CH58-2
 156            BA   0.032
 157            LS       0    94.2
 158            UD   0.213
                *

 159            KK CCH58-2
 160            KM  COMBINE CH58-2 AND RCH58-1
 161            KM  FOURTH AND STEWART
 162            HC       2
                *

 163            KKRCCH58-2
 164            KM  ROUTE CCH58-2 TO CCH59-3
```

```
 165          KM  STEWART
 166          RD     630   0.011   0.016       0    TRAP       0      50
              *

 167          KK  CH58-3
 168          BA   0.026
 169          LS       0    94.1
 170          UD   0.208
              *

 171          KK CCH58-3
 172          KM  COMBINE CH58-3, RCCH59-3, AND RCCH58-2
 173          KM  NEAR LV BOULEVARD AND STEWART
 174          HC       3
              *

 175          KKRCCH58-3
 176          KM  ROUTE DDCH58 TO CW
 177          KM  LINING = RCP
 178          RD     700   0.002   0.013       0    CIRC       4
              *

 179          KK  CH58-4
 180          BA   0.046
 181          LS       0    91.9
 182          UD   0.244
              *

 183          KK  LC22-6
 184          KM   MODEIFIED SUBBASIN LC22 FROM NORTH NIEGHBORHOOD STUDY
 185          BA    0.01
 186          LS       0    94.8
 187          UD   0.093
              *
1                                      HEC-1 INPUT                                          PAGE  6

            LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 188          KK RLC22-6
 189          KM  ROUTE LC22-6 TO CCH58-4
 190          KM  CIVIC CENTER
 191          RD    1638   0.005   0.016       0    TRAP      50       0
              *

 192          KK CCH58-4
 193          KM  COMBINE CH58-4 AND RCCH58-3
 194          KM  NEAR LV BOULEVARD AND STEWART
 195          HC       2
              *

 196          KK  LC22-1
 197          KM   MODIFIED SUBBASIN FROM CENTRAL NEIGHBORHOOD STDY
 198          BA   0.043
 199          LS       0    94.8
 200          UD   0.210
              *

 201          KK RLC22-1
 202          KM  ROUTE LC22-1 TO CCH54-1
 203          KM  CIVIC CENTER
 204          RD     524   0.008   0.016       0    TRAP      14       0
              *

 205          KK  CH54-1
 206          BA   0.034
 207          LS       0    93.9
 208          UD   0.214
              *

 209          KK CCH54-1
 210          KM   COMBINE CH51-1 AND LC22-1
 211          HC       2
              *

 212          KKRCCH54-1
 213          KM  ROUTE CH54-1 TO CCH54-2
 214          KM  CIVIC CENTER
 215          RD     980   0.002   0.013       0    CIRC       3
              *

 216          KK  CH54-2
 217          BA   0.035
 218          LS       0    94.0
 219          UD   0.201
              *

 220          KK RCH54-2
 221          KM  ROUTE CH54-2 TO CCH54-3
 222          KM  GASS
 223          RD     550 0.00545   0.016       0    TRAP       0      50
              *
1                                      HEC-1 INPUT                                          PAGE  7

            LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
             224          KK  CH54-3
             225          BA   0.019
             226          LS       0    94.1
             227          UD   0.180
                          *

             228          KK CCH54-3
             229          KM  COMBINE CH54-3 AND RCH54-2
             230          KM  CHARLESTON AND GASS
             231          HC       3
                          *

             232          KKRCCH54-3
             233          KM  ROUTE CH54-3 TO CCH54-3
             234          KM  GASS
             235          RD    1550   0.011   0.016       0    TRAP       0      50
                          *

             236          KK  LC22-2
             237          BA   0.021
             238          LS       0    94.8
             239          UD   0.162
                          *

             240          KK RLC22-2
             241          KM   ROURE LC22-2 TO CCH59-1
             242          KM  BONNEVILLE
             243          RD     497   0.007   0.015       0    TRAP       0      50
                          *

             244          KK  CH59-1
             245          BA   0.020
             246          LS       0    94.0
             247          UD   0.190
                          *

             248          KK CCH59-1
             249          KM  COMBINE CH59-1 AND RCCH54-1
             250          KM  CIVIC CENTER AND BONNEVILLE
             251          HC       2
                          *

             252          KKRCCH59-1
             253          KM  ROUTE CCH59-1 TO CCH59-2
             254          KM  BONNEVILLE
             255          RD     760  0.0093   0.013       0    CIRC     2.5
                          *

             256          KK  CH59-2
             257          BA   0.026
             258          LS       0    94.0
             259          UD   0.196
                          *
1                                                HEC-1 INPUT                                                PAGE  8

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


             260          KK CCH59-2
             261          KM  COMBINE CH59-2 AND RCCH59-1
             262          KM  FOURTH AND BONNEVILLE
             263          HC       2
                          *

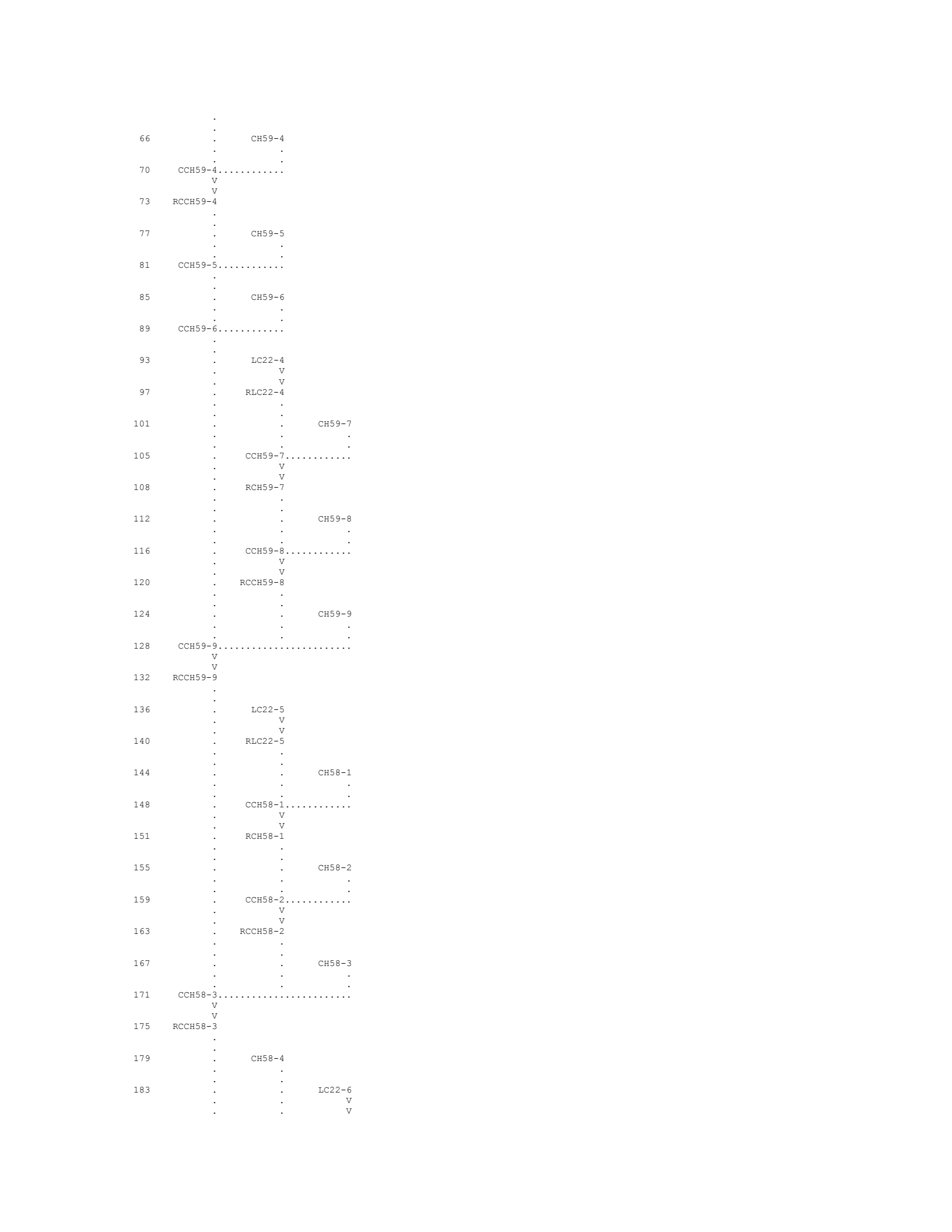
             264          KKRCCH59-2
             265          KM  ROUTE CCH59-2 TO CCH59-3
             266          KM  BONNEVILLE
             267          RD     400   0.013   0.013       0    CIRC       3
                          *

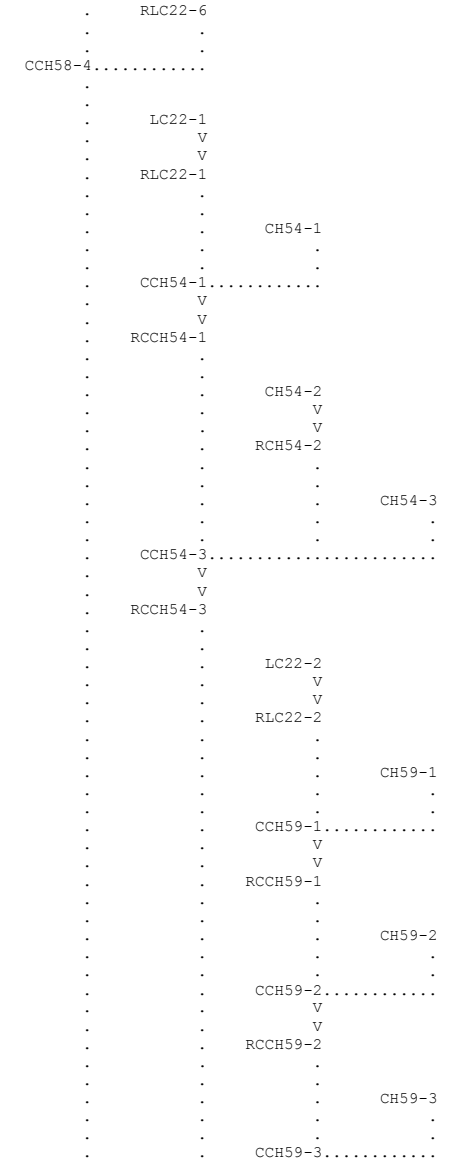
             268          KK  CH59-3
             269          BA   0.019
             270          LS       0    93.1
             271          UD   0.171
                          *

             272          KK CCH59-3
             273          KM  COMBINE CH59-3 AND CCH59-2
             274          KM  LAS VEGAS BOULEVARD AND BONNEVILLE
             275          HC       2
                          *
             276          ZZ
1
                  SCHEMATIC DIAGRAM OF STREAM NETWORK
  INPUT
   LINE      (V) ROUTING          (---->) DIVERSION OR PUMP FLOW

    NO.      (.) CONNECTOR        (<----) RETURN OF DIVERTED OR PUMPED FLOW

      49      LC22-3
                   V
                   V
      62     RLC22-3
```


66 CH59-4
70 CCH59-4
73 RCCH59-4
77 CH59-5
81 CCH59-5
85 CH59-6
89 CCH59-6
93 LC22-4
97 RLC22-4
101 CH59-7
105 CCH59-7
108 RCH59-7
112 CH59-8
116 CCH59-8
120 RCCH59-8
124 CH59-9
128 CCH59-9
132 RCCH59-9
136 LC22-5
140 RLC22-5
144 CH58-1
148 CCH58-1
151 RCH58-1
155 CH58-2
159 CCH58-2
163 RCCH58-2
167 CH58-3
171 CCH58-3
175 RCCH58-3
179 CH58-4
183 LC22-6



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********

****

* * *

* FLOOD HYDROGRAPH PACKAGE (HEC-1) * * U.S. ARMY CORPS OF ENGINEERS

* JUN 1998 * * HYDROLOGIC ENGINEERING CENTER

* VERSION 4.1 * * 609 SECOND STREET

* * * DAVIS, CALIFORNIA 95616

* RUN DATE 07OCT15 TIME 15:43:46 * * (916) 756-1104

* * *

****

****

TECHNICAL DRAINAGE STUDY FOR LAS VEGAS BLVD.
CHARLESTON TO STEWART

==========

```
  DEVELOPED CONDITION
  100-YEAR EVENT
  NORTH OF CHARLESTON

*******************************************************************************
  PREPARED BY:  VTN NEVADA
  DATE:  10/2015
  FILE: LVB_N_100.DAT
  WO# 7517-1
  BY: WJM
===============================================================================
   10-YR STORM
  STORM DISTRIBUTION: SDN3
  IN MCCARRAN AIRPORT RAINFALL AREA


****************************************
JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)

JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:

      CONCENTRATION   AREA    DARF
      POINT           SQ. MI.
                      0-0.5   0.99
                      0.5-1   0.975
                      1-2     0.95
                      2-3     0.925
                      3-4     0.915
                      4-5     0.908
                      5-6     0.903
                      6-7     0.895
                      7-8     0.885


JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
10-YEAR,  6-HOUR STORM,  SDN3


   46 IO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                        NMIN          5  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1    0  STARTING DATE
                       ITIME        0000  STARTING TIME
                          NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      2    0  ENDING DATE
                      NDTIME        0055  ENDING TIME
                      ICENT           19  CENTURY MARK

                  COMPUTATION INTERVAL     .08 HOURS
                       TOTAL TIME BASE   24.92 HOURS

           ENGLISH UNITS
                DRAINAGE AREA         SQUARE MILES
                PRECIPITATION DEPTH   INCHES
                LENGTH, ELEVATION     FEET
                FLOW                  CUBIC FEET PER SECOND
                STORAGE VOLUME        ACRE-FEET
                SURFACE AREA          ACRES
                TEMPERATURE           DEGREES FAHRENHEIT

      JP          MULTI-PLAN OPTION
                        NPLAN          1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                      RATIOS OF PRECIPITATION
                      .99       .98       .95       .93       .92       .91       .90
1

               PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                                FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                          TIME TO PEAK IN HOURS


                                                                                RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN            RATIO 1  RATIO 2  RATIO 3  RATIO 4  RATIO 5  RATIO 6  RATIO 7
                                                        .99      .98      .95      .93      .92      .91      .90

 HYDROGRAPH AT
+                LC22-3       .03     1   FLOW          51.      50.      49.      47.      47.      46.      46.
                                         TIME         3.58     3.58     3.58     3.58     3.58     3.58     3.58

 ROUTED TO
+                RLC22-3      .03     1   FLOW          49.      49.      47.      46.      45.      45.      45.
                                         TIME         3.58     3.58     3.58     3.58     3.58     3.58     3.58

 HYDROGRAPH AT
+                CH59-4       .03     1   FLOW          42.      41.      40.      39.      38.      38.      38.
                                         TIME         3.67     3.67     3.67     3.67     3.67     3.67     3.67

  2 COMBINED AT
```

+	CCH59-4	.06	1	FLOW	91.	90.	87.	84.	83.	82.	82.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RCCH59-4	.06	1	FLOW	90.	89.	85.	83.	81.	81.	81.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH59-5	.04	1	FLOW	55.	54.	53.	51.	50.	50.	50.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT											
+	CCH59-5	.10	1	FLOW	145.	143.	138.	134.	132.	131.	131.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH59-6	.03	1	FLOW	41.	41.	39.	38.	38.	37.	37.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT											
+	CCH59-6	.13	1	FLOW	186.	184.	177.	172.	170.	168.	168.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	LC22-4	.02	1	FLOW	30.	29.	29.	28.	27.	27.	27.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO											
+	RLC22-4	.02	1	FLOW	29.	28.	27.	26.	26.	26.	26.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	CH59-7	.01	1	FLOW	25.	25.	24.	24.	23.	23.	23.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	CCH59-7	.03	1	FLOW	54.	53.	51.	50.	49.	49.	49.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RCH59-7	.03	1	FLOW	52.	51.	49.	47.	47.	46.	46.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	CH59-8	.02	1	FLOW	33.	33.	32.	31.	30.	30.	30.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	CCH59-8	.05	1	FLOW	85.	83.	81.	78.	77.	76.	76.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RCCH59-8	.05	1	FLOW	81.	79.	76.	74.	73.	73.	72.
				TIME	3.58	3.58	3.58	3.67	3.58	3.58	3.67
HYDROGRAPH AT											
+	CH59-9	.01	1	FLOW	25.	25.	24.	23.	23.	23.	23.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	CCH59-9	.19	1	FLOW	286.	281.	272.	265.	260.	258.	257.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	RCCH59-9	.19	1	FLOW	276.	274.	262.	258.	251.	249.	247.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	LC22-5	.03	1	FLOW	42.	41.	40.	39.	39.	38.	38.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RLC22-5	.03	1	FLOW	41.	40.	39.	37.	37.	37.	36.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	CH58-1	.02	1	FLOW	36.	35.	34.	33.	32.	32.	32.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	CCH58-1	.05	1	FLOW	76.	75.	73.	70.	70.	69.	68.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RCH58-1	.05	1	FLOW	75.	74.	71.	70.	69.	68.	67.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH58-2	.03	1	FLOW	46.	45.	44.	43.	42.	42.	41.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	CCH58-2	.08	1	FLOW	121.	119.	115.	112.	111.	109.	108.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67

ROUTED TO											
+	RCCH58-2	.08	1	FLOW	119.	117.	114.	110.	109.	108.	107.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH58-3	.03	1	FLOW	38.	37.	36.	35.	35.	34.	34.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	CCH58-3	.30	1	FLOW	432.	428.	412.	403.	395.	390.	388.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	RCCH58-3	.30	1	FLOW	419.	416.	399.	392.	384.	378.	376.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH58-4	.05	1	FLOW	60.	58.	57.	55.	54.	53.	53.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	LC22-6	.01	1	FLOW	19.	18.	18.	17.	17.	17.	17.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO											
+	RLC22-6	.01	1	FLOW	18.	17.	17.	17.	16.	16.	16.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT											
+	CCH58-4	.06	1	FLOW	78.	76.	73.	71.	70.	70.	69.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	LC22-1	.04	1	FLOW	64.	63.	61.	59.	58.	58.	57.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RLC22-1	.04	1	FLOW	63.	62.	60.	58.	58.	57.	57.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH54-1	.03	1	FLOW	48.	48.	46.	45.	44.	44.	43.
				TIME	3.58	3.58	3.58	3.67	3.67	3.67	3.67
2 COMBINED AT											
+	CCH54-1	.08	1	FLOW	111.	110.	106.	103.	102.	101.	100.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	RCCH54-1	.08	1	FLOW	109.	107.	103.	100.	99.	98.	98.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH54-2	.04	1	FLOW	52.	51.	50.	48.	47.	47.	47.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RCH54-2	.04	1	FLOW	51.	50.	49.	48.	47.	46.	46.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	CH54-3	.02	1	FLOW	30.	29.	28.	28.	27.	27.	27.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	CCH54-3	.13	1	FLOW	187.	184.	178.	173.	171.	169.	168.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	RCCH54-3	.13	1	FLOW	184.	180.	172.	170.	166.	164.	162.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT											
+	LC22-2	.02	1	FLOW	35.	34.	33.	32.	32.	32.	31.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RLC22-2	.02	1	FLOW	33.	33.	32.	31.	31.	30.	30.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	CH59-1	.02	1	FLOW	31.	30.	29.	28.	28.	28.	27.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	CCH59-1	.04	1	FLOW	64.	63.	61.	59.	58.	58.	57.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	RCCH59-1	.04	1	FLOW	62.	61.	59.	57.	56.	56.	55.
				TIME	3.58	3.58	3.58	3.58	3.67	3.58	3.67
HYDROGRAPH AT											
+	CH59-2	.03	1	FLOW	39.	38.	37.	36.	36.	35.	35.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58

```
  2 COMBINED AT
+               CCH59-2       .07     1   FLOW         101.      99.      96.      93.      92.      91.      90.
                                          TIME         3.58     3.58     3.58     3.58     3.58     3.58     3.58

 ROUTED TO
+               RCCH59-2      .07     1   FLOW         100.      98.      95.      92.      91.      90.      89.
                                          TIME         3.58     3.58     3.58     3.58     3.58     3.58     3.58

 HYDROGRAPH AT
+                CH59-3       .02     1   FLOW          29.      29.      28.      27.      27.      26.      26.
                                          TIME         3.58     3.58     3.58     3.58     3.58     3.58     3.58

  2 COMBINED AT
+               CCH59-3       .09     1   FLOW         129.     127.     123.     119.     117.     116.     115.
                                          TIME         3.58     3.58     3.58     3.58     3.58     3.58     3.58
1
                                      SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                          (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                                  INTERPOLATED TO
                                                                                COMPUTATION INTERVAL
           ISTAQ    ELEMENT      DT       PEAK    TIME TO     VOLUME      DT       PEAK    TIME TO     VOLUME
                                                     PEAK                                             PEAK

                                (MIN)     (CFS)      (MIN)     (IN)     (MIN)     (CFS)     (MIN)       (IN)

          FOR PLAN = 1  RATIO=  .00
           RLC22-3  MANE         2.35     49.91    216.09      2.18      5.00     49.43    215.00        2.18


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3488E+01 EXCESS= .0000E+00 OUTFLOW= .3488E+01 BASIN STORAGE= .3877E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-3  MANE         2.36     49.01    217.02      2.14      5.00     48.95    215.00        2.14


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3427E+01 EXCESS= .0000E+00 OUTFLOW= .3428E+01 BASIN STORAGE= .3124E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-3  MANE         2.38     47.62    216.25      2.07      5.00     47.15    215.00        2.07


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3317E+01 EXCESS= .0000E+00 OUTFLOW= .3317E+01 BASIN STORAGE= .3822E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-3  MANE         2.39     46.22    215.50      2.01      5.00     45.87    215.00        2.01


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3211E+01 EXCESS= .0000E+00 OUTFLOW= .3211E+01 BASIN STORAGE= .3475E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-3  MANE         2.40     45.62    216.18      1.98      5.00     45.13    215.00        1.97


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3166E+01 EXCESS= .0000E+00 OUTFLOW= .3166E+01 BASIN STORAGE= .3991E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-3  MANE         2.41     45.21    216.65      1.96      5.00     44.83    215.00        1.96


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3136E+01 EXCESS= .0000E+00 OUTFLOW= .3136E+01 BASIN STORAGE= .3553E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-3  MANE         2.41     44.91    216.99      1.95      5.00     44.72    215.00        1.95


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3117E+01 EXCESS= .0000E+00 OUTFLOW= .3117E+01 BASIN STORAGE= .3273E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
          RCCH59-4  MANE         2.82     90.12    219.60      2.16      5.00     89.57    220.00        2.16


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .6794E+01 EXCESS= .0000E+00 OUTFLOW= .6795E+01 BASIN STORAGE= .5453E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
          RCCH59-4  MANE         2.82     88.77    220.34      2.12      5.00     88.74    220.00        2.12
```

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6681E+01 EXCESS= .0000E+00 OUTFLOW= .6682E+01 BASIN STORAGE= .4618E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-4	MANE	2.85	85.91	219.39	2.05	5.00	85.26	220.00	2.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6459E+01 EXCESS= .0000E+00 OUTFLOW= .6459E+01 BASIN STORAGE= .5685E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-4	MANE	2.87	83.58	218.13	1.99	5.00	83.15	220.00	1.99

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6259E+01 EXCESS= .0000E+00 OUTFLOW= .6260E+01 BASIN STORAGE= .5503E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-4	MANE	2.88	82.18	218.93	1.96	5.00	81.48	220.00	1.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6163E+01 EXCESS= .0000E+00 OUTFLOW= .6164E+01 BASIN STORAGE= .4650E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-4	MANE	2.89	81.59	219.36	1.94	5.00	80.99	220.00	1.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6104E+01 EXCESS= .0000E+00 OUTFLOW= .6105E+01 BASIN STORAGE= .4268E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-4	MANE	2.89	81.28	219.60	1.93	5.00	80.84	220.00	1.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6069E+01 EXCESS= .0000E+00 OUTFLOW= .6069E+01 BASIN STORAGE= .5473E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-4	MANE	3.00	29.23	213.00	2.18	5.00	28.60	215.00	2.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1863E+01 EXCESS= .0000E+00 OUTFLOW= .1864E+01 BASIN STORAGE= .4297E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-4	MANE	3.00	28.72	213.00	2.14	5.00	28.12	215.00	2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1829E+01 EXCESS= .0000E+00 OUTFLOW= .1829E+01 BASIN STORAGE= .4250E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-4	MANE	3.25	27.52	214.50	2.07	5.00	27.16	215.00	2.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1769E+01 EXCESS= .0000E+00 OUTFLOW= .1769E+01 BASIN STORAGE= .4558E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-4	MANE	3.38	26.92	213.07	2.01	5.00	26.25	215.00	2.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1712E+01 EXCESS= .0000E+00 OUTFLOW= .1713E+01 BASIN STORAGE= .5540E-03 PERCENT ERROR= - .1

FOR PLAN = 1 RATIO= .00

RLC22-4	MANE	3.39	26.71	213.73	1.98	5.00	26.03	215.00	1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1690E+01 EXCESS= .0000E+00 OUTFLOW= .1690E+01 BASIN STORAGE= .4560E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-4	MANE	3.40	26.30	214.20	1.96	5.00	25.80	215.00	1.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1673E+01 EXCESS= .0000E+00 OUTFLOW= .1674E+01 BASIN STORAGE= .4100E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-4	MANE	3.41	26.00	214.55	1.95	5.00	25.69	215.00	1.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1662E+01 EXCESS= .0000E+00 OUTFLOW= .1662E+01 BASIN STORAGE= .6051E-03 PERCENT ERROR= -
.1

FOR PLAN = 1 RATIO= .00

RCH59-7	MANE	3.21	52.87	218.15	2.17	5.00	52.02	215.00	2.17

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3591E+01 EXCESS= .0000E+00 OUTFLOW= .3591E+01 BASIN STORAGE= .6402E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCH59-7	MANE	3.22	51.73	215.87	2.13	5.00	50.75	215.00	2.13

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3521E+01 EXCESS= .0000E+00 OUTFLOW= .3522E+01 BASIN STORAGE= .5076E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCH59-7	MANE	3.25	50.39	217.62	2.06	5.00	48.98	215.00	2.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3412E+01 EXCESS= .0000E+00 OUTFLOW= .3413E+01 BASIN STORAGE= .5336E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCH59-7	MANE	3.27	48.56	216.11	2.00	5.00	47.45	215.00	2.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3302E+01 EXCESS= .0000E+00 OUTFLOW= .3303E+01 BASIN STORAGE= .5491E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCH59-7	MANE	3.28	48.27	216.68	1.97	5.00	46.93	215.00	1.97

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3259E+01 EXCESS= .0000E+00 OUTFLOW= .3260E+01 BASIN STORAGE= .4673E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCH59-7	MANE	3.29	47.83	217.16	1.95	5.00	46.39	215.00	1.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3227E+01 EXCESS= .0000E+00 OUTFLOW= .3228E+01 BASIN STORAGE= .6384E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCH59-7	MANE	3.29	47.57	217.45	1.94	5.00	46.11	215.00	1.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3206E+01 EXCESS= .0000E+00 OUTFLOW= .3207E+01 BASIN STORAGE= .5969E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCCH59-8	MANE	2.07	84.38	217.20	2.16	5.00	80.97	215.00	2.16

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5866E+01 EXCESS= .0000E+00 OUTFLOW= .5867E+01 BASIN STORAGE= .3896E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCCH59-8	MANE	2.08	81.77	218.40	2.12	5.00	79.20	215.00	2.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5754E+01 EXCESS= .0000E+00 OUTFLOW= .5754E+01 BASIN STORAGE= .3827E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCCH59-8	MANE	2.10	79.35	218.13	2.05	5.00	76.41	215.00	2.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5573E+01 EXCESS= .0000E+00 OUTFLOW= .5574E+01 BASIN STORAGE= .3286E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCCH59-8	MANE	2.11	77.07	217.74	1.98	5.00	74.21	220.00	1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5392E+01 EXCESS= .0000E+00 OUTFLOW= .5393E+01 BASIN STORAGE= .3922E-03 PERCENT ERROR=
.0

FOR PLAN = 1 RATIO= .00

RCCH59-8	MANE	2.12	75.85	218.38	1.96	5.00	73.22	215.00	1.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5322E+01 EXCESS= .0000E+00 OUTFLOW= .5322E+01 BASIN STORAGE= .3232E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-8	MANE	2.13	75.17	216.83	1.94	5.00	72.64	215.00	1.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5270E+01 EXCESS= .0000E+00 OUTFLOW= .5270E+01 BASIN STORAGE= .3756E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-8	MANE	2.13	75.23	217.17	1.92	5.00	72.25	220.00	1.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5235E+01 EXCESS= .0000E+00 OUTFLOW= .5235E+01 BASIN STORAGE= .3382E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-9	MANE	2.55	276.70	219.11	2.12	5.00	275.78	220.00	2.12

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2199E+02 EXCESS= .0000E+00 OUTFLOW= .2187E+02 BASIN STORAGE= .3907E-03 PERCENT ERROR= .5

FOR PLAN = 1 RATIO= .00

RCCH59-9	MANE	2.56	274.07	219.87	2.09	5.00	273.71	220.00	2.09

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2160E+02 EXCESS= .0000E+00 OUTFLOW= .2149E+02 BASIN STORAGE= .3271E-03 PERCENT ERROR= .5

FOR PLAN = 1 RATIO= .00

RCCH59-9	MANE	2.57	262.06	218.74	2.02	5.00	262.05	220.00	2.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2088E+02 EXCESS= .0000E+00 OUTFLOW= .2077E+02 BASIN STORAGE= .3134E-03 PERCENT ERROR= .5

FOR PLAN = 1 RATIO= .00

RCCH59-9	MANE	2.59	257.86	219.98	1.96	5.00	257.82	220.00	1.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2023E+02 EXCESS= .0000E+00 OUTFLOW= .2013E+02 BASIN STORAGE= .3177E-03 PERCENT ERROR= .5

FOR PLAN = 1 RATIO= .00

RCCH59-9	MANE	2.60	252.35	220.70	1.93	5.00	251.45	220.00	1.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1992E+02 EXCESS= .0000E+00 OUTFLOW= .1982E+02 BASIN STORAGE= .3665E-03 PERCENT ERROR= .5

FOR PLAN = 1 RATIO= .00

RCCH59-9	MANE	2.60	249.42	221.05	1.91	5.00	248.75	220.00	1.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1972E+02 EXCESS= .0000E+00 OUTFLOW= .1962E+02 BASIN STORAGE= .3403E-03 PERCENT ERROR= .5

FOR PLAN = 1 RATIO= .00

RCCH59-9	MANE	2.60	247.90	221.21	1.89	5.00	247.45	220.00	1.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1959E+02 EXCESS= .0000E+00 OUTFLOW= .1949E+02 BASIN STORAGE= .3216E-03 PERCENT ERROR= .5

FOR PLAN = 1 RATIO= .00

RLC22-5	MANE	2.56	40.95	215.41	2.18	5.00	40.60	215.00	2.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2909E+01 EXCESS= .0000E+00 OUTFLOW= .2909E+01 BASIN STORAGE= .4150E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-5	MANE	2.58	40.36	216.34	2.14	5.00	39.64	215.00	2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2853E+01 EXCESS= .0000E+00 OUTFLOW= .2853E+01 BASIN STORAGE= .3387E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

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           RLC22-5  MANE         2.59     39.05    215.35      2.07      5.00     38.75    215.00        2.07


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2766E+01 EXCESS= .0000E+00 OUTFLOW= .2767E+01 BASIN STORAGE= .4299E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-5  MANE         2.61     38.09    217.00      2.01      5.00     37.40    215.00        2.01


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2675E+01 EXCESS= .0000E+00 OUTFLOW= .2676E+01 BASIN STORAGE= .4021E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-5  MANE         2.62     37.64    217.68      1.98      5.00     37.24    215.00        1.98


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2642E+01 EXCESS= .0000E+00 OUTFLOW= .2642E+01 BASIN STORAGE= .3466E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-5  MANE         2.63     37.09    215.53      1.96      5.00     36.68    215.00        1.96


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2615E+01 EXCESS= .0000E+00 OUTFLOW= .2616E+01 BASIN STORAGE= .4219E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-5  MANE         2.63     36.89    215.87      1.95      5.00     36.31    215.00        1.95


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2597E+01 EXCESS= .0000E+00 OUTFLOW= .2597E+01 BASIN STORAGE= .3904E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RCH58-1  MANE         2.80     75.44    218.61      2.15      5.00     74.75    220.00        2.15


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .5613E+01 EXCESS= .0000E+00 OUTFLOW= .5614E+01 BASIN STORAGE= .4920E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RCH58-1  MANE         2.82     73.95    219.78      2.11      5.00     73.68    220.00        2.11


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .5502E+01 EXCESS= .0000E+00 OUTFLOW= .5503E+01 BASIN STORAGE= .5238E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RCH58-1  MANE         2.84     71.96    218.39      2.04      5.00     71.45    220.00        2.04


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .5336E+01 EXCESS= .0000E+00 OUTFLOW= .5337E+01 BASIN STORAGE= .5187E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RCH58-1  MANE         2.86     69.68    220.24      1.98      5.00     69.63    220.00        1.98


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .5162E+01 EXCESS= .0000E+00 OUTFLOW= .5163E+01 BASIN STORAGE= .4812E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RCH58-1  MANE         2.87     69.14    217.84      1.95      5.00     69.01    220.00        1.95


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .5097E+01 EXCESS= .0000E+00 OUTFLOW= .5098E+01 BASIN STORAGE= .4321E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RCH58-1  MANE         2.88     68.14    218.51      1.93      5.00     67.66    220.00        1.93


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .5041E+01 EXCESS= .0000E+00 OUTFLOW= .5042E+01 BASIN STORAGE= .5121E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RCH58-1  MANE         2.88     67.58    218.97      1.91      5.00     67.00    220.00        1.91


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .5004E+01 EXCESS= .0000E+00 OUTFLOW= .5004E+01 BASIN STORAGE= .4695E-03 PERCENT ERROR=
.0
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FOR PLAN = 1 RATIO= .00
RCCH58-2 MANE 1.92 119.39 219.00 2.14 5.00 119.12 220.00 2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9232E+01 EXCESS= .0000E+00 OUTFLOW= .9232E+01 BASIN STORAGE= .3895E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCCH58-2 MANE 1.93 117.73 221.79 2.10 5.00 117.27 220.00 2.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9060E+01 EXCESS= .0000E+00 OUTFLOW= .9060E+01 BASIN STORAGE= .3137E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCCH58-2 MANE 1.94 113.94 221.54 2.03 5.00 113.88 220.00 2.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8774E+01 EXCESS= .0000E+00 OUTFLOW= .8775E+01 BASIN STORAGE= .3329E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCCH58-2 MANE 1.96 110.48 219.18 1.97 5.00 110.43 220.00 1.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8492E+01 EXCESS= .0000E+00 OUTFLOW= .8492E+01 BASIN STORAGE= .3776E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCCH58-2 MANE 1.96 109.72 221.71 1.94 5.00 109.49 220.00 1.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8379E+01 EXCESS= .0000E+00 OUTFLOW= .8380E+01 BASIN STORAGE= .3258E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCCH58-2 MANE 1.97 107.52 218.64 1.92 5.00 107.51 220.00 1.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8289E+01 EXCESS= .0000E+00 OUTFLOW= .8290E+01 BASIN STORAGE= .3338E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCCH58-2 MANE 1.97 106.95 219.11 1.91 5.00 106.77 220.00 1.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8231E+01 EXCESS= .0000E+00 OUTFLOW= .8232E+01 BASIN STORAGE= .3875E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCCH58-3 MANE 1.17 420.50 220.55 2.12 5.00 419.06 220.00 2.12

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3403E+02 EXCESS= .0000E+00 OUTFLOW= .3392E+02 BASIN STORAGE= .1531E-03 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00
RCCH58-3 MANE 1.18 416.25 219.85 2.08 5.00 416.02 220.00 2.09

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3345E+02 EXCESS= .0000E+00 OUTFLOW= .3335E+02 BASIN STORAGE= .1613E-03 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00
RCCH58-3 MANE 1.18 400.77 220.36 2.01 5.00 399.21 220.00 2.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3232E+02 EXCESS= .0000E+00 OUTFLOW= .3222E+02 BASIN STORAGE= .1641E-03 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00
RCCH58-3 MANE 1.19 392.49 220.12 1.95 5.00 391.71 220.00 1.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3134E+02 EXCESS= .0000E+00 OUTFLOW= .3125E+02 BASIN STORAGE= .1791E-03 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00
RCCH58-3 MANE 1.19 383.92 219.78 1.92 5.00 383.80 220.00 1.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3086E+02 EXCESS= .0000E+00 OUTFLOW= .3077E+02 BASIN STORAGE= .1639E-03 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00
RCCH58-3 MANE 1.20 379.88 220.34 1.90 5.00 378.37 220.00 1.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3053E+02 EXCESS= .0000E+00 OUTFLOW= .3044E+02 BASIN STORAGE= .1674E-03 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00
RCCH58-3 MANE 1.20 377.10 220.60 1.89 5.00 375.56 220.00 1.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3033E+02 EXCESS= .0000E+00 OUTFLOW= .3024E+02 BASIN STORAGE= .1545E-03 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00
RLC22-6 MANE 3.00 18.13 219.00 2.19 5.00 17.93 220.00 2.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1164E+01 EXCESS= .0000E+00 OUTFLOW= .1170E+01 BASIN STORAGE= .3876E-02 PERCENT ERROR= - .8

FOR PLAN = 1 RATIO= .00
RLC22-6 MANE 3.25 17.46 221.00 2.15 5.00 17.39 220.00 2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1141E+01 EXCESS= .0000E+00 OUTFLOW= .1147E+01 BASIN STORAGE= .3835E-02 PERCENT ERROR= - .9

FOR PLAN = 1 RATIO= .00
RLC22-6 MANE 3.25 16.98 221.00 2.08 5.00 16.89 220.00 2.09

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1106E+01 EXCESS= .0000E+00 OUTFLOW= .1112E+01 BASIN STORAGE= .3795E-02 PERCENT ERROR= - .9

FOR PLAN = 1 RATIO= .00
RLC22-6 MANE 3.50 16.74 220.50 2.02 5.00 16.65 220.00 2.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1072E+01 EXCESS= .0000E+00 OUTFLOW= .1078E+01 BASIN STORAGE= .4496E-02 PERCENT ERROR= - 1.0

FOR PLAN = 1 RATIO= .00
RLC22-6 MANE 3.50 16.53 220.50 1.99 5.00 16.44 220.00 2.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1057E+01 EXCESS= .0000E+00 OUTFLOW= .1064E+01 BASIN STORAGE= .4476E-02 PERCENT ERROR= - 1.0

FOR PLAN = 1 RATIO= .00
RLC22-6 MANE 3.50 16.39 220.50 1.98 5.00 16.30 220.00 1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1047E+01 EXCESS= .0000E+00 OUTFLOW= .1053E+01 BASIN STORAGE= .4463E-02 PERCENT ERROR= - 1.0

FOR PLAN = 1 RATIO= .00
RLC22-6 MANE 3.50 16.29 220.50 1.96 5.00 16.19 220.00 1.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1040E+01 EXCESS= .0000E+00 OUTFLOW= .1046E+01 BASIN STORAGE= .4453E-02 PERCENT ERROR= - 1.0

FOR PLAN = 1 RATIO= .00
RLC22-1 MANE 1.06 63.85 216.53 2.18 5.00 63.05 220.00 2.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5002E+01 EXCESS= .0000E+00 OUTFLOW= .5003E+01 BASIN STORAGE= .6454E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RLC22-1 MANE 1.06 62.75 217.00 2.14 5.00 61.95 220.00 2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4910E+01 EXCESS= .0000E+00 OUTFLOW= .4910E+01 BASIN STORAGE= .6537E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RLC22-1 MANE 1.08 60.89 216.39 2.07 5.00 60.16 220.00 2.08

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4756E+01 EXCESS= .0000E+00 OUTFLOW= .4756E+01 BASIN STORAGE= .6634E-03 PERCENT ERROR= .0

```
          FOR PLAN = 1  RATIO=  .00
           RLC22-1  MANE         1.09     59.06    216.90      2.01      5.00     58.35    220.00        2.01


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .4602E+01 EXCESS= .0000E+00 OUTFLOW= .4602E+01 BASIN STORAGE= .6690E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-1  MANE         1.10     58.32    216.91      1.98      5.00     57.62    220.00        1.98


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .4541E+01 EXCESS= .0000E+00 OUTFLOW= .4541E+01 BASIN STORAGE= .6701E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-1  MANE         1.10     57.79    216.59      1.96      5.00     57.17    220.00        1.96


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .4498E+01 EXCESS= .0000E+00 OUTFLOW= .4498E+01 BASIN STORAGE= .6483E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
           RLC22-1  MANE         1.10     57.44    217.15      1.95      5.00     56.73    220.00        1.95


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .4467E+01 EXCESS= .0000E+00 OUTFLOW= .4467E+01 BASIN STORAGE= .6480E-03 PERCENT ERROR=
.0


          FOR PLAN = 1  RATIO=  .00
          RCCH54-1  MANE         2.24    108.87    219.32      2.14      5.00    108.58    220.00        2.14


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .8807E+01 EXCESS= .0000E+00 OUTFLOW= .8775E+01 BASIN STORAGE= .2290E-03 PERCENT ERROR=
.4


          FOR PLAN = 1  RATIO=  .00
          RCCH54-1  MANE         2.25    107.40    220.10      2.10      5.00    107.31    220.00        2.10


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .8641E+01 EXCESS= .0000E+00 OUTFLOW= .8610E+01 BASIN STORAGE= .2441E-03 PERCENT ERROR=
.4


          FOR PLAN = 1  RATIO=  .00
          RCCH54-1  MANE         2.26    103.61    219.16      2.03      5.00    103.41    220.00        2.03


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .8367E+01 EXCESS= .0000E+00 OUTFLOW= .8337E+01 BASIN STORAGE= .2325E-03 PERCENT ERROR=
.4


          FOR PLAN = 1  RATIO=  .00
          RCCH54-1  MANE         2.27    100.70    220.52      1.96      5.00    100.41    220.00        1.96


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .8092E+01 EXCESS= .0000E+00 OUTFLOW= .8063E+01 BASIN STORAGE= .2199E-03 PERCENT ERROR=
.4


          FOR PLAN = 1  RATIO=  .00
          RCCH54-1  MANE         2.28     98.98    221.08      1.94      5.00     98.88    220.00        1.94


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .7981E+01 EXCESS= .0000E+00 OUTFLOW= .7953E+01 BASIN STORAGE= .2483E-03 PERCENT ERROR=
.3


          FOR PLAN = 1  RATIO=  .00
          RCCH54-1  MANE         2.28     98.28    219.17      1.92      5.00     98.12    220.00        1.92


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .7905E+01 EXCESS= .0000E+00 OUTFLOW= .7877E+01 BASIN STORAGE= .2294E-03 PERCENT ERROR=
.3


          FOR PLAN = 1  RATIO=  .00
          RCCH54-1  MANE         2.29     97.97    219.48      1.91      5.00     97.73    220.00        1.91


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .7852E+01 EXCESS= .0000E+00 OUTFLOW= .7825E+01 BASIN STORAGE= .2771E-03 PERCENT ERROR=
.3


