

Main Street Improvements US 95 to Owens Avenue

Final Technical Drainage Study



Prepared for:
Department of Public Works
City of Las Vegas
Las Vegas, Nevada

January 2014

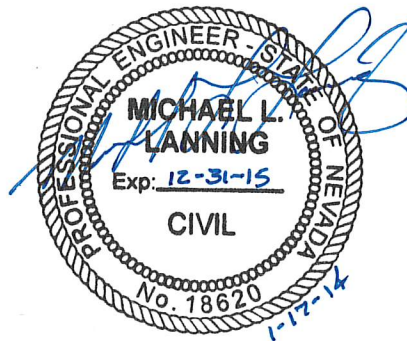
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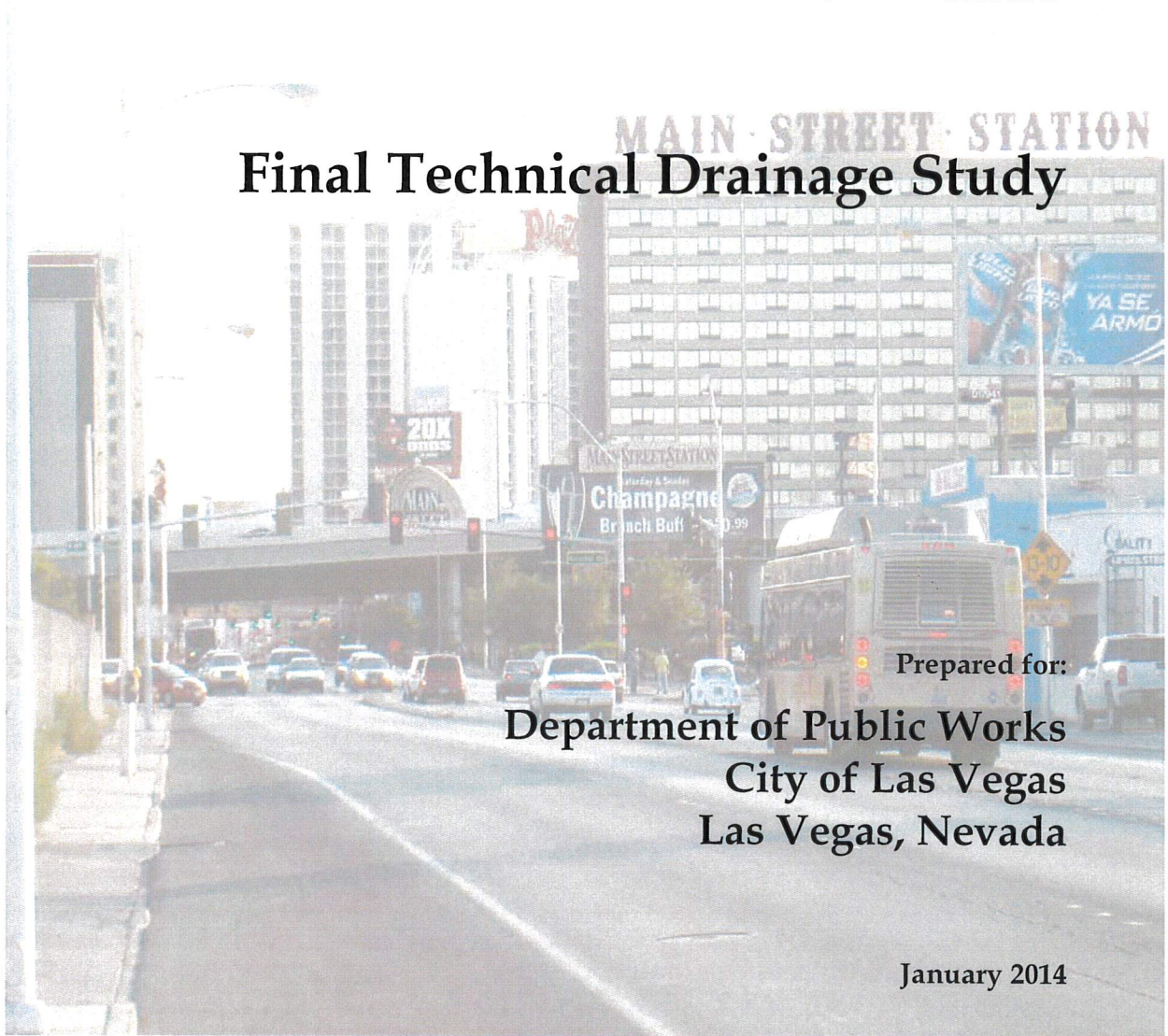


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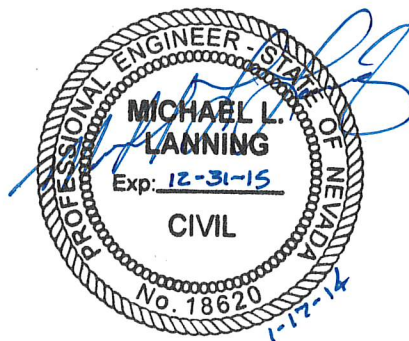
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1.0 INTRODUCTION

1.1 Project Scope and Purpose

Parsons Transportation Group was retained by the City of Las Vegas to perform engineering design services for the reconstruction of Main Street from US 95 to Owens Avenue. The proposed improvements include a one mile long, four lane wide roadway. The roadway is classified as an urban arterial with varied right-of-way from 90-foot to 85-foot. The project includes intersection improvements at Bonanza Road and Washington Avenue, both within NDOT right-of-way, and Owens Avenue, within the City of Las Vegas and the City of North Las Vegas. The primary goal of the project is to improve overall traffic capacity and enhance quality of not just the street, but the entire area.

This report will address the 70% design procedure and criteria used. It will describe the existing drainage conditions; describe the existing, proposed, and future Regional Flood Control facilities; and discuss hydrologic analysis and hydraulic calculation issues for the 70% Main Street improvements. A Final Technical Drainage Report will be submitted to incorporate any corresponding comments and changes to the 70% design and models.

2.0 GENERAL LOCATION AND DESCRIPTION

2.1 Project Location

The project area is located in the City of Las Vegas (CLV), Clark County, Nevada. The specific improvements are limited to North Main Street from US 95 to approximately 500-foot north of Owens Avenue into the North Las Vegas city limits. The project is within Section 27 of Township 20 South and Range 61 East (M.D.B.M.). North Main Street's major intersection improvements include Bonanza Road, Washington Avenue, Foremaster Lane and Owens Avenue. See Appendix A for Vicinity Map Figure 1 and APN Maps.

2.2 Project Description

The proposed roadway improvements will be approximately one mile of full roadway reconstruction and include full drainage improvements from Bonanza Road to Owens Avenue. The project will include the following roadway improvements:

- Widening of Main Street to provide new bus turnouts at three locations, one southbound between US 95 and Bonanza Road on Main Street, the second north of Bonanza Road, and the third southbound on Main Street, south of Washington Avenue.
- Widening of Main Street to provide exclusive right turn lanes onto Washington Avenue.
- Construction of a third southbound lane north of Foremaster Lane, which will connect with the City of North Las Vegas' North 5th Improvement Project. This third northbound lane will require minimal widening of Main Street to provide two southbound lanes and three northbound lanes.

- Construction of a 5-foot sidewalk with a 4-foot amenity zone for landscaping and improved street lighting. Intersection improvements on Bonanza Road, Washington Avenue and Owens Avenue are to incorporate new traffic signals.
- Sewer Improvements to accommodate the new amenity zone and new lighting.

See Appendix D for the 70% submittal of the drainage improvement plans.

2.3 Existing and Proposed Regional Flood Control Facilities

In the project limits, the existing Clark County Regional Flood Control District (CCRFC) facility consists of the Washington Avenue Channel Parallel, (WAPR 0097), a 14-foot x 8-foot RCB. Local inlets south of the Bonanza intersection directly connect to this facility.

The CCRFC has a planned flood control facility identified as LVOE 0236, a 13-foot x 8-foot RCB, which will convey 2,427 cfs. The planned CCRFC facility will connect to the existing Las Vegas Wash facility near North City Parkway and run along Main Street at Bonanza Road. The planned RCB turns east into Owens Avenue and is identified in the CCRFC Master Plan Update as LVOE 134, a 12-foot x 9-foot RCB. See Appendix A for the CCRFC 2008 Las Vegas Valley Flood Control Master Plan Update, Figure 27, Flood Control Facility Map.

A flood control corridor has been provided along Main Street for the planned 13-foot x 8-foot RCB (LVOE 0236). The corridor ranges from 32-foot, between a proposed new 8-inch sewer realignment and an existing 12-inch water line near 121+00 to 124+00, to 58-foot between an existing 16-inch water line and the new northbound gutter line.

This project proposes to design new inlets to maintain the 10-year dry-lane criteria. Since the existing 36-inch RCP will only provide a capacity of 67 cfs, the existing pipe at the north connection point will be surcharged. The 10-year design flows will be allowed to bubble up at Owens Avenue. Overflow of the existing facility will be temporarily conveyed within the street until the future Regional Flood Control facility LVOE 0236 is constructed.

2.4 Floodplain Information

The flood hazard areas within the project limits are delineated on the Federal Emergency Management Agency (FEMA) National Flood Insurance Program, Flood Insurance Rate Map (FIRM), Panels 2170 and 2160, dated September 27, 2002. The Project is located in non-shaded Zone X, which is determined to be outside the 0.2% annual chance flood plain. See Appendix A for FEMA Flood Insurance Rate Maps, Figures 3A and 3B.

2.5 Previous Drainage Studies

- The project area is included in the CLV Central Neighborhood Flood Control Master Plan, March 2005. The proposed street improvements lie within drainage sub-basins H, V1, and V2. See Appendix A for Figure E-4, Existing Drainage Conditions, and Figure F-4, Future Drainage Condition Maps.

- The Louis Berger Group, Inc., “Technical Drainage Study 70% Submittal, for North 5th Street Improvements Owens Avenue to Carey Avenue”, March 2008 was reviewed and concurred with. This report designed a major lateral connecting to the proposed Regional Flood Control Facility LVOE 0134 at Las Vegas Boulevard and Owens Avenue.

3.0 DESIGN CRITERIA

3.1 Hydrology Methodology

The Soil Conservation Service (SCS) Curve Number Method within the U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package Commuter Model was utilized to determine peak discharges for the proposed onsite condition. Peak discharges were computed for the fully developed 10-year and 100-year, 6-hour storm events. For urban areas, the value of the curve number is based on the basin land use and assumed soil type, AMC II, with average conditions.

The soil types identified are based on the “Soil Survey of Las Vegas Valley Area” prepared by USDA Natural Resource Conservation Service, formerly (SCS). The project consists of Soil Type C, from US 95 to just north of Bonanza, and Soil Type B, from Bonanza to the northern end of the project. See Appendix A, Drainage Map Figures 5A and 5B, for delineations of soil types.

The land use is based on the current Downtown North, Land Use Map for the City of Las Vegas; see Appendix B, Figure 4. The average percent impervious area indicated for commercial, business, and industrial land use is based on the “Runoff Curve Numbers for Urban Areas”, Table 602.

Rainfall

The project site is located within the McCarran Airport Rainfall Area. The precipitation depth used to determine the 10 and 100-year, 6-hour storm events discharges were obtained from the Clark County Regional Flood Control District Design (CCRFGD) Manual. Rainfall depths of 1.58 and 2.77 inches were used for the 10-year and 100-year, 6-hour storm events. Storm distribution Number of 3 (SND3) was used with for basins less than eight square miles. No depth-area deduction factor (DARF) was used, although HEC1 input maintained DARF ratios in case offsite basins were larger than anticipated.

Time of Concentration and Lag Time

Time of Concentration (Tc) and Lag Time (TLag), calculations are provided in Standard Form 4. The Tc and Tlag values were calculated per the methodology described in Section 602 of the CCRFGD Manual. All basin areas used an average velocity for a developed condition. Because the drainage areas are predominantly fully developed, except for four vacant lots, the average velocity was calculated for a developed condition. See Appendix B for Standard Form 4.

3.2 Hydraulic Methodology

The projects street drainage and storm drains are designed for the 10-year, 6-hour storm event. The 100-year storm event has also been evaluated to determine the possible effects on the storm drain system and the downstream connecting facilities.

Drop Inlet Sizing

Drop Inlet sizes were determined using HEC-22 methodology, using the FlowMaster computer program. A 50% clogging factor was applied to the inlets to determine the 10-year dry lane criteria in each direction of the roadway was maintained. A Manning's n of 0.016 was used for pavement surfaces. See Appendix B for Drop Inlet results.

Storm Drain Size

A StormCAD model was used to evaluate the capacity of the proposed storm drain. Locations where the proposed storm drain begins to surcharge and bubble up into the street are identified in the model. This is a temporary condition that will exist until full conveyance is achieved with the planned 13-foot x 8-foot RCB regional facility. A Manning's n of 0.013 was used for reinforced concrete pipes. See Appendix B.

Street Flow Analysis

The FlowMaster computer program was used to analyze the 10-year and 100-year street flow conveyance to determine the flow depths flow velocities. Output results for the 10 and 100-year event are provided in Appendix B. See Table 2 for FlowMaster street results.

4.0 EXISTING CONDITIONS

The project site is generally fully developed with the exception of four relatively small vacant parcels included in drainage basins EXWA2, EXWA3 EXWA4, and EOA5. The overall site drains from the south toward Owens Avenue. The inlets along Main Street are generally NDOT Type 3 Drop inlets with minimal curb openings. Based on the proposed inlet analysis, the current 10-year street inundation does not meet the minimum dry lane criteria.

4.1 US 95 to Bonanza Road

The drainage basin generally flows into Main Street from the west and is conveyed north toward Bonanza Road. There is a high point just south of US 95, north of the parking lot entrance to the Main Street Casino property. Regional Flood Control facility LVWH 0426 a (16-foot x 8-foot RCB) crosses Main Street with no inlet connections near the high point. Offsite flows are conveyed into Main Street via valley gutters and sidewalk under drains and flow north. Multiple NDOT Type 11 Drop Inlets at the south end of Bonanza convey on-street flows to the existing Regional Flood Control facility WAPR 0097 a (14-foot x 8-foot RCB).

Just north of Bonanza at the northeast corner of the intersection, a single Type 3 Drop Inlet is connected to a deep 36-inch RCP which conveys flow from the low point of Bonanza Road under the UPRR.

4.2 Bonanza Road to Owens Avenue

The majority of drainage facilities on Main Street north of Bonanza Road consist of NDOT Type 3 Drop Inlets and single grates connecting to existing 24-inch RCPs, with no storm drain manhole connections. Existing inlets are used as junction boxes to convey flows north. Because of multiple street overlays,

the curb openings of the drop inlets have been decreased or eliminated. All the inlets are NDOT Type 3 grates approximately 2.6 x 2-foot in size with 5" to 0" curb openings. Existing laterals consist of 15" RCPs with average depths of 2.5-feet to 3.5-feet, all connecting with minimal cover.

At the Washington Avenue and Main Street intersection, the existing inlet at the southeast corner's curb opening has been reduced to only 3". This inlet is connected to an 18-inch RCP which leads to a manhole near the middle of the Washington crosswalk. An abandoned 15-inch RCP is also connected to this manhole and the 18-inch RCP continues north connecting to an existing 24-inch storm drain.

The CLV Central Neighborhood Flood Control Master Plan Study indicates 40 cfs and 76 cfs for the 10-year and 100-year street flows, respectively. See Appendix B for the Existing Drainage Condition Map, Figure E-4. A deep 36-inch RCP, which conveys flows from the low point at Washington Avenue under the UPRR west of Main Street, has no connections where it crosses Main Street. This line ultimately connects to an existing 12-foot x 8-foot RCB flood control facility at Washington and Las Vegas Boulevard.

At Owens Avenue, a shallow 24-inch RCP connects to a 36-inch RCP and continues north. The 36-inch pipe is connected to a 72-inch RCP lateral, newly constructed with the City of North Las Vegas' North 5th Street project. Once the CCRFCD facility LVOE 0134 is constructed, existing plugs in the 72-inch pipe will be removed and flows will be diverted to it. The existing 36-inch RCP is estimated to have a capacity of 67 cfs with a slope of 1.03% crossing Owens Avenue, and then a reduced capacity of 55 cfs at the connection to the 72-inch RCP.

There is one single offsite storm drain connection to an existing Type 3 Drop Inlet located at station 154+00. Offsite flows from drainage basin EOA9 enter the existing inlet. The storm drain plans for the North 5th Street project and the existing Regional Flood Control facilities are provided in Appendix C.

5.0 PROPOSED DRAINAGE FACILITIES

5.1 General Description

The proposed drainage facilities will replace all the existing storm drain elements to maintain the 10-year dry lane criteria. Since the existing 36-inch facility at Owens Avenue does not have capacity to convey the flows with the improved inlet capacities, design flows will bubble out into the street temporarily until the CCRFCD Owens Avenue East storm drain facility, LVOE 0236, is constructed in 2016.

5.2 Hydrologic Analyses

Drainage Map Figure 5 (Appendix A) depicts the onsite and offsite sub basins and drainage patterns used in the hydrology analysis. Table 1 below summarizes the HEC-1 design peak 10 and 100-year design flows. Drainage basins beginning with "EMS" indicate basins within the roadway pavement on Main Street. Drainage basins beginning with "EBR" are the areas that contribute flows toward Bonanza Road. "EW" indicates sub basins that contribute flows toward Washington Avenue. "EO" basins are those sub

basins contributing flows toward Owens Avenue. Total flows to Washington Avenue are defined at concentration point CPWASHTN, where $Q_{10}/Q_{100} = 36/73$ cfs. The Central Neighborhood Flood Control Master Plan indicated a $Q_{10}/Q_{100} = 40/76$ cfs.

As defined in the Flood Control Master Plan, see Appendix A, a flow split was analysed at Washington and Main. With the proposed improved inlet capture, the total 100-year bypass at Main and Washington Avenue was determined to be 13 cfs, which is contained within the east side of the roadway crown. Storm water is conveyed east along Washington Avenue and no flow split occurs with the 10-year or 100-year events.

Table 1: HEC-1 Results, Flow at Concentration Points

BASIN FLOW SUMMARY							
Drainage Basin	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)	Drainage Basin	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)
EBR1	4.46	6	11	EOA1	8.73	9	21
EMS1	0.65	1	2	EMS13	0.40	1	1
CP1	-	6	13	CP13	-	9	22
EMS2- CP2	0.61	1	2	EOA4	71	1	2
EMS3	0.44	1	1	EMS14	0.40	1	1
EWA01	3.10	4	8	CP14	-	2	3
CP3	-	5	10	EMS15-CP15	0.40	1	1
EMS4	0.48	1	1	EOA6	0.66	1	2
EWA2	0.56	1	2	EMS16	0.34	1	1
EWA4	0.42	1	1	CP16	-	2	3
CP4	-	2	5	EOA3	6.00	6	15
EMS5	0.41	1	1	EMS17	0.29	1	1
EWA3	5.68	7	14	CP17	-	7	15
CP5	-	7	15	EOA8	0.78	2	3
EWA8	0.63	1	2	EMS18	0.31	1	1
EWA9	0.76	1	2	CP18	-	2	4
EMS6	0.40	1	1	EOA51	4.56	4	11
CP6	-	3	6	EMS19	0.29	1	1
EWA5	1.83	2	5	CP19	-	5	12
EMS7	0.32	1	1	EMS20-CP20	0.29	1	1
CP7	-	3	6	EOA5	9.90	10	25
EWA10	0.84	1	3	EMS21	0.34	1	1
EMS8	0.28	1	1	CP21	-	11	26
CP8	-	2	3	EOA12	6.94	13	24
EWA0	29.32	28	62	EMS22	0.37	1	1
EWA7	3.23	5	10	CP22	-	14	25
EMS9	0.27	1	1	EOA7	4.83	5	12

Table 1: HEC-1 Results, Flow at Concentration Points

BASIN FLOW SUMMARY							
Drainage Basin	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)	Drainage Basin	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)
CP9	-	5	11	EMS23	0.28	1	1
EWA11	71	1	2	CP23	-	5	12
EMS10	0.32	1	1	EMS24-CP24	0.31	1	1
CP10	-	2	3	EOA9	2.62	3	6
EOA	2.42	2	6	EOA11	1.43	2	4
EMS11	0.32	1	1	EMS25	0.37	1	1
CP11	-	3	7	CP25	-	5	12
EOA2	0.2	1 *	1	EOA10	0.48	1	2
EMS12	0.47	1	2	EMS26	1.98	4	7
CP12	-	1	2	CP26	-	5	9

* HEC-1 results of 0 cfs from rounding have been increased to a minimum of 1 cfs.

5.3 Hydraulic Analyses

Street inlets have been designed to meet 10-year dry lane criteria. See Table 2 for inlet summary results. A 50% clogging factor was applied to the proposed inlets. The drop inlets have been analyzed in accordance with HEC-22 methodologies. FlowMaster results are provided in Appendix B, and summarized in Table 2.

Table 2: Drop Inlet Location Summary- 10 year Storm

Drop Inlet Number	Station	Total 10-year Design Flow to Inlet (cfs)	Intercepted Flow (cfs)	Bypass Flow (cfs)	Spread (ft)	Allowable Spread (ft)	Inlet Type
Bonanza System:							
DI-1	111+81.74	1	0.96	0.04	7.09	34.3	NDOT TYPE 3
DI-2	112+21.93	1	0.98	0.02	7.11		NDOT TYPE 3
DI-3	112+11.34	0.04		0			NDOT TYPE 3
DI-4	111+81.74	6	6	0		sag	NDOT TYPE 2
Washington System:							
DI-5	118+40.55	5	4.42	0.58	16.19	16.5	DI-TYPE CM
DI-6	118+40.55	2	1.84	0.16	11.23	16.5	DI-TYPE CM
DI-7	121+82.99	7.58	4.42	3.16	16.12	16.5	DI-TYPE CM

Table 2: Drop Inlet Location Summary- 10 year Storm

Drop Inlet Number	Station	Total 10-year Design Flow to Inlet (cfs)	Intercepted Flow (cfs)	Bypass Flow (cfs)	Spread (ft)	Allowable Spread (ft)	Inlet Type
DI-8	121+82.99	3.16	2.48	0.68	11.38	16.5	DI-TYPE CM
DI-9	125+22.32	7.16	4.07	3.09	13.29	16.5	DI-TYPE CM
DI-10	125+22.79	2.68	2.16	0.52	8.85	16.5	DI-TYPE CM
DI-11	128+44.83	8.09	5.50	2.59	15.94	26.5	DI-TYPE CM
DI-12	128+69.66	2.52	2.07	0.45	10.03	16.5	DI-TYPE CM
Owens System: No 10 year split flow bypass							
DI-13	133+55.28	3.00	2.34	0.66	8.76	16.5	DI-TYPE CM
DI-14	133+56.54	1.00	0.99	0.01	5.20	16.5	DI-TYPE CM
DI-15	137+50.21	9.66	4.91	4.75	12.71	16.5	DI-TYPE CM
DI-16	137+50.21	2.01	1.78	0.23	6.43	16.5	DI-TYPE CM
DI-17	141+09.70	5.75	3.62	2.13	9.81	16.5	DI-TYPE CM
DI-18	140+98.27	2.23	1.94	0.29	6.43	16.5	DI-TYPE CM
DI-19	143+49.91	9.13	4.73	4.40	12.81	16.5	DI-TYPE CM
DI-20	143+53.12	2.29	1.95	0.34	7.09	16.5	DI-TYPE CM
DI-21	147+43.48	9.40	5.72	3.68	12.94	16.5	DI-TYPE CM
DI-22	147+43.48	1.34	1.29	0.05	5.46	16.5	DI-TYPE CM
DI-23	150+97.15	14.68	8.92	5.76	14.22	15.5	DI-TYPE CM
DI-24	150+97.15	14.05	6.15	7.90	13.97	15.5	DI-TYPE CM
DI-25	154+03.10	10.76	6.74	4.02	13.35	15.5	DI-SPECIAL TYPE CM
DI-26	154+01.21	8.90	3.66	5.24	12.40	15.5	DI-SPECIAL TYPE CM
DI-27	158+01.57	9.02	4.53	4.49	12.05	15.5	DI-SPECIAL TYPE CM
DI-28	159+01.69	10.24	5.58	4.66	10.59	24.25	Modified Type 11

5.4 Proposed Storm Drain

The existing 36-inch RCP is estimated to have a capacity of 67.6 cfs with an existing pipe slope of 1.03% crossing Owens Avenue. The difference between the capacity of the 36-inch pipe and the design flow conveyed in the trunk line of 84.9 cfs will bubble out at the intersection of Main Street and Owens from inlet DI-27 and DI-28. MH-13 is recommended to be bolted. The bubbler was calculated as an inverted orifice with total 10-year flows of 17 cfs. See Table 3 for the pipe hydraulic design summary. WSPG results and bubbler calculations are provided in Appendix B.

Start Node	Stop Node	Pipe Diam. (in)	Length (ft)	Total Flow in Pipe (cfs)	Capacity (Full Flow) (cfs)
MH-1	MH-2	24	342.2	6.26	16.0
MH-2	MH-3	24	330.8	13.16	30.2
MH-3	MH-4	24	336.3	19.39	21.4
MH-4	MH-6	36	457.5	26.99	69.7
MH-6	MH7	36	395.1	30.33	121.4
MH7	MH8	36	348.2	37.02	147.6
MH8	MH-9	36	244.2	42.57	129.2
MH-9	MH-10	36	390.4	47.58	101.9
MH-10	MH-11	36	346.9	48.93	142.3
MH-11	MH-12	36	299.9	55.68	138.3
MH-12	MH-13	36	405.6	70.62	63.7
MH-13	DI-28	36	82.9	84.91	56.3

5.5 Right-of-Way Acquisition Requirements

Right-of-way acquisition is required mainly to provide full street width improvements and ADA accessibility near existing driveways and proposed street curb returns. Widening the southbound right turn lane at Washington Avenue and providing three bus turnout bays near Bonanza Road and Washington Avenue will require right-of-way acquisitions.

Drainage easements along the back of sidewalk at the northbound bus turnout at Bonanza Road will require a temporary swale to maintain positive drainage within two vacant lots, APN 139-27-810-001 and 139-27-702-008 (near stations 115+00 to 116+25 respectively). A localized low point is formed with the proposed bus turnout concrete pad sloped at 2.0% against the existing crown of the road. The existing ground adjacent to the new back of sidewalk averages 12" to 6" lower than proposed back of

sidewalk elevation. The northbound cross slope of Main Street was increased to 3.0% to minimize the creation and severity of this low point. A sidewalk under drain is proposed near station 116+25 to convey flows into Main Street.

6.0 CONCLUSIONS and RECOMMENDATIONS

- Main Street Improvements will incorporate new inlets to provide increased system capacity and allow streets to meet the 10-year dry lane requirement. Until the new CCRFCD facility is constructed the proposed 24-inch and 36-inch temporary trunk line will not be sufficient to convey the 10-year HGL below the finish grade. Existing conveyance will be maintained within the street with no adverse effect to adjacent property owners. Proposed design flows will maintain existing drainage patterns and will be conveyed to the same locations.
- Inlet capacity and spread requirements will be achieved with the full build out of the CCRFCD facility LVOE 0236. All inlets have been designed to provide one dry lane in the southbound and northbound directions of Main Street
- The existing street flow conditions maintain CCRFCD MANUAL requirements for $V \cdot D$ for both the 10-year and 100-year flows.
- Pipe flows will temporarily discharge through bubblers at the north end of the project at Main Street and Owens, and ultimately be connected to a 13-foot x 8-foot RCB Regional Flood Control facility at Owens Avenue (LVOE 0236).
- A corridor for the future CCRFCD facility LVOE 0236 is maintained between the new lip of gutter (northbound) and proposed sewer line improvements.

7.0 REFERENCES

1. CCRFCD, Hydrologic Criteria and Drainage Design Manual, Clark County Regional Flood Control District, Dated August 12, 1999
2. CCRFCD, 2008 Las Vegas Valley Flood Control Master Plan Updated, prepared by PBS&J, and Parsons Brinkerhoff, September 2008
3. City of Las Vegas, Central Neighborhood Flood Control Master Plan, PBS&J, March 2005.
4. The Louis Berger Group, Inc., "Technical Drainage Study 70% Submittal, for North 5th Street Improvements Owens Avenue to Carey Avenue", March 2008
5. USACOE, 1998, U.S. Department of Army Corps of Engineers, Hydrologic Engineering Center, Computer Program HEC-1, Flood Hydrograph Package, June 1998.
6. U.S. Department of Transportation, FHWA, Hydraulic Engineering Circular No. 22, Urban Drainage Manual, September 2009.

APPENDIX A

- **FIGURE 1 VICINITY MAPS**
- **FIGURE 2A-2D ASSESSOR'S PARCEL MAP**
- **FIGURE 3A, 3B FLOOD INSURANCE RATE MAP**
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- **FIGURE 6A, 6B (RFCD FACILITIES FIGURE F-27)**
- **FIGURE 7 (CLV CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLANS, FUTURE DRAINAGE CONDITION, FIGURE F-4)**

APPENDIX B

- **STANDARD FORM 4**
- **10-YEAR HEC-1**
- **100-YEAR HEC-1**
- **10-YR/100-YR INLET SUMMARY TABLE**
- **FLOWMASTER INLET CALCULATIONS**
- **WSPG OUTPUT**
- **BUBBLER CALCULATION**

APPENDIX C

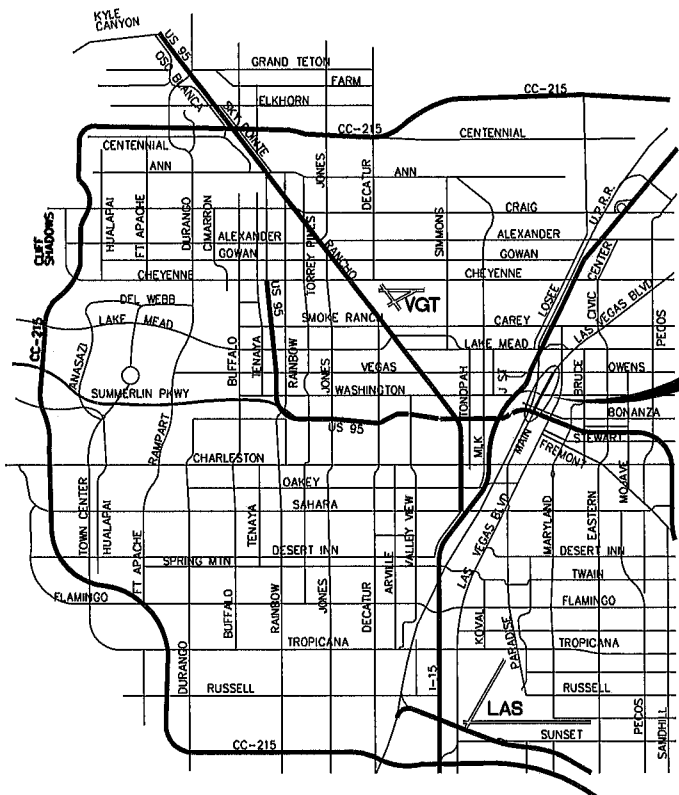
- **AS-BUILT PLANS**

APPENDIX D

- **FINAL PROGRESS SUBMITTAL STORM DRAIN PLANS AND PROFILES**

Appendix A

- *Figure 1 Vicinity Maps*
- *Figure 2A-2D Assessor's Parcel Map*
- *Figure 3A, 3B Flood Insurance Rate Map*
- *Figure 4 Land Use Map*
- *Figure 5 Drainage Basin Map*
- *Figure 6A, 6B (RFCD Facilities Figure F-27)*
- *Figure 7 (CLV Central Neighborhood Flood Control Master Plans, Future Drainage Condition, Figure F-4)*

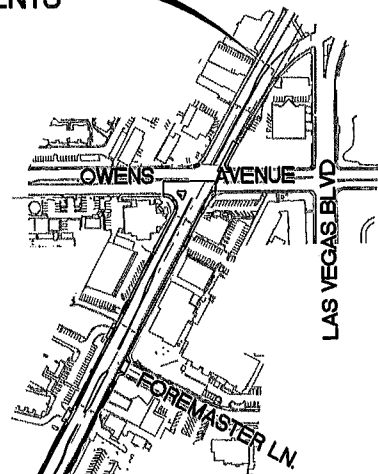


LOCATION MAP

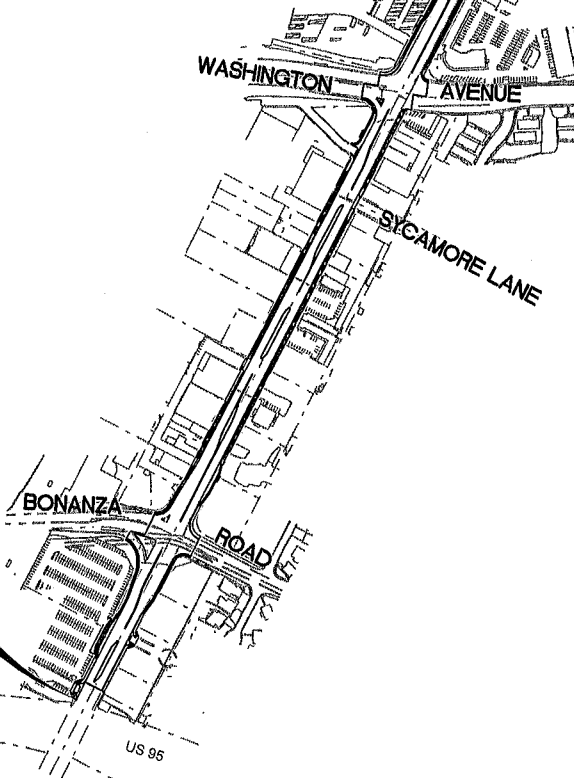
NOT TO SCALE

**END PROJECT
IMPROVEMENTS**

**PROJECT
LOCATION**



**BEGIN PROJECT
IMPROVEMENTS**



**MAIN STREET IMPROVEMENTS
US 95 TO OWENS**

**VICINITY MAP
FIGURE 1**

ASSESSOR'S PARCELS - CLARK CO., NV.
M. W. Schofield, Assessor

139-27-4

S 2 SW 4

27

T20S R61E

Scale: 1"=200'

Rev: 08/10/09

Parcel Number	Sub/Seq Number	Plat Recording Number	Block Number	Lot Number	Gov. Lot Number
001	001	123	139	140	161
002	002	124	139	140	161
003	003	125	139	140	161
004	004	126	139	140	161
005	005	127	139	140	161
006	006	128	139	140	161
007	007	129	139	140	161
008	008	130	139	140	161
009	009	131	139	140	161
010	010	132	139	140	161
011	011	133	139	140	161
012	012	134	139	140	161
013	013	135	139	140	161
014	014	136	139	140	161
015	015	137	139	140	161
016	016	138	139	140	161
017	017	139	139	140	161
018	018	140	139	140	161
019	019	141	139	140	161
020	020	142	139	140	161
021	021	143	139	140	161
022	022	144	139	140	161
023	023	145	139	140	161
024	024	146	139	140	161
025	025	147	139	140	161
026	026	148	139	140	161
027	027	149	139	140	161
028	028	150	139	140	161
029	029	151	139	140	161
030	030	152	139	140	161
031	031	153	139	140	161
032	032	154	139	140	161
033	033	155	139	140	161
034	034	156	139	140	161
035	035	157	139	140	161
036	036	158	139	140	161
037	037	159	139	140	161
038	038	160	139	140	161
039	039	161	139	140	161
040	040	162	139	140	161
041	041	163	139	140	161
042	042	164	139	140	161
043	043	165	139	140	161
044	044	166	139	140	161
045	045	167	139	140	161
046	046	168	139	140	161
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050	050	172	139	140	161
051	051	173	139	140	161
052	052	174	139	140	161
053	053	175	139	140	161
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060	060	182	139	140	161
061	061	183	139	140	161
062	062	184	139	140	161
063	063	185	139	140	161
064	064	186	139	140	161
065	065	187	139	140	161
066	066	188	139	140	161
067	067	189	139	140	161
068	068	190	139	140	161
069	069	191	139	140	161
070	070	192	139	140	161
071	071	193	139	140	161
072	072	194	139	140	161
073	073	195	139	140	161
074	074	196	139	140	161
075	075	197	139	140	161
076	076	198	139	140	161
077	077	199	139	140	161
078	078	200	139	140	161
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080	080	202	139	140	161
081	081	203	139	140	161
082	082	204	139	140	161
083	083	205	139	140	161
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085	085	207	139	140	161
086	086	208	139	140	161
087	087	209	139	140	161
088	088	210	139	140	161
089	089	211	139	140	161
090	090	212	139	140	161
091	091	213	139	140	161
092	092	214	139	140	161
093	093	215	139	140	161
094	094	216	139	140	161
095	095	217	139	140	161
096	096	218	139	140	161
097	097	219	139	140	161
098	098	220	139	140	161
099	099	221	139	140	161
100	100	222	139	140	161

MAP LEGEND

Parcel Boundary

Subd Boundary

Road Easement

PW/LD Boundary

Non-Parcel Lot Line

Match Line / Leader Line

Road ID Number

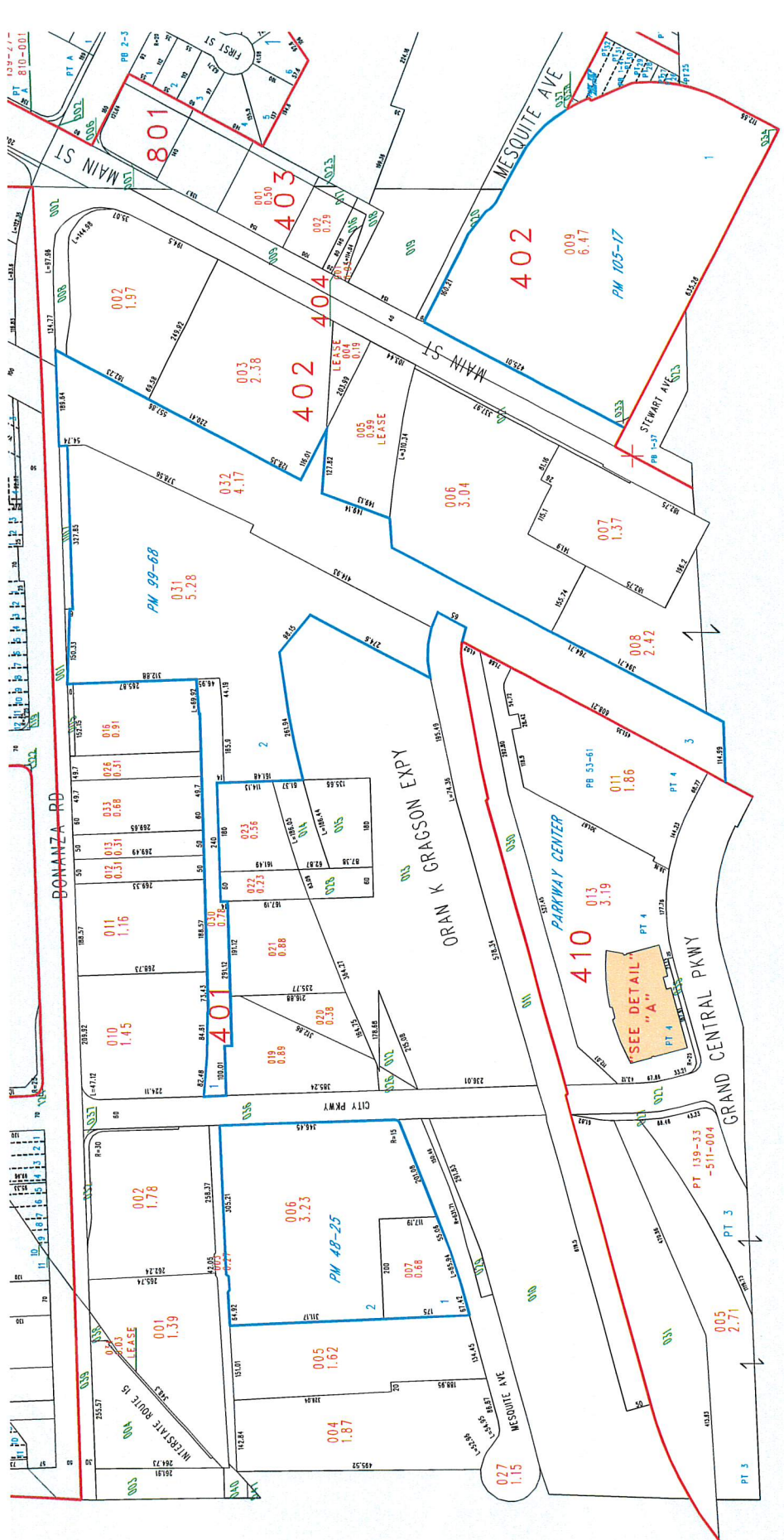
NOTES

This map is for assessment use only and does NOT represent a survey. No liability is assumed for the accuracy of the data delineated herein. Information on roads and other non-assessed parcels may be obtained from the Road Document Listing in the Assessor's Office.

