DS #: DS 4882

APN: 126.01-799.001

90% Drainage Design Report

PROJECT: US 95 Kyle Canyon Road Interchange

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:

CITY OF LAS VEGAS NEVADA

LETTER OF TRANSMITTAL

GCW
ENGINEERS \ SURVEYORS

Project No.: 412-634
Date: January 23, 2017

DS 4882

To: City of Las Vegas
333 N. Rancho Drive, 9th floor
Las Vegas, NV 89106

OH-SAN

Attention: Randy McConnell

Subject: **90 Percent Drainage Design Report for US95/ Kyle Canyon Road Interchange**

Sent Via: Hand Delivery

Items being sent:

1 Copy of 90 Percent Drainage Design Report Volume 1 and 2
1 CD

RECEIVED BY
2016 JAN 23 PM 1:47
CITY ENGINEERS OFFICE

These items are submitted:

- ☐ At your request
- ☒ For your approval
- ☐ For your review and comments
- ☒ For your action
- ☐ For your files
- ☐ For your information

Acknowledgment of receipt:

☒ **Required**

Received by: _____
Date: _____
Time: _____

Remarks:

Cordially,

GCW, INC.

James A. Monroe, Jr., PE, LEED AP
Project Manager
Flood Control

Copies to: Tim McCoy, GCW
Jay Guzman, GCW
Rachael Dennis, GCW

1555 South Rainbow Boulevard
Las Vegas, Nevada 89146
O 702.804.2000
F 702.804.2299
info@gcwengineering.com
gcwengineering.com



90% Drainage Design Report
US95/Kyle Canyon Road Interchange
Volume 1 of 2

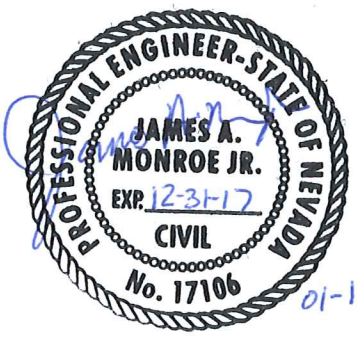
412.634A
January 2017

GCW
ENGINEERS \ SURVEYORS

90%
DRAINAGE DESIGN REPORT
FOR
US 95/KYLE CANYON ROAD
INTERCHANGE
VOLUME 1 OF 2

412.634A

January 2017



Prepared By:

GCW, Inc.
1555 South Rainbow Boulevard
Las Vegas, NV 89146
Phone: (702) 804-2000
Fax: (702) 804-2297

90% Drainage Design Report

This report addresses the 90% design level for the Kyle Canyon Road Interchange at US95. The 60% Drainage Design Report US95 / Kyle Canyon Road Interchange at US95 were submitted to the Nevada Department of Transportation (NDOT), Clark County Regional Flood Control District (CCRFCD) and City of Las Vegas (CLV) on February 1, 2016. Comments on the 60% improvement plans and Drainage Design Report were received from NDOT via email on March 2, 2016.

A meeting was held with NDOT and GCW on March 16, 2016 to discuss the 60% comments received from NDOT on March 2, 2016. This report includes revisions made to the 60% submittal to address NDOT's comments. Copies of the email and meeting minutes have been included in Appendix B.

Coordination meetings were held with NDOT, CLV, Slater Hanifan Group (SHG), and GCW after the 60% submittal to move the location of the proposed CCRFCD Facility crossing US95 to south of Kyle Canyon Road. The coordination meetings were held on May 11, 2016, June 15, 2016, June 16, 2016, and July 5, 2016. Copies of the meeting minutes have been included in Appendix B.

The *Supplement for US95/Kyle Canyon Road Interchange* (hereinafter, referred to as the CCRFCD Facility Design Memorandum), prepared by SHG, addressed the design for the CCRFCD Facility crossing US95. The CCRFCD Facility Design Memorandum was submitted to CLV for review on July 8, 2016. CLV issued comments on CCRFCD Facility Design Memorandum on August 2, 2016. SHG submitted a response to comments to CLV on August 10, 2016. The CCRFCD Facility Design Memorandum has been reviewed and accepted by GCW as part of this report. The portion of the CCRFCD Facility Crossing under US95 is included in the attached 90% plans for this project. Copies of the CCRFCD Facility Design Memorandum are included in Appendix B.

90%
DRAINAGE DESIGN REPORT
FOR
US95/KYLE CANYON ROAD
INTERCHANGE
VOLUME 1 OF 2

412.634A

January 2017

Prepared By:

GCW, Inc.
1555 South Rainbow Boulevard
Las Vegas, NV 89146
Phone: (702) 804-2000
Fax: (702) 804-2297

TABLE OF CONTENTS

	Description	Page
I.	INTRODUCTION	1
II.	LOCATION AND DESCRIPTION	3
III.	FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD HAZARD ANALYSIS	3
IV.	CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT (CCRFCD) FACILITIES	3
V.	HYDROLOGIC METHODOLOGY	8
VI.	HYDROLOGY DESCRIPTION	9
VII.	PROJECT DRAINAGE DESIGN CRITERIA	17
VIII.	STREET HYDRAULICS AND DROP INLET FACILITIES	20
IX.	RECOMMENDED STORM DRAIN FACILITIES	22
X.	CONCLUSIONS AND RECOMMENDATIONS	32
XI.	REFERENCES	33

LIST OF FIGURES

No.	Description	Page
FIGURE 1	VICINITY MAP	4
FIGURE 2	LOCATION MAP	5
FIGURE 3	FLOOD INSURANCE RATE MAP	6
FIGURE 4	CCRFCD FACILITIES	7
FIGURE 5	EXISTING CONDITIONS DRAINAGE MAP	12
FIGURE 6	PROPOSED CONDITIONS DRAINAGE MAP	13
FIGURE 7A	ONSITE BASIN MAP 1	15
FIGURE 7B	ONSITE BASIN MAP 2	16
FIGURE 8A	RECOMMENDED STORM DRAIN FACILITIES MAP	23
FIGURE 8B	RECOMMENDED STORM DRAIN FACILITIES MAP	24

LIST OF TABLES

No.	Description	Page
TABLE 1	EXISTING CONDITIONS HEC-1 MODEL OFFSITE BASINS	10
TABLE 2	PROPOSED CONDITIONS HEC-1 MODEL ONSITE BASINS	11
TABLE 3	DRAINAGE DESIGN CRITERIA	17
TABLE 4	DROP INLET SUMMARY	20
TABLE 5	WSPGW MODEL MAINLINE SUMMARY	25
TABLE 6	25-YEAR ONSITE DITCH/BERM CHARACTERISTICS	29
TABLE 7	50-YEAR OFFSITE DITCH/BERM CHARACTERISTICS	30
TABLE 8	100-YEAR OFFSITE DITCH/BERM CHARACTERISTICS	31

I. INTRODUCTION

The Nevada Department of Transportation (NDOT) has contracted with GCW, Inc. (GCW), to provide engineering and design services for the Kyle Canyon Road Interchange at US95 project located within Las Vegas, Nevada.

This report addresses the 90% design level for the proposed flood control improvements. The purpose of this report is to provide detailed hydraulic analyses in support of the proposed recommended flood control facilities. The following tasks were performed in preparation of this report:

- Identify and review pertinent improvement plans and hydraulic information from existing projects and previously approved drainage studies near and/or adjacent to the project site.
- Identify record drawings for the area projects and utilities and extract information pertinent to the recommended drainage facilities.
- Survey and pothole existing facilities and utilities.
- Identify the FEMA floodplain designation for the project site.
- Identify existing and proposed Clark Country Regional Flood Control District (CCRFCD) Facilities (Reference 1, hereinafter referred to as the 2013 MPU) adjacent to the project site.
- Identify the alignment, size, and profile for proposed CCRFCD Facilities within Kyle Canyon Road at US95 that will be constructed with this project.
- Estimate runoff generated for the peak offsite 10-year, 50-year, and 100-year return period storm events for existing and proposed conditions.
- Estimate runoff generated for the peak onsite 10-year, 25-year, and 50-year return period storm events for proposed conditions.
- Recommend drainage facilities to perpetuate existing drainage patterns and protect the project from storm runoff.
- Coordinate with concurrent and future projects in the area, specifically the future Skye Canyon Development located west of US95.
- Prepare 90% improvement plans incorporating the recommended drainage facilities.

GCW has reviewed technical drainage studies which previously analyzed the project site to determine offsite flow rates currently impacting existing storm drain facilities within the project limits. Hydrologic and hydraulic information has been referenced from these studies for the purposes of this report. The referenced studies include the following:

Kyle Canyon Master Drainage Study (Reference 2, hereinafter referred to as the Original Kyle Canyon MDS) was approved by City of Las Vegas (CLV) on March 29, 2007. Concurrence for the study was issued by Clark County Regional Flood Control District (CCRFCD) on March 8, 2007, and Clark County Department of Development Services on March 16, 2007. The Original Kyle Canyon MDS presented the existing hydrologic conditions for the site and determined flow rates west and east of the site. The existing conditions hydrologic analysis included in the *Response to Comments on the Master Drainage Study for Kyle Canyon* (Reference 3) has been referenced for this study. Pertinent reference material from the Original Kyle Canyon MDS has been included in Appendix E.

Conceptual Offsite Hydrology Report for US-95 Environmental Document – Cheyenne Avenue to Kyle Canyon Road (Reference 4, hereinafter, referred to as the US95 Study) analyzed the existing culverts within US95 and the west frontage road south of Kyle Canyon Road. The culvert hydraulic ratings for the existing culverts south of Kyle Canyon Road have been referenced to determine the flow rates conveyed east and south at the US95 culverts. Pertinent reference material from the US95 Study has been included in Appendix E.

Skye Canyon Master Drainage Study (formerly Master Drainage Study – Kyle Canyon) (Reference 5, hereinafter referred to as the Skye Canyon MDS) was conditionally approved by the City of Las Vegas (CLV) on May 24, 2012. Concurrence for the study was issued by CCRFCD on May 7, 2012, and Clark County Public Works (CCPW) on July 19, 2012.

Updates to the Skye Canyon MDS included the following:

- *Update to the Master Drainage Study for Skye Canyon* (Reference 6) – conditionally approved by CLV on December 30, 2014, with concurrence issued by CCRFCD on March 31, 2015.

- *Update #2 to the Master Drainage Study for Skye Canyon* (Reference 7, hereinafter referred to as the Skye Canyon MDS Update #2) – conditionally approved by CLV on November 23, 2015, with concurrence issued by CCRFCD on January 6, 2016.

- *Update #3 to the Master Drainage Study for Skye Canyon* (Reference 8, hereinafter referred to as the Skye Canyon MDS Update #3).

The design flow for the proposed CCRFCD Facility Crossing US95 is referenced from the Skye Canyon MDS Update #3. Pertinent reference material from the Skye Canyon MDS Update #3 as part of the CCRFCD Facility Design Memorandum has been included in Appendix B.

II. LOCATION AND DESCRIPTION

The proposed improvements include construction of a full service interchange at Kyle Canyon Road and US95 with US95 on and off ramps, widening US95, and construction of a bridge over Kyle Canyon Road. Drainage improvements will include construction of roadside ditches, RCP and RCB storm drain, culvert extensions, drop inlets, CCRFCD Facility MOSM 0064 and 0080, and other appurtenant drainage structures to intercept and convey storm runoff across the site.

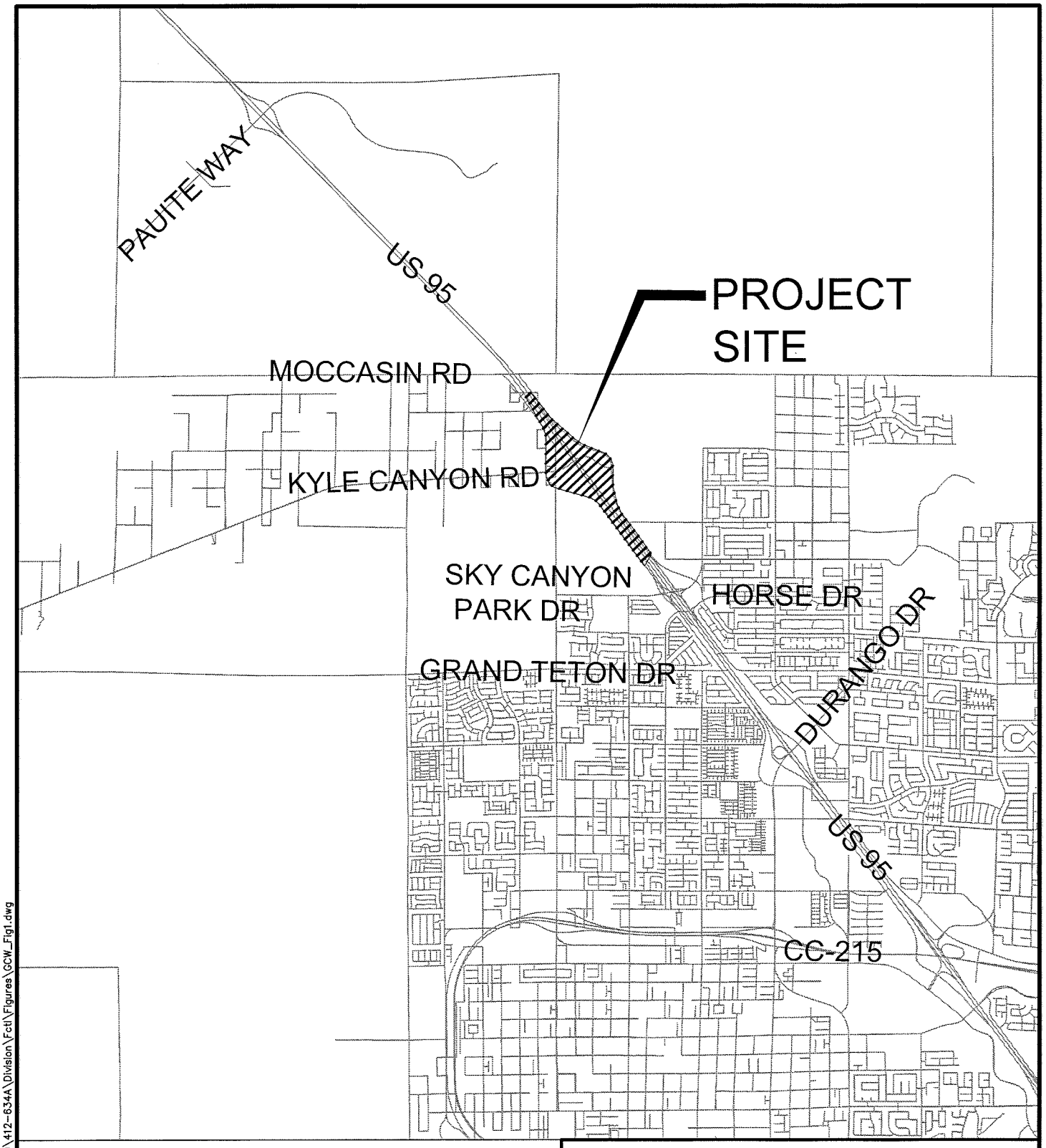
The project is located in Section 1, Township 19 South, Range 59 East, M.D.M. and Sections 6, Township 19 South, Range 60 East, M.D.M., in Clark County, Nevada. Please refer to Figures 1 and 2 for the vicinity and location of the project site.

III. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD HAZARD ANALYSIS

The project site is located on the Flood Insurance Rate Map (FIRM) Community Panels 32003C 1735 E and 32003C 1750E, dated September 27, 2002. Review of the FIRM panels shows that the project site is located within a FEMA-designated Zone X (areas outside of the 0.2% annual chance flood plain). Figure 3 shows the project site denoted on a portion of the aforementioned FIRMs.

IV. CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT (CCRFCD) FACILITIES

Figures 4A and 4B are reproduced from Figures F-8 and F-13 of the 2013 MPU. This figure depicts the project site in relation to existing and proposed CCRFCD facilities. The project proposes to construct portions of the Moccasin and Sheep Mountain Parkway CCRFCD Facilities MOSM 0064 and MOSM 0080 under US95 within the limits of the project.



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
US 95/KYLE CANYON RD INTERCHANGE

FIGURE 1

VICINITY MAP

GRAPHIC SCALE

5000 0 2500 5000

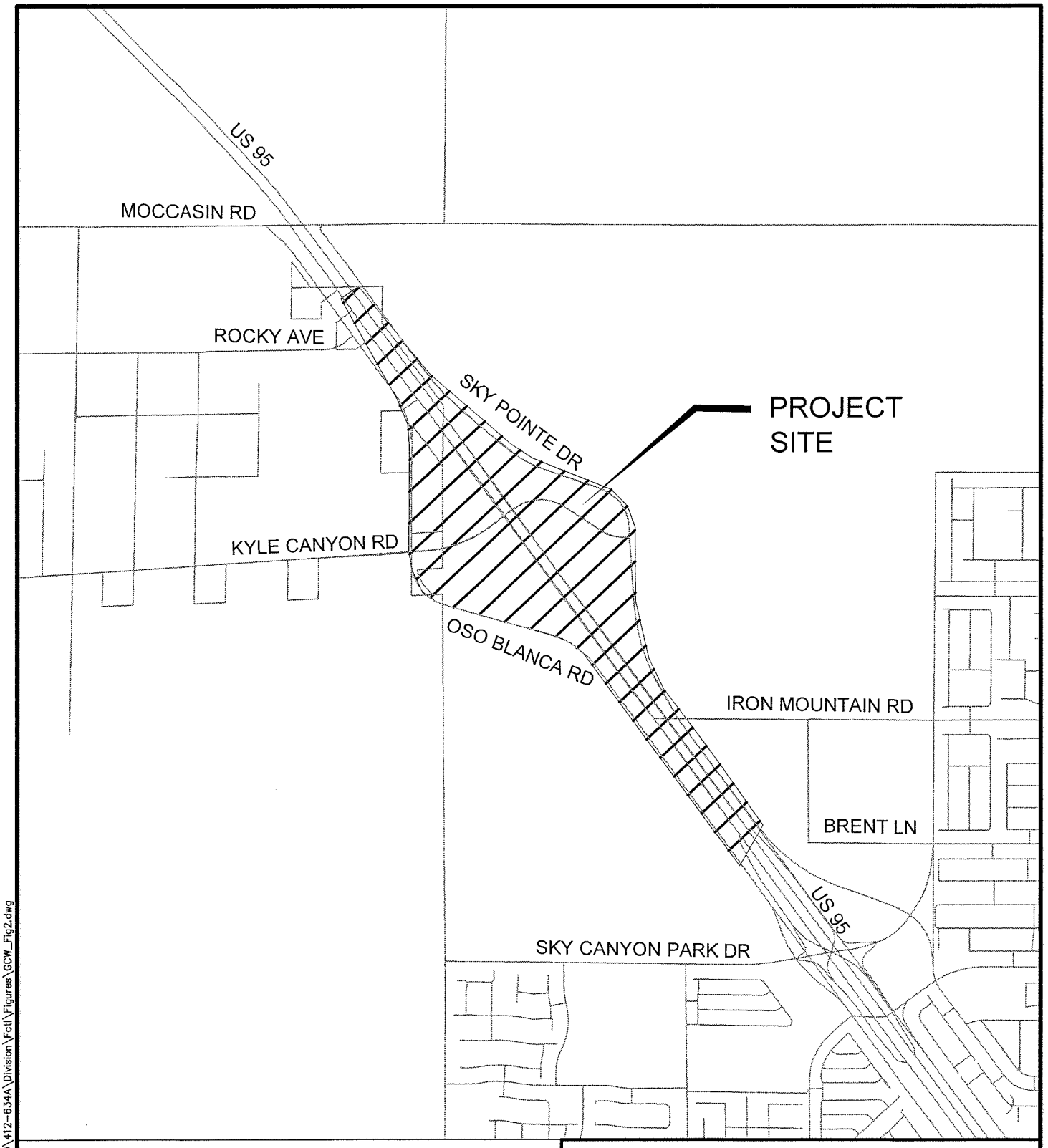
(IN FEET)

1 inch = 5000 ft.

NORTH

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

01-29-16 14:39:23 F:\Projects\400\412-634A\Division\Fct\Figures\GCW_Fig1.dwg
eresop



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
US 95/KYLE CANYON RD INTERCHANGE

FIGURE 2

LOCATION MAP

GRAPHIC SCALE

1500 0 750 1500

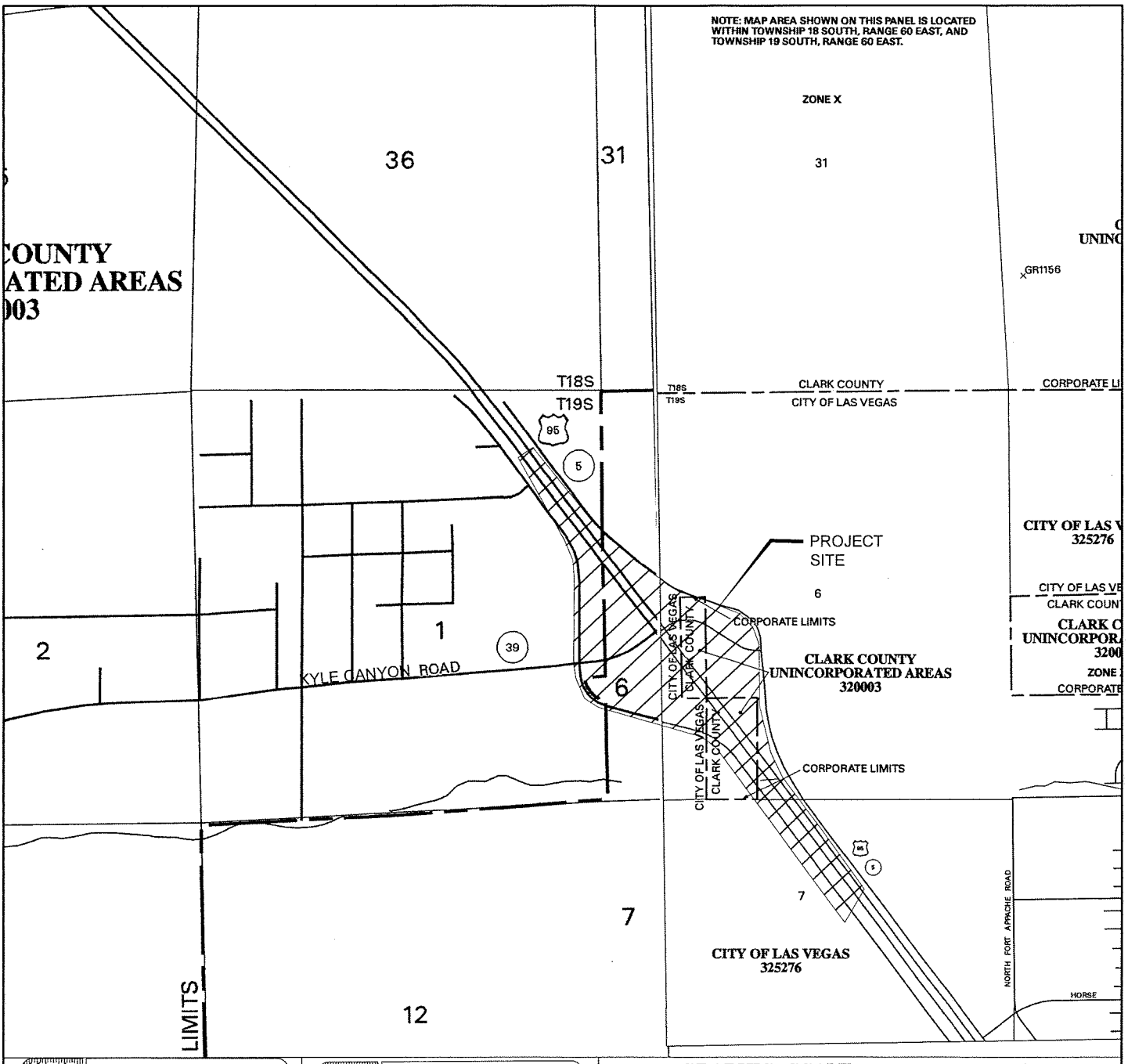
(IN FEET)

1 inch = 1500 ft.

NORTH

GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

eresop 01-29-16 14:40:17 F:\Projects\400\412-634A\Division\Fctl\Figures\GCW_Fig2.dwg



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1735 E

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 1735 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY, UNINCORPORATED AREAS	320003	1735	E
LAS VEGAS, CITY OF	325276	1735	E

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

MAP NUMBER 32003C1735 E

MAP REVISED: SEPTEMBER 27, 2002

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1750 E

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 1750 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LAS VEGAS, CITY OF	325276	1750	E
CLARK COUNTY, UNINCORPORATED AREAS	320003	1750	E

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

MAP NUMBER 32003C1750 E

MAP REVISED: SEPTEMBER 27, 2002

Federal Emergency Management Agency

GRAPHIC SCALE

2000 0 1000 2000

(IN FEET)

1 inch = 2000 ft.

NORTH

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
US 95/KYLE CANYON RD INTERCHANGE

FIGURE 3

F.I.R.M.

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

eresop 01-29-16 14:41:19 F:\Projects\400\412-634A\Division\Fct\Figures\GCW_Fig3.dwg

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVMO		LAS VEGAS WASH - MOCCASIN						
0144	P1	Conc Chnl 27'W 13'D 0:1 SS	1915	12502	2C64-E	LOWER5	77.49	3.10
0184	P1	Conc Chnl 27'W 12.5'D 0:1 SS	2440	12478	2CNW64-C	LOWER5	76.76	3.10
0226	P1	Conc Chnl 27'W 12.5'D 0:1 SS	2500	12478	2CNW64-C	LOWER5	76.76	3.10
0276	P1	Bridge 30'W 10'D	400	11877	CNW51-C	LOWER5	71.44	3.10
MOKC		MOCCASIN AND KYLE CANYON						
0000	P1	11' X 8' RCB	5450	2662	CNW35-C	LOWER3	2.69	3.40
MOSM		MOCCASIN AND SHEEP MOUNTAIN PARKWAY						
0000	P0	14' X 9' RCB	3370	3778	CNW64-C	LOWER3	5.32	2.40
0064	P0	14' X 8' RCB	880	3505	CNW50-C	LOWER3	4.99	3.00
0080	P0	14' X 8' RCB	710	3325	2CNW35-C	LOWER3	4.80	3.00

REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 8
FLOOD CONTROL FACILITIES

LEGEND

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

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

FIGURE 4A

N

0 500 1,000 2,000 3,000
Feet
Scale: 1 inch = 2,000 feet

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

US95 I-15 I-215

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

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
CN95		CENTENNIAL PKWY CHANNEL WEST / U.S 95 BRANCH						
0318	E	Transition Structure	60	653	CNW74-C	WEST3	0.44	1.50
0333	E	5' X 5' RCB	670	339	NW62-S	WEST3	0.22	1.50
MOHU		MOCCASIN - HUALAPAI BRANCH						
0000	P0	14' X 8' RCB	1920	761	2CNW45-N	LOWER3	2.10	0.50
0036	P0	10' X 8' RCB	2590	368	CNW45-N	LOWER3	1.15	0.50
MOIR		MOCCASIN - IRON MOUNTAIN BRANCH						
0000	P0	66" RCP	2770	446	2CNW33-C	LOWER3	1.76	3.60
MOKC		MOCCASIN AND KYLE CANYON						
0000	P1	11' X 8' RCB	5450	2662	CNW35-C	LOWER3	2.69	3.40
MOSM		MOCCASIN AND SHEEP MOUNTAIN PARKWAY						
0000	P0	14' X 9' RCB	3370	3778	CNW64-C	LOWER3	5.32	2.40
0064	P0	14' X 8' RCB	880	3505	CNW50-C	LOWER3	4.99	3.00
0080	P0	14' X 8' RCB	710	3325	2CNW35-C	LOWER3	4.80	3.00

PROJECT SITE

REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 13

FLOOD CONTROL FACILITIES

LEGEND

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

Remove & Replace/Parallel Facilities

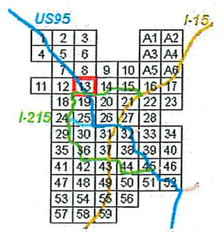
Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

FIGURE 4B

N

0 500 1,000 2,000 3,000
Feet
Scale: 1 inch = 2,000 feet

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



V. HYDROLOGIC METHODOLOGY

The methodology presented in this study is in compliance with the *Nevada Department of Transportation Drainage Manual* (Reference 9, hereinafter referred to as the NDOTDM) and *CCRFCD Hydrologic Criteria and Drainage Design Manual* (Reference 10, hereinafter referred to as the HCDDM).

Model Description - The watersheds were modeled using the SCS Unit Hydrograph method within the U.S. Army Corps of Engineers *HEC-1 Flood Hydrograph Package* (Reference 11). Since the drainage area for the project is less than 8 square miles, an SDN 3 design storm was selected for use in the HEC-1 computer model. Note that the existing conditions 100-year / 10-year HEC-1 models have been referenced from the Original Kyle Canyon MDS and have been included in Appendix E. These hydrologic models have been modified for the 50-year and 100-year storm events, and the revised hydrologic models have been included in Appendix A.

Precipitation – Portions of the tributary drainage areas lie outside of the McCarran Airport Rainfall Area. The 100-year point precipitation values, obtained from Figures 503, 505 and 506 of the HCDDM, are consistent with the values presented in the Original Kyle Canyon MDS. The adjusted 100-year point precipitation values range between 2.77 inches and 3.39 inches, respectively. The adjusted 50-year point precipitation values range conditions adjusted 50-year point precipitation values for these areas range between 2.41 inches and 2.92 inches, respectively.

The remaining portions of the project site lie within the McCarran Airport Rainfall Area. The adjusted 50-year and 100-year point precipitation values have been determined to be 2.41 inches and 2.77 inches, respectively from Table 505 of the HCDDM.

Precipitation exhibits for the 10-year and 100-year storm events have been referenced from the Original Kyle Canyon MDS and have been included in Appendix E. Precipitation exhibit for the 50-year storm event has been presented in Appendix A.

Curve Numbers (CN) – The project site lies within the area covered by the *Soil Survey of Las Vegas Valley Area Nevada* (Reference 12). This survey delineates families of soil types and the Hydrologic Soil Group (HSG) of each family. The portion of the soils map that depicts the project site has been referenced from the Original Kyle Canyon MDS and has been included in Appendix E.

Drainage Area and Flow Patterns – The subbasins and flow patterns used for the onsite proposed conditions hydrologic modeling were determined from grading plans for the US95 improvements and aerial topography with a 1-foot contour interval established in a master grading digital file. Offsite subbasins have been revised from the Original Kyle Canyon MDS to quantify flows at the proposed/existing culvert locations. Pertinent referenced material from the Original Kyle Canyon MDS has been included in Appendix E.

Runoff Coefficient (C) – Runoff Coefficients used for the Rational Method Calculations are based on Table 601 from the HCDDM. The percentage of streets and gravel proposed within the onsite subbasins were determined for the composite Runoff Coefficient calculations. The composite Runoff Coefficient Calculations have been included in Appendix A.

Lag Time – The lag time (TLAG) is described as the time between the center of mass of rainfall and the time of peak discharge from a basin. Lag time can be related to time of concentration (Tc) by the following relationship: TLAG = 0.6 (Tc). The time of concentration (Tc) is defined as the time required for runoff to flow from the most hydraulically distant area of the basin to the outlet of the basin or a design point. The procedure for calculating (Tc) is outlined in Section 602 of the HCDDM. Lag time calculations for the drainage subbasins are included in Appendix A on Standard Form 4. Onsite flows have been determined using Rational Method in accordance with the NDOTDM and the HCDDM. The onsite drainage areas are within the McCarran Airport Rainfall area; accordingly, Figure 517 from the HCDDM was used to determine the rainfall intensities based on a 5 minute time of concentration T_c.

VI. HYDROLOGY DESCRIPTION

Offsite Hydrology

Existing hydrologic conditions for the project were previously analyzed in the Original Kyle Canyon MDS and the US95 Study. Please note that the Skye Canyon MDS references the existing conditions presented in the Original Kyle Canyon MDS. It has been determined by GCW that the existing conditions hydrologic calculations presented in the Original Kyle Canyon MDS is still valid for this project. Figures 5 and 5AR referenced from the Original Kyle Canyon MDS and included in Appendix E depict the overall existing conditions subbasins that impact the project site. The Existing

Conditions Drainage Map, Figure 5, included herein, depicts the existing drainage patterns used in the hydrologic analysis for the site. Table 1 summarizes the existing conditions flow rates pertinent for this project and a complete summary table has been included on Figure 5 to show the results are consistent with the approved studies.

TABLE 1
SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL
OFFSITE BASINS

BASIN	AREA (AC)	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
CP9	-	1305	1005	556
CP15	-	131	106	50
CP16	-	312	252	144
CHD02B	-	433	344	253
CHD02C	-	261	207	151
DCHD02A	-	431	342	252
DCHD02B	-	261	207	151
DCHD02C	-	128	103	83
OFF9A	22.23	61	50	26
OFF9B	7.65	21	17	9
95-5	23.63	60	50	26

The Original Kyle Canyon MDS referenced the US95 Study hydraulic calculations and ratings for the existing culverts under US95 to determine existing flow splits at the culvert locations. The US95 Study presented detailed hydraulic calculations that determined flows that split east through the culverts and over the US95 roadway, and flows that continue south within existing roadside channels during the 100-year storm event. Facilities conveying offsite flows will be based on the 50-year event storm flows and designed to perpetuate existing conditions drainage patterns. The previously approved existing conditions HEC-1 model presented in the Original Kyle Canyon MDS has been modified to include 50-year precipitation values. The proposed improvements will discharge flows at Concentration Point CP15, therefore, Subbasin OFF9 has been subdivided into Subbasins OFF9A and OFF9B to determine a more accurate existing conditions flow rate at Concentration Point CP15 for comparison purposes. The total flow rate at Concentration Point CP16 located east of US95 on referenced Figures 5 and 5AR is virtually unchanged (309 cfs vs 312 cfs) and no other revisions were made to the approved model. A copy of the revised existing conditions 50-year and 100-year HEC-1 models have been included in Appendix A.

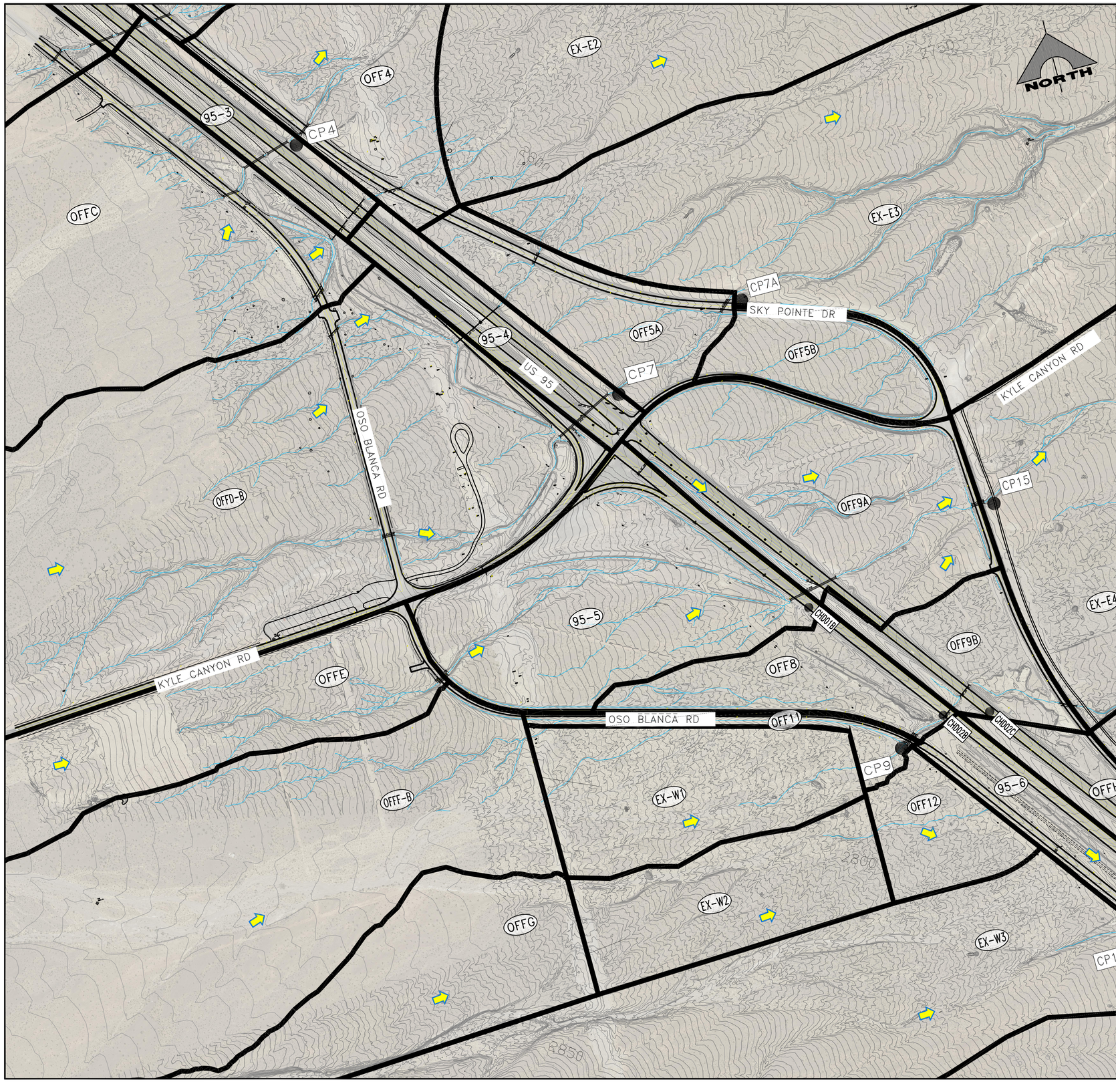
Based on coordination with the SHG and review of the Skye Canyon drainage studies, detention basins proposed with the Skye Canyon Development and future CCRFCD Facilities Moccasin Iron Mountain (MOIR), Moccasin Shaumber Branch (MOSR),

Moccasin Hualapai Branch (MOHU), Moccasin and Kyle Canyon (MOKC), and Moccasin and Sheep Mountain Parkway (MOSM); will reduce existing conditions flows to the proposed culvert extension locations. Copies of Figures F-8, F-12, and F-13 from the 2013 MPU have been included in Appendix E. Therefore, the proposed facilities are designed to perpetuate existing conditions flow patterns and do not assume the Skye Canyon Development and the future Regional facilities have been constructed. The proposed conditions HEC-1 model revised the existing subbasins to reflect proposed conditions. Existing Conditions Subbasins 95-5, OFF8, OFF9A, and OFF9B, were subdivided to reflect the proposed interchange improvements. Subbasin 95-5 was subdivided into Subbasins 95-5P1, 95-5P2, 95-5P3, and 95-5P4. Subbasins OFF9A and OFF9B have been replaced by Subbasins OFF9P1, OFF9P2, OFF9P3, and OFF9P4. Subbasin OFF8 has been replaced by Subbasins OFF8P1, and OFF8P2. Subbasins and HEC-1 nodes at locations east of US95 and south of Subbasins EX-W6 are not pertinent for this project and are not included in the proposed conditions HEC-1 model. Flow rates proposed to discharge east of US95 are consistent with existing conditions.

The Proposed Conditions Drainage Map, Figure 6, included herein depicts the overall proposed conditions subbasins that impact the project site. Table 2 summarizes the portions of the existing conditions model that have been revised for proposed conditions and a complete summary table has been included on Figure 6.

TABLE 2
SUMMARY OF PROPOSED CONDITIONS HEC-1 MODEL
OFFSITE BASINS

BASIN	AREA (AC)	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
CP15	-	125	108	49
CHD02B	-	432	343	253
CHD02C	-	261	246	224
DCHD02A	-	431	342	252
DCHD02B	-	260	246	224
DCHD02C	-	130	123	112
OFF8P1	8.51	22	15	9
OFF8P2	3.13	8	7	3
OFF9P1	0.55	2	5	1
OFF9P2	11.00	27	27	11
OFF9P3	10.68	29	15	13
OFF9P4	7.64	21	16	9
95-5P1	2.29	6	5	2
95-5P2	4.41	12	8	5
95-5P3	11.51	28	33	12
95-5P4	2.30	7	4	3



SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL
CONCENTRATION POINTS

CONCENTRATION POINT	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
CHD01B	77	62	28
CHD02B	433	344	253
CHD02C	261	207	151
CHD04B	1027	784	388
CHD04B2	526	349	107
CHD04C	673	540	349
CHD04C2	385	293	145
CHD05B	779	582	293
CHD05B2	391	267	94
CHD05C	774	608	345
CHD05C2	536	399	167
CHD06B	1121	911	430
CHD06B2	315	172	9
CHD06C	1325	1119	587
CHD06C2	493	363	37
CHD07B	368	202	24
CHD07B2	305	143	10
CHD07C	556	420	38
CHD07C2	441	343	17
CP1	81	59	21
CP2	129	94	33
CP3	151	110	38
CP4	87	70	22
CP5	105	83	27
CP6	233	177	59
CP7	450	336	134
CP7A	454	339	136
CP8	478	357	144
CP9	1305	1005	556
CP10	1419	1102	550
CP11	558	472	272
CP12	733	583	308
CP13	953	733	358
CP14	182	62	28
CP15	131	106	50
CP16	312	252	144
CP17	290	248	206
CP18	305	263	212
CP19	240	211	179
CP20	833	757	550
CP21	1071	967	728
CP22	1088	983	738
CP23	117	79	23
CP24	118	80	24
CP25	268	214	104
CP26	541	421	213
CP27	880	694	366
CPNM	22	17	6

GRAPHIC SCALE
200 0 100 200
(IN FEET)
1 inch = 200 ft.

LEGEND
- SUBBASIN BOUNDARY
- 95-3 ONSITE SUBBASIN NAME
- FLOW DIRECTION
- CP1 COMBINATION POINT

SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL
ONSITE BASINS

BASIN	AREA (AC)	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
EX-W1	15.36	20	15	5
EX-W2	13.24	22	17	7
EX-W3	172.93	268	223	103
EX-W4	67.06	121	103	47
EX-W5	285.43	443	360	170
EX-W6	9.93	21	17	8
EX-W7	126.63	197	162	76
EX-W8	139.52	213	171	81
EX-W9	116.76	173	135	63
EX-E1	33.75	36	26	9
EX-E2	140.59	141	106	35
EX-E3	119.48	112	83	28
EX-E4	140.56	147	109	36
EX-E5	63.30	79	61	22
EX-E6	10.26	21	17	9
EX-E7	21.31	45	36	18
EX-E8	10.67	22	18	9
EX-E9	6.13	13	10	5
ES1	11.10	29	24	14
ES2	31.40	84	71	43

SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL
FLOW SPLITS

DIVERT	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
DCHD01B	77	62	28
DCHD01C	77	62	28
DCHD02A	431	342	252
DCHD02B	261	207	151
DCHD02C	128	103	83
DCHD04A	854	646	285
DCHD04B	541	436	282
DCHD04C	289	247	204
DCHD05A	259	234	188
DCHD05B	389	316	200
DCHD05C	238	209	178
DCHD06A	784	683	357
DCHD06B	807	741	430
DCHD06C	832	757	549
DCHD07A	55	35	16
DCHD07B	63	59	14
DCHD07C	115	77	22

SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL
OFFSITE BASINS

BASIN	AREA (AC)	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
OFFA	12.99	17	12	4
OFFB	85.55	79	57	21
OFFC	85.34	80	64	20
OFFD-A	411.49	343	257	97
OFFD-B	319.21	232	173	61
OFFE	24.48	26	21	6
OFFF-A	636.03	843	652	322
OFFF-B	391.15	433	331	160
OFFG	25.98	48	40	18
OFFH	5.60	15	12	6
OFF2	59.39	61	45	15
OFF4	20.39	27	20	7
OFF5A	10.30	26	21	11
OFF5B	7.43	18	15	8
OFF8	8.50	19	16	8
OFF9A	22.23	61	50	26
OFF9B	7.65	21	17	9
OFF10	429.46	591	473	248
OFF11	2.92	4	3	1
OFF12	6.02	8	6	2
OFF14	8.56	19	16	8
OFF15	23.15	49	39	19
OFF16	504.67	538	431	220
OFF18	351.44	480	379	196
OFF20	42.00	85	67	33
OFF21	337.93	461	360	186
95-1	2.71	7	6	3
95-2	2.80	7	6	3
95-3	6.06	15	12	6
95-4	6.99	17	14	7
95-5	23.63	60	50	26
95-6	6.65	17	14	7
95-7A	4.41	13	11	6
95-7B	7.15	20	17	10
95-8A	3.32	10	9	5
95-8B	2.56	8	7	4
95-9A	7.06	19	16	9
95-9B	8.51	22	18	10

60% COMPLETE

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOW APP	DATE

PROJECT NO. 412-634A
DESIGN:
DRAWN:
CHECK:
PLOT DATE:
PLOT TIME: 10:31:17

GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gowengineering.com
F: \Projects\412-634\dwg\Hydro\60Percent\Figure 5.dwg
Raymond Blanchard

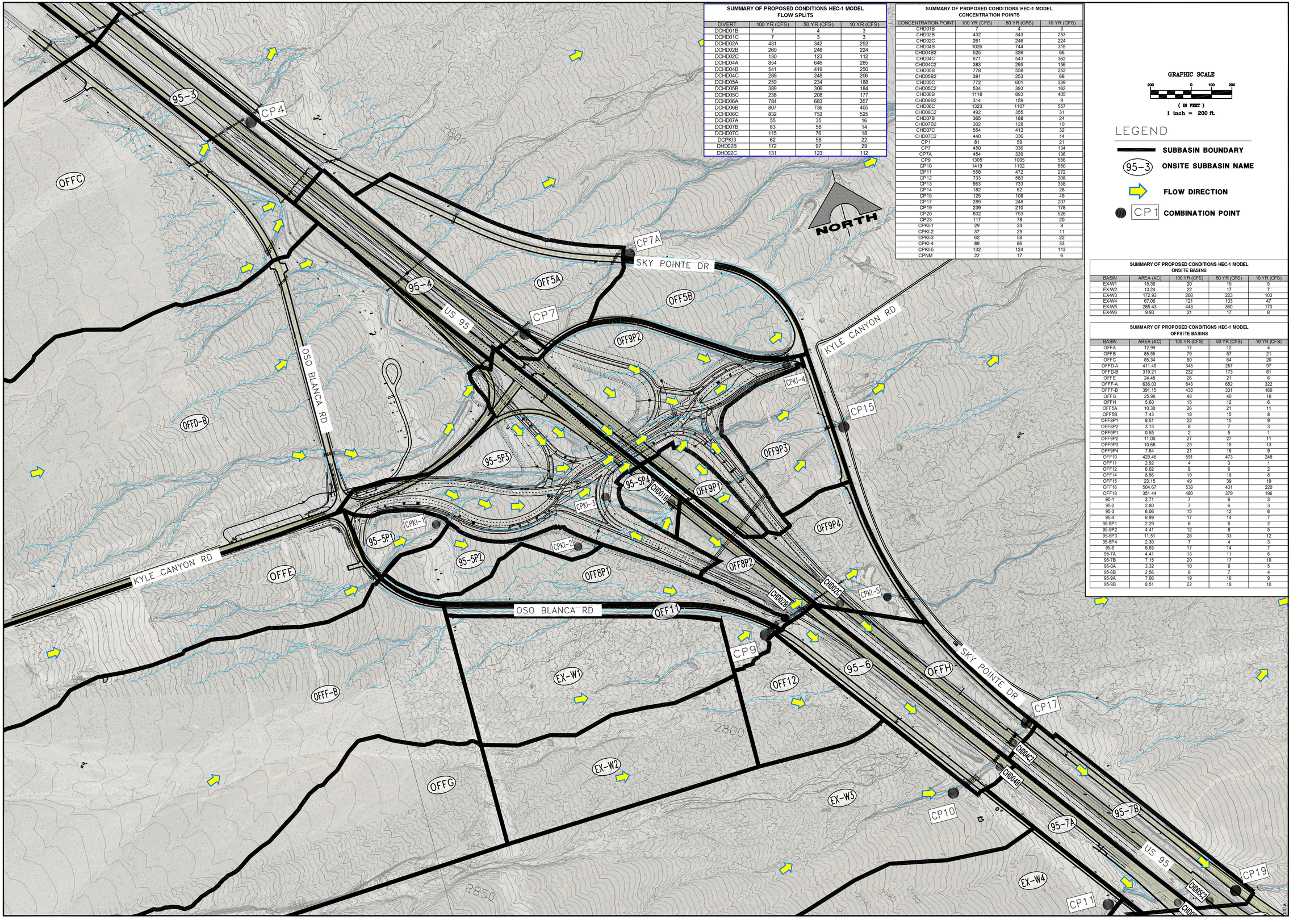
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US 95/KYLE CANYON RD INTERCHANGE

FIGURE 5
EXISTING CONDITIONS DRAINAGE MAP

DRAWING
FIG 5
OF SHTS

HTE: 00-00000



SUMMARY OF PROPOSED CONDITIONS HEC-1 MODEL FLOW SPLITS

DIVERT	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
DCHD01B	7	4	3
DCHD01C	7	3	3
DCHD02A	431	342	252
DCHD02B	260	246	224
DCHD02C	130	123	112
DCHD04A	854	646	285
DCHD04B	541	419	250
DCHD04C	288	248	206
DCHD05A	259	234	188
DCHD05B	389	306	184
DCHD05C	238	208	177
DCHD06A	784	683	357
DCHD06B	807	736	405
DCHD06C	832	752	525
DCHD07A	55	35	16
DCHD07B	63	58	14
DCHD07C	115	76	18
DCPKI3	62	58	22
DHD02B	172	97	29
DHD02C	131	123	112

SUMMARY OF PROPOSED CONDITIONS HEC-1 MODEL CONCENTRATION POINTS

CONCENTRATION POINT	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
CHD01B	7	4	3
CHD02B	432	343	253
CHD02C	261	246	224
CHD04B	1026	744	315
CHD04B2	525	326	66
CHD04C	671	543	362
CHD04C2	383	295	156
CHD05B	778	558	292
CHD05B2	391	253	68
CHD05C	772	601	339
CHD05C2	534	393	162
CHD06B	1118	893	405
CHD06B2	314	159	9
CHD06C	1323	1107	557
CHD06C2	492	355	31
CHD07B	365	188	24
CHD07B2	302	128	10
CHD07C	554	412	32
CHD07C2	440	336	14
CP1	81	59	21
CP7	450	336	134
CP7A	454	339	136
CP9	1305	1005	556
CP10	1419	1102	550
CP11	558	472	272
CP12	733	583	308
CP13	953	733	358
CP14	182	62	28
CP15	125	108	49
CP17	289	248	207
CP19	239	210	178
CP20	832	753	526
CP23	117	78	20
CPKI-1	29	24	8
CPKI-2	37	29	11
CPKI-3	62	58	22
CPKI-4	89	86	33
CPKI-5	132	124	113
CPNM	22	17	6

GRAPHIC SCALE

200 0 100 200

(IN FEET)

1 inch = 200 ft.

LEGEND

- SUBBASIN BOUNDARY
- 95-3 ONSITE SUBBASIN NAME
- FLOW DIRECTION
- CP1 COMBINATION POINT

SUMMARY OF PROPOSED CONDITIONS HEC-1 MODEL ONSITE BASINS

BASIN	AREA (AC)	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
EX-W1	15.36	20	15	5
EX-W2	13.24	22	17	7
EX-W3	172.93	268	223	103
EX-W4	67.06	121	103	47
EX-W5	285.43	443	360	170
EX-W6	9.93	21	17	8

SUMMARY OF PROPOSED CONDITIONS HEC-1 MODEL OFFSITE BASINS

BASIN	AREA (AC)	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
OFF-A	12.99	17	12	4
OFF B	85.55	79	57	21
OFFC	85.34	80	64	20
OFFD-A	411.49	343	257	97
OFFD-B	319.21	232	173	61
OFFE	24.48	26	21	6
OFFF-A	636.03	843	652	322
OFFF-B	391.15	433	331	160
OFFG	25.98	48	40	18
OFFH	5.60	15	12	6
OFF5A	10.30	26	21	11
OFF5B	7.43	18	15	8
OFF8P1	8.51	22	15	9
OFF8P2	3.13	8	7	3
OFF9P1	0.55	2	5	1
OFF9P2	11.00	27	27	11
OFF9P3	10.68	29	15	13
OFF9P4	7.64	21	16	9
OFF10	429.46	591	473	248
OFF11	2.92	4	3	1
OFF12	6.02	8	6	2
OFF14	8.56	19	16	8
OFF15	23.15	49	39	19
OFF16	504.67	538	431	220
OFF18	351.44	480	379	196
95-1	2.71	7	6	3
95-2	2.80	7	6	3
95-3	6.06	15	12	6
95-4	8.99	17	14	7
95-5P1	2.29	6	5	2
95-5P2	4.41	12	8	5
95-5P3	11.51	28	33	12
95-5P4	2.30	7	4	3
95-6	6.65	17	14	7
95-7A	4.41	13	11	6
95-7B	7.15	20	17	10
95-8A	3.32	10	9	5
95-8B	2.56	8	7	4
95-9A	7.06	19	16	9
95-9B	8.51	22	18	10

90% COMPLETE

REV	DESCRIPTION	DATE
		DATE:
		GCW APP
		DATE
		AGEN APP
		DATE

PROJECT NO. 412-634A

DESIGN:
DRAWN:
CHECK:
PLOT DATE: 01-15-16
PLOT TIME: 16:19:18

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\400\412-634\dwg\hydro\60Percent\Figure 6.dwg
Michelle Castell

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US 95/KYLE CANYON RD INTERCHANGE

FIGURE 6
PROPOSED CONDITIONS DRAINAGE MAP

DRAWING
FIG 6
1 OF 1 SHTS

HTE: 00-00000

Ultimate Conditions Hydrology

Ultimate Conditions has been referenced from the Skye Canyon MDS Update #3. Pertinent referenced material from the Skye Canyon MDS Update #3 has been included as part of the CCRFCD Facility Design Memorandum in Appendix B.

Onsite Hydrology

Onsite flows within the proposed roadway KCW1 and KCE1 alignments, generated within the median islands between the roadways, and from the interchange on and off ramps will be collected by storm drain facilities to be conveyed east within a proposed storm drain mainline to outlet flows at Concentration Point CP15. Please refer to Section IX for a more detailed discussion of the proposed storm drain mainline.

Figures 7A and 7B depict the proposed drainage patterns and onsite subbasins used to size the proposed roadway surface drainage facilities. The proposed roadway surface drainage facilities consist of curbs, gutters, drop inlets, storm drain laterals, median ditches, and roadside ditches.



25-YEAR ONSITE DITCH/BERM CHARACTERISTICS

Ditch/Berm	Min Slope (%)	Q_{25} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch I4	2.19	5.3	0.72	3.45	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	I4 + 95-3 + 95-4B
Ditch I5 East	3.4	3.4	0.56	3.64	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	I5
Ditch I5 South	2.5	5.2	0.69	3.61	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	95-13
Ditch 95-6	1.05	4.4	0.68	2.35	0	V-DITCH / Berm	5:1/3:1	Decorative Rock	2.00	95-6
Ditch 95-7	2.23	5.8	0.66	3.34	0	V-DITCH / Berm	5:1/3:1	Decorative Rock	2.00	95-7
Ditch 95-8	0.6	8.3	0.83	2.03	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	2.00	95-7 + 95-8
Ditch 95-15A	1.85	2.3	0.54	2.63	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	95-15A
Ditch 95-16	0.32	2.8	0.72	1.34	0	V-DITCH / Berm	5:1/3:1	Decorative Rock	2.00	95-16
Ditch 95-17	0.2	2.5	0.57	0.92	0	V-DITCH / Berm	10:1/7:1	Decorative Rock	2.00	95-17
Ditch 95-19	1.3	1.3	0.55	2.14	0	V-DITCH / Berm	2:1/2:1	Decorative Rock	1.50	95-19
Ditch 95-20	1.2	1.1	0.52	2.00	0	V-DITCH / Berm	2:1/2:1	Decorative Rock	2.00	95-20
Ditch KR1-2	1.8	2.0	0.39	2.14	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR1-2
Ditch KR1-3	1.9	8.8	0.68	3.17	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	2.00	KR1-2 + KR1-3
Ditch KR1-4	2.0	3.4	0.47	2.55	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR1-4
Ditch KR2-2	4.4	2.2	0.35	3.07	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR2-2
Ditch KR2-3	3.5	0.4	0.19	1.84	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR2-3
Ditch KR2-4	5.0	3.3	0.39	3.57	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR2-4
Ditch KR3-1A	4.6	2.9	0.38	3.35	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR3-1A
Ditch KR3-2	4.0	3.1	0.40	3.23	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR3-2
Ditch KR4-1	4.1	1.7	0.32	2.80	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-1
Ditch KR4-2	2.6	1.7	0.35	2.36	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-2
Ditch KR4-3	2.0	5.2	0.55	2.83	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	2.00	KR4-3
Ditch KR4-4	8.5	0.9	0.22	3.14	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-4
Ditch KR4-5	1.9	3.2	0.47	2.46	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-5
Ditch 95-9	1.4	6.7	0.60	2.51	0	V-DITCH / Berm	10:1/5:1	Decorative Rock	2.00	95-9

50-YEAR OFFSITE DITCH/BERM CHARACTERISTICS

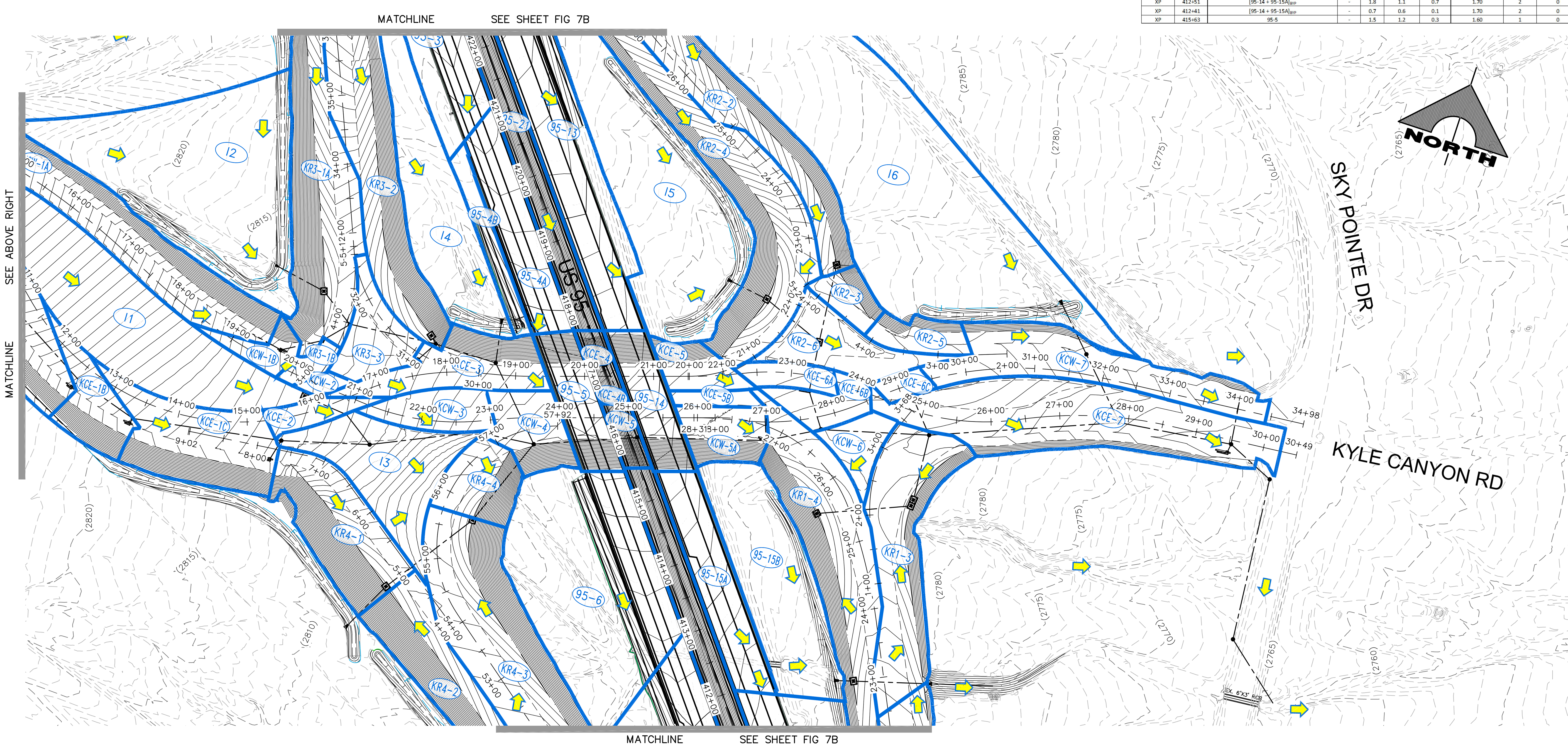
Ditch/Berm	Min Slope (%)	Q_{50} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch I2 East	1.56	4.8	0.73	2.96	0	V / Berm	3:1/3:1	Decorative Rock	2.00	I2
Ditch I2 South	3.18	2.4	0.50	3.25	0	V / Berm	3:1/3:1	Decorative Rock	1.50	1/2 I2
CP7	2.00	168	1.48	5.86	15	V / Berm	3:1/3:1	Class 150	2.50	1/2 CP7
95-5P1	2.20	5	0.65	4.00	0	V / Berm	3:1/3:1	Earth	2.00	95-5P1
95-5P2	3.00	8	0.87	3.56	0	V / Berm	3:1/3:1	Class 150	2.00	95-5P2
OFF8P1	3.00	15	1.10	4.16	0	V / Berm	3:1/3:1	Class 150	2.00	OFF8P1

100-YEAR OFFSITE DITCH/BERM CHARACTERISTICS

Ditch/Berm	Min Slope (%)	Q_{100} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch DHD02C	1.70	131	3.25	6.21	0	V-DITCH / Berm	2:1/2:1	Class 150	4.50	Culvert HD02BWS
Ditch DHD02B	1.70	172	2.00	4.79	0	V-DITCH / Berm	16:1/2:1	Class 300	3.00	Split South DHD02B
Ditch DHD02B	3.60	172	2.09	7.28	5	TRAP	3:1/3:1	Class 700	3.50	Split South DHD02B

SUMMARY - DROP INLET CALCULATIONS

Alignment	Station	Tributary	Q_{10} (cfs)	Q_{25} (cfs)	$Q_{Intercept}$ (cfs)	Q_{bypass} (cfs)	Longitudinal Slope (%)	Cross Slope (%)	Bike Lane (BL) Width (ft)	Curb & Gutter (CG) Width (ft)	Shoulder (SH) Width (ft)	Adjacent Travel Lane (TL) Width (ft)	Max Spread Width (ft) BL+CG+SH+1/2 TL	Spread (ft)	Drop Inlet Size	Inlet Type*	Notes
KCE1	12+50	KCE-1A	4.9	-	3.4	1.5	5.97	2	0	2	0	21	12.5	8.4	7' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KCE1	13+40	KCE-1A$_{BYP}$ + KCE-1B	2.3	-	2.0	0.3	4.23	2	0	2	0	21	12.5	6.4	7' Type 11 18" RCP	Capacity	Inlet added to meet spread criteria along KR4 Ramp
KR4A	7+95	KCE-1B$_{BYP}$ + KCE-1C	2.1	-	1.7	0.4	3.60	1	0	2	0	15	9.5	9.7	7' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KR4A	7+75	KCE-1C$_{BYP}$	0.4	-	0.4	0.0	3.60	1	0	2	0	15	9.5	2.1	7'Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KCE1	16+40	KCE2	0.4	-	0.3	0.1	2.95	2	6	2	0	15	15.5	2.1	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
KCW1	22+78	KCE-2$_{BYP}$ + KCW-3	0.8	-	0.8	0.0	2.95	2	0	2	0	15	9.5	3.8	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off to KR4 Ramp. Estimated slope based on profile of adjacent alignement KCE.
KCW1	27+00	KCW4 + KCW5 + KCW-5A	1.6	-	1.6	0.0	1.35	2	0	2	0	18	11	10.6	10' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump. Estimated slope using surface.
KCW1	27+76	KCE-6B	0.6	-	0.6	0.0	0.30	2	0	2	0	15	9.5	6.3	7' Type 11 18" RCP	Sag	Inlet added to collect lfow at sag location
KCW1	29+15	KCE-6C	0.2	-	0.2	0.0	0.70	2	0	0	12	15	19.5	2.1	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
KCE1	29+50	KCE7	3.7	-	3.6	0.1	0.50	2	6	2	0	12	14	12.6	15' Type 11 24" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KCW1	19+00	KCW-1A	4.8	-	3.7	1.1	5.92	2	6	2	0	15	15.5	8.3	10' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KCW1	19+70	KCW-1A$_{BYP}$ + KCW-1B	1.5	-	1.4	0.1	4.30	2	6	2	0	15	15.5	5.0	7' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KR3A	3+60	KCW-1B$_{BYP}$ + KR3-1B	0.4	-	0.3	0.1	2.89	2	0	2	8	14	17	2.1	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off curb to sump
KR3	30+89	KR3-3	1.0	-	0.9	0.1	3.00	0.7	0	2	8	14	17	8.3	Type 7 24" RCP	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
KCE1	23+30	KR3-3$_{BYP}$ + KCW2 + KCE3 + KCE-4 + KCE-5 + KCE-6A	2.6	-	2.6	0.0	0.85	2	6	2	0	15	15.5	9.7	15' Type 11 24" RCP	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
KCW1	26+97	KCE-4B + KCE-5B	0.3	-	0.3	0.0	0.85	2	0	0	0	0	NA	4.6	NDOT Type 2	Capacity	Inlet within Median. Spread contained within median.
KCW1	34+00	KR2-5 + KCW-7	2.9	-	2.9	0.0	0.50	2	6	2	0	12	14	11.4	15' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
XP	418+20	95-4A	-	2.2	1.3	0.9	1.57	2	0	0	12	12	18	8.7	NDOT Type 2	Capacity	Inlet added to limit bypass flow off curb to sump
XP	418+13	95-4A	-	0.9	0.9	0.0	1.57	2	0	0	12	12	18	6.2	Type 5-2G	Capacity	Inlet added to limit bypass flow off curb to sump
XP	412+61	95-14 + 95-15A	-	3.8	2.0	1.8	1.70	2	0	0	12	12	18	10.5	NDOT Type 2	Capacity	Inlet added to limit bypass flow off curb to sump
XP	412+51	[95-14 + 95-15A]$_{BYP}$	-	1.8	1.1	0.7	1.70	2	0	0	12	12	18	7.9	NDOT Type 2	Capacity	Inlet added to limit bypass flow off curb to sump
XP	412+41	[95-14 + 95-15A]$_{BYP}$	-	0.7	0.6	0.1	1.70	2	0	0	12	12	18	5.7	Type 5-2G	Capacity	Inlet added to limit bypass flow off curb to sump
XP	415+63	95-5	-	1.5	1.2	0.3	1.60	1	0	0	12	12	18	11.6	Type 5-2G	Capacity	Inlet added to limit bypass flow off curb to sump



GRAPHIC SCALE

100 0 50 100

(IN FEET)
1 inch = 100 ft.

LEGEND

ON1 — SUBBASIN NAME

SUBBASIN BOUNDARY

FLOW DIRECTION

SUMMARY OF PROPOSED CONDITIONS RATIONAL METHOD ONSITE BASINS

BASIN	AREA (AC)	10 YR (CFS)	25 YR (CFS)	50 YR (CFS)
I1	1.36	2.3	3.1	4.0
I2	1.65	2.8	3.8	4.8
I3	0.59	1.0	1.4	1.7
I4	0.82	1.4	1.9	2.4
I5	1.49	2.5	3.4	4.4
I6	2.85	10.8	14.3	17.1
I11	0.34	1.3	1.7	2.0
95-1A	1.78	5.2	7.0	8.5
95-1B	0.49	1.8	2.4	2.9
95-1C	0.68	2.6	3.4	4.1
95-1D	0.19	0.3	0.4	0.5
95-2A	0.25	0.4	0.6	0.7
95-2B	0.72	2.7	3.6	4.3
95-3	0.74	2.3	3.0	3.6
95-4A	0.44	1.6	2.2	2.6
95-4B	0.16	0.3	0.4	0.5
95-5	0.29	1.1	1.5	1.8
95-6	1.49	3.3	4.4	5.5
95-7	1.69	4.3	5.8	7.1
95-8	0.61	1.9	2.5	3.0
95-9	2.07	4.9	6.7	8.2
95-10	0.95	3.1	4.1	5.0
95-11	1.47	4.8	6.4	7.8
95-12	1.05	3.4	4.5	5.5
95-13	1.23	3.9	5.2	6.3
95-14	0.30	1.1	1.5	1.8
95-15A	0.46	1.7	2.3	2.8
95-15B	0.84	1.4	1.9	2.5
95-16	0.80	2.1	2.8	3.5
95-17	0.65	1.9	2.5	3.1
95-18	0.33	0.5	0.8	1.0
95-19	0.55	0.9	1.3	1.6
95-20	0.49	0.8	1.1	1.4
95-21	0.62	1.0	1.4	1.8
95-22	0.96	1.6	2.2	2.8
95-23	0.62	1.0	1.4	1.8
KCE-1A	1.43	4.9	6.5	7.8
KCE-1B	0.27	0.8	1.0	1.3
KCE-1C	0.58	1.8	2.4	2.9
KCE-2	0.11	0.4	0.6	0.7
KCE-3	0.40	1.3	1.7	2.0
KCE-4	0.08	0.2	0.3	0.4
KCE-4B	0.02	0.1	0.1	0.1
KCE-5	0.17	0.5	0.7	0.8
KCE-5B	0.07	0.2	0.3	0.4
KCE-6A	0.11	0.4	0.6	0.7
KCE-6B	0.17	0.6	0.9	1.0
KCE-6C	0.06	0.2	0.3	0.4
KCE-7	1.09	3.7	4.9	5.9
KCW-1A	1.57	4.8	6.4	7.7
KCW-1B	0.12	0.4	0.5	0.6
KCW-2	0.04	0.1	0.2	0.2
KCW-3	0.22	0.7	0.9	1.1
KCW-4	0.26	0.7	1.0	1.2
KCW-5	0.11	0.3	0.4	0.4
KCW-5A	0.22	0.6	0.8	1.0
KCW-6	0.16	0.6	0.8	0.9
KCW-7	0.64	2.5	3.4	4.0
KR1-1	2.31	7.6	10.1	12.2
KR1-2	0.52	1.5	2.0	2.4
KR1-3	1.83	5.1	6.8	8.3
KR1-4	1.10	2.5	3.4	4.2
KR2-1	0.90	2.5	3.4	4.1
KR2-2	0.73	1.6	2.2	2.7
KR2-3	0.13	0.3	0.4	0.5
KR2-4	1.16	2.4	3.3	4.1
KR2-5	0.15	0.4	0.5	0.6
KR2-6	0.34	1.3	1.7	2.0
KR3-1A	1.03	2.2	2.9	3.7
KR3-1B	0.07	0.3	0.3	0.4
KR3-2	1.04	2.3	3.1	3.8
KR3-3	0.26	1.0	1.3	1.6
KR4-1	0.55	1.2	1.7	2.1
KR4-2	0.73	1.2	1.7	2.1
KR4-3	1.47	3.9	5.2	6.4
KR4-4	0.26	0.7	0.9	1.1
KR4-5	0.82	2.4	3.2	3.8

LID#

90% COMPLETE

DATE:

REV | DATE | DESCRIPTION | DATE | AGEN APP | DATE | GCW APP

PROJECT NO. **412-634A**

DESIGN:
DRAWN:
CHECK:
PLOT DATE: 01-13-17
PLOT TIME: 10:17:41

F:\Projects\400\412-634\dwg\hydro\60Percent\Update - 100percent\Figure 7.dwg
Nelson Baggs

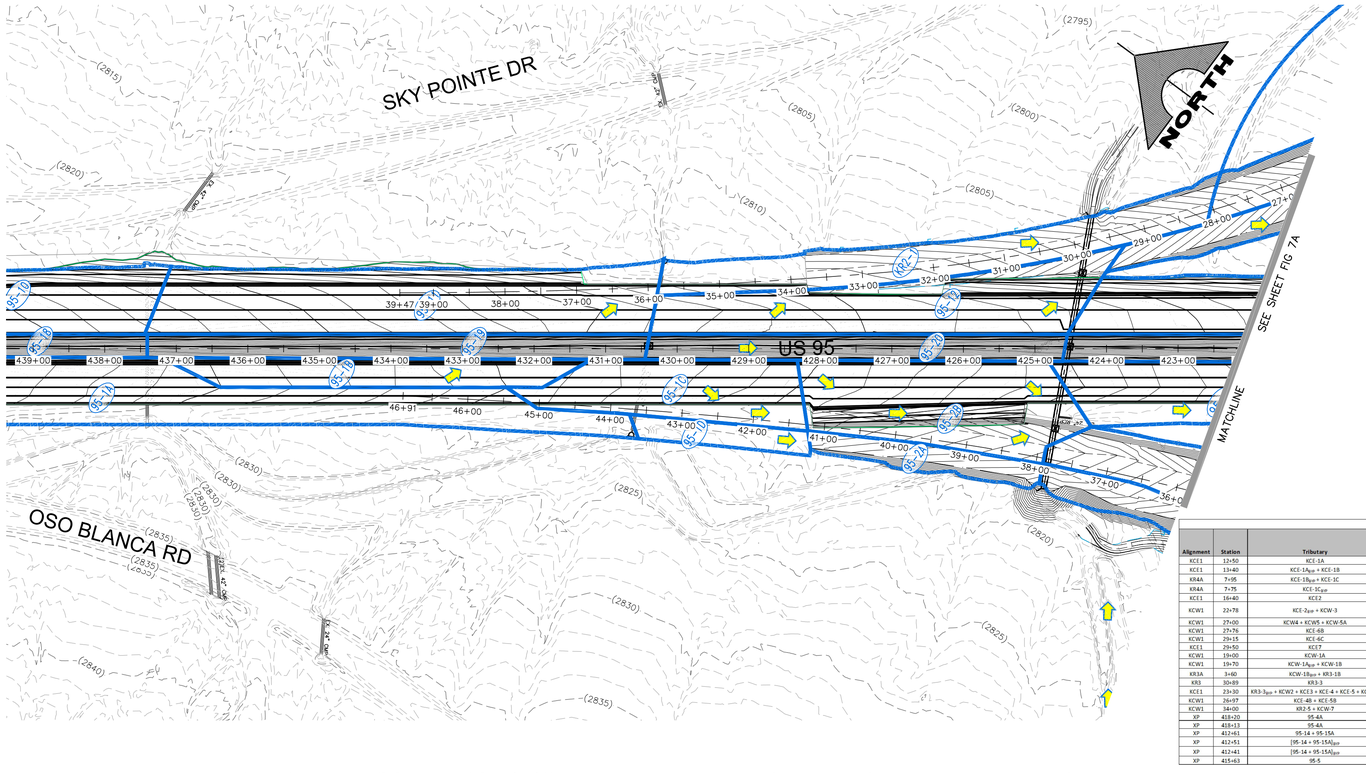
GCW ENGINEERS | SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US 95/KYLE CANYON RD INTERCHANGE

FIGURE 7A
ONSITE BASINS MAP 1

DRAWING
FIG 7A
1 OF 2 SHTS


SKY POINTE DR
OSO BLANCA RD
US 95
NORTH
SEE SHEET TIG 7A
MATCHLINE
(2795)
(2815)
(2805)
(2800)
(2820)
(2810)
(2805)
(2830)
(2825)
(2820)
(2830)
(2830)
(2830)
(2835)
(2835)
(2835)
(2840)
(2830)
(2825)
(2835)
(2830)
(2825)
(2820)
(2795)
(2790)
(2785)
(2780)
(2775)
(2760)
(2765)
(2755)
(2780)
(2790)
(2800)
(2795)
(2785)
(2780)
(2775)
(KR1-2)
(KR1-1)
(KR2-1)
(KR2-2)
(KR2-3)
(KR2-4)
(KR3-1A)
(KR3-1B)
(KR3-2)
(KR3-3)
(KR4-1)
(KR4-2)
(KR4-3)
(KR4-4)
(KR4-5)
(95-1A)
(95-1B)
(95-1C)
(95-1D)
(95-2A)
(95-2B)
(95-3)
(95-4A)
(95-4B)
(95-5)
(95-6)
(95-7)
(95-8)
(95-9)
(95-10)
(95-11)
(95-12)
(95-13)
(95-14)
(95-15A)
(95-15B)
(95-16)
(95-17)
(95-18)
(95-19)
(95-20)
(95-21)
(95-22)
(95-23)
(95-24)
(95-25)
(95-26)
(95-27)
(95-28)
(95-29)
(95-30)
(95-31)
(95-32)
(95-33)
(95-34)
(95-35)
(95-36)
(95-37)
(95-38)
(95-39)
(95-40)
(95-41)
(95-42)
(95-43)
(95-44)
(95-45)
(95-46)
(95-47)
(95-48)
(95-49)
(95-50)
(95-51)
(95-52)
(95-53)
(95-54)
(95-55)

VII. PROJECT DRAINAGE DESIGN CRITERIA

The drainage design criteria utilized on the project are based on the criteria as outlined in the NDOTDM and discussions with the NDOT Hydraulics Division as summarized in Table 3 below:

TABLE 3
DRAINAGE DESIGN CRITERIA

Design Feature	Design Frequency	Design Criteria	Reference	Comments
Roadway Surface Drainage US95 and Ramps (Principal Arterials & Other Freeways)				
Design Year Frequency	25 year	No spread into adjacent travel lanes	NDOTDM Tbl 3-1	
Superelevation reversals	25 year	Provide drop inlet to limit design flow bypass to 0.25 cfs.	NDOTDM 3.3.2.2	Where feasible, limit flow bypass to 0.10 cfs.
Sags	25 year	A 50% clogging factor shall be applied. For sag locations where a clogged inlet could result in ponding depths greater than one foot, provide two (2) additional flanker inlets. One on each side.	NDOTDM 3.3.2.2.1	
Bridge deck drainage	25 year	Flows directed onto bridges shall be limited to a maximum of 0.25 cfs	NDOTDM 3.3.2.2	Where feasible, limit flow bypass to 0 cfs. No inlets in the approach slab.
Roadway Surface Drainage Kyle Canyon Road (Minor Arterial & Urban or Rural Minor Collector)				
Design Year Frequency	10 year	Maximum spread ½ adjacent travel lane	NDOTDM Tbl 3-1	
Superelevation reversals	10 year	Provide drop inlet to limit design flow bypass to 0.25 cfs.	NDOTDM 3.3.2.2	Where feasible, limit flow bypass to 0.10 cfs.
Sags	10 year	A 50% clogging factor shall be applied. For sag locations where a clogged inlet could result in ponding depths greater than one foot, provide two (2) additional flanker inlets. One on each side.	NDOTDM 3.3.2.2.1	
Bridge deck drainage	10 year	Flows directed onto bridges shall be limited to a maximum of 0.25 cfs	NDOTDM 3.3.2.2	Where feasible, limit flow bypass to 0 cfs. No inlets in the approach slab.
Culverts				
Design Year Frequency	50 year	------	NDOTDM Tbl 3-1	
Minimum Diameter	50 year	The minimum culvert diameters shall be 24" on interstate systems and 18" elsewhere.	NDOTDM Tbl 3.3.4.2	

TABLE 3 DRAINAGE DESIGN CRITERIA				
Design Feature	Design Frequency	Design Criteria	Reference	Comments
Pipe Material	------	CMP can be used for extensions to existing CMP culverts. RCP shall be used elsewhere.		
Culvert Skew	50 year	The culvert skew shall not exceed 45 degrees as measured from a line perpendicular to the roadway centerline without the approval of the PHE.	NDOTDM 3.3.4.2	
Outlet protection	10-25 year (onsite) / 50 year (offsite) / 100 year (CCRFCD)	Outlet protection shall be considered for all culverts with erosive outlet velocities	NDOTDM 3.3.4.2	Filter/bedding should be used for all riprap installations.
Headwater Depth	50 year	The maximum allowable ponding elevation for the design flow is the edge of the roadway pavement.	NDOTDM 3.3.4.2	Additional consideration (seepage/piping, buoyancy, etc.) should be given if the headwater is over 1.5 times the diameter of the culvert.
Storm Drains				
Hydraulic gradient	10 year (onsite) / 50 year (offsite) / 100 year (CCRFCD)	The hydraulic gradient shall remain at least one (1) foot below the ground surface for the design flow.	NDOTDM 3.3.2.2.4	Storm drain shall be analyzed to pass 100 year flows if connected to CCRFCD Facility. However, the Hydraulic Gradient is not required to remain at least one (1) foot below ground surface.
Manholes	10 year (onsite) / 50 year (offsite) / 100 year (CCRFCD)	Manholes shall not be located in traffic lanes or roadway intersections. For storm drains with diameters 24" or less, the maximum spacing for manholes is 300'. For pipes over 24" in diameter, a 400' maximum is required for the manhole spacing.	NDOTDM 3.3.2.2.4	
Drop Inlets	10 year (onsite)	A maximum of 3 drop inlets along the storm drain trunk line shall be allowed. Drop inlet shall not be located along storm drain trunk line downstream of a manhole.		Slotted drains are not preferred anywhere. Trench drains are an acceptable alternative provided that the effective trench slope is 4% minimum and 12" internal trench width is provided. Directly connected inlets are also an acceptable alternative where it

TABLE 3
DRAINAGE DESIGN CRITERIA

Design Feature	Design Frequency	Design Criteria	Reference	Comments
				makes sense. A riprap downdrain should be provided at the end of barrier rail runs to pickup nuisance flows. If used for more than just nuisance flows where inlets are not feasible, the riprap downdrain should be sized appropriately.
Minimum Diameter	10 year (onsite)	The minimum diameters shall be 12" for embankment protector storm drains that are located out of the pavement sections, 15" for storm drain laterals, and 18" elsewhere.	NDOT Hydraulics Division	
Pipe Material	10 year (onsite)	HDPE can be used for storm drains that are located out of the pavement sections. RCP shall be used elsewhere.	NDOT Hydraulics Division	
Roadside and Median Ditches				
Freeboard	10 year / 25 year	Judgment must be applied to determine appropriate freeboard. Generally, appropriate freeboard will be between 0 and 1 foot.	NDOTDM 3.3.2.2.5	One foot freeboard should be provided above the design storm flow depth, less should be approved by NDOT Hydraulic Engineer.
Channels (off-site flow)				
Size and Capacity	50 year (design); 100 year (analyzed)	In addition to the design storm, flow conditions for the channels shall be analyzed for the 100-year event.	NDOTDM 3.3.3.2.1	
Side Slopes	50 year (design); 100 year (analyzed)	Unlined channel side slopes shall be 3:1 or flatter and riprap-lined channels shall have 2:1 or flatter side slopes.	NDOTDM 3.3.3.2.1	
Freeboard	50 year (design); 100 year (analyzed)	Channel freeboard shall be a minimum of 1-foot for the design storm.	NDOTDM 3.3.3.2.1	Perform superelevation and freeboard calculations.
Radius	50 year (design); 100 year (analyzed)	The minimum radius for channel bends shall be 50 feet.	NDOTDM 3.3.3.2.1	Angle points with less than a 5 degree deflection angle may be considered on a case by case basis.

VIII. STREET HYDRAULICS AND DROP INLET FACILITIES

US95 and the interchange on and off ramps are classified by NDOT as a Principal Arterial. Table 3-1 in the NDOTDM shows a minimum 25-yr design return frequency with no allowable spread into the adjacent travel lane.

Kyle Canyon Road is classified by NDOT as a Minor Arterial and Urban Minor Collector. Table 3-1 in the NDOTDM shows a minimum 10-yr design return frequency with the maximum allowable spread equal to ½ lane into the adjacent travel lane.

Drop inlets have been provided to meet the above mentioned NDOTDM Criteria and have been analyzed in accordance with HEC-22, Urban Drainage Design Manual, FHWA (Reference 13). The drop inlet calculations were prepared using the FHWA Hydraulic Toolbox Software (Reference 14). Table 4 below summarizes the street drop inlet calculations. The drop inlet calculations have been included in Appendix C.

TABLE 4
DROP INLET SUMMARY

Drop Inlet	Alignment	Station	Tributary	Q_{10} (cfs)	Q_{25} (cfs)	$Q_{intercept}$ (cfs)	Q_{bypass} (cfs)	Longitudinal Slope (%)	Cross Slope (%)	Max Spread Width (ft) BL+CG+SH+1/2 TL	Spread (ft)	Drop Inlet Size
1	KCE1	12+50	KCE-1A	4.9	-	3.4	1.5	5.97	2	12.5	8.4	7' Type 11 18" RCP
2	KCE1	13+40	KCE-1ABYP + KCE-1B	2.3	-	2.0	0.3	4.23	2	12.5	6.4	7' Type 11 18" RCP
3	KR4A	7+95	KCE-1BBYP + KCE-1C	2.1	-	1.7	0.4	3.60	1	9.5	9.7	7' Type 11 18" RCP
4	KR4A	7+75	KCE-1CBYP	0.4	-	0.4	0.0	3.60	1	9.5	2.1	7'Type 11 18" RCP
5	KCE1	16+40	KCE2	0.4	-	0.3	0.1	2.95	2	15.5	2.1	Type 3 24" RCP or Less
6	KCW1	22+78	KCE-2BYP + KCW-3	0.8	-	0.8	0.0	2.95	2	9.5	3.8	Type 3 24" RCP or Less
7	KCW1	27+00	KCW4 + KCW5 + KCW-5A	1.6	-	1.6	0.0	1.35	2	11	10.6	10' Type 11 18" RCP
8	KCW1	27+76	KCE-6B	0.6	-	0.6	0.0	0.30	2	9.5	6.3	7' Type 11 18" RCP
9	KCW1	29+15	KCE-6C	0.2	-	0.2	0.0	0.70	2	19.5	2.1	Type 3 24" RCP or Less
10	KCE1	29+50	KCE7	3.7	-	3.6	0.1	0.50	2	14	12.6	15' Type 11 24" RCP
11	KCW1	19+00	KCW-1A	4.8	-	3.7	1.1	5.92	2	15.5	8.3	10' Type 11 18" RCP
12	KCW1	19+70	KCW-1ABYP + KCW-1B	1.5	-	1.4	0.1	4.30	2	15.5	5.0	7' Type 11 18" RCP
13	KR3A	3+60	KCW-1BBYP +	0.4	-	0.3	0.1	2.89	2	17	2.1	Type 3 24" RCP or Less

TABLE 4
DROP INLET SUMMARY

Drop Inlet	Alignment	Station	Tributary	Q_{10} (cfs)	Q_{25} (cfs)	$Q_{intercept}$ (cfs)	Q_{bypass} (cfs)	Longitudinal Slope (%)	Cross Slope (%)	Max Spread Width (ft) BL+CG+SH+1/2 TL	Spread (ft)	Drop Inlet Size
			KR3-1B									
14	KR3	30+89	KR3-3	1.0	-	0.9	0.1	3.00	0.7	17	8.3	Type 7 24" RCP
15	KCE1	23+30	KR3-3BYP + KCW2 + KCE3 + KCE-4 + KCE-5 + KCE-6A	2.6	-	2.6	0.0	0.85	2	15.5	9.7	15' Type 11 24" RCP
16	KCW1	26+97	KCE-4B + KCE-5B	0.3	-	0.3	0.0	0.85	2	NA	4.6	NDOT Type 2
17	KCW1	34+00	KR2-5 + KCW-7	2.9	-	2.9	0.0	0.50	2	14	11.4	15' Type 11 18" RCP
18	XP	418+20	95-4A	-	2.2	1.3	0.9	1.57	2	18	8.7	NDOT Type 2
19	XP	418+13	95-4A	-	0.9	0.9	0.0	1.57	2	18	6.2	Type 5-2G
20	XP	412+61	95-14 + 95-15A	-	3.8	2.0	1.8	1.70	2	18	10.5	NDOT Type 2
21	XP	412+51	[95-14 + 95-15A]BYP	-	1.8	1.1	0.7	1.70	2	18	7.9	NDOT Type 2
22	XP	412+41	[95-14 + 95-15A]BYP	-	0.7	0.6	0.1	1.70	2	18	5.7	Type 5-2G
24	XP	415+63	95-5	-	1.5	1.2	0.3	1.60	1	18	11.6	Type 5-2G

Meeting spread criteria is a not a major issue for this project. The Kyle Canyon roadways will generally have sufficient flow conveyance capacity and allowable spread due to the provided shoulder widths and bike lanes. Sheet flows from the US95 on and off ramps are conveyed within roadside ditches and are not channelized within the proposed roadways. NDOT Type 2 Drop Inlet and Type 5-2G Embankment protectors are provided within the US95 southbound along the barrier rail upstream of the proposed Kyle Canyon Road bridge approach slab to eliminate flow conveyed to the bridge during the 25-year storm event. Additionally, NDOT Type 2 Drop Inlets are provided along the proposed barrier rail between Stations XP 412+21 and 412+41 to limit bypass flow conveyed off the edge of barrier rail to less than 0.1 cfs during the 25 year storm event.

Drop Inlets are provided to limit bypass flow from the gutter into the adjacent roadside sumps due to maintenance concerns. The gore area median islands located within the interchange quadrants include adjacent drop inlets to limit bypass flow conveyed into the Kyle Canyon Roadways and ramp street intersections.

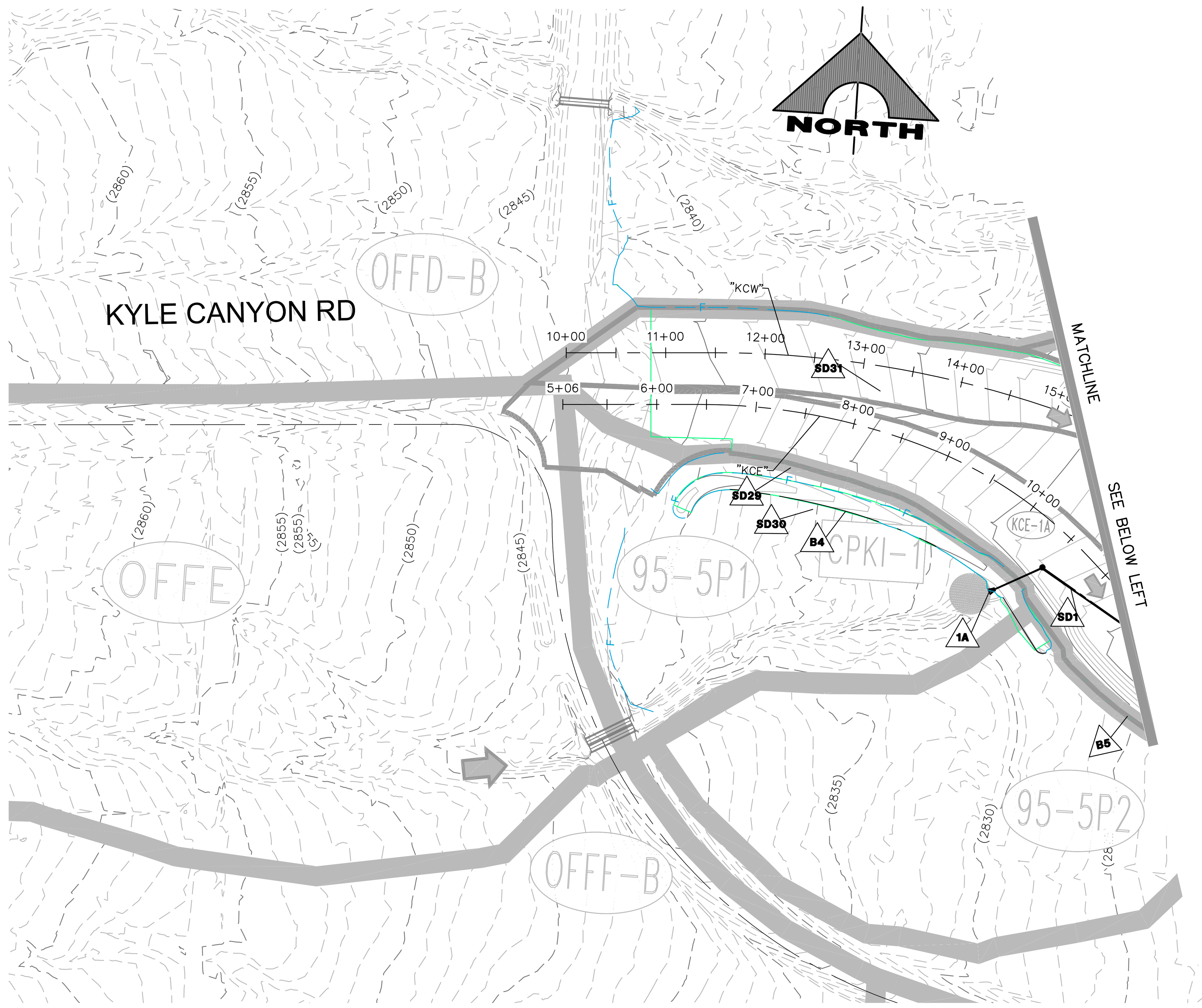
IX. RECOMMENDED STORM DRAIN FACILITIES

All proposed flood control facilities are shown on Figures 8A and 8B. Hydraulic calculations for the recommended facilities are included in Appendix C.

Mainline Storm Drain

The Kyle Canyon roadways are shown as two roadway alignments in the plans, KCW1 and KCE1. An approximately 2,450-foot long storm drain mainline consisting of 30-inch RCP to 60-inch wide by 38-inch high HERCP will convey offsite and onsite flow through the site. The storm drain mainline collects offsite flow at Concentration Point CPKI-1 and is located south along and adjacent to the KCE1 Roadway Alignment between approximate KCE1 Stations 10+50 and 16+50. The mainline storm drain also includes a 24-inch storm drain lateral designed to collect offsite flow at Concentration Point CPKI-2; an 18-inch lateral designed to collect offsite flow from Subbasin I2, and various onsite laterals designed to collect onsite generated flows. The KCW1 Alignment crosses the KCE1 Alignment at approximate KCE1 Station 16+50 and the storm drain mainline continues from Alignment KCE1 Alignment south along and adjacent to the KCW1 Roadway Alignment between approximate KCW1 Stations 21+00 and 30+00. The KCE1 Alignment crosses the KCW1 Alignment at KCW1 Station 28+50 and the storm drain mainline continues south along and adjacent to the KCE1 Roadway Alignment between approximate Station KCE1 23+50 and the Kyle Canyon Road and Sky Pointe Drive intersection. The proposed mainline storm drain will convey flows approximately 380 linear feet south within Sky Pointe Drive and outlet flows to an existing wash downstream of the existing dual (2) 6-foot wide by 3-foot high RCB located under Sky Pointe Drive adjacent to the proposed outlet location.

Hydraulic modeling for the proposed mainline storm drain was performed with the CIVILDESIGN Corp. WSPGW Water Surface Pressure Gradient Package (Reference 16, hereinafter referred to as WSPGW). A copy of the proposed mainline WSPGW model has been included in Appendix C.



EXISTING US-95 CULVERTS*

LOCATION	Q_{100}EX [cfs]	CP/SUBDIVISIONS/DIVERTS	FACILITY
E-4*	44	50% CP4	42" CMP
E-5*	225	50% CP7	42" CMP
E-6*	225	50% ECP7	6' X3' RCB
E-7*	NA	NA	TRIPLE 36" CMP
E-8*	77	DCHD01B	6' X 3' RCB
E-9*	261/128	DCHD02B/DCH02C	42" CMP
E-10	Q_{50}=106	CP15	(2) 6' X 3' RCB
E-11	Q_{50}=343 Q_{100}=432	CHD02B	(2) 6' X 3' RCB

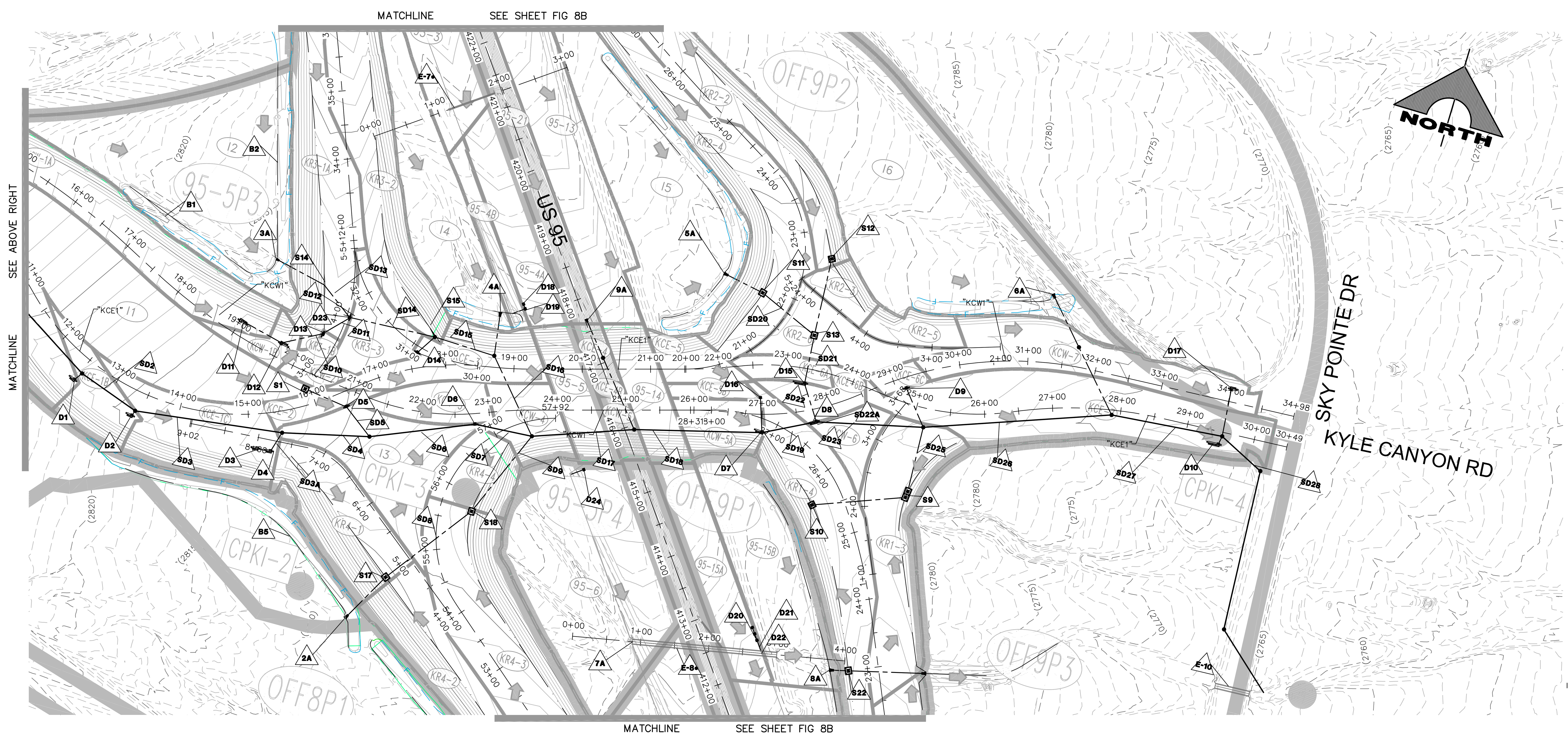
*EXISTING FACILITIES REFERENCED FROM THE KYLE CANYON MDS #2 RTC

FLOOD PROTECTION FACILITIES

LOCATION	Q_{10} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)	STATION	REMARKS	FACILITY	TRIBUTARY	WSPGW MODEL
D1	3.4	-	-	KCE 12+50		NDOT 7' TYPE 11 18" RCP	KCE-1A [4.9]	KCE1_12+53.WSW
D2	2	-	-	KCE 13+40		NDOT 7' TYPE 11 18" RCP	KCE-1A$_{BYP}$ [1.5] + KCE-1B [0.8]	KCE1_13+41.WSW
D3	1.7	-	-	KR4A 7+95		NDOT 7' TYPE 11 18" RCP	KCE-1B$_{BYP}$ [0.3] + KCE-1C [1.8]	KCE1_15+44.WSW
D4	0.4	-	-	KR4A 7+75		NDOT 7' TYPE 11 18" RCP	KCE-1C$_{BYP}$ [0.4]	KCE1_15+44.WSW
D5	0.3	-	-	KCE 16+40		NDOT TYPE 3 24" RCP or Less	KCE-2 [0.4]	KCW1_21+39.WSW
D6	0.8	-	-	KCW 22+78		NDOT TYPE 3 24" RCP or Less	KCE-2$_{BYP}$ [0.1] + KCW-3 [0.7]	KCMAIN.WSW
D7	1.6	-	-	KCW 27+00		NDOT 10' TYPE 11 18" RCP	KCW3$_{BYP}$ [0.1] + KCW4 [0.7] + KCW5 [0.3] + KCW-5A [0.6]	KCMAIN.WSW
D8	0.6	-	-	KCW 27+76		NDOT 7' TYPE 11 18" RCP	KCE-6B [0.6]	KCMAIN.WSW
D9	0.2	-	-	KCW 29+15		NDOT TYPE 3 24" RCP or Less	KCE-6C [0.2]	KCE1_25+15NORTH.WSW
D10	3.6	-	-	KCE 29+50		NDOT 15' TYPE 11 24" RCP	KCE7 [3.7]	KCE1_29+53_SOUTH.WSW
D11	3.7	-	-	KCW1 19+00		NDOT 10' TYPE 11 18" RCP	KCW-1A [4.8]	KR3A_3+99.WSW
D12	1.4	-	-	KCW1 19+70		NDOT 7' TYPE 11 18" RCP	KCW-1A$_{BYP}$ [1.1] + KCW-1B [0.4]	KR3A_3+99.WSW
D13	0.3	-	-	KR3A 3+60		NDOT TYPE 3 24" RCP or Less	KCW-1B$_{BYP}$ [0.1] + KR3-1B [0.3]	KR3A_3+99.WSW
D14	0.9	-	-	KR3 30+89		NDOT TYPE 3 24" RCP or Less	KR3-3 [1.0]	KR3_30+77S.WSW
D15	2.6	-	-	KCE1 23+30		NDOT 15' TYPE 11 24" RCP	KR3-3$_{BYP}$ [0.1] + KCW2 [0.1] + KCE3 [1.3] + KCE-4 [0.2] + KCE-5 [0.3] + KCE-6A [0.4]	KCW1_27+76NORTH.WSW
D16	0.3	-	-	KCW1 26+97		NDOT TYPE 2	KCE-4B [0.1] + KCE-5B [0.2]	KCW_27+00.WSW
D17	2.9	-	-	KCW1 34+00		NDOT 15' TYPE 11 18" RCP	KR2-5 [0.4] + KCW-7 [2.5]	KCE1_29+53_NORTH.WSW
D18	1.3	-	-	XP 418+20		NDOT Type 2	95-4A [1.6]	XP_418+13.WSW
D19	0.9	-	-	XP 418+13		TYPE 5-2G W/ 12" DOWN DRAIN	95-4A [1.6]	XP_418+13.WSW
D20	2.0	-	-	XP 412+61		NDOT Type 2	95-14 [1.1]+ 95-15A [1.7]	XP_412+41.WSW
D21	1.1	-	-	XP 412+51		NDOT Type 2	[95-14 + 95-15A]$_{BYP}$ [1.8]	XP_412+41.WSW
D22	0.6	-	-	XP 412+41		TYPE 5-2G W/ 12" DOWN DRAIN	[95-14 + 95-15A]$_{BYP}$ [1.8]	XP_412+41.WSW
D23	NUSIANCE	-	-	KR3A 3+99		NDOT TYPE 3 24" RCP or Less	-	KR3A_3+99.WSW KCE1_23+62NORTH.WSW
D24	-	1.5	-	XP 415+63		TYPE 5-2G W/ 12" DOWN DRAIN	95-5 [1.5]	-
D25	-	4.2	-	XP 405+04		NDOT TYPE 2 DOUBLE GRATE	95-7 [5.8] + 95-8 [2.5]	XP_405+04.WSW
1A	-	-	24	KCE1 10+24	4' DEEP SUMP; 3' DEEP RIPRAP CLASS 150	30" RCP W/ END SECTION	CPKI-1 [24]	KCMAIN.WSW
2A	-	-	8	KR4A 4+89	2.5' DEEP SUMP; 1.5' DEEP RIPRAP CLASS 150	24" RCP W/ END SECTION	95-5P2 [8]	KCW1_23+62SOUTH.WSW
3A	-	-	4.8	KR3A 4+86	2.5' DEEP SUMP; 1.5' DEEP RIPRAP CLASS 150	18" RCP W/ END SECTION	I2 [4.8]	KCW1_23+62NORTH.WSW
4A	-	7.5	-	KCE1 18+72	2.5' DEEP SUMP; 1.5' DEEP RIPRAP CLASS 150	24" RCP W/ END SECTION	I4 [1.9] + 95-3 [3.0] + 95-4A [2.2] + 95-4B [0.4]	KCE1_18+69.WSW
5A	-	8.6	-	KR2 21+78	2.5' DEEP SUMP; 1.5' DEEP RIPRAP CLASS 150	24" RCP W/ END SECTION	I5 [3.4] + 95-13 [5.2]	KCE1_23+31.WSW
6A	-	14.3	-	KCN1 31+70.20	3.5' DEEP SUMP; 2' DEEP RIPRAP CLASS 150	30" RCP W/ END SECTION	I6 [14.3]	KCE1_27+87NORTH.WSW
7A	-	4.4	-	XP 413+02	2.5' DEEP SUMP; 1.5' DEEP RIPRAP CLASS 150	6'x3' RCB W/ END SECTION	95-6 [4.4]	-
8A	-	11.4	-	KR1 23+03.61	2.5' DEEP SUMP; 1.5' DEEP RIPRAP CLASS 150	24" RCP W/ END SECTION	95-15A [2.3] + 95-15B [1.9] + 95-16 [2.8] + 7A [4.4] + 95-5 [1.5]	KR1_22+82.WSW
9A	-	1.4	-	KCE1 20+07	2' DEEP SUMP; 1' DEEP RIPRAP CLASS 150	18" RCP W/ END SECTION	95-21 [1.4]	KCW1_25+12.WSW

FLOOD PROTECTION FACILITIES

LOCATION	Q_{10} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)	STATION	FACILITY	TRIBUTARY
S1	2.3	-	-	KCE1 15+91	TYPE 2B FOR 30" RCP W/ 18" RCP	I1 [2.3]
S3	-	3.6	-	MOSM 9+54	TYPE 2B FOR 18" RCP	95-2B [3.6]
S4	-	4.5	-	MOSM 11+77	TYPE 2B FOR 42" RCP	95-12 [4.5]
S5	-	2.5	-	XP 404+95	TYPE 2A FOR 18" RCP	95-17 [2.5]
S6	-	1.3	-	XP 430+39	TYPE 2A FOR 18" RCP	95-19 [1.3]
S7	-	1.1	-	MOSM 11+77	TYPE 2A FOR 18" RCP	95-20 [1.1]
S8	-	2.2	-	XP 404+66	TYPE 2A FOR 18" RCP	95-22 [2.2]
S9	-	8.8	-	KR1A 2+15 & KR1A 2+29	(2) - TYPE 2B FOR 24" RCP	KR1-2 [2.0] + KR1-3 [6.8]
S10	-	4.2	-	KR1 25+61	TYPE 2B W/ 18" RCP	KR1-4 [3.4] + KCW-6 [0.8]
S11	-	3.3	-	KR2 21+85	TYPE 2B W/ 24" RCP	KR2-4 [3.3]
S12	-	2.6	-	KR2A 5+08	TYPE 2B W/ 18" RCP	KR2-2 [2.2] + KR2-3 [0.4]
S13	1.3	-	-	KCE1 23+31	TYPE 2A W/ 18" RCP	KR2-6 [1.3]
S14	-	2.9	-	KR3A 4+40	TYPE 2B W/ 24" RCP	KR3-1A [2.9]
S15	-	3.1	-	KR3 30+90	TYPE 2B W/ 18" RCP	KR3-2 [3.1]
S17	-	3.4	-	KR4A 5+00	TYPE 2B W/ 24" RCP	KR4-1 [1.7] + KR4-2 [1.7]
S18	-	7.5	-	KR4 55+70	TYPE 2B W/ 24" RCP	KR4-3 [5.2] + KR2-4 [0.9] + I3 [1.4]
S21	-	8.3	-	XP404+94	(2) - TYPE 2A FOR 18" RCP	95-8 [2.5] + 95-7 [5.8]
S22	-	NUISANCE	-	KR1 23+00	TYPE 2B FOR 18" RCP	KR1-4 [3.4]
B1	-	-	4.8	-	2' HIGH BERM, DECORATIVE ROCK, 3:1 SS	I2 [4.8]
B2	-	-	2.4	-	2' HIGH BERM, DECORATIVE ROCK, 3:1 SS	1/2 I2 [2.4]
B3	-	-	168	-	RIPRAP TRAP CHNL, 15' BW 2.5' DEEP, 3:1 SS, CLASS 150	1/2 CP7 [168]
B4	-	-	5	-	2' HIGH BERM, EARTH-LINED, 3:1 SS	95-5P1 [5]
B5	-	-	8	-	3' HIGH CONCRETE FLOOD WALL	95-5P2 [8]
B6	-	-	15	-	2' HIGH BERM, RIPRAP-LINED, 3:1 SS, CLASS 150	OFF8P1 [15]
B7	-	-	Q_{50}=97 Q_{100}=172	-	DITCH 2:1/16:1 SS	DHD02B
W1	-	-	Q_{50}=97 Q_{100}=172	-	5' WIDE TRAP WEIR AT ELEVATION 2778.84	DHD02B



GRAPHIC SCALE

100 0 50 100

(IN FEET)

1 inch = 100 ft.