          FOR PLAN = 1  RATIO=  .00
           RCH54-2  MANE         2.69     51.53    218.23      2.10      5.00     51.23    220.00        2.10
```

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3929E+01 EXCESS= .0000E+00 OUTFLOW= .3929E+01 BASIN STORAGE= .3630E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCH54-2	MANE	2.71	50.68	219.22	2.06	5.00	50.24	220.00	2.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3851E+01 EXCESS= .0000E+00 OUTFLOW= .3852E+01 BASIN STORAGE= .3948E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCH54-2	MANE	2.73	49.06	218.19	2.00	5.00	48.84	220.00	2.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3730E+01 EXCESS= .0000E+00 OUTFLOW= .3730E+01 BASIN STORAGE= .3658E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCH54-2	MANE	2.75	47.66	219.93	1.93	5.00	47.61	220.00	1.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3606E+01 EXCESS= .0000E+00 OUTFLOW= .3607E+01 BASIN STORAGE= .4448E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCH54-2	MANE	2.76	46.95	217.89	1.91	5.00	46.89	220.00	1.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3556E+01 EXCESS= .0000E+00 OUTFLOW= .3556E+01 BASIN STORAGE= .3840E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCH54-2	MANE	2.76	46.49	218.39	1.89	5.00	46.22	220.00	1.88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3520E+01 EXCESS= .0000E+00 OUTFLOW= .3520E+01 BASIN STORAGE= .4579E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCH54-2	MANE	2.77	46.22	218.76	1.87	5.00	45.84	220.00	1.87

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3495E+01 EXCESS= .0000E+00 OUTFLOW= .3495E+01 BASIN STORAGE= .4298E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH54-3	MANE	4.24	185.50	224.52	2.13	5.00	183.60	225.00	2.13

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1486E+02 EXCESS= .0000E+00 OUTFLOW= .1486E+02 BASIN STORAGE= .8341E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH54-3	MANE	4.25	179.98	221.09	2.08	5.00	179.50	225.00	2.08

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1456E+02 EXCESS= .0000E+00 OUTFLOW= .1456E+02 BASIN STORAGE= .1112E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH54-3	MANE	4.29	176.83	222.96	2.02	5.00	171.78	225.00	2.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1410E+02 EXCESS= .0000E+00 OUTFLOW= .1411E+02 BASIN STORAGE= .1168E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH54-3	MANE	4.32	171.93	224.56	1.95	5.00	170.40	225.00	1.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1365E+02 EXCESS= .0000E+00 OUTFLOW= .1365E+02 BASIN STORAGE= .8354E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH54-3	MANE	4.33	166.56	221.06	1.92	5.00	166.49	225.00	1.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1344E+02 EXCESS= .0000E+00 OUTFLOW= .1344E+02 BASIN STORAGE= .1108E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH54-3	MANE	4.35	165.79	221.60	1.90	5.00	163.50	225.00	1.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1330E+02 EXCESS= .0000E+00 OUTFLOW= .1330E+02 BASIN STORAGE= .9813E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH54-3	MANE	4.35	165.40	221.90	1.89	5.00	162.14	225.00	1.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1321E+02 EXCESS= .0000E+00 OUTFLOW= .1322E+02 BASIN STORAGE= .9203E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-2	MANE	2.33	34.11	217.06	2.18	5.00	33.41	215.00	2.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2445E+01 EXCESS= .0000E+00 OUTFLOW= .2445E+01 BASIN STORAGE= .3149E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-2	MANE	2.34	33.31	218.00	2.14	5.00	32.63	215.00	2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2397E+01 EXCESS= .0000E+00 OUTFLOW= .2398E+01 BASIN STORAGE= .3324E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-2	MANE	2.36	32.63	217.26	2.08	5.00	31.90	215.00	2.08

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2324E+01 EXCESS= .0000E+00 OUTFLOW= .2324E+01 BASIN STORAGE= .3068E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-2	MANE	2.38	31.40	216.55	2.01	5.00	30.69	215.00	2.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2247E+01 EXCESS= .0000E+00 OUTFLOW= .2247E+01 BASIN STORAGE= .3557E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-2	MANE	2.39	31.21	217.23	1.98	5.00	30.52	215.00	1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2219E+01 EXCESS= .0000E+00 OUTFLOW= .2219E+01 BASIN STORAGE= .3141E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-2	MANE	2.39	30.87	217.71	1.96	5.00	30.14	215.00	1.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2198E+01 EXCESS= .0000E+00 OUTFLOW= .2198E+01 BASIN STORAGE= .2784E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RLC22-2	MANE	2.40	30.50	218.06	1.95	5.00	29.84	215.00	1.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2181E+01 EXCESS= .0000E+00 OUTFLOW= .2181E+01 BASIN STORAGE= .3385E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-1	MANE	1.07	63.49	216.02	2.15	5.00	61.94	215.00	2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4691E+01 EXCESS= .0000E+00 OUTFLOW= .4691E+01 BASIN STORAGE= .9387E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-1	MANE	1.08	62.21	216.92	2.10	5.00	60.60	215.00	2.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4600E+01 EXCESS= .0000E+00 OUTFLOW= .4599E+01 BASIN STORAGE= .9810E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-1	MANE	1.08	60.58	216.99	2.04	5.00	58.97	215.00	2.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4457E+01 EXCESS= .0000E+00 OUTFLOW= .4457E+01 BASIN STORAGE= .9710E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-1	MANE	1.09	58.52	216.35	1.97	5.00	56.90	215.00	1.97

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4305E+01 EXCESS= .0000E+00 OUTFLOW= .4304E+01 BASIN STORAGE= .9749E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-1	MANE	1.09	57.98	216.74	1.94	5.00	56.39	220.00	1.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4252E+01 EXCESS= .0000E+00 OUTFLOW= .4252E+01 BASIN STORAGE= .1022E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-1	MANE	1.10	57.39	216.11	1.93	5.00	55.84	215.00	1.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4213E+01 EXCESS= .0000E+00 OUTFLOW= .4212E+01 BASIN STORAGE= .1037E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-1	MANE	1.10	56.90	216.48	1.91	5.00	55.33	220.00	1.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4180E+01 EXCESS= .0000E+00 OUTFLOW= .4179E+01 BASIN STORAGE= .9390E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-2	MANE	.44	100.94	215.89	2.13	5.00	99.68	215.00	2.13

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7612E+01 EXCESS= .0000E+00 OUTFLOW= .7612E+01 BASIN STORAGE= .4412E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-2	MANE	.44	98.93	215.89	2.09	5.00	97.68	215.00	2.09

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7465E+01 EXCESS= .0000E+00 OUTFLOW= .7465E+01 BASIN STORAGE= .4375E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-2	MANE	.44	96.12	215.79	2.02	5.00	94.83	215.00	2.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7230E+01 EXCESS= .0000E+00 OUTFLOW= .7230E+01 BASIN STORAGE= .4252E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-2	MANE	.45	92.90	215.93	1.95	5.00	91.67	215.00	1.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6986E+01 EXCESS= .0000E+00 OUTFLOW= .6985E+01 BASIN STORAGE= .4255E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-2	MANE	.45	91.85	215.97	1.93	5.00	90.60	215.00	1.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6896E+01 EXCESS= .0000E+00 OUTFLOW= .6896E+01 BASIN STORAGE= .4226E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-2	MANE	.45	91.08	215.90	1.91	5.00	89.85	215.00	1.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6832E+01 EXCESS= .0000E+00 OUTFLOW= .6831E+01 BASIN STORAGE= .4264E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCCH59-2	MANE	.45	90.26	215.84	1.90	5.00	89.02	215.00	1.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6779E+01 EXCESS= .0000E+00 OUTFLOW= .6779E+01 BASIN STORAGE= .4296E-04 PERCENT ERROR= .0

*** NORMAL END OF HEC-1 ***

B.4

SUBBASIN PRORATED FLOWS

SUB BASIN FLOWRATE APPROXIMATION CALCULATION SUMMARY

BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
LC22-1	27.6		32	64
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
MS2	5.4	20%	6	13
BASIN	**AREA**		**Q10**	**Q100**
LC22-1	27.6		32	64
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
MS3	2.8	10%	3	7
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH54-1	21.8		24	48
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
54A	8.2	38%	9	18
54C	6.2	28%	7	14
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH54-2	22.4		26	52
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
54B	5.5	24%	6	13
54D	8.3	37%	10	19
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH54-3	12.2		15	21
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
54E	4.6	38%	6	8
54I	0.4	3%	1	1
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
LC22-1	27.6		32	64
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
CS8	22.6	82%	26	52
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
LC22-1	27.6		32	62
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
MS4	2.8	10%	3	6
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH54-1	21.8		24	48
CH59-1	12.8		15	31
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
54F	5.6	26%	7	14
	0.8	7%		
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH54-2	22.4		26	52
CH59-2	16.6		19	39
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
54G	8.0	36%	10	21
	1.0	6%		

SUB BASIN FLOWRATE APPROXIMATION CALCULATION SUMMARY

BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH54-3	12.2		15	30
CH59-3	12.2		14	29
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
54H	3.7	30%	5	10
	0.5	4%		
54J	0.4	3%	1	1
	0.1	0%		
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
LC22-2	13.5		18	36
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
MS6A	2.6	19%	3	7
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-1	12.8		15	31
LC22-2	13.5		18	35
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59I	6.4	50%	9	19
	1.3	9%		
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-2	16.6		19	39
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59J	8.3	50%	9	19
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-3	12.2		14	29
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59K	4.2	35%	5	10
59Y	0.5	4%	1	1
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
LC22-2	13.5		18	36
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
MS6B	5.1	38%	7	14
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-1	12.8		15	31
LC22-2	13.5		18	36
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59L	5.9	46%	8	17
	1.2	9%		
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-2	16.6		19	39
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59M	7.6	46%	9	18
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-3	12.2		14	29
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59N	3.9	32%	4	9
59Z	0.4	4%	1	1

SUB BASIN FLOWRATE APPROXIMATION CALCULATION SUMMARY

BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
LC22-3	19.4		26	51
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
MS9	4.5	23%	6	12
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-4	18.6		21	42
LC22-3	19.4		26	51
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59O	6.6	36%	9	18
	1.2	6%		
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-5	25.0		28	55
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59P	8.9	36%	10	20
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-6	18.6		21	41
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59Q	4.6	25%	5	10
59AA	0.6	3%	1	1
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
LC22-3	19.4		26	51
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
MS10	5.1	26%	7	13
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
LC22-3	19.4		26	51
SUB BASIN	**SUB AREA**	**SUB AREA**	**SUB Q10**	**SUB Q100**
MS11	5.8	30%	8	15
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-4	18.6		21	42
LC22-3	19.4		26	51
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59R	12.1	65%	18	36
	3.4	18%		
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-5	25.0		28	55
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59S	8.2	33%	9	18
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-5	25.0		28	55
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59T	7.5	30%	8	17
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-6	18.6		21	41
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59U	8.1	44%	9	18
59AB	1.0	5%	1	2

SUB BASIN FLOWRATE APPROXIMATION CALCULATION SUMMARY

BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
LC22-4	10.2		15	30
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
MS12	5.8	56%	8	17
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-7	9.6		13	25
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59V	2.4	25%	3	6
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-7	9.6		13	15
LC22-4	10.2		15	30
LC22-5	16.0		21	42
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59V2	6.7	70%	15	22
	2.8	27%		
	1.3	8%		
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-8	12.8		17	33
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59W	9.1	71%	12	23
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-8	12.8		17	33
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59W2	3.7	29%	5	10
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH59-9	9.6		13	25
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
59X	4.7	49%	6	12
59AC	0.5	6%	1	1
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
LC22-5	16.0		21	42
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
MS13	10.2	64%	13	27
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH58-1	15.4		18	36
LC22-5	16.0		21	42
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
58Y	9.4	61%	13	26
	1.53	10%		
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH58-2	20.5		23	46
CH59-8	12.8		17	33
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
58Z	12.8	63%	16	32
	1.1	9%		

SUB BASIN FLOWRATE APPROXIMATION CALCULATION SUMMARY

BASIN	AREA (ac)		Q10 (cfs)	Q100 (cfs)
CH58-3	16.6		19	38
CH59-9	9.6		13	25
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
58AA	2.1	13%	5	9
	1.6	16%		
58AH	0.3	2%	1	1
	0.2	2%		
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH58-3	16.6		19	35
CH59-9	9.6		13	25
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
58AB	4.7	28%	6	10
	0.2	2%		
58AI	0.5	3%	1	1
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
LC22-5	16.0		21	42
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
MS14	5.8	36%	8	15
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH58-1	15.4		18	36
LC22-5	16.0		21	42
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
58AC	5.8	37%	9	18
	1.8	11%		
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
LC22-6	6.1		10	19
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
MS15	4.5	73%	7	14
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH58-4	29.4		27	60
LC22-6	6.1		10	19
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
58AD	3.6	12%	7	14
	2.0	33%		
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH58-2	20.5		23	46
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
58AE	7.7	38%	9	17
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH58-4	29.4		27	60
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
58AF	8.1	27%	7	16
BASIN	**AREA (ac)**		**Q10 (cfs)**	**Q100 (cfs)**
CH58-3	16.6		19	38
SUB BASIN	**SUB AREA (ac)**	**SUB AREA (ac)**	**SUB Q10 (cfs)**	**SUB Q100 (cfs)**
58AG	4.0	24%	5	9
58AJ	0.43	3%	0	1

APPENDIX C

HYDRAULIC ANALYSIS

C.1

NORMAL DEPTH CALCULATIONS

C.1.1

10-Year Dry Lane Capacity

Worksheet for 9L Hoover LT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.53	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+22.00	0.54

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+22.00, 0.54)	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	1.4	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	0.98	ft²
Wetted Perimeter	9.842	ft
Hydraulic Radius	0.10	ft

Worksheet for 9L Hoover LT 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.28	ft
Critical Slope		0.00820	ft/ft
Velocity		1.48	ft/s
Velocity Head		0.03	ft
Specific Energy		0.33	ft
Froude Number		0.82	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.28	ft
Channel Slope	0.53	%
Critical Slope	0.00820	ft/ft

Cross Section for 9L Hoover LT 10-Year Dry Lane

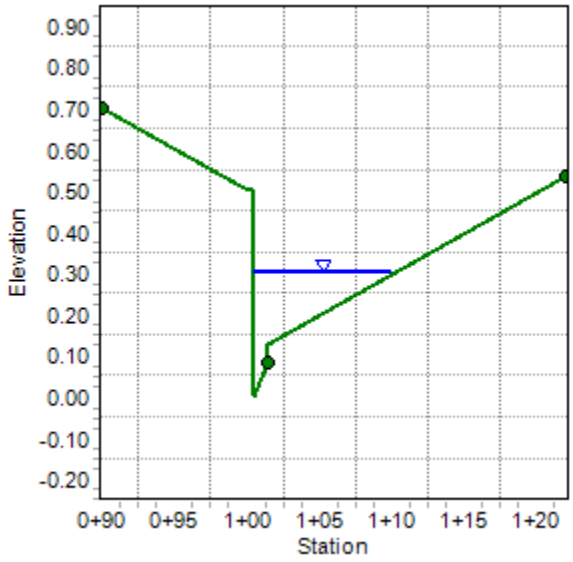
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.53	%
Normal Depth	0.30	ft
Discharge	1.4	ft³/s

Cross Section Image



Worksheet for 9R Hoover RT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.51	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
1+38.00	0.54
1+58.50	0.13
1+58.50	0.08
1+59.50	0.00
1+59.50	0.50
1+60.00	0.50
1+70.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+38.00, 0.54)	(1+58.50, 0.08)	0.016
(1+58.50, 0.08)	(1+70.00, 0.70)	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

Discharge	1.4	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	0.98	ft²
Wetted Perimeter	9.842	ft
Hydraulic Radius	0.10	ft

Worksheet for 9R Hoover RT 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.28	ft
Critical Slope		0.00822	ft/ft
Velocity		1.45	ft/s
Velocity Head		0.03	ft
Specific Energy		0.33	ft
Froude Number		0.80	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.28	ft
Channel Slope	0.51	%
Critical Slope	0.00822	ft/ft

Cross Section for 9R Hoover RT 10-Year Dry Lane

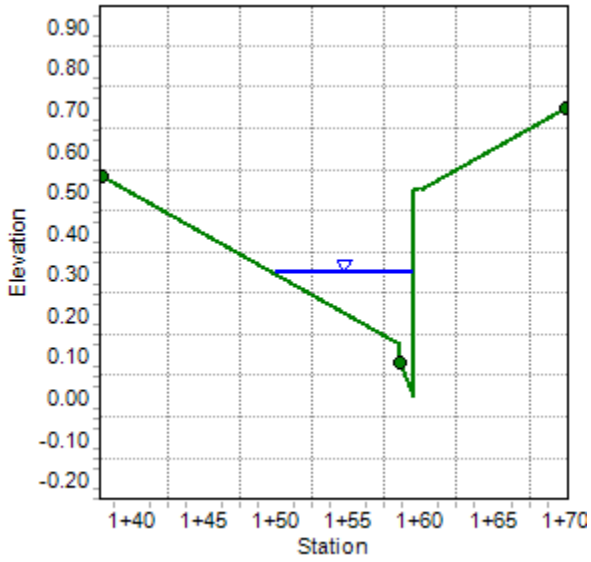
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.51	%
Normal Depth	0.30	ft
Discharge	1.4	ft³/s

Cross Section Image



Worksheet for 10L Gass LT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.97	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+22.00	0.54

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+22.00, 0.54)	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	2.0	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	0.98	ft²
Wetted Perimeter	9.842	ft
Hydraulic Radius	0.10	ft

Worksheet for 10L Gass LT 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.30	ft
Critical Slope		0.00787	ft/ft
Velocity		2.01	ft/s
Velocity Head		0.06	ft
Specific Energy		0.36	ft
Froude Number		1.10	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.30	ft
Channel Slope	0.97	%
Critical Slope	0.00787	ft/ft

Cross Section for 10L Gass LT 10-Year Dry Lane

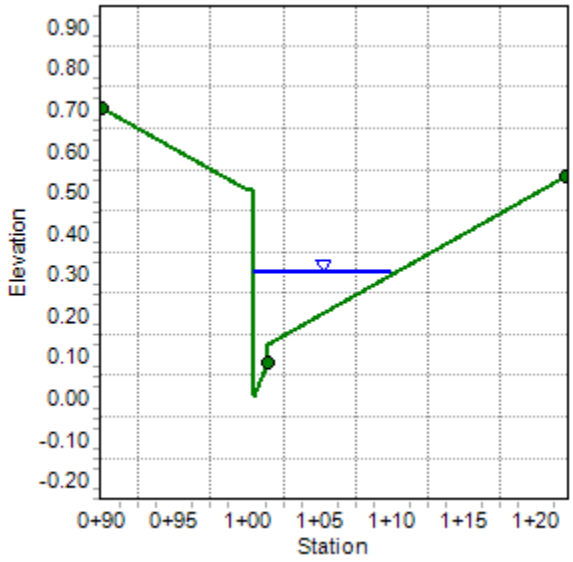
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.97	%
Normal Depth	0.30	ft
Discharge	2.0	ft³/s

Cross Section Image



Worksheet for 10R Gass RT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.95	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
1+38.00	0.54
1+58.50	0.13
1+58.50	0.08
1+59.50	0.00
1+59.50	0.50
1+60.00	0.50
1+70.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+38.00, 0.54)	(1+58.50, 0.08)	0.016
(1+58.50, 0.08)	(1+70.00, 0.70)	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

Discharge	1.9	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	0.98	ft²
Wetted Perimeter	9.842	ft
Hydraulic Radius	0.10	ft

Worksheet for 10R Gass RT 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.30	ft
Critical Slope		0.00788	ft/ft
Velocity		1.98	ft/s
Velocity Head		0.06	ft
Specific Energy		0.36	ft
Froude Number		1.09	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.30	ft
Channel Slope	0.95	%
Critical Slope	0.00788	ft/ft

Cross Section for 10R Gass RT 10-Year Dry Lane

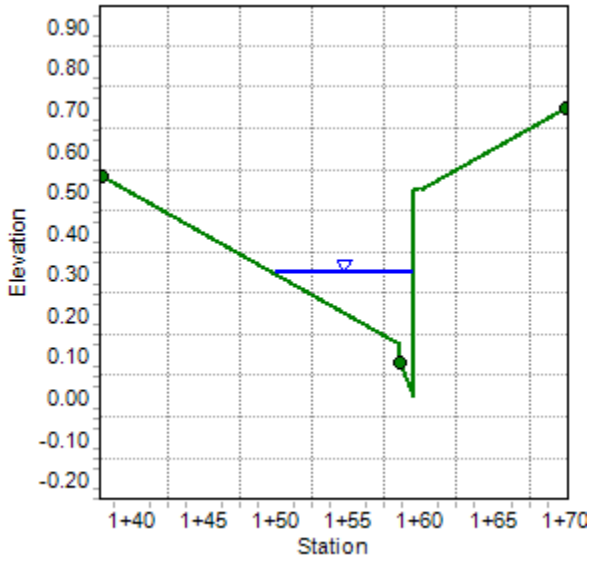
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.95	%
Normal Depth	0.30	ft
Discharge	1.9	ft³/s

Cross Section Image



Worksheet for 11L Garces LT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.38	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+22.00	0.54

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+22.00, 0.54)	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	1.2	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	0.98	ft²
Wetted Perimeter	9.842	ft
Hydraulic Radius	0.10	ft

Worksheet for 11L Garces LT 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.27	ft
Critical Slope		0.00838	ft/ft
Velocity		1.25	ft/s
Velocity Head		0.02	ft
Specific Energy		0.32	ft
Froude Number		0.69	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.27	ft
Channel Slope	0.38	%
Critical Slope	0.00838	ft/ft

Cross Section for 11L Garces LT 10-Year Dry Lane

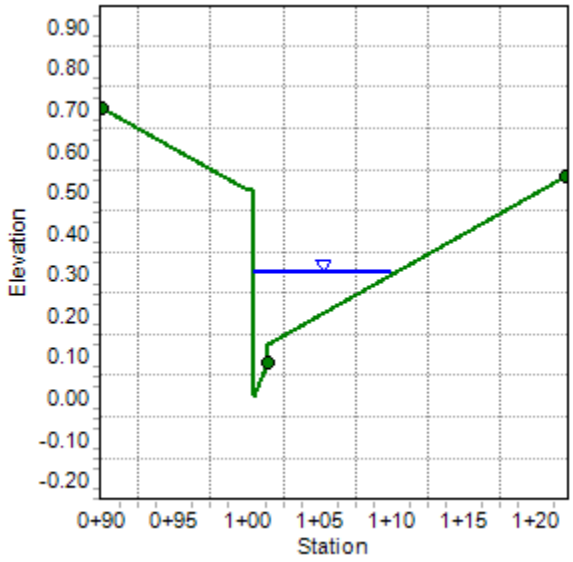
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.38	%
Normal Depth	0.30	ft
Discharge	1.2	ft³/s

Cross Section Image



Worksheet for 11R Garces RT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.40	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
1+38.00	0.54
1+58.50	0.13
1+58.50	0.08
1+59.50	0.00
1+59.50	0.50
1+60.00	0.50
1+70.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+38.00, 0.54)	(1+58.50, 0.08)	0.016
(1+58.50, 0.08)	(1+70.00, 0.70)	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

Discharge	1.3	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	0.98	ft²
Wetted Perimeter	9.842	ft
Hydraulic Radius	0.10	ft

Worksheet for 11R Garces RT 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.27	ft
Critical Slope		0.00835	ft/ft
Velocity		1.29	ft/s
Velocity Head		0.03	ft
Specific Energy		0.32	ft
Froude Number		0.71	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.27	ft
Channel Slope	0.40	%
Critical Slope	0.00835	ft/ft

Cross Section for 11R Garces RT 10-Year Dry Lane

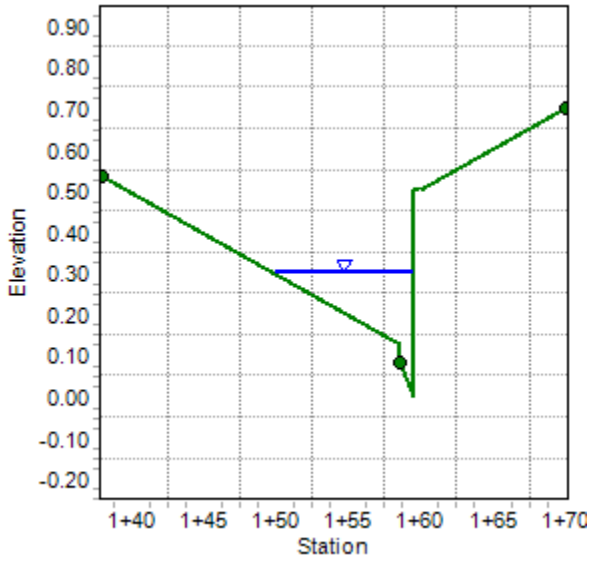
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.40	%
Normal Depth	0.30	ft
Discharge	1.3	ft³/s

Cross Section Image



Worksheet for 12L Bonneville LT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.07	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+22.00	0.54

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+22.00, 0.54)	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		0.5	ft³/s
Elevation Range	0.000 to 0.700 ft		
Flow Area		0.98	ft²
Wetted Perimeter		9.842	ft
Hydraulic Radius		0.10	ft

Worksheet for 12L Bonneville LT 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.21	ft
Critical Slope		0.00934	ft/ft
Velocity		0.54	ft/s
Velocity Head		0.00	ft
Specific Energy		0.30	ft
Froude Number		0.30	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.21	ft
Channel Slope	0.07	%
Critical Slope	0.00934	ft/ft

Cross Section for 12L Bonneville LT 10-Year Dry Lane

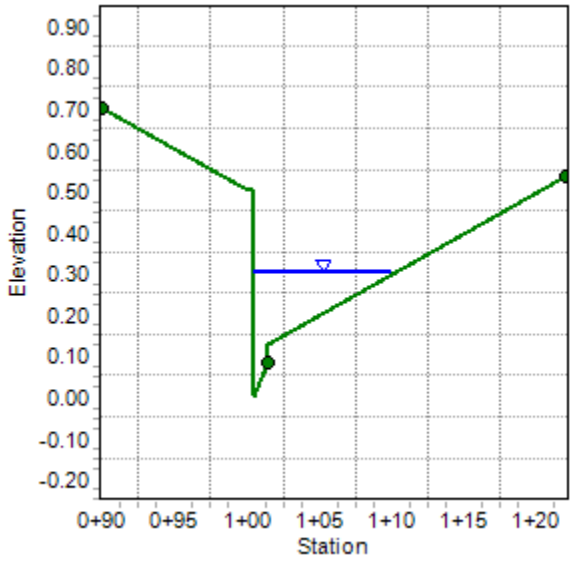
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.07	%
Normal Depth	0.30	ft
Discharge	0.5	ft³/s

Cross Section Image



Worksheet for 12R Bonneville RT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.10	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
1+37.50	0.54
1+58.00	0.13
1+58.00	0.08
1+59.00	0.00
1+59.00	0.50
1+59.50	0.50
1+69.50	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+37.50, 0.54)	(1+58.00, 0.08)	0.016
(1+58.00, 0.08)	(1+69.50, 0.70)	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

Discharge	0.6	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	0.98	ft²
Wetted Perimeter	9.842	ft
Hydraulic Radius	0.10	ft

Worksheet for 12R Bonneville RT 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.22	ft
Critical Slope		0.00913	ft/ft
Velocity		0.64	ft/s
Velocity Head		0.01	ft
Specific Energy		0.30	ft
Froude Number		0.35	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.22	ft
Channel Slope	0.10	%
Critical Slope	0.00913	ft/ft

Cross Section for 12R Bonneville RT 10-Year Dry Lane

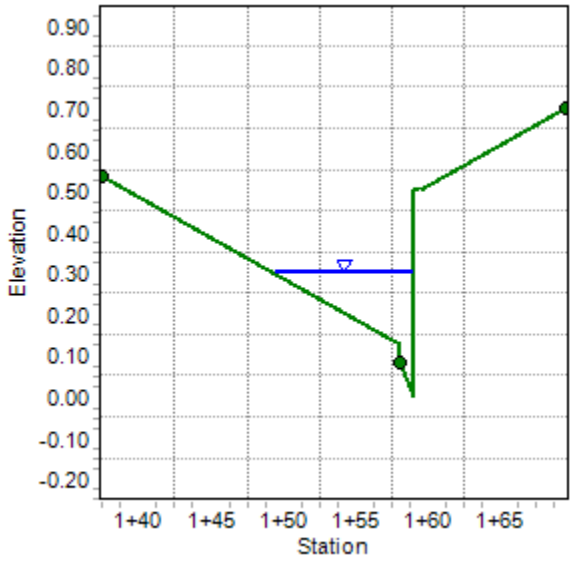
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.10	%
Normal Depth	0.30	ft
Discharge	0.6	ft³/s

Cross Section Image



Worksheet for 13L Clark LT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.13	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+22.00	0.54

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+22.00, 0.54)	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	0.7	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	0.98	ft²
Wetted Perimeter	9.842	ft
Hydraulic Radius	0.10	ft

Worksheet for 13L Clark LT 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.23	ft
Critical Slope		0.00898	ft/ft
Velocity		0.73	ft/s
Velocity Head		0.01	ft
Specific Energy		0.30	ft
Froude Number		0.40	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.23	ft
Channel Slope	0.13	%
Critical Slope	0.00898	ft/ft

Cross Section for 13L Clark LT 10-Year Dry Lane

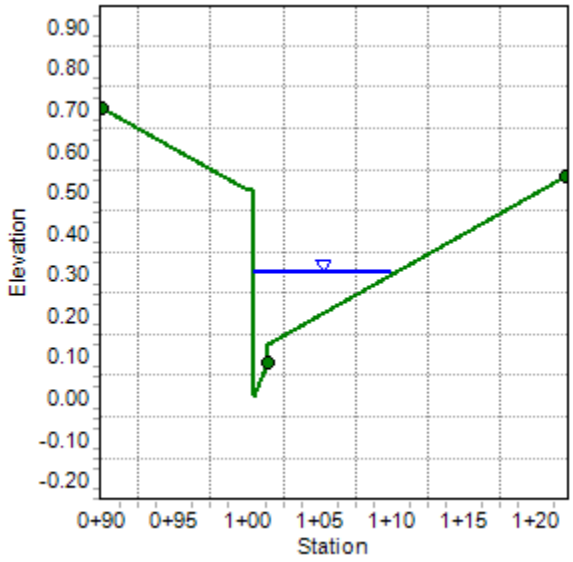
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.13	%
Normal Depth	0.30	ft
Discharge	0.7	ft³/s

Cross Section Image



Worksheet for 13R Clark RT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.14	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
1+37.70	0.54
1+58.50	0.13
1+58.50	0.08
1+59.50	0.00
1+59.50	0.50
1+60.00	0.50
1+70.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+37.70, 0.54)	(1+58.50, 0.08)	0.016
(1+58.50, 0.08)	(1+70.00, 0.70)	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

Discharge	0.8	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	1.03	ft²
Wetted Perimeter	10.148	ft
Hydraulic Radius	0.10	ft

Worksheet for 13R Clark RT 10-Year Dry Lane

Results

Top Width		9.800	ft
Normal Depth		0.30	ft
Critical Depth		0.24	ft
Critical Slope		0.00887	ft/ft
Velocity		0.78	ft/s
Velocity Head		0.01	ft
Specific Energy		0.31	ft
Froude Number		0.42	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.24	ft
Channel Slope	0.14	%
Critical Slope	0.00887	ft/ft

Cross Section for 13R Clark RT 10-Year Dry Lane

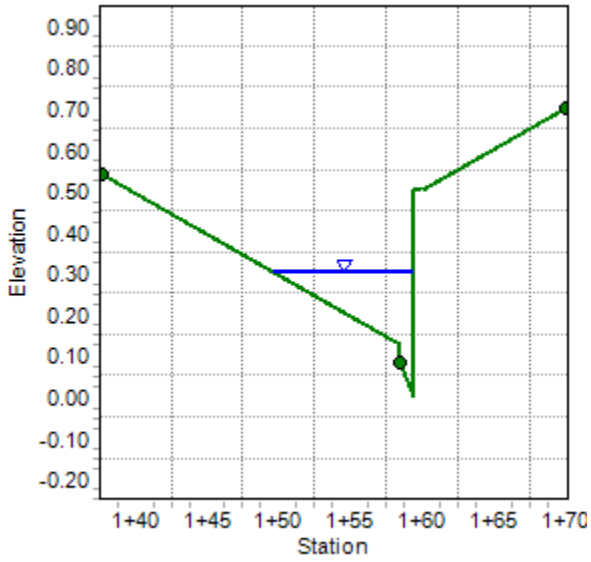
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.14	%
Normal Depth	0.30	ft
Discharge	0.8	ft³/s

Cross Section Image



Worksheet for 14L Bridger LT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.66	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+22.00	0.54

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+22.00, 0.54)	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	1.6	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	0.98	ft²
Wetted Perimeter	9.842	ft
Hydraulic Radius	0.10	ft

Worksheet for 14L Bridger LT 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.29	ft
Critical Slope		0.00807	ft/ft
Velocity		1.65	ft/s
Velocity Head		0.04	ft
Specific Energy		0.34	ft
Froude Number		0.91	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.29	ft
Channel Slope	0.66	%
Critical Slope	0.00807	ft/ft

Cross Section for 14L Bridger LT 10-Year Dry Lane

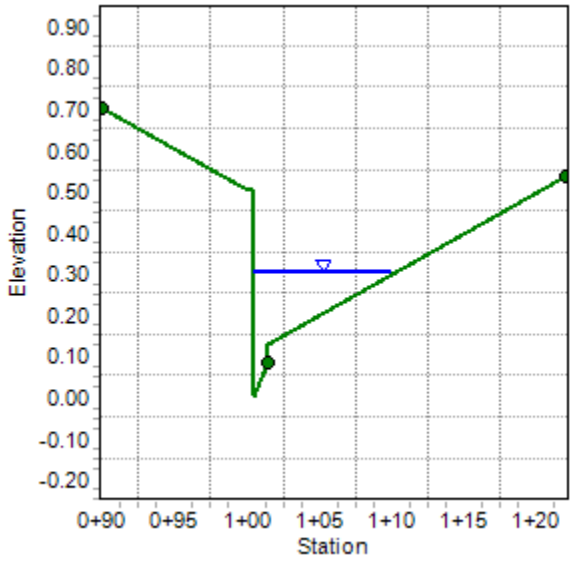
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.66	%
Normal Depth	0.30	ft
Discharge	1.6	ft³/s

Cross Section Image



Worksheet for 14R Bridger RT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.62	%
Normal Depth	0.29	ft

Section Definitions

Station (ft)	Elevation (ft)
1+38.00	0.53
1+58.00	0.13
1+58.00	0.08
1+59.00	0.00
1+59.00	0.50
1+59.50	0.50
1+69.50	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+38.00, 0.53)	(1+58.00, 0.08)	0.016
(1+58.00, 0.08)	(1+69.50, 0.70)	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

Discharge	1.4	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	0.88	ft²
Wetted Perimeter	9.332	ft
Hydraulic Radius	0.09	ft

Worksheet for 14R Bridger RT 10-Year Dry Lane

Results

Top Width		9.000	ft
Normal Depth		0.29	ft
Critical Depth		0.27	ft
Critical Slope		0.00823	ft/ft
Velocity		1.56	ft/s
Velocity Head		0.04	ft
Specific Energy		0.32	ft
Froude Number		0.88	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.29	ft
Critical Depth	0.27	ft
Channel Slope	0.62	%
Critical Slope	0.00823	ft/ft

Cross Section for 14R Bridger RT 10-Year Dry Lane

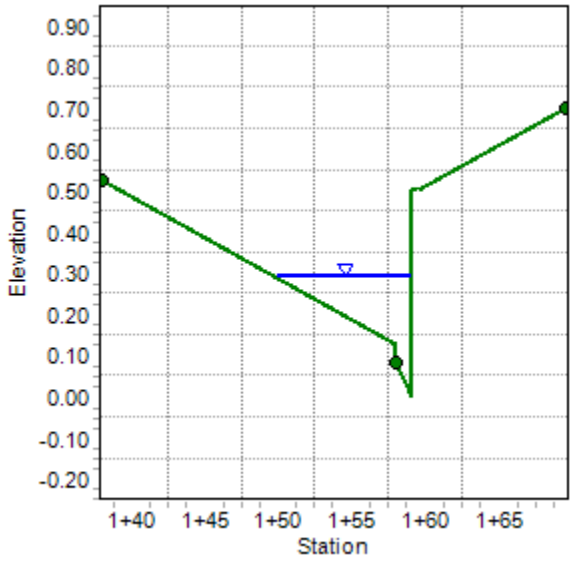
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.62	%
Normal Depth	0.29	ft
Discharge	1.4	ft³/s

Cross Section Image



Worksheet for 15L Carson 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.40	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+22.00	0.54

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+22.00, 0.54)	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	1.3	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	0.98	ft²
Wetted Perimeter	9.842	ft
Hydraulic Radius	0.10	ft

Worksheet for 15L Carson 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.27	ft
Critical Slope		0.00835	ft/ft
Velocity		1.29	ft/s
Velocity Head		0.03	ft
Specific Energy		0.32	ft
Froude Number		0.71	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.27	ft
Channel Slope	0.40	%
Critical Slope	0.00835	ft/ft

Cross Section for 15L Carson 10-Year Dry Lane

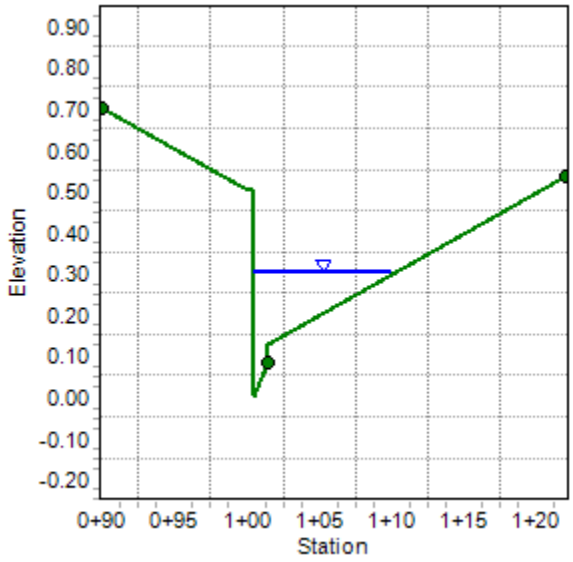
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.40	%
Normal Depth	0.30	ft
Discharge	1.3	ft³/s

Cross Section Image



Worksheet for 15R Carson 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.13	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
1+37.50	0.54
1+58.00	0.13
1+58.00	0.08
1+59.00	0.00
1+59.00	0.50
1+59.50	0.50
1+69.50	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+37.50, 0.54)	(1+58.00, 0.08)	0.016
(1+58.00, 0.08)	(1+69.50, 0.70)	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

Discharge	0.7	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	0.98	ft²
Wetted Perimeter	9.842	ft
Hydraulic Radius	0.10	ft

Worksheet for 15R Carson 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.23	ft
Critical Slope		0.00898	ft/ft
Velocity		0.73	ft/s
Velocity Head		0.01	ft
Specific Energy		0.30	ft
Froude Number		0.40	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.23	ft
Channel Slope	0.13	%
Critical Slope	0.00898	ft/ft

Cross Section for 15R Carson 10-Year Dry Lane

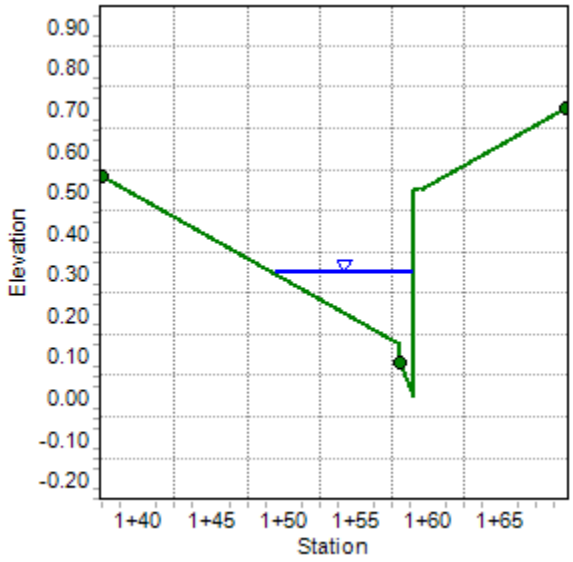
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.13	%
Normal Depth	0.30	ft
Discharge	0.7	ft³/s

Cross Section Image



Worksheet for 16L Fremont LT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.26	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+22.00	0.54

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+22.00, 0.54)	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	1.0	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	0.98	ft²
Wetted Perimeter	9.842	ft
Hydraulic Radius	0.10	ft

Worksheet for 16L Fremont LT 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.25	ft
Critical Slope		0.00859	ft/ft
Velocity		1.04	ft/s
Velocity Head		0.02	ft
Specific Energy		0.31	ft
Froude Number		0.57	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.25	ft
Channel Slope	0.26	%
Critical Slope	0.00859	ft/ft

Cross Section for 16L Fremont LT 10-Year Dry Lane

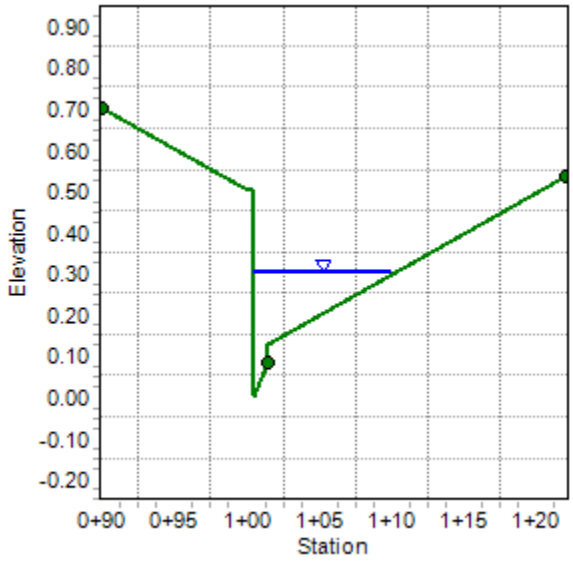
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.26	%
Normal Depth	0.30	ft
Discharge	1.0	ft³/s

Cross Section Image



Worksheet for 16R Fremont RT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.34	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
1+29.50	0.74
1+60.00	0.13
1+60.00	0.08
1+61.00	0.00
1+61.00	0.50
1+61.50	0.50
1+75.00	0.77

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+29.50, 0.74)	(1+60.00, 0.08)	0.016
(1+60.00, 0.08)	(1+75.00, 0.77)	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

Discharge	1.2	ft³/s
Elevation Range	0.000 to 0.770 ft	
Flow Area	0.98	ft²
Wetted Perimeter	9.842	ft
Hydraulic Radius	0.10	ft

Worksheet for 16R Fremont RT 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.26	ft
Critical Slope		0.00844	ft/ft
Velocity		1.19	ft/s
Velocity Head		0.02	ft
Specific Energy		0.32	ft
Froude Number		0.65	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.26	ft
Channel Slope	0.34	%
Critical Slope	0.00844	ft/ft

Cross Section for 16R Fremont RT 10-Year Dry Lane

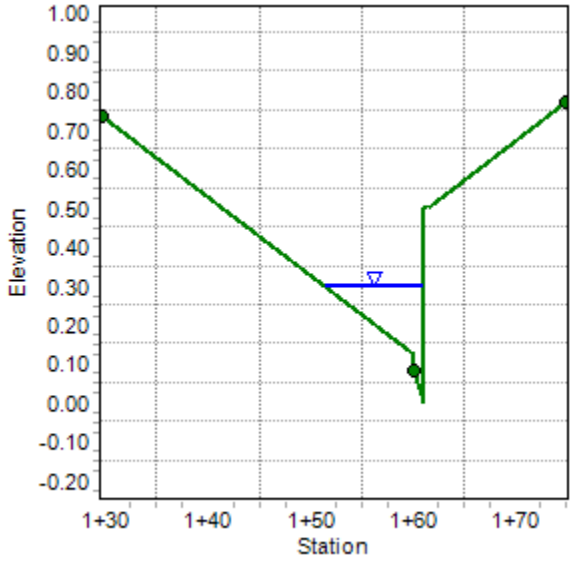
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.34	%
Normal Depth	0.30	ft
Discharge	1.2	ft³/s

Cross Section Image



Worksheet for 17L Ogden LT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.11	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
0+85.00	0.80
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+22.30	0.54

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+85.00, 0.80)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+22.30, 0.54)	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		0.7	ft³/s
Elevation Range	0.000 to 0.800 ft		
Flow Area		1.03	ft²
Wetted Perimeter		10.148	ft
Hydraulic Radius		0.10	ft

Worksheet for 17L Ogden LT 10-Year Dry Lane

Results

Top Width		9.800	ft
Normal Depth		0.30	ft
Critical Depth		0.23	ft
Critical Slope		0.00900	ft/ft
Velocity		0.69	ft/s
Velocity Head		0.01	ft
Specific Energy		0.31	ft
Froude Number		0.37	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.23	ft
Channel Slope	0.11	%
Critical Slope	0.00900	ft/ft

Cross Section for 17L Ogden LT 10-Year Dry Lane

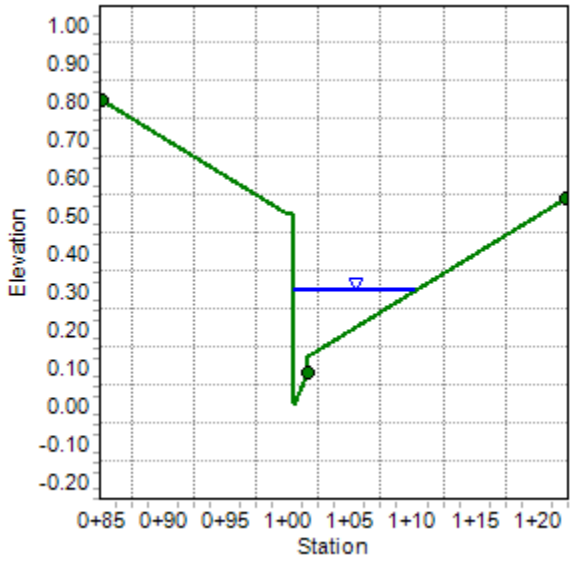
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.11	%
Normal Depth	0.30	ft
Discharge	0.7	ft³/s

Cross Section Image



Worksheet for 17R Ogden RT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.10	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
1+37.90	0.54
1+58.40	0.13
1+58.40	0.08
1+59.40	0.00
1+59.40	0.50
1+59.90	0.50
1+69.90	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+37.90, 0.54)	(1+58.40, 0.08)	0.016
(1+58.40, 0.08)	(1+69.90, 0.70)	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

Discharge	0.6	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	0.98	ft²
Wetted Perimeter	9.842	ft
Hydraulic Radius	0.10	ft

Worksheet for 17R Ogden RT 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.22	ft
Critical Slope		0.00913	ft/ft
Velocity		0.64	ft/s
Velocity Head		0.01	ft
Specific Energy		0.30	ft
Froude Number		0.35	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.22	ft
Channel Slope	0.10	%
Critical Slope	0.00913	ft/ft

Cross Section for 17R Ogden RT 10-Year Dry Lane

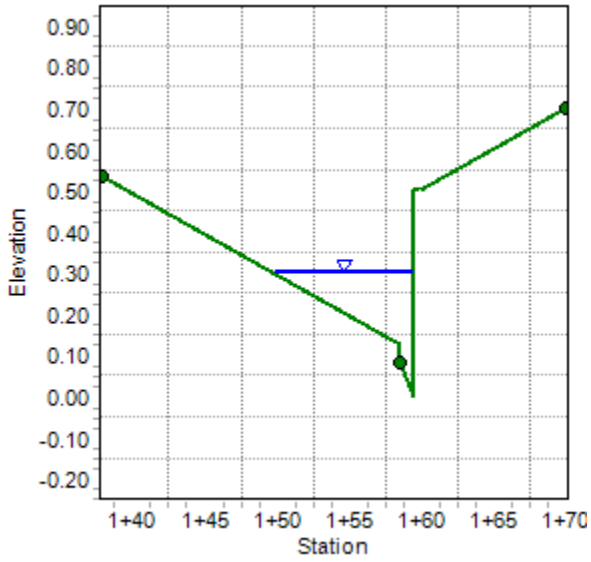
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.10	%
Normal Depth	0.30	ft
Discharge	0.6	ft³/s

Cross Section Image



Worksheet for 18L Stewart LT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.11	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
0+85.00	0.80
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+22.30	0.54

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+85.00, 0.80)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+22.30, 0.54)	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	0.7	ft³/s
Elevation Range	0.000 to 0.800 ft	
Flow Area	1.03	ft²
Wetted Perimeter	10.148	ft
Hydraulic Radius	0.10	ft

Worksheet for 18L Stewart LT 10-Year Dry Lane

Results

Top Width		9.800	ft
Normal Depth		0.30	ft
Critical Depth		0.23	ft
Critical Slope		0.00900	ft/ft
Velocity		0.69	ft/s
Velocity Head		0.01	ft
Specific Energy		0.31	ft
Froude Number		0.37	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.23	ft
Channel Slope	0.11	%
Critical Slope	0.00900	ft/ft

Cross Section for 18L Stewart LT 10-Year Dry Lane

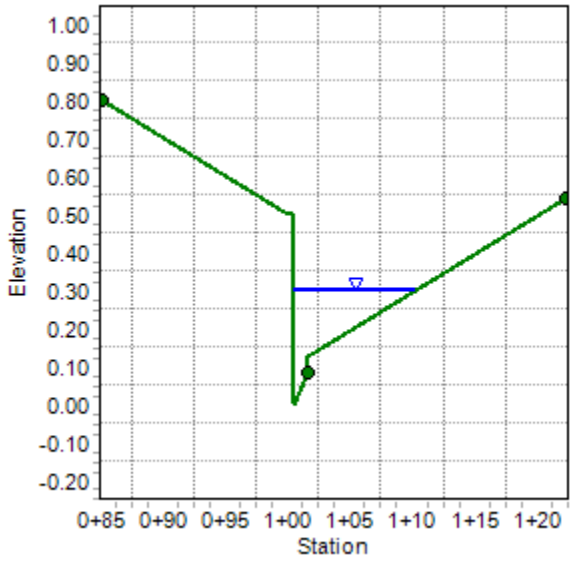
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.11	%
Normal Depth	0.30	ft
Discharge	0.7	ft³/s

Cross Section Image



Worksheet for 18R Stewart RT 10-Year Dry Lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.10	%
Normal Depth	0.30	ft

Section Definitions

Station (ft)	Elevation (ft)
1+27.90	0.74
1+58.40	0.13
1+58.40	0.08
1+59.40	0.00
1+59.40	0.50
1+59.90	0.50
1+74.90	0.80

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(1+27.90, 0.74)	(1+58.40, 0.08)	0.016
(1+58.40, 0.08)	(1+74.90, 0.80)	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

Discharge	0.6	ft³/s
Elevation Range	0.000 to 0.800 ft	
Flow Area	0.98	ft²
Wetted Perimeter	9.842	ft
Hydraulic Radius	0.10	ft

Worksheet for 18R Stewart RT 10-Year Dry Lane

Results

Top Width		9.500	ft
Normal Depth		0.30	ft
Critical Depth		0.22	ft
Critical Slope		0.00913	ft/ft
Velocity		0.64	ft/s
Velocity Head		0.01	ft
Specific Energy		0.30	ft
Froude Number		0.35	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.30	ft
Critical Depth	0.22	ft
Channel Slope	0.10	%
Critical Slope	0.00913	ft/ft

Cross Section for 18R Stewart RT 10-Year Dry Lane

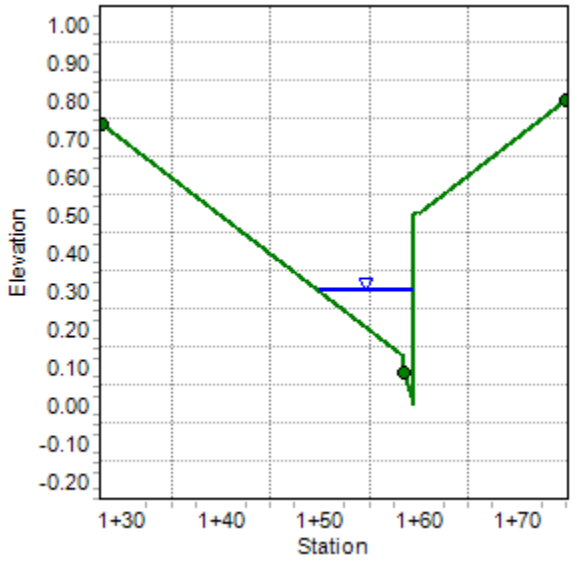
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.10	%
Normal Depth	0.30	ft
Discharge	0.6	ft³/s

Cross Section Image



C.1.2

Half Street Capacity

Worksheet for 9L Hoover LT Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.49	%
Normal Depth	0.70	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+30.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+30.00, 0.70)	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	26.3	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	9.82	ft²
Wetted Perimeter	40.303	ft
Hydraulic Radius	0.24	ft

Worksheet for 9L Hoover LT Capacity

Results

Top Width		39.750	ft
Normal Depth		0.70	ft
Critical Depth		0.68	ft
Critical Slope		0.00549	ft/ft
Velocity		2.67	ft/s
Velocity Head		0.11	ft
Specific Energy		0.81	ft
Froude Number		0.95	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.70	ft
Critical Depth	0.68	ft
Channel Slope	0.49	%
Critical Slope	0.00549	ft/ft

Cross Section for 9L Hoover LT Capacity

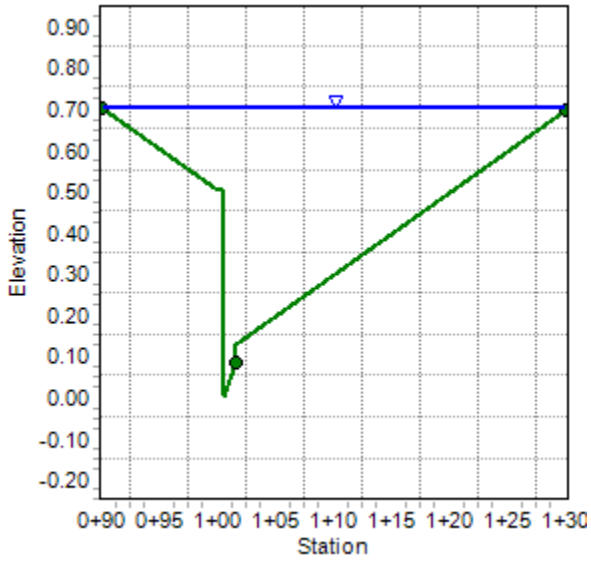
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.49	%
Normal Depth	0.70	ft
Discharge	26.3	ft³/s

Cross Section Image



Worksheet for 10L Gass LT Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.75	%
Normal Depth	0.70	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+30.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+30.00, 0.70)	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	32.5	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	9.82	ft²
Wetted Perimeter	40.303	ft
Hydraulic Radius	0.24	ft

Worksheet for 10L Gass LT Capacity

Results

Top Width		39.750	ft
Normal Depth		0.70	ft
Critical Depth		0.72	ft
Critical Slope		0.00528	ft/ft
Velocity		3.31	ft/s
Velocity Head		0.17	ft
Specific Energy		0.86	ft
Froude Number		1.17	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.70	ft
Critical Depth	0.72	ft
Channel Slope	0.75	%
Critical Slope	0.00528	ft/ft

Cross Section for 10L Gass LT Capacity

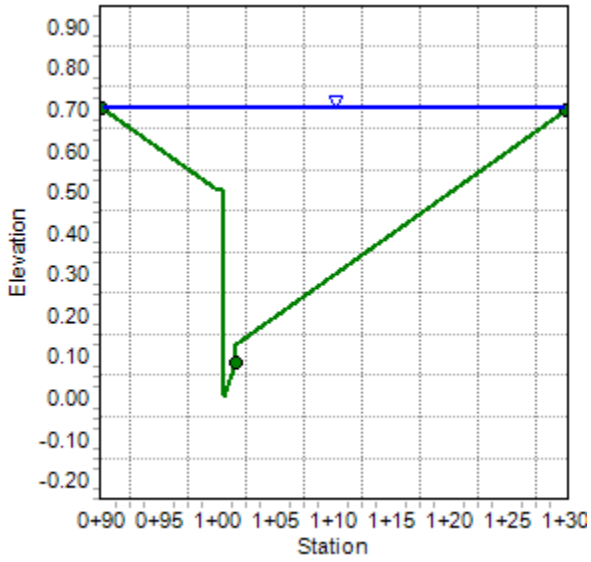
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.75	%
Normal Depth	0.70	ft
Discharge	32.5	ft³/s

Cross Section Image



Worksheet for 11L Garces LT Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.46	%
Normal Depth	0.70	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+30.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+30.00, 0.70)	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	25.4	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	9.82	ft²
Wetted Perimeter	40.303	ft
Hydraulic Radius	0.24	ft

Worksheet for 11L Garces LT Capacity

Results

Top Width		39.750	ft
Normal Depth		0.70	ft
Critical Depth		0.68	ft
Critical Slope		0.00551	ft/ft
Velocity		2.59	ft/s
Velocity Head		0.10	ft
Specific Energy		0.80	ft
Froude Number		0.92	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.70	ft
Critical Depth	0.68	ft
Channel Slope	0.46	%
Critical Slope	0.00551	ft/ft

Cross Section for 11L Garces LT Capacity

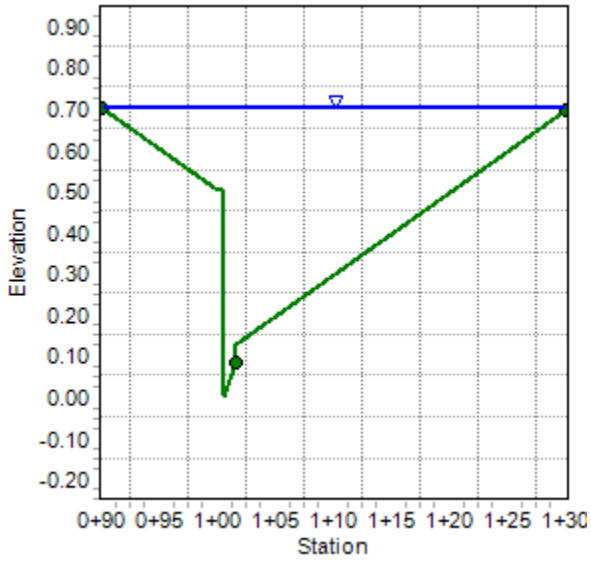
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.46	%
Normal Depth	0.70	ft
Discharge	25.4	ft³/s

Cross Section Image



Worksheet for 12L Bonneville LT Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.34	%
Normal Depth	0.70	ft

Section Definitions

Station (ft)	Elevation (ft)
0+85.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+35.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+85.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+35.00, 0.70)	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		25.6	ft³/s
Elevation Range	0.000 to 0.700 ft		
Flow Area		11.72	ft²
Wetted Perimeter		50.177	ft
Hydraulic Radius		0.23	ft

Worksheet for 12L Bonneville LT Capacity

Results

Top Width		49.625	ft
Normal Depth		0.70	ft
Critical Depth		0.65	ft
Critical Slope		0.00557	ft/ft
Velocity		2.18	ft/s
Velocity Head		0.07	ft
Specific Energy		0.77	ft
Froude Number		0.79	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.70	ft
Critical Depth	0.65	ft
Channel Slope	0.34	%
Critical Slope	0.00557	ft/ft

Cross Section for 12L Bonneville LT Capacity

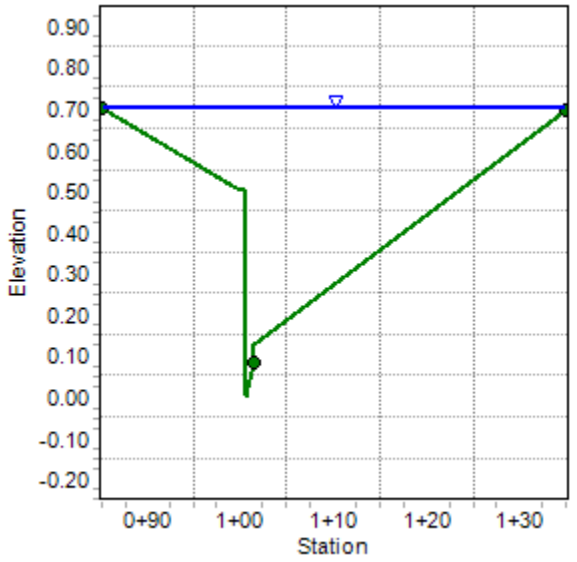
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.34	%
Normal Depth	0.70	ft
Discharge	25.6	ft³/s

Cross Section Image



Worksheet for 12.5L Between Clark & Bridger LT Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.14	%
Normal Depth	1.20	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+22.00	0.54
1+22.00	1.04
1+30.00	1.20

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+22.00, 0.54)	0.016
(1+22.00, 0.54)	(1+30.00, 1.20)	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

Discharge	71.8	ft^3/s
Elevation Range	0.000 to 1.195 ft	

Worksheet for 12.5L Between Clark & Bridger LT Capacity

Results

Flow Area		25.82	ft²
Wetted Perimeter		41.548	ft
Hydraulic Radius		0.62	ft
Top Width		40.000	ft
Normal Depth		1.20	ft
Critical Depth		0.95	ft
Critical Slope		0.00399	ft/ft
Velocity		2.78	ft/s
Velocity Head		0.12	ft
Specific Energy		1.32	ft
Froude Number		0.61	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	1.20	ft
Critical Depth	0.95	ft
Channel Slope	0.14	%
Critical Slope	0.00399	ft/ft

Cross Section for 12.5L Between Clark & Bridger LT Capacity

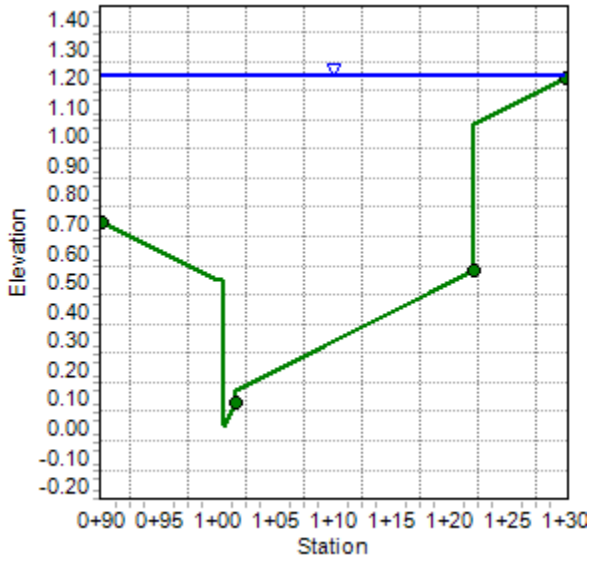
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.14	%
Normal Depth	1.20	ft
Discharge	71.8	ft³/s

Cross Section Image



Worksheet for 13L Clark LT Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.14	%
Normal Depth	0.70	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+30.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+30.00, 0.70)	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	14.0	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	9.82	ft²
Wetted Perimeter	40.303	ft
Hydraulic Radius	0.24	ft

Worksheet for 13L Clark LT Capacity

Results

Top Width		39.750	ft
Normal Depth		0.70	ft
Critical Depth		0.56	ft
Critical Slope		0.00585	ft/ft
Velocity		1.43	ft/s
Velocity Head		0.03	ft
Specific Energy		0.73	ft
Froude Number		0.51	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.70	ft
Critical Depth	0.56	ft
Channel Slope	0.14	%
Critical Slope	0.00585	ft/ft

Cross Section for 13L Clark LT Capacity

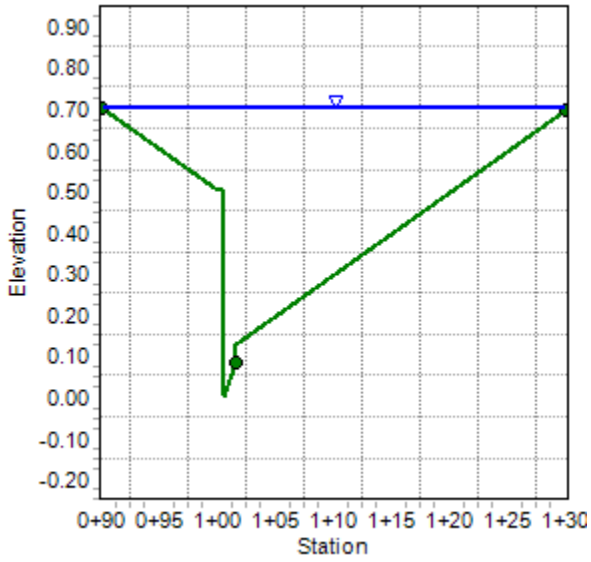
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.14	%
Normal Depth	0.70	ft
Discharge	14.0	ft³/s

Cross Section Image



Worksheet for 14L Bridger LT Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.24	%
Normal Depth	0.70	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+30.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+30.00, 0.70)	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	18.4	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	9.82	ft²
Wetted Perimeter	40.303	ft
Hydraulic Radius	0.24	ft

Worksheet for 14L Bridger LT Capacity

Results

Top Width		39.750	ft
Normal Depth		0.70	ft
Critical Depth		0.61	ft
Critical Slope		0.00571	ft/ft
Velocity		1.87	ft/s
Velocity Head		0.05	ft
Specific Energy		0.75	ft
Froude Number		0.66	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.70	ft
Critical Depth	0.61	ft
Channel Slope	0.24	%
Critical Slope	0.00571	ft/ft

Cross Section for 14L Bridger LT Capacity

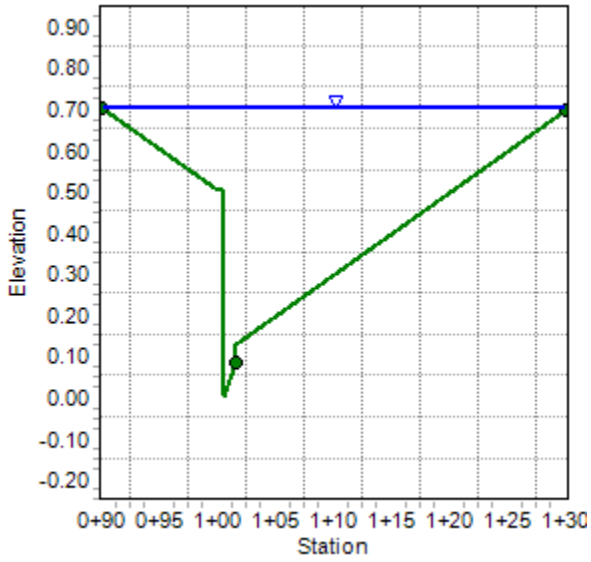
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.24	%
Normal Depth	0.70	ft
Discharge	18.4	ft³/s

Cross Section Image



Worksheet for 15L Carson Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.13	%
Normal Depth	0.70	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+30.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+30.00, 0.70)	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	13.5	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	9.82	ft²
Wetted Perimeter	40.303	ft
Hydraulic Radius	0.24	ft

Worksheet for 15L Carson Capacity

Results

Top Width		39.750	ft
Normal Depth		0.70	ft
Critical Depth		0.56	ft
Critical Slope		0.00587	ft/ft
Velocity		1.38	ft/s
Velocity Head		0.03	ft
Specific Energy		0.72	ft
Froude Number		0.49	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.70	ft
Critical Depth	0.56	ft
Channel Slope	0.13	%
Critical Slope	0.00587	ft/ft

Cross Section for 15L Carson Capacity

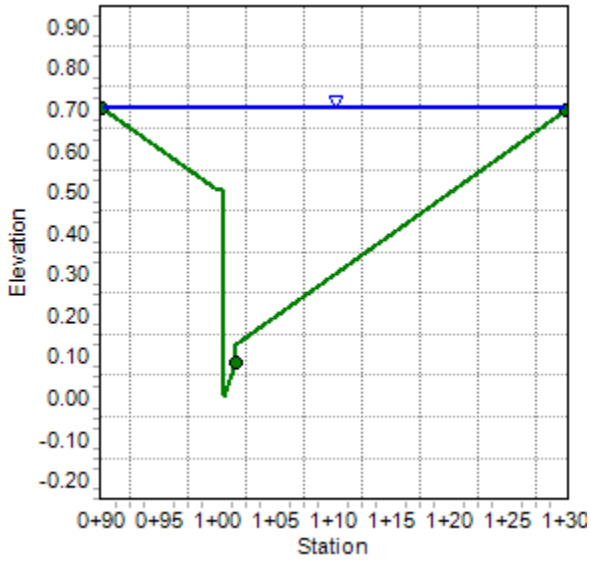
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.13	%
Normal Depth	0.70	ft
Discharge	13.5	ft³/s

Cross Section Image



Worksheet for 16L Fremont LT Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.22	%
Normal Depth	0.70	ft

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	0.70
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+30.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 0.70)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+30.00, 0.70)	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	17.6	ft³/s
Elevation Range	0.000 to 0.700 ft	
Flow Area	9.82	ft²
Wetted Perimeter	40.303	ft
Hydraulic Radius	0.24	ft

Worksheet for 16L Fremont LT Capacity

Results

Top Width		39.750	ft
Normal Depth		0.70	ft
Critical Depth		0.61	ft
Critical Slope		0.00573	ft/ft
Velocity		1.79	ft/s
Velocity Head		0.05	ft
Specific Energy		0.74	ft
Froude Number		0.64	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.70	ft
Critical Depth	0.61	ft
Channel Slope	0.22	%
Critical Slope	0.00573	ft/ft

Cross Section for 16L Fremont LT Capacity

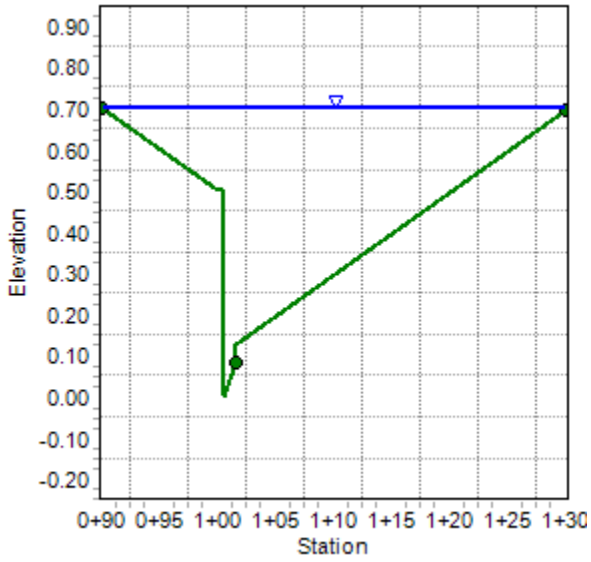
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.22	%
Normal Depth	0.70	ft
Discharge	17.6	ft³/s

Cross Section Image



Worksheet for 17L Ogden LT Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.36	%
Normal Depth	0.70	ft

Section Definitions

Station (ft)	Elevation (ft)
0+85.00	0.80
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+30.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+85.00, 0.80)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+30.00, 0.70)	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	22.5	ft³/s
Elevation Range	0.000 to 0.800 ft	
Flow Area	9.82	ft²
Wetted Perimeter	40.303	ft
Hydraulic Radius	0.24	ft

Worksheet for 17L Ogden LT Capacity

Results

Top Width		39.750	ft
Normal Depth		0.70	ft
Critical Depth		0.65	ft
Critical Slope		0.00558	ft/ft
Velocity		2.29	ft/s
Velocity Head		0.08	ft
Specific Energy		0.78	ft
Froude Number		0.81	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.70	ft
Critical Depth	0.65	ft
Channel Slope	0.36	%
Critical Slope	0.00558	ft/ft

Cross Section for 17L Ogden LT Capacity

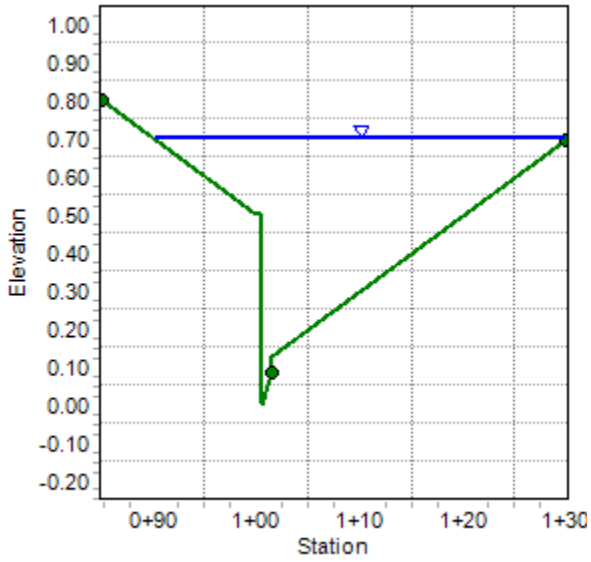
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.36	%
Normal Depth	0.70	ft
Discharge	22.5	ft³/s

Cross Section Image



Worksheet for 18L Stewart LT Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.63	%
Normal Depth	0.70	ft

Section Definitions

Station (ft)	Elevation (ft)
0+85.00	0.80
1+00.00	0.50
1+00.50	0.50
1+00.50	0.00
1+01.50	0.08
1+01.50	0.13
1+35.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+85.00, 0.80)	(1+01.50, 0.08)	0.013
(1+01.50, 0.08)	(1+35.00, 0.70)	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	34.3	ft³/s
Elevation Range	0.000 to 0.800 ft	
Flow Area	11.25	ft²
Wetted Perimeter	45.302	ft
Hydraulic Radius	0.25	ft

Worksheet for 18L Stewart LT Capacity

Results

Top Width		44.750	ft
Normal Depth		0.70	ft
Critical Depth		0.71	ft
Critical Slope		0.00541	ft/ft
Velocity		3.05	ft/s
Velocity Head		0.14	ft
Specific Energy		0.84	ft
Froude Number		1.07	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.000	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	0.70	ft
Critical Depth	0.71	ft
Channel Slope	0.63	%
Critical Slope	0.00541	ft/ft

Cross Section for 18L Stewart LT Capacity

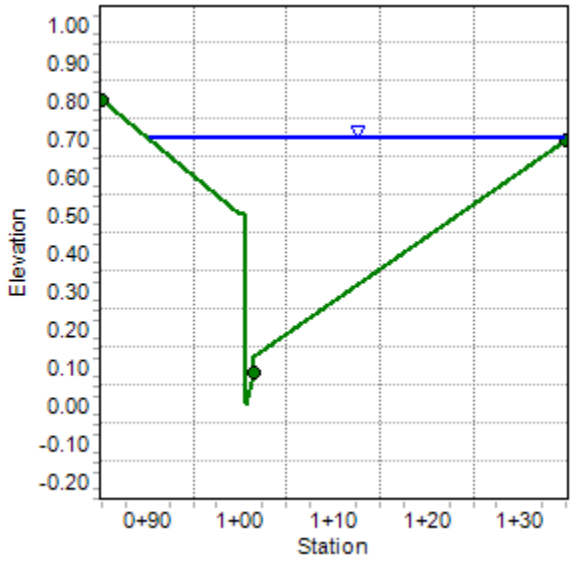
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.63	%
Normal Depth	0.70	ft
Discharge	34.3	ft³/s

Cross Section Image



C.1.3

Existing Side Street Storm Drain Capacity

Worksheet for Bonneville 36-inch Side Street Storm Drain

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01320	ft/ft
Normal Depth	3.00	ft
Diameter	3.00	ft
Discharge	76.63	ft³/s

Results

Discharge	76.63	ft³/s
Normal Depth	3.00	ft
Flow Area	7.07	ft²
Wetted Perimeter	9.42	ft
Hydraulic Radius	0.75	ft
Top Width	0.00	ft
Critical Depth	2.74	ft
Percent Full	100.0	%
Critical Slope	0.01151	ft/ft
Velocity	10.84	ft/s
Velocity Head	1.83	ft
Specific Energy	4.83	ft
Froude Number	0.00	
Maximum Discharge	82.43	ft³/s
Discharge Full	76.63	ft³/s
Slope Full	0.01320	ft/ft
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	%

Worksheet for Bonneville 36-inch Side Street Storm Drain

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.00	ft
Critical Depth	2.74	ft
Channel Slope	0.01320	ft/ft
Critical Slope	0.01151	ft/ft

Cross Section for Bonneville 36-inch Side Street Storm Drain

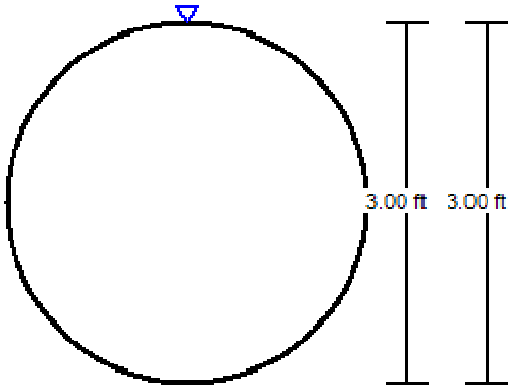
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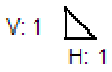
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01320	ft/ft
Normal Depth	3.00	ft
Diameter	3.00	ft
Discharge	76.63	ft³/s

Cross Section Image





Worksheet for Bridger 18-inch Side Street Storm Drain

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Normal Depth	1.50	ft
Diameter	1.50	ft
Discharge	7.43	ft³/s

Results

Discharge	7.43	ft³/s
Normal Depth	1.50	ft
Flow Area	1.77	ft²
Wetted Perimeter	4.71	ft
Hydraulic Radius	0.38	ft
Top Width	0.00	ft
Critical Depth	1.06	ft
Percent Full	100.0	%
Critical Slope	0.00703	ft/ft
Velocity	4.20	ft/s
Velocity Head	0.27	ft
Specific Energy	1.77	ft
Froude Number	0.00	
Maximum Discharge	7.99	ft³/s
Discharge Full	7.43	ft³/s
Slope Full	0.00500	ft/ft
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	%

Worksheet for Bridger 18-inch Side Street Storm Drain

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	1.06	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00703	ft/ft

Cross Section for Bridger 18-inch Side Street Storm Drain

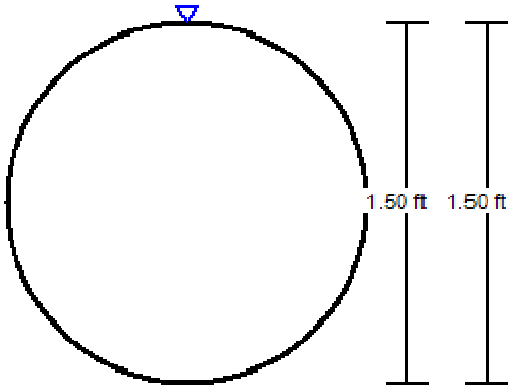
Project Description

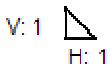
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Normal Depth	1.50	ft
Diameter	1.50	ft
Discharge	7.43	ft³/s

Cross Section Image





Worksheet for Carson 18-inch Side Street Storm Drain

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00570	ft/ft
Normal Depth	1.50	ft
Diameter	1.50	ft
Discharge	7.93	ft³/s

Results

Discharge	7.93	ft³/s
Normal Depth	1.50	ft
Flow Area	1.77	ft²
Wetted Perimeter	4.71	ft
Hydraulic Radius	0.38	ft
Top Width	0.00	ft
Critical Depth	1.09	ft
Percent Full	100.0	%
Critical Slope	0.00738	ft/ft
Velocity	4.49	ft/s
Velocity Head	0.31	ft
Specific Energy	1.81	ft
Froude Number	0.00	
Maximum Discharge	8.53	ft³/s
Discharge Full	7.93	ft³/s
Slope Full	0.00570	ft/ft
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	%

Worksheet for Carson 18-inch Side Street Storm Drain

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	1.09	ft
Channel Slope	0.00570	ft/ft
Critical Slope	0.00738	ft/ft

Cross Section for Carson 18-inch Side Street Storm Drain

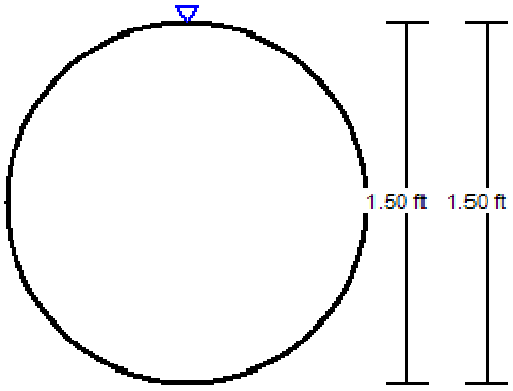
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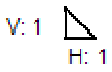
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00570	ft/ft
Normal Depth	1.50	ft
Diameter	1.50	ft
Discharge	7.93	ft³/s

Cross Section Image





Worksheet for Fremont 18-inch Side Street Storm Drain

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00040	ft/ft
Normal Depth	1.50	ft
Diameter	1.50	ft
Discharge	2.10	ft³/s

Results

Discharge	2.10	ft³/s
Normal Depth	1.50	ft
Flow Area	1.77	ft²
Wetted Perimeter	4.71	ft
Hydraulic Radius	0.38	ft
Top Width	0.00	ft
Critical Depth	0.55	ft
Percent Full	100.0	%
Critical Slope	0.00496	ft/ft
Velocity	1.19	ft/s
Velocity Head	0.02	ft
Specific Energy	1.52	ft
Froude Number	0.00	
Maximum Discharge	2.26	ft³/s
Discharge Full	2.10	ft³/s
Slope Full	0.00040	ft/ft
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	%

Worksheet for Fremont 18-inch Side Street Storm Drain

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	0.55	ft
Channel Slope	0.00040	ft/ft
Critical Slope	0.00496	ft/ft

Cross Section for Fremont 18-inch Side Street Storm Drain

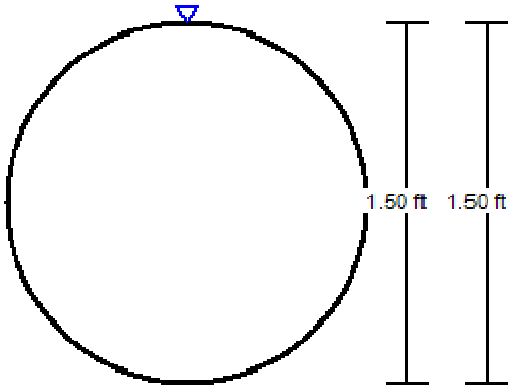
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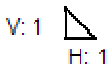
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00040	ft/ft
Normal Depth	1.50	ft
Diameter	1.50	ft
Discharge	2.10	ft³/s

Cross Section Image





Worksheet for Fremont 24-inch Side Street Storm Drain (north)

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00270	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	11.75	ft³/s

Results

Discharge	11.75	ft³/s
Normal Depth	2.00	ft
Flow Area	3.14	ft²
Wetted Perimeter	6.28	ft
Hydraulic Radius	0.50	ft
Top Width	0.00	ft
Critical Depth	1.23	ft
Percent Full	100.0	%
Critical Slope	0.00553	ft/ft
Velocity	3.74	ft/s
Velocity Head	0.22	ft
Specific Energy	2.22	ft
Froude Number	0.00	
Maximum Discharge	12.64	ft³/s
Discharge Full	11.75	ft³/s
Slope Full	0.00270	ft/ft
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	%

Worksheet for Fremont 24-inch Side Street Storm Drain (north)

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	1.23	ft
Channel Slope	0.00270	ft/ft
Critical Slope	0.00553	ft/ft

Worksheet for Fremont 24-inch Side Street Storm Drain (south)

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00780	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	19.98	ft³/s

Results

Discharge	19.98	ft³/s
Normal Depth	2.00	ft
Flow Area	3.14	ft²
Wetted Perimeter	6.28	ft
Hydraulic Radius	0.50	ft
Top Width	0.00	ft
Critical Depth	1.61	ft
Percent Full	100.0	%
Critical Slope	0.00811	ft/ft
Velocity	6.36	ft/s
Velocity Head	0.63	ft
Specific Energy	2.63	ft
Froude Number	0.00	
Maximum Discharge	21.49	ft³/s
Discharge Full	19.98	ft³/s
Slope Full	0.00780	ft/ft
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	%

Worksheet for Fremont 24-inch Side Street Storm Drain (south)

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	1.61	ft
Channel Slope	0.00780	ft/ft
Critical Slope	0.00811	ft/ft

Cross Section for Fremont 24-inch Side Street Storm Drain (north)

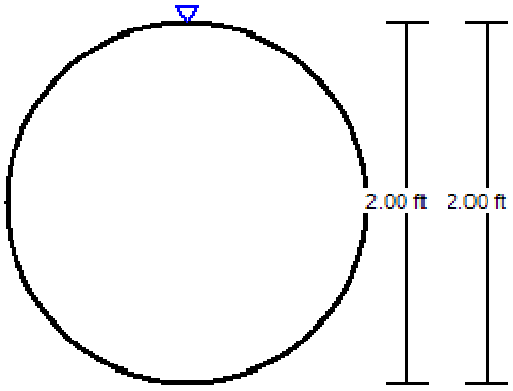
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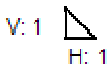
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00270	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	11.75	ft³/s

Cross Section Image





Cross Section for Fremont 24-inch Side Street Storm Drain (south)

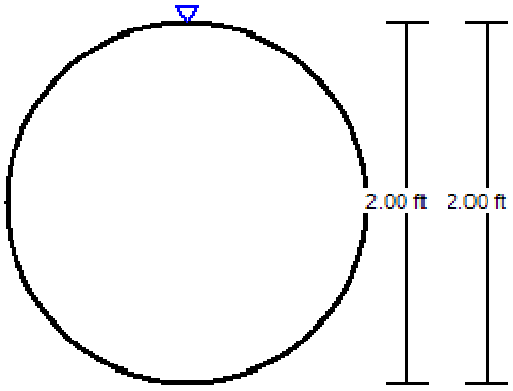
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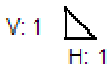
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00780	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	19.98	ft³/s

Cross Section Image





Worksheet for Ogdan 12-inch Side Street Storm Drain

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01750	ft/ft
Normal Depth	1.00	ft
Diameter	1.00	ft
Discharge	4.71	ft³/s

Results

Discharge	4.71	ft³/s
Normal Depth	1.00	ft
Flow Area	0.79	ft²
Wetted Perimeter	3.14	ft
Hydraulic Radius	0.25	ft
Top Width	0.00	ft
Critical Depth	0.90	ft
Percent Full	100.0	%
Critical Slope	0.01540	ft/ft
Velocity	6.00	ft/s
Velocity Head	0.56	ft
Specific Energy	1.56	ft
Froude Number	0.00	
Maximum Discharge	5.07	ft³/s
Discharge Full	4.71	ft³/s
Slope Full	0.01750	ft/ft
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	%

Worksheet for Ogdan 12-inch Side Street Storm Drain

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.00	ft
Critical Depth	0.90	ft
Channel Slope	0.01750	ft/ft
Critical Slope	0.01540	ft/ft

Cross Section for Ogdan 12-inch Side Street Storm Drain

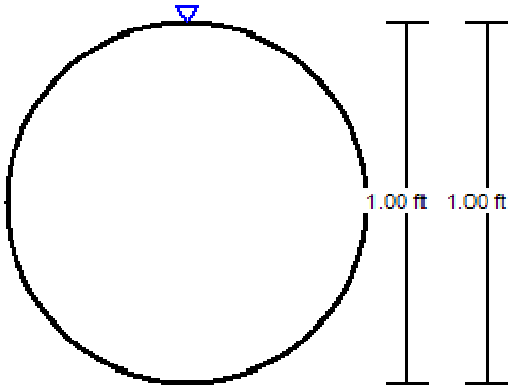
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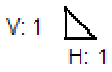
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01750	ft/ft
Normal Depth	1.00	ft
Diameter	1.00	ft
Discharge	4.71	ft³/s

Cross Section Image





Worksheet for Ogdan 15-inch Side Street Storm Drain

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01750	ft/ft
Normal Depth	1.25	ft
Diameter	1.25	ft
Discharge	8.55	ft³/s

Results

Discharge	8.55	ft³/s
Normal Depth	1.25	ft
Flow Area	1.23	ft²
Wetted Perimeter	3.93	ft
Hydraulic Radius	0.31	ft
Top Width	0.00	ft
Critical Depth	1.14	ft
Percent Full	100.0	%
Critical Slope	0.01527	ft/ft
Velocity	6.96	ft/s
Velocity Head	0.75	ft
Specific Energy	2.00	ft
Froude Number	0.00	
Maximum Discharge	9.19	ft³/s
Discharge Full	8.55	ft³/s
Slope Full	0.01750	ft/ft
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	%

Worksheet for Ogdan 15-inch Side Street Storm Drain

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.25	ft
Critical Depth	1.14	ft
Channel Slope	0.01750	ft/ft
Critical Slope	0.01527	ft/ft

Cross Section for Ogdan 15-inch Side Street Storm Drain

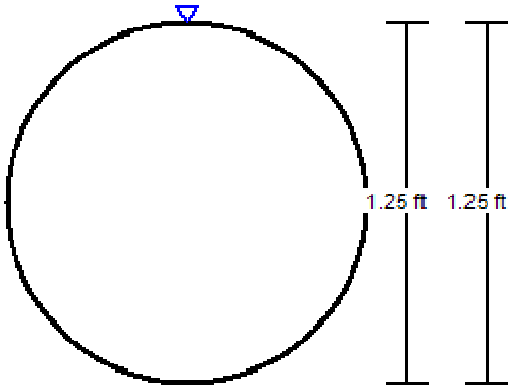
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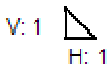
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01750	ft/ft
Normal Depth	1.25	ft
Diameter	1.25	ft
Discharge	8.55	ft³/s

Cross Section Image





Worksheet for Stewart 18-inch Side Street Storm Drain

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00280	ft/ft
Normal Depth	1.50	ft
Diameter	1.50	ft
Discharge	5.56	ft³/s

Results

Discharge	5.56	ft³/s
Normal Depth	1.50	ft
Flow Area	1.77	ft²
Wetted Perimeter	4.71	ft
Hydraulic Radius	0.38	ft
Top Width	0.00	ft
Critical Depth	0.91	ft
Percent Full	100.0	%
Critical Slope	0.00601	ft/ft
Velocity	3.15	ft/s
Velocity Head	0.15	ft
Specific Energy	1.65	ft
Froude Number	0.00	
Maximum Discharge	5.98	ft³/s
Discharge Full	5.56	ft³/s
Slope Full	0.00280	ft/ft
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	%

Worksheet for Stewart 18-inch Side Street Storm Drain

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	0.91	ft
Channel Slope	0.00280	ft/ft
Critical Slope	0.00601	ft/ft

Cross Section for Stewart 18-inch Side Street Storm Drain

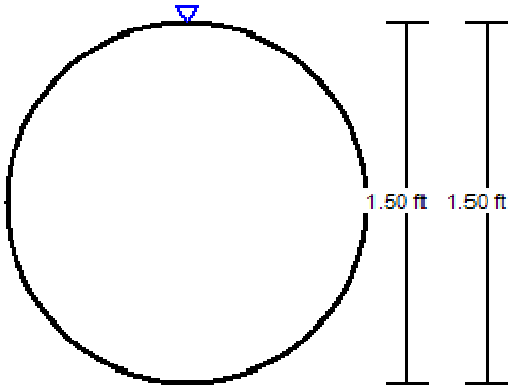
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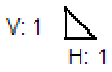
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00280	ft/ft
Normal Depth	1.50	ft
Diameter	1.50	ft
Discharge	5.56	ft³/s

Cross Section Image





C.2

HEC-22 DROP INLET CALCULATIONS

C.2.1

Las Vegas Boulevard Drop Inlets

LV BLVD, CHARLESTON TO STEWART

On Grade Drop Inlet Flow Interception Calculations (10 - Year Ultimate Flows Used)

All calculations are based on FHWA HEC-22 method

n = 0.016

Splash-over velocity 'V_0 = 10.0 ft/s (CHART 5)

Inlet Keynote	Inlet Type	Location Cross Street	Q cfs	$Q_{w/bypass}$ cfs	L_{grate} ft	L_{curb} ft	S_L ft/ft	S_x ft/ft	Q_{grate} [12] cfs	Q_{curb} [13] cfs	Clogging Factor	Interception cfs	Bypass cfs
HIGH POINT													
2.2	15' A	Hoover Ave., LT	6.0	6.0	0.0	15.0	0.01%	3.81%	0.00	5.96	57.5%	6.0	0.0
2.3	4' A	Hoover Ave., RT	1.0	1.0	0.0	4.0	0.45%	3.49%	0.00	0.27	57.5%	0.3	0.7
2.10	20' A	North of Hoover Ave, LT	6.3	6.3	0.0	20.0	0.44%	3.02%	0.00	3.33	57.5%	3.3	3.0
2.9	18' A	North of Hoover Ave, LT	3.0	3.0	0.0	18.0	0.44%	3.02%	0.00	1.87	57.5%	1.9	1.1
3.2	4' A	Gass Ave., RT	1.0	1.0	0.0	4.0	0.44%	3.64%	0.00	0.28	57.5%	0.3	0.7
3.10	20' A	North of Gass Ave., LT	7.8	7.8	0.0	20.0	1.00%	3.83%	0.00	3.49	57.5%	3.5	4.3
3.9	18' A	North of Gass Ave., LT	4.3	4.3	0.0	18.0	0.99%	4.34%	0.00	2.33	57.5%	2.3	2.0
4.3	20' A	Garces Ave., LT	7.0	7.0	0.0	20.0	0.96%	3.76%	0.00	3.27	57.5%	3.3	3.7
4.2	4' A	Garces Ave., RT	1.0	1.0	0.0	4.0	0.88%	3.58%	0.00	0.23	57.5%	0.2	0.8
4.12	20' A	North of Garces Ave., LT	8.2	8.2	0.0	20.0	0.41%	3.48%	0.00	4.32	57.5%	4.3	3.9
4.11	20' A	North of Garces Ave., LT	3.9	3.9	0.0	20.0	0.41%	3.86%	0.00	2.76	57.5%	2.8	1.1
LOW POINT													
HIGH POINT													
7.3	18' A	Between Clark & Bridger LT	4.8	4.8	0.0	18.0	0.10%	4.28%	0.00	4.12	57.5%	4.1	0.7
7.2	4' A	Between Clark & Bridger RT	0.5	0.5	0.0	4.0	0.07%	4.22%	0.00	0.31	57.5%	0.3	0.2
6.5	20' A	South of Clark, LT	8.7	8.7	0.0	20.0	0.26%	3.47%	0.00	5.01	57.5%	5.0	3.7
6.3	20' A	South of Clark, LT	3.7	3.7	0.0	20.0	0.24%	3.57%	0.00	2.88	57.5%	2.9	0.8
6.7	4' A	South of Clark, LT	0.8	0.8	0.0	4.0	0.24%	3.57%	0.00	0.28	57.5%	0.3	0.5
LOW POINT													

LV BLVD, CHARLESTON TO STEWART

On Grade Drop Inlet Flow Interception Calculations (10 - Year Ultimate Flows Used)

All calculations are based on FHWA HEC-22 method

n = **0.016**

Splash-over velocity 'V_0 = **10.0** **ft/s (CHART 5)**

Inlet Keynote	Inlet Type	Location Cross Street	Q cfs	$Q_{w/bypass}$ cfs	L_{grate} ft	L_{curb} ft	S_L ft/ft	S_x ft/ft	Q_{grate} [12] cfs	Q_{curb} [13] cfs	Clogging Factor	Interception cfs	Bypass cfs
HIGH POINT													
9.7	15' A	North of Bridger, LT	3.1	3.1	0.0	15.0	0.44%	3.02%	0.00	1.65	57.5%	1.7	1.4
10.2	4' A	Carson, RT	1.0	1.0	0.0	4.0	0.38%	3.78%	0.00	0.30	57.5%	0.3	0.7
10.7	20' A	North of Carson LT	10.0	10.0	0.0	20.0	0.20%	2.69%	0.00	5.16	57.5%	5.2	4.8
10.8	20' A	North of Carson LT	4.8	4.8	0.0	20.0	0.15%	2.42%	0.00	3.23	57.5%	3.2	1.6
10.9	4' A	North of Carson LT	1.6	1.6	0.0	4.0	0.15%	2.42%	0.00	0.40	57.5%	0.4	1.2
11.1	4' A	Fremont, LT	6.2	6.2	0.0	4.0	0.96%	6.84%	0.00	0.96	57.5%	1.0	5.2
11.5	4' A	Fremont, RT	1.0	1.0	0.0	4.0	0.14%	4.26%	0.00	0.41	57.5%	0.4	0.6
11.6	15' A	North of Fremont, LT	5.2	5.2	0.0	15.0	0.03%	3.09%	0.00	4.33	57.5%	4.3	0.9
12.6	20' A	North of Ogden, LT	12.4	12.4	0.0	20.0	0.15%	3.99%	0.00	7.73	57.5%	7.7	4.7
12.7	20' A	North of Ogden, LT	4.7	4.7	0.0	20.0	0.13%	4.45%	0.00	4.17	57.5%	4.2	0.5
13.2	20' A	Stewart, LT	5.5	5.5	0.0	20.0	0.09%	3.95%	0.00	4.80	57.5%	4.8	0.7

LV BLVD, CHARLESTON TO STEWART

On Grade Drop Inlet Flow Interception Calculations (10 - Year Ultimate Flows Used)

All calculations are based on FHWA HEC-22 method

n = 0.016

Splash-over velocity 'V_0 = 10.0 ft/s (CHART 5)

Inlet Keynote	Inlet Type	Location Cross Street	Q cfs	$Q_{w/bypass}$ cfs	L_{grate} ft	L_{curb} ft	S_L ft/ft	S_x ft/ft	Q_{grate} [12] cfs	Q_{curb} [13] cfs	Clogging Factor	Interception cfs	Bypass cfs

[1]Starts at the upstream end

[2]L_T = Curb opening length required to intercept 100% of the gutter flow

$L_T = KQ^{0.42}S_L^{0.3}(1/nS_x)^{0.6}$

K = (0.82 metric,0.60 English) = 0.60

[3]Slotted drain length upstream of the grate

(note: R_f can not exceed 1.0)

[4]E = Slotted drain inlet interception efficiency 0.09

$E = 1-(1-L/L_T)^{1.8}$

[5]T = Width of flow

(note: C_f (%) = Clogging Factor)

$T = (Qn/(K_cS_x^{1.67}S_L^{0.5}))^{1/2.67}$ 0.15

K_c = (0.376 metric, 0.56 English) = 0.56

[6]Q_s = Gutter flow

$Q_s = (K_c/n)S_x^{1.67}S_L^{0.5}T^{2.67}$

K_c = (0.376 metric, 0.56 English) = 0.56

[7]Q_x = Side flow

$Q_x = (K_c/n)S_x^{1.67}S_L^{0.5}(T-2)^{2.67}$ A = area of orifice

K_c = (0.376 metric, 0.56 English) = 0.56

C.2.2

Side Street Drop Inlets

Side Streets

On Grade Drop Inlet Flow Interception Calculations (10 - Year Ultimate Flows Used)

All calculations are based on FHWA HEC-22 method

n = 0.016

Splash-over velocity 'V_0 = 10.0 ft/s (CHART 5)

Inlet Keynote	Inlet Type	Location Cross Street	Q cfs	$Q_{w/bypass}$ cfs	L_{grate} ft	L_{curb} ft	S_L ft/ft	S_x ft/ft	Q_{grate} [12] cfs	Q_{curb} [13] cfs	Clogging Factor	Interception cfs	Bypass cfs
2.7	7.5' CM	Hoover, LT North	5.95	6.0	5.0	7.5	1.42%	2.00%	2.40	0.42	30%	2.8	3.1
2.6	Type 2 w/ 8' Slot	Hoover, LT South	5.95	6.0	2.0	10.0	1.60%	2.00%	1.53	1.24	30%	2.8	3.2
3.6	17.5' CM	Gass, LT South	7.7	7.7	15.0	17.5	0.55%	2.00%	6.24	0.64	30%	6.9	0.8
3.7	17.5 CM	Gass, LT North	7.7	7.7	15.0	17.5	0.60%	2.00%	6.22	0.63	30%	6.8	0.9
4.6	15' CM	Garces, LT South	10.1	10.1	12.5	15.0	0.99%	3.65%	7.67	0.90	30%	8.6	1.5
4.7	15' CM	Garces, LT North	10.1	10.1	12.5	15.0	2.10%	2.06%	6.54	0.51	30%	7.1	3.0
BSS-N	15' B	Bonneville, LT North	9.6	9.6	15.0	15.0	1.13%	2.00%	7.77	0.00	30%	7.8	1.8
BSS-S	15' B	Bonneville, LT South	9.6	9.6	15.0	15.0	0.75%	2.00%	8.09	0.00	30%	8.1	1.5
6.12	12.5' CM	Clark, LT North	9.55	9.6	17.5	20.0	5.08%	2.00%	6.70	0.38	30%	7.1	2.5
6.9	12.5' CM	Clark, LT South	9.55	9.6	17.5	20.0	0.78%	2.00%	7.87	0.66	30%	8.5	1.0
9.5	15' CM	Bridger, LT North	15.1	15.1	12.5	15.0	0.54%	2.00%	11.05	0.96	30%	12.0	3.1
9.4	20' CM	Bridger, LT South	15.1	15.1	17.5	20.0	0.44%	3.02%	12.69	1.30	30%	14.0	1.1
9.3	5' CM	Bridger, LT South	1.1	1.1	2.5	5.0	0.44%	3.02%	0.54	0.27	30%	0.8	0.3
10.6	20' CM	Carson, LT North	13.4	13.4	17.5	20.0	0.54%	2.00%	11.12	0.89	30%	12.0	1.4
10.5	20' CM	Carson, LT South	13.4	13.4	17.5	20.0	0.44%	2.07%	11.23	0.97	30%	12.2	1.2
12.4	20' CM	Ogden, LT North	14.4	14.4	17.5	20.0	0.68%	2.00%	11.77	0.87	30%	12.6	1.8
12.3	20' CM	Ogden, LT South	14.4	14.4	17.5	20.0	3.09%	2.00%	10.17	0.56	30%	10.7	3.7

Side Streets

On Grade Drop Inlet Flow Interception Calculations (10 - Year Ultimate Flows Used)

All calculations are based on FHWA HEC-22 method

n = **0.016**

Splash-over velocity 'V_0 = **10.0** **ft/s (CHART 5)**

Inlet Keynote	Inlet Type	Location Cross Street	Q cfs	$Q_{w/bypass}$ cfs	L_{grate} ft	L_{curb} ft	S_L ft/ft	S_x ft/ft	Q_{qrate} [12] cfs	Q_{curb} [13] cfs	Clogging Factor	Interception cfs	Bypass cfs

[1]Starts at the upstream end

[2]L_T = Curb opening length required to intercept 100% of the gutter flow

$L_T = KQ^{0.42}S_L^{0.3}(1/nS_x)^{0.6}$

K = (0.82 metric,0.60 English) = 0.60

[3]Slotted drain length upstream of the grate

(note: R_f can not exceed 1.0)

[4]E = Slotted drain inlet interception efficiency 0.09

$E = 1-(1-L/L_T)^{1.8}$

[5]T = Width of flow (note: C_f (%) = Clogging Factor)

$T = (Qn/(K_cS_x^{1.67}S_L^{0.5}))^{1/2.67}$ 0.15

K_c = (0.376 metric, 0.56 English) = 0.56

[6]Q_s = Gutter flow

$Q_s = (K_c/n)S_x^{1.67}S_L^{0.5}T^{2.67}$

K_c = (0.376 metric, 0.56 English) = 0.56

[7]Q_x = Side flow

$Q_x = (K_c/n)S_x^{1.67}S_L^{0.5}(T-2)^{2.67}$ A = area of orifice

K_c = (0.376 metric, 0.56 English) = 0.56

C.2.3

Sump Drop Inlets

LAS VEGAS BOULEVARD - CHARLESTON TO STEWART
Drop Inlets Flow Interception Calculations for Inlets in Sump Condition

All calculations are based on FHWA HEC-22 method

Calculations By: PLM
Date: 2/13/2017

unit system = **English** (metric or English)

INLET		Q	$Q_{w/bypass}$	L_{grate}	W_{grate}	L_{curb}	S_x	Clogging Factor	$d_{ponding}$[1]	T^2	P^3	A_g[4]	Q_{grate_w}[5]	Q_{grate_o}[6]	Q_{curb_w}[7]	Q_{curb_o}[8]	$Q_{captured}$[9]	$Q_{bypassed}$[10]
ID and DI Type	Location	cfs	cfs	ft	ft	ft			ft	ft	ft	sq ft	cfs	cfs	cfs	cfs	cfs	cfs
5.3 - 20' CO	10-Year Bonneville Ave, LT	**13.90**	13.90	0.0	0.0	20.0	3.38%	57.5%	**0.70**	20.71	0	0.0	0.00	0.00	14.93	19.11	14.93	**-1.03**
5.4 - 15' CO	10-Year Bonneville Ave, LT	**13.90**	13.90	0.0	0.0	15.0	3.38%	57.5%	**0.70**	20.71	0	0.0	0.00	0.00	11.20	14.33	11.20	**2.70**
5.3 - 20' CO	100-Year Bonneville Ave, LT	**25.60**	25.60	0.0	0.0	20.0	2.7%	57.5%	**0.70**	26.02	0	0.0	0.00	0.00	14.93	19.11	14.93	**10.67**
5.4 - 15' CO	100-Year Bonneville Ave, LT	**25.60**	25.60	0.0	0.0	15.0	2.7%	57.5%	**0.70**	26.02	0	0.0	0.00	0.00	11.20	14.33	11.20	**14.40**

26.1
Good

[1] Ponding depth over grate

[2] Total spread of water, $T = dS_x$

[3] Perimeter of the grate disregarding the side against the curb, $P = L_{grate} + 2W_{grate}$

[4] Clear opening area of the grate, $A_g = L_{grate} W_{grate}$

[5] Capacity of grate inlet operating as a weir: $Q_w = C_w P d^{1.5}$

C_w = (1.66 metric, 3.0 English) = 3.00

[6] Capacity of grate inlet operating as an orifice: $Q_o = C_o A_g (2gd)^{0.5}$

C_0 = 0.67

g = (acceleration due to gravity) = 32.16 ft/(sq sec)

[7] Capacity of curb opening operating as a weir: $Q_w = C_w L d^{1.5}$

C_w = (1.60 metric, 3.0 English) = 3.00

[8] Capacity of curb opening operating as an orifice: $Q_o = C_o h L (2gd_o)^{0.5}$

C_0 = 0.67 5+

g = (acceleration due to gravity) = 32.16 ft/(sq sec)

h = (height of curb-opening orifice) = 0.50 ft

[9] Combined grate and curb flow intercepted from the minimum of either wier or orifice flow

[10] Difference in total flow minus intercepted flow .: $Q - Q_{captured}$

C.3

PIMA COUNTY FLOW SPLIT

PIMA COUNTY FLOW SPLIT CALCULATIONS - INTERIM CONDITION

$$Q_L = 0.042\left[\frac{\left(Q_m^{0.93}\right)\left(W_{ss}^{0.85}\right)}{\left(S_m^{0.41}\right)\left(W_m^{0.79}\right)}\right]$$

$$Q_o = 46.8 \times W_{ss} \times Y_o \times S_{ss}^{0.5} - Q_L$$

$$Q_T = Q_L + Q_o$$

Where: Q_m = LV Blvd. flow measured between the curbs (cfs)
S_m = Longitudinal slope of the main street (ft / ft)
W_m = Width of the main street (ft)
W_{ss} = Width of side street (ft)
S_{ss} = Longitudinal slope of the side street (feet/foot)
Y_o= Average depth of overbank flow intercepted by the side street (ft)
Q_{OB} = Overbank flow on downstream side of LV Blvd. (cfs)
Q_L = Lateral flow into the side street (cfs)
Q_O = Overbank flow intercepted by the side street (cfs)
Q_T = Total flow intercepted by the side street (cfs)
Q_R = Flow remaining in LV Blvd. after split (cfs)

DESCRIPTIONS			INPUT							OUTPUT		RESULTS	
Hec-1 Flow Split Identifier	Main Street	Side Street	Q_m (cfs)	S_m (ft/ft)	W_m (ft)	W_{ss} (ft)	S_{ss} (ft/ft)	Y_o (ft)	Q_{OB} (cfs)	Q_L (cfs)	Q_O (cfs)	**Q_T (cfs)**	**Q_R (cfs)**
Hoover/LV BLVD 10yr	LV BLVD	Hoover	0.0	0.0042	50	50	0.02	0.00	0	0	0	**0.0**	**0.0**
Hoover/LV BLVD 100yr	LV BLVD	Hoover	0.0	0.0042	50	50	0.02	0.00	0	0	0	**0.0**	**0.0**
Gass/LV BLVD 10yr	LV BLVD	Gass	0.0	0.0062	50	46	0.0073	0.00	0	0	0	**0.0**	**0.0**
Gass/LV BLVD 100yr	LV BLVD	Gass	15.3	0.0062	50	46	0.0073	0.00	0	5	0	**5.0**	**10.3**
Garces/LV BLVD 10yr	LV BLVD	Garces	0.0	0.005	50	49	0.0072	0.00	0	0	0	**0.0**	**0.0**
Garces/LV BLVD 100yr	LV BLVD	Garces	48.9	0.005	50	49	0.0072	0.00	0	17	0	**17.0**	**31.9**
Bonneville/LV BLVD 10yr	LV BLVD	Bonneville	0.0	0.0009	50	42	0.0084	0.00	0	0	0	**0.0**	**0.0**
Bonneville/LV BLVD 100yr	LV BLVD	Bonneville	0.0	0.0009	50	42	0.0084	0.00	0	0	0	**0.0**	**0.0**
Clark/LV BLVD 10yr	LV BLVD	Clark	0.0	0.0008	50	49	0.006	0.00	0	0	0	**0.0**	**0.0**
Clark/LV BLVD 100yr	LV BLVD	Clark	42.3	0.0008	50	49	0.006	0.00	0	32	0	**32.0**	**10.3**
Bridger/LV BLVD 10yr	LV BLVD	Bridger	0.0	0.0033	50	60	0.0066	0.00	0	0	0	**0.0**	**0.0**
Bridger/LV BLVD 100yr	LV BLVD	Bridger	0.0	0.0033	50	60	0.0066	0.00	0	0	0	**0.0**	**0.0**
Carson/LV BLVD 10yr	LV BLVD	Carson	0.0	0.0013	60	60	0.01	0.00	0	0	0	**0.0**	**0.0**
Carson/LV BLVD 100yr	LV BLVD	Carson	43.3	0.0013	60	60	0.01	0.00	0	27	0	**27.0**	**16.3**
Fremont/LV BLVD 10 yr	LV BLVD	Fremont	0.0	0.0004	50	37	0.02	0.00	0	0	0	**0.0**	**0.0**
Fremont/LV BLVD 100 yr	LV BLVD	Fremont	0.0	0.0004	50	37	0.02	0.00	0	0	0	**0.0**	**0.0**
Ogden/LV BLVD 10yr	LV BLVD	Ogden	0.0	0.0024	50	60	0.013	0.00	0	0	0	**0.0**	**0.0**
Ogden/LV BLVD 100yr	LV BLVD	Ogden	23.6	0.0024	50	60	0.013	0.00	0	14	0	**14.0**	**9.6**
Stewart/LV BLVD 10 yr	LV BLVD	Stewart	0.0	0.0015	50	60	0.014	0.00	0	0	0	**0.0**	**0.0**
Stewart/LV BLVD 100 yr	LV BLVD	Stewart	30.6	0.0015	50	60	0.014	0.00	0	21	0	**21.0**	**9.6**

C.4

APPROACH/INTERCEPT/BYPASS STORM DRAIN SUMMARY

C.4.1

Charleston Boulevard to Bonneville Avenue

CHARLESTON TO BONNEVILLE

STREET FLOW METHODOLOGY

1) Offsite flow from the west fills up west half of street
1b) Drop inlet at intersection intercepts portion of west half street water
1c) Water in excess of drop inlet capacity continues north in west half of street to next reach of Main St
2) Water above half street capacity spills over to east half of street
2b) Drop inlet at intersection intercepts portion of east half street water
2c) Water in excess of drop inlet capacity, but less than street crown elevation diverts down side street to the east
3) Water in excess of street crown elevation splits to the north and to the east. Ratio for flows above this elevation determined by previously performed flow split calculations.

Legend

Qwest - Flow on west side of LVB
Qeast - Flow on east side of LVB
Qdiw - Flow discharged into DI on west side of LVB
Qdie - Flow discharged into DI on east side of LVB
Qnw - Flow routed north on west side of LVB through intersections
Qne - Flow routed north on east side of LVB through intersections
Qesplit - Flow split off LVB into side street

Charleston to Bonneville
Street and Storm Drain Summary

LVB at Hoover	24" RCP SD		
West Side 10-yr half street capacity:	1.4	cfs	
East Side 10-yr half street capacity:	1.4	cfs	

100-year Flow Summary			
West Side LVB			
Q Subbasin 54E (8)	8.0	cfs	
Previous Qnw	0.0	cfs	
Qnw (Subbasin + Previous Qnw)	8.0	cfs	
Qdiw: From HEC-22 DI Calculations =	6.0	cfs	Inlet 2.2
Qnw = Qw - Qdiw =	2.0	cfs	
East Side LVB Street			
Qe = Previous Qne + Subbasin 54I (1) =	1.0	cfs	
Qdiw: From HEC-22 DI Calculations =	0.3	cfs	Inlet 2.3
Qne = Qe - Qdie =	0.7	cfs	
West Side LVB			
Previous Qnw	2.0	cfs	
Q Existing upstream storm drain	0.0	cfs	
Side Street Drop Inlet	2.8	cfs	Inlet 2.7
Side Street Drop Inlet	2.8	cfs	Inlet 2.6
Q Side Street	25.8	cfs	
Q at west side of intersection	22.2	cfs	
Q contained on west side of intersection (allowable Q)	26.3	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	22.2	cfs	
Qdiw: From HEC-22 DI Calculations =	3.3	cfs	Inlet 2.10
New Qnw = Qnw - Qdiw =	18.9	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	1.9	cfs	Inlet 2.9
New Qnw = Qnw - Qdiw =	17.0	cfs	
East Side LVB Street			
Previous Qne	0.7	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	0.7	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q upstream of flow split	0.7	cfs	
Q Split to east	0.7	cfs	
Qne (in Las Vegas Blvd)	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.0	cfs	

Charleston to Bonneville
Street and Storm Drain Summary

LVB at Hoover

10-year Flow Summary			
West Side LVB			
Q Subbasin 54E (6)	6.0	cfs	
Previous Qnw	0.0	cfs	
Qnw (Subbasin + Previous Qnw)	6.0	cfs	
Qdiw: From HEC-22 DI Calculations =	6.0	cfs	Inlet 2.2
Qnw = Qw - Qdiw =	0.0	cfs	
East Side LVB Street			
Qe = Previous Qne + subbasin 54I (1) =	1.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.3	cfs	Inlet 2.3
Qne = Qe - Qdie =	0.7	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	0.0	cfs	
Q Existing upstream strom drain	0.0	cfs	
Side Street Drop Inlet	2.8	cfs	Inlet 2.7
Side Street Drop Inlet	2.8	cfs	Inlet 2.6
Q Side Street	11.9	cfs	
Q at west side of intersection	6.3	cfs	
Q contained on west side of intersection (allowable Q)	26.3	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	6.3	cfs	
Qdiw: From HEC-22 DI Calculations =	3.3	cfs	Inlet 2.10
New Qnw = Qnw - Qdiw =	3.0	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	1.9	cfs	Inlet 2.9
New Qnw = Qnw - Qdiw =	1.1	cfs	
East Side LVB Street			
Previous Qne	0.7	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	0.7	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q upstream of flow split	0.7	cfs	
Q Split to east	0.7	cfs	
Qne (in Las Vegas Blvd)	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.0	cfs	

Charleston to Bonneville
Street and Storm Drain Summary

Final Flow Routed North in LVB Through Intersection 100 YR	
West Side of Street (cfs):	17.0 cfs
East Side of Street (cfs):	0.0 cfs

Final Flow Routed North in LVB Through Intersection 10 YR	
West Side of Street(cfs):	1.1 cfs
East Side of Street (cfs):	0.0 cfs

Flow in Storm Drain System 100 YR	
Qdiw + Qdie:	17.1 cfs

Flow in Storm Drain System 10 YR	
Qdiw + Qdie:	17.1 cfs

Flow into Side Street: Hoover 100 YR	0.7 cfs
Flow into Side Street: Hoover 10 YR	0.7 cfs

Charleston to Bonneville
Street and Storm Drain Summary

LVB at Gass	30" RCP SD		
West Side 10-yr half street capacity:	2.0	cfs	
East Side 10-yr half street capacity:	1.9	cfs	

100-year Flow Summary			
West Side LVB			
Q Subbasin 54H (10)	10.0	cfs	
Previous Qnw	17.0	cfs	
Qnw (Subbasin + Previous Qnw)	27.0	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
Qnw = Qw - Qdiw =	27.0	cfs	
East Side LVB Street			
Qe = Previous Qne + SubBasin 54J (1) =	1.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.3	cfs	Inlet 3.2
Qne = Qe - Qdie =	0.7	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	27.0	cfs	
Q Existing upstream storm drain	0.0	cfs	
Side Street Drop Inlet	6.9	cfs	Inlet 3.6
Side Street Drop Inlet	6.8	cfs	Inlet 3.7
Q Side Street	33.8	cfs	
Q at west side of intersection	47.1	cfs	
Q contained on west side of intersection (allowable Q)	32.5	cfs	
Q overtopping to east side of LV Blvd.	14.6	cfs	
Qnw	32.5	cfs	
Qdiw: From HEC-22 DI Calculations =	3.5	cfs	Inlet 3.10
New Qnw = Qnw - Qdiw =	29.0	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	2.3	cfs	Inlet 3.9
New Qnw = Qnw - Qdiw =	26.7	cfs	
East Side LVB Street			
Previous Qne	0.7	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	0.7	cfs	
Qne = Overtopping from the west side	14.6	cfs	
Q upstream of flow split	15.3	cfs	
Q Split to east	5.0	cfs	Flow Split
Qne (in Las Vegas Blvd)	10.3	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	10.3	cfs	

Charleston to Bonneville
Street and Storm Drain Summary

LVB at Gass

10-year Flow Summary			
West Side LVB			
Q Subbasin 54H (5)	5.0	cfs	
Previous Qnw	1.1	cfs	
Qnw (Subbasin + Previous Qnw)	6.1	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
Qnw = Qw - Qdiw =	6.1	cfs	
East Side LVB Street			
Qe = Previous Qne + Subbasin 54J (1) =	1.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.3	cfs	Inlet 3.2
Qne = Qe - Qdie =	0.7	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	6.1	cfs	
Q Existing upstream storm drain	0.0	cfs	
Side Street Drop Inlet	6.9	cfs	Inlet 3.6
Side Street Drop Inlet	6.8	cfs	Inlet 3.7
Q Side Street	15.4	cfs	
Q at west side of intersection	7.8	cfs	
Q contained on west side of intersection (allowable Q)	32.5	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	7.8	cfs	
Qdiw: From HEC-22 DI Calculations =	3.5	cfs	Inlet 3.10
New Qnw = Qnw - Qdiw =	4.3	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	2.3	cfs	Inlet 3.9
New Qnw = Qnw - Qdiw =	2.0	cfs	
East Side LVB Street			
Previous Qne	0.7	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	0.7	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q upstream of flow split	0.7	cfs	
Q Split to east	0.7	cfs	
Qne (in Las Vegas Blvd)	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.0	cfs	

Charleston to Bonneville
Street and Storm Drain Summary

Final Flow Routed North in LVB Through Intersection 100 YR	
West Side of Street (cfs):	26.7 cfs
East Side of Street (cfs):	10.3 cfs

Final Flow Routed North in LVB Through Intersection 10 YR	
West Side of Street(cfs):	2.0 cfs
East Side of Street (cfs):	0.0 cfs

Flow in Storm Drain System 100 YR	
Qupstream+Qdiw + Qdie+ Existing Storm Drain:	36.9 cfs

Flow in Storm Drain System 10 YR	
Qupstream+Qdiw + Qdie:	36.9 cfs

Flow into Side Street: Gass 100 YR	5.0 cfs
Flow into Side Street: Gass 10 YR	0.7 cfs

Charleston to Bonneville
Street and Storm Drain Summary

LVB at Garces	36" RCP SD		
West Side 10-yr half street capacity:	1.2	cfs	
East Side 10-yr half street capacity:	1.3	cfs	

100-year Flow Summary			
West Side LVB			
Q Subbasin 59K (10)	10.0	cfs	
Previous Qnw	26.7	cfs	
Qnw (Subbasin + Previous Qnw)	36.7	cfs	
Qdiw: From HEC-22 DI Calculations =	3.3	cfs	Inlet 4.3
Qnw = Qw - Qdiw =	33.4	cfs	
East Side LVB Street			
Qe = Previous Qne + subbasin 59Y (1) =	11.3	cfs	
Qdie: From HEC-22 DI Calculations =	0.2	cfs	Inlet 4.2
Qne = Qe - Qdie =	11.1	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	33.4	cfs	
Q Existing upstream storm drain	0.0	cfs	
Side Street Drop Inlet	8.6	cfs	Inlet 4.6
Side Street Drop Inlet	7.1	cfs	Inlet 4.7
Q Side Street	45.5	cfs	
Q at west side of intersection	63.2	cfs	
Q contained on west side of intersection (allowable Q)	25.4	cfs	
Q overtopping to east side of LV Blvd.	37.8	cfs	
Qnw	25.4	cfs	
Qdiw: From HEC-22 DI Calculations =	4.3	cfs	Inlet 4.12
New Qnw = Qnw - Qdiw =	21.1	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	2.8	cfs	Inlet 4.11
New Qnw = Qnw - Qdiw =	18.3	cfs	
East Side LVB Street			
Previous Qne	11.1	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	11.1	cfs	
Qne = Overtopping from the west side	37.8	cfs	
Q upstream of flow split	48.9	cfs	
Q Split to east	17.0	cfs	Flow Split
Qne (in Las Vegas Blvd)	31.9	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	31.9	cfs	

Charleston to Bonneville
Street and Storm Drain Summary

LVB at Garces

10-year Flow Summary			
West Side LVB			
Q Subbasin 59K (5)	5.0	cfs	
Previous Qnw	2.0	cfs	
Qnw (Subbasin + Previous Qnw)	7.0	cfs	
Qdiw: From HEC-22 DI Calculations =	3.3	cfs	Inlet 4.3
Qnw = Qw - Qdiw =	3.7	cfs	
East Side LVB Street			
Qe = Previous Qne + subbasin 59Y (1) =	1.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.2	cfs	Inlet 4.2
Qne = Qe - Qdie =	0.8	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	3.7	cfs	
Q Existing upstream storm drain	0.0	cfs	
Side Street Drop Inlet	8.6	cfs	Inlet 4.6
Side Street Drop Inlet	7.1	cfs	Inlet 4.7
Q Side Street	20.2	cfs	
Q at west side of intersection	8.2	cfs	
Q contained on west side of intersection (allowable Q)	25.4	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	8.2	cfs	
Qdiw: From HEC-22 DI Calculations =	4.3	cfs	Inlet 4.12
New Qnw = Qnw - Qdiw =	3.9	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	2.8	cfs	Inlet 4.11
New Qnw = Qnw - Qdiw =	1.1	cfs	
East Side LVB Street			
Previous Qne	0.8	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	0.8	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q upstream of flow split	0.8	cfs	
Q Split to east	0.8	cfs	
Qne (in Las Vegas Blvd)	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.0	cfs	

Charleston to Bonneville
Street and Storm Drain Summary

Final Flow Routed North in LVB Through Intersection 100 YR	
West Side of Street (cfs):	18.3 cfs
East Side of Street (cfs):	31.9 cfs

Final Flow Routed North in LVB Through Intersection 10 YR	
West Side of Street(cfs):	1.1 cfs
East Side of Street (cfs):	0.0 cfs

Flow in Storm Drain System 100 YR	
Qupstream+Qdiw + Qdie+ Existing Storm Drain:	63.2 cfs

Flow in Storm Drain System 10 YR	
Qupstream+Qdiw + Qdie+ Existing Storm Drain:	63.2 cfs

Flow into Side Street: Gass 100 YR	17.0 cfs
Flow into Side Street: Gass 10 YR	0.8 cfs

Charleston to Bonneville
Street and Storm Drain Summary

LVB at Bonneville

Roadway Low Point
end 36" RCP SD begin 24" RCP new SD system

West Side 10-yr half street capacity:	0.5	cfs
East Side 10-yr half street capacity:	0.6	cfs

100-year Flow Summary			
West Side LVB			
Q Subbasin 59N (9)	9.0	cfs	
Previous Qnw	18.3	cfs	
Qnw (Subbasin + Previous Qnw)	27.3	cfs	
Qdiw = Existing Storm Drain	0.0	cfs	
Qnw = Qw - Qdiw =	27.3	cfs	
East Side LVB Street			
Qe = Previous Qne + 59Z (1) =	32.9	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne = Qe - Qdie =	32.9	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	27.3	cfs	
Q Existing upstream storm drain	8.1	cfs	
Side Street Drop Inlet	0.0	cfs	
Q Side Street	10.6	cfs	
Q at west side of intersection	29.8	cfs	
Q contained on west side of intersection (allowable Q)	25.6	cfs	
Q overtopping to east side of LV Blvd.	4.2	cfs	
Qnw	25.6	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	25.6	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	25.6	cfs	See Bridger-Bonneville
East Side LVB Street			
Previous Qne	32.9	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	32.9	cfs	
Qne = Overtopping from the west side	4.2	cfs	
Q upstream of flow split	37.1	cfs	
Q Split to east	37.1	cfs	
Qne (in Las Vegas Blvd)	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.0	cfs	

Charleston to Bonneville
Street and Storm Drain Summary

LVB at Bonneville

10-year Flow Summary		
West Side LVB		
Q Subbasin 59N (4)	4.0	cfs
Previous Qnw	1.1	cfs
Qnw (Subbasin + Previous Qnw)	5.1	cfs
Qdiw = Existing Storm Drain	0.0	cfs
Qnw = Qw - Qdiw =	5.1	cfs
East Side LVB Street		
Qe = Previous Qne + subbasin 59Z (1) =	1.0	cfs
Qdie: From HEC-22 DI Calculations =	0.0	cfs
Qne = Qe - Qdie =	1.0	cfs
SIDE FLOW		
West Side LVB		
Previous Qnw	5.1	cfs
Q Existing upstream storm drain	8.1	cfs
Side Street Drop Inlet	0.0	cfs
Q Side Street	9.6	cfs
Q at west side of intersection	6.6	cfs
Q contained on west side of intersection (allowable Q)	25.6	cfs
Q overtopping to east side of LV Blvd.	0.0	cfs
Qnw	6.6	cfs
Qdiw: From HEC-22 DI Calculations =	0.0	cfs
New Qnw = Qnw - Qdiw =	6.6	cfs
2nd DI -Qdiw: From HEC-22 DI Calculations =	0.0	cfs
New Qnw = Qnw - Qdiw =	6.6	cfs
East Side LVB Street		
Previous Qne + subbasin 59Z (1)	1.0	cfs
Qdie: From HEC-22 DI Calculations =	0.0	cfs
Qne at upstream of intersection	1.0	cfs
Qne = Overtopping from the west side	0.0	cfs
Q upstream of flow split	1.0	cfs
Q Split to east	1.0	cfs
Qne (in Las Vegas Blvd)	0.0	cfs
Qdie: From HEC-22 DI Calculations =	0.0	cfs
New Qne = Qne - Qdie =	0.0	cfs

Charleston to Bonneville
Street and Storm Drain Summary

Final Flow Routed North in LVB Through Intersection 100 YR

West Side of Street (cfs):	25.6 cfs
East Side of Street (cfs):	0.0 cfs

Final Flow Routed North in LVB Through Intersection 10 YR

West Side of Street(cfs):	6.6 cfs
East Side of Street (cfs):	0.0 cfs

END 1 STORM DRAIN SYSTEM

Flow in Storm Drain System 100 YR

Previous segement Q + Qdiw + Qdie:	63.2 cfs

Flow in Storm Drain System 10 YR

Qdiw + Qdie:	63.2 cfs

Flow into Side Street: Bonneville 100 YR	37.1 cfs
Flow into Side Street: Bonneville 10 YR	1.0 cfs

NOTE:

Storm Drain #1 does not include flows captured at the sump inlet at Bonneville. These flows are conveyed to Storm Drain #2, see Bridger-Bonneville tab. This sheet shows all flows approaching from the south being intercepted by the sump inlet in Bonneville.

Total flow diverted east in Bonneville is the sum of the sheets Bridger-Bonneville and Charleston-Bonneville

C.4.2

Bridger Avenue to Bonneville Avenue

BRIDGER TO BONNEVILLE

STREET FLOW METHODOLOGY

1) Offsite flow from the west fills up west half of street
1b) Drop inlet at intersection intercepts portion of west half street water
1c) Water in excess of drop inlet capacity continues north in west half of street to next reach of Main St
2) Water above half street capacity spills over to east half of street
2b) Drop inlet at intersection intercepts portion of east half street water
2c) Water in excess of drop inlet capacity, but less than street crown elevation diverts down side street to the east
3) Water in excess of street crown elevation splits to the north and to the east. Ratio for flows above this elevation determined by previously performed flow split calculations.

Legend

Qwest - Flow on west side of LVB
Qeast - Flow on east side of LVB
Qdiw - Flow discharged into DI on west side of LVB
Qdie - Flow discharged into DI on east side of LVB
Qnw - Flow routed north on west side of LVB through intersections
Qne - Flow routed north on east side of LVB through intersections
Qesplit - Flow split off LVB into side street

Bridger to Bonneville
Street and Storm Drain Summary

LVB at Bridger	54" RCP SD		
West Side 10-yr half street capacity:	0.7	cfs	
East Side 10-yr half street capacity:	0.8	cfs	

100-year Flow Summary			
West Side LVB			
Q Subbasin	0.0	cfs	
Previous Qnw	0.0	cfs	
Qnw (Subbasin + Previous Qnw)	0.0	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
Qnw = Qw - Qdiw =	0.0	cfs	
East Side LVB Street			
Qe = Previous Qne =	0.0	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
Qne = Qe - Qdie =	0.0	cfs	
West Side LVB			
Previous Qnw	0.0	cfs	
Q Existing upstream storm drain	0.0	cfs	
Side Street Drop Inlet	14.0	cfs	Inlet 9.4
Side Street Drop Inlet	0.8	cfs	Inlet 9.3
Q Side Street	30.2	cfs	
Q at west side of intersection	15.4	cfs	
Q contained on west side of intersection (allowable Q)	18.4	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	15.4	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	15.4	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	15.4	cfs	
East Side LVB Street			
Previous Qne	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	0.0	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q upstream of flow split	0.0	cfs	
Q Split to east	0.0	cfs	
Qne (in Las Vegas Blvd)	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.0	cfs	

Bridger to Bonneville
Street and Storm Drain Summary

LVB at Bridger

10-year Flow Summary			
West Side LVB			
Q Subbasin	0.0	cfs	
Previous Qnw	0.0	cfs	
Qnw (Subbasin + Previous Qnw)	0.0	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
Qnw = Qw - Qdiw =	0.0	cfs	
East Side LVB Street			
Qe = Previous Qne =	0.0	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
Qne = Qe - Qdie =	0.0	cfs	
West Side LVB			
Previous Qnw	0.0	cfs	
Q Existing upstream storm drain	0.0	cfs	
Side Street Drop Inlet	14.0	cfs	Inlet 9.4
Side Street Drop Inlet	0.8	cfs	Inlet 9.3
Q Side Street	15.1	cfs	
Q at west side of intersection	0.3	cfs	
Q contained on west side of intersection (allowable Q)	18.4	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	0.3	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	0.3	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	0.3	cfs	
East Side LVB Street			
Previous Qne	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	0.0	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q upstream of flow split	0.0	cfs	
Q Split to east	0.0	cfs	
Qne (in Las Vegas Blvd)	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.0	cfs	

Bridger to Bonneville
Street and Storm Drain Summary

Final Flow Routed North in LVB Through Intersection 100 YR	
West Side of Street (cfs):	15.4 cfs
East Side of Street (cfs):	0.0 cfs

Final Flow Routed North in LVB Through Intersection 10 YR	
West Side of Street(cfs):	0.3 cfs
East Side of Street (cfs):	0.0 cfs

Flow in Storm Drain System 100 YR	
Qupstream+Qdiw + Qdie+ Existing Storm Drain:	68.6 cfs

Flow in Storm Drain System 10 YR	
Qupstream+Qdiw + Qdie+ Existing Storm Drain:	56.9 cfs

Flow into Side Street: Bridger 100 YR	0.0 cfs
Flow into Side Street: Bridger 10 YR	0.0 cfs

Bridger to Bonneville
Street and Storm Drain Summary

LVB at Between Clark and Bridger	54" RCP SD		
West Side 10-yr half street capacity:	0.7	cfs	
East Side 10-yr half street capacity:	0.8	cfs	

100-year Flow Summary			
West Side LVB			
Q Subbasin 1/2 59U (9)	9.0	cfs	
Previous Qnw	15.4	cfs	
Qnw (Subbasin + Previous Qnw)	24.4	cfs	
Qdiw: From HEC-22 DI Calculations =	4.1	cfs	Inlet 7.3
Qnw = Qw - Qdiw =	20.3	cfs	
East Side LVB Street			
Qe = Previous Qne + subbasin 1/2 59AB (1) =	1.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.3	cfs	Inlet 7.2
Qne = Qe - Qdie =	0.7	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	20.3	cfs	
Q Existing upstream storm drain	0.0	cfs	
Q Side Street	0.0	cfs	
Q at west side of intersection	20.3	cfs	
Q contained on west side of intersection (allowable Q)	71.8	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	20.3	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	20.3	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	20.3	cfs	
East Side LVB Street			
Previous Qne	0.7	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	0.7	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q upstream of flow split	0.7	cfs	
Q Split to east	0.0	cfs	
Qne (in Las Vegas Blvd)	0.7	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.7	cfs	

Bridger to Bonneville
Street and Storm Drain Summary

LVB at Between Clark and Bridger

10-year Flow Summary			
West Side LVB			
Q Subbasin 1/2 59U (4.5)	4.5	cfs	
Previous Qnw	0.3	cfs	
Qnw (Subbasin + Previous Qnw)	4.8	cfs	
Qdiw: From HEC-22 DI Calculations =	4.1	cfs	Inlet 7.3
Qnw = Qw - Qdiw =	0.7	cfs	
East Side LVB Street			
Qe = Previous Qne + 1/2 59AB (0.5) =	0.5	cfs	
Qdie: From HEC-22 DI Calculations =	0.3	cfs	Inlet 7.2
Qne = Qe - Qdie =	0.2	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	0.7	cfs	
Q Existing upstream storm drain	0.0	cfs	
Q Side Street	0.0	cfs	
Q at west side of intersection	0.7	cfs	
Q contained on west side of intersection (allowable Q)	71.8	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	0.7	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	0.7	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	0.7	cfs	
East Side LVB Street			
Previous Qne	0.2	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	0.2	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q upstream of flow split	0.2	cfs	
Q Split to east	0.0	cfs	
Qne (in Las Vegas Blvd)	0.2	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.2	cfs	

Bridger to Bonneville
Street and Storm Drain Summary

Final Flow Routed North in LVB Through Intersection 100 YR	
West Side of Street (cfs):	20.3 cfs
East Side of Street (cfs):	0.7 cfs

Final Flow Routed North in LVB Through Intersection 10 YR	
West Side of Street(cfs):	0.7 cfs
East Side of Street (cfs):	0.2 cfs

Flow in Storm Drain System 100 YR	
Qupstream+Qdiw + Qdie+ Existing Storm Drain:	53.8 cfs

Flow in Storm Drain System 10 YR	
Qupstream+Qdiw + Qdie:	42.1 cfs

Flow into Side Street: Between Clark & Bridger 100 YR	0.0 cfs
Flow into Side Street: Between Clark & Bridger 10 YR	0.0 cfs

Bridger to Bonneville
Street and Storm Drain Summary

LVB at Clark 48"RCP SD

West Side 10-yr half street capacity:	0.5	cfs
East Side 10-yr half street capacity:	0.6	cfs

100-year Flow Summary			
West Side LVB			
Q Subbasin 1/2 59U (9)	9.0	cfs	
Previous Qnw	20.3	cfs	
Qnw (Subbasin + Previous Qnw)	29.3	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
Qnw = Qw - Qdiw =	29.3	cfs	
East Side LVB Street			
Qe = Previous Qne +subbasin 1/2 59AB (1) =	1.7	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne = Qe - Qdie =	1.7	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	29.3	cfs	
Side Street Storm Drain	0.0	cfs	
Side Street Drop Inlet	7.1	cfs	Inlet 6.12
Side Street Drop Inlet	8.5	cfs	Inlet 6.9
Q Side Street	40.9	cfs	
Q at west side of intersection	54.6	cfs	
Q contained on west side of intersection (allowable Q)	14.0	cfs	
Q overtopping to east side of LV Blvd.	40.6	cfs	
Qnw	14.0	cfs	
Qdiw: From HEC-22 DI Calculations =	5.0	cfs	Inlet 6.5
New Qnw = Qnw - Qdiw =	9.0	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	2.9	cfs	Inlet 6.3
New Qnw = Qnw - Qdiw =	6.1	cfs	
3nd DI -Qdiw: From HEC-22 DI Calculations =	0.3	cfs	Inlet 6.7
New Qnw = Qnw - Qdiw =	5.8	cfs	
East Side LVB Street			
Previous Qne	1.7	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	1.7	cfs	
Qne = Overtopping from the west side	40.6	cfs	
Q upstream of flow split	42.3	cfs	
Q Split to east	32.0	cfs	Flow Split
Qne (in Las Vegas Blvd)	10.3	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	10.3	cfs	

Bridger to Bonneville
Street and Storm Drain Summary

LVB at Clark

10-year Flow Summary			
West Side LVB			
Q Subbasin 1/2 59U (4.5)	4.5	cfs	
Previous Qnw	0.7	cfs	
Qnw (Subbasin + Previous Qnw)	5.2	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
Qnw = Qw - Qdiw =	5.2	cfs	
East Side LVB Street			
Qe = Previous Qne + subbasin 1/2 59AB (0.5)=	1.2	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne = Qe - Qdie =	1.2	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	5.2	cfs	
Side Street Drop Inlet	7.1	cfs	Inlet 6.12
Side Street Drop Inlet	8.5	cfs	Inlet 6.9
Q Side Street	19.1	cfs	
Q at west side of intersection	8.7	cfs	
Q contained on west side of intersection (allowable Q)	14.0	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	8.7	cfs	
Qdiw: From HEC-22 DI Calculations =	5.0	cfs	Inlet 6.5
New Qnw = Qnw - Qdiw =	3.7	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	2.9	cfs	Inlet 6.3
New Qnw = Qnw - Qdiw =	0.8	cfs	
3nd DI -Qdiw: From HEC-22 DI Calculations =	0.3	cfs	Inlet 6.7
New Qnw = Qnw - Qdiw =	0.5	cfs	
East Side LVB Street			
Previous Qne	1.2	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	1.2	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q upstream of flow split	1.2	cfs	
Q Split to east	1.2	cfs	
Qne (in Las Vegas Blvd)	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.0	cfs	

Bridger to Bonneville
Street and Storm Drain Summary

Final Flow Routed North in LVB Through Intersection 100 YR	
West Side of Street (cfs):	6.1 cfs
East Side of Street (cfs):	10.3 cfs

Final Flow Routed North in LVB Through Intersection 10 YR	
West Side of Street(cfs):	0.5 cfs
East Side of Street (cfs):	0.0 cfs

Flow in Storm Drain System 100 YR	
Qupstream+Qdiw + Qdie+ Existing Storm Drain:	49.4 cfs

Flow in Storm Drain System 10 YR	
Qupstream+Qdiw + Qdie+ Existing Storm Drain:	37.7 cfs

Flow into Side Street: Between Clark & Bridger 100 YR	32.0 cfs
Flow into Side Street: Between Clark & Bridger 10 YR	1.2 cfs

Bridger to Bonneville
Street and Storm Drain Summary

LVB at Bonneville	42"RCP SD	
West Side 10-yr half street capacity:	0.5	cfs
East Side 10-yr half street capacity:	0.6	cfs

100-year Flow Summary		
West Side LVB		
Q Subbasin 59Q (10)	10.0	cfs
Previous Qnw	6.1	cfs
Qnw (Subbasin + Previous Qnw)	16.1	cfs
Qdiw: From HEC-22 DI Calculations =	0.0	cfs
Qnw = Qw - Qdiw =	16.1	cfs
East Side LVB Street		
Qe = Previous Qne + subbasin 59AA (1) =	11.3	cfs
Qdie: From HEC-22 DI Calculations =	0.0	cfs
Qne = Qe - Qdie =	11.3	cfs
SIDE FLOW		
West Side LVB		
Previous Qnw	16.1	cfs
Q Existing upstream storm drain	7.8	cfs
Q Side Street Drop Inlet	0.0	cfs
Q Side Street	10.6	cfs
Q South Las Vegas Blvd	25.6	cfs
Q at west side of intersection	44.5	cfs
Q contained on west side of intersection (allowable Q)	25.6	cfs
Q overtopping to east side of LV Blvd.	18.9	cfs
Qnw	25.6	cfs
Qdiw: From HEC-22 DI Calculations =	25.6	cfs
New Qnw = Qnw - Qdiw =	0.0	cfs
2nd DI -Qdiw: From HEC-22 DI Calculations =	0.0	cfs
New Qnw = Qnw - Qdiw =	0.0	cfs
East Side LVB Street		
Previous Qne	11.3	cfs
Qdie: From HEC-22 DI Calculations =	0.0	cfs
Qne at upstream of intersection	11.3	cfs
Qne = Overtopping from the west side	18.9	cfs
Q upstream of flow split	30.2	cfs
Q Split to east	30.2	cfs
Qne (in Las Vegas Blvd)	0.0	cfs
Qdie: From HEC-22 DI Calculations =	0.0	cfs
New Qne = Qne - Qdie =	0.0	cfs

Bridger to Bonneville
Street and Storm Drain Summary

LVB at Bonneville

10-year Flow Summary		
West Side LVB		
Q Subbasin 59Q (5)	5.0	cfs
Previous Qnw	0.5	cfs
Qnw (Subbasin + Previous Qnw)	5.5	cfs
QdiW: From HEC-22 DI Calculations =	0.0	cfs
Qnw = Qw - Qdiw =	5.5	cfs
East Side LVB Street		
Qe = Previous Qne + subbasin 59AA (1) =	1.0	cfs
Qdie: From HEC-22 DI Calculations =	0.0	cfs
Qne = Qe - Qdie =	1.0	cfs
SIDE FLOW		
West Side LVB		
Previous Qnw	5.5	cfs
Q Existing upstream storm drain	7.8	cfs
Q Side Street Drop Inlet	0.0	cfs
Q Side Street	9.6	cfs
Q South Las Vegas Blvd	6.6	cfs
Q at west side of intersection	13.9	cfs
Q contained on west side of intersection (allowable Q)	25.6	cfs
Q overtopping to east side of LV Blvd.	0.0	cfs
Qnw	13.9	cfs
Qdiw: From HEC-22 DI Calculations =	13.9	cfs
New Qnw = Qnw - Qdiw =	0.0	cfs
2nd DI -Qdiw: From HEC-22 DI Calculations =	0.0	cfs
New Qnw = Qnw - Qdiw =	0.0	cfs
East Side LVB Street		
Previous Qne	1.0	cfs
Qdie: From HEC-22 DI Calculations =	0.0	cfs
Qne at upstream of intersection	1.0	cfs
Qne = Overtopping from the west side	0.0	cfs
Q upstream of flow split	1.0	cfs
Q Split to east	1.0	cfs
Qne (in Las Vegas Blvd)	0.0	cfs
Qdie: From HEC-22 DI Calculations =	0.0	cfs
New Qne = Qne - Qdie =	0.0	cfs

Bridger to Bonneville
Street and Storm Drain Summary

Final Flow Routed North in LVB Through Intersection 100 YR

West Side of Street (cfs):	0.0 cfs
East Side of Street (cfs):	0.0 cfs

Final Flow Routed North in LVB Through Intersection 10 YR

West Side of Street(cfs):	0.0 cfs
East Side of Street (cfs):	0.0 cfs

Flow in Storm Drain System 100 YR

Qupstream+Qdiw + Qdie+ Existing Storm Drain:	25.6 cfs

Flow in Storm Drain System 10 YR

Qupstream+Qdiw + Qdie+ Existing Storm Drain:	13.9 cfs

Flow into Side Street: Bonneville 100 YR	30.2 cfs
Flow into Side Street: Bonneville 10 YR	1.0 cfs

NOTE:

Storm drain #2 includes flows from south of Bonneville that are intercepted by the sump inlet at Bonneville. These flows are referenced from Charleston-Bonneville sheet.

Total flow diverted east in Bonneville is the sum of the sheets Bridger-Bonneville and Charleston-Bonneville

C.4.3

Bridger Avenue to Stewart Avenue

BRIDGER TO STEWART

STREET FLOW METHODOLOGY

1) Offsite flow from the west fills up west half of street
1b) Drop inlet at intersection intercepts portion of west half street water
1c) Water in excess of drop inlet capacity continues north in west half of street to next reach of Main St
2) Water above half street capacity spills over to east half of street
2b) Drop inlet at intersection intercepts portion of east half street water
2c) Water in excess of drop inlet capacity, but less than street crown elevation diverts down side street to the east
3) Water in excess of street crown elevation splits to the north and to the east. Ratio for flows above this elevation determined by previously performed flow split calculations.

Legend

Qwest - Flow on west side of LVB
Qeast - Flow on east side of LVB
Qdiw - Flow discharged into DI on west side of LVB
Qdie - Flow discharged into DI on east side of LVB
Qnw - Flow routed north on west side of LVB through intersections
Qne - Flow routed north on east side of LVB through intersections
Qesplit - Flow split off LVB into side street

Bridger to Stewart
Street and Storm Drain Summary

LVB at Bridger	5'x6' RCB SD		
West Side 10-yr half street capacity:	1.6	cfs	
East Side 10-yr half street capacity:	1.4	cfs	

100-year Flow Summary			
West Side LVB			
Q Subbasin	0.0	cfs	
Previous Qnw	0.0	cfs	
Qnw (Subbasin + Previous Qnw)	0.0	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
Qnw = Qw - Qdiw =	0.0	cfs	
East Side LVB Street			
Qe = Previous Qne =	0.0	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
Qne = Qe - Qdie =	0.0	cfs	
West Side LVB			
Previous Qnw	0.0	cfs	
Q Existing upstream storm drain	7.4	cfs	
Side Street Drop Inlet	12.0	cfs	Inlet 9.5
Q Side Street	30.1	cfs	
Q at west side of intersection	18.1	cfs	
Q contained on west side of intersection (allowable Q)	18.4	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	18.1	cfs	
Qdiw: From HEC-22 DI Calculations =	1.7	cfs	Inlet 9.7
New Qnw = Qnw - Qdiw =	16.4	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	16.4	cfs	
East Side LVB Street			
Previous Qne	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	0.0	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q upstream of flow split	0.0	cfs	
Q Split to east	0.0	cfs	
Qne (in Las Vegas Blvd)	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.0	cfs	

Bridger to Stewart
Street and Storm Drain Summary

LVB at Bridger 24" RCP SD

10-year Flow Summary			
West Side LVB			
Q Subbasin	0.0	cfs	
Previous Qnw	0.0	cfs	
Qnw (Subbasin + Previous Qnw)	0.0	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
Qnw = Qw - Qdiw =	0.0	cfs	
East Side LVB Street			
Qe = Previous Qne =	0.0	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
Qne = Qe - Qdie =	0.0	cfs	
West Side LVB			
Previous Qnw	0.0	cfs	
Q Existing Upstream Storm Drain	7.4	cfs	
Side Street Drop Inlet	12.0	cfs	Inlet 9.5
Q Side Street	15.1	cfs	
Q at west side of intersection	3.1	cfs	
Q contained on west side of intersection (allowable Q)	18.4	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	3.1	cfs	
Qdiw: From HEC-22 DI Calculations =	1.7	cfs	Inlet 9.7
New Qnw = Qnw - Qdiw =	1.4	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	1.4	cfs	
East Side LVB Street			
Previous Qne	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	0.0	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q upstream of flow split	0.0	cfs	
Q Split to east	0.0	cfs	
Qne (in Las Vegas Blvd)	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.0	cfs	

Bridger to Stewart
Street and Storm Drain Summary

Final Flow Routed North in LVB Through Intersection 100 YR	
West Side of Street (cfs):	16.4 cfs
East Side of Street (cfs):	0.0 cfs
Final Flow Routed North in LVB Through Intersection 10 YR	
West Side of Street(cfs):	1.4 cfs
East Side of Street (cfs):	0.0 cfs
Additional storm drain flow from south SD Q100	68.6 cfs
Additional storm drain flow from south SD Q10	56.9 cfs
Flow in Storm Drain System 100 YR	
Sump Inlet Q + Qdiw + Qdie:	89.7 cfs
Flow in Storm Drain System 10 YR	
Sump Inlet Q + Qdiw + Qdie:	78.0 cfs
Flow into Side Street: Bridger 100 YR	0.0 cfs
Flow into Side Street: Bridger 10 YR	0.0 cfs

Bridger to Stewart
Street and Storm Drain Summary

LVB at Carson 5'x6' RCB SD

West Side 10-yr half street capacity:	1.3	cfs
East Side 10-yr half street capacity:	0.7	cfs

100-year Flow Summary			
West Side LVB			
Q Subbasin 59X (12)	12.0	cfs	
Previous Qnw	16.4	cfs	
Qnw (Subbasin + Previous Qnw)	28.4	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
Qnw = Qw - Qdiw =	28.4	cfs	
East Side LVB Street			
Qe = Previous Qne +59AC (1) =	1.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.3	cfs	Inlet 10.2
Qne = Qe - Qdie =	0.7	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	28.4	cfs	
Q Existing upstream storm drain	7.9	cfs	
Side Street Drop Inlet 1	12.0	cfs	Inlet 10.6
Side Street Drop Inlet 2	12.2	cfs	Inlet 10.5
Q Side Street	51.9	cfs	
Q at west side of intersection	56.1	cfs	
Q contained on west side of intersection (allowable Q)	13.5	cfs	
Q overtopping to east side of LV Blvd.	42.6	cfs	
Qnw	13.5	cfs	
Qdiw: From HEC-22 DI Calculations =	5.2	cfs	Inlet 10.7
New Qnw = Qnw - Qdiw =	8.3	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	3.2	cfs	Inlet 10.8
New Qnw = Qnw - Qdiw =	5.1	cfs	
3nd DI -Qdiw: From HEC-22 DI Calculations =	0.4	cfs	Inlet 10.9
New Qnw = Qnw - Qdiw =	4.7	cfs	
East Side LVB Street			
Previous Qne	0.7	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	0.7	cfs	
Qne = Overtopping from the west side	42.6	cfs	
Q upstream of flow split	43.3	cfs	
Q Split to east	27.0	cfs	Flow Split
Qne (in Las Vegas Blvd)	16.3	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	16.3	cfs	

Bridger to Stewart
Street and Storm Drain Summary

LVB at Carson

10-year Flow Summary			
West Side LVB			
Q Subbasin 59X (6)	6.0	cfs	
Previous Qnw	1.4	cfs	
Qnw (Subbasin + Previous Qnw)	7.4	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
Qnw = Qw - Qdiw =	7.4	cfs	
East Side LVB Street			
Qe = Previous Qne +59AC (1) =	1.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.3	cfs	Inlet 10.2
Qne = Qe - Qdie =	0.7	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	7.4	cfs	
Q Existing upstream storm drain	7.9	cfs	
Side Street Drop Inlet 1	12.0	cfs	Inlet 10.6
Side Street Drop Inlet 2	12.2	cfs	Inlet 10.5
Q Side Street	26.8	cfs	
Q at west side of intersection	10.0	cfs	
Q contained on west side of intersection (allowable Q)	13.5	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	10.0	cfs	
Qdiw: From HEC-22 DI Calculations =	5.2	cfs	Inlet 10.7
New Qnw = Qnw - Qdiw =	4.8	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	3.2	cfs	Inlet 10.8
New Qnw = Qnw - Qdiw =	1.6	cfs	
3nd DI -Qdiw: From HEC-22 DI Calculations =	0.4	cfs	Inlet 10.9
New Qnw = Qnw - Qdiw =	1.2	cfs	
East Side LVB Street			
Previous Qne	0.7	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	0.7	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q upstream of flow split	0.7	cfs	
Q Split to east	0.7	cfs	
Qne (in Las Vegas Blvd)	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.0	cfs	

Bridger to Stewart
Street and Storm Drain Summary

Final Flow Routed North in LVB Through Intersection 100 YR		
West Side of Street (cfs):	4.7	cfs
East Side of Street (cfs):	16.3	cfs

Final Flow Routed North in LVB Through Intersection 10 YR		
West Side of Street(cfs):	1.2	cfs
East Side of Street (cfs):	0.0	cfs

Flow in Storm Drain System 100 YR		
Qupstream+Qdiw + Qdie+ Existing Storm Drain:	130.9	cfs

Flow in Storm Drain System 10 YR		
Qupstream+Qdiw + Qdie:	119.2	cfs

Flow into Side Street: Carson 100 YR	27.0	cfs
Flow into Side Street: Carson 10 YR	0.7	cfs

Bridger to Stewart
Street and Storm Drain Summary

LVB at Fremont 5'x6' RCB SD

West Side 10-yr half street capacity:	1.0	cfs
East Side 10-yr half street capacity:	1.2	cfs

100-year Flow Summary			
West Side LVB			
Q Subbasin 58AA (9)	9.0	cfs	
Previous Qnw	1.2	cfs	
Qnw (Subbasin + Previous Qnw)	10.2	cfs	
Qdiw: From HEC-22 DI Calculations =	1.0	cfs	Inlet 11.1
Qnw = Qw - Qdiw =	9.2	cfs	
East Side LVB Street			
Qe = Previous Qne + subbasin 58AH (1) =	17.3	cfs	
Qdie: From HEC-22 DI Calculations =	0.4	cfs	Inlet 11.5
Qne = Qe - Qdie =	16.9	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	9.2	cfs	
Q Existing upstream storm drain	33.9	cfs	
Q Side Street	0.0	cfs	
Q at west side of intersection	9.2	cfs	
Q contained on west side of intersection (allowable Q)	17.6	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	9.2	cfs	
Qdiw: From HEC-22 DI Calculations =	4.3	cfs	Inlet 11.6
New Qnw = Qnw - Qdiw =	4.9	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	4.9	cfs	
East Side LVB Street			
Previous Qne	16.9	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	16.9	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q upstream of flow split	16.9	cfs	
Q Split to east	16.9	cfs	
Qne (in Las Vegas Blvd)	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.0	cfs	

Bridger to Stewart
Street and Storm Drain Summary

LVB at Fremont

10-year Flow Summary			
West Side LVB			
Q Subbasin 58AA (5)	5.0	cfs	
Previous Qnw	1.2	cfs	
Qnw (Subbasin + Previous Qnw)	6.2	cfs	
Qdiw: From HEC-22 DI Calculations =	1.0	cfs	Inlet 11.1
Qnw = Qw - Qdiw =	5.2	cfs	
East Side LVB Street			
Qe = Previous Qne +subbasin 58AH (1) =	1.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.4	cfs	Inlet 11.5
Qne = Qe - Qdie =	0.6	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	5.2	cfs	
Q Existing upstream storm drain	33.9	cfs	
Q Side Street	0.0	cfs	
Q at west side of intersection	5.2	cfs	
Q contained on west side of intersection (allowable Q)	17.6	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	5.2	cfs	
Qdiw: From HEC-22 DI Calculations =	4.3	cfs	Inlet 11.6
New Qnw = Qnw - Qdiw =	0.9	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	0.9	cfs	
East Side LVB Street			
Previous Qne + subbasin 58AH (1)	0.6	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	0.6	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q upstream of flow split	0.6	cfs	
Q Split to east	0.6	cfs	
Qne (in Las Vegas Blvd)	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.0	cfs	

Bridger to Stewart
Street and Storm Drain Summary

Final Flow Routed North in LVB Through Intersection 100 YR

West Side of Street (cfs):	4.9	cfs
East Side of Street (cfs):	0.0	cfs

Final Flow Routed North in LVB Through Intersection 10 YR

West Side of Street(cfs):	0.9	cfs
East Side of Street (cfs):	0.0	cfs

Flow in Storm Drain System 100 YR

Qupstream+Qdiw + Qdie+ Existing Storm Drain:	170.5	cfs

Flow in Storm Drain System 10 YR

Qupstream+Qdiw + Qdie+ Existing Storm Drain:	158.8	cfs

Flow into Side Street: Fremont 100 YR	16.9	cfs
Flow into Side Street: Fremont 10 YR	0.6	cfs

Bridger to Stewart
Street and Storm Drain Summary

LVB at Ogden

5'x6' RCB SD

West Side 10-yr half street capacity:	0.7	cfs
East Side 10-yr half street capacity:	0.6	cfs

100-year Flow Summary			
West Side LVB			
Q Subbasin 58AB (10)	10.0	cfs	
Previous Qnw	4.9	cfs	
Qnw (Subbasin + Previous Qnw)	14.9	cfs	
Qdiw = Existing Storm Drain	0.0	cfs	
Qnw = Qw - Qdiw =	14.9	cfs	
East Side LVB Street			
Qe = Previous Qne + subbasin 58AI (1) =	1.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne = Qe - Qdie =	1.0	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	14.9	cfs	
Q Existing upstream storm drain	13.3	cfs	
Side Street drop inlet	12.6	cfs	Inlet 12.4
Side Street drop inlet	10.7	cfs	Inlet 12.3
Q Side Street	53.5	cfs	
Q at west side of intersection	45.1	cfs	
Q contained on west side of intersection (allowable Q)	22.5	cfs	
Q overtopping to east side of LV Blvd.	22.6	cfs	
Qnw	22.5	cfs	
Qdiw: From HEC-22 DI Calculations =	7.7	cfs	Inlet 12.6
New Qnw = Qnw - Qdiw =	14.8	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	4.2	cfs	Inlet 12.7
New Qnw = Qnw - Qdiw =	10.6	cfs	
East Side LVB Street			
Previous Qne	1.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	1.0	cfs	
Qne = Overtopping from the west side	22.6	cfs	
Q upstream of flow split	23.6	cfs	
Q Split to east	14.0	cfs	Flow Split
Qne (in Las Vegas Blvd)	9.6	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	9.6	cfs	

Bridger to Stewart
Street and Storm Drain Summary

LVB at Ogden

10-year Flow Summary			
West Side LVB			
Q Subbasin 58AB (6)	6.0	cfs	
Previous Qnw	0.9	cfs	
Qnw (Subbasin + Previous Qnw)	6.9	cfs	
Qdiw = Existing Storm Drain	0.0	cfs	
Qnw = Qw - Qdiw =	6.9	cfs	
East Side LVB Street			
Qe = Previous Qne + subbasin 58AI (1) =	1.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne = Qe - Qdie =	1.0	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	6.9	cfs	
Q Existing upstream storm drain	13.3	cfs	
Side Street drop inlet	12.6	cfs	Inlet 12.4
Side Street drop inlet	10.7	cfs	Inlet 12.3
Q Side Street	28.8	cfs	
Q at west side of intersection	12.4	cfs	
Q contained on west side of intersection (allowable Q)	22.5	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	12.4	cfs	
Qdiw: From HEC-22 DI Calculations =	7.7	cfs	Inlet 12.6
New Qnw = Qnw - Qdiw =	4.7	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	4.2	cfs	Inlet 12.7
New Qnw = Qnw - Qdiw =	0.5	cfs	
East Side LVB Street			
Previous Qne	1.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	1.0	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q at flow split (overtop + upstream)	1.0	cfs	
Q Split to east	1.0	cfs	
Qne (in Las Vegas Blvd)	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.0	cfs	

Bridger to Stewart
Street and Storm Drain Summary

Final Flow Routed North in LVB Through Intersection 100 YR

West Side of Street (cfs):	10.6	cfs
East Side of Street (cfs):	9.6	cfs

Final Flow Routed North in LVB Through Intersection 10 YR

West Side of Street(cfs):	0.5	cfs
East Side of Street (cfs):	0.0	cfs

Flow in Storm Drain System 100 YR

Previous segement Q + Qdiw + Qdie:	219.0	cfs

Flow in Storm Drain System 10 YR

Qdiw + Qdie:	207.3	cfs

Flow into Side Street: Ogden 100 YR	14.0	cfs
Flow into Side Street: Ogden 10 YR	1.0	cfs

Bridger to Stewart
Street and Storm Drain Summary

LVB at Stewart 5'x6' RCB SD

West Side 10-yr half street capacity:	0.7	cfs
East Side 10-yr half street capacity:	0.6	cfs

100-year Flow Summary			
West Side LVB			
Q Subbasin 58AG (9)	9.0	cfs	
Previous Qnw	10.6	cfs	
Qnw (Subbasin + Previous Qnw)	19.6	cfs	
Qdiw: From HEC-22 DI Calculations =	4.8	cfs	Inlet 13.2
Qnw = Qw - Qdiw =	14.8	cfs	
East Side LVB Street			
Qe = Previous Qne + subbasin 58AJ (1) =	10.6	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne = Qe - Qdie =	10.6	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	14.8	cfs	
Q Existing upstream storm drain	5.6	cfs	
Q Side Street	45.1	cfs	
Q at west side of intersection	54.3	cfs	
Q contained on west side of intersection (allowable Q)	34.3	cfs	
Q overtopping to east side of LV Blvd.	20.0	cfs	
Qnw	34.3	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	34.3	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	34.3	cfs	
East Side LVB Street			
Previous Qne	10.6	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	10.6	cfs	
Qne = Overtopping from the west side	20.0	cfs	
Q upstream of flow split	30.6	cfs	
Q Split to east	21.0	cfs	Flow Split
Qne (in Las Vegas Blvd)	9.6	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	9.6	cfs	

Bridger to Stewart
Street and Storm Drain Summary

LVB at Stewart

10-year Flow Summary			
West Side LVB			
Q Subbasin 58AG (5)	5.0	cfs	
Previous Qnw	0.5	cfs	
Qnw (Subbasin + Previous Qnw)	5.5	cfs	
Qdiw: From HEC-22 DI Calculations =	4.8	cfs	Inlet 13.2
Qnw = Qw - Qdiw =	0.7	cfs	
East Side LVB Street			
Qe = Previous Qne + subbasin 58AJ (0) =	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne = Qe - Qdie =	0.0	cfs	
SIDE FLOW			
West Side LVB			
Previous Qnw	0.7	cfs	
Q Existing upstream storm drain	5.6	cfs	
Q Side Street	25.7	cfs	
Q at west side of intersection	20.8	cfs	
Q contained on west side of intersection (allowable Q)	34.3	cfs	
Q overtopping to east side of LV Blvd.	0.0	cfs	
Qnw	20.8	cfs	
Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	20.8	cfs	
2nd DI -Qdiw: From HEC-22 DI Calculations =	0.0	cfs	
New Qnw = Qnw - Qdiw =	20.8	cfs	
East Side LVB Street			
Previous Qne	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
Qne at upstream of intersection	0.0	cfs	
Qne = Overtopping from the west side	0.0	cfs	
Q upstream of flow split	0.0	cfs	
Q Split to east	0.0	cfs	
Qne (in Las Vegas Blvd)	0.0	cfs	
Qdie: From HEC-22 DI Calculations =	0.0	cfs	
New Qne = Qne - Qdie =	0.0	cfs	

Bridger to Stewart
Street and Storm Drain Summary

Final Flow Routed North in LVB Through Intersection 100 YR

West Side of Street (cfs):	34.3	cfs
East Side of Street (cfs):	9.6	cfs

Final Flow Routed North in LVB Through Intersection 10 YR

West Side of Street(cfs):	20.8	cfs
East Side of Street (cfs):	0.0	cfs

Flow in Storm Drain System 100 YR

Previous segement Q + Qdiw + Qdie:	229.4	cfs

Flow in Storm Drain System 10 YR

Qdiw + Qdie:	217.7	cfs

Flow into Side Street: Ogden 100 YR	21.0	cfs
Flow into Side Street: Ogden 10 YR	0.0	cfs

C.5

WSPG (WATER SURFACE PRESSURE GRADIENT)

C.5.1

Input File for Charleston to Bonneville Storm Drain (Ultimate Condition)