This map is compiled from official records, including surveys and deeds, but only contains the information required for assessment. See the recorded documents for more detailed legal information.

USE THIS SCALE (FEET) WHEN MAP REDUCED FROM 1:12.5 ORIGINAL

0 50 100 200 400 600 800



TAX DIST 203

FIGURE 2A

NOTES

This map is for assessment use only and does NOT represent a survey.

No liability is assumed for the accuracy of the data delineated herein. Information on roads and other non-assessed parcels may be obtained from the Road Document Listing in the Assessor's Office.

This map is compiled from official records, including surveys and deeds, but only contains the information required for assessment. See the recorded documents for more detailed legal information.

USE THIS SCALE(FEET) WHEN MAP REDUCED FROM 1:1217 ORIGINAL

0 100 200 400 600 800

MAP LEGEND

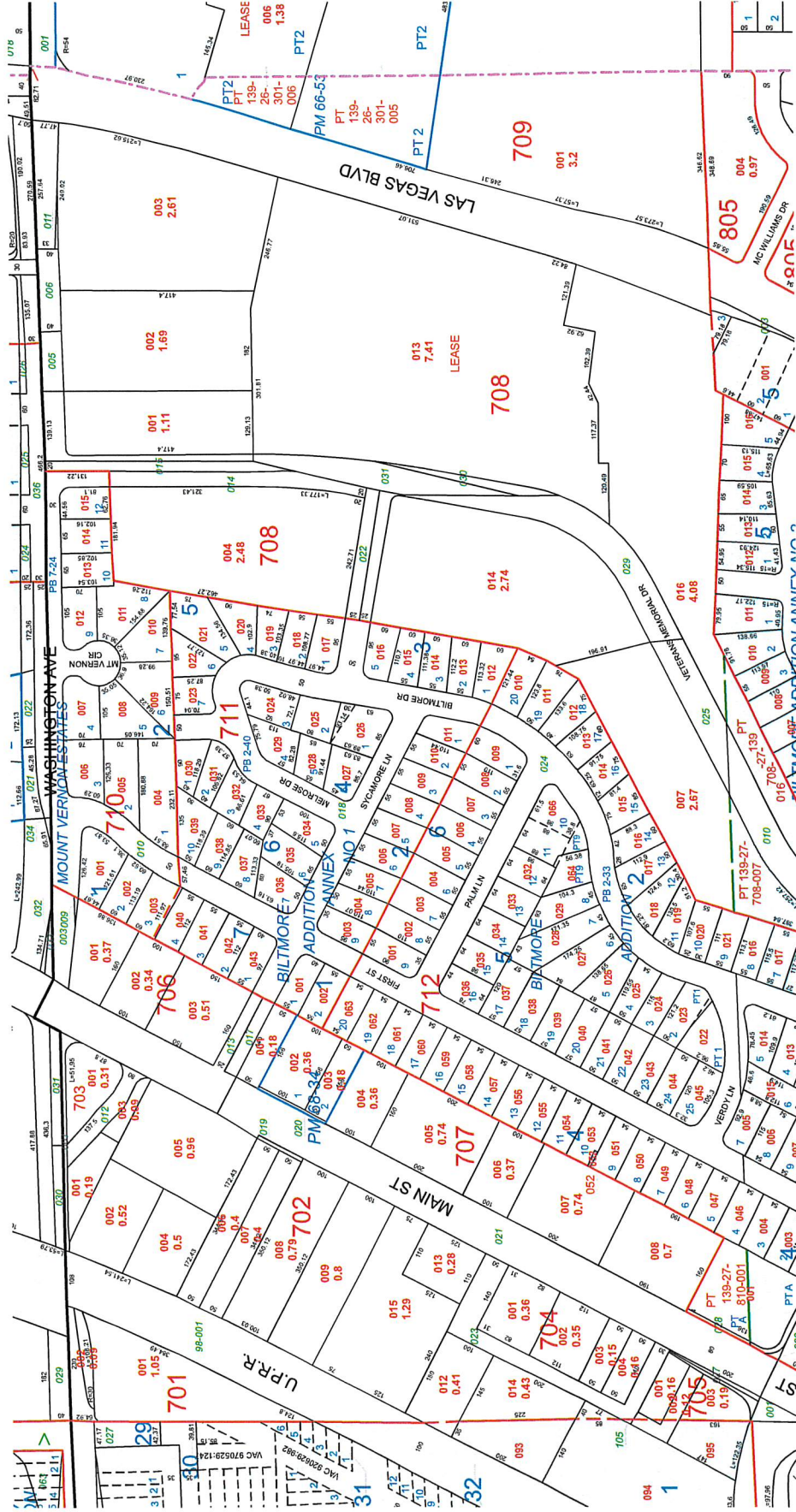
	PARCEL BOUNDARY		CONDOMINIUM UNIT
	SUB BOUNDARY		AIR SPACE PCL
	PM/D BOUNDARY		RIGHT OF WAY PCL
	ROAD EASEMENT		SUB-SURFACE PCL
	MATCH / LEADER LINE		HISTORIC LOT LINE
	HISTORIC SUB BOUNDARY		HISTORIC PM/D BOUNDARY
	SECTION LINE		

ASSESSOR'S PARCELS - CLARK CO., NV.

BOOK T20S R61E **SEC.** 27 **MAP** N 2 SE 4

Scale: 1" = 200' **Rev: 10/07/2010**

139-27-7



TAX DIST 203

FIGURE 2B

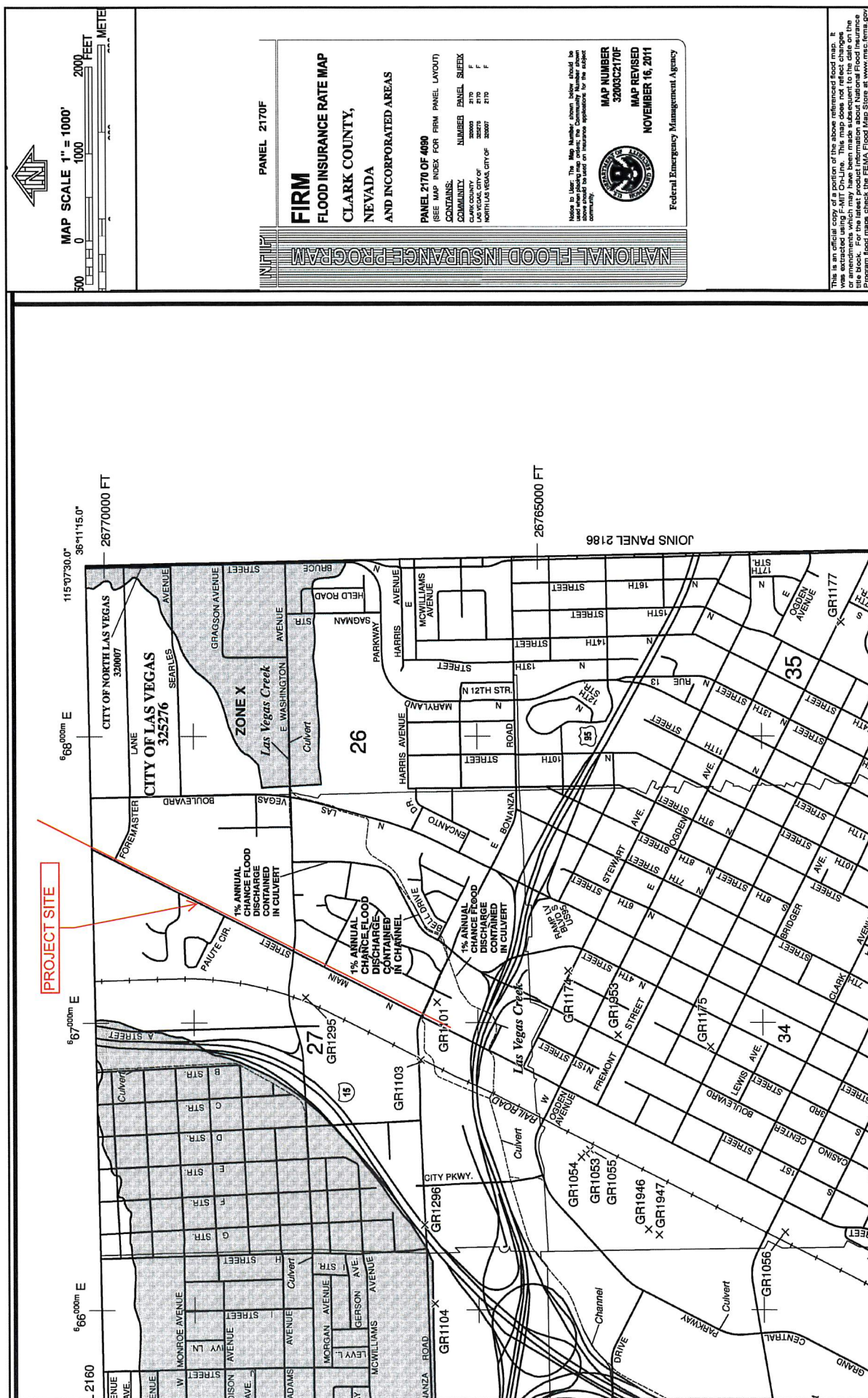


FIGURE 3A

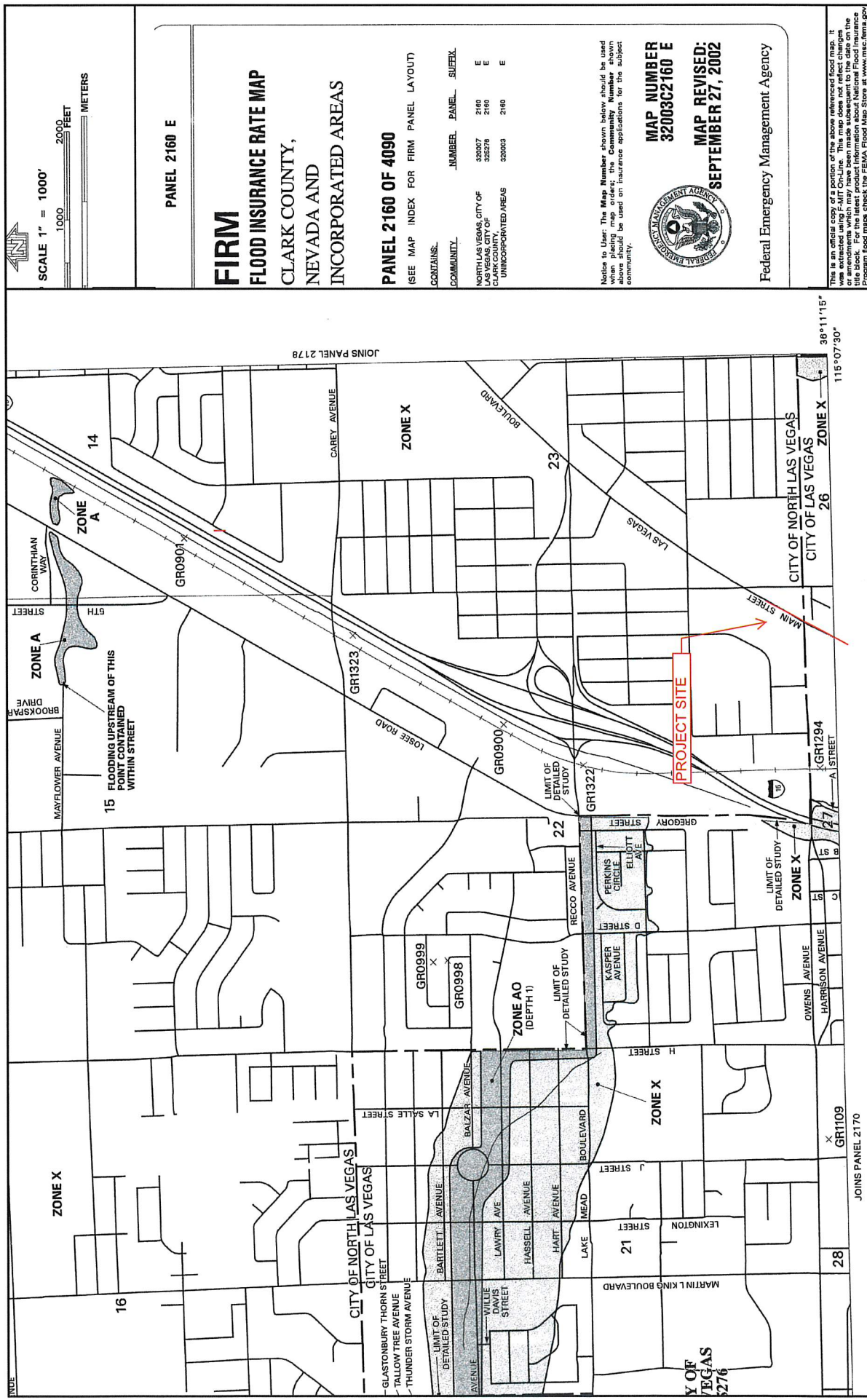
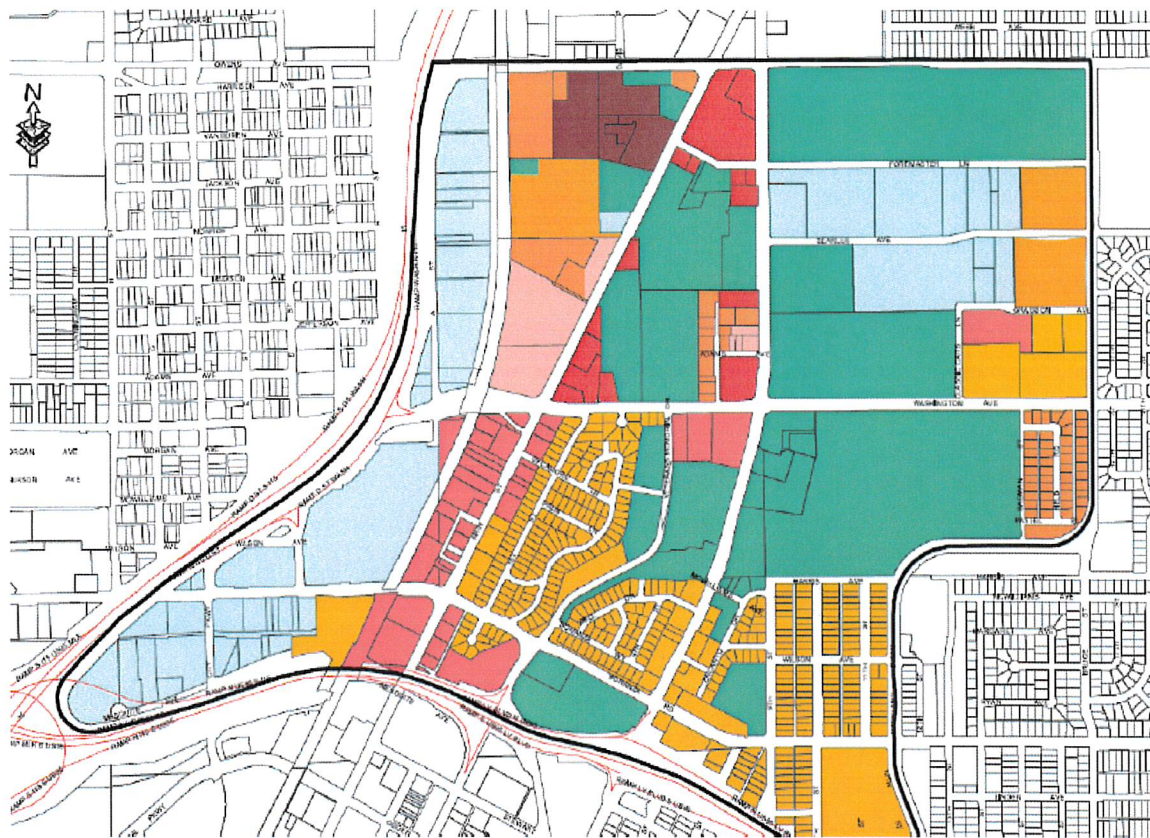


FIGURE 3B



- Orange Medium - Low - up to 8,49 du/ac
- Light Orange Medium - up to 25,49 du/ac
- Dark Orange High - 25+ du/ac
- Yellow Mixed Use (L,ML,M,H,O,SC,GC,PF)
- Pink Service Commercial
- Red General Commercial
- Light Red Commercial (O,SC,GC)
- Green Public Facility
- Light Blue Light Industrial / Research

FIGURE 4
Downtown North, General Plan Amendment
Land Use Map

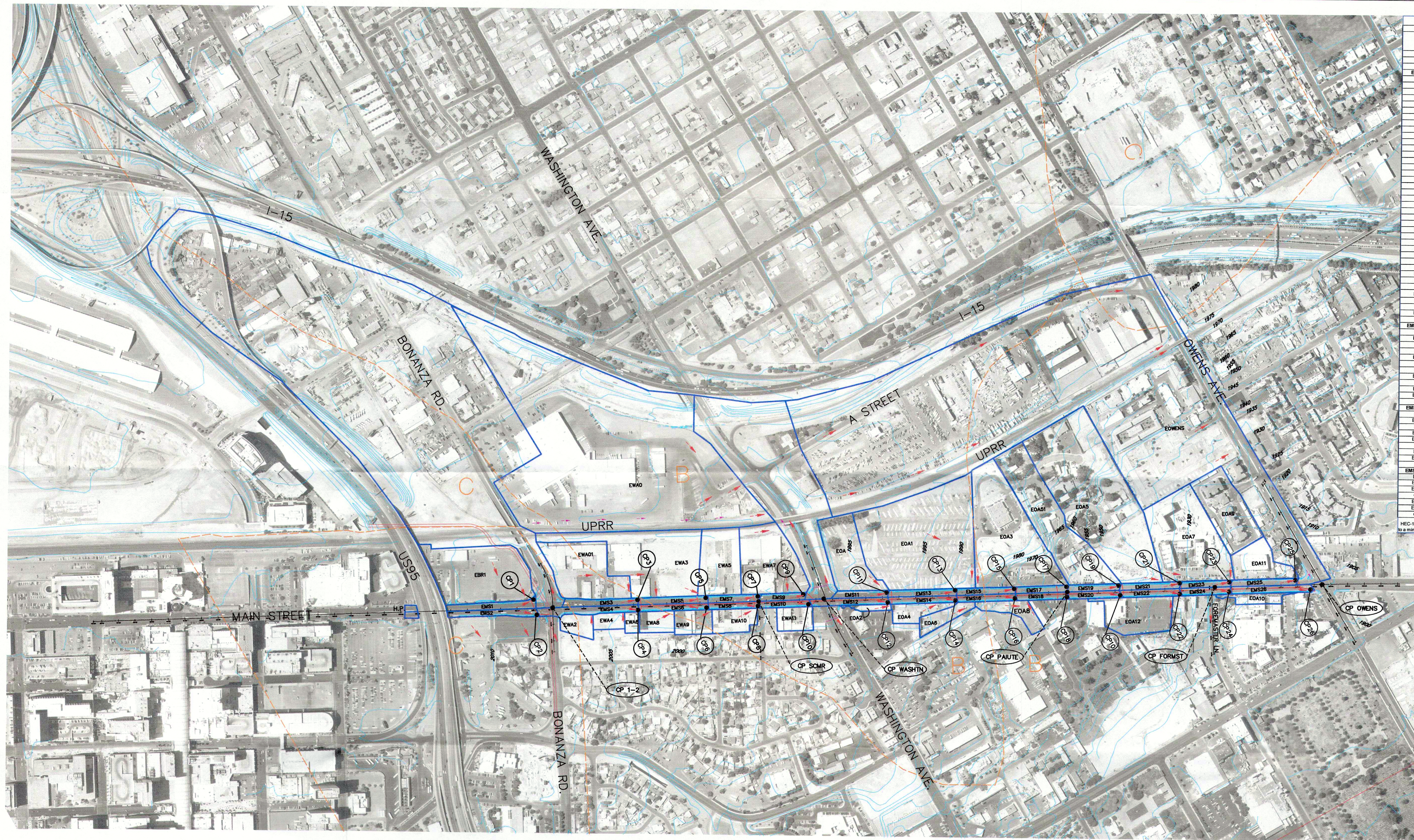
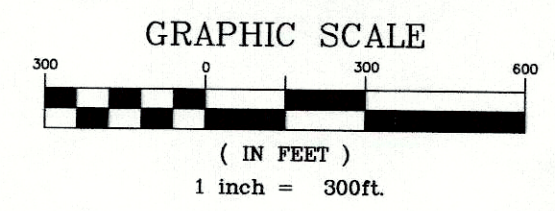


Table 1: HEC-1 Results Concentration Points			
BASIN FLOW SUMMARY			
DRAIN BASIN	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)
EBR1	4.46	6	11
EMS1	0.55	1	2
CP1	-	6	13
EMS2-CP2	0.61	1	2
EMS3	0.44	1	2
EWA01	3.10	4	8
CP3	-	5	10
EMS4	0.48	1	1
EWA2	0.56	1	2
EWA4	0.42	1	1
CP4	-	2	5
EMS5	0.41	1	1
EWA3	5.68	7	14
CP5	-	7	15
EWA6	0.63	1	2
EWA9	0.76	1	2
EMS6	0.40	1	1
CP6	-	3	6
EWA5	1.83	3	6
EMS7	0.32	1	1
CP7	-	4	7
EWA10	0.64	1	1
EMS8	0.28	1	1
CP8	-	2	3
EWA0	29.32	28	62
EWA7	3.23	5	10
EMS9	0.27	1	1
CP9	-	5	11
EWA11	7.1	1	3
EMS10	0.32	1	1
CP10	-	2	3
EOA	2.42	2	5
EMS11	0.32	1	1
CP11	-	3	7
EOA2	0.2	1	1
EMS12	0.47	1	2
CP12	-	1	2
EOA1	8.73	9	21
EMS13	0.40	1	1
CP13	-	9	22
EOA4	7.1	1	2
EMS14	0.40	1	1
CP14	-	2	3
EMS15-CP15	0.40	1	1
EOA5	0.66	1	2
EMS16	0.34	1	1
CP16	-	2	3
EOA3	6.00	6	15
EMS17	0.29	1	1
CP17	-	7	15
EOA8	0.78	2	3
EMS18	0.31	1	1
CP18	-	2	4
EOA51	4.56	4	11
EMS19	0.29	1	1
CP19	-	5	12
EMS20-CP20	0.29	1	1
EOA5	9.90	10	25
EMS21	0.34	1	1
CP21	-	11	26
EOA12	6.94	13	24
EMS22	0.37	1	1
CP22	-	14	26
EOA7	4.83	5	12
EMS23	0.28	1	1
CP23	-	5	11
EMS24-CP24	0.31	1	1
EOA5	2.62	3	6
EOA11	1.43	2	4
EMS25	0.37	1	1
CP25	-	5	12
EOA10	0.48	1	2
EMS26	1.98	4	7
CP26	-	5	9

HEC-1 results of 0 cfs have from computer rounder have been increased to a minimum of 1 cfs.



- LEGEND
- CP SCMR --- COMBINED CONCENTRATION POINTS
 - CP1 --- CONCENTRATION POINT
 - EXMS7 --- DRAIN BASIN ID
 - SOIL TYPE BOUNDARY

MAIN STREET IMPROVEMENTS
US-95 TO OWENS
DRAINAGE BASIN MAP
FIGURE 5



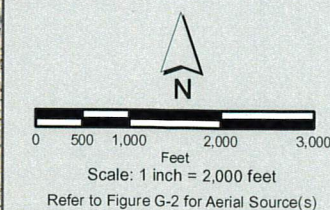
2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

**FIGURE F-27
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
- Culvert or Bridge Crossing
- 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 |
| Crossing | Crossing |



US95										
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								



ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **	ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **	ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **	ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **	
CABZ	E	CEDAR AVENUE - BONANZA							LVLE		LAKE MEAD DRAIN TO LAS VEGAS WASH							LVMD		LAS VEGAS WASH - MIDDLE							LWVH		WASHINGTON AVENUE CHANNEL							
0010	E	60" RCP	1450					0.30	0000	P1	12' X 8' RCB	2500	1030	CLV1B-2	WEST3	1.20	0.40	1648	E	3 Span Bridge 95'W 8'-10'D 2:1 SS @ Civil Center	120	11998	CHYPKIN	CCWEST5	73.97	0.70	0389	E	12' X 8' RCB	2110	1607	(1/2) CV1-C	SW5SC	15.16	0.90	
LV15		FREEWAY CHANNEL							0047	P1	12' X 6' RCB	2400	845	CLV1B-1	WEST3	0.89	0.50	1663	E	Conc Chnl 80'W 10'D 2:1 SS	700	11966	3C99B-7	CCWEST5	73.66	0.70	0426	E	16' X 8' RCB	150	1607	(1/2) CV1-C	SW5SC	15.16	1.08	
0000	E	Conc Chnl 20'W 10'D 1:1 SS (Replace w/ LV150001)	1800	4778	2CLV1E-3	CWEST4	11.12	0.18	0000	E	43'X 68" HERCP (Replace w/ LVLM0001)	847	994	CLM20-C	NW3SC	1.36	4.60	1664	E	3 Span Bridge 75'W 10'D 2:1 SS @ I-15	120	11966	3C99B-7	CCWEST5	73.66	0.70	0429	E	Splitter Structure (2- 12' X 8' RCB)	190	2870	DCLC21	SW5	22.79	1.90	
0001	P0	Conc Chnl 55'W 10'D 0:1 SS (Replaces LV150000)	1800	4778	2CLV1E-3	CWEST4	11.12	0.18	0001	P0	12' X 5' RCB (Replaces LVLM0000)	847	994	CLM20-C	NW3SC	1.36	4.60	1665	E	Transition Structure	200	7358	CLV99B-5	WEST5	48.77	0.36	0431	E	3: 14.33' X 10' RCB	665	2870	DCLC21	SW5	22.79	0.15	
0032	E	Conc Chnl 20'W 10'D 1:1 SS (Replace w/ LV150033)	200	4301	2CLV1D-5	CWEST4	10.22	0.18	0016	E	54" RCP (Replace w/ LVLM0017)	965	994	CLM20-C	NW3SC	1.36	4.38	1670	E	Free Span Bridge 55'W 12'D @ UPRR	40	7358	CLV99B-5	WEST5	48.77	0.36	0446	E	Junction Structure	69	2870	DCLC21	SW5	22.79	0.15	
0033	P0	Conc Chnl 50'W 10'D 0:1 SS (Replaces LV150032)	200	4301	2CLV1D-5	CWEST4	10.22	0.18	0017	P0	12' X 5' RCB (Replaces LVLM0016)	965	994	CLM20-C	NW3SC	1.36	4.38	1677	E	Conc Chnl 80'W 10'D 2:1 SS	370	7358	CLV99B-5	WEST5	48.77	1.69	0447	E	3: 14.33' X 10' RCB	1955	4978	CCAL93	SW5	22.19	0.15	
0038	E	2: 8' X 10' RCB (Replace w/ LV150039)	2200	4301	2CLV1D-5	CWEST4	10.22	0.75	0033	E	60" RCP (Replace w/ LVLM0034)	1186	994	CLM20-C	NW3SC	1.36	1.62	1679	E	4 Span Bridge 100'W 12'D 2:1 SS @ Losee	120	7358	CLV99B-5	WEST5	48.77	0.37										
0039	P0	2: 13' X 10' RCB (Replaces LV150038)	2200	4301	2CLV1D-5	CWEST4	10.22	0.75	0034	P0	12' X 5' RCB (Replaces LVLM0033)	1186	994	CLM20-C	NW3SC	1.36	1.62	1680	E	Conc Chnl 80'W 10'D 2:1 SS	480	7358	CLV99B-5	WEST5	48.77	0.37										
0059	E	Conc Chnl 20'W 10'D 1:1 SS (Replace w/ LV150060)	1600	4301	2CLV1D-5	CWEST4	10.22	0.18	0059	E	72" RCP (Replace w/ LVLM0060)	5952	994	CLM20-C	NW3SC	1.36	0.66																			
0060	P0	Conc Chnl 50'W 10'D 0:1 SS (Replaces LV150059)	1600	4301	2CLV1D-5	CWEST4	10.22	0.18	0060	P0	12' X 6' RCB (Replaces LVLM0059)	5952	994	CLM20-C	NW3SC	1.36	0.66																			
0080	E	Conc Chnl 20'W 10'D 1:1 SS (Replace w/ LV150081)	4300	3953	CLV1D-4	CWEST4	9.42	0.18																												
0081	P0	Conc Chnl 45'W 10'D 0:1 SS (Replaces LV150080)	4300	3953	CLV1D-4	CWEST4	9.42	0.18	LVLV		LAS VEGAS BLVD DRAIN																									
0190	E	Conc Chnl 20'W 10'D 1:1 SS with Drop Structures	100	3776	CW1C2	NW4SC	8.84	0.18	0000	P1	2: 10' X 9' RCB	2600	987	CLW075-4	WEST3	1.03	0.10																			
0191	E	Conc Chnl 20'W 10'D 1:1 SS with Drop Structures	100	3776	CW1C2	NW4SC	8.84	0.18	LVMD		LAS VEGAS WASH - MIDDLE																									
0193	E	Conc Chnl 20'W 10'D 1:1 SS with Drop Structures	1300	3776	CW1C2	NW4SC	8.84	0.18	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																			
0210	E	3: 12' X 9' RCB	900	3123	CCVG24	NW3SC	7.07	0.18	1149	P1	Conc Chnl 70'W 10'D 1.5:1 SS (Replaces LVMD1148)	1675	13944	CCBN15-C	CLVWASH5	112.59	0.41																			
0229	E	2: 7.5' X 3' RCBC @ Lake Mead (Replace w/ LV150230)	125	1011	DRAILRD	NW3	5.22	1.10	1176	E	5 Span Bridge 110'W 20'D 2:1 SS @ Bonanza	120	12690	CLW04-C	CLVWASH5	106.80	0.57																			
0230	P2	12' X 4.5' RCBC @ Lake Mead (Replaces LV150229)	125	1011	DRAILRD	NW3	5.22	1.10	1178	E	Earth Chnl 30'W 18'-20'D 2:1 SS (Replace w/ LVMD1179)	1500	12690	CLW04-C	CLVWASH5	106.80	0.57																			
0231	E	Conc Chnl 8'W 8'D 0:1 SS	900	1011	DRAILRD	NW3	5.22	2.50	1179	P1	Conc Chnl 60'W 9.5'D 2:1 SS (Replaces LVMD1178)	1500	12690	CLW04-C	CLVWASH5	106.80	0.57																			
0248	E	8' X 8' RCBC @ UPRR	350	1011	DRAILRD	NW3	5.22	1.34	1208	E	Bank-Stab. Chnl 65'W 15'D 2:1 SS (Replace w/ LVMD1209)	1420	12690	CLW04-C	CLVWASH5	106.80	0.32																			
0255	E	Conc Chnl 8'W 8'D 0:1 SS	1330	1011	DRAILRD	NW3	5.22	2.00	1209	P1	Conc Chnl 60'W 10.5'D 2:1 SS (Replaces LVMD1208)	1420	12690	CLW04-C	CLVWASH5	106.80	0.32																			
0280	E	Conc Chnl 30'W 8'D 0:1 SS	200	2022	CCVG10	NW3	5.22	2.00	1230	E	4 Span Bridge 162'W 13'D @ Washington	105	12654	CCLVW03	CLVWASH5	106.53	0.73																			
0284	E	14' X 6' RCB	1790	1221	CVG10-C	NW3	4.84	0.50	1232	E	Bank-Stab. Chnl 48'W 8'D 2:1 SS (Replace w/ LVMD1233)	1900	12654	CCLVW03	CLVWASH5	106.53	0.73																			
0316	E	11' X 6' RCB	3010	985	CWA20-C	NW3	4.46	0.59	1233	P1	Conc Chnl 90'W 8'D 0:1 SS (Replaces LVMD1232)	1900	12654	CCLVW03	CLVWASH5	106.53	0.73																			
0372	E	9' X 6' RCB	1970	985	CWA20-C	NW3	4.46	0.66	1271	E	4 Span Bridge 94'W 10'-12'D 2:1 SS @ Lamb	120	11954	CCLVW01C	CLVWASH5	103.23	0.38																			
LVBR		LAS VEGAS - BROOK							1272	E	Earth Chnl 80'W 10'D 2:1 SS (Replace w/ LVMD1273)	2400	11954	CCLVW01C	CLVWASH5	103.23	0.38																			
0000	P1	Conc Chnl 12'W 4.5'D 2:1 SS	285	989	CLV1D-5	WEST3	0.80	2.90	1273	P1	Conc Chnl 80'W 9'D 2:1 SS (Replaces LVMD1272)	2400	11954	CCLVW01C	CLVWASH5	103.23	0.38																			
0005	E	Conc Chnl 9'W 5'D 2:1 SS	375	989	CLV1D-5	WEST3	0.80	2.67	1320	E	Gabion Chnl 100'W 10'D 2:1 SS (Replace w/ LVMD1321)	1950	8636	CK-C1	CLVWASH5	100.94	0.38																			
0011	E	11' X 3' RCBC @ Losee	150	989	CLV1D-5	WEST3	0.80	2.90	1321	P1	Conc Chnl 80'W 7.5'D 2:1 SS (Replaces LVMD1320)	1950	8636	CK-C1	CLVWASH5	100.94	0.38																			
0013	E	Conc Chnl 12'W 4.5'D 2:1 SS	750	989	CLV1D-5	WEST3	0.80	2.60	1354	E	5 Span Bridge 110'W 7'-8'D 2:1 SS @ Owens	120	8504	2CLV1B-2	CCWEST5	78.09	0.58																			
0014	E	12' X 4' RCBC @ N. 5th St	100	989	CLV1D-5	WEST3	0.80	2.60	1355	E	Gabion Chnl 100'W 10'D 2:1 SS	3432	8504	2CLV1B-2	CCWEST5	78.09	0.58																			
0026	P1	Conc Chnl 12'W 4.5'D 2:1 SS	850	989	CLV1D-5	WEST3	0.80	4.30	1420	E	7: 8'-12' X 8' RCBC @ Lake Mead (Replace w/ LVMD1421)	200	8291	CLW64-4	CCWEST5	76.89	0.60																			
LVBZ		LAS VEGAS WASH - BONANZA							1421	P1	2 Span Bridge 84'W 8'D @ Lake Mead (Replaces LVMD1420)	200	8291	CLW64-4	CCWEST5	76.89	0.60																			
0000	P1	2: 12' X 7' RCB	3400	1636	CBN15-C	SW3	2.40	0.40	1423	E	Earth Chnl 60'W 8'D 1:1 SS (Replace w/ LVMD1424)	1060	8291	CLW64-4	CCWEST5	76.89	0.60																			
0064	P1	2: 12' X 6' RCB	2630	1449	CBN12-C	SW3	2.12	0.40	1424	P2	Conc Chnl 84'W 13'D 0:1 SS (Replaces LVMD1423)	1060	8291	CLW64-4	CCWEST5	76.89	0.34																			
0114	P1	2: 12' X 6' RCB	2740	1256	CBN10-C	SW3	1.79	0.40	1443	E	Earth Chnl 60'W 8'D 1:1 SS (Replace w/ LVMD1444)	2000	8291	CLW64-4	CCWEST5	76.89	0.60																			
0166	E	54" RCP (Replace w/ LV20167)	1095	1051	CBN09	SW3	1.54	0.45	1444	P2	Conc Chnl 84'W 8'D 0:1 SS (Replaces LVMD1443)	2000	8291	CLW64-4	CCWEST5	76.89	0.34																			
0167	P0	10' X 9' RCB (Replaces LV20166)	1095	1051	CBN09	SW3	1.54	0.45	1482	E	1 Span Bridge 99'W 7'D @ Carey	72	8291	CLW64-4	CCWEST5	76.89	1.00																			
0187	E	48" RCP (Replace w/ LV20188)	1235	1051	CBN09	SW3	1.54	0.71	1483	E	Earth Chnl 75'W 6'D 2:1 SS (Replace w/ LVMD1484)	1950	8291	CLW64-4	CCWEST5	76.89	0.40																			
0188	P0	9' X 9' RCB (Replaces LV20187)	1235	1051	CBN09	SW3	1.54	0.71	1484	P2	Conc Chnl 84'W 8'-9'D 0:1 SS (Replaces LVMD1483)	1950	8291	CLW64-4	CCWEST5	76.89	0.37																			
0210	E	42" RCP (Replace w/ LV20211)	704	911	CBN08	SW3	1.30	1.37	1521	E	Earth Chnl 75'W 6'D 2:1 SS (Replace w/ LVMD1522)	680	8241	2CLW1A-3	CCWEST5	76.53	0.40																			
0211	P0	8' X 7' RCB (Replaces LV20210)	704	911	CBN08	SW3	1.30	1.37	1522	P2	Conc Chnl 95'W 8'D 0:1 SS (Replaces LVMD1521)	680	8241	2CLW1A-3	CCWEST5	76.53	0.53																			
0223	E	36" RCP (Replace w/ LV20224)	2275	722	CBN03	SW3	1.09	0.72	1534	E	1 Span Bridge 72.5'W 7.5'D @ Las Vegas Blvd	120	8067	CLW1A-4	CCWEST5	74.91	0.88																			
0224	P0	8' X 7' RCB (Replaces LV20223																																		