LEGEND

SUBBASIN NAME

SUBBASIN BOUNDARY

FLOW DIRECTION

FACILITY IDENTIFICATION

FLOOD PROTECTION FACILITIES

LOCATION	Q_{10} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)	Q_{100} (cfs)	FACILITY	TRIBUTARY	NOTES
SD1	-	-	24	-	30" RCP	CPKI-1 [24]	KCMAIN.WSW
SD2	-	-	27.4	-	30" RCP	CPKI-1 [24] + D1 [3.4]	KCMAIN.WSW
SD3	-	-	29.4	-	30" RCP	SD2 [27.4] + D2 [2]	KCMAIN.WSW
SD3A	2.1	-	-	-	18" RCP	D3 [1.7] + D4 [0.4]	KCE1_15+44.WSW
SD4	-	-	31.5	-	30" RCP	SD3 [29.4] + SD3A [2.1]	KCMAIN.WSW
SD5	2.6	-	-	-	18" RCP	S1 [2.3] + D5 [0.3]	KCW1_21+39.WSW
SD6	-	-	34.1	-	30" RCP	SD4 [31.5] +SD5 [2.6]	KCMAIN.WSW
SD7	-	-	34.9	-	30" RCP	SD6 [34.1] + D6 [0.7]	KCMAIN.WSW
SD8	-	-	11.4	-	24" RCP	2A [8] +S17 [3.4]	KCW1_23+62SOUTH.WSW
SD9	-	-	18.9	-	30" RCP	SD8 [11.4] + S18 [7.5]	KCW1_23+62SOUTH.WSW
SD10	5.1	-	-	-	18" RCP	D11 [3.7] + D12 [1.4]	KR3A_3+99.WSW
SD11	5.4	-	-	-	18" RCP	SD10 [5.1] + D13 [0.3]	KR3A_3+99.WSW
SD13	-	-	7.7	-	24" RCP	3A [4.8] + S14 [2.9]	KCW1_23+62NORTH.WSW
SD14	-	-	13.1	-	24" RCP	SD12 [5.4] + SD13 [7.7]	KCW1_23+62NORTH.WSW
SD15	-	-	17.1	-	24" RCP	SD14 [13.1]+ D14 [0.9] + S15 [3.1]	KCW1_23+62NORTH.WSW
SD16	-	-	24.6	-	30" RCP	SD15 [117.1] + 4A [7.5]	KCW1_23+62NORTH.WSW
SD17	-	-	58	-	42" RCP	CPKI-3 [58]	KCMAIN.WSW
SD18	-	-	59.4	-	42" RCP	SD17 [58] + 9A [1.4]	KCMAIN.WSW
SD19	-	-	61	-	42" RCP	SD18 [59.4] + D7 [1.6]	KCMAIN.WSW
SD20	-	11.9	-	-	24" RCP	5A [8.6] + S11 [3.3]	KCE1_23+31.WSW
SD21	-	15.8	-	-	24" RCP	SD20 [11.9] + S12 [2.6] + S13 [1.3]	KCW_27+76SOUTH.WSW
SD22	-	18.4	-	-	30" RCP	SD21 [15.8] + D15 [2.6]	KCW1_27+76NORTH.WSW
SD22A	-	19.0	-	-	30" RCP	SD22 [18.4] + D8 [0.6]	KCW1_27+76NORTH.WSW
SD23	-	-	78.4	-	42" RCP	SD22A [19.0] + SD19 [61]	KCMAIN.WSW
SD25	13.0	-	-	-	24" RCP	S9 [8.8] + S10 [4.2]	KCE1_25+15SOUTH.WSW
SD26	-	-	86	-	42" RCP	CPKI-4 [86]	KCMAIN.WSW
SD27	-	-	86	-	60" X 38" HERCP	CPKI-4 [86]	KCMAIN.WSW
SD28	-	-	86	-	60" X 38" HERCP	CPKI-4 [86]	KCMAIN.WSW
SD29	-	-	-	2709**	11' X 8' RCB	CNW35-C	-
SD30	-	-	-	1559**	12' X 10' RCB	HU-IR	-
SD31	-	-	-	3318**	(2) - 11' X8' RCB	CKC5	-
SD31A	-	-	-	3411**	(2) - 11' HIGH X7' WIDE RCB	CKC6	-
SD32	253	-	343	432	HEADWALL 5'-WIDE TRAP WEIR THW = 2781.00' WEIR = 2778.84'	CHD02B	-
SD32A	-	-	-	2079	13' X 8' RCB	-	-
SD32B	-	-	-	22	24" RCP	OFF8P1	KR4_44+89.WSW
SD33	-	-	-	131	5' X3' RCB	DHD02C [131]	-
SD34	-	-	-	130	5' X3' RCB	DCHC02C [130]	-
SD35	-	-	168	-	42" CMP CULVERT EXTENTIONS	1/2 CP7 [168]	-

**REFERENCED FROM THE UPDATE #2 TO THE SKY CANYON MDS

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP	DATE:

PROJECT NO. **412-634A**

DESIGN:
DRAWN:
CHECK:
PLOT DATE: 01-13-17
PLOT TIME: 10:19:18

GCW ENGINEERS SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\400\412-634\dwg\hydro\60Percent\Update - 100percent\Figure 8.dwg
Nelson Baggs

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US 95/KYLE CANYON RD INTERCHANGE

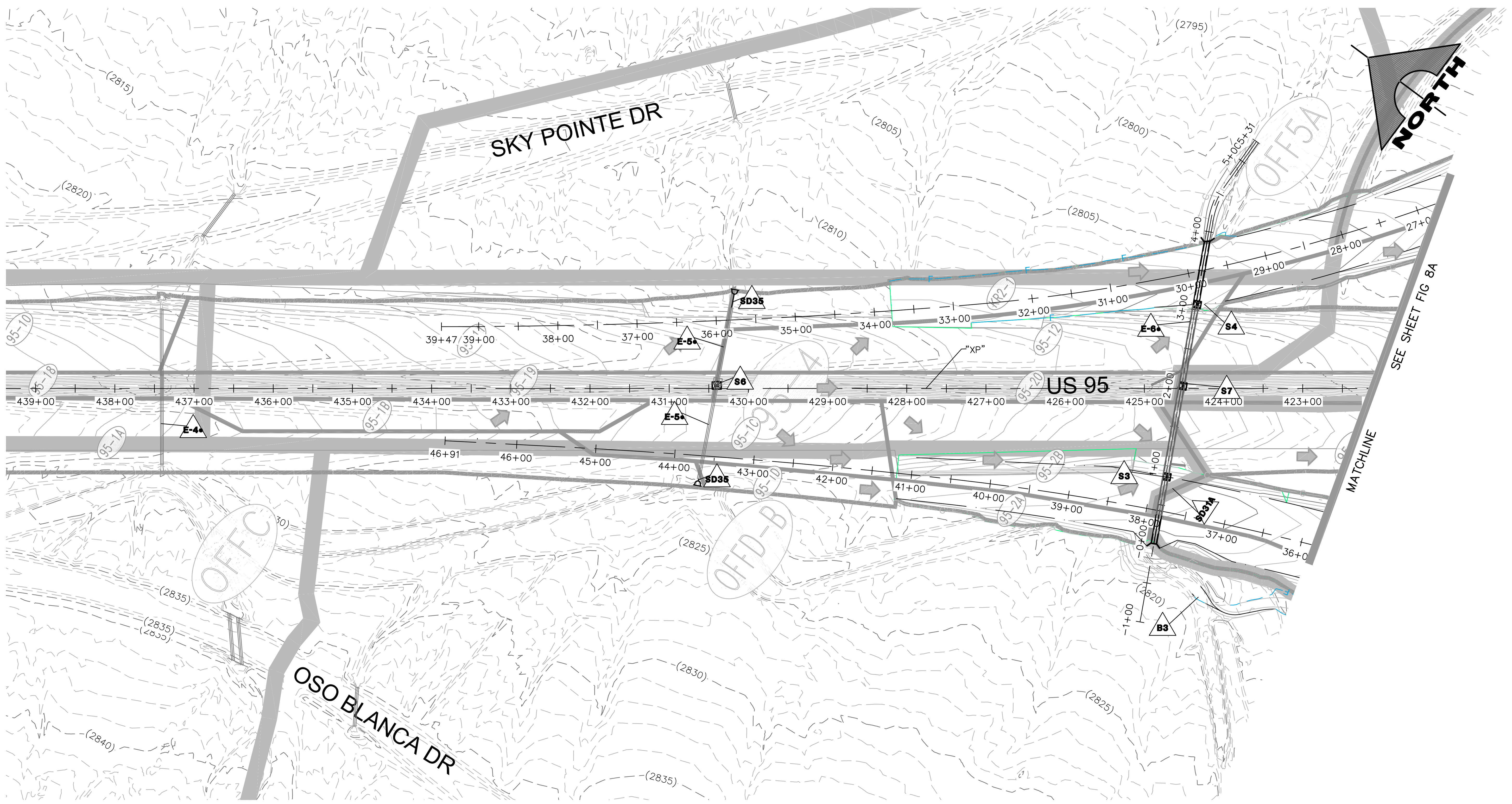
FIGURE 8A

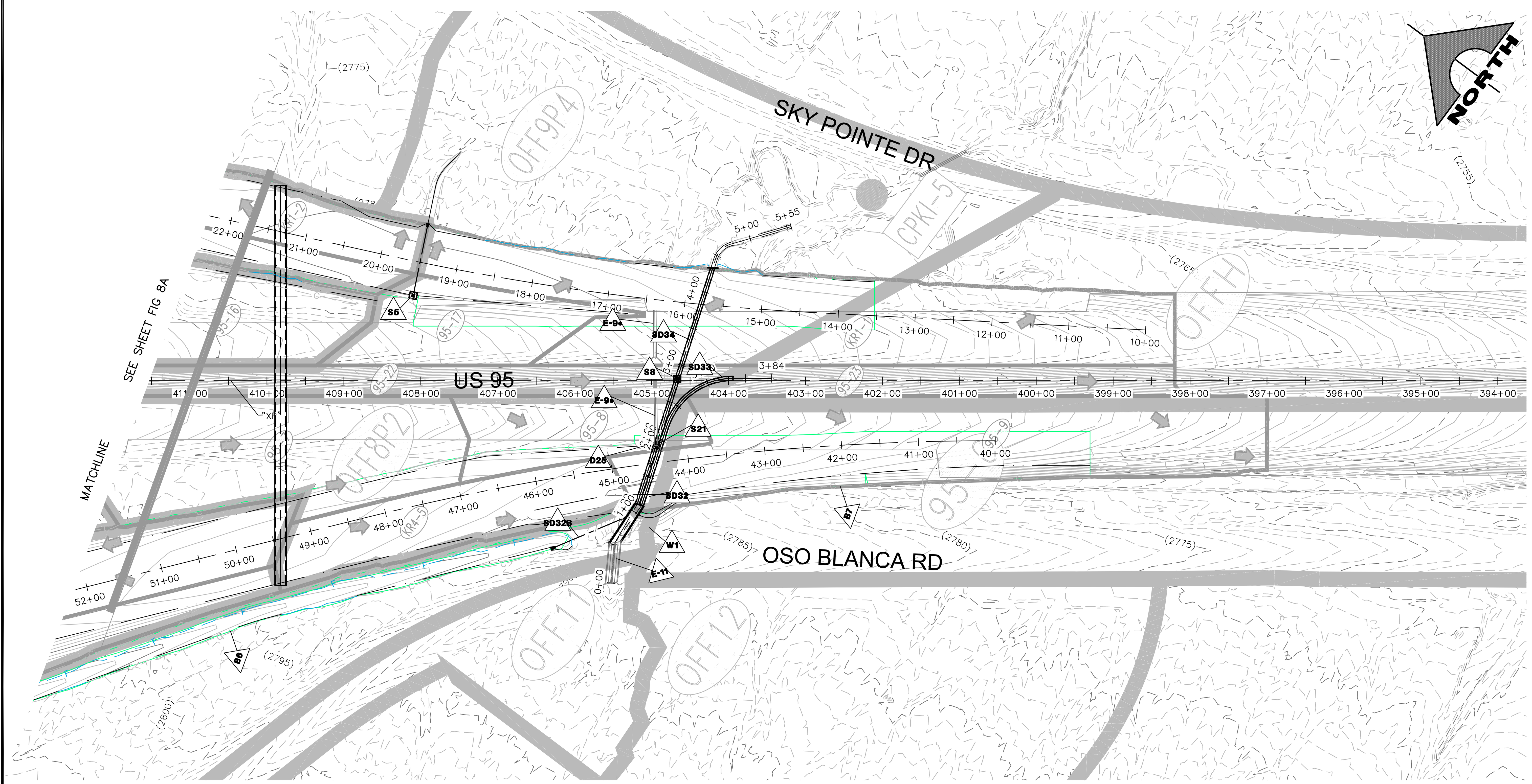
RECOMMENDED STORM DRAIN FACILITIES MAP

DRAWING

FIG 8A

1 OF 2 SHTS





FLOOD PROTECTION FACILITIES

LOCATION	Q_{10} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)	STATION	REMARKS	FACILITY	TRIBUTARY	WSPGW MODEL
D1	3.4	-	-	KCE 12+50		NDOT 7' TYPE 11 18" RCP	KCE-1A [4.9]	KCE1_12+53.WSW
D2	2	-	-	KCE 13+40		NDOT 7' TYPE 11 18" RCP	KCE-$1A_{BYP}$ [1.5] + KCE-1B [0.8]	KCE1_13+41.WSW
D3	1.7	-	-	KR4A 7+95		NDOT 7' TYPE 11 18" RCP	KCE-$1B_{BYP}$ [0.3] + KCE-1C [1.8]	KCE1_15+44.WSW
D4	0.4	-	-	KR4A 7+75		NDOT 7' TYPE 11 18" RCP	KCE-$1C_{BYP}$ [0.4]	KCE1_15+44.WSW
D5	0.3	-	-	KCE 16+40		NDOT TYPE 3 24" RCP or Less	KCE-2 [0.4]	KCW1_21+39.WSW
D6	0.8	-	-	KCW 22+78		NDOT TYPE 3 24" RCP or Less	KCE-2_{BYP} [0.1] + KCW-3 [0.7]	KCMAIN.WSW
D7	1.6	-	-	KCW 27+00		NDOT 10' TYPE 11 18" RCP	$KCW3_{BYP}$ [0.1] + KCW4 [0.7] + KCW5 [0.3] + KCW-5A [0.6]	KCMAIN.WSW
D8	0.6	-	-	KCW 27+76		NDOT 7' TYPE 11 18" RCP	KCE-6B [0.6]	KCMAIN.WSW
D9	0.2	-	-	KCW 29+15		NDOT TYPE 3 24" RCP or Less	KCE-6C [0.2]	KCE1_25+15NORTH.WSW
D10	3.6	-	-	KCE 29+50		NDOT 15' TYPE 11 24" RCP	KCE7 [3.7]	KCE1_29+53_SOUTH.WSW
D11	3.7	-	-	KCW1 19+00		NDOT 10' TYPE 11 18" RCP	KCW-1A [4.8]	KR3A_3+99.WSW
D12	1.4	-	-	KCW1 19+70		NDOT 7' TYPE 11 18" RCP	KCW-$1A_{BYP}$ [1.1] + KCW-1B [0.4]	KR3A_3+99.WSW
D13	0.3	-	-	KR3A 3+60		NDOT TYPE 3 24" RCP or Less	KCW-$1B_{BYP}$ [0.1] + KR3-1B [0.3]	KR3A_3+99.WSW
D14	0.9	-	-	KR3 30+89		NDOT TYPE 3 24" RCP or Less	KR3-3 [1.0]	KR3_30+77S.WSW
D15	2.6	-	-	KCE1 23+30		NDOT 15' TYPE 11 24" RCP	KR3-3_{BYP} [0.1] + KCW2 [0.1] + KCE3 [1.3] + KCE-4 [0.2] + KCE-5 [0.3] + KCE-6A [0.4]	KCW1_27+76NORTH.WSW
D16	0.3	-	-	KCW1 26+97		NDOT TYPE 2	KCE-4B [0.1] + KCE-5B [0.2]	KCW_27+00.WSW
D17	2.9	-	-	KCW1 34+00		NDOT 15' TYPE 11 18" RCP	KR2-5 [0.4] + KCW-7 [2.5]	KCE1_29+53_NORTH.WSW
D18	1.3	-	-	XP 418+20		NDOT Type 2	95-4A [1.6]	XP_418+13.WSW
D19	0.9	-	-	XP 418+13		TYPE 5-2G W/ 12" DOWN DRAIN	95-4A [1.6]	XP_418+13.WSW
D20	2.0	-	-	XP 412+61		NDOT Type 2	95-14 [1.1]+ 95-15A [1.7]	XP_412+41.WSW
D21	1.1	-	-	XP 412+51		NDOT Type 2	$[95\text{-}14 + 95\text{-}15A]_{BYP}$ [1.8]	XP_412+41.WSW
D22	0.6	-	-	XP 412+41		TYPE 5-2G W/ 12" DOWN DRAIN	$[95\text{-}14 + 95\text{-}15A]_{BYP}$ [1.8]	XP_412+41.WSW
D23	NUSIANCE	-	-	KR3A 3+99		NDOT TYPE 3 24" RCP or Less	-	KR3A_3+99.WSW KCE1_23+62NORTH.WSW
D24	-	1.5	-	XP 415+63		TYPE 5-2G W/ 12" DOWN DRAIN	95-5 [1.5]	-
D25	-	4.2	-	XP 405+04		NDOT TYPE 2 DOUBLE GRATE	95-7 [5.8] + 95-8 [2.5]	XP_405+04.WSW
1A	-	-	24	KCE1 10+24	4' DEEP SUMP; 3' DEEP RIPPRAP CLASS 150	30" RCP W/ END SECTION	CPKI-1 [24]	KCMAIN.WSW
2A	-	-	8	KR4A 4+89	2.5' DEEP SUMP; 1.5' DEEP RIPPRAP CLASS 150	24" RCP W/ END SECTION	95-5P2 [8]	KCW1_23+62SOUTH.WSW
3A	-	-	4.8	KR3A 4+86	2.5' DEEP SUMP; 1.5' DEEP RIPPRAP CLASS 150	18" RCP W/ END SECTION	I2 [4.8]	KCW1_23+62NORTH.WSW
4A	-	7.5	-	KCE1 18+72	2.5' DEEP SUMP; 1.5' DEEP RIPPRAP CLASS 150	24" RCP W/ END SECTION	I4 [1.9] + 95-3 [3.0] + 95-4A [2.2] + 95-4B [0.4]	KCE1_18+69.WSW
5A	-	8.6	-	KR2 21+78	2.5' DEEP SUMP; 1.5' DEEP RIPPRAP CLASS 150	24" RCP W/ END SECTION	I5 [3.4] + 95-13 [5.2]	KCE1_23+31.WSW
6A	-	14.3	-	KCN1 31+70.20	3.5' DEEP SUMP; 2' DEEP RIPPRAP CLASS 150	30" RCP W/ END SECTION	I6 [14.3]	KCE1_27+87NORTH.WSW
7A	-	4.4	-	XP 413+02	2.5' DEEP SUMP; 1.5' DEEP RIPPRAP CLASS 150	6'x3' RCB W/ END SECTION	95-6 [4.4]	-
8A	-	11.4	-	KR1 23+03.61	2.5' DEEP SUMP; 1.5' DEEP RIPPRAP CLASS 150	24" RCP W/ END SECTION	95-15A [2.3] + 95-15B [1.9] + 95-16 [2.8] + 7A [4.4] + 95-5 [1.5]	KR1_22+82.WSW
9A	-	1.4	-	KCE1 20+07	2' DEEP SUMP; 1' DEEP RIPPRAP CLASS 150	18" RCP W/ END SECTION	95-21 [1.4]	KCW1_25+12.WSW

FLOOD PROTECTION FACILITIES

LOCATION	Q_{10} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)	STATION	FACILITY	TRIBUTARY
S1	2.3	-	-	KCE1 15+91	TYPE 2B FOR 30" RCP W/ 18" RCP	I1 [2.3]
S3	-	3.6	-	MOSM 9+54	TYPE 2B FOR 18" RCP	95-2B [3.6]
S4	-	4.5	-	MOSM 11+77	TYPE 2B FOR 42" RCP	95-12 [4.5]
S5	-	2.5	-	XP 404+95	TYPE 2A FOR 18" RCP	95-17 [2.5]
S6	-	1.3	-	XP 430+39	TYPE 2A FOR 18" RCP	95-19 [1.3]
S7	-	1.1	-	MOSM 11+77	TYPE 2A FOR 18" RCP	95-20 [1.1]
S8	-	2.2	-	XP 404+66	TYPE 2A FOR 18" RCP	95-22 [2.2]
S9	-	8.8	-	KR1A 2+15 & KR1A 2+29	(2) - TYPE 2B FOR 24" RCP	KR1-2 [2.0] + KR1-3 [6.8]
S10	-	4.2	-	KR1 25+61	TYPE 2B W/ 18" RCP	KR1-4 [3.4] + KCW-6 [0.8]
S11	-	3.3	-	KR2 21+85	TYPE 2B W/ 24" RCP	KR2-4 [3.3]
S12	-	2.6	-	KR2A 5+08	TYPE 2B W/ 18" RCP	KR2-2 [2.2] + KR2-3 [0.4]
S13	1.3	-	-	KCE1 23+31	TYPE 2A W/ 18" RCP	KR2-6 [1.3]
S14	-	2.9	-	KR3A 4+40	TYPE 2B W/ 24" RCP	KR3-1A [2.9]
S15	-	3.1	-	KR3 30+90	TYPE 2B W/ 18" RCP	KR3-2 [3.1]
S17	-	3.4	-	KR4A 5+00	TYPE 2B W/ 24" RCP	KR4-1 [1.7] + KR4-2 [1.7]
S18	-	7.5	-	KR4 55+70	TYPE 2B W/ 24" RCP	KR4-3 [5.2] + KR2-4 [0.9] + I3 [1.4]
S21	-	8.3	-	XP404+94	(2) - TYPE 2A FOR 18" RCP	95-8 [2.5] + 95-7 [5.8]
S22	-	NUISANCE	-	KR1 23+00	TYPE 2B FOR 18" RCP	KR1-4 [3.4]
B1	-	-	4.8	-	2' HIGH BERM, DECORATIVE ROCK, 3:1 SS	I2 [4.8]
B2	-	-	2.4	-	2' HIGH BERM, DECORATIVE ROCK, 3:1 SS	1/2 I2 [2.4]
B3	-	-	168	-	RIPRAP TRAP CHNL, 15' BW 2.5' DEEP, 3:1 SS, CLASS 150	1/2 CP7 [168]
B4	-	-	5	-	2' HIGH BERM, EARTH-LINED, 3:1 SS	95-5P1 [5]
B5	-	-	8	-	3' HIGH CONCRETE FLOOD WALL	95-5P2 [8]
B6	-	-	15	-	2' HIGH BERM, RIPRAP-LINED, 3:1 SS, CLASS 150	OFF8P1 [15]
B7	-	-	Q_{50}=97 Q_{100}=172	-	DITCH 2:1/16:1 SS	DHD02B
W1	-	-	Q_{50}=97 Q_{100}=172	-	5' WIDE TRAP WEIR AT ELEVATION 2778.84	DHD02B

EXISTING US-95 CULVERTS*

LOCATION	Q_{100}EX [cfs]	CP/SUBBDIVISIONS/DIVERTS	FACILITY
E-4*	44	50% CP4	42" CMP
E-5*	225	50% CP7	42" CMP
E-6*	225	50% ECP7	6' X3' RCB
E-7*	NA	NA	TRIPLE 36" CMP
E-8*	77	DCHD01B	6' X 3' RCB
E-9*	261/128	DCHD02B/DCH02C	42" CMP
E-10	Q_{50}=106	CP15	(2) 6' X 3' RCB
E-11	Q_{50}=343 Q_{100}=432	CHD02B	(2) 6' X 3' RCB

*EXISTING FACILITIES REFERENCED FROM THE KYLE CANYON MDS #2 RTC

FLOOD PROTECTION FACILITIES

LOCATION	Q_{10} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)	Q_{100} (cfs)	FACILITY	TRIBUTARY	NOTES
SD1	-	-	24	-	30" RCP	CPKI-1 [24]	KCMAIN.WSW
SD2	-	-	27.4	-	30" RCP	CPKI-1 [24] + D1 [3.4]	KCMAIN.WSW
SD3	-	-	29.4	-	30" RCP	SD2 [27.4] + D2 [2]	KCMAIN.WSW
SD3A	2.1	-	-	-	18" RCP	D3 [1.7] + D4 [0.4]	KCE1_15+44.WSW
SD4	-	-	31.5	-	30" RCP	SD3 [29.4] + SD3A [2.1]	KCMAIN.WSW
SD5	2.6	-	-	-	18" RCP	S1 [2.3] + D5 [0.3]	KCW1_21+39.WSW
SD6	-	-	34.1	-	30" RCP	SD4 [31.5] +SD5 [2.6]	KCMAIN.WSW
SD7	-	-	34.9	-	30" RCP	SD6 [34.1] + D6 [0.7]	KCMAIN.WSW
SD8	-	-	11.4	-	24" RCP	2A [8] +S17 [3.4]	KCW1_23+62SOUTH.WSW
SD9	-	-	18.9	-	30" RCP	SD8 [11.4] + S18 [7.5]	KCW1_23+62SOUTH.WSW
SD10	5.1	-	-	-	18" RCP	D11 [3.7] + D12 [1.4]	KR3A_3+99.WSW
SD11	5.4	-	-	-	18" RCP	SD10 [5.1] + D13 [0.3]	KR3A_3+99.WSW
SD13	-	-	7.7	-	24" RCP	3A [4.8] + S14 [2.9]	KCW1_23+62NORTH.WSW
SD14	-	-	13.1	-	24" RCP	SD12 [5.4] + SD13 [7.7]	KCW1_23+62NORTH.WSW
SD15	-	-	17.1	-	24" RCP	SD14 [13.1]+ D14 [0.9] + S15 [3.1]	KCW1_23+62NORTH.WSW
SD16	-	-	24.6	-	30" RCP	SD15 [117.1] + 4A [7.5]	KCW1_23+62NORTH.WSW
SD17	-	-	58	-	42" RCP	CPKI-3 [58]	KCMAIN.WSW
SD18	-	-	59.4	-	42" RCP	SD17 [58] + 9A [1.4]	KCMAIN.WSW
SD19	-	-	61	-	42" RCP	SD18 [59.4] + D7 [1.6]	KCMAIN.WSW
SD20	-	11.9	-	-	24" RCP	5A [8.6] + S11 [3.3]	KCE1_23+31.WSW
SD21	-	15.8	-	-	24" RCP	SD20 [11.9] + S12 [2.6] + S13 [1.3]	KCW_27+76SOUTH.WSW
SD22	-	18.4	-	-	30" RCP	SD21 [15.8] + D15 [2.6]	KCW1_27+76NORTH.WSW
SD22A	-	19.0	-	-	30" RCP	SD22 [18.4] + D8 [0.6]	KCW1_27+76NORTH.WSW
SD23	-	-	78.4	-	42" RCP	SD22A [19.0] + SD19 [61]	KCMAIN.WSW
SD25	13.0	-	-	-	24" RCP	S9 [8.8] + S10 [4.2]	KCE1_25+15SOUTH.WSW
SD26	-	-	86	-	42" RCP	CPKI-4 [86]	KCMAIN.WSW
SD27	-	-	86	-	60" X 38" HERCP	CPKI-4 [86]	KCMAIN.WSW
SD28	-	-	86	-	60" X 38" HERCP	CPKI-4 [86]	KCMAIN.WSW
SD29	-	-	-	2709**	11' X 8' RCB	CNW35-C	-
SD30	-	-	-	1559**	12' X 10' RCB	HU-IR	-
SD31	-	-	-	3318**	(2) - 11' X 8' RCB	CKC5	-
SD31A	-	-	-	3411**	(2) - 11' HIGH X 7' WIDE RCB	CKC6	-
SD32	253	-	343	432	HEADWALL 5'-WIDE TRAP WEIR THW = 2781.00' WEIR = 2778.84'	CHD02B	-
SD32A	-	-	-	2079	13' X 8' RCB	-	-
SD32B	-	-	-	22	24" RCP	OFF8P1	KR4_44+89.WSW
SD33	-	-	-	131	5' X 3' RCB	DHD02C [131]	-
SD34	-	-	-	130	5' X 3' RCB	DCHC02C [130]	-
SD35	-	-	168	-	42" CMP CULVERT EXTENTIONS	1/2 CP7 [168]	-

**REFERENCED FROM THE UPDATE #2 TO THE SKY CANYON MDS

GRAPHIC SCALE

100 0 50 100

(IN FEET)
1 inch = 100 ft.

LEGEND

ON1 — SUBBASIN NAME

SUBBASIN BOUNDARY

FLOW DIRECTION

FACILITY IDENTIFICATION

REV | DATE | DESCRIPTION | DATE | AGEN APP | DATE | GCW APP | DATE:

90% COMPLETE

PROJECT NO. **412-634A**

DESIGN:
DRAWN:
CHECK:
PLOT DATE: 01-13-17
PLOT TIME: 10:19:52

GCW ENGINEERS SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\400\412-634\dwg\hydro\60Percent\Update - 100percent\Figure 8.dwg
Nelson Baggs

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US 95/KYLE CANYON RD INTERCHANGE

FIGURE 8B

RECOMMENDED STORM DRAIN FACILITIES MAP

LID#:

DRAWING
FIG 8B
2 OF 2 SHTS

The mainline storm drain model is labeled "KCMain.WSW". The results of the WSPGW model are summarized in Table 5.

TABLE 5
WSPGW MODEL MAINLINE SUMMARY

KCMain.wsw

Station	Invert (ft)	Flow Depth (ft)	HGL (ft)	Q Total (cfs)	Velocity (fps)	Froude	Facility Description
-3439.57	2761.57	2.811	2764.381	86	9.11	1	60-inch wide x 38-inch high HERCP
-3330.57	2761.9	3.245	2765.145	86	7.88	0.74	60-inch wide x 38-inch high HERCP
-3325.57	2762	3.017	2765.017	86	8.46	0.87	Manhole Location
-3087.87	2762.71	3.401	2766.111	86	7.55	0.67	60-inch wide x 38-inch high HERCP
-3082.87	2762.81	3.236	2766.046	86	7.9	0.75	60-inch wide x 38-inch high HERCP
-3007.37	2763.04	3.323	2766.363	86	7.71	0.7	60-inch wide x 38-inch high HERCP
-3002.37	2763.14	3.136	2766.276	86	8.14	0.8	Manhole Location
-2837.57	2763.64	2.213	2765.853	86	12.06	1.59	60-inch wide x 38-inch high HERCP
-2832.57	2763.74	2.886	2766.626	86	10.13	1	Manhole Location
-2556.17	2764.46	4.543	2769.003	86	8.94	0	42-inch RCP
-2551.17	2764.56	4.878	2769.438	78.4	8.15	0	Manhole Location
-2394.47	2765.453	4.988	2770.441	78.4	8.15	0	42-inch RCP
-2389.47	2765.553	5.658	2771.211	61	6.34	0	Manhole Location
-2308.27	2767.331	4.21	2771.541	61	6.34	0	42-inch RCP
-2303.27	2767.431	4.192	2771.623	59.4	6.17	0	Manhole Location
-2116.17	2768.397	3.918	2772.315	59.4	6.17	0	42-inch RCP

TABLE 5
WSPGW MODEL MAINLINE SUMMARY
KCMain.wsw

Station	Invert (ft)	Flow Depth (ft)	HGL (ft)	Q Total (cfs)	Velocity (fps)	Froude	Facility Description
-2111.17	2768.497	3.888	2772.385	58	6.03	0	Manhole Location
-1961.07	2769.264	3.649	2772.913	58	6.03	0	42-inch RCP
-1956.07	2769.364	1.026	2770.39	34.9	18.4	3.69	Manhole Location
-1870.87	2775.315	1.293	2776.607	34.9	13.63	2.37	30-inch RCP
-1865.87	2775.415	1.168	2776.583	34.1	15.17	2.81	Manhole Location
-1710.47	2781.015	1.313	2782.328	34.1	13.06	2.25	30-inch RCP
-1705.47	2781.115	1.123	2782.238	31.5	14.74	2.8	Manhole Location
-1577.47	2785.595	1.189	2786.784	31.5	13.69	2.51	30-inch RCP
-1572.47	2785.695	1.108	2786.803	29.4	14	2.68	Manhole Location
-1354.97	2792.49	1.142	2793.632	29.4	13.45	2.53	30-inch RCP
-1349.97	2792.59	0.958	2793.548	27.4	15.83	3.31	Manhole Location
-1255.17	2797.207	1.041	2798.248	27.4	14.17	2.82	30-inch RCP
-1250.17	2797.307	0.865	2798.172	24	15.92	3.52	Manhole Location
-1038.27	2808.131	0.614	2808.745	24	25.65	6.85	30-inch RCP
-1033.27	2808.23	0.594	2808.825	24	26.84	7.3	Manhole Location
-974.37	2825.353	1.668	2827.021	24	6.9	-	30-inch RCP

The mainline storm drain is designed to collect and convey 50-year offsite generated flows and 10-year onsite generated flows within the proposed onsite storm drain facilities. The mainline storm drain will convey a maximum 50-year flow rate of 86 cfs from Concentration Point CPKI-4 and will discharge flows at Concentration Point CP15

near the outlet of the existing dual (2) 6-foot wide by 3-foot high RCBs located within the east frontage road (Sky Pointe Drive) south of Kyle Canyon Road. Flow discharged from the existing dual (2) 6-foot wide by 3-foot high RCBs and the proposed mainline storm drain combine at Concentration Point CP15 for at total 50-year flow rate of 108 cfs. A normal depth calculation for the outlet channel based on the 50-year flow rate at Concentration Point CP15 shows a flow depth of 1.43 feet at the outlet. The starting water surface elevation of 2763.00 feet used for the mainline storm drain hydraulic model is based on the calculated depth of flow at the outlet (invert elevation + flow depth = 2761.57 feet + 1.43 feet). The normal depth calculation for the outlet channel has been included in Appendix C.

Lateral Storm Drains

WSPGW calculations for the onsite lateral storm drains have been included in Appendix C. The WSPGW calculations for the laterals have been labeled to match the plans for the location of the downstream manhole proposed to connect the lateral to the mainline. Additionally, the labels for the WSPGW calculations are included on the facilities table shown on Figures 8A and 8B.

Culvert Extensions

It is proposed to extend existing culverts located at XP Station 430+00, XP Station 424+50, and XP Station 405+00 to accommodate the revised lane widths due to additional roadway lanes. The existing culvert sizes have been used for the culvert extensions where possible to maintain existing culvert capacities. Additionally, note that in general, the proposed flow rates (that are tributary to the proposed / extended existing culverts) during proposed conditions will follow the same flow pattern as existing conditions.

Storm flows generated within the infill areas elevated above the Kyle Canyon Roadway will be directed to sumps with RCP storm drain and end sections. The sumps are sized to contain the design headwater depth plus 1 foot freeboard minimum. Inlet control calculations for the RCP storm drain are included in Appendix C. The sumps will include Class 150 Riprap up to the calculated headwater depth.

Replacement of existing Culvert HD02B and HD02C at XP Station 405+00

Due to cover constraints, the existing 42-inch CMPs under the US95 northbound and southbound lanes near XP Station 405+00 will be removed and replaced with this project. The newly proposed culvert crossings will consist of two (2) - 5-foot wide by 3-

foot high RCB culverts that outlet flows both east of US95 and south within the proposed roadside swale located between the US95 southbound and northbound roadways. The proposed culvert crossings are designed to perpetuate the existing conditions flow split east and flow that continues south within existing roadside channels during the 100-year storm event. The impacted culvert locations were previously labeled as HD02B and HD02C in the referenced US95 Study. The previous US95 Study flow split node locations of CHD02B and CHD02C have been maintained in both the existing and proposed conditions HEC-1 models. Although the location of the proposed culverts has been slightly revised from existing, the original naming convention from the US95 Study has been maintained for clarity. Pertinent referenced material from the US95 Study has been included in Appendix E.

A portion of the 100-year flows that impact the existing culvert locations overtops the roadways to the east during existing conditions. However, during proposed conditions, the widening of the roadway raises the overtopping profile of the road, therefore eliminating the potential for overtopping flows to the east and increasing existing conditions 100-year flows conveyed south. Therefore, in order to maintain existing drainage patterns and to avoid increasing flows south during the 100-year storm event, the proposed culvert system at KR4 Station 44+50 has been modeled using the FHWA HY-8 software (Reference 15). A 5-foot wide trapezoidal weir notch has been provided within the berm to ensure the 100-year storm flows discharging south will be in conformance with previous drainage patterns south and west of the western boundary of the proposed Ramp KR4 alignment. A total flow rate of 432 cfs will impact the proposed culverts at CHD02B. A total flow rate of 172 cfs (DHD02B) will discharge south through the proposed weir notch and the remaining 260 cfs (DCHD02B) will be split east under US95 and south between the US95 north and southbound lanes. A total flow rate of 130 cfs (DCHD02C) will discharge east under US95 and 130 cfs (DHD02C) will discharge south between the US95 north and southbound. Flow rates proposed to discharge east of US95 and south within roadside swales are consistent with existing conditions flow rates during the 100-year storm event. The proposed facilities are labeled on Figures 8A and 8B. Copies of the hydraulic calculations have been included in Appendix C.

The existing conditions HEC-1 model, based on the referenced US95 Study culvert ratings, shows a total 100-year flow rate of 432 cfs at Concentration Point CHD02B. Additionally, the model shows a 260 cfs split east (DCHD02B) and 172 cfs split south (DHD02B) at this location. The existing conditions HEC-1 model, based on the US95 Study culvert ratings, shows the 260 cfs will combine at Concentration Point CHD02C for

a total flow rate of 261 cfs. Of the 261 cfs, the model shows 128 cfs split east (DCHD02C) with the remaining 133 cfs discharging south between the US95 north and southbound lanes.

Ditches shown on Figures 7A and 7B will convey the flows since the proposed six (6) culvert system perpetuates the existing conditions 100-year flow rates the proposed culvert system will not have an adverse impact on downstream properties or facilities.

Pipe classification was determined using D-Load calculations with HS-25 loading. All pipes for the project will be Class III or higher based on the cover heights. The D-load calculations have been provided in Appendix C.

Ditches/Berms

Berms are provided to direct offsite flows to proposed sumps with proposed storm drain. Roadside ditches have been graded to convey storm flow discharged to and produced by infill areas. Hydraulic calculations have been included in Appendix C. Information for the ditches has been included on Figures 7A and 7B. Onsite ditches are summarized in Table 6. Offsite ditches are summarized in Tables 7 and 8. Ditch calculations have been included in Appendix C. Proposed berms designed to convey offsite flows are based on 50-year storm event flow rates. Onsite roadside swales are based on 25-year storm event flow rates.

TABLE 6
25-YEAR ONSITE DITCH/BERM CHARACTERISTICS

Ditch / Berm	Min Slope (%)	Q_{25} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch I4	2.19	5.3	0.72	3.45	0	V-Ditch / Berm	3:1/3:1	Decorative Rock	2.00	I4 + 95-3 + 95-4B
Ditch I5 East	3.4	3.4	0.56	3.64	0	V-Ditch / Berm	3:1/3:1	Decorative Rock	2.00	I5
Ditch I5 South	2.5	5.2	0.69	3.61	0	V-Ditch / Berm	3:1/3:1	Decorative Rock	2.00	95-13
Ditch 95-6	1.05	4.4	0.68	2.35	0	V-Ditch / Berm	5:1/3:1	Decorative Rock	2.00	95-6
Ditch 95-7	2.23	5.8	0.66	3.34	0	V-Ditch / Berm	5:1/3:1	Decorative Rock	2.00	95-7
Ditch 95-8	0.6	8.3	0.83	2.03	0	V-Ditch / Berm	10:1/2:1	Decorative Rock	2.00	95-7 + 95-8
Ditch 95-15A	1.85	2.3	0.54	2.63	0	V-Ditch / Berm	3:1/3:1	Decorative Rock	2.00	95-15A

TABLE 6
25-YEAR ONSITE DITCH/BERM CHARACTERISTICS

Ditch / Berm	Min Slope (%)	Q_{25} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch 95-16	0.32	2.8	0.72	1.34	0	V-Ditch / Berm	5:1/3:1	Decorative Rock	2.00	95-16
Ditch 95-17	0.2	2.5	0.57	0.92	0	V-Ditch / Berm	10:1/7:1	Decorative Rock	2.00	95-17
Ditch 95-19	1.3	1.3	0.55	2.14	0	V-Ditch / Berm	2:1/2:1	Decorative Rock	1.50	95-19
Ditch 95-20	1.2	1.1	0.52	2.00	0	V-Ditch / Berm	2:1/2:1	Decorative Rock	2.00	95-20
Ditch KR1-2	1.8	2.0	0.39	2.14	0	V-Ditch / Berm	10:1/2:1	Decorative Rock	1.50	KR1-2
Ditch KR1-3	1.9	8.8	0.68	3.17	0	V-Ditch / Berm	10:1/2:1	Decorative Rock	2.00	KR1-2 + KR1-3
Ditch KR1-4	2.0	3.4	0.47	2.55	0	V-Ditch / Berm	10:1/2:1	Decorative Rock	1.50	KR1-4
Ditch KR2-2	4.4	2.2	0.35	3.07	0	V-Ditch / Berm	10:1/2:1	Decorative Rock	1.50	KR2-2
Ditch KR2-3	3.5	0.4	0.19	1.84	0	V-Ditch / Berm	10:1/2:1	Decorative Rock	1.50	KR2-3
Ditch KR2-4	5.0	3.3	0.39	3.57	0	V-Ditch / Berm	10:1/2:1	Decorative Rock	1.50	KR2-4
Ditch KR3-1A	4.6	2.9	0.38	3.35	0	V-Ditch / Berm	10:1/2:1	Decorative Rock	1.50	KR3-1A
Ditch KR3-2	4.0	3.1	0.40	3.23	0	V-Ditch / Berm	10:1/2:1	Decorative Rock	1.50	KR3-2
Ditch KR4-1	4.1	1.7	0.32	2.80	0	V-Ditch / Berm	10:1/2:1	Decorative Rock	1.50	KR4-1
Ditch KR4-2	2.6	1.7	0.35	2.36	0	V-Ditch / Berm	10:1/2:1	Decorative Rock	1.50	KR4-2
Ditch KR4-3	2.0	5.2	0.55	2.83	0	V-Ditch / Berm	10:1/2:1	Decorative Rock	2.00	KR4-3
Ditch KR4-4	8.5	0.9	0.22	3.14	0	V-Ditch / Berm	10:1/2:1	Decorative Rock	1.50	KR4-4
Ditch KR4-5	1.9	3.2	0.47	2.46	0	V-Ditch / Berm	10:1/2:1	Decorative Rock	1.50	KR4-5
Ditch 95-9	1.4	6.7	0.60	2.51	0	V-Ditch / Berm	10:1/5:1	Decorative Rock	2.00	95-9

TABLE 7
50-YEAR OFFSITE DITCH/BERM CHARACTERISTICS

Ditch / Berm	Min Slope (%)	Q_{50} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch I2 East	1.56	4.8	0.73	2.96	0	V-Ditch / Berm	3:1/3:1	Decorative Rock	2.00	I2

TABLE 7
50-YEAR OFFSITE DITCH/BERM CHARACTERISTICS

Ditch / Berm	Min Slope (%)	Q_{50} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch I2 South	3.18	2.4	0.50	3.25	0	V-Ditch / Berm	3:1/3:1	Decorative Rock	1.50	1/2 I2
CP7	2	168	1.48	5.86	15	V-Ditch / Berm	3:1/3:1	Class 150	2.50	1/2 CP7
95-5P1	2.2	5	0.65	4.00	0	V-Ditch / Berm	3:1/3:1	Earth	2.00	95-5P1
95-5P2	3	8	0.87	3.56	0	V-Ditch / Berm	3:1/3:1	Class 150	2.00	95-5P2
OFF8P1	3	15	1.10	4.16	0	V-Ditch / Berm	3:1/3:1	Class 150	2.00	OFF8P1

TABLE 8
100-YEAR OFFSITE DITCH/BERM CHARACTERISTICS

Ditch / Berm	Min Slope (%)	Q_{100} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch DHD02C	1.70	131	3.25	6.21	0	V-Ditch / Berm	2:1/2:1	Class 150	4.50	Culvert HD02B WS
Ditch DHD02B	1.70	172	2.00	4.79	0	V-Ditch / Berm	16:1/2:1	Class 300	3.00	Split South DHD02B
Ditch DHD02B	3.60	172	2.09	7.28	5	TRAP	3:1/3:1	Class 700	3.50	Split South DHD02B

Type 2A or 2B drop inlets with a concrete apron (or pipe end sections) will be installed in the infill areas to capture and convey storm flows. Weir and orifice calculations were performed for all Type 2A and 2B drop inlets and inlet control calculations were performed for pipe end sections. Copies of the abovementioned calculations are included in Appendix C.

Riprap

Riprap protection calculations in accordance with the HCDDM have been performed to determine acceptable d_{50} size and class for proposed riprap aprons. The pad lengths are based on NDOT Standard Detail R-3.1.4. The detail specifies a minimum pad length equal to 3XD. The riprap sizing calculations are included in Appendix C.

X. CONCLUSIONS AND RECOMMENDATIONS

1. This Project includes construction of the Kyle Canyon Road Interchange and pertinent flood control facilities including storm drain, culvert, and open channel facilities.

2. The Project Specific Drainage Design Criteria has been outlined in Table 3.

3. The proposed improvements are not located within a FEMA-designated Special Flood Hazard Area.

4. The project proposes to construct portions of Moccasin and Sheep Mountain Parkway CCRFCD Facilities MOSM 0064 and MOSM 0080 under US95 within the limits of the project. The hydrology for the proposed CCRFCD facilities are based on the referenced Skye Canyon MDS Update #3 and is in compliance with the City of Las Vegas (CLV) and the criteria set forth in the CCRFCD HCDDM.

5. Recommended storm drain facilities proposed with the project are shown on the attached 90% improvement plans.

6. The proposed improvements, once completed, will not adversely impact adjacent or downstream properties or facilities.

XI. REFERENCES

1. Clark County Regional Flood Control District, *2013 Las Vegas Valley Flood Control Master Plan Update*. 2013.

2. G. C. Wallace, Inc., *Kyle Canyon Master Drainage Study*, August 2006.

3. G. C. Wallace, Inc., *Response to Comments on the Master Drainage Study for Kyle Canyon*, December 2006.

4. VTN Nevada, *Conceptual Offsite Hydrology Report for US-95 Environmental Document – Cheyenne Avenue to Kyle Canyon Road*. May 2004.

5. Slater Hanifan Group, Inc., *Master Drainage Study – Kyle Canyon*, June 2010.

6. Slater Hanifan Group, Inc., *Update to the Master Drainage for Skye Canyon*, December 2014.

7. Slater Hanifan Group, Inc., *Update #2 to the Master Drainage for Skye Canyon*, March 2015.

8. Slater Hanifan Group, Inc., *Update #3 to the Master Drainage for Skye Canyon*, April 2016.

9. NDOT Hydraulics Section, *Nevada Department of Transportation Drainage Manual*, December 2006.

10. Clark County Regional Flood Control District (CCRFCD) *Hydrologic Criteria and* Drainage *Design Manual.* August 1999.

11. U. S. Army Corps of Engineers. *HEC-1 Flood Hydrograph Package*. June 1998.

12. U. S. Department of Agriculture, Soil Conservation Service. *SCS Soil Survey of Las Vegas Valley Area*, July 1985.

13. Federal Highway Administration, *Hydraulic Engineering Circular No. 22 Urban Drainage Design Manual 3rd Edition*, Revised August 2013.

14. Federal Highway Administration, *Hydraulic Toolbox*, August 2014. Version 4.2.

15. Federal Highway Administration, *HY-8*, January 2012. Version 7.2.

16. CIVILDESIGN Corporation, *WSPGW Water Surface Pressure Gradient Package*, 1991-2000. Version 12.99.

90% DRAINAGE DESIGN REPORT FOR KYLE CANYON INTERCHANGE AT US 95 APPENDIX LAYOUT

Appendix A. Hydrologic Calculations and Information (Volume 1 of 2)

1. Figure 503 of the HCDDM
2. Figure 505 of the HCDDM
3. Figure 506 of the HCDDM
4. Table 505 of the HCDDM
5. Existing Conditions Standard Form 4 – Offsite (50 yr)
6. Existing Conditions HEC-1 Analysis (50 yr)
7. Existing Conditions HEC-1 Analysis (100 yr)
8. Proposed Conditions Standard Form 4 – Offsite (50 yr)
9. Proposed Conditions HEC-1 Analysis (50 yr)
10. Proposed Conditions HEC-1 Analysis (100 yr)
11. Figure 517 of the HCDDM
12. Table 601 of the HCDDM
13. Proposed Rational Method (10 yr, 25 yr, 50 yr, 100 yr)

Appendix B. Comments, Meeting Minutes, and CCRFCD Facility Design Memorandum

1. Emailed NDOT 60% Comments
2. Meeting Minutes
3. Supplement for US95/Kyle Canyon Road Interchange
4. Response to CLV Comments on the Supplement for US95/Kyle Canyon Road Interchange

Appendix C. Hydraulic Calculations and Information (Volume 2 of 2)

1. Table 3-1 of the NDOTDM
2. Roadway Functional Classification
3. Drop Inlet Summary and Calculations
4. Vertical Curve Calculation
5. Sump Drop Inlet Calculations
6. 25 yr, 50 yr and 100 yr Ditch Calculations
7. Riprap Calculations
8. Inlet Control Calculations
9. Outlet Protection Calculations
10. KCMain Outlet Channel Normal Depth Calculation
11. D-load Calculations
12. HY-8 Calculations
13. WSPGW Calculations
    a. KCMain.WSW
    b. KCE1_12+53.WSW
    c. KCE1_13+41.WSW
    d. KCE1_15+44.WSW
    e. KCW1_21+39.WSW
    f. KCW1_23+62North.WSW
        i. KR3A_3+99.WSW
        ii. KR3_30+77N.WSW
        iii. KR3_30+77S.WSW
        iv. KCE1_18+69.WSW
    g. KCW1_23+62SOUTH.WSW
    h. KCW1_25+12.WSW
    i. KCW1_27+00.WSW
    j. KCW1_27+76.WSW
        i. KCE1_23+31.WSW
    k. KCE1_25+15NORTH.WSW
    l. KCE1_25+15SOUTH.WSW

m. KCE1_27+87NORTH.WSW
n. KCE1_29+53NORTH.WSW
o. KCE1_29+53SOUTH.WSW
p. XP_418+13.WSW
q. KR1_19+48.WSW
r. XP_412+41.WSW
s. KR1_22+82.WSW
t. KR4_44+89.WSW
u. XP_405+04.WSW

Appendix D. 90% Storm Drain Plans

Appendix E. Referenced Material (On CD)

1. Master Drainage Study for Kyle Canyon
   a. Approval letter
   b. Concurrence letters
   c. Figure 5 – Existing Conditions Drainage Map
   d. Figure 5AR – Existing Conditions Onsite Drainage Map
   e. Figure 9U2 – 100-Year Flood Protection Facilities Map
   f. Soils Exhibit
   g. Rainfall Exhibit
   h. Soils Description Tables
   i. Composite Curve Numbers
   j. DARF values for HEC-1 Model
   k. Existing Conditions Standard Form 4 – Onsite (100 yr)
   l. Existing Conditions Standard Form 4 – Offsite (100 yr)
   m. Existing Conditions HEC-1 Analysis (100 yr)

2. Conceptual Offsite Hydrology Report for US-95 Environmental Document, Cheyenne Avenue to Kyle Canyon Road
   a. Hydrology and Hydraulics Discussion
   b. US-95 Existing Conditions Culvert Analyses Summary
   c. Exhibit 4 – Existing Basin Map
   d. Culvert Location Exhibits
   e. Culvert Analyses

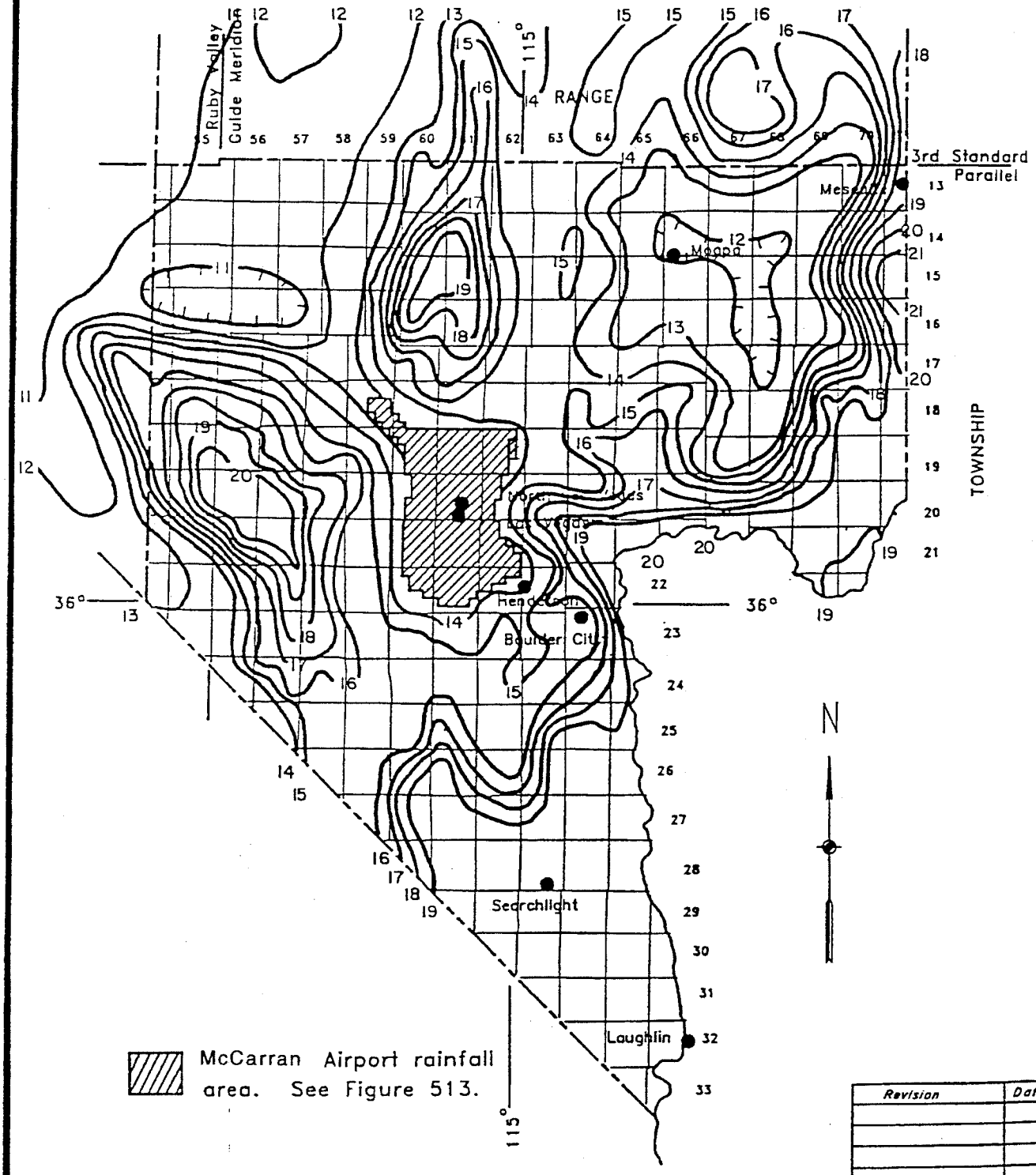
3. Master Drainage Study Update #2 for Skye Canyon
   a. Approval letters
   b. Concurrence letters
   c. Exhibit E – Proposed Condition Drainage Map
   d. Exhibit H – Ultimate Condition Flood Control Facilities Map
   e. Ultimate Condition Standard Form 4
   f. Ultimate Condition HEC-1 Analysis

4. 2013 Las Vegas Valley Flood Control Master Plan Update
   a. Figure F-8
   b. Figure F-12
   c. Figure F-13

APPENDIX A

Hydrologic Calculations and Information

RAINFALL DEPTH-DURATION-FREQUENCY
10-YEAR, 6-HOUR
(DEPTHS IN TENTHS OF INCHES)



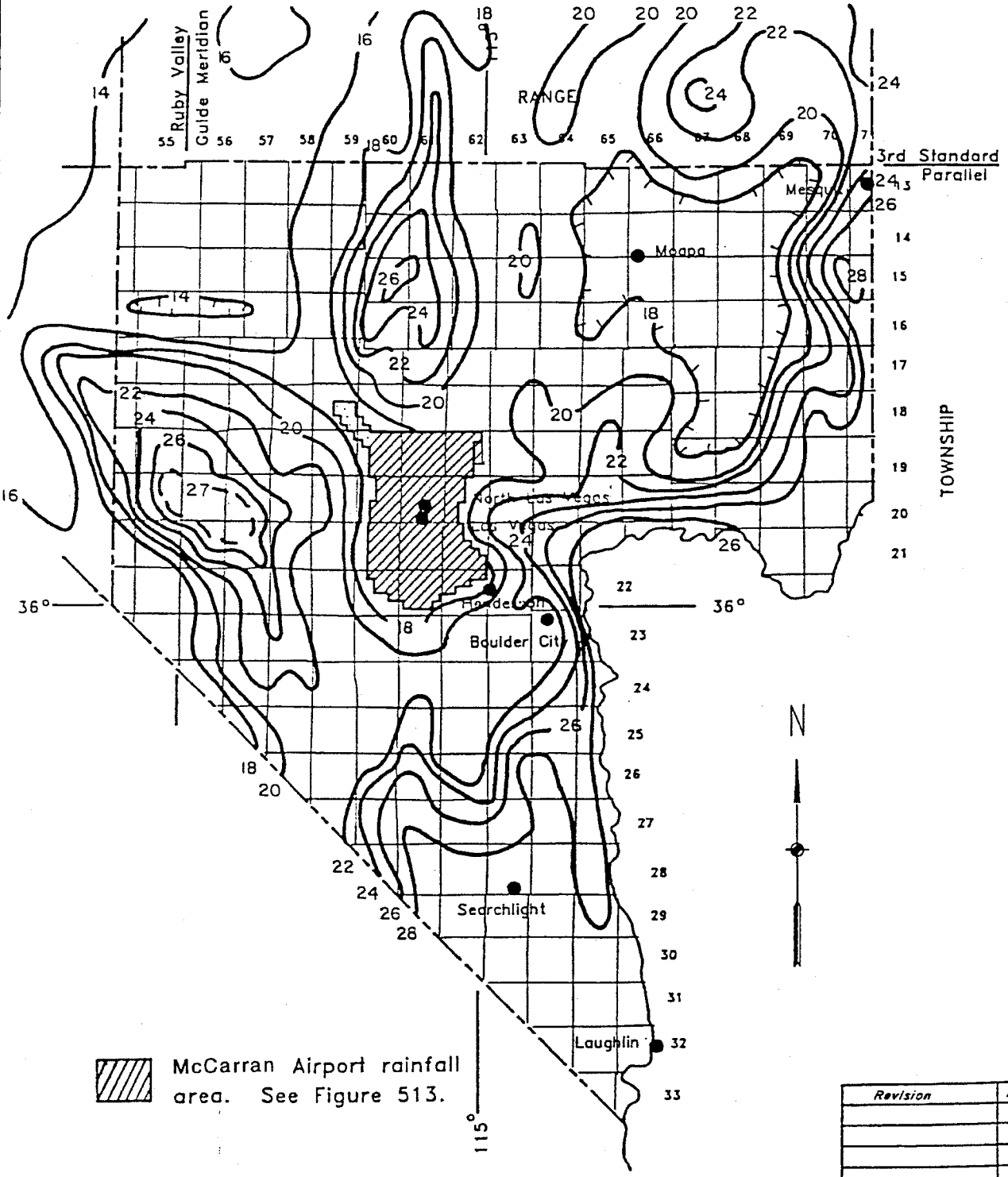
Revision	Date

WRC ENGINEERING

REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 503

RAINFALL DEPTH-DURATION-FREQUENCY
50-YEAR, 6-HOUR
(DEPTHS IN TENTHS OF INCHES)



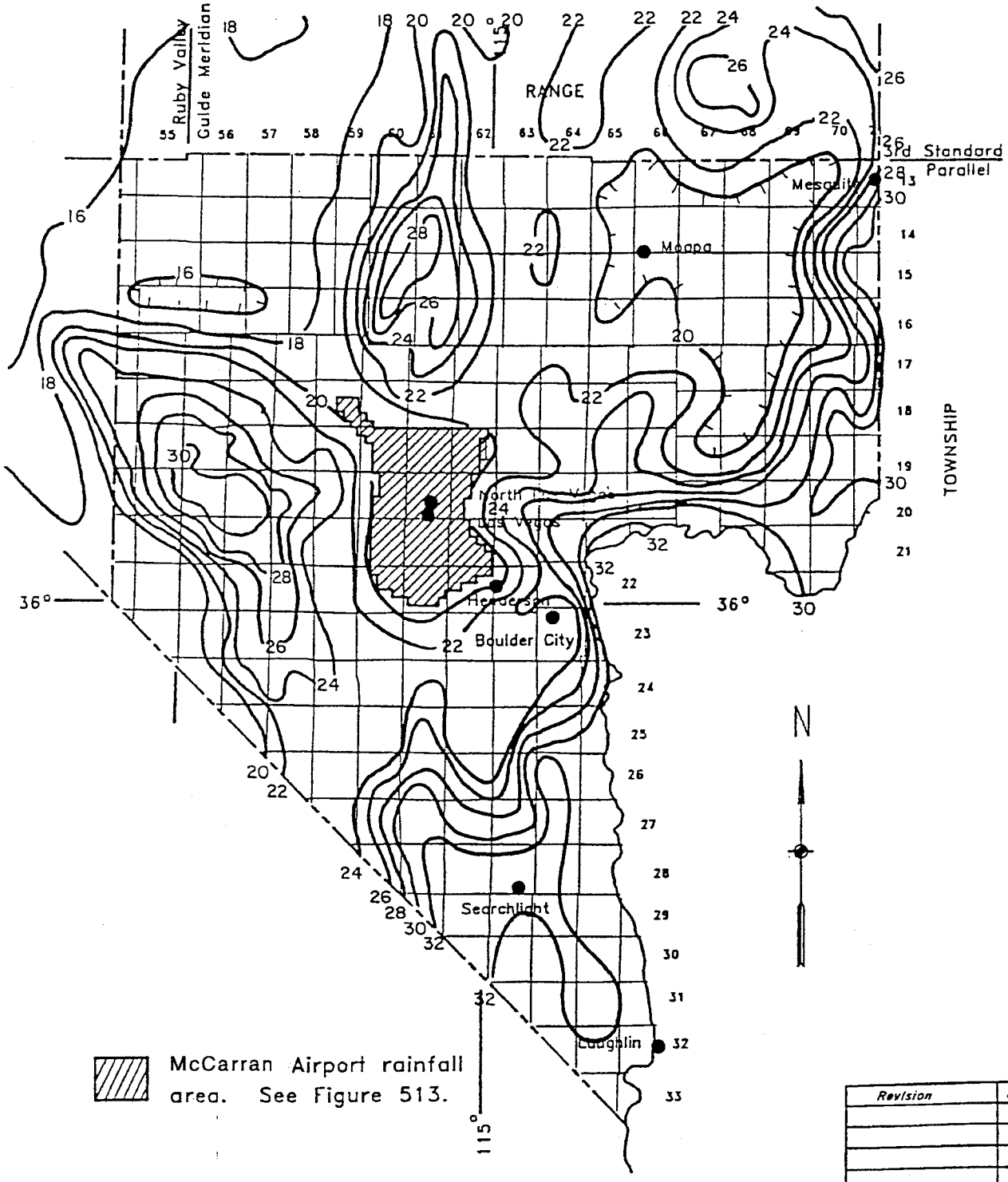
Revision	Date

WRC ENGINEERING

REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 505

RAINFALL DEPTH-DURATION-FREQUENCY
100-YEAR, 6-HOUR
(DEPTHS IN TENTHS OF INCHES)



Revision	Date

WRC ENGINEERING	REFERENCE: NOAA ATLAS 2, VOLUME VII NEVADA, 1973	FIGURE 506

DEPTH-DURATION-FREQUENCY VALUES FOR McCARRAN AIRPORT RAINFALL AREA

(IN INCHES)

TIME	RECURRENCE INTERVAL					
	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
5 min.	0.15	0.27	0.35	0.46	0.54	0.63
10 min.	0.25	0.44	0.57	0.74	0.89	1.02
15 min.	0.33	0.57	0.74	0.97	1.15	1.32
30 min.	0.44	0.78	1.01	1.31	1.55	1.79
1 hour	0.52	0.89	1.15	1.50	1.78	2.06
2 hour	0.59	1.01	1.30	1.70	2.01	2.30
3 hour	0.64	1.08	1.39	1.82	2.15	2.48
6 hour	0.72	1.22	1.58	2.05	2.41	2.77
24 hour (TR-55)	1.20	1.60	1.80	2.40	2.70	2.96

NOTE: 1. Refer to Figure 513 for a description and drawing of the area included in the McCarran Airport Rainfall Area.

2. The 24 hour values presented above are for use with TR-55 only.

3. Table 501 adjustments not required.

Revision	Date

HYDROLOGIC CRITERIA AND DESIGN MANUAL

TIME OF CONCENTRATION

G. C. WALLACE, INC.
Engineers/Planners/Surveyors

Kyle Canyon Interchange
Existing Conditions
50-year Offsite Hydrolic Analysis
SF4 referenced from the original KC Master Drainage and modified for this Study

Project No: 412-634A
Date: 1/05/16
Calculated by: JAM

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK URBANIZED BASINS		Tc	Tlag	REMARKS
DESIG: (1)	DEV./EX. (D or E)	CN (16)	K (2)	AREA Ac (3)	AREA Sq Mi (4)	INITIAL LENGTH Feet (5)	SLOPE % (6)	Ti Min (7)	TRAVEL LENGTH Feet (8)	SLOPE % (9a)	V1 VELOCITY fps (9b)	V2 VELOCITY fps (10)	Tt Min (11)	TOTAL LENGTH Feet (12)	Tc = (L/180)+10 Min (13)	Min (14)	Tlag = 0.6Tc/60 Hours (15)	Remarks: Precipitation
EX-W1	E	77.4	0.6317	15.36	0.0240	240	2.9	9.1	1086	3.2	2.7	5.3	5.0	1326	N/A	14.1	**0.141**	2.41
EX-W2	E	81.6	0.6871	13.24	0.0207	171	4.1	6.1	1145	3.3	2.7	5.4	5.1	1316	N/A	11.2	**0.112**	2.41
EX-W3	E	86.4	0.7505	172.93	0.2702	139	19.4	2.8	7705	3.0	2.6	5.1	26.8	7844	N/A	29.5	**0.295**	2.50
EX-W4	E	86.9	0.7571	67.06	0.1048	297	13.1	4.5	4450	3.3	2.7	5.3	15.4	4747	N/A	19.9	**0.199**	2.50
EX-W5	E	86.3	0.7492	285.43	0.4460	152	12.5	3.4	8352	3.3	2.7	5.4	27.4	8504	N/A	30.8	**0.308**	2.50
EX-W6	E	86.9	0.7571	9.93	0.0155	216	3.7	5.9	877	3.4	2.7	5.4	4.2	1093	N/A	10.1	**0.101**	2.41
EX-W7	E	86.2	0.7478	126.63	0.1979	405	4.2	7.9	6439	3.4	2.7	5.4	21.3	6844	N/A	29.2	**0.292**	2.50
EX-W8	E	86.2	0.7478	139.52	0.2180	184	12.8	3.7	8588	3.2	2.7	5.3	28.7	8772	N/A	32.3	**0.323**	2.50
EX-W9	E	84.4	0.7241	116.76	0.1824	176	15.3	3.6	7922	3.3	2.7	5.3	26.4	8098	N/A	30.0	**0.300**	2.50
EX-E1	E	77.4	0.6317	33.75	0.0527	196	3.1	8.1	4032	2.8	2.5	4.9	15.4	4228	N/A	23.5	**0.235**	2.41
EX-E2	E	77.4	0.6317	140.59	0.2197	93	4.8	4.8	5565	2.7	2.4	4.8	20.8	5658	N/A	25.7	**0.257**	2.41
EX-E3	E	77.4	0.6317	119.48	0.1867	303	2.6	10.6	5304	2.7	2.4	4.8	20.2	5607	N/A	30.8	**0.308**	2.41
EX-E4	E	77.4	0.6317	140.56	0.2196	233	2.7	9.2	3740	2.7	2.4	4.8	14.7	3973	N/A	24.0	**0.240**	2.41
EX-E5	E	79.5	0.6594	63.30	0.0989	162	3.4	6.7	3315	2.6	2.4	4.7	13.4	3477	N/A	20.2	**0.202**	2.41
EX-E6	E	86.9	0.7571	10.26	0.0160	303	3.3	7.2	509	2.2	2.2	4.3	3.9	812	N/A	11.1	**0.111**	2.41
EX-E7	E	86.9	0.7571	21.31	0.0333	147	4.1	4.7	1608	3.1	2.6	5.2	6.8	1755	N/A	11.5	**0.115**	2.41
EX-E8	E	86.9	0.7571	10.67	0.0167	364	2.2	9.1	890	3.5	2.8	5.5	4.2	1254	N/A	13.3	**0.133**	2.41
EX-E9	E	86.9	0.7571	6.13	0.0096	140	2.1	5.7	1115	3.0	2.6	5.1	5.2	1255	N/A	10.9	**0.109**	2.41
ES1	D	92.7	0.8336	11.10	0.0173	100	1.0	4.8	1620	2.8	3.4	5.1	6.1	1720	19.6	10.9	**0.109**	2.41
ES2	D	94.7	0.8600	31.40	0.0490	100	1.0	4.3	2337	1.8	2.7	4.1	10.5	2437	23.5	14.8	**0.148**	2.41

$Tc = Ti + Tt$ $Tlag = 0.6\ Tc$

$Ti = 1.8\ (1.1 - K)\ L^{1/2} / S^{1/3}$

$K = 0.0132\ (CN) - 0.39$

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

Existing: $V1 = 14.8*(S/100)^{1/2}$ $V2 = 29.4*(S/100)^{1/2}$

Developed: $V1 = 20.2*(S/100)^{1/2}$ $V2 = 30.6*(S/100)^{1/2}$

REFERENCE:

STANDARD FORM 4

HYDROLOGIC CRITERIA AND DESIGN MANUAL

TIME OF CONCENTRATION

G. C. WALLACE, INC.
Engineers/Planners/Surveyors

Kyle Canyon Interchange
Existing Conditions
50-year Offsite Hydrolic Analysis
SF4 referenced from the original KC Master Drainage and modified for this Study

Project No: 412-634A
Date: 1/05/16
Calculated by: JAM

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK URBANIZED BASINS		Tc	Tlag	REMARKS
DESIG: (1)	DEV./EX. (D or E)	CN (16)	K (2)	AREA Ac (3)	AREA Sq Mi (4)	INITIAL LENGTH Feet (5)	SLOPE % (6)	Ti Min (7)	TRAVEL LENGTH Feet (8)	SLOPE % (9a)	V1 VELOCITY fps (9b)	V2 VELOCITY fps (10)	Tt Min (11)	TOTAL LENGTH Feet (12)	Tc = (L/180)+10 Min (13)	Min (14)	Tlag = 0.6Tc/60 Hours (15)	Remarks: Precipitation
OFFA	E	77.4	0.6317	13.0	0.0203	287	3.5	9.4	1176	3.0	2.6	5.1	5.5	1463	N/A	14.9	0.149	2.41
OFFB	E	77.4	0.6317	85.6	0.1337	500	3.5	12.4	7955	3.2	2.6	5.3	26.8	8455	N/A	39.2	0.392	2.50
OFFC	E	77.4	0.6317	85.3	0.1333	500	3.5	12.4	5576	3.3	2.7	5.4	18.9	6076	N/A	31.3	0.313	2.50
OFFD-A	E	77.4	0.6317	411.5	0.6430	500	3.5	12.4	14360	4.3	3.1	6.1	40.6	14860	N/A	53.0	0.530	2.68
OFFD-B	E	77.4	0.6317	319.2	0.4988	500	3.5	12.4	10906	2.6	2.4	4.8	39.8	11406	N/A	52.2	0.522	2.50
OFFE	E	77.4	0.6317	24.5	0.0383	500	3.0	13.1	2860	3.5	2.8	5.5	10.2	3360	N/A	23.2	0.232	2.50
OFFF-A	E	83.8	0.7162	636.0	0.9938	500	3.5	10.2	14655	6.4	3.7	7.4	33.9	15155	N/A	44.1	0.441	2.72
OFFF-B	E	84.1	0.7201	391.2	0.6112	500	3.5	10.1	11918	3.3	2.7	5.3	39.0	12418	N/A	49.0	0.490	2.50
OFFG	E	86.5	0.7518	26.0	0.0406	500	4.3	8.6	2810	3.5	2.8	5.5	10.0	3310	N/A	18.6	0.186	2.50
OFFH	D	89.5	0.7914	5.6	0.0088	200	4.0	4.9	805	3.1	3.6	5.4	3.3	1005	15.6	8.2	0.082	2.41
OFF2	E	77.4	0.6317	59.4	0.0928	200	2.3	9.0	4241	3.0	2.6	5.1	15.4	4441	N/A	24.5	0.245	2.41
OFF4	E	77.4	0.6317	20.4	0.0319	200	2.3	9.0	849	2.8	2.5	4.9	4.5	1049	N/A	13.6	0.136	2.41
OFF5A	D	89.1	0.7861	10.3	0.0161	200	2.0	6.3	555	3.2	3.6	5.5	2.5	755	14.2	8.8	0.088	2.41
OFF5B	D	89.1	0.7861	7.4	0.0116	200	2.0	6.3	770	2.8	3.4	5.1	3.3	970	15.4	9.7	0.097	2.41
OFF8	D	89.1	0.7861	8.5	0.0133	200	2.6	5.8	1304	2.6	3.3	4.9	5.3	1504	18.4	11.1	0.111	2.41
OFF9A	D	89.1	0.7861	22.2	0.0347	50	12.0	1.7	1115	2.6	3.3	4.9	4.6	1165	16.5	6.4	0.064	2.41
OFF9B	D	89.1	0.7861	7.6	0.0119	50	10.0	1.9	1115	2.2	3.0	4.6	5.0	1165	16.5	6.8	0.068	2.41
OFF10	E	86.2	0.7478	429.5	0.6710	500	4.0	8.9	16775	4.1	3.0	6.0	48.3	17275	N/A	57.3	0.573	2.92
OFF11	D	77.4	0.6317	2.9	0.0046	30	5.2	2.7	1620	2.4	3.1	4.7	6.7	1650	19.2	9.3	0.093	2.41
OFF12	D	77.4	0.6317	6.0	0.0094	200	3.5	7.9	651	1.8	2.7	4.1	3.7	851	14.7	11.5	0.115	2.41
OFF14	D	86.9	0.7571	8.6	0.0134	200	4.0	5.5	773	2.5	3.2	4.8	3.5	973	15.4	9.0	0.090	2.41
OFF15	D	86.9	0.7571	23.2	0.0362	200	3.5	5.7	1678	2.4	3.1	4.7	6.8	1878	20.4	12.6	0.126	2.41
OFF16	E	86.6	0.7531	504.7	0.7885	500	1.2	13.1	18514	3.7	2.8	5.7	56.0	19014	N/A	69.2	0.692	2.64
OFF18	E	86.3	0.7492	351.4	0.5491	500	4.2	8.8	11962	3.9	2.9	5.8	35.8	12462	N/A	44.5	0.445	2.61
OFF20	E	86.2	0.7478	42.0	0.0656	500	4.2	8.8	3502	4.9	3.3	6.5	10.2	4002	N/A	19.0	0.190	2.57
OFF21	E	85.7	0.7412	337.9	0.5280	500	3.0	10.0	11390	3.8	2.9	5.7	34.6	11890	N/A	44.6	0.446	2.64
95-1	D	89.1	0.7861	2.7	0.0042	50	2.0	3.2	599	1.5	2.5	3.8	3.8	649	13.6	6.9	0.069	2.41
95-2	D	89.1	0.7861	2.8	0.0044	50	2.0	3.2	644	0.7	1.7	2.6	5.8	694	13.9	9.0	0.090	2.41
95-3	D	89.1	0.7861	6.1	0.0095	50	2.0	3.2	1322	1.8	2.7	4.1	6.4	1372	17.6	9.5	0.095	2.41
95-4	D	89.1	0.7861	7.0	0.0109	50	2.0	3.2	1336	2.0	2.8	4.3	6.2	1386	17.7	9.4	0.094	2.41
95-5	D	89.1	0.7861	23.6	0.0369	50	2.0	3.2	800	1.3	2.3	3.5	5.1	850	14.7	8.2	0.082	2.41
95-6	D	89.9	0.7967	6.7	0.0104	50	2.0	3.1	1313	1.8	2.7	4.1	6.4	1363	17.6	9.5	0.095	2.41
95-7A	D	92.6	0.8323	4.4	0.0069	50	2.0	2.7	1071	2.2	3.0	4.6	4.8	1121	16.2	7.5	0.075	2.41
95-7B	D	92.6	0.8323	7.2	0.0112	50	2.0	2.7	1296	2.0	2.9	4.3	6.0	1346	17.5	8.7	0.087	2.41
95-8A	D	92.6	0.8323	3.3	0.0052	50	2.0	2.7	664	1.8	2.7	4.1	3.7	714	14.0	6.4	0.064	2.41
95-8B	D	92.6	0.8323	2.6	0.0040	50	2.0	2.7	568	3.2	3.6	5.5	2.5	618	13.4	5.2	0.052	2.41
95-9A	D	92.6	0.8323	7.1	0.0110	50	2.0	2.7	1364	1.6	2.5	3.8	7.1	1414	17.9	9.8	0.098	2.41
95-9B	D	92.6	0.8323	8.5	0.0133	50	2.0	2.7	1534	0.8	1.8	2.7	11.2	1584	18.8	13.9	0.139	2.41

Tc = Ti + Tt Tlag = 0.6 Tc
Ti = 1.8 (1.1 - K) $L^{1/2}$ / $S^{1/3}$
K = 0.0132 (CN) - 0.39

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

Existing: V1 = 14.8*(S/100)$^{1/2}$ V2 = 29.4*(S/100)$^{1/2}$

Developed: V1 = 20.2*(S/100)$^{1/2}$ V2 = 30.6*(S/100)$^{1/2}$

REFERENCE:

STANDARD FORM 4

```
1*****************************************                                                  ****************************************
 *                                       *                                                  *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998               *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1                 *                                                  *          609 SECOND STREET           *
 *                                       *                                                  *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   05JAN16  TIME  16:13:08   *                                                  *           (916) 756-1104             *
 *                                       *                                                  *                                      *
 *****************************************                                                  ****************************************


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


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

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

1                                                   HEC-1 INPUT                                                    PAGE  1

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

                      *DIAGRAM
 *** FREE ***
          1           ID   ******************************************************************
          2           ID   * ............................................................... *
          3           ID   * :                                                             : *
          4           ID   * :              KYLE CANYON INTERCHANGE                        : *
          5           ID   * :                                                             : *
          6           ID   * :              EXISTING CONDITIONS                            : *
          7           ID   * :                                                             : *
          8           ID   * : REFERENCED FROM RTC TO MDS FOR KYLE CANYON [DEC 2006]       : *
          9           ID   * : AND MODIFIED TO USE 50-YEAR PRECIPITATION VALUES            : *
         10           ID   * :                                                             : *
         11           ID   * :.............................................................: *
         12           ID   * :              RETURN PERIOD_ _ _ _50 -YEAR                   : *
         13           ID   * :              DISTRIBUTION_ _ _ _ 6-HOUR SDN3                : *
         14           ID   * :              PROJECT NO_ _ _ _ _ 412.634A                   : *
         15           ID   * :              FILENAME_ _ _ _ _ _ EX50.H1                    : *
         16           ID   * :              DATE MODELED_ _ _ _ 01/05/16                   : *
         17           ID   * :              MODELED BY_ _ _ _ _ JAM                        : *
         18           ID   * :.............................................................: *
         19           ID   * :                                                             : *
         20           ID   * :.............................................................: *
         21           ID   ******************************************************************
         22           ID    JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
         23           ID
         24           ID
         25           ID
         26           ID                      AREA      DARF
         27           ID                         SQ.MI.
         28           ID
         29           ID                       0.0 - 0.5    0.99
         30           ID                       0.5 - 1.0    0.98
         31           ID                       1.0 - 2.0    0.95
         32           ID                       2.0 - 4.0    0.92
         33           ID                       4.0 - 6.0    0.91
         34           ID                       6.0 - 8.0    0.89
         35           ID
         36           ID
         37           ID
         38           ID
         39           IT       5       0       0     300
         40           IO       5
         41           IN       5       0       0
         42           JR    PREC       1    0.98    0.95    0.92    0.91    0.89
                      *

         43           KK    OFFA
         44           KM            AREA  13.0 AC
         45           PB    2.41
         46           BA  0.0203
         47           PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
         48           PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
         49           PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
         50           PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
         51           PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
1                                                   HEC-1 INPUT                                                    PAGE  2

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

         52           PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
         53           PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
         54           PC    .998    .999    1.00
         55           LS       0    77.4
         56           UD    .149
                      *

         57           KK    95-1
         58           KM            AREA  2.7 AC
         59           PB    2.41
         60           BA  0.0042
         61           LS       0    89.1
         62           UD    .069
                      *
```

```
 63          KK    CPNM
 64          KM   COMBINATION POINT CPNM
 65          KM   COMBINE OFFA AND 95-1
 66          HC       2
             *

 67          KK    OFFB
 68          KM             AREA  85.6 AC
 69          PB    2.50
 70          BA  0.1337
 71          LS       0    77.4
 72          UD    .392
             *

 73          KK    95-2
 74          KM             AREA  2.8 AC
 75          PB    2.41
 76          BA  0.0044
 77          LS       0    89.1
 78          UD    .090
             *

 79          KK     CP1
 80          KM   COMBINATION POINT CP1
 81          KM   COMBINE OFFB AND 95-2
 82          HC       2
             *

 83          KK    RCP1
 84          KM   ROUTE CP1 THRU OFF2
 85          KM   N-STEPS    K     X-FACTOR
 86          RM       1   0.078    0.15
             *

 87          KK    OFF2
 88          KM             AREA  59.4 AC
 89          PB    2.41
 90          BA  0.0928
 91          LS       0    77.4
 92          UD    .245
             *
```



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

 93          KK     CP2
 94          KM   COMBINATION POINT CP2
 95          KM   COMBINE CP1 AND OFF2
 96          HC       2
             *

 97          KK    RCP2
 98          KM   ROUTE CP2 THRU EX-E1
 99          KM   N-STEPS    K     X-FACTOR
100          RM       1   0.094    0.15
             *

101          KK   EX-E1
102          KM             AREA  33.75 AC
103          PB    2.41
104          BA  0.0527
105          LS       0    77.4
106          UD    .235
             *

107          KK     CP3
108          KM   COMBINATION POINT CP3
109          KM   COMBINE RCP2 AND EX-E1
110          HC       2
             *

111          KK    OFFC
112          KM             AREA  85.3 AC
113          PB    2.50
114          BA  0.1333
115          LS       0    77.4
116          UD    .313
             *

117          KK    95-3
118          KM             AREA  6.1 AC
119          PB    2.41
120          BA  0.0095
121          LS       0    89.1
122          UD    .095
             *

123          KK     CP4
124          KM   COMBINATION POINT CP4
125          KM   COMBINE OFFC AND 95-3
126          HC       2
             *

127          KK    OFF4
128          KM             AREA  20.4 AC
129          PB    2.41
130          BA  0.0319
131          LS       0    77.4
132          UD    .136
             *
```



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

133          KK     CP5
134          KM   COMBINATION POINT CP5
135          KM   COMBINE CP4 AND OFF4
136          HC       2
             *
```

```
 137          KK    RCP5
 138          KM   ROUTE CP5 THRU EX-E2
 139          KM   N-STEPS   K    X-FACTOR
 140          RM       2   0.162    0.15
              *

 141          KK   EX-E2
 142          KM            AREA  140.59 AC
 143          PB    2.41
 144          BA  0.2197
 145          LS       0    77.4
 146          UD    .257
              *

 147          KK     CP6
 148          KM   COMBINATION POINT CP6
 149          KM   COMBINE RCP5 AND EX-E2
 150          HC       2
              *

 151          KK  OFFD-A
 152          KM            AREA  411.5 AC
 153          PB    2.68
 154          BA  0.6430
 155          LS       0    77.4
 156          UD    .530
              *

 157          KK ROFFD-A
 158          KM   ROUTE OFFD-A TO CP7
 159          KM   N-STEPS   K    X-FACTOR
 160          RM       5   0.400    0.15
              *

 161          KK  OFFD-B
 162          KM            AREA  319.2 AC
 163          PB    2.50
 164          BA  0.4988
 165          LS       0    77.4
 166          UD    .522
              *

 167          KK    95-4
 168          KM            AREA  7.0 AC
 169          PB    2.41
 170          BA  0.0109
 171          LS       0    89.1
 172          UD    .094
              *
1                                          HEC-1 INPUT                                                PAGE  5

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

 173          KK     CP7
 174          KM   COMBINATION POINT CP7
 175          KM   COMBINE OFFD-A, OFFD-B AND 95-4
 176          HC       3
              *

 177          KK   OFF5A
 178          KM            AREA  10.3 AC
 179          PB    2.41
 180          BA  0.0161
 181          LS       0    89.1
 182          UD    .088
              *

 183          KK   OFF5B
 184          KM            AREA  7.4 AC
 185          PB    2.41
 186          BA  0.0116
 187          LS       0    89.1
 188          UD    .097
              *

 189          KK    CP7A
 190          KM   COMBINATION POINT CP7A
 191          KM   COMBINE CP7, OFF5A AND OFF5B
 192          HC       3
              *

 193          KK   RCP7A
 194          KM   ROUTE CP7A THRU EX-E3
 195          KM   N-STEPS   K    X-FACTOR
 196          RM       2   0.132    0.15
              *

 197          KK   EX-E3
 198          KM            AREA  119.48 AC
 199          PB    2.41
 200          BA  0.1867
 201          LS       0    77.4
 202          UD    .308
              *

 203          KK     CP8
 204          KM   COMBINATION POINT CP8
 205          KM   COMBINE RCP7A AND EX-E3
 206          HC       2
              *

 207          KKCPNE-DUMMY
 208          KM   COMBINATION POINT CPNE-DUMMY
 209          KM   COMBINE CPNM, CP3, CP6 AND CP8
 210          HC       4
              *
1                                          HEC-1 INPUT                                                PAGE  6

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

```
211          KK   OFF10
212          KM             AREA  429.5 AC
213          PB    2.92
214          BA  0.6710
215          LS       0    86.2
216          UD    .573
             *

217          KK  ROFF10
218          KM   ROUTE OFF10 THRU OFFF-A AND OFFF-B
219          KM   N-STEPS   K    X-FACTOR
220          RM       7   0.583    0.15
             *

221          KK  OFFF-A
222          KM             AREA  636.0 AC
223          PB    2.72
224          BA  0.9938
225          LS       0    83.8
226          UD    .441
             *

227          KK ROFFF-A
228          KM   ROUTE OFFF-A THRU OFFF-B
229          KM   N-STEPS   K    X-FACTOR
230          RM       3   0.238    0.15
             *

231          KK  OFFF-B
232          KM             AREA  391.2 AC
233          PB    2.50
234          BA  0.6112
235          LS       0    84.1
236          UD    .490
             *

237          KK   EX-W1
238          KM             AREA  15.36 AC
239          PB    2.41
240          BA  0.0240
241          LS       0    77.4
242          UD    .141
             *

243          KK   OFF11
244          KM             AREA  2.9 AC
245          PB    2.41
246          BA  0.0046
247          LS       0    77.4
248          UD    .093
             *
```

1 HEC-1 INPUT PAGE 7

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

249          KK     CP9
250          KM   COMBINATION POINT CP9
251          KM   COMBINE ROFF10, OFFF-A, OFFF-B, EX-W1 AND OFF11
252          HC       5
             *

253          KK    DCP9
254          KM   FLOW SPLIT AT CULVERT
255          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
256          DT DCHD02A
257          DI       0     150     300     450     600     750     900    1050    1100    1350
258          DI    1500
259          DQ       0     122     186     230     261     283     316     353     366     445
260          DQ     497
             *

261          KK    RCP9
262          KM   ROUTE TO BASIN OFF12
263          RD     850  0.0165    0.02       0    TRAP       0      10
             *

264          KK    OFFG
265          KM             AREA  26.0 AC
266          PB    2.50
267          BA  0.0406
268          LS       0    86.5
269          UD    .186
             *

270          KK   EX-W2
271          KM             AREA  13.24 AC
272          PB    2.41
273          BA  0.0207
274          LS       0    81.6
275          UD    .112
             *

276          KK   OFF12
277          KM             AREA  6.0 AC
278          PB    2.41
279          BA  0.0094
280          LS       0    77.4
281          UD    .115
             *

282          KK   OFF16
283          KM             AREA  504.7 AC
284          PB    2.64
285          BA  0.7885
286          LS       0    86.6
287          UD    .692
             *
```

1 HEC-1 INPUT PAGE 8

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

```
288          KK  ROFF16
289          KM   ROUTE OFF16 THRU EX-W3
290          KM   N-STEPS   K    X-FACTOR
291          RM       2   0.198    0.15
             *

292          KK   EX-W3
293          KM            AREA  172.93 AC
294          PB    2.50
295          BA  0.2702
296          LS       0    86.4
297          UD    .295
             *

298          KK    CP10
299          KM   COMBINATION POINT CP10
300          KM   COMBINE RCP9, OFFG, EX-W2, OFF12, ROFF16 AND EX-W3
301          HC       6
             *

302          KK   DCP10
303          KM   FLOW SPLIT AT CULVERT
304          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
305          DT DCHD04A
306          DI       0     300     600     900    1200    1500    1800    2100    2400    2540
307          DI    3000
308          DQ       0     132     316     514     710     907    1115    1252    1399    1468
309          DQ    1684
             *

310          KKDSPHD04A
311          KM   FLOW SPLIT AT BETWEEN HD04A AND HD05A
312          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
313          KM   BASED ON CHANNEL CAPACITY = 527 CFS
314          DT DSHD04A
315          DI       0     527    2000
316          DQ       0       1    1473
             *

317          KK  RDCP10
318          KM   ROUTE TO THE NEXT CULVERT AT BASIN OFF11
319          RD    1068  0.0160    0.02       0    TRAP       0      10
             *

320          KK   EX-W4
321          KM            AREA  67.06 AC
322          PB    2.50
323          BA  0.1048
324          LS       0    86.9
325          UD    .199
             *
```



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

326          KK    CP11
327          KM   COMBINATION POINT CP11
328          KM   COMBINE RDCP10 AND EX-W4
329          HC       2
             *

330          KK   DCP11
331          KM   FLOW SPLIT AT CULVERT
332          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
333          DT DCHD05A
334          DI       0     170     340     510     680     850    1020    1190    1360    1372
335          DI    1700
336          DQ       0     169     200     244     296     372     459     546     632     637
337          DQ     807
             *

338          KKDSPHD05A
339          KM   FLOW SPLIT AT BETWEEN HD05A AND HD06A
340          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
341          KM   BASED ON CHANNEL CAPACITY = 605 CFS
342          DT DSHD05A
343          DI       0     605    2000
344          DQ       0       1    1395
             *

345          KK  RDCP11
346          KM   ROUTE TO THE NEXT CULVERT AT BASIN OFF12
347          RD     626  0.0134    0.02       0    TRAP       0      10
             *

348          KK   OFF18
349          KM            AREA  351.4 AC
350          PB    2.61
351          BA  0.5491
352          LS       0    86.3
353          UD    .445
             *

354          KK  ROFF18
355          KM   ROUTE OFF18 THRU EX-W5
356          KM   N-STEPS   K    X-FACTOR
357          RM       2   0.171    0.15
             *

358          KK   EX-W5
359          KM            AREA  285.43 AC
360          PB    2.50
361          BA  0.4460
362          LS       0    86.3
363          UD    .308
             *
```



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

```
364          KK    CP12
365          KM   COMBINATION POINT CP12
366          KM   COMBINE ROFF18 AND EX-W5
367          HC       2
             *

368          KK   OFF14
369          KM            AREA  8.6 AC
370          PB    2.41
371          BA  0.0134
372          LS       0    86.9
373          UD    .090
             *

374          KK    CP13
375          KM   COMBINATION POINT CP13
376          KM   COMBINE RDCP11, CP12 AND OFF14
377          HC       3
             *

378          KK   DCP13
379          KM   FLOW SPLIT AT CULVERT
380          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
381          DT DCHD06A
382          DI       0   200.0   400.0     600     800    1000    1200    1400    1600    1772
383          DI    2000
384          DQ       0   199.9   399.9     594     727     802     865     927    1017    1095
385          DQ    1207
             *

386          KKDSPHD06A
387          KM   FLOW SPLIT AT BETWEEN HD06A AND HD07A
388          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
389          KM   BASED ON CHANNEL CAPACITY = 1,692 CFS
390          DT DSHD06A
391          DI       0    1692    2000
392          DQ       0       1     308
             *

393          KKRDCRCOFF18
394          KM   ROUTE TO THE NEXT CULVERT AT BASIN OFFH
395          RD    1349  0.0186    0.02       0    TRAP       0      10
             *

396          KK   EX-W6
397          KM            AREA  9.93 AC
398          PB    2.41
399          BA  0.0155
400          LS       0    86.9
401          UD    .101
             *
```



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

402          KK   OFF15
403          KM            AREA  23.2 AC
404          PB    2.41
405          BA  0.0362
406          LS       0    86.9
407          UD    .126
             *

408          KK    CP14
409          KM   COMBINATION POINT CP14
410          KM   COMBINE RDCRCOFF18, EX-W6 AND OFF15
411          HC       3
             *

412          KK   DCP14
413          KM   FLOW SPLIT AT CULVERT
414          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
415          DT DCHD07A
416          DI       0      90     180     270     360     450     540     630     720     771
417          DI     900
418          DQ       0      51      55      58      60      61      65      78      93     101
419          DQ     123
             *

420          KKDSPHD07A
421          KM   FLOW SPLIT AT BETWEEN HD07A AND HD08A
422          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
423          KM   BASED ON CHANNEL CAPACITY = 338 CFS
424          DT DSHD07A
425          DI       0     338    2000
426          DQ       0       1    1662
             *

427          KK    OFFE
428          KM            AREA  24.5 AC
429          PB    2.50
430          BA  0.0383
431          LS       0    77.4
432          UD    .232
             *

433          KK    95-5
434          KM            AREA  23.6 AC
435          PB    2.41
436          BA  0.0369
437          LS       0    89.1
438          UD    .082
             *
```



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

439          KK  CHD01B
440          KM   COMBINATION POINT CHD01B
```

```
 441          KM   COMBINE OFFE AND 95-5
 442          HC       2
              *

 443          KK  DHD01B
 444          KM   FLOW SPLIT AT CULVERT 1B
 445          DT DCHD01B
 446          DI       0    15.0    29.0    45.0    60.0    75.0    90.0   105.0     120     135
 447          DI     150
 448          DQ       0    14.9    28.9    44.9    59.9    74.9    89.9   104.9     116     121
 449          DQ     125
              *

 450          KK RDHD01B
 451          KM   ROUTE TO THE NEXT CULVERT
 452          RD    1000  0.0165    0.02       0    TRAP       0      10
              *

 453          KK    OFF8
 454          KM            AREA  8.5 AC
 455          PB    2.41
 456          BA  0.0133
 457          LS       0    89.1
 458          UD    .111
              *

 459          KKRETHD02A
 460          KM   RETREIVE FLOW FROM CULVERT HD02A
 461          DR DCHD02A
              *

 462          KK  CHD02B
 463          KM   COMBINATION POINT CHD02B
 464          KM   COMBINE RDHD01B, OFF8 AND RETHD02A
 465          HC       3
              *

 466          KK  DHD02B
 467          KM   FLOW SPLIT AT CULVERT HD02B
 468          DT DCHD02B
 469          DI       0    50.0     100     150     200     250     300     350     400     450
 470          DI     500
 471          DQ       0    49.9      82      99     124     149     178     211     241     271
 472          DQ     299
              *

 473          KK RDHD02B
 474          KM   ROUTE TO THE NEXT CULVERT
 475          RD    1320  0.0165    0.02       0    TRAP       0      10
              *
```

1 HEC-1 INPUT PAGE 13

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

 476          KK    95-6
 477          KM            AREA  6.7 AC
 478          PB    2.41
 479          BA  0.0104
 480          LS       0    89.9
 481          UD    .095
              *

 482          KKRETHD04A
 483          KM   RETREIVE FLOW FROM CULVERT HD04A
 484          DR DCHD04A
              *

 485          KK  CHD04B
 486          KM   COMBINATION POINT CHD04B
 487          KM   COMBINE RDHD02B, 95-6 AND RETHD04A
 488          HC       3
              *

 489          KK  DHD04B
 490          KM   SPLIT FLOW AT CULVERT HD04B
 491          DT DCHD04B
 492          DI       0   200.0     400     600     800    1000    1200    1400    1600    1800
 493          DI    2000
 494          DQ       0   199.9     287     359     443     529     620     710     800     895
 495          DQ     988
              *

 496          KKRETSHD04A
 497          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD04A AND HD05A
 498          DR DSHD04A
              *

 499          KK   95-7A
 500          KM            AREA  4.4 AC
 501          PB    2.41
 502          BA  0.0069
 503          LS       0    92.6
 504          UD    .075
              *

 505          KK CHD04B2
 506          KM   COMBINE 95-7A WITH BYPASS AND SPILL FLOW
 507          HC       3
              *

 508          KKDSPHD04B
 509          KM   FLOW SPLIT AT BETWEEN HD04B AND HD05B
 510          KM   DIVERSION TO THE OTHER SIDE OF US95
 511          KM   BASED ON CHANNEL CAPACITY = 1004 CFS
 512          DT DSHD04B
 513          DI       0    1004    2000
 514          DQ       0       1     996
              *
```

1 HEC-1 INPUT PAGE 14

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

```
 515          KK RDHD04B
 516          KM   ROUTE TO THE NEXT CULVERT
 517          RD    1068  0.0160    0.02       0    TRAP       0      10
              *

 518          KKRETHD05A
 519          KM   RETREIVE FLOW FROM CULVERT HD05A
 520          DR DCHD05A
              *

 521          KK  CHD05B
 522          KM   COMBINATION POINT CHD05B
 523          KM   COMBINE RDHD04B AND RETHD05A
 524          HC       2
              *

 525          KK  DHD05B
 526          KM   SPLIT FLOW AT CULVERT HD05B
 527          DT DCHD05B
 528          DI       0     200     400     600     800    1000    1200    1400    1600    1800
 529          DI    2000
 530          DQ       0     164     242     323     397     494     600     703     809     913
 531          DQ    1029
              *

 532          KK   95-8A
 533          KM            AREA  3.3 AC
 534          PB    2.41
 535          BA  0.0052
 536          LS       0    92.6
 537          UD    .064
              *

 538          KKRETSHD05A
 539          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD05A AND HD06A
 540          DR DSHD05A
              *

 541          KK CHD05B2
 542          KM   COMBINE 95-8A WITH BYPASS AND SPILL FLOW
 543          HC       3
              *

 544          KKDSPHD05B
 545          KM   FLOW SPLIT AT BETWEEN HD05B AND HD06B
 546          KM   DIVERSION TO THE OTHER SIDE OF US95
 547          KM   BASED ON CHANNEL CAPACITY = 4017 CFS
 548          DT DSHD05B
 549          DI       0    4017    5000
 550          DQ       0       1     983
              *
```



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

 551          KK RDHD05B
 552          KM   ROUTE TO THE NEXT CULVERT
 553          RD     626  0.0134    0.02       0    TRAP       0      10
              *

 554          KKRETHD06A
 555          KM   RETREIVE FLOW FROM CULVERT HD06A
 556          DR DCHD06A
              *

 557          KK  CHD06B
 558          KM   COMBINE BYPASS WITH RETREIVED FLOW
 559          HC       2
              *

 560          KK  DHD06B
 561          KM   SPLIT FLOW AT CULVERT HD06B
 562          DT DCHD06B
 563          DI       0   160.0   480.0     640     800     960    1120    1280    1400    1600
 564          DQ       0   159.9   479.9     634     706     757     807     857     899     969
              *

 565          KK   95-9A
 566          KM            AREA  7.1 AC
 567          PB    2.41
 568          BA  0.0110
 569          LS       0    92.6
 570          UD    .098
              *

 571          KKRETSHD06A
 572          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD06A AND HD07A
 573          DR DSHD06A
              *

 574          KK CHD06B2
 575          KM   COMBINE 95-9A WITH BYPASS AND SPILL FLOW
 576          HC       3
              *

 577          KKDSPHD06B
 578          KM   FLOW SPLIT AT BETWEEN HD06B AND HD07B
 579          KM   DIVERSION TO THE OTHER SIDE OF US95
 580          KM   BASED ON CHANNEL CAPACITY = 4876 CFS
 581          DT DSHD06B
 582          DI       0    4876    5000
 583          DQ       0       1     124
              *
```



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

 584          KK RDHD06B
```

```
585         KM   ROUTE TO THE NEXT CULVERT
586         RD    1349  0.0186    0.02       0    TRAP       0      10
            *

587         KKRETHD07A
588         KM   RETREIVE FLOW FROM CULVERT HD07A
589         DR DCHD07A
            *

590         KK  CHD07B
591         KM   COMBINE BYPASS WITH RETREIVED FLOW
592         HC       2
            *

593         KK  DHD07B
594         KM   SPLIT FLOW AT CULVERT HD07B
595         DT DCHD07B
596         DI       0      90     180     270     360     450     540     630     700     810
597         DI     900
598         DQ       0      53      58      61      63      65      67      69      70      71
599         DQ      72
            *

600         KKRETSHD07A
601         KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD07A AND HD08A
602         DR DSHD07A
            *

603         KK CHD07B2
604         KM   COMBINE BYPASS WITH SPILL FLOW
605         HC       2
            *

606         KKDSPHD07B
607         KM   FLOW SPLIT AT BETWEEN HD07B AND HD08B
608         KM   DIVERSION TO THE OTHER SIDE OF US95
609         KM   BASED ON CHANNEL CAPACITY = 1770 CFS
610         DT DSHD07B
611         DI       0    1770    5000
612         DQ       0       1    3230
            *

613         KK DCHD01B
614         KM   RETREIVE FLOW FROM VTN HD01B CULVERT
615         DR DCHD01B
            *

616         KK  DHD01C
617         KM   SPLIT FLOW AT CULVERT HD01C
618         DT DCHD01C
619         DI       0    10.0    50.0
620         DQ       0     9.9    49.9
            *
```



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

621         KK RDHD01C
622         KM   ROUTE TO THE NEXT CULVERT
623         RK    1000  0.0165    0.02       0    TRAP      13      20
            *

624         KKRETHD02B
625         KM   RETREIVE FLOW FROM CULVERT HD02B
626         DR DCHD02B
            *

627         KK  CHD02C
628         KM   COMBINE BYPASS WITH RETREIVED FLOW
629         HC       2
            *

630         KK  DHD02C
631         KM   SPLIT FLOW AT CULVERT HD02C
632         DT DCHD02C
633         DI       0     100     200     250     400     500     600     700     800     900
634         DI    1000
635         DQ       0      65     100     122     201     258     323     384     447     514
636         DQ     581
            *

637         KK RDHD02C
638         KM   ROUTE TO THE NEXT CULVERT
639         RK    1320  0.0165    0.02       0    TRAP      13      20
            *

640         KKRETHD04B
641         KM   RETREIVE FLOW FROM CULVERT HD04B
642         DR DCHD04B
            *

643         KK  CHD04C
644         KM   COMBINE BYPASS WITH RETREIVED FLOW
645         HC       2
            *

646         KK  DHD04C
647         KM   SPLIT FLOW AT CULVERT HD04C
648         DT DCHD04C
649         DI       0     200     400     600     800    1000    1200    1400    1600    1800
650         DI    2000
651         DQ       0     181     212     262     336     416     503     609     719     823
652         DQ     933
            *

653         KKRETSHD04B
654         KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD04B AND HD05B
655         DR DSHD04B
            *
```

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

 656      KK CHD04C2
 657      KM   COMBINE BYPASS WITH SPILL FLOW
 658      HC       2
          *

 659      KKDSPHD04C
 660      KM   FLOW SPLIT AT BETWEEN HD04C AND HD05C
 661      KM   DIVERSION TO THE OTHER SIDE OF US95
 662      KM   BASED ON CHANNEL CAPACITY = 1079 CFS
 663      DT DSHD04C
 664      DI       0    1079    2000
 665      DQ       0       1     921
          *

 666      KK RDHD04C
 667      KM   ROUTE TO THE NEXT CULVERT
 668      RK    1068  0.0160    0.02       0    TRAP      13      20
          *

 669      KKRETHD05B
 670      KM   RETREIVE FLOW FROM CULVERT HD05B
 671      DR DCHD05B
          *

 672      KK  CHD05C
 673      KM   COMBINE BYPASS WITH RETREIVED FLOW
 674      HC       2
          *

 675      KK  DHD05C
 676      KM   SPLIT FLOW AT CULVERT HD05C
 677      DT DCHD05C
 678      DI       0     150     300     450     600     750     800    1050    1200    1350
 679      DI    1500
 680      DQ       0     132     171     193     208     232     245     321     380     444
 681      DQ     513
          *

 682      KKRETSHD05B
 683      KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD05B AND HD06B
 684      DR DSHD05B
          *

 685      KK CHD05C2
 686      KM   COMBINE BYPASS WITH SPILL FLOW
 687      HC       2
          *

 688      KKDSPHD05C
 689      KM   FLOW SPLIT AT BETWEEN HD05C AND HD06C
 690      KM   DIVERSION TO THE OTHER SIDE OF US95
 691      KM   BASED ON CHANNEL CAPACITY = 2744 CFS
 692      DT DSHD05C
 693      DI       0    2744    5000
```



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

 694      DQ       0       1    2256
          *

 695      KK RDHD05C
 696      KM   ROUTE TO THE NEXT CULVERT
 697      RK     626  0.0134    0.02       0    TRAP      13      20
          *

 698      KKRETHD06B
 699      KM   RETREIVE FLOW FROM CULVERT HD06B
 700      DR DCHD06B
          *

 701      KK  CHD06C
 702      KM   COMBINE BYPASS WITH RETREIVED FLOW
 703      HC       2
          *

 704      KK  DHD06C
 705      KM   SPLIT FLOW AT CULVERT HD06C
 706      DT DCHD06C
 707      DI       0   200.0   400.0     600     800    1000    1200    1400    1600    1680
 708      DI    2000
 709      DQ       0   199.9   399.9     560     647     713     786     860     948     988
 710      DQ    1142
          *

 711      KKRETSHD06B
 712      KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD06B AND HD07B
 713      DR DSHD06B
          *

 714      KK CHD06C2
 715      KM   COMBINE BYPASS WITH SPILL FLOW
 716      HC       2
          *

 717      KKDSPHD06C
 718      KM   FLOW SPLIT AT BETWEEN HD06C AND HD07C
 719      KM   DIVERSION TO THE OTHER SIDE OF US95
 720      KM   BASED ON CHANNEL CAPACITY = 2175 CFS
 721      DT DSHD06C
 722      DI       0    2175    5000
 723      DQ       0       1    2825
          *

 724      KK RDHD06C
 725      KM   ROUTE TO THE NEXT CULVERT
 726      RK    1349  0.0186    0.02       0    TRAP      13      20
          *
```

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

 727          KKRETHD07B
 728          KM   RETREIVE FLOW FROM CULVERT HD07B
 729          DR DCHD07B
              *

 730          KK  CHD07C
 731          KM   COMBINE BYPASS WITH RETREIVED FLOW
 732          HC       2
              *

 733          KK  DHD07C
 734          KM   SPLIT FLOW AT CULVERT HD07C
 735          DT DCHD07C
 736          DI       0      90     180     270     360     450     540     600     720     810
 737          DI     900
 738          DQ       0      51      58      62      66      83     110     130     174     208
 739          DQ     244
              *

 740          KKRETSHD07B
 741          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD07B AND HD08B
 742          DR DSHD07B
              *

 743          KK CHD07C2
 744          KM   COMBINE BYPASS WITH SPILL FLOW
 745          HC       2
              *

 746          KKDSPHD07C
 747          KM   FLOW SPLIT AT BETWEEN HD07C AND HD08C
 748          KM   DIVERSION TO THE OTHER SIDE OF US95
 749          KM   BASED ON CHANNEL CAPACITY = 2396 CFS
 750          DT DSHD07C
 751          DI       0    2396    5000
 752          DQ       0       1    2604
              *

 753          KKCPW-DUMMY
 754          KM   COMBINATION POINT CPW-DUMMY
 755          KM   COMBINE DSPHD07A, DSPHD07B, AND DSPHD07C
 756          HC       3
              *

 757          KK DCHD01C
 758          KM   RETREIVE FLOW FROM VTN HD01B CULVERT
 759          DR DCHD01C
              *
1                                      HEC-1 INPUT                                      PAGE 21

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

 760          KKRDCHD01C
 761          KM   ROUTE DCHCO1B TO CP15
 762          KM   LENGTH  SLOPE   n-VALUE          SHAPE     WIDTH  S-SLOPE
 763          RD     905    .025    .025       0    TRAP      20       2
              *

 764          KK   OFF9A
 765          KM            AREA  22.2 AC
 766          PB    2.41
 767          BA  0.0347
 768          LS       0    89.1
 769          UD    .064
              *

 770          KK    CP15
 771          KM   COMBINATION POINT CP15
 772          KM   COMBINE RDCHD01C AND OFF9A
 773          HC       2
              *

 774          KK   RCP15
 775          KM   ROUTE CP15 THRU EX-E4
 776          KM   N-STEPS   K    X-FACTOR
 777          RM       1   0.089    0.15
              *

 778          KK DCHD02C
 779          KM   RETREIVE FLOW FROM VTN HD02C CULVERT
 780          DR DCHD02C
              *

 781          KKRDCHD02C
 782          KM   ROUTE DCHCO2C TO CP15
 783          KM   LENGTH  SLOPE   n-VALUE          SHAPE     WIDTH  S-SLOPE
 784          RD     905    .025    .025       0    TRAP      20       2
              *

 785          KK   OFF9B
 786          KM            AREA  7.6 AC
 787          PB    2.41
 788          BA  0.0119
 789          LS       0    89.1
 790          UD    .068
              *

 791          KK   EX-E4
 792          KM            AREA  140.56 AC
 793          PB    2.41
 794          BA  0.2196
 795          LS       0    77.4
 796          UD    .240
              *
1                                      HEC-1 INPUT                                      PAGE 22

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

```
797           KK    CP16
798           KM   COMBINATION POINT CP16
799           KM   COMBINE RCP15, RDCHD02C,OFF9B, AND EX-E4
800           HC       4
              *

801           KK DCHD04C
802           KM   RETREIVE FLOW FROM VTN HD04C CULVERT
803           DR DCHD04C
              *

804           KK    OFFH
805           KM              AREA  5.6 AC
806           PB    2.41
807           BA  0.0088
808           LS       0    89.5
809           UD    .082
              *

810           KK    CP17
811           KM   COMBINATION POINT CP17
812           KM   COMBINE DCHD04C AND OFFH
813           HC       2
              *

814           KK   RCP17
815           KM   ROUTE CP1 THRU EX-E5
816           KM   N-STEPS    K     X-FACTOR
817           RM       1   0.073    0.15
              *

818           KK   EX-E5
819           KM              AREA  63.30 AC
820           PB    2.41
821           BA  0.0989
822           LS       0    79.5
823           UD    .202
              *

824           KK     ES1
825           KM              AREA  11.1 AC
826           PB    2.41
827           BA  0.0173
828           LS       0    92.7
829           UD    .109
              *

830           KK    CP18
831           KM   COMBINATION POINT CP18
832           KM   COMBINE RCP17, EX-E5, AND ES1
833           HC       3
              *
1                                    HEC-1 INPUT                                    PAGE 23

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

834           KK DSHD04C
835           KM   RETREIVE FLOW THAT OVERTOPS US 95 CHANNEL
836           KM   BETWEEN VTN HD04C AND HD05C CULVERTS
837           DR DSHD04C
              *

838           KK DCHD05C
839           KM   RETREIVE FLOW FROM VTN HD05C CULVERT
840           DR DCHD05C
              *

841           KK   95-7B
842           KM              AREA  7.2 AC
843           PB    2.41
844           BA  0.0112
845           LS       0    92.6
846           UD    .087
              *

847           KK    CP19
848           KM   COMBINATION POINT CP19
849           KM   COMBINE DSHD04C, DCHD05C AND 95-7B
850           HC       3
              *

851           KK DSHD05C
852           KM   RETREIVE FLOW THAT OVERTOPS US 95 CHANNEL
853           KM   BETWEEN VTN HD05C AND HD06C CULVERTS
854           DR DSHD05C
              *

855           KK DCHD06C
856           KM   RETREIVE FLOW FROM VTN HD06C CULVERT
857           DR DCHD06C
              *

858           KK   95-8B
859           KM              AREA  2.6 AC
860           PB    2.41
861           BA  0.0040
862           LS       0    92.6
863           UD    .052
              *

864           KK    CP20
865           KM   COMBINATION POINT CP20
866           KM   COMBINE DSHD05C, DCHD06C AND 95-8B
867           HC       3
              *
1                                    HEC-1 INPUT                                    PAGE 24

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

```
868          KK   EX-E6
869          KM             AREA  10.26 AC
870          PB    2.41
871          BA  0.0160
872          LS       0    86.9
873          UD    .111
             *

874          KK    CP21
875          KM   COMBINATION POINT CP21
876          KM   COMBINE CP19, CP20, AND EX-E6
877          HC       3
             *

878          KK     ES2
879          KM             AREA  31.4 AC
880          PB    2.41
881          BA  0.0490
882          LS       0    94.7
883          UD    .148
             *

884          KK   EX-E7
885          KM             AREA  21.31 AC
886          PB    2.41
887          BA  0.0333
888          LS       0    86.9
889          UD    .111
             *

890          KK   EX-E8
891          KM             AREA  10.67 AC
892          PB    2.41
893          BA  0.0167
894          LS       0    86.9
895          UD    .133
             *

896          KK    CP22
897          KM   COMBINATION POINT CP22
898          KM   COMBINE RCP21, ES2, EX-E7, AND EX-E8
899          HC       4
             *

900          KK DSHD06C
901          KM   RETREIVE FLOW THAT OVERTOPS US 95 CHANNEL
902          KM   BETWEEN VTN HD06C AND HD07C CULVERTS
903          DR DSHD06C
             *
1                                        HEC-1 INPUT                                        PAGE 25

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

904          KK DCHD07C
905          KM   RETREIVE FLOW FROM VTN HD07C CULVERT
906          DR DCHD07C
             *

907          KK   95-9B
908          KM             AREA  8.5 AC
909          PB    2.41
910          BA  0.0133
911          LS       0    92.6
912          UD    .139
             *

913          KK    CP23
914          KM   COMBINATION POINT CP23
915          KM   COMBINE DSHD06C, DCHD07C AND 95-9B
916          HC       3
             *

917          KK   RCP23
918          KM   ROUTE CP23 THRU EX-E9
919          KM     LEN   SLOPE       N     N/A   SHAPE      BW      SS
920          RD     720    .029    .035       0    TRAP      50       5
             *

921          KK   EX-E9
922          KM             AREA  6.13 AC
923          PB    2.41
924          BA  0.0096
925          LS       0    86.9
926          UD    .109
             *

927          KK    CP24
928          KM   COMBINATION POINT CP24
929          KM   COMBINE CP23 AND EX-E9
930          HC       2
             *

931          KKCPSE-DUMMY
932          KM   COMBINATION POINT CPSE-DUMMY
933          KM   COMBINE CP16, CP18 CP22, AND CP24
934          HC       4
             *

935          KK   EX-W7
936          KM             AREA  126.63 AC
937          PB    2.50
938          BA  0.1979
939          LS       0    86.2
940          UD    .292
             *
1                                        HEC-1 INPUT                                        PAGE 26

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

```
941           KK   OFF20
942           KM              AREA  42.0 AC
943           PB    2.57
944           BA  0.0656
945           LS       0    86.2
946           UD    .190
              *

947           KK  ROFF20
948           KM   ROUTE OFF18 THRU EX-W8
949           KM   N-STEPS    K     X-FACTOR
950           RM       4   0.329    0.15
              *

951           KK   EX-W8
952           KM              AREA  139.52 AC
953           PB    2.50
954           BA  0.2180
955           LS       0    86.2
956           UD    .323
              *

957           KK    CP25
958           KM   COMBINATION POINT CP25
959           KM   COMBINE ROFF20 AND EX-W8
960           HC       2
              *

961           KK   OFF21
962           KM              AREA  337.9 AC
963           PB    2.64
964           BA  0.5280
965           LS       0    85.7
966           UD    .446
              *

967           KK  ROFF21
968           KM   ROUTE OFF21 THRU EX-W9
969           KM   N-STEPS    K     X-FACTOR
970           RM       2   0.178    0.15
              *

971           KK   EX-W9
972           KM              AREA  116.76 AC
973           PB    2.50
974           BA  0.1824
975           LS       0    84.4
976           UD    .300
              *
```

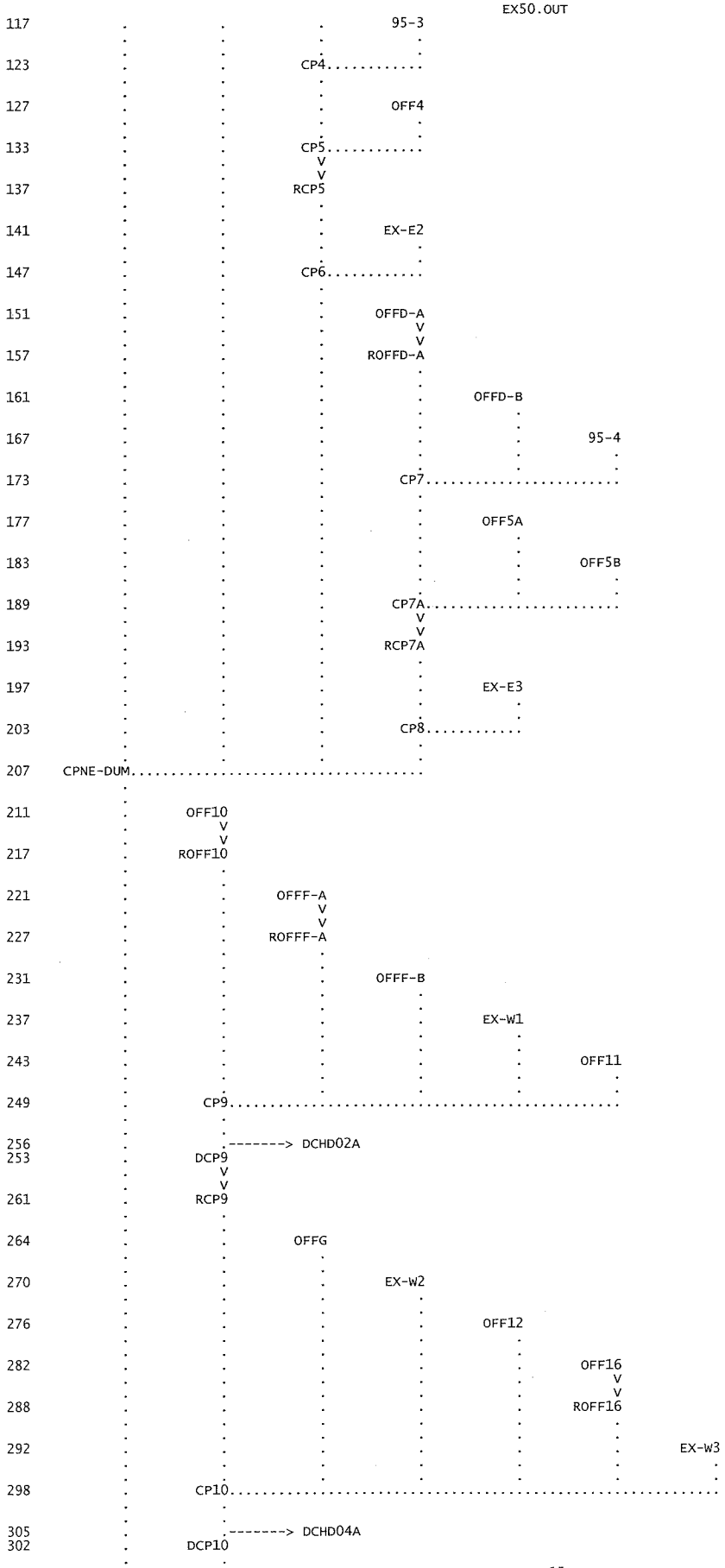


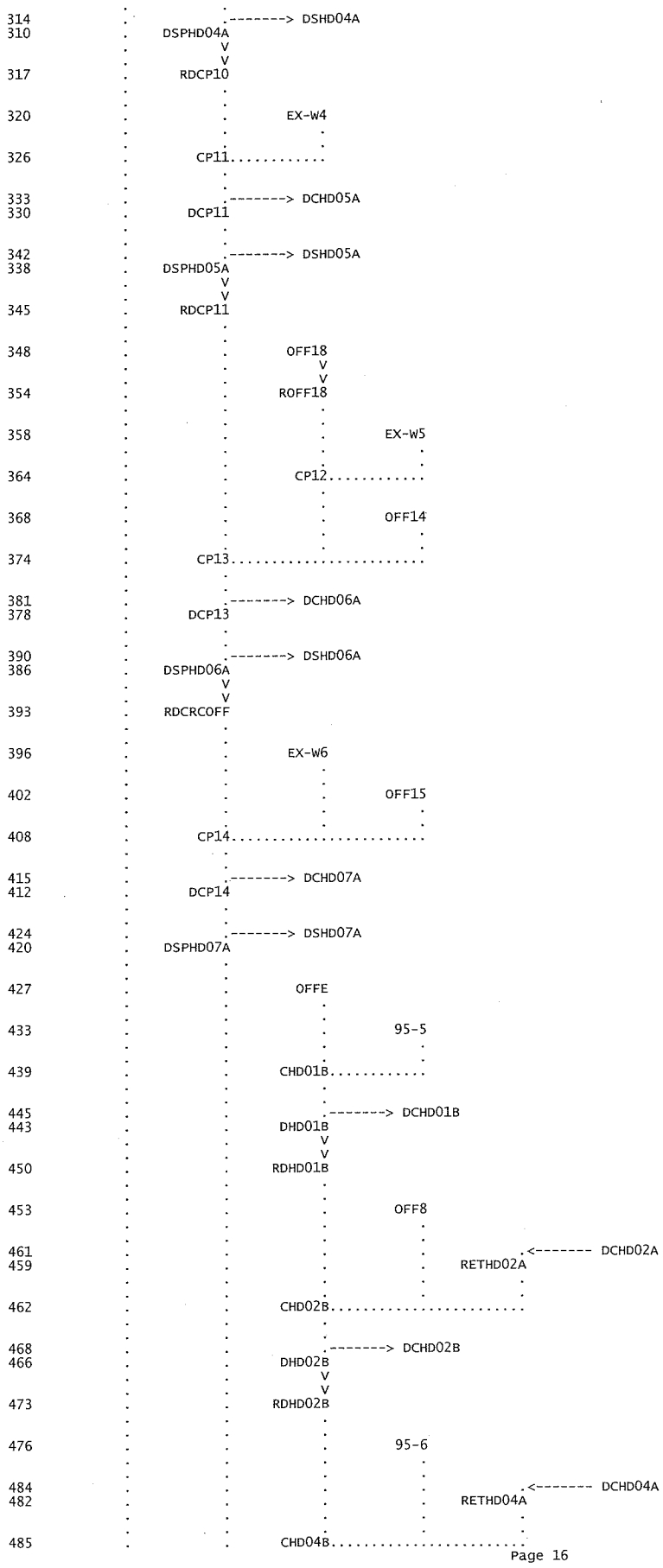
```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

977           KK    CP26
978           KM   COMBINATION POINT CP26
979           KM   COMBINE ROFF21 AND EX-W9
980           HC       2
              *

981           KK    CP27
982           KM   COMBINATION POINT CP27
983           KM   COMBINE EX-W7, CP25 AND CP26
984           HC       3
              *
985           ZZ
```

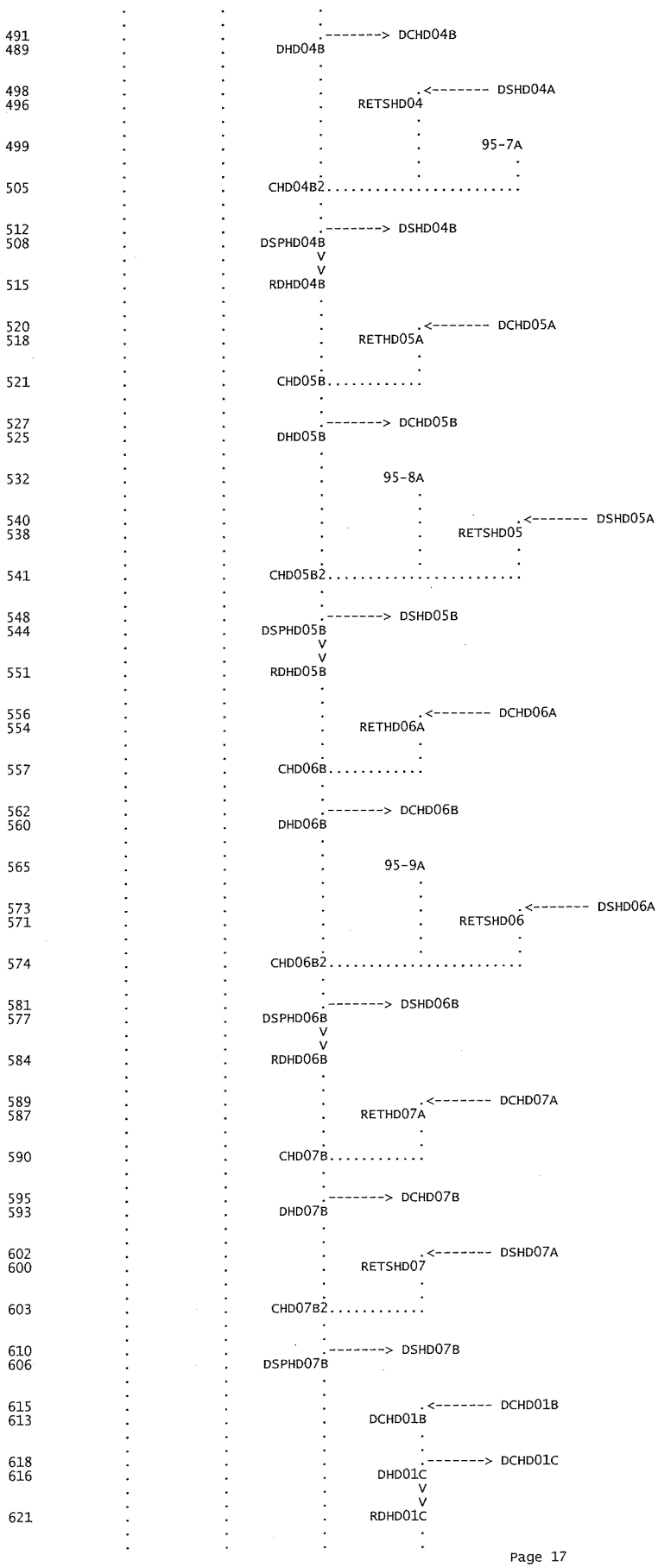
1

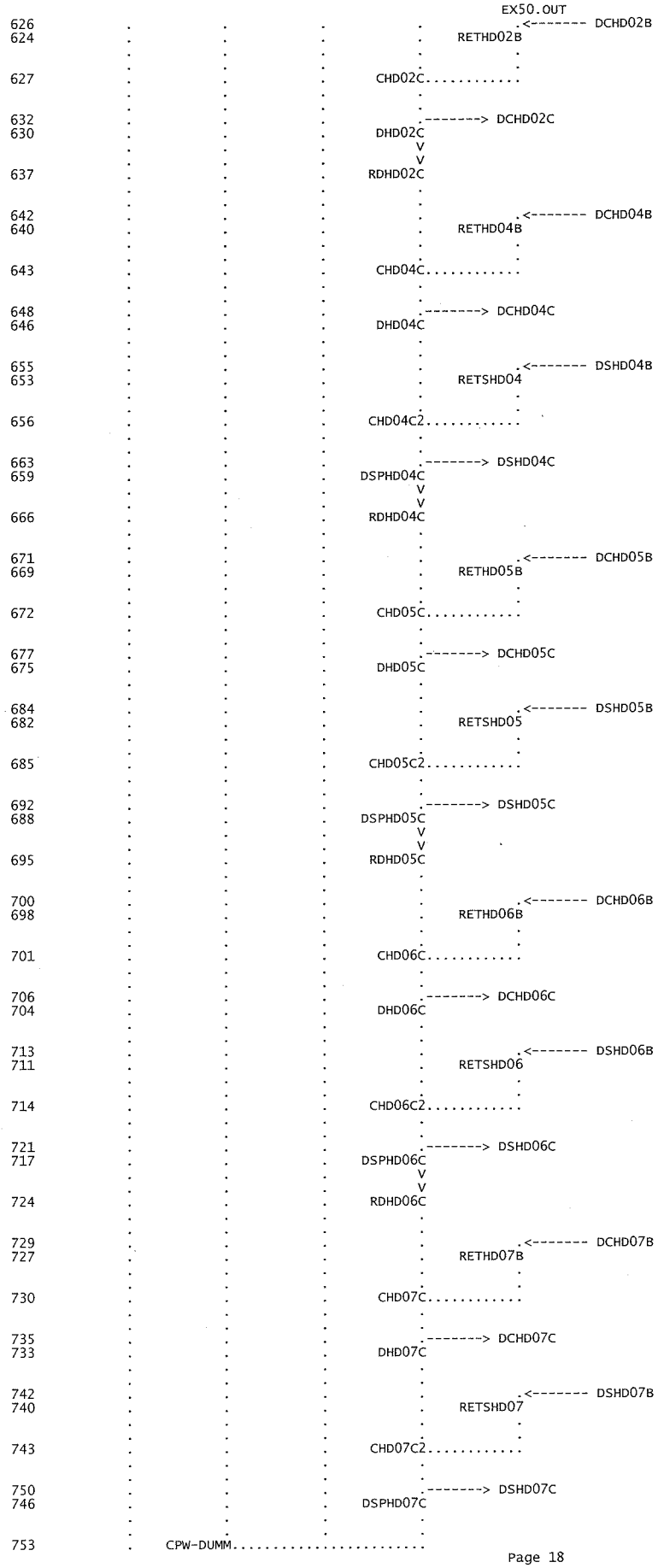
SCHEMATIC DIAGRAM OF STREAM NETWORK

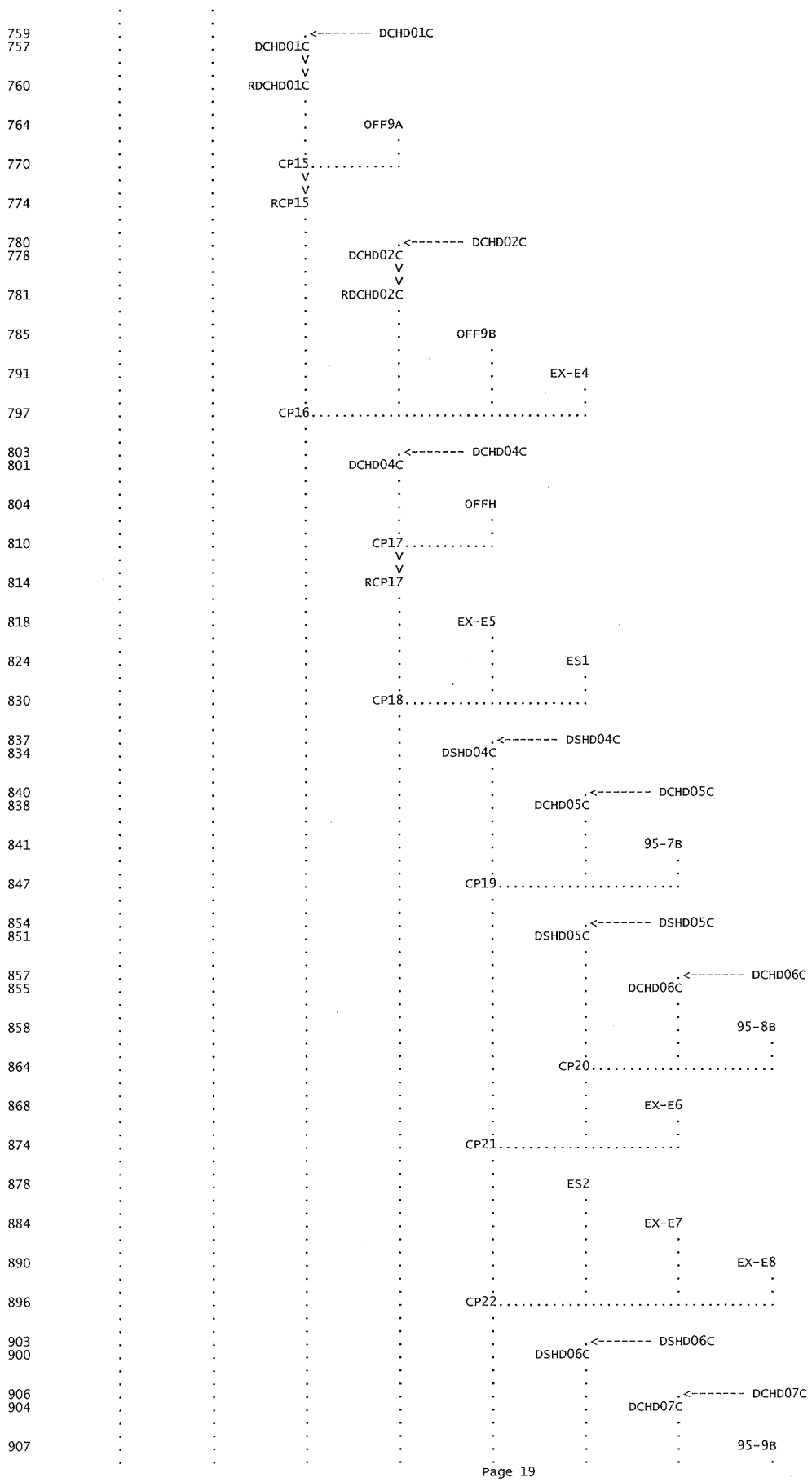
```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   43        OFFA
               .
               .
   57          .        95-1
               .          .
               .          .
   63        CPNM..........
               .
               .
   67          .        OFFB
               .          .
               .          .
   73          .          .        95-2
               .          .          .
               .          .          .
   79          .         CP1..........
               .          V
               .          V
   83          .        RCP1
               .          .
               .          .
   87          .          .        OFF2
               .          .          .
               .          .          .
   93          .         CP2..........
               .          V
               .          V
   97          .        RCP2
               .          .
               .          .
  101          .          .       EX-E1
               .          .          .
               .          .          .
  107          .         CP3..........
               .          .
               .          .
  111          .          .        OFFC
               .          .          .
               .          .          .
```

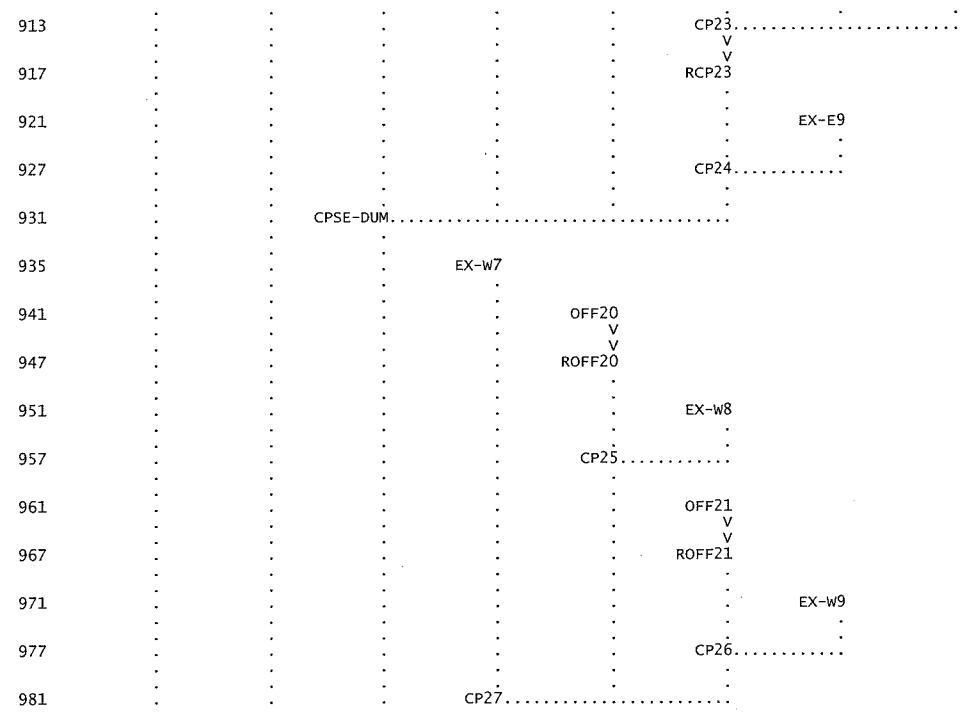

95-3
CP4
OFF4
CP5
RCP5
EX-E2
CP6
OFFD-A
ROFFD-A
OFFD-B
95-4
CP7
OFF5A
OFF5B
CP7A
RCP7A
EX-E3
CP8
CPNE-DUM
OFF10
ROFF10
OFFF-A
ROFFF-A
OFFF-B
EX-W1
OFF11
CP9
DCHD02A
DCP9
RCP9
OFFG
EX-W2
OFF12
OFF16
ROFF16
EX-W3
CP10
DCHD04A
DCP10


DSHD04A
DSPHD04A
RDCP10
EX-W4
CP11
DCHD05A
DCP11
DSHD05A
DSPHD05A
RDCP11
OFF18
ROFF18
EX-W5
CP12
OFF14
CP13
DCHD06A
DCP13
DSHD06A
DSPHD06A
RDCRCOFF
EX-W6
OFF15
CP14
DCHD07A
DCP14
DSHD07A
OFFE
95-5
CHD01B
DCHD01B
DHD01B
RDHD01B
OFF8
DCHD02A
RETHD02A
CHD02B
DCHD02B
DHD02B
RDHD02B
95-6
DCHD04A
RETHD04A
CHD04B


491
489
DHD04B
DCHD04B
498
496
RETSHD04
DSHD04A
499
95-7A
505
CHD04B2
512
508
DSPHD04B
DSHD04B
515
RDHD04B
520
518
RETHD05A
DCHD05A
521
CHD05B
527
525
DHD05B
DCHD05B
532
95-8A
540
538
RETSHD05
DSHD05A
541
CHD05B2
548
544
DSPHD05B
DSHD05B
551
RDHD05B
556
554
RETHD06A
DCHD06A
557
CHD06B
562
560
DHD06B
DCHD06B
565
95-9A
573
571
RETSHD06
DSHD06A
574
CHD06B2
581
577
DSPHD06B
DSHD06B
584
RDHD06B
589
587
RETHD07A
DCHD07A
590
CHD07B
595
593
DHD07B
DCHD07B
602
600
RETSHD07
DSHD07A
603
CHD07B2
610
606
DSPHD07B
DSHD07B
615
613
DCHD01B
DCHD01B
618
616
DHD01C
DCHD01C
621
RDHD01C


626
624
RETHD02B
DCHD02B
627
CHD02C
632
630
DHD02C
DCHD02C
637
RDHD02C
642
640
RETHD04B
DCHD04B
643
CHD04C
648
646
DHD04C
DCHD04C
655
653
RETSHD04
DSHD04B
656
CHD04C2
663
659
DSPHD04C
DSHD04C
666
RDHD04C
671
669
RETHD05B
DCHD05B
672
CHD05C
677
675
DHD05C
DCHD05C
684
682
RETSHD05
DSHD05B
685
CHD05C2
692
688
DSPHD05C
DSHD05C
695
RDHD05C
700
698
RETHD06B
DCHD06B
701
CHD06C
706
704
DHD06C
DCHD06C
713
711
RETSHD06
DSHD06B
714
CHD06C2
721
717
DSPHD06C
DSHD06C
724
RDHD06C
729
727
RETHD07B
DCHD07B
730
CHD07C
735
733
DHD07C
DCHD07C
742
740
RETSHD07
DSHD07B
743
CHD07C2
750
746
DSPHD07C
DSHD07C
753
CPW-DUMM


DCHD01C
DCHD01C
RDCHD01C
OFF9A
CP15
RCP15
DCHD02C
DCHD02C
RDCHD02C
OFF9B
EX-E4
CP16
DCHD04C
DCHD04C
OFFH
CP17
RCP17
EX-E5
ES1
CP18
DSHD04C
DSHD04C
DCHD05C
DCHD05C
95-7B
CP19
DSHD05C
DSHD05C
DCHD06C
DCHD06C
95-8B
CP20
EX-E6
CP21
ES2
EX-E7
EX-E8
CP22
DSHD06C
DSHD06C
DCHD07C
DCHD07C
95-9B



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   25NOV15  TIME  11:10:20   *
*                                       *
*****************************************
```

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

```
*********************************************************************
* ................................................................. *
* :                                                               : *
* :              KYLE CANYON INTERCHANGE                          : *
* :                                                               : *
* :              EXISTING CONDITIONS                              : *
* :                                                               : *
* : REFERENCED FROM RTC TO MDS FOR KYLE CANYON [DEC 2006]         : *
* : AND MODIFIED TO USE 50-YEAR PRECIPITATION VALUES              : *
* :                                                               : *
* :.............................................................: *
* :              RETURN PERIOD_ _ _ _50 -YEAR                     : *
* :              DISTRIBUTION_ _ _ _ 6-HOUR SDN3                  : *
* :              PROJECT NO_ _ _ _ _ 412.634                      : *
* :              FILENAME_ _ _ _ _ _ EX50.H1                      : *
* :              DATE MODELED_ _ _ _ 03/26/08                     : *
* :              MODELED BY_ _ _ _ _ AKS                          : *
* :.............................................................: *
* :                                                               : *
* :.............................................................: *
*********************************************************************
```

JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:

AREA SQ.MI.	DARF
0.0 - 0.5	0.99
0.5 - 1.0	0.98
1.0 - 2.0	0.95
2.0 - 4.0	0.92
4.0 - 6.0	0.91
6.0 - 8.0	0.89

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

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

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

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

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
1.00 .98 .95 .92 .91 .89

1

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .98	RATIO 3 .95	RATIO 4 .92	RATIO 5 .91	RATIO 6 .89
HYDROGRAPH AT										
+	OFFA	.02	1	FLOW	12.	12.	11.	10.	10.	9.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	95-1	.00	1	FLOW	6.	6.	6.	5.	5.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CPNM	.02	1	FLOW	17.	16.	15.	14.	14.	13.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	OFFB	.13	1	FLOW	57.	54.	51.	47.	46.	44.
				TIME	3.83	3.83	3.92	3.92	3.92	3.92
HYDROGRAPH AT										
+	95-2	.00	1	FLOW	6.	6.	5.	5.	5.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CP1	.14	1	FLOW	59.	56.	52.	49.	47.	45.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83
ROUTED TO										
+	RCP1	.14	1	FLOW	57.	55.	51.	48.	46.	44.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT										
+	OFF2	.09	1	FLOW	45.	43.	40.	37.	37.	35.
				TIME	3.67	3.67	3.67	3.75	3.75	3.75
2 COMBINED AT										
+	CP2	.23	1	FLOW	94.	90.	84.	78.	76.	72.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83
ROUTED TO										
+	RCP2	.23	1	FLOW	91.	87.	81.	76.	74.	70.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT										
+	EX-E1	.05	1	FLOW	26.	25.	24.	22.	21.	20.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT										
+	CP3	.28	1	FLOW	110.	106.	98.	91.	89.	84.
				TIME	3.83	3.83	3.83	3.83	3.83	3.92
HYDROGRAPH AT										
+	OFFC	.13	1	FLOW	64.	61.	57.	53.	51.	49.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT										
+	95-3	.01	1	FLOW	12.	12.	11.	11.	11.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CP4	.14	1	FLOW	70.	67.	62.	58.	57.	54.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT										
+	OFF4	.03	1	FLOW	20.	19.	18.	17.	16.	15.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT										
+	CP5	.17	1	FLOW	83.	80.	74.	69.	68.	64.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO										
+	RCP5	.17	1	FLOW	79.	75.	70.	66.	64.	61.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT										
+	EX-E2	.22	1	FLOW	106.	101.	94.	88.	86.	81.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT										
+	CP6	.39	1	FLOW	177.	169.	157.	146.	142.	135.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT										
+	OFFD-A	.64	1	FLOW	268.	257.	241.	224.	219.	208.