```
T1   Las Vegas Blvd Stewart to Sahara - February 2017
T2   Charleston to Boneville Storm Drain - Ultimate Condition
T3   W.O. #7517-1     File: CHARL-BON.WSW      10-Year Event
SO    996.14 1998.13   4                          2001.13
R    1007.78 1999.84   4      .013                                  .000 -85.000 5
R    1368.52 2002.55   4      .013                                  .000    .000 0
JX   1368.52 2002.55   4  2   .013    7.1           2002.55          68.0         .000
R    1478.44 2003.65   4      .013                                  .000    .000 0
JX   1478.44 2003.65   4  1   .013   15.7           2003.65          66.0         .000
R    1518.40 2004.05   3      .013                                  .000    .000 0
JX   1518.40 2004.05   3  1  1.013    3.3      0.2  2004.05 2006.55  40.0-21.0    .000
R    1840.84 2007.27   3      .013                                  .000    .000 0
JX   1840.84 2007.27   3  2   .013    5.8           2007.27          62.0         .000
R    1981.69 2008.68   3      .013                                  .000    .000 0
JX   1981.69 2008.68   3  1   .013   13.7           2008.67          79.0         .000
R    1996.48 2008.82   2      .013                                  .000    .000 0
JX   1996.48 2008.82   2  1   .013    0.3           2008.82         -22.0         .000
R    2336.44 2012.22   2      .013                                  .000    .000 0
JX   2336.44 2012.22   2  1   .013    5.2           2012.22          62.0         .000
R    2426.51 2012.67   2      .013                                  .000    .000 0
JX   2426.51 2012.67   2  1   .013    5.6           2012.67          68.0         .000
R    2476.81 2013.50   1      .013                                  .000  62.000 8
JX   2476.81 2013.50   1  1   .013    0.3           2013.50         -22.0         .000
R    2532.96 2014.06   1      .013                                  .000    .000 0
SH   2532.96 2014.06   1
CD   1  4   1    .000   1.500     .000  .000  .000   .00
CD   2  4   1    .000   2.000     .000  .000  .000   .00
CD   3  4   1    .000   2.500     .000  .000  .000   .00
CD   4  4   1    .000   3.000     .000  .000  .000   .00
CD   5  4   1    .000   3.500     .000  .000  .000   .00
CD   6  4   1    .000   4.000     .000  .000  .000   .00
Q             6.0     .0
```

C.5.2

Output File for Charleston to Bonneville Storm Drain (Ultimate Condition)

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
996.140	1998.130	1.649	1999.779	63.20	15.88	3.91	2003.69	.00	2.56	2.99	3.000	.000	.00	1 .0
.008	.1469					.0262	.00	1.65	2.42	1.02	.013	.00	.00	PIPE
996.148	1998.131	1.649	1999.780	63.20	15.87	3.91	2003.69	.00	2.56	2.99	3.000	.000	.00	1 .0
2.367	.1469					.0246	.06	1.65	2.42	1.02	.013	.00	.00	PIPE
998.515	1998.479	1.715	2000.194	63.20	15.13	3.55	2003.75	.00	2.56	2.97	3.000	.000	.00	1 .0
2.031	.1469					.0218	.04	1.72	2.25	1.02	.013	.00	.00	PIPE
1000.546	1998.777	1.784	2000.561	63.20	14.42	3.23	2003.79	.00	2.56	2.95	3.000	.000	.00	1 .0
1.729	.1469					.0193	.03	1.78	2.08	1.02	.013	.00	.00	PIPE
1002.275	1999.031	1.857	2000.888	63.20	13.75	2.94	2003.83	.00	2.56	2.91	3.000	.000	.00	1 .0
1.464	.1469					.0171	.02	1.86	1.93	1.02	.013	.00	.00	PIPE
1003.739	1999.246	1.934	2001.180	63.20	13.11	2.67	2003.85	.00	2.56	2.87	3.000	.000	.00	1 .0
1.212	.1469					.0152	.02	1.93	1.78	1.02	.013	.00	.00	PIPE
1004.951	1999.424	2.017	2001.441	63.20	12.50	2.43	2003.87	.00	2.56	2.82	3.000	.000	.00	1 .0
.994	.1469					.0135	.01	2.02	1.64	1.02	.013	.00	.00	PIPE
1005.945	1999.570	2.105	2001.676	63.20	11.92	2.21	2003.88	.00	2.56	2.75	3.000	.000	.00	1 .0
.776	.1469					.0120	.01	2.11	1.51	1.02	.013	.00	.00	PIPE
1006.721	1999.684	2.201	2001.885	63.20	11.37	2.01	2003.89	.00	2.56	2.65	3.000	.000	.00	1 .0
.568	.1469					.0108	.01	2.20	1.38	1.02	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1007.289	1999.768	2.306	2002.074	63.20	10.84	1.82	2003.90	.00	2.56	2.53	3.000	.000	.00	1 .0
.363	.1469					.0097	.00	2.31	1.26	1.02	.013	.00	.00	PIPE
1007.652	1999.821	2.422	2002.243	63.20	10.33	1.66	2003.90	.00	2.56	2.37	3.000	.000	.00	1 .0
.128	.1469					.0088	.00	2.42	1.13	1.02	.013	.00	.00	PIPE
1007.780	1999.840	2.556	2002.396	63.20	9.85	1.51	2003.90	.00	2.56	2.13	3.000	.000	.00	1 .0
36.302	.0075					.0081	.30	2.56	1.00	3.00	.013	.00	.00	PIPE
1044.082	2000.113	2.716	2002.829	63.20	9.39	1.37	2004.20	.00	2.56	1.76	3.000	.000	.00	1 .0
232.199	.0075					.0081	1.88	2.72	.85	3.00	.013	.00	.00	PIPE
1276.281	2001.857	2.973	2004.830	63.20	8.95	1.24	2006.07	.00	2.56	.57	3.000	.000	.00	1 .0
25.761	.0075					.0084	.22	2.97	.45	3.00	.013	.00	.00	PIPE
1302.042	2002.051	3.000	2005.051	63.20	8.94	1.24	2006.29	.00	2.56	.00	3.000	.000	.00	1 .0
66.478	.0075					.0088	.58	3.00	.00	3.00	.013	.00	.00	PIPE
1368.520	2002.550	3.097	2005.647	63.20	8.94	1.24	2006.89	.00	2.56	.00	3.000	.000	.00	1 .0
JUNCT STR	.0000					.0080	.00	3.10	.00		.013	.00	.00	PIPE
1368.520	2002.550	3.597	2006.147	56.10	7.94	.98	2007.13	.00	2.43	.00	3.000	.000	.00	1 .0
109.920	.0100					.0071	.78	3.60	.00	2.11	.013	.00	.00	PIPE
1478.440	2003.650	3.275	2006.925	56.10	7.94	.98	2007.90	.00	2.43	.00	3.000	.000	.00	1 .0
JUNCT STR	.0000					.0054	.00	3.28	.00		.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1478.440	2003.650	3.967	2007.618	40.40	8.23	1.05	2008.67	.00	2.14	.00	2.500	.000	.00	1 .0
39.960	.0100					.0097	.39	3.97	.00	2.01	.013	.00	.00	PIPE
1518.400	2004.050	3.955	2008.005	40.40	8.23	1.05	2009.06	.00	2.14	.00	2.500	.000	.00	1 .0
JUNCT STR	.0000					.0089	.00	3.96	.00		.013	.00	.00	PIPE
1518.400	2004.050	4.274	2008.324	36.90	7.52	.88	2009.20	.00	2.06	.00	2.500	.000	.00	1 .0
322.440	.0100					.0081	2.61	4.27	.00	1.85	.013	.00	.00	PIPE
1840.840	2007.270	3.664	2010.934	36.90	7.52	.88	2011.81	.00	2.06	.00	2.500	.000	.00	1 .0
JUNCT STR	.0000					.0069	.00	3.66	.00		.013	.00	.00	PIPE
1840.840	2007.270	4.140	2011.410	31.10	6.34	.62	2012.03	.00	1.90	.00	2.500	.000	.00	1 .0
140.850	.0100					.0057	.81	4.14	.00	1.63	.013	.00	.00	PIPE
1981.690	2008.680	3.540	2012.220	31.10	6.34	.62	2012.84	.00	1.90	.00	2.500	.000	.00	1 .0
JUNCT STR	.0000					.0038	.00	3.54	.00		.013	.00	.00	PIPE
1981.690	2008.680	4.268	2012.948	17.40	5.54	.48	2013.42	.00	1.50	.00	2.000	.000	.00	1 .0
14.790	.0095					.0059	.09	4.27	.00	1.34	.013	.00	.00	PIPE
1996.480	2008.820	4.216	2013.036	17.40	5.54	.48	2013.51	.00	1.50	.00	2.000	.000	.00	1 .0
JUNCT STR	.0000					.0058	.00	4.22	.00		.013	.00	.00	PIPE
1996.480	2008.820	4.248	2013.068	17.10	5.44	.46	2013.53	.00	1.49	.00	2.000	.000	.00	1 .0
339.960	.0100					.0057	1.94	4.25	.00	1.30	.013	.00	.00	PIPE

Program Package Serial Number: 1513

WATER SURFACE PROFILE LISTING Date: 2-13-2017 Time:11:39:13

Las Vegas Blvd Stewart to Sahara - February 2017

Charleston to Boneville Storm Drain - Ultimate Condition

W.O. #7517-1 File: CHARL-BON.WSW 10-Year Event

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
2336.440	2012.220	2.790	2015.010	17.10	5.44	.46	2015.47	.00	1.49	.00	2.000	.000	.00	1 .0
JUNCT STR	.0000					.0042	.00	2.79	.00		.013	.00	.00	PIPE
2336.440	2012.220	3.194	2015.414	11.90	3.79	.22	2015.64	.00	1.24	.00	2.000	.000	.00	1 .0
90.070	.0050					.0028	.25	3.19	.00	1.29	.013	.00	.00	PIPE
2426.510	2012.670	2.993	2015.663	11.90	3.79	.22	2015.89	.00	1.24	.00	2.000	.000	.00	1 .0
JUNCT STR	.0000					.0018	.00	2.99	.00		.013	.00	.00	PIPE
2426.510	2012.670	3.248	2015.918	6.30	3.57	.20	2016.12	.00	.97	.00	1.500	.000	.00	1 .0
50.300	.0165					.0036	.18	3.25	.00	.72	.013	.00	.00	PIPE
2476.810	2013.500	2.718	2016.218	6.30	3.57	.20	2016.42	.00	.97	.00	1.500	.000	.00	1 .0
JUNCT STR	.0000					.0034	.00	2.72	.00		.013	.00	.00	PIPE
2476.810	2013.500	2.754	2016.254	6.00	3.40	.18	2016.43	.00	.95	.00	1.500	.000	.00	1 .0
56.150	.0100					.0033	.18	2.75	.00	.81	.013	.00	.00	PIPE
2532.960	2014.060	2.377	2016.437	6.00	3.40	.18	2016.62	.00	.95	.00	1.500	.000	.00	1 .0

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch

C.5.3

Input File for Bonneville to Stewart Storm Drain (Ultimate Condition)