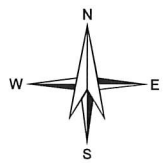
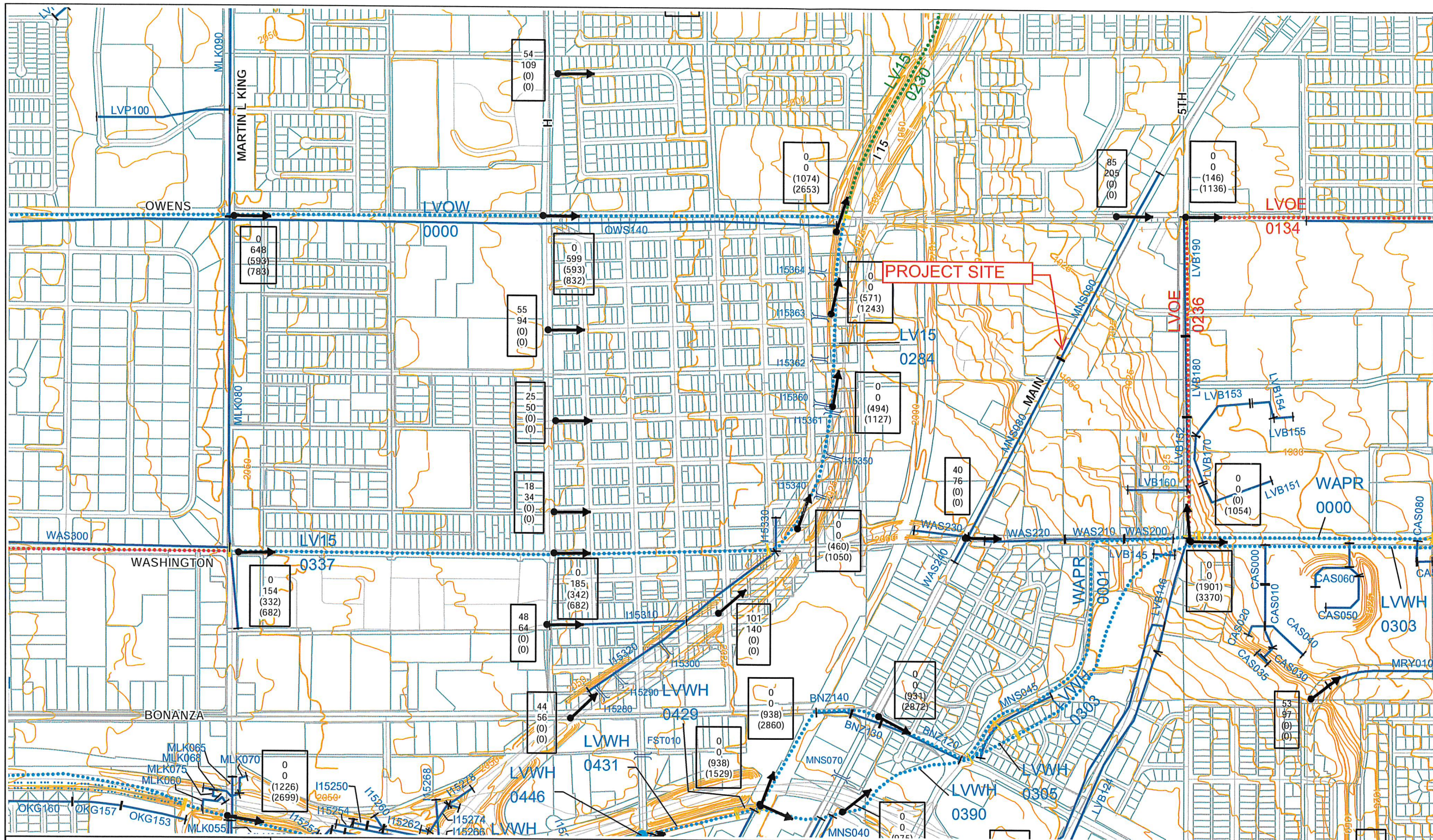
City of Las Vegas

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-4



SCALE: 1 inch = 800 feet

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)

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 explanation.

Durango	Rainbow	Decatur	Tonopah	5th	Pecos	Nellis
			1	2		
Lake Mead			3	4	5	6
Washington			7	8	9	10
Charleston			11	12	13	14
Sahara			15	16	17	18
Desert Inn			19	20	21	22

FUTURE DRAINAGE CONDITIONS



2270 Corporate Circle, Suite 100
Henderson, NV 89074
(702) 263-7275
Fax: (702) 263-7200

Appendix B

- **STANDARD FORM 4**
 - **10-YEAR HEC-1**
 - **100-YEAR HEC-1**
- **10-YR/100-YR INLET SUMMARY TABLE**
- **FLOWMASTER INLET CALCULATIONS**
 - **WSPG OUTPUT**
- **BUBBLER CALCULATION**

TIME OF CONCENTRATION
PROPOSED CONDITION

Project No. MAIN STREET US95 TO OWENS AVE.

DEVELOPMENT
CALCULATED BY
CHECKED BY:

DATE:	12/8/2013
DATE:	12/19/2013

Sub-Basin Data				INITIAL/OVERLAND TIME (ti)				TRAVEL TIME (ti)				Time of Concentration		Tc URBANIZED BASINS CHECK		FINAL	REMARKS			
KK	BA	LS			Resistance Coef.															
Basin (i)	Area (ac)	Area (sq. mil)	Dev/ Undev	CN	K	L (ft)	Slope (ft/ft)	t _i (min)	L (ft)	Slope (%)	Velocity (ft/s)	V1 (ft/s)	V2 (ft/s)	t _i (min)	Tc Tc=ti + ti (min)	Total Length, L (ft)	tc= (L ^{1/180})+10 (min)	Tc (min)	Tc (used)	TLAG =0.6 tc (hour)
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
EBR1	4.46	0.0070	D	94	0.85	100	0.012	4.2	2337	1.00%	2.02	3.06	3.06	14.13	18.4	2437	23.5	18.4	18.4	0.1835
EWA0	29.32	0.0458	D	92	0.82	130	0.040	3.6	2379	2.23%	3.02	4.57	4.57	9.62	13.2	2509	23.9	13.2	13.2	0.1318
EWA01	3.10	0.0048	D	94	0.85	200	0.010	6.3	791	0.50%	1.43	2.16	2.16	8.08	14.4	991	15.5	14.4	14.4	0.1442
EWA2	0.56	0.0009	D	94	0.85	100	0.005	5.7	116	0.50%	1.43	2.16	2.16	1.35	7.0	216	11.2	7.0	7.0	0.0700
EWA3	5.26	0.0082	D	92	0.82	170	0.037	4.2	1130	1.00%	2.02	3.06	3.06	7.56	11.7	1300	17.2	11.7	11.7	0.1174
EWA4	0.42	0.0007	D	94	0.85	50	0.010	3.2	203	1.00%	2.02	3.06	3.06	1.67	4.8	253	11.4	4.8	5.0	0.0500
EWA5	2.25	0.0035	D	92	0.82	190	0.010	6.8	247	1.80%	2.71	4.11	4.11	1.52	8.4	437	12.4	8.4	8.4	0.0836
EWA6	0.25	0.0004	D	94	0.85	50	0.010	3.2	124	1.00%	2.02	3.06	3.06	1.02	4.2	174	11.0	4.2	5.0	0.0500
EWA7	3.23	0.0050	D	92	0.82	50	0.010	3.5	460	0.95%	1.97	2.98	2.98	3.89	7.4	510	12.8	7.4	7.4	0.0740
EWA8	0.63	0.0010	D	94	0.85	50	0.010	3.2	204	1.00%	2.02	3.06	3.06	1.68	4.9	254	11.4	4.9	5.0	0.0500
EWA9	0.76	0.0012	D	93	0.84	27	0.010	2.5	338	0.70%	1.69	2.56	2.56	3.33	5.8	365	12.0	5.8	5.8	0.0579
EWA10	0.84	0.0013	D	92	0.82	45	0.010	3.3	283	1.11%	2.13	3.22	3.22	2.22	5.5	328	11.8	5.5	5.5	0.0554
EWA11	0.71	0.0011	D	92	0.82	50	0.010	3.5	156	1.00%	2.02	3.06	3.06	1.29	4.8	206	11.1	4.8	5.0	0.0500
EOA	2.42	0.0038	D	88	0.77	100	0.010	5.9	604	1.81%	2.72	4.12	4.12	3.49	9.4	704	13.9	9.4	9.4	0.0940
EOA1	8.73	0.0136	D	88	0.77	100	0.017	5.0	975	2.70%	3.32	5.03	5.03	4.09	9.0	1075	16.0	9.0	9.0	0.0904
EOA2	0.20	0.0003	D	92	0.82	35	0.010	2.9	190	1.81%	2.72	4.12	4.12	1.17	4.1	225	11.3	4.1	5.0	0.0500
EOA3	6.00	0.0094	D	88	0.77	100	0.015	5.2	1069	3.20%	3.61	5.47	5.47	4.04	9.2	1169	16.5	9.2	9.2	0.0920
EOA4	0.71	0.0011	D	92	0.82	60	0.010	3.8	365	1.00%	2.02	3.06	3.06	3.01	6.9	425	12.4	6.9	6.9	0.0685
EOA5	9.90	0.0155	D	88	0.77	100	0.031	4.1	1261	5.00%	4.52	6.84	6.84	3.70	7.8	1361	17.6	7.8	7.8	0.0775
EOA51	4.56	0.0071	D	88	0.77	100	0.015	5.2	1152	2.15%	2.96	4.49	4.49	5.24	10.4	1252	17.0	10.4	10.4	0.1040
EOA6	0.86	0.0010	D	92	0.82	30	0.020	2.2	369	3.80%	3.94	5.97	5.97	1.56	3.7	399	12.2	3.7	5.0	0.0500
EOA7	4.83	0.0075	D	88	0.77	100	0.039	3.8	695	1.00%	2.02	3.06	3.06	5.19	8.9	795	14.4	8.9	8.9	0.0894
EOA8	0.78	0.0012	D	98	0.90	50	0.045	1.5	263	4.10%	4.09	6.20	6.20	1.07	2.6	313	11.7	2.6	5.0	0.0500
EOA9	2.62	0.0041	D	88	0.77	100	0.032	4.0	543	1.00%	2.02	3.06	3.06	4.36	8.4	643	13.6	8.4	8.4	0.0839
EOA10	0.48	0.0008	D	92	0.82	40	0.010	3.1	356	1.30%	2.30	3.49	3.49	2.58	5.7	396	12.2	5.7	5.7	0.0571
EOA11	1.43	0.0022	D	92	0.82	100	0.018	4.1	225	1.00%	2.02	3.06	3.06	1.83	5.9	322	11.8	5.9	5.9	0.0591
EOA12	6.94	0.0108	D	98	0.90	100	0.010	3.5	395	1.00%	2.02	3.06	3.06	3.26	6.8	495	12.8	6.8	6.8	0.0679
EMS1	0.65	0.0010	D	98	0.90	32	0.020	1.6	500	0.63%	1.60	2.43	2.43	5.20	6.8	532	13.0	6.8	6.8	0.0679
EMS2	0.61	0.0010	D	98	0.90	32	0.020	1.6	525	0.68%	1.67	2.52	2.52	5.17	6.8	557	13.1	6.8	6.8	0.0676
EMS3	0.44	0.0007	D	98	0.90	50	0.020	2.0	443	0.38%	1.25	1.89	1.89	5.93	7.9	493	12.7	7.9	7.9	0.0791
EMS4	0.48	0.0007	D	98	0.90	45	0.020	1.9	438	0.38%	1.25	1.89	1.89	5.86	7.7	483	12.7	7.7	7.7	0.0775
EMS5	0.41	0.0006	D	98	0.90	32	0.020	1.6	412	0.68%	1.67	2.52	2.52	4.12	5.7	444	12.5	5.7	5.7	0.0571
EMS6	0.40	0.0006	D	98	0.90	32	0.020	1.6	412	0.68%	1.67	2.52	2.52	4.12	5.7	444	12.5	5.7	5.7	0.0571
EMS7	0.32	0.0005	D	98	0.90	32	0.020	1.6	310	1.89%	2.78	4.21	4.21	1.86	3.4	342	11.9	3.4	5.0	0.0500
EMS8	0.28	0.0004	D	98	0.90	32	0.020	1.6	310	1.89%	2.78	4.21	4.21	1.86	3.4	342	11.9	3.4	5.0	0.0500
EMS9	0.27	0.0004	D	98	0.90	32	0.020	1.6	266	0.95%	1.97	2.98	2.98	2.25	3.8	298	11.7	3.8	5.0	0.0500
EMS10	0.32	0.0005	D	98	0.90	32	0.020	1.6	304	0.95%	1.97	2.98	2.98	2.57	4.2	336	11.9	4.2	5.0	0.0500
EMS11	0.32	0.0005	D	98	0.90	32	0.020	1.6	321	1.81%	2.72	4.12	4.12	1.97	3.6	363	12.0	3.6	5.0	0.0500

TIME OF CONCENTRATION PROPOSED CONDITION																			
Project No. MAIN STREET US95 TO OWENS AVE.										DEVELOPMENT CALCULATED BY: BAS CHECKED BY: SP		DATE: 12/8/2013 DATE: 12/19/2013							
Sub-Basin Data				INITIAL/OVERLAND TIME (ti)				TRAVEL TIME (ti)				Time of Concentration		Tc URBANIZED BASINS CHECK		REMARKS			
KK	Area (ac)	Area (sq. mil)	BA	LS	Resistance Coef.	L (ft)	Slope S (ft/ft)	ti (min)	L (ft)	Slope (%)	V1 Velocity (ft/s)	V2 Velocity (ft/s)	ti (min)	Tc (min)	Total Length, L (ft)	tc= (L ^{1/180})+10 (min)	Tc (min)	Tc (used)	TLAG
Basin (1)	(2)	(3)				(6)	(7)	(8)	(9)	(10)	(11)	(12)	(14)	(15)	(16)	(17)	(18)	(19)	=0.6 tc (hour)
EMS12	0.47	0.0007	D	98	0.90	32	0.020	1.6	472	1.81%	2.72	4.12	2.89	4.5	504	12.8	4.5	5.0	0.0500
EMS13	0.40	0.0006	D	98	0.90	32	0.020	1.6	398	4.60%	4.33	6.56	1.53	3.1	430	12.4	3.1	5.0	0.0500
EMS14	0.40	0.0006	D	98	0.90	32	0.020	1.6	398	4.60%	4.33	6.56	1.53	3.1	430	12.4	3.1	5.0	0.0500
EMS15	0.40	0.0006	D	98	0.90	32	0.020	1.6	352	4.10%	4.09	6.20	1.43	3.0	384	12.1	3.0	5.0	0.0500
EMS16	0.34	0.0005	D	98	0.90	32	0.020	1.6	312	2.57%	3.24	4.91	1.61	3.2	344	11.9	3.2	5.0	0.0500
EMS17	0.29	0.0005	D	98	0.90	32	0.020	1.6	312	2.57%	3.24	4.91	1.61	3.2	344	11.9	3.2	5.0	0.0500
EMS18	0.31	0.0005	D	98	0.90	32	0.020	1.6	336	3.28%	3.66	5.54	1.53	3.1	368	12.0	3.1	5.0	0.0500
EMS19	0.29	0.0005	D	98	0.90	32	0.020	1.6	336	3.28%	3.66	5.54	1.53	3.1	368	12.0	3.1	5.0	0.0500
EMS20	0.29	0.0005	D	98	0.90	32	0.020	1.6	355	5.00%	4.52	6.84	1.31	2.9	387	12.2	2.9	5.0	0.0500
EMS21	0.34	0.0005	D	98	0.90	32	0.020	1.6	355	5.00%	4.52	6.84	1.31	2.9	387	12.2	2.9	5.0	0.0500
EMS22	0.37	0.0006	D	98	0.90	32	0.020	1.6	300	4.35%	4.21	6.38	1.19	2.8	332	11.8	2.8	5.0	0.0500
EMS23	0.28	0.0004	D	98	0.90	32	0.020	1.6	300	4.35%	4.21	6.38	1.19	2.8	332	11.8	2.8	5.0	0.0500
EMS24	0.31	0.0005	D	98	0.90	32	0.020	1.6	402	1.30%	2.30	3.49	2.91	4.5	434	12.4	4.5	5.0	0.0500
EMS25	0.37	0.0006	D	98	0.90	32	0.020	1.6	405	1.30%	2.30	3.49	2.93	4.5	437	12.4	4.5	5.0	0.0500
EMS26	1.98	0.0031	D	98	0.90	32	0.020	1.6	3828	3.30%	3.67	5.56	12.25	16.8	3978	32.1	16.8	16.8	0.1684
OWENS	63.77	0.0840	D	93	0.84	150	0.020	4.6											

NOTES:

(6) K = 0.0132 CN - 0.39 (HCDDM eq. 603)

(16) to=ti + tt

ti= 1.8 (1.1 - K) L_o^{1/2} / S^{1/3} (HCDDM eq. 602)

L_o=Length of overland flow, ft

Average Velocity for Existing Condition:

V1= 14.8 * S^{1/2}

V2= 29.4 * S^{1/3}

Average Velocity for Developed Condition:

V1= 20.2 * S^{1/2}

V2= 30.6 * S^{1/3}

REFERENCE:

STANDARD FORM 4


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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HBC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 08DEC13 TIME 02:34:43
*
*****

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*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****

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X X XXXXXX XXXX X
X X X X X XX
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X X X X X X
X X X X X
X X XXXXXX XXXX XXX

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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HBC-1 KNOWN AS HEC1 (JAN 73), HECIGS, HECIDB, 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 SUBMERGENCES, 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

1 HEC-1 INPUT PAGE 1

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LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID File: EXMS.DAT
2 ID
3 ID
4 ID EXISTING DRAINAGE CONDITIONS RUN
5 ID
6 ID
7 ID *****
8 ID *****
9 ID *
10 ID * MAIN STREET *
11 ID * US95 TO OWNENS AVE *
12 ID *
13 ID *
14 ID *
15 ID * FILE : EXMS10.DAT *
16 ID *
17 ID * 10-YEAR 6 HOUR *
18 ID *
19 ID *
20 ID * EXISTING CONDITIONS *
21 ID *
22 ID * PARSONS JN:647369 *
23 ID *
24 ID *****
25 ID *****
26 ID AREA DARP (sq.mi.)
27 ID 0 0.99
28 ID 0.5 0.975
29 ID
30 ID THIS ANALYSIS IS FOR THE MAIN STREET IMPROVEMENTS US95 TO OWNENS
31 ID
*** FREB ***
32 IT 3 0 0 300
33 IO 5 0 0
34 IN 5 0 0
35 JR PREC .99 0.975 0.95 0.925 .915 .908 .903 .895 .885
*
36 KK EBR1
37 KM EXISTING BASIN TO BONANZA
38 BA 0.0070
39 PB 1.58
40 PC .000 .020 .057 .070 .087 .108 .124 .130 .130 .130
41 PC .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
42 PC .130 .197 .199 .200 .201 .204 .214 .229 .241 .249
43 PC .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
44 PC .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
45 PC .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
46 PC .982 .985 .987 .989 .990 .993 .993 .994 .995 .998
47 PC .998 .999 1.00
48 LS 0 94
49 UD 0.1835
*

```

1 HEC-1 INPUT PAGE 2

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
50 KK EMS1
51 KM EXISTING MAIN ST PAVEMENT TO BONANZA
52 BA 0.0010
53 LS 0 98
54 UD 0.0679
*
55 KK CP1
56 KM COMBINED EMS1, AND EBR1
57 HC 2
*
58 KK EMS2
59 BA 0.0010
60 LS 0 98
61 UD 0.0676
*

```


62 KK CP1-2
63 KM COMBINED CP1, AND EMS2
64 HC 2
*
65 KK EMS3
66 BA 0.0007
67 LS 0 98
68 UD 0.0791
*
69 KK EWA01
70 BA 0.0048
71 LS 0 94
72 UD 0.1442
*
73 KK CP3
74 KM COMBINED EWA01 AND EMS3
75 HC 2
*
76 KK EMS4
77 BA 0.0007
78 LS 0 98
79 UD 0.0775
*
80 KK EWA2
81 BA 0.0009
82 LS 0 94
83 UD 0.0700
*

1

HEC-1 INPUT

PAGE 3

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

84 KK EWA4
85 BA 0.0007
86 LS 0 94
87 UD 0.0500
*
88 KK CP4
89 KM COMBINED EMS3, EWA2 AND EWA4
90 HC 3
*
91 KK CP3-4
92 KM COMBINED cp3 AND CP4
93 HC 2
*
94 KK EWA8
95 BA 0.0010
96 LS 0 94
97 UD 0.0500
*
98 KK EWA9
99 BA 0.0012
100 LS 0 93
101 UD 0.0579
*
102 KK EMS6
103 BA 0.0006
104 LS 0 98
105 UD 0.0571
*
106 KK CP6
107 KM COMBINED EWA8, EWA9 AND EMS6
108 HC 3
*
109 KK EWA3
110 BA 0.0082
111 LS 0 92
112 UD 0.1174
*
113 KK EMS5
114 BA 0.0006
115 LS 0 98
116 UD 0.0571
*

1

HEC-1 INPUT

PAGE 4

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

117 KK CP5
118 KM COMBINED EWA3 AND EMS5
119 HC 2
*
120 KK CP5-6
121 KM COMBINED CP5 AND CP6
122 HC 2
*
123 KK EWA10
124 BA 0.0013
125 LS 0 92
126 UD 0.0554
*
127 KK EMS8
128 BA 0.0004
129 LS 0 98
130 UD 0.0500
*

131 KK CP8
 132 KM COMBINED EWA10 AND EMS8
 133 HC 2
 *
 134 KK EWA5
 135 BA 0.0035
 136 LS 0 92
 137 UD 0.0836
 *
 138 KK EMS7
 139 BA 0.0005
 140 LS 0 98
 141 UD 0.0500
 *
 142 KK CP7
 143 KM COMBINED EWA5 AND EMS7
 144 HC 2
 *
 145 KK CP7-8
 146 KM COMBINED CP7 AND CP-8
 147 HC 2
 *

1

HEC-1 INPUT

PAGE 5

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
 148 KK CPSCMR
 149 KM COMBINE FLOWS AT SYCAMORE CP1-2,CP3-4,CP5-6,CP78
 150 HC 4
 *
 151 KK EWA11
 152 BA 0.0011
 153 LS 0 92
 154 UD 0.0500
 *
 155 KK EMS10
 156 BA 0.0005
 157 LS 0 98
 158 UD 0.0500
 *
 159 KK CP10
 160 KM COMBINED EWA11 AND EMS10
 161 HC 2
 *
 162 KK EWA7
 163 BA 0.0050
 164 LS 0 92
 165 UD 0.0500
 *
 166 KK EMS9
 167 BA 0.0004
 168 LS 0 98
 169 UD 0.0500
 *
 170 KK CP9
 171 KM COMBINED EWA0, EWA7 AND EMS9
 172 HC 2
 *
 173 KK CP910
 174 KM COMBINED CP9, CP10
 175 HC 2
 *
 176 KKCPWASHTN
 177 KM COMBINE FLOWS AT WASHINGTON, COMBINE CP10, CPSCMR
 178 HC 2
 *

1

HEC-1 INPUT

PAGE 6

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
 179 KK EOA
 180 BA 0.0038
 181 LS 0 88
 182 UD 0.0940
 *
 183 KK EMS11
 184 BA 0.0005
 185 LS 0 98
 186 UD 0.0500
 *
 187 KK CP11
 188 KM COMBINED EOA1 AND EMS11
 189 HC 2
 *
 190 KK EOA2
 191 BA 0.0003
 192 LS 0 92
 193 UD 0.0500
 *
 194 KK EMS12
 195 BA 0.0007
 196 LS 0 98
 197 UD 0.0500
 *
 198 KK CP12
 199 KM COMBINED EOA2 AND EMS12

200	HC	2	
	*		
201	KK	CP1112	
202	KM	COMBINED CP11 AND CP12	
203	HC	2	
	*		
204	KK	EOA1	
205	BA	0.0136	
206	LS	0	88
207	UD	0.0904	
	*		
208	KK	EMS13	
209	BA	0.0006	
210	LS	0	98
211	UD	0.0500	
	*		
1		HRC-1 INPUT	PAGE 7
LINE	ID	1.....2.....3.....4.....5.....6.....7.....8.....9.....10	
212	KK	CP13	
213	KM	COMBINED EOA1 AND EMS13	
214	HC	2	
	*		
215	KK	EOA4	
216	BA	0.0011	
217	LS	0	92
218	UD	0.0685	
	*		
219	KK	EMS14	
220	BA	0.0006	
221	LS	0	98
222	UD	0.0500	
	*		
223	KK	CP14	
224	KM	COMBINED EOA4 AND EMS14	
225	HC	2	
	*		
226	KK	CP1314	
227	KM	COMBINED CP13 AND CP14	
228	HC	2	
	*		
229	KK	EOA6	
230	BA	0.0010	
231	LS	0	92
232	UD	0.0500	
	*		
233	KK	EMS16	
234	BA	0.0005	
235	LS	0	98
236	UD	0.0500	
	*		
237	KK	CP16	
238	KM	COMBINED EOA6 AND EMS16	
239	HC	2	
	*		
240	KK	EMS15	
241	KM	CP15	
242	BA	0.0005	
243	LS	0	98
244	UD	0.0500	
	*		
1		HRC-1 INPUT	PAGE 8
LINE	ID	1.....2.....3.....4.....5.....6.....7.....8.....9.....10	
245	KK	CP1516	
246	KM	COMBINED CP15 AND CP16	
247	HC	2	
	*		
248	KK	EOA8	
249	BA	0.0012	
250	LS	0	98
251	UD	0.0500	
	*		
252	KK	EMS18	
253	BA	0.0005	
254	LS	0	98
255	UD	0.0500	
	*		
256	KK	CP18	
257	KM	COMBINED EOA8 AND EMS18	
258	HC	2	
	*		
259	KK	EOA3	
260	BA	0.0094	
261	LS	0	88
262	UD	0.0920	
	*		
263	KK	EMS17	
264	BA	0.0005	
265	LS	0	98
266	UD	0.0500	
	*		
267	KK	CP17	
268	KM	COMBINED EOA3 AND EMS17	

269	HC	2		
270	KK	CP1718		
271	KM	COMBINED CP17 AND CP18		
272	HC	2		
273	KKCPPAIUTE			
274	KM	COMBINED FLOWS AT PAIUTE		
275	HC	4		
1			HEC-1 INPUT	PAGE 9
LINE	ID	1	2	3
276	KK	EOA51		
277	BA	0.0071		
278	LS	0	88	
279	UD	0.1040		
280	KK	EMS19		
281	BA	0.0005		
282	LS	0	98	
283	UD	0.0500		
284	KK	CP19		
285	KM	COMBINED EOA5 AND EMS19		
286	HC	2		
287	KK	EMS20		
288	BA	0.0005		
289	LS	0	98	
290	UD	0.0500		
291	KK	CP1920		
292	KM	COMBINED CP19 AND CP20		
293	HC	2		
294	KK	EOA5		
295	BA	0.0155		
296	LS	0	88	
297	UD	0.0775		
298	KK	EMS21		
299	BA	0.0006		
300	LS	0	98	
301	UD	0.0500		
302	KK	CP21		
303	KM	COMBINED EOA5 AND EMS21		
304	HC	2		
305	KK	EOA12		
306	BA	0.0108		
307	LS	0	98	
308	UD	0.0679		
1			HEC-1 INPUT	PAGE 10
LINE	ID	1	2	3
309	KK	EMS22		
310	BA	0.0006		
311	LS	0	98	
312	UD	0.0500		
313	KK	CP22		
314	KM	COMBINED EOA12 AND EMS22		
315	HC	2		
316	KK	CP2122		
317	KM	COMBINED EOA21 AND CP22		
318	HC	2		
319	KKCPFORMST			
320	KM	COMBINE FLOWS AT FOREMASTER		
321	HC	3		
322	KK	EOA7		
323	BA	0.0075		
324	LS	0	88	
325	UD	0.0894		
326	KK	EMS23		
327	BA	0.0004		
328	LS	0	98	
329	UD	0.0500		
330	KK	CP23		
331	KM	COMBINED EOA7 AND EMS23		
332	HC	2		
333	KK	EMS24		
334	BA	0.0005		
335	LS	0	98	
336	UD	0.0500		


```

337      KK  CP2324
338      KM  COMBINED CP23 AND CP24
339      HC      2
      *
1      HEC-1 INPUT
      PAGE 11
      LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

340      KK  BOA9
341      BA  0.0041
342      LS      0      88
343      UD  0.0839
      *

344      KK  BOA11
345      BA  0.0022
346      LS      0      92
347      UD  0.0591
      *

348      KK  EMS25
349      BA  0.0006
350      LS      0      98
351      UD  0.0500
      *

352      KK  CP25
353      KM  COMBINED BOA9,BOA11 AND EMS25
354      HC      3
      *

355      KK  BOA10
356      BA  0.0008
357      LS      0      92
358      UD  0.0571
      *

359      KK  EMS26
360      BA  0.0031
361      LS      0      98
362      UD  0.0500
      *

363      KK  CP26
364      KM  COMBINED BOA10 AND EMS26
365      HC      2
      *

366      KK  BOWENS
367      BA  0.0840
368      LS      0      93
369      UD  0.1684
      *

370      KK  CP2526
371      KM  COMBINED CP25 AND CP26
372      HC      3
      *

```

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1      HEC-1 INPUT
      PAGE 12
      LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

373      KK  CPWOWENS
374      KM  COMBINE FLOWS AT OWENS AVE.
375      HC      3
      *

376      KK  EWA0
377      BA  0.0458
378      LS      0      92
379      UD  0.1118
      *

380      ZZ

1      SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
LINE      (V) ROUTING      (--->) DIVERSION OR PUMP FLOW
NO.      (.) CONNECTOR      (<---) RETURN OF DIVERTED OR PUMPED FLOW