				TIME	4.00	4.00	4.00	4.00	4.00	4.00
ROUTED TO										
+	ROFFD-A	.64	1	FLOW	248.	238.	223.	208.	203.	193.
				TIME	4.42	4.42	4.42	4.42	4.42	4.42
HYDROGRAPH AT										
+	OFFD-B	.50	1	FLOW	181.	173.	162.	150.	147.	139.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT										
+	95-4	.01	1	FLOW	14.	14.	13.	12.	12.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT										
+	CP7	1.15	1	FLOW	375.	360.	336.	314.	306.	291.
				TIME	4.33	4.33	4.33	4.33	4.33	4.33
HYDROGRAPH AT										
+	OFF5A	.02	1	FLOW	21.	21.	20.	19.	18.	18.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	OFF5B	.01	1	FLOW	15.	14.	14.	13.	13.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT										
+	CP7A	1.18	1	FLOW	378.	363.	339.	317.	309.	294.
				TIME	4.33	4.33	4.33	4.33	4.33	4.33
ROUTED TO										
+	RCP7A	1.18	1	FLOW	374.	359.	335.	312.	305.	290.
				TIME	4.42	4.42	4.42	4.42	4.42	4.50
HYDROGRAPH AT										
+	EX-E3	.19	1	FLOW	83.	79.	74.	68.	67.	63.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT										
+	CP8	1.37	1	FLOW	398.	382.	357.	333.	325.	309.
				TIME	4.42	4.42	4.42	4.42	4.42	4.42
4 COMBINED AT										
+	CPNE-DUM	2.07	1	FLOW	553.	529.	494.	459.	448.	425.
				TIME	4.00	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	OFF10	.67	1	FLOW	488.	473.	451.	429.	422.	408.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
ROUTED TO										
+	ROFF10	.67	1	FLOW	439.	426.	407.	387.	380.	368.
				TIME	4.58	4.67	4.67	4.67	4.67	4.67
HYDROGRAPH AT										
+	OFFF-A	.99	1	FLOW	674.	652.	619.	586.	575.	553.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO										
+	ROFFF-A	.99	1	FLOW	634.	613.	582.	551.	540.	520.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	OFFF-B	.61	1	FLOW	343.	331.	314.	296.	290.	279.
				TIME	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT										
+	EX-W1	.02	1	FLOW	15.	14.	13.	12.	12.	11.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	OFF11	.00	1	FLOW	3.	3.	3.	3.	2.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
5 COMBINED AT										
+	CP9	2.30	1	FLOW	1157.	1119.	1062.	1005.	986.	949.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
DIVERSION TO										
+	DCHD02A	2.30	1	FLOW	384.	372.	356.	342.	337.	328.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DCP9	2.30	1	FLOW	773.	747.	706.	663.	649.	621.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO										
+	RCP9	2.30	1	FLOW	769.	744.	703.	661.	647.	620.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	OFFG	.04	1	FLOW	40.	39.	37.	35.	35.	33.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	EX-W2	.02	1	FLOW	17.	17.	16.	15.	15.	14.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	OFF12	.01	1	FLOW	6.	6.	5.	5.	5.	5.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	OFF16	.79	1	FLOW	444.	431.	410.	390.	383.	370.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO										
+	ROFF16	.79	1	FLOW	430.	416.	396.	376.	370.	357.
				TIME	4.33	4.33	4.33	4.33	4.33	4.33
HYDROGRAPH AT										
+	EX-W3	.27	1	FLOW	223.	216.	205.	195.	191.	185.

				TIME	3.75	3.75	3.75	3.75	3.75	3.75
6 COMBINED AT										
+	CP10	3.43	1	FLOW	1272.	1231.	1167.	1102.	1081.	1038.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DCHD04A	3.43	1	FLOW	757.	730.	689.	646.	632.	604.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DCP10	3.43	1	FLOW	515.	501.	479.	456.	449.	434.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DSHD04A	3.43	1	FLOW	1.	1.	1.	1.	1.	1.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DSPHD04A	3.43	1	FLOW	514.	500.	478.	455.	448.	433.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
ROUTED TO										
+	RDCP10	3.43	1	FLOW	513.	499.	477.	455.	447.	432.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	EX-W4	.10	1	FLOW	103.	99.	95.	90.	88.	85.
				TIME	3.58	3.58	3.58	3.58	3.58	3.67
2 COMBINED AT										
+	CP11	3.54	1	FLOW	534.	519.	496.	472.	464.	448.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
DIVERSION TO										
+	DCHD05A	3.54	1	FLOW	251.	247.	240.	234.	232.	228.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DCP11	3.54	1	FLOW	283.	272.	255.	238.	232.	220.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
DIVERSION TO										
+	DSHD05A	3.54	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DSPHD05A	3.54	1	FLOW	282.	272.	255.	237.	232.	220.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO										
+	RDCP11	3.54	1	FLOW	281.	271.	254.	237.	231.	220.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	OFF18	.55	1	FLOW	391.	379.	361.	343.	337.	325.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO										
+	ROFF18	.55	1	FLOW	374.	362.	345.	328.	322.	310.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	EX-W5	.45	1	FLOW	360.	348.	331.	315.	309.	298.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT										
+	CP12	1.00	1	FLOW	633.	613.	583.	554.	544.	524.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT										
+	OFF14	.01	1	FLOW	16.	15.	15.	14.	14.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT										
+	CP13	4.55	1	FLOW	871.	840.	794.	748.	733.	703.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00
DIVERSION TO										
+	DCHD06A	4.55	1	FLOW	754.	742.	723.	693.	683.	663.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00
HYDROGRAPH AT										
+	DCP13	4.55	1	FLOW	117.	98.	71.	56.	51.	41.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00
DIVERSION TO										
+	DSHD06A	4.55	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT										
+	DSPHD06A	4.55	1	FLOW	117.	98.	71.	56.	51.	41.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00
ROUTED TO										
+	RDCRCOFF	4.55	1	FLOW	118.	99.	71.	55.	50.	40.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT										
+	EX-W6	.02	1	FLOW	17.	17.	16.	15.	15.	14.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	OFF15	.04	1	FLOW	39.	38.	36.	35.	34.	33.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT										
+	CP14	4.60	1	FLOW	131.	111.	83.	67.	62.	51.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
DIVERSION TO										
+	DCHD07A	4.60	1	FLOW	53.	52.	47.	38.	35.	29.

				TIME	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT										
+	DCP14	4.60	1	FLOW	79.	59.	36.	29.	27.	22.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
DIVERSION TO										
+	DSHD07A	4.60	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT										
+	DSPHD07A	4.60	1	FLOW	78.	59.	36.	29.	27.	22.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT										
+	OFFE	.04	1	FLOW	21.	20.	19.	17.	17.	16.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT										
+	95-5	.04	1	FLOW	50.	48.	46.	44.	43.	42.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CHD01B	.08	1	FLOW	62.	60.	57.	54.	53.	51.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO										
+	DCHD01B	.08	1	FLOW	62.	60.	57.	54.	53.	51.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	DHD01B	.08	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.25	3.25	3.25	3.33	3.33	3.33
ROUTED TO										
+	RDHD01B	.08	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.50	3.50	3.50	3.50	3.58	3.58
HYDROGRAPH AT										
+	OFF8	.01	1	FLOW	16.	16.	15.	14.	14.	14.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	RETHD02A	.00	1	FLOW	384.	372.	356.	342.	337.	328.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
3 COMBINED AT										
+	CHD02B	.09	1	FLOW	386.	374.	358.	344.	339.	330.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
DIVERSION TO										
+	DCHD02B	.09	1	FLOW	233.	225.	216.	207.	204.	198.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DHD02B	.09	1	FLOW	153.	149.	142.	137.	135.	132.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO										
+	RDHD02B	.09	1	FLOW	153.	148.	142.	137.	135.	132.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	95-6	.01	1	FLOW	14.	13.	13.	12.	12.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	RETHD04A	.00	1	FLOW	757.	730.	689.	646.	632.	604.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
3 COMBINED AT										
+	CHD04B	.10	1	FLOW	912.	880.	832.	784.	768.	737.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DCHD04B	.10	1	FLOW	491.	477.	457.	436.	430.	416.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DHD04B	.10	1	FLOW	421.	403.	375.	348.	339.	320.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	RETSHD04	.00	1	FLOW	1.	1.	1.	1.	1.	1.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	95-7A	.01	1	FLOW	11.	11.	10.	10.	10.	9.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT										
+	CHD04B2	.11	1	FLOW	422.	404.	377.	349.	340.	322.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DSHD04B	.11	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DSPHD04B	.11	1	FLOW	422.	404.	376.	349.	340.	322.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
ROUTED TO										
+	RDHD04B	.11	1	FLOW	421.	403.	375.	348.	339.	321.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	RETHD05A	.00	1	FLOW	251.	247.	240.	234.	232.	228.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
2 COMBINED AT										
+	CHD05B	.11	1	FLOW	672.	649.	615.	582.	571.	549.

				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DCHD05B	.11	1	FLOW	350.	341.	329.	316.	311.	302.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DHD05B	.11	1	FLOW	322.	308.	287.	266.	260.	246.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	95-8A	.01	1	FLOW	9.	8.	8.	8.	8.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	RETSHD05	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
3 COMBINED AT										
+	CHD05B2	.11	1	FLOW	323.	309.	288.	267.	261.	247.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DSHD05B	.11	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DSPHD05B	.11	1	FLOW	323.	309.	288.	267.	261.	247.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
ROUTED TO										
+	RDHD05B	.11	1	FLOW	323.	308.	287.	266.	260.	246.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	RETHD06A	.00	1	FLOW	754.	742.	723.	693.	683.	663.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00
2 COMBINED AT										
+	CHD06B	.11	1	FLOW	1046.	1020.	976.	927.	911.	879.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
DIVERSION TO										
+	DCHD06B	.11	1	FLOW	784.	776.	762.	747.	741.	731.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	DHD06B	.11	1	FLOW	262.	244.	214.	181.	170.	148.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	95-9A	.01	1	FLOW	16.	16.	15.	14.	14.	14.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	RETSHD06	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92
3 COMBINED AT										
+	CHD06B2	.12	1	FLOW	264.	247.	217.	183.	172.	150.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08
DIVERSION TO										
+	DSHD06B	.12	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	DSPHD06B	.12	1	FLOW	264.	247.	216.	183.	172.	150.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08
ROUTED TO										
+	RDHD06B	.12	1	FLOW	263.	244.	213.	179.	170.	147.
				TIME	4.17	4.17	4.08	4.17	4.17	4.17
HYDROGRAPH AT										
+	RETHD07A	.00	1	FLOW	53.	52.	47.	38.	35.	29.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
2 COMBINED AT										
+	CHD07B	.12	1	FLOW	315.	293.	257.	215.	202.	172.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
DIVERSION TO										
+	DCHD07B	.12	1	FLOW	62.	62.	61.	59.	59.	58.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	DHD07B	.12	1	FLOW	253.	232.	197.	156.	143.	115.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	RETSHD07	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
2 COMBINED AT										
+	CHD07B2	.12	1	FLOW	253.	232.	197.	156.	143.	115.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
DIVERSION TO										
+	DSHD07B	.12	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	DSPHD07B	.12	1	FLOW	253.	232.	197.	156.	143.	115.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	DCHD01B	.00	1	FLOW	62.	60.	57.	54.	53.	51.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO										
+	DCHD01C	.00	1	FLOW	62.	60.	57.	54.	53.	51.

				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DHD01C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.25	3.25	3.25	3.25	3.25	3.25
ROUTED TO											
+	RDHD01C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.42	3.42	3.50	3.50	3.42	3.50
HYDROGRAPH AT											
+	RETHD02B	.00	1	FLOW	233.	225.	216.	207.	204.	198.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
2 COMBINED AT											
+	CHD02C	.00	1	FLOW	233.	225.	216.	207.	204.	198.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
DIVERSION TO											
+	DCHD02C	.00	1	FLOW	114.	111.	107.	103.	102.	99.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT											
+	DHD02C	.00	1	FLOW	118.	114.	109.	104.	102.	99.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO											
+	RDHD02C	.00	1	FLOW	118.	114.	109.	104.	102.	98.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	RETHD04B	.00	1	FLOW	491.	477.	457.	436.	430.	416.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
2 COMBINED AT											
+	CHD04C	.00	1	FLOW	609.	591.	565.	540.	532.	515.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DCHD04C	.00	1	FLOW	265.	260.	253.	247.	245.	241.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DHD04C	.00	1	FLOW	344.	331.	312.	293.	287.	274.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	RETSHD04	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
2 COMBINED AT											
+	CHD04C2	.00	1	FLOW	344.	332.	312.	293.	287.	274.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DSHD04C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DSPHD04C	.00	1	FLOW	344.	331.	312.	293.	287.	274.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
ROUTED TO											
+	RDHD04C	.00	1	FLOW	343.	331.	312.	293.	286.	274.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	RETHD05B	.00	1	FLOW	350.	341.	329.	316.	311.	302.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
2 COMBINED AT											
+	CHD05C	.00	1	FLOW	693.	672.	640.	608.	598.	576.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DCHD05C	.00	1	FLOW	223.	220.	214.	209.	208.	206.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DHD05C	.00	1	FLOW	470.	453.	426.	399.	390.	370.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	RETSHD05	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
2 COMBINED AT											
+	CHD05C2	.00	1	FLOW	470.	453.	426.	399.	390.	370.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DSHD05C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DSPHD05C	.00	1	FLOW	470.	453.	426.	399.	390.	370.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
ROUTED TO											
+	RDHD05C	.00	1	FLOW	469.	452.	425.	398.	389.	369.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	RETHD06B	.00	1	FLOW	784.	776.	762.	747.	741.	731.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
2 COMBINED AT											
+	CHD06C	.00	1	FLOW	1246.	1219.	1177.	1134.	1119.	1090.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
DIVERSION TO											
+	DCHD06C	.00	1	FLOW	803.	793.	778.	762.	757.	746.

				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DHD06C	.00	1	FLOW	443.	426.	399.	372.	363.	344.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	RETSHD06	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08
2 COMBINED AT										
+	CHD06C2	.00	1	FLOW	443.	426.	399.	372.	363.	344.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
DIVERSION TO										
+	DSHD06C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DSPHD06C	.00	1	FLOW	443.	426.	399.	372.	363.	344.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO										
+	RDHD06C	.00	1	FLOW	441.	424.	398.	371.	362.	344.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	RETHD07B	.00	1	FLOW	62.	62.	61.	59.	59.	58.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
2 COMBINED AT										
+	CHD07C	.00	1	FLOW	503.	485.	457.	429.	420.	400.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DCHD07C	.00	1	FLOW	99.	93.	85.	79.	77.	74.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DHD07C	.00	1	FLOW	404.	391.	372.	350.	343.	326.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	RETSHD07	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
2 COMBINED AT										
+	CHD07C2	.00	1	FLOW	404.	392.	372.	350.	343.	326.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DSHD07C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DSPHD07C	.00	1	FLOW	404.	391.	372.	350.	343.	326.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
3 COMBINED AT										
+	CPW-DUMM	4.72	1	FLOW	708.	661.	590.	520.	499.	452.
				TIME	4.08	4.08	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DCHD01C	.00	1	FLOW	62.	60.	57.	54.	53.	51.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO										
+	RDCHD01C	.00	1	FLOW	61.	59.	56.	53.	52.	50.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	OFF9A	.03	1	FLOW	50.	49.	47.	45.	44.	43.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CP15	.03	1	FLOW	106.	103.	97.	92.	91.	87.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO										
+	RCP15	.03	1	FLOW	95.	92.	87.	83.	81.	78.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	DCHD02C	.00	1	FLOW	114.	111.	107.	103.	102.	99.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO										
+	RDCHD02C	.00	1	FLOW	114.	111.	107.	103.	101.	99.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	OFF9B	.01	1	FLOW	17.	16.	16.	15.	15.	14.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	EX-E4	.22	1	FLOW	109.	104.	97.	90.	87.	83.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
4 COMBINED AT										
+	CP16	.27	1	FLOW	288.	279.	265.	252.	248.	240.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT										
+	DCHD04C	.00	1	FLOW	265.	260.	253.	247.	245.	241.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	OFFH	.01	1	FLOW	12.	12.	11.	11.	11.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CP17	.01	1	FLOW	266.	261.	254.	248.	246.	241.

				TIME	4.25	4.25	4.25	4.25	4.25	4.25
ROUTED TO +	RCP17	.01	1	FLOW	265.	260.	253.	247.	245.	241.
				TIME	4.33	4.33	4.33	4.33	4.33	4.33
HYDROGRAPH AT +	EX-E5	.10	1	FLOW	61.	58.	55.	51.	50.	47.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT +	ES1	.02	1	FLOW	24.	24.	23.	22.	22.	21.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT +	CP18	.13	1	FLOW	282.	278.	271.	263.	260.	256.
				TIME	3.67	3.67	3.67	3.67	3.75	3.75
HYDROGRAPH AT +	DSHD04C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT +	DCHD05C	.00	1	FLOW	223.	220.	214.	209.	208.	206.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT +	95-7B	.01	1	FLOW	17.	17.	16.	15.	15.	15.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT +	CP19	.01	1	FLOW	224.	221.	216.	211.	209.	207.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT +	DSHD05C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT +	DCHD06C	.00	1	FLOW	803.	793.	778.	762.	757.	746.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT +	95-8B	.00	1	FLOW	7.	7.	7.	6.	6.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT +	CP20	.00	1	FLOW	804.	794.	778.	762.	757.	746.
				TIME	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT +	EX-E6	.02	1	FLOW	17.	17.	16.	15.	15.	15.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT +	CP21	.03	1	FLOW	1029.	1016.	995.	974.	967.	954.
				TIME	4.17	4.17	4.17	4.25	4.17	4.25
HYDROGRAPH AT +	ES2	.05	1	FLOW	71.	70.	67.	65.	64.	62.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT +	EX-E7	.03	1	FLOW	36.	35.	34.	32.	31.	30.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT +	EX-E8	.02	1	FLOW	18.	17.	17.	16.	16.	15.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
4 COMBINED AT +	CP22	.13	1	FLOW	1047.	1033.	1011.	990.	983.	969.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT +	DSHD06C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT +	DCHD07C	.00	1	FLOW	99.	93.	85.	79.	77.	74.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT +	95-9B	.01	1	FLOW	18.	18.	17.	16.	16.	16.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT +	CP23	.01	1	FLOW	101.	96.	87.	81.	79.	75.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO +	RCP23	.01	1	FLOW	101.	96.	87.	81.	79.	75.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT +	EX-E9	.01	1	FLOW	10.	10.	10.	9.	9.	9.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT +	CP24	.02	1	FLOW	102.	97.	88.	82.	80.	76.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
4 COMBINED AT +	CPSE-DUM	.54	1	FLOW	1612.	1586.	1546.	1505.	1489.	1461.
				TIME	4.08	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT +	EX-W7	.20	1	FLOW	162.	157.	149.	142.	139.	134.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT +	OFF20	.07	1	FLOW	67.	64.	61.	58.	57.	55.

				TIME	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO										
+	ROFF20	.07	1	FLOW	55.	53.	51.	48.	47.	45.
				TIME	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT										
+	EX-W8	.22	1	FLOW	171.	166.	158.	149.	147.	141.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT										
+	CP25	.28	1	FLOW	214.	207.	197.	187.	184.	177.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83
HYDROGRAPH AT										
+	OFF21	.53	1	FLOW	372.	360.	343.	325.	319.	308.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO										
+	ROFF21	.53	1	FLOW	354.	343.	326.	310.	304.	293.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	EX-W9	.18	1	FLOW	135.	131.	124.	117.	115.	110.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT										
+	CP26	.71	1	FLOW	435.	421.	400.	380.	373.	359.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
3 COMBINED AT										
+	CP27	1.19	1	FLOW	754.	730.	694.	659.	647.	623.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.11	772.76	251.77	.74	5.00	769.29	255.00	.74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9146E+02 EXCESS= .0000E+00 OUTFLOW= .9146E+02 BASIN STORAGE= .2984E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.12	746.70	251.71	.71	5.00	743.67	255.00	.71

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8779E+02 EXCESS= .0000E+00 OUTFLOW= .8779E+02 BASIN STORAGE= .2872E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.13	705.64	251.89	.67	5.00	702.90	255.00	.67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8227E+02 EXCESS= .0000E+00 OUTFLOW= .8227E+02 BASIN STORAGE= .2994E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.15	663.23	252.38	.62	5.00	661.28	255.00	.63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7679E+02 EXCESS= .0000E+00 OUTFLOW= .7679E+02 BASIN STORAGE= .3006E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.16	648.98	251.43	.61	5.00	647.49	255.00	.61

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7498E+02 EXCESS= .0000E+00 OUTFLOW= .7498E+02 BASIN STORAGE= .2868E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.17	621.10	251.89	.58	5.00	619.58	255.00	.58

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7136E+02 EXCESS= .0000E+00 OUTFLOW= .7136E+02 BASIN STORAGE= .2963E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RDCP10	MANE	1.56	513.55	256.06	.42	5.00	513.34	255.00	.42

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7766E+02 EXCESS= .0000E+00 OUTFLOW= .7766E+02 BASIN STORAGE= .3819E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RDCP10	MANE	1.57	499.47	256.27	.41	5.00	499.08	255.00	.41

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7527E+02 EXCESS= .0000E+00 OUTFLOW= .7527E+02 BASIN STORAGE= .3937E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RDCP10	MANE	1.59	477.31	256.00	.39	5.00	477.07	255.00	.39

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7168E+02 EXCESS= .0000E+00 OUTFLOW= .7168E+02 BASIN STORAGE= .3754E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RDCP10	MANE	1.61	454.82	255.88	.37	5.00	454.61	255.00	.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6811E+02 EXCESS= .0000E+00 OUTFLOW= .6811E+02 BASIN STORAGE= .3985E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.62	447.21	256.93	.37	5.00	447.10	255.00	.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6693E+02 EXCESS= .0000E+00 OUTFLOW= .6693E+02 BASIN STORAGE= .3723E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.63	432.39	255.86	.35	5.00	432.15	255.00	.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6455E+02 EXCESS= .0000E+00 OUTFLOW= .6455E+02 BASIN STORAGE= .3662E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.14	282.12	252.22	.17	5.00	281.14	255.00	.17

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3221E+02 EXCESS= .0000E+00 OUTFLOW= .3221E+02 BASIN STORAGE= .2359E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.15	271.73	252.31	.16	5.00	270.88	255.00	.16

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3061E+02 EXCESS= .0000E+00 OUTFLOW= .3061E+02 BASIN STORAGE= .2324E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.17	254.86	251.74	.15	5.00	254.28	255.00	.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2820E+02 EXCESS= .0000E+00 OUTFLOW= .2820E+02 BASIN STORAGE= .2280E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.19	237.37	252.70	.14	5.00	237.09	255.00	.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2579E+02 EXCESS= .0000E+00 OUTFLOW= .2579E+02 BASIN STORAGE= .2279E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.19	231.59	251.90	.13	5.00	231.24	255.00	.13

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2499E+02 EXCESS= .0000E+00 OUTFLOW= .2499E+02 BASIN STORAGE= .2312E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.21	219.99	252.74	.12	5.00	219.83	255.00	.12

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2339E+02 EXCESS= .0000E+00 OUTFLOW= .2339E+02 BASIN STORAGE= .2342E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.70	118.35	240.00	.02	5.00	118.34	240.00	.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4885E+01 EXCESS= .0000E+00 OUTFLOW= .4888E+01 BASIN STORAGE= .4421E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.82	98.70	239.78	.02	5.00	98.51	240.00	.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4006E+01 EXCESS= .0000E+00 OUTFLOW= .4008E+01 BASIN STORAGE= .4656E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	3.06	71.41	241.61	.01	5.00	70.86	240.00	.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2907E+01 EXCESS= .0000E+00 OUTFLOW= .2909E+01 BASIN STORAGE= .4731E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	3.25	55.34	240.39	.01	5.00	55.21	240.00	.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2129E+01 EXCESS= .0000E+00 OUTFLOW= .2131E+01 BASIN STORAGE= .4484E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	3.33	50.88	242.79	.01	5.00	50.02	240.00	.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1886E+01 EXCESS= .0000E+00 OUTFLOW= .1887E+01 BASIN STORAGE= .4553E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	3.52	41.08	242.58	.01	5.00	39.77	240.00	.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1395E+01 EXCESS= .0000E+00 OUTFLOW= .1397E+01 BASIN STORAGE= .4350E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.25	.10	208.00	.00	5.00	.10	210.00	.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1790E-01 EXCESS= .0000E+00 OUTFLOW= .1798E-01 BASIN STORAGE= .3367E-03 PERCENT ERROR= -2.3

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.25	.11	211.25	.00	5.00	.11	210.00	.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1757E-01 EXCESS= .0000E+00 OUTFLOW= .1762E-01 BASIN STORAGE= .3376E-03 PERCENT ERROR= -2.2

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	4.00	.11	212.00	.00	5.00	.10	210.00	.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1701E-01 EXCESS= .0000E+00 OUTFLOW= .1708E-01 BASIN STORAGE= .3393E-03 PERCENT ERROR= -2.4

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	4.00	.10	212.00	.00	5.00	.10	225.00	.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1641E-01 EXCESS= .0000E+00 OUTFLOW= .1648E-01 BASIN STORAGE= .3368E-03 PERCENT ERROR= -2.5

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	4.00	.10	212.00	.00	5.00	.10	215.00	.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1622E-01 EXCESS= .0000E+00 OUTFLOW= .1629E-01 BASIN STORAGE= .3656E-03 PERCENT ERROR= -2.7

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	4.00	.10	212.00	.00	5.00	.10	215.00	.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1583E-01 EXCESS= .0000E+00 OUTFLOW= .1592E-01 BASIN STORAGE= .3612E-03 PERCENT ERROR= -2.8

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.58	153.06	255.48	5.37	5.00	153.05	255.00	5.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2532E+02 EXCESS= .0000E+00 OUTFLOW= .2533E+02 BASIN STORAGE= .4753E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.60	148.37	254.95	5.23	5.00	148.34	255.00	5.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2469E+02 EXCESS= .0000E+00 OUTFLOW= .2469E+02 BASIN STORAGE= .4439E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.63	142.06	255.13	5.04	5.00	142.06	255.00	5.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2378E+02 EXCESS= .0000E+00 OUTFLOW= .2378E+02 BASIN STORAGE= .4808E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.66	136.82	254.91	4.86	5.00	136.80	255.00	4.86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2292E+02 EXCESS= .0000E+00 OUTFLOW= .2292E+02 BASIN STORAGE= .4828E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.66	135.24	255.66	4.79	5.00	135.19	255.00	4.79

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2262E+02 EXCESS= .0000E+00 OUTFLOW= .2263E+02 BASIN STORAGE= .4513E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.68	132.06	254.49	4.67	5.00	132.00	255.00	4.67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2205E+02 EXCESS= .0000E+00 OUTFLOW= .2205E+02 BASIN STORAGE= .4896E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.64	421.37	255.86	7.58	5.00	421.31	255.00	7.58

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4274E+02 EXCESS= .0000E+00 OUTFLOW= .4274E+02 BASIN STORAGE= .3832E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.66	403.05	253.72	7.16	5.00	403.01	255.00	7.16

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4042E+02 EXCESS= .0000E+00 OUTFLOW= .4042E+02 BASIN STORAGE= .3765E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.69	375.85	256.55	6.55	5.00	375.35	255.00	6.55

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3695E+02 EXCESS= .0000E+00 OUTFLOW= .3695E+02 BASIN STORAGE= .3678E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.72	348.36	256.28	5.94	5.00	348.02	255.00	5.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3350E+02 EXCESS= .0000E+00 OUTFLOW= .3351E+02 BASIN STORAGE= .3800E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.73	339.24	256.24	5.74	5.00	338.90	255.00	5.74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3237E+02 EXCESS= .0000E+00 OUTFLOW= .3237E+02 BASIN STORAGE= .3819E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.76	320.98	256.30	5.33	5.00	320.56	255.00	5.33

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3009E+02 EXCESS= .0000E+00 OUTFLOW= .3009E+02 BASIN STORAGE= .3836E-03 PERCENT ERROR= .0

```
 FOR PLAN = 1  RATIO=  .00
  RDHD05B  MANE          1.10    323.01    255.86      6.24      5.00    322.73    255.00        6.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3691E+02 EXCESS= .0000E+00 OUTFLOW= .3691E+02 BASIN STORAGE= .2323E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
  RDHD05B  MANE          1.11    308.46    255.46      5.93      5.00    308.24    255.00        5.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3509E+02 EXCESS= .0000E+00 OUTFLOW= .3509E+02 BASIN STORAGE= .2322E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
  RDHD05B  MANE          1.13    287.07    255.57      5.48      5.00    286.79    255.00        5.48

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3241E+02 EXCESS= .0000E+00 OUTFLOW= .3241E+02 BASIN STORAGE= .2388E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
  RDHD05B  MANE          1.15    266.71    255.71      5.03      5.00    266.38    255.00        5.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2980E+02 EXCESS= .0000E+00 OUTFLOW= .2980E+02 BASIN STORAGE= .2347E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
  RDHD05B  MANE          1.16    260.30    256.16      4.89      5.00    259.82    255.00        4.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2893E+02 EXCESS= .0000E+00 OUTFLOW= .2893E+02 BASIN STORAGE= .2328E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
  RDHD05B  MANE          1.17    246.91    256.02      4.60      5.00    246.45    255.00        4.60

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2721E+02 EXCESS= .0000E+00 OUTFLOW= .2721E+02 BASIN STORAGE= .2376E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
  RDHD06B  MANE          2.20    264.69    248.79      2.56      5.00    263.45    250.00        2.56

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1665E+02 EXCESS= .0000E+00 OUTFLOW= .1666E+02 BASIN STORAGE= .4526E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
  RDHD06B  MANE          2.24    246.13    248.55      2.29      5.00    243.97    250.00        2.29

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1489E+02 EXCESS= .0000E+00 OUTFLOW= .1489E+02 BASIN STORAGE= .4387E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
  RDHD06B  MANE          2.31    215.10    247.54      1.88      5.00    213.37    245.00        1.88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1225E+02 EXCESS= .0000E+00 OUTFLOW= .1225E+02 BASIN STORAGE= .4362E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
  RDHD06B  MANE          2.41    181.33    248.53      1.49      5.00    179.17    250.00        1.49

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9707E+01 EXCESS= .0000E+00 OUTFLOW= .9708E+01 BASIN STORAGE= .4640E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
  RDHD06B  MANE          2.45    170.41    247.51      1.37      5.00    169.77    250.00        1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8932E+01 EXCESS= .0000E+00 OUTFLOW= .8933E+01 BASIN STORAGE= .4336E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
  RDHD06B  MANE          2.54    148.11    248.64      1.14      5.00    146.58    250.00        1.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7433E+01 EXCESS= .0000E+00 OUTFLOW= .7433E+01 BASIN STORAGE= .4448E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO= 1.00
  RDHD01C  MANE          4.48       .10    244.95     -1.00      5.00       .10    245.00       -1.00


 FOR PLAN = 1  RATIO=  .98
  RDHD01C  MANE          4.56       .10    244.67     -1.00      5.00       .10    245.00       -1.00


 FOR PLAN = 1  RATIO=  .95
  RDHD01C  MANE          4.42       .10    258.36     -1.00      5.00       .10    255.00       -1.00


 FOR PLAN = 1  RATIO=  .92
  RDHD01C  MANE          4.54       .10    283.54     -1.00      5.00       .10    285.00       -1.00


 FOR PLAN = 1  RATIO=  .91
  RDHD01C  MANE          4.55       .10    240.68     -1.00      5.00       .10    285.00       -1.00


 FOR PLAN = 1  RATIO=  .89
  RDHD01C  MANE          4.42       .10    252.78     -1.00      5.00       .10    250.00       -1.00
```

FOR PLAN = 1 RATIO= 1.00

RDHD02C	MANE	1.04	118.28	252.07	-1.00	5.00	117.78	255.00	-1.00

FOR PLAN = 1 RATIO= .98

RDHD02C	MANE	1.01	114.17	252.37	-1.00	5.00	113.77	255.00	-1.00

FOR PLAN = 1 RATIO= .95

RDHD02C	MANE	1.05	108.83	252.02	-1.00	5.00	108.55	255.00	-1.00

FOR PLAN = 1 RATIO= .92

RDHD02C	MANE	1.05	103.87	252.19	-1.00	5.00	103.62	255.00	-1.00

FOR PLAN = 1 RATIO= .91

RDHD02C	MANE	.98	102.15	252.22	-1.00	5.00	101.93	255.00	-1.00

FOR PLAN = 1 RATIO= .89

RDHD02C	MANE	1.03	98.48	252.81	-1.00	5.00	98.32	255.00	-1.00

FOR PLAN = 1 RATIO= 1.00

RDHD04C	MANE	.68	343.49	255.80	-1.00	5.00	343.38	255.00	-1.00

FOR PLAN = 1 RATIO= .98

RDHD04C	MANE	.65	331.26	255.66	-1.00	5.00	331.07	255.00	-1.00

FOR PLAN = 1 RATIO= .95

RDHD04C	MANE	.74	311.69	255.99	-1.00	5.00	311.55	255.00	-1.00

FOR PLAN = 1 RATIO= .92

RDHD04C	MANE	.70	292.79	256.12	-1.00	5.00	292.56	255.00	-1.00

FOR PLAN = 1 RATIO= .91

RDHD04C	MANE	.69	286.62	256.36	-1.00	5.00	286.33	255.00	-1.00

FOR PLAN = 1 RATIO= .89

RDHD04C	MANE	.77	273.88	256.36	-1.00	5.00	273.64	255.00	-1.00

FOR PLAN = 1 RATIO= 1.00

RDHD05C	MANE	.44	469.80	255.47	-1.00	5.00	469.44	255.00	-1.00

FOR PLAN = 1 RATIO= .98

RDHD05C	MANE	.40	452.42	255.63	-1.00	5.00	451.94	255.00	-1.00

FOR PLAN = 1 RATIO= .95

RDHD05C	MANE	.48	425.40	255.67	-1.00	5.00	424.97	255.00	-1.00

FOR PLAN = 1 RATIO= .92

RDHD05C	MANE	.39	398.68	255.62	-1.00	5.00	398.07	255.00	-1.00

FOR PLAN = 1 RATIO= .91

RDHD05C	MANE	.50	389.36	255.81	-1.00	5.00	388.81	255.00	-1.00

FOR PLAN = 1 RATIO= .89

RDHD05C	MANE	.51	369.80	255.70	-1.00	5.00	369.21	255.00	-1.00

FOR PLAN = 1 RATIO= 1.00

RDHD06C	MANE	.76	442.75	251.39	-1.00	5.00	441.27	255.00	-1.00

FOR PLAN = 1 RATIO= .98

RDHD06C	MANE	.70	425.64	251.80	-1.00	5.00	424.20	255.00	-1.00

FOR PLAN = 1 RATIO= .95

RDHD06C	MANE	.79	399.01	251.65	-1.00	5.00	397.78	255.00	-1.00

FOR PLAN = 1 RATIO= .92

RDHD06C	MANE	.73	372.02	251.46	-1.00	5.00	371.31	255.00	-1.00

FOR PLAN = 1 RATIO= .91
RDHD06C MANE .81 362.62 251.81 -1.00 5.00 362.27 255.00 -1.00

FOR PLAN = 1 RATIO= .89
RDHD06C MANE .84 343.76 252.21 -1.00 5.00 343.65 255.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD01C MANE 2.19 62.03 212.12 -1.00 5.00 60.84 215.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD01C MANE 2.21 60.11 212.34 -1.00 5.00 59.01 215.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD01C MANE 2.25 56.79 213.88 -1.00 5.00 55.58 215.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD01C MANE 2.29 53.85 213.30 -1.00 5.00 52.71 215.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD01C MANE 2.31 53.00 212.35 -1.00 5.00 52.16 215.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD01C MANE 2.34 50.93 212.80 -1.00 5.00 50.15 215.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD02C MANE 1.78 114.27 253.06 -1.00 5.00 113.85 255.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD02C MANE 1.80 111.19 251.89 -1.00 5.00 110.70 255.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD02C MANE 1.82 106.90 253.36 -1.00 5.00 106.63 255.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD02C MANE 1.85 103.05 252.85 -1.00 5.00 102.79 255.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD02C MANE 1.85 101.72 252.12 -1.00 5.00 101.46 255.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD02C MANE 1.87 99.25 252.36 -1.00 5.00 99.05 255.00 -1.00

FOR PLAN = 1 RATIO= .00
RCP23 MANE 2.38 101.30 254.23 16.73 5.00 101.02 255.00 16.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1186E+02 EXCESS= .0000E+00 OUTFLOW= .1186E+02 BASIN STORAGE= .9233E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP23 MANE 2.42 95.89 254.12 15.94 5.00 95.63 255.00 15.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1131E+02 EXCESS= .0000E+00 OUTFLOW= .1131E+02 BASIN STORAGE= .9011E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP23 MANE 2.50 87.45 254.69 14.77 5.00 87.35 255.00 14.77

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1048E+02 EXCESS= .0000E+00 OUTFLOW= .1048E+02 BASIN STORAGE= .9264E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP23 MANE 2.56 81.13 253.47 13.75 5.00 81.05 255.00 13.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9749E+01 EXCESS= .0000E+00 OUTFLOW= .9750E+01 BASIN STORAGE= .9020E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP23 MANE 2.58 79.30 255.50 13.38 5.00 79.29 255.00 13.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9486E+01 EXCESS= .0000E+00 OUTFLOW= .9488E+01 BASIN STORAGE= .9525E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP23 MANE 2.63 75.48 254.63 12.59 5.00 75.41 255.00 12.59

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8931E+01 EXCESS= .0000E+00 OUTFLOW= .8932E+01 BASIN STORAGE= .9628E-03 PERCENT ERROR= .0

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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN  1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   05JAN16  TIME  16:15:10   *
*                                       *
*****************************************
```

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

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

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

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

1 HEC-1 INPUT PAGE 1

```
          LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
                    *DIAGRAM
*** FREE ***
             1      ID   ************************************************************
             2      ID   * .......................................................... *
             3      ID   * :                                                        : *
             4      ID   * :              KYLE CANYON                               : *
             5      ID   * :                                                        : *
             6      ID   * :              EXISTING CONDITIONS                       : *
             7      ID   * :........................................................: *
             8      ID   * :              RETURN PERIOD_ _ _ _100 & 10 -YEAR        : *
             9      ID   * :              DISTRIBUTION_ _ _ _ 6-HOUR SDN3           : *
            10      ID   * :              PROJECT NO_ _ _ _ _ 412.634A              : *
            11      ID   * :              FILENAME_ _ _ _ _ _ EX100.H1              : *
            12      ID   * :              DATE MODELED_ _ _ _ 01/05/16              : *
            13      ID   * :              MODELED BY_ _ _ _ _ JAM                   : *
            14      ID   * :........................................................: *
            15      ID   * :                                                        : *
            16      ID   * :........................................................: *
            17      ID   ************************************************************
            18      ID    JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
            19      ID
            20      ID
            21      ID
            22      ID                    AREA      DARF
            23      ID                      SQ.MI.
            24      ID
            25      ID                     0.0 - 0.5    0.99
            26      ID                     0.5 - 1.0    0.98
            27      ID                     1.0 - 2.0    0.95
            28      ID                     2.0 - 4.0    0.92
            29      ID                     4.0 - 6.0    0.91
            30      ID                     6.0 - 8.0    0.89
            31      ID
            32      ID
            33      ID
            34      ID
            35      IT       5       0       0     300
            36      IO       5
            37      IN       5       0       0
            38      JR    PREC       1    0.98    0.95    0.92    0.91    0.89    0.57
                    *
            39      KK    OFFA
            40      KM              AREA  13.0 AC
            41      PB    2.77
            42      BA  0.0203
            43      PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
            44      PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
            45      PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
            46      PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
            47      PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
            48      PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
            49      PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
            50      PC    .998    .999   1.00
            51      LS       0   77.4
```

1 HEC-1 INPUT PAGE 2

```
          LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
            52      UD    .149
                    *
            53      KK    95-1
            54      KM              AREA  2.7 AC
            55      PB    2.77
            56      BA  0.0042
            57      LS       0   89.1
            58      UD    .069
                    *
```

```
                *

 63             KK    OFFB
 64             KM            AREA  85.6 AC
 65             PB    2.93
 66             BA  0.1337
 67             LS       0    77.4
 68             UD    .392
                *

 69             KK    95-2
 70             KM            AREA  2.8 AC
 71             PB    2.77
 72             BA  0.0044
 73             LS       0    89.1
 74             UD    .090
                *

 75             KK     CP1
 76             KM   COMBINATION POINT CP1
 77             KM   COMBINE OFFB AND 95-2
 78             HC       2
                *

 79             KK    RCP1
 80             KM   ROUTE CP1 THRU OFF2
 81             KM   N-STEPS   K    X-FACTOR
 82             RM       1   0.078    0.15
                *

 83             KK    OFF2
 84             KM            AREA  59.4 AC
 85             PB    2.77
 86             BA  0.0928
 87             LS       0    77.4
 88             UD    .245
                *
1                                    HEC-1 INPUT                                    PAGE  3

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

 89             KK     CP2
 90             KM   COMBINATION POINT CP2
 91             KM   COMBINE CP1 AND OFF2
 92             HC       2
                *

 93             KK    RCP2
 94             KM   ROUTE CP2 THRU EX-E1
 95             KM   N-STEPS   K    X-FACTOR
 96             RM       1   0.094    0.15
                *

 97             KK   EX-E1
 98             KM            AREA  33.75 AC
 99             PB    2.77
100             BA  0.0527
101             LS       0    77.4
102             UD    .235
                *

103             KK     CP3
104             KM   COMBINATION POINT CP3
105             KM   COMBINE RCP2 AND EX-E1
106             HC       2
                *

107             KK    OFFC
108             KM            AREA  85.3 AC
109             PB    2.79
110             BA  0.1333
111             LS       0    77.4
112             UD    .313
                *

113             KK    95-3
114             KM            AREA  6.1 AC
115             PB    2.77
116             BA  0.0095
117             LS       0    89.1
118             UD    .095
                *

119             KK     CP4
120             KM   COMBINATION POINT CP4
121             KM   COMBINE OFFC AND 95-3
122             HC       2
                *

123             KK    OFF4
124             KM            AREA  20.4 AC
125             PB    2.77
126             BA  0.0319
127             LS       0    77.4
128             UD    .136
                *
1                                    HEC-1 INPUT                                    PAGE  4

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

129             KK     CP5
130             KM   COMBINATION POINT CP5
131             KM   COMBINE CP4 AND OFF4
132             HC       2
                *

133             KK    RCP5
134             KM   ROUTE CP5 THRU EX-E2
135             KM   N-STEPS   K    X-FACTOR
136             RM       2   0.162    0.15
```

```
                *

 137            KK   EX-E2
 138            KM            AREA  140.59 AC
 139            PB    2.77
 140            BA  0.2197
 141            LS       0    77.4
 142            UD    .257
                *

 143            KK     CP6
 144            KM   COMBINATION POINT CP6
 145            KM   COMBINE RCP5 AND EX-E2
 146            HC       2
                *

 147            KK  OFFD-A
 148            KM            AREA  411.5 AC
 149            PB    3.09
 150            BA  0.6430
 151            LS       0    77.4
 152            UD    .530
                *

 153            KK ROFFD-A
 154            KM   ROUTE OFFD-A TO CP7
 155            KM   N-STEPS   K    X-FACTOR
 156            RM       5   0.400    0.15
                *

 157            KK  OFFD-B
 158            KM            AREA  319.2 AC
 159            PB    2.87
 160            BA  0.4988
 161            LS       0    77.4
 162            UD    .522
                *

 163            KK    95-4
 164            KM            AREA  7.0 AC
 165            PB    2.77
 166            BA  0.0109
 167            LS       0    89.1
 168            UD    .094
                *
1                                          HEC-1 INPUT                                          PAGE  5

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

 169            KK     CP7
 170            KM   COMBINATION POINT CP7
 171            KM   COMBINE OFFD-A, OFFD-B AND 95-4
 172            HC       3
                *

 173            KK   OFF5A
 174            KM            AREA  10.3 AC
 175            PB    2.77
 176            BA  0.0161
 177            LS       0    89.1
 178            UD    .088
                *

 179            KK   OFF5B
 180            KM            AREA  7.4 AC
 181            PB    2.77
 182            BA  0.0116
 183            LS       0    89.1
 184            UD    .097
                *

 185            KK    CP7A
 186            KM   COMBINATION POINT CP7A
 187            KM   COMBINE CP7, OFF5A AND OFF5B
 188            HC       3
                *

 189            KK   RCP7A
 190            KM   ROUTE CP7A THRU EX-E3
 191            KM   N-STEPS   K    X-FACTOR
 192            RM       2   0.132    0.15
                *

 193            KK   EX-E3
 194            KM            AREA  119.48 AC
 195            PB    2.77
 196            BA  0.1867
 197            LS       0    77.4
 198            UD    .308
                *

 199            KK     CP8
 200            KM   COMBINATION POINT CP8
 201            KM   COMBINE RCP7A AND EX-E3
 202            HC       2
                *

 203            KKCPNE-DUMMY
 204            KM   COMBINATION POINT CPNE-DUMMY
 205            KM   COMBINE CPNM, CP3, CP6 AND CP8
 206            HC       4
                *
1                                          HEC-1 INPUT                                          PAGE  6

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

 207            KK   OFF10
 208            KM            AREA  429.5 AC
 209            PB    3.39
 210            BA  0.6710
```

```
211          LS       0    86.2
212          UD    .573
             *

213          KK  ROFF10
214          KM   ROUTE OFF10 THRU OFFF-A AND OFFF-B
215          KM   N-STEPS   K    X-FACTOR
216          RM       7   0.583    0.15
             *

217          KK  OFFF-A
218          KM           AREA  636.0 AC
219          PB    3.19
220          BA  0.9938
221          LS       0    83.8
222          UD    .441
             *

223          KK ROFFF-A
224          KM   ROUTE OFFF-A THRU OFFF-B
225          KM   N-STEPS   K    X-FACTOR
226          RM       3   0.238    0.15
             *

227          KK  OFFF-B
228          KM           AREA  391.2 AC
229          PB    2.93
230          BA  0.6112
231          LS       0    84.1
232          UD    .490
             *

233          KK   EX-W1
234          KM           AREA  15.36 AC
235          PB    2.77
236          BA  0.0240
237          LS       0    77.4
238          UD    .141
             *

239          KK   OFF11
240          KM           AREA  2.9 AC
241          PB    2.77
242          BA  0.0046
243          LS       0    77.4
244          UD    .093
             *
```



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

245          KK     CP9
246          KM   COMBINATION POINT CP9
247          KM   COMBINE ROFF10, OFFF-A, OFFF-B, EX-W1 AND OFF11
248          HC       5
             *

249          KK    DCP9
250          KM   FLOW SPLIT AT CULVERT
251          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
252          DT DCHD02A
253          DI       0     150     300     450     600     750     900    1050    1100    1350
254          DI    1500
255          DQ       0     122     186     230     261     283     316     353     366     445
256          DQ     497
             *

257          KK    RCP9
258          KM   ROUTE TO BASIN OFF12
259          RD     850  0.0165    0.02       0    TRAP       0      10
             *

260          KK    OFFG
261          KM           AREA  26.0 AC
262          PB    2.79
263          BA  0.0406
264          LS       0    86.5
265          UD    .186
             *

266          KK   EX-W2
267          KM           AREA  13.24 AC
268          PB    2.77
269          BA  0.0207
270          LS       0    81.6
271          UD    .112
             *

272          KK   OFF12
273          KM           AREA  6.0 AC
274          PB    2.77
275          BA  0.0094
276          LS       0    77.4
277          UD    .115
             *

278          KK   OFF16
279          KM           AREA  504.7 AC
280          PB    3.06
281          BA  0.7885
282          LS       0    86.6
283          UD    .692
             *
```



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

284          KK  ROFF16
285          KM   ROUTE OFF16 THRU EX-W3
286          KM   N-STEPS   K    X-FACTOR
```

```
287          RM       2   0.198    0.15
             *

288          KK   EX-W3
289          KM            AREA  172.93 AC
290          PB    2.82
291          BA  0.2702
292          LS       0    86.4
293          UD    .295
             *

294          KK    CP10
295          KM   COMBINATION POINT CP10
296          KM   COMBINE RCP9, OFFG, EX-W2, OFF12, ROFF16 AND EX-W3
297          HC       6
             *

298          KK   DCP10
299          KM   FLOW SPLIT AT CULVERT
300          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
301          DT DCHD04A
302          DI       0     300     600     900    1200    1500    1800    2100    2400    2540
303          DI    3000
304          DQ       0     132     316     514     710     907    1115    1252    1399    1468
305          DQ    1684
             *

306          KKDSPHD04A
307          KM   FLOW SPLIT AT BETWEEN HD04A AND HD05A
308          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
309          KM   BASED ON CHANNEL CAPACITY = 527 CFS
310          DT DSHD04A
311          DI       0     527    2000
312          DQ       0       1    1473
             *

313          KK  RDCP10
314          KM   ROUTE TO THE NEXT CULVERT AT BASIN OFF11
315          RD    1068  0.0160    0.02       0    TRAP       0      10
             *

316          KK   EX-W4
317          KM            AREA  67.06 AC
318          PB    2.78
319          BA  0.1048
320          LS       0    86.9
321          UD    .199
             *
```



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

322          KK    CP11
323          KM   COMBINATION POINT CP11
324          KM   COMBINE RDCP10 AND EX-W4
325          HC       2
             *

326          KK   DCP11
327          KM   FLOW SPLIT AT CULVERT
328          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
329          DT DCHD05A
330          DI       0     170     340     510     680     850    1020    1190    1360    1372
331          DI    1700
332          DQ       0     169     200     244     296     372     459     546     632     637
333          DQ     807
             *

334          KKDSPHD05A
335          KM   FLOW SPLIT AT BETWEEN HD05A AND HD06A
336          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
337          KM   BASED ON CHANNEL CAPACITY = 605 CFS
338          DT DSHD05A
339          DI       0     605    2000
340          DQ       0       1    1395
             *

341          KK  RDCP11
342          KM   ROUTE TO THE NEXT CULVERT AT BASIN OFF12
343          RD     626  0.0134    0.02       0    TRAP       0      10
             *

344          KK   OFF18
345          KM            AREA  351.4 AC
346          PB    3.05
347          BA  0.5491
348          LS       0    86.3
349          UD    .445
             *

350          KK  ROFF18
351          KM   ROUTE OFF18 THRU EX-W5
352          KM   N-STEPS   K    X-FACTOR
353          RM       2   0.171    0.15
             *

354          KK   EX-W5
355          KM            AREA  285.43 AC
356          PB    2.86
357          BA  0.4460
358          LS       0    86.3
359          UD    .308
             *
```



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

360          KK    CP12
361          KM   COMBINATION POINT CP12
362          KM   COMBINE ROFF18 AND EX-W5
```

```
363          HC       2
             *

364          KK   OFF14
365          KM            AREA  8.6 AC
366          PB    2.77
367          BA  0.0134
368          LS       0    86.9
369          UD    .090
             *

370          KK    CP13
371          KM   COMBINATION POINT CP13
372          KM   COMBINE RDCP11, CP12 AND OFF14
373          HC       3
             *

374          KK   DCP13
375          KM   FLOW SPLIT AT CULVERT
376          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
377          DT DCHD06A
378          DI       0   200.0   400.0     600     800    1000    1200    1400    1600    1772
379          DI    2000
380          DQ       0   199.9   399.9     594     727     802     865     927    1017    1095
381          DQ    1207
             *

382          KKDSPHD06A
383          KM   FLOW SPLIT AT BETWEEN HD06A AND HD07A
384          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
385          KM   BASED ON CHANNEL CAPACITY = 1,692 CFS
386          DT DSHD06A
387          DI       0    1692    2000
388          DQ       0       1     308
             *

389          KKRDCRCOFF18
390          KM   ROUTE TO THE NEXT CULVERT AT BASIN OFFH
391          RD    1349  0.0186    0.02       0    TRAP       0      10
             *

392          KK   EX-W6
393          KM            AREA  9.93 AC
394          PB    2.77
395          BA  0.0155
396          LS       0    86.9
397          UD    .101
             *
```



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

398          KK   OFF15
399          KM            AREA  23.2 AC
400          PB    2.77
401          BA  0.0362
402          LS       0    86.9
403          UD    .126
             *

404          KK    CP14
405          KM   COMBINATION POINT CP14
406          KM   COMBINE RDCRCOFF18, EX-W6 AND OFF15
407          HC       3
             *

408          KK   DCP14
409          KM   FLOW SPLIT AT CULVERT
410          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
411          DT DCHD07A
412          DI       0      90     180     270     360     450     540     630     720     771
413          DI     900
414          DQ       0      51      55      58      60      61      65      78      93     101
415          DQ     123
             *

416          KKDSPHD07A
417          KM   FLOW SPLIT AT BETWEEN HD07A AND HD08A
418          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
419          KM   BASED ON CHANNEL CAPACITY = 338 CFS
420          DT DSHD07A
421          DI       0     338    2000
422          DQ       0       1    1662
             *

423          KK    OFFE
424          KM            AREA  24.5 AC
425          PB    2.78
426          BA  0.0383
427          LS       0    77.4
428          UD    .232
             *

429          KK    95-5
430          KM            AREA  23.6 AC
431          PB    2.77
432          BA  0.0369
433          LS       0    89.1
434          UD    .082
             *
```



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

435          KK  CHD01B
436          KM   COMBINATION POINT CHD01B
437          KM   COMBINE OFFE AND 95-5
438          HC       2
             *
```

```
KK  DHD01B
KM   FLOW SPLIT AT CULVERT 1B
DT DCHD01B
DI       0    15.0    29.0    45.0    60.0    75.0    90.0   105.0     120     135
DI     150
DQ       0    14.9    28.9    44.9    59.9    74.9    89.9   104.9     116     121
DQ     125
*

KK RDHD01B
KM   ROUTE TO THE NEXT CULVERT
RD    1000  0.0165    0.02       0    TRAP       0      10
*

KK    OFF8
KM            AREA  8.5 AC
PB    2.77
BA  0.0133
LS       0    89.1
UD    .111
*

KKRETHD02A
KM   RETREIVE FLOW FROM CULVERT HD02A
DR DCHD02A
*

KK  CHD02B
KM   COMBINATION POINT CHD02B
KM   COMBINE RDHD01B, OFF8 AND RETHD02A
HC       3
*

KK  DHD02B
KM   FLOW SPLIT AT CULVERT HD02B
DT DCHD02B
DI       0    50.0     100     150     200     250     300     350     400     450
DI     500
DQ       0    49.9      82      99     124     149     178     211     241     271
DQ     299
*

KK RDHD02B
KM   ROUTE TO THE NEXT CULVERT
RD    1320  0.0165    0.02       0    TRAP       0      10
*
```

1 HEC-1 INPUT PAGE 13

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

KK    95-6
KM            AREA  6.7 AC
PB    2.77
BA  0.0104
LS       0    89.9
UD    .095
*

KKRETHD04A
KM   RETREIVE FLOW FROM CULVERT HD04A
DR DCHD04A
*

KK  CHD04B
KM   COMBINATION POINT CHD04B
KM   COMBINE RDHD02B, 95-6 AND RETHD04A
HC       3
*

KK  DHD04B
KM   SPLIT FLOW AT CULVERT HD04B
DT DCHD04B
DI       0   200.0     400     600     800    1000    1200    1400    1600    1800
DI    2000
DQ       0   199.9     287     359     443     529     620     710     800     895
DQ     988
*

KKRETSHD04A
KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD04A AND HD05A
DR DSHD04A
*

KK   95-7A
KM            AREA  4.4 AC
PB    2.77
BA  0.0069
LS       0    92.6
UD    .075
*

KK CHD04B2
KM   COMBINE 95-7A WITH BYPASS AND SPILL FLOW
HC       3
*

KKDSPHD04B
KM   FLOW SPLIT AT BETWEEN HD04B AND HD05B
KM   DIVERSION TO THE OTHER SIDE OF US95
KM   BASED ON CHANNEL CAPACITY = 1004 CFS
DT DSHD04B
DI       0    1004    2000
DQ       0       1     996
*
```

1 HEC-1 INPUT PAGE 14

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

KK RDHD04B
KM   ROUTE TO THE NEXT CULVERT
```

```
513          RD    1068  0.0160    0.02       0    TRAP       0      10
             *

514          KKRETHD05A
515          KM   RETREIVE FLOW FROM CULVERT HD05A
516          DR DCHD05A
             *

517          KK  CHD05B
518          KM   COMBINATION POINT CHD05B
519          KM   COMBINE RDHD04B AND RETHD05A
520          HC       2
             *

521          KK  DHD05B
522          KM   SPLIT FLOW AT CULVERT HD05B
523          DT DCHD05B
524          DI       0     200     400     600     800    1000    1200    1400    1600    1800
525          DI    2000
526          DQ       0     164     242     323     397     494     600     703     809     913
527          DQ    1029
             *

528          KK   95-8A
529          KM            AREA  3.3 AC
530          PB    2.77
531          BA  0.0052
532          LS       0    92.6
533          UD    .064
             *

534          KKRETSHD05A
535          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD05A AND HD06A
536          DR DSHD05A
             *

537          KK CHD05B2
538          KM   COMBINE 95-8A WITH BYPASS AND SPILL FLOW
539          HC       3
             *

540          KKDSPHD05B
541          KM   FLOW SPLIT AT BETWEEN HD05B AND HD06B
542          KM   DIVERSION TO THE OTHER SIDE OF US95
543          KM   BASED ON CHANNEL CAPACITY = 4017 CFS
544          DT DSHD05B
545          DI       0    4017    5000
546          DQ       0       1     983
             *
1                                        HEC-1 INPUT                                        PAGE 15

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

547          KK RDHD05B
548          KM   ROUTE TO THE NEXT CULVERT
549          RD     626  0.0134    0.02       0    TRAP       0      10
             *

550          KKRETHD06A
551          KM   RETREIVE FLOW FROM CULVERT HD06A
552          DR DCHD06A
             *

553          KK  CHD06B
554          KM   COMBINE BYPASS WITH RETREIVED FLOW
555          HC       2
             *

556          KK  DHD06B
557          KM   SPLIT FLOW AT CULVERT HD06B
558          DT DCHD06B
559          DI       0   160.0   480.0     640     800     960    1120    1280    1400    1600
560          DQ       0   159.9   479.9     634     706     757     807     857     899     969
             *

561          KK   95-9A
562          KM            AREA  7.1 AC
563          PB    2.77
564          BA  0.0110
565          LS       0    92.6
566          UD    .098
             *

567          KKRETSHD06A
568          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD06A AND HD07A
569          DR DSHD06A
             *

570          KK CHD06B2
571          KM   COMBINE 95-9A WITH BYPASS AND SPILL FLOW
572          HC       3
             *

573          KKDSPHD06B
574          KM   FLOW SPLIT AT BETWEEN HD06B AND HD07B
575          KM   DIVERSION TO THE OTHER SIDE OF US95
576          KM   BASED ON CHANNEL CAPACITY = 4876 CFS
577          DT DSHD06B
578          DI       0    4876    5000
579          DQ       0       1     124
             *
1                                        HEC-1 INPUT                                        PAGE 16

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

580          KK RDHD06B
581          KM   ROUTE TO THE NEXT CULVERT
582          RD    1349  0.0186    0.02       0    TRAP       0      10
             *
```

```
583          KKRETHD07A
584          KM   RETREIVE FLOW FROM CULVERT HD07A
585          DR DCHD07A
             *

586          KK  CHD07B
587          KM   COMBINE BYPASS WITH RETREIVED FLOW
588          HC       2
             *

589          KK  DHD07B
590          KM   SPLIT FLOW AT CULVERT HD07B
591          DT DCHD07B
592          DI       0      90     180     270     360     450     540     630     700     810
593          DI     900
594          DQ       0      53      58      61      63      65      67      69      70      71
595          DQ      72
             *

596          KKRETSHD07A
597          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD07A AND HD08A
598          DR DSHD07A
             *

599          KK CHD07B2
600          KM   COMBINE BYPASS WITH SPILL FLOW
601          HC       2
             *

602          KKDSPHD07B
603          KM   FLOW SPLIT AT BETWEEN HD07B AND HD08B
604          KM   DIVERSION TO THE OTHER SIDE OF US95
605          KM   BASED ON CHANNEL CAPACITY = 1770 CFS
606          DT DSHD07B
607          DI       0    1770    5000
608          DQ       0       1    3230
             *

609          KK DCHD01B
610          KM   RETREIVE FLOW FROM VTN HD01B CULVERT
611          DR DCHD01B
             *

612          KK  DHD01C
613          KM   SPLIT FLOW AT CULVERT HD01C
614          DT DCHD01C
615          DI       0    10.0    50.0
616          DQ       0     9.9    49.9
             *
```



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

617          KK RDHD01C
618          KM   ROUTE TO THE NEXT CULVERT
619          RK    1000  0.0165    0.02       0    TRAP      13      20
             *

620          KKRETHD02B
621          KM   RETREIVE FLOW FROM CULVERT HD02B
622          DR DCHD02B
             *

623          KK  CHD02C
624          KM   COMBINE BYPASS WITH RETREIVED FLOW
625          HC       2
             *

626          KK  DHD02C
627          KM   SPLIT FLOW AT CULVERT HD02C
628          DT DCHD02C
629          DI       0     100     200     250     400     500     600     700     800     900
630          DI    1000
631          DQ       0      65     100     122     201     258     323     384     447     514
632          DQ     581
             *

633          KK RDHD02C
634          KM   ROUTE TO THE NEXT CULVERT
635          RK    1320  0.0165    0.02       0    TRAP      13      20
             *

636          KKRETHD04B
637          KM   RETREIVE FLOW FROM CULVERT HD04B
638          DR DCHD04B
             *

639          KK  CHD04C
640          KM   COMBINE BYPASS WITH RETREIVED FLOW
641          HC       2
             *

642          KK  DHD04C
643          KM   SPLIT FLOW AT CULVERT HD04C
644          DT DCHD04C
645          DI       0     200     400     600     800    1000    1200    1400    1600    1800
646          DI    2000
647          DQ       0     181     212     262     336     416     503     609     719     823
648          DQ     933
             *

649          KKRETSHD04B
650          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD04B AND HD05B
651          DR DSHD04B
             *
```



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

652          KK CHD04C2
```

```
653          KM   COMBINE BYPASS WITH SPILL FLOW
654          HC       2
             *

655          KKDSPHD04C
656          KM   FLOW SPLIT AT BETWEEN HD04C AND HD05C
657          KM   DIVERSION TO THE OTHER SIDE OF US95
658          KM   BASED ON CHANNEL CAPACITY = 1079 CFS
659          DT DSHD04C
660          DI       0    1079    2000
661          DQ       0       1     921
             *

662          KK RDHD04C
663          KM   ROUTE TO THE NEXT CULVERT
664          RK    1068  0.0160    0.02       0    TRAP      13      20
             *

665          KKRETHD05B
666          KM   RETREIVE FLOW FROM CULVERT HD05B
667          DR DCHD05B
             *

668          KK  CHD05C
669          KM   COMBINE BYPASS WITH RETREIVED FLOW
670          HC       2
             *

671          KK  DHD05C
672          KM   SPLIT FLOW AT CULVERT HD05C
673          DT DCHD05C
674          DI       0     150     300     450     600     750     800    1050    1200    1350
675          DI    1500
676          DQ       0     132     171     193     208     232     245     321     380     444
677          DQ     513
             *

678          KKRETSHD05B
679          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD05B AND HD06B
680          DR DSHD05B
             *

681          KK CHD05C2
682          KM   COMBINE BYPASS WITH SPILL FLOW
683          HC       2
             *

684          KKDSPHD05C
685          KM   FLOW SPLIT AT BETWEEN HD05C AND HD06C
686          KM   DIVERSION TO THE OTHER SIDE OF US95
687          KM   BASED ON CHANNEL CAPACITY = 2744 CFS
688          DT DSHD05C
689          DI       0    2744    5000
```



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

690          DQ       0       1    2256
             *

691          KK RDHD05C
692          KM   ROUTE TO THE NEXT CULVERT
693          RK     626  0.0134    0.02       0    TRAP      13      20
             *

694          KKRETHD06B
695          KM   RETREIVE FLOW FROM CULVERT HD06B
696          DR DCHD06B
             *

697          KK  CHD06C
698          KM   COMBINE BYPASS WITH RETREIVED FLOW
699          HC       2
             *

700          KK  DHD06C
701          KM   SPLIT FLOW AT CULVERT HD06C
702          DT DCHD06C
703          DI       0   200.0   400.0     600     800    1000    1200    1400    1600    1680
704          DI    2000
705          DQ       0   199.9   399.9     560     647     713     786     860     948     988
706          DQ    1142
             *

707          KKRETSHD06B
708          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD06B AND HD07B
709          DR DSHD06B
             *

710          KK CHD06C2
711          KM   COMBINE BYPASS WITH SPILL FLOW
712          HC       2
             *

713          KKDSPHD06C
714          KM   FLOW SPLIT AT BETWEEN HD06C AND HD07C
715          KM   DIVERSION TO THE OTHER SIDE OF US95
716          KM   BASED ON CHANNEL CAPACITY = 2175 CFS
717          DT DSHD06C
718          DI       0    2175    5000
719          DQ       0       1    2825
             *

720          KK RDHD06C
721          KM   ROUTE TO THE NEXT CULVERT
722          RK    1349  0.0186    0.02       0    TRAP      13      20
             *
```



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

```
723          KKRETHD07B
724          KM   RETREIVE FLOW FROM CULVERT HD07B
725          DR DCHD07B
             *

726          KK  CHD07C
727          KM   COMBINE BYPASS WITH RETREIVED FLOW
728          HC       2
             *

729          KK  DHD07C
730          KM   SPLIT FLOW AT CULVERT HD07C
731          DT DCHD07C
732          DI       0      90     180     270     360     450     540     600     720     810
733          DI     900
734          DQ       0      51      58      62      66      83     110     130     174     208
735          DQ     244
             *

736          KKRETSHD07B
737          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD07B AND HD08B
738          DR DSHD07B
             *

739          KK CHD07C2
740          KM   COMBINE BYPASS WITH SPILL FLOW
741          HC       2
             *

742          KKDSPHD07C
743          KM   FLOW SPLIT AT BETWEEN HD07C AND HD08C
744          KM   DIVERSION TO THE OTHER SIDE OF US95
745          KM   BASED ON CHANNEL CAPACITY = 2396 CFS
746          DT DSHD07C
747          DI       0    2396    5000
748          DQ       0       1    2604
             *

749          KKCPW-DUMMY
750          KM   COMBINATION POINT CPW-DUMMY
751          KM   COMBINE DSPHD07A, DSPHD07B, AND DSPHD07C
752          HC       3
             *

753          KK DCHD01C
754          KM   RETREIVE FLOW FROM VTN HD01B CULVERT
755          DR DCHD01C
             *
```



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

756          KKRDCHD01C
757          KM   ROUTE DCHC01B TO CP15
758          KM   LENGTH  SLOPE   n-VALUE         SHAPE     WIDTH  S-SLOPE
759          RD     905    .025    .025       0    TRAP      20       2
             *

760          KK   OFF9A
761          KM             AREA  22.2 AC
762          PB    2.77
763          BA  0.0347
764          LS       0    89.1
765          UD    .064
             *

766          KK    CP15
767          KM   COMBINATION POINT CP15
768          KM   COMBINE RDCHD01C AND OFF9A
769          HC       2
             *

770          KK   RCP15
771          KM   ROUTE CP15 THRU EX-E4
772          KM   N-STEPS   K    X-FACTOR
773          RM       1   0.089    0.15
             *

774          KK DCHD02C
775          KM   RETREIVE FLOW FROM VTN HD02C CULVERT
776          DR DCHD02C
             *

777          KKRDCHD02C
778          KM   ROUTE DCHC02C TO CP15
779          KM   LENGTH  SLOPE   n-VALUE         SHAPE     WIDTH  S-SLOPE
780          RD     905    .025    .025       0    TRAP      20       2
             *

781          KK   OFF9B
782          KM             AREA  7.6 AC
783          PB    2.77
784          BA  0.0119
785          LS       0    89.1
786          UD    .068
             *

787          KK   EX-E4
788          KM             AREA  140.56 AC
789          PB    2.77
790          BA  0.2196
791          LS       0    77.4
792          UD    .240
             *
```



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

793          KK    CP16
794          KM   COMBINATION POINT CP16
```

```
 795          KM   COMBINE RCP15, RDCHD02C, OFF9B, AND EX-E4
 796          HC       4
              *

 797          KK DCHD04C
 798          KM   RETREIVE FLOW FROM VTN HD04C CULVERT
 799          DR DCHD04C
              *

 800          KK    OFFH
 801          KM              AREA  5.6 AC
 802          PB    2.77
 803          BA  0.0088
 804          LS       0    89.5
 805          UD    .082
              *

 806          KK    CP17
 807          KM   COMBINATION POINT CP17
 808          KM   COMBINE DCHD04C AND OFFH
 809          HC       2
              *

 810          KK   RCP17
 811          KM   ROUTE CP1 THRU EX-E5
 812          KM   N-STEPS   K    X-FACTOR
 813          RM       1   0.073    0.15
              *

 814          KK   EX-E5
 815          KM              AREA  63.30 AC
 816          PB    2.77
 817          BA  0.0989
 818          LS       0    79.5
 819          UD    .202
              *

 820          KK     ES1
 821          KM              AREA  11.1 AC
 822          PB    2.77
 823          BA  0.0173
 824          LS       0    92.7
 825          UD    .109
              *

 826          KK    CP18
 827          KM   COMBINATION POINT CP18
 828          KM   COMBINE RCP17, EX-E5, AND ES1
 829          HC       3
              *
```



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

 830          KK DSHD04C
 831          KM   RETREIVE FLOW THAT OVERTOPS US 95 CHANNEL
 832          KM   BETWEEN VTN HD04C AND HD05C CULVERTS
 833          DR DSHD04C
              *

 834          KK DCHD05C
 835          KM   RETREIVE FLOW FROM VTN HD05C CULVERT
 836          DR DCHD05C
              *

 837          KK   95-7B
 838          KM              AREA  7.2 AC
 839          PB    2.77
 840          BA  0.0112
 841          LS       0    92.6
 842          UD    .087
              *

 843          KK    CP19
 844          KM   COMBINATION POINT CP19
 845          KM   COMBINE DSHD04C, DCHD05C AND 95-7B
 846          HC       3
              *

 847          KK DSHD05C
 848          KM   RETREIVE FLOW THAT OVERTOPS US 95 CHANNEL
 849          KM   BETWEEN VTN HD05C AND HD06C CULVERTS
 850          DR DSHD05C
              *

 851          KK DCHD06C
 852          KM   RETREIVE FLOW FROM VTN HD06C CULVERT
 853          DR DCHD06C
              *

 854          KK   95-8B
 855          KM              AREA  2.6 AC
 856          PB    2.77
 857          BA  0.0040
 858          LS       0    92.6
 859          UD    .052
              *

 860          KK    CP20
 861          KM   COMBINATION POINT CP20
 862          KM   COMBINE DSHD05C, DCHD06C AND 95-8B
 863          HC       3
              *
```



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

 864          KK   EX-E6
 865          KM              AREA  10.26 AC
 866          PB    2.77
```

```
          BA  0.0160
          LS       0     86.9
          UD    .111
          *

          KK    CP21
          KM   COMBINATION POINT CP21
          KM   COMBINE CP19, CP20, AND EX-E6
          HC       3
          *

          KK     ES2
          KM             AREA  31.4 AC
          PB    2.77
          BA  0.0490
          LS       0     94.7
          UD    .148
          *

          KK   EX-E7
          KM             AREA  21.31 AC
          PB    2.77
          BA  0.0333
          LS       0     86.9
          UD    .111
          *

          KK   EX-E8
          KM             AREA  10.67 AC
          PB    2.77
          BA  0.0167
          LS       0     86.9
          UD    .133
          *

          KK    CP22
          KM   COMBINATION POINT CP22
          KM   COMBINE RCP21, ES2, EX-E7, AND EX-E8
          HC       4
          *

          KK DSHD06C
          KM   RETREIVE FLOW THAT OVERTOPS US 95 CHANNEL
          KM   BETWEEN VTN HD06C AND HD07C CULVERTS
          DR DSHD06C
          *
1                                    HEC-1 INPUT                                    PAGE 25

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

          KK DCHD07C
          KM   RETREIVE FLOW FROM VTN HD07C CULVERT
          DR DCHD07C
          *

          KK   95-9B
          KM             AREA  8.5 AC
          PB    2.77
          BA  0.0133
          LS       0     92.6
          UD    .139
          *

          KK    CP23
          KM   COMBINATION POINT CP23
          KM   COMBINE DSHD06C, DCHD07C AND 95-9B
          HC       3
          *

          KK   RCP23
          KM   ROUTE CP23 THRU EX-E9
          KM     LEN   SLOPE       N      N/A   SHAPE      BW      SS
          RD     720    .029    .035       0    TRAP      50       5
          *

          KK   EX-E9
          KM             AREA  6.13 AC
          PB    2.77
          BA  0.0096
          LS       0     86.9
          UD    .109
          *

          KK    CP24
          KM   COMBINATION POINT CP24
          KM   COMBINE CP23 AND EX-E9
          HC       2
          *

          KKCPSE-DUMMY
          KM   COMBINATION POINT CPSE-DUMMY
          KM   COMBINE CP16, CP18 CP22, AND CP24
          HC       4
          *

          KK   EX-W7
          KM             AREA  126.63 AC
          PB    2.84
          BA  0.1979
          LS       0     86.2
          UD    .292
          *
1                                    HEC-1 INPUT                                    PAGE 26

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

          KK   OFF20
          KM             AREA  42.0 AC
          PB    3.01
          BA  0.0656
```

```
941           LS       0    86.2
942           UD    .190
              *

943           KK  ROFF20
944           KM   ROUTE OFF18 THRU EX-W8
945           KM   N-STEPS   K    X-FACTOR
946           RM       4   0.329    0.15
              *

947           KK   EX-W8
948           KM                 AREA  139.52 AC
949           PB    2.88
950           BA  0.2180
951           LS       0    86.2
952           UD    .323
              *

953           KK    CP25
954           KM   COMBINATION POINT CP25
955           KM   COMBINE ROFF20 AND EX-W8
956           HC       2
              *

957           KK   OFF21
958           KM                 AREA  337.9 AC
959           PB    3.10
960           BA  0.5280
961           LS       0    85.7
962           UD    .446
              *

963           KK  ROFF21
964           KM   ROUTE OFF21 THRU EX-W9
965           KM   N-STEPS   K    X-FACTOR
966           RM       2   0.178    0.15
              *

967           KK   EX-W9
968           KM                 AREA  116.76 AC
969           PB    2.91
970           BA  0.1824
971           LS       0    84.4
972           UD    .300
              *
```



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

973           KK    CP26
974           KM   COMBINATION POINT CP26
975           KM   COMBINE ROFF21 AND EX-W9
976           HC       2
              *

977           KK    CP27
978           KM   COMBINATION POINT CP27
979           KM   COMBINE EX-W7, CP25 AND CP26
980           HC       3
              *
981           ZZ
```

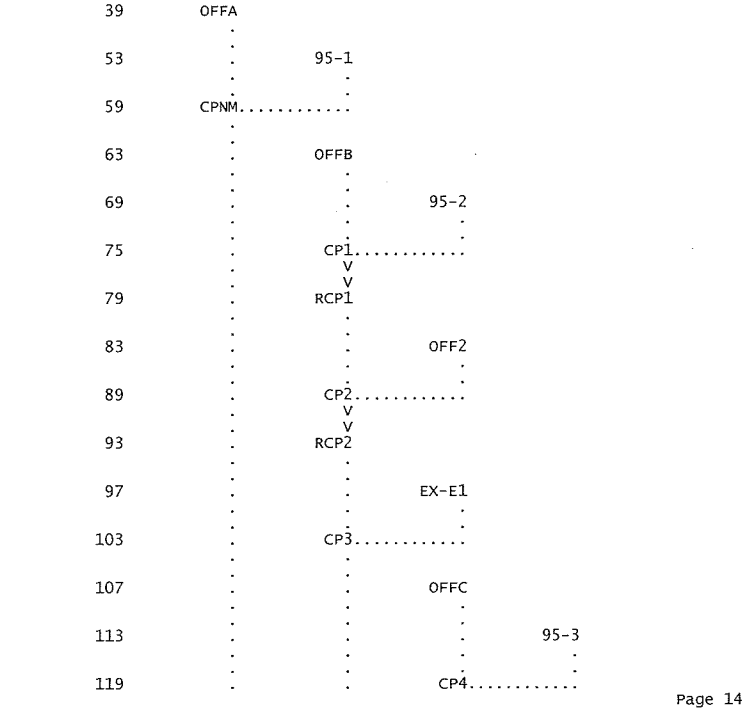
1

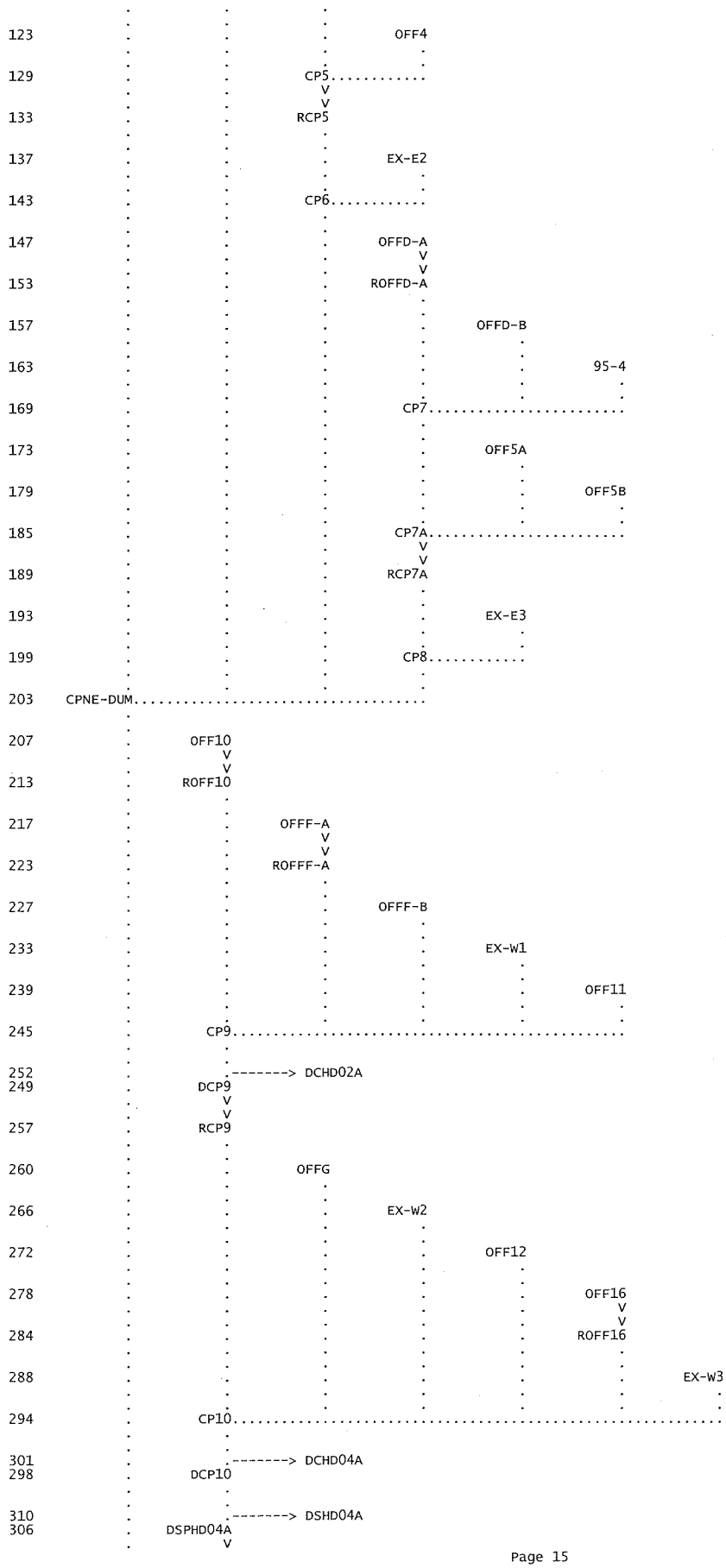
SCHEMATIC DIAGRAM OF STREAM NETWORK

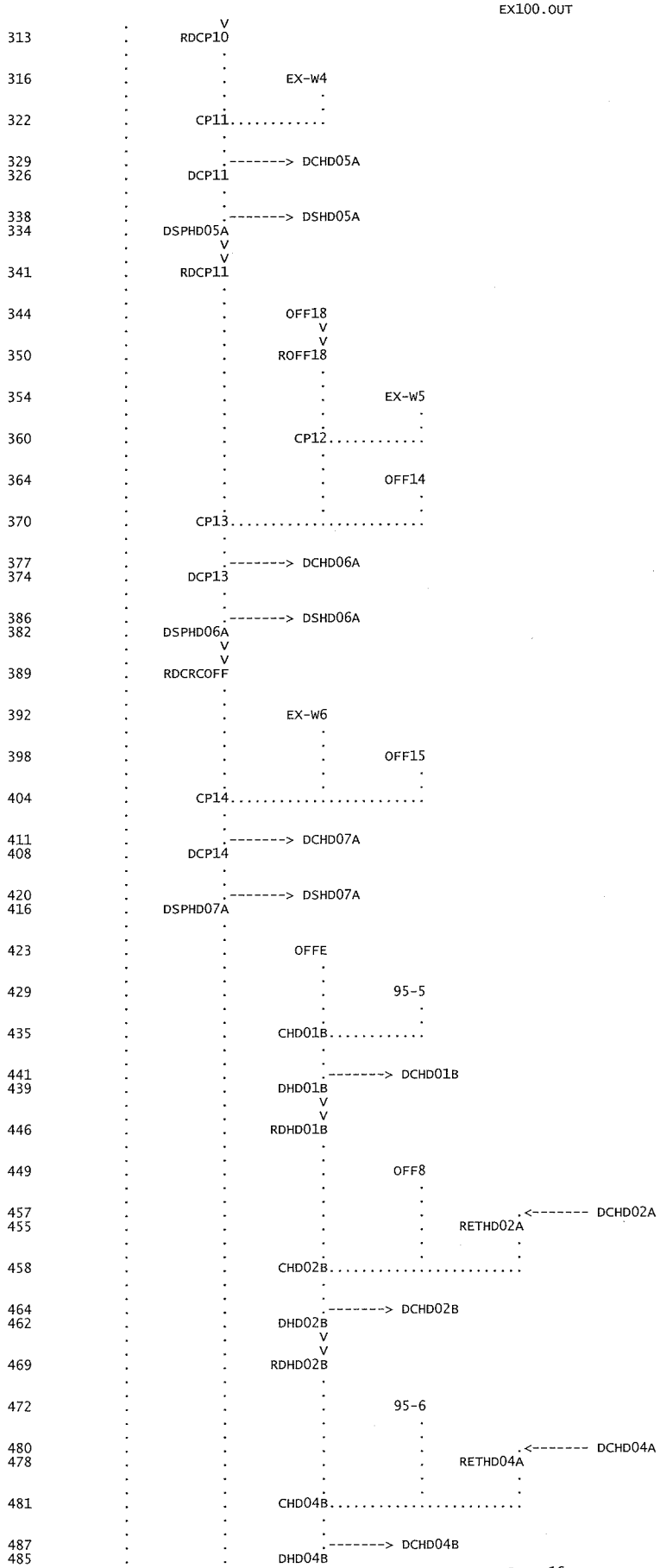
INPUT LINE NO.

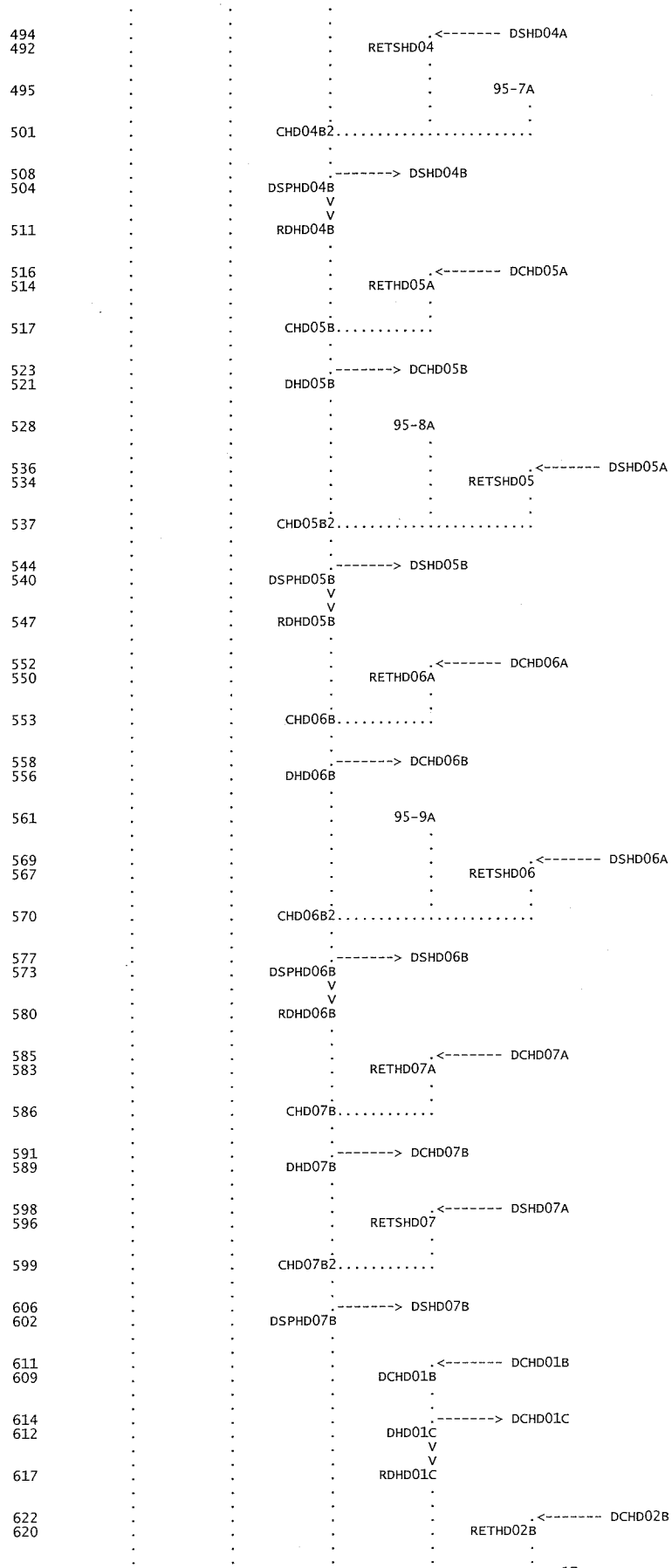
(V) ROUTING (---->) DIVERSION OR PUMP FLOW

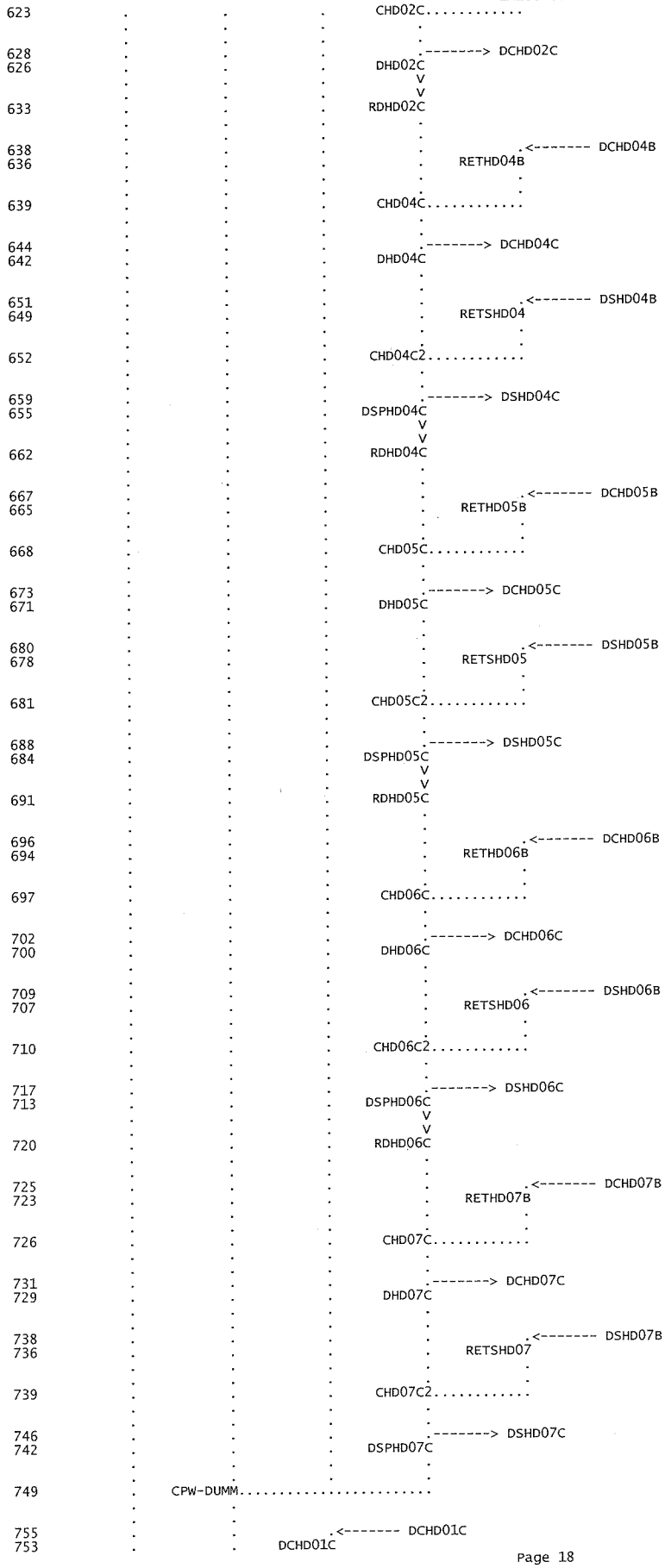
(.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW

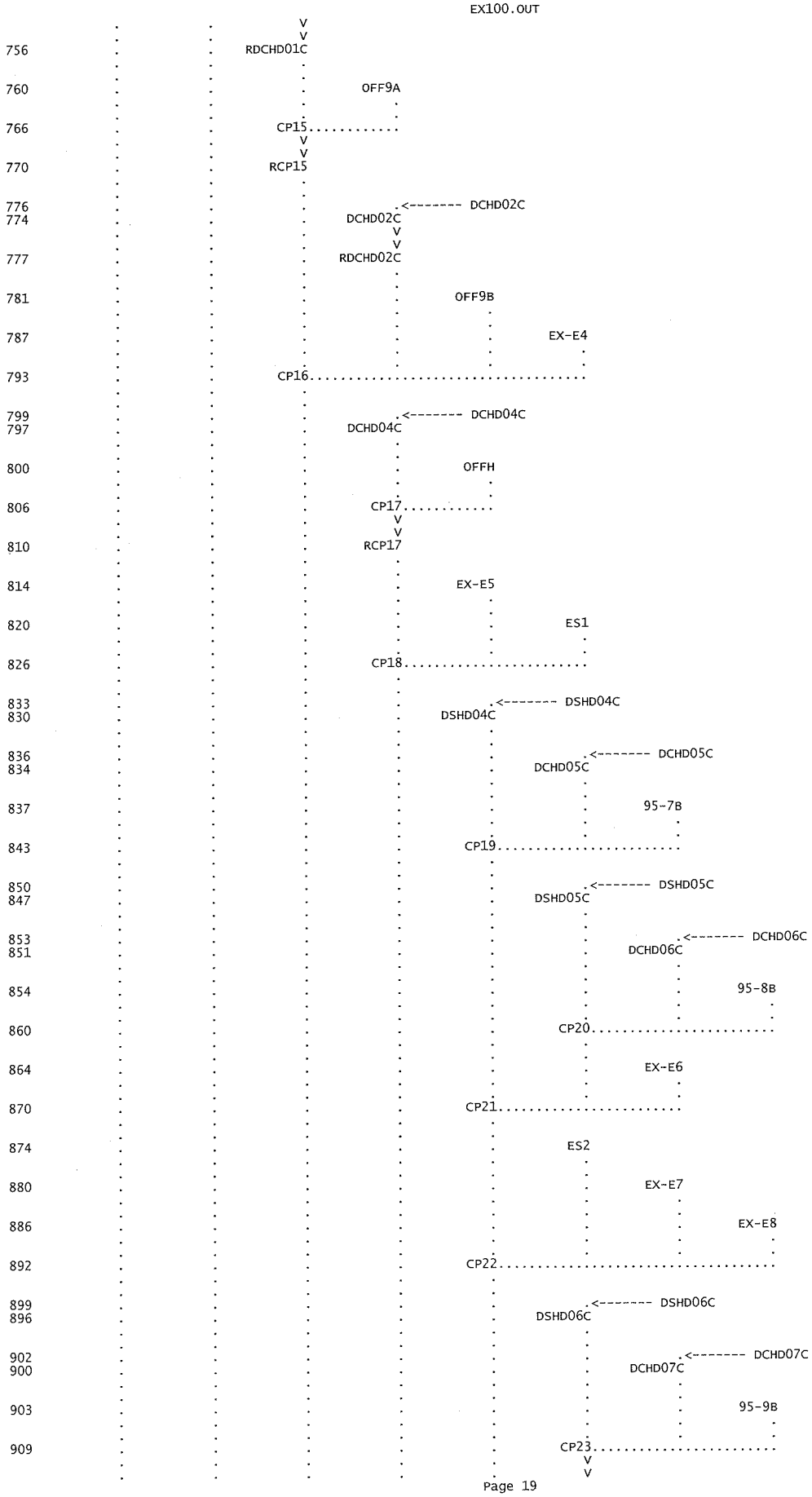


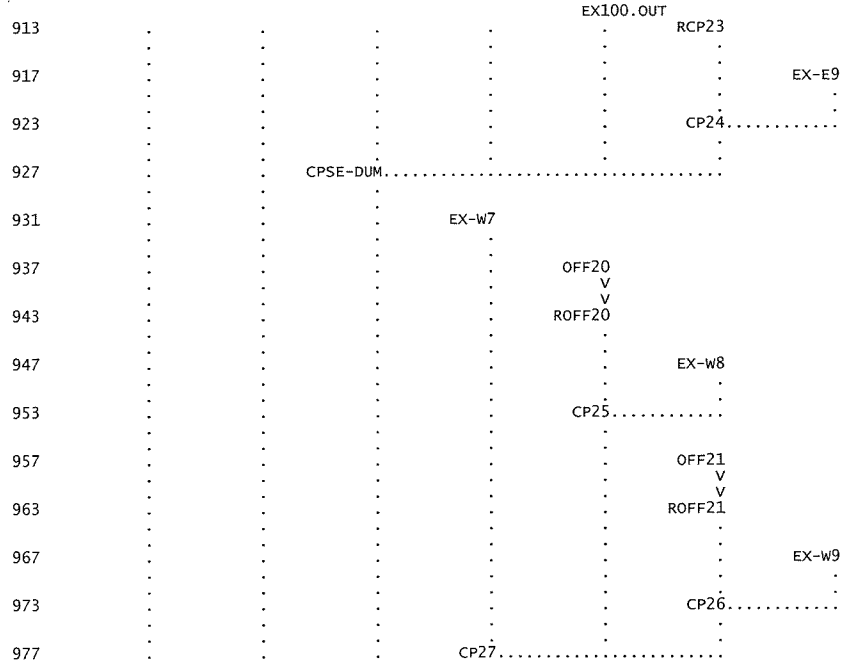

123 OFF4
129 CP5
133 RCP5
137 EX-E2
143 CP6
147 OFFD-A
153 ROFFD-A
157 OFFD-B
163 95-4
169 CP7
173 OFF5A
179 OFF5B
185 CP7A
189 RCP7A
193 EX-E3
199 CP8
203 CPNE-DUM
207 OFF10
213 ROFF10
217 OFFF-A
223 ROFFF-A
227 OFFF-B
233 EX-W1
239 OFF11
245 CP9
252 -------> DCHD02A
249 DCP9
257 RCP9
260 OFFG
266 EX-W2
272 OFF12
278 OFF16
284 ROFF16
288 EX-W3
294 CP10
301 -------> DCHD04A
298 DCP10
310 -------> DSHD04A
306 DSPHD04A


V
313 RDCP10
316 EX-W4
322 CP11
329 -------> DCHD05A
326 DCP11
338 -------> DSHD05A
334 DSPHD05A
V
V
341 RDCP11
344 OFF18
V
V
350 ROFF18
354 EX-W5
360 CP12
364 OFF14
370 CP13
377 -------> DCHD06A
374 DCP13
386 -------> DSHD06A
382 DSPHD06A
V
V
389 RDCRCOFF
392 EX-W6
398 OFF15
404 CP14
411 -------> DCHD07A
408 DCP14
420 -------> DSHD07A
416 DSPHD07A
423 OFFE
429 95-5
435 CHD01B
441 -------> DCHD01B
439 DHD01B
V
V
446 RDHD01B
449 OFF8
457 <------- DCHD02A
455 RETHD02A
458 CHD02B
464 -------> DCHD02B
462 DHD02B
V
V
469 RDHD02B
472 95-6
480 <------- DCHD04A
478 RETHD04A
481 CHD04B
487 -------> DCHD04B
485 DHD04B


494
492
RETSHD04
DSHD04A
95-7A
495
501
CHD04B2
508
504
DSPHD04B
DSHD04B
511
RDHD04B
516
514
RETHD05A
DCHD05A
517
CHD05B
523
521
DHD05B
DCHD05B
528
95-8A
536
534
RETSHD05
DSHD05A
537
CHD05B2
544
540
DSPHD05B
DSHD05B
547
RDHD05B
552
550
RETHD06A
DCHD06A
553
CHD06B
558
556
DHD06B
DCHD06B
561
95-9A
569
567
RETSHD06
DSHD06A
570
CHD06B2
577
573
DSPHD06B
DSHD06B
580
RDHD06B
585
583
RETHD07A
DCHD07A
586
CHD07B
591
589
DHD07B
DCHD07B
598
596
RETSHD07
DSHD07A
599
CHD07B2
606
602
DSPHD07B
DSHD07B
611
609
DCHD01B
DCHD01B
614
612
DHD01C
DCHD01C
617
RDHD01C
622
620
RETHD02B
DCHD02B


623 CHD02C
628
626 DHD02C
633 RDHD02C
638
636 RETHD04B
639 CHD04C
644
642 DHD04C
651
649 RETSHD04
652 CHD04C2
659
655 DSPHD04C
662 RDHD04C
667
665 RETHD05B
668 CHD05C
673
671 DHD05C
680
678 RETSHD05
681 CHD05C2
688
684 DSPHD05C
691 RDHD05C
696
694 RETHD06B
697 CHD06C
702
700 DHD06C
709
707 RETSHD06
710 CHD06C2
717
713 DSPHD06C
720 RDHD06C
725
723 RETHD07B
726 CHD07C
731
729 DHD07C
738
736 RETSHD07
739 CHD07C2
746
742 DSPHD07C
749 CPW-DUMM
755
753 DCHD01C
DCHD02C
DCHD04B
DCHD04C
DSHD04B
DSHD04C
DCHD05B
DCHD05C
DSHD05B
DSHD05C
DCHD06B
DCHD06C
DSHD06B
DSHD06C
DCHD07B
DCHD07C
DSHD07B
DSHD07C
DCHD01C


RDCHD01C
OFF9A
CP15
RCP15
DCHD02C
DCHD02C
RDCHD02C
OFF9B
EX-E4
CP16
DCHD04C
DCHD04C
OFFH
CP17
RCP17
EX-E5
ES1
CP18
DSHD04C
DSHD04C
DCHD05C
DCHD05C
95-7B
CP19
DSHD05C
DSHD05C
DCHD06C
DCHD06C
95-8B
CP20
EX-E6
CP21
ES2
EX-E7
EX-E8
CP22
DSHD06C
DSHD06C
DCHD07C
DCHD07C
95-9B
CP23



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   25NOV15  TIME  11:10:26   *
*                                       *
*****************************************
```

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

```
*****************************************************************
* ............................................................. *
* :                                                           : *
* :              KYLE CANYON                                  : *
* :                                                           : *
* :              EXISTING CONDITIONS                          : *
* :...........................................................: *
* :              RETURN PERIOD_ _ _ _100 & 10 -YEAR           : *
* :              DISTRIBUTION_ _ _ _ 6-HOUR SDN3              : *
* :              PROJECT NO_ _ _ _ _ 784.016                  : *
* :              FILENAME_ _ _ _ _ _ EX-RTC.H1                : *
* :              DATE MODELED_ _ _ _ 11/28/06                 : *
* :              MODELED BY_ _ _ _ _ REH/BJK                  : *
* :...........................................................: *
* :                                                           : *
* :...........................................................: *
*****************************************************************
```

JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:

AREA SQ.MI.	DARF
0.0 - 0.5	0.99
0.5 - 1.0	0.98
1.0 - 2.0	0.95
2.0 - 4.0	0.92
4.0 - 6.0	0.91
6.0 - 8.0	0.89

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

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

                COMPUTATION INTERVAL      .08 HOURS
                    TOTAL TIME BASE   24.92 HOURS

       ENGLISH UNITS
            DRAINAGE AREA         SQUARE MILES
            PRECIPITATION DEPTH   INCHES
            LENGTH, ELEVATION     FEET
```

FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
1.00 .98 .95 .92 .91 .89 .57

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

1

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .98	RATIO 3 .95	RATIO 4 .92	RATIO 5 .91	RATIO 6 .89	RATIO 7 .57
HYDROGRAPH AT											
+	OFFA	.02	1	FLOW	17.	16.	15.	14.	14.	13.	4.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	95-1	.00	1	FLOW	7.	7.	7.	6.	6.	6.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CPNM	.02	1	FLOW	22.	21.	20.	19.	18.	18.	6.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	OFFB	.13	1	FLOW	79.	76.	71.	67.	65.	62.	21.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92
HYDROGRAPH AT											
+	95-2	.00	1	FLOW	7.	7.	6.	6.	6.	6.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP1	.14	1	FLOW	81.	78.	73.	69.	67.	64.	21.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92
ROUTED TO											
+	RCP1	.14	1	FLOW	80.	76.	72.	67.	66.	63.	21.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT											
+	OFF2	.09	1	FLOW	61.	59.	55.	51.	50.	48.	15.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
2 COMBINED AT											
+	CP2	.23	1	FLOW	129.	124.	116.	109.	106.	101.	33.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83
ROUTED TO											
+	RCP2	.23	1	FLOW	125.	120.	113.	105.	103.	98.	32.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT											
+	EX-E1	.05	1	FLOW	36.	34.	32.	30.	29.	28.	9.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
2 COMBINED AT											
+	CP3	.28	1	FLOW	151.	145.	136.	127.	124.	118.	38.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92
HYDROGRAPH AT											
+	OFFC	.13	1	FLOW	80.	77.	72.	67.	66.	63.	20.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT											
+	95-3	.01	1	FLOW	15.	14.	14.	13.	13.	13.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP4	.14	1	FLOW	87.	84.	79.	74.	72.	69.	22.

				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT											
+	OFF4	.03	1	FLOW	27.	26.	24.	23.	22.	21.	7.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	CP5	.17	1	FLOW	105.	101.	95.	89.	87.	83.	27.
				TIME	3.67	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO											
+	RCP5	.17	1	FLOW	100.	96.	90.	84.	82.	79.	26.
				TIME	3.83	3.83	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT											
+	EX-E2	.22	1	FLOW	141.	136.	127.	119.	116.	111.	35.
				TIME	3.67	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT											
+	CP6	.39	1	FLOW	233.	223.	209.	196.	191.	182.	59.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT											
+	OFFD-A	.64	1	FLOW	357.	343.	323.	303.	296.	283.	97.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08
ROUTED TO											
+	ROFFD-A	.64	1	FLOW	330.	317.	299.	280.	274.	262.	90.
				TIME	4.42	4.42	4.42	4.42	4.42	4.42	4.50
HYDROGRAPH AT											
+	OFFD-B	.50	1	FLOW	242.	232.	218.	204.	199.	190.	61.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08
HYDROGRAPH AT											
+	95-4	.01	1	FLOW	17.	17.	16.	15.	15.	14.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CP7	1.15	1	FLOW	499.	479.	450.	422.	413.	395.	134.
				TIME	4.25	4.25	4.25	4.33	4.33	4.33	4.42
HYDROGRAPH AT											
+	OFF5A	.02	1	FLOW	26.	25.	24.	23.	23.	22.	11.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	OFF5B	.01	1	FLOW	18.	17.	17.	16.	16.	15.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CP7A	1.18	1	FLOW	502.	483.	454.	426.	416.	398.	136.
				TIME	4.25	4.25	4.33	4.33	4.33	4.33	4.42
ROUTED TO											
+	RCP7A	1.18	1	FLOW	497.	478.	450.	421.	412.	394.	135.
				TIME	4.42	4.42	4.42	4.42	4.42	4.42	4.50
HYDROGRAPH AT											
+	EX-E3	.19	1	FLOW	112.	107.	101.	94.	92.	87.	28.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83
2 COMBINED AT											
+	CP8	1.37	1	FLOW	528.	508.	478.	448.	438.	419.	144.
				TIME	4.42	4.42	4.42	4.42	4.42	4.42	4.58
4 COMBINED AT											
+	CPNE-DUM	2.07	1	FLOW	739.	709.	665.	622.	608.	580.	190.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	4.17
HYDROGRAPH AT											
+	OFF10	.67	1	FLOW	608.	591.	565.	539.	530.	513.	248.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08
ROUTED TO											
+	ROFF10	.67	1	FLOW	548.	532.	508.	485.	477.	462.	224.
				TIME	4.58	4.58	4.58	4.58	4.58	4.58	4.67
HYDROGRAPH AT											
+	OFFF-A	.99	1	FLOW	870.	843.	803.	763.	750.	723.	322.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO											
+	ROFFF-A	.99	1	FLOW	819.	793.	755.	718.	705.	680.	303.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT											
+	OFFF-B	.61	1	FLOW	447.	433.	411.	390.	383.	369.	160.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT											
+	EX-W1	.02	1	FLOW	20.	19.	18.	17.	16.	16.	5.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	OFF11	.00	1	FLOW	4.	4.	4.	3.	3.	3.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58
5 COMBINED AT											
+	CP9	2.30	1	FLOW	1489.	1443.	1374.	1305.	1282.	1237.	556.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
DIVERSION TO											
+	DCHD02A	2.30	1	FLOW	493.	477.	453.	431.	424.	409.	252.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT											
+	DCP9	2.30	1	FLOW	996.	965.	920.	874.	859.	828.	304.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
ROUTED TO											
+	RCP9	2.30	1	FLOW	992.	962.	917.	870.	855.	824.	303.

				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT											
+	OFFG	.04	1	FLOW	48.	47.	44.	42.	41.	40.	18.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	EX-W2	.02	1	FLOW	22.	21.	20.	19.	19.	18.	7.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	OFF12	.01	1	FLOW	8.	8.	7.	7.	7.	6.	2.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	OFF16	.79	1	FLOW	555.	538.	514.	490.	482.	466.	220.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO											
+	ROFF16	.79	1	FLOW	537.	521.	498.	474.	466.	451.	213.
				TIME	4.33	4.33	4.33	4.33	4.33	4.33	4.42
HYDROGRAPH AT											
+	EX-W3	.27	1	FLOW	268.	260.	248.	236.	232.	224.	103.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
6 COMBINED AT											
+	CP10	3.43	1	FLOW	1613.	1564.	1492.	1419.	1395.	1347.	550.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DCHD04A	3.43	1	FLOW	985.	952.	902.	854.	838.	806.	285.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DCP10	3.43	1	FLOW	628.	613.	590.	565.	557.	540.	265.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DSHD04A	3.43	1	FLOW	102.	87.	64.	39.	31.	14.	1.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DSPHD04A	3.43	1	FLOW	526.	526.	526.	526.	526.	526.	264.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
ROUTED TO											
+	RDCP10	3.43	1	FLOW	526.	526.	526.	526.	526.	526.	263.
				TIME	4.25	4.08	4.17	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	EX-W4	.10	1	FLOW	121.	117.	112.	106.	104.	101.	47.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67
2 COMBINED AT											
+	CP11	3.54	1	FLOW	578.	572.	564.	558.	555.	550.	272.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
DIVERSION TO											
+	DCHD05A	3.54	1	FLOW	265.	263.	261.	259.	258.	256.	188.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
HYDROGRAPH AT											
+	DCP11	3.54	1	FLOW	313.	309.	304.	299.	297.	294.	85.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
DIVERSION TO											
+	DSHD05A	3.54	1	FLOW	1.	1.	1.	0.	0.	0.	0.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
HYDROGRAPH AT											
+	DSPHD05A	3.54	1	FLOW	313.	309.	303.	299.	297.	293.	84.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
ROUTED TO											
+	RDCP11	3.54	1	FLOW	310.	308.	301.	298.	295.	293.	84.
				TIME	4.00	4.00	4.00	4.08	4.08	4.17	4.25
HYDROGRAPH AT											
+	OFF18	.55	1	FLOW	495.	480.	459.	437.	430.	416.	196.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO											
+	ROFF18	.55	1	FLOW	473.	459.	439.	418.	411.	397.	187.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT											
+	EX-W5	.45	1	FLOW	443.	429.	410.	390.	383.	370.	170.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT											
+	CP12	1.00	1	FLOW	792.	768.	733.	698.	686.	663.	308.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT											
+	OFF14	.01	1	FLOW	19.	19.	18.	17.	17.	16.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CP13	4.55	1	FLOW	1105.	1076.	1024.	971.	953.	917.	358.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
DIVERSION TO											
+	DCHD06A	4.55	1	FLOW	835.	826.	810.	791.	784.	771.	357.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT											
+	DCP13	4.55	1	FLOW	270.	250.	214.	180.	169.	146.	0.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.67
DIVERSION TO											
+	DSHD06A	4.55	1	FLOW	0.	0.	0.	0.	0.	0.	0.

				TIME	3.92	3.92	3.92	3.92	3.92	3.92	.00
HYDROGRAPH AT											
+	DSPHD06A	4.55	1	FLOW	270.	250.	214.	180.	169.	146.	0.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.67
ROUTED TO											
+	RDCRCOFF	4.55	1	FLOW	263.	242.	209.	181.	168.	148.	0.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.92
HYDROGRAPH AT											
+	EX-W6	.02	1	FLOW	21.	21.	20.	19.	19.	18.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58
HYDROGRAPH AT											
+	OFF15	.04	1	FLOW	49.	47.	45.	43.	42.	41.	19.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	CP14	4.60	1	FLOW	282.	260.	224.	195.	182.	161.	28.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
DIVERSION TO											
+	DCHD07A	4.60	1	FLOW	58.	58.	56.	56.	55.	54.	16.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
HYDROGRAPH AT											
+	DCP14	4.60	1	FLOW	224.	202.	168.	140.	127.	107.	12.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
DIVERSION TO											
+	DSHD07A	4.60	1	FLOW	1.	1.	0.	0.	0.	0.	0.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
HYDROGRAPH AT											
+	DSPHD07A	4.60	1	FLOW	223.	202.	167.	139.	127.	107.	12.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
HYDROGRAPH AT											
+	OFFE	.04	1	FLOW	26.	25.	24.	22.	22.	21.	6.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
HYDROGRAPH AT											
+	95-5	.04	1	FLOW	60.	59.	56.	54.	53.	51.	26.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CHD01B	.08	1	FLOW	77.	74.	71.	67.	66.	64.	28.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO											
+	DCHD01B	.08	1	FLOW	77.	74.	71.	67.	66.	64.	28.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DHD01B	.08	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	3.25	3.25	3.25	3.25	3.25	3.25	3.42
ROUTED TO											
+	RDHD01B	.08	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.75	4.75	3.50	3.50	3.50	3.50	3.58
HYDROGRAPH AT											
+	OFF8	.01	1	FLOW	19.	19.	18.	17.	17.	17.	8.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	RETHD02A	.00	1	FLOW	493.	477.	453.	431.	424.	409.	252.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
3 COMBINED AT											
+	CHD02B	.09	1	FLOW	495.	479.	455.	433.	426.	411.	253.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
DIVERSION TO											
+	DCHD02B	.09	1	FLOW	296.	287.	274.	261.	256.	248.	151.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT											
+	DHD02B	.09	1	FLOW	199.	192.	181.	172.	169.	164.	102.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
ROUTED TO											
+	RDHD02B	.09	1	FLOW	197.	190.	181.	171.	168.	163.	102.
				TIME	4.17	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	95-6	.01	1	FLOW	17.	16.	16.	15.	15.	14.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RETHD04A	.00	1	FLOW	985.	952.	902.	854.	838.	806.	285.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
3 COMBINED AT											
+	CHD04B	.10	1	FLOW	1184.	1143.	1084.	1027.	1008.	970.	388.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DCHD04B	.10	1	FLOW	613.	594.	567.	541.	533.	516.	282.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DHD04B	.10	1	FLOW	571.	549.	517.	485.	475.	454.	106.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	RETSHD04	.00	1	FLOW	102.	87.	64.	39.	31.	14.	1.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	95-7A	.01	1	FLOW	13.	13.	12.	12.	12.	11.	6.

				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT												
+	CHD04B2	.11	1	FLOW	674.	637.	582.	526.	507.	469.	107.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO												
+	DSHD04B	.11	1	FLOW	1.	1.	1.	1.	1.	0.	0.
				TIME	4.17	4.17	4.17	4.25	4.25	4.25	4.25
HYDROGRAPH AT												
+	DSPHD04B	.11	1	FLOW	673.	636.	581.	525.	507.	469.	107.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
ROUTED TO												
+	RDHD04B	.11	1	FLOW	672.	635.	581.	524.	506.	468.	106.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT												
+	RETHD05A	.00	1	FLOW	265.	263.	261.	259.	258.	256.	188.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
2 COMBINED AT												
+	CHD05B	.11	1	FLOW	928.	890.	836.	779.	761.	722.	293.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
DIVERSION TO												
+	DCHD05B	.11	1	FLOW	459.	441.	414.	389.	382.	368.	200.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT												
+	DHD05B	.11	1	FLOW	469.	450.	421.	390.	378.	354.	93.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT												
+	95-8A	.01	1	FLOW	10.	10.	10.	9.	9.	9.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	RETSHD05	.00	1	FLOW	1.	1.	1.	0.	0.	0.	0.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
3 COMBINED AT												
+	CHD05B2	.11	1	FLOW	470.	451.	422.	391.	379.	355.	94.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
DIVERSION TO												
+	DSHD05B	.11	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.25	4.25	4.25	4.25
HYDROGRAPH AT												
+	DSPHD05B	.11	1	FLOW	470.	451.	422.	391.	379.	355.	94.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
ROUTED TO												
+	RDHD05B	.11	1	FLOW	469.	450.	422.	390.	378.	354.	93.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT												
+	RETHD06A	.00	1	FLOW	835.	826.	810.	791.	784.	771.	357.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
2 COMBINED AT												
+	CHD06B	.11	1	FLOW	1251.	1224.	1181.	1137.	1121.	1090.	430.
				TIME	4.08	4.08	4.08	4.17	4.17	4.17	4.08
DIVERSION TO												
+	DCHD06B	.11	1	FLOW	848.	840.	826.	812.	807.	798.	430.
				TIME	4.08	4.08	4.08	4.17	4.17	4.17	4.08
HYDROGRAPH AT												
+	DHD06B	.11	1	FLOW	403.	385.	355.	325.	314.	292.	0.
				TIME	4.08	4.08	4.08	4.17	4.17	4.17	3.58
HYDROGRAPH AT												
+	95-9A	.01	1	FLOW	19.	19.	18.	17.	17.	17.	9.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	RETSHD06	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	.00
3 COMBINED AT												
+	CHD06B2	.12	1	FLOW	406.	387.	358.	326.	315.	294.	9.
				TIME	4.08	4.08	4.08	4.17	4.17	4.17	3.50
DIVERSION TO												
+	DSHD06B	.12	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	3.42
HYDROGRAPH AT												
+	DSPHD06B	.12	1	FLOW	406.	387.	358.	326.	315.	294.	9.
				TIME	4.08	4.08	4.08	4.17	4.17	4.17	3.50
ROUTED TO												
+	RDHD06B	.12	1	FLOW	403.	385.	357.	326.	315.	293.	9.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
HYDROGRAPH AT												
+	RETHD07A	.00	1	FLOW	58.	58.	56.	56.	55.	54.	16.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
2 COMBINED AT												
+	CHD07B	.12	1	FLOW	459.	440.	411.	379.	368.	346.	24.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
DIVERSION TO												
+	DCHD07B	.12	1	FLOW	65.	65.	64.	63.	63.	63.	14.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
HYDROGRAPH AT												
+	DHD07B	.12	1	FLOW	394.	375.	347.	316.	305.	283.	10.

				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
HYDROGRAPH AT												
+	RETSHD07	.00	1	FLOW	1.	1.	0.	0.	0.	0.	0.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
2 COMBINED AT												
+	CHD07B2	.12	1	FLOW	394.	376.	347.	316.	305.	283.	10.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
DIVERSION TO												
+	DSHD07B	.12	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.08	4.17	4.17	4.17	4.17	4.17	3.50
HYDROGRAPH AT												
+	DSPHD07B	.12	1	FLOW	394.	375.	347.	316.	305.	283.	10.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
HYDROGRAPH AT												
+	DCHD01B	.00	1	FLOW	77.	74.	71.	67.	66.	64.	28.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO												
+	DCHD01C	.00	1	FLOW	77.	74.	71.	67.	66.	63.	28.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	DHD01C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	3.17	3.17	3.17	3.17	3.17	3.25	3.33
ROUTED TO												
+	RDHD01C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	3.42	3.42	3.42	3.42	3.42	3.42	3.58
HYDROGRAPH AT												
+	RETHD02B	.00	1	FLOW	296.	287.	274.	261.	256.	248.	151.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
2 COMBINED AT												
+	CHD02C	.00	1	FLOW	297.	288.	274.	261.	257.	248.	151.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
DIVERSION TO												
+	DCHD02C	.00	1	FLOW	146.	142.	135.	128.	125.	121.	83.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT												
+	DHD02C	.00	1	FLOW	150.	146.	139.	133.	131.	127.	68.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
ROUTED TO												
+	RDHD02C	.00	1	FLOW	149.	145.	139.	132.	130.	126.	68.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT												
+	RETHD04B	.00	1	FLOW	613.	594.	567.	541.	533.	516.	282.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
2 COMBINED AT												
+	CHD04C	.00	1	FLOW	762.	739.	706.	673.	663.	642.	349.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO												
+	DCHD04C	.00	1	FLOW	322.	313.	301.	289.	285.	278.	204.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT												
+	DHD04C	.00	1	FLOW	440.	426.	405.	384.	378.	365.	145.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT												
+	RETSHD04	.00	1	FLOW	1.	1.	1.	1.	1.	0.	0.
				TIME	4.17	4.17	4.17	4.25	4.25	4.25	4.25
2 COMBINED AT												
+	CHD04C2	.00	1	FLOW	441.	426.	405.	385.	378.	365.	145.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO												
+	DSHD04C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT												
+	DSPHD04C	.00	1	FLOW	440.	426.	405.	384.	378.	365.	145.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
ROUTED TO												
+	RDHD04C	.00	1	FLOW	440.	426.	405.	384.	378.	365.	144.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT												
+	RETHD05B	.00	1	FLOW	459.	441.	414.	389.	382.	368.	200.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
2 COMBINED AT												
+	CHD05C	.00	1	FLOW	899.	867.	819.	774.	760.	733.	345.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
DIVERSION TO												
+	DCHD05C	.00	1	FLOW	275.	265.	251.	238.	235.	229.	178.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT												
+	DHD05C	.00	1	FLOW	624.	601.	568.	535.	525.	504.	167.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT												
+	RETSHD05	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.25	4.25	4.25	4.25
2 COMBINED AT												
+	CHD05C2	.00	1	FLOW	624.	601.	568.	536.	526.	504.	167.

				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
DIVERSION TO											
+	DSHD05C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DSPHD05C	.00	1	FLOW	624.	601.	568.	535.	525.	503.	167.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
ROUTED TO											
+	RDHD05C	.00	1	FLOW	623.	601.	568.	535.	525.	503.	167.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	RETHD06B	.00	1	FLOW	848.	840.	826.	812.	807.	798.	430.
				TIME	4.08	4.08	4.08	4.17	4.17	4.17	4.08
2 COMBINED AT											
+	CHD06C	.00	1	FLOW	1464.	1433.	1387.	1341.	1325.	1293.	587.
				TIME	4.17	4.17	4.17	4.25	4.17	4.17	4.17
DIVERSION TO											
+	DCHD06C	.00	1	FLOW	888.	875.	855.	838.	832.	820.	549.
				TIME	4.17	4.17	4.17	4.25	4.17	4.17	4.17
HYDROGRAPH AT											
+	DHD06C	.00	1	FLOW	576.	559.	532.	503.	493.	473.	37.
				TIME	4.17	4.17	4.17	4.25	4.17	4.17	4.17
HYDROGRAPH AT											
+	RETSHD06	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	3.42
2 COMBINED AT											
+	CHD06C2	.00	1	FLOW	576.	559.	532.	503.	493.	473.	37.
				TIME	4.17	4.17	4.17	4.25	4.17	4.17	4.17
DIVERSION TO											
+	DSHD06C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT											
+	DSPHD06C	.00	1	FLOW	576.	558.	532.	502.	493.	472.	37.
				TIME	4.17	4.17	4.17	4.25	4.17	4.17	4.17
ROUTED TO											
+	RDHD06C	.00	1	FLOW	575.	558.	531.	502.	493.	472.	36.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	RETHD07B	.00	1	FLOW	65.	65.	64.	63.	63.	63.	14.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
2 COMBINED AT											
+	CHD07C	.00	1	FLOW	640.	622.	595.	566.	556.	535.	38.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DCHD07C	.00	1	FLOW	144.	138.	128.	119.	115.	108.	22.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DHD07C	.00	1	FLOW	495.	484.	467.	447.	440.	426.	17.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	RETSHD07	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.08	4.17	4.17	4.17	4.17	4.17	3.50
2 COMBINED AT											
+	CHD07C2	.00	1	FLOW	495.	484.	467.	447.	441.	426.	17.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DSHD07C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.25	4.25	4.17	4.25
HYDROGRAPH AT											
+	DSPHD07C	.00	1	FLOW	495.	484.	467.	447.	440.	426.	17.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
3 COMBINED AT											
+	CPW-DUMM	4.72	1	FLOW	1057.	1012.	940.	866.	838.	787.	28.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	3.58
HYDROGRAPH AT											
+	DCHD01C	.00	1	FLOW	77.	74.	71.	67.	66.	63.	28.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO											
+	RDCHD01C	.00	1	FLOW	74.	72.	68.	65.	64.	62.	28.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	OFF9A	.03	1	FLOW	61.	59.	57.	54.	54.	52.	26.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP15	.03	1	FLOW	131.	127.	120.	114.	113.	109.	50.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO											
+	RCP15	.03	1	FLOW	117.	113.	108.	103.	101.	97.	44.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	DCHD02C	.00	1	FLOW	146.	142.	135.	128.	125.	121.	83.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
ROUTED TO											
+	RDCHD02C	.00	1	FLOW	146.	141.	134.	127.	125.	120.	83.

				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT											
+	OFF9B	.01	1	FLOW	21.	20.	19.	18.	18.	17.	9.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	EX-E4	.22	1	FLOW	147.	141.	132.	123.	120.	115.	36.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
4 COMBINED AT											
+	CP16	.27	1	FLOW	354.	344.	328.	312.	308.	297.	144.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
HYDROGRAPH AT											
+	DCHD04C	.00	1	FLOW	322.	313.	301.	289.	285.	278.	204.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	OFFH	.01	1	FLOW	15.	14.	14.	13.	13.	12.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP17	.01	1	FLOW	323.	315.	302.	290.	286.	279.	205.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
ROUTED TO											
+	RCP17	.01	1	FLOW	321.	313.	301.	289.	285.	277.	204.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	EX-E5	.10	1	FLOW	79.	76.	72.	68.	66.	63.	22.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	ES1	.02	1	FLOW	29.	28.	27.	26.	26.	25.	14.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CP18	.13	1	FLOW	340.	331.	318.	305.	301.	293.	212.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.58
HYDROGRAPH AT											
+	DSHD04C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT											
+	DCHD05C	.00	1	FLOW	275.	265.	251.	238.	235.	229.	178.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	95-7B	.01	1	FLOW	20.	20.	19.	18.	18.	18.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CP19	.01	1	FLOW	277.	267.	253.	240.	236.	231.	179.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	DSHD05C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DCHD06C	.00	1	FLOW	888.	875.	855.	838.	832.	820.	549.
				TIME	4.17	4.17	4.17	4.25	4.17	4.17	4.17
HYDROGRAPH AT											
+	95-8B	.00	1	FLOW	8.	8.	8.	7.	7.	7.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CP20	.00	1	FLOW	889.	875.	856.	839.	833.	821.	550.
				TIME	4.17	4.17	4.17	4.25	4.25	4.17	4.17
HYDROGRAPH AT											
+	EX-E6	.02	1	FLOW	21.	21.	20.	19.	19.	18.	9.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	CP21	.03	1	FLOW	1167.	1143.	1110.	1080.	1071.	1053.	728.
				TIME	4.17	4.25	4.25	4.25	4.25	4.25	4.17
HYDROGRAPH AT											
+	ES2	.05	1	FLOW	84.	82.	79.	76.	75.	73.	43.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	EX-E7	.03	1	FLOW	45.	43.	41.	40.	39.	38.	18.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	EX-E8	.02	1	FLOW	22.	22.	21.	20.	19.	19.	9.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
4 COMBINED AT											
+	CP22	.13	1	FLOW	1187.	1163.	1128.	1098.	1088.	1071.	738.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT											
+	DSHD06C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT											
+	DCHD07C	.00	1	FLOW	144.	138.	128.	119.	115.	108.	22.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	95-9B	.01	1	FLOW	22.	21.	20.	20.	19.	19.	10.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	CP23	.01	1	FLOW	147.	140.	131.	121.	117.	110.	23.

				TIME	4.17	4.25	4.25	4.25	4.25	4.25	4.17
ROUTED TO											
+	RCP23	.01	1	FLOW	147.	140.	131.	121.	117.	110.	23.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	EX-E9	.01	1	FLOW	13.	13.	12.	11.	11.	11.	5.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	CP24	.02	1	FLOW	148.	142.	132.	122.	118.	111.	24.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
4 COMBINED AT											
+	CPSE-DUM	.54	1	FLOW	1901.	1854.	1784.	1720.	1700.	1663.	1082.
				TIME	4.17	4.17	4.17	4.17	4.08	4.08	4.17
HYDROGRAPH AT											
+	EX-W7	.20	1	FLOW	197.	191.	183.	174.	171.	165.	76.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT											
+	OFF20	.07	1	FLOW	85.	82.	79.	75.	74.	71.	33.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67
ROUTED TO											
+	ROFF20	.07	1	FLOW	70.	68.	65.	62.	61.	59.	28.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT											
+	EX-W8	.22	1	FLOW	213.	207.	197.	188.	184.	178.	81.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT											
+	CP25	.28	1	FLOW	268.	260.	248.	236.	232.	224.	104.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83
HYDROGRAPH AT											
+	OFF21	.53	1	FLOW	475.	461.	440.	419.	412.	398.	186.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO											
+	ROFF21	.53	1	FLOW	453.	440.	420.	400.	393.	380.	176.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT											
+	EX-W9	.18	1	FLOW	173.	168.	159.	151.	149.	143.	63.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT											
+	CP26	.71	1	FLOW	558.	541.	516.	491.	482.	466.	213.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00
3 COMBINED AT											
+	CP27	1.19	1	FLOW	953.	924.	880.	838.	824.	796.	366.
				TIME	3.83	3.83	3.83	3.92	3.92	3.92	3.92

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .00									
	RCP9 MANE	1.04	994.73	250.92	1.00	5.00	992.09	250.00	1.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1224E+03 EXCESS= .0000E+00 OUTFLOW= .1224E+03 BASIN STORAGE= .2934E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
	RCP9 MANE	1.05	964.16	251.80	.96	5.00	961.89	250.00	.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1181E+03 EXCESS= .0000E+00 OUTFLOW= .1181E+03 BASIN STORAGE= .3029E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
	RCP9 MANE	1.06	919.51	251.64	.91	5.00	916.79	250.00	.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1117E+03 EXCESS= .0000E+00 OUTFLOW= .1117E+03 BASIN STORAGE= .2896E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
	RCP9 MANE	1.08	873.48	251.67	.86	5.00	870.50	250.00	.86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1052E+03 EXCESS= .0000E+00 OUTFLOW= .1052E+03 BASIN STORAGE= .2878E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
	RCP9 MANE	1.08	857.94	251.73	.84	5.00	854.95	250.00	.84

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1031E+03 EXCESS= .0000E+00 OUTFLOW= .1031E+03 BASIN STORAGE= .2985E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
	RCP9 MANE	1.09	826.95	251.87	.80	5.00	823.97	250.00	.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9881E+02 EXCESS= .0000E+00 OUTFLOW= .9881E+02 BASIN STORAGE= .2986E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
	RCP9 MANE	1.40	303.67	256.31	.27	5.00	302.95	255.00	.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3340E+02 EXCESS= .0000E+00 OUTFLOW= .3340E+02 BASIN STORAGE= .2887E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.55	526.69	237.48	.51	5.00	526.07	255.00	.51

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9259E+02 EXCESS= .0000E+00 OUTFLOW= .9259E+02 BASIN STORAGE= .4003E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.55	527.06	237.48	.50	5.00	526.06	255.00	.50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9077E+02 EXCESS= .0000E+00 OUTFLOW= .9077E+02 BASIN STORAGE= .3931E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.55	526.30	242.14	.48	5.00	526.07	250.00	.48

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8782E+02 EXCESS= .0000E+00 OUTFLOW= .8782E+02 BASIN STORAGE= .3755E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.55	526.26	246.80	.46	5.00	526.03	255.00	.46

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8474E+02 EXCESS= .0000E+00 OUTFLOW= .8474E+02 BASIN STORAGE= .3646E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.55	526.29	248.35	.46	5.00	526.04	255.00	.46

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8364E+02 EXCESS= .0000E+00 OUTFLOW= .8364E+02 BASIN STORAGE= .4061E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.55	526.28	251.46	.44	5.00	526.03	255.00	.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8136E+02 EXCESS= .0000E+00 OUTFLOW= .8136E+02 BASIN STORAGE= .3980E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.84	263.79	258.17	.21	5.00	262.85	260.00	.21

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3787E+02 EXCESS= .0000E+00 OUTFLOW= .3787E+02 BASIN STORAGE= .4044E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.11	312.32	237.00	.22	5.00	309.85	240.00	.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4168E+02 EXCESS= .0000E+00 OUTFLOW= .4168E+02 BASIN STORAGE= .2346E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.11	308.85	236.64	.21	5.00	308.45	240.00	.21

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4052E+02 EXCESS= .0000E+00 OUTFLOW= .4052E+02 BASIN STORAGE= .2353E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.12	302.80	241.08	.20	5.00	301.08	245.00	.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3861E+02 EXCESS= .0000E+00 OUTFLOW= .3861E+02 BASIN STORAGE= .2278E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.12	298.29	246.44	.19	5.00	297.93	245.00	.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3660E+02 EXCESS= .0000E+00 OUTFLOW= .3661E+02 BASIN STORAGE= .2336E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.12	296.56	246.82	.19	5.00	295.34	245.00	.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3589E+02 EXCESS= .0000E+00 OUTFLOW= .3589E+02 BASIN STORAGE= .2341E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.13	293.19	249.82	.18	5.00	293.17	250.00	.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3442E+02 EXCESS= .0000E+00 OUTFLOW= .3442E+02 BASIN STORAGE= .2350E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.54	84.38	256.56	.03	5.00	83.52	255.00	.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6199E+01 EXCESS= .0000E+00 OUTFLOW= .6199E+01 BASIN STORAGE= .2316E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.19	265.14	238.68	.05	5.00	263.28	235.00	.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1218E+02 EXCESS= .0000E+00 OUTFLOW= .1219E+02 BASIN STORAGE= .4403E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.23	246.10	238.85	.05	5.00	241.62	235.00	.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1104E+02 EXCESS= .0000E+00 OUTFLOW= .1104E+02 BASIN STORAGE= .4565E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.32	212.92	238.90	.04	5.00	209.46	240.00	.04	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9328E+01 EXCESS= .0000E+00 OUTFLOW= .9331E+01 BASIN STORAGE= .4597E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.42	181.06	239.92	.03	5.00	180.86	240.00	.03	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7796E+01 EXCESS= .0000E+00 OUTFLOW= .7799E+01 BASIN STORAGE= .4379E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.46	169.01	238.86	.03	5.00	168.02	240.00	.03	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7269E+01 EXCESS= .0000E+00 OUTFLOW= .7272E+01 BASIN STORAGE= .4541E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.55	148.06	239.92	.03	5.00	147.93	240.00	.03	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6261E+01 EXCESS= .0000E+00 OUTFLOW= .6264E+01 BASIN STORAGE= .4621E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	5.00	.11	235.00	.00	5.00	.11	235.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1625E-01 EXCESS= .0000E+00 OUTFLOW= .1632E-01 BASIN STORAGE= .4497E-03 PERCENT ERROR= -3.2

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.00	.10	285.00	.00	5.00	.10	285.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1986E-01 EXCESS= .0000E+00 OUTFLOW= .1997E-01 BASIN STORAGE= .3515E-03 PERCENT ERROR= -2.3

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.00	.11	285.00	.00	5.00	.11	285.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1955E-01 EXCESS= .0000E+00 OUTFLOW= .1967E-01 BASIN STORAGE= .3484E-03 PERCENT ERROR= -2.4

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.00	.10	210.00	.00	5.00	.10	210.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1907E-01 EXCESS= .0000E+00 OUTFLOW= .1919E-01 BASIN STORAGE= .3392E-03 PERCENT ERROR= -2.4

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.00	.11	210.00	.00	5.00	.11	210.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1858E-01 EXCESS= .0000E+00 OUTFLOW= .1870E-01 BASIN STORAGE= .3582E-03 PERCENT ERROR= -2.5

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.00	.11	210.00	.00	5.00	.11	210.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1841E-01 EXCESS= .0000E+00 OUTFLOW= .1852E-01 BASIN STORAGE= .3597E-03 PERCENT ERROR= -2.6

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.00	.11	210.00	.00	5.00	.11	210.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1804E-01 EXCESS= .0000E+00 OUTFLOW= .1814E-01 BASIN STORAGE= .3559E-03 PERCENT ERROR= -2.5

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.50	.10	217.00	.00	5.00	.10	225.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1083E-01 EXCESS= .0000E+00 OUTFLOW= .1088E-01 BASIN STORAGE= .3582E-03 PERCENT ERROR= -3.8

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.42	198.24	253.92	6.61	5.00	197.42	250.00	6.61	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3119E+02 EXCESS= .0000E+00 OUTFLOW= .3119E+02 BASIN STORAGE= .4506E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.44	191.22	253.78	6.42	5.00	190.44	255.00	6.42	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3031E+02 EXCESS= .0000E+00 OUTFLOW= .3031E+02 BASIN STORAGE= .4537E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.47	180.72	252.44	6.15	5.00	180.63	255.00	6.15	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2904E+02 EXCESS= .0000E+00 OUTFLOW= .2904E+02 BASIN STORAGE= .4546E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.51	171.64	253.24	5.89	5.00	171.32	255.00	5.89	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2779E+02 EXCESS= .0000E+00 OUTFLOW= .2779E+02 BASIN STORAGE= .4705E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.52	168.85	254.31	5.80	5.00	168.48	255.00	5.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2740E+02 EXCESS= .0000E+00 OUTFLOW= .2740E+02 BASIN STORAGE= .4752E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.54	163.11	253.98	5.64	5.00	162.73	255.00	5.64

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2661E+02 EXCESS= .0000E+00 OUTFLOW= .2661E+02 BASIN STORAGE= .4836E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.86	102.16	257.11	3.24	5.00	101.93	255.00	3.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1528E+02 EXCESS= .0000E+00 OUTFLOW= .1528E+02 BASIN STORAGE= .4631E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.46	673.49	252.47	11.76	5.00	671.99	255.00	11.76

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6635E+02 EXCESS= .0000E+00 OUTFLOW= .6635E+02 BASIN STORAGE= .3807E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.48	636.76	253.12	11.09	5.00	634.99	255.00	11.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6260E+02 EXCESS= .0000E+00 OUTFLOW= .6261E+02 BASIN STORAGE= .3649E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.51	581.76	252.84	10.15	5.00	580.54	255.00	10.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5725E+02 EXCESS= .0000E+00 OUTFLOW= .5725E+02 BASIN STORAGE= .3773E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.55	525.42	253.12	9.22	5.00	524.05	255.00	9.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5202E+02 EXCESS= .0000E+00 OUTFLOW= .5202E+02 BASIN STORAGE= .3759E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.57	506.09	253.84	8.92	5.00	505.77	255.00	8.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5033E+02 EXCESS= .0000E+00 OUTFLOW= .5034E+02 BASIN STORAGE= .3794E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.60	467.82	254.04	8.34	5.00	467.71	255.00	8.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4707E+02 EXCESS= .0000E+00 OUTFLOW= .4708E+02 BASIN STORAGE= .3805E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	2.31	106.81	258.90	1.31	5.00	106.12	260.00	1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7389E+01 EXCESS= .0000E+00 OUTFLOW= .7390E+01 BASIN STORAGE= .3805E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.00	469.24	255.07	9.04	5.00	469.21	255.00	9.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5352E+02 EXCESS= .0000E+00 OUTFLOW= .5352E+02 BASIN STORAGE= .2300E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.01	450.15	255.72	8.62	5.00	450.04	255.00	8.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5104E+02 EXCESS= .0000E+00 OUTFLOW= .5104E+02 BASIN STORAGE= .2289E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.03	421.93	255.78	8.01	5.00	421.71	255.00	8.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4740E+02 EXCESS= .0000E+00 OUTFLOW= .4740E+02 BASIN STORAGE= .2362E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.05	390.08	255.57	7.38	5.00	389.82	255.00	7.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4370E+02 EXCESS= .0000E+00 OUTFLOW= .4370E+02 BASIN STORAGE= .2364E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.06	378.38	255.39	7.17	5.00	378.15	255.00	7.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4248E+02 EXCESS= .0000E+00 OUTFLOW= .4248E+02 BASIN STORAGE= .2350E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.07	354.23	255.32	6.77	5.00	354.01	255.00	6.77

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4009E+02 EXCESS= .0000E+00 OUTFLOW= .4009E+02 BASIN STORAGE= .2360E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.50	93.42	260.55	1.71	5.00	93.40	260.00	1.71

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1012E+02 EXCESS= .0000E+00 OUTFLOW= .1012E+02 BASIN STORAGE= .2342E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	1.98	405.38	247.16	4.91	5.00	403.29	250.00	4.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3197E+02 EXCESS= .0000E+00 OUTFLOW= .3197E+02 BASIN STORAGE= .4348E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.00	387.34	248.03	4.56	5.00	385.03	250.00	4.56

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2968E+02 EXCESS= .0000E+00 OUTFLOW= .2968E+02 BASIN STORAGE= .4506E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.04	358.39	248.90	4.04	5.00	356.83	250.00	4.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2629E+02 EXCESS= .0000E+00 OUTFLOW= .2629E+02 BASIN STORAGE= .4358E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.09	326.33	248.50	3.51	5.00	325.57	250.00	3.50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2282E+02 EXCESS= .0000E+00 OUTFLOW= .2282E+02 BASIN STORAGE= .4379E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.11	315.60	248.48	3.34	5.00	314.85	250.00	3.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2173E+02 EXCESS= .0000E+00 OUTFLOW= .2173E+02 BASIN STORAGE= .4506E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.14	294.33	248.64	3.01	5.00	293.38	250.00	3.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1957E+02 EXCESS= .0000E+00 OUTFLOW= .1958E+02 BASIN STORAGE= .4642E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	4.50	8.95	216.00	.08	5.00	8.69	215.00	.08

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5514E+00 EXCESS= .0000E+00 OUTFLOW= .5518E+00 BASIN STORAGE= .5125E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= 1.00

RDHD01C	MANE	4.57	.10	251.47	-1.00	5.00	.10	255.00	-1.00

FOR PLAN = 1 RATIO= .98

RDHD01C	MANE	4.49	.10	251.78	-1.00	5.00	.10	255.00	-1.00

FOR PLAN = 1 RATIO= .95

RDHD01C	MANE	4.45	.10	200.70	-1.00	5.00	.10	250.00	-1.00

FOR PLAN = 1 RATIO= .92

RDHD01C	MANE	4.42	.10	305.40	-1.00	5.00	.10	305.00	-1.00

FOR PLAN = 1 RATIO= .91

RDHD01C	MANE	4.50	.10	200.57	-1.00	5.00	.10	285.00	-1.00

FOR PLAN = 1 RATIO= .89

RDHD01C	MANE	4.50	.10	279.55	-1.00	5.00	.10	280.00	-1.00

FOR PLAN = 1 RATIO= .57

RDHD01C	MANE	4.47	.10	212.98	-1.00	5.00	.10	235.00	-1.00

FOR PLAN = 1 RATIO= 1.00

RDHD02C	MANE	.97	149.85	251.63	-1.00	5.00	149.16	250.00	-1.00

FOR PLAN = 1 RATIO= .98

RDHD02C	MANE	.97	145.67	251.84	-1.00	5.00	144.90	250.00	-1.00

FOR PLAN = 1 RATIO= .95

RDHD02C	MANE	.92	139.39	251.83	-1.00	5.00	138.55	255.00	-1.00

FOR PLAN = 1 RATIO= .92

RDHD02C	MANE	1.08	133.02	252.05	-1.00	5.00	132.39	255.00	-1.00

FOR PLAN = 1 RATIO= .91								
RDHD02C MANE	1.07	130.89	252.71	-1.00	5.00	130.38	255.00	-1.00
FOR PLAN = 1 RATIO= .89								
RDHD02C MANE	1.07	126.70	252.02	-1.00	5.00	126.07	255.00	-1.00
FOR PLAN = 1 RATIO= .57								
RDHD02C MANE	1.17	67.89	256.74	-1.00	5.00	67.81	255.00	-1.00
FOR PLAN = 1 RATIO= 1.00								
RDHD04C MANE	.55	440.28	251.48	-1.00	5.00	439.92	255.00	-1.00
FOR PLAN = 1 RATIO= .98								
RDHD04C MANE	.57	425.89	251.24	-1.00	5.00	425.71	255.00	-1.00
FOR PLAN = 1 RATIO= .95								
RDHD04C MANE	.69	404.72	254.76	-1.00	5.00	404.72	255.00	-1.00
FOR PLAN = 1 RATIO= .92								
RDHD04C MANE	.67	384.40	255.64	-1.00	5.00	384.37	255.00	-1.00
FOR PLAN = 1 RATIO= .91								
RDHD04C MANE	.59	377.74	255.96	-1.00	5.00	377.68	255.00	-1.00
FOR PLAN = 1 RATIO= .89								
RDHD04C MANE	.64	364.60	255.28	-1.00	5.00	364.56	255.00	-1.00
FOR PLAN = 1 RATIO= .57								
RDHD04C MANE	.77	145.14	257.01	-1.00	5.00	144.43	260.00	-1.00
FOR PLAN = 1 RATIO= 1.00								
RDHD05C MANE	.44	623.33	255.30	-1.00	5.00	623.18	255.00	-1.00
FOR PLAN = 1 RATIO= .98								
RDHD05C MANE	.40	600.96	255.35	-1.00	5.00	600.76	255.00	-1.00
FOR PLAN = 1 RATIO= .95								
RDHD05C MANE	.36	567.90	255.74	-1.00	5.00	567.60	255.00	-1.00
FOR PLAN = 1 RATIO= .92								
RDHD05C MANE	.41	535.09	255.47	-1.00	5.00	534.80	255.00	-1.00
FOR PLAN = 1 RATIO= .91								
RDHD05C MANE	.47	525.04	255.56	-1.00	5.00	524.78	255.00	-1.00
FOR PLAN = 1 RATIO= .89								
RDHD05C MANE	.35	503.38	255.71	-1.00	5.00	502.79	255.00	-1.00
FOR PLAN = 1 RATIO= .57								
RDHD05C MANE	.47	167.22	260.32	-1.00	5.00	167.20	260.00	-1.00
FOR PLAN = 1 RATIO= 1.00								
RDHD06C MANE	.73	575.53	251.57	-1.00	5.00	574.67	255.00	-1.00
FOR PLAN = 1 RATIO= .98								
RDHD06C MANE	.74	558.26	251.82	-1.00	5.00	557.61	255.00	-1.00
FOR PLAN = 1 RATIO= .95								
RDHD06C MANE	.79	531.61	252.06	-1.00	5.00	531.36	255.00	-1.00
FOR PLAN = 1 RATIO= .92								
RDHD06C MANE	.68	502.48	255.32	-1.00	5.00	502.48	255.00	-1.00
FOR PLAN = 1 RATIO= .91								
RDHD06C MANE	.76	492.87	252.19	-1.00	5.00	492.81	255.00	-1.00

FOR PLAN = 1 RATIO= .89
RDHD06C MANE .81 472.41 251.88 -1.00 5.00 472.13 255.00 -1.00

FOR PLAN = 1 RATIO= .57
RDHD06C MANE 1.34 36.97 252.21 -1.00 5.00 36.36 255.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD01C MANE 2.04 76.47 212.01 -1.00 5.00 74.33 215.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD01C MANE 2.06 74.12 212.24 -1.00 5.00 72.21 215.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD01C MANE 2.10 70.23 213.73 -1.00 5.00 68.39 215.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD01C MANE 2.13 66.73 213.23 -1.00 5.00 65.10 215.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD01C MANE 2.15 65.76 212.37 -1.00 5.00 64.28 215.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD01C MANE 2.17 63.30 212.83 -1.00 5.00 62.08 215.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD01C MANE 2.85 28.11 214.06 -1.00 5.00 27.58 215.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD02C MANE 1.64 146.14 250.95 -1.00 5.00 145.71 250.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD02C MANE 1.66 141.63 252.07 -1.00 5.00 140.96 250.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD02C MANE 1.69 134.53 251.37 -1.00 5.00 133.87 250.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD02C MANE 1.72 127.54 252.47 -1.00 5.00 126.93 250.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD02C MANE 1.73 125.32 252.28 -1.00 5.00 124.64 250.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD02C MANE 1.75 121.07 251.79 -1.00 5.00 120.37 250.00 -1.00

FOR PLAN = 1 RATIO= .00
RDCHD02C MANE 1.99 82.68 256.30 -1.00 5.00 82.68 255.00 -1.00

FOR PLAN = 1 RATIO= .00
RCP23 MANE 2.09 147.24 253.24 23.92 5.00 146.80 255.00 23.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1697E+02 EXCESS= .0000E+00 OUTFLOW= .1697E+02 BASIN STORAGE= .9547E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP23 MANE 2.13 140.58 252.91 22.82 5.00 140.45 255.00 22.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1619E+02 EXCESS= .0000E+00 OUTFLOW= .1619E+02 BASIN STORAGE= .9405E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP23 MANE 2.18 130.71 254.83 21.29 5.00 130.66 255.00 21.30

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1510E+02 EXCESS= .0000E+00 OUTFLOW= .1510E+02 BASIN STORAGE= .9337E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP23 MANE 2.24 120.70 255.05 19.73 5.00 120.69 255.00 19.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1399E+02 EXCESS= .0000E+00 OUTFLOW= .1400E+02 BASIN STORAGE= .9014E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCP23 MANE 2.26 117.30 255.24 19.24 5.00 117.28 255.00 19.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1364E+02 EXCESS= .0000E+00 OUTFLOW= .1364E+02 BASIN STORAGE= .9074E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP23	MANE	2.31	110.47	253.66	18.20	5.00	110.30	255.00	18.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1291E+02 EXCESS= .0000E+00 OUTFLOW= .1291E+02 BASIN STORAGE= .9050E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP23	MANE	3.93	23.29	255.51	2.83	5.00	23.07	255.00	2.83

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2010E+01 EXCESS= .0000E+00 OUTFLOW= .2011E+01 BASIN STORAGE= .1000E-02 PERCENT ERROR= -.1

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

HYDROLOGIC CRITERIA AND DESIGN MANUAL

TIME OF CONCENTRATION

G. C. WALLACE, INC.
Engineers/Planners/Surveyors

Kyle Canyon Interchange
Proposed Conditions
50-year Offsite Hydrolic Analysis
SF4 referenced from the original KC Master Drainage and modified for this Study

Project No: 412-634A
Date: 5-Jan-16
Calculated by: JAM, RDD, DBC

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK URBANIZED BASINS		Tc	Tlag	REMARKS
DESIG: (1)	DEV./EX. (D or E)	CN (16)	K (2)	AREA Ac (3)	AREA Sq Mi (4)	INITIAL LENGTH Feet (5)	SLOPE % (6)	Ti Min (7)	TRAVEL LENGTH Feet (8)	SLOPE % (9a)	V1 VELOCITY fps (9b)	V2 VELOCITY fps (10)	Tt Min (11)	TOTAL LENGTH Feet (12)	Tc = (L/180)+10 Min (13)	Min (14)	Tlag = 0.6Tc/60 Hours (15)	Remarks: Precipitation
EX-W1	E	77.4	0.6317	15.36	0.0240	240	2.9	9.1	1086	3.2	2.7	5.3	5.0	1326	N/A	14.1	0.141	2.41
EX-W2	E	81.6	0.6871	13.24	0.0207	171	4.1	6.1	1145	3.3	2.7	5.4	5.1	1316	N/A	11.2	0.112	2.41
EX-W3	E	86.4	0.7505	172.93	0.2702	139	19.4	2.8	7705	3.0	2.6	5.1	26.8	7844	N/A	29.5	0.295	2.50
EX-W4	E	86.9	0.7571	67.06	0.1048	297	13.1	4.5	4450	3.3	2.7	5.3	15.4	4747	N/A	19.9	0.199	2.50
EX-W5	E	86.3	0.7492	285.43	0.4460	152	12.5	3.4	8352	3.3	2.7	5.4	27.4	8504	N/A	30.8	0.308	2.50
EX-W6	E	86.9	0.7571	9.93	0.0155	216	3.7	5.9	877	3.4	2.7	5.4	4.2	1093	N/A	10.1	0.101	2.41
EX-W7	E	86.2	0.7478	126.63	0.1979	405	4.2	7.9	6439	3.4	2.7	5.4	21.3	6844	N/A	29.2	0.292	2.50
EX-W8	E	86.2	0.7478	139.52	0.2180	184	12.8	3.7	8588	3.2	2.7	5.3	28.7	8772	N/A	32.3	0.323	2.50
EX-W9	E	84.4	0.7241	116.76	0.1824	176	15.3	3.6	7922	3.3	2.7	5.3	26.4	8098	N/A	30.0	0.300	2.50
EX-E1	E	77.4	0.6317	33.75	0.0527	196	3.1	8.1	4032	2.8	2.5	4.9	15.4	4228	N/A	23.5	0.235	2.41
EX-E2	E	77.4	0.6317	140.59	0.2197	93	4.8	4.8	5565	2.7	2.4	4.8	20.8	5658	N/A	25.7	0.257	2.41
EX-E3	E	77.4	0.6317	119.48	0.1867	303	2.6	10.6	5304	2.7	2.4	4.8	20.2	5607	N/A	30.8	0.308	2.41
EX-E4	E	77.4	0.6317	140.56	0.2196	233	2.7	9.2	3740	2.7	2.4	4.8	14.7	3973	N/A	24.0	0.240	2.41
EX-E5	E	79.5	0.6594	63.30	0.0989	162	3.4	6.7	3315	2.6	2.4	4.7	13.4	3477	N/A	20.2	0.202	2.41
EX-E6	E	86.9	0.7571	10.26	0.0160	303	3.3	7.2	509	2.2	2.2	4.3	3.9	812	N/A	11.1	0.111	2.41
EX-E7	E	86.9	0.7571	21.31	0.0333	147	4.1	4.7	1608	3.1	2.6	5.2	6.8	1755	N/A	11.5	0.115	2.41
EX-E8	E	86.9	0.7571	10.67	0.0167	364	2.2	9.1	890	3.5	2.8	5.5	4.2	1254	N/A	13.3	0.133	2.41
EX-E9	E	86.9	0.7571	6.13	0.0096	140	2.1	5.7	1115	3.0	2.6	5.1	5.2	1255	N/A	10.9	0.109	2.41
ES1	D	92.7	0.8336	11.10	0.0173	100	1.0	4.8	1620	2.8	3.4	5.1	6.1	1720	19.6	10.9	0.109	2.41
ES2	D	94.7	0.8600	31.40	0.0490	100	1.0	4.3	2337	1.8	2.7	4.1	10.5	2437	23.5	14.8	0.148	2.41

Tc = Ti + Tt Tlag = 0.6 Tc
Ti = 1.8 (1.1 - K) $L^{1/2}$ / $S^{1/3}$
K = 0.0132 (CN) - 0.39

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

Existing: V1 = $14.8*(S/100)^{1/2}$ V2 = $29.4*(S/100)^{1/2}$
Developed: V1 = $20.2*(S/100)^{1/2}$ V2 = $30.6*(S/100)^{1/2}$

REFERENCE:

STANDARD FORM 4

HYDROLOGIC CRITERIA AND DESIGN MANUAL

TIME OF CONCENTRATION

G. C. WALLACE, INC.
Engineers/Planners/Surveyors

Kyle Canyon Interchange
Proposed Conditions
50-year Offsite Hydrolic Analysis
SF4 referenced from the original KC Master Drainage and modified for this Study

Project No: 412-634A
Date: 9-Jan-16
Calculated by: JAM,RDD, DBC

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK URBANIZED BASINS		Tc	Tlag	REMARKS
DESIG:	DEV./EX. (D or E)	CN	K	AREA Ac	AREA Sq Mi	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY fps	V2 VELOCITY fps	Tt Min	TOTAL LENGTH Feet	Tc = (L/180)+10 Min	Min	Tlag = 0.6Tc/60 Hours	Remarks: Precipitation
(1)		(16)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(11)	(12)	(13)	(14)	(15)	
OFFA	E	77.4	0.6317	13.0	0.0203	287	3.5	9.4	1176	3.0	2.6	5.1	5.5	1463	N/A	14.9	0.149	2.41
OFFB	E	77.4	0.6317	85.6	0.1337	500	3.5	12.4	7955	3.2	2.6	5.3	26.8	8455	N/A	39.2	0.392	2.50
OFFC	E	77.4	0.6317	85.3	0.1333	500	3.5	12.4	5576	3.3	2.7	5.4	18.9	6076	N/A	31.3	0.313	2.50
OFFD-A	E	77.4	0.6317	411.5	0.6430	500	3.5	12.4	14360	4.3	3.1	6.1	40.6	14860	N/A	53.0	0.530	2.68
OFFD-B	E	77.4	0.6317	319.2	0.4988	500	3.5	12.4	10906	2.6	2.4	4.8	39.8	11406	N/A	52.2	0.522	2.50
OFFE	E	77.4	0.6317	24.5	0.0383	500	3.0	13.1	2860	3.5	2.8	5.5	10.2	3360	N/A	23.2	0.232	2.50
OFFF-A	E	83.8	0.7162	636.0	0.9938	500	3.5	10.2	14655	6.4	3.7	7.4	33.9	15155	N/A	44.1	0.441	2.72
OFFF-B	E	84.1	0.7201	391.2	0.6112	500	3.5	10.1	11918	3.3	2.7	5.3	39.0	12418	N/A	49.0	0.490	2.50
OFFG	E	86.5	0.7518	26.0	0.0406	500	4.3	8.6	2810	3.5	2.8	5.5	10.0	3310	N/A	18.6	0.186	2.50
OFFH	D	89.5	0.7914	5.6	0.0088	200	4.0	4.9	805	3.1	3.6	5.4	3.3	1005	15.6	8.2	0.082	2.41
OFF2	E	77.4	0.6317	59.4	0.0928	200	2.3	9.0	4241	3.0	2.6	5.1	15.4	4441	N/A	24.5	0.245	2.41
OFF4	E	77.4	0.6317	20.4	0.0319	200	2.3	9.0	849	2.8	2.5	4.9	4.5	1049	N/A	13.6	0.136	2.41
OFF5A	D	89.1	0.7861	10.3	0.0161	200	2.0	6.3	555	3.2	3.6	5.5	2.5	755	14.2	8.8	0.088	2.41
OFF5B	D	89.1	0.7861	7.4	0.0116	200	2.0	6.3	770	2.8	3.4	5.1	3.3	970	15.4	9.7	0.097	2.41
OFF8P1	D	89.1	0.7861	7.2	0.0112	20	12.5	1.1	2020	3.0	3.5	5.3	7.1	2040	21.3	8.2	0.082	2.41
OFF8P2	D	89.1	0.7861	3.2	0.0050	55	1.8	3.4	785	1.7	2.6	3.9	4.4	840	14.7	7.8	0.078	2.41
OFF9P1	D	89.1	0.7861	2.1	0.0032	50	9.0	1.9	225	4.9	4.5	6.8	0.8	275	11.5	2.8	0.050	2.41
OFF9P2	D	89.1	0.7861	13.8	0.0215	110	4.1	3.7	1530	2.6	3.3	4.9	6.0	1640	19.1	9.7	0.097	2.41
OFF9P3	D	89.1	0.7861	6.5	0.0102	50	12.0	1.7	1115	2.6	3.3	4.9	4.6	1165	16.5	6.4	0.064	2.41
OFF9P4	D	89.1	0.7861	7.3	0.0115	50	10.0	1.9	1115	2.2	3.0	4.6	5.0	1165	16.5	6.8	0.068	2.41
OFF10	E	86.2	0.7478	429.5	0.6710	500	4.0	8.9	16775	4.1	3.0	6.0	48.3	17275	N/A	57.3	0.573	2.92
OFF11	D	77.4	0.6317	2.9	0.0046	30	5.2	2.7	1620	2.4	3.1	4.7	6.7	1650	19.2	9.3	0.093	2.41
OFF12	D	77.4	0.6317	6.0	0.0094	200	3.5	7.9	651	1.8	2.7	4.1	3.7	851	14.7	11.5	0.115	2.41
OFF14	D	86.9	0.7571	8.6	0.0134	200	4.0	5.5	773	2.5	3.2	4.8	3.5	973	15.4	9.0	0.090	2.41
OFF15	D	86.9	0.7571	23.2	0.0362	200	3.5	5.7	1678	2.4	3.1	4.7	6.8	1878	20.4	12.6	0.126	2.41
OFF16	E	86.6	0.7531	504.7	0.7885	500	1.2	13.1	18514	3.7	2.8	5.7	56.0	19014	N/A	69.2	0.692	2.64
OFF18	E	86.3	0.7492	351.4	0.5491	500	4.2	8.8	11962	3.9	2.9	5.8	35.8	12462	N/A	44.5	0.445	2.61
OFF20	E	86.2	0.7478	42.0	0.0656	500	4.2	8.8	3502	4.9	3.3	6.5	10.2	4002	N/A	19.0	0.190	2.57
OFF21	E	85.7	0.7412	337.9	0.5280	500	3.0	10.0	11390	3.8	2.9	5.7	34.6	11890	N/A	44.6	0.446	2.64
95-1	D	89.1	0.7861	2.7	0.0042	50	2.0	3.2	599	1.5	2.5	3.8	3.8	649	13.6	6.9	0.069	2.41
95-2	D	89.1	0.7861	2.8	0.0044	50	2.0	3.2	644	0.7	1.7	2.6	5.8	694	13.9	9.0	0.090	2.41
95-3	D	89.1	0.7861	6.1	0.0095	50	2.0	3.2	1322	1.8	2.7	4.1	6.4	1372	17.6	9.5	0.095	2.41
95-4	D	89.1	0.7861	7.0	0.0109	50	2.0	3.2	1336	2.0	2.8	4.3	6.2	1386	17.7	9.4	0.094	2.41
95-5	D	89.1	0.7861	23.6	0.0369	50	2.0	3.2	800	1.3	2.3	3.5	5.1	850	14.7	8.2	0.082	2.41
95-5P1	D	89.1	0.7865	2.2	0.0034	160	2.2	5.5	615	2.7	3.3	5.0	2.9	775	14.3	8.4	0.084	2.41
95-5P2	D	89.1	0.7861	3.8	0.0059	75	4.7	2.9	1085	2.8	3.4	5.1	4.4	1160	16.4	7.3	0.073	2.41
95-5P3	D	89.1	0.7861	16.3	0.0254	150	4.3	4.2	1275	2.9	3.4	5.2	4.9	1425	17.9	9.1	0.091	2.41
95-5P4	D	89.1	0.7861	1.5	0.0023	40	8.8	1.7	330	2.7	3.3	5.1	1.6	370	12.1	3.4	0.050	2.41
95-6	D	89.9	0.7967	6.7	0.0104	50	2.0	3.1	1313	1.8	2.7	4.1	6.4	1363	17.6	9.5	0.095	2.41
95-7A	D	92.6	0.8323	4.4	0.0069	50	2.0	2.7	1071	2.2	3.0	4.6	4.8	1121	16.2	7.5	0.075	2.41
95-7B	D	92.6	0.8323	7.2	0.0112	50	2.0	2.7	1296	2.0	2.9	4.3	6.0	1346	17.5	8.7	0.087	2.41
95-8A	D	92.6	0.8323	3.3	0.0052	50	2.0	2.7	664	1.8	2.7	4.1	3.7	714	14.0	6.4	0.064	2.41
95-8B	D	92.6	0.8323	2.6	0.0040	50	2.0	2.7	568	3.2	3.6	5.5	2.5	618	13.4	5.2	0.052	2.41
95-9A	D	92.6	0.8323	7.1	0.0110	50	2.0	2.7	1364	1.6	2.5	3.8	7.1	1414	17.9	9.8	0.098	2.41
95-9B	D	92.6	0.8323	8.5	0.0133	50	2.0	2.7	1534	0.8	1.8	2.7	11.2	1584	18.8	13.9	0.139	2.41

Tc = Ti + Tt Tlag = 0.6 Tc
Ti = 1.8 (1.1 - K) $L^{1/2}$ / $S^{1/3}$
K = 0.0132 (CN) - 0.39

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

Existing: V1 = 14.8*(S/100)$^{1/2}$
V2 = 29.4*(S/100)$^{1/2}$

Developed: V1 = 20.2*(S/100)$^{1/2}$
V2 = 30.6*(S/100)$^{1/2}$

REFERENCE:

STANDARD FORM 4

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN   1998                *
*          VERSION 4.1                  *
*                                       *
*  RUN DATE   28DEC16  TIME  10:36:49   *
*                                       *
*****************************************
```

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

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

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

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


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

                        *DIAGRAM
 *** FREE ***
               1        ID   ********************************************************************
               2        ID   * .............................................................. *
               3        ID   * :                                                            : *
               4        ID   * :              KYLE CANYON INTERCHANGE                       : *
               5        ID   * :                                                            : *
               6        ID   * :              PROPOSED CONDITIONS                           : *
               7        ID   * :                                                            : *
               8        ID   * : REFERENCED FROM RTC TO MDS FOR KYLE CANYON [DEC 2006]      : *
               9        ID   * : AND MODIFIED TO USE 50-YEAR PRECIPITATION VALUES           : *
              10        ID   * :                                                            : *
              11        ID   * :............................................................: *
              12        ID   * :              RETURN PERIOD_ _ _ _50 -YEAR                  : *
              13        ID   * :              DISTRIBUTION_ _ _ _ 6-HOUR SDN3               : *
              14        ID   * :              PROJECT NO_ _ _ _ _ 412.634A                  : *
              15        ID   * :              FILENAME_ _ _ _ _ _ PRO50.H1                  : *
              16        ID   * :              DATE MODELED_ _ _ _ 12/28/16                  : *
              17        ID   * :              MODELED BY_ _ _ _ _ JAM, RRD, DBC             : *
              18        ID   * :............................................................: *
              19        ID   * :                                                            : *
              20        ID   * :............................................................: *
              21        ID   ********************************************************************
              22        ID    JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
              23        ID
              24        ID
              25        ID
              26        ID                     AREA      DARF
              27        ID                       SQ.MI.
              28        ID
              29        ID                      0.0 - 0.5    0.99
              30        ID                      0.5 - 1.0    0.98
              31        ID                      1.0 - 2.0    0.95
              32        ID                      2.0 - 4.0    0.92
              33        ID                      4.0 - 6.0    0.91
              34        ID                      6.0 - 8.0    0.89
              35        ID
              36        ID
              37        ID
              38        ID
              39        IT      5       0       0     300
              40        IO      5
              41        IN      5       0       0
              42        JR    PREC      1    0.98    0.95    0.92    0.91    0.89
                        *
              43        KK    OFFA
              44        KM              AREA  13.0 AC
              45        PB    2.41
              46        BA  0.0203
              47        PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
              48        PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
              49        PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
              50        PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
              51        PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
```



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

              52        PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
              53        PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
              54        PC    .998    .999   1.00
              55        LS      0   77.4
              56        UD    .149
                        *
              57        KK    95-1
              58        KM              AREA  2.7 AC
```

```
 59          PB    2.41
 60          BA  0.0042
 61          LS       0    89.1
 62          UD    .069
             *

 63          KK    CPNM
 64          KM   COMBINATION POINT CPNM
 65          KM   COMBINE OFFA AND 95-1
 66          HC       2
             *

 67          KK    OFFB
 68          KM                 AREA  85.6 AC
 69          PB    2.50
 70          BA  0.1337
 71          LS       0    77.4
 72          UD    .392
             *

 73          KK    95-2
 74          KM                 AREA  2.8 AC
 75          PB    2.41
 76          BA  0.0044
 77          LS       0    89.1
 78          UD    .090
             *

 79          KK     CP1
 80          KM   COMBINATION POINT CP1
 81          KM   COMBINE OFFB AND 95-2
 82          HC       2
             *

 83          KK    OFFC
 84          KM                 AREA  85.3 AC
 85          PB    2.50
 86          BA  0.1333
 87          LS       0    77.4
 88          UD    .313
             *
```



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

 89          KK    95-3
 90          KM                 AREA  6.1 AC
 91          PB    2.41
 92          BA  0.0095
 93          LS       0    89.1
 94          UD    .095
             *

 95          KK     CP4
 96          KM   COMBINATION POINT CP4
 97          KM   COMBINE OFFC AND 95-3
 98          HC       2
             *

 99          KK  OFFD-A
100          KM                 AREA  411.5 AC
101          PB    2.68
102          BA  0.6430
103          LS       0    77.4
104          UD    .530
             *

105          KK ROFFD-A
106          KM   ROUTE OFFD-A TO CP7
107          KM   N-STEPS    K    X-FACTOR
108          RM       5   0.400    0.15
             *

109          KK  OFFD-B
110          KM                 AREA  319.2 AC
111          PB    2.50
112          BA  0.4988
113          LS       0    77.4
114          UD    .522
             *

115          KK    95-4
116          KM                 AREA  7.0 AC
117          PB    2.41
118          BA  0.0109
119          LS       0    89.1
120          UD    .094
             *

121          KK     CP7
122          KM   COMBINATION POINT CP7
123          KM   COMBINE OFFD-A, OFFD-B AND 95-4
124          HC       3
             *
```



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

125          KK   OFF5A
126          KM                 AREA  10.3 AC
127          PB    2.41
128          BA  0.0161
129          LS       0    89.1
130          UD    .088
```

```
                *

 131            KK   OFF5B
 132            KM            AREA  7.4 AC
 133            PB    2.41
 134            BA  0.0116
 135            LS       0     89.1
 136            UD    .097
                *

 137            KK    CP7A
 138            KM   COMBINATION POINT CP7A
 139            KM   COMBINE CP7, OFF5A AND OFF5B
 140            HC       3
                *

 141            KK   RCP7A
 142            KM   ROUTE CP7A THRU EX-E3
 143            KM   N-STEPS   K    X-FACTOR
 144            RM       2   0.132    0.15
                *

 145            KKCPNE-DUMMY
 146            KM   COMBINATION POINT CPNE-DUMMY
 147            KM   COMBINE CPNM, CP1,CP4, AND CP7A
 148            HC       4
                *

 149            KK   OFF10
 150            KM            AREA  429.5 AC
 151            PB    2.92
 152            BA  0.6710
 153            LS       0     86.2
 154            UD    .573
                *

 155            KK  ROFF10
 156            KM   ROUTE OFF10 THRU OFFF-A AND OFFF-B
 157            KM   N-STEPS   K    X-FACTOR
 158            RM       7   0.583    0.15
                *

 159            KK  OFFF-A
 160            KM            AREA  636.0 AC
 161            PB    2.72
 162            BA  0.9938
 163            LS       0     83.8
 164            UD    .441
                *
```



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

 165            KK ROFFF-A
 166            KM   ROUTE OFFF-A THRU OFFF-B
 167            KM   N-STEPS   K    X-FACTOR
 168            RM       3   0.238    0.15
                *

 169            KK  OFFF-B
 170            KM            AREA  391.2 AC
 171            PB    2.50
 172            BA  0.6112
 173            LS       0     84.1
 174            UD    .490
                *

 175            KK   EX-W1
 176            KM            AREA  15.36 AC
 177            PB    2.41
 178            BA  0.0240
 179            LS       0     77.4
 180            UD    .141
                *

 181            KK   OFF11
 182            KM            AREA  2.9 AC
 183            PB    2.41
 184            BA  0.0046
 185            LS       0     77.4
 186            UD    .093
                *

 187            KK     CP9
 188            KM   COMBINATION POINT CP9
 189            KM   COMBINE ROFF10, OFFF-A, OFFF-B, EX-W1 AND OFF11
 190            HC       5
                *

 191            KK    DCP9
 192            KM   FLOW SPLIT AT CULVERT
 193            KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
 194            DT DCHD02A
 195            DI       0     150     300     450     600     750     900    1050    1100    1350
 196            DI    1500
 197            DQ       0     122     186     230     261     283     316     353     366     445
 198            DQ     497
                *

 199            KK    RCP9
 200            KM   ROUTE TO BASIN OFF12
 201            RD     850  0.0165    0.02       0    TRAP       0      10
                *
```

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

 202          KK    OFFG
 203          KM             AREA  26.0 AC
 204          PB    2.50
 205          BA  0.0406
 206          LS       0     86.5
 207          UD    .186
              *

 208          KK   EX-W2
 209          KM             AREA  13.24 AC
 210          PB    2.41
 211          BA  0.0207
 212          LS       0     81.6
 213          UD    .112
              *

 214          KK   OFF12
 215          KM             AREA  6.0 AC
 216          PB    2.41
 217          BA  0.0094
 218          LS       0     77.4
 219          UD    .115
              *

 220          KK   OFF16
 221          KM             AREA  504.7 AC
 222          PB    2.64
 223          BA  0.7885
 224          LS       0     86.6
 225          UD    .692
              *

 226          KK  ROFF16
 227          KM   ROUTE OFF16 THRU EX-W3
 228          KM   N-STEPS   K    X-FACTOR
 229          RM       2   0.198    0.15
              *

 230          KK   EX-W3
 231          KM             AREA  172.93 AC
 232          PB    2.50
 233          BA  0.2702
 234          LS       0     86.4
 235          UD    .295
              *

 236          KK    CP10
 237          KM   COMBINATION POINT CP10
 238          KM   COMBINE RCP9, OFFG, EX-W2, OFF12, ROFF16 AND EX-W3
 239          HC       6
              *
```



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

 240          KK   DCP10
 241          KM   FLOW SPLIT AT CULVERT
 242          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
 243          DT DCHD04A
 244          DI       0     300     600     900    1200    1500    1800    2100    2400    2540
 245          DI    3000
 246          DQ       0     132     316     514     710     907    1115    1252    1399    1468
 247          DQ    1684
              *

 248          KKDSPHD04A
 249          KM   FLOW SPLIT AT BETWEEN HD04A AND HD05A
 250          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
 251          KM   BASED ON CHANNEL CAPACITY = 527 CFS
 252          DT DSHD04A
 253          DI       0     527    2000
 254          DQ       0       1    1473
              *

 255          KK  RDCP10
 256          KM   ROUTE TO THE NEXT CULVERT AT BASIN OFF11
 257          RD    1068  0.0160    0.02       0    TRAP       0      10
              *

 258          KK   EX-W4
 259          KM             AREA  67.06 AC
 260          PB    2.50
 261          BA  0.1048
 262          LS       0     86.9
 263          UD    .199
              *

 264          KK    CP11
 265          KM   COMBINATION POINT CP11
 266          KM   COMBINE RDCP10 AND EX-W4
 267          HC       2
              *

 268          KK   DCP11
 269          KM   FLOW SPLIT AT CULVERT
 270          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
 271          DT DCHD05A
 272          DI       0     170     340     510     680     850    1020    1190    1360    1372
 273          DI    1700
 274          DQ       0     169     200     244     296     372     459     546     632     637
 275          DQ     807
              *
```

```
276          KKDSPHD05A
277          KM   FLOW SPLIT AT BETWEEN HD05A AND HD06A
278          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
279          KM   BASED ON CHANNEL CAPACITY = 605 CFS
280          DT DSHD05A
281          DI       0     605    2000
```



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

282          DQ       0       1    1395
             *

283          KK  RDCP11
284          KM   ROUTE TO THE NEXT CULVERT AT BASIN OFF12
285          RD     626  0.0134    0.02       0    TRAP       0      10
             *

286          KK   OFF18
287          KM             AREA  351.4 AC
288          PB    2.61
289          BA  0.5491
290          LS       0    86.3
291          UD    .445
             *

292          KK  ROFF18
293          KM   ROUTE OFF18 THRU EX-W5
294          KM   N-STEPS    K    X-FACTOR
295          RM       2   0.171    0.15
             *

296          KK   EX-W5
297          KM             AREA  285.43 AC
298          PB    2.50
299          BA  0.4460
300          LS       0    86.3
301          UD    .308
             *

302          KK    CP12
303          KM   COMBINATION POINT CP12
304          KM   COMBINE ROFF18 AND EX-W5
305          HC       2
             *

306          KK   OFF14
307          KM             AREA  8.6 AC
308          PB    2.41
309          BA  0.0134
310          LS       0    86.9
311          UD    .090
             *

312          KK    CP13
313          KM   COMBINATION POINT CP13
314          KM   COMBINE RDCP11, CP12 AND OFF14
315          HC       3
             *
```



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

316          KK   DCP13
317          KM   FLOW SPLIT AT CULVERT
318          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
319          DT DCHD06A
320          DI       0   200.0   400.0     600     800    1000    1200    1400    1600    1772
321          DI    2000
322          DQ       0   199.9   399.9     594     727     802     865     927    1017    1095
323          DQ    1207
             *

324          KKDSPHD06A
325          KM   FLOW SPLIT AT BETWEEN HD06A AND HD07A
326          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
327          KM   BASED ON CHANNEL CAPACITY = 1,692 CFS
328          DT DSHD06A
329          DI       0    1692    2000
330          DQ       0       1     308
             *

331          KKRDCRCOFF18
332          KM   ROUTE TO THE NEXT CULVERT AT BASIN OFFH
333          RD    1349  0.0186    0.02       0    TRAP       0      10
             *

334          KK   EX-W6
335          KM             AREA  9.93 AC
336          PB    2.41
337          BA  0.0155
338          LS       0    86.9
339          UD    .101
             *

340          KK   OFF15
341          KM             AREA  23.2 AC
342          PB    2.41
343          BA  0.0362
344          LS       0    86.9
345          UD    .126
             *

346          KK    CP14
```

```
 347          KM   COMBINATION POINT CP14
 348          KM   COMBINE RDCRCOFF18, EX-W6 AND OFF15
 349          HC       3
              *

 350          KK   DCP14
 351          KM   FLOW SPLIT AT CULVERT
 352          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
 353          DT DCHD07A
 354          DI       0      90     180     270     360     450     540     630     720     771
 355          DI     900
 356          DQ       0      51      55      58      60      61      65      78      93     101
 357          DQ     123
              *
```



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

 358          KKDSPHD07A
 359          KM   FLOW SPLIT AT BETWEEN HD07A AND HD08A
 360          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
 361          KM   BASED ON CHANNEL CAPACITY = 338 CFS
 362          DT DSHD07A
 363          DI       0     338    2000
 364          DQ       0       1    1662
              *

 365          KK    OFFE
 366          KM              AREA  24.5 AC
 367          PB    2.50
 368          BA  0.0383
 369          LS       0    77.4
 370          UD    .232
              *

 371          KK  95-5P1
 372          KM              AREA  2.2 AC
 373          PB    2.41
 374          BA  0.0034
 375          LS       0    89.1
 376          UD    .084
              *

 377          KK  CPKI-1
 378          KM   COMBINATION POINT CPKI-1
 379          KM   COMBINE OFFE AND 95-5P1
 380          HC       2
              *

 381          KK  95-5P2
 382          KM              AREA  3.8 AC
 383          PB    2.41
 384          BA  0.0059
 385          LS       0    89.1
 386          UD    .073
              *

 387          KK  CPKI-2
 388          KM   COMBINATION POINT CPKI-2
 389          KM   COMBINE CPK1 AND 95-5P2
 390          HC       2
              *

 391          KK  95-5P3
 392          KM              AREA  16.3 AC
 393          PB    2.41
 394          BA  0.0254
 395          LS       0    89.1
 396          UD    .091
              *
```



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

 397          KK  CPKI-3
 398          KM   COMBINATION POINT CPKI-3
 399          KM   COMBINE CPK2 AND 95-5P3
 400          HC       2
              *

 401          KK  RCPKI3
 402          KM   DIVERT CPK3 EAST IN STORM DRAIN
 403          DT  DCPKI3
 404          DI       0     500
 405          DQ       0     500
              *

 406          KK  95-5P4
 407          KM              AREA  1.5 AC
 408          PB    2.41
 409          BA  0.0023
 410          LS       0    89.1
 411          UD    .050
              *

 412          KK  CHD01B
 413          KM   COMBINATION POINT CHD01B
 414          KM   COMBINE RCPKI3 AND 95-5P4
 415          HC       2
              *

 416          KK  DHD01B
 417          KM   FLOW SPLIT AT CULVERT 1B
 418          DT DCHD01B
```

```
419          DI       0    15.0    29.0    45.0    60.0    75.0    90.0   105.0     120     135
420          DI     150
421          DQ       0    14.9    28.9    44.9    59.9    74.9    89.9   104.9     116     121
422          DQ     125
             *

423          KK RDHD01B
424          KM   ROUTE TO THE NEXT CULVERT
425          RD    1000  0.0165    0.02       0    TRAP       0      10
             *

426          KK  OFF8P1
427          KM              AREA  7.2 AC
428          PB    2.41
429          BA  0.0112
430          LS       0    89.1
431          UD    .082
             *
```



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

432          KKRETHD02A
433          KM   RETREIVE FLOW FROM CULVERT HD02A
434          DR DCHD02A
             *

435          KK  CHD02B
436          KM   COMBINATION POINT CHD02B
437          KM   COMBINE RDHD01B, OFF8P2 AND RETHD02A
438          HC       3
             *

439          KK  DHD02B
440          KM   REVISED W/KYLE CANYON INTERCHANGE FACILITIES
441          KM   FLOW SPLIT AT CULVERT HD02B
442          DT DCHD02B
443          DI       0     253     343     432     450     500
444          DQ       0     224     246     260     262     268
             *

445          KK RDHD02B
446          KM   ROUTE TO THE NEXT CULVERT
447          RD    1320  0.0165    0.02       0    TRAP       0      10
             *

448          KK    95-6
449          KM              AREA  6.7 AC
450          PB    2.41
451          BA  0.0104
452          LS       0    89.9
453          UD    .095
             *

454          KKRETHD04A
455          KM   RETREIVE FLOW FROM CULVERT HD04A
456          DR DCHD04A
             *

457          KK  CHD04B
458          KM   COMBINATION POINT CHD04B
459          KM   COMBINE RDHD02B, 95-6 AND RETHD04A
460          HC       3
             *

461          KK  DHD04B
462          KM   SPLIT FLOW AT CULVERT HD04B
463          DT DCHD04B
464          DI       0   200.0     400     600     800    1000    1200    1400    1600    1800
465          DI    2000
466          DQ       0   199.9     287     359     443     529     620     710     800     895
467          DQ     988
             *
```



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

468          KKRETSHD04A
469          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD04A AND HD05A
470          DR DSHD04A
             *

471          KK   95-7A
472          KM              AREA  4.4 AC
473          PB    2.41
474          BA  0.0069
475          LS       0    92.6
476          UD    .075
             *

477          KK CHD04B2
478          KM   COMBINE 95-7A WITH BYPASS AND SPILL FLOW
479          HC       3
             *

480          KKDSPHD04B
481          KM   FLOW SPLIT AT BETWEEN HD04B AND HD05B
482          KM   DIVERSION TO THE OTHER SIDE OF US95
483          KM   BASED ON CHANNEL CAPACITY = 1004 CFS
484          DT DSHD04B
485          DI       0    1004    2000
486          DQ       0       1     996
             *
```

```
487          KK RDHD04B
488          KM   ROUTE TO THE NEXT CULVERT
489          RD    1068  0.0160    0.02       0    TRAP       0      10
             *

490          KKRETHD05A
491          KM   RETREIVE FLOW FROM CULVERT HD05A
492          DR DCHD05A
             *

493          KK  CHD05B
494          KM   COMBINATION POINT CHD05B
495          KM   COMBINE RDHD04B AND RETHD05A
496          HC       2
             *

497          KK  DHD05B
498          KM   SPLIT FLOW AT CULVERT HD05B
499          DT DCHD05B
500          DI       0     200     400     600     800    1000    1200    1400    1600    1800
501          DI    2000
502          DQ       0     164     242     323     397     494     600     703     809     913
503          DQ    1029
             *
```



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

504          KK   95-8A
505          KM            AREA  3.3 AC
506          PB    2.41
507          BA  0.0052
508          LS       0    92.6
509          UD    .064
             *

510          KKRETSHD05A
511          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD05A AND HD06A
512          DR DSHD05A
             *

513          KK CHD05B2
514          KM   COMBINE 95-8A WITH BYPASS AND SPILL FLOW
515          HC       3
             *

516          KKDSPHD05B
517          KM   FLOW SPLIT AT BETWEEN HD05B AND HD06B
518          KM   DIVERSION TO THE OTHER SIDE OF US95
519          KM   BASED ON CHANNEL CAPACITY = 4017 CFS
520          DT DSHD05B
521          DI       0    4017    5000
522          DQ       0       1     983
             *

523          KK RDHD05B
524          KM   ROUTE TO THE NEXT CULVERT
525          RD     626  0.0134    0.02       0    TRAP       0      10
             *

526          KKRETHD06A
527          KM   RETREIVE FLOW FROM CULVERT HD06A
528          DR DCHD06A
             *

529          KK  CHD06B
530          KM   COMBINE BYPASS WITH RETREIVED FLOW
531          HC       2
             *

532          KK  DHD06B
533          KM   SPLIT FLOW AT CULVERT HD06B
534          DT DCHD06B
535          DI       0   160.0   480.0     640     800     960    1120    1280    1400    1600
536          DQ       0   159.9   479.9     634     706     757     807     857     899     969
             *
```



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

537          KK   95-9A
538          KM            AREA  7.1 AC
539          PB    2.41
540          BA  0.0110
541          LS       0    92.6
542          UD    .098
             *

543          KKRETSHD06A
544          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD06A AND HD07A
545          DR DSHD06A
             *

546          KK CHD06B2
547          KM   COMBINE 95-9A WITH BYPASS AND SPILL FLOW
548          HC       3
             *

549          KKDSPHD06B
550          KM   FLOW SPLIT AT BETWEEN HD06B AND HD07B
551          KM   DIVERSION TO THE OTHER SIDE OF US95
552          KM   BASED ON CHANNEL CAPACITY = 4876 CFS
553          DT DSHD06B
554          DI       0    4876    5000
```

```
555          DQ       0       1     124
             *

556          KK RDHD06B
557          KM   ROUTE TO THE NEXT CULVERT
558          RD    1349  0.0186    0.02       0    TRAP       0      10
             *

559          KKRETHD07A
560          KM   RETREIVE FLOW FROM CULVERT HD07A
561          DR DCHD07A
             *

562          KK  CHD07B
563          KM   COMBINE BYPASS WITH RETREIVED FLOW
564          HC       2
             *

565          KK  DHD07B
566          KM   SPLIT FLOW AT CULVERT HD07B
567          DT DCHD07B
568          DI       0      90     180     270     360     450     540     630     700     810
569          DI     900
570          DQ       0      53      58      61      63      65      67      69      70      71
571          DQ      72
             *
```



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

572          KKRETSHD07A
573          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD07A AND HD08A
574          DR DSHD07A
             *

575          KK CHD07B2
576          KM   COMBINE BYPASS WITH SPILL FLOW
577          HC       2
             *

578          KKDSPHD07B
579          KM   FLOW SPLIT AT BETWEEN HD07B AND HD08B
580          KM   DIVERSION TO THE OTHER SIDE OF US95
581          KM   BASED ON CHANNEL CAPACITY = 1770 CFS
582          DT DSHD07B
583          DI       0    1770    5000
584          DQ       0       1    3230
             *

585          KK DCHD01B
586          KM   RETREIVE FLOW FROM VTN HD01B CULVERT
587          DR DCHD01B
             *

588          KK  DHD01C
589          KM   SPLIT FLOW AT CULVERT HD01C
590          DT DCHD01C
591          DI       0    10.0    50.0
592          DQ       0     9.9    49.9
             *

593          KK RDHD01C
594          KM   ROUTE TO THE NEXT CULVERT
595          RK    1000  0.0165    0.02       0    TRAP      13      20
             *

596          KK  OFF8P2
597          KM           AREA  3.2 AC
598          PB    2.41
599          BA  0.0050
600          LS       0    89.1
601          UD    .078
             *

602          KKRETHD02B
603          KM   RETREIVE FLOW FROM CULVERT HD02B
604          DR DCHD02B
             *
```



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

605          KK  CHD02C
606          KM   COMBINE BYPASS WITH OFF8P2 AND RETREIVED FLOW
607          HC       3
             *

608          KK  DHD02C
609          KM   REVISED W/KYLE CANYON INTERCHANGE FACILITIES
610          KM   SPLIT FLOW AT CULVERT HD02C
611          DT DCHD02C
612          DI       0     246     500
613          DQ       0     123     134
             *

614          KK RDHD02C
615          KM   ROUTE TO THE NEXT CULVERT
616          RK    1320  0.0165    0.02       0    TRAP      13      20
             *

617          KKRETHD04B
618          KM   RETREIVE FLOW FROM CULVERT HD04B
619          DR DCHD04B
             *
```

```
KK  CHD04C
KM   COMBINE BYPASS WITH RETREIVED FLOW
HC       2
*

KK  DHD04C
KM   SPLIT FLOW AT CULVERT HD04C
DT DCHD04C
DI       0     200     400     600     800    1000    1200    1400    1600    1800
DI    2000
DQ       0     181     212     262     336     416     503     609     719     823
DQ     933
*

KKRETSHD04B
KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD04B AND HD05B
DR DSHD04B
*

KK CHD04C2
KM   COMBINE BYPASS WITH SPILL FLOW
HC       2
*

KKDSPHD04C
KM   FLOW SPLIT AT BETWEEN HD04C AND HD05C
KM   DIVERSION TO THE OTHER SIDE OF US95
KM   BASED ON CHANNEL CAPACITY = 1079 CFS
DT DSHD04C
DI       0    1079    2000
DQ       0       1     921
*
```

1 HEC-1 INPUT PAGE 18

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

KK RDHD04C
KM   ROUTE TO THE NEXT CULVERT
RK    1068  0.0160    0.02       0    TRAP      13      20
*

KKRETHD05B
KM   RETREIVE FLOW FROM CULVERT HD05B
DR DCHD05B
*

KK  CHD05C
KM   COMBINE BYPASS WITH RETREIVED FLOW
HC       2
*

KK  DHD05C
KM   SPLIT FLOW AT CULVERT HD05C
DT DCHD05C
DI       0     150     300     450     600     750     800    1050    1200    1350
DI    1500
DQ       0     132     171     193     208     232     245     321     380     444
DQ     513
*

KKRETSHD05B
KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD05B AND HD06B
DR DSHD05B
*

KK CHD05C2
KM   COMBINE BYPASS WITH SPILL FLOW
HC       2
*

KKDSPHD05C
KM   FLOW SPLIT AT BETWEEN HD05C AND HD06C
KM   DIVERSION TO THE OTHER SIDE OF US95
KM   BASED ON CHANNEL CAPACITY = 2744 CFS
DT DSHD05C
DI       0    2744    5000
DQ       0       1    2256
*

KK RDHD05C
KM   ROUTE TO THE NEXT CULVERT
RK     626  0.0134    0.02       0    TRAP      13      20
*

KKRETHD06B
KM   RETREIVE FLOW FROM CULVERT HD06B
DR DCHD06B
*
```

1 HEC-1 INPUT PAGE 19

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

KK  CHD06C
KM   COMBINE BYPASS WITH RETREIVED FLOW
HC       2
*

KK  DHD06C
KM   SPLIT FLOW AT CULVERT HD06C
DT DCHD06C
DI       0   200.0   400.0     600     800    1000    1200    1400    1600    1680
DI    2000
DQ       0   199.9   399.9     560     647     713     786     860     948     988
```

```
687          DQ    1142
             *

688          KKRETSHD06B
689          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD06B AND HD07B
690          DR DSHD06B
             *

691          KK CHD06C2
692          KM   COMBINE BYPASS WITH SPILL FLOW
693          HC       2
             *

694          KKDSPHD06C
695          KM   FLOW SPLIT AT BETWEEN HD06C AND HD07C
696          KM   DIVERSION TO THE OTHER SIDE OF US95
697          KM   BASED ON CHANNEL CAPACITY = 2175 CFS
698          DT DSHD06C
699          DI       0    2175    5000
700          DQ       0       1    2825
             *

701          KK RDHD06C
702          KM   ROUTE TO THE NEXT CULVERT
703          RK    1349  0.0186    0.02       0    TRAP      13      20
             *

704          KKRETHD07B
705          KM   RETREIVE FLOW FROM CULVERT HD07B
706          DR DCHD07B
             *

707          KK  CHD07C
708          KM   COMBINE BYPASS WITH RETREIVED FLOW
709          HC       2
             *

710          KK  DHD07C
711          KM   SPLIT FLOW AT CULVERT HD07C
712          DT DCHD07C
713          DI       0      90     180     270     360     450     540     600     720     810
714          DI     900
715          DQ       0      51      58      62      66      83     110     130     174     208
```



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

716          DQ     244
             *

717          KKRETSHD07B
718          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD07B AND HD08B
719          DR DSHD07B
             *

720          KK CHD07C2
721          KM   COMBINE BYPASS WITH SPILL FLOW
722          HC       2
             *

723          KKDSPHD07C
724          KM   FLOW SPLIT AT BETWEEN HD07C AND HD08C
725          KM   DIVERSION TO THE OTHER SIDE OF US95
726          KM   BASED ON CHANNEL CAPACITY = 2396 CFS
727          DT DSHD07C
728          DI       0    2396    5000
729          DQ       0       1    2604
             *

730          KKCPW-DUMMY
731          KM   COMBINATION POINT CPW-DUMMY
732          KM   COMBINE DSPHD07A, DSPHD07B, AND DSPHD07C
733          HC       3
             *

734          KK   CPKI3
735          KM   RETREIVE FLOW FROM CPKI-3 STORM DRAIN
736          DR  DCPKI3
             *

737          KK  OFF9P2
738          KM          AREA  13.8 AC
739          PB    2.41
740          BA  0.0215
741          LS       0    89.1
742          UD    .097
             *

743          KK  CPKI-4
744          KM   COMBINATION POINT CPKI-4
745          KM   COMBINE CPKI-3, AND OFF9P2
746          HC       2
             *

747          KK DCHD01C
748          KM   RETREIVE FLOW FROM VTN HD01B CULVERT
749          DR DCHD01C
             *
```



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

750          KKRDCHD01C
751          KM   ROUTE DCHC01B TO CP15
752          KM   LENGTH  SLOPE   n-VALUE         SHAPE     WIDTH  S-SLOPE
```

```
 753          RD     905    .025    .025       0    TRAP      20       2
              *

 754          KK  OFF9P1
 755          KM             AREA  2.1 AC
 756          PB    2.41
 757          BA  0.0032
 758          LS       0    89.1
 759          UD    .050
              *

 760          KK  OFF9P3
 761          KM             AREA  6.5 AC
 762          PB    2.41
 763          BA  0.0102
 764          LS       0    89.1
 765          UD    .064
              *

 766          KK    CP15
 767          KM   COMBINATION POINT CP15
 768          KM   COMBINE CPKI-4, RDCHD01C, OFF9P1,AND OFF9P3
 769          HC       4
              *

 770          KK DCHD02C
 771          KM   RETREIVE FLOW FROM VTN HD02C CULVERT
 772          DR DCHD02C
              *

 773          KK  OFF9P4
 774          KM             AREA  7.3 AC
 775          PB    2.41
 776          BA  0.0115
 777          LS       0    89.1
 778          UD    .068
              *

 779          KK  CPKI-5
 780          KM   COMBINATION POINT CPKI-5
 781          KM   COMBINE DCHD02C AND OFF9P4
 782          HC       2
              *

 783          KK  RCPKI5
 784          KM   ROUTE CPKI-5 THRU EX-E4
 785          KM   N-STEPS    K    X-FACTOR
 786          RM       1   0.089    0.15
              *
```

1 HEC-1 INPUT PAGE 22

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

 787          KKCPKI5-DUMMY
 788          KM   COMBINATION POINT CPKI5-DUMMY
 789          KM   COMBINE CPW-DUMM, CP15, AND CPKI5-DUMMY
 790          HC       3
              *

 791          KK DCHD04C
 792          KM   RETREIVE FLOW FROM VTN HD04C CULVERT
 793          DR DCHD04C
              *

 794          KK    OFFH
 795          KM             AREA  5.6 AC
 796          PB    2.41
 797          BA  0.0088
 798          LS       0    89.5
 799          UD    .082
              *

 800          KK    CP17
 801          KM   COMBINATION POINT CP17
 802          KM   COMBINE DCHD04C AND OFFH
 803          HC       2
              *

 804          KK DSHD04C
 805          KM   RETREIVE FLOW THAT OVERTOPS US 95 CHANNEL
 806          KM   BETWEEN VTN HD04C AND HD05C CULVERTS
 807          DR DSHD04C
              *

 808          KK DCHD05C
 809          KM   RETREIVE FLOW FROM VTN HD05C CULVERT
 810          DR DCHD05C
              *

 811          KK   95-7B
 812          KM             AREA  7.2 AC
 813          PB    2.41
 814          BA  0.0112
 815          LS       0    92.6
 816          UD    .087
              *

 817          KK    CP19
 818          KM   COMBINATION POINT CP19
 819          KM   COMBINE DSHD04C, DCHD05C AND 95-7B
 820          HC       3
              *
```

1 HEC-1 INPUT PAGE 23

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

```
821           KK DSHD05C
822           KM   RETREIVE FLOW THAT OVERTOPS US 95 CHANNEL
823           KM   BETWEEN VTN HD05C AND HD06C CULVERTS
824           DR DSHD05C
              *

825           KK DCHD06C
826           KM   RETREIVE FLOW FROM VTN HD06C CULVERT
827           DR DCHD06C
              *

828           KK   95-8B
829           KM             AREA  2.6 AC
830           PB    2.41
831           BA  0.0040
832           LS       0    92.6
833           UD    .052
              *

834           KK    CP20
835           KM   COMBINATION POINT CP20
836           KM   COMBINE DSHD05C, DCHD06C AND 95-8B
837           HC       3
              *

838           KK DSHD06C
839           KM   RETREIVE FLOW THAT OVERTOPS US 95 CHANNEL
840           KM   BETWEEN VTN HD06C AND HD07C CULVERTS
841           DR DSHD06C
              *

842           KK DCHD07C
843           KM   RETREIVE FLOW FROM VTN HD07C CULVERT
844           DR DCHD07C
              *

845           KK   95-9B
846           KM             AREA  8.5 AC
847           PB    2.41
848           BA  0.0133
849           LS       0    92.6
850           UD    .139
              *

851           KK    CP23
852           KM   COMBINATION POINT CP23
853           KM   COMBINE DSHD06C, DCHD07C AND 95-9B
854           HC       3
              *
```



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

855           KK   RCP23
856           KM   ROUTE CP23 THRU EX-E9
857           KM     LEN   SLOPE       N     N/A   SHAPE      BW      SS
858           RD     720    .029    .035       0    TRAP      50       5
              *

859           KKCPSE-DUMMY
860           KM   COMBINATION POINT CPSE-DUMMY
861           KM   COMBINE CPKI5-DUMMY, CP17, CP19, CP20, AND CP23
862           HC       4
              *
863           ZZ
```

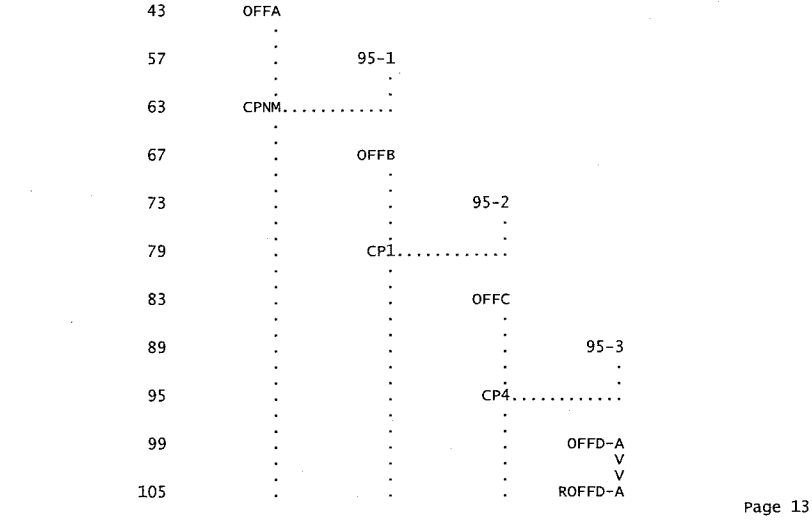
1

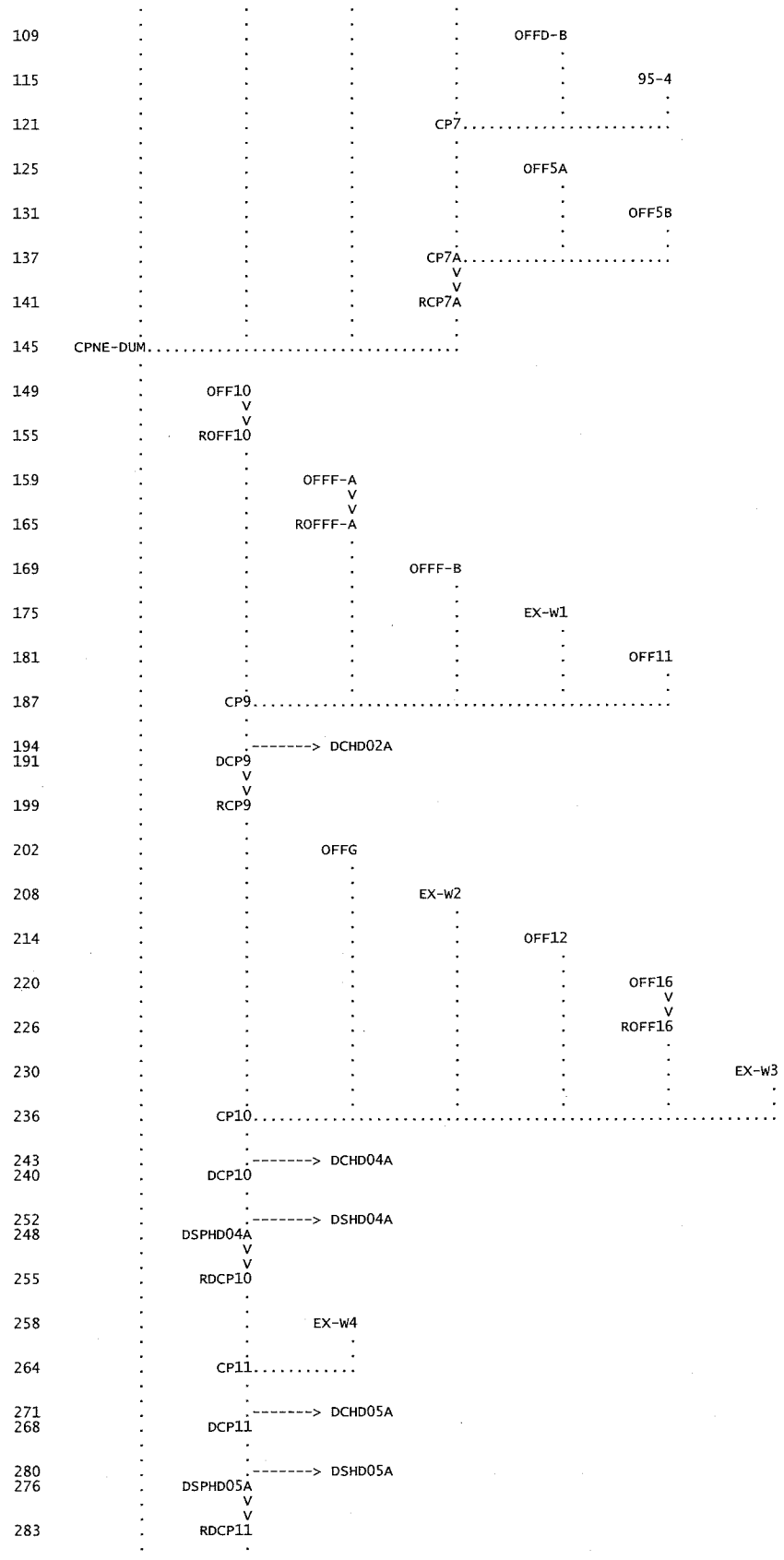
SCHEMATIC DIAGRAM OF STREAM NETWORK

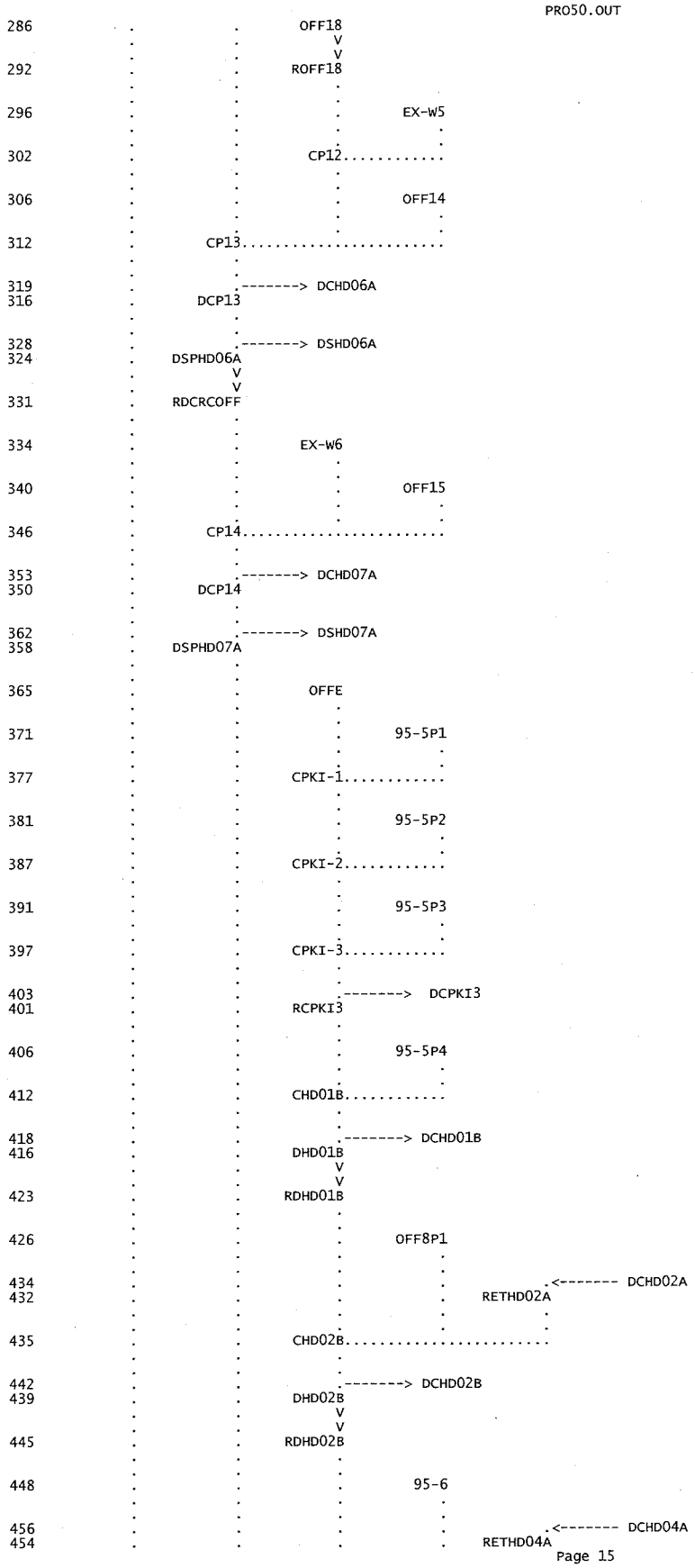
INPUT LINE NO.

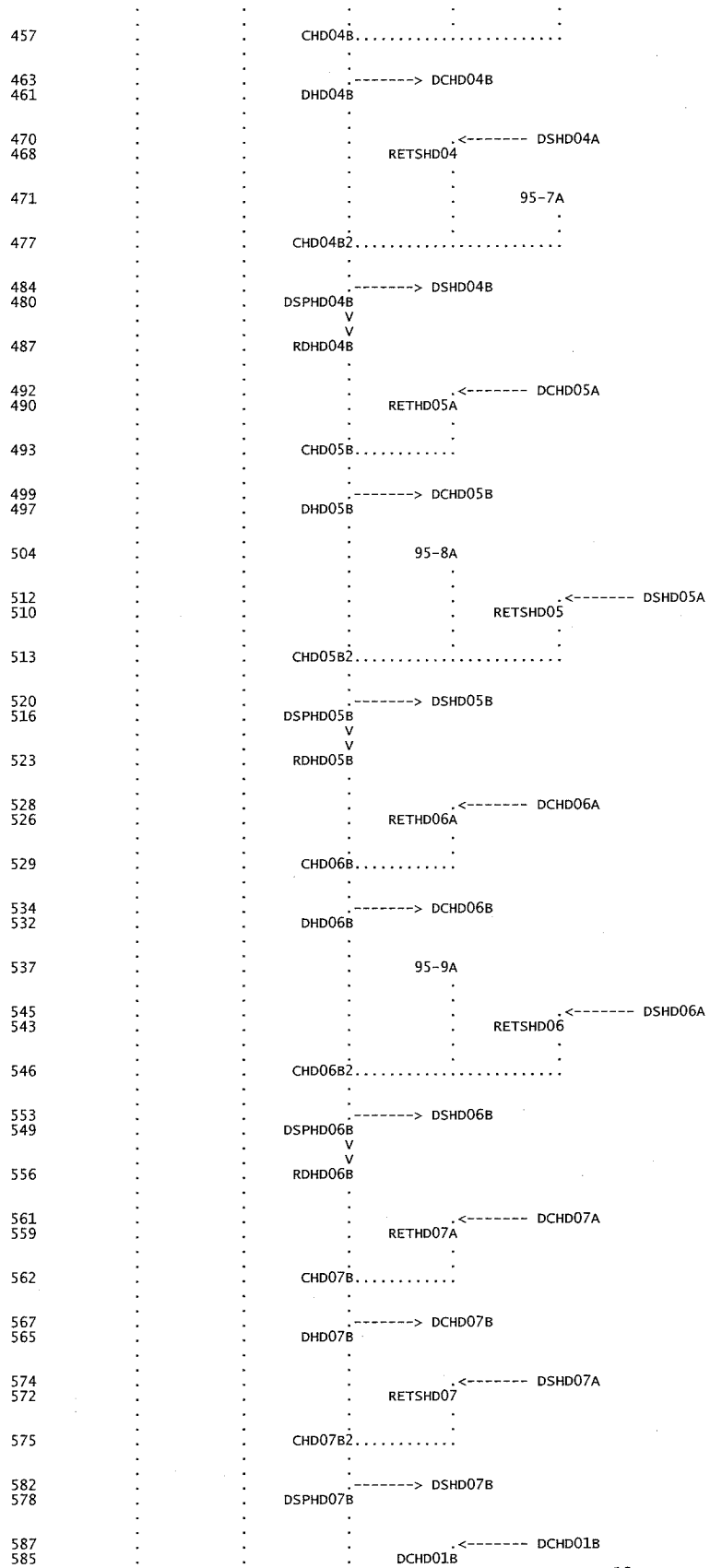
(V) ROUTING (---->) DIVERSION OR PUMP FLOW

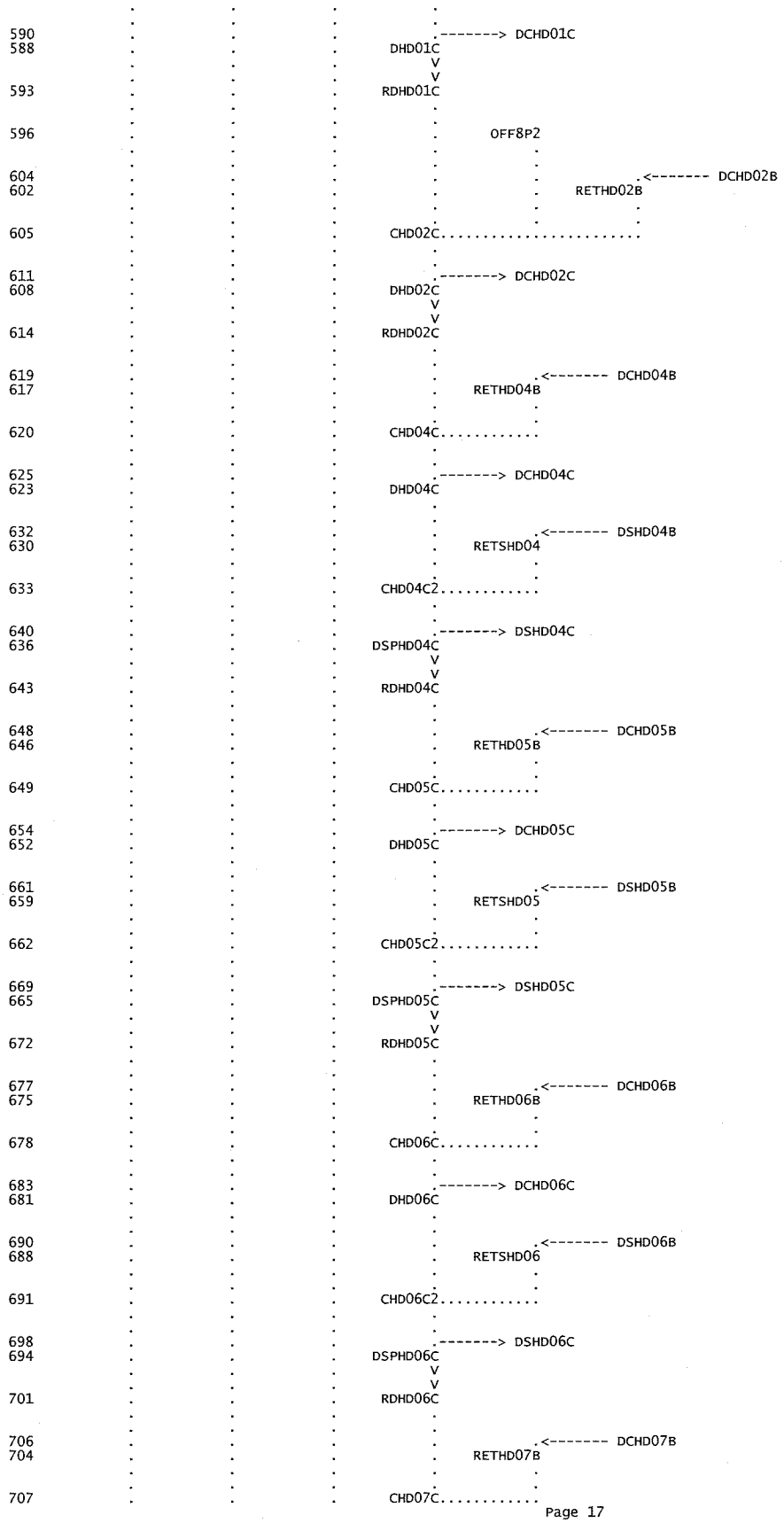
(.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW

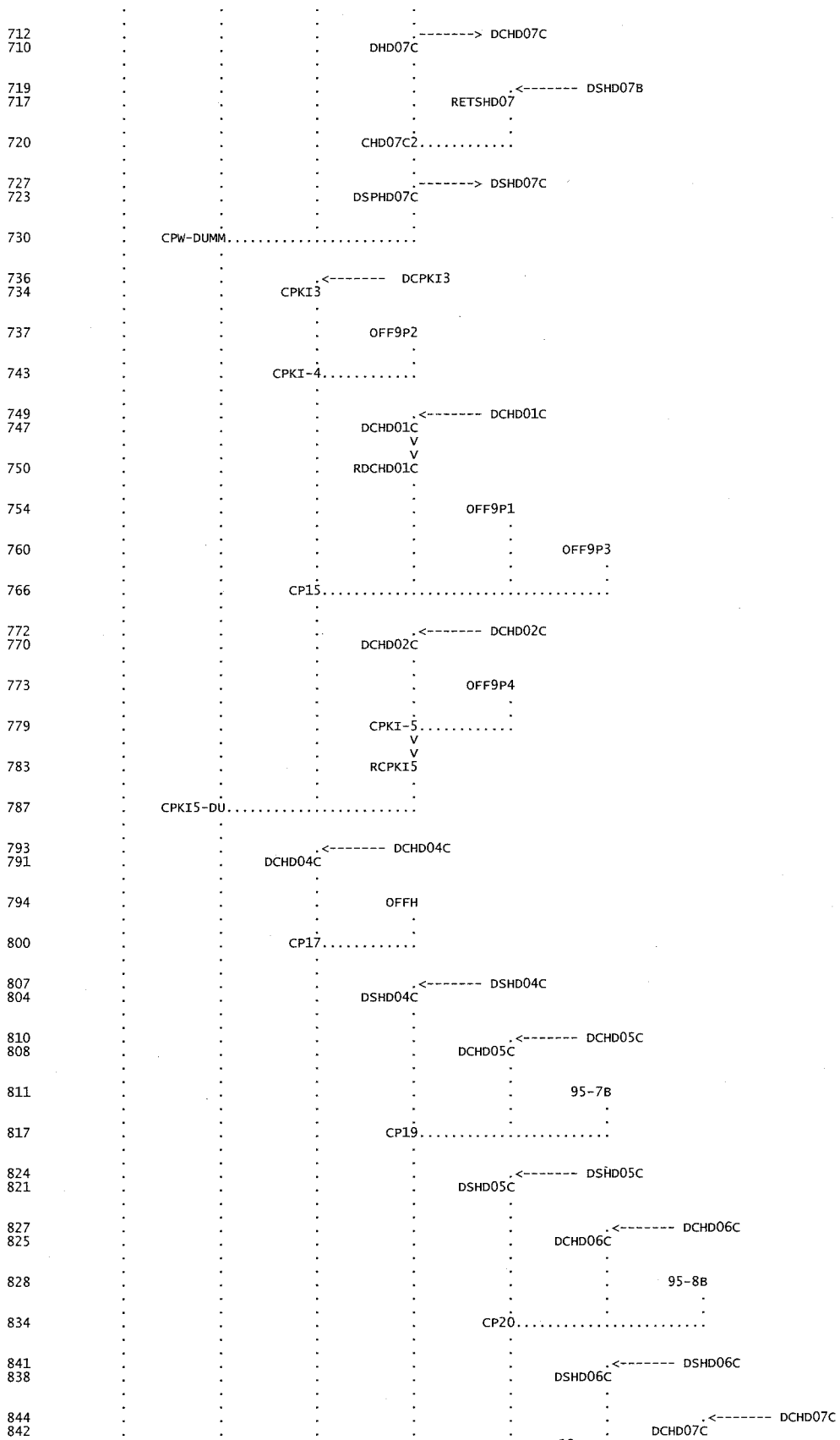



109
OFFD-B
115
95-4
121
CP7
125
OFF5A
131
OFF5B
137
CP7A
141
RCP7A
145
CPNE-DUM
149
OFF10
155
ROFF10
159
OFFF-A
165
ROFFF-A
169
OFFF-B
175
EX-W1
181
OFF11
187
CP9
194
DCHD02A
191
DCP9
199
RCP9
202
OFFG
208
EX-W2
214
OFF12
220
OFF16
226
ROFF16
230
EX-W3
236
CP10
243
DCHD04A
240
DCP10
252
DSHD04A
248
DSPHD04A
255
RDCP10
258
EX-W4
264
CP11
271
DCHD05A
268
DCP11
280
DSHD05A
276
DSPHD05A
283
RDCP11

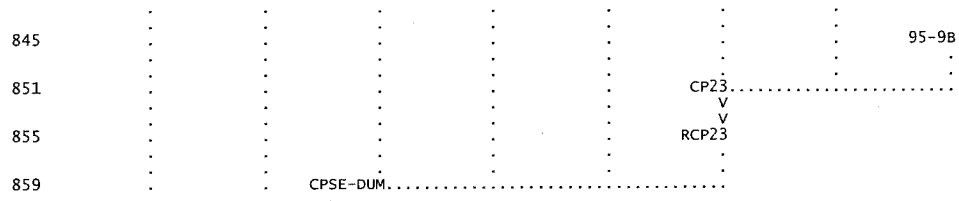

OFF18
ROFF18
EX-W5
CP12
OFF14
CP13
DCHD06A
DCP13
DSHD06A
DSPHD06A
RDCRCOFF
EX-W6
OFF15
CP14
DCHD07A
DCP14
DSHD07A
DSPHD07A
OFFE
95-5P1
CPKI-1
95-5P2
CPKI-2
95-5P3
CPKI-3
DCPKI3
RCPKI3
95-5P4
CHD01B
DCHD01B
DHD01B
RDHD01B
OFF8P1
DCHD02A
RETHD02A
CHD02B
DCHD02B
DHD02B
RDHD02B
95-6
DCHD04A
RETHD04A


457 CHD04B
463
461 DHD04B
470
468 RETSHD04
471 95-7A
477 CHD04B2
484
480 DSPHD04B
487 RDHD04B
492
490 RETHD05A
493 CHD05B
499
497 DHD05B
504 95-8A
512
510 RETSHD05
513 CHD05B2
520
516 DSPHD05B
523 RDHD05B
528
526 RETHD06A
529 CHD06B
534
532 DHD06B
537 95-9A
545
543 RETSHD06
546 CHD06B2
553
549 DSPHD06B
556 RDHD06B
561
559 RETHD07A
562 CHD07B
567
565 DHD07B
574
572 RETSHD07
575 CHD07B2
582
578 DSPHD07B
587
585 DCHD01B
DCHD04B
DSHD04A
DSHD04B
DCHD05A
DCHD05B
DSHD05A
DSHD05B
DCHD06A
DCHD06B
DSHD06A
DSHD06B
DCHD07A
DCHD07B
DSHD07A
DSHD07B
DCHD01B


590
588 DHD01C
593 RDHD01C
596 OFF8P2
604
602 RETHD02B
DCHD01C
DCHD02B
605 CHD02C
611
608 DHD02C
614 RDHD02C
619
617 RETHD04B
DCHD02C
DCHD04B
620 CHD04C
625
623 DHD04C
632
630 RETSHD04
DCHD04C
DSHD04B
633 CHD04C2
640
636 DSPHD04C
643 RDHD04C
648
646 RETHD05B
DSHD04C
DCHD05B
649 CHD05C
654
652 DHD05C
661
659 RETSHD05
DCHD05C
DSHD05B
662 CHD05C2
669
665 DSPHD05C
672 RDHD05C
677
675 RETHD06B
DSHD05C
DCHD06B
678 CHD06C
683
681 DHD06C
690
688 RETSHD06
DCHD06C
DSHD06B
691 CHD06C2
698
694 DSPHD06C
701 RDHD06C
706
704 RETHD07B
DSHD06C
DCHD07B
707 CHD07C


712
710
DHD07C
DCHD07C
719
717
RETSHD07
DSHD07B
720
CHD07C2
727
723
DSPHD07C
DSHD07C
730
CPW-DUMM
736
734
CPKI3
DCPKI3
737
OFF9P2
743
CPKI-4
749
747
DCHD01C
DCHD01C
750
RDCHD01C
754
OFF9P1
760
OFF9P3
766
CP15
772
770
DCHD02C
DCHD02C
773
OFF9P4
779
CPKI-5
783
RCPKI5
787
CPKI5-DU
793
791
DCHD04C
DCHD04C
794
OFFH
800
CP17
807
804
DSHD04C
DSHD04C
810
808
DCHD05C
DCHD05C
811
95-7B
817
CP19
824
821
DSHD05C
DSHD05C
827
825
DCHD06C
DCHD06C
828
95-8B
834
CP20
841
838
DSHD06C
DSHD06C
844
842
DCHD07C
DCHD07C