```
T1   Las Vegas Blvd Stewart to Sahara - February 2017
T2   Bonneville to Stewart Storm Drain - Ultimate Condition
T3   W.O. #7517-1       File: BON-STEW.WSW      10-Year Event
SO    966.43 1996.57   9                          2002.57
R    1000.00 1996.65   9      .013                                .000    .000 0
JX   1000.00 1996.65   9  2   .013    4.8           1998.00        43.0         .000
R    1248.16 1997.22   9      .013                                .000    .000 0
JX   1248.16 1997.22   9  2   .013    4.2           1997.19        62.0         .000
R    1316.09 1997.36   9      .013                                .000  -2.00  0
JX   1316.09 1997.36   9  1   .013    7.7           1997.36        72.0         .000
R    1390.32 1997.55   9      .013                                .000   2.00  0
JX   1390.32 1997.55   9  1   .013   12.6           2001.55        90.0         .000
R    1416.51 1997.62   9      .013                                .000    .000 0
JX   1416.51 1997.62   9  1   .013   24.0           2001.62        47.0         .000
R    1806.54 1998.60   9      .013                                .000    .000 0
JX   1806.54 1998.60   9  2 1.013   36.1      2.5  1998.60 1998.60  21.0-45.0    .000
R    1939.14 1998.93   9      .013                                .000    .000 0
JX   1939.14 1998.93   9  1   .013    1.0           2003.93        54.0         .000
R    2051.25 1999.21   9      .013                                .000    .000 0
R    2179.67 1999.53   9      .013                                .000    .000 0
JX   2179.67 1999.53   9  1   .013    0.4           2004.00        79.0         .000
R    2197.17 1999.57   9      .013                                .000    .000 0
JX   2197.17 1999.57   9  1   .013    3.2           2004.07        64.0         .000
R    2305.67 1999.74   9      .013                                .000    .000 0
JX   2305.67 1999.74   9  1   .013    5.2           1999.83        90.0         .000
R    2382.07 2000.04   9      .013                                .000   8.000 1
JX   2382.07 2000.04   9  1   .013   32.1           2000.04        90.0         .000
R    2420.37 2000.14   9      .013                                .000  -8.000 1
JX   2420.37 2000.14   9  1   .013    0.3           2000.14        66.0         .000
R    2786.52 2001.06   9      .013                                .000    .000 0
JX   2786.52 2001.06   9  2   .013    1.7           2001.06        82.0         .000
R    2829.16 2001.16   7      .013                                .000    .000 0
JX   2829.16 2001.16   7  2   .013   34.2           2001.16        61.0         .000
R    3091.41 2001.82   7      .013                                .000    .000 0
R    3274.24 2002.27   7      .013                                .000    .000 0
JX   3274.24 2002.27   7  1 2.013    4.1      0.3  2005.77 2005.77  25.0-62.0    .000
R    3500.64 2002.84   6      .013                                .000    .000 0
R    3804.03 2003.60   6      .013                                .000    .000 0
JX   3804.03 2003.60   6  1   .013    7.1           2003.60        90.0         .000
R    3841.40 2003.69   6      .013                                .000    .000 0
JX   3841.40 2003.69   6  1   .013    8.5           2003.69        90.0         .000
R    3874.03 2003.77   6      .013                                .000    .000 0
JX   3874.03 2003.77   6  1   .013    0.3           2003.77        50.0         .000
R    3941.03 2003.94   6      .013                                .000    .000 0
JX   3941.03 2003.94   6  1   .013    5.0           2003.94        50.0         .000
R    3971.03 2004.02   6      .013                                .000    .000 0
JX   3971.03 2004.02   6  1   .013    2.9           2004.01        50.0         .000
R    4187.70 2004.55   4      .013                                .000    .000 0
JX   4187.70 2004.55   4  2   .013    6.9           2004.55        69.0         .000
R    4209.53 2004.61   4      .013                                .000  55.00  7
R    4226.20 2004.763  1      .013                                .000    .000 0
SH   4226.20 2004.763  1
CD   1  4   1    .000   1.500     .000  .000  .000   .00
CD   2  4   1    .000   2.000     .000  .000  .000   .00
CD   3  4   1    .000   2.500     .000  .000  .000   .00
CD   4  4   1    .000   3.000     .000  .000  .000   .00
CD   5  4   1    .000   3.500     .000  .000  .000   .00
CD   6  4   1    .000   4.000     .000  .000  .000   .00
CD   7  4   1    .000   4.500     .000  .000  .000   .00
CD   8  4   1    .000   5.000     .000  .000  .000   .00
CD   9  3   0    .000   5.000    6.000  .000  .000   .00
Q             7.0     .0
```

C.5.4

Output File for Bonneville to Stewart Storm Drain (Ultimate Condition)

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
966.430	1996.570	6.000	2002.570	212.10	7.07	.78	2003.35	.00	3.39	6.00	5.000	6.000	.00	0 .0
33.570	.0024					.0025	.08	6.00	.56	4.33	.013	.00	.00	BOX
1000.000	1996.650	6.005	2002.655	212.10	7.07	.78	2003.43	.00	3.39	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0024	.00	6.00	.56		.013	.00	.00	BOX
1000.000	1996.650	6.069	2002.719	207.30	6.91	.74	2003.46	.00	3.33	6.00	5.000	6.000	.00	0 .0
248.160	.0023					.0024	.60	6.07	.54	4.31	.013	.00	.00	BOX
1248.160	1997.220	6.098	2003.318	207.30	6.91	.74	2004.06	.00	3.33	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0023	.00	6.10	.54		.013	.00	.00	BOX
1248.160	1997.220	6.155	2003.375	203.10	6.77	.71	2004.09	.00	3.29	6.00	5.000	6.000	.00	0 .0
67.930	.0021					.0023	.16	6.16	.53	4.43	.013	.00	.00	BOX
1316.090	1997.360	6.178	2003.537	203.10	6.77	.71	2004.25	.00	3.29	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0021	.00	6.18	.53		.013	.00	.00	BOX
1316.090	1997.360	6.273	2003.633	195.40	6.51	.66	2004.29	.00	3.21	6.00	5.000	6.000	.00	0 .0
74.230	.0026					.0021	.16	6.27	.51	3.95	.013	.00	.00	BOX
1390.320	1997.550	6.246	2003.796	195.40	6.51	.66	2004.46	.00	3.21	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0019	.00	6.25	.51		.013	.00	.00	BOX
1390.320	1997.550	6.411	2003.961	182.80	6.09	.58	2004.54	.00	3.07	6.00	5.000	6.000	.00	0 .0
26.190	.0027					.0019	.05	6.41	.48	3.69	.013	.00	.00	BOX

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1416.510	1997.620	6.390	2004.010	182.80	6.09	.58	2004.59	.00	3.07	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0014	.00	6.39	.48		.013	.00	.00	BOX
1416.510	1997.620	6.531	2004.151	158.80	5.29	.44	2004.59	.00	2.79	6.00	5.000	6.000	.00	0 .0
390.030	.0025					.0014	.55	6.53	.42	3.39	.013	.00	.00	BOX
1806.540	1998.600	6.105	2004.705	158.80	5.29	.44	2005.14	.00	2.79	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0008	.00	6.10	.42		.013	.00	.00	BOX
1806.540	1998.600	6.290	2004.890	120.20	4.01	.25	2005.14	.00	2.32	6.00	5.000	6.000	.00	0 .0
132.600	.0025					.0008	.11	6.29	.32	2.76	.013	.00	.00	BOX
JUNCT STR	.0000					.0008	.00	6.07	.32		.013	.00	.00	BOX
1939.140	1998.930	6.076	2005.006	119.20	3.97	.25	2005.25	.00	2.31	6.00	5.000	6.000	.00	0 .0
112.110	.0025					.0008	.09	6.08	.31	2.74	.013	.00	.00	BOX
2051.250	1999.210	5.886	2005.096	119.20	3.97	.25	2005.34	.00	2.31	6.00	5.000	6.000	.00	0 .0
128.420	.0025					.0008	.10	5.89	.31	2.74	.013	.00	.00	BOX
JUNCT STR	.0000					.0008	.00	5.67	.31		.013	.00	.00	BOX
2179.670	1999.530	5.672	2005.202	118.80	3.96	.24	2005.45	.00	2.30	6.00	5.000	6.000	.00	0 .0
17.500	.0023					.0008	.01	5.67	.31	2.82	.013	.00	.00	BOX

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2197.170	1999.570	5.646	2005.216	118.80	3.96	.24	2005.46	.00	2.30	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0008	.00	5.65	.31		.013	.00	.00	BOX

2197.170	1999.570	5.672	2005.242	115.60	3.85	.23	2005.47	.00	2.26	6.00	5.000	6.000	.00	0	.0
108.500	.0016					.0008	.08	5.67	.30	3.19	.013	.00	.00	BOX	
2305.670	1999.740	5.583	2005.323	115.60	3.85	.23	2005.55	.00	2.26	6.00	5.000	6.000	.00	0	.0
JUNCT STR	.0000					.0007	.00	5.58	.30		.013	.00	.00	BOX	
2305.670	1999.740	5.624	2005.364	110.40	3.68	.21	2005.57	.00	2.19	6.00	5.000	6.000	.00	0	.0
76.400	.0039					.0007	.05	5.62	.29	2.19	.013	.00	.00	BOX	
2382.070	2000.040	5.392	2005.432	110.40	3.68	.21	2005.64	.00	2.19	6.00	5.000	6.000	.00	0	.0
JUNCT STR	.0000					.0003	.00	5.39	.29		.013	.00	.00	BOX	
2382.070	2000.040	5.601	2005.641	78.30	2.61	.11	2005.75	.00	1.74	6.00	5.000	6.000	.00	0	.0
38.300	.0026					.0003	.01	5.60	.21	1.98	.013	.00	.00	BOX	
JUNCT STR	.0000					.0003	.00	5.52	.21		.013	.00	.00	BOX	
2420.370	2000.140	5.524	2005.664	78.00	2.60	.10	2005.77	.00	1.74	6.00	5.000	6.000	.00	0	.0
241.454	.0025					.0003	.08	5.52	.20	2.01	.013	.00	.00	BOX	
2661.824	2000.747	5.000	2005.747	78.00	2.60	.10	2005.85	.00	1.74	6.00	5.000	6.000	.00	0	.0
97.658	.0025					.0002	.02	5.00	.20	2.01	.013	.00	.00	BOX	

Program Package Serial Number: 1513

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Las Vegas Blvd Stewart to Sahara - February 2017

Bonneville to Stewart Storm Drain - Ultimate Condition

W.O. #7517-1 File: BON-STEW.WSW 10-Year Event

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2759.482	2000.992	4.766	2005.758	78.00	2.73	.12	2005.87	.00	1.74	6.00	5.000	6.000	.00	0 .0
27.038	.0025					.0003	.01	4.77	.22	2.01	.013	.00	.00	BOX
				WARNING - Flow depth near top of box conduit										
2786.520	2001.060	4.702	2005.762	78.00	2.76	.12	2005.88	.00	1.74	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0002	.00	4.70	.22		.013	.00	.00	BOX
				WARNING - Flow depth near top of box conduit										
2786.520	2001.060	4.713	2005.773	76.30	4.80	.36	2006.13	.00	2.55	.00	4.500	.000	.00	1 .0
42.640	.0023					.0015	.06	4.71	.00	3.05	.013	.00	.00	PIPE
2829.160	2001.160	4.677	2005.837	76.30	4.80	.36	2006.19	.00	2.55	.00	4.500	.000	.00	1 .0
JUNCT STR	.0000					.0010	.00	4.68	.00		.013	.00	.00	PIPE
2829.160	2001.160	4.925	2006.085	42.10	2.65	.11	2006.19	.00	1.87	.00	4.500	.000	.00	1 .0
206.724	.0025					.0005	.09	4.93	.00	2.05	.013	.00	.00	PIPE
3035.884	2001.680	4.500	2006.180	42.10	2.65	.11	2006.29	.00	1.87	.00	4.500	.000	.00	1 .0
55.526	.0025					.0004	.02	4.50	.00	2.05	.013	.00	.00	PIPE
3091.410	2001.820	4.382	2006.202	42.10	2.67	.11	2006.31	.00	1.87	1.44	4.500	.000	.00	1 .0
159.696	.0025					.0004	.06	4.38	.14	2.07	.013	.00	.00	PIPE

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Las Vegas Blvd Stewart to Sahara - February 2017

Bonneville to Stewart Storm Drain - Ultimate Condition

W.O. #7517-1 File: BON-STEW.WSW 10-Year Event

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3251.106	2002.213	4.042	2006.255	42.10	2.80	.12	2006.38	.00	1.87	2.72	4.500	.000	.00	1 .0
23.134	.0025					.0004	.01	4.04	.21	2.07	.013	.00	.00	PIPE
3274.240	2002.270	3.992	2006.262	42.10	2.82	.12	2006.39	.00	1.87	2.85	4.500	.000	.00	1 .0
JUNCT STR	.0000					.0004	.00	3.99	.22		.013	.00	.00	PIPE
3274.240	2002.270	4.019	2006.289	37.70	3.00	.14	2006.43	.00	1.83	.00	4.000	.000	.00	1 .0
10.215	.0025					.0007	.01	4.02	.00	2.05	.013	.00	.00	PIPE
3284.455	2002.296	4.000	2006.296	37.70	3.00	.14	2006.44	.00	1.83	.00	4.000	.000	.00	1 .0
189.696	.0025					.0006	.12	4.00	.00	2.05	.013	.00	.00	PIPE
3474.152	2002.773	3.629	2006.402	37.70	3.15	.15	2006.56	.00	1.83	2.32	4.000	.000	.00	1 .0
26.488	.0025					.0006	.02	3.63	.24	2.05	.013	.00	.00	PIPE
3500.640	2002.840	3.575	2006.415	37.70	3.18	.16	2006.57	.00	1.83	2.46	4.000	.000	.00	1 .0

101.218	.0025					.0006	.06	3.58	.26	2.06	.013	.00	.00	PIPE				
3601.858	2003.094	3.370	2006.464	37.70	3.34	.17	2006.64	.00	1.83	2.91	4.000	.000	.00	1	.0			
84.653	.0025					.0007	.06	3.37	.30	2.06	.013	.00	.00	PIPE				
3686.510	2003.306	3.199	2006.505	37.70	3.50	.19	2006.69	.00	1.83	3.20	4.000	.000	.00	1	.0			
76.214	.0025					.0008	.06	3.20	.34	2.06	.013	.00	.00	PIPE				
3762.725	2003.496	3.047	2006.544	37.70	3.67	.21	2006.75	.00	1.83	3.41	4.000	.000	.00	1	.0			
41.305	.0025					.0008	.03	3.05	.37	2.06	.013	.00	.00	PIPE				

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Las Vegas Blvd Stewart to Sahara - February 2017

Bonneville to Stewart Storm Drain - Ultimate Condition

W.O. #7517-1 File: BON-STEW.WSW 10-Year Event

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL		No Wth Prs/Pip	
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR		Type Ch	
3804.030	2003.600	2.966	2006.566	37.70	3.77	.22	2006.79	.00	1.83	3.50	4.000	.000	.00	1	.0	
JUNCT STR	.0000					.0007	.00	2.97	.39		.013	.00	.00	PIPE		
3804.030	2003.600	3.127	2006.727	30.60	2.90	.13	2006.86	.00	1.64	3.30	4.000	.000	.00	1	.0	
37.370	.0024					.0005	.02	3.13	.29	1.84	.013	.00	.00	PIPE		
3841.400	2003.690	3.050	2006.740	30.60	2.98	.14	2006.88	.00	1.64	3.40	4.000	.000	.00	1	.0	
JUNCT STR	.0000					.0004	.00	3.05	.30		.013	.00	.00	PIPE		
3841.400	2003.690	3.184	2006.874	22.10	2.06	.07	2006.94	.00	1.39	3.22	4.000	.000	.00	1	.0	
32.630	.0025					.0003	.01	3.18	.20	1.53	.013	.00	.00	PIPE		
JUNCT STR	.0000					.0003	.00	3.11	.21		.013	.00	.00	PIPE		
3874.030	2003.770	3.113	2006.883	21.80	2.08	.07	2006.95	.00	1.38	3.32	4.000	.000	.00	1	.0	
60.239	.0025					.0003	.02	3.11	.21	1.51	.013	.00	.00	PIPE		
3934.269	2003.923	2.970	2006.893	21.80	2.18	.07	2006.97	.00	1.38	3.50	4.000	.000	.00	1	.0	
6.761	.0025					.0003	.00	2.97	.23	1.51	.013	.00	.00	PIPE		
3941.030	2003.940	2.954	2006.894	21.80	2.19	.07	2006.97	.00	1.38	3.52	4.000	.000	.00	1	.0	
JUNCT STR	.0000					.0002	.00	2.95	.23		.013	.00	.00	PIPE		
3941.030	2003.940	2.987	2006.927	16.80	1.67	.04	2006.97	.00	1.20	3.48	4.000	.000	.00	1	.0	
30.000	.0027					.0002	.01	2.99	.17	1.29	.013	.00	.00	PIPE		

Program Package Serial Number: 1513

WATER SURFACE PROFILE LISTING Date: 2-13-2017 Time: 1:11:56

Las Vegas Blvd Stewart to Sahara - February 2017

Bonneville to Stewart Storm Drain - Ultimate Condition

W.O. #7517-1 File: BON-STEW.WSW 10-Year Event

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL		No Wth Prs/Pip	
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR		Type Ch	
3971.030	2004.020	2.910	2006.930	16.80	1.72	.05	2006.98	.00	1.20	3.56	4.000	.000	.00	1	.0	
JUNCT STR	.0000					.0001	.00	2.91	.18		.013	.00	.00	PIPE		
3971.030	2004.020	2.929	2006.949	13.90	1.98	.06	2007.01	.00	1.19	.91	3.000	.000	.00	1	.0	
109.058	.0024					.0004	.04	2.93	.13	1.36	.013	.00	.00	PIPE		
4080.088	2004.287	2.698	2006.985	13.90	2.08	.07	2007.05	.00	1.19	1.81	3.000	.000	.00	1	.0	
72.850	.0024					.0004	.03	2.70	.19	1.36	.013	.00	.00	PIPE		
4152.938	2004.465	2.542	2007.007	13.90	2.18	.07	2007.08	.00	1.19	2.16	3.000	.000	.00	1	.0	
34.762	.0024					.0004	.01	2.54	.22	1.36	.013	.00	.00	PIPE		
4187.700	2004.550	2.468	2007.018	13.90	2.23	.08	2007.10	.00	1.19	2.29	3.000	.000	.00	1	.0	
JUNCT STR	.0000					.0003	.00	2.47	.24		.013	.00	.00	PIPE		
4187.700	2004.550	2.556	2007.106	7.00	1.09	.02	2007.12	.00	.83	2.13	3.000	.000	.00	1	.0	
21.830	.0027					.0001	.00	2.56	.11	.91	.013	.00	.00	PIPE		
4209.530	2004.610	2.498	2007.108	7.00	3.96	.24	2007.35	.00	1.02	.00	1.500	.000	.00	1	.0	
16.670	.0092					.0044	.07	2.50	.00	.92	.013	.00	.00	PIPE		
4226.200	2004.763	2.419	2007.182	7.00	3.96	.24	2007.43	.00	1.02	.00	1.500	.000	.00	1	.0	

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C.5.5

Input File for Charleston to Bonneville Storm Drain (Interim Condition)

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T1   Las Vegas Blvd Stewart to Sahara - February 2017
T2   Bonneville to Stewart Storm Drain - Interim Condition
T3   W.O. #7517-1       File: BON-STEW.WSW      10-Year Event
SO    966.43 1996.57   9                          2005.05
R    1000.00 1996.65   9      .013                                .000    .000 0
JX   1000.00 1996.65   9  2   .013    4.8           1998.00        43.0         .000
R    1248.16 1997.22   9      .013                                .000    .000 0
JX   1248.16 1997.22   9  2   .013    4.2           1997.19        62.0         .000
R    1316.09 1997.36   9      .013                                .000  -2.00  0
JX   1316.09 1997.36   9  1   .013    7.7           1997.36        72.0         .000
R    1390.32 1997.55   9      .013                                .000   2.00  0
JX   1390.32 1997.55   9  1   .013   12.6           2001.55        90.0         .000
R    1416.51 1997.62   9      .013                                .000    .000 0
JX   1416.51 1997.62   9  1   .013   24.0           2001.62        47.0         .000
R    1806.54 1998.60   9      .013                                .000    .000 0
JX   1806.54 1998.60   9  2  1.013   36.1      2.5  1998.60 1998.60  21.0-45.0    .000
R    1939.14 1998.93   9      .013                                .000    .000 0
JX   1939.14 1998.93   9  1   .013    1.0           2003.93        54.0         .000
R    2051.25 1999.21   9      .013                                .000    .000 0
R    2179.67 1999.53   9      .013                                .000    .000 0
JX   2179.67 1999.53   9  1   .013    0.4           2004.00        79.0         .000
R    2197.17 1999.57   9      .013                                .000    .000 0
JX   2197.17 1999.57   9  1   .013    3.2           2004.07        64.0         .000
R    2305.67 1999.74   9      .013                                .000    .000 0
JX   2305.67 1999.74   9  1   .013    5.2           1999.83        90.0         .000
R    2382.07 2000.04   9      .013                                .000   8.000 1
JX   2382.07 2000.04   9  1   .013   32.1           2000.04        90.0         .000
R    2420.37 2000.14   9      .013                                .000  -8.000 1
JX   2420.37 2000.14   9  1   .013    0.3           2000.14        66.0         .000
R    2786.52 2001.06   9      .013                                .000    .000 0
JX   2786.52 2001.06   9  2   .013    1.7           2001.06        82.0         .000
R    2829.16 2001.16   7      .013                                .000    .000 0
JX   2829.16 2001.16   7  2   .013   34.2           2001.16        61.0         .000
R    3091.41 2001.82   7      .013                                .000    .000 0
R    3274.24 2002.27   7      .013                                .000    .000 0
JX   3274.24 2002.27   7  1  2.013    4.1      0.3  2005.77 2005.77  25.0-62.0    .000
R    3500.64 2002.84   6      .013                                .000    .000 0
R    3804.03 2003.60   6      .013                                .000    .000 0
JX   3804.03 2003.60   6  1   .013    7.1           2003.60        90.0         .000
R    3841.40 2003.69   6      .013                                .000    .000 0
JX   3841.40 2003.69   6  1   .013    8.5           2003.69        90.0         .000
R    3874.03 2003.77   6      .013                                .000    .000 0
JX   3874.03 2003.77   6  1   .013    0.3           2003.77        50.0         .000
R    3941.03 2003.94   6      .013                                .000    .000 0
JX   3941.03 2003.94   6  1   .013    5.0           2003.94        50.0         .000
R    3971.03 2004.02   6      .013                                .000    .000 0
JX   3971.03 2004.02   6  1   .013    2.9           2004.01        50.0         .000
R    4187.70 2004.55   4      .013                                .000    .000 0
JX   4187.70 2004.55   4  2   .013    6.9           2004.55        69.0         .000
R    4209.53 2004.61   4      .013                                .000  55.00  7
R    4226.20 2004.763  1      .013                                .000    .000 0
SH   4226.20 2004.763  1
CD   1  4   1    .000   1.500     .000  .000  .000   .00
CD   2  4   1    .000   2.000     .000  .000  .000   .00
CD   3  4   1    .000   2.500     .000  .000  .000   .00
CD   4  4   1    .000   3.000     .000  .000  .000   .00
CD   5  4   1    .000   3.500     .000  .000  .000   .00
CD   6  4   1    .000   4.000     .000  .000  .000   .00
CD   7  4   1    .000   4.500     .000  .000  .000   .00
CD   8  4   1    .000   5.000     .000  .000  .000   .00
CD   9  3   0    .000   5.000    6.000  .000  .000   .00
Q             7.0     .0
```