36      EBR1
      .
50      EMS1
      .
55      CP1.....
      .
58      EMS2
      .
62      CP1-2.....
      .
65      EMS3
      .
69      EWA01
      .
73      CP3.....
      .
76      EMS4
      .
80      EWA2
      .
84      EWA4
      .

```


88		CP4	
91	CP3-4		
94		EWA8	
98			EWA9
102			EMS6
106		CP6	
109			EWA3
113			EMS5
117		CP5	
120		CP5-6	
123			EWA10
127			EMS8
131		CP8	
134			EWA5
138			EMS7
142			CP7
145		CP7-8	
148	CPSCMR		
151		EWA11	
155		EMS10	
159		CP10	
162		EWA7	
166			EMS9
170		CP9	
173		CP910	
176	CPWASHTN		
179		EOA	
183		EMS11	
187		CP11	
190		EOA2	
194			EMS12
198		CP12	
201		CP1112	
204		EOA1	
208			EMS13
212		CP13	
215			EOA4
219			EMS14

223			CP14.....			
226		CP1314.....				
229			EOA6			
233				EMS16		
237			CP16.....			
240				EMS15		
245			CP1516.....			
248				EOA8		
252					EMS18	
256				CP18.....		
259					EOA3	
263						EMS17
267					CP17.....	
270				CP1718.....		
273	CPPAIUTE.....					
276		EOA51				
280			EMS19			
284			CP19.....			
287				EMS20		
291			CP1920.....			
294				EOA5		
298					EMS21	
302				CP21.....		
305					EOA12	
309						EMS22
313					CP22.....	
316				CP2122.....		
319	CPFORMST.....					
322		EOA7				
326			EMS23			
330			CP23.....			
333				EMS24		
337			CP2324.....			
340				EOA9		
344					EOA11	
348						EMS25
352				CP25.....		
355					EOA10	
359						EMS26


```

(*** ) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 08DEC13 TIME 02:34:43
*
*****

```

*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*

EXISTING DRAINAGE CONDITIONS RUN

```

*****
*
*          MAIN STREET
*        US95 TO OWENS AVE
*
*
*
*
*
*
*
*
*
*
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*
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*
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*
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*
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*
*****

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THIS ANALYSIS IS FOR THE MAIN STREET IMPROVEMENTS US95 TO OWNENS

```

33 IO      OUTPUT CONTROL VARIABLES
          IPRINT      5 PRINT CONTROL
          IPLOT       0 PLOT CONTROL
          QSCAL       0. HYDROGRAPH PLOT SCALE

IT         HYDROGRAPH TIME DATA
          MININ      3 MINUTES IN COMPUTATION INTERVAL
          IDATE      1 0 STARTING DATE
          ITIME      0000 STARTING TIME
          NQ        300 NUMBER OF HYDROGRAPH ORDINATES
          NDDATE     1 0 ENDING DATE
          NDTIME     1457 ENDING TIME
          ICENT      19 CENTURY MARK

          COMPUTATION INTERVAL .05 HOURS
          TOTAL TIME BASE 14.95 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      .89      .88

```

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION									
				RATIO 1 .99	RATIO 2 .98	RATIO 3 .95	RATIO 4 .93	RATIO 5 .92	RATIO 6 .91	RATIO 7 .90	RATIO 8 .89	RATIO 9 .88	
HYDROGRAPH AT +	EBR1	.01	1	FLOW TIME	6. 3.60	5. 3.60	5. 3.60	5. 3.60	5. 3.60	5. 3.60	5. 3.60	5. 3.60	5. 3.60
HYDROGRAPH AT +	EMS1	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
2 COMBINED AT													

+	CP1	.01	1	FLOW TIME	6. 3.55	6. 3.55	6. 3.55	6. 3.55	6. 3.55	6. 3.55	6. 3.55	5. 3.55
HYDROGRAPH AT												
+	EMS2	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
2 COMBINED AT												
+	CP1-2	.01	1	FLOW TIME	7. 3.55	7. 3.55	7. 3.55	7. 3.55	7. 3.55	7. 3.55	7. 3.55	6. 3.55
HYDROGRAPH AT												
+	EMS3	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
HYDROGRAPH AT												
+	EWA01	.00	1	FLOW TIME	4. 3.55	4. 3.55	4. 3.55	4. 3.55	4. 3.55	4. 3.55	4. 3.55	3. 3.55
2 COMBINED AT												
+	CP3	.01	1	FLOW TIME	5. 3.55	5. 3.55	5. 3.55	4. 3.55	4. 3.55	4. 3.55	4. 3.55	4. 3.55
HYDROGRAPH AT												
+	EMS4	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
HYDROGRAPH AT												
+	EWA2	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
HYDROGRAPH AT												
+	EWA4	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
3 COMBINED AT												
+	CP4	.00	1	FLOW TIME	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50
2 COMBINED AT												
+	CP3-4	.01	1	FLOW TIME	7. 3.55	7. 3.55	7. 3.55	6. 3.55	6. 3.55	6. 3.55	6. 3.55	6. 3.55
HYDROGRAPH AT												
+	EWA8	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
HYDROGRAPH AT												
+	EWA9	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
HYDROGRAPH AT												
+	EMS6	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
3 COMBINED AT												
+	CP6	.00	1	FLOW TIME	3. 3.50	3. 3.50	3. 3.50	3. 3.50	3. 3.50	3. 3.50	3. 3.50	3. 3.50
HYDROGRAPH AT												
+	EWA3	.01	1	FLOW TIME	7. 3.55	6. 3.55	6. 3.55	6. 3.55	6. 3.55	6. 3.55	6. 3.55	6. 3.55
HYDROGRAPH AT												
+	EMS5	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
2 COMBINED AT												
+	CP5	.01	1	FLOW TIME	7. 3.55	7. 3.55	7. 3.55	7. 3.55	6. 3.55	6. 3.55	6. 3.55	6. 3.55
2 COMBINED AT												
+	CP5-6	.01	1	FLOW TIME	10. 3.50	10. 3.50	9. 3.50	9. 3.50	9. 3.50	9. 3.50	9. 3.50	8. 3.50
HYDROGRAPH AT												
+	EWA10	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
HYDROGRAPH AT												
+	EMS8	.00	1	FLOW TIME	1. 3.50	1. 3.50	0. 3.50	0. 3.50	0. 3.50	0. 3.50	0. 3.50	0. 3.50
2 COMBINED AT												
+	CP8	.00	1	FLOW TIME	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	1. 3.50
HYDROGRAPH AT												
+	EWA5	.00	1	FLOW TIME	3. 3.55	3. 3.55	3. 3.55	3. 3.55	3. 3.55	3. 3.55	3. 3.55	3. 3.55
HYDROGRAPH AT												
+	EMS7	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
2 COMBINED AT												
+	CP7	.00	1	FLOW TIME	4. 3.50	3. 3.50	3. 3.50	3. 3.50	3. 3.50	3. 3.50	3. 3.50	3. 3.50
2 COMBINED AT												
+	CP7-8	.01	1	FLOW TIME	5. 3.50	5. 3.50	5. 3.50	5. 3.50	5. 3.50	5. 3.50	5. 3.50	5. 3.50
4 COMBINED AT												
+	CPSCMR	.03	1	FLOW TIME	29. 3.55	28. 3.55	28. 3.55	27. 3.55	26. 3.55	26. 3.55	26. 3.55	25. 3.55
HYDROGRAPH AT												
+	EWA11	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
HYDROGRAPH AT												
+	EMS10	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50

Central
Neighborhood MP
shows Q10=40 cfs

2 COMBINED AT	CP10	.00	1	FLOW	2.	2.	2.	2.	2.	2.	2.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EWA7	.00	1	FLOW	5.	5.	5.	4.	4.	4.	4.	4.	4.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMS9	.00	1	FLOW	1.	1.	0.	0.	0.	0.	0.	0.	0.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP9	.01	1	FLOW	5.	5.	5.	5.	5.	5.	5.	5.	5.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP910	.01	1	FLOW	7.	7.	7.	6.	6.	6.	6.	6.	6.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CPWASHTN	.04	1	FLOW	36.	35.	34.	33.	32.	32.	32.	31.	31.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EOA	.00	1	FLOW	2.	2.	2.	2.	2.	2.	2.	2.	2.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EMS11	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP11	.00	1	FLOW	3.	3.	3.	3.	3.	3.	3.	2.	2.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EOA2	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.	0.	0.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMS12	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP12	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP1112	.01	1	FLOW	4.	4.	4.	4.	4.	4.	4.	4.	3.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EOA1	.01	1	FLOW	9.	9.	8.	8.	8.	8.	8.	7.	7.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EMS13	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP13	.01	1	FLOW	9.	9.	9.	8.	8.	8.	8.	8.	8.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EOA4	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMS14	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP14	.00	1	FLOW	2.	2.	2.	2.	2.	2.	2.	2.	2.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP1314	.02	1	FLOW	11.	11.	10.	10.	10.	9.	9.	9.	9.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EOA6	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMS16	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP16	.00	1	FLOW	2.	2.	2.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMS15	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP1516	.00	1	FLOW	2.	2.	2.	2.	2.	2.	2.	2.	2.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EOA8	.00	1	FLOW	2.	2.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMS18	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP18	.00	1	FLOW	2.	2.	2.	2.	2.	2.	2.	2.	2.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EOA3	.01	1	FLOW	6.	6.	6.	5.	5.	5.	5.	5.	5.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55

HYDROGRAPH AT	EMS17	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP17	.01	1	FLOW	7.	6.	6.	6.	6.	6.	6.	6.	5.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
2 COMBINED AT	CP1718	.01	1	FLOW	9.	8.	8.	8.	8.	7.	7.	7.	7.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
4 COMBINED AT	CPPAIUTE	.03	1	FLOW	26.	25.	24.	23.	23.	22.	22.	22.	21.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EOA51	.01	1	FLOW	4.	4.	4.	4.	4.	4.	4.	4.	4.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EMS19	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP19	.01	1	FLOW	5.	5.	5.	4.	4.	4.	4.	4.	4.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EMS20	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP1920	.01	1	FLOW	5.	5.	5.	5.	5.	5.	5.	5.	5.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EOA5	.02	1	FLOW	10.	10.	9.	9.	9.	9.	9.	9.	8.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EMS21	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP21	.02	1	FLOW	11.	11.	10.	10.	9.	9.	9.	9.	9.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.55	3.55
HYDROGRAPH AT	EOA12	.01	1	FLOW	13.	13.	13.	12.	12.	12.	12.	12.	12.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMS22	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP22	.01	1	FLOW	14.	14.	13.	13.	13.	13.	13.	12.	12.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP2122	.03	1	FLOW	25.	24.	23.	23.	22.	22.	22.	22.	21.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT	CPFORMST	.07	1	FLOW	56.	55.	52.	50.	50.	49.	49.	48.	47.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EOA7	.01	1	FLOW	5.	5.	5.	4.	4.	4.	4.	4.	4.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EMS23	.00	1	FLOW	1.	1.	0.	0.	0.	0.	0.	0.	0.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP23	.01	1	FLOW	5.	5.	5.	5.	5.	5.	5.	4.	4.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EMS24	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP2324	.01	1	FLOW	6.	6.	5.	5.	5.	5.	5.	5.	5.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EOA9	.00	1	FLOW	3.	3.	2.	2.	2.	2.	2.	2.	2.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EOA11	.00	1	FLOW	2.	2.	2.	2.	2.	2.	2.	2.	2.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMS25	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT	CP25	.01	1	FLOW	5.	5.	5.	5.	5.	5.	5.	5.	5.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EOA10	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMS26	.00	1	FLOW	4.	4.	4.	4.	4.	4.	4.	4.	4.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP26	.00	1	FLOW	5.	5.	5.	4.	4.	4.	4.	4.	4.
+													

				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT													
+	BOWENS	.08	1	FLOW	64.	63.	60.	58.	57.	57.	56.	55.	55.
				TIME	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
3 COMBINED AT													
+	CP2526	.09	1	FLOW	70.	69.	66.	64.	63.	62.	61.	61.	60.
				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
3 COMBINED AT													
+	CPOWENS	.17	1	FLOW	130.	127.	122.	117.	115.	114.	113.	112.	110.
				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT													
+	EWA0	.05	1	FLOW	35.	35.	33.	32.	31.	31.	31.	30.	30.
				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55

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


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1*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
* RUN DATE 08DEC13 TIME 02:35:09
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*****
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*****

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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

1 HEC-1 INPUT PAGE 1

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LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID File: EXMS100-FINAL.DAT
2 ID
3 ID
4 ID EXISTING DRAINAGE CONDITIONS RUN
5 ID
6 ID
7 ID
8 ID
9 ID *
10 ID * MAIN STREET *
11 ID * US95 TO OWNENS AVE *
12 ID *
13 ID *
14 ID *
15 ID * FILE : EXMS10.DAT *
16 ID *
17 ID * 100-YEAR 6 HOUR *
18 ID *
19 ID *
20 ID * EXISTING CONDITIONS *
21 ID *
22 ID * PARSONS JN:647369 *
23 ID *
24 ID
25 ID
26 ID AREA DARF (sq.mi.)
27 ID 0 0.99
28 ID 0.5 0.975
29 ID
30 ID THIS ANALYSIS IS FOR THE MAIN STREET IMPROVEMENTS US95 TO OWNENS
31 ID
*** FREE ***
32 IT 3 0 0 300
33 IO 5 0 0
34 IN 5 0 0
35 JR PREC .99 0.975 0.95 0.925 .915 .908 .903 .895 .885
*
36 KK EBR1
37 KM EXISTING BASIN TO BONANZA
38 BA 0.0070
39 PB 2.77
40 PC .000 .020 .057 .070 .087 .108 .124 .130 .130 .130
41 PC .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
42 PC .190 .197 .199 .200 .204 .204 .214 .229 .241 .249
43 PC .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
44 PC .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
45 PC .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
46 PC .982 .985 .987 .989 .990 .993 .993 .994 .995 .998
47 PC .998 .999 1.00
48 LS 0 94
49 UD 0.1835
*

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1 HEC-1 INPUT PAGE 2

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LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
50 KK EMS1
51 KM EXISTING MAIN ST PAVEMENT TO BONANZA
52 BA 0.0010
53 LS 0 98
54 UD 0.0679
*
55 KK CP1
56 KM COMBINED EMS1,AND EBR1
57 HC 2
*
58 KK EMS2
59 BA 0.0010
60 LS 0 98
61 UD 0.0676
*

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62	KK	CP1-2	
63	KM	COMBINED CP1, AND EMS2	
64	HC	2	
	*		
65	KK	EMS3	
66	BA	0.0007	
67	LS	0	98
68	UD	0.0791	
	*		
69	KK	EWA01	
70	BA	0.0048	
71	LS	0	94
72	UD	0.1442	
	*		
73	KK	CP3	
74	KM	COMBINED EWA01 AND EMS3	
75	HC	2	
	*		
76	KK	EMS4	
77	BA	0.0007	
78	LS	0	98
79	UD	0.0775	
	*		
80	KK	EWA2	
81	BA	0.0009	
82	LS	0	94
83	UD	0.0700	
	*		

1 HEC-1 INPUT PAGE 3

LINE	ID	1	2	3	4	5	6	7	8	9	10
84	KK	EWA4									
85	BA	0.0007									
86	LS	0									
87	UD	0.0500									
	*										
88	KK	CP4									
89	KM	COMBINED EMS3, EWA2 AND EWA4									
90	HC	3									
	*										
91	KK	CP3-4									
92	KM	COMBINED cp3 AND CP4									
93	HC	2									
	*										
94	KK	EWA8									
95	BA	0.0010									
96	LS	0									
97	UD	0.0500									
	*										
98	KK	EWA9									
99	BA	0.0012									
100	LS	0									
101	UD	0.0579									
	*										
102	KK	EMS6									
103	BA	0.0006									
104	LS	0									
105	UD	0.0571									
	*										
106	KK	CP6									
107	KM	COMBINED EWA8, EWA9 AND EMS6									
108	HC	3									
	*										
109	KK	EWA3									
110	BA	0.0082									
111	LS	0									
112	UD	0.1174									
	*										
113	KK	EMS5									
114	BA	0.0006									
115	LS	0									
116	UD	0.0571									
	*										

1 HEC-1 INPUT PAGE 4

117	KK	CP5	
118	KM	COMBINED EWA3 AND EMS5	
119	HC	2	
	*		
120	KK	CP5-6	
121	KM	COMBINED CP5 AND CP6	
122	HC	2	
	*		
123	KK	EWA10	
124	BA	0.0013	
125	LS	0	92
126	UD	0.0554	
	*		
127	KK	EMS8	
128	BA	0.0004	
129	LS	0	98
130	UD	0.0500	
	*		

131	KK	CP8		
132	KM	COMBINED EWA10 AND EMS8		
133	HC	2		
	*			
134	KK	EWA5		
135	BA	0.0035		
136	LS	0	92	
137	UD	0.0836		
	*			
138	KK	EMS7		
139	BA	0.0005		
140	LS	0	98	
141	UD	0.0500		
	*			
142	KK	CP7		
143	KM	COMBINED EWA5 AND EMS7		
144	HC	2		
	*			
145	KK	CP7-8		
146	KM	COMBINED CP7 AND CP-8		
147	HC	2		
	*			
1		HEC-1 INPUT		PAGE 5
LINE	ID	1.....2.....3.....4.....5.....6.....7.....8.....9.....10		
148	KK	CPSCMR		
149	KM	COMBINE FLOWS AT SYCAMORE CP1-2,CP3-4,CP5-6,CP78		
150	HC	4		
	*			
151	KK	EWA11		
152	BA	0.0011		
153	LS	0	92	
154	UD	0.0500		
	*			
155	KK	EMS10		
156	BA	0.0005		
157	LS	0	98	
158	UD	0.0500		
	*			
159	KK	CP10		
160	KM	COMBINED EWA11 AND EMS10		
161	HC	2		
	*			
162	KK	EWA7		
163	BA	0.0050		
164	LS	0	92	
165	UD	0.0500		
	*			
166	KK	EMS9		
167	BA	0.0004		
168	LS	0	98	
169	UD	0.0500		
	*			
170	KK	CP9		
171	KM	COMBINED EWA0, EWA7 AND EMS9		
172	HC	2		
	*			
173	KK	CP910		
174	KM	COMBINED CP9, CP10		
175	HC	2		
	*			
176	KKCPWASHTN			
177	KM	COMBINE FLOWS AT WASHINGTON, COMBINE CP10, CPSCMR		
178	HC	2		
	*			
1		HEC-1 INPUT		PAGE 6
LINE	ID	1.....2.....3.....4.....5.....6.....7.....8.....9.....10		
179	KK	EOA		
180	BA	0.0038		
181	LS	0	88	
182	UD	0.0940		
	*			
183	KK	EMS11		
184	BA	0.0005		
185	LS	0	98	
186	UD	0.0500		
	*			
187	KK	CP11		
188	KM	COMBINED EOA1 AND EMS11		
189	HC	2		
	*			
190	KK	EOA2		
191	BA	0.0003		
192	LS	0	92	
193	UD	0.0500		
	*			
194	KK	EMS12		
195	BA	0.0007		
196	LS	0	98	
197	UD	0.0500		
	*			
198	KK	CP12		
199	KM	COMBINED EOA2 AND EMS12		

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200      HC      2
      *
201      KK      CP1112
202      KM      COMBINED CP11 AND CP12
203      HC      2
      *
204      KK      EOA1
205      BA      0.0136
206      LS      0      88
207      UD      0.0904
      *
208      KK      EMS13
209      BA      0.0006
210      LS      0      98
211      UD      0.0500
      *
1
HRC-1 INPUT
PAGE 7

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```

LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
212      KK      CP13
213      KM      COMBINED EOA1 AND EMS13
214      HC      2
      *
215      KK      EOA4
216      BA      0.0011
217      LS      0      92
218      UD      0.0685
      *
219      KK      EMS14
220      BA      0.0006
221      LS      0      98
222      UD      0.0500
      *
223      KK      CP14
224      KM      COMBINED EOA4 AND EMS14
225      HC      2
      *
226      KK      CP1314
227      KM      COMBINED CP13 AND CP14
228      HC      2
      *
229      KK      EOA6
230      BA      0.0010
231      LS      0      92
232      UD      0.0500
      *
233      KK      EMS16
234      BA      0.0005
235      LS      0      98
236      UD      0.0500
      *
237      KK      CP16
238      KM      COMBINED EOA6 AND EMS16
239      HC      2
      *
240      KK      EMS15
241      KM      CP15
242      BA      0.0005
243      LS      0      98
244      UD      0.0500
      *
1
HRC-1 INPUT
PAGE 8