```
                .         .         .         .         .         .         .
                .         .         .         .         .         .         .
  845           .         .         .         .         .         .         .      95-9B
                .         .         .         .         .         .         .         .
                .         .         .         .         .         .         .         .
  851           .         .         .         .         .       CP23.......................
                .         .         .         .         .          V
                .         .         .         .         .          V
  855           .         .         .         .         .      RCP23
                .         .         .         .         .          .
                .         .         .         .         .          .
  859           .         .    CPSE-DUM.................................
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   28DEC16  TIME  10:36:49   *
*                                       *
*****************************************
```

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

```
*****************************************************************
* ............................................................ *
* :                                                          : *
* :              KYLE CANYON INTERCHANGE                     : *
* :                                                          : *
* :              PROPOSED CONDITIONS                         : *
* :                                                          : *
* : REFERENCED FROM RTC TO MDS FOR KYLE CANYON [DEC 2006]    : *
* : AND MODIFIED TO USE 50-YEAR PRECIPITATION VALUES         : *
* :                                                          : *
* :..........................................................: *
* :              RETURN PERIOD_ _ _ _50 -YEAR                : *
* :              DISTRIBUTION_ _ _ _ 6-HOUR SDN3             : *
* :              PROJECT NO_ _ _ _ _ 412.634A                : *
* :              FILENAME_ _ _ _ _ _ PRO50.H1                : *
* :              DATE MODELED_ _ _ _ 12/28/16                : *
* :              MODELED BY_ _ _ _ _ JAM, RRD, DBC           : *
* :..........................................................: *
* :                                                          : *
* :..........................................................: *
*****************************************************************
```

JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:

AREA SQ.MI.	DARF
0.0 - 0.5	0.99
0.5 - 1.0	0.98
1.0 - 2.0	0.95
2.0 - 4.0	0.92
4.0 - 6.0	0.91
6.0 - 8.0	0.89

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

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

                 COMPUTATION INTERVAL     .08 HOURS
                      TOTAL TIME BASE   24.92 HOURS

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

    JP          MULTI-PLAN OPTION
                     NPLAN           1  NUMBER OF PLANS

    JR          MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                  1.00       .98       .95       .92       .91       .89
1

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

RATIOS APPLIED TO PRECIPITATION

OPERATION	STATION	AREA	PLAN		RATIO 1 1.00	RATIO 2 .98	RATIO 3 .95	RATIO 4 .92	RATIO 5 .91	RATIO 6 .89
HYDROGRAPH AT										
+	OFFA	.02	1	FLOW	12.	12.	11.	10.	10.	9.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	95-1	.00	1	FLOW	6.	6.	6.	5.	5.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CPNM	.02	1	FLOW	17.	16.	15.	14.	14.	13.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	OFFB	.13	1	FLOW	57.	54.	51.	47.	46.	44.
				TIME	3.83	3.83	3.92	3.92	3.92	3.92
HYDROGRAPH AT										
+	95-2	.00	1	FLOW	6.	6.	5.	5.	5.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CP1	.14	1	FLOW	59.	56.	52.	49.	47.	45.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83
HYDROGRAPH AT										
+	OFFC	.13	1	FLOW	64.	61.	57.	53.	51.	49.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT										
+	95-3	.01	1	FLOW	12.	12.	11.	11.	11.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CP4	.14	1	FLOW	70.	67.	62.	58.	57.	54.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT										
+	OFFD-A	.64	1	FLOW	268.	257.	241.	224.	219.	208.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
ROUTED TO										
+	ROFFD-A	.64	1	FLOW	248.	238.	223.	208.	203.	193.
				TIME	4.42	4.42	4.42	4.42	4.42	4.42
HYDROGRAPH AT										
+	OFFD-B	.50	1	FLOW	181.	173.	162.	150.	147.	139.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT										
+	95-4	.01	1	FLOW	14.	14.	13.	12.	12.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT										
+	CP7	1.15	1	FLOW	375.	360.	336.	314.	306.	291.
				TIME	4.33	4.33	4.33	4.33	4.33	4.33
HYDROGRAPH AT										
+	OFF5A	.02	1	FLOW	21.	21.	20.	19.	18.	18.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	OFF5B	.01	1	FLOW	15.	14.	14.	13.	13.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT										
+	CP7A	1.18	1	FLOW	378.	363.	339.	317.	309.	294.
				TIME	4.33	4.33	4.33	4.33	4.33	4.33
ROUTED TO										
+	RCP7A	1.18	1	FLOW	374.	359.	335.	312.	305.	290.
				TIME	4.42	4.42	4.42	4.42	4.42	4.50
4 COMBINED AT										
+	CPNE-DUM	1.49	1	FLOW	421.	404.	378.	352.	344.	327.
				TIME	4.42	4.42	4.42	4.42	4.42	4.42
HYDROGRAPH AT										
+	OFF10	.67	1	FLOW	488.	473.	451.	429.	422.	408.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
ROUTED TO										
+	ROFF10	.67	1	FLOW	439.	426.	407.	387.	380.	368.
				TIME	4.58	4.67	4.67	4.67	4.67	4.67
HYDROGRAPH AT										
+	OFFF-A	.99	1	FLOW	674.	652.	619.	586.	575.	553.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO										
+	ROFFF-A	.99	1	FLOW	634.	613.	582.	551.	540.	520.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	OFFF-B	.61	1	FLOW	343.	331.	314.	296.	290.	279.
				TIME	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT										
+	EX-W1	.02	1	FLOW	15.	14.	13.	12.	12.	11.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	OFF11	.00	1	FLOW	3.	3.	3.	3.	2.	2.

				TIME	3.50	3.50	3.50	3.50	3.50	3.50
5 COMBINED AT										
+	CP9	2.30	1	FLOW	1157.	1119.	1062.	1005.	986.	949.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
DIVERSION TO										
+	DCHD02A	2.30	1	FLOW	384.	372.	356.	342.	337.	328.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DCP9	2.30	1	FLOW	773.	747.	706.	663.	649.	621.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO										
+	RCP9	2.30	1	FLOW	769.	744.	703.	661.	647.	620.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	OFFG	.04	1	FLOW	40.	39.	37.	35.	35.	33.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	EX-W2	.02	1	FLOW	17.	17.	16.	15.	15.	14.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	OFF12	.01	1	FLOW	6.	6.	5.	5.	5.	5.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	OFF16	.79	1	FLOW	444.	431.	410.	390.	383.	370.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO										
+	ROFF16	.79	1	FLOW	430.	416.	396.	376.	370.	357.
				TIME	4.33	4.33	4.33	4.33	4.33	4.33
HYDROGRAPH AT										
+	EX-W3	.27	1	FLOW	223.	216.	205.	195.	191.	185.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
6 COMBINED AT										
+	CP10	3.43	1	FLOW	1272.	1231.	1167.	1102.	1081.	1038.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DCHD04A	3.43	1	FLOW	757.	730.	689.	646.	632.	604.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DCP10	3.43	1	FLOW	515.	501.	479.	456.	449.	434.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DSHD04A	3.43	1	FLOW	1.	1.	1.	1.	1.	1.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DSPHD04A	3.43	1	FLOW	514.	500.	478.	455.	448.	433.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
ROUTED TO										
+	RDCP10	3.43	1	FLOW	513.	499.	477.	455.	447.	432.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	EX-W4	.10	1	FLOW	103.	99.	95.	90.	88.	85.
				TIME	3.58	3.58	3.58	3.58	3.58	3.67
2 COMBINED AT										
+	CP11	3.54	1	FLOW	534.	519.	496.	472.	464.	448.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
DIVERSION TO										
+	DCHD05A	3.54	1	FLOW	251.	247.	240.	234.	232.	228.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DCP11	3.54	1	FLOW	283.	272.	255.	238.	232.	220.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
DIVERSION TO										
+	DSHD05A	3.54	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DSPHD05A	3.54	1	FLOW	282.	272.	255.	237.	232.	220.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO										
+	RDCP11	3.54	1	FLOW	281.	271.	254.	237.	231.	220.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	OFF18	.55	1	FLOW	391.	379.	361.	343.	337.	325.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO										
+	ROFF18	.55	1	FLOW	374.	362.	345.	328.	322.	310.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	EX-W5	.45	1	FLOW	360.	348.	331.	315.	309.	298.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75

2 COMBINED AT										
+ CP12	1.00	1	FLOW	633.	613.	583.	554.	544.	524.
			TIME	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT										
+ OFF14	.01	1	FLOW	16.	15.	15.	14.	14.	13.
			TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT										
+ CP13	4.55	1	FLOW	871.	840.	794.	748.	733.	703.
			TIME	3.92	3.92	4.00	4.00	4.00	4.00
DIVERSION TO										
+ DCHD06A	4.55	1	FLOW	754.	742.	723.	693.	683.	663.
			TIME	3.92	3.92	4.00	4.00	4.00	4.00
HYDROGRAPH AT										
+ DCP13	4.55	1	FLOW	117.	98.	71.	56.	51.	41.
			TIME	3.92	3.92	4.00	4.00	4.00	4.00
DIVERSION TO										
+ DSHD06A	4.55	1	FLOW	0.	0.	0.	0.	0.	0.
			TIME	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT										
+ DSPHD06A	4.55	1	FLOW	117.	98.	71.	56.	51.	41.
			TIME	3.92	3.92	4.00	4.00	4.00	4.00
ROUTED TO										
+ RDCRCOFF	4.55	1	FLOW	118.	99.	71.	55.	50.	40.
			TIME	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT										
+ EX-W6	.02	1	FLOW	17.	17.	16.	15.	15.	14.
			TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+ OFF15	.04	1	FLOW	39.	38.	36.	35.	34.	33.
			TIME	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT										
+ CP14	4.60	1	FLOW	131.	111.	83.	67.	62.	51.
			TIME	4.00	4.00	4.00	4.00	4.00	4.00
DIVERSION TO										
+ DCHD07A	4.60	1	FLOW	53.	52.	47.	38.	35.	29.
			TIME	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT										
+ DCP14	4.60	1	FLOW	79.	59.	36.	29.	27.	22.
			TIME	4.00	4.00	4.00	4.00	4.00	4.00
DIVERSION TO										
+ DSHD07A	4.60	1	FLOW	0.	0.	0.	0.	0.	0.
			TIME	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT										
+ DSPHD07A	4.60	1	FLOW	78.	59.	36.	29.	27.	22.
			TIME	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT										
+ OFFE	.04	1	FLOW	21.	20.	19.	17.	17.	16.
			TIME	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT										
+ 95-5P1	.00	1	FLOW	5.	4.	4.	4.	4.	4.
			TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+ CPKI-1	.04	1	FLOW	24.	23.	21.	20.	19.	18.
			TIME	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT										
+ 95-5P2	.01	1	FLOW	8.	8.	8.	7.	7.	7.
			TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+ CPKI-2	.05	1	FLOW	29.	27.	26.	24.	24.	22.
			TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+ 95-5P3	.03	1	FLOW	33.	32.	31.	29.	29.	28.
			TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+ CPKI-3	.07	1	FLOW	58.	56.	54.	51.	50.	48.
			TIME	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO										
+ DCPKI3	.07	1	FLOW	58.	56.	54.	51.	50.	48.
			TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+ RCPKI3	.07	1	FLOW	0.	0.	0.	0.	0.	0.
			TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+ 95-5P4	.00	1	FLOW	4.	3.	3.	3.	3.	3.
			TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+ CHD01B	.08	1	FLOW	4.	3.	3.	3.	3.	3.
			TIME	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO										
+ DCHD01B	.08	1	FLOW	4.	3.	3.	3.	3.	3.

				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	DHD01B	.08	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO										
+	RDHD01B	.08	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT										
+	OFF8P1	.01	1	FLOW	15.	15.	14.	13.	13.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	RETHD02A	.00	1	FLOW	384.	372.	356.	342.	337.	328.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
3 COMBINED AT										
+	CHD02B	.09	1	FLOW	385.	373.	357.	343.	338.	329.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
DIVERSION TO										
+	DCHD02B	.09	1	FLOW	253.	251.	248.	246.	245.	243.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DHD02B	.09	1	FLOW	133.	122.	109.	97.	94.	87.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO										
+	RDHD02B	.09	1	FLOW	132.	121.	109.	97.	93.	86.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	95-6	.01	1	FLOW	14.	13.	13.	12.	12.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	RETHD04A	.00	1	FLOW	757.	730.	689.	646.	632.	604.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
3 COMBINED AT										
+	CHD04B	.10	1	FLOW	890.	853.	798.	744.	726.	691.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DCHD04B	.10	1	FLOW	482.	466.	442.	419.	412.	397.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DHD04B	.10	1	FLOW	408.	387.	356.	324.	314.	294.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	RETSHD04	.00	1	FLOW	1.	1.	1.	1.	1.	1.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	95-7A	.01	1	FLOW	11.	11.	10.	10.	10.	9.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT										
+	CHD04B2	.10	1	FLOW	410.	389.	358.	326.	316.	295.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DSHD04B	.10	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DSPHD04B	.10	1	FLOW	410.	389.	357.	326.	315.	295.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
ROUTED TO										
+	RDHD04B	.10	1	FLOW	409.	388.	356.	324.	314.	294.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	RETHD05A	.00	1	FLOW	251.	247.	240.	234.	232.	228.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
2 COMBINED AT										
+	CHD05B	.10	1	FLOW	660.	634.	596.	558.	546.	522.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DCHD05B	.10	1	FLOW	345.	335.	321.	306.	301.	291.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DHD05B	.10	1	FLOW	315.	298.	275.	252.	245.	231.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	95-8A	.01	1	FLOW	9.	8.	8.	8.	8.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	RETSHD05	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
3 COMBINED AT										
+	CHD05B2	.11	1	FLOW	316.	299.	276.	253.	246.	231.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25

DIVERSION TO										
+	DSHD05B	.11	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DSPHD05B	.11	1	FLOW	316.	299.	276.	253.	246.	231.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
ROUTED TO										
+	RDHD05B	.11	1	FLOW	315.	298.	275.	252.	245.	230.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	RETHD06A	.00	1	FLOW	754.	742.	723.	693.	683.	663.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00
2 COMBINED AT										
+	CHD06B	.11	1	FLOW	1037.	1006.	961.	910.	893.	859.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
DIVERSION TO										
+	DCHD06B	.11	1	FLOW	781.	771.	757.	741.	736.	725.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	DHD06B	.11	1	FLOW	256.	235.	204.	169.	157.	134.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	95-9A	.01	1	FLOW	16.	16.	15.	14.	14.	14.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	RETSHD06	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92
3 COMBINED AT										
+	CHD06B2	.12	1	FLOW	257.	237.	206.	171.	159.	136.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
DIVERSION TO										
+	DSHD06B	.12	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	DSPHD06B	.12	1	FLOW	257.	237.	206.	171.	159.	136.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
ROUTED TO										
+	RDHD06B	.12	1	FLOW	256.	236.	202.	169.	158.	134.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	RETHD07A	.00	1	FLOW	53.	52.	47.	38.	35.	29.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
2 COMBINED AT										
+	CHD07B	.12	1	FLOW	308.	283.	245.	202.	188.	158.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
DIVERSION TO										
+	DCHD07B	.12	1	FLOW	62.	61.	60.	59.	58.	57.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	DHD07B	.12	1	FLOW	246.	222.	185.	143.	130.	101.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	RETSHD07	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
2 COMBINED AT										
+	CHD07B2	.12	1	FLOW	246.	222.	185.	143.	130.	101.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
DIVERSION TO										
+	DSHD07B	.12	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	DSPHD07B	.12	1	FLOW	246.	222.	185.	143.	130.	101.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT										
+	DCHD01B	.00	1	FLOW	4.	3.	3.	3.	3.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO										
+	DCHD01C	.00	1	FLOW	3.	3.	3.	3.	3.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	DHD01C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO										
+	RDHD01C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.67	3.67	3.75	3.75	3.75	3.75
HYDROGRAPH AT										
+	OFF8P2	.00	1	FLOW	7.	7.	6.	6.	6.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	RETHD02B	.00	1	FLOW	253.	251.	248.	246.	245.	243.

				TIME	4.17	4.17	4.17	4.17	4.17	4.17
3 COMBINED AT										
+	CHD02C	.00	1	FLOW	253.	251.	249.	246.	245.	243.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
DIVERSION TO										
+	DCHD02C	.00	1	FLOW	123.	123.	123.	123.	123.	122.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DHD02C	.00	1	FLOW	130.	128.	126.	123.	123.	122.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO										
+	RDHD02C	.00	1	FLOW	130.	128.	125.	123.	123.	121.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	RETHD04B	.00	1	FLOW	482.	466.	442.	419.	412.	397.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
2 COMBINED AT										
+	CHD04C	.00	1	FLOW	611.	594.	568.	543.	535.	519.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DCHD04C	.00	1	FLOW	266.	260.	254.	248.	246.	242.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DHD04C	.00	1	FLOW	345.	333.	314.	295.	289.	277.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	RETSHD04	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
2 COMBINED AT										
+	CHD04C2	.00	1	FLOW	346.	334.	314.	295.	289.	277.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DSHD04C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DSPHD04C	.00	1	FLOW	345.	333.	314.	295.	289.	277.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
ROUTED TO										
+	RDHD04C	.00	1	FLOW	345.	333.	313.	295.	289.	277.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	RETHD05B	.00	1	FLOW	345.	335.	321.	306.	301.	291.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
2 COMBINED AT										
+	CHD05C	.00	1	FLOW	690.	668.	635.	601.	590.	568.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DCHD05C	.00	1	FLOW	222.	219.	214.	208.	207.	205.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DHD05C	.00	1	FLOW	468.	449.	421.	393.	383.	363.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	RETSHD05	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
2 COMBINED AT										
+	CHD05C2	.00	1	FLOW	468.	450.	421.	393.	383.	363.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DSHD05C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DSPHD05C	.00	1	FLOW	468.	449.	421.	393.	383.	363.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
ROUTED TO										
+	RDHD05C	.00	1	FLOW	467.	449.	420.	392.	382.	362.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	RETHD06B	.00	1	FLOW	781.	771.	757.	741.	736.	725.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
2 COMBINED AT										
+	CHD06C	.00	1	FLOW	1240.	1212.	1167.	1122.	1107.	1077.
				TIME	4.17	4.17	4.17	4.17	4.17	4.25
DIVERSION TO										
+	DCHD06C	.00	1	FLOW	801.	790.	774.	758.	752.	741.
				TIME	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT										
+	DHD06C	.00	1	FLOW	439.	421.	393.	365.	355.	336.
				TIME	4.17	4.17	4.17	4.17	4.17	4.25

HYDROGRAPH AT										
+	RETSHD06	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08
2 COMBINED AT										
+	CHD06C2	.00	1	FLOW	439.	421.	393.	365.	355.	336.
				TIME	4.17	4.17	4.17	4.17	4.17	4.25
DIVERSION TO										
+	DSHD06C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DSPHD06C	.00	1	FLOW	439.	421.	393.	364.	355.	336.
				TIME	4.17	4.17	4.17	4.17	4.17	4.25
ROUTED TO										
+	RDHD06C	.00	1	FLOW	438.	420.	392.	364.	355.	336.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	RETHD07B	.00	1	FLOW	62.	61.	60.	59.	58.	57.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
2 COMBINED AT										
+	CHD07C	.00	1	FLOW	499.	481.	451.	422.	412.	391.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DCHD07C	.00	1	FLOW	98.	92.	83.	78.	76.	72.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DHD07C	.00	1	FLOW	401.	388.	368.	344.	336.	319.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	RETSHD07	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.08	4.08	4.08	4.08	4.08
2 COMBINED AT										
+	CHD07C2	.00	1	FLOW	402.	388.	368.	344.	336.	320.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO										
+	DSHD07C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT										
+	DSPHD07C	.00	1	FLOW	401.	388.	368.	344.	336.	319.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
3 COMBINED AT										
+	CPW-DUMM	4.72	1	FLOW	694.	646.	575.	504.	480.	433.
				TIME	4.08	4.08	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	CPKI3	.00	1	FLOW	58.	56.	54.	51.	50.	48.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	OFF9P2	.02	1	FLOW	27.	26.	25.	24.	24.	23.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CPKI-4	.02	1	FLOW	86.	83.	79.	75.	73.	71.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	DCHD01C	.00	1	FLOW	3.	3.	3.	3.	3.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO										
+	RDCHD01C	.00	1	FLOW	3.	3.	3.	3.	3.	2.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	OFF9P1	.00	1	FLOW	5.	5.	5.	4.	4.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	OFF9P3	.01	1	FLOW	15.	14.	14.	13.	13.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
4 COMBINED AT										
+	CP15	.03	1	FLOW	108.	105.	100.	95.	93.	90.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	DCHD02C	.00	1	FLOW	123.	123.	123.	123.	123.	122.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	OFF9P4	.01	1	FLOW	16.	16.	15.	15.	14.	14.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CPKI-5	.01	1	FLOW	126.	126.	125.	124.	124.	123.
				TIME	4.50	4.50	4.00	4.08	4.08	4.08
ROUTED TO										
+	RCPKI5	.01	1	FLOW	126.	125.	124.	124.	124.	122.
				TIME	4.58	4.58	4.17	4.25	4.25	4.25
3 COMBINED AT										
+	CPKI5-DU	4.77	1	FLOW	842.	793.	715.	641.	617.	568.

				TIME	4.08	4.08	4.08	4.17	4.17	4.17
HYDROGRAPH AT										
+	DCHD04C	.00	1	FLOW	266.	260.	254.	248.	246.	242.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	OFFH	.01	1	FLOW	12.	12.	11.	11.	11.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CP17	.01	1	FLOW	267.	261.	255.	248.	246.	242.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DSHD04C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DCHD05C	.00	1	FLOW	222.	219.	214.	208.	207.	205.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	95-7B	.01	1	FLOW	17.	17.	16.	15.	15.	15.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT										
+	CP19	.01	1	FLOW	224.	220.	215.	210.	208.	206.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DSHD05C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	DCHD06C	.00	1	FLOW	801.	790.	774.	758.	752.	741.
				TIME	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT										
+	95-8B	.00	1	FLOW	7.	7.	7.	6.	6.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT										
+	CP20	.00	1	FLOW	801.	791.	775.	758.	753.	742.
				TIME	4.17	4.17	4.17	4.17	4.25	4.25
HYDROGRAPH AT										
+	DSHD06C	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT										
+	DCHD07C	.00	1	FLOW	98.	92.	83.	78.	76.	72.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT										
+	95-9B	.01	1	FLOW	18.	18.	17.	16.	16.	16.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT										
+	CP23	.01	1	FLOW	100.	94.	85.	80.	78.	74.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO										
+	RCP23	.01	1	FLOW	100.	94.	85.	80.	78.	74.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25
4 COMBINED AT										
+	CPSE-DUM	.04	1	FLOW	1391.	1366.	1329.	1296.	1285.	1264.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO=		.00							
RCP9	MANE	1.11	772.76	251.77	.74	5.00	769.29	255.00	.74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9146E+02 EXCESS= .0000E+00 OUTFLOW= .9146E+02 BASIN STORAGE= .2984E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO=		.00							
RCP9	MANE	1.12	746.70	251.71	.71	5.00	743.67	255.00	.71

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8779E+02 EXCESS= .0000E+00 OUTFLOW= .8779E+02 BASIN STORAGE= .2872E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO=		.00							
RCP9	MANE	1.13	705.64	251.89	.67	5.00	702.90	255.00	.67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8227E+02 EXCESS= .0000E+00 OUTFLOW= .8227E+02 BASIN STORAGE= .2994E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO=		.00							
RCP9	MANE	1.15	663.23	252.38	.62	5.00	661.28	255.00	.63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7679E+02 EXCESS= .0000E+00 OUTFLOW= .7679E+02 BASIN STORAGE= .3006E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP9	MANE	1.16	648.98	251.43	.61	5.00	647.49	255.00	.61

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7498E+02 EXCESS= .0000E+00 OUTFLOW= .7498E+02 BASIN STORAGE= .2868E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP9	MANE	1.17	621.10	251.89	.58	5.00	619.58	255.00	.58

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7136E+02 EXCESS= .0000E+00 OUTFLOW= .7136E+02 BASIN STORAGE= .2963E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.56	513.55	256.06	.42	5.00	513.34	255.00	.42

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7766E+02 EXCESS= .0000E+00 OUTFLOW= .7766E+02 BASIN STORAGE= .3819E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.57	499.47	256.27	.41	5.00	499.08	255.00	.41

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7527E+02 EXCESS= .0000E+00 OUTFLOW= .7527E+02 BASIN STORAGE= .3937E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.59	477.31	256.00	.39	5.00	477.07	255.00	.39

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7168E+02 EXCESS= .0000E+00 OUTFLOW= .7168E+02 BASIN STORAGE= .3754E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.61	454.82	255.88	.37	5.00	454.61	255.00	.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6811E+02 EXCESS= .0000E+00 OUTFLOW= .6811E+02 BASIN STORAGE= .3985E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.62	447.21	256.93	.37	5.00	447.10	255.00	.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6693E+02 EXCESS= .0000E+00 OUTFLOW= .6693E+02 BASIN STORAGE= .3723E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.63	432.39	255.86	.35	5.00	432.15	255.00	.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6455E+02 EXCESS= .0000E+00 OUTFLOW= .6455E+02 BASIN STORAGE= .3662E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.14	282.12	252.22	.17	5.00	281.14	255.00	.17

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3221E+02 EXCESS= .0000E+00 OUTFLOW= .3221E+02 BASIN STORAGE= .2359E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.15	271.73	252.31	.16	5.00	270.88	255.00	.16

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3061E+02 EXCESS= .0000E+00 OUTFLOW= .3061E+02 BASIN STORAGE= .2324E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.17	254.86	251.74	.15	5.00	254.28	255.00	.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2820E+02 EXCESS= .0000E+00 OUTFLOW= .2820E+02 BASIN STORAGE= .2280E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.19	237.37	252.70	.14	5.00	237.09	255.00	.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2579E+02 EXCESS= .0000E+00 OUTFLOW= .2579E+02 BASIN STORAGE= .2279E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.19	231.59	251.90	.13	5.00	231.24	255.00	.13

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2499E+02 EXCESS= .0000E+00 OUTFLOW= .2499E+02 BASIN STORAGE= .2312E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.21	219.99	252.74	.12	5.00	219.83	255.00	.12

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2339E+02 EXCESS= .0000E+00 OUTFLOW= .2339E+02 BASIN STORAGE= .2342E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.70	118.35	240.00	.02	5.00	118.34	240.00	.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4885E+01 EXCESS= .0000E+00 OUTFLOW= .4888E+01 BASIN STORAGE= .4421E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RDCRCOFF MANE 2.82 98.70 239.78 .02 5.00 98.51 240.00 .02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4006E+01 EXCESS= .0000E+00 OUTFLOW= .4008E+01 BASIN STORAGE= .4656E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RDCRCOFF MANE 3.06 71.41 241.61 .01 5.00 70.86 240.00 .01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2907E+01 EXCESS= .0000E+00 OUTFLOW= .2909E+01 BASIN STORAGE= .4731E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RDCRCOFF MANE 3.25 55.34 240.39 .01 5.00 55.21 240.00 .01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2129E+01 EXCESS= .0000E+00 OUTFLOW= .2131E+01 BASIN STORAGE= .4484E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RDCRCOFF MANE 3.33 50.88 242.79 .01 5.00 50.02 240.00 .01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1886E+01 EXCESS= .0000E+00 OUTFLOW= .1887E+01 BASIN STORAGE= .4553E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RDCRCOFF MANE 3.52 41.08 242.58 .01 5.00 39.77 240.00 .01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1395E+01 EXCESS= .0000E+00 OUTFLOW= .1397E+01 BASIN STORAGE= .4350E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RDHD01B MANE 3.75 .02 225.00 .00 5.00 .02 225.00 .00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1140E-02 EXCESS= .0000E+00 OUTFLOW= .1245E-02 BASIN STORAGE= .3365E-03 PERCENT ERROR= -38.7

FOR PLAN = 1 RATIO= .00
RDHD01B MANE 4.00 .02 224.00 .00 5.00 .02 225.00 .00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1096E-02 EXCESS= .0000E+00 OUTFLOW= .1215E-02 BASIN STORAGE= .3658E-03 PERCENT ERROR= -44.2

FOR PLAN = 1 RATIO= .00
RDHD01B MANE 4.25 .02 225.25 .00 5.00 .02 225.00 .00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1044E-02 EXCESS= .0000E+00 OUTFLOW= .1155E-02 BASIN STORAGE= .3584E-03 PERCENT ERROR= -44.9

FOR PLAN = 1 RATIO= .00
RDHD01B MANE 4.00 .02 228.00 .00 5.00 .02 225.00 .00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9943E-03 EXCESS= .0000E+00 OUTFLOW= .1110E-02 BASIN STORAGE= .3484E-03 PERCENT ERROR= -46.7

FOR PLAN = 1 RATIO= .00
RDHD01B MANE 4.00 .02 228.00 .00 5.00 .02 225.00 .00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9775E-03 EXCESS= .0000E+00 OUTFLOW= .1093E-02 BASIN STORAGE= .3451E-03 PERCENT ERROR= -47.2

FOR PLAN = 1 RATIO= .00
RDHD01B MANE 4.25 .02 225.25 .00 5.00 .02 225.00 .00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9435E-03 EXCESS= .0000E+00 OUTFLOW= .1091E-02 BASIN STORAGE= .3488E-03 PERCENT ERROR= -52.6

FOR PLAN = 1 RATIO= .00
RDHD02B MANE 2.68 132.04 254.24 3.03 5.00 131.62 255.00 3.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1400E+02 EXCESS= .0000E+00 OUTFLOW= .1400E+02 BASIN STORAGE= .4576E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RDHD02B MANE 2.73 121.76 253.93 2.86 5.00 121.47 255.00 2.86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1319E+02 EXCESS= .0000E+00 OUTFLOW= .1319E+02 BASIN STORAGE= .4524E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RDHD02B MANE 2.81 108.71 255.80 2.62 5.00 108.67 255.00 2.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1208E+02 EXCESS= .0000E+00 OUTFLOW= .1208E+02 BASIN STORAGE= .4688E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RDHD02B MANE 2.89 96.69 254.65 2.39 5.00 96.63 255.00 2.39

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1104E+02 EXCESS= .0000E+00 OUTFLOW= .1104E+02 BASIN STORAGE= .4890E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.92	93.09	254.09	2.32	5.00	93.08	255.00	2.32

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1072E+02 EXCESS= .0000E+00 OUTFLOW= .1072E+02 BASIN STORAGE= .5033E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.98	86.49	256.09	2.19	5.00	86.46	255.00	2.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1009E+02 EXCESS= .0000E+00 OUTFLOW= .1010E+02 BASIN STORAGE= .4591E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.65	409.09	256.10	6.72	5.00	408.81	255.00	6.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3718E+02 EXCESS= .0000E+00 OUTFLOW= .3718E+02 BASIN STORAGE= .3796E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.67	387.85	256.18	6.27	5.00	387.51	255.00	6.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3473E+02 EXCESS= .0000E+00 OUTFLOW= .3473E+02 BASIN STORAGE= .3803E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.71	356.68	256.48	5.62	5.00	356.12	255.00	5.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3112E+02 EXCESS= .0000E+00 OUTFLOW= .3113E+02 BASIN STORAGE= .3781E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.75	324.58	257.24	4.98	5.00	324.43	255.00	4.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2759E+02 EXCESS= .0000E+00 OUTFLOW= .2759E+02 BASIN STORAGE= .3640E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.76	314.40	255.77	4.78	5.00	314.26	255.00	4.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2645E+02 EXCESS= .0000E+00 OUTFLOW= .2645E+02 BASIN STORAGE= .3827E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.79	294.53	256.46	4.37	5.00	293.91	255.00	4.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2421E+02 EXCESS= .0000E+00 OUTFLOW= .2421E+02 BASIN STORAGE= .3684E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.10	314.98	256.34	5.79	5.00	314.62	255.00	5.79

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3366E+02 EXCESS= .0000E+00 OUTFLOW= .3366E+02 BASIN STORAGE= .2305E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.12	298.68	256.40	5.47	5.00	298.31	255.00	5.47

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3179E+02 EXCESS= .0000E+00 OUTFLOW= .3179E+02 BASIN STORAGE= .2331E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.14	275.26	256.01	4.99	5.00	274.77	255.00	5.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2903E+02 EXCESS= .0000E+00 OUTFLOW= .2903E+02 BASIN STORAGE= .2382E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.17	252.59	255.68	4.54	5.00	252.14	255.00	4.54

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2638E+02 EXCESS= .0000E+00 OUTFLOW= .2638E+02 BASIN STORAGE= .2300E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.18	245.53	256.37	4.39	5.00	244.90	255.00	4.39

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2553E+02 EXCESS= .0000E+00 OUTFLOW= .2553E+02 BASIN STORAGE= .2357E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.19	230.90	256.72	4.10	5.00	230.30	255.00	4.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2383E+02 EXCESS= .0000E+00 OUTFLOW= .2383E+02 BASIN STORAGE= .2302E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.22	256.42	250.41	2.45	5.00	256.40	250.00	2.45

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1567E+02 EXCESS= .0000E+00 OUTFLOW= .1567E+02 BASIN STORAGE= .4421E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.26	237.32	248.74	2.17	5.00	235.63	250.00	2.17

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1387E+02 EXCESS= .0000E+00 OUTFLOW= .1387E+02 BASIN STORAGE= .4529E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.34	204.60	248.34	1.76	5.00	202.45	250.00	1.75

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1124E+02 EXCESS= .0000E+00 OUTFLOW= .1124E+02 BASIN STORAGE= .4740E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.45	169.62	247.87	1.37	5.00	168.91	250.00	1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8783E+01 EXCESS= .0000E+00 OUTFLOW= .8784E+01 BASIN STORAGE= .4742E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.50	158.43	249.74	1.25	5.00	157.84	250.00	1.25

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8002E+01 EXCESS= .0000E+00 OUTFLOW= .8003E+01 BASIN STORAGE= .4796E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.60	135.41	249.31	1.02	5.00	134.42	250.00	1.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6545E+01 EXCESS= .0000E+00 OUTFLOW= .6545E+01 BASIN STORAGE= .4677E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= 1.00

RDHD01C	MANE	5.00	.03	224.12	-1.00	5.00	.03	225.00	-1.00

FOR PLAN = 1 RATIO= .98

RDHD01C	MANE	5.00	.03	219.87	-1.00	5.00	.03	220.00	-1.00

FOR PLAN = 1 RATIO= .95

RDHD01C	MANE	4.42	.03	221.07	-1.00	5.00	.03	225.00	-1.00

FOR PLAN = 1 RATIO= .92

RDHD01C	MANE	4.59	.03	222.08	-1.00	5.00	.03	225.00	-1.00

FOR PLAN = 1 RATIO= .91

RDHD01C	MANE	4.49	.03	225.26	-1.00	5.00	.03	225.00	-1.00

FOR PLAN = 1 RATIO= .89

RDHD01C	MANE	4.69	.03	222.16	-1.00	5.00	.02	225.00	-1.00

FOR PLAN = 1 RATIO= 1.00

RDHD02C	MANE	1.01	129.83	252.27	110.31	5.00	129.64	255.00	110.30

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2941E+02 EXCESS= .0000E+00 OUTFLOW= .2941E+02 BASIN STORAGE= .4109E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .98

RDHD02C	MANE	.99	128.00	252.18	108.42	5.00	127.84	255.00	108.42

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2891E+02 EXCESS= .0000E+00 OUTFLOW= .2891E+02 BASIN STORAGE= .3842E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .95

RDHD02C	MANE	1.08	125.58	252.43	105.59	5.00	125.48	255.00	105.59

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2815E+02 EXCESS= .0000E+00 OUTFLOW= .2816E+02 BASIN STORAGE= .3619E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .92

RDHD02C	MANE	1.05	123.41	252.84	102.78	5.00	123.32	255.00	102.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2740E+02 EXCESS= .0000E+00 OUTFLOW= .2741E+02 BASIN STORAGE= .5664E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .91

RDHD02C	MANE	1.05	122.66	252.03	101.84	5.00	122.61	255.00	101.84

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2715E+02 EXCESS= .0000E+00 OUTFLOW= .2715E+02 BASIN STORAGE= .3737E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .89

RDHD02C	MANE	.96	121.53	252.04	99.96	5.00	121.49	255.00	99.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2665E+02 EXCESS= .0000E+00 OUTFLOW= .2665E+02 BASIN STORAGE= .5170E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= 1.00

RDHD04C	MANE	.62	345.18	255.92	162.68	5.00	345.01	255.00	162.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4337E+02 EXCESS= .0000E+00 OUTFLOW= .4338E+02 BASIN STORAGE= .4475E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .98

RDHD04C	MANE	.72	333.04	255.96	156.37	5.00	332.91	255.00	156.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4169E+02 EXCESS= .0000E+00 OUTFLOW= .4170E+02 BASIN STORAGE= .3093E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .95

RDHD04C	MANE	.65	313.68	255.70	146.86	5.00	313.48	255.00	146.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3915E+02 EXCESS= .0000E+00 OUTFLOW= .3916E+02 BASIN STORAGE= .3798E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .92

RDHD04C	MANE	.74	294.86	255.95	137.37	5.00	294.64	255.00	137.45

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3663E+02 EXCESS= .0000E+00 OUTFLOW= .3663E+02 BASIN STORAGE= .4147E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .91

RDHD04C	MANE	.65	288.88	256.10	134.33	5.00	288.55	255.00	134.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3581E+02 EXCESS= .0000E+00 OUTFLOW= .3582E+02 BASIN STORAGE= .3878E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .89

RDHD04C	MANE	.74	276.94	256.06	128.21	5.00	276.66	255.00	128.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3418E+02 EXCESS= .0000E+00 OUTFLOW= .3419E+02 BASIN STORAGE= .3746E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= 1.00

RDHD05C	MANE	.48	467.18	255.84	199.58	5.00	466.83	255.00	199.67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5322E+02 EXCESS= .0000E+00 OUTFLOW= .5322E+02 BASIN STORAGE= .1387E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .98

RDHD05C	MANE	.38	449.12	255.53	190.41	5.00	448.61	255.00	190.49

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5077E+02 EXCESS= .0000E+00 OUTFLOW= .5077E+02 BASIN STORAGE= .1727E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .95

RDHD05C	MANE	.51	420.83	255.90	176.52	5.00	420.40	255.00	176.60

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4707E+02 EXCESS= .0000E+00 OUTFLOW= .4707E+02 BASIN STORAGE= .1631E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .92

RDHD05C	MANE	.41	392.37	255.67	162.83	5.00	391.67	255.00	162.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4342E+02 EXCESS= .0000E+00 OUTFLOW= .4342E+02 BASIN STORAGE= .1345E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .91

RDHD05C	MANE	.50	382.36	255.65	158.31	5.00	381.77	255.00	158.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4221E+02 EXCESS= .0000E+00 OUTFLOW= .4221E+02 BASIN STORAGE= .1442E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .89

RDHD05C	MANE	.40	363.04	255.77	149.35	5.00	362.18	255.00	149.41

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3982E+02 EXCESS= .0000E+00 OUTFLOW= .3982E+02 BASIN STORAGE= .1318E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= 1.00

RDHD06C	MANE	.66	439.23	251.45	147.84	5.00	437.88	255.00	147.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3941E+02 EXCESS= .0000E+00 OUTFLOW= .3942E+02 BASIN STORAGE= .3214E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .98

RDHD06C	MANE	.70	421.08	251.36	138.39	5.00	419.99	255.00	138.33

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3688E+02 EXCESS= .0000E+00 OUTFLOW= .3690E+02 BASIN STORAGE= .2878E-07 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .95

RDHD06C	MANE	.80	392.96	251.97	124.35	5.00	392.27	255.00	124.39

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3314E+02 EXCESS= .0000E+00 OUTFLOW= .3316E+02 BASIN STORAGE= .3098E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .92

RDHD06C	MANE	.77	364.36	251.69	109.71	5.00	364.17	255.00	109.76

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2924E+02 EXCESS= .0000E+00 OUTFLOW= .2925E+02 BASIN STORAGE= .2051E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .91

RDHD06C	MANE	.77	354.72	251.73	104.93	5.00	354.66	255.00	104.96	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2796E+02 EXCESS= .0000E+00 OUTFLOW= .2798E+02 BASIN STORAGE= .2864E-07 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .89

RDHD06C	MANE	.84	335.82	255.10	95.21	5.00	335.81	255.00	95.27	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2538E+02 EXCESS= .0000E+00 OUTFLOW= .2539E+02 BASIN STORAGE= .2974E-07 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	3.75	3.08	213.75	-1.00	5.00	3.08	215.00	-1.00	

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	4.00	2.91	216.00	-1.00	5.00	2.87	215.00	-1.00	

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	4.25	2.73	216.75	-1.00	5.00	2.71	215.00	-1.00	

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	4.00	2.66	216.00	-1.00	5.00	2.62	215.00	-1.00	

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	4.00	2.62	216.00	-1.00	5.00	2.58	215.00	-1.00	

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	4.25	2.50	216.75	-1.00	5.00	2.47	215.00	-1.00	

FOR PLAN = 1 RATIO= .00

RCP23	MANE	2.39	99.94	255.37	16.34	5.00	99.92	255.00	16.34	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1159E+02 EXCESS= .0000E+00 OUTFLOW= .1159E+02 BASIN STORAGE= .9467E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP23	MANE	2.43	94.27	253.11	15.52	5.00	94.25	255.00	15.51	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1100E+02 EXCESS= .0000E+00 OUTFLOW= .1101E+02 BASIN STORAGE= .9050E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP23	MANE	2.52	85.50	254.13	14.39	5.00	85.38	255.00	14.39	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1020E+02 EXCESS= .0000E+00 OUTFLOW= .1021E+02 BASIN STORAGE= .9112E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP23	MANE	2.58	79.77	255.14	13.34	5.00	79.76	255.00	13.33	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9457E+01 EXCESS= .0000E+00 OUTFLOW= .9459E+01 BASIN STORAGE= .9003E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP23	MANE	2.60	77.78	254.70	12.94	5.00	77.72	255.00	12.94	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9180E+01 EXCESS= .0000E+00 OUTFLOW= .9182E+01 BASIN STORAGE= .9464E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP23	MANE	2.65	73.80	253.98	12.20	5.00	73.69	255.00	12.20	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8654E+01 EXCESS= .0000E+00 OUTFLOW= .8656E+01 BASIN STORAGE= .9488E-03 PERCENT ERROR= .0

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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   28DEC16  TIME  10:36:31   *
*                                       *
*****************************************
```

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

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

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

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

1 HEC-1 INPUT PAGE 1

```
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9.....10
                        *DIAGRAM
 *** FREE ***
             1          ID   ************************************************************
             2          ID   * ........................................................ *
             3          ID   * :                                                      : *
             4          ID   * :              KYLE CANYON INTERCHANGE                 : *
             5          ID   * :                                                      : *
             6          ID   * :              PROPOSED CONDITIONS                     : *
             7          ID   * :                                                      : *
             8          ID   * : REFERENCED FROM RTC TO MDS FOR KYLE CANYON [DEC 2006] : *
             9          ID   * : AND MODIFIED TO REFLECT PROPOSED INTERCHANGE         : *
            10          ID   * :                                                      : *
            11          ID   * :......................................................: *
            12          ID   * :              RETURN PERIOD_ _ _ _100 -YEAR           : *
            13          ID   * :              DISTRIBUTION_ _ _ _ 6-HOUR SDN3         : *
            14          ID   * :              PROJECT NO_ _ _ _ _ 412.634A            : *
            15          ID   * :              FILENAME_ _ _ _ _ _ PRO100.H1           : *
            16          ID   * :              DATE MODELED_ _ _ _ 12/28/16            : *
            17          ID   * :              MODELED BY_ _ _ _ _ JAM, RRD            : *
            18          ID   * :......................................................: *
            19          ID   * :                                                      : *
            20          ID   * :......................................................: *
            21          ID   ************************************************************
            22          ID    JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
            23          ID
            24          ID
            25          ID
            26          ID                     AREA      DARF
            27          ID                        SQ.MI.
            28          ID
            29          ID                      0.0 - 0.5    0.99
            30          ID                      0.5 - 1.0    0.98
            31          ID                      1.0 - 2.0    0.95
            32          ID                      2.0 - 4.0    0.92
            33          ID                      4.0 - 6.0    0.91
            34          ID                      6.0 - 8.0    0.89
            35          ID
            36          ID
            37          ID
            38          ID
            39          IT       5       0       0     300
            40          IO       5
            41          IN       5       0       0
            42          JR    PREC       1    0.98    0.95    0.92    0.91    0.89    0.57
                        *
            43          KK    OFFA
            44          KM              AREA  13.0 AC
            45          PB    2.77
            46          BA  0.0203
            47          PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
            48          PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
            49          PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
            50          PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
            51          PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
```

1 HEC-1 INPUT PAGE 2

```
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9.....10
            52          PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
            53          PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
            54          PC    .998    .999   1.00
            55          LS       0   77.4
            56          UD    .149
                        *
            57          KK    95-1
            58          KM              AREA  2.7 AC
```

```
 59          PB    2.77
 60          BA  0.0042
 61          LS       0    89.1
 62          UD    .069
             *

 63          KK    CPNM
 64          KM   COMBINATION POINT CPNM
 65          KM   COMBINE OFFA AND 95-1
 66          HC       2
             *

 67          KK    OFFB
 68          KM              AREA  85.6 AC
 69          PB    2.93
 70          BA  0.1337
 71          LS       0    77.4
 72          UD    .392
             *

 73          KK    95-2
 74          KM              AREA  2.8 AC
 75          PB    2.77
 76          BA  0.0044
 77          LS       0    89.1
 78          UD    .090
             *

 79          KK     CP1
 80          KM   COMBINATION POINT CP1
 81          KM   COMBINE OFFB AND 95-2
 82          HC       2
             *

 83          KK    OFFC
 84          KM              AREA  85.3 AC
 85          PB    2.79
 86          BA  0.1333
 87          LS       0    77.4
 88          UD    .313
             *
```



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

 89          KK    95-3
 90          KM              AREA  6.1 AC
 91          PB    2.77
 92          BA  0.0095
 93          LS       0    89.1
 94          UD    .095
             *

 95          KK     CP4
 96          KM   COMBINATION POINT CP4
 97          KM   COMBINE OFFC AND 95-3
 98          HC       2
             *

 99          KK  OFFD-A
100          KM              AREA  411.5 AC
101          PB    3.09
102          BA  0.6430
103          LS       0    77.4
104          UD    .530
             *

105          KK ROFFD-A
106          KM   ROUTE OFFD-A TO CP7
107          KM   N-STEPS    K     X-FACTOR
108          RM       5   0.400    0.15
             *

109          KK  OFFD-B
110          KM              AREA  319.2 AC
111          PB    2.87
112          BA  0.4988
113          LS       0    77.4
114          UD    .522
             *

115          KK    95-4
116          KM              AREA  7.0 AC
117          PB    2.77
118          BA  0.0109
119          LS       0    89.1
120          UD    .094
             *

121          KK     CP7
122          KM   COMBINATION POINT CP7
123          KM   COMBINE OFFD-A, OFFD-B AND 95-4
124          HC       3
             *
```



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

125          KK   OFF5A
126          KM              AREA  10.3 AC
127          PB    2.77
128          BA  0.0161
129          LS       0    89.1
130          UD    .088
```

```
                *

131             KK   OFF5B
132             KM            AREA  7.4 AC
133             PB    2.77
134             BA  0.0116
135             LS       0    89.1
136             UD    .097
                *

137             KK    CP7A
138             KM   COMBINATION POINT CP7A
139             KM   COMBINE CP7, OFF5A AND OFF5B
140             HC       3
                *

141             KK   RCP7A
142             KM   ROUTE CP7A THRU EX-E3
143             KM   N-STEPS   K    X-FACTOR
144             RM       2   0.132    0.15
                *

145             KKCPNE-DUMMY
146             KM   COMBINATION POINT CPNE-DUMMY
147             KM   COMBINE CPNM, CP1,CP4, AND CP7A
148             HC       4
                *

149             KK   OFF10
150             KM            AREA  429.5 AC
151             PB    3.39
152             BA  0.6710
153             LS       0    86.2
154             UD    .573
                *

155             KK  ROFF10
156             KM   ROUTE OFF10 THRU OFFF-A AND OFFF-B
157             KM   N-STEPS   K    X-FACTOR
158             RM       7   0.583    0.15
                *

159             KK  OFFF-A
160             KM            AREA  636.0 AC
161             PB    3.19
162             BA  0.9938
163             LS       0    83.8
164             UD    .441
                *
```

1 HEC-1 INPUT PAGE 5

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

165             KK ROFFF-A
166             KM   ROUTE OFFF-A THRU OFFF-B
167             KM   N-STEPS   K    X-FACTOR
168             RM       3   0.238    0.15
                *

169             KK  OFFF-B
170             KM            AREA  391.2 AC
171             PB    2.93
172             BA  0.6112
173             LS       0    84.1
174             UD    .490
                *

175             KK   EX-W1
176             KM            AREA  15.36 AC
177             PB    2.77
178             BA  0.0240
179             LS       0    77.4
180             UD    .141
                *

181             KK   OFF11
182             KM            AREA  2.9 AC
183             PB    2.77
184             BA  0.0046
185             LS       0    77.4
186             UD    .093
                *

187             KK     CP9
188             KM   COMBINATION POINT CP9
189             KM   COMBINE ROFF10, OFFF-A, OFFF-B, EX-W1 AND OFF11
190             HC       5
                *

191             KK    DCP9
192             KM   FLOW SPLIT AT CULVERT
193             KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
194             DT DCHD02A
195             DI       0     150     300     450     600     750     900    1050    1100    1350
196             DI    1500
197             DQ       0     122     186     230     261     283     316     353     366     445
198             DQ     497
                *

199             KK    RCP9
200             KM   ROUTE TO BASIN OFF12
201             RD     850  0.0165    0.02       0    TRAP       0      10
                *
```

1 HEC-1 INPUT PAGE 6

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

  202     KK    OFFG
  203     KM              AREA  26.0 AC
  204     PB    2.79
  205     BA  0.0406
  206     LS       0    86.5
  207     UD    .186
          *

  208     KK   EX-W2
  209     KM              AREA  13.24 AC
  210     PB    2.77
  211     BA  0.0207
  212     LS       0    81.6
  213     UD    .112
          *

  214     KK   OFF12
  215     KM              AREA  6.0 AC
  216     PB    2.77
  217     BA  0.0094
  218     LS       0    77.4
  219     UD    .115
          *

  220     KK   OFF16
  221     KM              AREA  504.7 AC
  222     PB    3.06
  223     BA  0.7885
  224     LS       0    86.6
  225     UD    .692
          *

  226     KK  ROFF16
  227     KM   ROUTE OFF16 THRU EX-W3
  228     KM   N-STEPS    K     X-FACTOR
  229     RM       2   0.198    0.15
          *

  230     KK   EX-W3
  231     KM              AREA  172.93 AC
  232     PB    2.82
  233     BA  0.2702
  234     LS       0    86.4
  235     UD    .295
          *

  236     KK    CP10
  237     KM   COMBINATION POINT CP10
  238     KM   COMBINE RCP9, OFFG, EX-W2, OFF12, ROFF16 AND EX-W3
  239     HC       6
          *
```



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

  240     KK   DCP10
  241     KM   FLOW SPLIT AT CULVERT
  242     KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
  243     DT DCHD04A
  244     DI       0     300     600     900    1200    1500    1800    2100    2400    2540
  245     DI    3000
  246     DQ       0     132     316     514     710     907    1115    1252    1399    1468
  247     DQ    1684
          *

  248     KKDSPHD04A
  249     KM   FLOW SPLIT AT BETWEEN HD04A AND HD05A
  250     KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
  251     KM   BASED ON CHANNEL CAPACITY = 527 CFS
  252     DT DSHD04A
  253     DI       0     527    2000
  254     DQ       0       1    1473
          *

  255     KK  RDCP10
  256     KM   ROUTE TO THE NEXT CULVERT AT BASIN OFF11
  257     RD    1068  0.0160    0.02       0    TRAP       0      10
          *

  258     KK   EX-W4
  259     KM              AREA  67.06 AC
  260     PB    2.78
  261     BA  0.1048
  262     LS       0    86.9
  263     UD    .199
          *

  264     KK    CP11
  265     KM   COMBINATION POINT CP11
  266     KM   COMBINE RDCP10 AND EX-W4
  267     HC       2
          *

  268     KK   DCP11
  269     KM   FLOW SPLIT AT CULVERT
  270     KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
  271     DT DCHD05A
  272     DI       0     170     340     510     680     850    1020    1190    1360    1372
  273     DI    1700
  274     DQ       0     169     200     244     296     372     459     546     632     637
  275     DQ     807
          *
```

```
KKDSPHD05A
KM   FLOW SPLIT AT BETWEEN HD05A AND HD06A
KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
KM   BASED ON CHANNEL CAPACITY = 605 CFS
DT DSHD05A
DI       0     605    2000
```



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

DQ       0       1    1395
*

KK  RDCP11
KM   ROUTE TO THE NEXT CULVERT AT BASIN OFF12
RD     626  0.0134    0.02       0    TRAP       0      10
*

KK   OFF18
KM            AREA  351.4 AC
PB    3.05
BA  0.5491
LS       0    86.3
UD    .445
*

KK  ROFF18
KM   ROUTE OFF18 THRU EX-W5
KM   N-STEPS   K    X-FACTOR
RM       2   0.171    0.15
*

KK   EX-W5
KM            AREA  285.43 AC
PB    2.86
BA  0.4460
LS       0    86.3
UD    .308
*

KK    CP12
KM   COMBINATION POINT CP12
KM   COMBINE ROFF18 AND EX-W5
HC       2
*

KK   OFF14
KM            AREA  8.6 AC
PB    2.77
BA  0.0134
LS       0    86.9
UD    .090
*

KK    CP13
KM   COMBINATION POINT CP13
KM   COMBINE RDCP11, CP12 AND OFF14
HC       3
*
```



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

KK   DCP13
KM   FLOW SPLIT AT CULVERT
KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
DT DCHD06A
DI       0   200.0   400.0     600     800    1000    1200    1400    1600    1772
DI    2000
DQ       0   199.9   399.9     594     727     802     865     927    1017    1095
DQ    1207
*

KKDSPHD06A
KM   FLOW SPLIT AT BETWEEN HD06A AND HD07A
KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
KM   BASED ON CHANNEL CAPACITY = 1,692 CFS
DT DSHD06A
DI       0    1692    2000
DQ       0       1     308
*

KKRDCRCOFF18
KM   ROUTE TO THE NEXT CULVERT AT BASIN OFFH
RD    1349  0.0186    0.02       0    TRAP       0      10
*

KK   EX-W6
KM            AREA  9.93 AC
PB    2.77
BA  0.0155
LS       0    86.9
UD    .101
*

KK   OFF15
KM            AREA  23.2 AC
PB    2.77
BA  0.0362
LS       0    86.9
UD    .126
*

KK    CP14
```

```
347          KM   COMBINATION POINT CP14
348          KM   COMBINE RDCRCOFF18, EX-W6 AND OFF15
349          HC       3
             *

350          KK   DCP14
351          KM   FLOW SPLIT AT CULVERT
352          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
353          DT DCHD07A
354          DI       0      90     180     270     360     450     540     630     720     771
355          DI     900
356          DQ       0      51      55      58      60      61      65      78      93     101
357          DQ     123
             *
```



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

358          KKDSPHD07A
359          KM   FLOW SPLIT AT BETWEEN HD07A AND HD08A
360          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
361          KM   BASED ON CHANNEL CAPACITY = 338 CFS
362          DT DSHD07A
363          DI       0     338    2000
364          DQ       0       1    1662
             *

365          KK    OFFE
366          KM              AREA  24.5 AC
367          PB    2.78
368          BA  0.0383
369          LS       0    77.4
370          UD    .232
             *

371          KK  95-5P1
372          KM              AREA  2.3 AC
373          PB    2.77
374          BA  0.0036
375          LS       0    89.1
376          UD    .084
             *

377          KK  CPKI-1
378          KM   COMBINATION POINT CPKI-1
379          KM   COMBINE OFFE AND 95-5P1
380          HC       2
             *

381          KK  95-5P2
382          KM              AREA  4.4 AC
383          PB    2.77
384          BA  0.0069
385          LS       0    89.1
386          UD    .073
             *

387          KK  CPKI-2
388          KM   COMBINATION POINT CPKI-2
389          KM   COMBINE CPK1 AND 95-5P2
390          HC       2
             *

391          KK  95-5P3
392          KM              AREA  11.5 AC
393          PB    2.77
394          BA  0.0180
395          LS       0    89.1
396          UD    .091
             *
```



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

397          KK  CPKI-3
398          KM   COMBINATION POINT CPKI-3
399          KM   COMBINE CPK2 AND 95-5P3
400          HC       2
             *

401          KK  RCPKI3
402          KM   DIVERT CPK3 EAST IN STORM DRAIN
403          DT  DCPKI3
404          DI       0     500
405          DQ       0     500
             *

406          KK  95-5P4
407          KM              AREA  2.3 AC
408          PB    2.77
409          BA  0.0036
410          LS       0    89.1
411          UD    .050
             *

412          KK  CHD01B
413          KM   COMBINATION POINT CHD01B
414          KM   COMBINE RCPKI3 AND 95-5P4
415          HC       2
             *

416          KK  DHD01B
417          KM   FLOW SPLIT AT CULVERT 1B
418          DT DCHD01B
```

```
419          DI       0    15.0    29.0    45.0    60.0    75.0    90.0   105.0     120     135
420          DI     150
421          DQ       0    14.9    28.9    44.9    59.9    74.9    89.9   104.9     116     121
422          DQ     125
             *

423          KK RDHD01B
424          KM   ROUTE TO THE NEXT CULVERT
425          RD    1000  0.0165    0.02       0    TRAP       0      10
             *

426          KK  OFF8P1
427          KM              AREA  8.5 AC
428          PB    2.77
429          BA  0.0133
430          LS       0    89.1
431          UD    .082
             *
```



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

432          KKRETHD02A
433          KM   RETREIVE FLOW FROM CULVERT HD02A
434          DR DCHD02A
             *

435          KK  CHD02B
436          KM   COMBINATION POINT CHD02B
437          KM   COMBINE RDHD01B, OFF8P2 AND RETHD02A
438          HC       3
             *

439          KK  DHD02B
440          KM   REVISED W/KYLE CANYON INTERCHANGE FACILITIES
441          KM   FLOW SPLIT AT CULVERT HD02B
442          DT DCHD02B
443          DI       0     253     343     432     450     500
444          DQ       0     224     246     260     262     268
             *

445          KK RDHD02B
446          KM   ROUTE TO THE NEXT CULVERT
447          RD    1320  0.0165    0.02       0    TRAP       0      10
             *

448          KK    95-6
449          KM              AREA  6.7 AC
450          PB    2.77
451          BA  0.0104
452          LS       0    89.9
453          UD    .095
             *

454          KKRETHD04A
455          KM   RETREIVE FLOW FROM CULVERT HD04A
456          DR DCHD04A
             *

457          KK  CHD04B
458          KM   COMBINATION POINT CHD04B
459          KM   COMBINE RDHD02B, 95-6 AND RETHD04A
460          HC       3
             *

461          KK  DHD04B
462          KM   SPLIT FLOW AT CULVERT HD04B
463          DT DCHD04B
464          DI       0   200.0     400     600     800    1000    1200    1400    1600    1800
465          DI    2000
466          DQ       0   199.9     287     359     443     529     620     710     800     895
467          DQ     988
             *
```



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

468          KKRETSHD04A
469          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD04A AND HD05A
470          DR DSHD04A
             *

471          KK   95-7A
472          KM              AREA  4.4 AC
473          PB    2.77
474          BA  0.0069
475          LS       0    92.6
476          UD    .075
             *

477          KK CHD04B2
478          KM   COMBINE 95-7A WITH BYPASS AND SPILL FLOW
479          HC       3
             *

480          KKDSPHD04B
481          KM   FLOW SPLIT AT BETWEEN HD04B AND HD05B
482          KM   DIVERSION TO THE OTHER SIDE OF US95
483          KM   BASED ON CHANNEL CAPACITY = 1004 CFS
484          DT DSHD04B
485          DI       0    1004    2000
486          DQ       0       1     996
             *
```

```
487          KK RDHD04B
488          KM   ROUTE TO THE NEXT CULVERT
489          RD    1068  0.0160    0.02       0    TRAP       0      10
             *

490          KKRETHD05A
491          KM   RETREIVE FLOW FROM CULVERT HD05A
492          DR DCHD05A
             *

493          KK  CHD05B
494          KM   COMBINATION POINT CHD05B
495          KM   COMBINE RDHD04B AND RETHD05A
496          HC       2
             *

497          KK  DHD05B
498          KM   SPLIT FLOW AT CULVERT HD05B
499          DT DCHD05B
500          DI       0     200     400     600     800    1000    1200    1400    1600    1800
501          DI    2000
502          DQ       0     164     242     323     397     494     600     703     809     913
503          DQ    1029
             *
```



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

504          KK   95-8A
505          KM             AREA  3.3 AC
506          PB    2.77
507          BA  0.0052
508          LS       0    92.6
509          UD    .064
             *

510          KKRETSHD05A
511          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD05A AND HD06A
512          DR DSHD05A
             *

513          KK CHD05B2
514          KM   COMBINE 95-8A WITH BYPASS AND SPILL FLOW
515          HC       3
             *

516          KKDSPHD05B
517          KM   FLOW SPLIT AT BETWEEN HD05B AND HD06B
518          KM   DIVERSION TO THE OTHER SIDE OF US95
519          KM   BASED ON CHANNEL CAPACITY = 4017 CFS
520          DT DSHD05B
521          DI       0    4017    5000
522          DQ       0       1     983
             *

523          KK RDHD05B
524          KM   ROUTE TO THE NEXT CULVERT
525          RD     626  0.0134    0.02       0    TRAP       0      10
             *

526          KKRETHD06A
527          KM   RETREIVE FLOW FROM CULVERT HD06A
528          DR DCHD06A
             *

529          KK  CHD06B
530          KM   COMBINE BYPASS WITH RETREIVED FLOW
531          HC       2
             *

532          KK  DHD06B
533          KM   SPLIT FLOW AT CULVERT HD06B
534          DT DCHD06B
535          DI       0   160.0   480.0     640     800     960    1120    1280    1400    1600
536          DQ       0   159.9   479.9     634     706     757     807     857     899     969
             *
```



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

537          KK   95-9A
538          KM             AREA  7.1 AC
539          PB    2.77
540          BA  0.0110
541          LS       0    92.6
542          UD    .098
             *

543          KKRETSHD06A
544          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD06A AND HD07A
545          DR DSHD06A
             *

546          KK CHD06B2
547          KM   COMBINE 95-9A WITH BYPASS AND SPILL FLOW
548          HC       3
             *

549          KKDSPHD06B
550          KM   FLOW SPLIT AT BETWEEN HD06B AND HD07B
551          KM   DIVERSION TO THE OTHER SIDE OF US95
552          KM   BASED ON CHANNEL CAPACITY = 4876 CFS
553          DT DSHD06B
554          DI       0    4876    5000
```

```
555          DQ       0       1     124
             *

556          KK RDHD06B
557          KM   ROUTE TO THE NEXT CULVERT
558          RD    1349  0.0186    0.02       0    TRAP       0      10
             *

559          KKRETHD07A
560          KM   RETREIVE FLOW FROM CULVERT HD07A
561          DR DCHD07A
             *

562          KK  CHD07B
563          KM   COMBINE BYPASS WITH RETREIVED FLOW
564          HC       2
             *

565          KK  DHD07B
566          KM   SPLIT FLOW AT CULVERT HD07B
567          DT DCHD07B
568          DI       0      90     180     270     360     450     540     630     700     810
569          DI     900
570          DQ       0      53      58      61      63      65      67      69      70      71
571          DQ      72
             *
```



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

572          KKRETSHD07A
573          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD07A AND HD08A
574          DR DSHD07A
             *

575          KK CHD07B2
576          KM   COMBINE BYPASS WITH SPILL FLOW
577          HC       2
             *

578          KKDSPHD07B
579          KM   FLOW SPLIT AT BETWEEN HD07B AND HD08B
580          KM   DIVERSION TO THE OTHER SIDE OF US95
581          KM   BASED ON CHANNEL CAPACITY = 1770 CFS
582          DT DSHD07B
583          DI       0    1770    5000
584          DQ       0       1    3230
             *

585          KK DCHD01B
586          KM   RETREIVE FLOW FROM VTN HD01B CULVERT
587          DR DCHD01B
             *

588          KK  DHD01C
589          KM   SPLIT FLOW AT CULVERT HD01C
590          DT DCHD01C
591          DI       0    10.0    50.0
592          DQ       0     9.9    49.9
             *

593          KK RDHD01C
594          KM   ROUTE TO THE NEXT CULVERT
595          RK    1000  0.0165    0.02       0    TRAP      13      20
             *

596          KK  OFF8P2
597          KM           AREA  3.1 AC
598          PB    2.77
599          BA  0.0049
600          LS       0    89.1
601          UD    .078
             *

602          KKRETHD02B
603          KM   RETREIVE FLOW FROM CULVERT HD02B
604          DR DCHD02B
             *
```



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

605          KK  CHD02C
606          KM   COMBINE BYPASS WITH OFF8P2 AND RETREIVED FLOW
607          HC       3
             *

608          KK  DHD02C
609          KM   REVISED W/KYLE CANYON INTERCHANGE FACILITIES
610          KM   SPLIT FLOW AT CULVERT HD02C
611          DT DCHD02C
612          DI       0     260     500
613          DQ       0     130     134
             *

614          KK RDHD02C
615          KM   ROUTE TO THE NEXT CULVERT
616          RK    1320  0.0165    0.02       0    TRAP      13      20
             *

617          KKRETHD04B
618          KM   RETREIVE FLOW FROM CULVERT HD04B
619          DR DCHD04B
             *
```

```
KK  CHD04C
KM   COMBINE BYPASS WITH RETREIVED FLOW
HC       2
*

KK  DHD04C
KM   SPLIT FLOW AT CULVERT HD04C
DT DCHD04C
DI       0     200     400     600     800    1000    1200    1400    1600    1800
DI    2000
DQ       0     181     212     262     336     416     503     609     719     823
DQ     933
*

KKRETSHD04B
KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD04B AND HD05B
DR DSHD04B
*

KK CHD04C2
KM   COMBINE BYPASS WITH SPILL FLOW
HC       2
*

KKDSPHD04C
KM   FLOW SPLIT AT BETWEEN HD04C AND HD05C
KM   DIVERSION TO THE OTHER SIDE OF US95
KM   BASED ON CHANNEL CAPACITY = 1079 CFS
DT DSHD04C
DI       0    1079    2000
DQ       0       1     921
*
```



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

KK RDHD04C
KM   ROUTE TO THE NEXT CULVERT
RK    1068  0.0160    0.02       0    TRAP      13      20
*

KKRETHD05B
KM   RETREIVE FLOW FROM CULVERT HD05B
DR DCHD05B
*

KK  CHD05C
KM   COMBINE BYPASS WITH RETREIVED FLOW
HC       2
*

KK  DHD05C
KM   SPLIT FLOW AT CULVERT HD05C
DT DCHD05C
DI       0     150     300     450     600     750     800    1050    1200    1350
DI    1500
DQ       0     132     171     193     208     232     245     321     380     444
DQ     513
*

KKRETSHD05B
KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD05B AND HD06B
DR DSHD05B
*

KK CHD05C2
KM   COMBINE BYPASS WITH SPILL FLOW
HC       2
*

KKDSPHD05C
KM   FLOW SPLIT AT BETWEEN HD05C AND HD06C
KM   DIVERSION TO THE OTHER SIDE OF US95
KM   BASED ON CHANNEL CAPACITY = 2744 CFS
DT DSHD05C
DI       0    2744    5000
DQ       0       1    2256
*

KK RDHD05C
KM   ROUTE TO THE NEXT CULVERT
RK     626  0.0134    0.02       0    TRAP      13      20
*

KKRETHD06B
KM   RETREIVE FLOW FROM CULVERT HD06B
DR DCHD06B
*
```



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

KK  CHD06C
KM   COMBINE BYPASS WITH RETREIVED FLOW
HC       2
*

KK  DHD06C
KM   SPLIT FLOW AT CULVERT HD06C
DT DCHD06C
DI       0   200.0   400.0     600     800    1000    1200    1400    1600    1680
DI    2000
DQ       0   199.9   399.9     560     647     713     786     860     948     988
```

```
687          DQ    1142
             *

688          KKRETSHD06B
689          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD06B AND HD07B
690          DR DSHD06B
             *

691          KK CHD06C2
692          KM   COMBINE BYPASS WITH SPILL FLOW
693          HC       2
             *

694          KKDSPHD06C
695          KM   FLOW SPLIT AT BETWEEN HD06C AND HD07C
696          KM   DIVERSION TO THE OTHER SIDE OF US95
697          KM   BASED ON CHANNEL CAPACITY = 2175 CFS
698          DT DSHD06C
699          DI       0    2175    5000
700          DQ       0       1    2825
             *

701          KK RDHD06C
702          KM   ROUTE TO THE NEXT CULVERT
703          RK    1349  0.0186    0.02       0    TRAP      13      20
             *

704          KKRETHD07B
705          KM   RETREIVE FLOW FROM CULVERT HD07B
706          DR DCHD07B
             *

707          KK  CHD07C
708          KM   COMBINE BYPASS WITH RETREIVED FLOW
709          HC       2
             *

710          KK  DHD07C
711          KM   SPLIT FLOW AT CULVERT HD07C
712          DT DCHD07C
713          DI       0      90     180     270     360     450     540     600     720     810
714          DI     900
715          DQ       0      51      58      62      66      83     110     130     174     208
1                                        HEC-1 INPUT                                          PAGE 20

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

716          DQ     244
             *

717          KKRETSHD07B
718          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD07B AND HD08B
719          DR DSHD07B
             *

720          KK CHD07C2
721          KM   COMBINE BYPASS WITH SPILL FLOW
722          HC       2
             *

723          KKDSPHD07C
724          KM   FLOW SPLIT AT BETWEEN HD07C AND HD08C
725          KM   DIVERSION TO THE OTHER SIDE OF US95
726          KM   BASED ON CHANNEL CAPACITY = 2396 CFS
727          DT DSHD07C
728          DI       0    2396    5000
729          DQ       0       1    2604
             *

730          KKCPW-DUMMY
731          KM   COMBINATION POINT CPW-DUMMY
732          KM   COMBINE DSPHD07A, DSPHD07B, AND DSPHD07C
733          HC       3
             *

734          KK   CPKI3
735          KM   RETREIVE FLOW FROM CPKI-3 STORM DRAIN
736          DR  DCPKI3
             *

737          KK  OFF9P2
738          KM            AREA  11.0 AC
739          PB    2.77
740          BA  0.0172
741          LS       0    89.1
742          UD    .097
             *

743          KK  CPKI-4
744          KM   COMBINATION POINT CPKI-4
745          KM   COMBINE CPKI-3 AND OFF9P2
746          HC       2
             *

747          KK DCHD01C
748          KM   RETREIVE FLOW FROM VTN HD01B CULVERT
749          DR DCHD01C
             *
1                                        HEC-1 INPUT                                          PAGE 21

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

750          KKRDCHD01C
751          KM   ROUTE DCHC01B TO CP15
752          KM   LENGTH  SLOPE   n-VALUE         SHAPE     WIDTH  S-SLOPE
```

```
 753          RD     905    .025    .025       0    TRAP      20       2
              *

 754          KK  OFF9P1
 755          KM             AREA  0.5 AC
 756          PB    2.77
 757          BA  0.0009
 758          LS       0    89.1
 759          UD    .050
              *

 760          KK  OFF9P3
 761          KM             AREA  10.7 AC
 762          PB    2.77
 763          BA  0.0167
 764          LS       0    89.1
 765          UD    .064
              *

 766          KK    CP15
 767          KM   COMBINATION POINT CP15
 768          KM   COMBINE CPKI-4, RDCHD01C, OFF9P1, AND OFF9P3
 769          HC       4
              *

 770          KK DCHD02C
 771          KM   RETREIVE FLOW FROM VTN HD02C CULVERT
 772          DR DCHD02C
              *

 773          KK  OFF9P4
 774          KM             AREA  7.6 AC
 775          PB    2.77
 776          BA  0.0119
 777          LS       0    89.1
 778          UD    .068
              *

 779          KK  CPKI-5
 780          KM   COMBINATION POINT CPKI-5
 781          KM   COMBINE DCHD02C AND OFF9P4
 782          HC       2
              *

 783          KK  RCPKI5
 784          KM   ROUTE CKI6 THRU EX-E4
 785          KM   N-STEPS   K    X-FACTOR
 786          RM       1   0.089    0.15
              *
```



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

 787          KKCPKI5-DUMMY
 788          KM   COMBINATION POINT CPKI5-DUMMY
 789          KM   COMBINE CPW-DUMM, CP15, AND CPKI5-DUMMY
 790          HC       3
              *

 791          KK DCHD04C
 792          KM   RETREIVE FLOW FROM VTN HD04C CULVERT
 793          DR DCHD04C
              *

 794          KK    OFFH
 795          KM             AREA  5.6 AC
 796          PB    2.77
 797          BA  0.0088
 798          LS       0    89.5
 799          UD    .082
              *

 800          KK    CP17
 801          KM   COMBINATION POINT CP17
 802          KM   COMBINE DCHD04C AND OFFH
 803          HC       2
              *

 804          KK DSHD04C
 805          KM   RETREIVE FLOW THAT OVERTOPS US 95 CHANNEL
 806          KM   BETWEEN VTN HD04C AND HD05C CULVERTS
 807          DR DSHD04C
              *

 808          KK DCHD05C
 809          KM   RETREIVE FLOW FROM VTN HD05C CULVERT
 810          DR DCHD05C
              *

 811          KK   95-7B
 812          KM             AREA  7.2 AC
 813          PB    2.77
 814          BA  0.0112
 815          LS       0    92.6
 816          UD    .087
              *

 817          KK    CP19
 818          KM   COMBINATION POINT CP19
 819          KM   COMBINE DSHD04C, DCHD05C AND 95-7B
 820          HC       3
              *
```



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

```
821           KK DSHD05C
822           KM   RETREIVE FLOW THAT OVERTOPS US 95 CHANNEL
823           KM   BETWEEN VTN HD05C AND HD06C CULVERTS
824           DR DSHD05C
              *

825           KK DCHD06C
826           KM   RETREIVE FLOW FROM VTN HD06C CULVERT
827           DR DCHD06C
              *

828           KK   95-8B
829           KM             AREA  2.6 AC
830           PB    2.77
831           BA  0.0040
832           LS       0    92.6
833           UD    .052
              *

834           KK    CP20
835           KM   COMBINATION POINT CP20
836           KM   COMBINE DSHD05C, DCHD06C AND 95-8B
837           HC       3
              *

838           KK DSHD06C
839           KM   RETREIVE FLOW THAT OVERTOPS US 95 CHANNEL
840           KM   BETWEEN VTN HD06C AND HD07C CULVERTS
841           DR DSHD06C
              *

842           KK DCHD07C
843           KM   RETREIVE FLOW FROM VTN HD07C CULVERT
844           DR DCHD07C
              *

845           KK   95-9B
846           KM             AREA  8.5 AC
847           PB    2.77
848           BA  0.0133
849           LS       0    92.6
850           UD    .139
              *

851           KK    CP23
852           KM   COMBINATION POINT CP23
853           KM   COMBINE DSHD06C, DCHD07C AND 95-9B
854           HC       3
              *
```



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

855           KK   RCP23
856           KM   ROUTE CP23 THRU EX-E9
857           KM     LEN   SLOPE       N     N/A   SHAPE      BW      SS
858           RD     720    .029    .035       0    TRAP      50       5
              *

859           KKCPSE-DUMMY
860           KM   COMBINATION POINT CPSE-DUMMY
861           KM   COMBINE CPKI5-DUMMY, CP17, CP19, CP20, AND CP23
862           HC       4
              *
863           ZZ
```

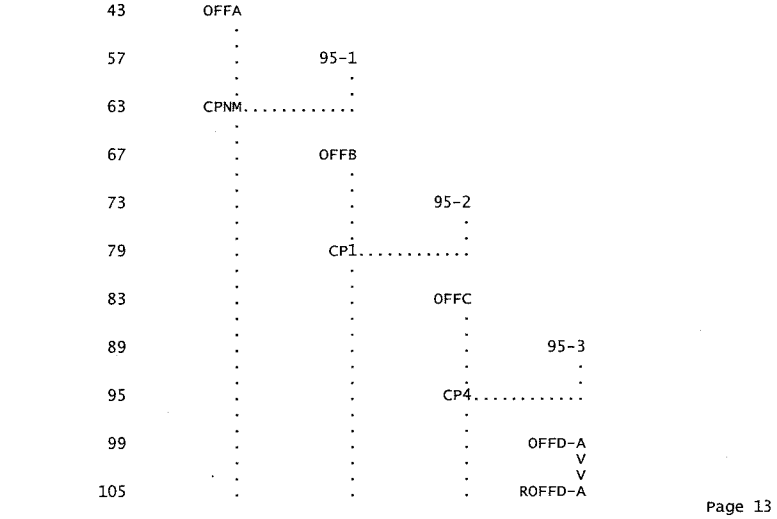
1

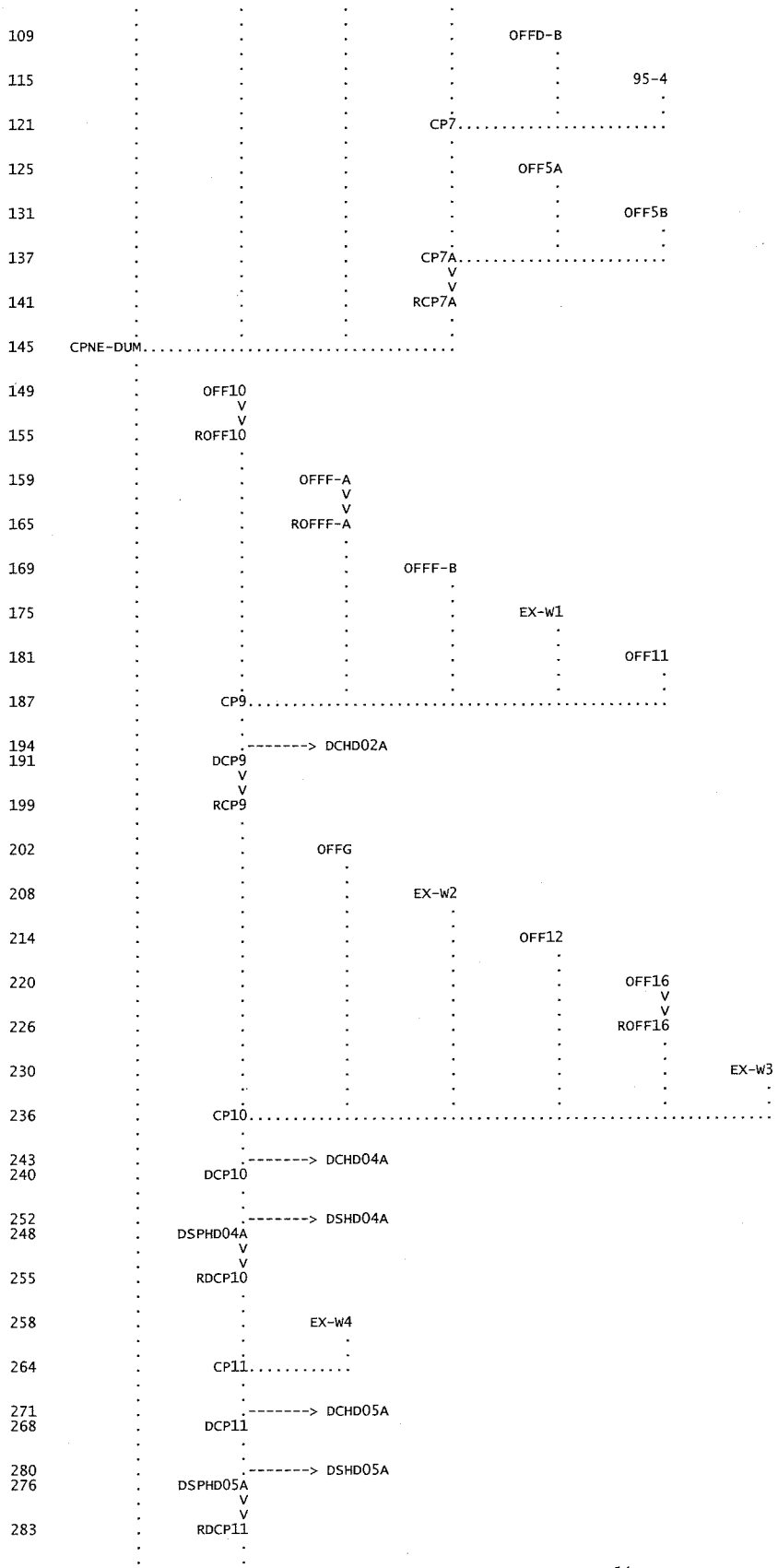
SCHEMATIC DIAGRAM OF STREAM NETWORK

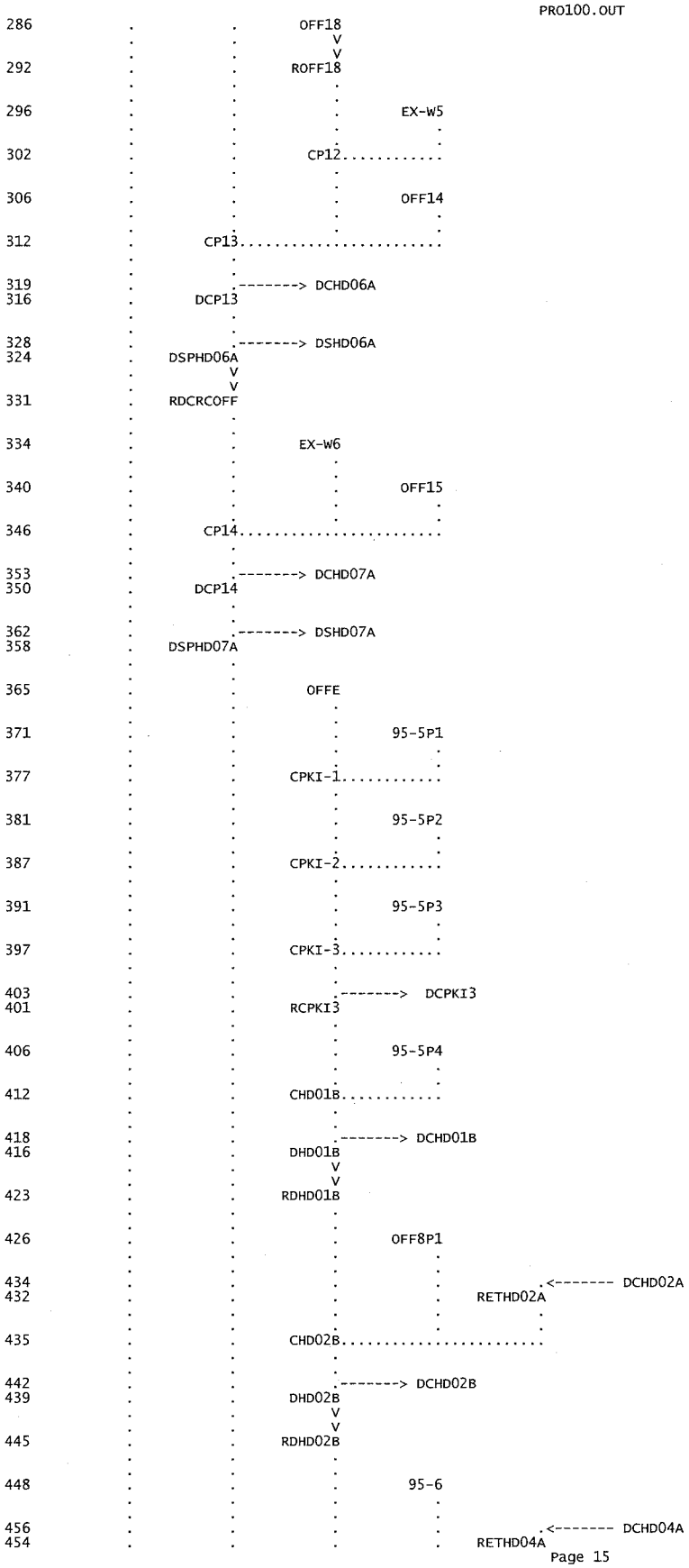
INPUT LINE NO.

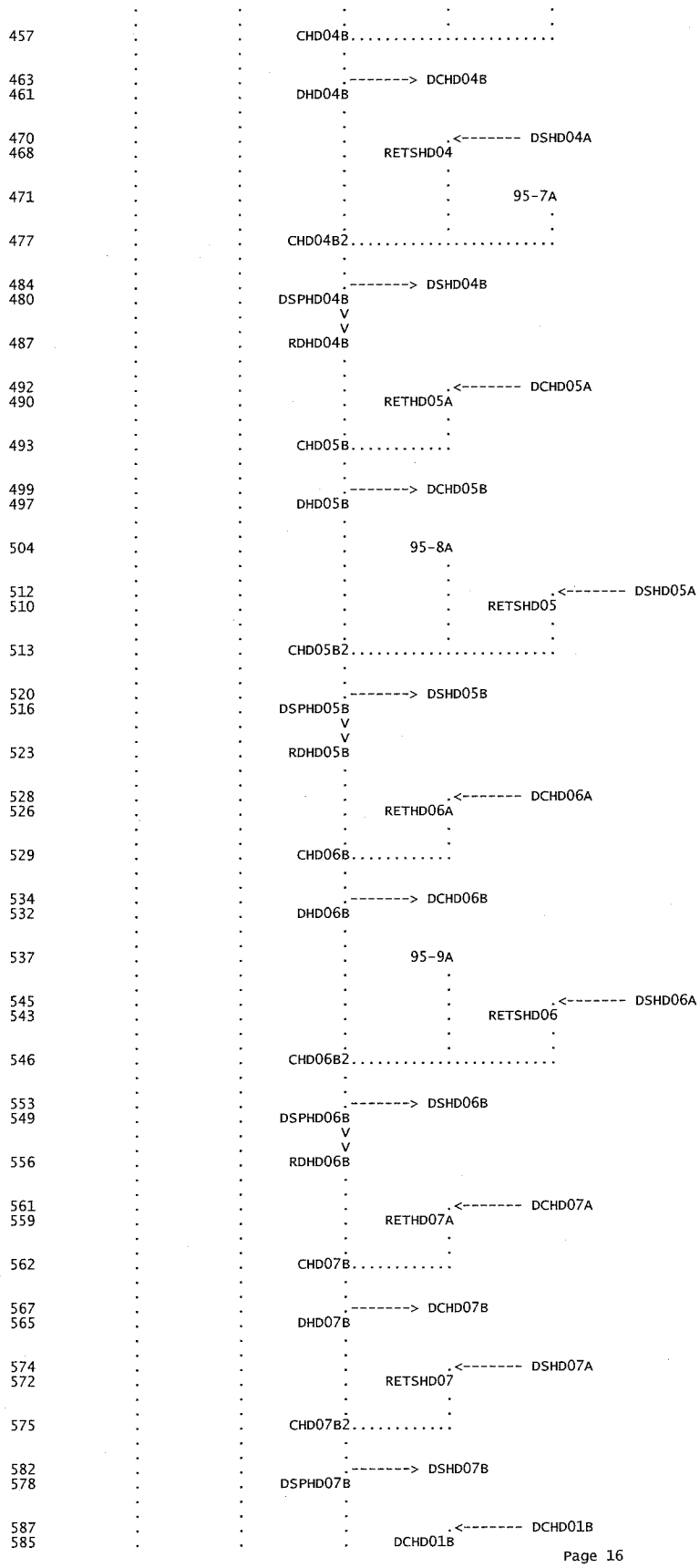
(V) ROUTING (---->) DIVERSION OR PUMP FLOW

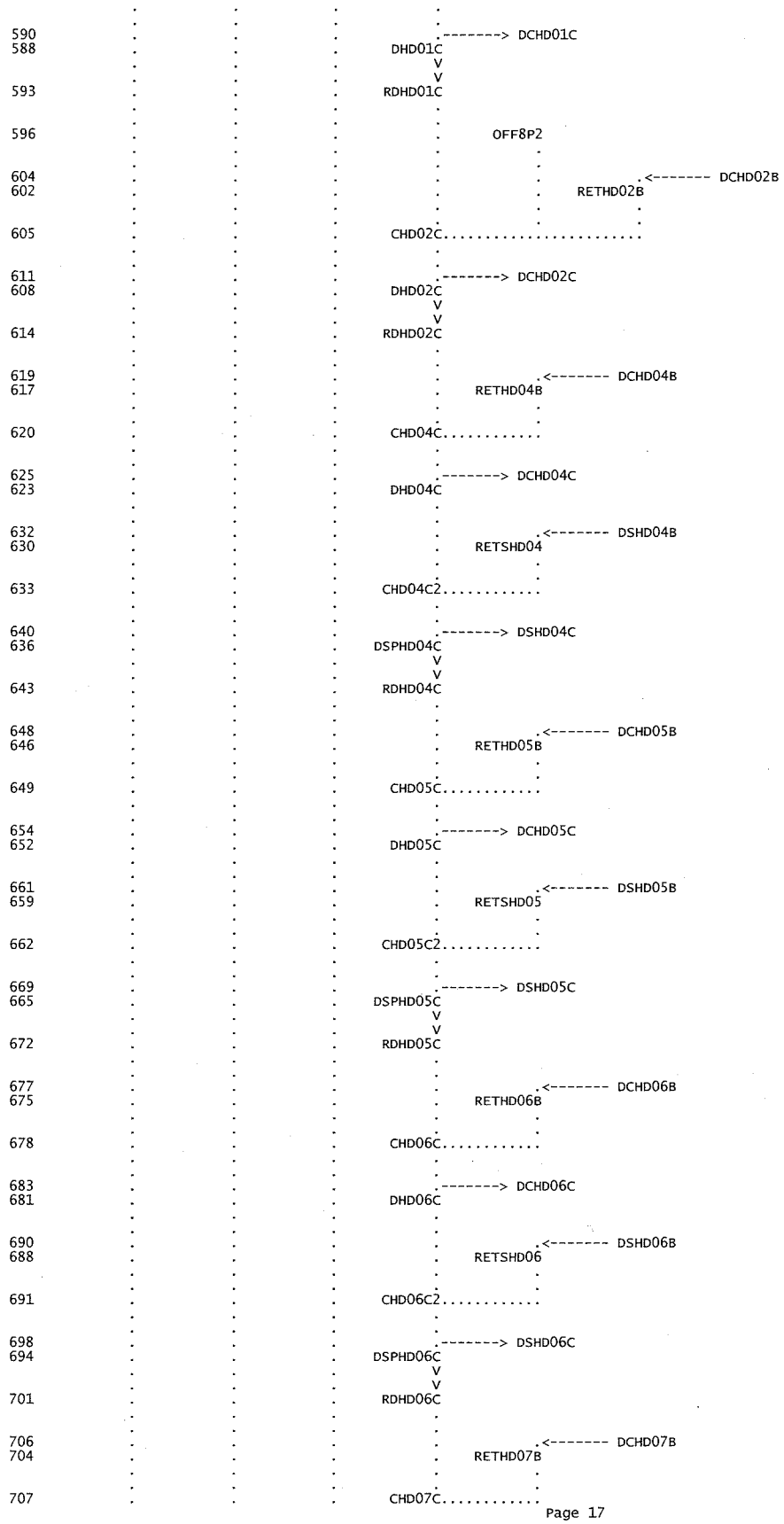
(.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW

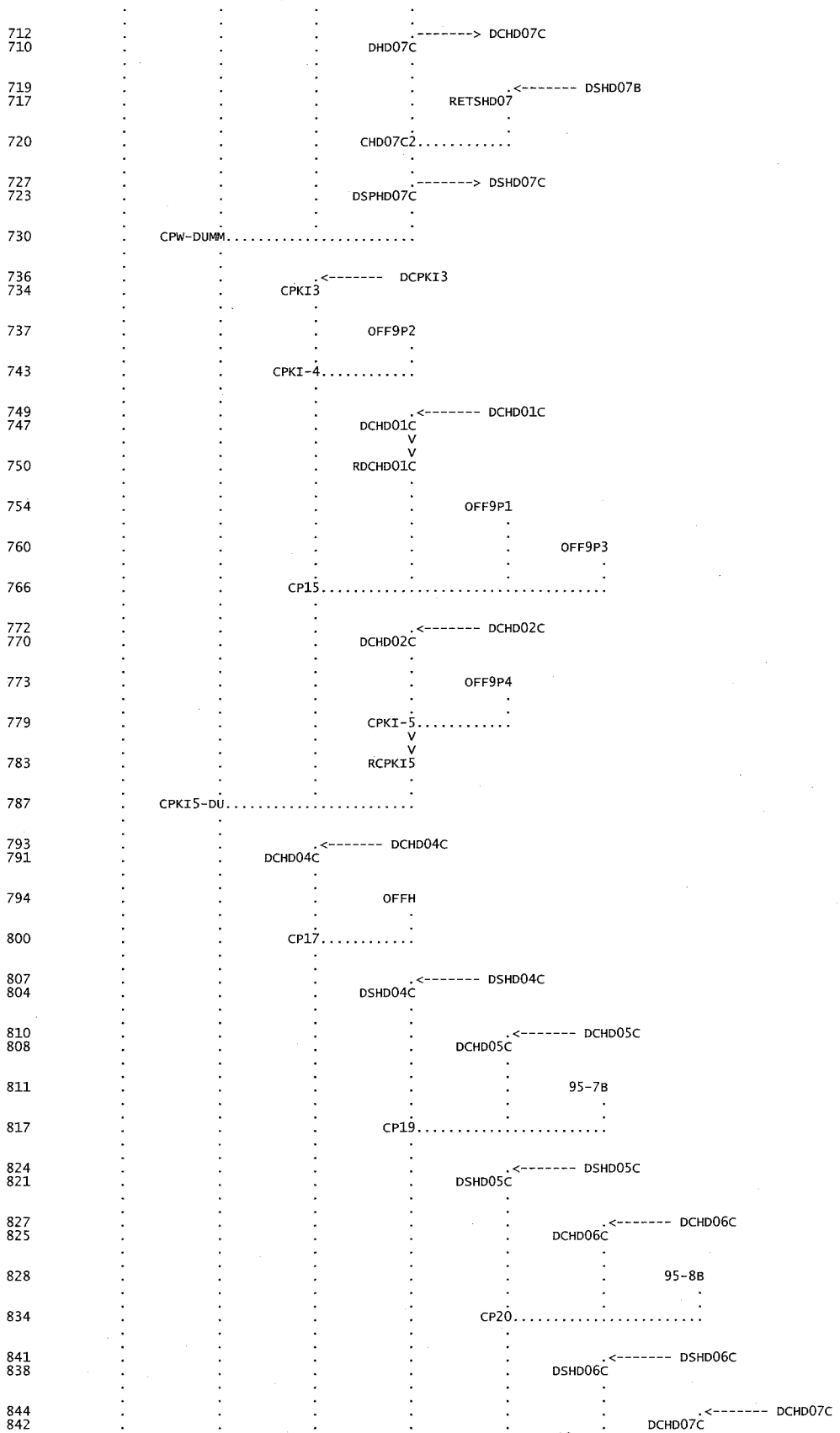


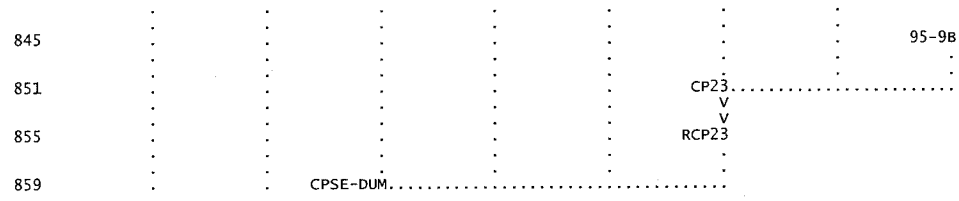

109
OFFD-B
115
95-4
121
CP7
125
OFF5A
131
OFF5B
137
CP7A
141
RCP7A
145
CPNE-DUM
149
OFF10
155
ROFF10
159
OFFF-A
165
ROFFF-A
169
OFFF-B
175
EX-W1
181
OFF11
187
CP9
194
DCHD02A
191
DCP9
199
RCP9
202
OFFG
208
EX-W2
214
OFF12
220
OFF16
226
ROFF16
230
EX-W3
236
CP10
243
DCHD04A
240
DCP10
252
DSHD04A
248
DSPHD04A
255
RDCP10
258
EX-W4
264
CP11
271
DCHD05A
268
DCP11
280
DSHD05A
276
DSPHD05A
283
RDCP11


286
OFF18
292
ROFF18
296
EX-W5
302
CP12
306
OFF14
312
CP13
319
DCHD06A
316
DCP13
328
DSHD06A
324
DSPHD06A
331
RDCRCOFF
334
EX-W6
340
OFF15
346
CP14
353
DCHD07A
350
DCP14
362
DSHD07A
358
DSPHD07A
365
OFFE
371
95-5P1
377
CPKI-1
381
95-5P2
387
CPKI-2
391
95-5P3
397
CPKI-3
403
DCPKI3
401
RCPKI3
406
95-5P4
412
CHD01B
418
DCHD01B
416
DHD01B
423
RDHD01B
426
OFF8P1
434
DCHD02A
432
RETHD02A
435
CHD02B
442
DCHD02B
439
DHD02B
445
RDHD02B
448
95-6
456
DCHD04A
454
RETHD04A


CHD04B
DCHD04B
DHD04B
DSHD04A
RETSHD04
95-7A
CHD04B2
DSHD04B
DSPHD04B
RDHD04B
DCHD05A
RETHD05A
CHD05B
DCHD05B
DHD05B
95-8A
DSHD05A
RETSHD05
CHD05B2
DSHD05B
DSPHD05B
RDHD05B
DCHD06A
RETHD06A
CHD06B
DCHD06B
DHD06B
95-9A
DSHD06A
RETSHD06
CHD06B2
DSHD06B
DSPHD06B
RDHD06B
DCHD07A
RETHD07A
CHD07B
DCHD07B
DHD07B
DSHD07A
RETSHD07
CHD07B2
DSHD07B
DSPHD07B
DCHD01B
DCHD01B


590
588 DHD01C
593 RDHD01C
596 OFF8P2
604 DCHD02B
602 RETHD02B
605 CHD02C
611 DCHD02C
608 DHD02C
614 RDHD02C
619 DCHD04B
617 RETHD04B
620 CHD04C
625 DCHD04C
623 DHD04C
632 DSHD04B
630 RETSHD04
633 CHD04C2
640 DSHD04C
636 DSPHD04C
643 RDHD04C
648 DCHD05B
646 RETHD05B
649 CHD05C
654 DCHD05C
652 DHD05C
661 DSHD05B
659 RETSHD05
662 CHD05C2
669 DSHD05C
665 DSPHD05C
672 RDHD05C
677 DCHD06B
675 RETHD06B
678 CHD06C
683 DCHD06C
681 DHD06C
690 DSHD06B
688 RETSHD06
691 CHD06C2
698 DSHD06C
694 DSPHD06C
701 RDHD06C
706 DCHD07B
704 RETHD07B
707 CHD07C


712
710
DHD07C
DCHD07C
719
717
RETSHD07
DSHD07B
720
CHD07C2
727
723
DSPHD07C
DSHD07C
730
CPW-DUMM
736
734
CPKI3
DCPKI3
737
OFF9P2
743
CPKI-4
749
747
DCHD01C
DCHD01C
750
RDCHD01C
754
OFF9P1
760
OFF9P3
766
CP15
772
770
DCHD02C
DCHD02C
773
OFF9P4
779
CPKI-5
783
RCPKI5
787
CPKI5-DU
793
791
DCHD04C
DCHD04C
794
OFFH
800
CP17
807
804
DSHD04C
DSHD04C
810
808
DCHD05C
DCHD05C
811
95-7B
817
CP19
824
821
DSHD05C
DSHD05C
827
825
DCHD06C
DCHD06C
828
95-8B
834
CP20
841
838
DSHD06C
DSHD06C
844
842
DCHD07C
DCHD07C



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********
* *
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* *
* RUN DATE 28DEC16 TIME 10:36:31 *
* *
****

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

****
* *
* KYLE CANYON INTERCHANGE *
* *
* PROPOSED CONDITIONS *
* *
* REFERENCED FROM RTC TO MDS FOR KYLE CANYON [DEC 2006] *
* AND MODIFIED TO REFLECT PROPOSED INTERCHANGE *
* *
* RETURN PERIOD_ _ _ _100 -YEAR *
* DISTRIBUTION_ _ _ _ 6-HOUR SDN3 *
* PROJECT NO_ _ _ _ _ 412.634A *
* FILENAME_ _ _ _ _ _ PRO100.H1 *
* DATE MODELED_ _ _ _ 12/28/16 *
* MODELED BY_ _ _ _ _ JAM, RRD *
* *
* *
****

JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:

AREA SQ.MI.	DARF
0.0 - 0.5	0.99
0.5 - 1.0	0.98
1.0 - 2.0	0.95
2.0 - 4.0	0.92
4.0 - 6.0	0.91
6.0 - 8.0	0.89

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

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

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

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

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
1.00 .98 .95 .92 .91 .89 .57
WARNING FDKRUT FAILURE TO PRESERVE UPSTREAM HYDROGRAPH VOLUME - CHECK ROUTED HYDROGRAPH SUMQU= .0000 SUMQT= .0001

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

1

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .98	RATIO 3 .95	RATIO 4 .92	RATIO 5 .91	RATIO 6 .89	RATIO 7 .57
HYDROGRAPH AT											
+	OFFA	.02	1	FLOW	17.	16.	15.	14.	14.	13.	4.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	95-1	.00	1	FLOW	7.	7.	7.	6.	6.	6.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CPNM	.02	1	FLOW	22.	21.	20.	19.	18.	18.	6.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	OFFB	.13	1	FLOW	79.	76.	71.	67.	65.	62.	21.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92
HYDROGRAPH AT											
+	95-2	.00	1	FLOW	7.	7.	6.	6.	6.	6.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP1	.14	1	FLOW	81.	78.	73.	69.	67.	64.	21.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92
HYDROGRAPH AT											
+	OFFC	.13	1	FLOW	80.	77.	72.	67.	66.	63.	20.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT											
+	95-3	.01	1	FLOW	15.	14.	14.	13.	13.	13.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP4	.14	1	FLOW	87.	84.	79.	74.	72.	69.	22.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT											
+	OFFD-A	.64	1	FLOW	357.	343.	323.	303.	296.	283.	97.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08
ROUTED TO											
+	ROFFD-A	.64	1	FLOW	330.	317.	299.	280.	274.	262.	90.
				TIME	4.42	4.42	4.42	4.42	4.42	4.42	4.50
HYDROGRAPH AT											
+	OFFD-B	.50	1	FLOW	242.	232.	218.	204.	199.	190.	61.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08
HYDROGRAPH AT											
+	95-4	.01	1	FLOW	17.	17.	16.	15.	15.	14.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CP7	1.15	1	FLOW	499.	479.	450.	422.	413.	395.	134.
				TIME	4.25	4.25	4.25	4.33	4.33	4.33	4.42
HYDROGRAPH AT											
+	OFF5A	.02	1	FLOW	26.	25.	24.	23.	23.	22.	11.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	OFF5B	.01	1	FLOW	18.	17.	17.	16.	16.	15.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CP7A	1.18	1	FLOW	502.	483.	454.	426.	416.	398.	136.
				TIME	4.25	4.25	4.33	4.33	4.33	4.33	4.42
ROUTED TO											
+	RCP7A	1.18	1	FLOW	497.	478.	450.	421.	412.	394.	135.
				TIME	4.42	4.42	4.42	4.42	4.42	4.42	4.50
4 COMBINED AT											
+	CPNE-DUM	1.49	1	FLOW	558.	537.	504.	473.	463.	442.	155.
				TIME	4.33	4.33	4.33	4.42	4.42	4.42	4.58
HYDROGRAPH AT											
+	OFF10	.67	1	FLOW	608.	591.	565.	539.	530.	513.	248.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08
ROUTED TO											
+	ROFF10	.67	1	FLOW	548.	532.	508.	485.	477.	462.	224.
				TIME	4.58	4.58	4.58	4.58	4.58	4.58	4.67
HYDROGRAPH AT											
+	OFFF-A	.99	1	FLOW	870.	843.	803.	763.	750.	723.	322.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO											
+	ROFFF-A	.99	1	FLOW	819.	793.	755.	718.	705.	680.	303.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT											
+	OFFF-B	.61	1	FLOW	447.	433.	411.	390.	383.	369.	160.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT											

+	EX-W1	.02	1	FLOW	20.	19.	18.	17.	16.	16.	5.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	OFF11	.00	1	FLOW	4.	4.	4.	3.	3.	3.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58
5 COMBINED AT											
+	CP9	2.30	1	FLOW	1489.	1443.	1374.	1305.	1282.	1237.	556.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
DIVERSION TO											
+	DCHD02A	2.30	1	FLOW	493.	477.	453.	431.	424.	409.	252.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT											
+	DCP9	2.30	1	FLOW	996.	965.	920.	874.	859.	828.	304.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
ROUTED TO											
+	RCP9	2.30	1	FLOW	992.	962.	917.	870.	855.	824.	303.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT											
+	OFFG	.04	1	FLOW	48.	47.	44.	42.	41.	40.	18.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	EX-W2	.02	1	FLOW	22.	21.	20.	19.	19.	18.	7.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	OFF12	.01	1	FLOW	8.	8.	7.	7.	7.	6.	2.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	OFF16	.79	1	FLOW	555.	538.	514.	490.	482.	466.	220.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO											
+	ROFF16	.79	1	FLOW	537.	521.	498.	474.	466.	451.	213.
				TIME	4.33	4.33	4.33	4.33	4.33	4.33	4.42
HYDROGRAPH AT											
+	EX-W3	.27	1	FLOW	268.	260.	248.	236.	232.	224.	103.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
6 COMBINED AT											
+	CP10	3.43	1	FLOW	1613.	1564.	1492.	1419.	1395.	1347.	550.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DCHD04A	3.43	1	FLOW	985.	952.	902.	854.	838.	806.	285.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DCP10	3.43	1	FLOW	628.	613.	590.	565.	557.	540.	265.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DSHD04A	3.43	1	FLOW	102.	87.	64.	39.	31.	14.	1.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DSPHD04A	3.43	1	FLOW	526.	526.	526.	526.	526.	526.	264.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
ROUTED TO											
+	RDCP10	3.43	1	FLOW	526.	526.	526.	526.	526.	526.	263.
				TIME	4.25	4.08	4.17	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	EX-W4	.10	1	FLOW	121.	117.	112.	106.	104.	101.	47.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67
2 COMBINED AT											
+	CP11	3.54	1	FLOW	578.	572.	564.	558.	555.	550.	272.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
DIVERSION TO											
+	DCHD05A	3.54	1	FLOW	265.	263.	261.	259.	258.	256.	188.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
HYDROGRAPH AT											
+	DCP11	3.54	1	FLOW	313.	309.	304.	299.	297.	294.	85.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
DIVERSION TO											
+	DSHD05A	3.54	1	FLOW	1.	1.	1.	0.	0.	0.	0.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
HYDROGRAPH AT											
+	DSPHD05A	3.54	1	FLOW	313.	309.	303.	299.	297.	293.	84.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
ROUTED TO											
+	RDCP11	3.54	1	FLOW	310.	308.	301.	298.	295.	293.	84.
				TIME	4.00	4.00	4.00	4.08	4.08	4.17	4.25
HYDROGRAPH AT											
+	OFF18	.55	1	FLOW	495.	480.	459.	437.	430.	416.	196.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO											
+	ROFF18	.55	1	FLOW	473.	459.	439.	418.	411.	397.	187.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08

HYDROGRAPH AT											
+	EX-W5	.45	1	FLOW	443.	429.	410.	390.	383.	370.	170.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT											
+	CP12	1.00	1	FLOW	792.	768.	733.	698.	686.	663.	308.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT											
+	OFF14	.01	1	FLOW	19.	19.	18.	17.	17.	16.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CP13	4.55	1	FLOW	1105.	1076.	1024.	971.	953.	917.	358.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
DIVERSION TO											
+	DCHD06A	4.55	1	FLOW	835.	826.	810.	791.	784.	771.	357.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT											
+	DCP13	4.55	1	FLOW	270.	250.	214.	180.	169.	146.	0.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.67
DIVERSION TO											
+	DSHD06A	4.55	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	.00
HYDROGRAPH AT											
+	DSPHD06A	4.55	1	FLOW	270.	250.	214.	180.	169.	146.	0.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.67
ROUTED TO											
+	RDCRCOFF	4.55	1	FLOW	263.	242.	209.	181.	168.	148.	0.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.92
HYDROGRAPH AT											
+	EX-W6	.02	1	FLOW	21.	21.	20.	19.	19.	18.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58
HYDROGRAPH AT											
+	OFF15	.04	1	FLOW	49.	47.	45.	43.	42.	41.	19.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	CP14	4.60	1	FLOW	282.	260.	224.	195.	182.	161.	28.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
DIVERSION TO											
+	DCHD07A	4.60	1	FLOW	58.	58.	56.	56.	55.	54.	16.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
HYDROGRAPH AT											
+	DCP14	4.60	1	FLOW	224.	202.	168.	140.	127.	107.	12.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
DIVERSION TO											
+	DSHD07A	4.60	1	FLOW	1.	1.	0.	0.	0.	0.	0.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
HYDROGRAPH AT											
+	DSPHD07A	4.60	1	FLOW	223.	202.	167.	139.	127.	107.	12.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
HYDROGRAPH AT											
+	OFFE	.04	1	FLOW	26.	25.	24.	22.	22.	21.	6.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
HYDROGRAPH AT											
+	95-5P1	.00	1	FLOW	6.	6.	5.	5.	5.	5.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CPKI-1	.04	1	FLOW	29.	28.	27.	25.	24.	23.	8.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	95-5P2	.01	1	FLOW	12.	11.	11.	10.	10.	10.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CPKI-2	.05	1	FLOW	37.	36.	34.	32.	31.	30.	11.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	95-5P3	.02	1	FLOW	28.	28.	26.	25.	25.	24.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CPKI-3	.07	1	FLOW	62.	60.	57.	54.	53.	51.	22.
				TIME	3.58	3.58	3.58	3.50	3.50	3.50	3.50
DIVERSION TO											
+	DCPKI3	.07	1	FLOW	62.	60.	57.	54.	53.	51.	22.
				TIME	3.58	3.58	3.58	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RCPKI3	.07	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	.00	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT											
+	95-5P4	.00	1	FLOW	7.	7.	6.	6.	6.	6.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											

+	CHD01B	.07	1	FLOW	7.	7.	6.	6.	6.	6.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO											
+	DCHD01B	.07	1	FLOW	7.	6.	6.	6.	6.	6.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DHD01B	.07	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO											
+	RDHD01B	.07	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT											
+	OFF8P1	.01	1	FLOW	22.	21.	20.	19.	19.	18.	9.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RETHD02A	.00	1	FLOW	493.	477.	453.	431.	424.	409.	252.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
3 COMBINED AT											
+	CHD02B	.08	1	FLOW	495.	479.	455.	432.	425.	411.	253.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
DIVERSION TO											
+	DCHD02B	.08	1	FLOW	267.	265.	263.	260.	259.	257.	224.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT											
+	DHD02B	.08	1	FLOW	227.	213.	192.	172.	166.	154.	29.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
ROUTED TO											
+	RDHD02B	.08	1	FLOW	225.	211.	190.	171.	165.	153.	29.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	95-6	.01	1	FLOW	17.	16.	16.	15.	15.	14.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RETHD04A	.00	1	FLOW	985.	952.	902.	854.	838.	806.	285.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
3 COMBINED AT											
+	CHD04B	.09	1	FLOW	1212.	1164.	1093.	1026.	1004.	961.	315.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DCHD04B	.09	1	FLOW	625.	604.	571.	541.	531.	512.	250.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DHD04B	.09	1	FLOW	586.	560.	522.	485.	473.	449.	65.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	RETSHD04	.00	1	FLOW	102.	87.	64.	39.	31.	14.	1.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	95-7A	.01	1	FLOW	13.	13.	12.	12.	12.	11.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CHD04B2	.10	1	FLOW	689.	648.	587.	525.	505.	464.	66.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DSHD04B	.10	1	FLOW	1.	1.	1.	1.	1.	0.	0.
				TIME	4.17	4.17	4.17	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DSPHD04B	.10	1	FLOW	688.	647.	586.	525.	505.	463.	66.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
ROUTED TO											
+	RDHD04B	.10	1	FLOW	687.	646.	586.	524.	504.	462.	65.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	RETHD05A	.00	1	FLOW	265.	263.	261.	259.	258.	256.	188.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
2 COMBINED AT											
+	CHD05B	.10	1	FLOW	943.	902.	841.	778.	759.	716.	252.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
DIVERSION TO											
+	DCHD05B	.10	1	FLOW	466.	446.	417.	389.	382.	366.	184.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	DHD05B	.10	1	FLOW	476.	455.	424.	389.	377.	350.	68.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	95-8A	.01	1	FLOW	10.	10.	10.	9.	9.	9.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RETSHD05	.00	1	FLOW	1.	1.	1.	0.	0.	0.	0.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25

3 COMBINED AT											
+	CHD05B2	.11	1	FLOW	478.	457.	425.	391.	378.	351.	68.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
DIVERSION TO											
+	DSHD05B	.11	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DSPHD05B	.11	1	FLOW	478.	456.	425.	390.	378.	351.	68.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
ROUTED TO											
+	RDHD05B	.11	1	FLOW	477.	456.	424.	389.	377.	350.	68.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	RETHD06A	.00	1	FLOW	835.	826.	810.	791.	784.	771.	357.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
2 COMBINED AT											
+	CHD06B	.11	1	FLOW	1254.	1226.	1182.	1135.	1118.	1085.	405.
				TIME	4.08	4.08	4.17	4.17	4.17	4.17	4.08
DIVERSION TO											
+	DCHD06B	.11	1	FLOW	849.	840.	826.	812.	807.	796.	405.
				TIME	4.08	4.08	4.17	4.17	4.17	4.17	4.08
HYDROGRAPH AT											
+	DHD06B	.11	1	FLOW	405.	386.	356.	323.	312.	289.	0.
				TIME	4.08	4.08	4.17	4.17	4.17	4.17	3.58
HYDROGRAPH AT											
+	95-9A	.01	1	FLOW	19.	19.	18.	17.	17.	17.	9.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RETSHD06	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	.00
3 COMBINED AT											
+	CHD06B2	.12	1	FLOW	408.	388.	358.	325.	314.	290.	9.
				TIME	4.08	4.08	4.17	4.17	4.17	4.17	3.50
DIVERSION TO											
+	DSHD06B	.12	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	3.42
HYDROGRAPH AT											
+	DSPHD06B	.12	1	FLOW	408.	388.	357.	325.	313.	290.	9.
				TIME	4.08	4.08	4.17	4.17	4.17	4.17	3.50
ROUTED TO											
+	RDHD06B	.12	1	FLOW	407.	388.	357.	324.	312.	289.	9.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
HYDROGRAPH AT											
+	RETHD07A	.00	1	FLOW	58.	58.	56.	56.	55.	54.	16.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
2 COMBINED AT											
+	CHD07B	.12	1	FLOW	462.	443.	411.	377.	365.	342.	24.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
DIVERSION TO											
+	DCHD07B	.12	1	FLOW	65.	65.	64.	63.	63.	63.	14.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
HYDROGRAPH AT											
+	DHD07B	.12	1	FLOW	397.	378.	347.	314.	302.	279.	10.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
HYDROGRAPH AT											
+	RETSHD07	.00	1	FLOW	1.	1.	0.	0.	0.	0.	0.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
2 COMBINED AT											
+	CHD07B2	.12	1	FLOW	398.	378.	348.	314.	302.	280.	10.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
DIVERSION TO											
+	DSHD07B	.12	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.50
HYDROGRAPH AT											
+	DSPHD07B	.12	1	FLOW	397.	378.	347.	314.	302.	279.	10.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
HYDROGRAPH AT											
+	DCHD01B	.00	1	FLOW	7.	6.	6.	6.	6.	6.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO											
+	DCHD01C	.00	1	FLOW	7.	6.	6.	6.	6.	6.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DHD01C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO											
+	RDHD01C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
HYDROGRAPH AT											

+	OFF8P2	.00	1	FLOW	8.	8.	8.	7.	7.	7.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RETHD02B	.00	1	FLOW	267.	265.	263.	260.	259.	257.	224.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
3 COMBINED AT											
+	CHD02C	.00	1	FLOW	268.	266.	263.	261.	259.	257.	224.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
DIVERSION TO											
+	DCHD02C	.00	1	FLOW	130.	130.	130.	130.	130.	129.	112.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT											
+	DHD02C	.00	1	FLOW	138.	136.	133.	131.	130.	129.	112.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
ROUTED TO											
+	RDHD02C	.00	1	FLOW	138.	136.	133.	130.	130.	128.	112.
				TIME	4.17	4.17	4.17	4.17	4.17	4.25	4.25
HYDROGRAPH AT											
+	RETHD04B	.00	1	FLOW	625.	604.	571.	541.	531.	512.	250.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
2 COMBINED AT											
+	CHD04C	.00	1	FLOW	763.	739.	704.	671.	661.	641.	362.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DCHD04C	.00	1	FLOW	322.	314.	300.	288.	284.	277.	206.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DHD04C	.00	1	FLOW	441.	426.	404.	383.	376.	364.	156.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	RETSHD04	.00	1	FLOW	1.	1.	1.	1.	1.	0.	0.
				TIME	4.17	4.17	4.17	4.25	4.25	4.25	4.25
2 COMBINED AT											
+	CHD04C2	.00	1	FLOW	441.	426.	404.	383.	377.	364.	156.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DSHD04C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT											
+	DSPHD04C	.00	1	FLOW	441.	426.	404.	383.	376.	364.	156.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
ROUTED TO											
+	RDHD04C	.00	1	FLOW	441.	426.	404.	383.	376.	364.	155.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	RETHD05B	.00	1	FLOW	466.	446.	417.	389.	382.	366.	184.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
2 COMBINED AT											
+	CHD05C	.00	1	FLOW	907.	872.	820.	772.	758.	730.	339.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
DIVERSION TO											
+	DCHD05C	.00	1	FLOW	277.	267.	251.	238.	234.	229.	177.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	DHD05C	.00	1	FLOW	629.	605.	569.	534.	524.	501.	162.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	RETSHD05	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.25	4.25	4.25	4.25
2 COMBINED AT											
+	CHD05C2	.00	1	FLOW	629.	605.	569.	534.	524.	501.	162.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
DIVERSION TO											
+	DSHD05C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DSPHD05C	.00	1	FLOW	629.	605.	569.	534.	524.	501.	162.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
ROUTED TO											
+	RDHD05C	.00	1	FLOW	629.	605.	569.	533.	523.	500.	162.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	RETHD06B	.00	1	FLOW	849.	840.	826.	812.	807.	796.	405.
				TIME	4.08	4.08	4.17	4.17	4.17	4.17	4.08
2 COMBINED AT											
+	CHD06C	.00	1	FLOW	1471.	1438.	1388.	1339.	1323.	1288.	557.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.17
DIVERSION TO											
+	DCHD06C	.00	1	FLOW	891.	877.	856.	838.	832.	819.	525.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.17

HYDROGRAPH AT											
+	DHD06C	.00	1	FLOW	580.	561.	533.	502.	492.	470.	31.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.17
HYDROGRAPH AT											
+	RETSHD06	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	3.42
2 COMBINED AT											
+	CHD06C2	.00	1	FLOW	580.	561.	533.	502.	492.	470.	31.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.17
DIVERSION TO											
+	DSHD06C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT											
+	DSPHD06C	.00	1	FLOW	579.	561.	532.	502.	491.	470.	31.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.17
ROUTED TO											
+	RDHD06C	.00	1	FLOW	579.	561.	532.	501.	491.	470.	30.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	RETHD07B	.00	1	FLOW	65.	65.	64.	63.	63.	63.	14.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
2 COMBINED AT											
+	CHD07C	.00	1	FLOW	644.	625.	596.	565.	554.	532.	32.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DCHD07C	.00	1	FLOW	146.	139.	129.	118.	115.	108.	18.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DHD07C	.00	1	FLOW	498.	486.	467.	446.	439.	424.	14.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	RETSHD07	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.50
2 COMBINED AT											
+	CHD07C2	.00	1	FLOW	498.	486.	468.	447.	440.	424.	14.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO											
+	DSHD07C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.08
HYDROGRAPH AT											
+	DSPHD07C	.00	1	FLOW	498.	486.	467.	446.	439.	424.	14.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
3 COMBINED AT											
+	CPW-DUMM	4.72	1	FLOW	1059.	1011.	936.	858.	829.	776.	28.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	3.58
HYDROGRAPH AT											
+	CPKI3	.00	1	FLOW	62.	60.	57.	54.	53.	51.	22.
				TIME	3.58	3.58	3.58	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	OFF9P2	.02	1	FLOW	27.	26.	25.	24.	23.	23.	11.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CPKI-4	.02	1	FLOW	89.	86.	82.	78.	77.	74.	33.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DCHD01C	.00	1	FLOW	7.	6.	6.	6.	6.	6.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO											
+	RDCHD01C	.00	1	FLOW	6.	6.	5.	5.	5.	5.	3.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	OFF9P1	.00	1	FLOW	2.	2.	2.	1.	1.	1.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	OFF9P3	.02	1	FLOW	29.	29.	27.	26.	26.	25.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
4 COMBINED AT											
+	CP15	.03	1	FLOW	125.	121.	116.	110.	108.	105.	49.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DCHD02C	.00	1	FLOW	130.	130.	130.	130.	130.	129.	112.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT											
+	OFF9P4	.01	1	FLOW	21.	20.	19.	18.	18.	17.	9.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CPKI-5	.01	1	FLOW	134.	133.	133.	132.	131.	130.	113.
				TIME	4.50	4.00	4.00	4.08	4.08	4.08	4.25
ROUTED TO											

+	RCPKI5	.01	1	FLOW	133.	133.	132.	131.	131.	130.	112.
				TIME	4.58	4.08	4.08	4.17	4.17	4.25	4.33
3 COMBINED AT											
+	CPKI5-DU	4.77	1	FLOW	1218.	1169.	1092.	1012.	982.	926.	134.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.25
HYDROGRAPH AT											
+	DCHD04C	.00	1	FLOW	322.	314.	300.	288.	284.	277.	206.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	OFFH	.01	1	FLOW	15.	14.	14.	13.	13.	12.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP17	.01	1	FLOW	323.	315.	301.	289.	285.	278.	207.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DSHD04C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT											
+	DCHD05C	.00	1	FLOW	277.	267.	251.	238.	234.	229.	177.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	95-7B	.01	1	FLOW	20.	20.	19.	18.	18.	18.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CP19	.01	1	FLOW	279.	269.	253.	239.	236.	230.	178.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	DSHD05C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DCHD06C	.00	1	FLOW	891.	877.	856.	838.	832.	819.	525.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.17
HYDROGRAPH AT											
+	95-8B	.00	1	FLOW	8.	8.	8.	7.	7.	7.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CP20	.00	1	FLOW	892.	877.	856.	838.	832.	819.	526.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.17
HYDROGRAPH AT											
+	DSHD06C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT											
+	DCHD07C	.00	1	FLOW	146.	139.	129.	118.	115.	108.	18.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	95-9B	.01	1	FLOW	22.	21.	20.	20.	19.	19.	10.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	CP23	.01	1	FLOW	148.	142.	131.	120.	117.	110.	20.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.17
ROUTED TO											
+	RCP23	.01	1	FLOW	148.	141.	131.	120.	117.	110.	19.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
4 COMBINED AT											
+	CPSE-DUM	.04	1	FLOW	1642.	1602.	1542.	1487.	1470.	1437.	927.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.17

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.04	994.73	250.92	1.00	5.00	992.09	250.00	1.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1224E+03 EXCESS= .0000E+00 OUTFLOW= .1224E+03 BASIN STORAGE= .2934E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.05	964.16	251.80	.96	5.00	961.89	250.00	.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1181E+03 EXCESS= .0000E+00 OUTFLOW= .1181E+03 BASIN STORAGE= .3029E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.06	919.51	251.64	.91	5.00	916.79	250.00	.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1117E+03 EXCESS= .0000E+00 OUTFLOW= .1117E+03 BASIN STORAGE= .2896E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP9	MANE	1.08	873.48	251.67	.86	5.00	870.50	250.00	.86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1052E+03 EXCESS= .0000E+00 OUTFLOW= .1052E+03 BASIN STORAGE= .2878E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP9	MANE	1.08	857.94	251.73	.84	5.00	854.95	250.00	.84

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1031E+03 EXCESS= .0000E+00 OUTFLOW= .1031E+03 BASIN STORAGE= .2985E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP9	MANE	1.09	826.95	251.87	.80	5.00	823.97	250.00	.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9881E+02 EXCESS= .0000E+00 OUTFLOW= .9881E+02 BASIN STORAGE= .2986E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP9	MANE	1.40	303.67	256.31	.27	5.00	302.95	255.00	.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3340E+02 EXCESS= .0000E+00 OUTFLOW= .3340E+02 BASIN STORAGE= .2887E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.55	526.69	237.48	.51	5.00	526.07	255.00	.51

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9259E+02 EXCESS= .0000E+00 OUTFLOW= .9259E+02 BASIN STORAGE= .4003E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.55	527.06	237.48	.50	5.00	526.06	255.00	.50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9077E+02 EXCESS= .0000E+00 OUTFLOW= .9077E+02 BASIN STORAGE= .3931E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.55	526.30	242.14	.48	5.00	526.07	250.00	.48

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8782E+02 EXCESS= .0000E+00 OUTFLOW= .8782E+02 BASIN STORAGE= .3755E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.55	526.26	246.80	.46	5.00	526.03	255.00	.46

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8474E+02 EXCESS= .0000E+00 OUTFLOW= .8474E+02 BASIN STORAGE= .3646E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.55	526.29	248.35	.46	5.00	526.04	255.00	.46

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8364E+02 EXCESS= .0000E+00 OUTFLOW= .8364E+02 BASIN STORAGE= .4061E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.55	526.28	251.46	.44	5.00	526.03	255.00	.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8136E+02 EXCESS= .0000E+00 OUTFLOW= .8136E+02 BASIN STORAGE= .3980E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP10	MANE	1.84	263.79	258.17	.21	5.00	262.85	260.00	.21

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3787E+02 EXCESS= .0000E+00 OUTFLOW= .3787E+02 BASIN STORAGE= .4044E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.11	312.32	237.00	.22	5.00	309.85	240.00	.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4168E+02 EXCESS= .0000E+00 OUTFLOW= .4168E+02 BASIN STORAGE= .2346E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.11	308.85	236.64	.21	5.00	308.45	240.00	.21

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4052E+02 EXCESS= .0000E+00 OUTFLOW= .4052E+02 BASIN STORAGE= .2353E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.12	302.80	241.08	.20	5.00	301.08	245.00	.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3861E+02 EXCESS= .0000E+00 OUTFLOW= .3861E+02 BASIN STORAGE= .2278E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.12	298.29	246.44	.19	5.00	297.93	245.00	.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3660E+02 EXCESS= .0000E+00 OUTFLOW= .3661E+02 BASIN STORAGE= .2336E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.12	296.56	246.82	.19	5.00	295.34	245.00	.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3589E+02 EXCESS= .0000E+00 OUTFLOW= .3589E+02 BASIN STORAGE= .2341E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.13	293.19	249.82	.18	5.00	293.17	250.00	.18	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3442E+02 EXCESS= .0000E+00 OUTFLOW= .3442E+02 BASIN STORAGE= .2350E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.54	84.38	256.56	.03	5.00	83.52	255.00	.03	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6199E+01 EXCESS= .0000E+00 OUTFLOW= .6199E+01 BASIN STORAGE= .2316E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.19	265.14	238.68	.05	5.00	263.28	235.00	.05	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1218E+02 EXCESS= .0000E+00 OUTFLOW= .1219E+02 BASIN STORAGE= .4403E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.23	246.10	238.85	.05	5.00	241.62	235.00	.05	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1104E+02 EXCESS= .0000E+00 OUTFLOW= .1104E+02 BASIN STORAGE= .4565E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.32	212.92	238.90	.04	5.00	209.46	240.00	.04	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9328E+01 EXCESS= .0000E+00 OUTFLOW= .9331E+01 BASIN STORAGE= .4597E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.42	181.06	239.92	.03	5.00	180.86	240.00	.03	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7796E+01 EXCESS= .0000E+00 OUTFLOW= .7799E+01 BASIN STORAGE= .4379E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.46	169.01	238.86	.03	5.00	168.02	240.00	.03	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7269E+01 EXCESS= .0000E+00 OUTFLOW= .7272E+01 BASIN STORAGE= .4541E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.55	148.06	239.92	.03	5.00	147.93	240.00	.03	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6261E+01 EXCESS= .0000E+00 OUTFLOW= .6264E+01 BASIN STORAGE= .4621E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	5.00	.11	235.00	.00	5.00	.11	235.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1625E-01 EXCESS= .0000E+00 OUTFLOW= .1632E-01 BASIN STORAGE= .4497E-03 PERCENT ERROR= -3.2

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.00	.04	225.00	.00	5.00	.04	225.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2188E-02 EXCESS= .0000E+00 OUTFLOW= .2282E-02 BASIN STORAGE= .3391E-03 PERCENT ERROR= -19.8

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.00	.04	225.00	.00	5.00	.04	225.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2124E-02 EXCESS= .0000E+00 OUTFLOW= .2233E-02 BASIN STORAGE= .3474E-03 PERCENT ERROR= -21.5

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.25	.04	224.25	.00	5.00	.04	225.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2016E-02 EXCESS= .0000E+00 OUTFLOW= .2118E-02 BASIN STORAGE= .3602E-03 PERCENT ERROR= -22.9

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.25	.03	224.25	.00	5.00	.03	225.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1922E-02 EXCESS= .0000E+00 OUTFLOW= .2017E-02 BASIN STORAGE= .3555E-03 PERCENT ERROR= -23.4

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.25	.03	224.25	.00	5.00	.03	225.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1891E-02 EXCESS= .0000E+00 OUTFLOW= .1983E-02 BASIN STORAGE= .3526E-03 PERCENT ERROR= -23.5

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.50	.03	224.00	.00	5.00	.03	225.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1843E-02 EXCESS= .0000E+00 OUTFLOW= .1952E-02 BASIN STORAGE= .3475E-03 PERCENT ERROR= -24.8

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.75	.02	228.75	.00	5.00	.02	230.00	.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8982E-03 EXCESS= .0000E+00 OUTFLOW= .1014E-02 BASIN STORAGE= .3513E-03 PERCENT ERROR= -52.0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.34	226.19	252.59	4.97	5.00	225.27	255.00	4.97	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2220E+02 EXCESS= .0000E+00 OUTFLOW= .2220E+02 BASIN STORAGE= .4650E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.38	212.22	254.29	4.69	5.00	210.92	255.00	4.69	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2095E+02 EXCESS= .0000E+00 OUTFLOW= .2095E+02 BASIN STORAGE= .4736E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.44	191.14	253.68	4.28	5.00	189.83	255.00	4.28	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1911E+02 EXCESS= .0000E+00 OUTFLOW= .1911E+02 BASIN STORAGE= .4724E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.51	171.26	253.18	3.90	5.00	170.74	255.00	3.90	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1739E+02 EXCESS= .0000E+00 OUTFLOW= .1739E+02 BASIN STORAGE= .4582E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.53	165.12	252.94	3.77	5.00	165.01	255.00	3.77	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1684E+02 EXCESS= .0000E+00 OUTFLOW= .1684E+02 BASIN STORAGE= .4583E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.58	153.49	255.19	3.53	5.00	153.46	255.00	3.54	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1578E+02 EXCESS= .0000E+00 OUTFLOW= .1578E+02 BASIN STORAGE= .4517E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	3.92	28.95	258.39	1.18	5.00	28.89	255.00	1.18	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5251E+01 EXCESS= .0000E+00 OUTFLOW= .5251E+01 BASIN STORAGE= .5180E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.45	688.70	252.54	11.54	5.00	687.11	255.00	11.55	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6218E+02 EXCESS= .0000E+00 OUTFLOW= .6218E+02 BASIN STORAGE= .3738E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.47	647.50	253.49	10.80	5.00	646.36	255.00	10.81	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5819E+02 EXCESS= .0000E+00 OUTFLOW= .5819E+02 BASIN STORAGE= .3683E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.51	586.09	252.30	9.74	5.00	585.60	255.00	9.74	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5244E+02 EXCESS= .0000E+00 OUTFLOW= .5245E+02 BASIN STORAGE= .3658E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.55	524.96	253.16	8.71	5.00	523.58	255.00	8.71	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4691E+02 EXCESS= .0000E+00 OUTFLOW= .4692E+02 BASIN STORAGE= .3723E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.57	503.98	252.51	8.38	5.00	503.76	255.00	8.39	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4516E+02 EXCESS= .0000E+00 OUTFLOW= .4516E+02 BASIN STORAGE= .3686E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.60	463.05	253.16	7.75	5.00	461.84	255.00	7.76	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4177E+02 EXCESS= .0000E+00 OUTFLOW= .4177E+02 BASIN STORAGE= .3809E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	2.61	65.18	258.44	.69	5.00	65.03	260.00	.68	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3704E+01 EXCESS= .0000E+00 OUTFLOW= .3705E+01 BASIN STORAGE= .3827E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.00	477.01	256.02	9.02	5.00	476.91	255.00	9.02	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5107E+02 EXCESS= .0000E+00 OUTFLOW= .5107E+02 BASIN STORAGE= .2339E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.01	455.97	255.90	8.56	5.00	455.80	255.00	8.56	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4846E+02 EXCESS= .0000E+00 OUTFLOW= .4846E+02 BASIN STORAGE= .2373E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.03	424.35	255.38	7.88	5.00	424.17	255.00	7.88	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4461E+02 EXCESS= .0000E+00 OUTFLOW= .4461E+02 BASIN STORAGE= .2346E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.05	389.72	255.62	7.19	5.00	389.38	255.00	7.20	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4075E+02 EXCESS= .0000E+00 OUTFLOW= .4075E+02 BASIN STORAGE= .2355E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.06	377.11	255.60	6.97	5.00	376.72	255.00	6.97	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3949E+02 EXCESS= .0000E+00 OUTFLOW= .3949E+02 BASIN STORAGE= .2295E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.08	350.82	255.99	6.54	5.00	350.32	255.00	6.54	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3702E+02 EXCESS= .0000E+00 OUTFLOW= .3702E+02 BASIN STORAGE= .2328E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.62	68.30	260.63	1.44	5.00	68.29	260.00	1.44	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8149E+01 EXCESS= .0000E+00 OUTFLOW= .8149E+01 BASIN STORAGE= .2378E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	1.97	408.71	248.76	5.01	5.00	406.94	250.00	5.01	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3132E+02 EXCESS= .0000E+00 OUTFLOW= .3132E+02 BASIN STORAGE= .4481E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.00	388.93	247.87	4.64	5.00	387.67	250.00	4.63	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2897E+02 EXCESS= .0000E+00 OUTFLOW= .2898E+02 BASIN STORAGE= .4547E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.04	358.28	248.98	4.07	5.00	357.11	250.00	4.07	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2545E+02 EXCESS= .0000E+00 OUTFLOW= .2545E+02 BASIN STORAGE= .4339E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.09	323.84	248.72	3.52	5.00	323.55	250.00	3.51	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2198E+02 EXCESS= .0000E+00 OUTFLOW= .2199E+02 BASIN STORAGE= .4692E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.11	312.52	248.86	3.34	5.00	312.13	250.00	3.33	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2085E+02 EXCESS= .0000E+00 OUTFLOW= .2085E+02 BASIN STORAGE= .4372E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.15	289.93	249.36	2.99	5.00	289.49	250.00	2.98	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1867E+02 EXCESS= .0000E+00 OUTFLOW= .1867E+02 BASIN STORAGE= .4415E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	4.50	8.95	216.00	.09	5.00	8.69	215.00	.09	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5514E+00 EXCESS= .0000E+00 OUTFLOW= .5517E+00 BASIN STORAGE= .5125E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= 1.00

RDHD01C	MANE	4.91	.07	219.88	-1.00	5.00	.07	220.00	-1.00	