C.5.6

Output File for Charleston to Bonneville Storm Drain (Interim Condition)

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
966.430	1996.570	8.480	2005.050	212.10	7.07	.78	2005.83	.00	3.39	6.00	5.000	6.000	.00	0 .0
33.570	.0024					.0025	.08	8.48	.56	4.33	.013	.00	.00	BOX
1000.000	1996.650	8.485	2005.135	212.10	7.07	.78	2005.91	.00	3.39	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0024	.00	8.48	.56		.013	.00	.00	BOX
1000.000	1996.650	8.549	2005.199	207.30	6.91	.74	2005.94	.00	3.33	6.00	5.000	6.000	.00	0 .0
248.160	.0023					.0024	.60	8.55	.54	4.31	.013	.00	.00	BOX
1248.160	1997.220	8.579	2005.799	207.30	6.91	.74	2006.54	.00	3.33	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0023	.00	8.58	.54		.013	.00	.00	BOX
1248.160	1997.220	8.635	2005.855	203.10	6.77	.71	2006.57	.00	3.29	6.00	5.000	6.000	.00	0 .0
67.930	.0021					.0023	.16	8.64	.53	4.43	.013	.00	.00	BOX
1316.090	1997.360	8.658	2006.018	203.10	6.77	.71	2006.73	.00	3.29	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0021	.00	8.66	.53		.013	.00	.00	BOX
1316.090	1997.360	8.753	2006.113	195.40	6.51	.66	2006.77	.00	3.21	6.00	5.000	6.000	.00	0 .0
74.230	.0026					.0021	.16	8.75	.51	3.95	.013	.00	.00	BOX
1390.320	1997.550	8.726	2006.276	195.40	6.51	.66	2006.94	.00	3.21	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0019	.00	8.73	.51		.013	.00	.00	BOX
1390.320	1997.550	8.891	2006.441	182.80	6.09	.58	2007.02	.00	3.07	6.00	5.000	6.000	.00	0 .0
26.190	.0027					.0019	.05	8.89	.48	3.69	.013	.00	.00	BOX

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1416.510	1997.620	8.870	2006.490	182.80	6.09	.58	2007.07	.00	3.07	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0014	.00	8.87	.48		.013	.00	.00	BOX
1416.510	1997.620	9.012	2006.632	158.80	5.29	.44	2007.07	.00	2.79	6.00	5.000	6.000	.00	0 .0
390.030	.0025					.0014	.55	9.01	.42	3.39	.013	.00	.00	BOX
1806.540	1998.600	8.585	2007.185	158.80	5.29	.44	2007.62	.00	2.79	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0008	.00	8.58	.42		.013	.00	.00	BOX
1806.540	1998.600	8.771	2007.370	120.20	4.01	.25	2007.62	.00	2.32	6.00	5.000	6.000	.00	0 .0
132.600	.0025					.0008	.11	8.77	.32	2.76	.013	.00	.00	BOX
JUNCT STR	.0000					.0008	.00	8.55	.32		.013	.00	.00	BOX
1939.140	1998.930	8.556	2007.486	119.20	3.97	.25	2007.73	.00	2.31	6.00	5.000	6.000	.00	0 .0
112.110	.0025					.0008	.09	8.56	.31	2.74	.013	.00	.00	BOX
2051.250	1999.210	8.366	2007.576	119.20	3.97	.25	2007.82	.00	2.31	6.00	5.000	6.000	.00	0 .0
128.420	.0025					.0008	.10	8.37	.31	2.74	.013	.00	.00	BOX
JUNCT STR	.0000					.0008	.00	8.15	.31		.013	.00	.00	BOX
2179.670	1999.530	8.152	2007.682	118.80	3.96	.24	2007.93	.00	2.30	6.00	5.000	6.000	.00	0 .0
17.500	.0023					.0008	.01	8.15	.31	2.82	.013	.00	.00	BOX

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2197.170	1999.570	8.125	2007.695	118.80	3.96	.24	2007.94	.00	2.30	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0008	.00	8.13	.31		.013	.00	.00	BOX

2197.170	1999.570	8.149	2007.719	115.60	3.85	.23	2007.95	.00	2.26	6.00	5.000	6.000	.00	0	.0
108.500	.0016					.0008	.08	8.15	.30	3.19	.013	.00	.00	BOX	
2305.670	1999.740	8.060	2007.800	115.60	3.85	.23	2008.03	.00	2.26	6.00	5.000	6.000	.00	0	.0
JUNCT STR	.0000					.0007	.00	8.06	.30		.013	.00	.00	BOX	
2305.670	1999.740	8.101	2007.841	110.40	3.68	.21	2008.05	.00	2.19	6.00	5.000	6.000	.00	0	.0
76.400	.0039					.0007	.05	8.10	.29	2.19	.013	.00	.00	BOX	
2382.070	2000.040	7.869	2007.909	110.40	3.68	.21	2008.12	.00	2.19	6.00	5.000	6.000	.00	0	.0
JUNCT STR	.0000					.0003	.00	7.87	.29		.013	.00	.00	BOX	
2382.070	2000.040	8.078	2008.118	78.30	2.61	.11	2008.22	.00	1.74	6.00	5.000	6.000	.00	0	.0
38.300	.0026					.0003	.01	8.08	.21	1.98	.013	.00	.00	BOX	
JUNCT STR	.0000					.0003	.00	8.00	.21		.013	.00	.00	BOX	
2420.370	2000.140	8.001	2008.141	78.00	2.60	.10	2008.25	.00	1.74	6.00	5.000	6.000	.00	0	.0
366.150	.0025					.0003	.13	8.00	.20	2.01	.013	.00	.00	BOX	
JUNCT STR	.0000					.0003	.00	7.21	.20		.013	.00	.00	BOX	

Program Package Serial Number: 1513

WATER SURFACE PROFILE LISTING Date: 2-13-2017 Time: 2:47:37

Las Vegas Blvd Stewart to Sahara - February 2017

Bonneville to Stewart Storm Drain - Interim Condition

W.O. #7517-1 File: BON-STEW.WSW 10-Year Event

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2786.520	2001.060	7.215	2008.275	76.30	4.80	.36	2008.63	.00	2.55	.00	4.500	.000	.00	1 .0
42.640	.0023					.0015	.06	7.22	.00	3.05	.013	.00	.00	PIPE
2829.160	2001.160	7.179	2008.339	76.30	4.80	.36	2008.70	.00	2.55	.00	4.500	.000	.00	1 .0
JUNCT STR	.0000					.0010	.00	7.18	.00		.013	.00	.00	PIPE
2829.160	2001.160	7.428	2008.588	42.10	2.65	.11	2008.70	.00	1.87	.00	4.500	.000	.00	1 .0
262.250	.0025					.0005	.12	7.43	.00	2.05	.013	.00	.00	PIPE
3091.410	2001.820	6.888	2008.708	42.10	2.65	.11	2008.82	.00	1.87	.00	4.500	.000	.00	1 .0
182.830	.0025					.0005	.08	6.89	.00	2.07	.013	.00	.00	PIPE
3274.240	2002.270	6.522	2008.792	42.10	2.65	.11	2008.90	.00	1.87	.00	4.500	.000	.00	1 .0
JUNCT STR	.0000					.0004	.00	6.52	.00		.013	.00	.00	PIPE
3274.240	2002.270	6.548	2008.818	37.70	3.00	.14	2008.96	.00	1.83	.00	4.000	.000	.00	1 .0
226.400	.0025					.0007	.16	6.55	.00	2.05	.013	.00	.00	PIPE
3500.640	2002.840	6.134	2008.974	37.70	3.00	.14	2009.11	.00	1.83	.00	4.000	.000	.00	1 .0
303.390	.0025					.0007	.21	6.13	.00	2.06	.013	.00	.00	PIPE
3804.030	2003.600	5.583	2009.183	37.70	3.00	.14	2009.32	.00	1.83	.00	4.000	.000	.00	1 .0
JUNCT STR	.0000					.0006	.00	5.58	.00		.013	.00	.00	PIPE
3804.030	2003.600	5.678	2009.278	30.60	2.44	.09	2009.37	.00	1.64	.00	4.000	.000	.00	1 .0
37.370	.0024					.0005	.02	5.68	.00	1.84	.013	.00	.00	PIPE

Program Package Serial Number: 1513

WATER SURFACE PROFILE LISTING Date: 2-13-2017 Time: 2:47:37

Las Vegas Blvd Stewart to Sahara - February 2017

Bonneville to Stewart Storm Drain - Interim Condition

W.O. #7517-1 File: BON-STEW.WSW 10-Year Event

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3841.400	2003.690	5.605	2009.295	30.60	2.44	.09	2009.39	.00	1.64	.00	4.000	.000	.00	1 .0
JUNCT STR	.0000					.0003	.00	5.61	.00		.013	.00	.00	PIPE
3841.400	2003.690	5.694	2009.384	22.10	1.76	.05	2009.43	.00	1.39	.00	4.000	.000	.00	1 .0
32.630	.0025					.0002	.01	5.69	.00	1.53	.013	.00	.00	PIPE
JUNCT STR	.0000					.0002	.00	5.62	.00		.013	.00	.00	PIPE
3874.030	2003.770	5.624	2009.394	21.80	1.73	.05	2009.44	.00	1.38	.00	4.000	.000	.00	1 .0
67.000	.0025					.0002	.02	5.62	.00	1.51	.013	.00	.00	PIPE
3941.030	2003.940	5.469	2009.409	21.80	1.73	.05	2009.46	.00	1.38	.00	4.000	.000	.00	1 .0
JUNCT STR	.0000					.0002	.00	5.47	.00		.013	.00	.00	PIPE
3941.030	2003.940	5.485	2009.425	16.80	1.34	.03	2009.45	.00	1.20	.00	4.000	.000	.00	1 .0

30.000	.0027					.0001	.00	5.48	.00	1.29	.013	.00	.00	PIPE	
JUNCT STR	.0000					.0001	.00	5.41	.00		.013	.00	.00	PIPE	
3971.030	2004.020	5.419	2009.439	13.90	1.97	.06	2009.50	.00	1.19	.00	3.000	.000	.00	1	.0
216.670	.0024					.0004	.09	5.42	.00	1.36	.013	.00	.00	PIPE	
4187.700	2004.550	4.983	2009.533	13.90	1.97	.06	2009.59	.00	1.19	.00	3.000	.000	.00	1	.0
JUNCT STR	.0000					.0003	.00	4.98	.00		.013	.00	.00	PIPE	

Program Package Serial Number: 1513

WATER SURFACE PROFILE LISTING Date: 2-13-2017 Time: 2:47:37

Las Vegas Blvd Stewart to Sahara - February 2017

Bonneville to Stewart Storm Drain - Interim Condition

W.O. #7517-1 File: BON-STEW.WSW 10-Year Event

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
4187.700	2004.550	5.049	2009.599	7.00	.99	.02	2009.61	.00	.83	.00	3.000	.000	.00	1	.0
21.830	.0027					.0001	.00	5.05	.00	.91	.013	.00	.00	PIPE	
4209.530	2004.610	4.999	2009.609	7.00	3.96	.24	2009.85	.00	1.02	.00	1.500	.000	.00	1	.0
16.670	.0092					.0044	.07	5.00	.00	.92	.013	.00	.00	PIPE	
4226.200	2004.763	4.920	2009.683	7.00	3.96	.24	2009.93	.00	1.02	.00	1.500	.000	.00	1	.0

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C.6

STANDARD FORM 6

C.6.1

SF6 for Charleston to Bonneville Storm Drain Laterals (Ultimate Condition)

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO#** 7517-2

18" Lateral to INLET 2.3 - Hoover Ave - RT

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2016.25	2013.50	2.75	0.20	1.5	0.85	2016.25	0.00	2016.25

Phi Index

n Value	Phi
0.013	0.004925

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq, ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+29.06	1.5	2013.50	2013.65	29.06	1.77	0.00492	0.30	0.52	0.17	0.00	0.00001	0.00001	0.00						0.00	2016.25	2016.25	Yes	2015.15	2016.25	2016.25
2	INLET 2.3	10+29.06	10+29.06	1.5	2013.65	2013.65	0.00	1.77	0.00492	0.30	N/A	0.17	0.00	0.00001	0.00001	0.00				0.00		0.00	2016.25	2016.25				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2015.92	2012.67	3.25	0.91	1.5	1.205	2015.92	0.16	2016.08

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 2.7 - Hoover Ave - LT - Sidestreet North

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+63.73	1.5	2012.67	2012.99	63.73	1.77	0.00492	5.60	0.50	3.17	0.16	0.00283	0.00283	0.18						0.18	2016.26	2016.10	Yes	2014.65	2016.26	2016.10
2	MANHOLE	10+63.73	10+63.73	1.5	2012.99	2012.99	0.00	1.77	0.00492	5.60	N/A	3.17	0.16	0.00283	0.00283	0.00	0.00	0.07				0.07	2016.32	2016.17	Yes	2014.53	2016.32	2016.17
3	PIPE	10+63.73	11+16.71	1.5	2012.99	2013.26	52.98	1.77	0.00492	2.80	0.51	1.58	0.04	0.00071	0.00177	0.09						0.09	2016.42	2016.38	Yes	2014.80	2016.42	2016.38
4	INLET 2.7	11+16.71	11+16.71	1.5	2013.26	2013.26	0.00	1.77	0.00492	2.80	N/A	1.58	0.04	0.00071	0.00071	0.00				0.02		0.02	2016.44	2016.40				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	48	0.43	0.156	0.067	0	1.00	0.16	0.16	0							
3																
4														0.5	0.039	0.019

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2016.17	2012.99	3.18	0.64	1.5	1.07	2016.167	0.04	2016.21

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 2.6 - Hoover Ave - LT - Sidestreet South

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+36.09	1.5	2012.99	2013.17	36.09	1.77	0.00492	2.80	0.50	1.58	0.04	0.00071	0.00071	0.03						0.03	2016.23	2016.19	Yes	2014.71	2016.23	2016.19
2	INLET 2.6	10+36.09	10+36.09	1.5	2013.17	2013.17	0.00	1.77	0.00492	2.80	N/A	1.58	0.04	0.00071	0.00071	0.00				0.02		0.02	2016.25	2016.21				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.039	0.019

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2015.41	2012.22	3.19	0.88	1.5	1.19	2015.41	0.13	2015.54

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLETS 2.9 & 2.10 - North of Hoover Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+53.36	1.5	2012.22	2013.07	53.36	1.77	0.00492	5.20	1.59	2.94	0.13	0.00244	0.00244	0.13						0.13	2015.67	2015.54	Yes	2014.70	2015.67	2015.54
2	INLET 2.9	10+53.36	10+53.36	1.5	2013.07	2013.07	0.00	1.77	0.00492	5.20	N/A	2.94	0.13	0.00244	0.00244	0.00		0.09		0.07		0.16	2015.83	2015.70	Yes	2014.62	2015.83	2015.70
3	PIPE	10+53.36	10+82.81	1.5	2013.07	2013.22	29.45	1.77	0.00492	3.30	0.51	1.87	0.05	0.00098	0.00171	0.05						0.05	2015.88	2015.83	Yes	2014.77	2015.88	2015.83
4	INLET 2.10	10+82.81	10+82.81	1.5	2013.22	2013.22	0.00	1.77	0.00492	3.30	N/A	1.87	0.05	0.00098	0.00098	0.00				0.03		0.03	2015.91	2015.86				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	62	0.67	0.134	0.090										0.5	0.134	0.067
3																
4														0.5	0.054	0.027

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2013.07	2008.82	4.25	0.20	1.5	0.85	2013.07	0.00	2013.07

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewaet to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 3.2 - Gass Ave - RT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+33.84	1.5	2008.82	2009.90	33.84	1.77	0.00492	0.30	3.19	0.17	0.00	0.00001	0.00001	0.00						0.00	2013.07	2013.07	Yes	2011.40	2013.07	2013.07
2	INLET 3.2	10+33.84	10+33.84	1.5	2009.90	2009.90	0.00	1.77	0.00492	0.30	N/A	0.17	0.00	0.00001	0.00001	0.00				0.00		0.00	2013.07	2013.07				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2012.95	2008.67	4.28	1.33	2.0	1.665	2012.95	0.30	2013.25

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

24" Lateral to INLET 3.6 - Gass Ave - LT - Sidestreet South

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+43.08	2	2008.67	2008.99	43.08	3.14	0.00492	13.70	0.74	4.36	0.30	0.00366	0.00366	0.16						0.16	2013.40	2013.11	Yes	2011.29	2013.40	2013.11
2	MANHOLE	10+43.08	10+43.08	2	2008.99	2008.99	0.00	3.14	0.00492	13.70	N/A	4.36	0.30	0.00366	0.00366	0.00	0.11	0.01				0.12	2013.52	2013.23	Yes	2010.73	2013.52	2013.23
3	PIPE	10+43.08	10+85.27	1.5	2008.99	2009.31	42.19	1.77	0.00492	6.90	0.76	3.90	0.24	0.00430	0.00398	0.17						0.17	2013.69	2013.45	Yes	2011.05	2013.69	2013.45
4	MANHOLE	10+85.27	10+85.27	1.5	2009.31	2009.31	0.00	1.77	0.00492	6.90	N/A	3.90	0.24	0.00430	0.00430	0.00		0.09				0.09	2013.78	2013.54	Yes	2011.05	2013.78	2013.54
5	PIPE	10+85.27	11+06.75	1.5	2009.31	2009.47	21.48	1.77	0.00492	6.90	0.74	3.90	0.24	0.00430	0.00430	0.09						0.09	2013.87	2013.64	Yes	2011.21	2013.87	2013.64
6	INLET 3.6	11+06.75	11+06.75	1.5	2009.47	2009.47	0.00	1.77	0.00492	6.90	N/A	3.90	0.24	0.00430	0.00430	0.00				0.12		0.12	2013.99	2013.75				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	0	0.02	0.295	0.006	33	0.62	0.30	0.30	0.112							
3																
4	45	0.39	0.237	0.092												
5																
6														0.5	0.237	0.118

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2013.23	2009.28	3.95	1.01	1.5	1.255	2013.226	0.23	2013.46

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 3.7 - Gass Ave - LT - Sidestreet North

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+64.41	1.5	2009.28	2009.92	64.41	1.77	0.00492	6.80	0.99	3.85	0.23	0.00417	0.00417	0.27						0.27	2013.72	2013.49	Yes	2011.65	2013.72	2013.49
2	INLET 3.7	10+64.41	10+64.41	1.5	2009.92	2009.92	0.00	1.77	0.00492	6.80	N/A	3.85	0.23	0.00417	0.00417	0.00				0.11		0.11	2013.84	2013.61				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.230	0.115

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2011.41	2007.27	4.14	0.93	1.5	1.215	2011.41	0.17	2011.58

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLETS 3.9 & 3.10 - North of Hoover Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+56.49	1.5	2007.27	2008.12	56.49	1.77	0.00492	5.80	1.50	3.28	0.17	0.00304	0.00304	0.17						0.17	2011.75	2011.58	Yes	2009.79	2011.75	2011.58
2	INLET 3.9	10+56.49	10+56.49	1.5	2008.12	2008.12	0.00	1.77	0.00492	5.80	N/A	3.28	0.17	0.00304	0.00304	0.00		0.11		0.08		0.20	2011.94	2011.78	Yes	2009.68	2011.94	2011.78
3	PIPE	10+56.49	10+85.34	1.5	2008.12	2008.41	28.85	1.77	0.00492	3.50	1.01	1.98	0.06	0.00111	0.00207	0.06						0.06	2012.00	2011.94	Yes	2009.97	2012.00	2011.94
4	INLET 3.10	10+85.34	10+85.34	1.5	2008.41	2008.41	0.00	1.77	0.00492	3.50	N/A	1.98	0.06	0.00111	0.00111	0.00				0.03		0.03	2012.03	2011.97				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	62	0.67	0.167	0.112										0.5	0.167	0.084
3																
4														0.5	0.061	0.030

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2008.32	2004.05	4.27	0.69	1.5	1.095	2008.32	0.05	2008.37

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 4.3 - Graces Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+77.17	1.5	2004.05	2005.29	77.17	1.77	0.00492	3.30	1.61	1.87	0.05	0.00098	0.00098	0.08						0.08	2008.45	2008.40	Yes	2006.84	2008.45	2008.40
2	INLET 4.3	10+77.17	10+77.17	1.5	2005.29	2005.29	0.00	1.77	0.00492	3.30	N/A	1.87	0.05	0.00098	0.00098	0.00				0.03		0.03	2008.48	2008.42				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.054	0.027

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2008.32	2006.55	1.77	0.16	1.5	0.83	2008.32	0.00	2008.32

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 4.2 - Graces Ave - RT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq, ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+37.70	1.5	2006.55	2006.74	37.70	1.77	0.00492	0.20	0.50	0.11	0.00	0.00000	0.00000	0.00						0.00	2008.32	2008.32	Yes	2008.24	2008.32	2008.32
2	INLET 4.2	10+37.70	10+37.70	1.5	2006.74	2006.74	0.00	1.77	0.00492	0.20	N/A	0.11	0.00	0.00000	0.00000	0.00				0.00		0.00	2008.32	2008.32				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2007.62	2003.65	3.97	1.43	2.0	1.715	2007.62	0.39	2008.01

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

24" Lateral to INLET 4.7 - Graces Ave - LT - Sidestreet North

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+42.68	2	2003.65	2004.08	42.68	3.14	0.00492	15.70	1.01	5.00	0.39	0.00480	0.00480	0.20						0.20	2008.21	2007.82	Yes	2006.47	2008.21	2007.82
2	MANHOLE	10+42.68	10+42.68	2	2004.08	2004.08	0.00	3.14	0.00492	15.70	N/A	5.00	0.39	0.00480	0.00480	0.00	0.00	0.17				0.17	2008.38	2007.99	Yes	2005.83	2008.38	2007.99
3	PIPE	10+42.68	10+94.55	1.5	2004.08	2004.60	51.87	1.77	0.00492	7.10	1.00	4.02	0.25	0.00455	0.00468	0.24						0.24	2008.62	2008.37	Yes	2006.35	2008.62	2008.37
4	INLET 4.7	10+94.55	10+94.55	1.5	2004.60	2004.60	0.00	1.77	0.00492	7.10	N/A	4.02	0.25	0.00455	0.00455	0.00				0.13		0.13	2008.75	2008.50				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	48	0.43	0.388	0.167	0	1.00	0.39	0.39	0							
3																
4														0.5	0.251	0.125