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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
245      KK      CP1516
246      KM      COMBINED CP15 AND CP16
247      HC      2
      *
248      KK      EOA8
249      BA      0.0012
250      LS      0      98
251      UD      0.0500
      *
252      KK      EMS18
253      BA      0.0005
254      LS      0      98
255      UD      0.0500
      *
256      KK      CP18
257      KM      COMBINED EOA8 AND EMS18
258      HC      2
      *
259      KK      EOA3
260      BA      0.0094
261      LS      0      88
262      UD      0.0920
      *
263      KK      EMS17
264      BA      0.0005
265      LS      0      98
266      UD      0.0500
      *
267      KK      CP17
268      KM      COMBINED EOA3 AND EMS17

```


269	HC	2	
	*		
270	KK	CP1718	
271	KM	COMBINED CP17 AND CP18	
272	HC	2	
	*		
273	KKCPPAIUTE		
274	KM	COMBINED FLOWS AT PAIUTE	
275	HC	4	
	*		
1		HEC-1 INPUT	PAGE 9
LINE	ID	1.....2.....3.....4.....5.....6.....7.....8.....9.....10	
276	KK	EOA51	
277	BA	0.0071	
278	LS	0	88
279	UD	0.1040	
	*		
280	KK	EMS19	
281	BA	0.0005	
282	LS	0	98
283	UD	0.0500	
	*		
284	KK	CP19	
285	KM	COMBINED EOA5 AND EMS19	
286	HC	2	
	*		
287	KK	EMS20	
288	BA	0.0005	
289	LS	0	98
290	UD	0.0500	
	*		
291	KK	CP1920	
292	KM	COMBINED CP19 AND CP20	
293	HC	2	
	*		
294	KK	EOA5	
295	BA	0.0155	
296	LS	0	88
297	UD	0.0775	
	*		
298	KK	EMS21	
299	BA	0.0006	
300	LS	0	98
301	UD	0.0500	
	*		
302	KK	CP21	
303	KM	COMBINED EOA5 AND EMS21	
304	HC	2	
	*		
305	KK	EOA12	
306	BA	0.0108	
307	LS	0	98
308	UD	0.0679	
	*		
1		HEC-1 INPUT	PAGE 10
LINE	ID	1.....2.....3.....4.....5.....6.....7.....8.....9.....10	
309	KK	EMS22	
310	BA	0.0006	
311	LS	0	98
312	UD	0.0500	
	*		
313	KK	CP22	
314	KM	COMBINED EOA12 AND EMS22	
315	HC	2	
	*		
316	KK	CP2122	
317	KM	COMBINED EOA21 AND CP22	
318	HC	2	
	*		
319	KKCPFORMST		
320	KM	COMBINE FLOWS AT FOREMASTER	
321	HC	3	
	*		
322	KK	EOA7	
323	BA	0.0075	
324	LS	0	88
325	UD	0.0894	
	*		
326	KK	EMS23	
327	BA	0.0004	
328	LS	0	98
329	UD	0.0500	
	*		
330	KK	CP23	
331	KM	COMBINED EOA7 AND EMS23	
332	HC	2	
	*		
333	KK	EMS24	
334	BA	0.0005	
335	LS	0	98
336	UD	0.0500	
	*		

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337      KK CP2324
338      KM COMBINED CP23 AND CP24
339      HC      2
      *
1      HEC-1 INPUT
      PAGE 11
      LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

340      KK ROA9
341      BA 0.0041
342      LS      0      88
343      UD 0.0839
      *
344      KK ROA11
345      BA 0.0022
346      LS      0      92
347      UD 0.0591
      *
348      KK EMS25
349      BA 0.0006
350      LS      0      98
351      UD 0.0500
      *
352      KK CP25
353      KM COMBINED ROA9,ROA11 AND EMS25
354      HC      3
      *
355      KK ROA10
356      BA 0.0008
357      LS      0      92
358      UD 0.0571
      *
359      KK EMS26
360      BA 0.0031
361      LS      0      98
362      UD 0.0500
      *
363      KK CP26
364      KM COMBINED ROA10 AND EMS26
365      HC      2
      *
366      KK EOWENS
367      BA 0.0840
368      LS      0      93
369      UD 0.1684
      *
370      KK CP2526
371      KM COMBINED CP25 AND CP26
372      HC      3
      *
1      HEC-1 INPUT
      PAGE 12
      LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

373      KK CPWOWENS
374      KM COMBINE FLOWS AT OWENS AVE.
375      HC      3
      *
376      KK EWA0
377      BA 0.0458
378      LS      0      92
379      UD 0.1318
      *
380      ZZ

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1      SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW

36      EBR1
      .
50      .      EMS1
      .
55      CP1.....
      .
58      .      EMS2
      .
62      CP1-2.....
      .
65      .      EMS3
      .
69      .      EWA01
      .
73      .      CP3.....
      .
76      .      EMS4
      .
80      .      .      EWA2
      .
84      .      .      .      EWA4
      .

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88			CP4.....	
91		CP3-4.....		
94			EWAS	
98				EWAS9
102				RMS6
106			CP6.....	
109				EWAS3
113				RMS5
117			CP5.....	
120			CP5-6.....	
123				EWAS10
127				RMS8
131			CP8.....	
134				EWAS5
138				RMS7
142				CP7.....
145			CP7-8.....	
148	CPSCMR.....			
151		EWAS11		
155			RMS10	
159		CP10.....		
162			EWAS7	
166				RMS9
170			CP9.....	
173		CP910.....		
176	CPWASHTN.....			
179		EOA		
183			RMS11	
187		CP11.....		
190			EOA2	
194				RMS12
198			CP12.....	
201		CP1112.....		
204			EOA1	
208				RMS13
212			CP13.....	
215				EOA4
219				RMS14

223			CP14.....	
226		CP1314.....		
229			EOA6	
233			EMS16	
237			CP16.....	
240			EMS15	
245			CP1516.....	
248			EOA8	
252				EMS18
256			CP18.....	
259				EOA3
263				EMS17
267				CP17.....
270			CP1718.....	
273	CPPAIUTE.....			
276		EOA51		
280			EMS19	
284		CP19.....		
287			EMS20	
291		CP1920.....		
294			EOA5	
298			EMS21	
302			CP21.....	
305			EOA12	
309				EMS22
313			CP22.....	
316			CP2122.....	
319	CPFORMST.....			
322		EOA7		
326			EMS23	
330		CP23.....		
333			EMS24	
337		CP2324.....		
340			EOA9	
344			EOA11	
348				EMS25
352			CP25.....	
355			EOA10	
359				EMS26

+	CP1	.01	1	FLOW TIME	13. 3.55	12. 3.55	12. 3.55	12. 3.55	12. 3.55	11. 3.55	11. 3.55	11. 3.55	11. 3.55
	HYDROGRAPH AT												
+	BMS2	.00	1	FLOW TIME	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50
+	2 COMBINED AT												
+	CP1-2	.01	1	FLOW TIME	15. 3.55	14. 3.55	14. 3.55	13. 3.55	13. 3.55	13. 3.55	13. 3.55	13. 3.55	13. 3.55
	HYDROGRAPH AT												
+	BMS3	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
	HYDROGRAPH AT												
+	EWA01	.00	1	FLOW TIME	8. 3.55	8. 3.55	8. 3.55	8. 3.55	7. 3.55	7. 3.55	7. 3.55	7. 3.55	7. 3.55
+	2 COMBINED AT												
+	CP3	.01	1	FLOW TIME	10. 3.55	9. 3.55	9. 3.55	9. 3.55	9. 3.55	9. 3.55	9. 3.55	9. 3.55	8. 3.55
	HYDROGRAPH AT												
+	BMS4	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
	HYDROGRAPH AT												
+	EWA2	.00	1	FLOW TIME	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50
	HYDROGRAPH AT												
+	EWA4	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
+	3 COMBINED AT												
+	CP4	.00	1	FLOW TIME	5. 3.50	5. 3.50	5. 3.50	4. 3.50	4. 3.50	4. 3.50	4. 3.50	4. 3.50	4. 3.50
+	2 COMBINED AT												
+	CP3-4	.01	1	FLOW TIME	14. 3.55	14. 3.55	13. 3.55	13. 3.55	13. 3.55	13. 3.55	12. 3.55	12. 3.55	12. 3.55
	HYDROGRAPH AT												
+	EWA8	.00	1	FLOW TIME	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50
	HYDROGRAPH AT												
+	EWA9	.00	1	FLOW TIME	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50
	HYDROGRAPH AT												
+	BMS6	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
+	3 COMBINED AT												
+	CP6	.00	1	FLOW TIME	6. 3.50	6. 3.50	6. 3.50	5. 3.50	5. 3.50	5. 3.50	5. 3.50	5. 3.50	5. 3.50
	HYDROGRAPH AT												
+	EWA3	.01	1	FLOW TIME	14. 3.55	14. 3.55	13. 3.55	13. 3.55	13. 3.55	12. 3.55	13. 3.55	12. 3.55	12. 3.55
	HYDROGRAPH AT												
+	BMS5	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
+	2 COMBINED AT												
+	CP5	.01	1	FLOW TIME	15. 3.55	15. 3.55	14. 3.55	14. 3.55	14. 3.55	14. 3.55	14. 3.55	13. 3.55	13. 3.55
+	2 COMBINED AT												
+	CP5-6	.01	1	FLOW TIME	20. 3.50	20. 3.50	19. 3.50	19. 3.50	18. 3.50	18. 3.50	18. 3.50	18. 3.50	18. 3.50
	HYDROGRAPH AT												
+	EWA10	.00	1	FLOW TIME	3. 3.50	3. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50
	HYDROGRAPH AT												
+	BMS8	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
+	2 COMBINED AT												
+	CP8	.00	1	FLOW TIME	3. 3.50	3. 3.50	3. 3.50	3. 3.50	3. 3.50	3. 3.50	3. 3.50	3. 3.50	3. 3.50
	HYDROGRAPH AT												
+	EWA5	.00	1	FLOW TIME	6. 3.50	6. 3.50	6. 3.50	6. 3.50	6. 3.50	6. 3.50	6. 3.50	6. 3.50	5. 3.50
	HYDROGRAPH AT												
+	BMS7	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50
+	2 COMBINED AT												
+	CP7	.00	1	FLOW TIME	7. 3.50	7. 3.50	7. 3.50	7. 3.50	7. 3.50	7. 3.50	7. 3.50	7. 3.50	6. 3.50
+	2 COMBINED AT												
+	CP7-8	.01	1	FLOW TIME	11. 3.50	11. 3.50	10. 3.50	10. 3.50	10. 3.50	10. 3.50	10. 3.50	10. 3.50	10. 3.50
+	4 COMBINED AT												
+	CPSCMR	.03	1	FLOW TIME	59. 3.50	58. 3.50	56. 3.50	54. 3.50	53. 3.50	53. 3.50	53. 3.50	52. 3.50	51. 3.50
	HYDROGRAPH AT												
+	EWA11	.00	1	FLOW TIME	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50	2. 3.50
	HYDROGRAPH AT												
+	BMS10	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50	1. 3.50

Central Neighborhood Flood
Control MP shows Q100=76 cfs

2 COMBINED AT	CP10	.00	1	FLOW	3.	3.	3.	3.	3.	3.	3.	3.	3.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EWA7	.00	1	FLOW	10.	10.	10.	9.	9.	9.	9.	9.	9.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMS9	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP9	.01	1	FLOW	11.	11.	10.	10.	10.	10.	10.	10.	10.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP910	.01	1	FLOW	14.	14.	14.	13.	13.	13.	13.	13.	13.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CPWASHTN	.04	1	FLOW	73.	72.	70.	67.	67.	66.	66.	65.	64.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EOA	.00	1	FLOW	6.	6.	6.	5.	5.	5.	5.	5.	5.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EMS11	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP11	.00	1	FLOW	7.	7.	6.	6.	6.	6.	6.	6.	6.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EOA2	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMS12	.00	1	FLOW	2.	2.	2.	2.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP12	.00	1	FLOW	2.	2.	2.	2.	2.	2.	2.	2.	2.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP1112	.01	1	FLOW	9.	9.	9.	8.	8.	8.	8.	8.	8.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EOA1	.01	1	FLOW	21.	21.	20.	19.	19.	19.	19.	18.	18.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EMS13	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP13	.01	1	FLOW	22.	22.	21.	20.	20.	20.	20.	19.	19.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT	EOA4	.00	1	FLOW	2.	2.	2.	2.	2.	2.	2.	2.	2.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMS14	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP14	.00	1	FLOW	3.	3.	3.	3.	3.	3.	3.	3.	3.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP1314	.02	1	FLOW	25.	25.	24.	23.	23.	22.	22.	22.	22.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EOA6	.00	1	FLOW	2.	2.	2.	2.	2.	2.	2.	2.	2.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMS16	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP16	.00	1	FLOW	3.	3.	3.	3.	3.	3.	3.	3.	3.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMS15	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP1516	.00	1	FLOW	4.	4.	4.	4.	4.	4.	4.	4.	4.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EOA8	.00	1	FLOW	3.	3.	3.	3.	3.	3.	3.	2.	2.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMS18	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP18	.00	1	FLOW	4.	4.	4.	4.	4.	4.	4.	4.	3.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EOA3	.01	1	FLOW	15.	14.	14.	13.	13.	13.	13.	13.	12.
+				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55

HYDROGRAPH AT														
+	RMS17	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT														
+	CP17	.01	1	FLOW	15.	15.	15.	14.	14.	14.	14.	13.	13.	13.
				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
2 COMBINED AT														
+	CP1718	.01	1	FLOW	19.	19.	18.	17.	17.	17.	17.	17.	16.	16.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
4 COMBINED AT														
+	CPPAIUTH	.03	1	FLOW	58.	57.	55.	53.	52.	51.	51.	50.	50.	50.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT														
+	BOA51	.01	1	FLOW	11.	11.	10.	10.	10.	10.	10.	9.	9.	9.
				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT														
+	BMS19	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT														
+	CP19	.01	1	FLOW	12.	11.	11.	11.	11.	10.	10.	10.	10.	10.
				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT														
+	BMS20	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT														
+	CP1920	.01	1	FLOW	13.	12.	12.	11.	11.	11.	11.	11.	11.	11.
				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT														
+	BOA5	.02	1	FLOW	25.	24.	23.	22.	22.	22.	21.	21.	21.	21.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT														
+	BMS21	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT														
+	CP21	.02	1	FLOW	26.	25.	24.	24.	23.	23.	23.	22.	22.	22.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT														
+	EOA12	.01	1	FLOW	24.	23.	23.	22.	22.	22.	21.	21.	21.	21.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT														
+	BMS22	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT														
+	CP22	.01	1	FLOW	25.	25.	24.	23.	23.	23.	23.	22.	22.	22.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT														
+	CP2122	.03	1	FLOW	51.	50.	48.	47.	46.	46.	45.	45.	44.	44.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT														
+	CPFORMST	.07	1	FLOW	121.	119.	115.	111.	109.	108.	107.	106.	105.	105.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT														
+	BOA7	.01	1	FLOW	12.	11.	11.	11.	10.	10.	10.	10.	10.	10.
				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT														
+	BMS23	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT														
+	CP23	.01	1	FLOW	12.	12.	12.	11.	11.	11.	11.	11.	11.	11.
				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT														
+	BMS24	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT														
+	CP2324	.01	1	FLOW	13.	13.	13.	12.	12.	12.	12.	12.	11.	11.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT														
+	BOA9	.00	1	FLOW	6.	6.	6.	6.	6.	6.	6.	6.	5.	5.
				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT														
+	BOA11	.00	1	FLOW	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT														
+	BMS25	.00	1	FLOW	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT														
+	CP25	.01	1	FLOW	12.	12.	11.	11.	11.	11.	11.	11.	10.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT														
+	BOA10	.00	1	FLOW	2.	2.	1.	1.	1.	1.	1.	1.	1.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT														
+	BMS26	.00	1	FLOW	7.	7.	7.	7.	7.	7.	6.	6.	6.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT														
+	CP26	.00	1	FLOW	9.	9.	8.	8.	8.	8.	8.	8.	8.	8.

				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT													
+	BOWENS	.08	1	FLOW	133.	130.	126.	122.	121.	120.	119.	117.	116.
				TIME	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
3 COMBINED AT													
+	CP2526	.09	1	FLOW	147.	145.	140.	136.	134.	132.	132.	130.	128.
				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
3 COMBINED AT													
+	CPOWENS	.17	1	FLOW	276.	271.	262.	254.	250.	248.	246.	243.	240.
				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
HYDROGRAPH AT													
+	EWAO	.05	1	FLOW	76.	74.	72.	70.	69.	68.	67.	67.	66.
				TIME	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55

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

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- **10-YEAR AND 100-YEAR INLET SUMMARY**

Main Street US 95 to Owens Avenue

Table 2: Drop Inlet Location Summary- 10 year Storm

Drop Inlet Number	Station	Concentra- tion Point	Added Bypass Flow (cfs)	TOTAL DESIGN DISCHARGE TO INLET	10-year Q10 (cfs)	Intercepted Flow (cfs)	Bypass Flow (cfs)	Carryover Inlet	Longitudinal Street Slope %	Street Cross Slope %	Spread (ft)	Allowable Spread (ft)	Velocity V (fps)	Depth, D (ft)	V*D ≤6	Inlet Type
Bonanza System																
DI-1	111+81.74	EMS1	0	1		0.96	0.04	DI-3	0.63	2.00	7.09	34.3	1.75	0.23	0.4	NDOT TYPE 3
DI-2	112+21.93	CP2	0	1	1	0.98	0.02	east to Bonanza	0.63	2.00	7.11		1.74	0.23	0.4	NDOT TYPE 3
DI-3	112+11.34	-	0.04	0.04	-		0		0.62	2.00		sag			0.0	NDOT TYPE 3
DI-4	111+81.74	EBR1	0	6	6	6	0								0.0	NDOT TYPE 2
Washington System																
DI-5	118+40.55	CP3	0	5	5	4.42	0.58	DI-7	0.30	2.00	16.19	16.5	1.86	0.41	0.8	DI-TYPE CM
DI-6	118+40.55	CP4	0	2	2	1.84	0.16	DI-8	0.30	2.00	11.23	16.5	1.51	0.31	0.5	DI-TYPE CM
DI-7	121+82.99	CP5	0.58	7.58	7	4.42	3.16	DI-9	0.70	2.00	16.12	16.5	2.84	0.42	1.2	DI-TYPE CM
DI-8	121+82.99	CP6	0.16	3.16	3	2.48	0.68	DI-10	0.70	2.00	11.38	16.5	2.32	0.32	0.7	DI-TYPE CM
DI-9	125+22.32	CP7	3.16	7.16	4	4.07	3.09	DI-11	1.67	2.00	13.29	16.5	3.91	0.36	1.4	DI-TYPE CM
DI-10	126+22.79	CP8	0.68	2.68	2	2.16	0.52	DI-12	1.67	2.00	8.85	16.5	3.15	0.27	0.9	DI-TYPE CM
DI-11	128+44.83	CP9	3.09	8.09	5	5.50	2.59	Washington	0.85	2.00	15.94	26.5	3.10	0.41	1.3	DI-TYPE CM
DI-12	128+69.66	CP10	0.52	2.52	2	2.07	0.45	Washington	0.82	2.00	10.03	16.5	2.35	0.29	0.7	DI-TYPE CM
						Total Flows to Washington:										
Owens System: No 10 year split flow bypass																
DI-13	133+55.28	CP11	0.00	3.00	3	2.34	0.66	DI-15	2.20	2.00	8.76	16.5	3.60	0.27	1.0	DI-TYPE CM
DI-14	133+56.54	CP12	0.00	1.00	1	0.99	0.01	DI-16	2.20	2.00	5.20	16.5	2.96	0.19	0.6	DI-TYPE CM
DI-15	137+50.21	CP13	0.66	9.66	9	4.91	4.75	DI-17	3.80	2.00	12.71	16.5	5.74	0.34	2.0	DI-TYPE CM
DI-16	137+50.21	CP14	0.01	2.01	2	1.78	0.23	DI-18	3.80	2.00	6.43	16.5	4.16	0.22	0.9	DI-TYPE CM
DI-17	141+09.70	CP15-EMS15	4.75	5.75	1	3.62	2.13	DI-19	4.74	2.00	9.81	16.5	5.58	0.29	1.6	DI-TYPE CM
DI-18	140+98.27	CP16	0.23	2.23	2	1.94	0.29	DI-20	4.72	2.00	6.43	16.5	4.63	0.22	1.0	DI-TYPE CM
DI-19	143+49.91	CP17	2.13	9.13	7	4.73	4.40	DI-21	3.26	2.00	12.81	16.5	5.34	0.35	1.9	DI-TYPE CM
DI-20	143+53.12	CP18	0.29	2.29	2	1.95	0.34	DI-22	3.30	2.00	7.09	16.5	4.02	0.23	0.9	DI-TYPE CM
DI-21	147+43.48	CP19	4.40	9.40	5	5.72	3.68	DI-23	3.28	2.00	12.94	16.5	5.39	0.35	1.9	DI-TYPE CM
DI-22	147+43.48	CP20-EMS20	0.34	1.34	1	1.29	0.05	DI-24	3.28	2.00	5.46	16.5	3.66	0.20	0.7	DI-TYPE CM
DI-23	150+97.15	CP21	3.68	14.68	11	8.92	5.76	DI-25	5.00	2.00	14.22	15.5	7.03	0.37	2.6	DI-TYPE CM
DI-24	150+97.15	CP22	0.05	14.05	14	6.15	7.90	DI-26	5.00	2.00	13.97	15.5	6.96	0.37	2.6	DI-TYPE CM
DI-25	154+03.10	CP23	5.76	10.76	5	6.74	4.02	DI-27	4.05	2.00	13.35	15.5	5.94	0.33	2.0	DI-SPECIAL TYPE CM
DI-26	154+01.21	CP24-EMS24	7.90	8.90	1	3.66	5.24	DI-28	4.05	2.00	12.40	15.5	5.67	0.31	1.8	DI-SPECIAL TYPE CM
DI-27	158+01.57	CP25	4.02	9.02	5	4.53	4.49	Owens	1.30	3.00	12.05	15.5	4.09	0.41	1.7	DI-SPECIAL TYPE CM
DI-28	159+01.69	CP26	5.24	10.24	5	5.58	4.66	Owens	1.29	4.00	10.59	24.25	4.52	0.46	2.1	Modified Type 11
					Total flow to Owens:		10.11									
					Total flow to Owens:		9.15									

Main Street US 95 to Owens Avenue 100 YEAR

Drop Inlet Summary												
Drop Inlet Number	Station	Concentra- tion Point	HEC-1 RESULTS	100-Year Design Discharge (cfs)	Intercepted Flow (cfs)	Bypass Flow (cfs)	Carryover Inlet	Longitudinal Street Slope %	Street Cross Slope %	Velocity V (fps)	Depth, D (ft)	V/D <8
Bonanza System												
DI-1	111+81.74	EMS1	2	2	1.63	0.37	DI-3	4.00	2.00	2.01	0.28	0.6
DI-2	112+21.93	CP2	2	2	1.67	0.33	-	0.90	2.00	2	0.28	0.6
DI-3	112+11.34	-	0	0.37	-	0	-	0.62	2.00	-	-	-
DI-4	111+81.74	EBR1	11	11	-	0	-	sag	-	-	-	-
Washington System												
DI-5	118+40.55	CP3	10	10	7.56	2.44	DI-7	0.30	2.00	2.20	0.51	1
DI-6	118+40.55	CP4	5	5	3.63	1.37	DI-8	0.30	2.00	1.86	0.41	1
DI-7	121+82.99	CP5	15	17.44	7.33	10.11	DI-9	0.70	2.00	3.47	0.54	2
DI-8	121+82.99	CP6	6	7.37	4.32	3.05	DI-10	0.70	2.00	2.82	0.41	1
DI-9	125+22.32	CP7	7	17.11	6.83	10.28	DI-11	1.67	2.00	4.80	0.46	2
DI-10	125+22.79	CP8	3	6.05	3.67	2.38	DI-12	1.67	2.00	3.76	0.34	1
DI-11	128+44.83	CP9	11	21.28	10.79	10.49	WASHINGTON	0.85	2.00	3.92	0.55	2
DI-12	128+69.66	CP10	3	5.38	3.50	1.88	WASHINGTON	0.82	2.00	2.78	0.36	1
				Total Flows to Washington:		12.37						
Owens System:												
No FLOWSPLIT CALCULATION: Total flow toward Washington is at least 13 cfs, which is maintained on the east side of the street crown. The capacity of the half the street at Main and Washington is higher than the flows bypassing, so no split will occur with the 100-year flow. 13 cfs will be conveyed down stream west along Washington Ave.												
DI-13	133+55.28	CP11	7	7.00	4.01	2.99	DI-15	2.20	2.00	4.32	0.34	1.5
DI-14	133+56.54	CP12	2	2.00	1.76	0.24	DI-16	2.20	2.00	3.32	0.24	0.8
DI-15	137+50.21	CP13	22	24.99	8.35	16.64	DI-17	3.80	2.00	7.18	0.46	3.3
DI-16	137+50.21	CP14	3	3.24	2.49	0.75	DI-18	3.80	2.00	4.54	0.25	1.1
DI-17	141+09.70	CP15-EMS15	1	17.64	6.90	10.74	DI-19	4.74	2.00	7.19	0.40	2.9
DI-18	140+98.27	CP16	3	3.75	2.76	0.99	DI-20	4.72	2.00	5.10	0.25	1.3
DI-19	143+49.91	CP17	15	25.74	8.63	17.11	DI-21	3.26	2.00	6.82	0.47	3.2
DI-20	143+53.12	CP18	4	4.99	3.27	1.72	DI-22	3.30	2.00	4.7	0.29	1.4
DI-21	147+43.48	CP19	12	29.11	9.14	19.97	DI-23	3.28	2.00	7.05	0.49	3.5
DI-22	147+43.48	CP20-EMS20	1	2.72	2.20	0.52	DI-24	3.28	2.00	4.14	0.24	1.0
DI-23	150+97.15	CP21	26	45.97	15.02	30.95	DI-25	5.00	2.00	9.23	0.53	4.9
DI-24	150+97.15	CP22	25	25.52	6.21	19.31	DI-26	5.00	2.00	7.94	0.42	3.3
DI-25	154+03.10	CP23	12	42.95	13.13	29.82	DI-27	4.05	2.00	8.34	0.51	4.3
DI-26	154+01.21	CP24-EMS24	1	20.31	5.79	14.52	DI-28	4.05	2.00	6.93	0.40	2.8
DI-27	158+01.57	CP25	12	41.82	11.30	30.52	Owens	1.30	3.00	5.98	0.70	4.2
DI-28	159+01.69	CP26	9	23.52	10.97	12.55	Owens	1.29	4.00	5.56	0.62	3.4
			Total flow to Owens:				43.07					

• **FLOWMASTER INLET CALCULATIONS**

111+81.74

Worksheet for DI-1

Project Description

Solve For Efficiency

Input Data

Discharge	1.00	ft ³ /s
Slope	0.00630	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	3.50	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	4.00	ft ✓

NDOT TYPE 3 DI

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	96.27	%
Intercepted Flow	0.96	ft ³ /s
Bypass Flow	0.04	ft ³ /s
Spread	7.09	ft
Depth	0.23	ft
Flow Area	0.57	ft ²
Gutter Depression	0.09	ft
Total Depression	0.38	ft
Velocity	1.75	ft/s
Splash Over Velocity	8.13	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.19	
Grate Flow Ratio	0.60	
Equivalent Cross Slope	0.17260	ft/ft
Active Grate Length	2.00	ft
Length Factor	0.44	
Total Interception Length	4.50	ft

11/18/74

Worksheet for DI-1_100YR**Project Description**