```
 FOR PLAN = 1  RATIO=  .98
  RDHD01C  MANE          4.94       .06    220.91     -1.00       5.00       .06    220.00       -1.00


 FOR PLAN = 1  RATIO=  .95
  RDHD01C  MANE          5.00       .06    219.40     -1.00       5.00       .06    220.00       -1.00


 FOR PLAN = 1  RATIO=  .92
  RDHD01C  MANE          5.00       .06    220.02     -1.00       5.00       .06    220.00       -1.00


 FOR PLAN = 1  RATIO=  .91
  RDHD01C  MANE          5.00       .06    220.91     -1.00       5.00       .05    220.00       -1.00


 FOR PLAN = 1  RATIO=  .89
  RDHD01C  MANE          5.00       .05    222.40     -1.00       5.00       .05    220.00       -1.00


 FOR PLAN = 1  RATIO=  .57
  RDHD01C  MANE          4.66       .03    224.11     -1.00       5.00       .03    225.00       -1.00


 FOR PLAN = 1  RATIO= 1.00
  RDHD02C  MANE          1.05    137.78    252.33    127.51       5.00    137.62    250.00      127.51

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3332E+02 EXCESS= .0000E+00 OUTFLOW= .3332E+02 BASIN STORAGE= .4053E-07 PERCENT ERROR=     .0

 FOR PLAN = 1  RATIO=  .98
  RDHD02C  MANE          1.05    135.88    251.67    125.36       5.00    135.70    250.00      125.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3276E+02 EXCESS= .0000E+00 OUTFLOW= .3276E+02 BASIN STORAGE= .5261E-07 PERCENT ERROR=     .0

 FOR PLAN = 1  RATIO=  .95
  RDHD02C  MANE           .93    133.04    252.32    122.13       5.00    132.87    250.00      122.13

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3191E+02 EXCESS= .0000E+00 OUTFLOW= .3192E+02 BASIN STORAGE= .5388E-07 PERCENT ERROR=     .0

 FOR PLAN = 1  RATIO=  .92
  RDHD02C  MANE          1.03    130.54    252.16    118.94       5.00    130.31    250.00      118.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3108E+02 EXCESS= .0000E+00 OUTFLOW= .3108E+02 BASIN STORAGE= .4732E-07 PERCENT ERROR=     .0

 FOR PLAN = 1  RATIO=  .91
  RDHD02C  MANE          1.01    129.70    251.68    117.88       5.00    129.57    250.00      117.88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3080E+02 EXCESS= .0000E+00 OUTFLOW= .3080E+02 BASIN STORAGE= .5856E-07 PERCENT ERROR=     .0

 FOR PLAN = 1  RATIO=  .89
  RDHD02C  MANE          1.05    128.56    252.49    115.81       5.00    128.43    255.00      115.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3026E+02 EXCESS= .0000E+00 OUTFLOW= .3026E+02 BASIN STORAGE= .4856E-07 PERCENT ERROR=     .0

 FOR PLAN = 1  RATIO=  .57
  RDHD02C  MANE          1.08    111.93    256.42     77.96       5.00    111.82    255.00       77.97

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2037E+02 EXCESS= .0000E+00 OUTFLOW= .2037E+02 BASIN STORAGE= .4761E-07 PERCENT ERROR=     .0

 FOR PLAN = 1  RATIO= 1.00
  RDHD04C  MANE           .57    440.84    251.65    218.28       5.00    440.58    255.00      218.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5703E+02 EXCESS= .0000E+00 OUTFLOW= .5704E+02 BASIN STORAGE= .4183E-07 PERCENT ERROR=     .0

 FOR PLAN = 1  RATIO=  .98
  RDHD04C  MANE           .59    426.00    251.18    210.67       5.00    425.78    255.00      210.75

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5504E+02 EXCESS= .0000E+00 OUTFLOW= .5505E+02 BASIN STORAGE= .4122E-07 PERCENT ERROR=     .0

 FOR PLAN = 1  RATIO=  .95
  RDHD04C  MANE           .72    403.69    254.99    199.26       5.00    403.69    255.00      199.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5206E+02 EXCESS= .0000E+00 OUTFLOW= .5207E+02 BASIN STORAGE= .3758E-07 PERCENT ERROR=     .0

 FOR PLAN = 1  RATIO=  .92
  RDHD04C  MANE           .58    382.88    256.01    188.22       5.00    382.83    255.00      188.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4918E+02 EXCESS= .0000E+00 OUTFLOW= .4918E+02 BASIN STORAGE= .2949E-07 PERCENT ERROR=     .0
```

```
          FOR PLAN = 1  RATIO=  .91
           RDHD04C  MANE          .60    376.21    255.58    184.53      5.00    376.14    255.00      184.61

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4821E+02 EXCESS= .0000E+00 OUTFLOW= .4822E+02 BASIN STORAGE= .4092E-07 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .89
           RDHD04C  MANE          .75    363.55    255.30    177.17      5.00    363.51    255.00      177.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4629E+02 EXCESS= .0000E+00 OUTFLOW= .4630E+02 BASIN STORAGE= .3393E-07 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .57
           RDHD04C  MANE          .88    155.44    256.70     60.25      5.00    154.71    260.00       60.28

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1574E+02 EXCESS= .0000E+00 OUTFLOW= .1574E+02 BASIN STORAGE= .3223E-07 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO= 1.00
           RDHD05C  MANE          .41    628.83    255.21    282.78      5.00    628.69    255.00      282.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7389E+02 EXCESS= .0000E+00 OUTFLOW= .7390E+02 BASIN STORAGE= .1514E-07 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .98
           RDHD05C  MANE          .38    604.84    255.45    271.05      5.00    604.58    255.00      271.16

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7083E+02 EXCESS= .0000E+00 OUTFLOW= .7083E+02 BASIN STORAGE= .1748E-07 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .95
           RDHD05C  MANE          .33    569.04    255.61    253.74      5.00    568.53    255.00      253.84

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6630E+02 EXCESS= .0000E+00 OUTFLOW= .6631E+02 BASIN STORAGE= .1544E-07 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .92
           RDHD05C  MANE          .40    533.80    255.50    236.71      5.00    533.48    255.00      236.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6185E+02 EXCESS= .0000E+00 OUTFLOW= .6186E+02 BASIN STORAGE= .1647E-07 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .91
           RDHD05C  MANE          .34    523.47    255.76    231.09      5.00    523.06    255.00      231.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6039E+02 EXCESS= .0000E+00 OUTFLOW= .6039E+02 BASIN STORAGE= .1763E-07 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .89
           RDHD05C  MANE          .37    500.50    255.50    219.84      5.00    500.06    255.00      219.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5744E+02 EXCESS= .0000E+00 OUTFLOW= .5745E+02 BASIN STORAGE= .1758E-07 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .57
           RDHD05C  MANE          .55    162.29    260.14     58.48      5.00    162.28    260.00       58.52

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1528E+02 EXCESS= .0000E+00 OUTFLOW= .1528E+02 BASIN STORAGE= .1367E-07 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO= 1.00
           RDHD06C  MANE          .73    579.37    251.84    227.55      5.00    578.95    255.00      227.63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5944E+02 EXCESS= .0000E+00 OUTFLOW= .5946E+02 BASIN STORAGE= .2919E-07 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .98
           RDHD06C  MANE          .74    560.94    251.87    216.93      5.00    560.64    255.00      216.97

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5666E+02 EXCESS= .0000E+00 OUTFLOW= .5669E+02 BASIN STORAGE= .3131E-07 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .95
           RDHD06C  MANE          .79    532.27    254.56    200.72      5.00    532.27    255.00      200.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5244E+02 EXCESS= .0000E+00 OUTFLOW= .5245E+02 BASIN STORAGE= .2643E-07 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .92
           RDHD06C  MANE          .73    501.44    255.78    183.97      5.00    501.42    255.00      184.13

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4806E+02 EXCESS= .0000E+00 OUTFLOW= .4807E+02 BASIN STORAGE= .1924E-07 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .91
           RDHD06C  MANE          .65    491.35    255.38    178.40      5.00    491.31    255.00      178.50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4659E+02 EXCESS= .0000E+00 OUTFLOW= .4662E+02 BASIN STORAGE= .2470E-07 PERCENT ERROR=   -.1
```

FOR PLAN = 1 RATIO= .89

RDHD06C	MANE	.79	469.58	254.30	166.97	5.00	469.58	255.00	167.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4361E+02 EXCESS= .0000E+00 OUTFLOW= .4363E+02 BASIN STORAGE= .3088E-07 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .57

RDHD06C	MANE	1.37	31.01	253.50	4.64	5.00	30.43	255.00	4.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1207E+01 EXCESS= .0000E+00 OUTFLOW= .1214E+01 BASIN STORAGE= .2626E-07 PERCENT ERROR= -.5

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	3.00	6.09	213.00	-1.00	5.00	5.97	215.00	-1.00

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	3.00	5.92	213.00	-1.00	5.00	5.82	215.00	-1.00

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	3.25	5.57	214.50	-1.00	5.00	5.43	215.00	-1.00

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	3.25	5.34	214.50	-1.00	5.00	5.20	215.00	-1.00

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	3.25	5.26	214.50	-1.00	5.00	5.12	215.00	-1.00

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	3.50	5.09	213.50	-1.00	5.00	5.00	215.00	-1.00

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	3.75	2.60	217.50	-1.00	5.00	2.51	215.00	-1.00

FOR PLAN = 1 RATIO= .00

RCP23	MANE	2.09	148.62	254.40	23.63	5.00	148.43	255.00	23.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1676E+02 EXCESS= .0000E+00 OUTFLOW= .1676E+02 BASIN STORAGE= .9416E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP23	MANE	2.12	141.74	254.33	22.53	5.00	141.49	255.00	22.52

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1598E+02 EXCESS= .0000E+00 OUTFLOW= .1598E+02 BASIN STORAGE= .9089E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP23	MANE	2.18	130.97	254.62	20.93	5.00	130.87	255.00	20.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1485E+02 EXCESS= .0000E+00 OUTFLOW= .1485E+02 BASIN STORAGE= .9421E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP23	MANE	2.24	120.15	255.31	19.38	5.00	120.12	255.00	19.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1375E+02 EXCESS= .0000E+00 OUTFLOW= .1375E+02 BASIN STORAGE= .9525E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP23	MANE	2.26	116.56	255.62	18.89	5.00	116.55	255.00	18.88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1340E+02 EXCESS= .0000E+00 OUTFLOW= .1340E+02 BASIN STORAGE= .9564E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCP23	MANE	2.31	109.77	254.29	17.77	5.00	109.56	255.00	17.76

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1260E+02 EXCESS= .0000E+00 OUTFLOW= .1260E+02 BASIN STORAGE= .9467E-03 PERCENT ERROR= .0

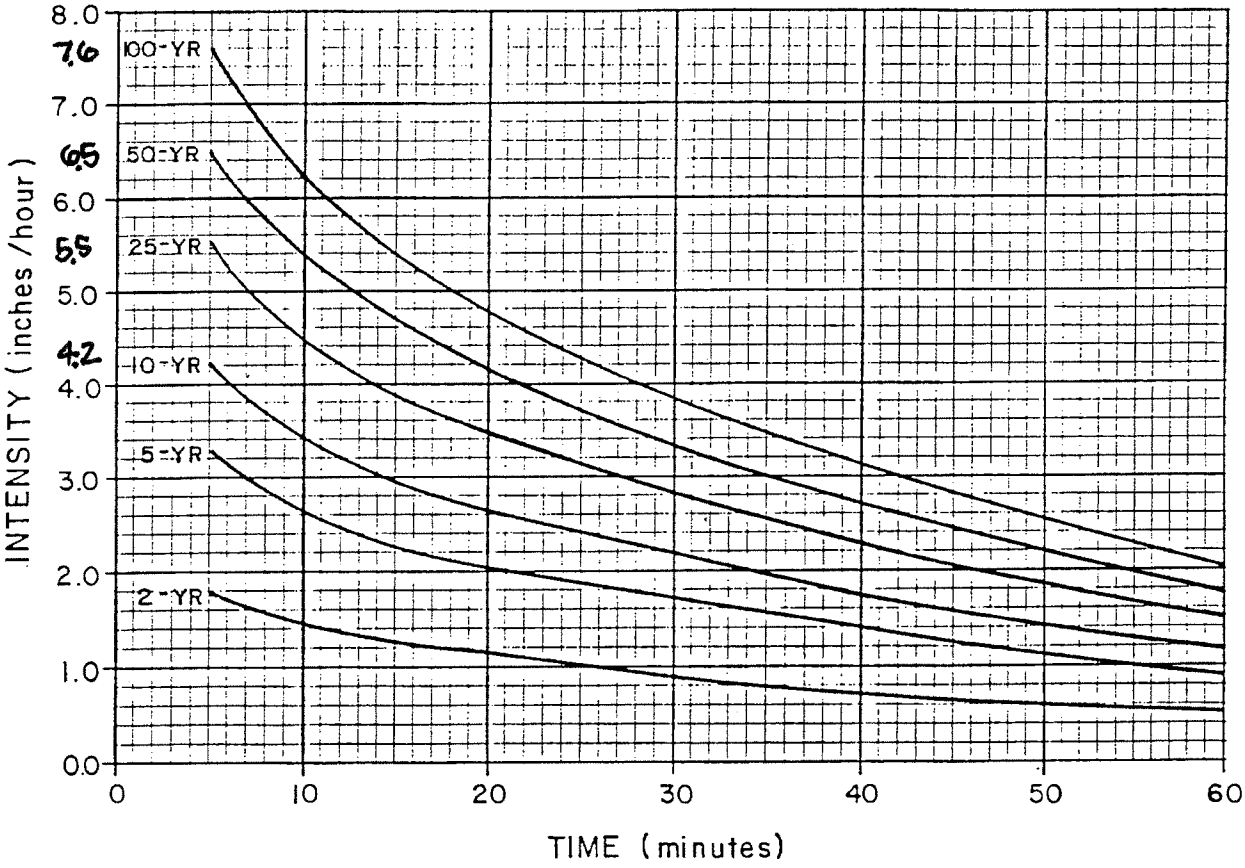
FOR PLAN = 1 RATIO= .00

RCP23	MANE	4.15	19.58	257.08	2.57	5.00	19.27	255.00	2.57

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1823E+01 EXCESS= .0000E+00 OUTFLOW= .1824E+01 BASIN STORAGE= .9471E-03 PERCENT ERROR= -.1

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

TIME-INTENSITY-FREQUENCY CURVES FOR McCARRAN AIRPORT RAINFALL AREA



NOTE: 1. Refer to Table 506 for tabulation of Time-Intensity-Frequency Values.

Revision	Date

WRC ENGINEERING	REFERENCE: USACE, Los Angeles District, 1988	FIGURE 517

RATIONAL FORMULA METHOD RUNOFF COEFFICIENTS AND AVERAGE PERCENT IMPERVIOUS AREA

LAND USE OR SURFACE CHARACTERISTICS	AVERAGE PERCENT IMPERVIOUS AREA	RUNOFF COEFFICIENTS 10-YEAR		100-YEAR	
		GRASS[1]	DESERT[2]	GRASS[1]	DESERT[2]
Business and Commercial:					
Downtown Areas	95	.88	.88	.89	.89
Neighborhood Areas	70	.70	.75	.80	.83
Residential (Average Lot Size):					
1/8 Acre or less (Multi-Unit)	65	.68	.73	.78	.80
1/4 Acre	38	.55	.62	.65	.74
1/3 Acre	30	.50	.57	.60	.70
1/2 Acre	25	.45	.53	.55	.67
1 Acre	20	.40	.49	.50	.64
2 Acre	12	.35	.45	.40	.60
Industrial:	72	.72	.76	.82	.84
Open Space: (Lawns, Parks, Golf Courses)	5	.10	-	.30	-
Undeveloped Areas: (Natural Vegetation)	0	-	.25	-	.50
		10-YR	25-YR	50-YR	100-YR
Streets and Roads:					
Paved	100	.90	0.91	0.92	.93
Gravel	20	.40	0.42	0.45	.50
Drives and Walks:	95	.88			.89
Roofs:	90	.85			.87

Notes:

1 Grass - Grassed Landscaping or Irrigated Vegetation
2 Desert - Desert Landscaping or Natural Vegetation

Revision	Date

WRC ENGINEERING

REFERENCE: USDCM, DRCOG, 1969 (with modifications)

TABLE 601

10-yr Composite Runoff Coefficient Calculation (McCarran Airport Rainfall Area)					
Subbasin	Streets and Road - Paved, % *	Streets and Road - Gravel, % *	C_{paved} **	C_{gravel} **	$C_{composite}$
I1	0.0	100.0	0.90	0.40	0.40
I2	0.0	100.0	0.90	0.40	0.40
I3	0.0	100.0	0.90	0.40	0.40
I4	0.0	100.0	0.90	0.40	0.40
I5	0.0	100.0	0.90	0.40	0.40
I6	100.0	0.0	0.90	0.40	0.90
I11	100.0	0.0	0.90	0.40	0.90
95-1A	59.9	40.1	0.90	0.40	0.70
95-1B	100.0	0.0	0.90	0.40	0.90
95-1C	100.0	0.0	0.90	0.40	0.90
95-1D	0.0	100.0	0.90	0.40	0.40
95-2A	0.0	100.0	0.90	0.40	0.40
95-2B	100.0	0.0	0.90	0.40	0.90
95-3	65.4	34.6	0.90	0.40	0.73
95-4A	100.0	0.0	0.90	0.40	0.90
95-4B	0.0	100.0	0.90	0.40	0.40
95-5	100.0	0.0	0.90	0.40	0.90
95-6	23.9	76.1	0.90	0.40	0.52
95-7	40.8	59.2	0.90	0.40	0.60
95-8	66.9	33.1	0.90	0.40	0.73
95-9	33.6	66.4	0.90	0.40	0.57
95-10	74.2	25.8	0.90	0.40	0.77
95-11	76.8	23.2	0.90	0.40	0.78
95-12	73.9	26.1	0.90	0.40	0.77
95-13	73.1	26.9	0.90	0.40	0.77
95-14	100.0	0.0	0.90	0.40	0.90
95-15A	100.0	0.0	0.90	0.40	0.90
95-15B	0.0	100.0	0.90	0.40	0.40
95-16	46.3	53.7	0.90	0.40	0.63
95-17	57.9	42.1	0.90	0.40	0.69
95-18	0.0	100.0	0.90	0.40	0.40
95-19	0.0	100.0	0.90	0.40	0.40
95-20	0.0	100.0	0.90	0.40	0.40
95-21	0.0	100.0	0.90	0.40	0.40
95-22	0.0	100.0	0.90	0.40	0.40
95-23	0.0	100.0	0.90	0.40	0.40
KCE-1A	81.7	18.3	0.90	0.40	0.81
KCE-1B	61.3	38.7	0.90	0.40	0.71
KCE-1C	65.6	34.4	0.90	0.40	0.73
KCE-2	100.0	0.0	0.90	0.40	0.90
KCE-3	68.1	31.9	0.90	0.40	0.74
KCE-4	39.6	60.4	0.90	0.40	0.60
KCE-4B	100.0	0.0	0.90	0.40	0.90
KCE-5	62.4	37.6	0.90	0.40	0.71
KCE-5B	100.0	0.0	0.90	0.40	0.90
KCE-6A	100.0	0.0	0.90	0.40	0.90
KCE-6B	100.0	0.0	0.90	0.40	0.90
KCE-6C	100.0	0.0	0.90	0.40	0.90
KCE-7	80.8	19.2	0.90	0.40	0.80
KCW-1A	64.9	35.1	0.90	0.40	0.72
KCW-1B	70.7	29.3	0.90	0.40	0.75
KCW-2	100.0	0.0	0.90	0.40	0.90
KCW-3	69.2	30.8	0.90	0.40	0.75
KCW-4	51.0	49.0	0.90	0.40	0.66
KCW-5	41.7	58.3	0.90	0.40	0.61
KCW-5A	57.9	42.1	0.90	0.40	0.69
KCW-6	100.0	0.0	0.90	0.40	0.90
KCW-7	90.0	10.0	0.90	0.40	0.85
KR1-1	75.6	24.4	0.90	0.40	0.78
KR1-2	56.2	43.8	0.90	0.40	0.68
KR1-3	52.2	47.8	0.90	0.40	0.66
KR1-4	29.8	70.2	0.90	0.40	0.55
KR2-1	54.1	45.9	0.90	0.40	0.67
KR2-2	23.9	76.1	0.90	0.40	0.52
KR2-3	43.4	56.6	0.90	0.40	0.62
KR2-4	20.1	79.9	0.90	0.40	0.50
KR2-5	43.8	56.2	0.90	0.40	0.62
KR2-6	100.0	0.0	0.90	0.40	0.90
KR3-1A	20.4	79.6	0.90	0.40	0.50
KR3-1B	100.0	0.0	0.90	0.40	0.90
KR3-2	24.3	75.7	0.90	0.40	0.52
KR3-3	100.0	0.0	0.90	0.40	0.90
KR4-1	27.1	72.9	0.90	0.40	0.54
KR4-2	0.0	100.0	0.90	0.40	0.40
KR4-3	46.0	54.0	0.90	0.40	0.63
KR4-4	42.6	57.4	0.90	0.40	0.61
KR4-5	57.6	42.4	0.90	0.40	0.69

* - From digital CAD files

** - From Table 601 of the HCDDM

25-yr Composite Runoff Coefficient Calculation (McCarran Airport Rainfall Area)					
Subbasin	Streets and Road - Paved, % *	Streets and Road - Gravel, % *	C_{paved} **	C_{gravel} **	$C_{composite}$
I1	0.0	100.0	0.91	0.42	0.42
I2	0.0	100.0	0.91	0.42	0.42
I3	0.0	100.0	0.91	0.42	0.42
I4	0.0	100.0	0.91	0.42	0.42
I5	0.0	100.0	0.91	0.42	0.42
I6	100.0	0.0	0.91	0.42	0.91
I11	100.0	0.0	0.91	0.42	0.91
95-1A	59.9	40.1	0.91	0.42	0.71
95-1B	100.0	0.0	0.91	0.42	0.91
95-1C	100.0	0.0	0.91	0.42	0.91
95-1D	0.0	100.0	0.91	0.42	0.42
95-2A	0.0	100.0	0.91	0.42	0.42
95-2B	100.0	0.0	0.91	0.42	0.91
95-3	65.4	34.6	0.91	0.42	0.74
95-4A	100.0	0.0	0.91	0.42	0.91
95-4B	0.0	100.0	0.91	0.42	0.42
95-5	100.0	0.0	0.91	0.42	0.91
95-6	23.9	76.1	0.91	0.42	0.54
95-7	40.8	59.2	0.91	0.42	0.62
95-8	66.9	33.1	0.91	0.42	0.75
95-9	33.6	66.4	0.91	0.42	0.58
95-10	74.2	25.8	0.91	0.42	0.78
95-11	76.8	23.2	0.91	0.42	0.80
95-12	73.9	26.1	0.91	0.42	0.78
95-13	73.1	26.9	0.91	0.42	0.78
95-14	100.0	0.0	0.91	0.42	0.91
95-15A	100.0	0.0	0.91	0.42	0.91
95-15B	0.0	100.0	0.91	0.42	0.42
95-16	46.3	53.7	0.91	0.42	0.65
95-17	57.9	42.1	0.91	0.42	0.70
95-18	0.0	100.0	0.91	0.42	0.42
95-19	0.0	100.0	0.91	0.42	0.42
95-20	0.0	100.0	0.91	0.42	0.42
95-21	0.0	100.0	0.91	0.42	0.42
95-22	0.0	100.0	0.91	0.42	0.42
95-23	0.0	100.0	0.91	0.42	0.42
KCE-1A	81.7	18.3	0.91	0.42	0.82
KCE-1B	61.3	38.7	0.91	0.42	0.72
KCE-1C	65.6	34.4	0.91	0.42	0.74
KCE-2	100.0	0.0	0.91	0.42	0.91
KCE-3	68.1	31.9	0.91	0.42	0.75
KCE-4	39.6	60.4	0.91	0.42	0.61
KCE-4B	100.0	0.0	0.91	0.42	0.91
KCE-5	62.4	37.6	0.91	0.42	0.73
KCE-5B	100.0	0.0	0.91	0.42	0.91
KCE-6A	100.0	0.0	0.91	0.42	0.91
KCE-6B	100.0	0.0	0.91	0.42	0.91
KCE-6C	100.0	0.0	0.91	0.42	0.91
KCE-7	80.8	19.2	0.91	0.42	0.82
KCW-1A	64.9	35.1	0.91	0.42	0.74
KCW-1B	70.7	29.3	0.91	0.42	0.77
KCW-2	100.0	0.0	0.91	0.42	0.91
KCW-3	69.2	30.8	0.91	0.42	0.76
KCW-4	51.0	49.0	0.91	0.42	0.67
KCW-5	41.7	58.3	0.91	0.42	0.62
KCW-5A	57.9	42.1	0.91	0.42	0.70
KCW-6	100.0	0.0	0.91	0.42	0.91
KCW-7	90.0	10.0	0.91	0.42	0.86
KR1-1	75.6	24.4	0.91	0.42	0.79
KR1-2	56.2	43.8	0.91	0.42	0.70
KR1-3	52.2	47.8	0.91	0.42	0.68
KR1-4	29.8	70.2	0.91	0.42	0.57
KR2-1	54.1	45.9	0.91	0.42	0.68
KR2-2	23.9	76.1	0.91	0.42	0.54
KR2-3	43.4	56.6	0.91	0.42	0.63
KR2-4	20.1	79.9	0.91	0.42	0.52
KR2-5	43.8	56.2	0.91	0.42	0.63
KR2-6	100.0	0.0	0.91	0.42	0.91
KR3-1A	20.4	79.6	0.91	0.42	0.52
KR3-1B	100.0	0.0	0.91	0.42	0.91
KR3-2	24.3	75.7	0.91	0.42	0.54
KR3-3	100.0	0.0	0.91	0.42	0.91
KR4-1	27.1	72.9	0.91	0.42	0.55
KR4-2	0.0	100.0	0.91	0.42	0.42
KR4-3	46.0	54.0	0.91	0.42	0.65
KR4-4	42.6	57.4	0.91	0.42	0.63
KR4-5	57.6	42.4	0.91	0.42	0.70

* - From digital CAD files

** - From Table 601 of the HCDDM

50-yr Composite Runoff Coefficient Calculation (McCarran Airport Rainfall Area)					
Subbasin	Streets and Road - Paved, % *	Streets and Road - Gravel, % *	C_{paved} **	C_{gravel} **	$C_{composite}$
I1	0.0	100.0	0.92	0.45	0.45
I2	0.0	100.0	0.92	0.45	0.45
I3	0.0	100.0	0.92	0.45	0.45
I4	0.0	100.0	0.92	0.45	0.45
I5	0.0	100.0	0.92	0.45	0.45
I6	100.0	0.0	0.92	0.45	0.92
I11	100.0	0.0	0.92	0.45	0.92
95-1A	59.9	40.1	0.92	0.45	0.73
95-1B	100.0	0.0	0.92	0.45	0.92
95-1C	100.0	0.0	0.92	0.45	0.92
95-1D	0.0	100.0	0.92	0.45	0.45
95-2A	0.0	100.0	0.92	0.45	0.45
95-2B	100.0	0.0	0.92	0.45	0.92
95-3	65.4	34.6	0.92	0.45	0.76
95-4A	100.0	0.0	0.92	0.45	0.92
95-4B	0.0	100.0	0.92	0.45	0.45
95-5	100.0	0.0	0.92	0.45	0.92
95-6	23.9	76.1	0.92	0.45	0.56
95-7	40.8	59.2	0.92	0.45	0.64
95-8	66.9	33.1	0.92	0.45	0.76
95-9	33.6	66.4	0.92	0.45	0.61
95-10	74.2	25.8	0.92	0.45	0.80
95-11	76.8	23.2	0.92	0.45	0.81
95-12	73.9	26.1	0.92	0.45	0.80
95-13	73.1	26.9	0.92	0.45	0.79
95-14	100.0	0.0	0.92	0.45	0.92
95-15A	100.0	0.0	0.92	0.45	0.92
95-15B	0.0	100.0	0.92	0.45	0.45
95-16	46.3	53.7	0.92	0.45	0.67
95-17	57.9	42.1	0.92	0.45	0.72
95-18	0.0	100.0	0.92	0.45	0.45
95-19	0.0	100.0	0.92	0.45	0.45
95-20	0.0	100.0	0.92	0.45	0.45
95-21	0.0	100.0	0.92	0.45	0.45
95-22	0.0	100.0	0.92	0.45	0.45
95-23	0.0	100.0	0.92	0.45	0.45
KCE-1A	81.7	18.3	0.92	0.45	0.83
KCE-1B	61.3	38.7	0.92	0.45	0.74
KCE-1C	65.6	34.4	0.92	0.45	0.76
KCE-2	100.0	0.0	0.92	0.45	0.92
KCE-3	68.1	31.9	0.92	0.45	0.77
KCE-4	39.6	60.4	0.92	0.45	0.64
KCE-4B	100.0	0.0	0.92	0.45	0.92
KCE-5	62.4	37.6	0.92	0.45	0.74
KCE-5B	100.0	0.0	0.92	0.45	0.92
KCE-6A	100.0	0.0	0.92	0.45	0.92
KCE-6B	100.0	0.0	0.92	0.45	0.92
KCE-6C	100.0	0.0	0.92	0.45	0.92
KCE-7	80.8	19.2	0.92	0.45	0.83
KCW-1A	64.9	35.1	0.92	0.45	0.76
KCW-1B	70.7	29.3	0.92	0.45	0.78
KCW-2	100.0	0.0	0.92	0.45	0.92
KCW-3	69.2	30.8	0.92	0.45	0.78
KCW-4	51.0	49.0	0.92	0.45	0.69
KCW-5	41.7	58.3	0.92	0.45	0.65
KCW-5A	57.9	42.1	0.92	0.45	0.72
KCW-6	100.0	0.0	0.92	0.45	0.92
KCW-7	90.0	10.0	0.92	0.45	0.87
KR1-1	75.6	24.4	0.92	0.45	0.81
KR1-2	56.2	43.8	0.92	0.45	0.71
KR1-3	52.2	47.8	0.92	0.45	0.70
KR1-4	29.8	70.2	0.92	0.45	0.59
KR2-1	54.1	45.9	0.92	0.45	0.70
KR2-2	23.9	76.1	0.92	0.45	0.56
KR2-3	43.4	56.6	0.92	0.45	0.65
KR2-4	20.1	79.9	0.92	0.45	0.54
KR2-5	43.8	56.2	0.92	0.45	0.66
KR2-6	100.0	0.0	0.92	0.45	0.92
KR3-1A	20.4	79.6	0.92	0.45	0.55
KR3-1B	100.0	0.0	0.92	0.45	0.92
KR3-2	24.3	75.7	0.92	0.45	0.56
KR3-3	100.0	0.0	0.92	0.45	0.92
KR4-1	27.1	72.9	0.92	0.45	0.58
KR4-2	0.0	100.0	0.92	0.45	0.45
KR4-3	46.0	54.0	0.92	0.45	0.67
KR4-4	42.6	57.4	0.92	0.45	0.65
KR4-5	57.6	42.4	0.92	0.45	0.72

* - From digital CAD files

** - From Table 601 of the HCDDM

Subbasin Name	Coefficient, K	Runoff Coefficient, C				T_c used	Intensity, I (in/hr)				Area, A	Q_{10}	Q_{25}	Q_{50}
		10-YR	25-YR	50-YR	100-YR	(minutes)	10-YR	25-YR	50-YR	100-YR	(ac)	(cfs)	(cfs)	(cfs)
I1	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	1.36	2.3	3.1	4.0
I2	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	1.65	2.8	3.8	4.8
I3	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	0.59	1.0	1.4	1.7
I4	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	0.82	1.4	1.9	2.4
I5	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	1.49	2.5	3.4	4.4
I6	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	2.85	10.8	14.3	17.1
I11	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.34	1.3	1.7	2.0
95-1A	1	0.70	0.71	0.73	0.76	5.00	4.2	5.5	6.5	7.6	1.78	5.2	7.0	8.5
95-1B	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.49	1.8	2.4	2.9
95-1C	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.68	2.6	3.4	4.1
95-1D	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	0.19	0.3	0.4	0.5
95-2A	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	0.25	0.4	0.6	0.7
95-2B	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.72	2.7	3.6	4.3
95-3	1	0.73	0.74	0.76	0.78	5.00	4.2	5.5	6.5	7.6	0.74	2.3	3.0	3.6
95-4A	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.44	1.6	2.2	2.6
95-4B	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	0.16	0.3	0.4	0.5
95-5	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.29	1.1	1.5	1.8
95-6	1	0.52	0.54	0.56	0.60	5.00	4.2	5.5	6.5	7.6	1.49	3.3	4.4	5.5
95-7	1	0.60	0.62	0.64	0.68	5.00	4.2	5.5	6.5	7.6	1.69	4.3	5.8	7.1
95-8	1	0.73	0.75	0.76	0.79	5.00	4.2	5.5	6.5	7.6	0.61	1.9	2.5	3.0
95-9	1	0.57	0.58	0.61	0.64	5.00	4.2	5.5	6.5	7.6	2.07	4.9	6.7	8.2
95-10	1	0.77	0.78	0.80	0.82	5.00	4.2	5.5	6.5	7.6	0.95	3.1	4.1	5.0
95-11	1	0.78	0.80	0.81	0.83	5.00	4.2	5.5	6.5	7.6	1.47	4.8	6.4	7.8
95-12	1	0.77	0.78	0.80	0.82	5.00	4.2	5.5	6.5	7.6	1.05	3.4	4.5	5.5
95-13	1	0.77	0.78	0.79	0.81	5.00	4.2	5.5	6.5	7.6	1.23	3.9	5.2	6.3
95-14	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.30	1.1	1.5	1.8
95-15A	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.46	1.7	2.3	2.8
95-15B	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	0.84	1.4	1.9	2.5
95-16	1	0.63	0.65	0.67	0.70	5.00	4.2	5.5	6.5	7.6	0.80	2.1	2.8	3.5
95-17	1	0.69	0.70	0.72	0.75	5.00	4.2	5.5	6.5	7.6	0.65	1.9	2.5	3.1
95-18	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	0.33	0.5	0.8	1.0
95-19	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	0.55	0.9	1.3	1.6
95-20	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	0.49	0.8	1.1	1.4
95-21	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	0.62	1.0	1.4	1.8
95-22	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	0.96	1.6	2.2	2.8
95-23	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	0.62	1.0	1.4	1.8
KCE-1A	1	0.81	0.82	0.83	0.85	5.00	4.2	5.5	6.5	7.6	1.43	4.9	6.5	7.8
KCE-1B	1	0.71	0.72	0.74	0.76	5.00	4.2	5.5	6.5	7.6	0.27	0.8	1.0	1.3
KCE-1C	1	0.73	0.74	0.76	0.78	5.00	4.2	5.5	6.5	7.6	0.58	1.8	2.4	2.9
KCE-2	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.11	0.4	0.6	0.7
KCE-3	1	0.74	0.75	0.77	0.79	5.00	4.2	5.5	6.5	7.6	0.40	1.3	1.7	2.0
KCE-4	1	0.60	0.61	0.64	0.67	5.00	4.2	5.5	6.5	7.6	0.08	0.2	0.3	0.4
KCE-4B	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.02	0.1	0.1	0.1
KCE-5	1	0.71	0.73	0.74	0.77	5.00	4.2	5.5	6.5	7.6	0.17	0.5	0.7	0.8
KCE-5B	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.07	0.2	0.3	0.4
KCE-6A	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.11	0.4	0.6	0.7
KCE-6B	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.17	0.6	0.9	1.0
KCE-6C	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.06	0.2	0.3	0.4
KCE-7	1	0.80	0.82	0.83	0.85	5.00	4.2	5.5	6.5	7.6	1.09	3.7	4.9	5.9
KCW-1A	1	0.72	0.74	0.76	0.78	5.00	4.2	5.5	6.5	7.6	1.57	4.8	6.4	7.7
KCW-1B	1	0.75	0.77	0.78	0.80	5.00	4.2	5.5	6.5	7.6	0.12	0.4	0.5	0.6
KCW-2	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.04	0.1	0.2	0.2
KCW-3	1	0.75	0.76	0.78	0.80	5.00	4.2	5.5	6.5	7.6	0.22	0.7	0.9	1.1
KCW-4	1	0.66	0.67	0.69	0.72	5.00	4.2	5.5	6.5	7.6	0.26	0.7	1.0	1.2
KCW-5	1	0.61	0.62	0.65	0.68	5.00	4.2	5.5	6.5	7.6	0.11	0.3	0.4	0.4
KCW-5A	1	0.69	0.70	0.72	0.75	5.00	4.2	5.5	6.5	7.6	0.22	0.6	0.8	1.0
KCW-6	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.16	0.6	0.8	0.9
KCW-7	1	0.85	0.86	0.87	0.89	5.00	4.2	5.5	6.5	7.6	0.71	2.5	3.4	4.0
KR1-1	1	0.78	0.79	0.81	0.83	5.00	4.2	5.5	6.5	7.6	2.31	7.6	10.1	12.2
KR1-2	1	0.68	0.70	0.71	0.74	5.00	4.2	5.5	6.5	7.6	0.52	1.5	2.0	2.4
KR1-3	1	0.66	0.68	0.70	0.72	5.00	4.2	5.5	6.5	7.6	1.83	5.1	6.8	8.3
KR1-4	1	0.55	0.57	0.59	0.63	5.00	4.2	5.5	6.5	7.6	1.10	2.5	3.4	4.2
KR2-1	1	0.67	0.68	0.70	0.73	5.00	4.2	5.5	6.5	7.6	0.90	2.5	3.4	4.1
KR2-2	1	0.52	0.54	0.56	0.60	5.00	4.2	5.5	6.5	7.6	0.73	1.6	2.2	2.7
KR2-3	1	0.62	0.63	0.65	0.69	5.00	4.2	5.5	6.5	7.6	0.13	0.3	0.4	0.5
KR2-4	1	0.50	0.52	0.54	0.59	5.00	4.2	5.5	6.5	7.6	1.16	2.4	3.3	4.1
KR2-5	1	0.62	0.63	0.66	0.69	5.00	4.2	5.5	6.5	7.6	0.15	0.4	0.5	0.6
KR2-6	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.34	1.3	1.7	2.0
KR3-1A	1	0.50	0.52	0.55	0.59	5.00	4.2	5.5	6.5	7.6	1.03	2.2	2.9	3.7
KR3-1B	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.07	0.3	0.3	0.4
KR3-2	1	0.52	0.54	0.56	0.60	5.00	4.2	5.5	6.5	7.6	1.04	2.3	3.1	3.8
KR3-3	1	0.90	0.91	0.92	0.93	5.00	4.2	5.5	6.5	7.6	0.26	1.0	1.3	1.6
KR4-1	1	0.54	0.55	0.58	0.62	5.00	4.2	5.5	6.5	7.6	0.55	1.2	1.7	2.1
KR4-2	1	0.40	0.42	0.45	0.50	5.00	4.2	5.5	6.5	7.6	0.73	1.2	1.7	2.1
KR4-3	1	0.63	0.65	0.67	0.70	5.00	4.2	5.5	6.5	7.6	1.47	3.9	5.2	6.4
KR4-4	1	0.61	0.63	0.65	0.68	5.00	4.2	5.5	6.5	7.6	0.26	0.7	0.9	1.1
KR4-5	1	0.69	0.70	0.72	0.75	5.00	4.2	5.5	6.5	7.6	0.82	2.4	3.2	3.8

* - From digital CAD files

** - From Table 601 of the HCDDM

APPENDIX B

Comments, Meeting Minutes, and CCRFCD
Facility Design Memorandum

James Monroe

From: Holman, Christopher M [CHolman@dot.state.nv.us]
Sent: Wednesday, March 02, 2016 4:28 PM
To: Ryan Belsick; James Monroe
Subject: Kyle Canyon Review
Attachments: Pages from Kyle Canyon PDF - Pre-60%.pdf

Good Afternoon,

I have attached my comments from the pre-60% plan set. The area that appears to require the most attention is the flow split at the station 405+00 culvert. I don't think that we have any appetite as a department to have flow retained against a barrier rail, especially a modified (taller) rail. The design that was provided does a very good job of replicating the flow splits in the existing conditions, however as a department we may have some more flexibility to split flows and an over the shoulder review would be the best way to work through the design. My schedule has been very busy, but I will be more available starting next week. Please let me know if you have questions. Thanks.

Chris M. Holman, P.E.
Senior Hydraulic Engineer
Nevada Department of Transportation
1263 S. Stewart St., Carson City, NV 89712
Telephone: (775) 888-7798; Fax: (775) 888-7177
cholman@dot.state.nv.us

This communication, including any attachments, may contain confidential information and is intended only for the individual or entity to whom it is addressed. Any review, dissemination or copying of this communication by anyone other than the intended recipient is strictly prohibited. If you are not the intended recipient, please contact the sender by reply e-mail and delete all copies of the original message.

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D101.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	D101

PRELIMINARY

SUBJECT TO REVISION
2/2/2016

h9010cmh
Sticky Note

Flow may be split somewhat differently than existing conditions, an over the shoulder review is probably the easiest way to handle this.

h9010cmh
Sticky Note

Revise ditch geometry to include capacity for all flow, so that no flow is being retained against barrier rail. Modified rail should not be used.

h9010cmh
Sticky Note

Construct riprap apron

h9010cmh
Sticky Note

Show proposed inside widening

h9010cmh
Sticky Note

Grade ditch to realign flow with existing flowline, riprap line if necessary

h9010cmh
Sticky Note

construct riprap apron

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE AAccad

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D101A.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	D101A

PRELIMINARY
SUBJECT TO REVISION
2/2/2016

(1) "XP" 403+83.96
INSTALL 53" X 34" RCP END SECTION (SAFETY TYPE) (3.00' RT.)
INSTALL 53" X 34" X 50' HERCP FROM "XP" 403+83.96 (3.00' RT.) LIE= XX.XX'
TO "XP" 404+33.96 (3.00' RT.) UIE = XX.XX'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DPX)

(2) "XP" 404+33.96
CONSTRUCT TYPE 2 MANHOLE, (3.00' RT.)
(COVER ELEV=2777.78', INV ELEV=XXXX.XX', H=X.X')
INSTALL 53" X 34" X 101' HERCP FROM "XP" 404+33.96 (3.00' RT.) LIE= XX.XX'
TO "XP" 404+87.00 (83.33' LT.) UIE = XX.XX'
CONNECT TO TYPE 2A DROP INLET
(SEE SHEET DPX)

(3) "XP" 404+87.00
CONSTRUCT TYPE 2A DROP INLET, (83.33' LT.)
(COVER ELEV=2781.83', INV ELEV=XXXX.XX', H=X.X')
INSTALL 53" X 34" X 69' HERCP FROM "XP" 404+87.00 (83.33' LT.) LIE= XX.XX'
TO "KR4" 44+61.57 (40.13' LT.) UIE = XX.XX'
CONSTRUCT MODIFIED HEADWALL LT.
(SEE SHEET DPX AND DDX)

(4) "KR4" 44+61.57 TO "KR4" 45+10.49
CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL
FROM "KR4" 44+61.57 (83.33' LT.)
TO "KR4"45+10.49 (95.27' LT.)
(SEE SHEET DPX AND DDX)

(5) "KR1" 15+65.81
CONSTRUCT HEADWALL TYPE 1 (58.64' RT.)
INSTALL 53" X 34" X 162' HERCP FROM "KR1" 15+65.81 (58.64' RT.) UIE= XX.XX'
TO "XP" 404+66.66 (2.31' RT.) LIE = XX.XX'
CONNECT TO TYPE 2A DROP INLET
(SEE SHEET DPX)

(6) "XP" 404+66.66
CONSTRUCT TYPE 2A DROP INLET (2.31' RT.)
(GRATE ELEV= 2779.54', INV ELEV= XX.XX', H= X.X')
INSTALL 53" X 34" X 90' HERCP FROM "XP" 404+66.66 (2.31' RT.) UIE= XX.XX'
TO "XP" 404+94.09 (83.55' LT.) LIE = XX.XX'
CONNECT TO TYPE 2A DROP INLET
(SEE SHEET DPX)

(7) "XP" 404+94.09
CONSTRUCT TYPE 2A DROP INLET (83.55' LT.)
(GRATE ELEV= 2781.29', INV ELEV= XX.XX', H= X.X')
INSTALL 53" X 34" X 52' HERCP FROM "XP" 404+94.09 (83.55' LT.) LIE= XX.XX'
TO "KR4" 44+61.42 (24.28' LT.) UIE = XX.XX'
CONNECT TO TYPE 2 DROP INLET
(SEE SHEET DPX)

(8) "KR4" 44+61.42
CONSTRUCT TYPE 2 DROP INLET (24.28' LT.)
(GRATE ELEV= 2780.12', INV ELEV= XX.XX', H= X.X')
INSTALL 53" X 34" X 14' HERCP FROM "KR3" 44+61.42 (24.28' LT.) LIE= XX.XX'
TO "KR4" 44+67.67 (37.25' LT.) UIE = XX.XX'
CONNECT TO MODIFIED HEADWALL LT.
(SEE SHEET DPX)

(9) "XP" 404+95 TO "XP" 404+96
REMOVE 42" CMP

(10) "XP" 404+95 TO "XP" 404+96
REMOVE 42" CMP

(11) "KR4" 45+90.17
INSTALL 24" RCP END SECTION (88.72' LT.)
INSTALL 24" X 97' RCP FROM "KR4" 45+90.17 (88.72' LT.) UIE= XX.XX'
TO "KR4" 44+94.11 (65.73' LT.) LIE = XX.XX'
CONSTRUCT RCP CONNECTION
(SEE SHEET DPX)

(12) "KR1" 19+48.39
CONSTRUCT TYPE 2A DROP INLET (44.00' LT.)
(GRATE ELEV= 2779.53', INV ELEV= XX.XX', H= X.X')
INSTALL 18" X 87' RCP FROM "KR1" 19+48.39 (44.00' LT.) UIE= XX.XX'
TO "KR1" 19+48.39 (43.07' RT.) LIE = XX.XX'
INSTALL 18" RCP END SECTION RT.
(SEE SHEET DPX)

60% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE AAccad

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D102.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	D102

PRELIMINARY

SUBJECT TO REVISION
2/2/2016

h9010cmh
Sticky Note

Where does flow go at the end of this rail, provide drop inlets/ embankment protector/ riprap down drain

h9010cmh
Sticky Note

Provide class 150 riprap downdrain to pick up nuisance

"KR4A" +27.60
111.86' LT.

"KR3" +76.49
76.88' RT.

"XP" +53.35
162.99' RT.

"XP" +23.57
109.08' RT.

"KR2" +85.12
71.55' LT.

"KR4" "KR4A" "KR3A" "KR3" "KCR3" "KCW1" "KCE1" "KCR4" "KCW" "KCE" "XS1e" "XP" "XN1e" "KR1" "KR1A" "KR2" "KR2A"

KYLE CANYON RD

T. 19S. R. 60E. SEC. 6

US 95

EX. 24" CMP

R/W

60% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE

AAccad

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D102A.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	D102A

PRELIMINARY
SUBJECT TO REVISION
2/2/2016

(1) "XP" 412+21.17
CONSTRUCT TYPE 2 DROP INLET (76.25' RT.)
(GRATE ELEV= 2792.37', INV ELEV= XX.XX', H= X.X')
INSTALL 18" X 10' RCP FROM "XP" 412+21.17 (76.25' RT.) LIE= XX.XX'
TO "XP" 412+31.17 (76.25' RT.) UIE= XX.XX'
ONTO EXISTING 6' X 3' RCB
CONNECT TO TYPE 2 DROP INLET
(SEE SHEET DPX)

(2) "XP" 412+31.17
CONSTRUCT TYPE 2 DROP INLET (76.25' RT.)
(GRATE ELEV= 2792.56', INV ELEV= XX.XX', H= X.X')
INSTALL 18" X 10' RCP FROM "XP" 412+31.17 (76.25' RT.) LIE= XX.XX'
TO "XP" 412+41.17 (76.25' RT.) UIE= XX.XX'
CONNECT TO TYPE 2 DROP INLET
(SEE SHEET DPX)

(3) "XP" 412+41.17
CONSTRUCT TYPE 2 DROP INLET (76.25' RT.)
(GRATE ELEV= 2792.75', INV ELEV= XX.XX', H= X.X')
(SEE SHEET DPX)

(4) "XP" 412+49 TO "XP" 412+95
ABANDON 24" CMP

(5) "XP" 418+13.49
CONSTRUCT TYPE 5-2G EMBANKMENT PROTECTOR (76.25' RT.)
(GRATE ELEV= 2804.31', INV ELEV= XX.XX', H= X.X')
INSTALL 12" X 20' CMP FROM "XP" 418+13.49 (76.50' LT.) UIE= XX.XX'
TO "XP" 418+13.49 (96.01' LT.) LIE= XX.XX'
(SEE SHEET DPX)

(6) "XP" 418+20.99
CONSTRUCT TYPE 2 DROP INLET (76.25' RT.)
(GRATE ELEV= 2804.42', INV ELEV= XX.XX', H= X.X')
INSTALL 12" X 8' CMP FROM "XP" 412+13.29 (76.50' LT.) LIE= XX.XX'
TO "XP" 418+20.99 (76.50' RT.) UIE= XX.XX'
CONNECT TO TYPE 5-2G EMBANKMENT PROTECTOR
(SEE SHEET DPX)

(7) "XP" 421+25
ABANDON 24" CMP

(8) "KR1" 23+00.05
CONSTRUCT TYPE 2A DROP INLET (44.00' LT.)
(GRATE ELEV= 2775.28', INV ELEV= XX.XX', H= X.X')
INSTALL 24" X 107' RCP FROM "KR1" 22+82.20 (62.00' RT.) LIE= XX.XX'
TO "KR1" 23+00.05 (44.00' LT.) UIE = XX.XX'
INSTALL 24" RCP END SECTION RT.
(SEE SHEET DPX)

(9) "KR1" 23+03.61
INSTALL 24" RCP END SECTION (65.50' LT.)
INSTALL 24" X 22' RCP FROM "KR1" 23+00.05 (44.00' LT.) LIE= XX.XX'
TO "KR1" 23+03.61 (65.50' LT.) UIE = XX.XX'
CONNECT TO TYPE 2A DROP INLET
(SEE SHEET DPX)

h9010cmh
Sticky Note

Type 2A drop inlet grates should only be used in locations not available to foot traffic. Behind barrier rail is the safest location.

60% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

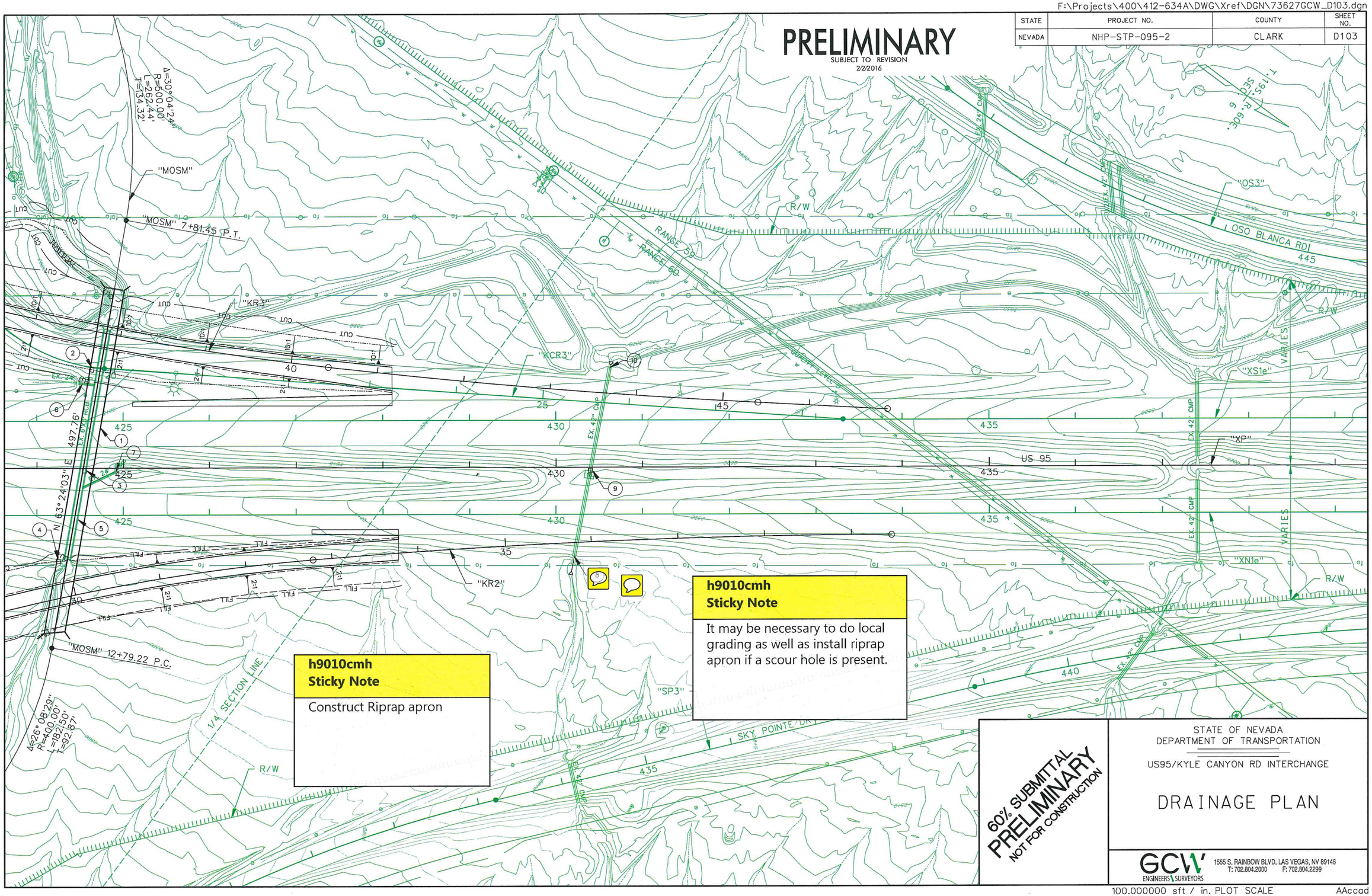
100.000000 sft / in. PLOT SCALE AAccad

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D103.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	D103

PRELIMINARY

SUBJECT TO REVISION
2/2/2016



h9010cmh
Sticky Note

It may be necessary to do local grading as well as install riprap apron if a scour hole is present.

h9010cmh
Sticky Note

Construct Riprap apron

60% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE

AAccad

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D103A.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	D103A

PRELIMINARY
SUBJECT TO REVISION
2/2/2016

(1) "MOSM" 8+60.59 TO "MOSM" 12+61.80
CONSTRUCT DOUBLE 11' X 7' RCB
CONSTRUCT RCB HEADWALL TYPE 1 RT. AND LT.
(SEE SHEET DPX)

(2) "MOSM" 9+57.01
CONSTRUCT TYPE 2A DROP INLET (9.88' RT.)
(GRATE ELEV= 2807.84', INV ELEV= XX.XX', H= X.X')
ONTO DOUBLE 11' X 7' RCB
(SEE SHEET DPX)

(3) "MOSM" 10+72.53
CONSTRUCT TYPE 2A DROP INLET (2.03' LT.)
(GRATE ELEV= 2805.35', INV ELEV= XX.XX', H= X.X')
ONTO DOUBLE 11' X 7' RCB
(SEE SHEET DPX)

(4) "MOSM" 11+80.34
CONSTRUCT TYPE 2A DROP INLET (9.92' RT.)
(GRATE ELEV= 2806.09', INV ELEV= XX.XX', H= X.X')
ONTO DOUBLE 11' X 7' RCB
(SEE SHEET DPX)

(5) "MOSM" 9+09 TO "MOSM" 11+76
REMOVE 6' X 3' RCB
REMOVE HEADWALL RT. AND LT.

(6) "MOSM" 9+74 TO "MOSM" 9+75
REMOVE 24" RCP
REMOVE RCP END SECTION

(7) "MOSM" 10+68 TO "MOSM" 10+92
REMOVE 24" CMP
REMOVE CMP END SECTION

(8) "XP" 430+18.03 TO "XP" 430+21.26
EXTEND EXISTING 42" CMP
INSTALL 42" X 17' CMP FROM "XP" 430+18.03' (119.06' RT.) LIE= XX.XX'
TO "XP" 430+21.26' (102.07' RT.) UIE= XX.XX'
INSTALL 42" CMP END SECTION (119.06' RT.)
(SEE SHEET DPX)

(9) "XP" 430+39.98
CONSTRUCT TYPE 2A DROP INLET (3.69' RT.)
(GRATE ELEV= 2812.41', INV ELEV= XX.XX', H= X.X')
ONTO EXISTING 42" CMP
REMOVE EXISTING DROP INLET
INSTALL 42" X 6' CMP FROM "XP" 430+39.98' (3.69' RT.) UIE= XX.XX'
TO "XP" 430+38.84' (9.70' RT.) LIE= XX.XX'
CONNECT TO EXISTING 42" CMP
(SEE SHEET DPX)

(10) "XP" 430+62.81 TO "XP" 430+63.33
EXTEND EXISTING 42" CMP
INSTALL 42" X 3' CMP FROM "XP" 430+62.81' (114.21' LT.) LIE= XX.XX'
TO "XP" 430+63.33' (116.84' LT.) UIE= XX.XX'
INSTALL 42" CMP END SECTION (116.84' LT.)
(SEE SHEET DPX)

60% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE AAccad

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D104.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	D104

PRELIMINARY

SUBJECT TO REVISION
2/2/2016

T.19S. R.60E.
SEC. 1

"KCW" 176+08.15 P.O.B.

1/4 SECTION LINE

"KCW"

180

185

KYLE CANYON RD (SR 157)

190

1/4Sec. Line

NO STORM DRAIN FACILITIES

60% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE

AAccad

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D105.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	D105

PRELIMINARY

SUBJECT TO REVISION
2/2/2016

① "MOSM" 0+69.95 TO "MOSM" 1+37.84 — CONSTRUCT 12' X 10' RCB
CONSTRUCT PLUG "MOSM" 0+69.95
(SEE SHEET DPX)

② "MOSM" 1+37.84 TO "MOSM" 1+62.43 — CONSTRUCT JUNCTION STRUCTURE
(SEE SHEET DDX)

③ "MOSM" 1+62.43 TO "MOSM" 2+99.56 — CONSTRUCT DOUBLE 11' X 7' RCB
CONSTRUCT PLUG "MOSM" 2+99.56
(SEE SHEET DPX)

④ "KCE1" 6+87.19 TO "KCE1" 7+77.12 — CONSTRUCT 11' X 8' X 61.60' RCB
FROM "KCE1" 6+87.19 (56.72' RT.)
TO "KCE1" 7+77.12 (21.90' RT.)
CONSTRUCT PLUG (56.72' RT.)
(SEE SHEET DPX)

⑤ "KCE1" 7+77.12 TO "KCE1" 7+83.14 — CONSTRUCT 11' X 8' X 7.2' RCB
FROM "KCE1" 7+77.12 (21.90' RT.)
TO "KCE1" 7+83.14 (17.74' RT.)
(SEE SHEET DPX)

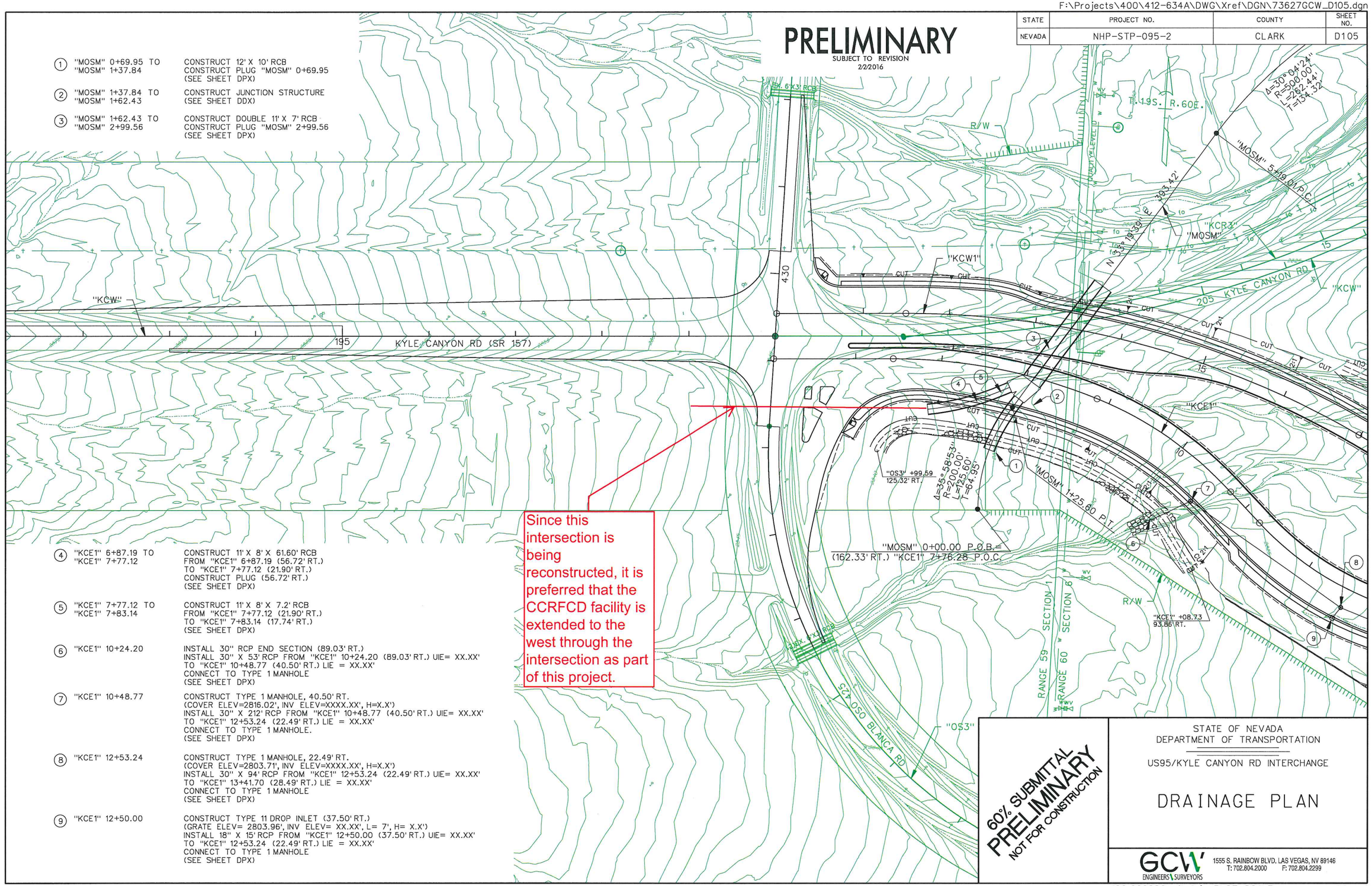
⑥ "KCE1" 10+24.20 — INSTALL 30" RCP END SECTION (89.03' RT.)
INSTALL 30" X 53' RCP FROM "KCE1" 10+24.20 (89.03' RT.) UIE= XX.XX'
TO "KCE1" 10+48.77 (40.50' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

⑦ "KCE1" 10+48.77 — CONSTRUCT TYPE 1 MANHOLE, 40.50' RT.
(COVER ELEV=2816.02', INV ELEV=XXXX.XX', H=X.X')
INSTALL 30" X 212' RCP FROM "KCE1" 10+48.77 (40.50' RT.) UIE= XX.XX'
TO "KCE1" 12+53.24 (22.49' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE.
(SEE SHEET DPX)

⑧ "KCE1" 12+53.24 — CONSTRUCT TYPE 1 MANHOLE, 22.49' RT.
(COVER ELEV=2803.71', INV ELEV=XXXX.XX', H=X.X')
INSTALL 30" X 94' RCP FROM "KCE1" 12+53.24 (22.49' RT.) UIE= XX.XX'
TO "KCE1" 13+41.70 (28.49' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

⑨ "KCE1" 12+50.00 — CONSTRUCT TYPE 11 DROP INLET (37.50' RT.)
(GRATE ELEV= 2803.96', INV ELEV= XX.XX', L= 7', H= X.X')
INSTALL 18" X 15' RCP FROM "KCE1" 12+50.00 (37.50' RT.) UIE= XX.XX'
TO "KCE1" 12+53.24 (22.49' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

Since this intersection is being reconstructed, it is preferred that the CCRFCD facility is extended to the west through the intersection as part of this project.



60% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

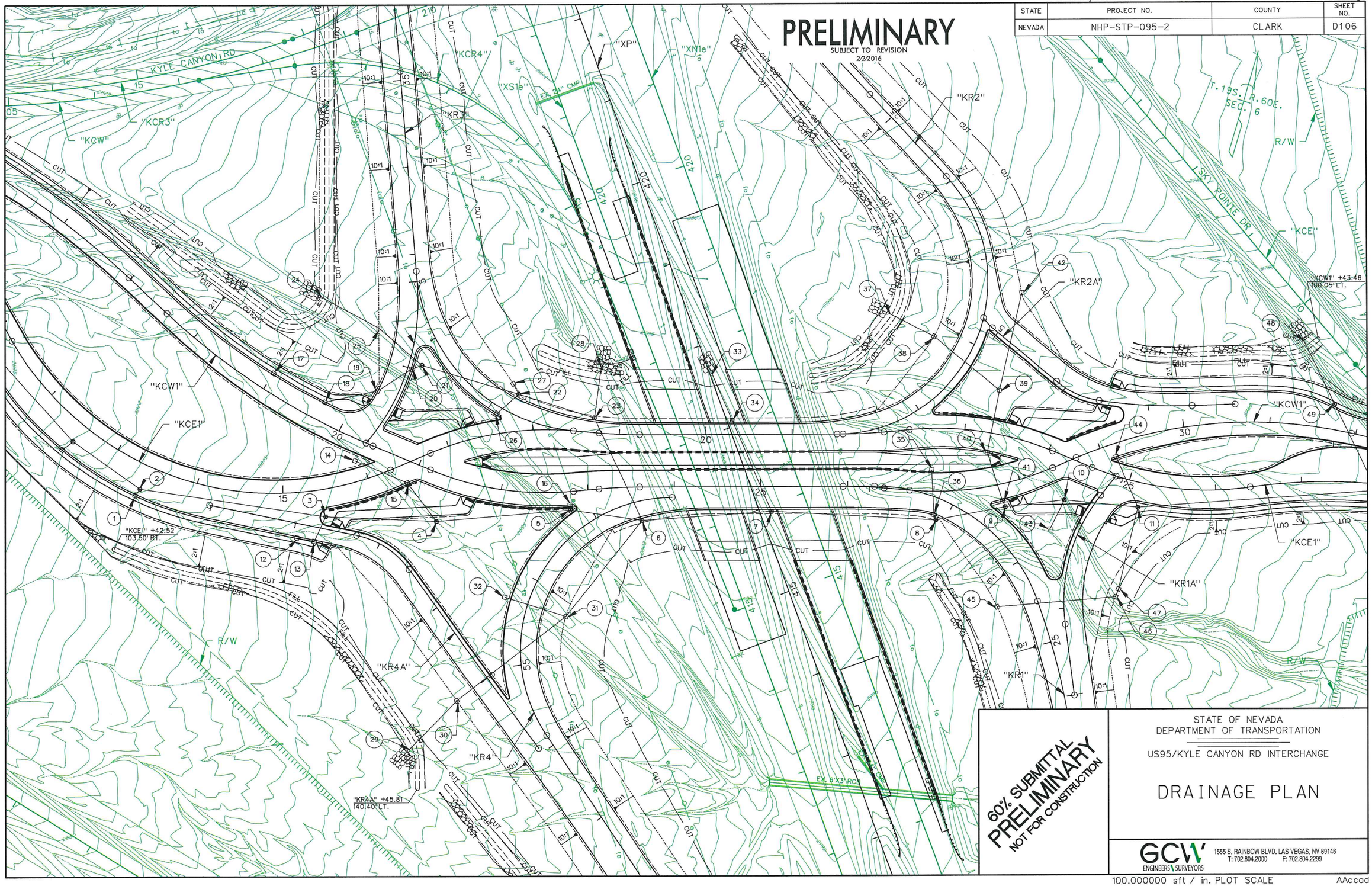
100.000000 sft / in. PLOT SCALE AAccad

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D106.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	D106

PRELIMINARY

SUBJECT TO REVISION
2/2/2016



60% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE

AAccad

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D106A.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	D106A

PRELIMINARY

SUBJECT TO REVISION
2/2/2016

(1) "KCE1" 13+40.00
CONSTRUCT TYPE 11 DROP INLET (37.50' RT.)
(GRATE ELEV= 2799.24', INV ELEV= XX.XX', L= 7', H= X.X')
INSTALL 18" X 9' RCP FROM "KCE1" 13+40.00 (37.50' RT.) UIE= XX.XX'
TO "KCE1" 13+41.70 (28.49' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

(2) "KCE1" 13+41.70
CONSTRUCT TYPE 1 MANHOLE, (28.49' RT.)
(COVER ELEV=2798.99', INV ELEV=XXXX.XX', H=X.X')
INSTALL 30" X 217' RCP FROM "KCE1" 13+41.70 (28.49' RT.) UIE= XX.XX'
TO "KCE1" 15+44.81 (31.57' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

(3) "KCE1" 15+44.81
CONSTRUCT TYPE 1 MANHOLE, (31.57' RT.)
(COVER ELEV=2792.99', INV ELEV=XXXX.XX', H=X.X')
INSTALL 30" X 128' RCP FROM "KCE1" 15+44.81 (31.57' RT.) UIE= XX.XX'
TO "KCW1" 21+39.53 (63.25' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

(4) "KCW1" 21+39.53
CONSTRUCT TYPE 1 MANHOLE, (53.25' RT.)
(COVER ELEV=2788.02', INV ELEV=XXXX.XX', H=X.X')
INSTALL 30" X 155' RCP FROM "KCW1" 21+39.53 (53.25' RT.) UIE= XX.XX'
TO "KCW1" 22+77.64 (21.19' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

(5) "KCW1" 22+78.00
CONSTRUCT TYPE 1 MANHOLE, (20.93' RT.)
(COVER ELEV=2782.29', INV ELEV=XXXX.XX', H=X.X')
INSTALL 30" X 84' RCP FROM "KCW1" 22+78.00 (20.93' RT.) UIE= XX.XX'
TO "KCW1" 23+62.69 (38.36' RT.) LIE = XX.XX'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DPX)

(6) "KCW1" 23+62.69
CONSTRUCT TYPE 2 MANHOLE, (38.36' RT.)
(COVER ELEV=2780.65', INV ELEV=XXXX.XX', H=X.X')
INSTALL 36" X 150' RCP FROM "KCW1" 23+62.69 (38.36' RT.) UIE= XX.XX'
TO "KCW1" 25+12.48 (28.50' RT.) LIE = XX.XX'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DPX)

(7) "KCW1" 25+12.48
CONSTRUCT TYPE 2 MANHOLE, (28.50' RT.)
(COVER ELEV=2777.88', INV ELEV=XXXX.XX', H=X.X')
INSTALL 36" X 190' RCP FROM "KCW1" 25+12.48 (28.50' RT.) UIE= XX.XX'
TO "KCW1" 27+02.20 (32.66' RT.) LIE = XX.XX'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DPX)

(8) "KCW1" 27+02.20
CONSTRUCT TYPE 2 MANHOLE, (32.66' RT.)
(COVER ELEV=2774.88', INV ELEV=XXXX.XX', H=X.X')
INSTALL 36" X 82' RCP FROM "KCW1" 27+02.20 (32.66' RT.) UIE= XX.XX'
TO "KCW1" 27+77.72 (26.42' RT.) LIE = XX.XX'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DPX)

(9) "KCW1" 27+77.72
CONSTRUCT TYPE 2 MANHOLE, (26.42' RT.)
(COVER ELEV=2774.48', INV ELEV=XXXX.XX', H=X.X')
INSTALL 42" X 82' RCP FROM "KCW1" 27+77.72 (26.42' RT.) UIE= XX.XX'
TO "KCW1" 28+39.27 (39.28' RT.) LIE = XX.XX'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DPX)

(10) "KCW1" 28+39.27
CONSTRUCT TYPE 2 MANHOLE, (39.28' RT.)
(COVER ELEV=2774.70', INV ELEV=XXXX.XX', H=X.X')
INSTALL 42" X 86' RCP FROM "KCW1" 28+39.27 (39.28' RT.) UIE= XX.XX'
TO "KCE1" 25+15.62 (28.02' RT.) LIE = XX.XX'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DPX)

(11) "KCE1" 25+15.62
CONSTRUCT TYPE 2 MANHOLE, (28.02' RT.)
(COVER ELEV=2774.36', INV ELEV=XXXX.XX', H=X.X')
INSTALL 42" X 276' RCP FROM "KCE1" 25+15.62 (28.02' RT.) UIE= XX.XX'
TO "KCE1" 27+87.25 (7.20' RT.) LIE = XX.XX'
CONNECT TO TYPE 4 MANHOLE
(SEE SHEET DPX)

(12) "KR4A" 7+95.00
CONSTRUCT TYPE 11 DROP INLET (16.50' LT.)
(GRATE ELEV= 2793.45', INV ELEV= XX.XX', L= 7', H= X.X')
INSTALL 18" X 20' RCP FROM "KR4A" 7+95.00 (16.50' LT.) UIE= XX.XX'
TO "KR4A" 7+75.00 (16.50' LT.) LIE = XX.XX'
CONNECT TO TYPE 11 DROP INLET
(SEE SHEET DPX)

(13) "KR4A" 7+75.00
CONSTRUCT TYPE 11 DROP INLET (16.50' LT.)
(GRATE ELEV= 2792.89', INV ELEV= XX.XX', L= 7', H= X.X')
INSTALL 18" X 31' RCP FROM "KR4A" 7+75.00 (16.50' LT.) UIE= XX.XX'
TO "KCE1" 15+44.81 (31.57' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

(14) "KCE1" 15+91.52
CONSTRUCT TYPE 2A DROP INLET (23.67' LT.)
(GRATE ELEV= 2792.78', INV ELEV= XX.XX', H= X.X')
INSTALL 24" X 66' RCP FROM "KCE1" 15+91.52 (23.67' LT.) UIE= XX.XX'
TO "KCE1" 16+40.00 (21.25' RT.) LIE = XX.XX'
CONNECT TO TYPE 3 DROP INLET
(SEE SHEET DPX)

(15) "KCE1" 16+40.00
CONSTRUCT TYPE 3 DROP INLET (21.25' RT.)
(GRATE ELEV= 2789.98', INV ELEV= XX.XX', H= X.X')
INSTALL 24" X 56' RCP FROM "KCE1" 16+40.00 (21.25' RT.) UIE= XX.XX'
TO "KCW1" 21+39.53 (53.25' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

(16) "KCW1" 22+78.00
CONSTRUCT TYPE 3 DROP INLET (15.25' RT.)
(GRATE ELEV= 2782.50', INV ELEV= XX.XX', H= X.X')
INSTALL 18" X 5' RCP FROM "KCW1" 22+78.00 (15.25' RT.) UIE= XX.XX'
TO "KCW1" 22+78.00 (20.93' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

(17) "KCW1" 19+00.00
CONSTRUCT TYPE 11 DROP INLET (21.08' LT.)
(GRATE ELEV= 2797.93', INV ELEV= XX.XX', L= 10', H= X.X')
INSTALL 18" X 68' RCP FROM "KCW1" 19+00.00 (21.08' LT.) UIE= XX.XX'
TO "KCW1" 19+70.00 (22.19' LT.) LIE = XX.XX'
CONNECT TO TYPE 11 DROP INLET
(SEE SHEET DPX)

(18) "KCW1" 19+70.00
CONSTRUCT TYPE 11 DROP INLET (22.19' LT.)
(GRATE ELEV= 2794.34', INV ELEV= XX.XX', L= 10', H= X.X')
INSTALL 18" X 62' RCP FROM "KCW1" 19+70.00 (22.19' LT.) UIE= XX.XX'
TO "KR3A" 3+60.00 (22.25' LT.) LIE = XX.XX'
CONNECT TO TYPE 3 DROP INLET
(SEE SHEET DPX)

(19) "KR3A" 3+60.00
CONSTRUCT TYPE 3 DROP INLET (22.19' LT.)
(GRATE ELEV= 2791.73', INV ELEV= XX.XX', H= X.X')
INSTALL 18" X 46' RCP FROM "KR3A" 3+60.00 (22.25' LT.) UIE= XX.XX'
TO "KR3A" 3+99.00 (4.25' RT.) LIE = XX.XX'
CONNECT TO TYPE 3 DROP INLET
(SEE SHEET DPX)

(20) "KR3A" 3+99.00
CONSTRUCT TYPE 3 DROP INLET (4.25' RT.)
(GRATE ELEV= 2790.88', INV ELEV= XX.XX', H= X.X')
INSTALL 18" X 13' RCP FROM "KR3A" 3+99.00 (4.25' RT.) UIE= XX.XX'
TO "KR3A" 4+06.74 (14.76' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

(21) "KR3A" 4+06.74
CONSTRUCT TYPE 1 MANHOLE, (14.76' LT.)
(COVER ELEV=2790.93', INV ELEV=XXXX.XX', H=X.X')
INSTALL 24" X 114' RCP FROM "KR3A" 4+06.74 (14.76' RT.) UIE= XX.XX'
TO "KR3" 30+77.00 (23.45' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

(22) "KR3" 30+77.00
CONSTRUCT TYPE 1 MANHOLE, (23.45' RT.)
(COVER ELEV=2786.53', INV ELEV=XXXX.XX', H=X.X')
INSTALL 24" X 91' RCP FROM "KR3" 30+77.00 (23.45' RT.) UIE= XX.XX'
TO "KCE1" 18+69.61 (16.76' LT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

(23) "KCE1" 18+69.61
CONSTRUCT TYPE 1 MANHOLE, (16.76' LT.)
(COVER ELEV=2784.29', INV ELEV=XXXX.XX', H=X.X')
INSTALL 30" X 130' RCP FROM "KCE1" 18+69.61 (16.76' LT.) UIE= XX.XX'
TO "KCW1" 23+62.69 (38.36' RT.) LIE = XX.XX'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DPX)

(24) "KR3A" 4+86.33
INSTALL 18" RCP END SECTION (111.36' LT.)
INSTALL 18" X 75' RCP FROM "KR3A" 4+86.33 (111.36' LT.) UIE= XX.XX'
TO "KR3A" 4+40.00 (42.95' LT.) LIE = XX.XX'
CONNECT TO TYPE 2A DROP INLET
(SEE SHEET DPX)

(25) "KR3A" 4+40.00
CONSTRUCT TYPE 2A DROP INLET (42.95' LT.)
(GRATE ELEV= 2789.85', INV ELEV= XX.XX', H= X.X')
INSTALL 24" X 66' RCP FROM "KR2A" 4+40.00 (42.95' LT.) UIE= XX.XX'
TO "KR2A" 4+06.74 (14.76' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

(26) "KR3" 30+89.00
CONSTRUCT TYPE 3 DROP INLET (8.25' LT.)
(GRATE ELEV= 2787.21', INV ELEV= XX.XX', H= X.X')
INSTALL 18" X 34' RCP FROM "KR3" 30+89.00 (8.25' LT.) UIE= XX.XX'
TO "KR3" 30+77.00 (23.45' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

(27) "KR3" 30+90.00
CONSTRUCT TYPE 2A DROP INLET (30.90' LT.)
(GRATE ELEV= 2786.27', INV ELEV= XX.XX', H= X.X')
INSTALL 18" X 13' RCP FROM "KR3" 30+90.00 (30.90' LT.) UIE= XX.XX'
TO "KR3" 30+77.00 (23.45' RT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

(28) "KCE1" 18+72.55
INSTALL 24" RCP END SECTION (75.19' LT.)
INSTALL 24" X 59' RCP FROM "KCE1" 18+72.55 (75.19' LT.) UIE= XX.XX'
TO "KCE1" 18+69.61 (16.76' LT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

(29) "KR4A" 4+89.57
INSTALL 24" RCP END SECTION (121.21' LT.)
INSTALL 24" X 78' RCP FROM "KR4A" 4+89.57 (121.21' LT.) UIE= XX.XX'
TO "KR4A" 5+00.00 (44.00' LT.) LIE = XX.XX'
CONNECT TO TYPE 2A DROP INLET
(SEE SHEET DPX)

(30) "KR4A" 5+00.00
CONSTRUCT TYPE 2A DROP INLET (44.00' LT.)
(GRATE ELEV= 2778.35', INV ELEV= XX.XX', H= X.X')
INSTALL 24" X 158' RCP FROM "KR4A"5+00.00 (44.00' LT.) UIE= XX.XX'
TO "KR4" 55+70.50 (46.00' RT.) LIE = XX.XX'
CONNECT TO TYPE 2A DROP INLET
(SEE SHEET DPX)

(31) "KR4" 55+70.50
CONSTRUCT TYPE 2A DROP INLET (46.00' RT.)
(GRATE ELEV= 2775.57', INV ELEV= XX.XX', H= X.X')
INSTALL 30" X 141' RCP FROM "KR4" 55+70.50 (46.00' RT.) UIE= XX.XX'
TO "KCW1" 23+62.69 (38.36' RT.) LIE = XX.XX'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DPX)

(32) "KR4" 55+70.65
CONSTRUCT TYPE 2A DROP INLET (27.67' LT.)
(GRATE ELEV= 2779.76', INV ELEV= XX.XX', H= X.X')
INSTALL 18" X 74' RCP FROM "KR4" 55+70.65 (27.67' RT.) UIE= XX.XX'
TO "KR4" 55+70.50 (46.00' RT.) LIE = XX.XX'
CONNECT TO TYPE 2A DROP INLET
(SEE SHEET DPX)

(33) "KCE1" 20+07.60
INSTALL 18" RCP END SECTION (69.25' LT.)
INSTALL 18" X 58' RCP FROM "KCE1" 20+07.60 (69.25' LT.) UIE= XX.XX'
TO "KCE1" 20+30.47 (16.50' LT.) LIE = XX.XX'
CONNECT TO TYPE TYPE 1 MANHOLE
(SEE SHEET DPX)

(34) "KCE1" 20+30.47
CONSTRUCT TYPE 1 MANHOLE, (16.50' LT.)
(COVER ELEV=2780.89', INV ELEV=XXXX.XX', H=X.X')
INSTALL 18" X 114' RCP FROM "KCE1" 20+30.47 (16.50' LT.) UIE= XX.XX'
TO "KCW1" 25+12.48 (28.50' RT.) LIE = XX.XX'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DPX)

(35) "KCW1" 26+97.00
CONSTRUCT TYPE 2 DROP INLET (27.67' LT.)
(GRATE ELEV= 2775.32', INV ELEV= XX.XX', H= X.X')
INSTALL 18" X 51' RCP FROM "KCW1" 26+94.08 (9.64' LT.) UIE= XX.XX'
TO "KCW1" 27+00.00 (26.84' RT.) LIE = XX.XX'
CONNECT TO TYPE 11 DROP INLET
(SEE SHEET DPX)

(36) "KCW1" 27+00.00
CONSTRUCT TYPE 11 DROP INLET (26.84' RT.)
(GRATE ELEV= 2774.61', INV ELEV= XX.XX', L= 10', H= X.X')
INSTALL 18" X 6' RCP FROM "KCW1" 27+00.00 (26.84' RT.) UIE= XX.XX'
TO "KCW1" 27+02.20 (32.66' RT.) LIE = XX.XX'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DPX)

(37) "KR2" 21+78.92
INSTALL 24" RCP END SECTION (102.83' LT.)
INSTALL 24" X 57' RCP FROM "KR2" 21+78.92 (102.83' LT.) UIE= XX.XX'
TO "KR2" 21+85.12 (46.00' LT.) LIE = XX.XX'
CONNECT TO TYPE 2A DROP INLET
(SEE SHEET DPX)

60% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE AAccad

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D106B.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	D106B

PRELIMINARY
SUBJECT TO REVISION
2/2/2016

(38) "KR2" 21+85.12
CONSTRUCT TYPE 2A DROP INLET (46.00' LT.)
(GRATE ELEV= 2772.57', INV ELEV= XX.XX', H= X.X')
INSTALL 24" X 98' RCP FROM "KR2" 21+85.12 (46.00' LT.) UIE= XX.XX'
TO "KCE1" 23+31.19 (49.98' LT.) LIE = XX.XX'
CONNECT TO TYPE 2A DROP INLET
(SEE SHEET DPX)

(39) "KCE1" 23+31.19
CONSTRUCT TYPE 2A DROP INLET (49.98' LT.)
(GRATE ELEV= 2776.69', INV ELEV= XX.XX', H= X.X')
INSTALL 24" X 73' RCP FROM "KCE1" 23+31.19 (49.98' LT.) UIE= XX.XX'
TO "KCE1" 23+30.00 (22.50' RT.) LIE = XX.XX'
CONNECT TO TYPE 3 DROP INLET
(SEE SHEET DPX)

(40) "KCE1" 23+30.00
CONSTRUCT TYPE 3 DROP INLET (22.50' RT.)
(GRATE ELEV= 2775.49', INV ELEV= XX.XX', H= X.X')
INSTALL 30" X 58' RCP FROM "KCE1" 23+30.00 (22.50' RT.) UIE= XX.XX'
TO "KCW1" 27+76.00 (18.98' RT.) LIE = XX.XX'
CONNECT TO TYPE 11 DROP INLET
(SEE SHEET DPX)

(41) "KCW1" 27+76.00
CONSTRUCT TYPE 11 DROP INLET (18.98' RT.)
(GRATE ELEV= 2774.56', INV ELEV= XX.XX', L= 15', H= X.X')
INSTALL 30" X 8' RCP FROM "KCW1" 27+76.00 (18.98' RT.) UIE= XX.XX'
TO "KCW1" 27+77.72 (26.42' RT.) LIE = XX.XX'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DPX)

(42) "KR2A" 5+08.52
CONSTRUCT TYPE 2A DROP INLET (52.46' RT.)
(GRATE ELEV= 2772.96', INV ELEV= XX.XX', H= X.X')
INSTALL 18" X 115' RCP FROM "KR2A" 5+08.52 (52.46' RT.) UIE= XX.XX'
TO "KCE1" 23+31.19 (49.98' LT.) LIE = XX.XX'
CONNECT TO TYPE 2A DROP INLET
(SEE SHEET DPX)

(43) "KR1" 26+07.92
CONSTRUCT TYPE 2A DROP INLET (52.25' RT.)
(GRATE ELEV= 2774.27', INV ELEV= XX.XX', H= X.X')
INSTALL 18" X 37' RCP FROM "KR1" 26+07.92 (52.25' RT.) UIE= XX.XX'
TO "KCW1" 28+39.27 (39.28' RT.) LIE = XX.XX'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DPX)

(44) "KCW1" 29+15.00
CONSTRUCT TYPE 3 DROP INLET (15.25' RT.)
(GRATE ELEV= 2774.36', INV ELEV= XX.XX', H= X.X')
INSTALL 18" X 115' RCP FROM "KCW1" 29+15.00 (15.25' RT.) UIE= XX.XX'
TO "KCE1" 25+15.62 (28.02' RT.) LIE = XX.XX'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DPX)

(45) "KR1" 25+61.80
CONSTRUCT TYPE 2A DROP INLET (45.63' LT.)
(GRATE ELEV= 2769.81', INV ELEV= XX.XX', H= X.X')
INSTALL 18" X 137' RCP FROM "KR1" 25+61.80 (45.63' LT.) UIE= XX.XX'
TO "KR1A" 2+15.77 (59.84' RT.) LIE = XX.XX'
CONNECT TO TYPE 2A DROP INLET
(SEE SHEET DPX)

(46) "KR1A" 2+15.77
CONSTRUCT TYPE 2A DROP INLET (59.84' RT.)
(GRATE ELEV= 2771.26', INV ELEV= XX.XX', H= X.X')
INSTALL 24" X 10' RCP FROM "KR1A" 2+15.77 (59.84' RT.) UIE= XX.XX'
TO "KR1A" 2+29.06 (62.59' RT.) LIE = XX.XX'
CONNECT TO TYPE 2A DROP INLET
(SEE SHEET DPX)

(47) "KR1A" 2+29.06
CONSTRUCT TYPE 2A DROP INLET (62.59' RT.)
(GRATE ELEV= 2771.33', INV ELEV= XX.XX', H= X.X')
INSTALL 24" X 96' RCP FROM "KR1A" 2+29.06 (62.59' RT.) UIE= XX.XX'
TO "KCE1" 25+15.62 (28.02' RT.) LIE = XX.XX'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DPX)

(48) "KCW1" 31+30.25
INSTALL 30" RCP END SECTION (95.48' LT.)
INSTALL 30" X 80' RCP FROM "KCW1" 31+30.25 (95.48' LT.) UIE= XX.XX'
TO "KCW1" 31+70.20 (28.80' LT.) LIE = XX.XX'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DPX)

(49) "KCW1" 31+70.20
CONSTRUCT TYPE 1 MANHOLE, (28.80' LT.)
(COVER ELEV=2771.78', INV ELEV=XXXX.XX', H=X.X')
INSTALL 30" X 110' RCP FROM "KCW1" 31+70.20 (28.80' LT.) UIE= XX.XX'
TO "KCE1" 27+87.25 (7.20' RT.) LIE = XX.XX'
CONNECT TO TYPE 4 MANHOLE
(SEE SHEET DPX)

60% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

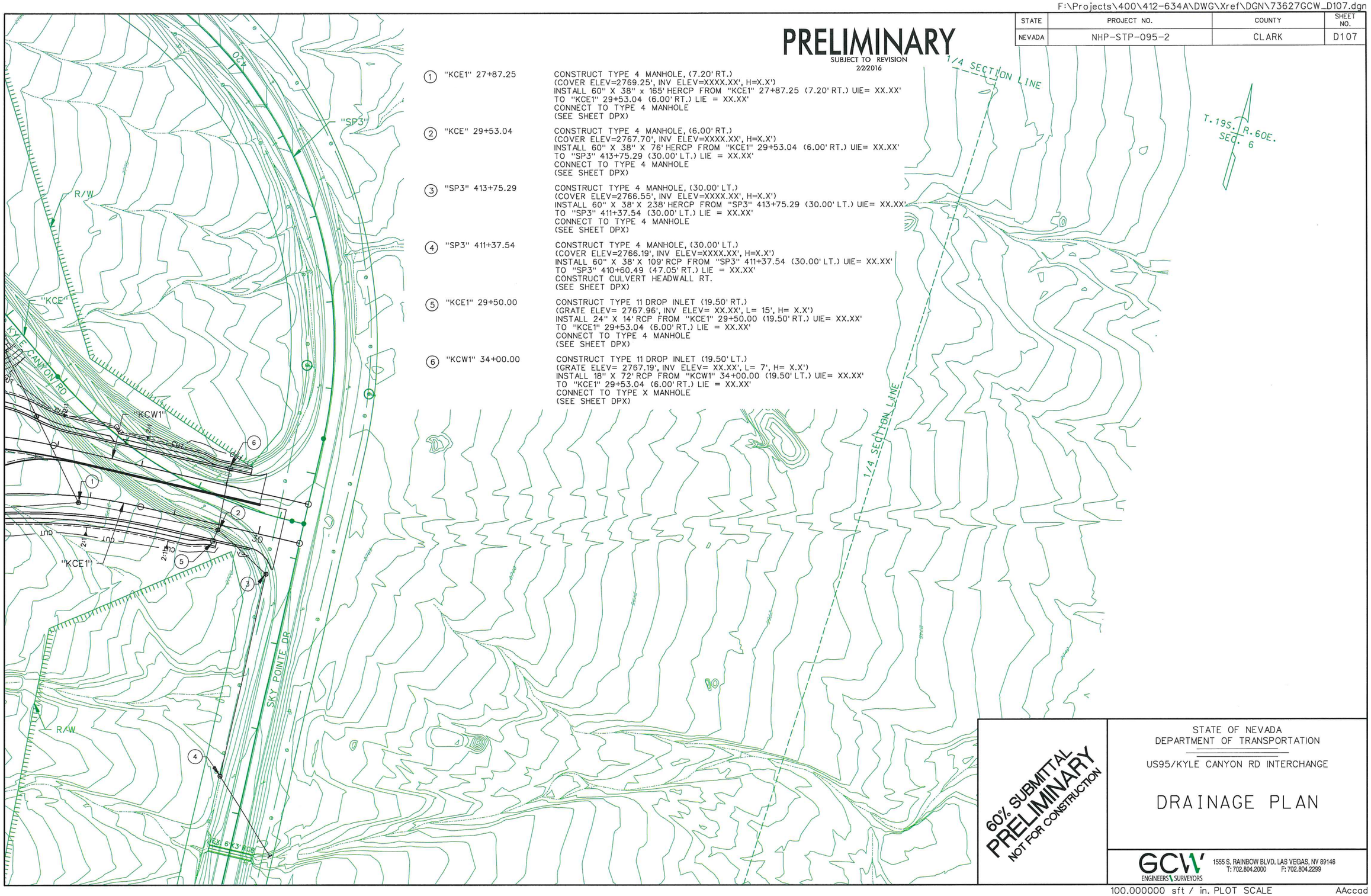
100.000000 sft / in. PLOT SCALE AAccad

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D107.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	D107

PRELIMINARY

SUBJECT TO REVISION
2/2/2016



1. "KCE1" 27+87.25
   CONSTRUCT TYPE 4 MANHOLE, (7.20' RT.)
   (COVER ELEV=2769.25', INV ELEV=XXXX.XX', H=X.X')
   INSTALL 60" X 38" x 165' HERCP FROM "KCE1" 27+87.25 (7.20' RT.) UIE= XX.XX'
   TO "KCE1" 29+53.04 (6.00' RT.) LIE = XX.XX'
   CONNECT TO TYPE 4 MANHOLE
   (SEE SHEET DPX)

2. "KCE" 29+53.04
   CONSTRUCT TYPE 4 MANHOLE, (6.00' RT.)
   (COVER ELEV=2767.70', INV ELEV=XXXX.XX', H=X.X')
   INSTALL 60" X 38" X 76' HERCP FROM "KCE1" 29+53.04 (6.00' RT.) UIE= XX.XX'
   TO "SP3" 413+75.29 (30.00' LT.) LIE = XX.XX'
   CONNECT TO TYPE 4 MANHOLE
   (SEE SHEET DPX)

3. "SP3" 413+75.29
   CONSTRUCT TYPE 4 MANHOLE, (30.00' LT.)
   (COVER ELEV=2766.55', INV ELEV=XXXX.XX', H=X.X')
   INSTALL 60" X 38' X 238' HERCP FROM "SP3" 413+75.29 (30.00' LT.) UIE= XX.XX'
   TO "SP3" 411+37.54 (30.00' LT.) LIE = XX.XX'
   CONNECT TO TYPE 4 MANHOLE
   (SEE SHEET DPX)

4. "SP3" 411+37.54
   CONSTRUCT TYPE 4 MANHOLE, (30.00' LT.)
   (COVER ELEV=2766.19', INV ELEV=XXXX.XX', H=X.X')
   INSTALL 60" X 38' X 109' RCP FROM "SP3" 411+37.54 (30.00' LT.) UIE= XX.XX'
   TO "SP3" 410+60.49 (47.05' RT.) LIE = XX.XX'
   CONSTRUCT CULVERT HEADWALL RT.
   (SEE SHEET DPX)

5. "KCE1" 29+50.00
   CONSTRUCT TYPE 11 DROP INLET (19.50' RT.)
   (GRATE ELEV= 2767.96', INV ELEV= XX.XX', L= 15', H= X.X')
   INSTALL 24" X 14' RCP FROM "KCE1" 29+50.00 (19.50' RT.) UIE= XX.XX'
   TO "KCE1" 29+53.04 (6.00' RT.) LIE = XX.XX'
   CONNECT TO TYPE 4 MANHOLE
   (SEE SHEET DPX)

6. "KCW1" 34+00.00
   CONSTRUCT TYPE 11 DROP INLET (19.50' LT.)
   (GRATE ELEV= 2767.19', INV ELEV= XX.XX', L= 7', H= X.X')
   INSTALL 18" X 72' RCP FROM "KCW1" 34+00.00 (19.50' LT.) UIE= XX.XX'
   TO "KCE1" 29+53.04 (6.00' RT.) LIE = XX.XX'
   CONNECT TO TYPE X MANHOLE
   (SEE SHEET DPX)

60% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE AAccad

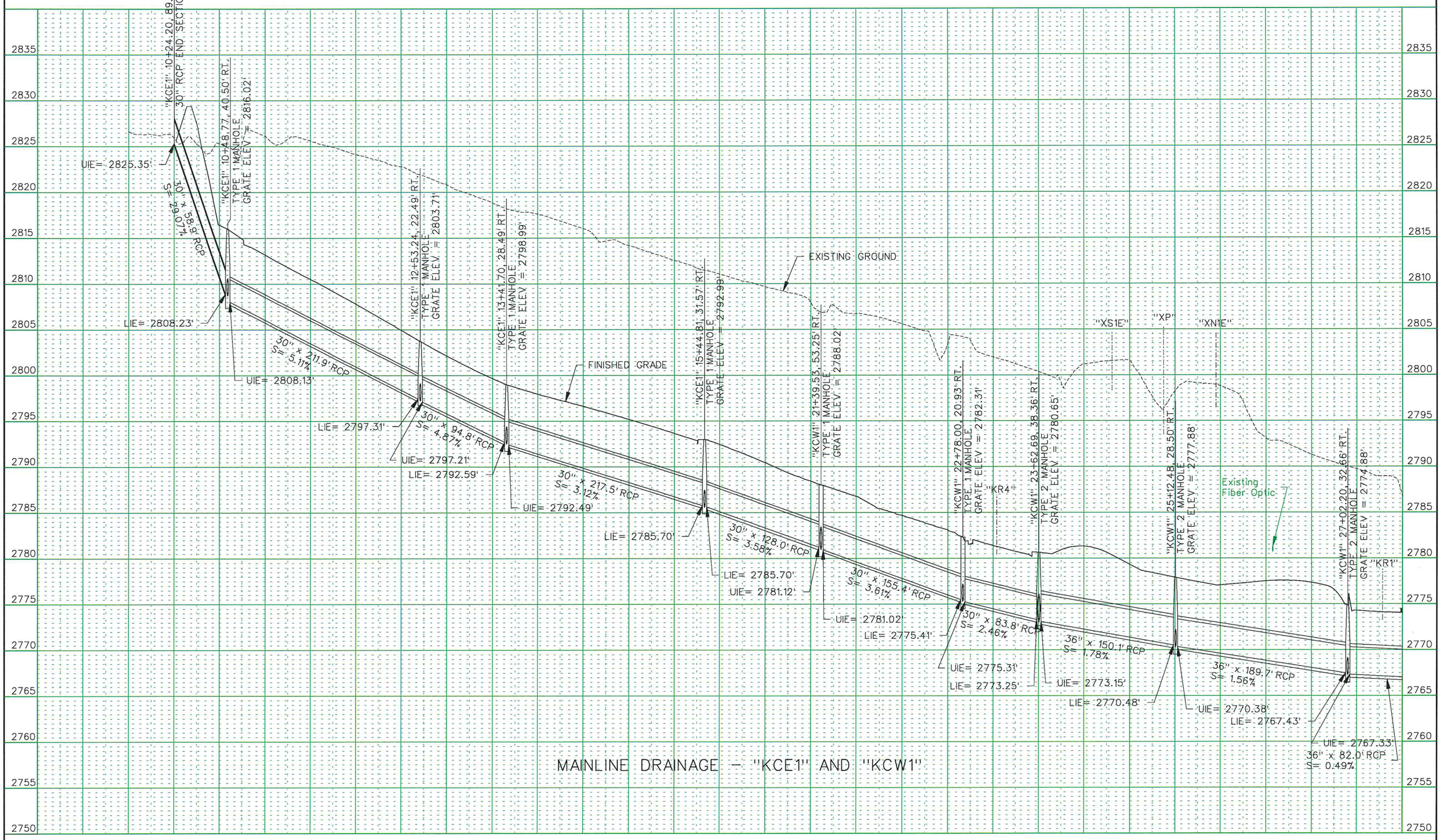
F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP101.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	DP101

NOTE: DEPICTED UTILITY LOCATIONS ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.

PRELIMINARY

SUBJECT TO REVISION
2/2/2016



MAINLINE DRAINAGE – "KCE1" AND "KCW1"

100.000000 sft / in. PLOT SCALE

AAccad

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP102.dgn

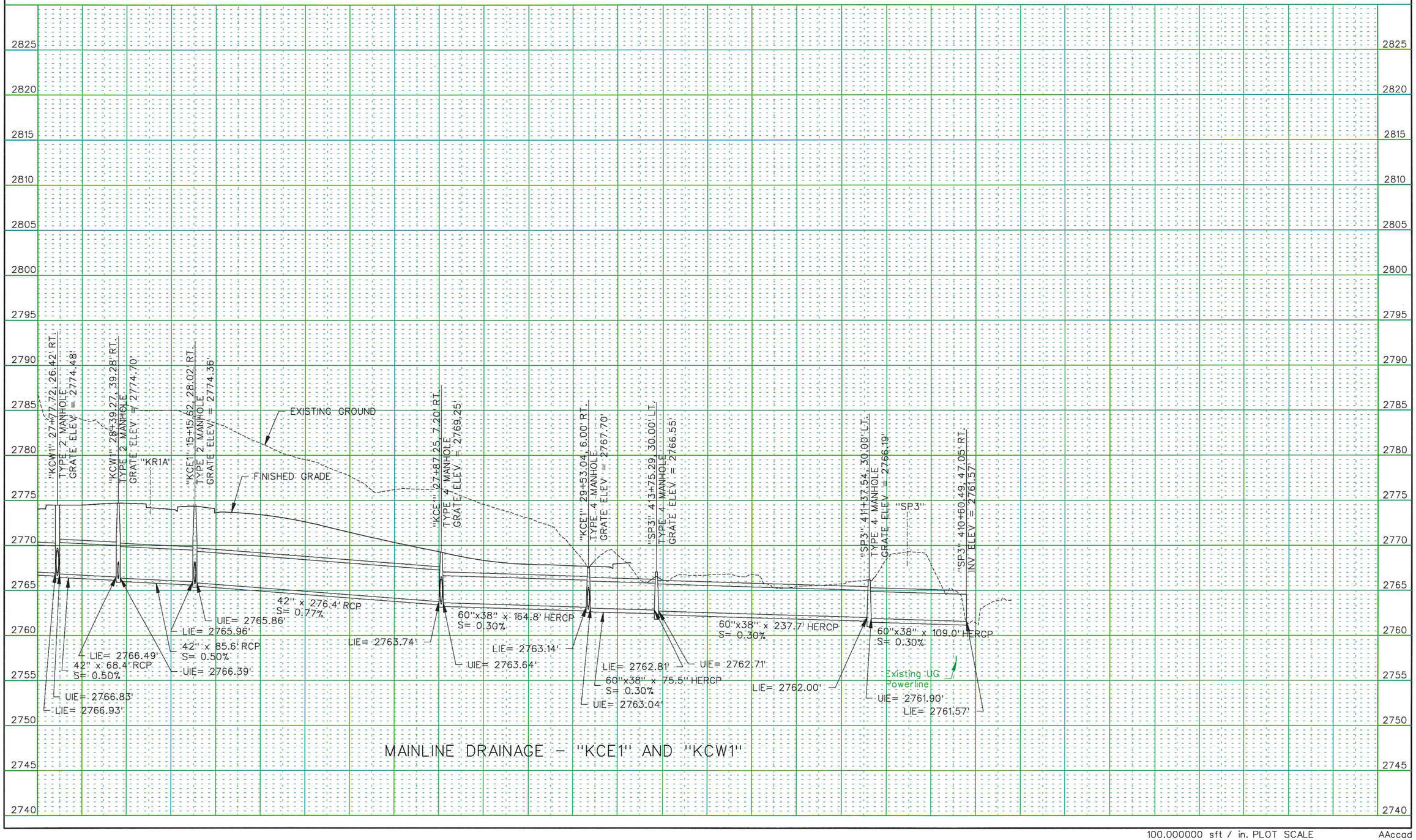
NOTE: DEPICTED UTILITY LOCATIONS ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.

PRELIMINARY

SUBJECT TO REVISION

2/2/2016

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	DP102



100.000000 sft / in. PLOT SCALE

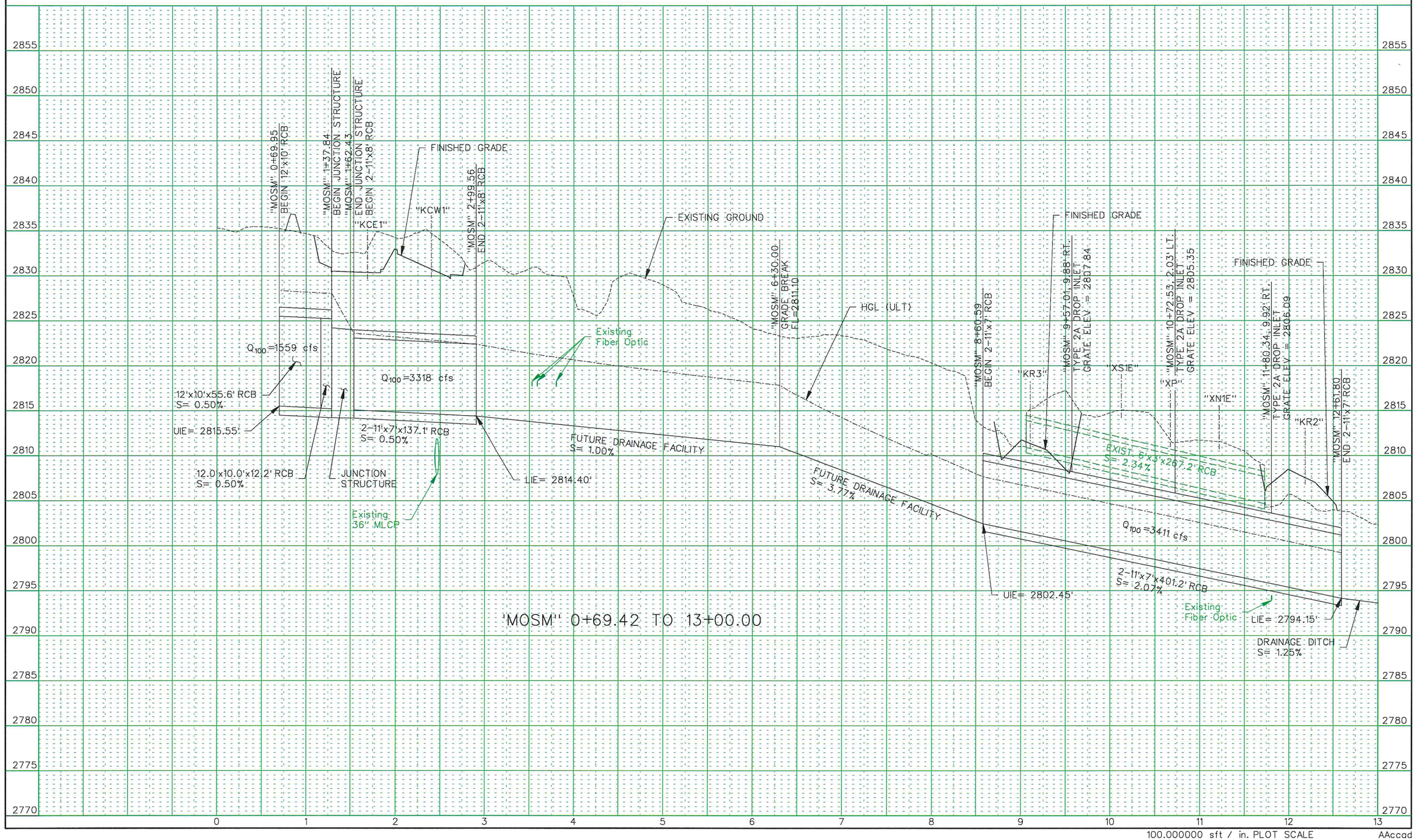
AAccad

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP103.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	DP103

NOTE: DEPICTED UTILITY LOCATIONS ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.

PRELIMINARY
SUBJECT TO REVISION
2/2/2016



100.000000 sft / in. PLOT SCALE AAccad

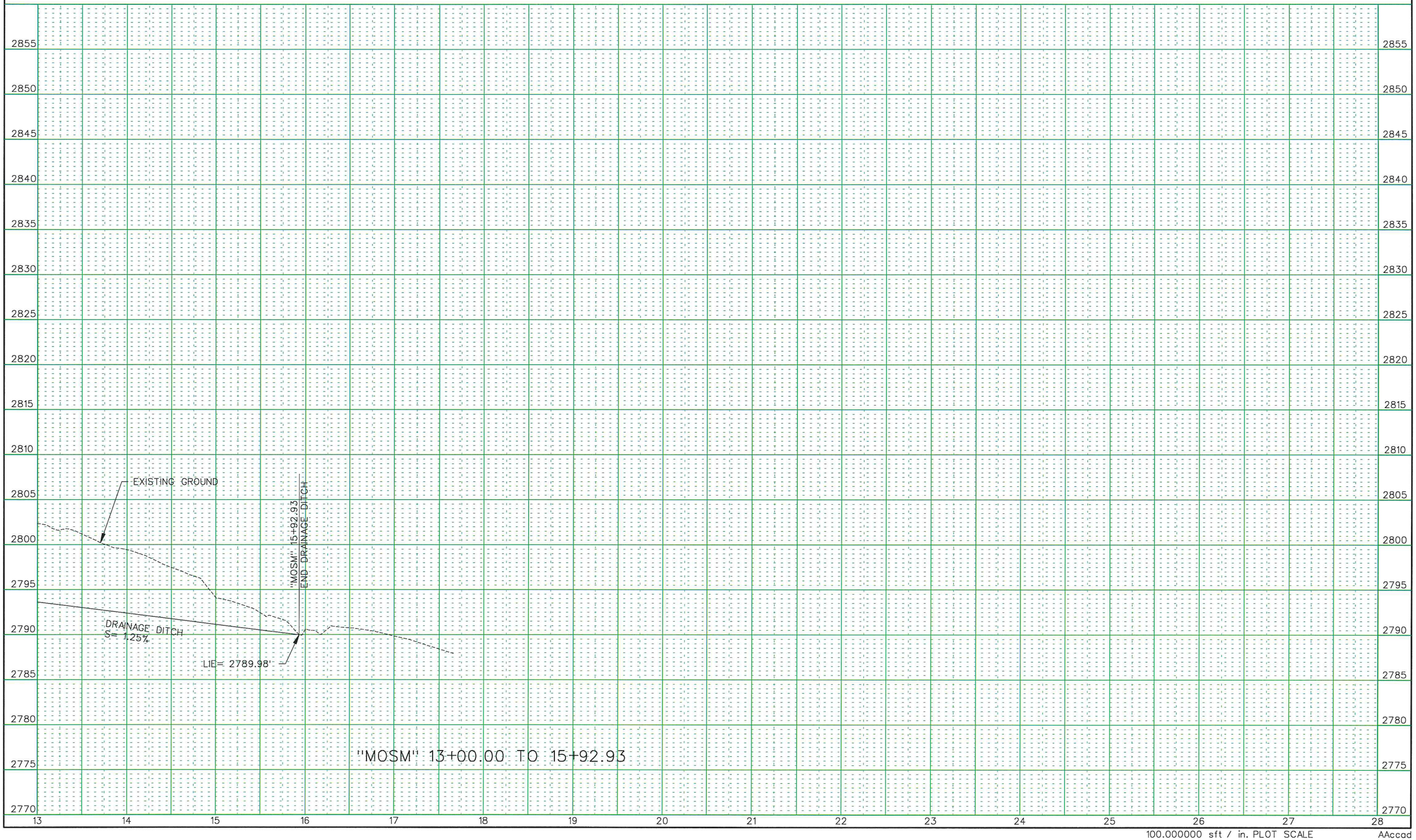
F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP104.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	DP104

PRELIMINARY

SUBJECT TO REVISION

2/2/2016



100.000000 sft / in. PLOT SCALE

AAccad

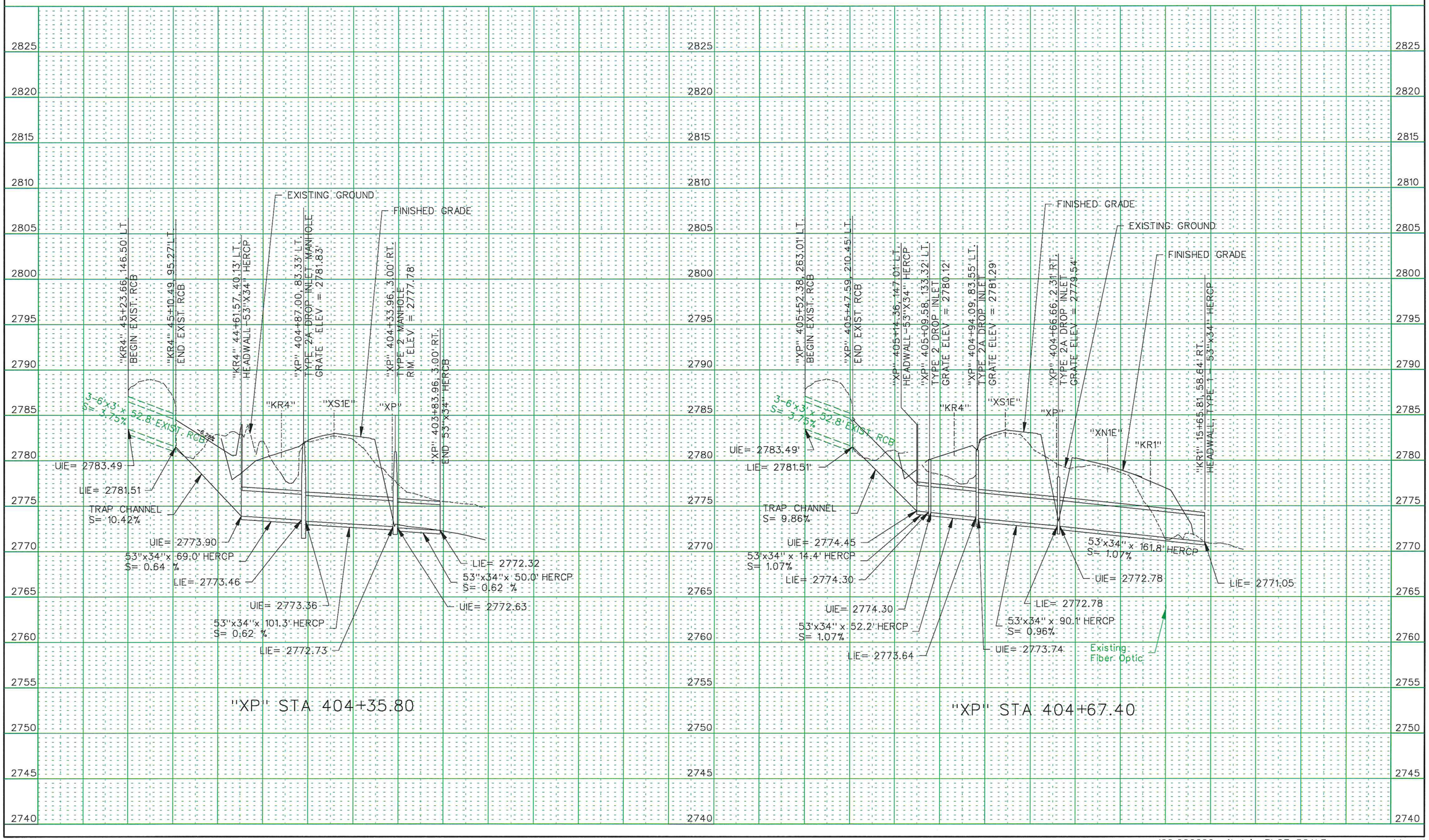
F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP105.dgn

NOTE: DEPICTED UTILITY LOCATIONS ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.

PRELIMINARY

SUBJECT TO REVISION
2/2/2016

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2	CLARK	DP105



100.000000 sft / in. PLOT SCALE

AAccad

MEETING NOTES
By: Ryan Belsick

Project No. 412-634A
Date: March 16, 2016

SUBJECT:	US 95 Phase 2B/5 US 95/Kyle Canyon (SR 157) Interchange NDOT Coordination Meeting
PLACE:	Conference Call
TIME:	2:00 pm
DATE:	March 16, 2016
ATTENDING:	Chris Holman, NDOT Hydraulics Jay Guzman, GCW Ryan Belsick, GCW James Monroe, GCW Rachael Dennis, GCW

The following items were discussed:

Drainage

1. NDOT stated that the area that needs the most attention is the flow split at the Station 405+00 culvert. NDOT's preference is to provide a channel rather than to have flow against a barrier rail, especially a modified type (taller). NDOT stated the design provided in the 60% submittal replicates the flow splits in the existing conditions, however an alternative design is preferred by NDOT.

2. GCW discussed an alternative Station 405+00 analysis that limits the headwater depth along the southbound onramp to the roadway profile. The analysis eliminates the modified barrier rail design but also increases the flow along the west side of the southbound onramp. GCW stated that increased flows may impact downstream properties and facilities and that the City would require the increased flows to be tracked. GCW stated that alternative flow split analyses would be discussed with the City.

3. NDOT stated that Horse Drive Improvements should be reviewed to confirm that the most current information (i.e., flow split, facilities, etc.) is being used.

4. NDOT requested that the Clark County Regional Flood Control District Facility be extended across Oso Blanca Road.

5. NDOT and GCW discussed NDOT's March 2, 2016 drainage comments and GCW stated that they will review and address them.

6. NDOT followed up with a phone call the same day stating that an alternative analysis might include adding additional storm drain cells to convey more flow to the east. NDOT's preference is to eliminate the flow split south within the median between US

95 northbound and southbound lanes. GCW stated that increased flows to the east may impact downstream properties and facilities and that the City would require the increased flows to be tracked. NDOT requested that this option be discussed with the City.

ACTION ITEMS:

- ***GCW to schedule meeting with the City to discuss flow split alternatives and downstream impacts.***

cc: Attendees

MEETING NOTES
By: Ryan Belsick

Project No. 412-634A
Date: May 11, 2016

SUBJECT:	US 95 Phase 2B/5 US 95/Kyle Canyon (SR 157) Interchange Drainage Coordination Meeting	
PLACE:	CLV DSC 9th Floor Gravel Conference Room	
TIME:	10:00 am	
DATE:	May 11, 2016	
ATTENDING:	Randy McConnell, CLV Mark Sorensen, CLV Oh-Sang Kwon, CLV	Tim McCoy, GCW Ryan Belsick, GCW James Monroe, GCW

The meeting was held to discuss the revised alignment of the CCRFCD Facility crossing US 95 per Skye Canyon's master drainage plan and NDOT's comments on the flow spit at STA 405+00 culvert. The following items were discussed:

1. GCW has reviewed the Skye Canyon Master Drainage Study which changes the proposed location of the RFCD Culvert crossing US 95 to south of Kyle Canyon Road. It is anticipated that the culvert will be capped and not used until the Skye Canyon Development connects to it in the future. CLV and GCW discussed the horizontal alignment at the new locations which should be based on existing right-of-way, cost and length of storm drain under US95. CLV stressed that the drainage costs cannot be increased. GCW will design the horizontal alignment for the revised RFCD location under US 95 and proposed ramps that will be constructed as part of the Project using the conceptual layout provided by SHG. GCW will also prepare a cross section along the revised alignment. GCW will provide the horizontal alignment and cross section to SHG. SHG will be responsible to review the alignment and provide the culvert size and invert/profile that will work for Skye Canyon's proposed drainage system SHG will submit a Master Plan Amendment to CCRFD for the new location.

2. GCW discussed NDOT's comments regarding the culvert at STA 405+00. NDOT requested removing the proposed modified 5-foot high barrier rail along the SB on ramp that directs flow to the STA 405+00 culvert. GCW explained that reducing the available ponding at this culvert will increase the existing flows discharged. GCW asked the CLV if there is additional capacity to the south. CLV said that there are limitations to the south and requested that design matches the existing flow rates. GCW will install an additional cell to the culverts and modify the design in order to match the existing conditions 100-year flow split without the modified barrier rail along the ramp and coordinate proposed revisions with CLV and NDOT.

MEETING NOTES
By: Ryan Belsick

Project No. 412-634A
Date: June 15, 2016

SUBJECT:	US 95 Phase 2B/5 US 95/Kyle Canyon (SR 157) Interchange Drainage Coordination Meeting	
PLACE:	CLV DSC 9th Floor Boulder Conference Room	
TIME:	10:00 am	
DATE:	June 15, 2016	
ATTENDING:	Randy McConnell, CLV Oh-Sang Kwon, CLV Tim McCoy, GCW	Ryan Belsick, GCW Jay Guzman, GCW James Monroe, GCW
CONFERENCE CALL:	Chris Holman, NDOT Sajid Sulahria, NDOT Zelalem Alemu, NDOT	

The meeting was held to discuss the revised alignment of the CCRFCD Facility crossing US 95 that was coordinated with SHG and additional NDOT's comments on the 60% submittal. The following items were discussed:

1. After introductions were made, GCW presented an overall exhibit that showed the proposed interchange, drainage facilities, and conceptual revised alignment of the CCRFCD Facility south of the proposed interchange.
2. GCW stated that the 60% drainage report submitted back in February 2016 has not been updated to incorporate design information for the revised CCRFCD Facility alignment. However, GCW plans to incorporate the design once it has been refined and the necessary design level has been achieved.
3. NDOT commented whether the 30-inch RCP (Facility SD1 on Figure 8A) is adequate to handle flows conveyed by the dual 6-foot wide by 3-foot high RCB under Oso Blanca. GCW confirmed the hydrology and Subbasin OFFE (See Figure 5) is tributary to the facility which is consistent with the referenced studies. **GCW will identify the referenced material that addresses the flow tributary to the dual 6-foot wide by 3-foot high RCB.**
4. NDOT commented whether the proposed ditch within the median between the roadways south of the Station 405+00 Culvert will be non erosive and adequate to convey flows south. GCW stated a normal depth calculation was performed for the ditch. **GCW will provide results to NDOT.**
5. NDOT would like GCW to remove sumps and area drain inlets located within median islands that are not functioning as a manhole and that are not necessary to connect storm drain (i.e., 3 to 4 possible locations were identified where this may be possible). **GCW will investigate these locations and will revise the design and plans to account for the flows within the adjacent roadways.**

6. NDOT commented if the CCRFCD Facility alignment through the Kyle Canyon Road and Oso Blanca Road intersection has been considered with the revised CCRFCD alignment. NDOT also commented that high velocities will have to be mitigated. NDOT will need to see a typical RCB section and how the design addresses high velocities. **CLV will set up a meeting with SHG to confirm that they will be responsible to review the US95 crossing alignment and to provide the storm drain size, alignment and invert/profile for the Hualapai Way, Kyle Canyon Road and interchange storm drain system that will work for Skye Canyon's proposed drainage system. The CLV will require SHG to prepare a Technical Memorandum/ Drainage Study of their design.**
7. NDOT commented on if SHG had profiled and performed a hydraulic analysis for the CCRFCD Facility east of US95. NDOT questioned how the S curve alignment for the CCRFCD Facility east of US95 was determined. GCW stated revisions were made from the conceptual alignment provided by SHG to minimize the length of the facility under US95 and to keep the facility within NDOT right-of-way. GCW stated that SHG did not prepare an extended profile and hydraulic model east of US95. GCW and CLV agreed that the alignment, profile, and hydraulic model should be extended east (i.e., a minimum of 1000') to verify the design will work for future extension and connectivity. GCW, CLV, and NDOT agreed that there will be some work to get the design up to a 90% design level. There is some concern that the coordination effort could impact the schedule. There is also concern with how to show the facility in the plans since SHG will be providing the design. NDOT questioned the velocities in the RCB under US95 as indicated by the need for sacrificial concrete shown on the profile exhibit GCW sent to NDOT prior to the meeting. GCW and CLV agreed that SHG should provide a technical memorandum to address the CCRFCD Facility design. **CLV will set up a meeting with SHG to confirm that the future extension to the east has been considered. GCW will report back to NDOT and CLV to determine schedule impacts.**
8. **GCW will prepare a cost comparison for the revised CCRFCD Facility alignment.**

MEETING NOTES
By: Ryan Belsick

Project No. 412-634A
Date: June 16, 2016

SUBJECT:	US 95 Phase 2B/5 US 95/Kyle Canyon (SR 157) Interchange Drainage Coordination Meeting	
PLACE:	CLV DSC 7th Floor	
TIME:	4:00 pm Opal Conference Room	
DATE:	June 16, 2016	
ATTENDING:	Oh-Sang Kwon, CLV Peter Jackson, CLV	Ryan Belsick, GCW Jay Guzman, GCW Steve Jones, SHG
CONFERENCE CALL:		

The meeting was held to discuss the revised alignment of the CCRFCD Facility crossing US 95 that was coordinated with SHG. The following items were discussed:

1. After introductions were made, GCW presented an overall exhibit that showed the proposed interchange, drainage facilities, and conceptual revised alignment of the CCRFCD Facility south of the proposed interchange.
2. GCW and the CLV discussed NDOT's comments/concerns from the June 15, 2016 meeting with the CLV, NDOT and GCW. NDOT's main comment included the overall interchange storm drain design including the profile, alignment, hydrology and hydraulics. The CLV requested that an analysis of the storm drain system upstream and downstream of the interchange be performed including the Kyle Canyon Road and Hualapai Way reaches. The CLV stated the analysis must show that the storm drain system works with the Skye Canyon development. Additionally, the CLV stated that NDOT will require that the storm drain system maintain 1-foot of freeboard. **SHG will prepare a Technical Memorandum/Technical Drainage Study that includes the design of the interchange storm drain system including the profile, alignment, hydrology and hydraulics.**
3. An additional NDOT comment that was discussed included mitigation of high velocities. NDOT will need to see SHG's typical RCB section and how the design addresses high velocities. **SHG will include a typical RCB section with the Technical Memorandum/Technical Drainage Study that addresses high velocities.**
4. **SHG will prepare a Technical Memorandum/Technical Drainage Study for the CLV's review by July 1, 2016.**

MEETING NOTES
By: Ryan Belsick

Project No. 412-634A
Date: July 5, 2016

SUBJECT:	US 95 Phase 2B/5 US 95/Kyle Canyon (SR 157) Interchange Drainage Coordination Meeting	
PLACE:	Conference Call	
TIME:	10:00 am	
DATE:	July 5, 2016	
ATTENDING:	Randy McConnell, CLV Oh-Sang Kwon, CLV Chris Holman, NDOT Sajid Sulahria, NDOT Zelalem Alemu, NDOT	Steve Jones, SHG Tim McCoy, GCW Ryan Belsick, GCW James Monroe, GCW

SHG has extended the hydraulic model for the CCRFCD Facility under US95 to the east in order to address NDOT concerns. The meeting was held to discuss the results of the modeling and how to move forward with the design of the CCRFCD Facility. The following items were discussed:

1. After introductions were made, NDOT stated the plan to revise the alignment for the CCRFCD Facility and requested for SHG to discuss the status of the current design and the direction they would like to move forward with the design.
2. SHG explained that NDOT had concerns with the future extension of the CCRFCD Facility and wanted an extension of the hydraulic model to ensure the CCRFCD Facility will work will the future extension.
3. SHG mentioned NDOT would ideally prefer the future extension of the CCRFCD to be located entirely within NDOT right-of-way to the Log Cabin and Sky Pointe Drive Intersection. SHG discussed hydraulic models were prepared for two alignment extension alternatives. The first alternative for the alignment includes an S-Curve and keeps the extended CCRFCD Facility entirely within NDOT right-of-way. The second alternative keeps the facility straight through impacting private parcels east of NDOT right-of-way. SHG stated that the first alternative would require bigger facilities upstream and second alternative worked better hydraulically due to the high velocities and the S-Curve bend losses associated with the first alternative. The proposed CCRFCD Facility would be 13-foot wide by 8-foot high for the first alternative and 13-foot wide by 6-foot high for the second alternative. SHG understands that keeping the Facility within NDOT right-of-way ensures the facility can be extended in the future. NDOT is concerned that the proposed CCRFCD Facility becomes "throw away" and not used in the future due to hydraulic issues or the inability to extend the Facility. SHG states that the Skye Canyon Developer is prepared to dedicate an easement "today" through the private parcel west of Sky Pointe Drive if this makes the second alternative acceptable.

4. NDOT is concerned with the parcel being sold and removing a temporary construction easement and questioned will the Skye Canyon Developer dedicate a "permanent" drainage easement. SHG responded by saying "yes". NDOT mentioned a possible 12-18 months delay to dedicate the easement and will need concrete assurance the easement will be there in the future. CLV stated that a permanent drainage easement will also be included through the parcel east of Sky Point Drive for the extension to Log Cabin Road and CLV will require the easement to be constructed with the development of the parcel. SHG stated that the Skye Canyon Developer is willing to dedicate the permanent drainage easement and prepare legal descriptions and right-of-way exhibit now.
5. **SHG to provide plan, profile, and models for review of the two alternatives by Friday 7/8/16.**
6. **GCW to provide the cost difference between the 13-foot wide by 6-foot high RCB and 13-foot wide by 8-foot high RCB alternatives by Friday 7/8/16.**
7. **SHG to start preparing legal documents.**

MEETING NOTES
By: Ryan Belsick

Project No. 412-634A
Date: August 2, 2016

SUBJECT:	US 95 Phase 2B/5 US 95/Kyle Canyon (SR 157) Interchange Drainage Coordination Meeting	
PLACE:	CLV DSC 7th Floor Turquoise Conference Room	
TIME:	4:00 pm	
DATE:	August 2, 2016	
ATTENDING:	Randy McConnell, CLV Oh-Sang Kwon, CLV	Tim McCoy, GCW Ryan Belsick, GCW James Monroe, GCW

SHG has provided CLV and GCW with plan and profile exhibits for the two CCRFCD alternatives as discussed in the July 5, 2016 Coordination Meeting with NDOT, CLV, SHG, and GCW. The exhibits and supporting hydraulic calculations were sent to CLV and GCW for review in an email dated July 8, 2016. GCW forwarded the information sent by SHG to NDOT for review in an email dated July 19, 2016. NDOT's only comment was that they preferred the 13' X 8' RCB crossing under US95 regardless of which downstream alignment ends up being constructed in an email dated July 27, 2016.

This meeting was held to discuss NDOT, CLV, and GCW comments on the exhibits and hydraulic calculations prepared by SHG. The following items were discussed:

1. GCW provided a draft copy of comments and only the comments pertinent to the design were discussed.

2. It was questioned whether the surcharged HGL shown near the Sky Village Road and Oso Blanca Rd Intersection will allow flexibility for future connections to the CCRFCD Facility.

3. GCW questioned whether a stub should be provided at the Kyle Canyon Road and Skye Pointe Road Intersection as shown in the Skye Canyon Master Drainage Study Update #3.

4. GCW agrees with NDOT in that the RCB under US95 should be 13' X 8'. This will allow for future flexibility. It was noted that the hydraulic model shows the 13' X 6' RCB crossing alternative has less than one foot of freeboard upstream of Station 72+20.

5. GCW questioned the determination of the flow rates shown for the lateral connecting to the Mainline at Station 84+50. The technical memorandum provided by SHG did not clarify how the design flow rate for the mainline facility was determined.

6. GCW stated that the utilities at the O'Hare Road and Log Cabin Way Intersection should be verified.

7. GCW and CLV discussed the need to address future sediment through the system with velocities in excess of 30 fps. CLV stated additional sacrificial concrete will be required.

8. **GCW to make some edits to the draft comments and send an email to CLV with the document attached.**

9. **CLV will make final edits and copy the draft to letterhead and send it to SHG.**

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

OLY1608.000

July 8, 2016

Oh Sang Kwon, P.E.
City of Las Vegas – Department of Public Works
Flood Control Section
333 N. Rancho Drive – 7th Floor
Las Vegas, Nevada 89106

Subject: Supplement for US95/Kyle Canyon Road Interchange – Conceptual Design for CCRFCD Regional Facility Crossing

Dear Mr. Kwon:

The Interchange project is proposing to construct the regional storm drain under the US-95 and it's on/off ramps. The approach upstream and downstream connections into the culvert will be constructed by private developer as a part of the Skye Canyon master planned community. Upon coordination with City of Las Vegas (CLV) Public Works and GCW Engineers, the developer is required to prepare conceptual analysis for the regional storm drain alignment through the Nevada Dept. of Transportation (NDOT) right-of-way to confirm the proposed culvert crossing by the Interchange project is sufficient to accommodate the proposed regional flow rates in the alignment. An exhibit demonstrating the preliminary regional storm drain alignment, inclusive of the proposed Interchange culvert crossing, within the vicinity of the NDOT right-of-way has been included for reference.

Review of this supplement's regional storm drain alignment compared to the alignment in the current Clark County Regional Flood Control District (CCRFCD) MPU shows a difference. The changed alignment is attributed to a new master land plan for Skye Canyon and downstream regional alignment constraints placed on the Moccasin alignment. Several coordination meetings have occurred between the developer, SHG, CLV and CCRFCD regarding the changed alignment shown in this supplement and all parties are in agreement regarding what is shown in this supplement. A *Master Drainage Study Update #3 for Skye Canyon* (DS4420), prepared by SHG, is currently under review by CLV showing this alignment, and has been utilized to determine the proper design flow rates within the proposed interchange storm drain and its developer upstream and downstream connections. An ultimate condition flow rate of 2,079 cfs has been referenced as the 100-year design flow rate in the portion of the regional storm drain crossing the highway and constructed by the Interchange. The Ultimate Condition Drainage Facilities Map referenced from the Master Study has been included in this supplement.

Two (2) alignments are proposed in the future through the NDOT right-of-way and Interchange project. The Water Surface and Pressure Gradient (WSPG) Hydraulic Analysis System software has been utilized to determine HGLs to verify the CCRFCD criteria are satisfied.

- The regional alignment, entitled "Skye Village-Log Cabin", crossing US-95 to convey the regional flows east. The portion of the storm drain passing under the highway and on/off ramps is to be constructed with the Interchange project, the remainder of the alignment is anticipated to be installed by the private developer.

- The regional alignment, entitled "SR157-Oso Blanca", is the future regional facility planned in Kyle Canyon Road (a.k.a. SR157) that needs to connect into the "Skye Village-Log Cabin" regional alignment to adhere to MPU drainage patterns. It has been profiled because the alignment is different than previously anticipated by the MPU through the Interchange.

Skye Village-Log Cabin Regional Alignment

A conceptual design profile has been prepared that extends from Skye Canyon Park Drive (upstream limits) to Log Cabin Way (downstream limits). The upstream limits of concept have been selected to understand the vertical constraints as the future storm drain crosses the existing 36-inch water line. The downstream limits of concept have been selected because it is considered adequately outside NDOT right-of-way to show no hydraulic effects on the regional alignment. This alignment includes the subject proposed storm drain by the Interchange and represents the conveyance of the total ultimate condition regional flow rates exiting the NDOT right-of-way through the downstream Skye Canyon community. Note that the ultimate condition of regional facility connectivity represents the condition with the largest flow rate conveyed in this alignment, represented by confluence in Oso Blanca of the SR157-Oso Blanca regional facility discussed later in this supplement. However, the contributing watershed to the future regional facility from SR157 impacts the Skye Village-Log Cabin regional alignment currently but represents less total flow in the alignment. Collection of these flows is represented by the several 10-ft wide by 4-ft high RCB laterals shown in the profile south of Oso Blanca Road between Stations 44+50 to 50+00. Since the interim condition in which the 10-ft by 4-ft RCBs are potentially in-use generates less flow than ultimate regional condition, the interim condition has not been analyzed.

Resulting from a July 5, 2016 conference call with NDOT, CLV and GCW, two (2) alternative alignments extending east from US-95 are presented in this supplement. An exhibit has been included to show the potential alignments, colored in red and blue. Conceptual profiles and corresponding hydraulic models have been prepared for both alignments. It is noted that the likely alignment by the developer is the red alignment that extends through the developer's private property, as it presents the most hydraulic efficient option. A drainage easement is to be dedicated by the developer to CLV on the private property between the highway and Sky Pointe to reserve the corridor for future extension through the Interchange. As an alternative, in case the private developer does not connect and extend the regional facility in the future, the blue alignment represents an option entirely contained within the NDOT right-of-way that allows extension of the regional facility without private developer participation. The table below represents a comparative summary of size differences between the two alignments within the Interchange boundary. The respective hydraulic model has also been summarized in the below table.

Comparison of CCRFCD Regional Facility Sizes through US95 Interchange	
Straight Alignment (Red)	**S-Curve Alignment (Blue)**
13-ft wide by 6-ft high RCB *KCI-R.WSW*	13-ft wide by 8-ft high RCB *KCI-B.WSW*

Analysis shows that the flow velocities in the storm drain may be considered erosive by CCRFCD Manual standards (greater than 25 ft/s); therefore, an additional 1-inch cover of 6,000 psi compressive strength concrete over the steel reinforcing at the flowline of the RCB

will be required. The starting water surface elevation utilized in analysis is assumed top of RCB because it is anticipated that downstream extension will not result in a tailwater condition on the regional alignment, all the significant head losses that would impact the Interchange crossing have been evaluated with this supplement's conceptual design.

SR157-Oso Blanca Regional Alignment

A conceptual design profile has been prepared that extends from SR157 (upstream limits) to the Oso Blanca confluence with the Skye Village-Log Cabin alignment Log Cabin Way (downstream limits). The upstream limits of concept have been selected because it is adequate to show hydraulic impacts of the re-alignment of the regional facility bending south from SR157. The downstream limits of concept have been selected because it connects into the trunk Skye Village-Log Cabin alignment and the hydraulic losses associated with the confluence structure in Oso Blanca has been modeled with that alignment. Therefore, the starting water surface elevation in the SR157-Oso Blanca alignment model has been referenced from the Skye Village-Log Cabin alignment model. Similarly to the Skye Village-Log Cabin concept, analysis shows that the flow velocities in the storm drain may be considered erosive by CCRFCD Manual standards (greater than 25 ft/s); therefore, an additional 1-inch cover of 6,000 psi compressive strength concrete over the steel reinforcing at the flowline of the RCB will be required.

Note that the design flow rate utilized in this alignment varies from the current CCRFCD MPU. The Master Drainage Study that is referenced for establishing flow rates is proposing to update the MPU in the future to provide for upstream regional detention on a vacant BLM parcel adjacent to SR157. This new detention basin functions to limit the peak 100-year flow rate entering NDOT right-of-way, in order to not exceed what occurs during existing condition. The concept of adding regional detention in the SR157 regional alignment has been discussed with CLV and CCRFCD and agreed to in concept.

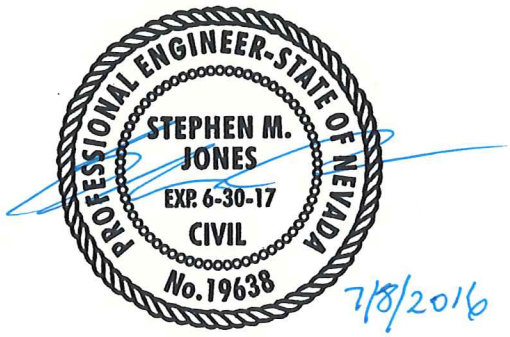
It is acknowledged that the developer for Skye Canyon is not responsible for this storm drain alignment because it is a future CCRFCD facility improvement, only a stub is planned to be constructed by the developer and reserved for future connection into the Skye Village-Log Cabin alignment. The developer has planned for collection of these flows that impact the alignment in the existing condition, via the several storm drain laterals shown in Skye Village and south of Oso Blanca.

Supporting calculations and exhibits are included in this supplement. If you have any questions or require additional information, please do not hesitate to contact us at 284-5300.

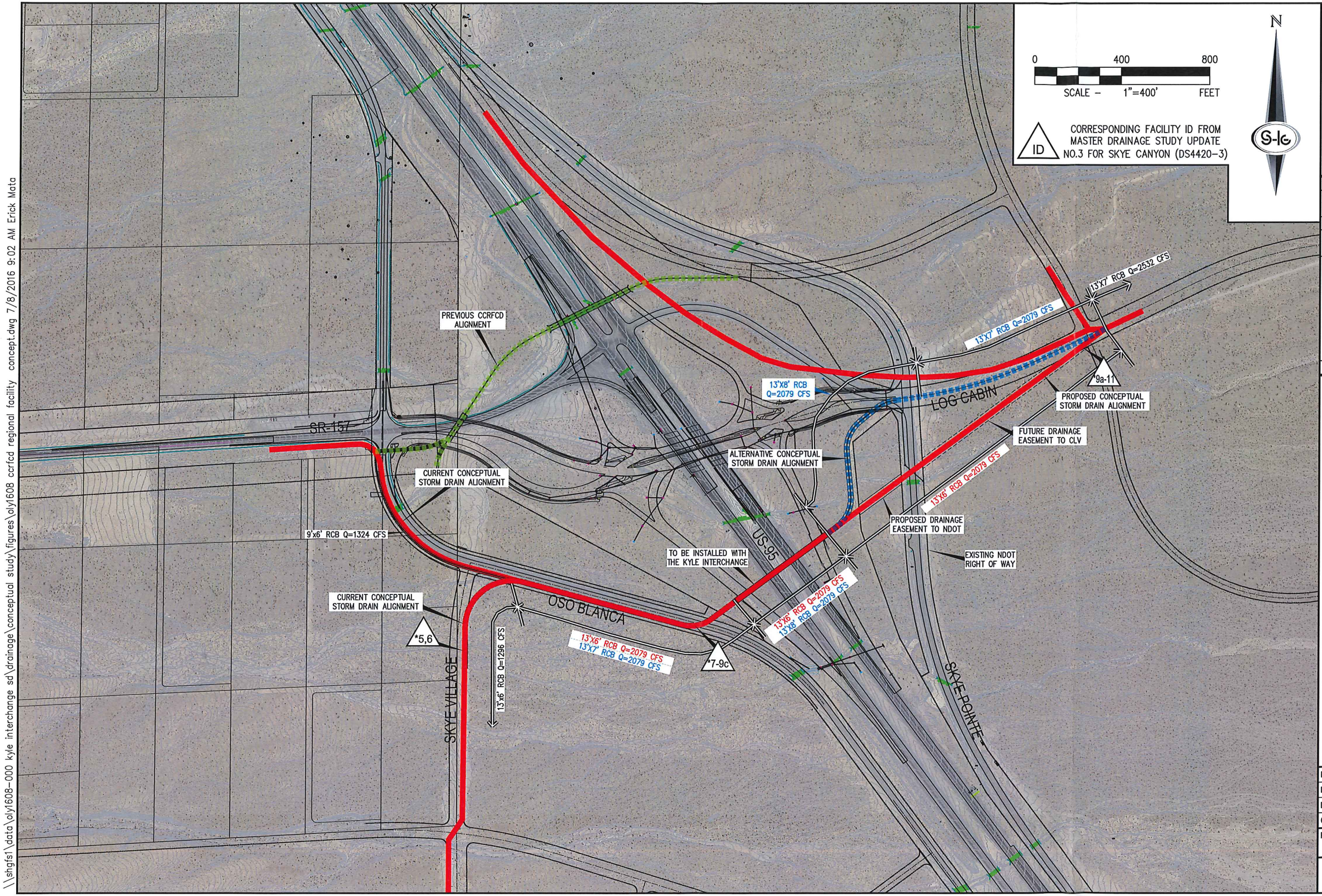
Respectfully Submitted,

SLATER HANIFAN GROUP

Steve Jones, P.E.
Project Manager - Flood Control Division



cc: Jerry Slater, P.E. – SHG
Marc Bolduc, P.E. – Olympia
Ryan Belsick, P.E. – GCW Engineers



\\shgfs1\data\oly1608-000 kyle interchange sd\drainage\conceptual study\figures\oly1608 ccrfcd regional facility concept.dwg 7/8/2016 9:02 AM Erick Mata

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

OLYMPIA COMPANIES (COOP. GCW, CLV, NDOT)

US-95 / KYLE CANYON INTERCHANGE

CCRFCD REGIONAL FACILITY CONCEPT

DATE: JULY 2016
DRAFTER: ETM
DESIGNER: ETM
CHECKED: SMJ
PROJECT NO. OLY1608.000

EXHIBIT
SHEET 1 OF 1