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2007.99	2004.08	3.91	0.64	1.5	1.07	2007.992	0.04	2008.03

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 4.6 - Graces Ave - LT - Sidestreet South

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+46.14	1.5	2004.08	2004.54	46.14	1.77	0.00492	2.80	1.00	1.58	0.04	0.00071	0.00071	0.03						0.03	2008.06	2008.02	Yes	2006.08	2008.06	2008.02
2	INLET 4.6	10+46.14	10+46.14	1.5	2004.54	2004.54	0.00	1.77	0.00492	2.80	N/A	1.58	0.04	0.00071	0.00071	0.00				0.02		0.02	2008.08	2008.04				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.039	0.019

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2006.15	2002.55	3.60	1.03	1.5	1.265	2006.15	0.25	2006.40

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO#** 7517-2

18" Lateral to INLET 4.12 - North of Graces Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+38.60	1.5	2002.55	2003.32	38.60	1.77	0.00492	7.10	1.99	4.02	0.25	0.00455	0.00455	0.18						0.18	2006.58	2006.33	Yes	2005.07	2006.58	2006.33
2	MANHOLE	10+38.60	10+38.60	1.5	2003.32	2003.32	0.00	1.77	0.00492	7.10	N/A	4.02	0.25	0.00455	0.00455	0.00	0.00	0.22				0.22	2006.80	2006.55	Yes	2004.91	2006.80	2006.55
3	PIPE	10+38.60	10+56.75	1.5	2003.32	2003.50	18.15	1.77	0.00492	4.30	0.99	2.43	0.09	0.00167	0.00311	0.06						0.06	2006.86	2006.76	Yes	2005.09	2006.86	2006.76
4	MANHOLE	10+56.75	10+56.75	1.5	2003.50	2003.50	0.00	1.77	0.00492	4.30	N/A	2.43	0.09	0.00167	0.00167	0.00		0.04				0.04	2006.90	2006.81	Yes	2005.09	2006.90	2006.81
5	PIPE	10+56.75	10+73.20	1.5	2003.50	2003.67	16.45	1.77	0.00492	4.30	1.03	2.43	0.09	0.00167	0.00167	0.03						0.03	2006.93	2006.83	Yes	2005.26	2006.93	2006.83
6	INLET 4.12	10+73.20	10+73.20	1.5	2003.67	2003.67	0.00	1.77	0.00492	4.30	N/A	2.43	0.09	0.00167	0.00167	0.00				0.05		0.05	2006.97	2006.88				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	72	0.89	0.251	0.223	0	1.00	0.25	0.25	0							
3																
4	50	0.46	0.092	0.042												
5																
6														0.5	0.092	0.046

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2006.55	2003.32	3.23	0.64	1.5	1.07	2006.549	0.04	2006.59

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 4.11 - North of Graces Ave - LT - Lateral

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+13.60	1.5	2003.32	2003.59	13.60	1.77	0.00492	2.80	1.99	1.58	0.04	0.00071	0.00071	0.01						0.01	2006.60	2006.56	Yes	2005.13	2006.60	2006.56
2	INLET 4.11	10+13.60	10+13.60	1.5	2003.59	2003.59	0.00	1.77	0.00492	2.80	N/A	1.58	0.04	0.00071	0.00071	0.00				0.02		0.02	2006.62	2006.58				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.039	0.019

C.6.2

SF6 for Bonneville to Stewart Storm Drain Laterals (Ultimate Condition)

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2007.11	2004.55	2.56	1.02	1.5	1.26	2007.11	0.24	2007.35

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 5.4 - North North of Bonneville Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq, ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+14.70	1.5	2004.55	2004.59	14.70	1.77	0.00492	6.90	0.27	3.90	0.24	0.00430	0.00430	0.06						0.06	2007.41	2007.17	Yes	2006.33	2007.41	2007.17
2	INLET 5.4	10+14.70	10+14.70	1.5	2004.59	2004.59	0.00	1.77	0.00492	6.90	N/A	3.90	0.24	0.00430	0.00430	0.00				0.12		0.12	2007.53	2007.29				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.237	0.118

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2006.95	2004.01	2.94	0.65	1.5	1.075	2006.95	0.04	2006.99

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewaet to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 6.3 - South South South of Clark Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+17.89	1.5	2004.01	2004.19	17.89	1.77	0.00492	2.90	1.01	1.64	0.04	0.00076	0.00076	0.01						0.01	2007.01	2006.96	Yes	2005.73	2007.01	2006.96
2	INLET 6.3	10+17.89	10+17.89	1.5	2004.19	2004.19	0.00	1.77	0.00492	2.90	N/A	1.64	0.04	0.00076	0.00076	0.00				0.02		0.02	2007.03	2006.98				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.042	0.021

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2006.93	2003.94	2.99	0.86	1.5	1.18	2006.93	0.12	2007.05

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 6.5 - South South of Clark Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+17.88	1.5	2003.94	2004.12	17.88	1.77	0.00492	5.00	1.01	2.83	0.12	0.00226	0.00226	0.04						0.04	2007.09	2006.97	Yes	2005.74	2007.09	2006.97
2	INLET 6.5	10+17.88	10+17.88	1.5	2004.12	2004.12	0.00	1.77	0.00492	5.00	N/A	2.83	0.12	0.00226	0.00226	0.00				0.06		0.06	2007.16	2007.03				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.124	0.062

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2006.88	2003.77	3.11	0.20	1.5	0.85	2006.88	0.00	2006.88

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 6.7 - South of Clark Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+17.89	1.5	2003.77	2003.95	17.89	1.77	0.00492	0.30	1.01	0.17	0.00	0.00001	0.00001	0.00						0.00	2006.88	2006.88	Yes	2005.45	2006.88	2006.88
2	INLET 6.7	10+17.89	10+17.89	1.5	2003.95	2003.95	0.00	1.77	0.00492	0.30	N/A	0.17	0.00	0.00001	0.00001	0.00				0.00		0.00	2006.88	2006.88				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2006.87	2003.67	3.20	0.52	1.5	1.01	2006.87	0.36	2007.23

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 6.9 - Clark Ave - LT - Sidestreet South

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+93.44	1.5	2003.67	2004.16	93.44	1.77	0.00492	8.50	0.52	4.81	0.36	0.00652	0.00652	0.61						0.61	2007.84	2007.48	Yes	2006.02	2007.84	2007.48
2	INLET 6.9	10+93.44	10+93.44	1.5	2004.16	2004.16	0.00	1.77	0.00492	8.50	N/A	4.81	0.36	0.00652	0.00652	0.00				0.18		0.18	2008.02	2007.66				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.359	0.180

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2006.73	2003.60	3.13	1.03	1.5	1.265	2006.73	0.25	2006.98

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 6.12 - Clark Ave - LT - Sidestreet North

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+77.40	1.5	2003.60	2004.00	77.40	1.77	0.00492	7.10	0.52	4.02	0.25	0.00455	0.00455	0.35						0.35	2007.33	2007.08	Yes	2005.75	2007.33	2007.08
2	MANHOLE	10+77.40	10+77.40	1.5	2004.00	2004.00	0.00	1.77	0.00492	7.10	N/A	4.02	0.25	0.00455	0.00455	0.00		0.13				0.13	2007.46	2007.21	Yes	2005.75	2007.46	2007.21
3	PIPE	10+77.40	10+91.32	1.5	2004.00	2004.06	13.92	1.77	0.00492	7.10	0.43	4.02	0.25	0.00455	0.00455	0.06						0.06	2007.52	2007.27	Yes	2005.81	2007.52	2007.27
4	INLET 6.12	10+91.32	10+91.32	1.5	2004.06	2004.06	0.00	1.77	0.00492	7.10	N/A	4.02	0.25	0.00455	0.00455	0.00				0.13		0.13	2007.65	2007.40				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	53	0.51	0.251	0.128												
3																
4														0.5	0.251	0.125

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2006.29	2005.77	0.52	0.78	1.5	1.14	2006.91	0.08	2006.99

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 7.3 - Between Clark and Bridger - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+33.02	1.5	2005.77	2005.94	33.02	1.77	0.00492	4.10	0.51	2.32	0.08	0.00152	0.00152	0.05						0.05	2007.04	2006.96	Yes	2007.52	2007.52	2007.44
2	INLET 7.3	10+33.02	10+33.02	1.5	2005.94	2005.94	0.00	1.77	0.00492	4.10	N/A	2.32	0.08	0.00152	0.00152	0.00				0.04		0.04	2007.57	2007.48				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.084	0.042

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2006.29	2005.77	0.52	0.20	1.5	0.85	2006.62	0.00	2006.62

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 7.2 - Between Clark and Bridger - RT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+56.22	1.5	2005.77	2006.05	56.22	1.77	0.00492	0.30	0.50	0.17	0.00	0.00001	0.00001	0.00						0.00	2006.62	2006.62	Yes	2007.55	2007.55	2007.55
2	INLET 7.2	10+56.22	10+56.22	1.5	2006.05	2006.05	0.00	1.77	0.00492	0.30	N/A	0.17	0.00	0.00001	0.00001	0.00				0.00		0.00	2007.55	2007.55				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2006.09	2001.16	4.93	1.99	2.5	2.245	2006.09	0.75	2006.84

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

30" Lateral to INLETS 9.3 & 9.4 - Bridger Ave - LT - Sidestreet South

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+32.84	2.5	2001.16	2001.49	32.84	4.91	0.00492	34.20	1.00	6.97	0.75	0.00694	0.00694	0.23						0.23	2007.07	2006.32	Yes	2004.74	2007.07	2006.32
2	MANHOLE	10+32.84	10+32.84	2.5	2001.49	2001.49	0.00	4.91	0.00492	34.20	N/A	6.97	0.75	0.00694	0.00694	0.00	0.52	0.22				0.74	2007.81	2007.06	Yes	2004.08	2007.81	2007.06
3	PIPE	10+32.84	10+78.41	1.5	2001.49	2001.95	45.57	1.77	0.00492	14.80	1.01	8.38	1.09	0.01977	0.01335	0.61						0.61	2008.42	2007.33	Yes	2004.54	2008.42	2007.33
4	INLET 9.3	10+78.41	10+78.41	1.5	2001.95	2001.95	0.00	1.77	0.00492	14.80	N/A	8.38	1.09	0.01977	0.01977	0.00		0.81		0.54		1.35	2009.77	2008.68	Yes	2004.42	2009.77	2008.68
5	PIPE	10+78.41	10+99.52	1.5	2001.95	2002.16	21.11	1.77	0.00492	14.00	0.99	7.92	0.97	0.01769	0.01873	0.40						0.40	2010.16	2009.19	Yes	2004.63	2010.16	2009.19
6	INLET 9.4	10+99.52	10+99.52	1.5	2002.16	2002.16	0.00	1.77	0.00492	14.00	N/A	7.92	0.97	0.01769	0.01769	0.00				0.49		0.49	2010.65	2009.68				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	37	0.29	0.754	0.219	73	0.31	0.75	0.75	0.520							
3																
4	65	0.74	1.089	0.806										0.5	1.089	0.545
5																
6														0.5	0.975	0.487

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2007.06	2001.49	5.57	1.31	1.5	1.405	2007.056	0.72	2007.77

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 9.5 - Bridger Ave - LT - Sidestreet North

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+27.28	1.5	2001.49	2001.76	27.28	1.77	0.00492	12.00	0.99	6.79	0.72	0.01300	0.01300	0.35						0.35	2008.13	2007.41	Yes	2003.98	2008.13	2007.41
2	INLET 9.5	10+27.28	10+27.28	1.5	2001.76	2001.76	0.00	1.77	0.00492	12.00	N/A	6.79	0.72	0.01300	0.01300	0.00				0.36		0.36	2008.49	2007.77				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.716	0.358

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2005.77	2001.06	4.71	0.49	1.5	0.995	2005.77	0.01	2005.78

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 9.7 - Bridger Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq, ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+13.84	1.5	2001.06	2001.20	13.84	1.77	0.00492	1.70	1.01	0.96	0.01	0.00026	0.00026	0.00						0.00	2005.79	2005.77	Yes	2002.71	2005.79	2005.77
2	INLET 9.7	10+13.84	10+13.84	1.5	2001.20	2001.20	0.00	1.77	0.00492	1.70	N/A	0.96	0.01	0.00026	0.00026	0.00				0.01		0.01	2005.80	2005.78				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.014	0.007

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2005.66	2000.14	5.52	0.20	1.5	0.85	2005.66	0.00	2005.66

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 10.2 - Carson Ave - RT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq, ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+58.77	1.5	2000.14	2000.43	58.77	1.77	0.00492	0.30	0.49	0.17	0.00	0.00001	0.00001	0.00						0.00	2005.66	2005.66	Yes	2001.93	2005.66	2005.66
2	INLET 10.2	10+58.77	10+58.77	1.5	2000.43	2000.43	0.00	1.77	0.00492	0.30	N/A	0.17	0.00	0.00001	0.00001	0.00				0.00		0.00	2005.66	2005.66				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2005.64	2000.25	5.39	1.93	2.5	2.215	2005.64	0.66	2006.30

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

30" Lateral to INLET 10.5 - Carson Ave - LT - Sidestreet South

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+33.50	2.5	2000.25	2000.42	33.50	4.91	0.00492	32.10	0.51	6.54	0.66	0.00611	0.00611	0.20						0.20	2006.51	2005.84	Yes	2003.58	2006.51	2005.84
2	MANHOLE	10+33.50	10+33.50	2.5	2000.42	2000.42	0.00	4.91	0.00492	32.10	N/A	6.54	0.66	0.00611	0.00611	0.00	0.43	0.33				0.76	2007.27	2006.60	Yes	2002.66	2007.27	2006.60
3	PIPE	10+33.50	10+64.60	1.5	2000.42	2000.58	31.10	1.77	0.00492	12.20	0.51	6.90	0.74	0.01343	0.00977	0.30						0.30	2007.57	2006.83	Yes	2002.82	2007.57	2006.83
4	INLET 10.5	10+64.60	10+64.60	1.5	2000.58	2000.58	0.00	1.77	0.00492	12.20	N/A	6.90	0.74	0.01343	0.01343	0.00				0.37		0.37	2007.94	2007.20				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	52	0.49	0.664	0.325	60	0.35	0.66	0.66	0.432							
3																
4														0.5	0.740	0.370

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2006.60	1999.51	7.09	1.31	1.5	1.405	2006.602	0.72	2007.32

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 10.6 - Carson Ave - LT - Sidestreet North

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+41.17	1.5	1999.51	2001.57	41.17	1.77	0.00492	12.00	5.00	6.79	0.72	0.01300	0.01300	0.54						0.54	2007.85	2007.14	Yes	2003.79	2007.85	2007.14
2	INLET 10.6	10+41.17	10+41.17	1.5	2001.57	2001.57	0.00	1.77	0.00492	12.00	N/A	6.79	0.72	0.01300	0.01300	0.00				0.36		0.36	2008.21	2007.49				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.716	0.358

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2005.36	1999.83	5.53	0.88	1.5	1.19	2005.36	0.13	2005.49

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 10.7 - North of Carson - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+18.95	1.5	1999.83	2000.02	18.95	1.77	0.00492	5.20	1.00	2.94	0.13	0.00244	0.00244	0.05						0.05	2005.54	2005.41	Yes	2001.65	2005.54	2005.41
2	INLET 10.7	10+18.95	10+18.95	1.5	2000.02	2000.02	0.00	1.77	0.00492	5.20	N/A	2.94	0.13	0.00244	0.00244	0.00				0.07		0.07	2005.61	2005.47				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.134	0.067

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2005.24	2004.07	1.17	0.68	1.5	1.09	2005.24	0.05	2005.29

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 10.8 - North North of Carson - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+20.74	1.5	2004.07	2004.12	20.74	1.77	0.00492	3.20	0.24	1.81	0.05	0.00092	0.00092	0.02						0.02	2005.31	2005.26	Yes	2005.67	2005.67	2005.62
2	INLET 10.8	10+20.74	10+20.74	1.5	2004.12	2004.12	0.00	1.77	0.00492	3.20	N/A	1.81	0.05	0.00092	0.00092	0.00				0.03		0.03	2005.70	2005.65				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.051	0.025

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2005.20	2004.00	1.20	0.23	1.5	0.865	2005.2	0.00	2005.20

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 10.9 - North North North of Carson - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+19.28	1.5	2004.00	2004.05	19.28	1.77	0.00492	0.40	0.26	0.23	0.00	0.00001	0.00001	0.00						0.00	2005.20	2005.20	Yes	2005.55	2005.55	2005.55
2	INLET 10.9	10+19.28	10+19.28	1.5	2004.05	2004.05	0.00	1.77	0.00492	0.40	N/A	0.23	0.00	0.00001	0.00001	0.00				0.00		0.00	2005.55	2005.55				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.001	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2005.10	2000.00	5.10	0.00	1.5	0.75	2005.1	0.00	2005.10

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral - Between Carson and Fremont - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq, ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+05.93	1.5	2000.00	2001.56	5.93	1.77	0.00492	0.00	26.31	0.00	0.00	0.00000	0.00000	0.00						0.00	2005.10	2005.10	Yes	2003.06	2005.10	2005.10
2	PIPE	10+05.93	10+05.93	1.5	2001.56	2001.56	0.00	1.77	0.00492	0.00	N/A	0.00	0.00	0.00000	0.00000	0.00				0.00		0.00	2005.10	2005.10				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2005.01	2003.93	1.08	0.37	1.5	0.935	2005.01	0.00	2005.01

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 11.1 - South of Fremont Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+20.90	1.5	2003.93	2003.98	20.90	1.77	0.00492	1.00	0.24	0.57	0.00	0.00009	0.00009	0.00						0.00	2005.02	2005.01	Yes	2005.48	2005.48	2005.48
2	INLET 11.1	10+20.90	10+20.90	1.5	2003.98	2003.98	0.00	1.77	0.00492	1.00	N/A	0.57	0.00	0.00009	0.00009	0.00				0.00		0.00	2005.49	2005.48				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.005	0.002

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2004.89	1998.60	6.29	1.43	3.0	2.215	2004.89	0.41	2005.30

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

24" Lateral to INLETS 11.6 & 11.7 - North of Fremont Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+45.34	3	1998.60	1998.72	45.34	7.07	0.00492	36.10	0.26	5.11	0.41	0.00292	0.00292	0.13						0.13	2005.43	2005.02	Yes	2002.13	2005.43	2005.02
2	INLET 11.6	10+45.34	10+45.34	3	1998.72	1998.72	0.00	7.07	0.00492	36.10	N/A	5.11	0.41	0.00292	0.00292	0.00		0.04		0.20		0.25	2005.67	2005.27	Yes	2002.31	2005.67	2005.27
3	PIPE	10+45.34	10+92.37	2	1998.72	1999.06	47.03	3.14	0.00492	31.80	0.72	10.12	1.59	0.01970	0.01131	0.53						0.53	2006.21	2004.62	Yes	2002.65	2006.21	2004.62
4	INLET 11.7	10+92.37	10+92.37	2	1999.06	1999.06	0.00	3.14	0.00492	31.80	N/A	10.12	1.59	0.01970	0.01970	0.00		0.13				0.13	2006.33	2004.74	Yes	2002.55	2006.33	2004.74
5	PIPE	10+92.37	11+04.64	1.5	1999.06	2000.30	12.27	1.77	0.00492	20.00	10.11	11.32	1.99	0.03610	0.02790	0.34						0.34	2006.68	2004.69	Yes	2003.79	2006.68	2004.69
6	MANHOLE	11+04.64	11+04.64	1.5	2000.30	2000.30	0.00	1.77	0.00492	20.00	N/A	11.32	1.99	0.03610	0.03610	0.00				0.99		0.99	2007.67	2005.68				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	20	0.11	0.405	0.045										0.5	0.405	0.203
3																
4	15	0.08	1.591	0.127												
5																
6														0.5	1.989	0.994

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2004.89	1998.60	6.29	0.60	1.5	1.05	2004.89	0.03	2004.92

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 11.5 - South of Fremont Ave - RT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+54.72	1.5	1998.60	1998.61	54.72	1.77	0.00492	2.50	0.02	1.41	0.03	0.00056	0.00056	0.03						0.03	2004.95	2004.92	Yes	2000.14	2004.95	2004.92
2	MANHOLE	10+54.72	10+54.72	1.5	1998.61	1998.61	0.00	1.77	0.00492	2.50	N/A	1.41	0.03	0.00056	0.00056	0.00		0.01				0.01	2004.96	2004.93	Yes	2000.14	2004.96	2004.93
3	PIPE	10+54.72	11+19.18	1.5	1998.61	1998.63	64.46	1.77	0.00492	2.50	0.03	1.41	0.03	0.00056	0.00056	0.04						0.04	2005.00	2004.97	Yes	2000.16	2005.00	2004.97
4	MANHOLE	11+19.18	11+19.18	1.5	1998.63	1998.63	0.00	1.77	0.00492	2.50	N/A	1.41	0.03	0.00056	0.00056	0.00	0.02	0.00				0.02	2005.02	2004.99	Yes	2000.13	2005.02	2004.99
5	PIPE	11+19.18	11+61.55	1.5	1998.63	1999.48	42.37	1.77	0.00492	0.40	2.01	0.23	0.00	0.00001	0.00029	0.01						0.01	2005.03	2005.03	Yes	2000.98	2005.03	2005.03
6	INLET 11.5	11+61.55	11+61.55	1.5	1999.48	1999.48	0.00	1.77	0.00492	0.40	N/A	0.23	0.00	0.00001	0.00001	0.00				0.00		0.00	2005.04	2005.03				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	40	0.32	0.031	0.010												
3																
4	4	0.03	0.031	0.001	89	0.25	0.03	0.03	0.023							
5																
6														0.5	0.001	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2004.15	2001.62	2.53	1.74	2.5	2.12	2004.15	0.37	2004.52

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

24" Lateral to INLET 12.3 - Ogden Ave - LT - Sidestreet South

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+33.50	2.5	2001.62	2001.79	33.50	4.91	0.00492	24.00	0.51	4.89	0.37	0.00342	0.00342	0.11						0.11	2004.64	2004.26	Yes	2004.66	2004.66	2004.29
2	MANHOLE	10+33.50	10+33.50	2.5	2001.79	2001.79	0.00	4.91	0.00492	24.00	N/A	4.89	0.37	0.00342	0.00342	0.00	0.22	0.09				0.31	2004.97	2004.60	Yes	2003.97	2004.97	2004.60
3	PIPE	10+33.50	10+64.60	2	2001.79	2001.95	31.10	3.14	0.00492	10.70	0.51	3.41	0.18	0.00223	0.00282	0.09						0.09	2005.06	2004.88	Yes	2004.13	2005.06	2004.88
4	INLET 12.3	10+64.60	10+64.60	2	2001.95	2001.95	0.00	3.14	0.00492	10.70	N/A	3.41	0.18	0.00223	0.00223	0.00				0.09		0.09	2005.15	2004.97				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	32	0.24	0.371	0.089	55	0.40	0.37	0.37	0.223							
3																
4														0.5	0.180	0.090

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2003.96	2001.55	2.41	1.34	1.5	1.42	2003.96	0.79	2004.75

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 12.4 - Ogden Ave - LT - Sidestreet North

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+48.67	1.5	2001.55	2001.80	48.67	1.77	0.00492	12.60	0.51	7.13	0.79	0.01433	0.01433	0.70						0.70	2005.45	2004.66	Yes	2004.09	2005.45	2004.66
2	INLET 12.4	10+48.67	10+48.67	1.5	2001.80	2001.80	0.00	1.77	0.00492	12.60	N/A	7.13	0.79	0.01433	0.01433	0.00				0.39		0.39	2005.84	2005.05				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.789	0.395

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2003.63	1997.36	6.27	1.08	1.5	1.29	2003.63	0.29	2003.92

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 12.6 - North of Ogden Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+14.44	1.5	1997.36	1997.50	14.44	1.77	0.00492	7.70	0.97	4.36	0.29	0.00535	0.00535	0.08						0.08	2004.00	2003.71	Yes	1999.29	2004.00	2003.71
2	INLET 12.6	10+14.44	10+14.44	1.5	1997.50	1997.50	0.00	1.77	0.00492	7.70	N/A	4.36	0.29	0.00535	0.00535	0.00				0.15		0.15	2004.15	2003.85				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.295	0.147

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2003.38	1997.19	6.19	0.79	1.5	1.145	2003.38	0.09	2003.47

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 12.7 - North North of Ogden Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+15.58	1.5	1997.19	1997.35	15.58	1.77	0.00492	4.20	1.03	2.38	0.09	0.00159	0.00159	0.02						0.02	2003.49	2003.40	Yes	1998.94	2003.49	2003.40
2	INLET 12.7	10+15.58	10+15.58	1.5	1997.35	1997.35	0.00	1.77	0.00492	4.20	N/A	2.38	0.09	0.00159	0.00159	0.00				0.04		0.04	2003.54	2003.45				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.088	0.044

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2002.82	1998.25	4.57	0.00	1.5	0.75	2002.82	0.00	2002.82

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 13.3 - Stewart Ave - RT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq, ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+54.33	1.5	1998.25	1998.79	54.33	1.77	0.00492	0.00	0.99	0.00	0.00	0.00000	0.00000	0.00						0.00	2002.82	2002.82	Yes	2000.29	2002.82	2002.82
2	INLET 13.3	10+54.33	10+54.33	1.5	1998.79	1998.79	0.00	1.77	0.00492	0.00	N/A	0.00	0.00	0.00000	0.00000	0.00				0.00		0.00	2002.82	2002.82				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2002.72	1998.00	4.72	0.84	1.5	1.17	2002.72	0.11	2002.83

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 13.2 - Stewart Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+16.59	1.5	1998.00	1998.17	16.59	1.77	0.00492	4.80	1.02	2.72	0.11	0.00208	0.00208	0.03						0.03	2002.87	2002.75	Yes	1999.78	2002.87	2002.75
2	INLET 13.2	10+16.59	10+16.59	1.5	1998.17	1998.17	0.00	1.77	0.00492	4.80	N/A	2.72	0.11	0.00208	0.00208	0.00				0.06		0.06	2002.93	2002.81				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.115	0.057

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2002.72	1998.00	4.72	0.00	1.5	0.75	2002.72	0.00	2002.72

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 13.4 - Stewart Ave - RT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+54.31	1.5	1998.00	1998.54	54.31	1.77	0.00492	0.00	0.99	0.00	0.00	0.00000	0.00000	0.00						0.00	2002.72	2002.72	Yes	2000.04	2002.72	2002.72
2	INLET 13.4	10+54.31	10+54.31	1.5	1998.54	1998.54	0.00	1.77	0.00492	0.00	N/A	0.00	0.00	0.00000	0.00000	0.00				0.00		0.00	2002.72	2002.72				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2002.57	1996.49	6.08	0.00	1.5	0.75	2002.57	0.00	2002.57

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 13.5 - Stewart Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq, ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+51.03	1.5	1996.49	1997.00	51.03	1.77	0.00492	0.00	1.00	0.00	0.00	0.00000	0.00000	0.00						0.00	2002.57	2002.57	Yes	1998.50	2002.57	2002.57
2	INLET 13.5	10+51.03	10+51.03	1.5	1997.00	1997.00	0.00	1.77	0.00492	0.00	N/A	0.00	0.00	0.00000	0.00000	0.00				0.00		0.00	2002.57	2002.57				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

C.6.3

SF6 for Charleston to Bonneville Storm Drain Laterals (Interim Condition)

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2009.60	2004.55	5.05	1.02	1.5	1.26	2009.6	0.24	2009.84

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 5.4 - North North of Bonneville Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq, ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+14.70	1.5	2004.55	2004.59	14.70	1.77	0.00492	6.90	0.27	3.90	0.24	0.00430	0.00430	0.06						0.06	2009.90	2009.66	Yes	2006.33	2009.90	2009.66
2	INLET 5.4	10+14.70	10+14.70	1.5	2004.59	2004.59	0.00	1.77	0.00492	6.90	N/A	3.90	0.24	0.00430	0.00430	0.00				0.12		0.12	2010.02	2009.78				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.237	0.118

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2009.44	2004.01	5.43	0.65	1.5	1.075	2009.44	0.04	2009.48

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewaet to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 6.3 - South South South of Clark Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+17.89	1.5	2004.01	2004.19	17.89	1.77	0.00492	2.90	1.01	1.64	0.04	0.00076	0.00076	0.01						0.01	2009.50	2009.45	Yes	2005.73	2009.50	2009.45
2	INLET 6.3	10+17.89	10+17.89	1.5	2004.19	2004.19	0.00	1.77	0.00492	2.90	N/A	1.64	0.04	0.00076	0.00076	0.00				0.02		0.02	2009.52	2009.47				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.042	0.021

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2009.43	2003.94	5.49	0.86	1.5	1.18	2009.43	0.12	2009.55

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 6.5 - South South of Clark Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+17.88	1.5	2003.94	2004.12	17.88	1.77	0.00492	5.00	1.01	2.83	0.12	0.00226	0.00226	0.04						0.04	2009.59	2009.47	Yes	2005.74	2009.59	2009.47
2	INLET 6.5	10+17.88	10+17.88	1.5	2004.12	2004.12	0.00	1.77	0.00492	5.00	N/A	2.83	0.12	0.00226	0.00226	0.00				0.06		0.06	2009.66	2009.53				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.124	0.062

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2009.39	2003.77	5.62	0.20	1.5	0.85	2009.39	0.00	2009.39

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 6.7 - South of Clark Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+17.89	1.5	2003.77	2003.95	17.89	1.77	0.00492	0.30	1.01	0.17	0.00	0.00001	0.00001	0.00						0.00	2009.39	2009.39	Yes	2005.45	2009.39	2009.39
2	INLET 6.7	10+17.89	10+17.89	1.5	2003.95	2003.95	0.00	1.77	0.00492	0.30	N/A	0.17	0.00	0.00001	0.00001	0.00				0.00		0.00	2009.39	2009.39				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2009.38	2003.67	5.71	0.52	1.5	1.01	2009.38	0.36	2009.74

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 6.9 - Clark Ave - LT - Sidestreet South

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+93.44	1.5	2003.67	2004.16	93.44	1.77	0.00492	8.50	0.52	4.81	0.36	0.00652	0.00652	0.61						0.61	2010.35	2009.99	Yes	2006.02	2010.35	2009.99
2	INLET 6.9	10+93.44	10+93.44	1.5	2004.16	2004.16	0.00	1.77	0.00492	8.50	N/A	4.81	0.36	0.00652	0.00652	0.00				0.18		0.18	2010.53	2010.17				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.359	0.180

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2009.28	2003.60	5.68	1.03	1.5	1.265	2009.28	0.25	2009.53

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO#** 7517-2

18" Lateral to INLET 6.12 - Clark Ave - LT - Sidestreet North

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+77.40	1.5	2003.60	2004.00	77.40	1.77	0.00492	7.10	0.52	4.02	0.25	0.00455	0.00455	0.35						0.35	2009.88	2009.63	Yes	2005.75	2009.88	2009.63
2	MANHOLE	10+77.40	10+77.40	1.5	2004.00	2004.00	0.00	1.77	0.00492	7.10	N/A	4.02	0.25	0.00455	0.00455	0.00		0.13				0.13	2010.01	2009.76	Yes	2005.75	2010.01	2009.76
3	PIPE	10+77.40	10+91.32	1.5	2004.00	2004.06	13.92	1.77	0.00492	7.10	0.43	4.02	0.25	0.00455	0.00455	0.06						0.06	2010.07	2009.82	Yes	2005.81	2010.07	2009.82
4	INLET 6.12	10+91.32	10+91.32	1.5	2004.06	2004.06	0.00	1.77	0.00492	7.10	N/A	4.02	0.25	0.00455	0.00455	0.00				0.13		0.13	2010.20	2009.95				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	53	0.51	0.251	0.128												
3																
4														0.5	0.251	0.125

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2008.82	2005.77	3.05	0.78	1.5	1.14	2008.82	0.08	2008.90

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 7.3 - Between Clark and Bridger - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+33.02	1.5	2005.77	2005.94	33.02	1.77	0.00492	4.10	0.51	2.32	0.08	0.00152	0.00152	0.05						0.05	2008.95	2008.87	Yes	2007.52	2008.95	2008.87
2	INLET 7.3	10+33.02	10+33.02	1.5	2005.94	2005.94	0.00	1.77	0.00492	4.10	N/A	2.32	0.08	0.00152	0.00152	0.00				0.04		0.04	2009.00	2008.91				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.084	0.042

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2008.82	2005.77	3.05	0.20	1.5	0.85	2008.82	0.00	2008.82

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 7.2 - Between Clark and Bridger - RT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+56.22	1.5	2005.77	2006.05	56.22	1.77	0.00492	0.30	0.50	0.17	0.00	0.00001	0.00001	0.00						0.00	2008.82	2008.82	Yes	2007.55	2008.82	2008.82
2	INLET 7.2	10+56.22	10+56.22	1.5	2006.05	2006.05	0.00	1.77	0.00492	0.30	N/A	0.17	0.00	0.00001	0.00001	0.00				0.00		0.00	2008.82	2008.82				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2008.59	2001.16	7.43	1.99	2.5	2.245	2008.59	0.75	2009.34

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

30" Lateral to INLETS 9.3 & 9.4 - Bridger Ave - LT - Sidestreet South

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+32.84	2.5	2001.16	2001.49	32.84	4.91	0.00492	34.20	1.00	6.97	0.75	0.00694	0.00694	0.23						0.23	2009.57	2008.82	Yes	2004.74	2009.57	2008.82
2	MANHOLE	10+32.84	10+32.84	2.5	2001.49	2001.49	0.00	4.91	0.00492	34.20	N/A	6.97	0.75	0.00694	0.00694	0.00	0.52	0.22				0.74	2010.31	2009.56	Yes	2004.08	2010.31	2009.56
3	PIPE	10+32.84	10+78.41	1.5	2001.49	2001.95	45.57	1.77	0.00492	14.80	1.01	8.38	1.09	0.01977	0.01335	0.61						0.61	2010.92	2009.83	Yes	2004.54	2010.92	2009.83
4	INLET 9.3	10+78.41	10+78.41	1.5	2001.95	2001.95	0.00	1.77	0.00492	14.80	N/A	8.38	1.09	0.01977	0.01977	0.00		0.81		0.54		1.35	2012.27	2011.18	Yes	2004.42	2012.27	2011.18
5	PIPE	10+78.41	10+99.52	1.5	2001.95	2002.16	21.11	1.77	0.00492	14.00	0.99	7.92	0.97	0.01769	0.01873	0.40						0.40	2012.66	2011.69	Yes	2004.63	2012.66	2011.69
6	INLET 9.4	10+99.52	10+99.52	1.5	2002.16	2002.16	0.00	1.77	0.00492	14.00	N/A	7.92	0.97	0.01769	0.01769	0.00				0.49		0.49	2013.15	2012.18				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	37	0.29	0.754	0.219	73	0.31	0.75	0.75	0.520							
3																
4	65	0.74	1.089	0.806										0.5	1.089	0.545
5																
6														0.5	0.975	0.487

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2009.56	2001.49	8.07	1.31	1.5	1.405	2009.556	0.72	2010.27

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 9.5 - Bridger Ave - LT - Sidestreet North

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+27.28	1.5	2001.49	2001.76	27.28	1.77	0.00492	12.00	0.99	6.79	0.72	0.01300	0.01300	0.35						0.35	2010.63	2009.91	Yes	2003.98	2010.63	2009.91
2	INLET 9.5	10+27.28	10+27.28	1.5	2001.76	2001.76	0.00	1.77	0.00492	12.00	N/A	6.79	0.72	0.01300	0.01300	0.00				0.36		0.36	2010.99	2010.27				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.716	0.358

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2008.28	2001.06	7.22	0.49	1.5	0.995	2008.28	0.01	2008.29

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 9.7 - Bridger Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+13.84	1.5	2001.06	2001.20	13.84	1.77	0.00492	1.70	1.01	0.96	0.01	0.00026	0.00026	0.00						0.00	2008.30	2008.28	Yes	2002.71	2008.30	2008.28
2	INLET 9.7	10+13.84	10+13.84	1.5	2001.20	2001.20	0.00	1.77	0.00492	1.70	N/A	0.96	0.01	0.00026	0.00026	0.00				0.01		0.01	2008.31	2008.29				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.014	0.007

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2008.14	2000.14	8.00	0.20	1.5	0.85	2008.14	0.00	2008.14

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 10.2 - Carson Ave - RT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq, ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+58.77	1.5	2000.14	2000.43	58.77	1.77	0.00492	0.30	0.49	0.17	0.00	0.00001	0.00001	0.00						0.00	2008.14	2008.14	Yes	2001.93	2008.14	2008.14
2	INLET 10.2	10+58.77	10+58.77	1.5	2000.43	2000.43	0.00	1.77	0.00492	0.30	N/A	0.17	0.00	0.00001	0.00001	0.00				0.00		0.00	2008.14	2008.14				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2008.12	2000.25	7.87	1.93	2.5	2.215	2008.12	0.66	2008.78

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

30" Lateral to INLET 10.5 - Carson Ave - LT - Sidestreet South

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+33.50	2.5	2000.25	2000.42	33.50	4.91	0.00492	32.10	0.51	6.54	0.66	0.00611	0.00611	0.20						0.20	2008.99	2008.32	Yes	2003.58	2008.99	2008.32
2	MANHOLE	10+33.50	10+33.50	2.5	2000.42	2000.42	0.00	4.91	0.00492	32.10	N/A	6.54	0.66	0.00611	0.00611	0.00	0.43	0.33				0.76	2009.75	2009.08	Yes	2002.66	2009.75	2009.08
3	PIPE	10+33.50	10+64.60	1.5	2000.42	2000.58	31.10	1.77	0.00492	12.20	0.51	6.90	0.74	0.01343	0.00977	0.30						0.30	2010.05	2009.31	Yes	2002.82	2010.05	2009.31
4	INLET 10.5	10+64.60	10+64.60	1.5	2000.58	2000.58	0.00	1.77	0.00492	12.20	N/A	6.90	0.74	0.01343	0.01343	0.00				0.37		0.37	2010.42	2009.68				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	52	0.49	0.664	0.325	60	0.35	0.66	0.66	0.432							
3																
4														0.5	0.740	0.370

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2009.08	1999.51	9.57	1.31	1.5	1.405	2009.082	0.72	2009.80

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 10.6 - Carson Ave - LT - Sidestreet North

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+41.17	1.5	1999.51	2001.57	41.17	1.77	0.00492	12.00	5.00	6.79	0.72	0.01300	0.01300	0.54						0.54	2010.33	2009.62	Yes	2003.79	2010.33	2009.62
2	INLET 10.6	10+41.17	10+41.17	1.5	2001.57	2001.57	0.00	1.77	0.00492	12.00	N/A	6.79	0.72	0.01300	0.01300	0.00				0.36		0.36	2010.69	2009.97				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.716	0.358

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2007.84	1999.83	8.01	0.88	1.5	1.19	2007.84	0.13	2007.97

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 10.7 - North of Carson - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+18.95	1.5	1999.83	2000.02	18.95	1.77	0.00492	5.20	1.00	2.94	0.13	0.00244	0.00244	0.05						0.05	2008.02	2007.89	Yes	2001.65	2008.02	2007.89
2	INLET 10.7	10+18.95	10+18.95	1.5	2000.02	2000.02	0.00	1.77	0.00492	5.20	N/A	2.94	0.13	0.00244	0.00244	0.00				0.07		0.07	2008.09	2007.95				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.134	0.067

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2007.72	2004.07	3.65	0.68	1.5	1.09	2007.72	0.05	2007.77

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 10.8 - North North of Carson - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+20.74	1.5	2004.07	2004.12	20.74	1.77	0.00492	3.20	0.24	1.81	0.05	0.00092	0.00092	0.02						0.02	2007.79	2007.74	Yes	2005.67	2007.79	2007.74
2	INLET 10.8	10+20.74	10+20.74	1.5	2004.12	2004.12	0.00	1.77	0.00492	3.20	N/A	1.81	0.05	0.00092	0.00092	0.00				0.03		0.03	2007.82	2007.76				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.051	0.025

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2007.68	2004.00	3.68	0.23	1.5	0.865	2007.68	0.00	2007.68

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 10.9 - North North North of Carson - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+19.28	1.5	2004.00	2004.05	19.28	1.77	0.00492	0.40	0.26	0.23	0.00	0.00001	0.00001	0.00						0.00	2007.68	2007.68	Yes	2005.55	2007.68	2007.68
2	INLET 10.9	10+19.28	10+19.28	1.5	2004.05	2004.05	0.00	1.77	0.00492	0.40	N/A	0.23	0.00	0.00001	0.00001	0.00				0.00		0.00	2007.68	2007.68				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.001	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2007.58	2000.00	7.58	0.00	1.5	0.75	2007.58	0.00	2007.58

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral - Between Carson and Fremont - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq, ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+05.93	1.5	2000.00	2001.56	5.93	1.77	0.00492	0.00	26.31	0.00	0.00	0.00000	0.00000	0.00						0.00	2007.58	2007.58	Yes	2003.06	2007.58	2007.58
2	PIPE	10+05.93	10+05.93	1.5	2001.56	2001.56	0.00	1.77	0.00492	0.00	N/A	0.00	0.00	0.00000	0.00000	0.00				0.00		0.00	2007.58	2007.58				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2007.49	2003.93	3.56	0.37	1.5	0.935	2007.49	0.00	2007.49

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 11.1 - South of Fremont Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+20.90	1.5	2003.93	2003.98	20.90	1.77	0.00492	1.00	0.24	0.57	0.00	0.00009	0.00009	0.00						0.00	2007.50	2007.49	Yes	2005.48	2007.50	2007.49
2	INLET 11.1	10+20.90	10+20.90	1.5	2003.98	2003.98	0.00	1.77	0.00492	1.00	N/A	0.57	0.00	0.00009	0.00009	0.00				0.00		0.00	2007.50	2007.49				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.005	0.002

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2007.37	1998.60	8.77	1.43	3.0	2.215	2007.37	0.41	2007.78

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

24" Lateral to INLETS 11.6 & 11.7 - North of Fremont Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+45.34	3	1998.60	1998.72	45.34	7.07	0.00492	36.10	0.26	5.11	0.41	0.00292	0.00292	0.13						0.13	2007.91	2007.50	Yes	2002.13	2007.91	2007.50
2	INLET 11.6	10+45.34	10+45.34	3	1998.72	1998.72	0.00	7.07	0.00492	36.10	N/A	5.11	0.41	0.00292	0.00292	0.00		0.04		0.20		0.25	2008.15	2007.75	Yes	2002.31	2008.15	2007.75
3	PIPE	10+45.34	10+92.37	2	1998.72	1999.06	47.03	3.14	0.00492	31.80	0.72	10.12	1.59	0.01970	0.01131	0.53						0.53	2008.69	2007.10	Yes	2002.65	2008.69	2007.10
4	INLET 11.7	10+92.37	10+92.37	2	1999.06	1999.06	0.00	3.14	0.00492	31.80	N/A	10.12	1.59	0.01970	0.01970	0.00		0.13				0.13	2008.81	2007.22	Yes	2002.55	2008.81	2007.22
5	PIPE	10+92.37	11+04.64	1.5	1999.06	2000.30	12.27	1.77	0.00492	20.00	10.11	11.32	1.99	0.03610	0.02790	0.34						0.34	2009.16	2007.17	Yes	2003.79	2009.16	2007.17
6	MANHOLE	11+04.64	11+04.64	1.5	2000.30	2000.30	0.00	1.77	0.00492	20.00	N/A	11.32	1.99	0.03610	0.03610	0.00				0.99		0.99	2010.15	2008.16				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	20	0.11	0.405	0.045										0.5	0.405	0.203
3																
4	15	0.08	1.591	0.127												
5																
6														0.5	1.989	0.994

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2007.37	1998.60	8.77	0.60	1.5	1.05	2007.37	0.03	2007.40

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 11.5 - South of Fremont Ave - RT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+54.72	1.5	1998.60	1998.61	54.72	1.77	0.00492	2.50	0.02	1.41	0.03	0.00056	0.00056	0.03						0.03	2007.43	2007.40	Yes	2000.14	2007.43	2007.40
2	MANHOLE	10+54.72	10+54.72	1.5	1998.61	1998.61	0.00	1.77	0.00492	2.50	N/A	1.41	0.03	0.00056	0.00056	0.00		0.01				0.01	2007.44	2007.41	Yes	2000.14	2007.44	2007.41
3	PIPE	10+54.72	11+19.18	1.5	1998.61	1998.63	64.46	1.77	0.00492	2.50	0.03	1.41	0.03	0.00056	0.00056	0.04						0.04	2007.48	2007.45	Yes	2000.16	2007.48	2007.45
4	MANHOLE	11+19.18	11+19.18	1.5	1998.63	1998.63	0.00	1.77	0.00492	2.50	N/A	1.41	0.03	0.00056	0.00056	0.00	0.02	0.00				0.02	2007.50	2007.47	Yes	2000.13	2007.50	2007.47
5	PIPE	11+19.18	11+61.55	1.5	1998.63	1999.48	42.37	1.77	0.00492	0.40	2.01	0.23	0.00	0.00001	0.00029	0.01						0.01	2007.51	2007.51	Yes	2000.98	2007.51	2007.51
6	INLET 11.5	11+61.55	11+61.55	1.5	1999.48	1999.48	0.00	1.77	0.00492	0.40	N/A	0.23	0.00	0.00001	0.00001	0.00				0.00		0.00	2007.52	2007.51				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	40	0.32	0.031	0.010												
3																
4	4	0.03	0.031	0.001	89	0.25	0.03	0.03	0.023							
5																
6														0.5	0.001	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2006.63	2001.62	5.01	1.74	2.5	2.12	2006.63	0.37	2007.00

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

24" Lateral to INLET 12.3 - Ogden Ave - LT - Sidestreet South

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+33.50	2.5	2001.62	2001.79	33.50	4.91	0.00492	24.00	0.51	4.89	0.37	0.00342	0.00342	0.11						0.11	2007.12	2006.74	Yes	2004.66	2007.12	2006.74
2	MANHOLE	10+33.50	10+33.50	2.5	2001.79	2001.79	0.00	4.91	0.00492	24.00	N/A	4.89	0.37	0.00342	0.00342	0.00	0.22	0.09				0.31	2007.43	2007.06	Yes	2003.97	2007.43	2007.06
3	PIPE	10+33.50	10+64.60	2	2001.79	2001.95	31.10	3.14	0.00492	10.70	0.51	3.41	0.18	0.00223	0.00282	0.09						0.09	2007.52	2007.34	Yes	2004.13	2007.52	2007.34
4	INLET 12.3	10+64.60	10+64.60	2	2001.95	2001.95	0.00	3.14	0.00492	10.70	N/A	3.41	0.18	0.00223	0.00223	0.00				0.09		0.09	2007.61	2007.43				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2	32	0.24	0.371	0.089	55	0.40	0.37	0.37	0.223							
3																
4														0.5	0.180	0.090

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2006.44	2001.55	4.89	1.34	1.5	1.42	2006.44	0.79	2007.23

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 12.4 - Ogden Ave - LT - Sidestreet North

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+48.67	1.5	2001.55	2001.80	48.67	1.77	0.00492	12.60	0.51	7.13	0.79	0.01433	0.01433	0.70						0.70	2007.93	2007.14	Yes	2004.09	2007.93	2007.14
2	INLET 12.4	10+48.67	10+48.67	1.5	2001.80	2001.80	0.00	1.77	0.00492	12.60	N/A	7.13	0.79	0.01433	0.01433	0.00				0.39		0.39	2008.32	2007.53				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.789	0.395

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2006.11	1997.36	8.75	1.08	1.5	1.29	2006.11	0.29	2006.40

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 12.6 - North of Ogden Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq, ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+14.44	1.5	1997.36	1997.50	14.44	1.77	0.00492	7.70	0.97	4.36	0.29	0.00535	0.00535	0.08						0.08	2006.48	2006.19	Yes	1999.29	2006.48	2006.19
2	INLET 12.6	10+14.44	10+14.44	1.5	1997.50	1997.50	0.00	1.77	0.00492	7.70	N/A	4.36	0.29	0.00535	0.00535	0.00				0.15		0.15	2006.63	2006.33				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.295	0.147

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2005.86	1997.19	8.67	0.79	1.5	1.145	2005.86	0.09	2005.95

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 12.7 - North North of Ogden Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+15.58	1.5	1997.19	1997.35	15.58	1.77	0.00492	4.20	1.03	2.38	0.09	0.00159	0.00159	0.02						0.02	2005.97	2005.88	Yes	1998.94	2005.97	2005.88
2	INLET 12.7	10+15.58	10+15.58	1.5	1997.35	1997.35	0.00	1.77	0.00492	4.20	N/A	2.38	0.09	0.00159	0.00159	0.00				0.04		0.04	2006.02	2005.93				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.088	0.044

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2005.30	1998.25	7.05	0.00	1.5	0.75	2005.3	0.00	2005.30

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 13.3 - Stewart Ave - RT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq, ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+54.33	1.5	1998.25	1998.79	54.33	1.77	0.00492	0.00	0.99	0.00	0.00	0.00000	0.00000	0.00						0.00	2005.30	2005.30	Yes	2000.29	2005.30	2005.30
2	INLET 13.3	10+54.33	10+54.33	1.5	1998.79	1998.79	0.00	1.77	0.00492	0.00	N/A	0.00	0.00	0.00000	0.00000	0.00				0.00		0.00	2005.30	2005.30				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2005.20	1998.00	7.20	0.84	1.5	1.17	2005.2	0.11	2005.31

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 13.2 - Stewart Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+16.59	1.5	1998.00	1998.17	16.59	1.77	0.00492	4.80	1.02	2.72	0.11	0.00208	0.00208	0.03						0.03	2005.35	2005.23	Yes	1999.78	2005.35	2005.23
2	INLET 13.2	10+16.59	10+16.59	1.5	1998.17	1998.17	0.00	1.77	0.00492	4.80	N/A	2.72	0.11	0.00208	0.00208	0.00				0.06		0.06	2005.41	2005.29				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.115	0.057

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2005.20	1998.00	7.20	0.00	1.5	0.75	2005.2	0.00	2005.20

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 13.4 - Stewart Ave - RT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+54.31	1.5	1998.00	1998.54	54.31	1.77	0.00492	0.00	0.99	0.00	0.00	0.00000	0.00000	0.00						0.00	2005.20	2005.20	Yes	2000.04	2005.20	2005.20
2	INLET 13.4	10+54.31	10+54.31	1.5	1998.54	1998.54	0.00	1.77	0.00492	0.00	N/A	0.00	0.00	0.00000	0.00000	0.00				0.00		0.00	2005.20	2005.20				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

Starting HGL and EGL

Tailwater Elevation	Outlet Invert Elevation	Tailwater Depth (ft)	Critical Depth- Dc (ft)	Pipe Diameter- D (ft)	(Dc+D)/2 (ft)	Starting HGL (ft)	Hv (ft)	Starting EGL (ft)
2005.05	1996.49	8.56	0.00	1.5	0.75	2005.05	0.00	2005.05

Phi Index

n Value	Phi
0.013	0.004925

STANDARD FORM 6

DEVELOPMENT: LV BLVD Stewart to Sahara
CALCULATED BY: PLM **WO# 7517-2**

18" Lateral to INLET 13.5 - Stewart Ave - LT

Segment Number	Segment Type	Starting Station	Ending Station	Diameter (ft)	D/S Invert	U/S Invert	Length (ft)	Area (sq. ft)	Phi	Flow (cfs)	Slope (%)	Velocity (fps)	Hv (ft)	Sf (ft/ft)	Ave. Sf (ft/ft)	Hf (ft)	Hj (ft)	Hm (ft)	Hb (ft)	Hi (ft)	H_ (ft)	H Total (ft)	U/S EGL Elevation	U/S HGL Elevation	Pressure Flow ?	D/S EGL of U/S Segment	Final U/S EGL	Final U/S HGL
1	PIPE	10+00.00	10+51.03	1.5	1996.49	1997.00	51.03	1.77	0.00492	0.00	1.00	0.00	0.00	0.00000	0.00000	0.00						0.00	2005.05	2005.05	Yes	1998.50	2005.05	2005.05
2	INLET 13.5	10+51.03	10+51.03	1.5	1997.00	1997.00	0.00	1.77	0.00492	0.00	N/A	0.00	0.00	0.00000	0.00000	0.00				0.00		0.00	2005.05	2005.05				

Manholes/Transition Losses

	Straight Through Manhole				Junction Manhole						Bend Losses			Inlet Losses		
Segment Number	Deflection Angle	Km	Hv (ft)	Hm (ft)	Junction Angle	Kj	D/S Hv (ft)	U/S Hv (ft)	Hj (ft)		Kb	Hv (ft)	Hb (ft)	Ki	Hv (ft)	Hi (ft)
1																
2														0.5	0.000	0.000

C.7

BUBBLER CALCULATION

C.7.1

Drop Inlet Orifice Equations

SURCHARGE CALCULATIONS FOR PROPOSED BUBBLER SYSTEM

PROJECT: Las Vegas Blvd Improvements
W.O.# 7517-2
CALCULATED BY: PLM

INLET 13.2 - Stewart Avenue

ORIFICE CALCULATION FOR PROPOSED GRATE = 0.0'

Orifice Equation: Q=CA(2gh)^.5

h=	0.00	ft	
Orifice Coefficient(C)=	0.65		
Effective Area Coef.=	0.65		
g=	32.2	ft/s^2	
Effective Area of Grate: A=	0.65 x Length(L) x Width(W)		
L with 30% clogging factor=	12.25	ft	Actual L = 17.50 ft
W=	1.5	ft	
Q=	**0.00**	**cfs**	

ORIFICE CALCULATION FOR PROPOSED CURB OPENING = 20'

Orifice Equation: Q=CA(2gh)^.5

h=	0.33	ft	
Orifice Coefficient(C)=	0.65		
g=	32.2	ft/s^2	
A=	Length(L) x Height(H)		
L with 20% clogging factor=	16	ft	Actual L = 20.00 ft
H=	0.5	ft	
Q=	**23.97**	**cfs**	
Drop Inlet Total Q=	**23.97**	**cfs**	

SURCHARGE CALCULATIONS FOR PROPOSED BUBBLER SYSTEM

PROJECT: Las Vegas Blvd Improvements
W.O.# 7517-2
CALCULATED BY: PLM

INLET 13.3 - Stewart Avenue

ORIFICE CALCULATION FOR PROPOSEDGRATE = 0.0'

Orifice Equation: Q=CA(2gh)^.5

h=	0.00	ft	
Orifice Coefficient(C)=	0.65		
Effective Area Coef.=	0.65		
g=	32.2	ft/s^2	
Effective Area of Grate: A=	0.65 x Length(L) x Width(W)		
L with 30% clogging factor=	12.25	ft	Actual L = 17.50 ft
W=	1.5	ft	
Q=	**0.00**	**cfs**	

ORIFICE CALCULATION FOR PROPOSED CURB OPENING = 20'

Orifice Equation: Q=CA(2gh)^.5

h=	0.54	ft	
Orifice Coefficient(C)=	0.65		
g=	32.2	ft/s^2	
A=	Length(L) x Height(H)		
L with 20% clogging factor=	16	ft	Actual L = 20.00 ft
H=	0.5	ft	
Q=	**30.67**	**cfs**	
Drop Inlet Total Q=	**30.67**	**cfs**	

SURCHARGE CALCULATIONS FOR PROPOSED BUBBLER SYSTEM

PROJECT: Las Vegas Blvd Improvements
W.O.# 7517-2
CALCULATED BY: PLM

INLET 13.4 - Stewart Avenue

ORIFICE CALCULATION FOR PROPOSED GRATE = 0.0'

Orifice Equation: Q=CA(2gh)^.5

h= 0.00 ft
Orifice Coefficient(C)= 0.65
Effective Area Coef.= 0.65
g= 32.2 ft/s^2

Effective Area of Grate: A= 0.65 x Length(L) x Width(W)
L with 30% clogging factor= 12.25 ft Actual L = 17.50 ft
W= 1.5 ft

Q= 0.00 cfs

ORIFICE CALCULATION FOR PROPOSED CURB OPENING = 5'

Orifice Equation: Q=CA(2gh)^.5

h= 0.58 ft
Orifice Coefficient(C)= 0.65
g= 32.2 ft/s^2

A= Length(L) x Height(H)
L with 20% clogging factor= 16 ft Actual L = 20.00 ft
H= 0.5 ft

Q= 31.78 cfs

Drop Inlet Total Q= 31.78 cfs

SURCHARGE CALCULATIONS FOR PROPOSED BUBBLER SYSTEM

PROJECT: Las Vegas Blvd Improvements
W.O.# 7517-2
CALCULATED BY: PLM

INLET 13.5 - Stewart Avenue

ORIFICE CALCULATION FOR PROPOSED GRATE = 17.5'

Orifice Equation: Q=CA(2gh)^.5

h=	0.23	ft	
Orifice Coefficient(C)=	0.65		
Effective Area Coef.=	0.65		
g=	32.2	ft/s^2	
Effective Area of Grate: A=	0.65 x Length(L) x Width(W)		
L with 30% clogging factor=	12.25	ft	Actual L = 17.50 ft
W=	1.5	ft	
Q=	**29.88**	**cfs**	

ORIFICE CALCULATION FOR PROPOSED CURB OPENING = 20'

Orifice Equation: Q=CA(2gh)^.5

h=	0.06	ft	
Orifice Coefficient(C)=	0.65		
g=	32.2	ft/s^2	
A=	Length(L) x Height(H)		
L with 20% clogging factor=	16	ft	Actual L = 20.00 ft
H=	0.5	ft	
Q=	**10.22**	**cfs**	
Drop Inlet Total Q=	**40.10**	**cfs**	

C.7.2

Storm Drain Orifice Equation

ORIFICE CALCULATIONS

DISCHARGE INTO EXISTING STORM DRAIN DOWNSTREAM OF BUBBLER SYSTEM

DEVELOPMENT Las Vegas Blvd Improvements

W.O. # 7517-2 **CALCULATED BY** PLM

EQUATIONS

$$Q = C_d A (2gh)^{1/2}$$

Where : Q = Flow (cfs); Cd = Orifice Coefficient, A = Area of Orifice (ft^2); g = Gravity (ft/s^2); h = Orifice Height, in feet.