Solve For Efficiency

Input Data

Discharge	2.00	ft ³ /s
Slope	0.00630	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	3.50	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	4.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	81.60	%
Intercepted Flow	1.63	ft ³ /s
Bypass Flow	0.37	ft ³ /s
Spread	9.62	ft
Depth	0.28	ft
Flow Area	0.99	ft ²
Gutter Depression	0.09	ft
Total Depression	0.38	ft
Velocity	2.01	ft/s
Splash Over Velocity	8.13	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.16	
Grate Flow Ratio	0.46	
Equivalent Cross Slope	0.13640	ft/ft
Active Grate Length	2.00	ft
Length Factor	0.29	
Total Interception Length	6.93	ft

112 + 21.93

Worksheet for DI-2**Project Description**

Solve For Efficiency

Input Data

Discharge	1.00	ft ³ /s
Slope	0.00620	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	3.50	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	3.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	4.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	97.74	%
Intercepted Flow	0.98	ft ³ /s
Bypass Flow	0.02	ft ³ /s
Spread	7.11	ft
Depth	0.23	ft
Flow Area	0.57	ft ²
Gutter Depression	0.09	ft
Total Depression	0.38	ft
Velocity	1.74	ft/s
Splash Over Velocity	7.58	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.15	
Grate Flow Ratio	0.60	
Equivalent Cross Slope	0.17214	ft/ft
Active Grate Length	1.75	ft
Length Factor	0.50	
Total Interception Length	4.49	ft

112+21.93

Worksheet for DI-2-100 YEAR

Project Description

Solve For Efficiency

Input Data

Discharge	2.00	ft ³ /s
Slope	0.00620	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	3.50	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	3.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	4.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	83.35	%
Intercepted Flow	1.67	ft ³ /s
Bypass Flow	0.33	ft ³ /s
Spread	9.65	ft
Depth	0.28	ft
Flow Area	1.00	ft ²
Gutter Depression	0.09	ft
Total Depression	0.38	ft
Velocity	2.00	ft/s
Splash Over Velocity	7.58	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.12	
Grate Flow Ratio	0.46	
Equivalent Cross Slope	0.13602	ft/ft
Active Grate Length	1.75	ft
Length Factor	0.33	
Total Interception Length	6.91	ft

4

11/1+81.74

Worksheet for DI#4 Inlet In Sag - 10-yr

Project Description

Solve For

Spread

(BAGN EBR1)

Input Data

Discharge	6.00	ft ³ /s	Q10
Left Side Slope	0.00	ft/ft (H:V)	
Right Side Slope	0.00	ft/ft (H:V)	
Bottom Width	2.00	ft	
Grate Width	2.00	ft	
Grate Length	3.00	ft	
Local Depression	4.00	in	
Local Depression Width	2.00	ft	
Grate Type	P-50 mm (P-1-7/8")		
Clogging	50.00	%	

← NDOT TYPE 2

Results

Spread	2.00	ft	
Depth	0.06	ft	← 0.5' CURB OK
Wetted Perimeter	2.13	ft	
Top Width	2.00	ft	
Open Grate Area	2.70	ft ²	
Active Grate Weir Length	8.00	ft	

Messages

Notes

LOCATED WITHIN BACK OF SIDEWALK IN 2' SIDEWALK DRAIN.

111+81.74

Worksheet for DI#4 Inlet In Sag - 100-yr

Project Description

Solve For Spread

Input Data

Discharge	11.00	ft ³ /s	← Q ₁₀₀
Left Side Slope	0.00	ft/ft (H:V)	
Right Side Slope	0.00	ft/ft (H:V)	
Bottom Width	2.00	ft	
Grate Width	2.00	ft	
Grate Length	3.00	ft	
Local Depression	4.00	in	
Local Depression Width	2.00	ft	
Grate Type	P-50 mm (P-1-7/8")		← NOT TYPE 3
Clogging	50.00	%	

Results

Spread	2.00	ft
Depth	0.26	ft ← < 0.5' CURB
Wetted Perimeter	2.52	ft
Top Width	2.00	ft
Open Grate Area	2.70	ft ²
Active Grate Weir Length	8.00	ft

Messages

Notes

LOCATED WITHIN BACK OF SIDEWALK IN 2' SIDEWALK DRAIN.

6

Worksheet for DI-5_Combination Inlet On Grade - 10 YR

Project Description

Solve For Efficiency

Input Data

Discharge	5.00	ft ³ /s
Slope	0.00300	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	7.50	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	7.50	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	88.42	%
Intercepted Flow	4.42	ft ³ /s
Bypass Flow	0.58	ft ³ /s
Spread	16.19	ft
Depth	0.41	ft
Flow Area	2.69	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	1.86	ft/s
Splash Over Velocity	8.05	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.48	
Grate Flow Ratio	0.27	
Equivalent Cross Slope	0.09671	ft/ft
Active Grate Length	3.75	ft
Length Factor	0.37	
Total Interception Length	10.03	ft

Worksheet for 100YR- DI-5 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	10.00	ft ³ /s
Slope	0.00300	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	7.50	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	7.50	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	75.56	%
Intercepted Flow	7.56	ft ³ /s
Bypass Flow	2.44	ft ³ /s
Spread	21.17	ft
Depth	0.51	ft
Flow Area	4.55	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	2.20	ft/s
Splash Over Velocity	8.05	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.40	
Grate Flow Ratio	0.21	
Equivalent Cross Slope	0.07795	ft/ft
Active Grate Length	3.75	ft
Length Factor	0.25	
Total Interception Length	15.27	ft

Worksheet for DI-6_Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	2.00	ft ³ /s
Slope	0.00300	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	91.96	%
Intercepted Flow	1.84	ft ³ /s
Bypass Flow	0.16	ft ³ /s
Spread	11.23	ft
Depth	0.31	ft
Flow Area	1.33	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	1.51	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.34	
Grate Flow Ratio	0.39	
Equivalent Cross Slope	0.13123	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.44	
Total Interception Length	5.68	ft

Worksheet for 100 YR DI-6 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	5.00	ft ³ /s
Slope	0.00300	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	72.56	%
Intercepted Flow	3.63	ft ³ /s
Bypass Flow	1.37	ft ³ /s
Spread	16.19	ft
Depth	0.41	ft
Flow Area	2.69	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	1.86	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.26	
Grate Flow Ratio	0.27	
Equivalent Cross Slope	0.09671	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.25	
Total Interception Length	10.03	ft

Worksheet for DI-7 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	8.59	ft ³ /s
Slope	0.00700	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	2.50	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	4.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	51.42	%
Intercepted Flow	4.42	ft ³ /s
Bypass Flow	4.17	ft ³ /s
Spread	16.93	ft
Depth	0.43	ft
Flow Area	2.94	ft ²
Gutter Depression	0.09	ft
Total Depression	0.43	ft
Velocity	2.93	ft/s
Splash Over Velocity	4.61	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.03	
Grate Flow Ratio	0.26	
Equivalent Cross Slope	0.09472	ft/ft
Active Grate Length	1.25	ft
Length Factor	0.17	
Total Interception Length	16.43	ft

Worksheet for 100 YR DI-7 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	17.44	ft ³ /s
Slope	0.00700	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	2.50	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	4.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	37.71	%
Intercepted Flow	6.58	ft ³ /s
Bypass Flow	10.86	ft ³ /s
Spread	22.26	ft
Depth	0.54	ft
Flow Area	5.03	ft ²
Gutter Depression	0.09	ft
Total Depression	0.43	ft
Velocity	3.47	ft/s
Splash Over Velocity	4.61	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.02	
Grate Flow Ratio	0.20	
Equivalent Cross Slope	0.07602	ft/ft
Active Grate Length	1.25	ft
Length Factor	0.11	
Total Interception Length	25.24	ft

Worksheet for DI-8 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	3.16	ft ³ /s
Slope	0.00700	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	78.43	%
Intercepted Flow	2.48	ft ³ /s
Bypass Flow	0.68	ft ³ /s
Spread	11.38	ft
Depth	0.32	ft
Flow Area	1.36	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	2.32	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.19	
Grate Flow Ratio	0.39	
Equivalent Cross Slope	0.12972	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.28	
Total Interception Length	8.94	ft

Worksheet for 100 YR DI-8 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	7.37	ft ³ /s
Slope	0.00700	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	58.59	%
Intercepted Flow	4.32	ft ³ /s
Bypass Flow	3.05	ft ³ /s
Spread	15.96	ft
Depth	0.41	ft
Flow Area	2.62	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	2.82	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.15	
Grate Flow Ratio	0.28	
Equivalent Cross Slope	0.09783	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.17	
Total Interception Length	15.11	ft

Worksheet for DI-9_Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	7.16	ft ³ /s
Slope	0.01670	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	56.83	%
Intercepted Flow	4.07	ft ³ /s
Bypass Flow	3.09	ft ³ /s
Spread	13.29	ft
Depth	0.36	ft
Flow Area	1.83	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	3.91	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.09	
Grate Flow Ratio	0.33	
Equivalent Cross Slope	0.11395	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.14	
Total Interception Length	17.68	ft

Worksheet for 100 YR DI-9 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	17.11	ft ³ /s
Slope	0.01670	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	39.91	%
Intercepted Flow	6.83	ft ³ /s
Bypass Flow	10.28	ft ³ /s
Spread	18.71	ft
Depth	0.46	ft
Flow Area	3.57	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	4.80	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.06	
Grate Flow Ratio	0.23	
Equivalent Cross Slope	0.08598	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.08	
Total Interception Length	30.19	ft

Worksheet for DI-10 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	2.68	ft ³ /s
Slope	0.01670	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	80.68	%
Intercepted Flow	2.16	ft ³ /s
Bypass Flow	0.52	ft ³ /s
Spread	8.85	ft
Depth	0.27	ft
Flow Area	0.85	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	3.15	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.12	
Grate Flow Ratio	0.49	
Equivalent Cross Slope	0.15949	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.26	
Total Interception Length	9.56	ft

Worksheet for 100 YR DI-10 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	7.53	ft ³ /s
Slope	0.01670	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	55.72	%
Intercepted Flow	4.20	ft ³ /s
Bypass Flow	3.33	ft ³ /s
Spread	13.56	ft
Depth	0.36	ft
Flow Area	1.91	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	3.95	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.08	
Grate Flow Ratio	0.33	
Equivalent Cross Slope	0.11204	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.14	
Total Interception Length	18.24	ft

Worksheet for DI-11 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	8.09	ft ³ /s
Slope	0.00850	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	7.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	7.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	67.95	%
Intercepted Flow	5.50	ft ³ /s
Bypass Flow	2.59	ft ³ /s
Spread	15.94	ft
Depth	0.41	ft
Flow Area	2.61	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	3.10	ft/s
Splash Over Velocity	7.72	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.24	
Grate Flow Ratio	0.28	
Equivalent Cross Slope	0.09795	ft/ft
Active Grate Length	3.50	ft
Length Factor	0.21	
Total Interception Length	16.64	ft

Worksheet for 100 YR DI-11 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	21.28	ft ³ /s
Slope	0.00850	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	7.50	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	7.50	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	50.71	%
Intercepted Flow	10.79	ft ³ /s
Bypass Flow	10.49	ft ³ /s
Spread	23.17	ft
Depth	0.55	ft
Flow Area	5.43	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	3.92	ft/s
Splash Over Velocity	8.05	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.19	
Grate Flow Ratio	0.19	
Equivalent Cross Slope	0.07274	ft/ft
Active Grate Length	3.75	ft
Length Factor	0.13	
Total Interception Length	29.87	ft

Worksheet for DI-12 Combination Inlet On Grade - 10- yr

Project Description

Solve For Efficiency

Input Data

Discharge	2.52	ft ³ /s
Slope	0.00820	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	2.50	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	4.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	82.01	%
Intercepted Flow	2.07	ft ³ /s
Bypass Flow	0.45	ft ³ /s
Spread	10.03	ft
Depth	0.29	ft
Flow Area	1.07	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	2.35	ft/s
Splash Over Velocity	4.61	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.05	
Grate Flow Ratio	0.44	
Equivalent Cross Slope	0.14407	ft/ft
Active Grate Length	1.25	ft
Length Factor	0.34	
Total Interception Length	8.00	ft

Worksheet for 100 YR DI-12 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	5.38	ft ³ /s
Slope	0.00820	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	65.06	%
Intercepted Flow	3.50	ft ³ /s
Bypass Flow	1.88	ft ³ /s
Spread	13.66	ft
Depth	0.36	ft
Flow Area	1.93	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	2.78	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.15	
Grate Flow Ratio	0.32	
Equivalent Cross Slope	0.11132	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.19	
Total Interception Length	12.85	ft

Worksheet for DI-13 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	3.00	ft ³ /s
Slope	0.02200	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	77.88	%
Intercepted Flow	2.34	ft ³ /s
Bypass Flow	0.66	ft ³ /s
Spread	8.76	ft
Depth	0.27	ft
Flow Area	0.83	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	3.60	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.10	
Grate Flow Ratio	0.50	
Equivalent Cross Slope	0.16088	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.23	
Total Interception Length	10.84	ft

Worksheet for 100 YR DI-13 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	7.00	ft ³ /s
Slope	0.02200	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	57.22	%
Intercepted Flow	4.01	ft ³ /s
Bypass Flow	2.99	ft ³ /s
Spread	12.46	ft
Depth	0.34	ft
Flow Area	1.62	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	4.32	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.07	
Grate Flow Ratio	0.36	
Equivalent Cross Slope	0.12026	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.14	
Total Interception Length	18.42	ft

Worksheet for DI-14 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	1.00	ft ³ /s
Slope	0.02200	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	99.49	%
Intercepted Flow	0.99	ft ³ /s
Bypass Flow	0.01	ft ³ /s
Spread	5.20	ft
Depth	0.19	ft
Flow Area	0.34	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	2.96	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.13	
Grate Flow Ratio	0.75	
Equivalent Cross Slope	0.23198	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.46	
Total Interception Length	5.48	ft

Worksheet for 100 YR DI-14_Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	2.00	ft ³ /s
Slope	0.02200	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	87.90	%
Intercepted Flow	1.76	ft ³ /s
Bypass Flow	0.24	ft ³ /s
Spread	7.31	ft
Depth	0.24	ft
Flow Area	0.60	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	3.32	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.11	
Grate Flow Ratio	0.58	
Equivalent Cross Slope	0.18494	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.30	
Total Interception Length	8.41	ft

Worksheet for DI-15 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	9.66	ft ³ /s
Slope	0.03800	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	50.85	%
Intercepted Flow	4.91	ft ³ /s
Bypass Flow	4.75	ft ³ /s
Spread	12.71	ft
Depth	0.34	ft
Flow Area	1.68	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	5.74	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.05	
Grate Flow Ratio	0.35	
Equivalent Cross Slope	0.11830	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.10	
Total Interception Length	25.09	ft

Worksheet for 100 YR DI-15 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	24.99	ft ³ /s
Slope	0.03800	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	33.41	%
Intercepted Flow	8.35	ft ³ /s
Bypass Flow	16.64	ft ³ /s
Spread	18.47	ft
Depth	0.46	ft
Flow Area	3.48	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	7.18	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	0.95	
Side Flow Factor	0.03	
Grate Flow Ratio	0.24	
Equivalent Cross Slope	0.08685	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.06	
Total Interception Length	45.02	ft

Worksheet for DI-16 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	2.01	ft ³ /s
Slope	0.03800	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	88.74	%
Intercepted Flow	1.78	ft ³ /s
Bypass Flow	0.23	ft ³ /s
Spread	6.45	ft
Depth	0.22	ft
Flow Area	0.48	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	4.16	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.08	
Grate Flow Ratio	0.65	
Equivalent Cross Slope	0.20243	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.27	
Total Interception Length	9.40	ft

Worksheet for 100 YR DI-16_Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	3.24	ft ³ /s
Slope	0.03800	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	76.81	%
Intercepted Flow	2.49	ft ³ /s
Bypass Flow	0.75	ft ³ /s
Spread	8.04	ft
Depth	0.25	ft
Flow Area	0.71	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	4.54	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.07	
Grate Flow Ratio	0.54	
Equivalent Cross Slope	0.17216	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.20	
Total Interception Length	12.66	ft

Worksheet for DI-17_Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	5.75	ft ³ /s
Slope	0.04740	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	63.01	%
Intercepted Flow	3.62	ft ³ /s
Bypass Flow	2.13	ft ³ /s
Spread	9.81	ft
Depth	0.29	ft
Flow Area	1.03	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	5.58	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.05	
Grate Flow Ratio	0.45	
Equivalent Cross Slope	0.14670	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.13	
Total Interception Length	18.95	ft

Worksheet for 100 YR DI-17 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	17.64	ft ³ /s
Slope	0.04740	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	39.10	%
Intercepted Flow	6.90	ft ³ /s
Bypass Flow	10.74	ft ³ /s
Spread	15.45	ft
Depth	0.40	ft
Flow Area	2.45	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	7.19	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	0.95	
Side Flow Factor	0.03	
Grate Flow Ratio	0.29	
Equivalent Cross Slope	0.10051	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.07	
Total Interception Length	38.07	ft

Worksheet for DI-18 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	2.23	ft ³ /s
Slope	0.04720	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	86.90	%
Intercepted Flow	1.94	ft ³ /s
Bypass Flow	0.29	ft ³ /s
Spread	6.43	ft
Depth	0.22	ft
Flow Area	0.48	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	4.63	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.06	
Grate Flow Ratio	0.65	
Equivalent Cross Slope	0.20274	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.24	
Total Interception Length	10.47	ft

Worksheet for 100 YR DI-18 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	3.75	ft ³ /s
Slope	0.04720	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	73.70	%
Intercepted Flow	2.76	ft ³ /s
Bypass Flow	0.99	ft ³ /s
Spread	8.17	ft
Depth	0.25	ft
Flow Area	0.74	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	5.10	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.06	
Grate Flow Ratio	0.53	
Equivalent Cross Slope	0.16993	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.17	
Total Interception Length	14.48	ft

Worksheet for DI-19 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	9.13	ft ³ /s
Slope	0.03260	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	51.77	%
Intercepted Flow	4.73	ft ³ /s
Bypass Flow	4.40	ft ³ /s
Spread	12.81	ft
Depth	0.35	ft
Flow Area	1.71	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	5.34	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.05	
Grate Flow Ratio	0.35	
Equivalent Cross Slope	0.11749	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.11	
Total Interception Length	23.50	ft

Worksheet for 100 YR DI-19 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	25.74	ft ³ /s
Slope	0.03260	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	33.53	%
Intercepted Flow	8.63	ft ³ /s
Bypass Flow	17.11	ft ³ /s
Spread	19.25	ft
Depth	0.47	ft
Flow Area	3.77	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	6.82	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	0.98	
Side Flow Factor	0.03	
Grate Flow Ratio	0.23	
Equivalent Cross Slope	0.08404	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.06	
Total Interception Length	44.40	ft

Worksheet for DI-20 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	2.29	ft ³ /s
Slope	0.03300	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Varied	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	85.27	%
Intercepted Flow	1.95	ft ³ /s
Bypass Flow	0.34	ft ³ /s
Spread	7.09	ft
Depth	0.23	ft
Flow Area	0.57	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	4.02	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.08	
Grate Flow Ratio	0.60	
Equivalent Cross Slope	0.18922	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.25	
Total Interception Length	9.91	ft

Worksheet for DI-21 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	9.40	ft ³ /s
Slope	0.03280	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	7.50	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	7.50	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	60.83	%
Intercepted Flow	5.72	ft ³ /s
Bypass Flow	3.68	ft ³ /s
Spread	12.94	ft
Depth	0.35	ft
Flow Area	1.74	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	5.39	ft/s
Splash Over Velocity	8.05	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.12	
Grate Flow Ratio	0.34	
Equivalent Cross Slope	0.11647	ft/ft