```
T1 KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608                                                  0
T2 MPU ULTIMATE CONDITION FACILITY
T3 SKYE VILLAGE - SKYE CANYON PARK TO US-95
SO  -8521.1502717.060  2                          2724.060
R   -8471.1502718.560  2       .015                                          .00
JX  -8421.1502720.060  1 72    .015  453.0          2719.15          -30.0
R   -8392.7202720.910  1       .015                                   .000
R   -8356.1002722.010  1       .015                                -10.000
R   -6921.1502765.060  1       .015                                   .000
R   -6401.2902775.450  1       .015                                   .000
R   -6286.1202777.470  1       .015                                   .000
R   -6105.7902780.620  1       .015                                 51.661    .000 0
R   -5413.6202792.730  1       .015                                   .000
TS  -5363.3002793.610  6       .015
JX  -5363.3002793.610  6  3    .015  783.000        2793.590
WX  -5363.3002793.610  1       .015                                   .000
R   -4996.3102800.400  1       .015                               -105.135    .000 0
R   -4300.5702812.210  1       .015                                   .000
R   -4192.8002814.510  1       .015                                 30.874    .000 0
R   -4083.3402816.840  1       .015                                -31.358    .000 0
R   -4070.6602817.110  1       .015                                   .000
JX  -4070.6602817.110  1 54    .015  296.0          2817.11           30.0
R   -3965.2102819.360  1       .015                                   .000
JX  -3940.2102819.890  7 42 42.015   92.0     92.0  2819.62 2819.62  30.0-30.0
R   -3697.6802825.060  7       .015                                   .000
R   -2328.8602831.900  7       .015                                   .000
JX  -2277.8602832.160  3  4    .015  404.000        2832.04           30.0
R   -1518.8602835.960  3       .015                                   .000
TS  -1497.8802836.060  5       .015
R   -1412.8802836.710  5       .015                                 15.000
JX  -1392.8802836.910 30 60    .013  370.0          2836.81           45.0
R    -758.8802843.260 30       .013                                   .000
SH   -758.8802843.260 30
CD   1  3   0    .000   6.000   13.000  .000  .000   .00
CD   2  3   0    .000   7.000   13.000  .000  .000   .00
CD   3  3   0    .000   6.000    9.000  .000  .000   .00
CD   4  3   0    .000   6.000    6.000  .000  .000   .00
CD   5  3   0    .000   5.000    8.000  .000  .000   .00
CD   6  3   0    .000   6.000   25.000  .000  .000   .00
CD   7  3   0    .000   6.000   11.000  .000  .000   .00
CD   8  3   0    .000   6.000   12.000  .000  .000   .00
CD   9  3   0    .000   6.000   12.000  .000  .000   .00
CD  10  3   0    .000   8.000    9.000  .000  .000   .00
CD  11  3   0    .000   8.000    8.000  .000  .000   .00
CD  30  4   1    .000   2.500     .000  .000  .000   .00
CD  36  4   1    .000   3.000     .000  .000  .000   .00
CD  42  4   1    .000   3.500     .000  .000  .000   .00
CD  54  4   1    .000   4.500     .000  .000  .000   .00
CD  60  4   1    .000   5.000     .000  .000  .000   .00
CD  72  4   1    .000   6.000     .000  .000  .000   .00
Q            42.000   .0
```

KCI-R.EDT

FILE: KCI-R.WSW W S P G W - EDIT LISTING - Version 14.06 Date: 7- 8-2016 Time: 6: 7:26

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	3	0	.000	6.000	13.000	.000	.000	.00										
CD	2	3	0	.000	7.000	13.000	.000	.000	.00										
CD	3	3	0	.000	6.000	9.000	.000	.000	.00										
CD	4	3	0	.000	6.000	6.000	.000	.000	.00										
CD	5	3	0	.000	5.000	8.000	.000	.000	.00										
CD	6	3	0	.000	6.000	25.000	.000	.000	.00										
CD	7	3	0	.000	6.000	11.000	.000	.000	.00										
CD	8	3	0	.000	6.000	12.000	.000	.000	.00										
CD	9	3	0	.000	6.000	12.000	.000	.000	.00										
CD	10	3	0	.000	8.000	9.000	.000	.000	.00										
CD	11	3	0	.000	8.000	8.000	.000	.000	.00										
CD	30	4	1		2.500														
CD	36	4	1		3.000														
CD	42	4	1		3.500														
CD	54	4	1		4.500														
CD	60	4	1		5.000														
CD	72	4	1		6.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608

HEADING LINE NO 2 IS -

MPU ULTIMATE CONDITION FACILITY

HEADING LINE NO 3 IS -

SKYE VILLAGE - SKYE CANYON PARK TO US-95

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET

	STATION	INVERT	SECT	W S ELEV
U/S DATA	-8521.150	2717.060	2	2724.060

ELEMENT NO 2 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-8471.150	2718.560	2	.015	.000	.000	.000	0

ELEMENT NO 3 IS A JUNCTION

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	-8421.150	2720.060	1	72	0	.015	453.000	.000	2719.150	.000	-30.000	.000

	RADIUS	ANGLE
	.000	.000

ELEMENT NO 4 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-8392.720	2720.910	1	.015	.000	.000	.000	0

ELEMENT NO 5 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-8356.100	2722.010	1	.015	209.818	-10.000	.000	0

ELEMENT NO 6 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-6921.150	2765.060	1	.015	.000	.000	.000	0

ELEMENT NO 7 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-6401.290	2775.450	1	.015	.000	.000	.000	0

ELEMENT NO 8 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-6286.120	2777.470	1	.015	.000	.000	.000	0

ELEMENT NO 9 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-6105.790	2780.620	1	.015	199.999	51.661	.000	0

```
ELEMENT NO  10 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -5413.620 2792.730    1                .015                           .000     .000      .000     0
ELEMENT NO  11 IS A TRANSITION         *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS   ANGLE
                            -5363.300 2793.610    6                .015                           .000     .000
ELEMENT NO  12 IS A JUNCTION           *         *     *     *                  *                  *                 *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2    N      Q3         Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                            -5363.300 2793.610    6     3     0    .015   783.000      .000  2793.590      .000    .000     .000
                                                                                                  RADIUS    ANGLE
                                                                                                    .000     .000
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
                                                  W S P G W                                                          PAGE NO   3
                        WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  13 IS A  WALL  EXIT                        *
                  U/S DATA   STATION    INVERT  SECT
                            -5363.300 2793.610    1
ELEMENT NO  14 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -4996.310 2800.400    1                .015                       200.000 -105.135      .000     0
ELEMENT NO  15 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -4300.570 2812.210    1                .015                           .000     .000      .000     0
ELEMENT NO  16 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -4192.800 2814.510    1                .015                       199.999   30.874      .000     0
ELEMENT NO  17 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -4083.340 2816.840    1                .015                       199.999  -31.358      .000     0
ELEMENT NO  18 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -4070.660 2817.110    1                .015                           .000     .000      .000     0
ELEMENT NO  19 IS A JUNCTION           *         *     *     *                  *                  *                 *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2    N      Q3         Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                            -4070.660 2817.110    1    54     0    .015   296.000      .000  2817.110      .000  30.000     .000
                                                                                                  RADIUS    ANGLE
                                                                                                    .000     .000
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
ELEMENT NO  20 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -3965.210 2819.360    1                .015                           .000     .000      .000     0
ELEMENT NO  21 IS A JUNCTION           *         *     *     *                  *                  *                 *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2    N      Q3         Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                            -3940.210 2819.890    7    42    42    .015    92.000     92.000  2819.620  2819.620  30.000  -30.000
                                                                                                  RADIUS    ANGLE
                                                                                                    .000     .000
                                                  W S P G W                                                          PAGE NO   4
                        WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  22 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -3697.680 2825.060    7                .015                           .000     .000      .000     0
ELEMENT NO  23 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -2328.860 2831.900    7                .015                           .000     .000      .000     0
ELEMENT NO  24 IS A JUNCTION           *         *     *     *                  *                  *                 *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2    N      Q3         Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                            -2277.860 2832.160    3     4     0    .015   404.000      .000  2832.040      .000  30.000     .000
                                                                                                  RADIUS    ANGLE
                                                                                                    .000     .000
```

ELEMENT NO 25 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
	-1518.860	2835.960	3			.015			.000	.000	.000	0

ELEMENT NO 26 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE
	-1497.880	2836.060	5			.015			.000	.000

ELEMENT NO 27 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
	-1412.880	2836.710	5			.015			324.676	15.000	.000	0

ELEMENT NO 28 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	-1392.880	2836.910	30	60	0	.013	370.000	.000	2836.810	.000	45.000	.000

									RADIUS	ANGLE
									.000	.000

ELEMENT NO 29 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H
	-758.880	2843.260	30			.013			.000	.000	.000	0

ELEMENT NO 30 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	-758.880	2843.260	30	.000

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608
MPU ULTIMATE CONDITION FACILITY
SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-8521.150	2717.060	6.633	2723.694	2532.00	29.36	13.39	2737.08	.00	7.00	13.00	7.000	13.000	.00	0 .0
50.000	.0300					.0172	.86	6.63	2.01	5.49	.015	.00	.00	BOX
		WARNING - Flow depth near top of box conduit												
-8471.150	2718.560	6.858	2725.418	2532.00	28.40	12.52	2737.94	.00	7.00	13.00	7.000	13.000	.00	0 .0
JUNCT STR	.0300					.0232	1.16	6.86	1.91		.015	.00	.00	BOX
		WARNING - Flow depth near top of box conduit												
-8421.150	2720.060	4.756	2724.816	2079.00	33.62	17.56	2742.37	.00	6.00	13.00	6.000	13.000	.00	0 .0
28.431	.0299					.0300	.85	4.76	2.72	4.76	.015	.00	.00	BOX
-8392.720	2720.910	4.756	2725.666	2079.00	33.63	17.56	2743.22	6.00	6.00	13.00	6.000	13.000	.00	0 .0
36.620	.0300					.0300	1.10	6.00	2.72	4.75	.015	.00	.00	BOX
-8356.100	2722.010	4.756	2726.766	2079.00	33.63	17.56	2744.32	.00	6.00	13.00	6.000	13.000	.00	0 .0
680.014	.0300					.0294	20.01	4.76	2.72	4.75	.015	.00	.00	BOX
-7676.085	2742.411	4.819	2747.230	2079.00	33.19	17.10	2764.33	.00	6.00	13.00	6.000	13.000	.00	0 .0
455.266	.0300					.0271	12.34	4.82	2.66	4.75	.015	.00	.00	BOX
-7220.819	2756.070	5.054	2761.124	2079.00	31.64	15.55	2776.67	.00	6.00	13.00	6.000	13.000	.00	0 .0
187.320	.0300					.0238	4.45	5.05	2.48	4.75	.015	.00	.00	BOX

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608
MPU ULTIMATE CONDITION FACILITY
SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-7033.499	2761.689	5.301	2766.990	2079.00	30.17	14.13	2781.12	.00	6.00	13.00	6.000	13.000	.00	0 .0

112.349	.0300					.0209	2.34	5.30	2.31	4.75	.015	.00	.00	BOX		
-6921.150	2765.060	5.560	2770.620	2079.00	28.76	12.85	2783.47	.00	6.00	13.00	6.000	13.000	.00	0	.0	
519.860	.0200					.0185	9.61	5.56	2.15	5.51	.015	.00	.00	BOX		
		WARNING - Flow depth near top of box conduit														
-6401.290	2775.450	5.792	2781.242	2079.00	27.61	11.84	2793.08	.00	6.00	13.00	6.000	13.000	.00	0	.0	
115.170	.0175					.0175	2.01	5.79	2.02	5.78	.015	.00	.00	BOX		
		WARNING - Flow depth near top of box conduit														
-6286.120	2777.470	5.795	2783.265	2079.00	27.60	11.83	2795.09	6.00	6.00	13.00	6.000	13.000	.00	0	.0	
180.330	.0175					.0174	3.14	6.00	2.02	5.79	.015	.00	.00	BOX		
		WARNING - Flow depth near top of box conduit														
-6105.790	2780.620	5.797	2786.417	2079.00	27.59	11.82	2798.24	.00	6.00	13.00	6.000	13.000	.00	0	.0	
692.170	.0175					.0226	15.63	5.80	2.02	5.79	.015	.00	.00	BOX		
		WARNING - Flow depth near top of box conduit														

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 7- 8-2016 Time: 6: 7:29

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608

MPU ULTIMATE CONDITION FACILITY

SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-5413.620	2792.730	6.000	2798.730	2079.00	26.65	11.03	2809.76	.00	6.00	13.00	6.000	13.000	.00	0	.0	
TRANS STR	.0175					.0060	.30	6.00	1.92		.015	.00	.00	BOX		
-5363.300	2793.610	15.070	2808.680	2079.00	13.86	2.98	2811.66	.00	5.99	25.00	6.000	25.000	.00	0	.0	
JUNCT STR	.0000					.0023	.00	15.07	1.00		.015	.00	.00	BOX		
-5363.300	2793.610	16.894	2810.504	1296.00	8.64	1.16	2811.66	.00	4.37	25.00	6.000	25.000	.00	0	.0	
WALL	EXIT															
-5363.300	2793.610	16.894	2810.504	1296.00	16.62	4.29	2814.79	.00	6.00	13.00	6.000	13.000	.00	0	.0	
366.990	.0185					.0108	3.96	.00	1.20	4.03	.015	.00	.00	BOX		
-4996.310	2800.400	14.988	2815.388	1296.00	16.62	4.29	2819.68	.00	6.00	13.00	6.000	13.000	.00	0	.0	
695.740	.0170					.0108	7.50	14.99	1.20	4.15	.015	.00	.00	BOX		
-4300.570	2812.210	10.681	2822.891	1296.00	16.62	4.29	2827.18	.00	6.00	13.00	6.000	13.000	.00	0	.0	
107.770	.0213					.0108	1.16	.00	1.20	3.83	.015	.00	.00	BOX		

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-4192.800	2814.510	10.045	2824.555	1296.00	16.62	4.29	2828.84	.00	6.00	13.00	6.000	13.000	.00	0 .0
109.460	.0213					.0108	1.18	.00	1.20	3.83	.015	.00	.00	BOX
-4083.340	2816.840	9.401	2826.241	1296.00	16.62	4.29	2830.53	.00	6.00	13.00	6.000	13.000	.00	0 .0
12.680	.0213					.0108	.14	9.40	1.20	3.83	.015	.00	.00	BOX
-4070.660	2817.110	9.268	2826.378	1296.00	16.62	4.29	2830.67	.00	6.00	13.00	6.000	13.000	.00	0 .0
JUNCT STR	.0000					.0064	.00	9.27	1.20		.015	.00	.00	BOX

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 7- 8-2016 Time: 6: 7:29

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608
MPU ULTIMATE CONDITION FACILITY
SKYE VILLAGE - SKYE CANYON PARK TO US-95

****

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-4070.660	2817.110	11.003	2828.113	1000.00	12.82	2.55	2830.67	.00	5.69	13.00	6.000	13.000	.00	0 .0
105.450	.0213					.0064	.68	11.00	.92	3.20	.015	.00	.00	BOX
-3965.210	2819.360	9.430	2828.790	1000.00	12.82	2.55	2831.34	.00	5.69	13.00	6.000	13.000	.00	0 .0
JUNCT STR	.0212					.0064	.16	9.43	.92		.015	.00	.00	BOX
-3940.210	2819.890	9.582	2829.471	816.00	12.36	2.37	2831.85	.00	5.55	11.00	6.000	11.000	.00	0 .0
240.610	.0213					.0064	1.55	9.58	.89	3.20	.015	.00	.00	BOX
-3699.600	2825.019	6.000	2831.019	816.00	12.36	2.37	2833.39	.00	5.55	11.00	6.000	11.000	.00	0 .0
1.920	.0213					.0038	.01	6.00	.89	3.20	.015	.00	.00	BOX
-3697.680	2825.060	5.801	2830.861	816.00	12.79	2.54	2833.40	.00	5.55	11.00	6.000	11.000	.00	0 .0
20.906	.0050					.0042	.09	5.80	.94	5.42	.015	.00	.00	BOX
		---------- WARNING - Flow depth near top of box conduit ----------												
-3676.773	2825.165	5.678	2830.843	816.00	13.06	2.65	2833.49	.00	5.55	11.00	6.000	11.000	.00	0 .0
HYDRAULIC JUMP														
		---------- WARNING - Flow depth near top of box conduit ----------												
-3676.773	2825.165	5.422	2830.587	816.00	13.68	2.91	2833.49	.00	5.55	11.00	6.000	11.000	.00	0 .0
1317.752	.0050					.0050	6.58	5.42	1.04	5.42	.015	.00	.00	BOX
		---------- WARNING - Flow depth near top of box conduit ----------												

Program Package Serial Number: 1704

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-2359.021	2831.749	5.422	2837.172	816.00	13.68	2.91	2840.08	.00	5.55	11.00	6.000	11.000	.00	0 .0
30.161	.0050					.0048	.15	5.42	1.04	5.42	.015	.00	.00	BOX
		WARNING - Flow depth near top of box conduit												
-2328.860	2831.900	5.550	2837.450	816.00	13.37	2.77	2840.22	.00	5.55	11.00	6.000	11.000	.00	0 .0
JUNCT STR	.0051					.0027	.14	5.55	1.00		.015	.00	.00	BOX
		WARNING - Flow depth near top of box conduit												
-2277.860	2832.160	7.550	2839.710	412.00	7.63	.90	2840.61	.00	4.02	9.00	6.000	9.000	.00	0 .0
674.696	.0050					.0027	1.83	7.55	.55	3.97	.015	.00	.00	BOX
-1603.164	2835.538	6.000	2841.538	412.00	7.63	.90	2842.44	.00	4.02	9.00	6.000	9.000	.00	0 .0
58.764	.0050					.0017	.10	6.00	.55	3.97	.015	.00	.00	BOX
-1544.400	2835.832	5.720	2841.552	412.00	8.00	.99	2842.55	.00	4.02	9.00	6.000	9.000	.00	0 .0
25.540	.0050					.0019	.05	5.72	.59	3.97	.015	.00	.00	BOX
		WARNING - Flow depth near top of box conduit												

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-1518.860	2835.960	5.599	2841.558	412.00	8.18	1.04	2842.60	.00	4.02	9.00	6.000	9.000	.00	0 .0
TRANS STR	.0048					.0020	.04	5.60	.61		.015	.00	.00	BOX
		WARNING - Flow depth near top of box conduit												
-1497.880	2836.060	5.096	2841.156	412.00	10.30	1.65	2842.80	.00	4.35	8.00	5.000	8.000	.00	0 .0
85.000	.0076					.0061	.52	.00	.81	3.81	.015	.00	.00	BOX
-1412.880	2836.710	5.098	2841.808	412.00	10.30	1.65	2843.46	.00	4.35	8.00	5.000	8.000	.00	0 .0

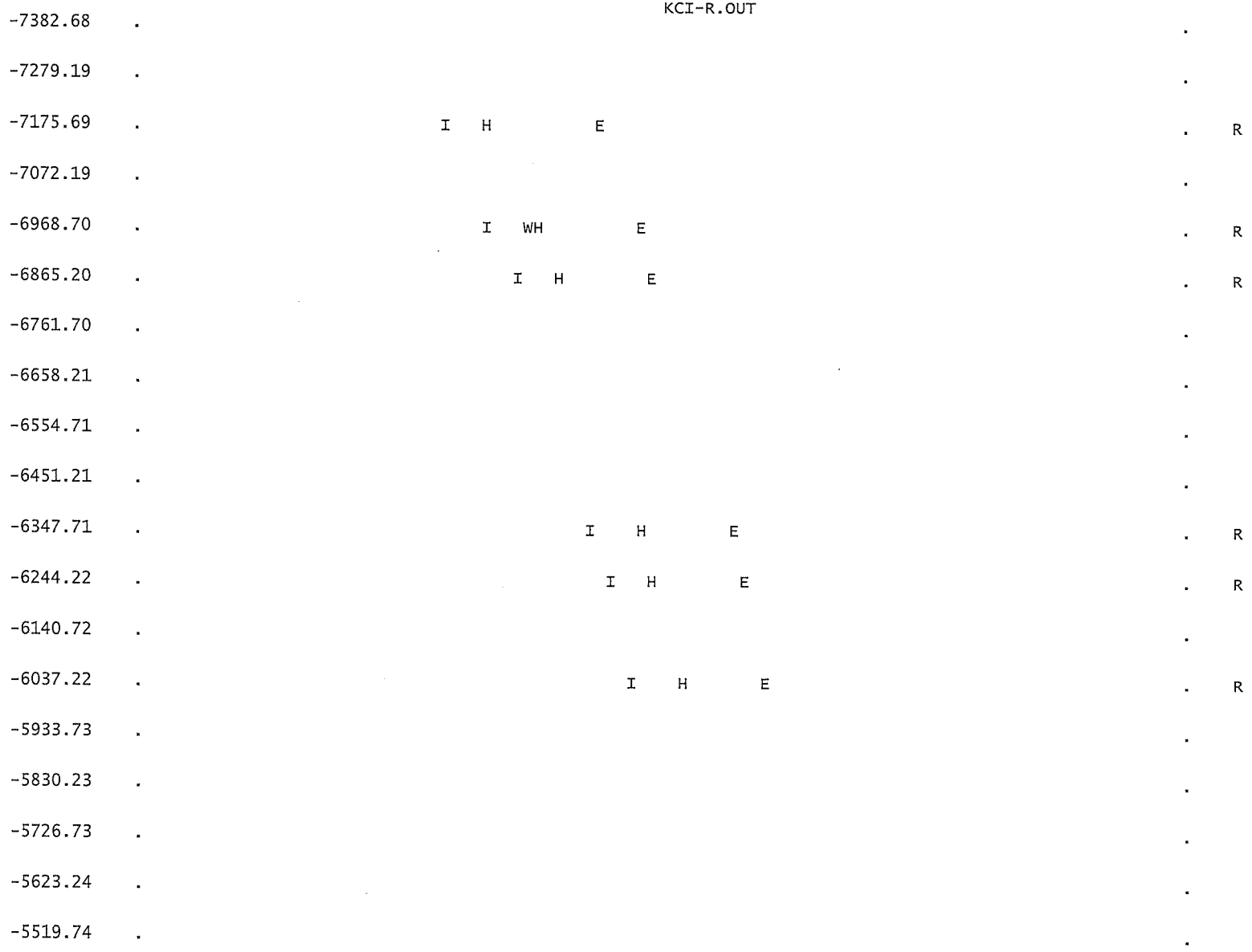
```
JUNCT STR   .0100                                                  .0075      .15    5.10     .81              .013       .00   .00  BOX
                   -------------------- WARNING - Junction Analysis - Change in Channel Type ---------------
         |         |        |         |         |                |         |        |        |        |        |        |      |
-1392.880  2836.910   5.559  2842.469    42.00    8.56    1.14  2843.61     .00    2.17     .00   2.500     .000   .00   1   .0
       -|-       -|-      -|-       -|-       -|-      -|-     -|-       -|-      -|-      -|-      -|-      -|-     -|-     |-
  634.000    .0100                                                 .0105     6.65    5.56     .00    2.11     .013       .00   .00  PIPE
         |         |        |         |         |                |         |        |        |        |        |        |      |
 -758.880  2843.260   5.856  2849.116    42.00    8.56    1.14  2850.25     .00    2.17     .00   2.500     .000   .00   1   .0
       -|-       -|-      -|-       -|-       -|-      -|-     -|-       -|-      -|-      -|-      -|-      -|-     -|-     |-
```

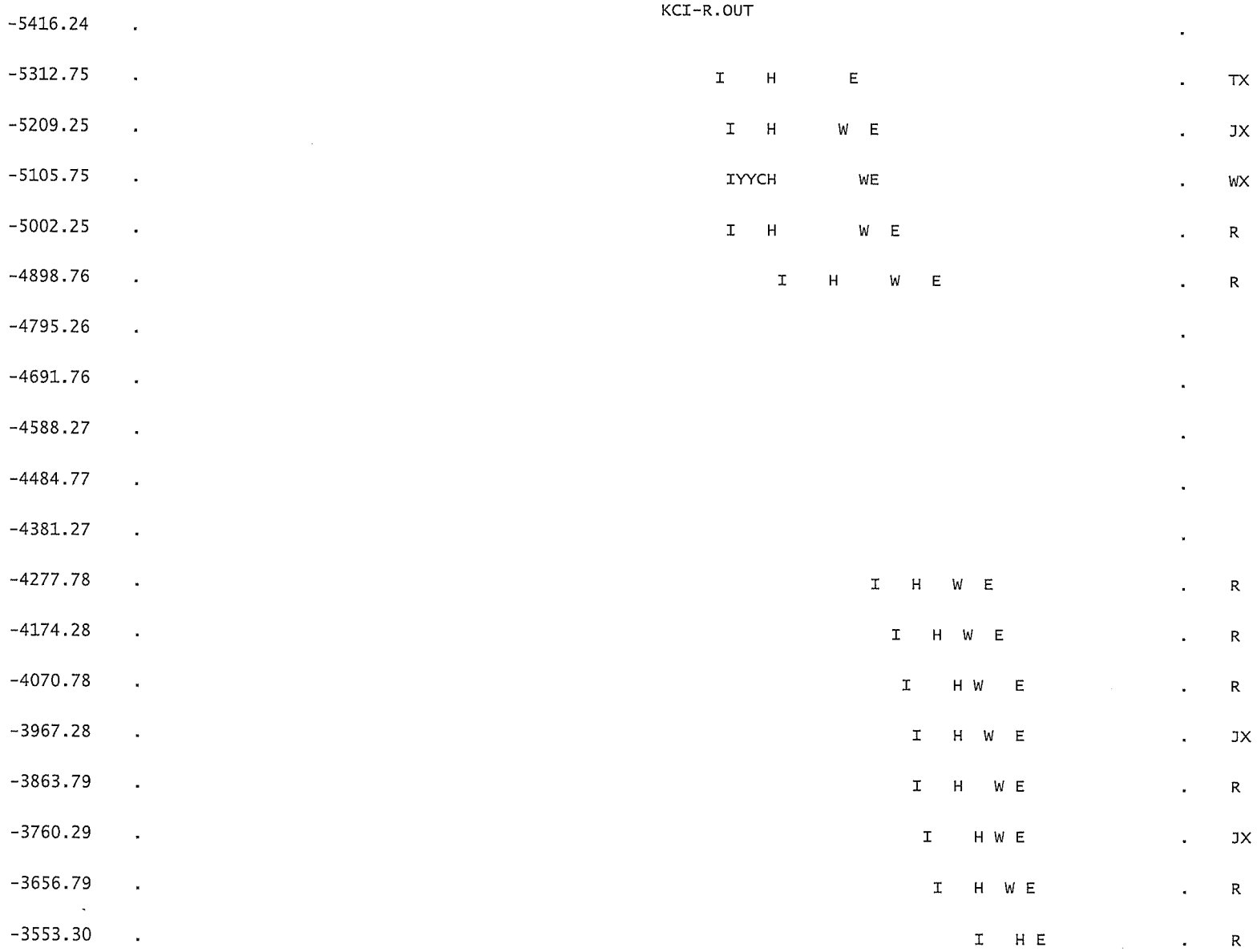
KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608

MPU ULTIMATE CONDITION FACILITY

SKYE VILLAGE - SKYE CANYON PARK TO US-95

```
-8521.15    .I   WH         E                                                                                  .    R

-8417.65    . I    H        E                                                                                  .    JX

-8314.16    .  I  WH            E                                                                              .    R

-8210.66    .  I   WH           E                                                                              .    R

-8107.16    .   I   WH           E                                                                             .    R

-8003.67    .                                                                                                  .

-7900.17    .                                                                                                  .

-7796.67    .                                                                                                  .

-7693.17    .                                                                                                  .

-7589.68    .                   I  WH           E                                                              .    R

-7486.18    .                                                                                                  .
```


-7382.68
-7279.19
-7175.69
-7072.19
-6968.70
-6865.20
-6761.70
-6658.21
-6554.71
-6451.21
-6347.71
-6244.22
-6140.72
-6037.22
-5933.73
-5830.23
-5726.73
-5623.24
-5519.74
I H E
I WH E
I H E
I H E
I H E
I H E
R
R
R
R
R


-5416.24
-5312.75
I H E
TX
-5209.25
I H W E
JX
-5105.75
IYYCH WE
WX
-5002.25
I H W E
R
-4898.76
I H W E
R
-4795.26
-4691.76
-4588.27
-4484.77
-4381.27
-4277.78
I H W E
R
-4174.28
I H W E
R
-4070.78
I H W E
R
-3967.28
I H W E
JX
-3863.79
I H W E
R
-3760.29
I H W E
JX
-3656.79
I H W E
R
-3553.30
I H E
R

-3449.80	.	I H E	.	R
-3346.30	.	I H E	.	R
-3242.81	.	I H E	.	R
-3139.31	.		.	
-3035.81	.		.	
-2932.32	.		.	
-2828.82	.		.	
-2725.32	.		.	
-2621.82	.		.	
-2518.33	.		.	
-2414.83	.		.	
-2311.33	.	I H E	.	R
-2207.84	.	I H E	.	JX
-2104.34	.	I CH W	.	R
-2000.84	.		.	
-1897.35	.		.	
-1793.85	.		.	
-1690.35	.		.	
-1586.86	.	I C HE	.	R

```
  -1483.36    .                                                
```

```
T1 KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608                                0
T2 MPU ULTIMATE CONDITION FACILITY (BLUE ALTERNATIVE)
T3 SKYE VILLAGE - SKYE CANYON PARK TO US-95
SO  -8781.6002717.430  2                          2724.430
R   -8681.6002720.730  2       .015                                      .00
JX  -8631.6002722.380  2 72    .015  453.0            2721.70          -30.0
R   -8368.3802731.070  2       .015                                     .000

R   -7825.0002749.000  2       .015                                   19.960    .000 0
TS  -7800.0002749.830  9       .015
R   -7689.0602753.460  9       .015                                     .000
R   -7590.4702754.690  9       .015                                  -34.041    .000 0
R   -7493.9902755.900  9       .015                                     .000

R   -7334.4702757.890  9       .015                                  -56.419    .000 0
R   -7140.6002760.320  9       .015                                     .000

R   -6973.6802762.400  9       .015                                   59.036    .000 0
R   -6921.1502763.060  9       .015                                     .000
R   -6401.2902773.450  9       .015                                     .000
TS  -6351.2402774.420  2       .015                                     .000
R   -6286.1202775.700  2       .015                                     .000
R   -6105.7902779.220  2       .015                                   51.661    .000 0
R   -5413.6202792.730  2       .015                                     .000
TS  -5363.3002793.610  6       .015                                     .000
JX  -5363.3002793.610  6  3    .015  783.000           2793.610
WX  -5363.3002793.610  1       .015                                     .000
R   -4996.3102800.400  1       .015                                 -105.135    .000 0
R   -4300.5702812.210  1       .015                                     .000
R   -4192.8002814.510  1       .015                                   30.874    .000 0
R   -4083.3402816.840  1       .015                                  -31.358    .000 0
R   -4070.6602817.110  1       .015                                     .000
JX  -4070.6602817.110  1 54    .015  296.0            2817.11           30.0
R   -3965.2102819.360  1       .015                                     .000
JX  -3940.2102819.890  7 42 42.015   92.0     92.0  2819.62 2819.62   30.0-30.0
R   -3697.6802825.060  7       .015                                     .000
R   -2328.8602831.900  7       .015                                     .000
JX  -2277.8602832.160  3  4    .015  404.000           2832.04           30.0
R   -1518.8602835.960  3       .015                                     .000
TS  -1497.8802836.060  5       .015
R   -1412.8802836.710  5       .015                                   15.000
JX  -1392.8802836.910 30 60    .013  370.0             2836.81           45.0
R    -758.8802843.260 30       .013                                     .000
SH   -758.8802843.260 30
CD   1  3   0    .000   6.000   13.000  .000  .000   .00
CD   2  3   0    .000   7.000   13.000  .000  .000   .00
CD   3  3   0    .000   6.000    9.000  .000  .000   .00
CD   4  3   0    .000   6.000    6.000  .000  .000   .00
CD   5  3   0    .000   5.000    8.000  .000  .000   .00
CD   6  3   0    .000   6.000   25.000  .000  .000   .00
CD   7  3   0    .000   6.000   11.000  .000  .000   .00
CD   8  3   0    .000   6.000   12.000  .000  .000   .00
CD   9  3   0    .000   8.000   13.000  .000  .000   .00
CD  10  3   0    .000   8.000    9.000  .000  .000   .00
CD  11  3   0    .000   8.000    8.000  .000  .000   .00
CD  30  4   1    .000   2.500     .000  .000  .000   .00
CD  36  4   1    .000   3.000     .000  .000  .000   .00
CD  42  4   1    .000   3.500     .000  .000  .000   .00
CD  54  4   1    .000   4.500     .000  .000  .000   .00
CD  60  4   1    .000   5.000     .000  .000  .000   .00
CD  72  4   1    .000   6.000     .000  .000  .000   .00
```

Q 42.000 .0

KCI-B.EDT

FILE: KCI-B.WSW W S P G W - EDIT LISTING - Version 14.06 Date: 7- 8-2016 Time: 6:33:37

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	3	0	.000	6.000	13.000	.000	.000	.00										
CD	2	3	0	.000	7.000	13.000	.000	.000	.00										
CD	3	3	0	.000	6.000	9.000	.000	.000	.00										
CD	4	3	0	.000	6.000	6.000	.000	.000	.00										
CD	5	3	0	.000	5.000	8.000	.000	.000	.00										
CD	6	3	0	.000	6.000	25.000	.000	.000	.00										
CD	7	3	0	.000	6.000	11.000	.000	.000	.00										
CD	8	3	0	.000	6.000	12.000	.000	.000	.00										
CD	9	3	0	.000	8.000	13.000	.000	.000	.00										
CD	10	3	0	.000	8.000	9.000	.000	.000	.00										
CD	11	3	0	.000	8.000	8.000	.000	.000	.00										
CD	30	4	1		2.500														
CD	36	4	1		3.000														
CD	42	4	1		3.500														
CD	54	4	1		4.500														
CD	60	4	1		5.000														
CD	72	4	1		6.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608

HEADING LINE NO 2 IS -

MPU ULTIMATE CONDITION FACILITY (BLUE ALTERNATIVE)

HEADING LINE NO 3 IS -

SKYE VILLAGE - SKYE CANYON PARK TO US-95

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

	STATION	INVERT	SECT	W S ELEV
U/S DATA	-8781.600	2717.430	2	2724.430

ELEMENT NO 2 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-8681.600	2720.730	2	.015	.000	.000	.000	0

ELEMENT NO 3 IS A JUNCTION * * * * * * *

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	-8631.600	2722.380	2	72	0	.015	453.000	.000	2721.700	.000	-30.000	.000

	RADIUS	ANGLE
	.000	.000

ELEMENT NO 4 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-8368.380	2731.070	2	.015	.000	.000	.000	0

ELEMENT NO 5 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-7825.000	2749.000	2	.015	1559.788	19.960	.000	0

ELEMENT NO 6 IS A TRANSITION * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE
U/S DATA	-7800.000	2749.830	9	.015	.000	.000

ELEMENT NO 7 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-7689.060	2753.460	9	.015	.000	.000	.000	0

ELEMENT NO 8 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H

-7590.470 2754.690 9 .015 165.941 -34.041 .000 0

ELEMENT NO 9 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

-7493.990 2755.900 9 .015 .000 .000 .000 0

ELEMENT NO 10 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

-7334.470 2757.890 9 .015 161.999 -56.419 .000 0

ELEMENT NO 11 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

-7140.600 2760.320 9 .015 .000 .000 .000 0

ELEMENT NO 12 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

-6973.680 2762.400 9 .015 162.000 59.036 .000 0

ELEMENT NO 13 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

-6921.150 2763.060 9 .015 .000 .000 .000 0

ELEMENT NO 14 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

-6401.290 2773.450 9 .015 .000 .000 .000 0

ELEMENT NO 15 IS A TRANSITION * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE

-6351.240 2774.420 2 .015 .000 .000

ELEMENT NO 16 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

-6286.120 2775.700 2 .015 .000 .000 .000 0

ELEMENT NO 17 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

-6105.790 2779.220 2 .015 199.999 51.661 .000 0

ELEMENT NO 18 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

-5413.620 2792.730 2 .015 .000 .000 .000 0

ELEMENT NO 19 IS A TRANSITION * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE

-5363.300 2793.610 6 .015 .000 .000

ELEMENT NO 20 IS A JUNCTION * * * * * * *

U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4

-5363.300 2793.610 6 3 0 .015 783.000 .000 2793.610 .000 .000 .000

RADIUS ANGLE

.000 .000

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 21 IS A WALL EXIT *

U/S DATA STATION INVERT SECT

-5363.300 2793.610 1

ELEMENT NO 22 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

-4996.310 2800.400 1 .015 200.000 -105.135 .000 0

ELEMENT NO 23 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

-4300.570 2812.210 1 .015 .000 .000 .000 0

ELEMENT NO 24 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

-4192.800 2814.510 1 .015 199.999 30.874 .000 0

```
ELEMENT NO  25 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -4083.340 2816.840    1                .015                       199.999  -31.358      .000     0
ELEMENT NO  26 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -4070.660 2817.110    1                .015                          .000     .000      .000     0
ELEMENT NO  27 IS A JUNCTION           *         *     *     *                  *                  *                 *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3         Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                            -4070.660 2817.110    1    54     0   .015   296.000      .000  2817.110      .000  30.000     .000
                                                                                                RADIUS    ANGLE
                                                                                                  .000     .000
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
ELEMENT NO  28 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -3965.210 2819.360    1                .015                          .000     .000      .000     0
ELEMENT NO  29 IS A JUNCTION           *         *     *     *                  *                  *                 *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3         Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                            -3940.210 2819.890    7    42    42   .015    92.000    92.000  2819.620  2819.620  30.000  -30.000
                                                                                                RADIUS    ANGLE
                                                                                                  .000     .000
ELEMENT NO  30 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -3697.680 2825.060    7                .015                          .000     .000      .000     0
ELEMENT NO  31 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -2328.860 2831.900    7                .015                          .000     .000      .000     0
ELEMENT NO  32 IS A JUNCTION           *         *     *     *                  *                  *                 *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3         Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                            -2277.860 2832.160    3     4     0   .015   404.000      .000  2832.040      .000  30.000     .000
                                                                                                RADIUS    ANGLE
                                                                                                  .000     .000
                                                    W S P G W                                                          PAGE NO   5
                        WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  33 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -1518.860 2835.960    3                .015                          .000     .000      .000     0
ELEMENT NO  34 IS A TRANSITION         *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS   ANGLE
                            -1497.880 2836.060    5                .015                          .000     .000
ELEMENT NO  35 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                            -1412.880 2836.710    5                .015                       324.676   15.000      .000     0
ELEMENT NO  36 IS A JUNCTION           *         *     *     *                  *                  *                 *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3         Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                            -1392.880 2836.910   30    60     0   .013   370.000      .000  2836.810      .000  45.000     .000
                                                                                                RADIUS    ANGLE
                                                                                                  .000     .000
ELEMENT NO  37 IS A REACH              *         *     *
                  U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                             -758.880 2843.260   30                .013                          .000     .000      .000     0
ELEMENT NO  38 IS A SYSTEM HEADWORKS                 *                      *
                  U/S DATA   STATION    INVERT  SECT                                      W S ELEV
                             -758.880 2843.260   30                                          .000
```

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-8781.600	2717.430	6.262	2723.692	2532.00	31.10	15.02	2738.71	.00	7.00	13.00	7.000	13.000	.00	0 .0
27.509	.0330					.0206	.57	6.26	2.19	5.30	.015	.00	.00	BOX
-8754.091	2718.338	6.354	2724.692	2532.00	30.65	14.59	2739.28	.00	7.00	13.00	7.000	13.000	.00	0 .0
72.491	.0330					.0190	1.38	6.35	2.14	5.30	.015	.00	.00	BOX
---------- WARNING - Flow depth near top of box conduit ----------														
-8681.600	2720.730	6.665	2727.395	2532.00	29.22	13.26	2740.66	.00	7.00	13.00	7.000	13.000	.00	0 .0
JUNCT STR	.0330					.0247	1.23	6.66	1.99		.015	.00	.00	BOX
---------- WARNING - Flow depth near top of box conduit ----------														
-8631.600	2722.380	4.669	2727.049	2079.00	34.25	18.22	2745.27	.00	7.00	13.00	7.000	13.000	.00	0 .0
263.220	.0330					.0307	8.08	4.67	2.79	4.59	.015	.00	.00	BOX
-8368.380	2731.070	4.762	2735.832	2079.00	33.58	17.51	2753.35	.29	7.00	13.00	7.000	13.000	.00	0 .0
139.159	.0330					.0291	4.05	5.05	2.71	4.59	.015	.00	.00	BOX
-8229.221	2735.662	4.849	2740.511	2079.00	32.98	16.89	2757.40	.28	7.00	13.00	7.000	13.000	.00	0 .0
204.250	.0330					.0266	5.44	5.13	2.64	4.59	.015	.00	.00	BOX
-8024.971	2742.402	5.086	2747.488	2079.00	31.44	15.35	2762.84	.26	7.00	13.00	7.000	13.000	.00	0 .0
119.177	.0330					.0234	2.79	5.34	2.46	4.59	.015	.00	.00	BOX

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-7905.794	2746.334	5.334	2751.668	2079.00	29.98	13.96	2765.63	.23	7.00	13.00	7.000	13.000	.00	0 .0
80.794	.0330					.0205	1.66	5.57	2.29	4.59	.015	.00	.00	BOX
-7825.000	2749.000	5.595	2754.595	2079.00	28.59	12.69	2767.28	.00	7.00	13.00	7.000	13.000	.00	0 .0

TRANS STR	.0332					.0188	.47	5.59	2.13			.015	.00	.00	BOX			
-7800.000	2749.830	5.687	2755.517	2079.00	28.12	12.28	2767.80	.00	8.00	13.00	8.000	13.000	.00	0	.0			
26.574	.0327					.0178	.47	5.69	2.08	4.61	.015	.00	.00	BOX				
-7773.426	2750.700	5.811	2756.511	2079.00	27.52	11.76	2768.27	.00	8.00	13.00	8.000	13.000	.00	0	.0			
47.734	.0327					.0163	.78	5.81	2.01	4.61	.015	.00	.00	BOX				
-7725.692	2752.261	6.095	2758.356	2079.00	26.24	10.69	2769.05	.00	8.00	13.00	8.000	13.000	.00	0	.0			
36.632	.0327					.0143	.52	6.09	1.87	4.61	.015	.00	.00	BOX				
-7689.060	2753.460	6.392	2759.852	2079.00	25.02	9.72	2769.57	1.52	8.00	13.00	8.000	13.000	.00	0	.0			
98.590	.0125					.0135	1.33	7.92	1.74	6.57	.015	.00	.00	BOX				
-7590.470	2754.690	6.342	2761.031	2079.00	25.22	9.88	2770.91	.00	8.00	13.00	8.000	13.000	.00	0	.0			
96.480	.0125					.0139	1.34	6.34	1.76	6.55	.015	.00	.00	BOX				
-7493.990	2755.900	6.282	2762.182	2079.00	25.46	10.06	2772.24	1.61	8.00	13.00	8.000	13.000	.00	0	.0			
159.520	.0125					.0145	2.31	7.90	1.79	6.57	.015	.00	.00	BOX				
-7334.470	2757.890	6.145	2764.035	2079.00	26.02	10.52	2774.55	.00	8.00	13.00	8.000	13.000	.00	0	.0			
193.870	.0125					.0157	3.05	6.15	1.85	6.55	.015	.00	.00	BOX				

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 7- 8-2016 Time: 6:33:41

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608
MPU ULTIMATE CONDITION FACILITY (BLUE ALTERNATIVE)
SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-7140.600	2760.320	5.910	2766.230	2079.00	27.06	11.37	2777.60	1.82	8.00	13.00	8.000	13.000	.00	0 .0
2.330	.0125					.0166	.04	7.73	1.96	6.57	.015	.00	.00	BOX
-7138.270	2760.349	5.906	2766.255	2079.00	27.08	11.38	2777.64	1.83	8.00	13.00	8.000	13.000	.00	0 .0
164.590	.0125					.0177	2.91	7.73	1.96	6.57	.015	.00	.00	BOX
-6973.680	2762.400	5.631	2768.031	2079.00	28.40	12.52	2780.55	.00	8.00	13.00	8.000	13.000	.00	0 .0
52.530	.0126					.0193	1.01	5.63	2.11	6.55	.015	.00	.00	BOX
-6921.150	2763.060	5.532	2768.592	2079.00	28.91	12.98	2781.57	.00	8.00	13.00	8.000	13.000	.00	0 .0
519.860	.0200					.0193	10.05	5.53	2.17	5.51	.015	.00	.00	BOX
-6401.290	2773.450	5.626	2779.076	2079.00	28.43	12.55	2791.62	.00	8.00	13.00	8.000	13.000	.00	0 .0
TRANS STR	.0194					.0189	.94	5.63	2.11		.015	.00	.00	BOX

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-6351.240	2774.420	5.631	2780.051	2079.00	28.40	12.52	2792.57	.00	7.00	13.00	7.000	13.000	.00	0 .0
65.120	.0197					.0188	1.22	5.63	2.11	5.54	.015	.00	.00	BOX
-6286.120	2775.700	5.648	2781.348	2079.00	28.31	12.45	2793.80	7.00	7.00	13.00	7.000	13.000	.00	0 .0
180.330	.0195					.0184	3.33	7.00	2.10	5.56	.015	.00	.00	BOX
-6105.790	2779.220	5.706	2784.926	2079.00	28.03	12.20	2797.12	.00	7.00	13.00	7.000	13.000	.00	0 .0
150.146	.0195					.0179	2.68	5.71	2.07	5.56	.015	.00	.00	BOX
-5955.645	2782.151	5.784	2787.935	2079.00	27.65	11.87	2799.80	.00	7.00	13.00	7.000	13.000	.00	0 .0
261.372	.0195					.0165	4.30	5.78	2.03	5.56	.015	.00	.00	BOX

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 7- 8-2016 Time: 6:33:41

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608

MPU ULTIMATE CONDITION FACILITY (BLUE ALTERNATIVE)

SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-5694.272	2787.252	6.067	2793.319	2079.00	26.36	10.79	2804.11	.00	7.00	13.00	7.000	13.000	.00	0 .0
136.154	.0195					.0145	1.97	6.07	1.89	5.56	.015	.00	.00	BOX
-5558.119	2789.910	6.363	2796.272	2079.00	25.13	9.81	2806.08	.00	7.00	13.00	7.000	13.000	.00	0 .0
85.934	.0195					.0128	1.10	6.36	1.76	5.56	.015	.00	.00	BOX
---------- WARNING - Flow depth near top of box conduit ----------														
-5472.185	2791.587	6.673	2798.260	2079.00	23.96	8.92	2807.18	.00	7.00	13.00	7.000	13.000	.00	0 .0
58.565	.0195					.0149	.87	6.67	1.63	5.56	.015	.00	.00	BOX
---------- WARNING - Flow depth near top of box conduit ----------														
-5413.620	2792.730	7.000	2799.730	2079.00	22.85	8.10	2807.83	.00	7.00	13.00	7.000	13.000	.00	0 .0
TRANS STR	.0175					.0060	.30	7.00	1.52		.015	.00	.00	BOX
-5363.300	2793.610	12.510	2806.120	2079.00	13.86	2.98	2809.10	.00	5.99	25.00	6.000	25.000	.00	0 .0
JUNCT STR	.0000					.0023	.00	12.51	1.00		.015	.00	.00	BOX
-5363.300	2793.610	14.334	2807.944	1296.00	8.64	1.16	2809.10	.00	4.37	25.00	6.000	25.000	.00	0 .0
WALL EXIT														
-5363.300	2793.610	14.334	2807.944	1296.00	16.62	4.29	2812.23	.00	6.00	13.00	6.000	13.000	.00	0 .0
366.990	.0185					.0108	3.96	.00	1.20	4.03	.015	.00	.00	BOX

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 7- 8-2016 Time: 6:33:41

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608
MPU ULTIMATE CONDITION FACILITY (BLUE ALTERNATIVE)
SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-4996.310	2800.400	12.428	2812.828	1296.00	16.62	4.29	2817.11	.00	6.00	13.00	6.000	13.000	.00	0 .0
695.740	.0170					.0108	7.50	12.43	1.20	4.15	.015	.00	.00	BOX
-4300.570	2812.210	8.121	2820.331	1296.00	16.62	4.29	2824.62	.00	6.00	13.00	6.000	13.000	.00	0 .0
107.770	.0213					.0108	1.16	.00	1.20	3.83	.015	.00	.00	BOX
-4192.800	2814.510	7.485	2821.995	1296.00	16.62	4.29	2826.28	.00	6.00	13.00	6.000	13.000	.00	0 .0
109.460	.0213					.0108	1.18	.00	1.20	3.83	.015	.00	.00	BOX
-4083.340	2816.840	6.841	2823.681	1296.00	16.62	4.29	2827.97	.00	6.00	13.00	6.000	13.000	.00	0 .0
12.680	.0213					.0108	.14	6.84	1.20	3.83	.015	.00	.00	BOX
-4070.660	2817.110	6.708	2823.818	1296.00	16.62	4.29	2828.10	.00	6.00	13.00	6.000	13.000	.00	0 .0
JUNCT STR	.0000					.0064	.00	6.71	1.20		.015	.00	.00	BOX
-4070.660	2817.110	8.443	2825.553	1000.00	12.82	2.55	2828.10	.00	5.69	13.00	6.000	13.000	.00	0 .0
105.450	.0213					.0064	.68	8.44	.92	3.20	.015	.00	.00	BOX
-3965.210	2819.360	6.870	2826.230	1000.00	12.82	2.55	2828.78	.00	5.69	13.00	6.000	13.000	.00	0 .0
JUNCT STR	.0212							6.87	.92		.015	.00	.00	BOX
-3940.210	2819.890	3.502	2823.392	816.00	21.18	6.97	2830.36	.00	5.55	11.00	6.000	11.000	.00	0 .0
17.091	.0213					.0164	.28	3.50	1.99	3.20	.015	.00	.00	BOX
-3923.119	2820.254	3.531	2823.785	816.00	21.01	6.85	2830.64	.00	5.55	11.00	6.000	11.000	.00	0 .0
73.490	.0213					.0152	1.12	3.53	1.97	3.20	.015	.00	.00	BOX

WATER SURFACE PROFILE LISTING Date: 7- 8-2016 Time: 6:33:41

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608
MPU ULTIMATE CONDITION FACILITY (BLUE ALTERNATIVE)
SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-3849.629	2821.821	3.704	2825.524	816.00	20.03	6.23	2831.75	.00	5.55	11.00	6.000	11.000	.00	0 .0
48.034	.0213					.0133	.64	3.70	1.83	3.20	.015	.00	.00	BOX

-3801.595	2822.845	3.884	2826.729	816.00	19.10	5.66	2832.39	.00	5.55	11.00	6.000	11.000	.00	0	.0
33.611	.0213					.0116	.39	3.88	1.71	3.20	.015	.00	.00	BOX	
-3767.984	2823.561	4.074	2827.635	816.00	18.21	5.15	2832.78	.00	5.55	11.00	6.000	11.000	.00	0	.0
24.219	.0213					.0102	.25	4.07	1.59	3.20	.015	.00	.00	BOX	
-3743.764	2824.078	4.273	2828.350	816.00	17.36	4.68	2833.03	.00	5.55	11.00	6.000	11.000	.00	0	.0
17.540	.0213					.0089	.16	4.27	1.48	3.20	.015	.00	.00	BOX	
-3726.224	2824.452	4.481	2828.933	816.00	16.55	4.25	2833.19	.00	5.55	11.00	6.000	11.000	.00	0	.0
12.486	.0213					.0079	.10	4.48	1.38	3.20	.015	.00	.00	BOX	
-3713.739	2824.718	4.700	2829.418	816.00	15.78	3.87	2833.29	.00	5.55	11.00	6.000	11.000	.00	0	.0
8.479	.0213					.0069	.06	4.70	1.28	3.20	.015	.00	.00	BOX	
-3705.260	2824.898	4.929	2829.828	816.00	15.05	3.52	2833.34	.00	5.55	11.00	6.000	11.000	.00	0	.0
5.185	.0213					.0061	.03	4.93	1.19	3.20	.015	.00	.00	BOX	
-3700.075	2825.009	5.170	2830.179	816.00	14.35	3.20	2833.38	.00	5.55	11.00	6.000	11.000	.00	0	.0
2.395	.0213					.0053	.01	5.17	1.11	3.20	.015	.00	.00	BOX	
-3697.680	2825.060	5.422	2830.482	816.00	13.68	2.91	2833.39	.00	5.55	11.00	6.000	11.000	.00	0	.0
1338.659	.0050					.0050	6.69	5.42	1.04	5.42	.015	.00	.00	BOX	

---------- WARNING - Flow depth near top of box conduit ----------

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-2359.021	2831.749	5.422	2837.172	816.00	13.68	2.91	2840.08	.00	5.55	11.00	6.000	11.000	.00	0 .0
30.161	.0050					.0048	.15	5.42	1.04	5.42	.015	.00	.00	BOX

---------- WARNING - Flow depth near top of box conduit ----------

-2328.860	2831.900	5.550	2837.450	816.00	13.37	2.77	2840.22	.00	5.55	11.00	6.000	11.000	.00	0	.0
JUNCT STR	.0051					.0027	.14	5.55	1.00		.015	.00	.00	BOX	

---------- WARNING - Flow depth near top of box conduit ----------

-2277.860	2832.160	7.550	2839.710	412.00	7.63	.90	2840.61	.00	4.02	9.00	6.000	9.000	.00	0	.0
674.696	.0050					.0027	1.83	7.55	.55	3.97	.015	.00	.00	BOX	
-1603.164	2835.538	6.000	2841.538	412.00	7.63	.90	2842.44	.00	4.02	9.00	6.000	9.000	.00	0	.0

58.764	.0050					.0017	.10	6.00	.55	3.97	.015	.00	.00	BOX		
-1544.400	2835.832	5.720	2841.552	412.00	8.00	.99	2842.55	.00	4.02	9.00	6.000	9.000	.00	0	.0	
25.540	.0050					.0019	.05	5.72	.59	3.97	.015	.00	.00	BOX		

---------- WARNING - Flow depth near top of box conduit ----------

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1518.860	2835.960	5.599	2841.558	412.00	8.18	1.04	2842.60	.00	4.02	9.00	6.000	9.000	.00	0 .0
TRANS STR	.0048					.0020	.04	5.60	.61		.015	.00	.00	BOX

---------- WARNING - Flow depth near top of box conduit ----------

-1497.880	2836.060	5.096	2841.156	412.00	10.30	1.65	2842.80	.00	4.35	8.00	5.000	8.000	.00	0	.0	
85.000	.0076					.0061	.52	.00	.81	3.81	.015	.00	.00	BOX		
-1412.880	2836.710	5.098	2841.808	412.00	10.30	1.65	2843.46	.00	4.35	8.00	5.000	8.000	.00	0	.0	
JUNCT STR	.0100					.0075	.15	5.10	.81		.013	.00	.00	BOX		

---------- WARNING - Junction Analysis - Change in Channel Type ----------

-1392.880	2836.910	5.559	2842.469	42.00	8.56	1.14	2843.61	.00	2.17	.00	2.500	.000	.00	1	.0	
634.000	.0100					.0105	6.65	5.56	.00	2.11	.013	.00	.00	PIPE		
-758.880	2843.260	5.856	2849.116	42.00	8.56	1.14	2850.25	.00	2.17	.00	2.500	.000	.00	1	.0	

♀
♀

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608

MPU ULTIMATE CONDITION FACILITY (BLUE ALTERNATIVE)

SKYE VILLAGE - SKYE CANYON PARK TO US-95

-8781.60	.I	WH	E		.	R
-8714.18	.I	H	E		.	R

```
-8646.76   .  I    H         E                                                  .   JX
-8579.35   .   I   WH           E                                               .   R
-8511.93   .                                                                    .
-8444.51   .                                                                    .
-8377.09   .                                                                    .
-8309.67   .          I  WSH           E                                        .   R
-8242.26   .                                                                    .
-8174.84   .             I   WH           E                                      .   R
-8107.42   .                                                                    .
-8040.00   .                                                                    .
-7972.59   .                  I   W H         E                                 .   R
-7905.17   .                     I   W H        E                               .   R
-7837.75   .                                                                    .
-7770.33   .                       I   W H       E                              .   TX
-7702.91   .                        I   W H      E                              .   R
-7635.50   .                         I   W H      E                             .   R
-7568.08   .                          I   W H     E                             .   R
-7500.66   .                           I   W H     E                            .   R
-7433.24   .                            I   W H     E                           .   R
-7365.83   .                            I    WH      E                          .   R
-7298.41   .                              I    WH      E                        .   R
```

```
-7230.99   .                                                                  .
-7163.57   .                                                                  .
-7096.15   .                    I   W H      E                                .   R
-7028.74   .                    I   W H      E                                .   R
-6961.32   .                     I    WH       E                              .   R
-6893.90   .                      I   W H       E                             .   R
-6826.48   .                                                                  .
-6759.07   .                                                                  .
-6691.65   .                                                                  .
-6624.23   .                                                                  .
-6556.81   .                                                                  .
-6489.39   .                                                                  .
-6421.98   .                                                                  .
-6354.56   .                            I   W H      E                        .   TX
-6287.14   .                            I    WH       E                       .   R
-6219.72   .                             I    WH       E                      .   R
-6152.31   .                                                                  .
-6084.89   .                                I   WH       E                     .   R
-6017.47   .                                                                  .
-5950.05   .                                  I    H        E                  .   R
```

```
-5882.63    .                                                    .
-5815.22    .                                                    .
-5747.80    .                                                    .
-5680.38    .                    I    H       E                  .    R
-5612.96    .                                                    .
-5545.54    .                     I    H      E                  .    R
-5478.13    .                                                    .
-5410.71    .                      I    WH     E                 .    R
-5343.29    .                       I    H      E                .    TX
-5275.87    .                       I   H    W  E                .    JX
-5208.46    .                       IYYCH      WE                .    WX
-5141.04    .                       I   H     W  E               .    R
-5073.62    .                                                    .
-5006.20    .                                                    .
-4938.78    .                            I   H    W    E         .    R
-4871.37    .                                                    .
-4803.95    .                                                    .
-4736.53    .                                                    .
-4669.11    .                                                    .
-4601.70    .                                                    .
```

-4534.28	.		.	
-4466.86	.		.	
-4399.44	.		.	
-4332.02	.		.	
-4264.61	.	I H W E	.	R
-4197.19	.		.	
-4129.77	.	I HW E	.	R
-4062.35	.	I H E	.	R
-3994.94	.	I HW E	.	JX
-3927.52	.	I H W E	.	R
-3860.10	.	I H E	.	JX
-3792.68	.	I W H E	.	R
-3725.26	.	I WH E	.	R
-3657.85	.	I WCH E	.	R
-3590.43	.	I WH E	.	R
-3523.01	.	I W H E	.	R
-3455.59	.	I WH E	.	R
-3388.17	.	I WCH E	.	R
-3320.76	.	I WH E	.	R
-3253.34	.	I WH E	.	R
-3185.92	.	I WH E	.	R

```
-3118.50   .                                                  I   H E          .   R
-3051.09   .                                                                   .
-2983.67   .                                                                   .
-2916.25   .                                                                   .
-2848.83   .                                                                   .
-2781.41   .                                                                   .
-2714.00   .                                                                   .
-2646.58   .                                                                   .
-2579.16   .                                                                   .
-2511.74   .                                                                   .
-2444.33   .                                                                   .
-2376.91   .                                                                   .
-2309.49   .                                                      I   H E      .   R
-2242.07   .                                                      I   H E      .   JX
-2174.65   .                                                      I  CH W      .   R
-2107.24   .                                                                   .
-2039.82   .                                                                   .
-1972.40   .                                                                   .
-1904.98   .                                                                   .
-1837.57   .                                                                   .
```

```
-1770.15    .                                                
```

E = ENERGY GRADE LINE
X = CURVES CROSSING OVER
B = BRIDGE ENTRANCE OR EXIT
Y = WALL ENTRANCE OR EXIT

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

```
T1 KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608                                    0
T2 MPU ULTIMATE CONDITION FACILITY
T3 OSO BLANCA LATERAL
SO  -2663.6202793.590  3                          2810.5
R   -2399.1302803.850  3      .015                                  .000
R   -1762.6702828.560  3      .015                                70.809    .000 0
R   -1606.3202834.630  3      .015                               -89.582    .000 0
R   -1197.4402850.490  3      .015                                  .000
SH  -1197.4402850.490  3
CD   1  3   0    .000   6.000   13.000  .000  .000   .00
CD   2  3   0    .000   6.000   11.000  .000  .000   .00
CD   3  3   0    .000   6.000    9.000  .000  .000   .00
CD   4  3   0    .000   6.000    6.000  .000  .000   .00
CD   5  3   0    .000   5.000    8.000  .000  .000   .00
CD   6  3   0    .000   6.000    9.000  .000  .000   .00
CD   7  3   0    .000   6.000   10.000  .000  .000   .00
CD   8  3   0    .000   8.000   11.000  .000  .000   .00
CD   9  3   0    .000   6.000   12.000  .000  .000   .00
CD  10  3   0    .000   8.000    9.000  .000  .000   .00
CD  11  3   0    .000   8.000    8.000  .000  .000   .00
CD  42  4   1    .000   3.500     .000  .000  .000   .00
CD  54  4   1    .000   4.500     .000  .000  .000   .00
Q          1324.000   .0
```

KCI-LAT.EDT

FILE: KCI-LAT.WSW

W S P G W - EDIT LISTING - Version 14.06 Date: 7- 8-2016 Time: 7:25:30

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	3	0	.000	6.000	13.000	.000	.000	.00										
CD	2	3	0	.000	6.000	11.000	.000	.000	.00										
CD	3	3	0	.000	6.000	9.000	.000	.000	.00										
CD	4	3	0	.000	6.000	6.000	.000	.000	.00										
CD	5	3	0	.000	5.000	8.000	.000	.000	.00										
CD	6	3	0	.000	6.000	9.000	.000	.000	.00										
CD	7	3	0	.000	6.000	10.000	.000	.000	.00										
CD	8	3	0	.000	8.000	11.000	.000	.000	.00										
CD	9	3	0	.000	6.000	12.000	.000	.000	.00										
CD	10	3	0	.000	8.000	9.000	.000	.000	.00										
CD	11	3	0	.000	8.000	8.000	.000	.000	.00										
CD	42	4	1		3.500														
CD	54	4	1		4.500														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608

HEADING LINE NO 2 IS -

MPU ULTIMATE CONDITION FACILITY

HEADING LINE NO 3 IS -

OSO BLANCA LATERAL

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA STATION INVERT SECT W S ELEV

-2663.620 2793.590 3 2810.500

ELEMENT NO 2 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-2399.130	2803.850	3	.015	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-1762.670	2828.560	3	.015	514.998	70.809	.000	0

ELEMENT NO 4 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-1606.320	2834.630	3	.015	100.000	-89.582	.000	0

ELEMENT NO 5 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-1197.440	2850.490	3	.015	.000	.000	.000	0

ELEMENT NO 6 IS A SYSTEM HEADWORKS * *

U/S DATA STATION INVERT SECT W S ELEV

-1197.440 2850.490 3 .000

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-2663.620	2793.590	16.910	2810.500	1324.00	24.52	9.33	2819.83	.00	6.00	9.00	6.000	9.000	.00	0 .0
264.490	.0388					.0280	7.40	16.91	1.76	4.42	.015	.00	.00	BOX
-2399.130	2803.850	14.049	2817.899	1324.00	24.52	9.33	2827.23	.00	6.00	9.00	6.000	9.000	.00	0 .0
376.294	.0388					.0280	10.53	.00	1.76	4.42	.015	.00	.00	BOX
-2022.835	2818.459	10.942	2829.402	1324.00	24.52	9.33	2838.74	.00	6.00	9.00	6.000	9.000	.00	0 .0
HYDRAULIC JUMP														
-2022.835	2818.459	4.492	2822.952	1324.00	32.75	16.65	2839.60	.58	6.00	9.00	6.000	9.000	.00	0 .0
260.165	.0388					.0364	9.47	5.07	2.72	4.42	.015	.00	.00	BOX
-1762.670	2828.560	4.557	2833.116	1324.00	32.29	16.19	2849.30	6.00	6.00	9.00	6.000	9.000	.00	0 .0
156.350	.0388					.0346	5.41	6.00	2.67	4.42	.015	.00	.00	BOX
-1606.320	2834.630	4.669	2839.299	1324.00	31.51	15.42	2854.71	.00	6.00	9.00	6.000	9.000	.00	0 .0
54.710	.0388					.0329	1.80	4.67	2.57	4.42	.015	.00	.00	BOX
-1551.610	2836.752	4.727	2841.479	1324.00	31.12	15.04	2856.52	.00	6.00	9.00	6.000	9.000	.00	0 .0
136.868	.0388					.0305	4.17	4.73	2.52	4.42	.015	.00	.00	BOX
-1414.742	2842.061	4.958	2847.019	1324.00	29.67	13.67	2860.69	.00	6.00	9.00	6.000	9.000	.00	0 .0
84.104	.0388					.0269	2.26	4.96	2.35	4.42	.015	.00	.00	BOX
-1330.638	2845.323	5.200	2850.523	1324.00	28.29	12.43	2862.95	.00	6.00	9.00	6.000	9.000	.00	0 .0
58.190	.0388					.0237	1.38	5.20	2.19	4.42	.015	.00	.00	BOX

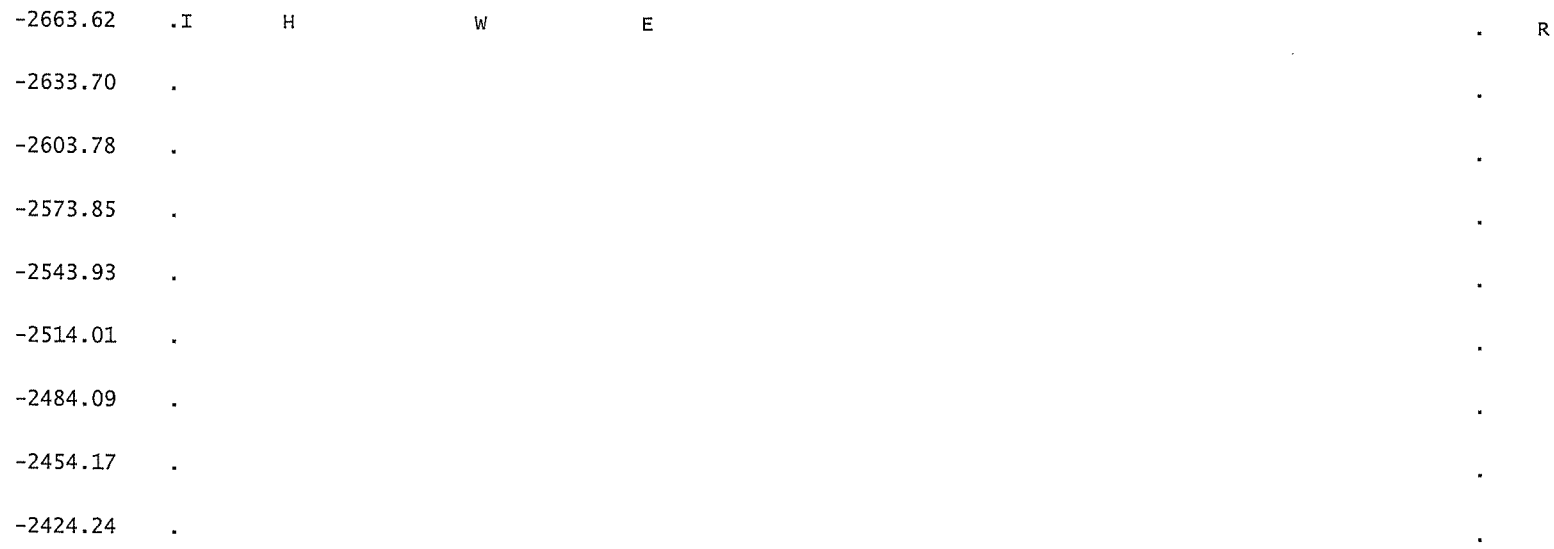
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
-1272.448	2847.581	5.454	2853.034	1324.00	26.97	11.30	2864.33	.00	6.00	9.00	6.000	9.000	.00	0	.0
42.693	.0388					.0210	.90	5.45	2.04	4.42	.015	.00	.00	BOX	
		---------- WARNING - Flow depth near top of box conduit ----------													
-1229.755	2849.237	5.720	2854.956	1324.00	25.72	10.27	2865.23	.00	6.00	9.00	6.000	9.000	.00	0	.0
32.316	.0388					.0238	.77	5.72	1.90	4.42	.015	.00	.00	BOX	
		---------- WARNING - Flow depth near top of box conduit ----------													
-1197.440	2850.490	6.000	2856.490	1324.00	24.52	9.33	2865.82	.00	6.00	9.00	6.000	9.000	.00	0	.0

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608

MPU ULTIMATE CONDITION FACILITY

OSO BLANCA LATERAL

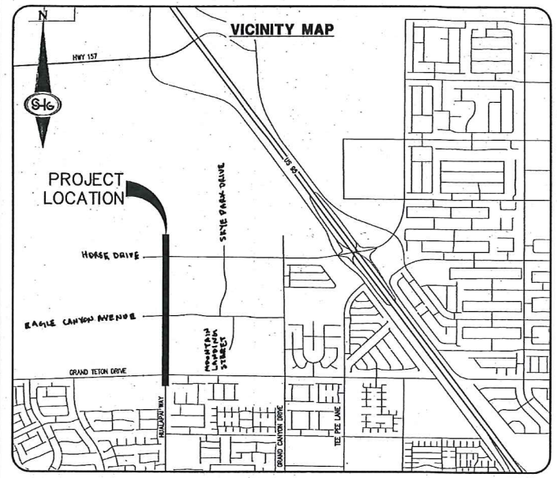


```
-2394.32   .          I      H          W           E                                  .   R
-2364.40   .                                                                           .
-2334.48   .                                                                           .
-2304.56   .                                                                           .
-2274.63   .                                                                           .
-2244.71   .                                                                           .
-2214.79   .                                                                           .
-2184.87   .                                                                           .
-2154.95   .                                                                           .
-2125.02   .                                                                           .
-2095.10   .                                                                           .
-2065.18   .                                                                           .
-2035.26   .                                                                           .
-2005.34   .                              I      H      W           E                   .   R
-1975.41   .                              I    WSH                   E                   .   R
-1945.49   .                                                                           .
-1915.57   .                                                                           .
-1885.65   .                                                                           .
-1855.72   .                                                                           .
```


-1825.80
-1795.88
-1765.96
-1736.04
-1706.11
-1676.19
-1646.27
-1616.35
-1586.43
-1556.50
-1526.58
-1496.66
-1466.74
-1436.82
-1406.89
-1376.97
-1347.05
-1317.13
-1287.21
I W H E R
I W H E R
I W H E R
I W H E R
I WH E R