Cd =	0.65
g =	32.20
A = π*radius^2	3.141592653

Location	Pipe Diameter (ft)	h (feet)	Orifice Coefficient	Orifice Area (ft^2)	Q (cfs)
Stewart	2.50	7.23	0.65	4.91	68.85

APPENDIX D

REFERENCE MATERIAL/SUPPLEMENTAL INFORMATION

D.1

REFERENCE STUDIES

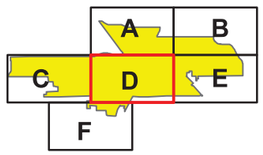
D.1.1

City of Las Vegas Central Neighborhood Flood Control Master Plan – Figures

City of Las Vegas

CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN

SUBBASIN MAP



ID 10-Year Subbasins

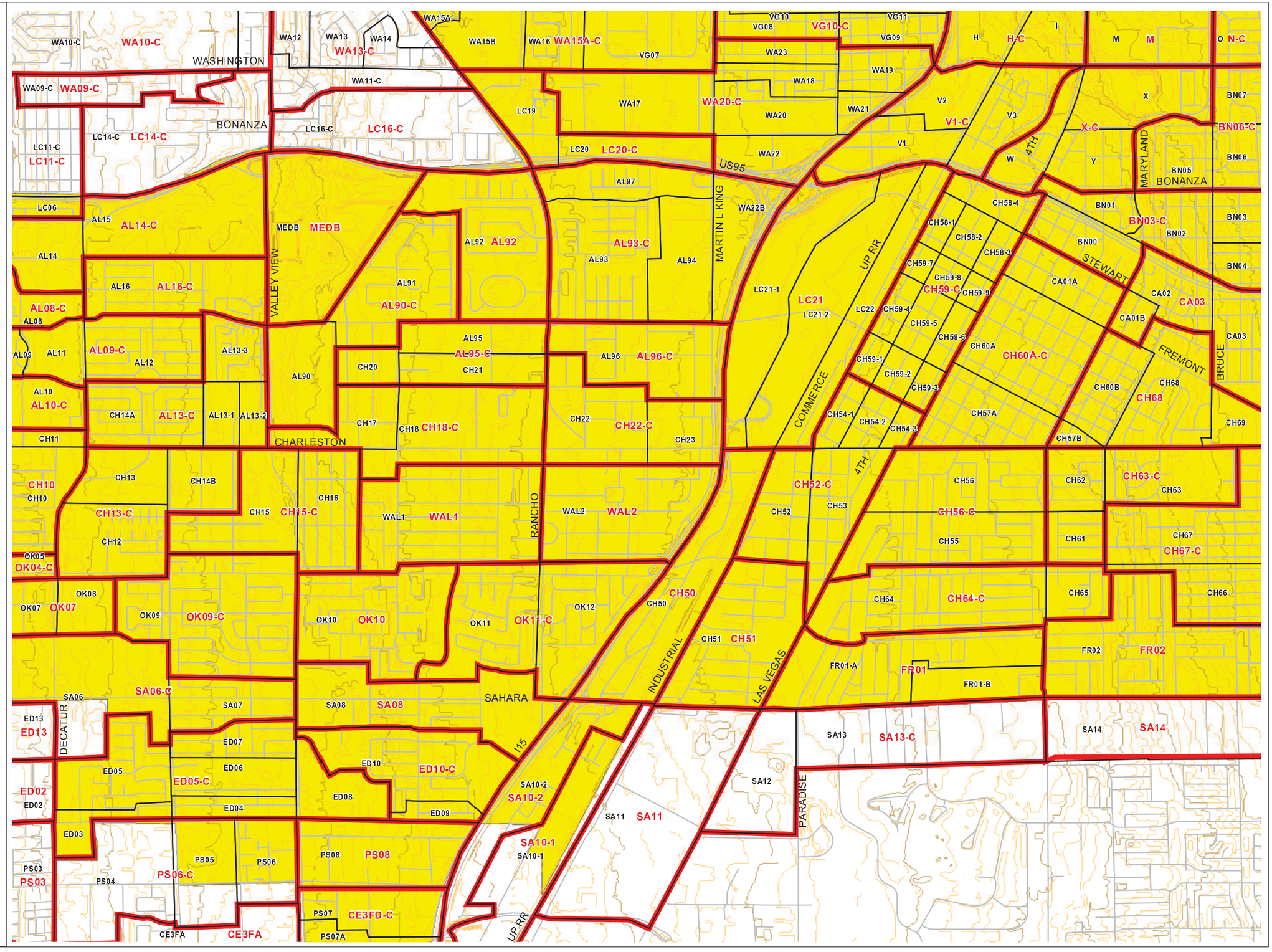
ID 100-Year Subbasins

Study Area

N
W
E
S

SCALE: 1 inch = 2000 feet

PBS&J



City of Las Vegas

CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN

LEGEND

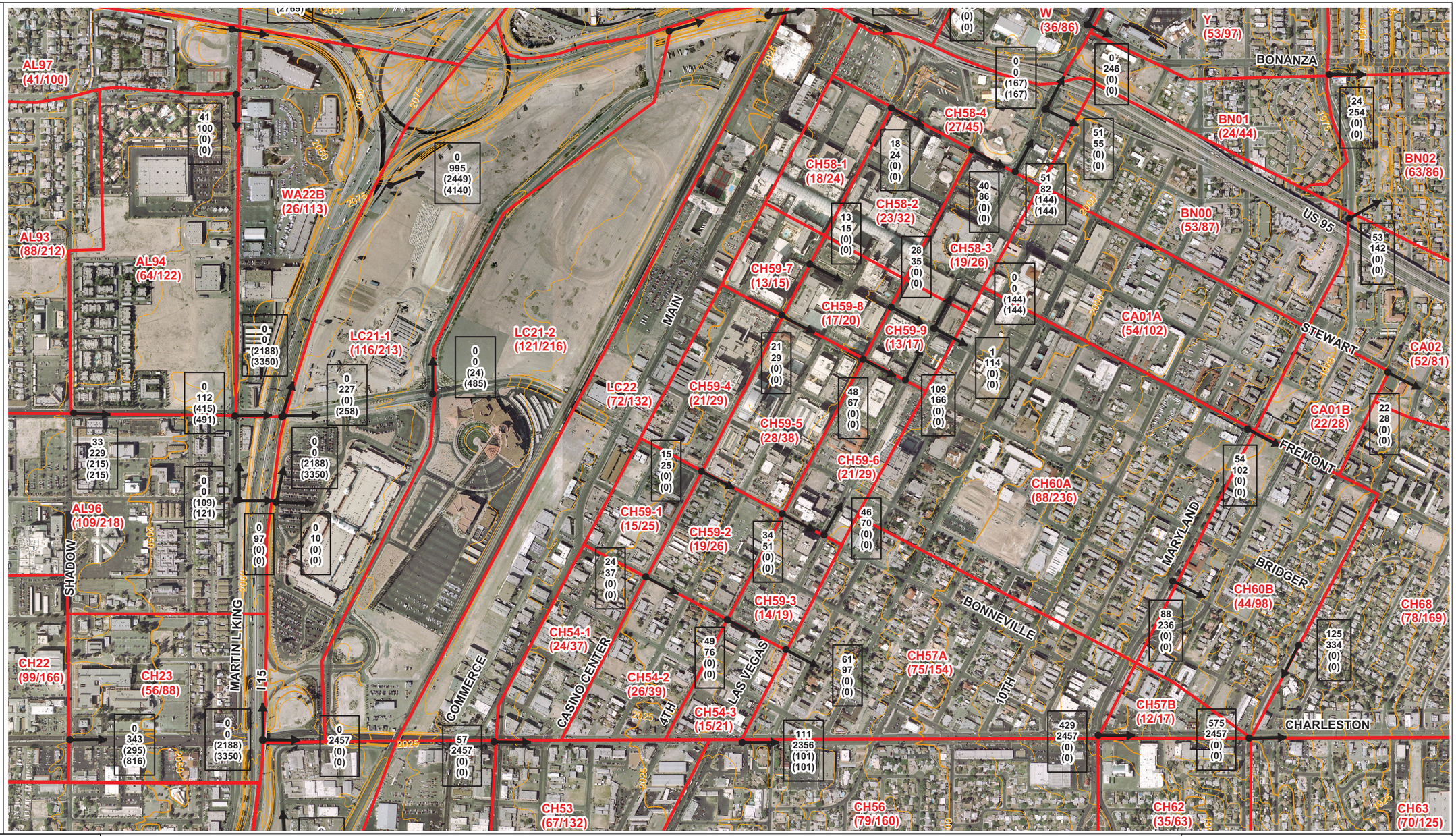
- Sub-basin Boundary
- LV12 — Basin ID
- (10yr./100yr.) — Contributing flow from the basin (cfs)
- Flow Arrow
- 250 / 500 / (300) / (800) — 10-Year Street Flow / 100-Year Street Flow / 10-Year Facility Flow / 100-Year Facility Flow

(Flows in CFS)

- Study Area Limit

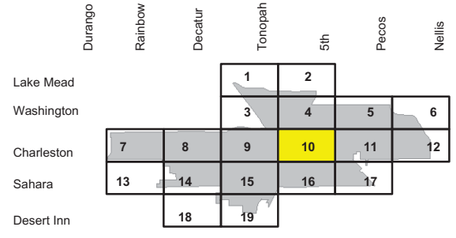
PHOTO DATE: SPRING 2004

FIGURE E-10



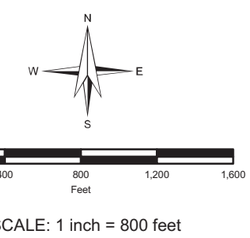
EXISTING DRAINAGE CONDITIONS

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Henderson, NV 89074
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Fax: (702) 263-7200



NOTE:
Existing conditions are based on future Curve Number values with only existing local and CCRFCD facilities in place.

100-Year flows at locations where a 100-Year subbasin concentration point does not exist in the hydrology model were based on an area-weighted ratio of the 100-Year flows from concentration points upstream and downstream of the location. See Volume I for a more detailed explaination.



SCALE: 1 inch = 800 feet

City of Las Vegas

CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN

LEGEND

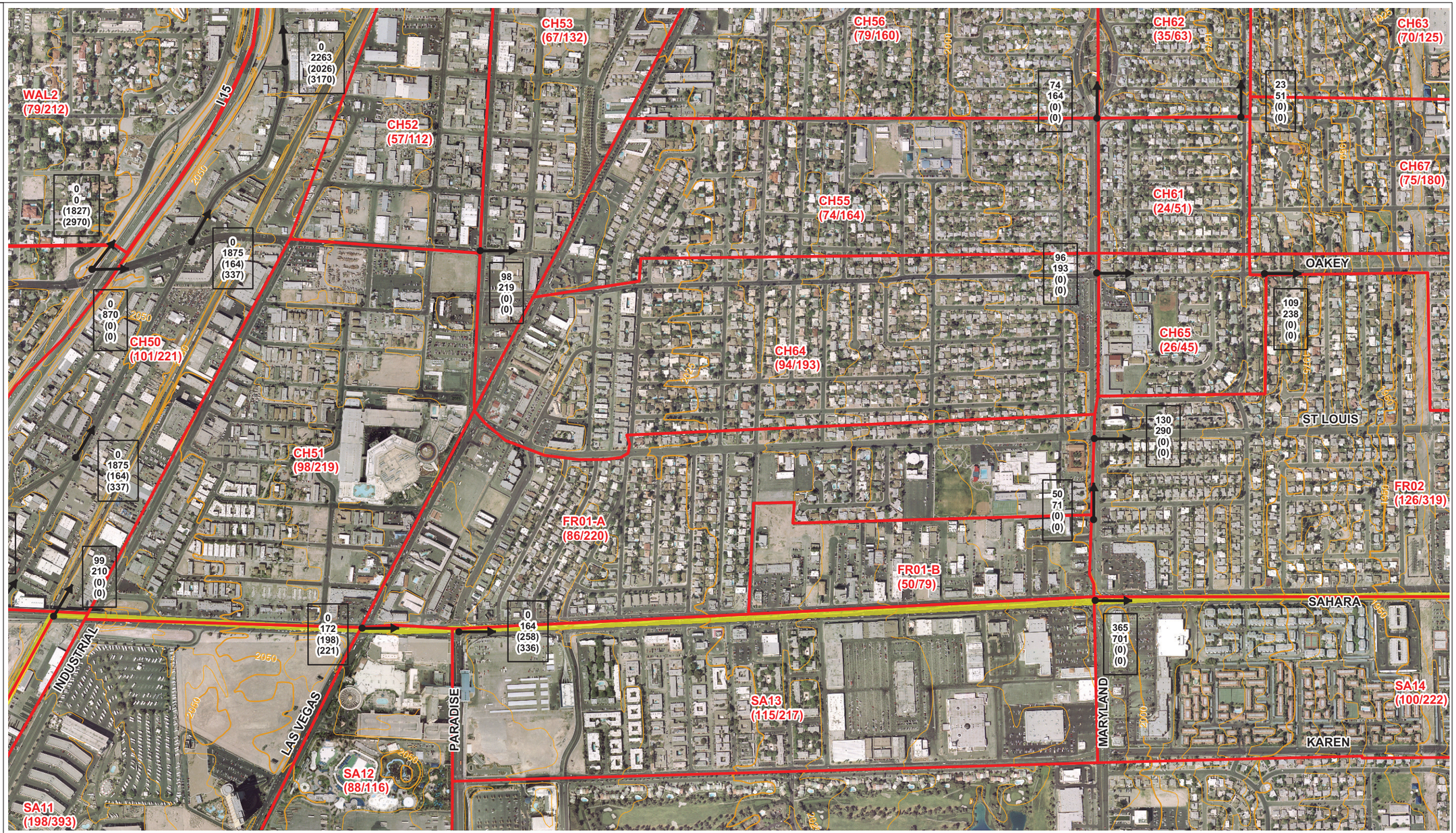
- Sub-basin Boundary
- LV12 — Basin ID
- (10yr./100yr.) — Contributing flow from the basin (cfs)
- Flow Arrow
- 250 / 500 / (300) / (800) — 10-Year Street Flow / 100-Year Street Flow / 10-Year Facility Flow / 100-Year Facility Flow

(Flows in CFS)

- Study Area Limit

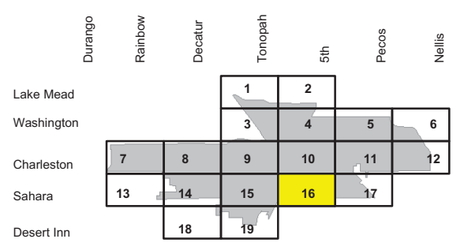
PHOTO DATE: SPRING 2004

FIGURE E-16



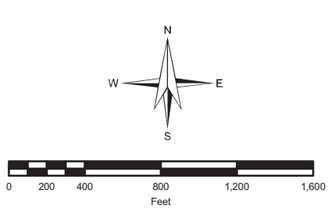
EXISTING DRAINAGE CONDITIONS

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Fax: (702) 263-7200

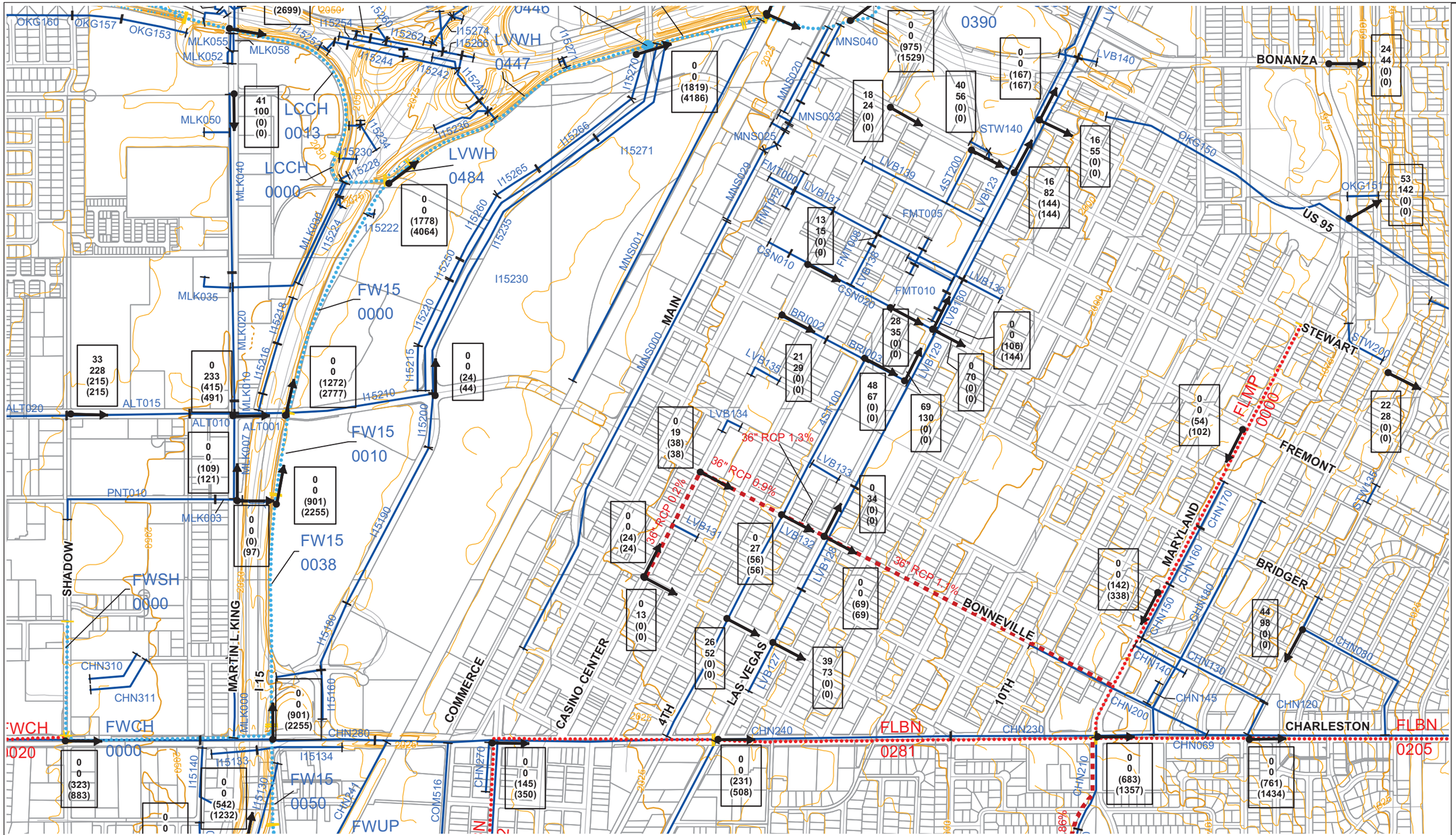


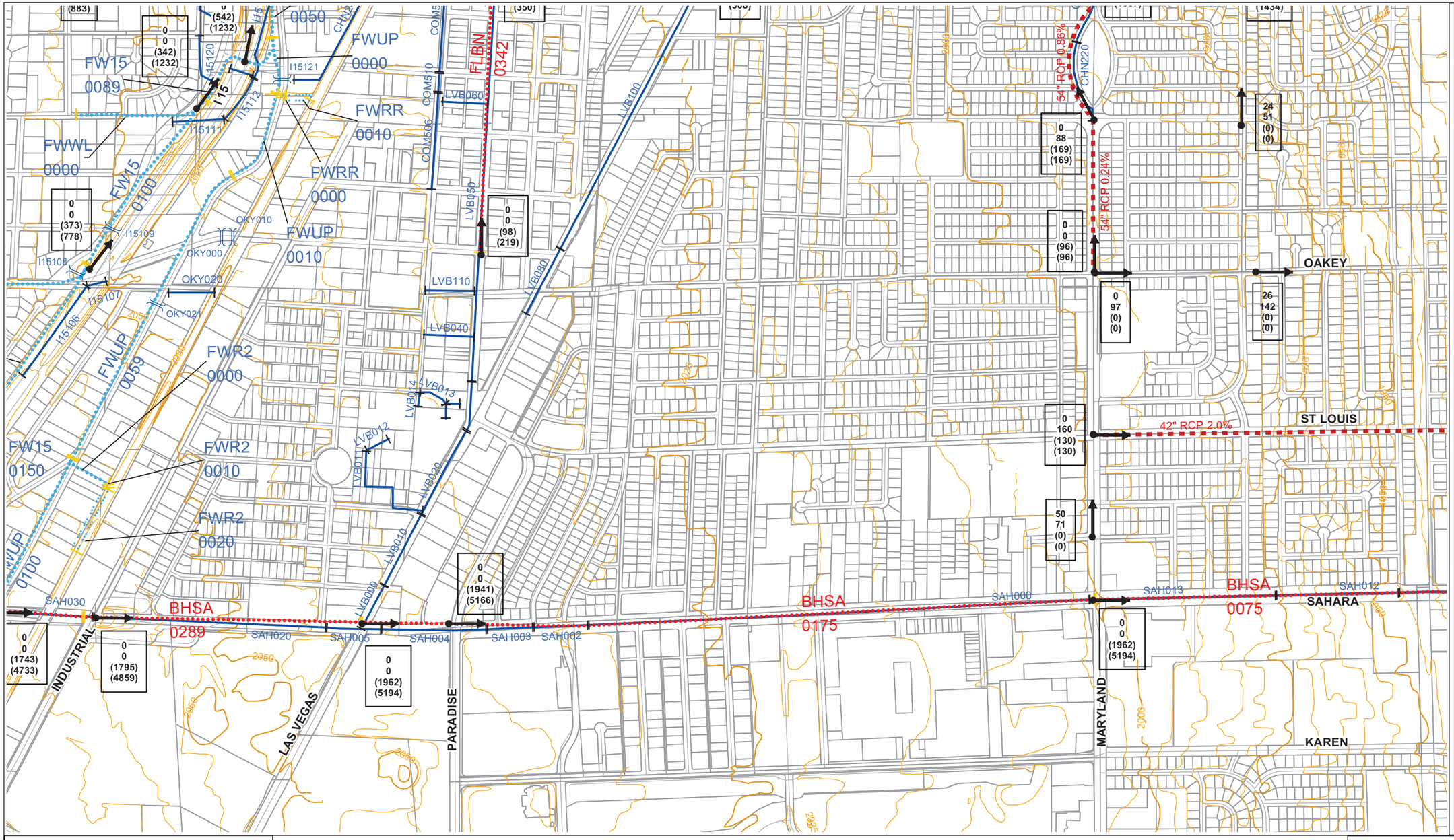
NOTE:
Existing conditions are based on future Curve Number values with only existing local and CCRFCD facilities in place.

100-Year flows at locations where a 100-Year subbasin concentration point does not exist in the hydrology model were based on an area-weighted ratio of the 100-Year flows from concentration points upstream and downstream of the location. See Volume I for a more detailed explaination.



SCALE: 1 inch = 800 feet


City of Las Vegas
CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN
LEGEND
Existing Regional Facility
Category A Proposed Regional Facility (2002 MPU)
Category B Proposed Regional Facility (2002 MPU)
Category A Proposed Regional Facility (2004 CNFCMP)
Existing Local Facility
Proposed Local Facility
Regional Culvert
Regional Bridge
Regional Pipeline
Regional Channel
Regional Levee
Regional Detention Basin
Local Storm Drain
Local Culvert
Proposed Local Storm Drain
Regional ID-Mile Separator
Local Facility Separator
FIGURE F-10
MAIN
STEWART
BONANZA
FREMONT
CHARLESTON
MARYLAND
BRIDGER
BONNEVILLE
10TH
4TH
LAS VEGAS
CASINO CENTER
COMMERCE
SHADOW
MARTIN L. KING
US 95
I-15
FLMP 0000
LVWH 0447
LVWH 0484
LCCH 0013
LCCH 0000
FW15 0000
FW15 0010
FW15 0038
FW15 0050
FWSH 0000
FWCH 0000
FWUP
FLBN 0281
FLBN 0205
0390
0446
I15271
I15230
36" RCP 0.2%
36" RCP 0.9%
36" RCP 1.3%
36" RCP 1.1%
86" RCP 0.2%
Flow Arrow
10-Year Street Flow
100-Year Street Flow
10-Year Facility Flow
100-Year Facility Flow
(Flows in CFS)
NOTE:
Ultimate drainage conditions are based on future Curve Number values with all flood control facilities in place.
100-Year flows at locations where a 100-Year subbasin concentration point does not exist in the hydrology model were based on an area-weighted ratio of the 100-Year flows from concentration points upstream and downstream of the location. See Volume I for a more detailed explaination.
N
W
E
S
0 200 400 800 1,200 1,600
Feet
SCALE: 1 inch = 800 feet
Durango
Rainbow
Decatur
Tonopah
5th
Pecos
Nellis
Lake Mead
Washington
Charleston
Sahara
Desert Inn
FUTURE DRAINAGE CONDITIONS
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CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN

City of Las Vegas

LEGEND

- Existing Regional Facility
- Category A Proposed Regional Facility (2002 MPU)
- Category B Proposed Regional Facility (2002 MPU)
- Category A Proposed Regional Facility (2004 CNFCMP)
- Existing Local Facility
- Proposed Local Facility
- Regional Culvert
- Regional Bridge
- Regional Pipeline
- Regional Channel
- Regional Levee
- Regional Detention Basin
- Local Storm Drain
- Local Culvert
- Proposed Local Storm Drain
- Regional ID-Mile Separator
- Local Facility Separator

FIGURE F-16

N
W E
S

0 200 400 800 1,200 1,600
Feet

SCALE: 1 inch = 800 feet

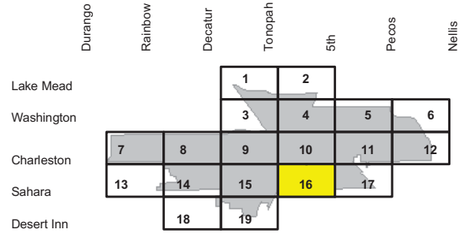
Flow Arrow

250	10-Year Street Flow
500	100-Year Street Flow
(300)	10-Year Facility Flow
(800)	100-Year Facility Flow

(Flows in CFS)

NOTE:
Ultimate drainage conditions are based on future Curve Number values with all flood control facilities in place.

100-Year flows at locations where a 100-Year subbasin concentration point does not exist in the hydrology model were based on an area-weighted ratio of the 100-Year flows from concentration points upstream and downstream of the location. See Volume I for a more detailed explaination.



FUTURE DRAINAGE CONDITIONS

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City of Las Vegas

2004 CITY OF LAS VEGAS
CENTRAL NEIGHBORHOOD
FLOOD CONTROL MASTER PLAN

LEGEND

REGIONAL STREAM NAME DESIGNATOR	AABB
REGIONAL MILE	0000
LOCAL STREAM NAME DESIGNATOR	AAB
LOCAL ID NUMBER	000
EXISTING FACILITY	E
PROPOSED OR MODIFIED FACILITY	P
CONTINGENCY LEVEL:	
CATEGORY B	P0
MASTER PLAN	P1
PRELIMINARY DESIGN	P2
DESIGN	P3
BOTTOM WIDTH	W
DEPTH	D
SIDE SLOPE, H:V	SS
LEFT SIDE SLOPE H:V	LSS
RIGHT SIDE SLOPE H:V	RSS
CORRUGATED METAL ARCH PIPE CULVERT	CMAP
CORRUGATED METAL PIPE CULVERT	CMP
DUCTILE IRON PIPE	DIP
HIGH DENSITY POLYETHYLENE PIPE	HDPE
HELICAL ELLIPTICAL REINFORCED CONCRETE PIPE	HERCP
PUBLIC DRAINAGE EASEMENT	PDE
POLYVINYL CHLORIDE PIPE	PVC
REINFORCED CONCRETE BOX	RCB
REINFORCED CONCRETE BOX CULVERT	RCBC
REINFORCED CONCRETE ELLIPTICAL PIPE	RCEP
REINFORCED CONCRETE PIPE	RCP
REINFORCED CONCRETE PIPE ARCH	RCPA
REINFORCED CONCRETE PIPE CULVERT	RCPC
STORM SEWER PIPE	SSP
VITRIFIED CLAY PIPE	VCP

NOTES:
FLOW = 100 YEAR HEC-1 FLOW (REGIONAL
FLOW = FACILITY CAPACITY (LOCAL FACILITIES)

FLOOD CONTROL FACILITIES INVENTORY

SHEET I - 7

PBS&J

ID	MILE	Status	Plan No.	Facility Description	Facility Length L (ft)	Channel Slope S (%)	Flow (cfs)
F-10							
LOCAL FACILITIES (continued)							
I15	260	E	107Y-4229	4' X 4' RCBC	520		128
I15	262	E	HWY BK I-14 Vol 1 SD-6	24" RCP (600mm)	623	1.76	30
I15	264	E	HWY BK I-14 Vol 1 SD-6	18" RCP (450mm)	140	0.50	7
I15	265	E	107Y-4229	6' X 4' RCBC	725		192
I15	266	E	107Y-4229	7' X 4' RCBC	230		224
I15	268	E	HWY BK I-14 Vol 1 SD-6	42" RCP (1050mm)	306	2.00	142
I15	270	E	107Y-4229	8' X 4' RCBC	435		256
I15	271	E	107Y-4229	12' X 4' RCBC	690		384
I15	273	E	HWY BK I-14 Vol 1 SD-9	18" RCP (450mm)	133	1.15	11
I15	274	E	HWY BK I-14 Vol 1 SD-6	18" RCP (450mm)	172	1.00	11
I15	276	E	HWY BK I-14 Vol 1 SD-6	18" RCP (450mm)	148	0.25	5
I15	278	E	HWY BK I-14 Vol 1 SD-6	18" RCP (450mm)	226	13.00	38
LVB	050	E	Hwy Bk # M-2	24" CMP	3675		23
LVB	100	E	NSHD # 11/Hwy Bk # L-5	24" RCP	2750		23
LVB	121	E	HWY BK # L-5	10" CMP	240		2
LVB	122	E	HWY BK # L-5	18" CMP	90		11
LVB	123	E	HWY BK # L-5	24" CMP	2424		23
LVB	124	E	HWY BK # L-5	24" CMP	1750		23
LVB	127	E	HWY BK # L-5	18" RCP	740		10
LVB	128	E	HWY BK # L-5	24" RCP	1000		19
LVB	129	E	Hwy Bk #L-5	53" X 34" RCP	1875		42
LVB	130	E	Hwy Bk #L-5	48" RCP	4050		144
LVB	131	E	107-V589	18" Semi-Circle RCP	200		1
LVB	132	E	107-V589	18" Semi-Circle RCP	225		1
LVB	133	E	107-V589	18" Semi-Circle RCP	263		1
LVB	134	E	107-V506	16" RCEP	165		7
LVB	135	E	107-V506	16" RCEP	165		7
LVB	136	E	327-V158A / 107-V981	18" RCP	1575		3
LVB	137	E	327-V164	12" ACP	207		3
LVB	138	E	307-V514	10" VCP	287		2
LVB	139	E	327-V149	12" ACP	1082		3
LVB	140	E	HWY BK # I-5	15" RCP	319		6
MLK	000	E	107-V856A	24" RCP	500		
MLK	003	E	107-V856A	18" RCP	180		
MLK	005	E	Hwy Bk #I-4	8' X 3' RCBC	228		168
MLK	007	E	100% Alta Plans	48" RCP	721	0.25	121
MLK	010	E	327-100/107-V856A	38" X 60" RCP	100		110
MLK	020	E	327-100/107-V856A	48" RCP	1224		72
MLK	030	E	327-100	48" RCP	1195		72
MLK	035	E	107-V1737	15" RCP	434	1.00	101
MLK	040	E	107-V856A	21" RCP	1977		10
MLK	050	E	107-V1433	18" RCP	150		11
MLK	052	E	HWY BK I-14 Vol 1 SD-14	18" RCP (450mm)	140	1.80	14
MLK	055	E	HWY BK I-14 Vol 1 SD-14	48" RCP (1200mm)	240	0.30	79
MLK	058	E	HWY BK I-14 Vol 1 SD-13	48" RCP (1200mm)	152	1.62	183
MLK	060	E	HWY BK I-14 Vol 1 SD-14	18" RCP (450mm)	272	3.80	20
MLK	065	E	107-V856A	24" RCP	560		
MLK	075	E	HWY BK I-14 Vol 1 SD-14	18" RCP (450mm)	407	3.00	18
MNS	000	E	HWY BK # M-2	18" CMP	4000		4
MNS	001	E	107-V2010	Conc Chnl 12'W 4'D 1:1 SS	3330		698
MNS	019	E	107-V2011	36" RCP	550		
MNS	020	E	107-V2011	24" RCP	635		19
MNS	021	E	107-V2011	20" DIP Force Main	395		
MNS	025	E	107-V2011	45" X 29"/30" RCP Laterals	65		
MNS	029	E	107-V1840	24" CMP	635		19
MNS	030	E	107-V2011	42" RCP	120	0.83	37
MNS	031	E	107-V2011	30" RCP	50		
MNS	032	E	107-V2011	2: 45" X 29" RCP	136	0.30	68
MNS	035	E	107-V2011	76" X 48" RCP	344	0.30	135
MNS	037	E	107-V2011	2: 53" X 34" RCP	104	25.00	96
MNS	040	E	107-V2011	76" X 48" RCP	385	25.00	123

ID	MILE	Status	Plan No.	Facility Description	Facility Length L (ft)	Channel Slope S (%)	Flow (cfs)
F-10							
LOCAL FACILITIES (continued)							
OKG	150	E	HWY BK # 1	30" RCP	4725		18
OKG	151	E	107-V1025	18" RCP	189		7
OKG	153	E	HWY BK I-14 Vol 1 SD-14	18" RCP (450mm)	522	1.20	12
OKG	157	E	HWY BK I-14 Vol 1 SD-15	24" RCP (600mm)	354	1.60	29
OKG	160	E	HWY BK I-14 Vol 1 SD-15	24" RCP (600mm)	669	1.20	25
PNT	010	E	327-V239	4" Pressure PVC	1472		
STW	100	E	Hwy Bk I-515	36" RCP	3300		67
STW	135	E	HWY BK # F-1	15" RCP	95		6
STW	140	E	327-V241	18" PVC	420	0.40	6
STW	200	E	107-V7894	8" RCP	223	0.50	
F-11							
REGIONAL FACILITIES							
CEDAR AVENUE - BONANZA							
CABZ	0000	E	107-V849A	72" RCP	517	0.30	
CABZ	0000	P0	2002 Master Plan Update	11' X 10' RCB	310	0.30	1085
CABZ	0006	E	107-V849A	60" RCP	1294	0.30	
CABZ	0006	P0	2002 Master Plan Update	11' X 10' RCB	1294	0.30	1085
CABZ	0021	E	107-V849A	68" x 43 CMAP	160	0.45	
CABZ	0021	P0	2002 Master Plan Update	9' X 9' RCB	160	0.45	943
CABZ	0028	E	107-V849A	54" SSP	935	0.45	
CABZ	0028	P0	2002 Master Plan Update	9' X 9' RCB	935	0.45	943
CABZ	0045	E	107-V849A	48" SSP	1234	0.80	
CABZ	0045	P0	2002 Master Plan Update	9' X 8' RCB	1234	0.80	943
CABZ	0066	E	107-V849A	42" SSP	704	0.80	
CABZ	0066	P0	2002 Master Plan Update	8' X 7' RCB	704	0.80	763
CABZ	0080	E	107-V849A	36" SSP	1919	0.75	
CABZ	0080	P0	2002 Master Plan Update	8' X 8' RCB	1919	0.75	763
CEDAR AVENUE CHANNEL							
CACH	0080	E	327-V179	Conc Chnl 12'W 6'D 1.5:1SS	2776	0.30	2372
CACH	0080	P1	2002 Master Plan Update	Conc Chnl 45'W 6'D 0:1SS	2640	0.30	2372
CACH	0127	E	327-V179	3: 4' X 12' RCBC @ Sandhill	100	0.30	2372
CACH	0127	P1	2002 Master Plan Update	3: 12' X 8' RCBC @ Sandhill	100	0.30	2372
CACH	0128	E	327-V179	Conc Chnl 10'W 8'D 1.5:1SS	900	0.30	2372
CACH	0128	P1	2002 Master Plan Update	Conc Chnl 28'W 8'D 0:1SS	900	0.30	2372
CACH	0146	E	327-V179	2: 5.5' X 12' RCBC @ Honolulu	100	0.30	2372
CACH	0146	P1	2002 Master Plan Update	3: 12' X 8' RCBC @ Honolulu	100	0.30	2372
CACH	0147	E	327-V179	Conc Chnl 10'W 8'D 1.5:1SS	880	0.30	2372
CACH	0147	P1	2002 Master Plan Update	Conc Chnl 28'W 8'D 0:1SS	1640	0.30	2372
CEDAR AVENUE - CHARLESTON							
CACN	0000	E	327-V140	72" RCP	800	0.50	
CACN	0000	P0	2002 Master Plan Update	10' X 8' RCB	800	0.50	945
CACN	0015	E	327-V140	2: 48" RCP	600	0.50	
CACN	0015	P0	2002 Master Plan Update	10' X 8' RCB	600	0.50	945
CACN	0026	E	327-V140	66" RCP	2700	0.50	
CACN	0026	P0	2002 Master Plan Update	10' X 8' RCB	2700	0.50	945
CEDAR AVENUE CHANNEL - STEWART							
CAST	0000	P1	2003 CNFCMP	8' X 7' RCB	2200	0.90	707
FLAMINGO - BOULDER HIGHWAY NORTH							
FLBN	0038	E	2002 Master Plan Update	Channel - Unknown Characteristics	6600	0.59	2284
FLBN	0038	P1	2004 CNFCMP	3: 9' X 7' RCB	6600	0.59	2284
FLBN	0167	P1	2002 Master Plan Update	2: 10' X 6' RCB	700	1.14	2054
FLBN	0180	P1	2002 Master Plan Update	2: 10' X 6' RCB	1300	1.31	1763
FLBN	0205	P1	2004 CNFCMP	10' X 7' RCB	4000	2.30	1520
LOCAL FACILITIES							
BHY	050	E	107-V594	66" RCP	500		237
BHY	060	E	HWY BK #B-2	24" RCP	120		30
BHY	110	E	327-86	66" RCP	700		237
BHY	111	E	117-V595	27" RCP	800		11
BHY	120	E	327-86	66" RCP	570		212
BHY	121	E	107-V594	4' X 0.5' RCBC	325		12
BNZ	040	E	107-V849A	33" RCP	1050		29
BNZ	072	E	107-V849A	10" VCP	1563	0.30	1
BNZ	080	E	107-V2325	27" RCP	130	0.25	13
BNZ	081	E	107-V2325	27" RCP	460	0.22	13
BNZ	082	E	107-V2325	24" RCP	150	0.30	11
BNZ	083	E	107-V2325	18" RCP	135	0.30	5

City of Las Vegas

2004 CITY OF LAS VEGAS
CENTRAL NEIGHBORHOOD
FLOOD CONTROL MASTER PLAN

LEGEND

REGIONAL STREAM NAME DESIGNATOR	AABB
REGIONAL MILE	0000
LOCAL STREAM NAME DESIGNATOR	AAB
LOCAL ID NUMBER	000
EXISTING FACILITY	E
PROPOSED OR MODIFIED FACILITY	P
CONTINGENCY LEVEL:	
CATEGORY B	P0
MASTER PLAN	P1
PRELIMINARY DESIGN	P2
DESIGN	P3
BOTTOM WIDTH	W
DEPTH	D
SIDE SLOPE, H:V	SS
LEFT SIDE SLOPE H:V	LSS
RIGHT SIDE SLOPE H:V	RSS
CORRUGATED METAL ARCH PIPE CULVERT	CMAP
CORRUGATED METAL PIPE CULVERT	CMP
DUCTILE IRON PIPE	DIP
HIGH DENSITY POLYETHYLENE PIPE	HDPE
HELICAL ELLIPTICAL REINFORCED CONCRETE PIPE	HERCP
PUBLIC DRAINAGE EASEMENT	PDE
POLYVINYL CHLORIDE PIPE	PVC
REINFORCED CONCRETE BOX	RCB
REINFORCED CONCRETE BOX CULVERT	RCBC
REINFORCED CONCRETE ELLIPTICAL PIPE	RCEP
REINFORCED CONCRETE PIPE	RCP
REINFORCED CONCRETE PIPE ARCH	RCPA
REINFORCED CONCRETE PIPE CULVERT	RCPC
STORM SEWER PIPE	SSP
VITRIFIED CLAY PIPE	VCP

NOTES:
FLOW = 100 YEAR HEC-1 FLOW (REGIONAL
FLOW = FACILITY CAPACITY (LOCAL FACILITIES)

FLOOD CONTROL FACILITIES INVENTORY

SHEET I - 11

PBS&J

F-16

REGIONAL FACILITIES

ID	MILE	Status	Plan No.	Facility Description	Facility Length L (ft)	Channel Slope S (%)	Flow (cfs)
BOULDER HIGHWAY, SAHARA AVENUE							
BHSA	0075	P1	2004 CNFCMP	2: 12' X 8' RCB	5280	2.11	5194
BHSA	0175	P1	2004 CNFCMP	3: 11' X 10' RCB	6000	0.67	5194
BHSA	0289	P1	2004 CNFCMP	2: 12' X 11' RCB	2300	0.87	5194
BHSA	0331	P1	2004 CNFCMP	2: 12' X 10' RCB	2000	1.00	4859
FLAMINGO - BOULDER HIGHWAY NORTH							
FLBN	0342	P1		10' X 6' RCB	4300	0.42	532
FREEWAY CHANNEL FROM DESERT INN TO EXPRESSWAY							
FW15	0050	E	327-V254	3: 12' X 10' RCB	812	0.17	2192
FW15	0089	E	327-V254	3: 12' X 10' RCB	922	0.17	805
FW15	0100	E	327-V254	3: 12' X 9' RCB	1669	0.17	805
FW15	0125	E	327-V254	2: 10' X 8' RCB	1379	0.80	805
OAKEY DRAIN							
FWOK	0000	E	327-V254	10' X 8' RCB	1300	0.62	805
FREEWAY CHANNEL - RAILROAD CHANNEL 2							
FWR2	0000	E	327-V254	5' X 5' RCBC	310	1.60	
FWR2	0010	E	327-V254	Conc Chnl 8'W 4'D 2:1 SS	50	0.95	
FWR2	0020	E	327-V254	Earth Chnl 8'W 4'D 2:1 SS	600	0.95	
FREEWAY CHANNEL BYPASS FACILITY RR BRANCH							
FWRR	0000	E	327-V254	48" RCP	35	1.22	
FWRR	0010	E	327-V254	Conc Chnl 5'W 5'D	215	1.22	
FREEWAY CHANNEL BYPASS FACILITY							
FWUP	0000	E	327-V254	12' X 9' RCB	426	0.37	221
FWUP	0010	E	327-V254	10' X 8' RCB	804	0.37	221
FWUP	0059	E	327-V254	6' X 5' RCB	2680	0.56	221
FWUP	0100	E	327-V254	6' X 5' RCB	1400	0.56	221
FREEWAY CHANNEL - WALDMAN AVENUE							
FWWL	0000	E	327-V254	6' X 6' RCB	1110	0.20	497

LOCAL FACILITIES

CHN	210	E	107V-829C	18" RCP	713		11
CHN	220	E	107V-731	18" RCP	606		10
CHN	241	E	327V-120	Conc Chnl 9'W 3'D 1.5:1 SS	1275		
COM	506	E	107V-2008	12" RCP	860	0.25	2
COM	510	E	107V-2008	12" RCP	88	0.25	2
COM	516	E	107V-2008	18" RCP	883	0.25	5
I15	106	E	HWY BK I-12	Riprap/Conc Chnl 10'W 6'D 2:1 SS	1197	0.10	484
I15	107	E	HWY BK I-3	45" X 29" Oval RCP	316	0.60	48
I15	108	E	HWY BK I-3	18" RCP	280	0.50	6
I15	109	E	HWY BK I-3	18" RCP	96	0.50	6
I15	111	E	HWY BK I-3	8' X 3' RCBC	360	0.25	170
I15	112	E	HWY BK I-3	Conc Chnl 6'W 2:1 SS	550	0.12	
I15	113	E	HWY BK I-3	24" RCP	236	0.40	12
I15	120	E	107V-800	15" RCP	351		6
I15	121	E	107-V793	9' x 3' RCB	80		189
I15	130	E	327-119	38" X 60" RCP	1435		56
I15	140	E	115-337	15" RCP	650	0.40	3
LVB	000	E	HWY BK # 12-A	15" RCP	413		6
LVB	010	E	107-V1942	18" RCP	713		11
LVB	011	E	107V-2358	18" RCP	1069	0.30	5
LVB	012	E	107V-2358	8" DIP	250	0.80	1
LVB	013	E	107V-2358	24" RCP	599	0.19	9
LVB	013	E	107V-2358	24" RCP	599	0.19	9
LVB	013	E	107V-2358	24" RCP	599	0.19	9
LVB	014	E	107V-2358	12" RCP	61	0.19	1
LVB	020	E	HWY BK # 12-A	24" RCP	1243		23
LVB	040	E	HWY BK # S-3	12" ACP	371		17
LVB	050	E	Hwy Bk # M-2	24" CMP	3675		23
LVB	060	E	327-7	15" RCP	379		4
LVB	080	E	HWY BK # L-3, L-5	10" VCP	600		2
LVB	100	E	NSHD # 11/Hwy Bk # L-5	24" RCP	2750		23
LVB	110	E	107-V1942	18" RCP	713		11
OKY	000	E	107V-957	31" X 50" RCP	120		60
OKY	010	E	107V-957	31" X 50" RCP	120		80
OKY	020	E	327-V120	Unlined Chnl 3'D 9'W	375		389
OKY	021	E	327-V120	2: 12" x 24" CMP	70		32
SAH	000	E	HWY BK # S-1	60" RCP	3910		221
SAH	002	E	HWY BK # S-1	66" RCP	695		336
SAH	003	E	HWY BK # S-1	83" X 53" RCP	295		336

F-16

LOCAL FACILITIES (continued)

ID	MILE	Status	Plan No.	Facility Description	Facility Length L (ft)	Channel Slope S (%)	Flow (cfs)
SAH	004	E	HWY BK # S-1	51" RCP	885		174
SAH	005	E	HWY BK # S-1	68" x 43" RCP	275		187
SAH	011	E	HWY BK # S-1	48" RCP	692		296
SAH	012	E	HWY BK # S-1	54" RCP	853		224
SAH	013	E	HWY BK # 67	24" RCP	1050		23
SAH	020	E	HWY BK # S-2	42" RCP	2506		75
SAH	030	E	HWY BK # S-2	36" RCP	812		67

F-17

REGIONAL FACILITIES

BOULDER HIGHWAY - EASTERN DRAIN							
BHEA	0000	P1	2003 CNFCMP	10' X 8' RCB	1320	0.20	563
BOULDER HIGHWAY - SAHARA							
BHSA	0000	E	HWY BK # S-1	72" RCP	768	0.79	5194
BHSA	0000	P1	2004 CNFCMP	2: 12' X 12' RCB	1350	0.79	5194
BHSA	0026	P1	2004 CNFCMP	2: 12' X 10' RCB	4000	1.30	5194
BHSA	0075	P1	2004 CNFCMP	2: 12' X 8' RCB	5280	2.11	5194
FLAMINGO - BOULDER HIGHWAY NORTH							
FLBN	0000	E	2002 Master Plan Update	Conc Chnl 5'W 6'D 2:1 SS	2200	0.70	5455
FLBN	0000	P1	2004 CNFCMP	3: 11' X 10' RCB	2200	0.70	5455
FLBN	0038	E	2002 Master Plan Update	Channel - Unknown Characteristics	6600	0.59	2284
FLBN	0038	P1	2004 CNFCMP	3: 9' X 7' RCB	6600	0.59	2284
FLAMINGO - BOULDER HIGHWAY SOUTH							
FLBS	0167	E	2002 Master Plan Update	Unlined Median Chnl 0'W 3.5'D 9:1 SS	8850	0.90	959
FLAMINGO WASH							
FLWA	0175	E	2002 Master Plan Update	Earth Chnl 50'W 12'D 1:1 SS	2400	0.70	10082
FLWA	0175	P1	2002 Master Plan Update	Conc Chnl 50'W 9'D 1:1 SS	2400	0.70	10082
FLWA	0226	E	2002 Master Plan Update	Free Span Bridge 100'W 10.0'D @ I-515	170	0.80	10082
FLWA	0228	E	2002 Master Plan Update	Earth Chnl 50'W 12'D 1:1 SS	1500	0.80	10082
FLWA	0228	P1	2002 Master Plan Update	Conc Chnl 50'W 9'D 1:1 SS	1500	0.80	10082
FLWA	0255	E	2002 Master Plan Update	2 Span Bridge 150'W 9'D @ Boulder Hwy	65	1.00	7469
FLWA	0256	E	2002 Master Plan Update	Conc Chnl 60'W 7.5'D 0:1 SS	40	1.00	7469
FLWA	0257	E	2002 Master Plan Update	2 Span Bridge 150'W 9'D @ Boulder Hwy	60	1.00	7469
FLWA	0258	E	2002 Master Plan Update	Conc Chnl 60'W 7.5'D 0:1 SS	750	0.44	7469
FLWA	0273	E	2002 Master Plan Update	Free Span Bridge 60'W 9.0'D @ Trailer Park	10	0.40	7469
FLWA	0274	E	2002 Master Plan Update	Conc Chnl 60'W 8.1'D 0:1 SS	1370	1.00	7469
COLORADO AVENUE SYSTEM							
LVCO	0109	E	2002 Master Plan Update	10' X 5' RCB	2500	0.25	394

LOCAL FACILITIES

BHY	000	E	HWY BK #B-2	24" RCP	150		30
BHY	010	E	HWY BK #B-2	24" RCP	150		30
BHY	020	E	HWY BK #B-2	24" RCP	150		30
BHY	030	E	HWY BK #B-2	24" RCP	150		30
BHY	040	E	HWY BK #B-2	24" RCP	150		30
BHY	050	E	107-V594	66" RCP	500		237
BHY	060	E	HWY BK #B-2	24" RCP	120		30
BHY	070	E	327-86	66" RCP	520		260
BHY	080	E	100-51-D1	30" RCP	155		29
BHY	090	E	100-51-D5	24" RCP	600		16
BHY	100	E	100-51-D5	18" RCP	300		7
BHY	110	E	327-86	66" RCP	700		237
CHN	070	E	107-V1632	12" PVC	678		2
ETN	000	E	327-V67	48" RCP	600		542
ETN	010	E	327-V67	42" RCP	748		450
ETN	020	E	327-V67	30" RCP	60		225
ETN	030	E	107-V835A	18" RCP	1529		6
ETN	040	E	327-73	12" VCP	555		3
ETN	050	E	327-73	15" RCP	293		7
ETN	060	E	327-73	18" RCP	518		11
ETN	090	E	107-V835A	24" RCP	628		16
SAH	007	E	HWY BK # S-1	66" RCP	3262		425
SAH	008	E	HWY BK # S-1	60" RCP	1888		300
SAH	009	E	HWY BK # S-1	51" RCP	1447		250
SAH	010	E	HWY BK # S-1	48" RCP	696		265
SAH	011	E	HWY BK # S-1	48" RCP	692		296
SAH	012	E	HWY BK # S-1	54" RCP	853		224

D.1.2

City of Las Vegas Central Neighborhood Flood Control Master Plan – Model

```
*DIAGRAM
*FREE
IDCLV CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN 2003
IDCENTRAL BASIN (SOUTHWEST, SOUTHEAST, NORTHEAST AREAS)
IDFUTURE CONDITION - FUTURE LAND USE, PROPOSED MASTER PLAN FACILITIES
ID                   EXISTING AND FUTURE LOCAL FACILITIES
IDINPUT FILE = FSW310.DAT
IDINPUT FILE DATE = OCTOBER, 2003
IDDESIGN STORM = 10-YEAR 6-HR STORM
IDSTORM DISTRIBUTION = SDN #3
IDMODELED BY PBS&J (STEPHEN C. ALTMAN P.E. AND GHAITH HAMADE, PhD.)
ID      STORM CENTERING - FULL WATERSHED
ID      COMPOSITE CURVE NUMBER RUN
ID      2002 MPU SUBBASINS USED FOR OFFSITE AREAS EXCEPT WHERE SPECIFIED
IDREFERENCED HYDROLOGIC MODELS:
IDCITY OF LAS VEGAS CITY WIDE HYDROLOGY ANALYSIS (PBS&J 1997)
IDPREDESIGN REPORT FOR I-15 FREEWAY CHANNEL (PARSONS BRINCKERHOFF 1999)
IDFINAL CENTRAL BASIN ASSESMENT (CARTER-BURGESS 1998)
IDHYDRAULIC DESIGN REPORT FOR I-15 WIDENING (LOUIS BERGER 1999)
IDCCRFCD 2002 LAS VEGAS VALLEY MASTER PLAN UPDATE (PBS&J, GCW, LBG)
ID
IDJR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
ID
ID      CONCENTRATION   AREA    DARF
ID      POINT           SQ. MI.
ID                      0-0.5      0.564
ID                      0.5-1      0.556
ID                      1-2        0.542
ID                      2-3        0.527
ID                      3-4        0.522
ID                      4-5        0.518
ID                      5-6        0.515
ID                      6-7         0.51
ID                      7-8        0.504
ID
IDJR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
ID
ID10-YEAR,  6-HOUR STORM,  SDN3
ID
IT5            0       0     300
IO5            0       0
IN5            0       0
JRPREC     0.564   0.556   0.542   0.527   0.522   0.518   0.515    0.51   0.504
*
KKCH59-4
BA0.029
PB2.77
PC0.000    0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
PC0.130    0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
PC0.190    0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
PC0.251    0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
PC0.499    0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
PC0.860    0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
PC0.982    0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
PC0.997    0.999   1.000
LS0         94.4
UD 0.217
*
KKRCH59-4
KMROUTE CH59-4 TO CCH59-5
KMBRIDGER
RD760     0.0079   0.016       0   TRAP        0      50
*
KKCH59-5
BA0.039
PB2.77
LS0         94.1
UD 0.227
*
KKCCH59-5
KMCOMBINE CH59-5 AND RCH59-4
KMFOURTH AND BRIDGER
HC2
*
KKCH59-6
BA0.029
PB2.77
LS0         94.0
UD 0.217
*
KKCCH59-6
KMCOMBINE CCH59-5 AND CH59-6
KMLAS VEGAS BOULEVARD AND BRIDGER
HC2
*
KKCH59-7
BA0.015
PB2.77
LS0         94.6
UD 0.143
*
KKRCH59-7
KMROUTE CH59-4 TO CCH59-5
KMBRIDGER
RD760     0.0079   0.016       0   TRAP        0      50
```

NOTE:

All subbasins used in the 10-year and the 100-year models have been referenced from this Central Neighborhood model.