Active Grate Length	3.75	ft
Length Factor	0.16	
Total Interception Length	23.96	ft

Worksheet for 100 YR DI-21 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	29.11	ft ³ /s
Slope	0.03280	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	31.41	%
Intercepted Flow	9.14	ft ³ /s
Bypass Flow	19.97	ft ³ /s
Spread	20.16	ft
Depth	0.49	ft
Flow Area	4.13	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	7.05	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	0.96	
Side Flow Factor	0.03	
Grate Flow Ratio	0.22	
Equivalent Cross Slope	0.08101	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.05	
Total Interception Length	47.89	ft

Worksheet for DI-22_Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	1.34	ft ³ /s
Slope	0.03280	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	98.56	%
Intercepted Flow	1.29	ft ³ /s
Bypass Flow	0.05	ft ³ /s
Spread	5.46	ft
Depth	0.20	ft
Flow Area	0.37	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	3.66	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.10	
Grate Flow Ratio	0.73	
Equivalent Cross Slope	0.22539	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.35	
Total Interception Length	7.11	ft

Worksheet for 100 YR DI-22 Combination Inlet On Grade - 1

Project Description

Solve For

Efficiency

Input Data

Discharge	2.72	ft ³ /s
Slope	0.03280	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option

Use Both

Grate Flow Option

Exclude None

Results

Efficiency	80.94	%
Intercepted Flow	2.20	ft ³ /s
Bypass Flow	0.52	ft ³ /s
Spread	7.68	ft
Depth	0.24	ft
Flow Area	0.66	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	4.14	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.08	
Grate Flow Ratio	0.56	
Equivalent Cross Slope	0.17826	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.23	
Total Interception Length	11.02	ft

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Worksheet for DI-23_Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	14.68	ft ³ /s
Slope	0.05000	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	2.50	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	10.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	60.76	%
Intercepted Flow	8.92	ft ³ /s
Bypass Flow	5.76	ft ³ /s
Spread	14.22	ft
Depth	0.37	ft
Flow Area	2.09	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	7.03	ft/s
Splash Over Velocity	4.61	ft/s
Frontal Flow Factor	0.78	
Side Flow Factor	0.01	
Grate Flow Ratio	0.31	
Equivalent Cross Slope	0.10769	ft/ft
Active Grate Length	1.25	ft
Length Factor	0.25	
Total Interception Length	34.36	ft

Worksheet for 100 YR DI-23 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	45.97	ft ³ /s
Slope	0.05000	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	2.50	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	10.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	32.68	%
Intercepted Flow	15.02	ft ³ /s
Bypass Flow	30.95	ft ³ /s
Spread	22.16	ft
Depth	0.53	ft
Flow Area	4.98	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	9.23	ft/s
Splash Over Velocity	4.61	ft/s
Frontal Flow Factor	0.58	
Side Flow Factor	0.00	
Grate Flow Ratio	0.20	
Equivalent Cross Slope	0.07525	ft/ft
Active Grate Length	1.25	ft
Length Factor	0.13	
Total Interception Length	68.82	ft

Worksheet for DI-24 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	14.05	ft ³ /s
Slope	0.05000	ft/ft
Gutter Width	1.50	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.50	ft
Grate Width	1.50	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	43.78	%
Intercepted Flow	6.15	ft ³ /s
Bypass Flow	7.90	ft ³ /s
Spread	13.97	ft
Depth	0.37	ft
Flow Area	2.02	ft ²
Gutter Depression	0.09	ft
Total Depression	0.42	ft
Velocity	6.96	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	0.97	
Side Flow Factor	0.03	
Grate Flow Ratio	0.32	
Equivalent Cross Slope	0.10927	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.07	
Total Interception Length	33.44	ft

Worksheet for 100 YR DI-24_Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	25.52	ft ³ /s
Slope	0.05000	ft/ft
Gutter Width	1.00	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.00	ft
Grate Width	1.00	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	24.35	%
Intercepted Flow	6.21	ft ³ /s
Bypass Flow	19.31	ft ³ /s
Spread	17.84	ft
Depth	0.42	ft
Flow Area	3.21	ft ²
Gutter Depression	0.06	ft
Total Depression	0.39	ft
Velocity	7.94	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	0.88	
Side Flow Factor	0.03	
Grate Flow Ratio	0.16	
Equivalent Cross Slope	0.08316	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.05	
Total Interception Length	50.62	ft

Worksheet for DI-25 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	10.76	ft ³ /s
Slope	0.04050	ft/ft
Gutter Width	1.00	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.00	ft
Grate Width	1.00	ft
Grate Length	2.50	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	10.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	62.68	%
Intercepted Flow	6.74	ft ³ /s
Bypass Flow	4.02	ft ³ /s
Spread	13.35	ft
Depth	0.33	ft
Flow Area	1.81	ft ²
Gutter Depression	0.06	ft
Total Depression	0.39	ft
Velocity	5.94	ft/s
Splash Over Velocity	4.61	ft/s
Frontal Flow Factor	0.88	
Side Flow Factor	0.01	
Grate Flow Ratio	0.22	
Equivalent Cross Slope	0.10565	ft/ft
Active Grate Length	1.25	ft
Length Factor	0.31	
Total Interception Length	28.64	ft

Worksheet for 100 YR DI-25 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	42.95	ft ³ /s
Slope	0.04050	ft/ft
Gutter Width	1.00	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.00	ft
Grate Width	1.00	ft
Grate Length	2.50	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	10.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	30.57	%
Intercepted Flow	13.13	ft ³ /s
Bypass Flow	29.82	ft ³ /s
Spread	22.62	ft
Depth	0.51	ft
Flow Area	5.15	ft ²
Gutter Depression	0.06	ft
Total Depression	0.39	ft
Velocity	8.34	ft/s
Splash Over Velocity	4.61	ft/s
Frontal Flow Factor	0.66	
Side Flow Factor	0.00	
Grate Flow Ratio	0.13	
Equivalent Cross Slope	0.06924	ft/ft
Active Grate Length	1.25	ft
Length Factor	0.13	
Total Interception Length	66.00	ft

Worksheet for DI-26 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	8.90	ft ³ /s
Slope	0.04050	ft/ft
Gutter Width	1.00	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.00	ft
Grate Width	1.00	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	41.10	%
Intercepted Flow	3.66	ft ³ /s
Bypass Flow	5.24	ft ³ /s
Spread	12.40	ft
Depth	0.31	ft
Flow Area	1.57	ft ²
Gutter Depression	0.06	ft
Total Depression	0.39	ft
Velocity	5.67	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.05	
Grate Flow Ratio	0.24	
Equivalent Cross Slope	0.11248	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.10	
Total Interception Length	25.47	ft

Worksheet for 100 YR DI-26 Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	20.31	ft ³ /s
Slope	0.04050	ft/ft
Gutter Width	1.00	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.00	ft
Grate Width	1.00	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	28.50	%
Intercepted Flow	5.79	ft ³ /s
Bypass Flow	14.52	ft ³ /s
Spread	17.03	ft
Depth	0.40	ft
Flow Area	2.93	ft ²
Gutter Depression	0.06	ft
Total Depression	0.39	ft
Velocity	6.93	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	0.97	
Side Flow Factor	0.03	
Grate Flow Ratio	0.17	
Equivalent Cross Slope	0.08635	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.06	
Total Interception Length	42.21	ft

Worksheet for DI-27 Combination Inlet On Grade - 10 yr

Project Description

Solve For Efficiency

Input Data

Discharge	9.02	ft ³ /s
Slope	0.01300	ft/ft
Gutter Width	1.00	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.03	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.00	ft
Grate Width	1.00	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	50.25	%
Intercepted Flow	4.53	ft ³ /s
Bypass Flow	4.49	ft ³ /s
Spread	12.05	ft
Depth	0.41	ft
Flow Area	2.20	ft ²
Gutter Depression	0.05	ft
Total Depression	0.38	ft
Velocity	4.09	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.12	
Grate Flow Ratio	0.23	
Equivalent Cross Slope	0.11673	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.14	
Total Interception Length	17.81	ft

Worksheet for 100 YR DI-27_Combination Inlet On Grade - 1

Project Description

Solve For Efficiency

Input Data

Discharge	41.82	ft ³ /s
Slope	0.01300	ft/ft
Gutter Width	1.00	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.03	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.00	ft
Grate Width	1.00	ft
Grate Length	5.00	ft
Grate Type	Curved Vaned	
Clogging	50.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	27.02	%
Intercepted Flow	11.30	ft ³ /s
Bypass Flow	30.52	ft ³ /s
Spread	21.55	ft
Depth	0.70	ft
Flow Area	6.99	ft ²
Gutter Depression	0.05	ft
Total Depression	0.38	ft
Velocity	5.98	ft/s
Splash Over Velocity	6.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.06	
Grate Flow Ratio	0.13	
Equivalent Cross Slope	0.07832	ft/ft
Active Grate Length	2.50	ft
Length Factor	0.06	
Total Interception Length	43.10	ft

Worksheet for DI-28_Combination Mod Type11

Project Description

Solve For Efficiency

Input Data

Discharge	10.24	ft ³ /s
Slope	0.01290	ft/ft
Gutter Width	1.00	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.04	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	5.00	ft
Grate Width	1.00	ft
Grate Length	6.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	6.50	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	54.49	%
Intercepted Flow	5.58	ft ³ /s
Bypass Flow	4.66	ft ³ /s
Spread	10.59	ft
Depth	0.46	ft
Flow Area	2.26	ft ²
Gutter Depression	0.04	ft
Total Depression	0.37	ft
Velocity	4.52	ft/s
Splash Over Velocity	10.37	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.21	
Grate Flow Ratio	0.25	
Equivalent Cross Slope	0.05846	ft/ft
Active Grate Length	3.25	ft
Length Factor	0.11	
Total Interception Length	28.38	ft

Worksheet for 100 YR DI-28 Combination Mod Type11

Project Description

Solve For Efficiency

Input Data

Discharge	23.52	ft ³ /s
Slope	0.01290	ft/ft
Gutter Width	1.00	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.04	ft/ft
Roughness Coefficient	0.016	
Local Depression	4.00	in
Local Depression Width	1.00	ft
Grate Width	1.00	ft
Grate Length	6.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	6.50	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	46.62	%
Intercepted Flow	10.97	ft ³ /s
Bypass Flow	12.55	ft ³ /s
Spread	14.52	ft
Depth	0.62	ft
Flow Area	4.23	ft ²
Gutter Depression	0.04	ft
Total Depression	0.37	ft
Velocity	5.56	ft/s
Splash Over Velocity	10.37	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.15	
Grate Flow Ratio	0.18	
Equivalent Cross Slope	0.10793	ft/ft
Active Grate Length	3.25	ft
Length Factor	0.12	
Total Interception Length	27.86	ft

• **WSPG OUTPUT**

 Water Surface Profile Gradient (WSPG)
 XP WSPG
 Engine Version 1.3 06/09/2010
 XP Software www.xpsoftware.com

INPUT FILE

 C:\Users\p0044959\XPS\wspg2010\Samples\MAIN STREET\BANANZA-OWENS_2013.wsx
 Computed 12/08/13 19:34:49

TITLE INFORMATION

RESULTS

Main Line													
Compsite Profile:													
ELEMENT	TYPE	STATION	INVERT	GROUND	W.S.	DEPTH	Q	VELOC.	VELOC.	ENERGY	SUPER		
CRITICAL FROUDE	SLOPE	NORMAL	CROSS										
NAME	NUMBER	DEPTH	ELEV	ELEV	ELEV			HEAD	GRADE	LN	ELEV		
DEPTH			SECTION										
###													
"Node20"	Outlet	-16224.00	1898.30	1902.61	1900.747	2.447	67.61	10.95	1.86	1902.61	0.000		
2.624	0.000	0.00000	0.000	Pipe									
"i.p."		-16113.56	1899.44	1903.75	1901.819	2.376	67.61	11.26	1.97	1903.79	0.000		
2.624	1.264	0.01035	2.449	Pipe									
"i.p."		-16043.60	1900.17	1904.48	1902.432	2.265	67.61	11.81	2.17	1904.60	0.000		
2.624	1.397	0.01035	2.449	Pipe									
"i.p."		-15997.89	1900.64	1904.95	1902.804	2.164	67.61	12.39	2.38	1905.19	0.000		
2.624	1.533	0.01035	2.449	Pipe									
"i.p."		-15961.99	1901.01	1905.32	1903.082	2.071	67.61	12.99	2.62	1905.70	0.000		
2.624	1.672	0.01035	2.449	Pipe									
"i.p."		-15931.68	1901.33	1905.64	1903.310	1.984	67.61	13.63	2.88	1906.19	0.000		
2.624	1.816	0.01035	2.449	Pipe									
"Link18"	Reach	-15905.12	1901.60	1906.00	1903.504	1.904	67.61	14.29	3.17	1906.67	0.000		
2.624	1.968	0.01035	2.449	Pipe									
"DI28"	Junction	-15899.12	1901.60	1906.57	1904.411	2.811	84.91	12.34	2.36	1906.77	0.000		
2.811	0.000	0.00000	0.000	Pipe									
"i.p."		-15890.41	1901.66	1906.63	1904.662	3.000	84.91	12.01	2.24	1906.90	0.000		
2.811	0.000	0.00712	3.000	Pipe									
"Link17"	Reach	-15816.23	1902.19	1907.34	1905.864	3.674	84.91	12.01	2.24	1908.10	0.000		
2.811	0.000	0.00712	3.000	Pipe									
"MH13"	Junction	-15811.23	1902.19	1907.34	1906.340	4.150	81.05	11.47	2.04	1908.38	0.000		
2.780	0.000	0.00000	0.000	Pipe									
"Link16"	Reach	-15405.60	1906.00	1916.42	1912.329	6.329	81.05	11.47	2.04	1914.37	0.000		
2.780	0.000	0.00939	3.000	Pipe									
"MH12"	Junction	-15400.60	1906.00	1964.20	1913.378	7.378	70.62	9.99	1.55	1914.93	0.000		
2.666	0.000	0.00000	0.000	Pipe									
HYDRAULIC	JUMP at	-15316.66	of length	0.14									
"i.p."		-15316.66	1909.64	1967.84	1914.319	4.680	70.62	9.99	1.55	1915.87	0.000		
2.666	0.000	0.04334	1.515	Pipe									
"i.p."		-15316.66	1909.64	1967.84	1911.191	1.553	70.62	19.13	5.68	1916.87	0.000		
2.666	3.027	0.04334	1.515	Pipe									
"i.p."		-15264.47	1911.90	1970.10	1913.472	1.571	70.62	18.84	5.51	1918.98	0.000		
2.666	2.969	0.04334	1.515	Pipe									
"i.p."		-15203.72	1914.53	1972.73	1916.166	1.632	70.62	17.97	5.01	1921.18	0.000		
2.666	2.760	0.04334	1.515	Pipe									
"i.p."		-15169.67	1916.01	1974.21	1917.706	1.697	70.62	17.13	4.56	1922.26	0.000		
2.666	2.564	0.04334	1.515	Pipe									
"i.p."		-15146.90	1917.00	1975.20	1918.761	1.765	70.62	16.33	4.14	1922.90	0.000		
2.666	2.378	0.04334	1.515	Pipe									
"i.p."		-15130.39	1917.71	1975.91	1919.549	1.836	70.62	15.57	3.77	1923.31	0.000		
2.666	2.203	0.04334	1.515	Pipe									
"i.p."		-15117.90	1918.25	1976.45	1920.166	1.913	70.62	14.85	3.42	1923.55	0.000		
2.666	2.037	0.04334	1.515	Pipe									
"i.p."		-15108.23	1918.67	1976.87	1920.667	1.994	70.62	14.16	3.11	1923.73	0.000		
2.666	1.880	0.04334	1.515	Pipe									
"Link15"	Reach	-15100.68	1919.00	1931.06	1921.081	2.081	70.62	13.50	2.83	1923.91	0.000		
2.666	1.729	0.04334	1.515	Pipe									
"MH11"	Junction	-15095.68	1919.00	1931.06	1920.279	1.279	55.68	19.38	5.83	1926.11	0.000		
2.420	0.000	0.00000	0.000	Pipe									
"i.p."		-15079.40	1919.79	1931.65	1921.072	1.279	55.68	19.38	5.83	1926.90	0.000		
2.420	3.470	0.04872	1.279	Pipe									
"i.p."		-14916.33	1927.74	1939.30	1929.054	1.318	55.68	18.62	5.38	1934.44	0.000		
2.420	3.274	0.04872	1.279	Pipe									
"i.p."		-14858.99	1930.53	1942.59	1931.899	1.367	55.68	17.75	4.89	1936.79	0.000		

CAPACITY OF
OUTLET PIPE

REMOVED
17cfs
DESIGN
Bubble

2.420	3.053	0.04872	1.279	Pipe											
	"i.p."	-14827.83	1932.05	1944.11	1933.468	1.418	55.68	16.92	4.45	1937.92	0.000				
2.420	2.846	0.04872	1.279	Pipe											
	"i.p."	-14807.16	1933.06	1945.12	1934.529	1.472	55.68	16.14	4.04	1938.57	0.000				
2.420	2.651	0.04872	1.279	Pipe											
	"i.p."	-14792.16	1933.79	1945.85	1935.316	1.528	55.68	15.39	3.68	1938.99	0.000				
2.420	2.469	0.04872	1.279	Pipe											
	"i.p."	-14780.74	1934.34	1946.40	1935.931	1.587	55.68	14.67	3.34	1939.27	0.000				
2.420	2.297	0.04872	1.279	Pipe											
	"i.p."	-14771.78	1934.78	1946.84	1936.429	1.649	55.68	13.99	3.04	1939.47	0.000				
2.420	2.135	0.04872	1.279	Pipe											
	"i.p."	-14764.65	1935.13	1947.19	1936.842	1.714	55.68	13.34	2.76	1939.60	0.000				
2.420	1.982	0.04872	1.279	Pipe											
	"i.p."	-14758.91	1935.41	1947.47	1937.190	1.783	55.68	12.72	2.51	1939.70	0.000				
2.420	1.838	0.04872	1.279	Pipe											
	"i.p."	-14754.31	1935.63	1947.69	1937.488	1.856	55.68	12.12	2.28	1939.77	0.000				
2.420	1.702	0.04872	1.279	Pipe											
	"i.p."	-14750.64	1935.81	1947.87	1937.744	1.934	55.68	11.56	2.08	1939.82	0.000				
2.420	1.573	0.04872	1.279	Pipe											
"Link14"	Reach	-14747.77	1935.95	1946.02	1937.966	2.016	55.68	11.02	1.89	1939.85	0.000				
2.420	1.450	0.04872	1.279	Pipe											
"MH10"	Junction	-14742.77	1935.95	1946.02	1937.410	1.460	48.93	14.33	3.19	1940.60	0.000				
2.277	0.000	0.00000	0.000	Pipe											
	"i.p."	-14583.77	1939.71	1949.78	1941.165	1.460	48.93	14.33	3.19	1944.36	0.000				
2.277	2.368	0.02362	1.460	Pipe											
	"i.p."	-14417.69	1943.63	1953.70	1945.126	1.498	48.93	13.87	2.99	1948.11	0.000				
2.277	2.254	0.02362	1.460	Pipe											
"Link13"	Reach	-14352.42	1945.17	1955.24	1946.725	1.555	48.93	13.22	2.72	1949.44	0.000				
2.277	2.097	0.02362	1.460	Pipe											
"MH9"	Junction	-14347.42	1945.17	1955.24	1946.354	1.184	42.57	16.42	4.19	1950.54	0.000				
2.125	0.000	0.00000	0.000	Pipe											
	"i.p."	-14280.25	1947.72	1957.79	1948.908	1.188	42.57	16.35	4.15	1953.06	0.000				
2.125	3.058	0.03796	1.182	Pipe											
	"i.p."	-14168.37	1951.97	1962.04	1953.198	1.231	42.57	15.59	3.77	1956.97	0.000				
2.125	2.855	0.03796	1.182	Pipe											
	"i.p."	-14127.31	1953.53	1963.60	1954.802	1.276	42.57	14.86	3.43	1958.23	0.000				
2.125	2.665	0.03796	1.182	Pipe											
"Link12"	Reach	-14103.23	1954.44	1964.51	1955.763	1.323	42.57	14.17	3.12	1958.88	0.000				
2.125	2.486	0.03796	1.182	Pipe											
"MH8"	Junction	-14098.23	1954.44	1964.51	1955.464	1.024	37.02	17.37	4.69	1960.15	0.000				
1.979	0.000	0.00000	0.000	Pipe											
	"i.p."	-14068.50	1955.90	1965.97	1956.920	1.024	37.02	17.37	4.69	1961.61	0.000				
1.979	3.538	0.04897	1.024	Pipe											
	"i.p."	-13940.34	1962.17	1972.24	1963.205	1.034	37.02	17.15	4.57	1967.77	0.000				
1.979	3.473	0.04897	1.024	Pipe											
	"i.p."	-13859.09	1966.15	1976.22	1967.221	1.071	37.02	16.35	4.15	1971.37	0.000				
1.979	3.246	0.04897	1.024	Pipe											
	"i.p."	-13825.59	1967.79	1977.86	1968.900	1.109	37.02	15.59	3.77	1972.67	0.000				
1.979	3.034	0.04897	1.024	Pipe											
	"i.p."	-13805.25	1968.79	1978.86	1969.936	1.149	37.02	14.86	3.43	1973.37	0.000				
1.979	2.834	0.04897	1.024	Pipe											
	"i.p."	-13791.08	1969.48	1979.55	1970.671	1.190	37.02	14.17	3.12	1973.79	0.000				
1.979	2.647	0.04897	1.024	Pipe											
	"i.p."	-13780.52	1970.00	1980.07	1971.231	1.234	37.02	13.51	2.83	1974.07	0.000				
1.979	2.472	0.04897	1.024	Pipe											
	"i.p."	-13772.33	1970.40	1980.47	1971.677	1.279	37.02	12.88	2.58	1974.25	0.000				
1.979	2.307	0.04897	1.024	Pipe											
	"i.p."	-13765.82	1970.72	1980.79	1972.043	1.326	37.02	12.28	2.34	1974.39	0.000				
1.979	2.152	0.04897	1.024	Pipe											
	"i.p."	-13760.57	1970.97	1981.04	1972.350	1.375	37.02	11.71	2.13	1974.48	0.000				
1.979	2.007	0.04897	1.024	Pipe											
	"i.p."	-13756.31	1971.18	1981.25	1972.610	1.427	37.02	11.17	1.94	1974.55	0.000				
1.979	1.871	0.04897	1.024	Pipe											
	"i.p."	-13752.85	1971.35	1981.42	1972.833	1.481	37.02	10.65	1.76	1974.59	0.000				
1.979	1.743	0.04897	1.024	Pipe											
"Link11"	Reach	-13750.04	1971.49	1981.56	1973.027	1.537	37.02	10.15	1.60	1974.63	0.000				
1.979	1.622	0.04897	1.024	Pipe											
"MH7"	Junction	-13745.04	1971.49	1981.56	1972.510	1.020	30.33	14.32	3.18	1975.69	0.000				
1.784	0.000	0.00000	0.000	Pipe											
	"i.p."	-13656.66	1974.44	1984.51	1975.462	1.020	30.33	14.32	3.18	1978.65	0.000				
1.784	2.922	0.03341	1.020	Pipe											
	"i.p."	-13534.97	1978.51	1988.58	1979.537	1.028	30.33	14.15	3.11	1982.65	0.000				
1.784	2.876	0.03341	1.020	Pipe											
	"i.p."	-13453.99	1981.21	1991.28	1982.279	1.065	30.33	13.50	2.83	1985.11	0.000				
1.784	2.688	0.03341	1.020	Pipe											
	"i.p."	-13421.71	1982.29	1992.36	1983.395	1.103	30.33	12.87	2.57	1985.97	0.000				
1.784	2.512	0.03341	1.020	Pipe											
	"i.p."	-13402.42	1982.94	1993.01	1984.079	1.142	30.33	12.27	2.34	1986.42	0.000				
1.784	2.347	0.03341	1.020	Pipe											
	"i.p."	-13389.19	1983.38	1993.45	1984.563	1.184	30.33	11.70	2.12	1986.69	0.000				
1.784	2.192	0.03341	1.020	Pipe											
	"i.p."	-13379.46	1983.70	1993.77	1984.930	1.227	30.33	11.15	1.93	1986.86	0.000				
1.784	2.047	0.03341	1.020	Pipe											
	"i.p."	-13372.05	1983.95	1994.02	1985.223	1.272	30.33	10.63	1.76	1986.98	0.000				
1.784	1.911	0.03341	1.020	Pipe											
	"i.p."	-13366.28	1984.14	1994.21	1985.463	1.319	30.33	10.14	1.60	1987.06	0.000				
1.784	1.783	0.03341	1.020	Pipe											

1.784	"i.p."	-13361.75	1984.30	1994.37	1985.663	1.367	30.33	9.67	1.45	1987.11	0.000
	1.663	0.03341	1.020	Pipe							
	"i.p."	-13358.19	1984.41	1994.48	1985.833	1.419	30.33	9.22	1.32	1987.15	0.000
1.784	1.550	0.03341	1.020	Pipe							
	"i.p."	-13355.43	1984.51	1994.58	1985.979	1.472	30.33	8.79	1.20	1987.18	0.000
1.784	1.444	0.03341	1.020	Pipe							
	"i.p."	-13353.32	1984.58	1994.65	1986.105	1.528	30.33	8.38	1.09	1987.20	0.000
1.784	1.344	0.03341	1.020	Pipe							
	"i.p."	-13351.78	1984.63	1994.70	1986.216	1.587	30.33	7.99	0.99	1987.21	0.000
1.784	1.251	0.03341	1.020	Pipe							
	"i.p."	-13350.74	1984.66	1994.73	1986.313	1.649	30.33	7.62	0.90	1987.21	0.000
1.784	1.162	0.03341	1.020	Pipe							
	"i.p."	-13350.14	1984.68	1994.75	1986.398	1.715	30.33	7.26	0.82	1987.22	0.000
1.784	1.079	0.03341	1.020	Pipe							
"Link10"	Reach	-13349.94	1984.69	1994.79	1986.473	1.783	30.33	6.93	0.74	1987.22	0.000
1.784	1.001	0.03341	1.020	Pipe							
HYDRAULIC	JUMP in the middle: of length	-0.00									
"MH6"	Junction	-13344.94	1984.69	1994.76	1986.369	1.679	26.99	6.63	0.68	1987.05	0.000
1.679	0.000	0.00000	0.000	Pipe							
	"i.p."	-13343.75	1984.69	1994.76	1986.436	1.746	26.99	6.32	0.62	1987.06	0.000
1.679	0.928	0.00022	3.000	Pipe							
	"i.p."	-13339.72	1984.69	1994.76	1986.508	1.816	26.99	6.03	0.56	1987.07	0.000
1.679	0.860	0.00022	3.000	Pipe							
	"i.p."	-13332.11	1984.69	1994.76	1986.584	1.891	26.99	5.75	0.51	1987.10	0.000
1.679	0.796	0.00022	3.000	Pipe							
	"i.p."	-13319.99	1984.70	1994.77	1986.667	1.971	26.99	5.48	0.47	1987.13	0.000
1.679	0.735	0.00022	3.000	Pipe							
	"i.p."	-13302.14	1984.70	1994.77	1986.756	2.057	26.99	5.23	0.42	1987.18	0.000
1.679	0.676	0.00022	3.000	Pipe							
	"i.p."	-13277.00	1984.70	1994.77	1986.853	2.148	26.99	4.98	0.39	1987.24	0.000
1.679	0.621	0.00022	3.000	Pipe							
	"i.p."	-13242.49	1984.71	1994.78	1986.960	2.248	26.99	4.75	0.35	1987.31	0.000
1.679	0.566	0.00022	3.000	Pipe							
	"i.p."	-13195.63	1984.72	1994.79	1987.080	2.357	26.99	4.53	0.32	1987.40	0.000
1.679	0.513	0.00022	3.000	Pipe							
	"i.p."	-13132.15	1984.74	1994.81	1987.217	2.480	26.99	4.32	0.29	1987.51	0.000
1.679	0.459	0.00022	3.000	Pipe							
	"i.p."	-13044.57	1984.76	1994.83	1987.379	2.623	26.99	4.12	0.26	1987.64	0.000
1.679	0.400	0.00022	3.000	Pipe							
	"i.p."	-12915.75	1984.78	1994.85	1987.589	2.805	26.99	3.93	0.24	1987.83	0.000
1.679	0.321	0.00022	3.000	Pipe							
"Link9"	Reach	-12887.48	1984.79	1999.85	1987.633	2.843	26.99	3.90	0.24	1987.87	0.000
1.679	0.302	0.00022	3.000	Pipe							
"MH4"	Junction	-12881.48	1984.79	1999.85	1987.870	3.080	19.39	2.74	0.12	1987.99	0.000
1.412	0.000	0.00000	0.000	Pipe							
HYDRAULIC	JUMP at	-12849.14	of length	0.06							
	"i.p."	-12878.27	1984.87	1999.93	1987.873	3.000	19.39	2.74	0.12	1987.99	0.000
1.412	0.034	0.02590	0.863	Pipe							
	"i.p."	-12867.67	1985.15	2000.21	1987.870	2.722	19.39	2.88	0.13	1988.00	0.000
1.412	0.258	0.02590	0.863	Pipe							
	"i.p."	-12861.75	1985.30	2000.36	1987.861	2.560	19.39	3.02	0.14	1988.00	0.000
1.412	0.306	0.02590	0.863	Pipe							
	"i.p."	-12857.00	1985.42	2000.48	1987.851	2.427	19.39	3.16	0.16	1988.01	0.000
1.412	0.346	0.02590	0.863	Pipe							
	"i.p."	-12852.96	1985.53	2000.59	1987.839	2.311	19.39	3.32	0.17	1988.01	0.000
1.412	0.385	0.02590	0.863	Pipe							
	"i.p."	-12849.42	1985.62	2000.68	1987.826	2.206	19.39	3.48	0.19	1988.01	0.000
1.412	0.423	0.02590	0.863	Pipe							
	"i.p."	-12849.14	1985.63	2000.69	1987.825	2.197	19.39	3.50	0.19	1988.01	0.000
1.412	0.426	0.02590	0.863	Pipe							
	"i.p."	-12849.14	1985.63	2000.69	1986.491	0.863	19.39	11.52	2.06	1988.55	0.000
1.412	2.579	0.02590	0.863	Pipe							
	"i.p."	-12733.87	1988.61	2003.67	1989.476	0.863	19.39	11.52	2.06	1991.54	0.000
1.412	2.579	0.02590	0.863	Pipe							
	"i.p."	-12636.52	1991.13	2006.19	1992.025	0.891	19.39	11.03	1.89	1993.91	0.000
1.412	2.426	0.02590	0.863	Pipe							
	"i.p."	-12604.59	1991.96	2007.02	1992.883	0.922	19.39	10.51	1.72	1994.60	0.000
1.412	2.270	0.02590	0.863	Pipe							
	"i.p."	-12587.09	1992.41	2007.47	1993.369	0.954	19.39	10.02	1.56	1994.93	0.000
1.412	2.123	0.02590	0.863	Pipe							
	"i.p."	-12575.59	1992.71	2007.77	1993.700	0.988	19.39	9.56	1.42	1995.12	0.000
1.412	1.986	0.02590	0.863	Pipe							
	"i.p."	-12567.38	1992.92	2007.98	1993.948	1.023	19.39	9.11	1.29	1995.24	0.000
1.412	1.857	0.02590	0.863	Pipe							
	"i.p."	-12561.28	1993.08	2008.14	1994.142	1.059	19.39	8.69	1.17	1995.31	0.000
1.412	1.736	0.02590	0.863	Pipe							
	"i.p."	-12556.64	1993.20	2008.26	1994.300	1.097	19.39	8.28	1.07	1995.37	0.000
1.412	1.622	0.02590	0.863	Pipe							
	"i.p."	-12553.08	1993.30	2008.36	1994.432	1.137	19.39	7.90	0.97	1995.40	0.000
1.412	1.516	0.02590	0.863	Pipe							
	"i.p."	-12550.37	1993.37	2008.43	1994.543	1.178	19.39	7.53	0.88	1995.42	0.000
1.412	1.416	0.02590	0.863	Pipe							
	"i.p."	-12548.34	1993.42	2008.48	1994.638	1.220	19.39	7.18	0.80	1995.44	0.000
1.412	1.322	0.02590	0.863	Pipe							
	"i.p."	-12546.88	1993.46	2008.52	1994.721	1.265	19.39	6.85	0.73	1995.45	0.000
1.412	1.234	0.02590	0.863	Pipe							
	"i.p."	-12545.90	1993.48	2008.54	1994.792	1.311	19.39	6.53	0.66	1995.45	0.000

1.412	1.152	0.02590	0.863	Pipe								
	"i.p."	-12545.35	1993.50	2008.56	1994.855	1.360	19.39	6.22	0.60	1995.46	0.000	
1.412	1.074	0.02590	0.863	Pipe								
"Link8"	Reach	-12545.17	1993.50	2003.88	1994.911	1.411	19.39	5.93	0.55	1995.46	0.000	
1.412	1.001	0.02590	0.863	Pipe								
HYDRAULIC	JUMP	in the middle: of length -0.00										
"MH3"	Junction	-12541.17	1993.50	2003.88	1994.279	0.779	13.16	9.02	1.26	1995.54	0.000	
1.153	0.000	0.00000	0.000	Pipe								
	"i.p."	-12390.08	1996.19	2006.57	1996.974	0.779	13.16	9.02	1.26	1998.24	0.000	
1.153	2.136	0.01784	0.779	Pipe								
	"i.p."	-12310.97	1997.61	2007.99	1998.393	0.788	13.16	8.89	1.23	1999.62	0.000	
1.153	2.092	0.01784	0.779	Pipe								
	"i.p."	-12264.25	1998.44	2008.82	1999.254	0.815	13.16	8.48	1.12	2000.37	0.000	
1.153	1.958	0.01784	0.779	Pipe								
	"i.p."	-12245.02	1998.78	2009.16	1999.625	0.843	13.16	8.08	1.01	2000.64	0.000	
1.153	1.833	0.01784	0.779	Pipe								
	"i.p."	-12233.72	1998.98	2009.36	1999.856	0.872	13.16	7.71	0.92	2000.78	0.000	
1.153	1.715	0.01784	0.779	Pipe								
	"i.p."	-12226.19	1999.12	2009.50	2000.021	0.903	13.16	7.35	0.84	2000.86	0.000	
1.153	1.605	0.01784	0.779	Pipe								
	"i.p."	-12220.90	1999.21	2009.59	2000.147	0.934	13.16	7.01	0.76	2000.91	0.000	
1.153	1.501	0.01784	0.779	Pipe								
	"i.p."	-12217.11	1999.28	2009.66	2000.247	0.967	13.16	6.68	0.69	2000.94	0.000	
1.153	1.404	0.01784	0.779	Pipe								
	"i.p."	-12214.40	1999.33	2009.71	2000.330	1.001	13.16	6.37	0.63	2000.96	0.000	
1.153	1.313	0.01784	0.779	Pipe								
	"i.p."	-12212.50	1999.36	2009.74	2000.399	1.037	13.16	6.07	0.57	2000.97	0.000	
1.153	1.228	0.01784	0.779	Pipe								
	"i.p."	-12211.28	1999.38	2009.76	2000.458	1.074	13.16	5.79	0.52	2000.98	0.000	
1.153	1.148	0.01784	0.779	Pipe								
	"i.p."	-12210.59	1999.40	2009.78	2000.508	1.112	13.16	5.52	0.47	2000.98	0.000	
1.153	1.072	0.01784	0.779	Pipe								
"MH3.1"	Reach	-12210.37	1999.40	2008.19	2000.652	1.152	13.16	5.26	0.43	2000.98	0.000	
1.153	1.002	0.01784	0.779	Pipe								
"MH2"	Junction	-12206.37	1999.40	2008.19	2001.117	1.717	6.26	1.50	0.03	2001.15	0.000	
0.786	0.000	0.00000	0.000	Pipe								
HYDRAULIC	JUMP	at -12054.65 of length 0.01										
	"i.p."	-12194.10	1999.46	2008.25	2001.117	1.652	6.26	1.57	0.04	2001.15	0.000	
0.786	0.239	0.00529	0.728	Pipe								

"MH1"	Headwrk	-11864.16	2001.21	2009.30	2001.996	0.786	6.26	4.24	0.28	2002.28	0.000
0.786	0.000	0.00000	0.000	Pipe							

*) in the W.S.ELEV column indicates flooding, it is set whenever W.S.ELEV > GROUND ELEV
i.p. = intermediate point processing results for reaches



SUBJECT MAIN STREET IMPROVEMENTS - US95 TO OWENS JOB NO. 647369
BUBBLER DESIGN- INVERTED ORIFICE SHEET NO. OF
MADE BY BAS DATE 11/26/2013 CHECKED BY DATE

Computational Method

Description: MAIN STREET - 70% BUBBLER DESIGN
Calc by: B. Sanchez
Printed: 12/8/2013 20:17

Location	Width (ft)	Height (ft)	Clogging (%)	Eff. Width (ft)	Q ₁₀₀ (cfs)	HW (ft)	Weir (cfs)	Orifice (cfs)
Node DI-28	9.0	0.667	0.5	4.5	17	1.2	1.1	17.5
Notes:	Minimum curb length of inlet					max 18" at flowline of gutter minus 4" at curb opening		Bubbler Designed to 12 cfs

Note: Orifice Equation

$$Q = C_o A_o (2gH_o)^{0.5}$$

where: Q = the orifice Flow rate (cfs)
C_o = discharge coefficient (0.67)
A_o = Area of orifice, (ft²)
H_o = effective head on the orifice measured from the centroid of the opening, (ft)
g = gravitational acceleration, (32.2 ft/s²)

Appendix C

- *As-Built Plans*



- [illegible]

Call
before you
Underground-
Overhead

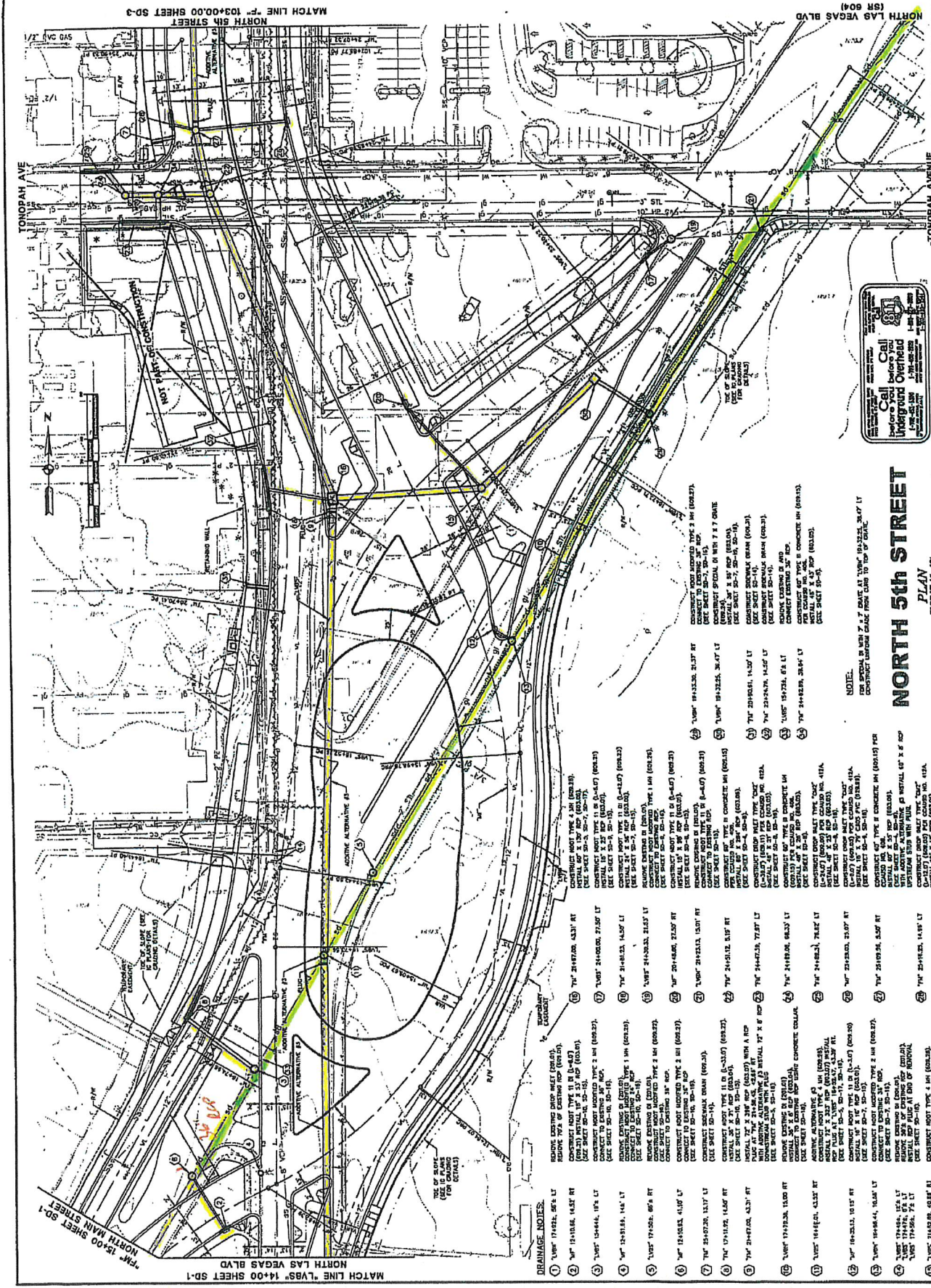
1-800-453-5262
1-708-562-3262
1-415-477-7000

MADE IN THE U.S.A.

Call
before you
Underground-
Overhead

1-800-453-5262
1-708-562-3262
1-415-477-7000

MADE IN THE U.S.A.



DRAINAGE NOTES:

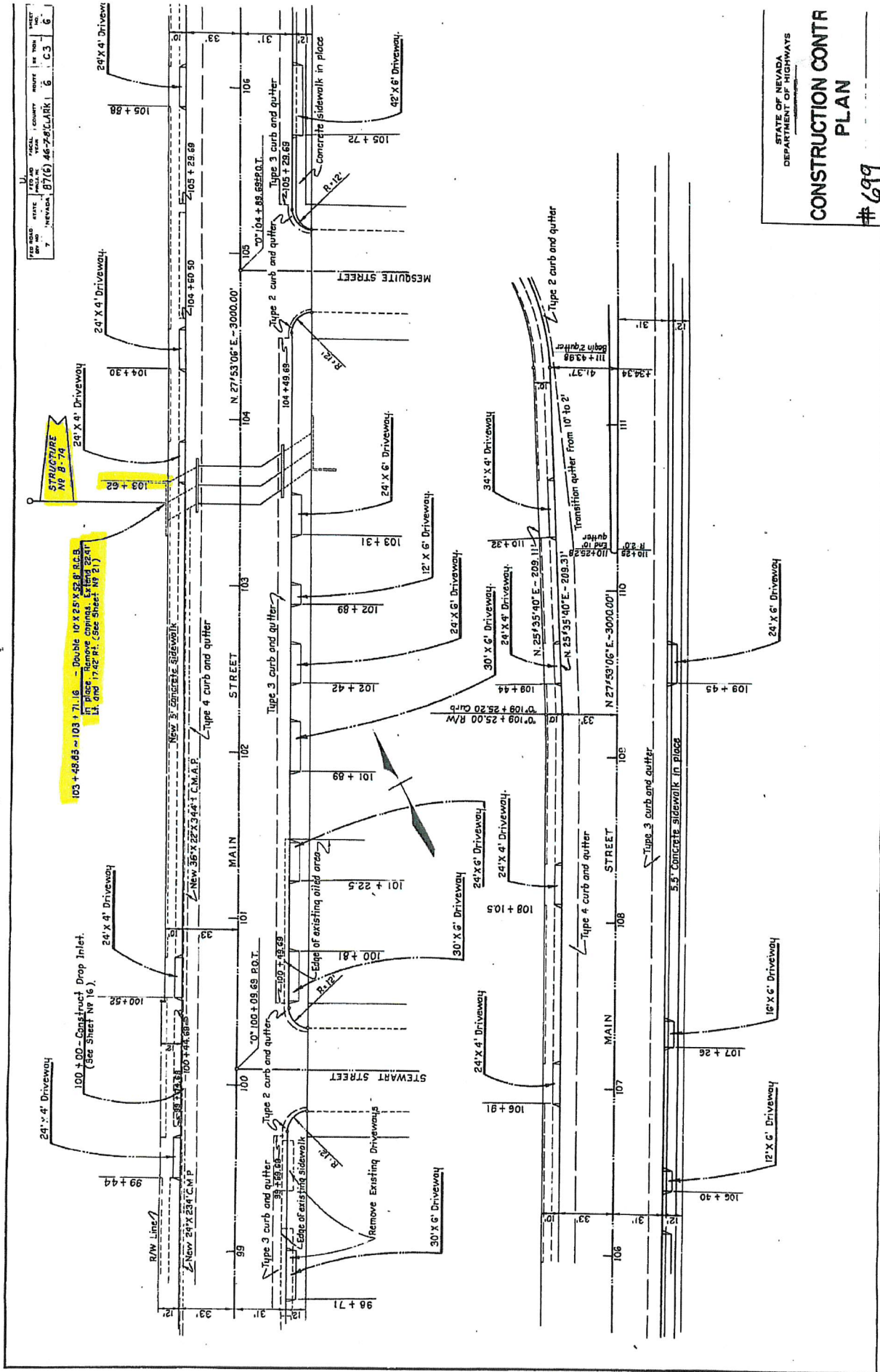
1. REMOVE EXISTING DRAINAGE (SEE 14+00)
2. CONSTRUCT NEW DRAINAGE (SEE 14+00)
3. CONSTRUCT NEW DRAINAGE (SEE 14+00)
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99. CONSTRUCT NEW DRAINAGE (SEE 14+00)
100. CONSTRUCT NEW DRAINAGE (SEE 14+00)

NOTE:

FOR SPECIAL INQUIRY, 17' OF DRAINAGE AT 17+103+00, SEE SHEET 17

CONSTRUCT NEW DRAINAGE (SEE 14+00)

REACHING				
REACHING				
REACHING				
DATE	DATE	DATE	DATE	DATE



as main u

[illegible]

NOTE: All waste material unless otherwise specified on plans shall be disposed of along Second Street between Mesquite Street and Bonanza Road as directed by the Engineer (Overhaul Allowed).

100' 8" M. No. 11 + Elev. 2018.580.
 Nail in pole 27' Lf - 0' 199 + 73.

"P" E M No 10 - Elev 2023.33 -
Nail in pole 27.74 2.99 + 11.00

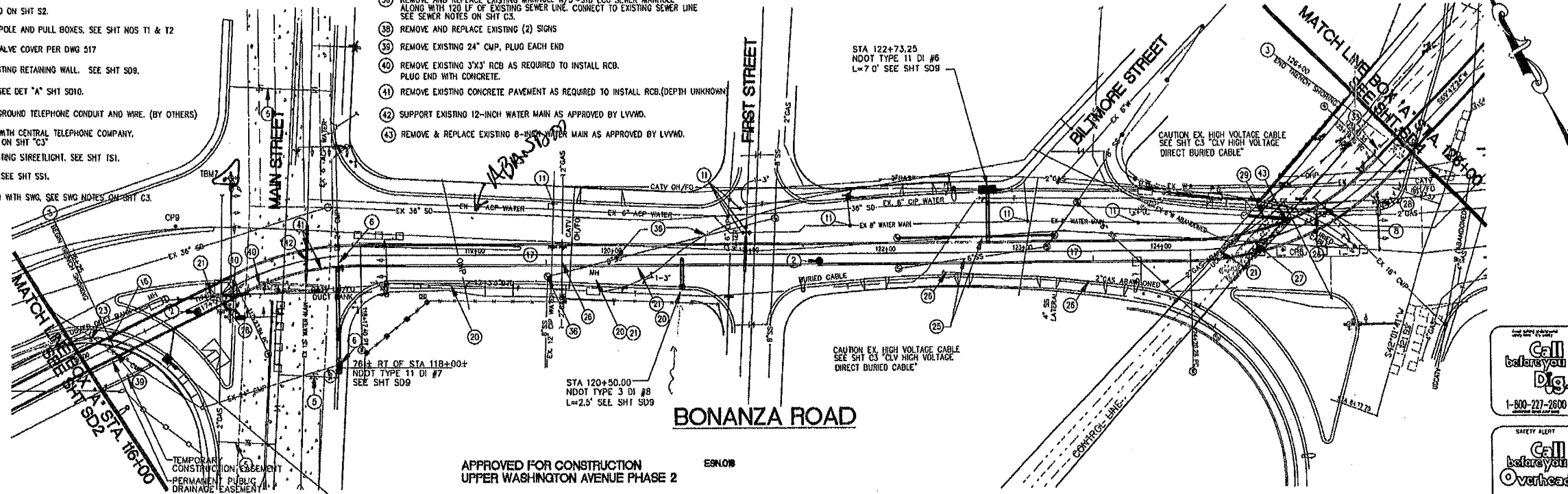
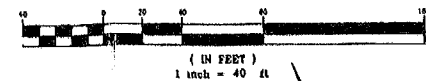
CONSTRUCTION NOTES

2. CONSTRUCT RCB MANHOLE PER DETAIL "E" SHT SD10.
3. CONSTRUCT TRENCH SHORING. SEE SHEET "C3" FOR TRENCH SHORING NOTES.
5. SAW CUT AG, ACTUAL LOCATION TO BE DETERMINED IN THE FIELD AT TIME OF CONSTRUCTION.
6. REMOVE 24" CMP AND DROP INLET.
8. SEE CONSTRUCTION NOTE 10 ON SHT S2.
10. RELOCATE TRAFFIC SIGNAL POLE AND PULL BOXES. SEE SHT NOS T1 & T2.
11. VERTICAL ADJUST WATER VALVE COVER PER DWG 517.
16. REMOVE AND REPLACE EXISTING RETAINING WALL. SEE SHT S09.
17. CONSTRUCT 14" X 8" RCB. SEE DET "A" SHT SD10.
20. RELOCATE EXISTING UNDERGROUND TELEPHONE CONDUIT AND WIRE. (BY OTHERS)
21. CONTRACTOR COORDINATE WITH CENTRAL TELEPHONE COMPANY. SEE CLV GENERAL NOTE 3 ON SHT "C3".
23. REMOVE AND REPLACE EXISTING STREETLIGHT. SEE SHT IS1.
25. RELOCATE EXISTING SEWER. SEE SHT SS1.
26. CONTRACTOR COORDINATION WITH SWG. SEE SWG NOTES ON SHT C3.

27. REMOVE AND RECONSTRUCT EXISTING 12"X8" RCB. SEE SHT SD13.
28. CONTRACTOR TO PROTECT TRAFFIC SIGNAL POLE AND/OR REMOVE SIGNAL POLE AND PROVIDE TEMPORARY OVERHEAD SIGNAL.
29. CONSTRUCT 36-INCH STORM DRAIN SEE SHT SDB.
30. REMOVE AND REPLACE EXISTING MANHOLE W/8"-STD ECC SEWER MANHOLE ALONG WITH 120 LF OF EXISTING SEWER LINE. CONNECT TO EXISTING SEWER LINE. SEE SEWER NOTES ON SHT C3.
31. REMOVE AND REPLACE EXISTING (2) SIGNS.
32. REMOVE EXISTING 24" CMP. PLUG EACH END.
40. REMOVE EXISTING 3'X3' RCB AS REQUIRED TO INSTALL RCB. PLUG END WITH CONCRETE.
41. REMOVE EXISTING CONCRETE PAVEMENT AS REQUIRED TO INSTALL RCB.(DEPTH UNKNOWN)
42. SUPPORT EXISTING 12-INCH WATER MAIN AS APPROVED BY LVVMD.
43. REMOVE & REPLACE EXISTING 8-INCH WATER MAIN AS APPROVED BY LVVMD.

- NOTES:
1. FOR RECONSTRUCTION OF PAVEMENT, MEDIAN ISLANDS, SIDEWALKS, CURB AND GUTTER SEE "S" SHEETS.
 2. FOR RECONSTRUCTION OF TRAFFIC SIGNAL SEE "YS" SHEETS.
 3. STA 116+50 TO 118+00 INSTALL PRE-CAST 14"X8" RCB.
 4. INSTALL A NON-CLIMBABLE TEMPORARY FENCE AT BACK OF CURB AND ALONG SIDEWALK FOR PEDESTRIAN TRAFFIC. ACTUAL LOCATION WILL BE DETERMINED IN FIELD BY THE ENGINEER.

GRAPHIC SCALE



* DETERMINED FROM POTHOLE INFORMATION.
CONTRACTOR TO VERIFY LOCATION

APPROVED FOR CONSTRUCTION
UPPER WASHINGTON AVENUE PHASE 2

LAS VEGAS VALLEY WATER DISTRICT DATE

Call before you Dig.
1-800-277-2600

Call before you Overhead.
593-6111

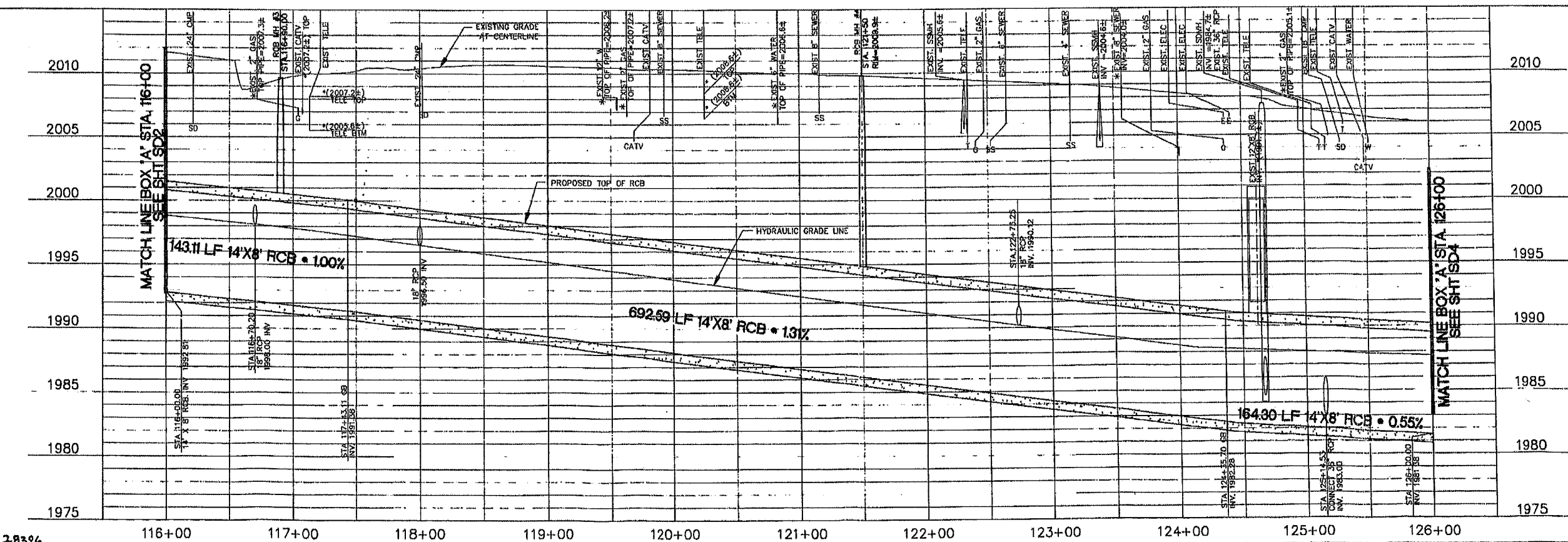
CITY OF LAS VEGAS
UPPER WASHINGTON AVENUE CONVEYANCE SYSTEM

PHASE 2 -- BOX A
PLAN AND PROFILE STA 116+00 TO 126+00

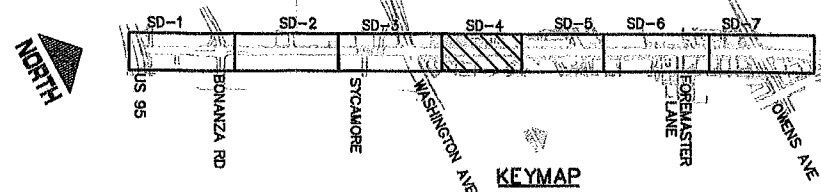
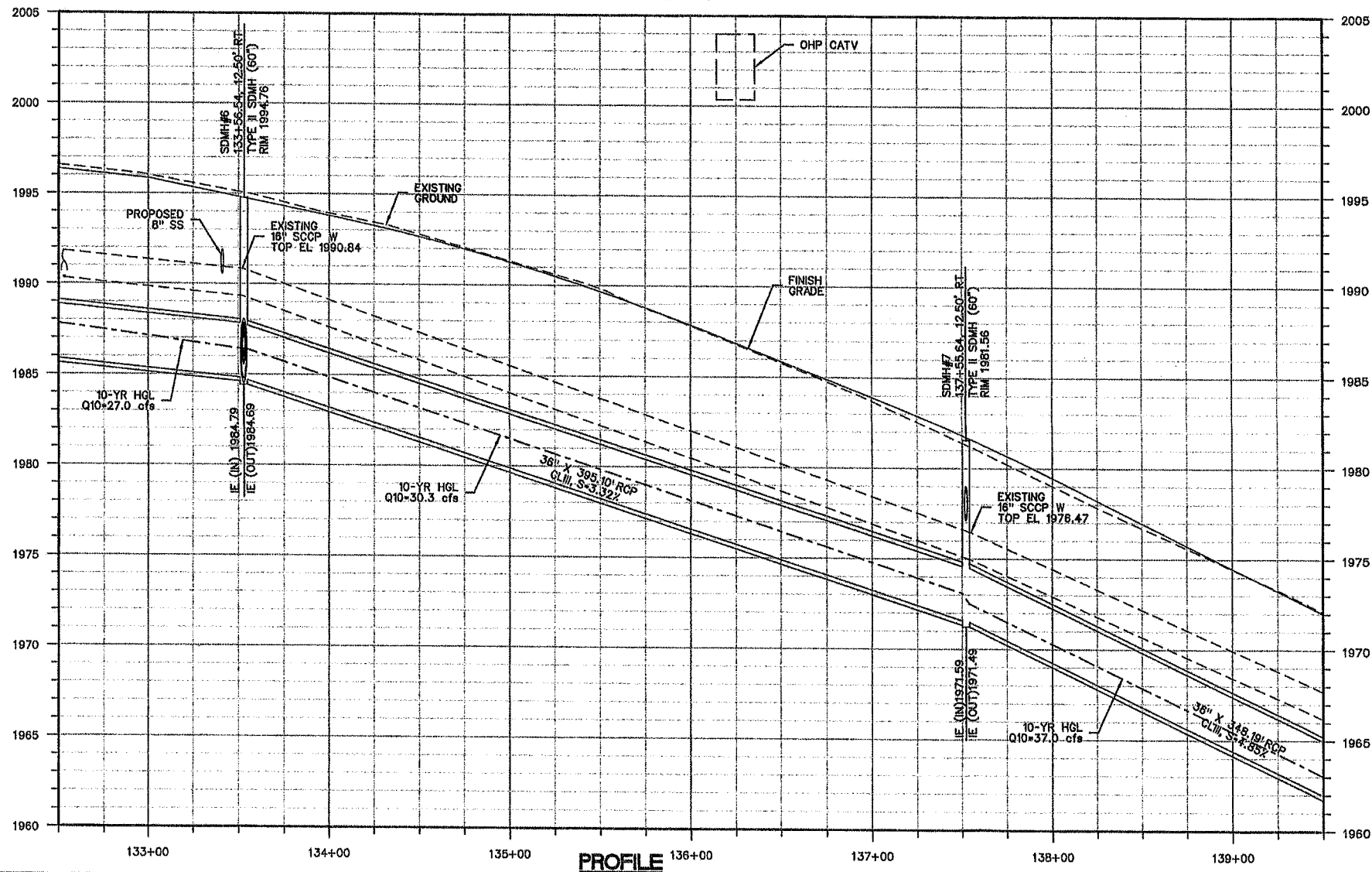
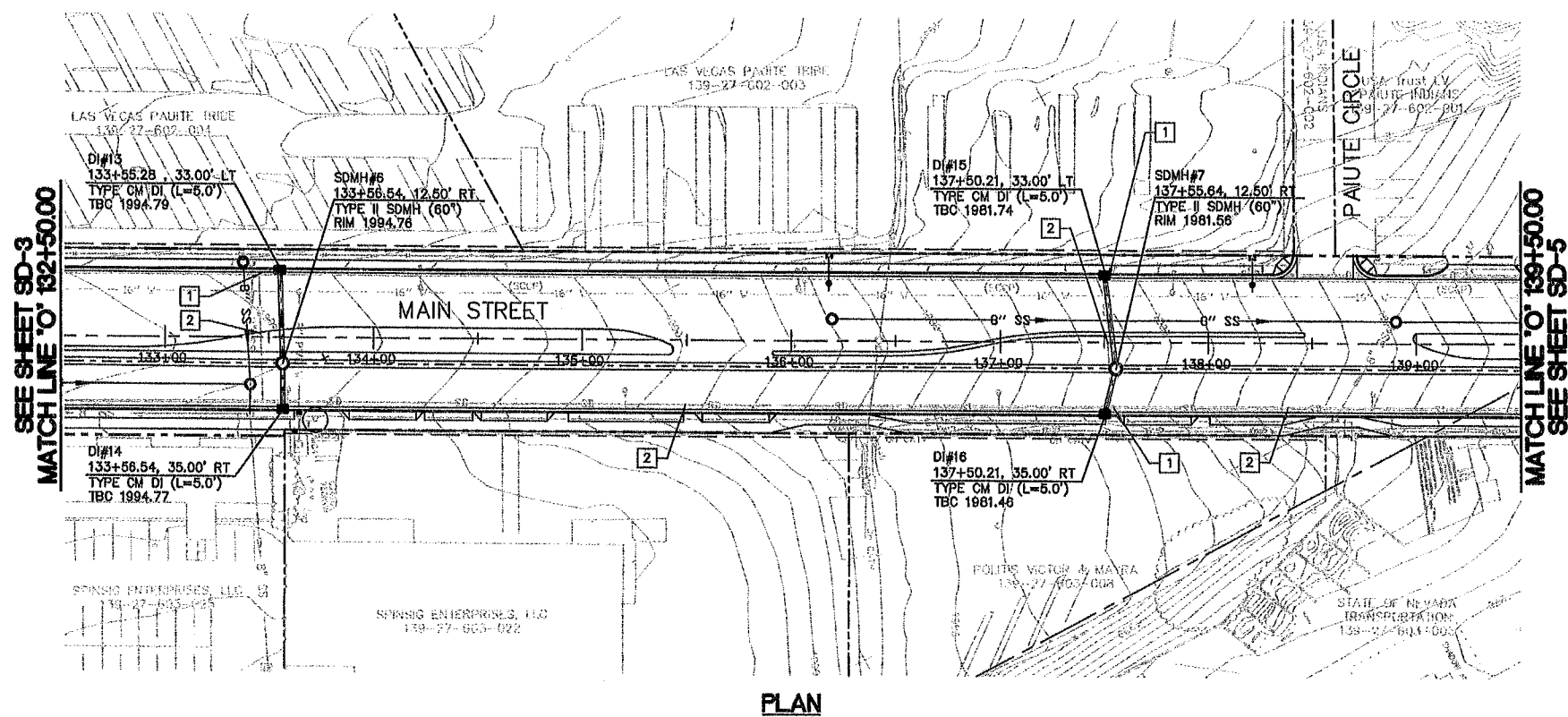
DESIGNED BY: 7/14/99
CHECKED BY: 7/14/99
PROJECT NO: 00-1730-11-50C
SCALE: 1" = 40' HOR.
1" = 4' VER.



SHEET
SD3
8 OF 32
DRAWING NO.
731-54F



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DRAINAGE REMOVAL NOTES

- 1 REMOVE DROP INLET
- 2 REMOVE STORM DRAIN PIPE
- 3 REMOVE STORM DRAIN MANHOLE
- 4 REMOVE SIDEWALK UNDERDRAIN
- 5 ABANDON STORM DRAIN

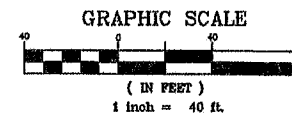
NOTES

1. SEE SANITARY SEWER SHEETS FOR SEWER SERVICE REQUIREMENTS.
2. SEE LIGHTING/ITS SHEETS FOR ELECTRICAL SERVICE REQUIREMENTS, POLE LAYOUT AND DETAILS.
3. SEE SIGNAL PLANS FOR TRAFFIC SIGNAL IMPROVEMENTS NOT SHOWN.
4. SEE UTILITY PLANS FOR MANHOLE ADJUSTMENT.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING
SERVICES MANAGER

DATE _____ PROJECT No. 116743



FINAL PROGRESS SET
NOT FOR CONSTRUCTION



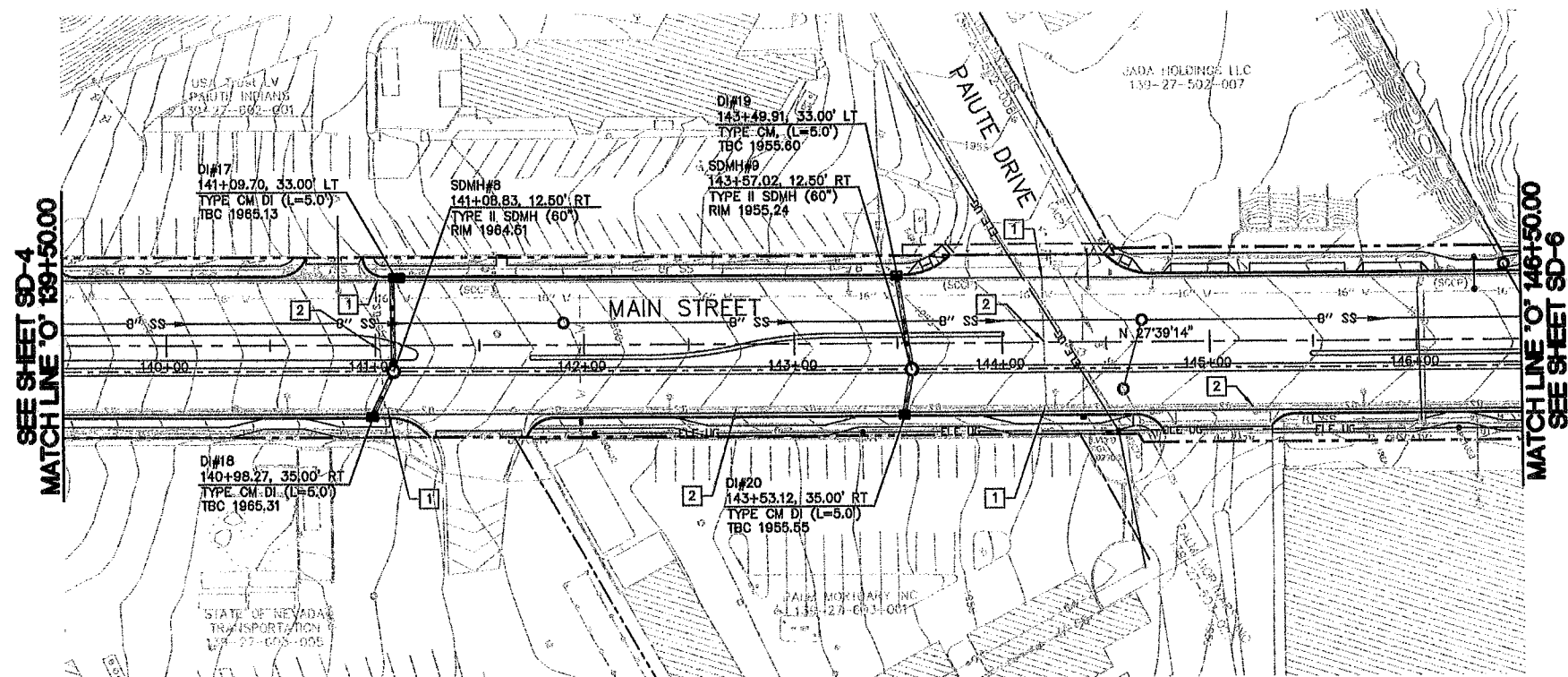
CLV HANSEN No. 38070

REVISIONS		NO. DATE DESCRIPTION APP'D	
DEPARTMENT OF PUBLIC WORKS ENGINEERING DESIGN SECTION CITY ENGINEER: DAVID BOWERS, P.E., P.T.O.E. PROGRAM MANAGER: KRISTINA SWALLOW, P.E. PARSONS DESIGNED BY: BMS DRAWN BY: ST CHECKED BY: ML DATE: 11-25-13 7095 EDWARD ST. STE. 100 LAS VEGAS, NV 89119 (702) 735-2000 FAX (702) 735-2001			
TITLE: MAIN STREET IMPROVEMENTS US 95 TO OWENS DRAINAGE PLAN AND PROFILE 132+50 TO 139+50			
SHEET: SD-4 X of X DRAWING NO. *****			

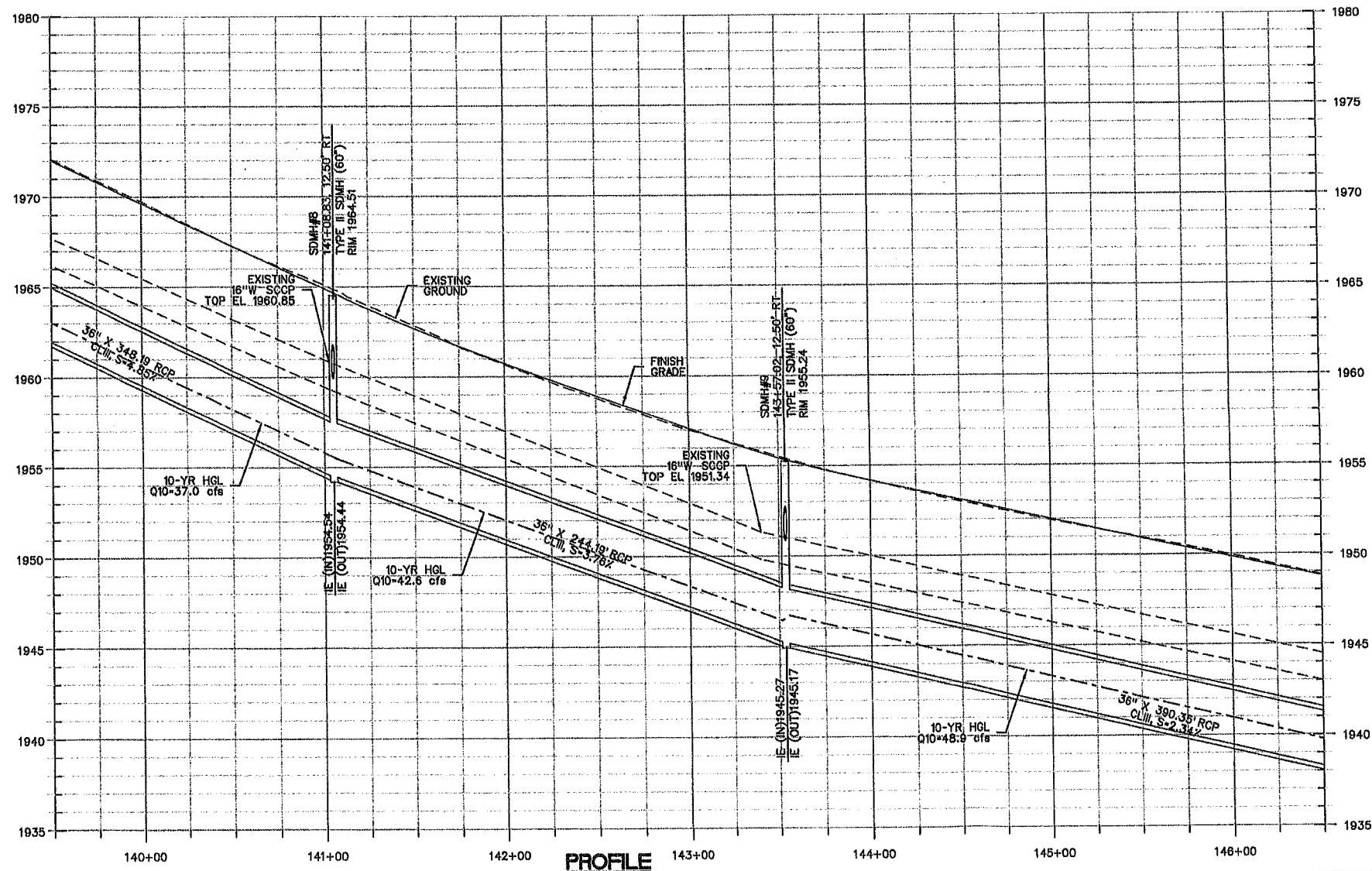
Appendix D

-
- *Final Progress Submittal Storm Drain Plans and Profiles*

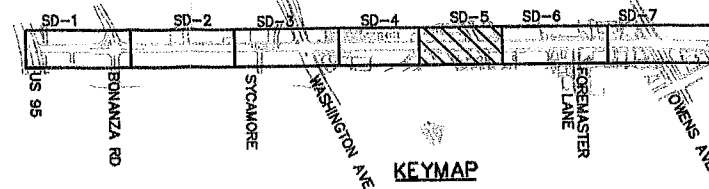
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PLAN



PROFILE



DRAINAGE REMOVAL NOTES

- 1 REMOVE DROP INLET
- 2 REMOVE STORM DRAIN PIPE
- 3 REMOVE STORM DRAIN MANHOLE
- 4 REMOVE SIDEWALK UNDERDRAIN
- 5 ABANDON STORM DRAIN

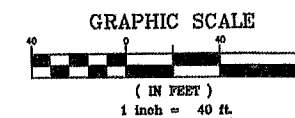
NOTES

1. SEE SANITARY SEWER SHEETS FOR SEWER SERVICE REQUIREMENTS.
2. SEE LIGHTING/ITS SHEETS FOR ELECTRICAL SERVICE REQUIREMENTS, POLE LAYOUT AND DETAILS.
3. SEE SIGNAL PLANS FOR TRAFFIC SIGNAL IMPROVEMENTS NOT SHOWN.
4. SEE UTILITY PLANS FOR MANHOLE ADJUSTMENT.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING
SERVICES MANAGER

DATE PROJECT No. 116743



FINAL PROGRESS SET
NOT FOR CONSTRUCTION

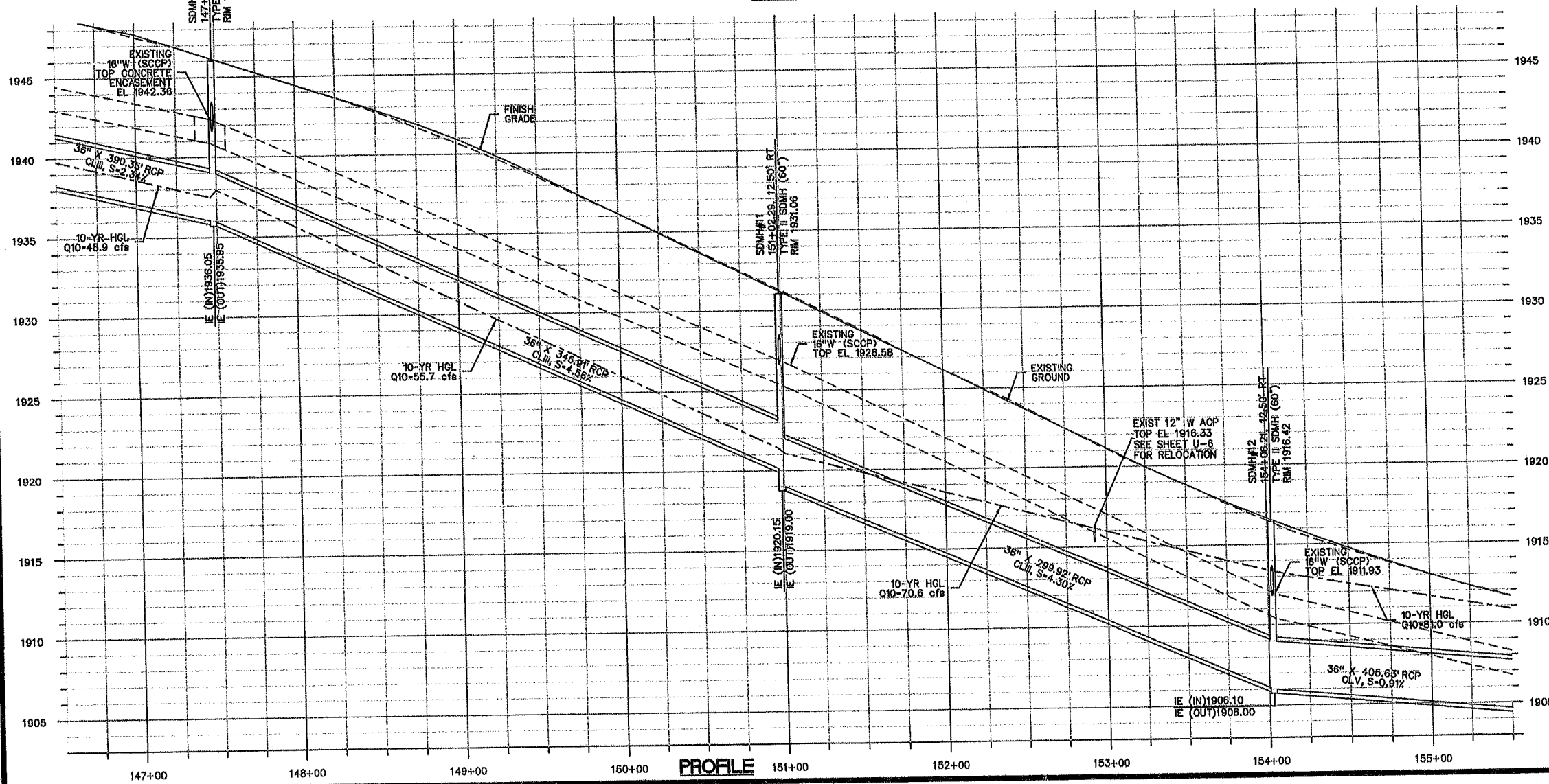


CLV HANSEN No. 38070

REVISIONS		NO. DATE DESCRIPTION APPD	
DEPARTMENT OF PUBLIC WORKS			
ENGINEERING DESIGN SECTION			
CITY ENGINEER: DAVID BOWERS, P.E. P.I.O.E.		DESIGNED BY: BAS	
PROGRAM MANAGER: KRISTINA SWALLOW, P.E.		DRAWN BY: ST	
CHECKED BY: JAL		DATE: 11-25-13	
PARSONS			
7000 E. FLORISSANT AVE. SUITE 100, LAS VEGAS, NV 89118			
(702) 789-2000 FAX (702) 789-2001			
TITLE: MAIN STREET IMPROVEMENTS			
US 95 TO OWENS			
DRAINAGE PLAN AND PROFILE			
139+50 TO 146+50			
SHEET: SD-5			
X of X			
DRAWING NO.			

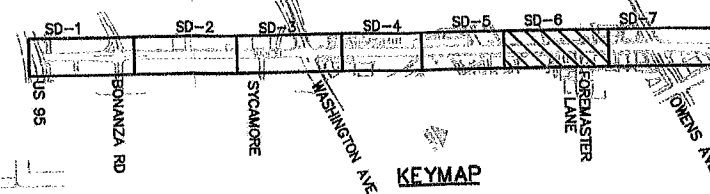
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SEE SHEET SD-5
MATCH LINE 'O' 146+50.00



PLAN

PROFILE



MATCH LINE 'O' 155+50.00
SEE SHEET SD-7

DRAINAGE REMOVAL NOTES

- 1 REMOVE DROP INLET
- 2 REMOVE STORM DRAIN PIPE
- 3 REMOVE STORM DRAIN MANHOLE
- 4 REMOVE SIDEWALK UNDERDRAIN
- 5 ABANDON STORM DRAIN

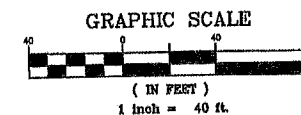
NOTES

1. SEE SANITARY SEWER SHEETS FOR SEWER SERVICE REQUIREMENTS.
2. SEE LIGHTING/ITS SHEETS FOR ELECTRICAL SERVICE REQUIREMENTS, POLE LAYOUT AND DETAILS.
3. SEE SIGNAL PLANS FOR TRAFFIC SIGNAL IMPROVEMENTS NOT SHOWN.
4. SEE UTILITY PLANS FOR MANHOLE ADJUSTMENT.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING
SERVICES MANAGER

DATE _____ PROJECT No. 116743



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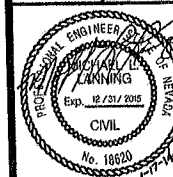
CLV HANSEN No. 38070

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

MAIN STREET IMPROVEMENTS
US 95 TO OWENS
DRAINAGE PLAN AND PROFILE
146+50 TO 155+50

TITLE:

SHEET:



Sheet
SD-6
X of X

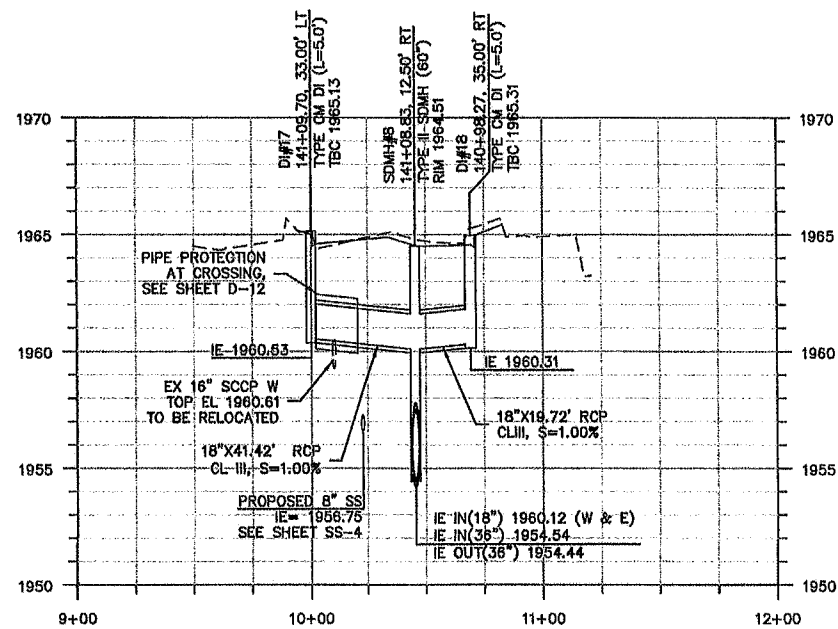
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NO.	DATE	DESCRIPTION	APPD.

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CITY ENGINEER: DAVID BOWERS, P.E., P.T.O.E.
PROGRAM MANAGER: KRISTINA SWALLOW, P.E.
DRAWN BY: ST
CHECKED BY: ML
DATE: 11-25-13

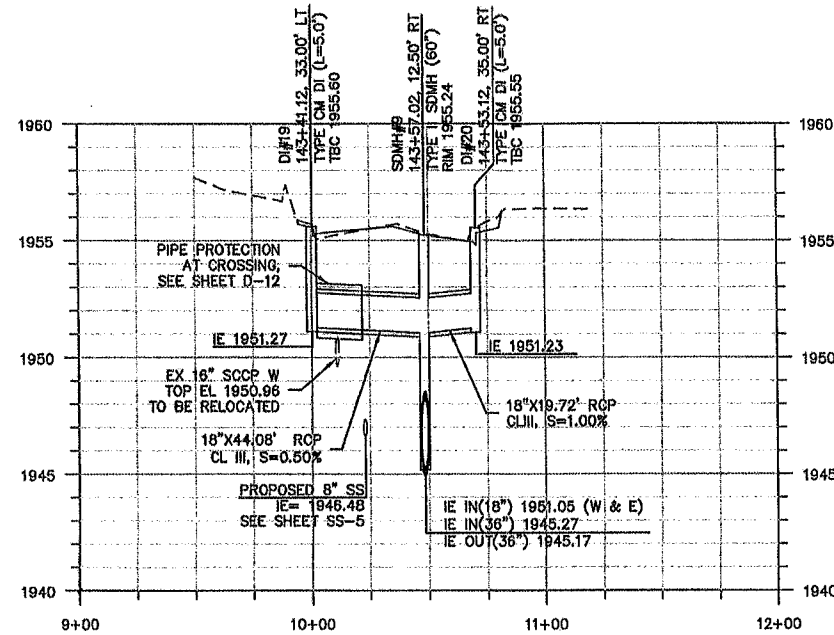
PARSONS
6795 EDMOND ST, STE 150, LAS VEGAS, NV 89118
(702) 788-2000 FAX (702) 788-2007

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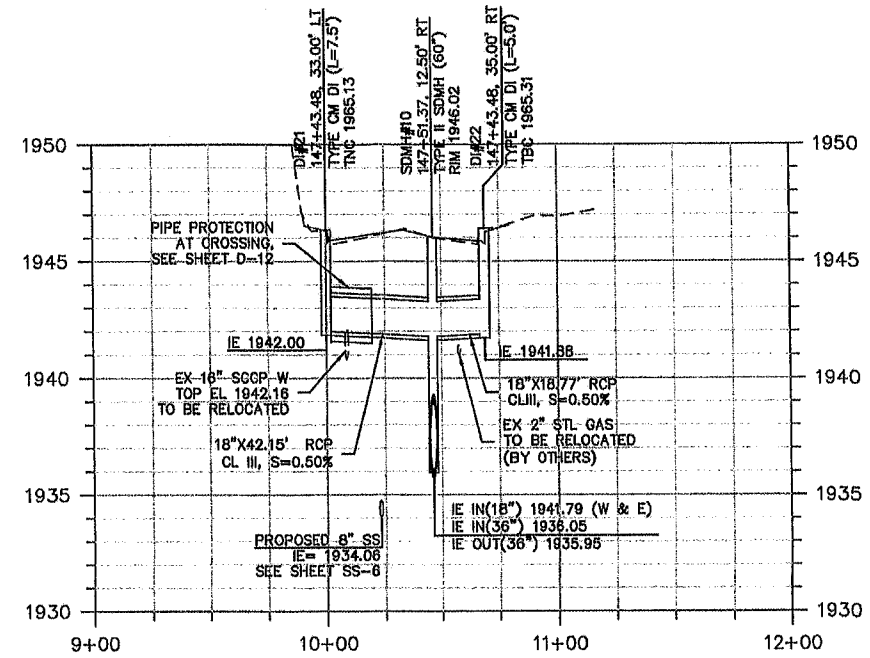
STORM DRAIN LATERAL AT 141+09

SEE SD-5 FOR LATERAL LOCATION



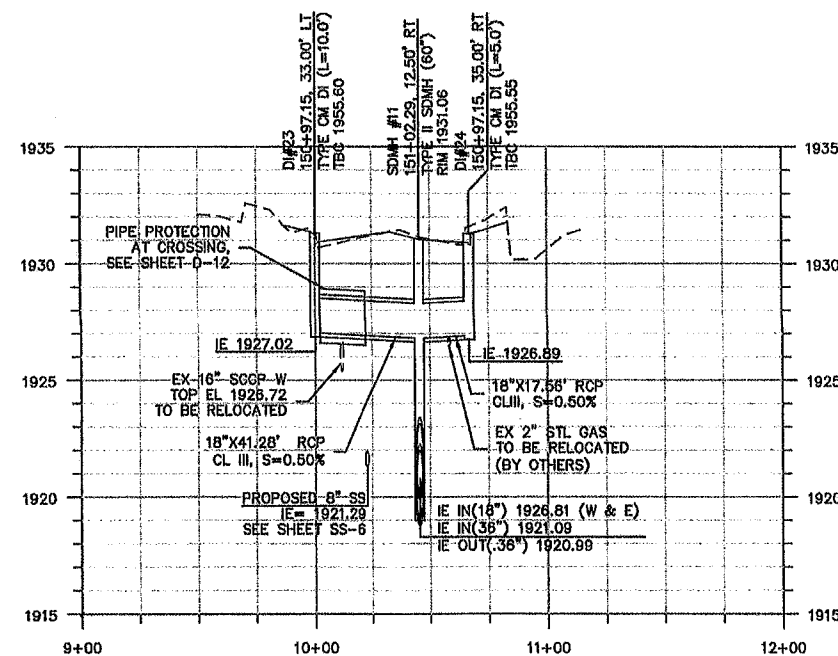
STORM DRAIN LATERAL AT 143+57

SEE SD-5 FOR LATERAL LOCATION



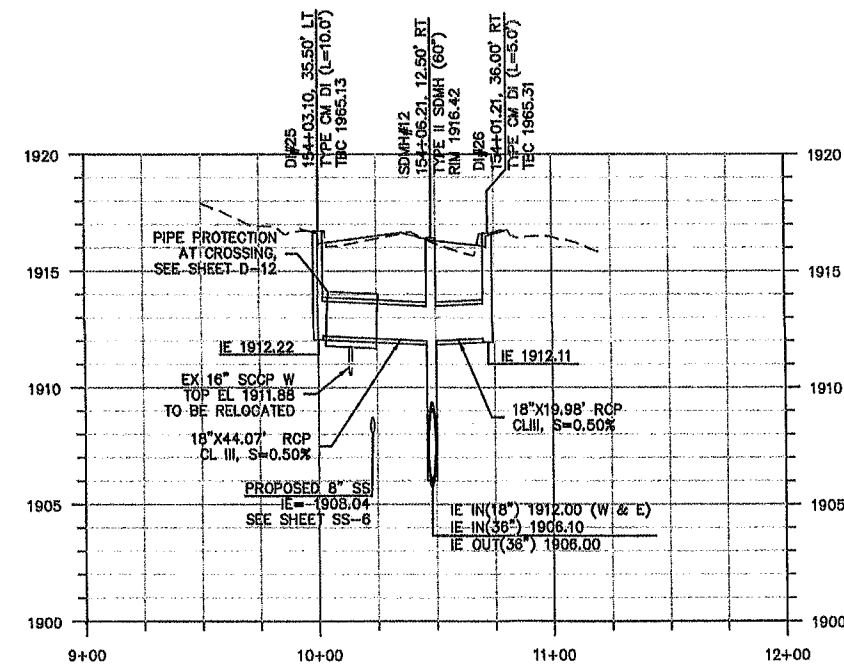
STORM DRAIN LATERAL AT 147+51

SEE SD-6 FOR LATERAL LOCATION



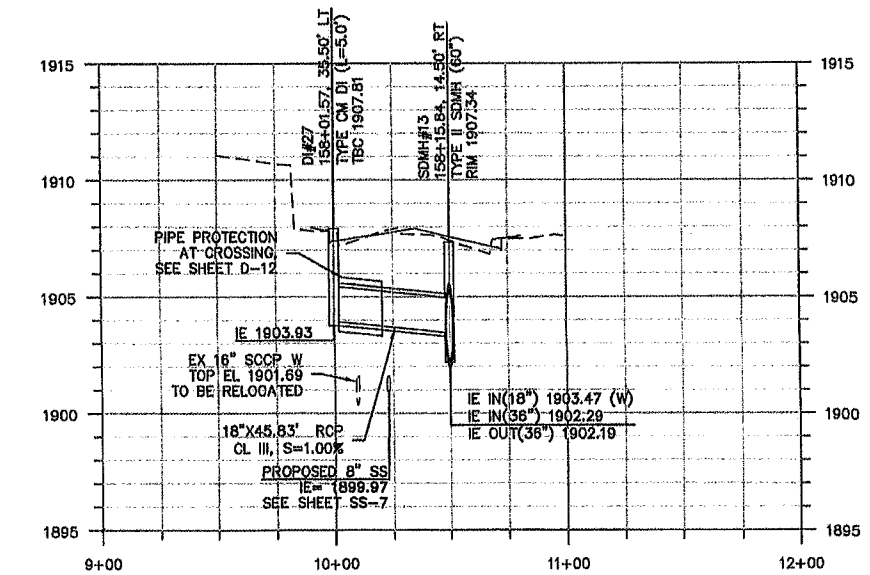
STORM DRAIN LATERAL AT 151+06

SEE SD-6 FOR LATERAL LOCATION



STORM DRAIN LATERAL AT 154+06

SEE SD-6 FOR LATERAL LOCATION



STORM DRAIN LATERAL AT 158+16

SEE SD-7 FOR LATERAL LOCATION

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING
SERVICES MANAGER

DATE PROJECT No. 118743



CLV HANSEN No. 38070

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY ENGINEER: DAVID BOWERS, P.E., P.O.E.
PROGRAM MANAGER: KRISTINA SWALLOW, P.E.

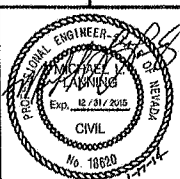
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DRAWN BY: JILL
CHECKED BY: JILL
DATE: 11-25-13

PARSONS
2000-2005 24th (702) 686-2001
7000-2005 24th (702) 686-2001

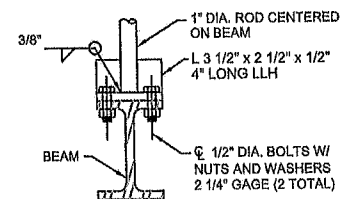
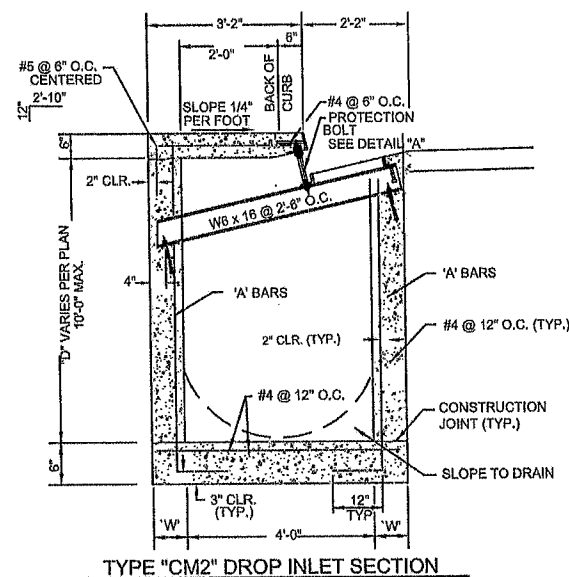


MAIN STREET IMPROVEMENTS
US 95 TO OWENS
DRAINAGE LATERAL PROFILES

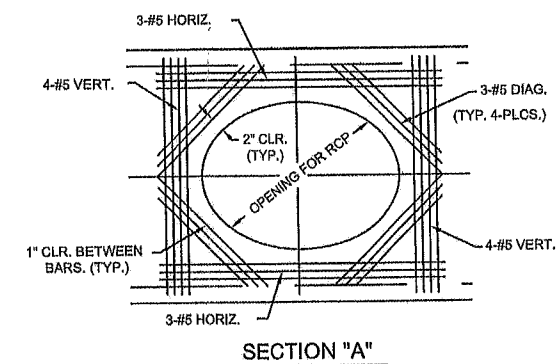
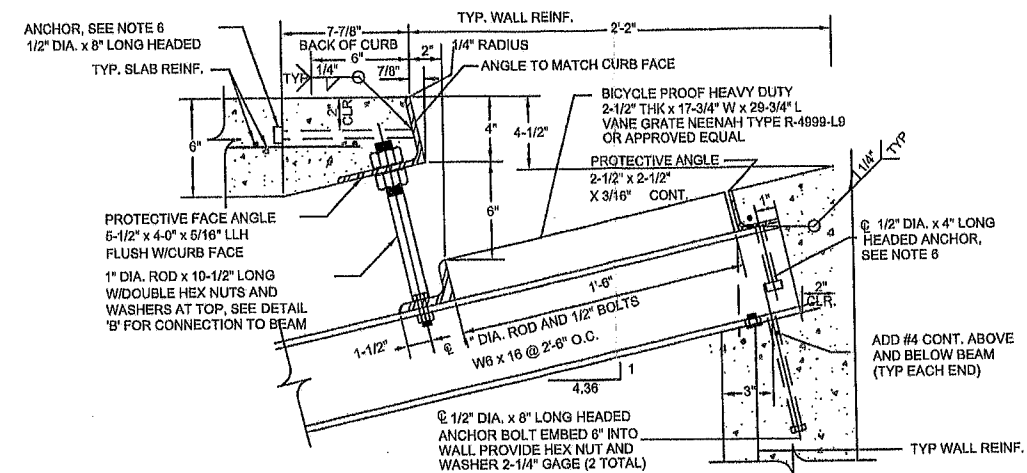
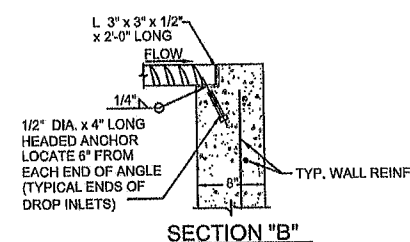
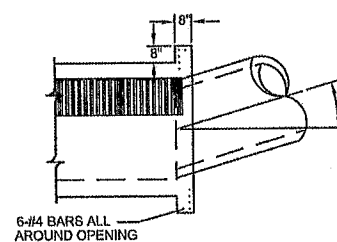
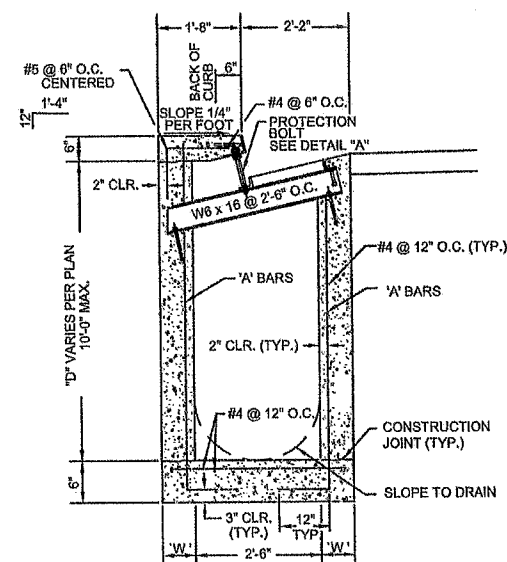
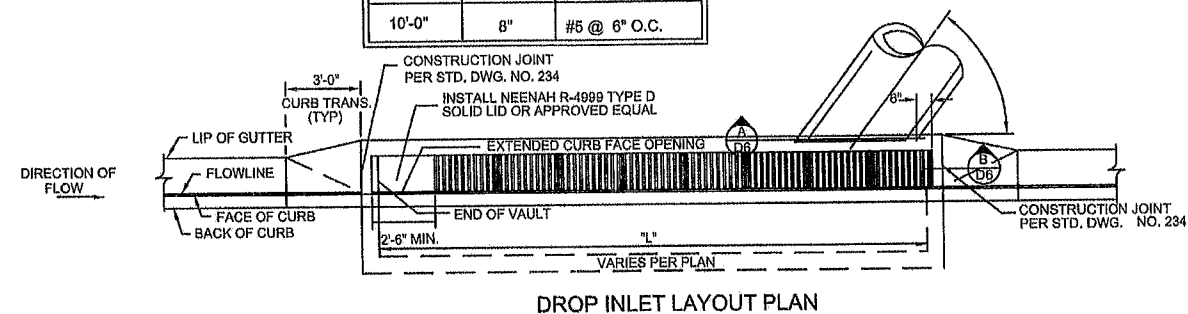
TITLE: SHEET:



Sheet
SD-9
X of X
DRAWING NO.
-



D (MAX)	DIM. 'W'	Ⓐ BARS
4'-0"	6"	#4 @ 12" O.C.
6'-0"	6"	#4 @ 12" O.C.
8'-0"	8"	#5 @ 12" O.C.
10'-0"	8"	#5 @ 6" O.C.

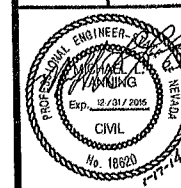


- NOTES:**

1. ALL EXPOSED METALS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.
2. PROVIDE 1/2" (MIN.) CLEARANCE ALL AROUND THE STEEL BEAM, DRY PACK AFTER INSTALLATION.
3. WHEN REQUIRED BY LENGTH OF OPENING, PLATE ANGLE MAY BE DELIVERED IN SECTIONS AND BUTT WELDED IN PLACE.
4. ALL GALVANIZED DAMAGED BY WELDING SHALL RECEIVE TWO COATS OF GALVALLOY OR EQUAL.
5. CONCRETE SHALL BE MODIFIED CLASS DA 4000 PSI, SEE SPECIAL PROVISIONS SECTION 501.
6. ANGLE ANCHORS SHALL BE EMBEDDED MIDPOINT IN EACH ENDWALL AND EVENLY SPACED, (MAXIMUM SPACING OF 2').

TYPE "C-D" MODIFIED
DROP INLET

FINAL PROGRESS SET
NOT FOR CONSTRUCTION



Sheet
SD-10
X of X
DRAWING NO.

0 **###-##-####**



DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY ENGINEER: DAVID BOWERS, P.E., P.T.O.E.
PROGRAM MANAGER: KRISTINA SWALLOW, P.E.

BABSONS

6795 EDMOND ST, STE. 150, LAS VEGAS, NV 89118
 (702) 789-2000 FAX (702) 789-2001
 DRAWN BY: JZ
 CHECKED BY: WILL
 DATE: 11-25-13

MAIN STREET IMPROVEMENTS

DRAINAGE DETAILS

TYPE "C-D" MODIFIED DROP INLET

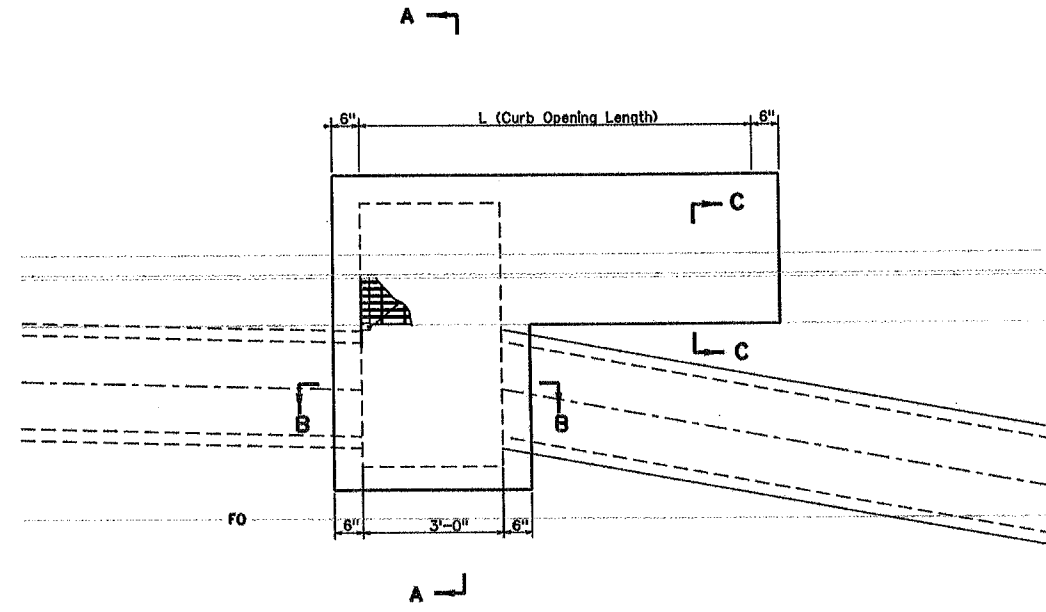
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SHEET:

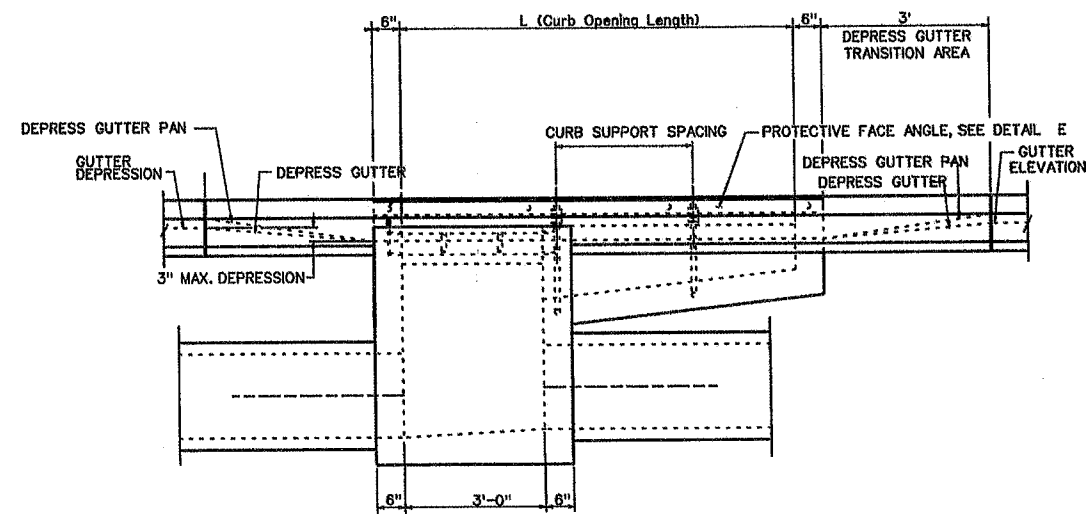
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SD-10

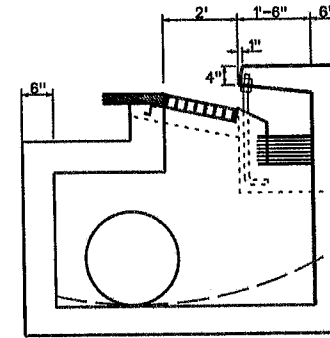
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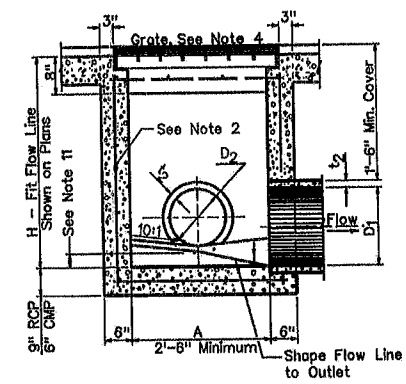
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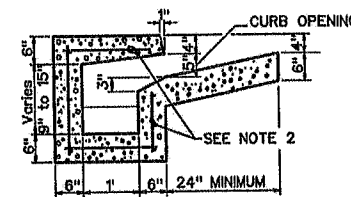
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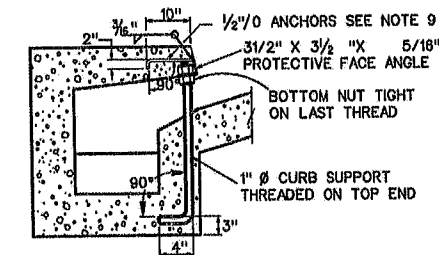
SECTION A-A



SECTION B-B



SECTION C-C



DETAIL E
FOR REBAR INSTALLATION
SEE SECTION C-C

NOTES:

1. ALL CONCRETE SHALL BE CLASS AA OR A.
2. REINFORCING STEEL SHALL BE NO. 4 BARS, EXCEPT AS NOTED, WITH MAXIMUM SPACE AT 12" CENTERS, WIRED TIGHTLY AT ALL INTERSECTIONS, AND EMBEDDED AT LEAST 1/2" CLEAR OF CONCRETE SURFACE, EXCEPT AS NOTED.
3. EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1".
4. FOR GRATE AND FRAME DETAIL, SEE SHEET R-4.2.3.
5. CURB OPENINGS LONGER THAN 7' SHALL HAVE ONE CURB SUPPORT FOR EACH 7' INCREMENT OR FRACTION THEREOF, EVENLY SPACED.
6. ANGLE ANCHORS SHALL BE EMBEDDED MIDPOINT IN EACH ENDWALL, EVENLY SPACED, AND MAXIMUM SPACING OF 5'.
7. SLOPE CATCH BASIN FLOORS 10:1 FROM ALL DIRECTIONS TOWARD OUTLET PIPE. IF BASIN IS USED AS A JUNCTION, SHAPE FLOW LINE(S) TO OUTLET PIPE, AND PROVIDE A 10:1 SLOPE TO FLOW LINE(S).

**FINAL PROGRESS SET
NOT FOR CONSTRUCTION**



REVISIONS	NO.	DATE	DESCRIPTION	APP'D

**DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION**

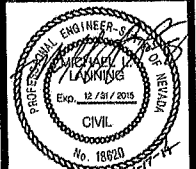
CITY ENGINEER: DAVID BOWERS, P.E., P.T.O.E.
PROGRAM MANAGER: DAVID KRISTINA, SWALLOW, P.E.
PARSONS
DESIGNED BY: BJS
DRAWN BY: ST
CHECKED BY: ML
DATE: 11-25-13



**MAIN STREET IMPROVEMENTS
US 95 TO OWENS**

**DRAINAGE DETAIL
MODIFIED TYPE 11 DROP INLET**

TITLE: SHEET:



Sheet
SD-11
of
DRAWING NO.
-

CLV HANSEN No. 38070

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PIPE ENCASEMENT MUST CONFORM TO SECTION 2.19.02 OF UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS (UDACS) FOR WATER AND STORM DRAIN OF SEWER CROSSING AND CLEARANCES

STORM DRAIN OR SEWER PIPE

10' MIN

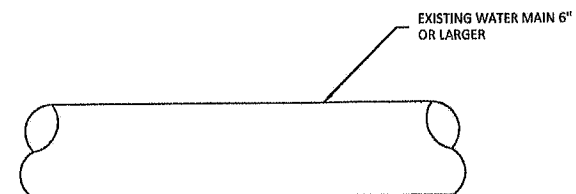
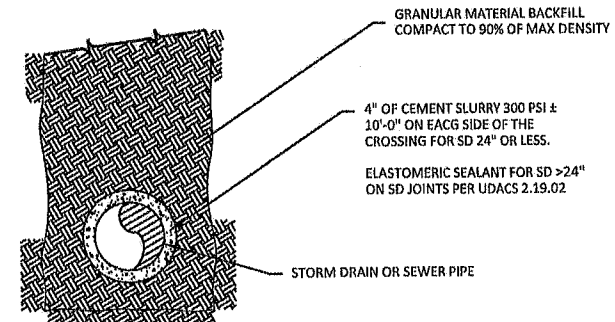
EXISTING WATER MAIN 6" OR LARGER

- WHERE THE WATER MAIN IS BELOW THE SEWER MAIN, OR WHERE THE WATER MAIN IS ABOVE THE SEWER MAIN WITH A VERTICAL SEPERATION LESS THAN EIGHTEEN (18) INCHES, THE FOLLOWING PROVISIONS SHALL APPLY.
- THE SEWER MAIN MUST BE CONSTRUCTED OF WATER QUALITY MATERIALS MEETING AWWA STANDARDS.
 - THE SEWER MAIN (DEPENDING ON FIELD CONDITIONS) SHALL BE TOTALLY ENCASED IN A MINIMUM OF FOUR (4) INCHES OF CEMENT SLURRY (300 PSI ±) FOR A DISTANCE OF TEN (10) FEET ON EACH SIDE OF THE CROSSING. ENCASEMENT WILL NOT BE PERMITTED FOR ASBESTOS CEMENT PIPE
 - THE SEWER MAIN OR WATER MAIN MAY BE INSTALLED IN A SLEEVE OF WATER QUALITY PIPE WHICH EXTENDS, WITHOUT JOINTS, TEN (10) FEET ON EACH SIDE OF THE MAIN.
 - THE ENGINEER MAY PETITION THE AGENCY FOR APPROVAL TO ENCASE THE WATER MAIN (DEPENDING ON FIELD CONDITION) IN A MINIMUM OF FOUR (4) INCHES OF CEMENT SLURRY (300 PSI ±) FOR A DISTANT OF TEN (10) FEET ON EACH SIDE OF THE CROSSING. ENCASEMENT WILL NOT BE PERMITTED FOR ASBESTOS CEMENT PIPE.
 - SEWER AND STORM DRAIN MAINS 24" OR GREATER IN DIA. MUST HAVE JOINTS, WITHIN 10' OF CROSSING, SEALED WITH APPROVED ELASTOMERIC SEALANT.

STORM DRAIN PIPE ENCASEMENT AT CROSSING

N.T.S

(NO DIRECT PAYMENT)



CONCRETE PIPE ENCASEMENT AT CROSSING

N.T.S

(NO DIRECT PAYMENT)

FINAL PROGRESS SET
NOT FOR CONSTRUCTION



CLV HANSEN No. 38070

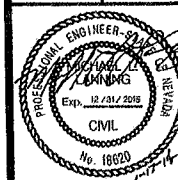
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY ENGINEER: DAVID BOWERS, P.E., P.T.O.E.
PROGRAM MANAGER: KRISTINA SWALLOW, P.E.



TITLE: MAIN STREET IMPROVEMENTS
US 95 TO OWENS

SHEET: DRAINAGE DETAILS
TYPE "C-D" MODIFIED DROP INLET



Sheet
SD-12
X of X
DRAWING NO.
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DESIGNED BY: BAS
DRAWN BY: SP
CHECKED BY: MLL
DATE: 11-25-13

NO. DATE DESCRIPTION

REVISIONS

APP'D