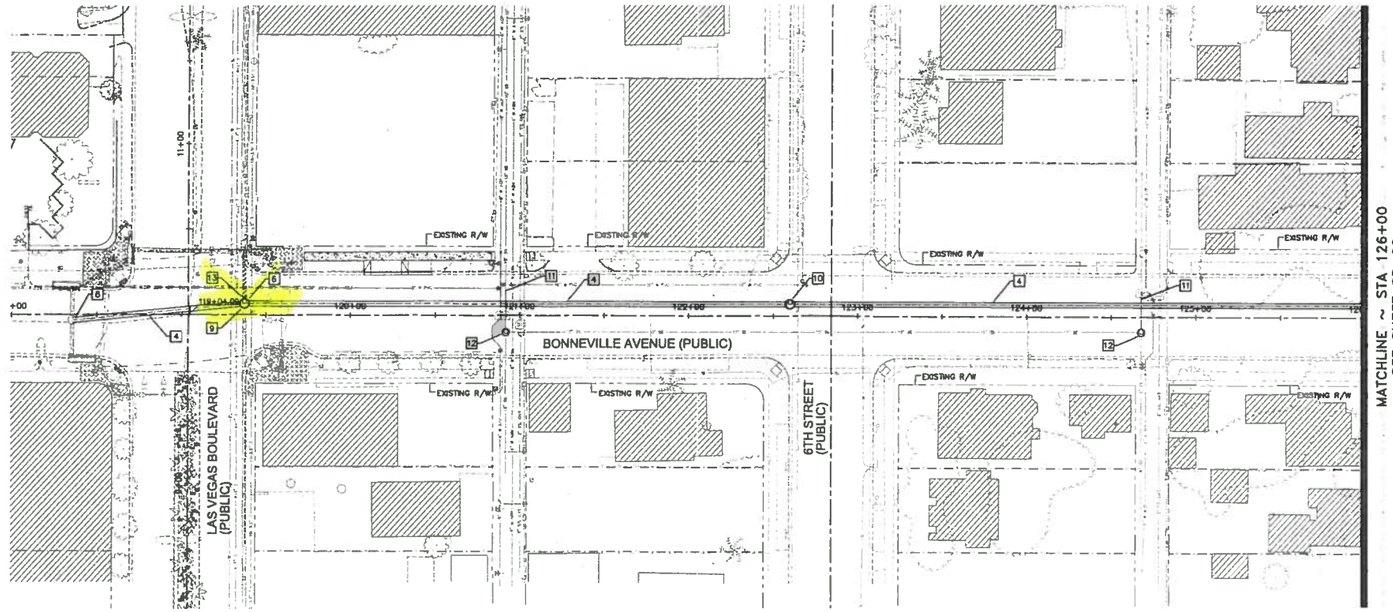
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*
KKCH59-8
BA0.020
PB2.77
LS0         94.3
UD 0.152
*
KKCCH59-8
KMCOMBINE CH59-8 AND RCH59-7
KMFOURTH AND CARSON
HC2
*
KKRCCH59-8
KMROUTE CCH59-8 TO CCH59-9
KMCARSON
RD600       0.01   0.016       0   TRAP        0      50
*
KKCH59-9
BA0.015
PB2.77
LS0         94.0
UD 0.130
*
KKCCH59-9
KMCOMBINE CH59-9, CCH59-6, AND RCCH59-8
KMNEAR LV BOULEVARD AND CARSON
HC3
*
KKDCH59
KMFLOW SPLIT TO CH60A
KMSPLIT TO FLAMINGO WASH SYSTEM
KMDEVELOPED FROM CWH MODEL
KMCAPACITY = 144 CFS
DTDCARSON
DI0          144    1000
DQ0            0     856
*
KKRCCH59-9
KMROUTE DCH59 TO CCH58 IN LV BLVD DRAIN
KMLINING = RCP
RD1400     0.002   0.013       0   CIRC        4
*
KKCH58-1
BA0.024
PB2.77
LS0         94.1
UD 0.202
*
KKRCH58-1
KMROUTE CH59-4 TO CCH59-5
KMSTEWART
RD760      0.009   0.016       0   TRAP        0      50
*
KKCH58-2
BA0.032
PB2.77
LS0         94.2
UD 0.213
*
KKCCH58-2
KMCOMBINE CH58-2 AND RCH58-1
KMFOURTH AND STEWART
HC2
*
KKRCCH58-2
KMROUTE CCH58-2 TO CCH59-3
KMSTEWART
RD630      0.011   0.016       0   TRAP        0      50
*
KKCH58-3
BA0.026
PB2.77
LS0         94.1
UD 0.208
*
KKCCH58-3
KMCOMBINE CH58-3, RCCH59-3, AND RCCH58-2
KMNEAR LV BOULEVARD AND STEWART
HC3
*
KKRCCH58-3
KMROUTE DDCH58 TO CW
KMLINING = RCP
RD700      0.002   0.013       0   CIRC        4
*
KKCH58-4
BA0.046
PB2.77
LS0         91.9
UD 0.244
*
KKCCH58-4
KMCOMBINE CH58-4 AND RCCH58-3
KMNEAR LV BOULEVARD AND STEWART
HC2
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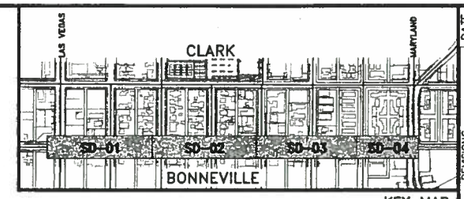
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*
KKDCCH58
KMFLOW SPLIT TO BN00
KMDIVERT Q EXCEEDING LAS VEGAS BLVD DRAIN CAPACITY:  48" PIPE, 167 CFS
KMDBN00 IN CWH
DTDBN00
DI0          167    1000
DQ0            0     833
*
KKCH51
BA0.237
PB2.77
LS0         91.3
UD 0.467
*
KKRCH51
KMROUTE CH51 TO CCH52
KMFACILITY = FLAMINGO - BOULDER NORTH
KMFACILITY # = FLBN 0242
KMLINING = RCB
RD2300    0.0042   0.015       0   TRAP       10       0
*
KKCH52
BA0.102
PB2.77
LS0         92.8
UD 0.325
*
KKCCH52
KMCOMBINE CH52 AND RCH51
KMCHARLESTON AND MAIN
HC2
*
KKRCCH52
KMROUTE CCH52 TO CCH53
KMFACILITY = FLAMINGO - BOULDER NORTH
KMFACILITY # = FLBN 0242
KMLINING = RCB
RD2000    0.0042   0.015       0   TRAP       10       0
*
KKCH53
BA0.120
PB2.77
LS0         94.1
UD 0.378
*
KKCCH53
KMCOMBINE CH53 AND RCCH52
KMCHARLESTON AND LAS VEGAS BLVD
HC2
*
KKRCCH53
KMROUTE CCH53 TO CCH54-3
KMFACILITY = FLAMINGO - BOULDER NORTH
KMFACILITY # = FLBN 0281
KMLINING = RCB
RD2000    0.0133   0.015       0   TRAP       14       0
*
KKCH54-2
BA0.035
PB2.77
LS0         94.0
UD 0.201
*
KKRCH54-2
KMROUTE CH54-2 TO CCH54-3
KMGASS
RD550    0.00545   0.016       0   TRAP        0      50
*
KKCH54-3
BA0.019
PB2.77
LS0         94.1
UD 0.180
*
KKCCH54-3
KMCOMBINE CH54-3 AND RCH54-2
KMCHARLESTON AND GASS
HC2
*
KKRCCH54-3
KMROUTE CH54-3 TO CCH54-3
KMGASS
RD1550     0.011   0.016       0   TRAP        0      50
*
KKCCCH54-3
KMCOMBINE RCCH54-3 AND RCCH53
KMCHARLESTON AND GASS
HC2
*
KKRCCH54-3
KMROUTE CCH54-3 TO CCH56
KMFACILITY = FLAMINGO - BOULDER NORTH
KMFACILITY # = FLBN 0281
KMLINING = RCB
```

```
RD1150    0.0133   0.015       0   TRAP       14       0
*
KKCH54-1
BA0.034
PB2.77
LS0         93.9
UD 0.214
*
KKRCH54-1
KMROUTE CH54-1 TO CCH54-2
KMCIVIC CENTER
RD980      0.002   0.013       0   CIRC        3
*
KKCH59-1
BA0.020
PB2.77
LS0         94.0
UD 0.190
*
KKCCH59-1
KMCOMBINE CH59-1 AND RCCH54-1
KMCIVIC CENTER AND BONNEVILLE
HC2
*
KKRCCH59-1
KMROUTE CCH59-1 TO CCH59-2
KMBONNEVILLE
RD760     0.0093   0.013       0   CIRC      2.5
*
KKCH59-2
BA0.026
PB2.77
LS0         94.0
UD 0.196
*
KKCCH59-2
KMCOMBINE CH59-2 AND RCCH59-1
KMFOURTH AND BONNEVILLE
HC2
*
KKRCCH59-2
KMROUTE CCH59-2 TO CCH59-3
KMBONNEVILLE
RD400      0.013   0.013       0   CIRC        3
*
KKCH59-3
BA0.019
PB2.77
LS0         93.1
UD 0.171
*
KKCCH59-3
KMCOMBINE CH59-3 AND CCH59-2
KMLAS VEGAS BOULEVARD AND BONNEVILLE
HC2
*
ZZ
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D.1.3

Bonneville 36-inch Storm Drain Plans





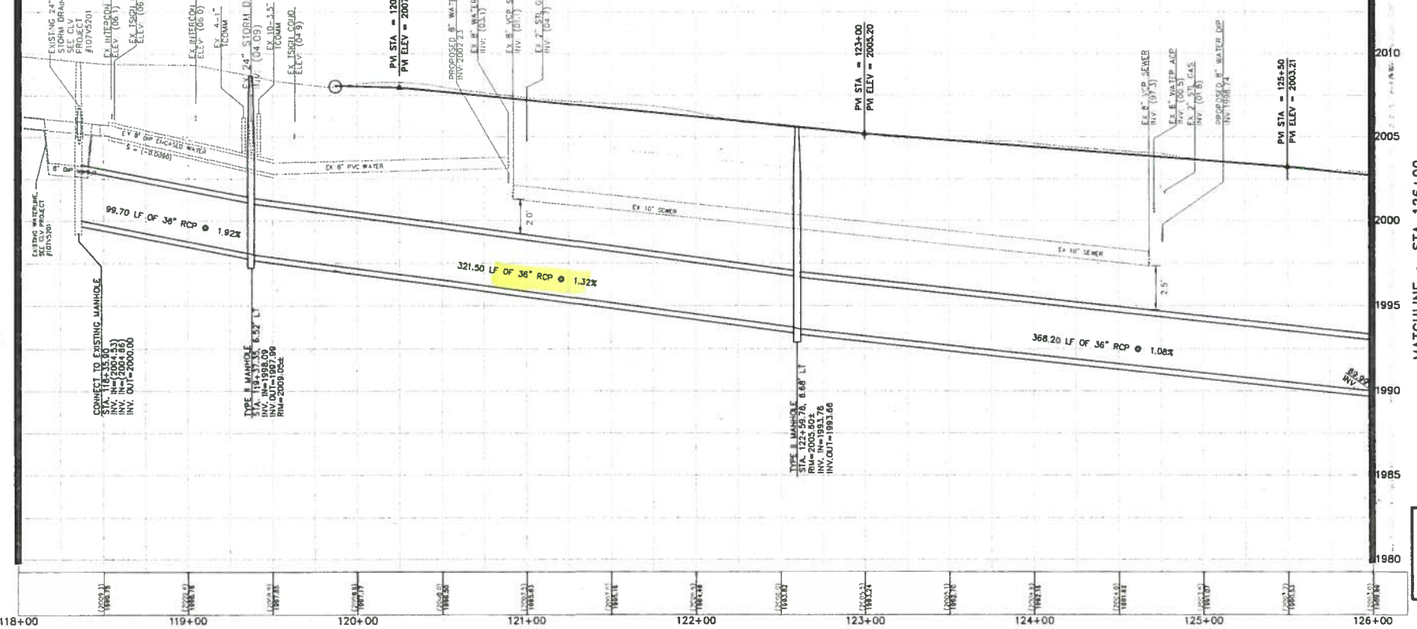
KEY MAP
NTS

STORM DRAIN NOTES

1. INSTALL 10.0' TYPE "CM2" DROP INLET PER CCAUSD No. 412A
2. INSTALL 20.0' TYPE "CM2" DROP INLET PER CCAUSD No. 412A
3. INSTALL 18" RCP STORM DRAIN PIPE
4. INSTALL 36" RCP STORM DRAIN PIPE
5. INSTALL 42" RCP STORM DRAIN PIPE
6. INSTALL 48" TYPE II STORM DRAIN MANHOLE PER CCAUSD No. 405
7. INSTALL 72" TYPE II STORM DRAIN MANHOLE PER CCAUSD No. 405, INSTALL WITH 30" SLOTTED MANHOLE COVER BOLTED DOWN WITH LARGER CONCRETE COLLAR, SEE DETAIL SHEET DT-01.
8. CONNECT STORM DRAIN TO EXISTING MANHOLE
9. CONNECT EXISTING STORM DRAIN TO NEW MANHOLE
10. INSTALL 60" TYPE II STORM DRAIN MANHOLE PER CCAUSD No. 405
11. SEE UT SHEETS FOR SEWER PIPE REPLACEMENTS
12. SEE UT SHEETS FOR SEWER MANHOLE REPLACEMENTS
13. CUT AND CAP EXISTING 24" STORM DRAIN FOR NEW MAN HOLE INSTALLATION. SLURRY AND BACKFILL EXISTING PIPE FROM CAP TO EXISTING DRAINAGE INLET ON NORTHEAST CORNER OF THE INTERSECTION. PROTECT EXISTING INLET IN PLACE.
14. INSTALL 24" RCP STORM DRAIN PIPE

SUE INFORMATION

No.	TYPE	MATERIAL	SIZE	DEPTH
11	WATER	ACP	8"	3.69'
12	SEWER	CAST IRON	8"	5.55'
13	SEWER	CONCRETE	8"	5.68'
14	WATER	ACP	6"	3.09'
51	GAS	STEEL	2"	2.30'
52	GAS	STEEL	2"	2.01'



CROWN LINE PROFILE

GENERAL NOTES

1. ALL STATIONS AND OFFSETS ARE BASED ON CONTROL LINE.
2. ELEVATIONS, OFFSETS AND GRADES ARE AT BACK OF CURB UNLESS OTHERWISE NOTED.
3. SEE HC SHEETS FOR CENTER LINE INFORMATION, BENCHMARK, AND BASIS OF BEARING.
4. ALL EXISTING UTILITY LOCATIONS SHOWN HEREIN ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.
5. CONTRACTOR TO FIELD VERIFY EXISTING SANITARY SEWER AND STORM DRAIN INVERT ELEVATIONS PRIOR TO CONSTRUCTION AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES.
6. ALL MANHOLES, VALVES, VAULTS, ETC. LOCATED WITHIN THE LIMITS OF CONSTRUCTION SHALL BE ADJUSTED TO FINISHED GRADE.

BASIS OF BEARING

THE BASIS OF BEARINGS FOR THIS SURVEY IS GRID NORTH AS DEFINED BY THE NORTH AMERICAN DATUM OF 1983 (NAD 83), NEVADA STATE PLANE EAST (2701) ZONE. SAID BEARINGS WERE DETERMINED BY STATIC GLOBAL POSITIONING SYSTEM (GPS) MEASUREMENTS PROCESSED BY THE NATIONAL GEODETIC SURVEY DIVISION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION USING THE ON-LINE POSITIONING USER SERVICE (OPUS). THE REFERENCE FRAME USED WAS NAD83 (CORS96) WITH AN EPOCH OF 2002.0000. ALL DISTANCES SHOWN HEREON ARE GROUND VALUES.

BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT "6C01 34SW6", BEING A RIVET & PLATE IN TOP OF CURB ON THE EAST SIDE OF MAIN BETWEEN BONNEVILLE & GARCES @ LIGHT POLE.

ELEVATION: 2027.08 (FEET)
617.6544 (METERS)

CITY OF LAS VEGAS VERTICAL CONTROL DATED 06/2002 BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER

DATE 9-26-12 PROJECT No. 110654 ESH 018

GRAPHIC SCALE

20 0 10 20 40

(IN FEET)

CALL SOUTHWEST GAS at 365-2296 for Standby when excavating over or near HIGH PRESSURE GAS LINES

811 know what's below Call before you dig-702-227-2929

SAFETY ALERT Call Before You Overhead

Call before you UnderGround 1-702-492-5300

DATE

REVISIONS

SCALE (H):
DRAWN BY:
SCALE (V):
DESIGNED BY:
DATE:
CHECKED BY:

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Kimley-Horn and Associates, Inc.
Engineering, Planning, and Environmental Consultants
2060 E. Flamingo Road, Suite 210, Las Vegas, NV 89119
PH. (702) 734-5666
FAX (702) 735-4849

CITY OF LAS VEGAS NEVADA

DEPARTMENT OF PUBLIC WORKS

PROJECT: BONNEVILLE/CLARK ONEWAY COUPLET PHASE II IMPROVEMENT PLANS

SHEET: STORM DRAIN IMPROVEMENT PLAN

ENGINEER-STAMP
PROFESSIONAL ENGINEER
PETER N. MEYERHOFER
Exp: 12/31/13
CIVIL
State of Nevada No. 18093
9/26/12

SHEET NO. SD-01
SHEET 30 OF 47
DRAWING NO. 107V5541

DT-STP-00031(160)

Sep 13, 2012 - 4:22pm - USER Michael.Medley
K:\LAV_Public\Trans\092756\021 Bonneville-Clark Phase II\CAD\256021SD.dwg

D.2

ASSESSOR'S PARCEL INFORMATION

NOTES

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USE THIS SCALE(FEET) WHEN MAP REDUCED FROM 11X17 ORIGINAL

0 100 200 400 600 800

MAP LEGEND

PARCEL BOUNDARY
SUB BOUNDARY
PM/LD BOUNDARY
ROAD EASEMENT
MATCH / LEADER LINE
HISTORIC LOT LINE
HISTORIC SUB BOUNDARY
HISTORIC PM/LD BOUNDARY
SECTION LINE

CONDOMINIUM UNIT
AIR SPACE PCL
RIGHT OF WAY PCL
SUB-SURFACE PCL

001 ROAD PARCEL NUMBER
001 PARCEL NUMER
1.00 ACREAGE
202 PARCEL SUB/SEQ NUMBER
PB 24-45 PLAT RECORDING NUMBER
5 BLOCK NUMBER
5 LOT NUMBER
GL5 GOV. LOT NUMBER

ASSESSOR'S PARCELS - CLARK CO., NV.
Michele W. Shafe - Assessor

BOOK T20S R61E

138	139	140
163	162	161

SEC. 34

6	5	4	3	2	1
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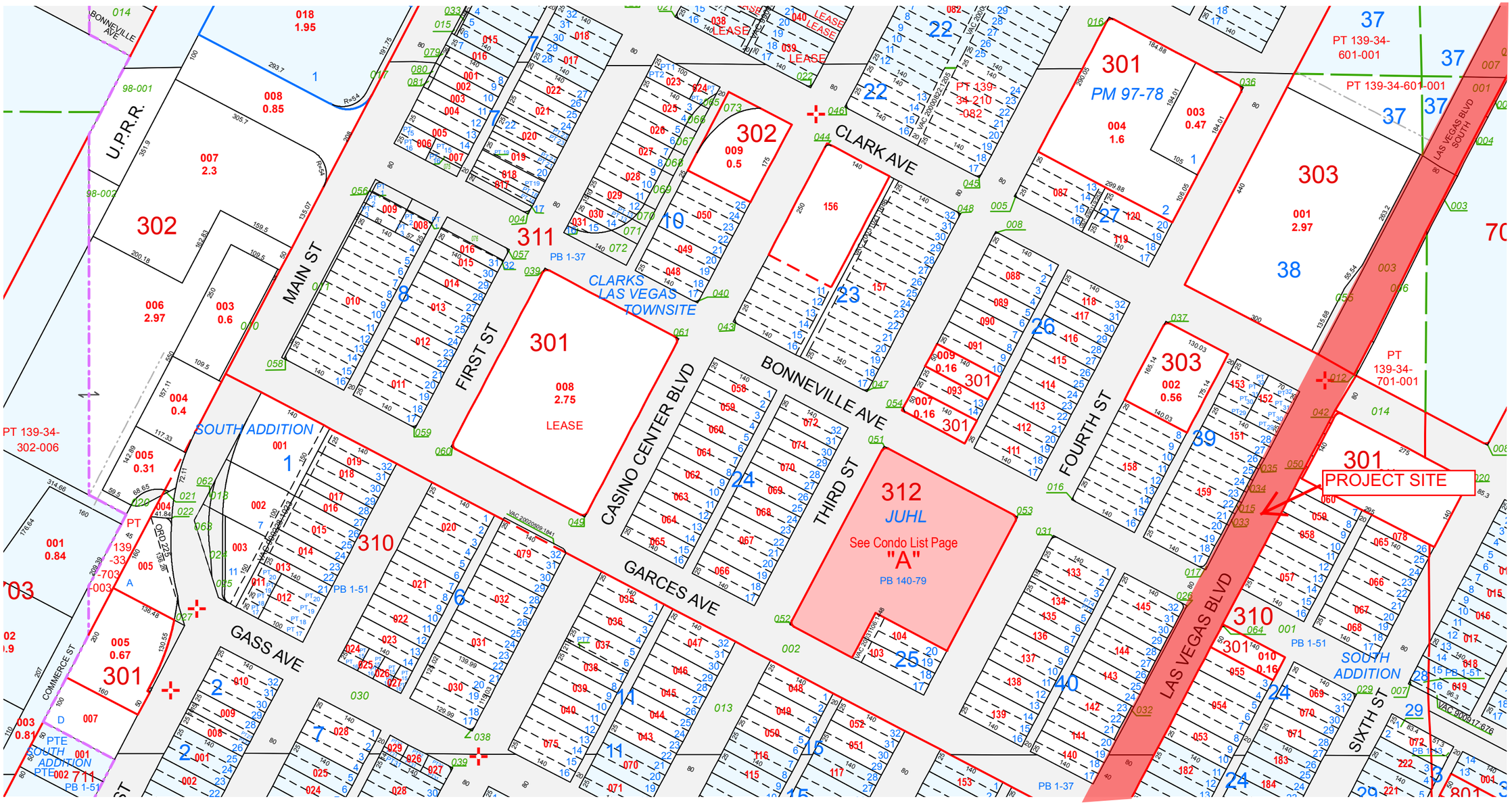
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139-34-3

CLARK COUNTY ASSESSOR MAPPING DIVISION NEVADA

Scale: 1" = 200' Rev: 5/8/2014



TAX DIST 203

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Michele W. Shafe - Assessor

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BOOK T20S R61E

SEC. 34

MAP S 2 SW 4

139-34-4

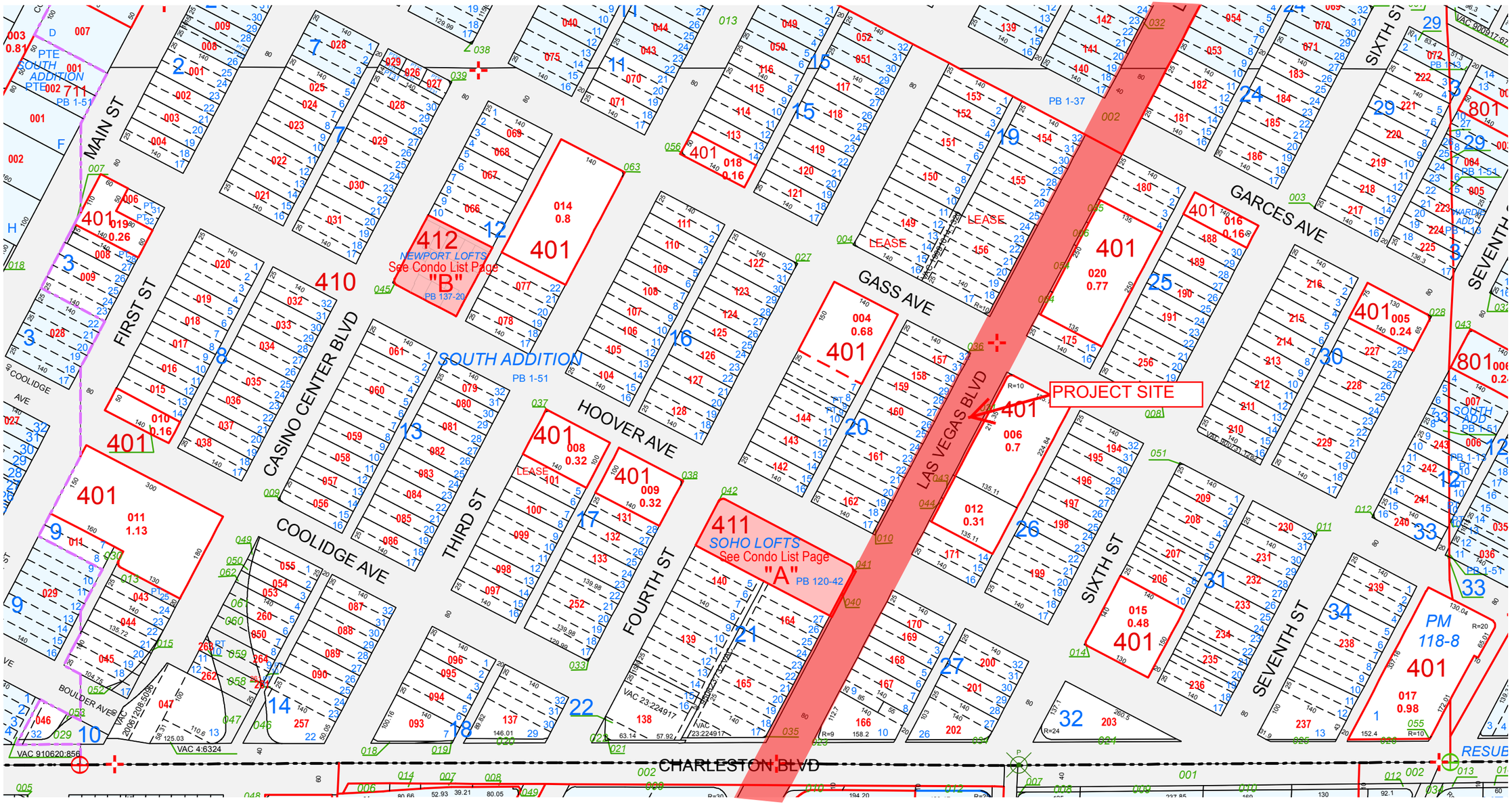
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Scale: 1" = 200'

Rev: 1/22/2015



TAX DIST 203

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ASSESSOR'S PARCELS - CLARK CO., NV.
Michele W. Shafe - Assessor

BOOK	SEC.	MAP
T20S R61E	34	S 2 NE 4

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163	162	161

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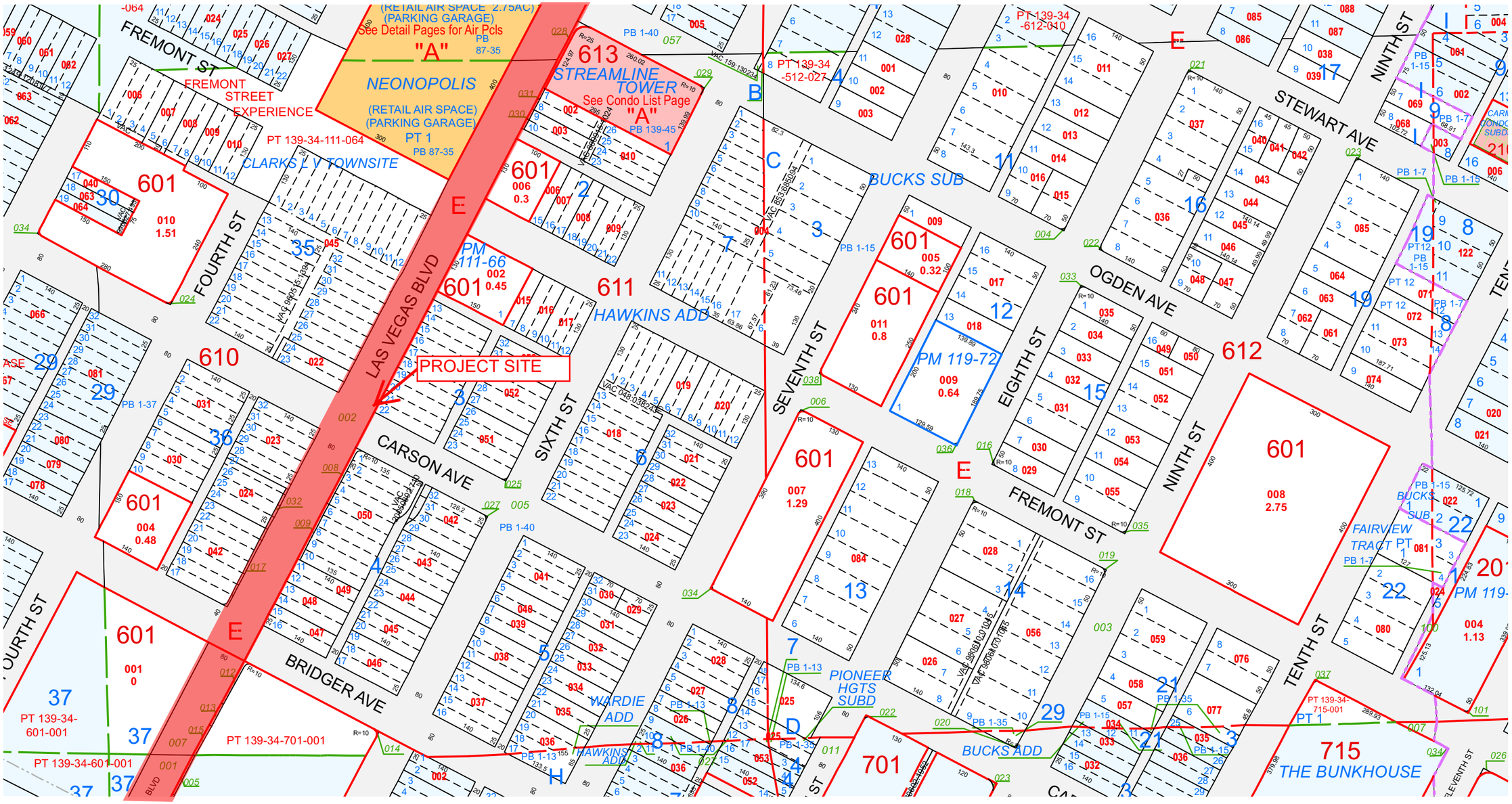
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139-34-6

CLARK COUNTY ASSESSOR MAPPING DIVISION NEVADA

Scale: 1" = 200'

Rev: 9/9/2015



TAX DIST 203

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Michele W. Shafe - Assessor

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BOOK T21S R61E

SEC. 3

MAP N 2 NW 4

162-03-1

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Scale: 1" = 200'

Rev: 7/7/2015

CLARK COUNTY ASSESSOR MAPPING DIVISION NEVADA

CHARLESTON BLVD

VAC 910620:856

BOULDER ADDITION

AQUARIUS PLAZA

LAS VEGAS/ CHARLESTON

PM 85-41

PM 120-41

BECKLEY SUBD

PARK PLACE ADDITION

AMENDED LOT J PARK PLACE ADDITION

PARK PLACE ADDITION REPLAT

PARADISE GROVE

DESERT PARK

PROJECT SITE

LAS VEGAS BLVD SOUTH

COMMERCE ST

MAIN ST

CASINO CENTER BLVD

THIRD ST

FOURTH ST

FIFTH PL

SIXTH ST

CALIFORNIA ST

COLORADO ST

PARK PASEO

TAX DIST 200,203

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BOOK T21S R61E

138	139	140
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MAP S 2 NW 4

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162-03-2

CLARK COUNTY ASSESSOR MAPPING DIVISION NEVADA

Scale: 1" = 200' Rev: 1/7/2013

PROJECT SITE

PARADISE GROVE

DESERT PARK NO 2

DESERT PARK NO 3

BOULDER ADDITION

PM 6-45

PB 1-52 PB 3-92 PB 4-55 PB 3-59 PB 3-4 PB 4-18 PB 3-19

IMPERIAL ST UTAH AVE WYOMING AVE OAKEY BLVD SWEENEY AVE BRACKEN AVE GRIFFITH AVE REXFORD DR

COMMERCE ST MAIN ST CASINO CENTER BLVD THIRD STREET HOUSSELS AVE REXFORD PL FIFTH PL SIXTH ST

LAS VEGAS BLVD SOUTH

VAC 2007:1226:394 VAC 880307:514 VAC 880503:458 VAC 2007:1226:395 VAC 2113:2072224

TAX DIST 200,203

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BOOK T21S R61E

SEC. 3

MAP N 2 SW 4

162-03-3

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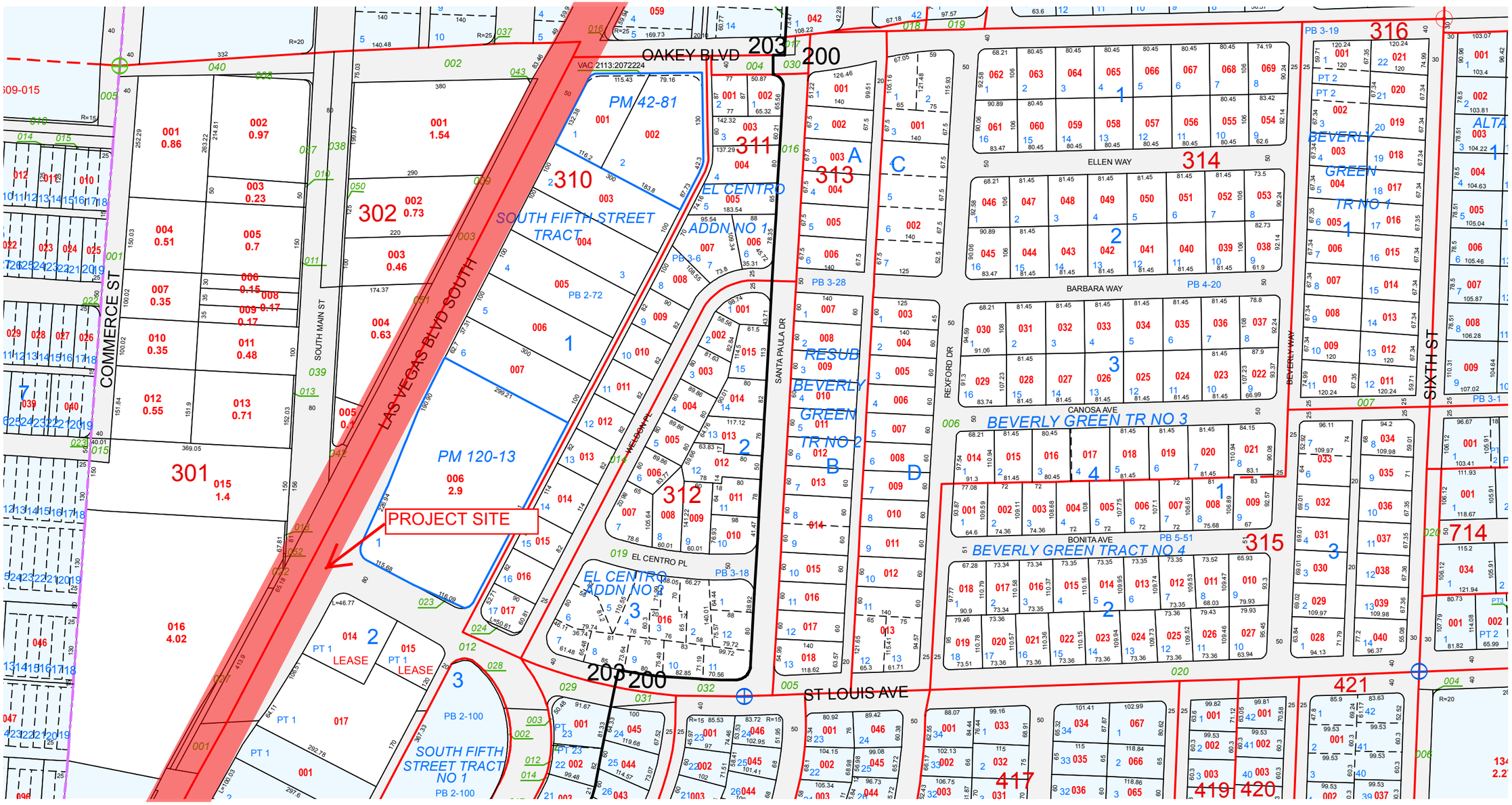
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Scale: 1" = 200'

Rev: 2/12/2015

CLARK COUNTY ASSESSOR MAPPING DIVISION NEVADA



TAX DIST 200,203

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BOOK T21S R61E

138	139	140
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SEC. 3

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MAP S 2 SW 4

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162-03-4

Scale: 1" = 200' Rev: 2/11/2015

CLARK COUNTY ASSESSOR MAPPING DIVISION NEVADA

ST LOUIS AVE
SOUTH FIFTH STREET TRACT
SOUTH FIFTH STREET TRACT NO 1
PARADISE VILLAGE
PARADISE VILLAGE TRACT NO 2
PARADISE VILLAGE TRACT 3
PARADISE VILLAGE TRACT 4
PARADISE RD
SANTA CLARA DR
SANTA PAULA DR
SANTA RITA DR
SANTA ROSA DR
SAN PEDOR DR
SAN PABLO DR
SANTA YNEZ DR
VAN PATTEN PL
BEVERLY WAY
SIXTH ST
LAS VEGAS BLVD SOUTH
SAHARA AT LAS VEGAS BLVD
SAHARA AVE
PARADISE PARK PB 3-89
AMENDED PARADISE PARK PB 6-93
PARADISE PLAZA PB 4-47
VAN PATTEN TRACT PB 3-68
PATTEN TRACT PB 4-17
SHERWOOD PK TR NO 3 PB 5-89
SHERWOOD PARK TRACT 2 PB 5-77
SHERWOOD PARK PB 5-59
BONITA TERRACE PB 27-93
See Condo List Page
PROJECT SITE
VAC 334602
VAC 282:228332
VAC 236:191342
VAC 891018:546

TAX DIST 212,200,203

D.3

CORRESPONDENCE/COMMENT MATRIX

Reviewer: Peter Jackson, CLV Date: October 6, 2015

Documents: 30% Drainage Design Report

Section	Comment	Response
	30% DRAINAGE DESIGN REPORT	
1.	Flood Control concurs that the storm drain system be designed to meet the dry-lane criteria in the ultimate condition, under the assumption that the future RFCD facilities are in place in Charleston Boulevard and that the facility in Las Vegas Boulevard, north of Stewart is upgraded in the future to meet the design criteria.	Acknowledged.
2.	Provide the minimum 10-foot horizontal separation between the existing sewer and the proposed new storm drain.	Minimum 10-ft horizontal separation has been provided where possible and where not possible water quality pipe will be used.
3.	Relocated the new storm drain away from the new curb line and amenity zone, the roadway corridor appears clear enough to accommodate proper separation.	New storm drain has been relocated.
4.	The system proposes to connect a larger 72-inch storm drain into the existing 48-inch storm drain at the Stewart Avenue intersection. Flood Control recommends that Drainage Report discuss in detail the system impacts as part of the 70% submittal. Provide calculations to verify the size of the bubbler inlets and bubbler laterals at the Stewart intersection needed to bubble out the flows in excess of the 48-inch storm drain capacity. Provide 30-inch slotted bolt down manhole lids for the storm drain where the HGL of the bubbler impacts upstream manholes. Provide special manhole details as necessary.	Detailed bubbler design has been provided.
5.	The proposed system south of Charleston needs to be sized to meet the dry-lane criteria. In the interim, the system will connect into the existing 42-inch storm drain in Charleston. Provide calculations to verify the size of the bubbler inlets and bubbler laterals at the Charleston intersection needed to bubble out the flows in excess of the 42-inch storm drain capacity. Provide 30-inch slotted bolt down manhole lids for the storm drain where the HGL of the bubbler impacts upstream manholes. Provide special manhole details as necessary.	Storm drain from Sahara to Charleston is no longer proposed with this phase of the project. The Charleston to Sahara storm drain is part of Phase 2 and will be addressed at that time.

Reviewer: Peter Jackson, CLV Date: October 6, 2015

Documents: 30% Drainage Design Report

6.	Include the existing 36-inch Bonneville storm drain into the project. Review the impacts of this local storm drain on the proposed storm drain shown.	The existing 36" Bonneville storm drain has been incorporated into the plans. Our proposed storm drain south of Bonneville will connect into this facility.
7.	As part of the 70% submittal, the Drainage Design Report will need an Updated Exhibit that shows the recommended storm drain system and labels the key concentration points with associated flows. The summary should include collected storm drain flows and the remaining street surface flows within Las Vegas Boulevard.	Figures 5.1 and 5.2 Facility Exhibits have been provided showing concentration points, storm drain interception, and inlet bypass flows.
8.	The Drainage Design Report will need to include a discussion on the utility conflicts along the proposed storm drain alignment and the potential impacts on the project construction. Plans must reflect the existing sewer system, including the residential/commercial lateral facility connections.	Utility conflicts as a result of the storm drain design will be addressed on the utility design sheets. Existing sewer system will be shown on plans and existing lateral information will be shown per as-built plans.
9.	The engineer must review the pipe size and hydraulics to verify system design parameters to keep the HGL a minimum of 12-inches below the finish grade. If the HGL is less than 18-inches below the finish grade, the City will require the installation of slotted and bolt down manholes. Additionally, the manhole concrete collars will need to be extended to prevent collar blow outs.	Storm drain system meets the requirement of being 12-inches or below the finish grade in the ultimate condition. Locations where the HGL is less than 18-inches below the finish grade have slotted and bolt down manholes.
10.	Provide Plan and Profiles of the entire storm drain facility including laterals with the next submittal. Include the pipe system design Q on the storm drain profile sheets. Provide details and sections of the proposed collection system.	Plan and profiles for the entire storm drain facility have been provided. Design flow of Q10 in cfs has been provided on profile sheets.
11.	Provide updated storm drain design plans with the next submittal that include the design data and the complete construction notes. Include the Inlet type, lengths, depth, number of grates, etc.	Updated storm drain design plans have been provided.
12.	Provide detail sheets showing the drop inlet details for the proposed storm drain using the standard CM – DM / 412A inlets. Other inlet designs will be reviewed on a case by case basis.	Drop inlet details will be provided as needed to support drainage design.

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13.	The Engineer should acquire and verify utility pothole information as soon as practical to determine additional constraints on the storm drain system design based upon the proposed design information. Consideration on utility relocations and impacts must be identified.	Pothole information was obtained and incorporated into storm drain design. Existing utility info is shown in profiles based on pot hole data.
14.	Provide Manholes along the storm drain at 400-foot maximum spacing. Adjust spacing to include Manholes near the junction structures, if required for maintenance consideration. Consider using precast Manhole Tees where applicable along the storm drain alignment to reduce costs.	Manholes have been provided at a 400-foot maximum spacing.
15.	Provide the geotechnical analysis with the next submittal. The 70% submittal must address design considerations to mitigate the impacts to the system design based upon the geotechnical analysis.	An additional copy of the Geotechnical report that was provided at the 30% design level will be submitted. The report is referenced in the Special Provisions for the contractors use.
16.	Provide updated inlet calculations based upon system design with the 70% submittal.	Updated inlet calculations have been provided.
17.	The plans need to clearly identify the removal item limits.	Removal item limits are clearly identified on the plans.
18.	Provide the lateral and inlet design information with the next submittal.	Lateral and inlet design information has been provided.
19.	The existing and proposed utility crossings of the storm drain must be shown on the storm drain plan and profiles sheets and on the lateral profiles.	Existing and proposed utility crossings have been added to the storm drain plan and profile.
20.	Provide detail sheets showing typical details needed for the construction, connection and any special transition structure details. Structural details, if required, must be submitted by the 90% submittal.	Typical storm detail sheets have been provided.
21.	Provide preliminary plan and profiles for relocated sewer and/or water lines as necessary with the next submittal. Verify the material type of existing water lines as ACP will require special handling.	Preliminary plan and profiles for relocated sewer and/or water lines as necessary has been provided.

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22.	Provide a minimum 1-foot vertical separation between sewer and storm drain crossings. Separations less than 2-feet will require protection of the sewer line.	Minimum 1-foot vertical separation provided where possible. Sewer lines will be protected where required.
23.	Provide a detailed cost estimate with the next submittal for review. The cost estimate must be refined prior to the 90% submittal and request for construction funding to assure that the requested and allocated storm drain funds are sufficient for construction.	Cost estimate provided.
24.	The Final Design report needs to include an electronic copy of the entire report with the input and output files for the hydraulics and hydrology.	CD provided.
25.	Add a note for all storm drain drop inlets that references the newly adopted USDCCA Drawing No. 421 (Stormwater Quality Management Stamp and Sign Detail).	Note will be added to the storm drain plans.
26.	Review the grading transitions between existing development and the new sidewalk. Show grading limits and retaining wall information as needed.	Grading transitions between existing and new sidewalk have been reviewed. Grading limits are provided. Transitions of sidewalk have been provided where necessary.
27.	Discuss and show any Traffic Signal underground impacts to the proposed storm drain system.	Coordination between existing traffic signal conduit and the proposed storm drain will be addressed on the traffic signal and storm drain plans.

APPENDIX E

IMPROVEMENT PLANS

APPENDIX F

DATA CD