```
-1257.28    .                                                                   I       WH             E   .    R

-1227.36    .                                                                     I      WH             E .    R

-1197.44    .                                                                     I        H            E.    R

          2793.590  2800.813  2808.037  2815.260  2822.484  2829.707  2836.930  2844.154  2851.377  2858.601  2865.825
```

N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   S = SUPER-ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY



IMPROVEMENT PLANS
FOR
SKYE CANYON PHASE 1
HUALAPAI WAY

(UPSTREAM PROFILE - CONTINUATION FROM EXHIBIT 1)

BENCHMARK

MONUMENT ID: USDA (1934) 19

U.S. DEPARTMENT OF AGRICULTURE BRASS DISC AT SOUTHWEST CORNER OF U.S. 95 AND KYLE CANYON ROAD

ELEVATION = 2817.61 FEET, 858.810 METERS
NAVD 88 DATUM

PER THE CITY OF LAS VEGAS BENCHMARK BOOK – 2008 ADJUSTMENT (UPDATED 05/24/2010)

BASIS OF BEARING

SOUTH 00°22'12" WEST, BEING THE BEARING OF THE WEST LINE OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 6, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 151, PAGE 14 OF SURVEYS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

OWNER

K A G DEVELOPMENT SOUTH LLC
% OLYMPIA COMPANIES LLC
11411 SOUTHERN HIGHLANDS
PARKWAY, SUITE 300
LAS VEGAS, NV 89141

DEVELOPER

NINETY–FIVE MANAGEMENT LLC
% OLYMPIA COMPANIES LLC
11411 SOUTHERN HIGHLANDS
PARKWAY, SUITE 300
LAS VEGAS, NV 89141
PH (702) 220–6565
FX (702) 220–6566

ENGINEER

SLATER HANIFAN GROUP
5740 S. ARVILLE STREET #216
LAS VEGAS, NV 89118
(702) 284–5300

SURVEY MONUMENTS PLACED FOR PUBLIC STREETS IN THIS PLAN SET SHALL BE PER BOOK 147 PAGE 71 OF SUBDIVISION PLATS

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

FAST
Call before you UnderGround.
1-702-433-5300
FREE AND OFFICIAL SYSTEM OF REGISTRATION

Call before you Dig
Avoid hitting underground utility lines. It's easy.
Call 811
OR
1-800-227-2600

APPROVALS

CITY ENGINEER–DAVID BOWER, P.E. #9875 — DATE 11/10/14

APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED OF RIGHT–OF–WAY, AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS EXCEPT THOSE SPECIALLY LISTED UNDER DEVIATIONS FORM STANDARDS. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS, CLARK COUNTY AREA, NEVADA.

CHRIS KNIGHT
DIRECTOR, BUILDING AND SAFETY — DATE 11-6-14

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. 122936 DATE: 10/20/14
SHEETS: C–01, G–02, G–03, R–01, C–01 THRU C–04, SD–01 THRU SD–05, AND UT–01 THRU UT–06

APPROVAL BY THE FIRE DEPARTMENT HAVING JURISDICTION IS REQUIRED PRIOR TO OBTAINING FINAL APPROVAL FROM THE LAS VEGAS VALLEY WATER DISTRICT.

LAS VEGAS FIRE AND RESCUE — DATE 9/18/14

NV ENERGY — DATE 7-30-14

NV ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.

CENTRAL TELEPHONE CO, DBA CENTURYLINK — DATE 7/30/14

THE AFFIXED CENTRAL TELEPHONE CO, DBA CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

SOUTHWEST GAS — EDWARD THURMAN — DATE 8/7/14

COX COMMUNICATIONS LAS VEGAS, INC. — DATE 7/31/14

3 DRY UTILITY SUPPLEMENTAL INDEX

SOUTHWEST GAS	
1	SHEET 1
2	SHEET 2
3	SHEET 3
4	SHEET 4
5	SHEET 5
6	SHEET 6
7	SHEET 7

INDEX OF DRAWINGS

SHT. NO.	DWG. NO.	DESCRIPTION
1	G–01	COVER SHEET
2	G–02	GENERAL NOTES
3	G–03	ABBREVIATIONS, LEGEND AND QUANTITIES
4	TY–01	ROADWAY SECTIONS
5	R–01	REMOVAL PLAN – "HW" 2+00.00 TO "HW" 11+50.00
6	C–01	CONSTRUCTION PLAN – "HW" 7+00.00 TO "HW" 16+50.00
7	C–02	CONSTRUCTION PLAN – "HW" 16+50.00 TO "HW" 26+00.00
8	C–03	CONSTRUCTION PLAN – "HW" 26+00.00 TO "HW" 33+00.00
9	C–04	CONSTRUCTION PLAN – "HW" 33+00.00 TO "HW" 42+50.00
10	C–05	CONSTRUCTION DETAILS
11	GR–01	GRADING PLAN – "HW" 6+50.00 TO "HW" 18+50.00
12	GR–02	GRADING PLAN – "HW" 18+50.00 TO "HW" 30+50.00
13	GR–03	GRADING PLAN – "HW" 30+50.00 TO "HW" 42+50.00
14	GR–04	GRADING DETAILS
15	SD–01	STORM DRAIN PLAN AND PROFILE – "HW" 7+00.00 TO "HW" 16+50.00
16	SD–02	STORM DRAIN PLAN AND PROFILE – "HW" 16+50.00 TO "HW" 26+00.00
17	SD–03	STORM DRAIN PLAN AND PROFILE – "HW" 26+00.00 TO "HW" 33+00.00
18	SD–04	STORM DRAIN PLAN AND PROFILE – "HW" 33+00.00 TO "HW" 42+50.00
19	SD–05	STORM DRAIN LATERAL PROFILES
20	SD–06	STORM DRAIN DETAILS
21	UT–01	UTILITY PLAN – "HW" 7+00.00 TO "HW" 16+50.00
22	UT–02	UTILITY PLAN – "HW" 16+50.00 TO "HW" 26+00.00
23	UT–03	UTILITY PLAN – "HW" 26+00.00 TO "HW" 33+00.00
24	UT–04	UTILITY PLAN – "HW" 33+00.00 TO "HW" 42+00.00
25	UT–05	UTILITY LATERAL PROFILES
26	UT–06	UTILITY DETAILS
27	LL–01	LIGHTING PLAN – "HW" 7+00.00 TO "HW" 26+00.00
28	LL–02	LIGHTING PLAN – "HW" 26+00.00 TO "HW" 42+00.00
29	LL–03	LIGHTING DETAILS
30	ST–01	SIGNING AND STRIPING PLAN – "HW" 7+00.00 TO "HW" 26+00.00
31	ST–02	SIGNING AND STRIPING PLAN – "HW" 26+00.00 TO "HW" 42+00.00
32	ST–03	SIGNING AND STRIPING DETAILS
33	S0.1	GENERAL STRUCTURAL NOTES
34	S0.2	TYPICAL DETAILS
35	S1.1	PLAN & PERSPECTIVE OF JUNCTION STRUCTURE
36	S2.1	JUNCTION STRUCTURE DETAILS
37		HORIZONTAL CONTROL PLAN I
38		HORIZONTAL CONTROL PLAN II
39		HORIZONTAL CONTROL PLAN III
40	CE–1	COMMON ELEMENT GRADING PLAN
41	CE–2	MONUMENT GRADING PLAN

NOTE: THIS PROJECT PLAN APPROVAL CONTINGENT ON
123097 SKYE CANYON PHASE 1 HUALAPAI DUST CONTROL
PLAN APPROVAL

H#54676

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP.
1	REV. DRAINAGE I WATER SHEDS	11/25/14	RM	JSR
2	REV. GRADING, SD, I, UTILITIES	1/13/15	RM	JSR
3	ADD CE GRADING PLANS AND ST	2/12/15	TAN	JSR
4	REVISE STORM DRAIN AND WATER LINES	6/11/15	RM	JSR
5	ADD SD LATERAL, UPDATE 12" W	6/25/15	RM	JSR
6	REVISE STORM DRAIN AND WATER LINES	10/15/15	RM	JSR
7	REVISE STORM DRAIN AND WATER LINES	10/26/15	RM	JSR
8	REVISE STORM DRAIN AND WATER LINES	11/12/15	RM	JSR

NINETY-FIVE MANAGEMENT LLC

SKYE CANYON PHASE 1
HUALAPAI WAY
COVER SHEET

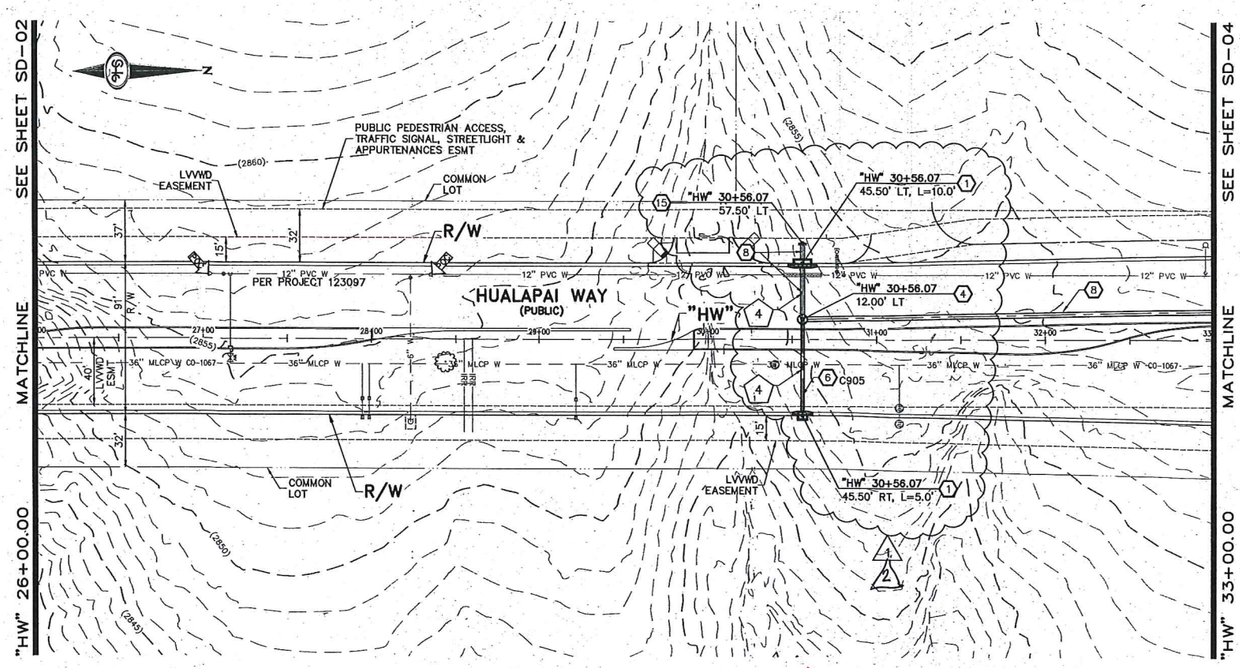
DATE: 6/16/14
DRAFTER: SPC
DESIGNER: DAM
CHECKED: JSR
PROJECT NO.
OLY1401-001

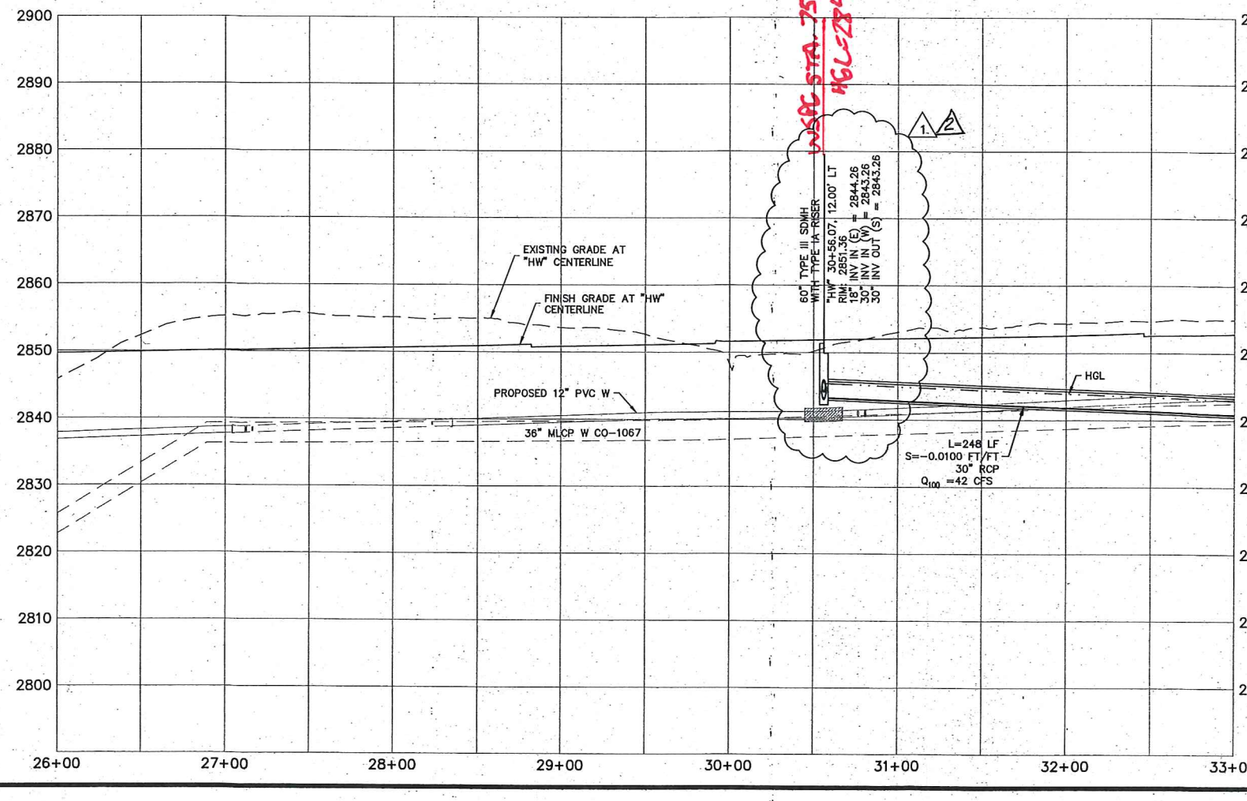
PROFESSIONAL ENGINEER – STATE OF NEVADA – JERRY J. SLAFER – Exp. 06/30/2016 – CIVIL – No. 14167

G-01
SHEET 1 OF 41
DRAWING NO.
107V6296-HW

HANSEN NO. 54676

J:\OLY1401\001 Skye Canyon\Drawings\Improvements\G-01_Cover Sheet.dwg, Layout1, 7/28/2015 2:53:40 PM, asmith





USACE STA. 758.88
HGL=2849.11'

STORM DRAIN NOTES

1. CONSTRUCT TYPE "CM2" DROP INLET (USDCCA STD. DWG. NO. 412.1)
2. CONSTRUCT 60" TYPE I MANHOLE (USDCCA STD. DWG. NO. 403.1)
3. CONSTRUCT 60" TYPE III MANHOLE (USDCCA STD. DWG. NO. 406.1)
4. CONSTRUCT 60" TYPE III MANHOLE WITH TYPE IA RISER (USDCCA STD. DWG. NOS. 404.1 & 406.1)
5. CONSTRUCT RCB ACCESS MANHOLE (TYPE I OR IA MANHOLE ASSEMBLY PER USDCCA STD. DWG. NO. 403 OR 404. USE OF TYPE I OR IA SHALL BE DETERMINED BASED ON FINAL COVER REQUIRED)
6. INSTALL 18" RCP OR C905 (SEE DETAIL) (USDCCA STD. DWG. NO. 503.2)
7. INSTALL 24" RCP OR C905 (SEE DETAIL) (USDCCA STD. DWG. NO. 503.2)
8. INSTALL 30" RCP (USDCCA STD. DWG. NO. 503.2)
9. INSTALL 36" RCP (USDCCA STD. DWG. NO. 503.2)
10. INSTALL 42" RCP (USDCCA STD. DWG. NO. 503.2)
11. INSTALL 48" RCP (USDCCA STD. DWG. NO. 503.2)
12. INSTALL 60" RCP (USDCCA STD. DWG. NO. 503.2)
13. CONSTRUCT PRECAST 8' X 5' RCB (NDOT STD. PLAN B-20.1.8)
14. CONSTRUCT JUNCTION STRUCTURE (SEE STRUCTURAL DETAILS)
15. CONSTRUCT BRICK AND MORTAR PLUG (SEE DETAIL 1, DRAWING SD-06)
16. CONSTRUCT 30" RCP END SECTION (NDOT STD. PLAN R-2.3.1)

NOTES

1. ALL RCP SHALL BE CLASS III UNLESS OTHERWISE SHOWN.
2. ALL PIPE LENGTHS ARE MEASURED ALONG PIPE CENTERLINE TO CENTER OF MANHOLE OR INSIDE EDGE OF DI OR RCB/RCA.
3. ALL DROP INLETS SHALL INCLUDE STORM WATER MANAGEMENT STAMP AND DETAIL PER USDCCA STD. DWG. NO. 421.
4. SEE STRUCTURAL PLANS FOR ADDITIONAL STRUCTURAL DETAILS AND CONNECTIONS.
5. ALL PIPES ARE PUBLICLY MAINTAINED.

DROP INLET NOTE

WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE

CAST-IN-PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB AND WALLS. BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS, CENTER BULB, OR FLAT STRIP (VINYLEX, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUAL)

LEGEND

(1) STORM DRAIN LATERAL # (SEE SHEET SD-05)

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DS-4661 ON FILE AT THE CITY OF LAS VEGAS FOR THE SUBJECT PROJECT

JERRY SLATER, P.E. 14167 — DATE 2-9-15

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE "X" (OUTSIDE THE 500-YEAR FLOOD PLAIN) ON THE FLOOD INSURANCE RATE MAP (FIRM) PANELS: 32003C1735E, 32003C1745E, 32003C1750E, ALL DATED SEPTEMBER 27, 2002

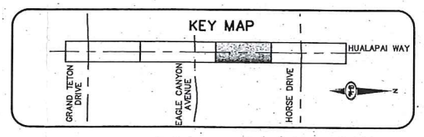
APPROVED FOR CONSTRUCTION

LVVWD ENGINEERING SERVICES MANAGER — DATE 02/11/15

PROJECT NO. 122936

1ST APP'D 10/29/14

KEY MAP



SCALE 40 0 40 80 FEET

AVOID HITTING OVERHEAD POWER LINES. IT'S EASY! CALL BEFORE YOU DO OVERHEAD. 1-702-227-2929

FAST Call before you UnderGround. 1-702-433-5900

Call before you Dig. Call 811. 1-800-227-2600

NO.	DESCRIPTION	DATE	BY	APP.
1	REVISED STORM DRAIN (LVVWD)	01/12/15	JJS	JSR
2	REV. STORM DRAIN (LVV)	1/13/15	JJS	JSR

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NINETY-FIVE MANAGEMENT LLC

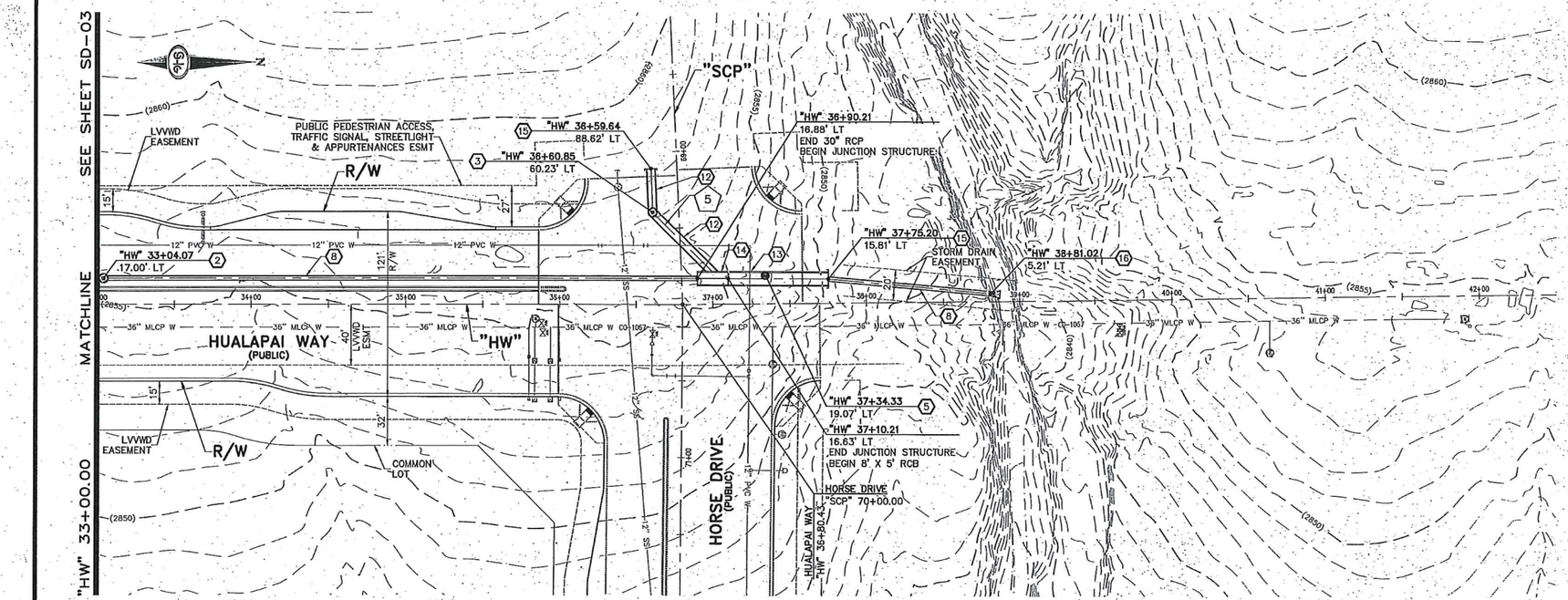
SKYE CANYON PHASE 1
HUALAPAI WAY
STORM DRAIN PLAN AND PROFILE - "HW" 26+00.00 TO "HW" 33+00.00

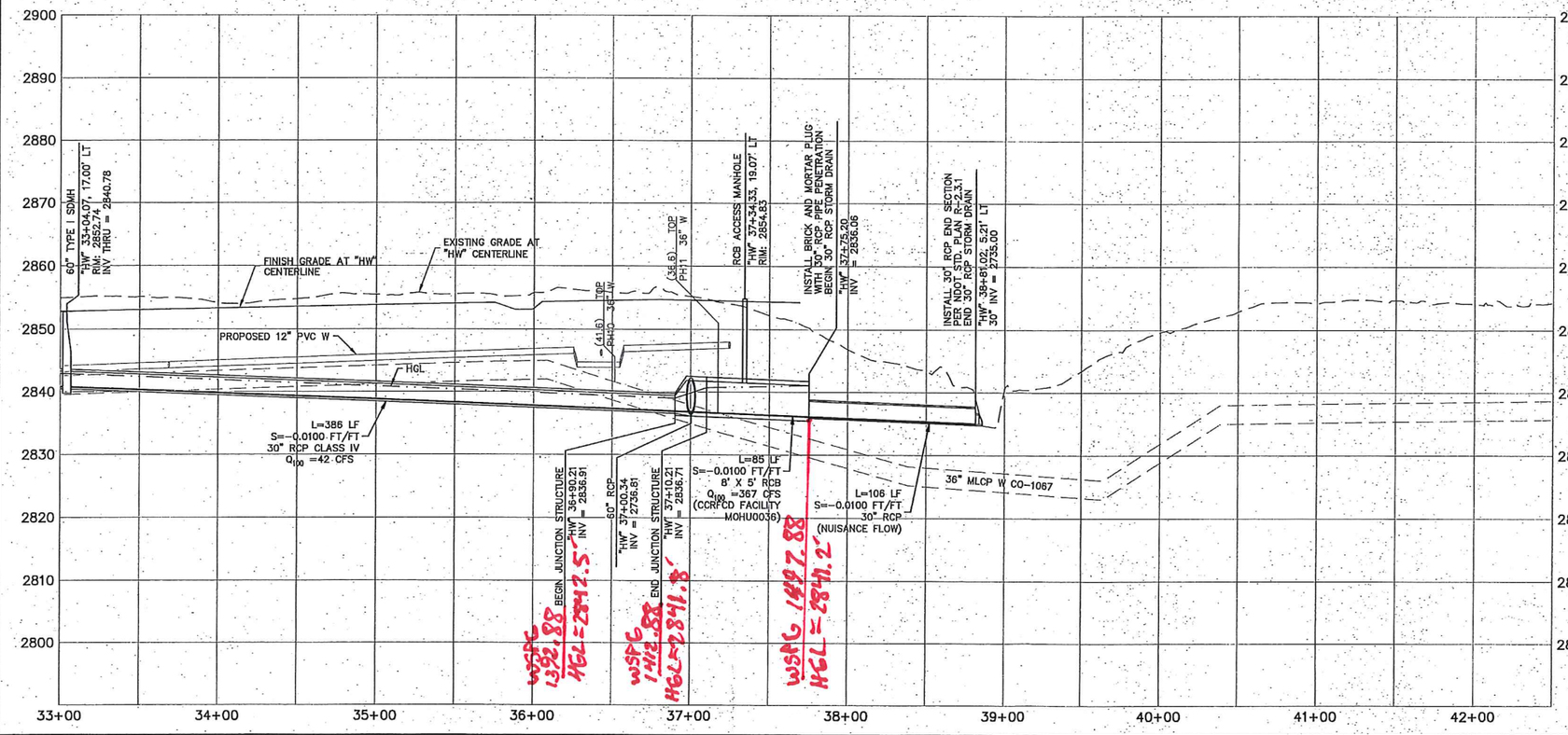
DATE: 9/17/14
DRAFTER: SPC
DESIGNER: DAM
CHECKED: JSR
PROJECT NO. OLY1401-001

PROFESSIONAL ENGINEER - STATE OF NEVADA - JERRY SLATER - No. 14167 - CIVIL - Exp. 06/30/2016 - 2-9-15

SD-03
SHEET 18 OF 36
DWG NO. 107V6296-HW
HANSEN NO. 54676

J:\OLY1401.001 Skye Canyon\Admin\Construction Support\Dwg_Revised Improv\HW SD-03.dwg, SD-03, 2/9/2015 3:57:27 PM, JeffB





STORM DRAIN NOTES

1. CONSTRUCT TYPE "CM2" DROP INLET (USDCCA STD. DWG. NO. 412.1)
2. CONSTRUCT 60" TYPE I MANHOLE (USDCCA STD. DWG. NO. 403.1)
3. CONSTRUCT 60" TYPE III MANHOLE (USDCCA STD. DWG. NO. 406.1)
4. CONSTRUCT 60" TYPE III MANHOLE WITH TYPE IA RISER (USDCCA STD. DWG. NOS. 404.1 & 406.1)
5. CONSTRUCT RCB ACCESS MANHOLE (TYPE I OR IA MANHOLE ASSEMBLY PER USDCCA STD. DWG. NO. 403 OR 404. USE OF TYPE I OR IA SHALL BE DETERMINED BASED ON FINAL COVER REQUIRED)
6. INSTALL 18" RCP (USDCCA STD. DWG. NO. 503.2)
7. INSTALL 24" RCP (USDCCA STD. DWG. NO. 503.2)
8. INSTALL 30" RCP (USDCCA STD. DWG. NO. 503.2)
9. INSTALL 36" RCP (USDCCA STD. DWG. NO. 503.2)
10. INSTALL 42" RCP (USDCCA STD. DWG. NO. 503.2)
11. INSTALL 48" RCP (USDCCA STD. DWG. NO. 503.2)
12. INSTALL 60" RCP (USDCCA STD. DWG. NO. 503.2)
13. CONSTRUCT PRECAST 8' X 5' RCB (NDOT STD. PLAN B-20.1.8)
14. CONSTRUCT JUNCTION STRUCTURE (SEE STRUCTURAL DETAILS)
15. CONSTRUCT BRICK AND MORTAR PLUG (SEE DETAIL 1, DRAWING SD-06)
16. CONSTRUCT 30" RCP END SECTION (NDOT STD. PLAN R-2.3.1)

NOTES

1. ALL RCP SHALL BE CLASS III UNLESS OTHERWISE SHOWN.
2. ALL PIPE LENGTHS ARE MEASURED ALONG PIPE CENTERLINE TO CENTER OF MANHOLE OR INSIDE EDGE OF DI OR RCB/RCA.
3. ALL DROP INLETS SHALL INCLUDE STORM WATER MANAGEMENT STAMP AND DETAIL PER USDCCA STD. DWG. NO. 421.
4. SEE STRUCTURAL PLANS FOR ADDITIONAL STRUCTURAL DETAILS AND CONNECTIONS.
5. ALL PIPES ARE PUBLICLY MAINTAINED.

DROP INLET NOTE

WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE

CAST-IN-PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB AND WALLS. BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS, CENTER BULB, OR FLAT STRIP (WYLEX, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUAL)

LEGEND

(1) STORM DRAIN LATERAL # (SEE SHEET SD-05)

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DS-4661 ON FILE AT THE CITY OF LAS VEGAS FOR THE SUBJECT PROJECT

JERRY SLATER, P.E. 14167 — DATE 9.30.14

FLOOD ZONE

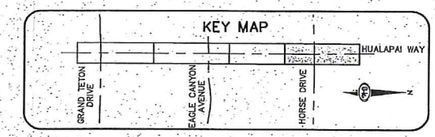
THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE "X" (OUTSIDE THE 500-YEAR FLOOD PLAIN) ON THE FLOOD INSURANCE RATE MAP (FIRM) PANELS: 32003C1734E, 32003C1745E, 32003C1750E, ALL DATED SEPTEMBER 27, 2002

APPROVED FOR CONSTRUCTION

VVWD ENGINEERING SERVICES MANAGER — DATE 10/30/14

PROJECT NO. 122936

KEY MAP



AVOID HITTING BURIED POWER LINES. IT'S DEADLY. CALL BEFORE YOU DIG OVERHEAD 1-702-227-2929
FAST Call before you UnderGround. 1-702-432-5300
Call before you Dig Call 811 1-800-227-2600

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT LLC

SKYE CANYON PHASE 1
HUALAPAI WAY
STORM DRAIN PLAN AND PROFILE - "HW" 33+00.00 TO "HW" 42+50.00

DATE: 9/17/14
DRAFTER: SPC
DESIGNER: DAM
CHECKED: JSR
PROJECT NO. OLY1401-001

PROFESSIONAL ENGINEER - STATE OF NEVADA - JERRY SLATER - Exp. 06/30/2016 - CIVIL - No. 14167 - 9.30.14

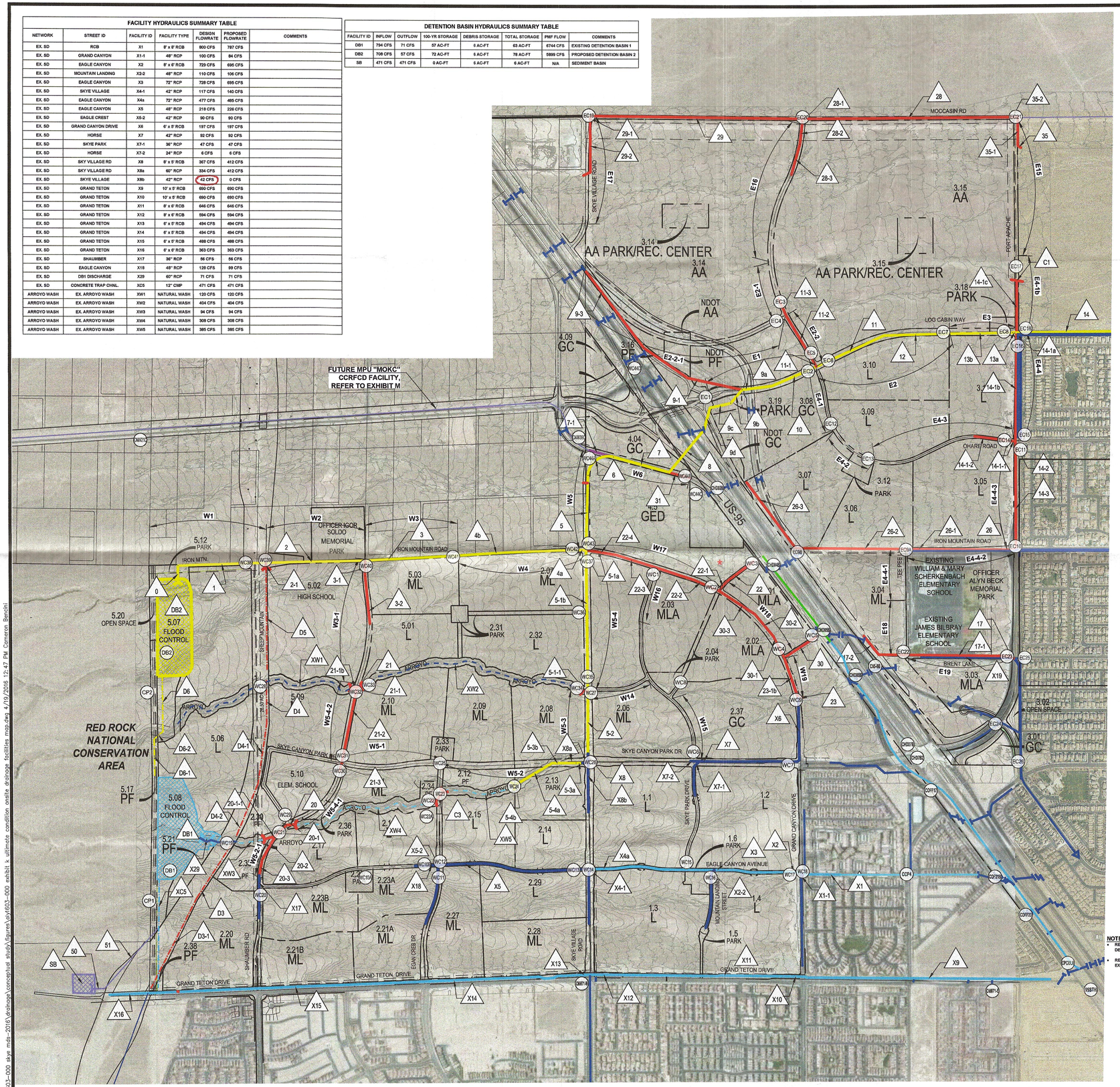
SD-04
SHEET 19 OF 37
DWG NO. 107V8296-HW
HANSEN NO. 54676

FACILITY HYDRAULICS SUMMARY TABLE

NETWORK	STREET ID	FACILITY ID	FACILITY TYPE	DESIGN FLOWRATE	PROPOSED FLOWRATE	COMMENTS
EX. SD	RCB	X1	8' x 8' RCB	800 CFS	787 CFS	
EX. SD	GRAND CANYON	X1-1	48" RCP	100 CFS	84 CFS	
EX. SD	EAGLE CANYON	X2	8' x 6' RCB	729 CFS	695 CFS	
EX. SD	MOUNTAIN LANDING	X2-2	48" RCP	110 CFS	106 CFS	
EX. SD	EAGLE CANYON	X3	72" RCP	728 CFS	695 CFS	
EX. SD	SKYE VILLAGE	X4-1	42" RCP	117 CFS	140 CFS	
EX. SD	EAGLE CANYON	X4a	72" RCP	477 CFS	485 CFS	
EX. SD	EAGLE CANYON	X5	48" RCP	218 CFS	226 CFS	
EX. SD	EAGLE CREST	X5-2	42" RCP	90 CFS	90 CFS	
EX. SD	GRAND CANYON DRIVE	X6	6' x 5' RCB	197 CFS	197 CFS	
EX. SD	HORSE	X7	42" RCP	92 CFS	92 CFS	
EX. SD	SKYE PARK	X7-1	36" RCP	47 CFS	47 CFS	
EX. SD	HORSE	X7-2	24" RCP	6 CFS	6 CFS	
EX. SD	SKY VILLAGE RD	X8	8' x 5' RCB	367 CFS	412 CFS	
EX. SD	SKY VILLAGE RD	X8a	60" RCP	334 CFS	412 CFS	
EX. SD	SKYE VILLAGE	X8b	42" RCP	42 CFS	0 CFS	
EX. SD	GRAND TETON	X9	10' x 5' RCB	690 CFS	690 CFS	
EX. SD	GRAND TETON	X10	8' x 6' RCB	690 CFS	690 CFS	
EX. SD	GRAND TETON	X11	8' x 6' RCB	646 CFS	646 CFS	
EX. SD	GRAND TETON	X12	8' x 6' RCB	594 CFS	594 CFS	
EX. SD	GRAND TETON	X13	6' x 5' RCB	494 CFS	494 CFS	
EX. SD	GRAND TETON	X14	6' x 5' RCB	494 CFS	494 CFS	
EX. SD	GRAND TETON	X15	6' x 5' RCB	498 CFS	498 CFS	
EX. SD	GRAND TETON	X16	6' x 6' RCB	363 CFS	363 CFS	
EX. SD	SHAUMBER	X17	36" RCP	56 CFS	56 CFS	
EX. SD	EAGLE CANYON	X18	48" RCP	128 CFS	99 CFS	
EX. SD	DB1 DISCHARGE	X29	60" RCP	71 CFS	71 CFS	
EX. SD	CONCRETE TRAP CHNL.	XC5	13" CMP	471 CFS	471 CFS	
ARROYO WASH	EX. ARROYO WASH	XW1	NATURAL WASH	120 CFS	120 CFS	
ARROYO WASH	EX. ARROYO WASH	XW2	NATURAL WASH	404 CFS	404 CFS	
ARROYO WASH	EX. ARROYO WASH	XW3	NATURAL WASH	94 CFS	94 CFS	
ARROYO WASH	EX. ARROYO WASH	XW4	NATURAL WASH	308 CFS	308 CFS	
ARROYO WASH	EX. ARROYO WASH	XW5	NATURAL WASH	385 CFS	385 CFS	

DETENTION BASIN HYDRAULICS SUMMARY TABLE

FACILITY ID	INFLOW	OUTFLOW	100-YR STORAGE	DEBRIS STORAGE	TOTAL STORAGE	PMF FLOW	COMMENTS
DB1	794 CFS	71 CFS	57 AC-FT	6 AC-FT	63 AC-FT	6744 CFS	EXISTING DETENTION BASIN 1
DB2	708 CFS	57 CFS	72 AC-FT	6 AC-FT	78 AC-FT	5899 CFS	PROPOSED DETENTION BASIN 2
SB	471 CFS	471 CFS	0 AC-FT	6 AC-FT	6 AC-FT	N/A	SEDIMENT BASIN



FACILITY HYDRAULICS SUMMARY TABLE

NETWORK	STREET ID	FACILITY ID	FACILITY TYPE	LENGTH	SLOPE	FLOW RATE	COMMENTS
WEST SD	DB2 OUTLET	0	30" RCP	214'	2.0%	57 CFS	
WEST SD	W1	1	30" RCP	1099'	2.9%	65 CFS	
WEST SD	W2	2	30" RCP	1236'	5.0%	90 CFS	
WEST SD	INFLOW FROM SHEEP MOUNTAIN CHNL	2-1	18" RCP	66'	4.4%	19 CFS	
WEST SD	W3	3	42" RCP	1161'	3.2%	227 CFS	
WEST SD	W3-1	3-1	36" RCP	191'	3.0%	112 CFS	
WEST SD	W3-1	3-2	30" RCP	595'	1.7%	40 CFS	
WEST SD	W4	4a	54" RCP	100'	4.5%	370 CFS	
WEST SD	W4	4b	48" RCP	1500'	4.5%	349 CFS	
WEST SD	W5	5	13' x 6' RCB	931'	1.0%	1296 CFS	
WEST SD	ARROYO WASH INFLOW	5-1-1	6' x 6' RCB	51'	14.6%	404 CFS	
WEST SD	W5-4	5-1a	8' x 6' RCB	100'	0.8%	1000 CFS	
WEST SD	W5-4	5-1b	8' x 6' RCB	1654'	0.9%	856 CFS	
WEST SD	W5-3	5-2	6' x 5' RCB	779'	1.0%	412 CFS	
WEST SD	W5-2	5-3a	60" RCP	79'	3.0%	412 CFS	
WEST SD	W5-2	5-3b	60" RCP	301'	3.0%	359 CFS	
WEST SD	CONVEYS FLOW TO SD 5-3a	5-4a	60" RCP	491'	3.0%	359 CFS	
WEST SD	INFLOW FROM ARROYO WASH	5-4b	6' x 6' RCB	50'	2.8%	359 CFS	
WEST SD	W5	6	13' x 6' RCB	445'	1.8%	1296 CFS	
WEST SD	W6	7	13' x 6' RCB	723'	2.0%	2079 CFS	
WEST SD	MPU FACILITY	7-1	7' x 6' RCB	309'	5.0%	1324 CFS	MOKC-0000 MPU FACILITY
WEST SD	DISCAHRGE TO ARROYO WASH	20	48" RCP	109'	2.0%	201 CFS	
WEST SD	W5-2-1	20-1	48" RCP	194'	2.0%	180 CFS	
WEST SD	INFLOW FROM DB1	20-1-1	48" RCP	135'	2.2%	94 CFS	
WEST SD	W5-2-1	20-2	36" RCP	340'	3.0%	84 CFS	
WEST SD	W5-2-1	20-3	36" RCP	193'	3.5%	84 CFS	
WEST SD	DISCHARGE TO ARROYO WASH	21	48" RCP	42'	4.0%	244 CFS	
WEST SD	W5-4-2	21-1	42" RCP	100'	2.5%	124 CFS	
WEST SD	INFLOW FROM ARROYO WASH	21-1b	48" RCP	68'	3.4%	120 CFS	
WEST SD	W5-4-2	21-2	36" RCP	863'	3.4%	62 CFS	
WEST SD	W5-4-1	21-3	36" RCP	103'	1.3%	62 CFS	
WEST SD	N/A	22	7' x 6' RCB	426'	2.2%	73 CFS	
WEST SD	N/A	22-1	7' x 6' RCB	146'	2.2%	73 CFS	
WEST SD	W17	22-2	8' x 6' RCB	339'	2.0%	73 CFS	
WEST SD	W17	22-3	8' x 6' RCB	1017'	2.0%	0 CFS	
WEST SD	W17	22-4	9' x 6' RCB	382'	2.6%	0 CFS	
WEST SD	W19 OUTLET TO WASH	23	36" RCP	59'	3.4%	289 CFS	
WEST SD	W19	23-1b	54" RCP	529'	1.7%	0 CFS	
WEST SD	N/A	30	42" RCP	476'	2.5%	170 CFS	
WEST SD	W18	30-1	72" RCP	297'	1.2%	135 CFS	
WEST SD	W18	30-2	54" RCP	364'	1.8%	0 CFS	
WEST SD	W18	30-3	54" RCP	527'	1.4%	0 CFS	
WEST SD	RCB	31	8' x 6' RCB	272'	2.0%	0 CFS	
WEST SD	DISCHARGE FROM SB	50	12' x 6' RCB	152'	1.5%	471 CFS	
WEST SD	DISCHARGE TO DB1	51	72" RCP	1015'	2.1%	471 CFS	
WEST SD	ARROYO WASH CULVERT	C3	6' x 6' RCB	164'	6.1%	308 CFS	
WEST SD	SHEEP MOUNTAIN CHNL	D3	EARTHEN TRAP CHNL	815'	3.6%	31 CFS	20' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D3-1	EARTHEN TRAP CHNL	1239'	1.7%	31 CFS	9' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D4	EARTHEN TRAP CHNL	534'	4.5%	11 CFS	5' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D4-1	EARTHEN TRAP CHNL	757'	1.5%	11 CFS	5' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D4-2	EARTHEN TRAP CHNL	691'	1.0%	11 CFS	5' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D5	EARTHEN TRAP CHNL	1252'	1.2%	6 CFS	5' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	CHANNEL TO DB2	D6	CONCRETE TRAP CHNL	723'	3.0%	235 CFS	12' BOTTOM WIDTH; 3:1 SIDE SLOPES; 5' DEEP
WEST SD	CHANNEL TO DB2	D6-1	EARTHEN TRAP CHNL	451'	0.9%	10 CFS	5' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	CHANNEL TO DB2	D6-2	EARTHEN TRAP CHNL	145'	1.4%	10 CFS	5' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP

FACILITY HYDRAULICS SUMMARY TABLE

NETWORK	STREET ID	FACILITY ID	FACILITY TYPE	LENGTH	SLOPE	FLOW RATE	COMMENTS
EAST SD	US-95 SD CROSSING	8	13' x 6' RCB	686'	2.3%	2079 CFS	
EAST SD	US-95	9-1	60" RCP	688'	4.0%	255 CFS	
EAST SD	US-95	9-2	60" RCP	665'	2.3%	250 CFS	
EAST SD	US-95	9-3	60" RCP	1191'	1.3%	250 CFS	
EAST SD	E1	9a	13' x 6' RCB	380'	2.5%	2355 CFS	
EAST SD	US-95 SD CROSSING	9b	13' x 6' RCB	220'	2.0%	2079 CFS	
EAST SD	US-95 SD CROSSING	9c	13' x 6' RCB	265'	2.3%	2079 CFS	
EAST SD	US-95 SD CROSSING	9d	13' x 6' RCB	282'	2.3%	2079 CFS	
EAST SD	E1	10	13' x 6' RCB	602'	2.5%	2355 CFS	
EAST SD	E2	11	13' x 6' RCB	929'	2.9%	2532 CFS	
EAST SD	E2-2	11-1	36" RCP	50'	3.0%	177 CFS	
EAST SD	E2-2	11-2	36" RCP	660'	1.2%	73 CFS	
EAST SD	E2-1	11-3	30" RCP	238'	1.7%	39 CFS	
EAST SD	E2	12	13' x 6' RCB	794'	2.9%	2532 CFS	
EAST SD	E3	13a	14' x 7' RCB	50'	1.6%	2606 CFS	
EAST SD	E3	13b	13' x 6' RCB	909'	2.9%	2532 CFS	
EAST SD	E4-3	14-1-1	42" RCP	50'	5.0%	181 CFS	
EAST SD	E4-3	14-1-2	42" RCP	461'	5.0%	36 CFS	
EAST SD	E4-4	14-1a	72" RCP	51'	1.4%	276 CFS	
EAST SD	E4-4	14-1b	72" RCP	1303'	0.7%	254 CFS	
EAST SD	E4-1b	14-1c	72" RCP	629'	2.0%	349 CFS	
EAST SD	E4-4-3	14-2	48" RCP	50'	6.8%	73 CFS	
EAST SD	E4-4-3	14-3	48" RCP	1299'	0.4%	0 CFS	
EAST SD	E19	17	36" RCP	56'	3.0%	70 CFS	
EAST SD	E19	17-1	6' x 6' RCB	1632'	3.5%	63 CFS	
EAST SD	Parcel 3.04	17-2	48" RCP	298'	2.3%	220 CFS	
EAST SD	E4-4-2	26	60" RCP	209'	2.6%	57 CFS	
EAST SD	E4-4-2	26-1	60" RCP	1180'	2.6%	57 CFS	
EAST SD	PARCEL 3.06	26-2	60" RCP	1350'	2.6%	23 CFS	
EAST SD	PARCEL 3.07	26-3	60" RCP	1018'	2.5%	23 CFS	
EAST SD	MPU FACILITY	29	N/A	N/A	N/A	N/A	LVMO-0144 MPU FACILITY, REPLACES PROP. CONDITION FACILITY D1
EAST SD	E16	26-1	48" RCP	50'	6.0%	159 CFS	
EAST SD	E16	26-2	42" RCP	269'	0.8%	81 CFS	
EAST SD	E16	26-3	24" RCP	391'	1.0%	81 CFS	LVMO-0154 MPU FACILITY, REPLACES PROP. CONDITION FACILITY D2
EAST SD	MPU FACILITY	29	N/A	2652'	3.1%	0 CFS	
EAST SD	E17	29-1	60" RCP	50'	4.0%	72 CFS	
EAST SD	E17	29-2	60" RCP	647'	0.6%	25 CFS	
OFFSITE SD	LOG CABIN WAY	14	14' x 7' RCB	1591'	2.2%	3137 CFS	SEE EXHIBIT M FOR CONTINUATION
PROPOSED SD	CROSSING FORT APACHE	35	60" RCP	46'	4.4%	0 CFS	NOT UTILIZED WITHIN THE ULTIMATE CONDITIONS
PROPOSED SD	E15	35-1	60" RCP	359'	0.8%	0 CFS	NOT UTILIZED WITHIN THE ULTIMATE CONDITIONS
PROPOSED SD	MOCCASIN CHNL INFLOW	35-2	60" RCP	120'	3.3%	0 CFS	NOT UTILIZED WITHIN THE ULTIMATE CONDITIONS
PROPOSED SD	E4-1b	C1	60" RCP	147'	2.0%	0 CFS	NOT UTILIZED WITHIN THE ULTIMATE CONDITIONS

NOTES:

- REFER TO EXHIBIT M - ULTIMATE CONDITION US-95 HYDRAULICS SUMMARY MAP FOR DETAILED FLOW THRU EXISTING US-95 CULVERTS & RCB FACILITIES
- REFER TO EXHIBIT K - ULTIMATE CONDITION OFFSITE EAST FACILITIES MAP FOR EXTENSION OF FACILITIES REQUIRED IN MPU ALIGNMENT EAST OF SKYE CANYON.

LEGEND

- PROPOSED LOCAL FACILITIES
- ONSITE CCRFCD REGIONAL FACILITIES
- FUTURE CCRFCD REGIONAL FACILITIES (BY OTHERS)
- FUTURE LOCAL FACILITIES
- EXISTING CCRFCD REGIONAL FACILITIES
- EXISTING LOCAL FACILITIES
- OPEN CHANNEL FACILITIES
- ID — STREET SEGMENT ID

N

0 600 1200

SCALE — 1"=600' FEET

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.
-					

OLYMPIA COcompanies

SKYE CANYON - MASTER DRAINAGE STUDY

ULTIMATE CONDITION ONSITE DRAINAGE FACILITIES MAP

DATE: APRIL 2016
DRAFTER: ###
DESIGNER: ###
CHECKED: SMJ
PROJECT NO. OLY1603.000

EXHIBIT J
SHEET 1 OF 1

J:\dv\1603-000 skye mds-2016\drohone\conceptual study\figures\dv\1603-000 exhibit k ultimate condition onsite drainage facilities map.dwg 4/19/2016 12:47 PM Cameron Benichi

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

OLY1608.000

August 10, 2016

Mr. Oh Sang Kwon, P.E.
Flood Control Project Manager
City of Las Vegas Department of Public Works
333 N. Rancho Drive – 7th Floor
Las Vegas, Nevada 89106

Subject: Response to City of Las Vegas Public Works Comments on the Supplement for US95/Kyle Canyon Road Interchange – Conceptual Design for CCRFCD Regional Facility Crossing

Dear Mr. Kwon:

This letter is submitted in response to the comments in your review memorandum dated August 2, 2016, regarding the above referenced project. A copy of the City of Las Vegas (CLV) Department of Public Works comments is provided behind this letter, and the comments have been individually addressed as follows:

Sheet 3

1. **Comment:** *Correct the match line station reference in left plan view to 54+50.00.*

   Response: The match line reference station has been updated accordingly.

2. **Comment:** *Minor discrepancies in slope between the hydraulic model and profile are shown between Stations 48+50 and 54+50.*

   Response: Acknowledged. The slope callout on the profile sheets has been updated to adequately reflect the slope on the hydraulic models in Appendix A. Note that there is a slope of 0.0% shown in the model at Station 5363.30, because the hydraulic model has analyzed where the storm flows from the Skye Village and SR157 alignments enter the 25-ft wide junction structure as a point confluence with zero length.

3. **Comment:** *Verify the width of the Junction Structure in the hydraulic model. The model shows a width of 25 feet and the two RCBs connecting are 13 feet wide.*

   Response: Anticipating the connection of two (2) RCB's, one is 13-ft wide and the second is 9-ft wide, each with a wall thickness of 1-ft, and 1-ft of separation between the two boxes at the junction structure, the hydraulic models showing a junction structure width of 25 feet is considered accurate and no changes to the model are necessary.

4. **Comment:** *The HGL is shown up to 11 feet above the top of the 13-foot wide by 6-foot high RCB near the Sky Village Road and Oso Blanca Road Intersection. Will the surcharged HGL at this location allow flexibility for future connections to the CCRFCD Facility (i.e. the 10-foot wide by 4-foot high laterals at Stations 45+50, 46+00, and 46+50)?*

Response: In the condition that the HGL is high above the RCB as stated in the comment, the ultimate connection of the RFCD facility in Kyle Canyon Road is in use and the 10-ft by 4-ft laterals are anticipated to no longer be utilized. A WSPG model of the ultimate RFCD facility in Kyle Canyon Road evaluates the tailwater impacts of the high HGL on its conceptual design (refer to Exhibit 6) and shows that the HGL normalizes with a hydraulic jump due to the steeper slope. Therefore, the high HGL at this location is considered acceptable and does not preclude future connection of the ultimate RFCD facility from Kyle Canyon Road.

The 10-ft by 4-ft laterals identified in this comment are provided only for interim collection of the current contributing flow across undeveloped property to the west on APNs 126-01-801-007, 126-01-801-009 and 126-01-801-019, and are anticipated to be abandoned in the ultimate condition of the watershed which is what has been modeled as a part of this supplement. The high HGL in the profile is a function of the junction structure designed to almost double the design flow rate in the trunk system, when the 10-ft by 4-ft laterals are in use this junction structure that causes the large jump in HGL will not be in use. In a preliminary effort to minimize adverse hydraulic losses, the conceptual profile shows that the interim flow collection will be accommodated by several confluences into the trunk line rather than 1 confluence like the ultimate junction structure that causes the large ultimate hydraulic loss. For conservative purposes, inspection of the HGL elevations in the area of the laterals are far below existing ground; therefore, the included exhibit in Appendix C showing the concept of how these laterals will function will not be adversely affected by a tailwater condition in the trunk storm drain.

In conclusion, the high HGL in the storm drain at Oso Blanca and Skye Village is not considered to be adverse to the functionality of the connectivity of all facilities into the ultimate RFCD storm drain addressed in this supplement.

Sheet 4

1. **Comment:** *What happens to the Facility shown within NDOT right-of-way that is shown connecting to the CCRFCD Facility Mainline at the Kyle Canyon Road and Skye Pointe Drive Intersection in Update #3 (Facility 9-1 in Update #3)?*

   Response: In an effort to reduce the amount of removal and replacement of new roadway constructed by the Kyle Canyon Interchange, the alignment of the storm drain identified as Facility 9-1 in the Master Drainage Study Update #3 has been shifted to traverse the developer's property and not enter Log Cabin Way until downstream of the interchange. The connection of Facility 9-1 into the ultimate RFCD storm drain alignment now occurs at the intersection of Log Cabin and O'Hare, as shown in the Facility Concept exhibit, re-included in this submittal in Appendix A. An amendment to the Master Drainage Study will be provided to show this master drainage facility alignment change, as annotated in Appendix D.

2. **Comment:** *Less than one foot of freeboard is shown in the CCRFCD Facility upstream of Station 72+20.*

   Response: Through coordination with CLV, it was communicated that the US95/Kyle Canyon Road Interchange project will be constructing the 13-ft wide by 8-ft high RCB crossing US95. Sheet 4 has been adjusted to show the change in storm drain size with

5740 S. Arville Street #216, Las Vegas, NV 89118 ph (702) 284-5300 fax (702) 284-5399

transition structures upstream and downstream to the 13-ft wide by 6-ft high RCB that was presented in the previous submittal. As a result of this change, the hydraulic model in Appendix A has been updated to show greater than 1-ft of freeboard in the storm drain crossing US95. The remaining storm drain appurtenances to the Interchange RCB defaults to CCRFCD Manual criteria for storm drain conveyance with the HGL determined to be greater than 1-ft below FG above the RCB, as coordinated with NDOT Hydraulics included in Appendix D.

Sheet 5

3. **Comment:** *How were the flow rate (453 cfs) and size (72-inch RCP) of the lateral connecting to the Mainline at Station 84+50 determined? Update #3 shows a 36-inch RCP (Facility 11-1 in Update #3) with 177 cfs connecting near this location.*

   Response: As a result of the re-aligned Facility 9-1, the connection to the RFCD storm drain at the intersection of Log Cabin and O'Hare now includes the total 100-yr flow rate collected by Facility 9-1 (255 cfs) and 11-1 (177 cfs) and any street flow required to be collected in Log Cabin by drop inlets connecting to the trunk line. For simplicity, the total flow rate in the ultimate RFCD storm drain Facility 11 has been utilized in this supplement's model which represents the design flow rate of 2,532 cfs.

   The 72-inch RCP lateral represents the contributing 432 cfs from totaling Facilities 9-1 and 11-1. Utilizing the assumed slope of 3.0% for Facility 11-1 identified in the Master Drainage Study Update #3, a Flowmaster normal depth computation included in Appendix A has determined that a 72-inch RCP is adequate as an estimation of the facility size.

4. **Comment:** *Verify any utilities at the O'Hare Road and Log Cabin Way Intersection.*

   Response: The future intersection of Log cabin and O'Hare is internal to the developer's property where currently it is undisturbed land with no right-of-way dedicated for either roadway in this location; therefore, it is assumed at this conceptual level that no utilities are present. Inspection of the CLV GIS server shows that sewer is not present in this location.

   Review of the included ALTA Survey for Skye Canyon in Appendix B shows that there is an existing easement for a Nevada Power underground utility in the alignment of Sky Pointe Drive. Upon technical design of the RFCD storm drain, further field verification of the horizontal and vertical location of the power feeder line will be required. However, for the purposes of this proof of concept, it is assumed that the developer will re-locate the utility if necessary in the future in the alignment of the RFCD storm drain.

Sheet 3A

1. **Comment:** *Show 100-year HGL on the profile.*

   Response: The Alternative HGL has been shown on this sheet.

Sheet 4A

2. **Comment:** *Show 100-year HGL on the profile upstream of Station 61+05.79.*

   Response: The Alternative HGL has been provided in the location requested.

Sheet 5A

1. **Comment:** *Minor discrepancies in inverts and stations between the hydraulic model and profile are shown between Stations 76+81.99 and 87+82.23.*

   Response: Model "KCI-B" has been revised to reflect the exact inverts and stations presented for the alternative profile. See Appendix A for the revised WSPGW model.

2. **Comment:** *Remove the 30 degree angle point in the hydraulic model at Station 86+31.60.*

   Response: The 30-degree angle point at this location represents a junction angle for the 72-inch RCP confluence into the CCRFCD trunk storm drain; therefore, it is considered accurate to compute the hydraulic losses at this location and must remain in the hydraulic model.

General

1. **Comment:** *How will the conveyance of sediment through the system with velocities in excess of 30 fps be mitigated in the future?*

   Response: Refer to the concept exhibits included in Appendix C showing that at the inlet of the several 10-ft by 4-ft RCB laterals, sediment basins will be included in the future design of the collection of the flow to limit the amount of sediment conveyed through the storm drain system. Additionally, as discussed in the previous submittal, to minimize the risk of abrasion from flow velocities upwards of 35 ft/s, Sheet 5 shows that the sacrificial concrete with high strength concrete is to be included in the future design of the RCBs in the system where velocities are considered at-risk.

   The velocity risks for sediment abrasion to the storm drain is considered low upon full build-out of the ultimate condition regional facility connectivity. Any contribution of sediment from Skye Canyon property will be mitigated by development. The offsite watershed responsible for the flows contributing to the 10-ft by 4-ft laterals will be routed through a future detention basin with debris storage in the regional alignment, removing a majority of future sediment concern.

2. **Comment:** *Label NDOT and CLV public right-of-way on exhibits.*

   Response: The exhibits have been updated accordingly.

3. **Comment:** *Label APNs for all parcels shown on exhibits.*

   Response: The exhibits have been updated accordingly.

4. **Comment:** *Note that the easement east of Sky Pointe Drive as discussed in the meeting on July 5, 2016 will need to be dedicated as part of the technical drainage study process.*

   Response: Acknowledged, any drainage easements required for extension of the CCRFCD storm drain through private property will be dedicated as necessary.

If you have any questions or require additional information, please do not hesitate to contact us at 702-284-5300.

Respectfully Submitted,

SLATER HANIFAN GROUP

Steve Jones, P.E.
Project Manager – Flood Control Division



cc: Jerry Slater – SHG
Marc Bolduc – Olympia
Bobby Williamson – Olympia
Ryan Belsick - GCW

APPENDIX

Appendix A – Revised Hydraulic Models
- WSPG – Skye Village Alignment
- WSPG – Alternative Skye Village Alignment
- O'Hare Lateral Normal Depth
- Updated Hydraulic Concept Summary Exhibit

Appendix B – ALTA Survey Exhibits

Appendix C – Concept Exhibits – 10-ft by 4-ft RCB Laterals

Appendix D – Reference Material
- Annotated Master Drainage Study Update #3 Exhibit
- NDOT Coordination Notes

Appendix E – Revised Concept Profile Exhibits

5740 S. Arville Street #216, Las Vegas, NV 89118 ph (702) 284-5300 fax (702) 284-5399

Memorandum

City of Las Vegas
Department of Public Works
City Engineering Division

To: Steve Jones, P.E.
Slater Hanifan Group

From: Oh-Sang Kwon, P.E.
Flood Control Section

Date: August 2, 2016

Hansen: 22326

Re: Kyle Canyon Interchange at US95
Conceptual Design for CCRFCD Regional Facility Crossing

We have reviewed the Kyle Canyon Interchange at US95, Conceptual Design for CCRFCD Regional Facility Crossing submittal for the proposed project and offer the following comments:

Sheet 3

1. Correct the match line station reference in left plan view to 54+50.00.
2. Minor discrepancies in slope between the hydraulic model and profile are shown between Stations 48+50 and 54+50.
3. Verify the width of the Junction Structure in the hydraulic model. The model shows a width of 25 feet and the two RCBs connecting are 13 feet wide.
4. The HGL is shown up to 11 feet above the top of the 13-foot wide by 6-foot high RCB near the Sky Village Road and Oso Blanca Road Intersection. Will the surcharged HGL at this location allow flexibility for future connections to the CCRFCD Facility (i.e. the 10-foot wide by 4-foot high laterals at Stations 45+50, 46+00, and 46+50)?

Sheet 4

1. What happens to the Facility shown within NDOT right-of-way that is shown connecting to the CCRFCD Facility Mainline at the Kyle Canyon Road and Skye Pointe Drive Intersection in Update #3 (Facility 9-1 in Update #3)?
2. Less than one foot of freeboard is shown in the CCRFCD Facility upstream of Station 72+20.

Sheet 5

3. How were the flow rate (453 cfs) and size (72-inch RCP) of the lateral connecting to the Mainline at Station 84+50 determined? Update #3 shows a 36-inch RCP (Facility 11-1 in Update #3) with 177 cfs connecting near this location.
4. Verify any utilities at the O'Hare Road and Log Cabin Way Intersection.

Sheet 3A

1. Show 100-year HGL on the profile.

Sheet 4A

2. Show 100-year HGL on the profile upstream of Station 61+05.79.

Sheet 5A

1. Minor discrepancies in inverts and stations between the hydraulic model and profile are shown between Stations 76+81.99 and 87+82.23.
2. Remove the 30 degree angle point in the hydraulic model at Station 86+31.60.

General

1. How will the conveyance of sediment through the system with velocities in excess of 30 fps be mitigated in the future?
2. Label NDOT and CLV public right-of-way on exhibits.
3. Label APNs for all parcels shown on exhibits.
4. Note that the easement east of Sky Pointe Drive as discussed in the meeting on July 5, 2016 will need to be dedicated as part of the technical drainage study process.

CC: Randy McConnell, P.E. – CLV
Mark Sorensen, P.E. – CLV

APPENDIX A

Revised Hydraulic Models

WSPG – Skye Village
Alignment

```
T1 KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608                                                  0
T2 MPU ULTIMATE CONDITION FACILITY
T3 SKYE VILLAGE - SKYE CANYON PARK TO US-95
SO  -8521.1502717.060  2                          2724.060
R   -8471.1502718.560  2       .015                                          .00
JX  -8421.1502720.060  1 72    .015  453.0          2719.15          -30.0
R   -8392.7202720.910  1       .015                                   .000
R   -8356.1002722.010  1       .015                                -10.000
R   -6941.1502762.660  1       .015                                   .000
TS  -6921.1502763.060  8       .015                                   .000
R   -6401.2902773.450  8       .015                                   .000
TS  -6381.2902775.800  1       .015                                   .000
R   -6286.1202777.470  1       .015                                   .000
R   -6105.7902780.620  1       .015                                 51.661    .000 0
R   -5413.6202792.730  1       .015                                   .000
TS  -5363.3002793.610  6       .015
JX  -5363.3002793.610  6  3    .015  783.000        2793.590
WX  -5363.3002793.610  1       .015                                   .000
R   -4996.3102800.400  1       .015                               -105.135    .000 0
R   -4300.5702812.210  1       .015                                   .000
R   -4192.8002814.510  1       .015                                 30.874    .000 0
R   -4083.3402816.840  1       .015                                -31.358    .000 0
R   -4070.6602817.110  1       .015                                   .000
JX  -4070.6602817.110  1 54    .015  296.0          2817.11           30.0
R   -3965.2102819.360  1       .015                                   .000
JX  -3940.2102819.890  7 42 42.015   92.0     92.0  2819.62 2819.62  30.0-30.0
R   -3697.6802825.060  7       .015                                   .000
R   -2328.8602831.900  7       .015                                   .000
JX  -2277.8602832.160  3  4    .015  404.000        2832.04           30.0
R   -1518.8602835.960  3       .015                                   .000
TS  -1497.8802836.060  5       .015
R   -1412.8802836.710  5       .015                                 15.000
JX  -1392.8802836.910 30 60    .013  370.0          2836.81           45.0
R    -758.8802843.260 30       .013                                   .000
SH   -758.8802843.260 30
CD   1  3   0    .000   6.000   13.000  .000  .000   .00
CD   2  3   0    .000   7.000   13.000  .000  .000   .00
CD   3  3   0    .000   6.000    9.000  .000  .000   .00
CD   4  3   0    .000   6.000    6.000  .000  .000   .00
CD   5  3   0    .000   5.000    8.000  .000  .000   .00
CD   6  3   0    .000   6.000   25.000  .000  .000   .00
CD   7  3   0    .000   6.000   11.000  .000  .000   .00
CD   8  3   0    .000   8.000   13.000  .000  .000   .00
CD   9  3   0    .000   6.000   12.000  .000  .000   .00
CD  10  3   0    .000   8.000    9.000  .000  .000   .00
CD  11  3   0    .000   8.000    8.000  .000  .000   .00
CD  30  4   1    .000   2.500     .000  .000  .000   .00
CD  36  4   1    .000   3.000     .000  .000  .000   .00
CD  42  4   1    .000   3.500     .000  .000  .000   .00
CD  54  4   1    .000   4.500     .000  .000  .000   .00
CD  60  4   1    .000   5.000     .000  .000  .000   .00
CD  72  4   1    .000   6.000     .000  .000  .000   .00
Q            42.000   .0
```

FILE: KCI-R.WSW W S P G W - EDIT LISTING - Version 14.06 Date: 8- 9-2016 Time:11:51:50

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	3	0	.000	6.000	13.000	.000	.000	.00										
CD	2	3	0	.000	7.000	13.000	.000	.000	.00										
CD	3	3	0	.000	6.000	9.000	.000	.000	.00										
CD	4	3	0	.000	6.000	6.000	.000	.000	.00										
CD	5	3	0	.000	5.000	8.000	.000	.000	.00										
CD	6	3	0	.000	6.000	25.000	.000	.000	.00										
CD	7	3	0	.000	6.000	11.000	.000	.000	.00										
CD	8	3	0	.000	8.000	13.000	.000	.000	.00										
CD	9	3	0	.000	6.000	12.000	.000	.000	.00										
CD	10	3	0	.000	8.000	9.000	.000	.000	.00										
CD	11	3	0	.000	8.000	8.000	.000	.000	.00										
CD	30	4	1		2.500														
CD	36	4	1		3.000														
CD	42	4	1		3.500														
CD	54	4	1		4.500														
CD	60	4	1		5.000														
CD	72	4	1		6.000														

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608

HEADING LINE NO 2 IS -

MPU ULTIMATE CONDITION FACILITY

HEADING LINE NO 3 IS -

SKYE VILLAGE - SKYE CANYON PARK TO US-95

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

	STATION	INVERT	SECT	W S ELEV
U/S DATA	-8521.150	2717.060	2	2724.060

ELEMENT NO 2 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-8471.150	2718.560	2	.015	.000	.000	.000	0

ELEMENT NO 3 IS A JUNCTION * * * * * * *

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	-8421.150	2720.060	1	72	0	.015	453.000	.000	2719.150	.000	-30.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 4 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-8392.720	2720.910	1	.015	.000	.000	.000	0

ELEMENT NO 5 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-8356.100	2722.010	1	.015	209.818	-10.000	.000	0

ELEMENT NO 6 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-6941.150	2762.660	1	.015	.000	.000	.000	0

ELEMENT NO 7 IS A TRANSITION * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE
U/S DATA	-6921.150	2763.060	8	.015	.000	.000

ELEMENT NO 8 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA								

```
                                                                KCI-R
                          -6401.290 2773.450    8                .015                                .000     .000      .000     0
 ELEMENT NO   9 IS A TRANSITION          *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                              RADIUS   ANGLE
                          -6381.290 2775.800    1                .015                                .000     .000
 ELEMENT NO  10 IS A REACH               *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                              RADIUS    ANGLE     ANG PT  MAN H
                          -6286.120 2777.470    1                .015                                .000     .000      .000     0
 ELEMENT NO  11 IS A REACH               *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                              RADIUS    ANGLE     ANG PT  MAN H
                          -6105.790 2780.620    1                .015                            199.999   51.661      .000     0
 ELEMENT NO  12 IS A REACH               *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                              RADIUS    ANGLE     ANG PT  MAN H
                          -5413.620 2792.730    1                .015                                .000     .000      .000     0
                                                    W S P G W                                                                PAGE NO   3
                         WATER SURFACE PROFILE - ELEMENT CARD LISTING
 ELEMENT NO  13 IS A TRANSITION          *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                              RADIUS   ANGLE
                          -5363.300 2793.610    6                .015                                .000     .000
 ELEMENT NO  14 IS A JUNCTION            *         *     *     *                   *                   *                 *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2    N      Q3         Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                          -5363.300 2793.610    6     3     0    .015   783.000      .000  2793.590      .000    .000     .000
                                                                                                  RADIUS    ANGLE
                                                                                                    .000     .000
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
 ELEMENT NO  15 IS A  WALL  EXIT                         *
                    U/S DATA   STATION    INVERT  SECT
                          -5363.300 2793.610    1
 ELEMENT NO  16 IS A REACH               *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                              RADIUS    ANGLE     ANG PT  MAN H
                          -4996.310 2800.400    1                .015                            200.000 -105.135      .000     0
 ELEMENT NO  17 IS A REACH               *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                              RADIUS    ANGLE     ANG PT  MAN H
                          -4300.570 2812.210    1                .015                                .000     .000      .000     0
 ELEMENT NO  18 IS A REACH               *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                              RADIUS    ANGLE     ANG PT  MAN H
                          -4192.800 2814.510    1                .015                            199.999   30.874      .000     0
 ELEMENT NO  19 IS A REACH               *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                              RADIUS    ANGLE     ANG PT  MAN H
                          -4083.340 2816.840    1                .015                            199.999  -31.358      .000     0
 ELEMENT NO  20 IS A REACH               *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                              RADIUS    ANGLE     ANG PT  MAN H
                          -4070.660 2817.110    1                .015                                .000     .000      .000     0
 ELEMENT NO  21 IS A JUNCTION            *         *     *     *                   *                   *                 *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2    N      Q3         Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                          -4070.660 2817.110    1    54     0    .015   296.000      .000  2817.110      .000  30.000     .000
                                                                                                  RADIUS    ANGLE
                                                                                                    .000     .000
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
                                                    W S P G W                                                                PAGE NO   4
                         WATER SURFACE PROFILE - ELEMENT CARD LISTING
 ELEMENT NO  22 IS A REACH               *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                              RADIUS    ANGLE     ANG PT  MAN H
                          -3965.210 2819.360    1                .015                                .000     .000      .000     0
 ELEMENT NO  23 IS A JUNCTION            *         *     *     *                   *                   *                 *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2    N      Q3         Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
```

```
                                                                                                                KCI-R
                                -3940.210 2819.890    7    42    42   .015    92.000    92.000  2819.620  2819.620  30.000  -30.000
                                                                                                          RADIUS    ANGLE
                                                                                                            .000     .000
ELEMENT NO  24 IS A REACH              *         *     *
                U/S DATA   STATION    INVERT  SECT                N                                    RADIUS    ANGLE     ANG PT  MAN H
                                -3697.680 2825.060    7                .015                                .000     .000      .000     0
ELEMENT NO  25 IS A REACH              *         *     *
                U/S DATA   STATION    INVERT  SECT                N                                    RADIUS    ANGLE     ANG PT  MAN H
                                -2328.860 2831.900    7                .015                                .000     .000      .000     0
ELEMENT NO  26 IS A JUNCTION           *         *     *     *            *                                  *                  *
                U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4      INVERT-3 INVERT-4  PHI 3  PHI 4
                                -2277.860 2832.160    3     4     0   .015   404.000      .000  2832.040      .000  30.000      .000
                                                                                                          RADIUS    ANGLE
                                                                                                            .000     .000
ELEMENT NO  27 IS A REACH              *         *     *
                U/S DATA   STATION    INVERT  SECT                N                                    RADIUS    ANGLE     ANG PT  MAN H
                                -1518.860 2835.960    3                .015                                .000     .000      .000     0
ELEMENT NO  28 IS A TRANSITION         *         *     *
                U/S DATA   STATION    INVERT  SECT                N                                    RADIUS   ANGLE
                                -1497.880 2836.060    5                .015                                .000     .000
ELEMENT NO  29 IS A REACH              *         *     *
                U/S DATA   STATION    INVERT  SECT                N                                    RADIUS    ANGLE     ANG PT  MAN H
                                -1412.880 2836.710    5                .015                              324.676   15.000      .000     0
ELEMENT NO  30 IS A JUNCTION           *         *     *     *            *                                  *                  *
                U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4      INVERT-3 INVERT-4  PHI 3  PHI 4
                                -1392.880 2836.910   30    60     0   .013   370.000      .000  2836.810      .000  45.000      .000
                                                                                                          RADIUS    ANGLE
                                                                                                            .000     .000
                                                                  W S P G W
                                                WATER SURFACE PROFILE - ELEMENT CARD LISTING                                  PAGE NO   5
ELEMENT NO  31 IS A REACH              *         *     *
                U/S DATA   STATION    INVERT  SECT                N                                    RADIUS    ANGLE     ANG PT  MAN H
                                -758.880 2843.260   30                .013                                .000     .000      .000     0
ELEMENT NO  32 IS A SYSTEM HEADWORKS                 *                  *
                U/S DATA   STATION    INVERT  SECT                                                  W S ELEV
                                -758.880 2843.260   30                                                 .000
```

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-8521.150	2717.060	6.701	2723.761	2532.00	29.06	13.12	2736.88	.00	7.00	13.00	7.000	13.000	.00	0 .0
50.000	.0300					.0167	.84	6.70	1.98	5.49	.015	.00	.00	BOX
				WARNING - Flow depth near top of box conduit										
-8471.150	2718.560	6.946	2725.506	2532.00	28.04	12.21	2737.72	.00	7.00	13.00	7.000	13.000	.00	0 .0
JUNCT STR	.0300					.0224	1.12	6.95	1.87		.015	.00	.00	BOX
				WARNING - Flow depth near top of box conduit										
-8421.150	2720.060	4.817	2724.877	2079.00	33.20	17.11	2741.99	.00	6.00	13.00	6.000	13.000	.00	0 .0
28.431	.0299					.0289	.82	4.82	2.67	4.76	.015	.00	.00	BOX
-8392.720	2720.910	4.821	2725.731	2079.00	33.17	17.08	2742.82	6.00	6.00	13.00	6.000	13.000	.00	0 .0
36.620	.0300					.0288	1.05	6.00	2.66	4.75	.015	.00	.00	BOX
-8356.100	2722.010	4.828	2726.838	2079.00	33.12	17.04	2743.87	.00	6.00	13.00	6.000	13.000	.00	0 .0
213.174	.0287					.0287	6.12	4.83	2.66	4.83	.015	.00	.00	BOX
-8142.926	2728.134	4.828	2732.963	2079.00	33.12	17.04	2750.00	.00	6.00	13.00	6.000	13.000	.00	0 .0
740.228	.0287					.0276	20.41	4.83	2.66	4.83	.015	.00	.00	BOX
-7402.698	2749.400	4.978	2754.378	2079.00	32.13	16.03	2770.41	.00	6.00	13.00	6.000	13.000	.00	0 .0
308.160	.0287					.0248	7.64	4.98	2.54	4.83	.015	.00	.00	BOX

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-7094.538	2758.253	5.221	2763.474	2079.00	30.63	14.57	2778.04	.00	6.00	13.00	6.000	13.000	.00	0 .0
153.388	.0287					.0218	3.34	5.22	2.36	4.83	.015	.00	.00	BOX
-6941.150	2762.660	5.476	2768.135	2079.00	29.21	13.25	2781.38	.00	6.00	13.00	6.000	13.000	.00	0 .0
TRANS STR	.0200					.0204	.41	5.48	2.20		.015	.00	.00	BOX
				WARNING - Flow depth near top of box conduit										
-6921.150	2763.060	5.473	2768.533	2079.00	29.22	13.26	2781.79	.00	8.00	13.00	8.000	13.000	.00	0 .0
519.860	.0200					.0212	11.02	5.47	2.20	5.51	.015	.00	.00	BOX
-6401.290	2773.450	5.318	2778.768	2079.00	30.07	14.04	2792.81	.00	8.00	13.00	8.000	13.000	.00	0 .0
TRANS STR	.1175					.0197	.39	5.32	2.30		.015	.00	.00	BOX
-6381.290	2775.800	5.792	2781.592	2079.00	27.61	11.84	2793.43	.00	6.00	13.00	6.000	13.000	.00	0 .0
95.170	.0175					.0175	1.66	5.79	2.02	5.78	.015	.00	.00	BOX
				WARNING - Flow depth near top of box conduit										
-6286.120	2777.470	5.795	2783.265	2079.00	27.60	11.83	2795.09	6.00	6.00	13.00	6.000	13.000	.00	0 .0
180.330	.0175					.0174	3.14	6.00	2.02	5.79	.015	.00	.00	BOX
				WARNING - Flow depth near top of box conduit										

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 8- 9-2016 Time:11:51:56

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608
MPU ULTIMATE CONDITION FACILITY
SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-6105.790	2780.620	5.797	2786.417	2079.00	27.59	11.82	2798.24	.00	6.00	13.00	6.000	13.000	.00	0 .0
692.170	.0175					.0226	15.63	5.80	2.02	5.79	.015	.00	.00	BOX
WARNING - Flow depth near top of box conduit														
-5413.620	2792.730	6.000	2798.730	2079.00	26.65	11.03	2809.76	.00	6.00	13.00	6.000	13.000	.00	0 .0
TRANS STR	.0175					.0060	.30	6.00	1.92		.015	.00	.00	BOX
-5363.300	2793.610	15.070	2808.680	2079.00	13.86	2.98	2811.66	.00	5.99	25.00	6.000	25.000	.00	0 .0
JUNCT STR	.0000					.0023	.00	15.07	1.00		.015	.00	.00	BOX
-5363.300	2793.610	16.894	2810.504	1296.00	8.64	1.16	2811.66	.00	4.37	25.00	6.000	25.000	.00	0 .0
WALL EXIT														
-5363.300	2793.610	16.894	2810.504	1296.00	16.62	4.29	2814.79	.00	6.00	13.00	6.000	13.000	.00	0 .0
366.990	.0185					.0108	3.96	.00	1.20	4.03	.015	.00	.00	BOX
-4996.310	2800.400	14.988	2815.388	1296.00	16.62	4.29	2819.68	.00	6.00	13.00	6.000	13.000	.00	0 .0
695.740	.0170					.0108	7.50	14.99	1.20	4.15	.015	.00	.00	BOX
-4300.570	2812.210	10.681	2822.891	1296.00	16.62	4.29	2827.18	.00	6.00	13.00	6.000	13.000	.00	0 .0
107.770	.0213					.0108	1.16	.00	1.20	3.83	.015	.00	.00	BOX
-4192.800	2814.510	10.045	2824.555	1296.00	16.62	4.29	2828.84	.00	6.00	13.00	6.000	13.000	.00	0 .0
109.460	.0213					.0108	1.18	.00	1.20	3.83	.015	.00	.00	BOX

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 8- 9-2016 Time:11:51:56

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608
MPU ULTIMATE CONDITION FACILITY
SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-4083.340	2816.840	9.401	2826.241	1296.00	16.62	4.29	2830.53	.00	6.00	13.00	6.000	13.000	.00	0 .0
12.680	.0213					.0108	.14	9.40	1.20	3.83	.015	.00	.00	BOX
-4070.660	2817.110	9.268	2826.378	1296.00	16.62	4.29	2830.67	.00	6.00	13.00	6.000	13.000	.00	0 .0
JUNCT STR	.0000					.0064	.00	9.27	1.20		.015	.00	.00	BOX
-4070.660	2817.110	11.003	2828.113	1000.00	12.82	2.55	2830.67	.00	5.69	13.00	6.000	13.000	.00	0 .0
105.450	.0213					.0064	.68	11.00	.92	3.20	.015	.00	.00	BOX
-3965.210	2819.360	9.430	2828.790	1000.00	12.82	2.55	2831.34	.00	5.69	13.00	6.000	13.000	.00	0 .0
JUNCT STR	.0212					.0064	.16	9.43	.92		.015	.00	.00	BOX
-3940.210	2819.890	9.582	2829.471	816.00	12.36	2.37	2831.85	.00	5.55	11.00	6.000	11.000	.00	0 .0
240.610	.0213					.0064	1.55	9.58	.89	3.20	.015	.00	.00	BOX
-3699.600	2825.019	6.000	2831.019	816.00	12.36	2.37	2833.39	.00	5.55	11.00	6.000	11.000	.00	0 .0
1.920	.0213					.0038	.01	6.00	.89	3.20	.015	.00	.00	BOX
-3697.680	2825.060	5.801	2830.861	816.00	12.79	2.54	2833.40	.00	5.55	11.00	6.000	11.000	.00	0 .0

20.906	.0050					.0042	.09	5.80	.94	5.42	.015		.00	.00	BOX			

WARNING - Flow depth near top of box conduit

-3676.773	2825.165	5.678	2830.843	816.00	13.06	2.65	2833.49	.00	5.55	11.00	6.000	11.000	.00	0	.0			
HYDRAULIC JUMP																		

WARNING - Flow depth near top of box conduit

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 8- 9-2016 Time:11:51:56

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608
MPU ULTIMATE CONDITION FACILITY
SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-3676.773	2825.165	5.422	2830.587	816.00	13.68	2.91	2833.49	.00	5.55	11.00	6.000	11.000	.00	0 .0
1317.752	.0050					.0050	6.58	5.42	1.04	5.42	.015		.00	.00 BOX

WARNING - Flow depth near top of box conduit

-2359.021	2831.749	5.422	2837.172	816.00	13.68	2.91	2840.08	.00	5.55	11.00	6.000	11.000	.00	0	.0
30.161	.0050					.0048	.15	5.42	1.04	5.42	.015		.00	.00	BOX

WARNING - Flow depth near top of box conduit

-2328.860	2831.900	5.550	2837.450	816.00	13.37	2.77	2840.22	.00	5.55	11.00	6.000	11.000	.00	0	.0
JUNCT STR	.0051					.0027	.14	5.55	1.00		.015		.00	.00	BOX

WARNING - Flow depth near top of box conduit

-2277.860	2832.160	7.550	2839.710	412.00	7.63	.90	2840.61	.00	4.02	9.00	6.000	9.000	.00	0	.0
674.696	.0050					.0027	1.83	7.55	.55	3.97	.015		.00	.00	BOX
-1603.164	2835.538	6.000	2841.538	412.00	7.63	.90	2842.44	.00	4.02	9.00	6.000	9.000	.00	0	.0
58.764	.0050					.0017	.10	6.00	.55	3.97	.015		.00	.00	BOX

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 8- 9-2016 Time:11:51:56

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608
MPU ULTIMATE CONDITION FACILITY
SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1544.400	2835.832	5.720	2841.552	412.00	8.00	.99	2842.55	.00	4.02	9.00	6.000	9.000	.00	0	.0
25.540	.0050					.0019	.05	5.72	.59	3.97	.015		.00	.00	BOX

WARNING - Flow depth near top of box conduit

-1518.860	2835.960	5.599	2841.558	412.00	8.18	1.04	2842.60	.00	4.02	9.00	6.000	9.000	.00	0	.0
TRANS STR	.0048					.0020	.04	5.60	.61		.015		.00	.00	BOX

WARNING - Flow depth near top of box conduit

-1497.880	2836.060	5.096	2841.156	412.00	10.30	1.65	2842.80	.00	4.35	8.00	5.000	8.000	.00	0	.0
85.000	.0076					.0061	.52	.00	.81	3.81	.015		.00	.00	BOX
-1412.880	2836.710	5.098	2841.808	412.00	10.30	1.65	2843.46	.00	4.35	8.00	5.000	8.000	.00	0	.0
JUNCT STR	.0100					.0075	.15	5.10	.81		.013		.00	.00	BOX

WARNING - Junction Analysis - Change in Channel Type

-1392.880	2836.910	5.559	2842.469	42.00	8.56	1.14	2843.61	.00	2.17	.00	2.500	.000	.00	1	.0
634.000	.0100					.0105	6.65	5.56	.00	2.11	.013		.00	.00	PIPE
-758.880	2843.260	5.856	2849.116	42.00	8.56	1.14	2850.25	.00	2.17	.00	2.500	.000	.00	1	.0

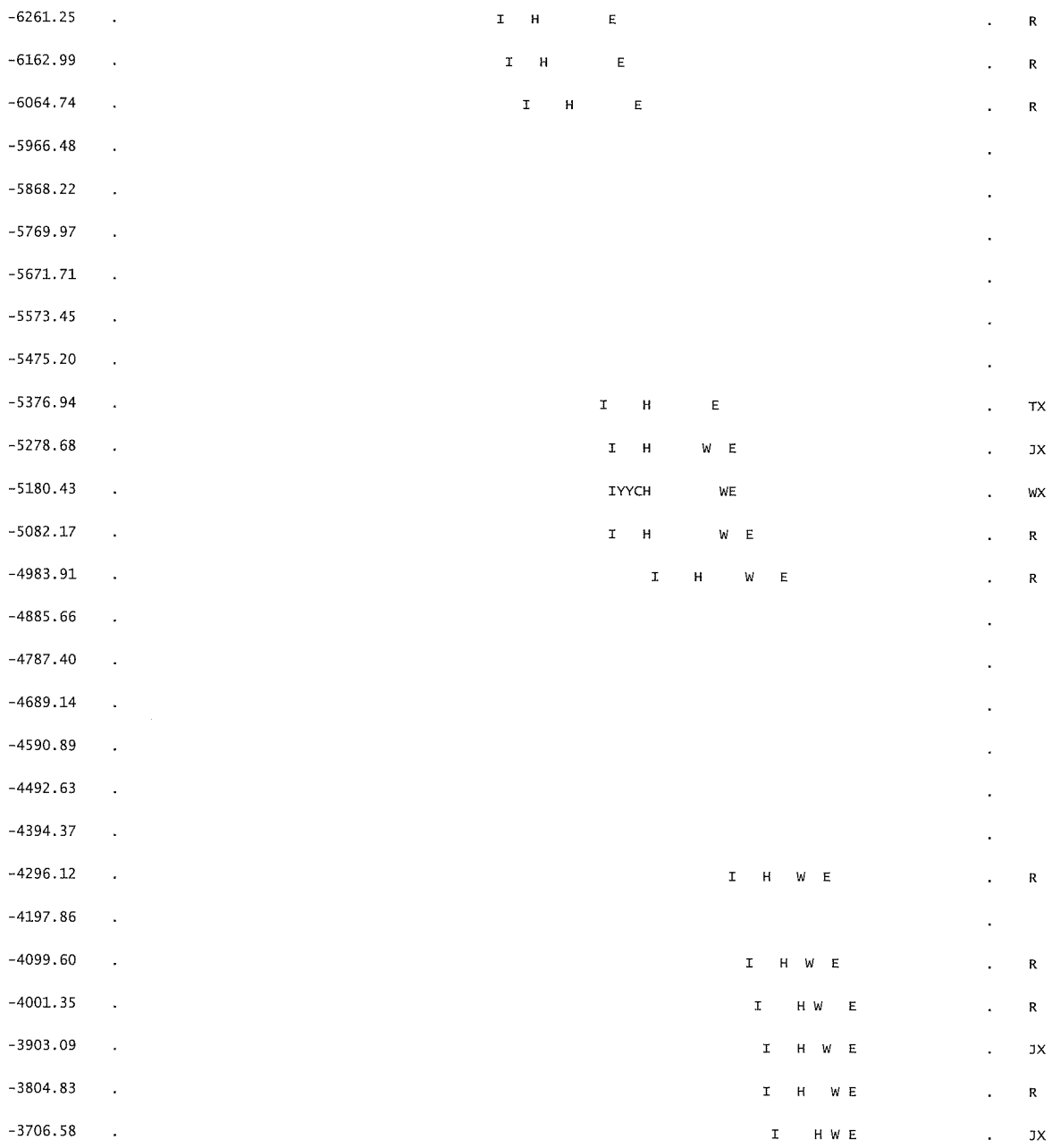
♀

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608

MPU ULTIMATE CONDITION FACILITY

SKYE VILLAGE - SKYE CANYON PARK TO US-95

-8521.15	.I H E	.	R
-8422.89	. I H E	.	JX
-8324.64	. I WH E	.	R
-8226.38	. I WH E	.	R
-8128.12	. I WH E	.	R
-8029.87	. I WH E	.	R
-7931.61	.	.	
-7833.35	.	.	
-7735.10	.	.	
-7636.84	.	.	
-7538.58	.	.	
-7440.33	.	.	
-7342.07	. I H E	.	R
-7243.81	.	.	
-7145.56	.	.	
-7047.30	. I WH E	.	R
-6949.04	.	.	
-6850.79	. I H E	.	TX
-6752.53	. I W H E	.	R
-6654.28	.	.	
-6556.02	.	.	
-6457.76	.	.	
-6359.51	. I W H E	.	TX


-6261.25
-6162.99
-6064.74
-5966.48
-5868.22
-5769.97
-5671.71
-5573.45
-5475.20
-5376.94
-5278.68
-5180.43
-5082.17
-4983.91
-4885.66
-4787.40
-4689.14
-4590.89
-4492.63
-4394.37
-4296.12
-4197.86
-4099.60
-4001.35
-3903.09
-3804.83
-3706.58
I H E
I H E
I H E
I H E
I H W E
IYYCH WE
I H W E
I H W E
I H W E
I H W E
I H W E
I H W E
I H W E
R
R
R
TX
JX
WX
R
R
R

KCI-R

| | | |

-857.14 .

-758.88 . I H W . R

2717.060 2730.379 2743.699 2757.018 2770.337 2783.657 2796.976 2810.295 2823.615 2836.934 2850.253

N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   S = SUPER-ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

WSPG – Alternative Skye Village Alignment

```
T1 KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608                                0
T2 MPU ULTIMATE CONDITION FACILITY (BLUE ALTERNATIVE)
T3 SKYE VILLAGE - SKYE CANYON PARK TO US-95
SO  -8782.2302717.240  2                          2724.240
R   -8682.2302720.540  2       .015                                        .00
JX  -8632.2302722.190  2 72    .015  453.0           2721.36          -30.0
R   -8324.0002732.360  2       .015                                    .000
R   -7825.0002748.830  2       .015                                 19.960    .000 0
TS  -7800.0002749.650  9       .015
R   -7681.9902753.550  9       .015                                    .000
R   -7590.4702754.690  9       .015                                -34.041    .000 0
R   -7493.9902755.900  9       .015                                    .000
R   -7334.4702757.890  9       .015                                -56.419    .000 0
R   -7140.6002760.320  9       .015                                    .000
R   -6973.6802762.400  9       .015                                 59.036    .000 0
R   -6921.1502763.060  9       .015                                    .000
R   -6401.2902773.450  9       .015                                    .000
TS  -6351.2402774.420  2       .015                                    .000
R   -6286.1202775.700  2       .015                                    .000
R   -6105.7902779.220  2       .015                                 51.661    .000 0
R   -5413.6202792.730  2       .015                                    .000
TS  -5363.3002793.610  6       .015                                    .000
JX  -5363.3002793.610  6  3    .015  783.000          2793.610
WX  -5363.3002793.610  1       .015                                    .000
R   -4996.3102800.400  1       .015                             -105.135    .000 0
R   -4300.5702812.210  1       .015                                    .000
R   -4192.8002814.510  1       .015                                 30.874    .000 0
R   -4083.3402816.840  1       .015                                -31.358    .000 0
R   -4070.6602817.110  1       .015                                    .000
JX  -4070.6602817.110  1 54    .015  296.0           2817.11          30.0
R   -3965.2102819.360  1       .015                                    .000
JX  -3940.2102819.890  7 42 42.015   92.0     92.0  2819.62 2819.62  30.0-30.0
R   -3697.6802825.060  7       .015                                    .000
R   -2328.8602831.900  7       .015                                    .000
JX  -2277.8602832.160  3  4    .015  404.000          2832.04          30.0
R   -1518.8602835.960  3       .015                                    .000
TS  -1497.8802836.060  5       .015
R   -1412.8802836.710  5       .015                                 15.000
JX  -1392.8802836.910 30 60    .013  370.0            2836.81          45.0
R    -758.8802843.260 30       .013                                    .000
SH   -758.8802843.260 30
CD   1  3   0    .000   6.000   13.000  .000  .000   .00
CD   2  3   0    .000   7.000   13.000  .000  .000   .00
CD   3  3   0    .000   6.000    9.000  .000  .000   .00
CD   4  3   0    .000   6.000    6.000  .000  .000   .00
CD   5  3   0    .000   5.000    8.000  .000  .000   .00
CD   6  3   0    .000   6.000   25.000  .000  .000   .00
CD   7  3   0    .000   6.000   11.000  .000  .000   .00
CD   8  3   0    .000   6.000   12.000  .000  .000   .00
CD   9  3   0    .000   8.000   13.000  .000  .000   .00
CD  10  3   0    .000   8.000    9.000  .000  .000   .00
CD  11  3   0    .000   8.000    8.000  .000  .000   .00
CD  30  4   1    .000   2.500     .000  .000  .000   .00
CD  36  4   1    .000   3.000     .000  .000  .000   .00
CD  42  4   1    .000   3.500     .000  .000  .000   .00
CD  54  4   1    .000   4.500     .000  .000  .000   .00
CD  60  4   1    .000   5.000     .000  .000  .000   .00
```

```
CD  72  4   1    .000   6.000     .000  .000  .000   .00
Q             42.000   .0
```

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	3	0	.000	6.000	13.000	.000	.000	.00										
CD	2	3	0	.000	7.000	13.000	.000	.000	.00										
CD	3	3	0	.000	6.000	9.000	.000	.000	.00										
CD	4	3	0	.000	6.000	6.000	.000	.000	.00										
CD	5	3	0	.000	5.000	8.000	.000	.000	.00										
CD	6	3	0	.000	6.000	25.000	.000	.000	.00										
CD	7	3	0	.000	6.000	11.000	.000	.000	.00										
CD	8	3	0	.000	6.000	12.000	.000	.000	.00										
CD	9	3	0	.000	8.000	13.000	.000	.000	.00										
CD	10	3	0	.000	8.000	9.000	.000	.000	.00										
CD	11	3	0	.000	8.000	8.000	.000	.000	.00										
CD	30	4	1		2.500														
CD	36	4	1		3.000														
CD	42	4	1		3.500														
CD	54	4	1		4.500														
CD	60	4	1		5.000														
CD	72	4	1		6.000														

W S P G W PAGE NO 1
WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608

HEADING LINE NO 2 IS -
MPU ULTIMATE CONDITION FACILITY (BLUE ALTERNATIVE)

HEADING LINE NO 3 IS -
SKYE VILLAGE - SKYE CANYON PARK TO US-95

W S P G W PAGE NO 2
WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *
U/S DATA STATION INVERT SECT W S ELEV
-8782.230 2717.240 2 2724.240

ELEMENT NO 2 IS A REACH * * *
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
-8682.230 2720.540 2 .015 .000 .000 .000 0

ELEMENT NO 3 IS A JUNCTION * * * * * * *
U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
-8632.230 2722.190 2 72 0 .015 453.000 .000 2721.360 .000 -30.000 .000
RADIUS ANGLE
.000 .000

ELEMENT NO 4 IS A REACH * * *
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
-8324.000 2732.360 2 .015 .000 .000 .000 0

ELEMENT NO 5 IS A REACH * * *
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
-7825.000 2748.830 2 .015 1432.395 19.960 .000 0

ELEMENT NO 6 IS A TRANSITION * * *
U/S DATA STATION INVERT SECT N RADIUS ANGLE
-7800.000 2749.650 9 .015 .000 .000

ELEMENT NO 7 IS A REACH * * *
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
-7681.990 2753.550 9 .015 .000 .000 .000 0

ELEMENT NO 8 IS A REACH * * *
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
-7590.470 2754.690 9 .015 154.041 -34.041 .000 0

ELEMENT NO 9 IS A REACH * * *
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
-7493.990 2755.900 9 .015 .000 .000 .000 0

ELEMENT NO 10 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-7334.470	2757.890	9	.015	161.999	-56.419	.000	0

ELEMENT NO 11 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-7140.600	2760.320	9	.015	.000	.000	.000	0

ELEMENT NO 12 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-6973.680	2762.400	9	.015	162.000	59.036	.000	0

ELEMENT NO 13 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-6921.150	2763.060	9	.015	.000	.000	.000	0

ELEMENT NO 14 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-6401.290	2773.450	9	.015	.000	.000	.000	0

ELEMENT NO 15 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	-6351.240	2774.420	2	.015	.000	.000

ELEMENT NO 16 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-6286.120	2775.700	2	.015	.000	.000	.000	0

ELEMENT NO 17 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-6105.790	2779.220	2	.015	199.999	51.661	.000	0

ELEMENT NO 18 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-5413.620	2792.730	2	.015	.000	.000	.000	0

ELEMENT NO 19 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	-5363.300	2793.610	6	.015	.000	.000

ELEMENT NO 20 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	-5363.300	2793.610	6	3	0	.015	783.000	.000	2793.610	.000	.000	.000

RADIUS	ANGLE
.000	.000

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 21 IS A WALL EXIT *

U/S DATA	STATION	INVERT	SECT
	-5363.300	2793.610	1

ELEMENT NO 22 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-4996.310	2800.400	1	.015	200.000	-105.135	.000	0

ELEMENT NO 23 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-4300.570	2812.210	1	.015	.000	.000	.000	0

ELEMENT NO 24 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-4192.800	2814.510	1	.015	199.999	30.874	.000	0

ELEMENT NO 25 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-4083.340	2816.840	1	.015	199.999	-31.358	.000	0

ELEMENT NO 26 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-4070.660	2817.110	1	.015	.000	.000	.000	0

ELEMENT NO 27 IS A JUNCTION * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4

```
                                                                KCI-B
                          -4070.660 2817.110    1    54     0   .015   296.000      .000  2817.110      .000  30.000      .000
                                                                                                RADIUS    ANGLE
                                                                                                  .000     .000
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
 ELEMENT NO  28 IS A REACH              *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                          -3965.210 2819.360    1                .015                            .000     .000      .000     0
 ELEMENT NO  29 IS A JUNCTION           *         *     *     *                *                   *                *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                          -3940.210 2819.890    7    42    42   .015    92.000    92.000  2819.620  2819.620  30.000  -30.000
                                                                                                RADIUS    ANGLE
                                                                                                  .000     .000
 ELEMENT NO  30 IS A REACH              *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                          -3697.680 2825.060    7                .015                            .000     .000      .000     0
 ELEMENT NO  31 IS A REACH              *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                          -2328.860 2831.900    7                .015                            .000     .000      .000     0
 ELEMENT NO  32 IS A JUNCTION           *         *     *     *                *                   *                *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                          -2277.860 2832.160    3     4     0   .015   404.000      .000  2832.040      .000  30.000      .000
                                                                                                RADIUS    ANGLE
                                                                                                  .000     .000
                                                    W S P G W                                                                PAGE NO   5
                        WATER SURFACE PROFILE - ELEMENT CARD LISTING
 ELEMENT NO  33 IS A REACH              *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                          -1518.860 2835.960    3                .015                            .000     .000      .000     0
 ELEMENT NO  34 IS A TRANSITION         *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                          RADIUS   ANGLE
                          -1497.880 2836.060    5                .015                            .000     .000
 ELEMENT NO  35 IS A REACH              *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                          -1412.880 2836.710    5                .015                         324.676   15.000      .000     0
 ELEMENT NO  36 IS A JUNCTION           *         *     *     *                *                   *                *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                          -1392.880 2836.910   30    60     0   .013   370.000      .000  2836.810      .000  45.000      .000
                                                                                                RADIUS    ANGLE
                                                                                                  .000     .000
 ELEMENT NO  37 IS A REACH              *         *     *
                    U/S DATA   STATION    INVERT  SECT                N                          RADIUS    ANGLE     ANG PT  MAN H
                           -758.880 2843.260   30                .013                            .000     .000      .000     0
 ELEMENT NO  38 IS A SYSTEM HEADWORKS                 *                     *
                    U/S DATA   STATION    INVERT  SECT                                      W S ELEV
                           -758.880 2843.260   30                                              .000
```

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608
MPU ULTIMATE CONDITION FACILITY (BLUE ALTERNATIVE)
SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-8782.230	2717.240	6.267	2723.507	2532.00	31.08	15.00	2738.51	.00	7.00	13.00	7.000	13.000	.00	0 .0
28.020	.0330					.0205	.58	6.27	2.19	5.30	.015	.00	.00	BOX
-8754.211	2718.165	6.361	2724.526	2532.00	30.62	14.56	2739.08	.00	7.00	13.00	7.000	13.000	.00	0 .0
71.980	.0330					.0189	1.36	6.36	2.14	5.30	.015	.00	.00	BOX
---------- WARNING - Flow depth near top of box conduit ----------														
-8682.230	2720.540	6.672	2727.212	2532.00	29.19	13.23	2740.45	.00	7.00	13.00	7.000	13.000	.00	0 .0
JUNCT STR	.0330					.0247	1.23	6.67	1.99		.015	.00	.00	BOX
---------- WARNING - Flow depth near top of box conduit ----------														
-8632.230	2722.190	4.666	2726.855	2079.00	34.28	18.24	2745.10	.00	7.00	13.00	7.000	13.000	.00	0 .0
308.230	.0330					.0306	9.42	4.67	2.80	4.59	.015	.00	.00	BOX
-8324.000	2732.360	4.780	2737.140	2079.00	33.46	17.38	2754.52	.32	7.00	13.00	7.000	13.000	.00	0 .0
65.451	.0330					.0292	1.91	5.10	2.70	4.59	.015	.00	.00	BOX
-8258.549	2734.520	4.820	2739.340	2079.00	33.18	17.09	2756.44	.31	7.00	13.00	7.000	13.000	.00	0 .0
222.961	.0330					.0271	6.04	5.13	2.66	4.59	.015	.00	.00	BOX
-8035.588	2741.879	5.055	2746.935	2079.00	31.64	15.54	2762.48	.28	7.00	13.00	7.000	13.000	.00	0 .0
126.155	.0330					.0238	3.00	5.34	2.48	4.59	.015	.00	.00	BOX

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608
MPU ULTIMATE CONDITION FACILITY (BLUE ALTERNATIVE)
SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-7909.433	2746.043	5.302	2751.345	2079.00	30.16	14.13	2765.47	.26	7.00	13.00	7.000	13.000	.00	0 .0
84.433	.0330					.0209	1.76	5.56	2.31	4.59	.015	.00	.00	BOX
-7825.000	2748.830	5.561	2754.391	2079.00	28.76	12.84	2767.23	.00	7.00	13.00	7.000	13.000	.00	0 .0
TRANS STR	.0328					.0191	.48	5.56	2.15		.015	.00	.00	BOX
-7800.000	2749.650	5.646	2755.296	2079.00	28.33	12.46	2767.75	.00	8.00	13.00	8.000	13.000	.00	0 .0
35.048	.0330					.0180	.63	5.65	2.10	4.59	.015	.00	.00	BOX
-7764.952	2750.808	5.809	2756.617	2079.00	27.53	11.77	2768.39	.00	8.00	13.00	8.000	13.000	.00	0 .0
46.899	.0330					.0163	.76	5.81	2.01	4.59	.015	.00	.00	BOX
-7718.052	2752.358	6.093	2758.451	2079.00	26.25	10.70	2769.15	.00	8.00	13.00	8.000	13.000	.00	0 .0
36.062	.0330					.0143	.52	6.09	1.87	4.59	.015	.00	.00	BOX
-7681.990	2753.550	6.390	2759.940	2079.00	25.03	9.73	2769.67	8.00	8.00	13.00	8.000	13.000	.00	0 .0

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
91.520	.0125					.0135	1.24	8.00	1.74	6.57	.015	.00	.00	BOX
-7590.470	2754.690	6.342	2761.031	2079.00	25.22	9.88	2770.91	.00	8.00	13.00	8.000	13.000	.00	0 .0
96.480	.0125					.0139	1.34	6.34	1.76	6.55	.015	.00	.00	BOX
-7493.990	2755.900	6.282	2762.182	2079.00	25.46	10.06	2772.24	1.61	8.00	13.00	8.000	13.000	.00	0 .0
159.520	.0125					.0145	2.31	7.90	1.79	6.57	.015	.00	.00	BOX
-7334.470	2757.890	6.145	2764.035	2079.00	26.02	10.52	2774.55	.00	8.00	13.00	8.000	13.000	.00	0 .0
193.870	.0125					.0157	3.05	6.15	1.85	6.55	.015	.00	.00	BOX

Program Package Serial Number: 1704
WATER SURFACE PROFILE LISTING Date: 8- 8-2016 Time: 1:31: 7
KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608
MPU ULTIMATE CONDITION FACILITY (BLUE ALTERNATIVE)
SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-7140.600	2760.320	5.910	2766.230	2079.00	27.06	11.37	2777.60	1.82	8.00	13.00	8.000	13.000	.00	0 .0
2.330	.0125					.0166	.04	7.73	1.96	6.57	.015	.00	.00	BOX
-7138.270	2760.349	5.906	2766.255	2079.00	27.08	11.38	2777.64	1.83	8.00	13.00	8.000	13.000	.00	0 .0
164.590	.0125					.0177	2.91	7.73	1.96	6.57	.015	.00	.00	BOX
-6973.680	2762.400	5.631	2768.031	2079.00	28.40	12.52	2780.55	.00	8.00	13.00	8.000	13.000	.00	0 .0
52.530	.0126					.0193	1.01	5.63	2.11	6.55	.015	.00	.00	BOX
-6921.150	2763.060	5.532	2768.592	2079.00	28.91	12.98	2781.57	.00	8.00	13.00	8.000	13.000	.00	0 .0
519.860	.0200					.0193	10.05	5.53	2.17	5.51	.015	.00	.00	BOX
-6401.290	2773.450	5.626	2779.076	2079.00	28.43	12.55	2791.62	.00	8.00	13.00	8.000	13.000	.00	0 .0
TRANS STR	.0194					.0189	.94	5.63	2.11		.015	.00	.00	BOX
-6351.240	2774.420	5.631	2780.051	2079.00	28.40	12.52	2792.57	.00	7.00	13.00	7.000	13.000	.00	0 .0
65.120	.0197					.0188	1.22	5.63	2.11	5.54	.015	.00	.00	BOX
-6286.120	2775.700	5.648	2781.348	2079.00	28.31	12.45	2793.80	7.00	7.00	13.00	7.000	13.000	.00	0 .0
180.330	.0195					.0184	3.33	7.00	2.10	5.56	.015	.00	.00	BOX
-6105.790	2779.220	5.706	2784.926	2079.00	28.03	12.20	2797.12	.00	7.00	13.00	7.000	13.000	.00	0 .0
150.146	.0195					.0179	2.68	5.71	2.07	5.56	.015	.00	.00	BOX
-5955.645	2782.151	5.784	2787.935	2079.00	27.65	11.87	2799.80	.00	7.00	13.00	7.000	13.000	.00	0 .0
261.372	.0195					.0165	4.30	5.78	2.03	5.56	.015	.00	.00	BOX

Program Package Serial Number: 1704
WATER SURFACE PROFILE LISTING Date: 8- 8-2016 Time: 1:31: 7
KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608
MPU ULTIMATE CONDITION FACILITY (BLUE ALTERNATIVE)
SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-5694.272	2787.252	6.067	2793.319	2079.00	26.36	10.79	2804.11	.00	7.00	13.00	7.000	13.000	.00	0 .0

136.154	.0195					.0145	1.97	6.07	1.89	5.56	.015	.00	.00	BOX				
-5558.119	2789.910	6.363	2796.272	2079.00	25.13	9.81	2806.08	.00	7.00	13.00	7.000	13.000	.00	0	.0			
85.934	.0195					.0128	1.10	6.36	1.76	5.56	.015	.00	.00	BOX				
-5472.185	2791.587	6.673	2798.260	2079.00	23.96	8.92	2807.18	.00	7.00	13.00	7.000	13.000	.00	0	.0			
58.565	.0195					.0149	.87	6.67	1.63	5.56	.015	.00	.00	BOX				
-5413.620	2792.730	7.000	2799.730	2079.00	22.85	8.10	2807.83	.00	7.00	13.00	7.000	13.000	.00	0	.0			
TRANS STR	.0175					.0060	.30	7.00	1.52		.015	.00	.00	BOX				
-5363.300	2793.610	12.510	2806.120	2079.00	13.86	2.98	2809.10	.00	5.99	25.00	6.000	25.000	.00	0	.0			
JUNCT STR	.0000					.0023	.00	12.51	1.00		.015	.00	.00	BOX				
-5363.300	2793.610	14.334	2807.944	1296.00	8.64	1.16	2809.10	.00	4.37	25.00	6.000	25.000	.00	0	.0			
WALL	EXIT																	
-5363.300	2793.610	14.334	2807.944	1296.00	16.62	4.29	2812.23	.00	6.00	13.00	6.000	13.000	.00	0	.0			
366.990	.0185					.0108	3.96	.00	1.20	4.03	.015	.00	.00	BOX				

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL		No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR		Type Ch
-4996.310	2800.400	12.428	2812.828	1296.00	16.62	4.29	2817.11	.00	6.00	13.00	6.000	13.000	.00	0	.0
695.740	.0170					.0108	7.50	12.43	1.20	4.15	.015	.00	.00	BOX	
-4300.570	2812.210	8.121	2820.331	1296.00	16.62	4.29	2824.62	.00	6.00	13.00	6.000	13.000	.00	0	.0
107.770	.0213					.0108	1.16	.00	1.20	3.83	.015	.00	.00	BOX	
-4192.800	2814.510	7.485	2821.995	1296.00	16.62	4.29	2826.28	.00	6.00	13.00	6.000	13.000	.00	0	.0
109.460	.0213					.0108	1.18	.00	1.20	3.83	.015	.00	.00	BOX	
-4083.340	2816.840	6.841	2823.681	1296.00	16.62	4.29	2827.97	.00	6.00	13.00	6.000	13.000	.00	0	.0
12.680	.0213					.0108	.14	6.84	1.20	3.83	.015	.00	.00	BOX	
-4070.660	2817.110	6.708	2823.818	1296.00	16.62	4.29	2828.10	.00	6.00	13.00	6.000	13.000	.00	0	.0
JUNCT STR	.0000					.0064	.00	6.71	1.20		.015	.00	.00	BOX	
-4070.660	2817.110	8.443	2825.553	1000.00	12.82	2.55	2828.10	.00	5.69	13.00	6.000	13.000	.00	0	.0
105.450	.0213					.0064	.68	8.44	.92	3.20	.015	.00	.00	BOX	
-3965.210	2819.360	6.870	2826.230	1000.00	12.82	2.55	2828.78	.00	5.69	13.00	6.000	13.000	.00	0	.0
JUNCT STR	.0212							6.87	.92		.015	.00	.00	BOX	
-3940.210	2819.890	3.502	2823.392	816.00	21.18	6.97	2830.36	.00	5.55	11.00	6.000	11.000	.00	0	.0
17.091	.0213					.0164	.28	3.50	1.99	3.20	.015	.00	.00	BOX	
-3923.119	2820.254	3.531	2823.785	816.00	21.01	6.85	2830.64	.00	5.55	11.00	6.000	11.000	.00	0	.0
73.490	.0213					.0152	1.12	3.53	1.97	3.20	.015	.00	.00	BOX	

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-3849.629	2821.821	3.704	2825.524	816.00	20.03	6.23	2831.75	.00	5.55	11.00	6.000	11.000	.00	0 .0
48.034	.0213					.0133	.64	3.70	1.83	3.20	.015	.00	.00	BOX
-3801.595	2822.845	3.884	2826.729	816.00	19.10	5.66	2832.39	.00	5.55	11.00	6.000	11.000	.00	0 .0
33.611	.0213					.0116	.39	3.88	1.71	3.20	.015	.00	.00	BOX
-3767.984	2823.561	4.074	2827.635	816.00	18.21	5.15	2832.78	.00	5.55	11.00	6.000	11.000	.00	0 .0
24.219	.0213					.0102	.25	4.07	1.59	3.20	.015	.00	.00	BOX
-3743.764	2824.078	4.273	2828.350	816.00	17.36	4.68	2833.03	.00	5.55	11.00	6.000	11.000	.00	0 .0
17.540	.0213					.0089	.16	4.27	1.48	3.20	.015	.00	.00	BOX
-3726.224	2824.452	4.481	2828.933	816.00	16.55	4.25	2833.19	.00	5.55	11.00	6.000	11.000	.00	0 .0
12.486	.0213					.0079	.10	4.48	1.38	3.20	.015	.00	.00	BOX
-3713.739	2824.718	4.700	2829.418	816.00	15.78	3.87	2833.29	.00	5.55	11.00	6.000	11.000	.00	0 .0
8.479	.0213					.0069	.06	4.70	1.28	3.20	.015	.00	.00	BOX
-3705.260	2824.898	4.929	2829.828	816.00	15.05	3.52	2833.34	.00	5.55	11.00	6.000	11.000	.00	0 .0
5.185	.0213					.0061	.03	4.93	1.19	3.20	.015	.00	.00	BOX
-3700.075	2825.009	5.170	2830.179	816.00	14.35	3.20	2833.38	.00	5.55	11.00	6.000	11.000	.00	0 .0
2.395	.0213					.0053	.01	5.17	1.11	3.20	.015	.00	.00	BOX
-3697.680	2825.060	5.422	2830.482	816.00	13.68	2.91	2833.39	.00	5.55	11.00	6.000	11.000	.00	0 .0
1338.659	.0050					.0050	6.69	5.42	1.04	5.42	.015	.00	.00	BOX

---------- WARNING - Flow depth near top of box conduit ----------

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-2359.021	2831.749	5.422	2837.172	816.00	13.68	2.91	2840.08	.00	5.55	11.00	6.000	11.000	.00	0 .0
30.161	.0050					.0048	.15	5.42	1.04	5.42	.015	.00	.00	BOX

---------- WARNING - Flow depth near top of box conduit ----------

-2328.860	2831.900	5.550	2837.450	816.00	13.37	2.77	2840.22	.00	5.55	11.00	6.000	11.000	.00	0 .0
JUNCT STR	.0051					.0027	.14	5.55	1.00		.015	.00	.00	BOX

---------- WARNING - Flow depth near top of box conduit ----------

-2277.860	2832.160	7.550	2839.710	412.00	7.63	.90	2840.61	.00	4.02	9.00	6.000	9.000	.00	0 .0
674.696	.0050					.0027	1.83	7.55	.55	3.97	.015	.00	.00	BOX

-1603.164	2835.538	6.000	2841.538	412.00	7.63	.90	2842.44	.00	4.02	9.00	6.000	9.000	.00	0	.0
58.764	.0050					.0017	.10	6.00	.55	3.97	.015	.00	.00	BOX	
-1544.400	2835.832	5.720	2841.552	412.00	8.00	.99	2842.55	.00	4.02	9.00	6.000	9.000	.00	0	.0
25.540	.0050					.0019	.05	5.72	.59	3.97	.015	.00	.00	BOX	

---------- WARNING - Flow depth near top of box conduit ----------

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 8- 8-2016 Time: 1:31: 7

KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608

MPU ULTIMATE CONDITION FACILITY (BLUE ALTERNATIVE)

SKYE VILLAGE - SKYE CANYON PARK TO US-95

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1518.860	2835.960	5.599	2841.558	412.00	8.18	1.04	2842.60	.00	4.02	9.00	6.000	9.000	.00	0 .0
TRANS STR	.0048					.0020	.04	5.60	.61		.015	.00	.00	BOX

---------- WARNING - Flow depth near top of box conduit ----------

-1497.880	2836.060	5.096	2841.156	412.00	10.30	1.65	2842.80	.00	4.35	8.00	5.000	8.000	.00	0	.0
85.000	.0076					.0061	.52	.00	.81	3.81	.015	.00	.00	BOX	
-1412.880	2836.710	5.098	2841.808	412.00	10.30	1.65	2843.46	.00	4.35	8.00	5.000	8.000	.00	0	.0
JUNCT STR	.0100					.0075	.15	5.10	.81		.013	.00	.00	BOX	

---------- WARNING - Junction Analysis - Change in Channel Type ----------

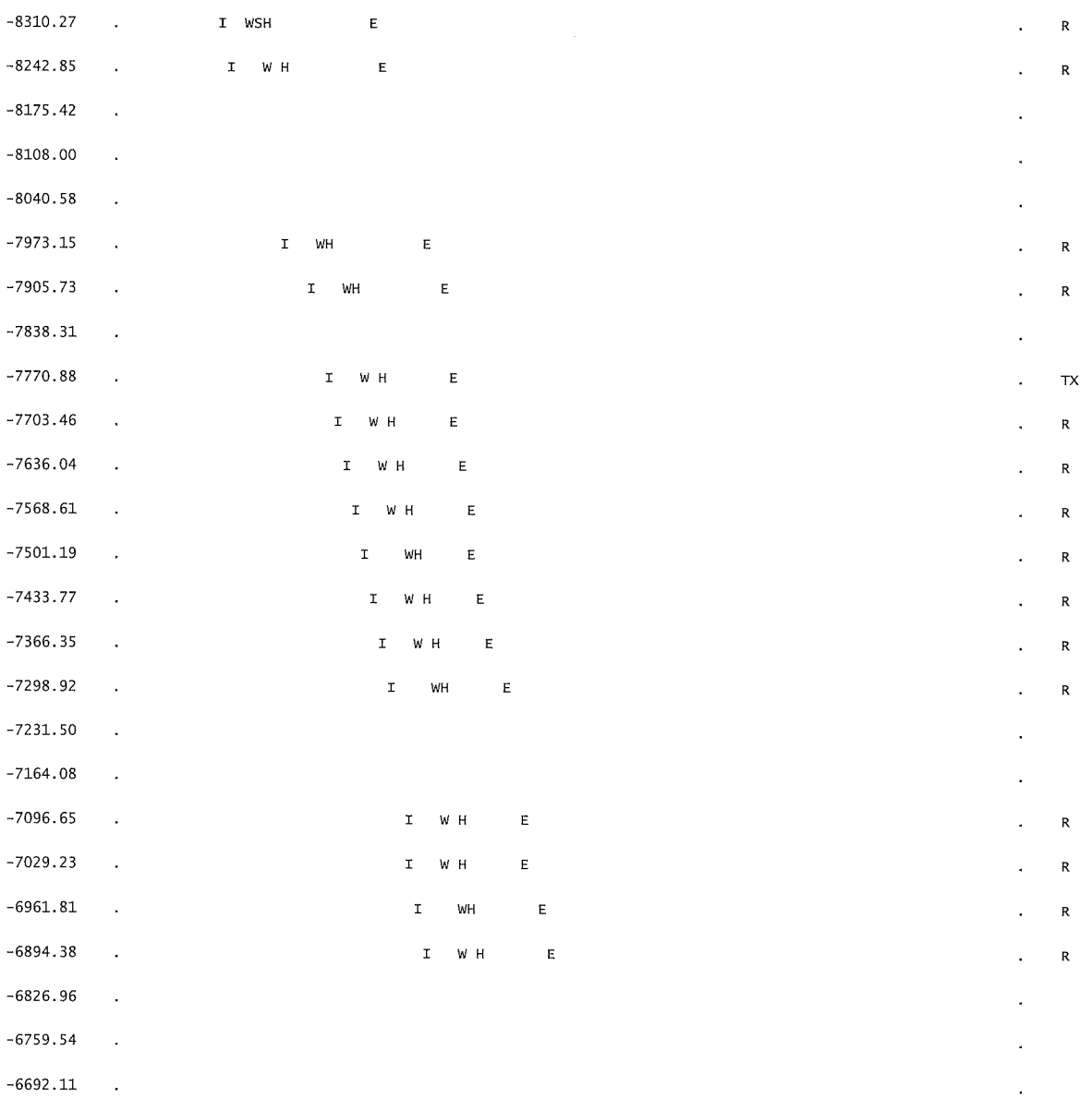
-1392.880	2836.910	5.559	2842.469	42.00	8.56	1.14	2843.61	.00	2.17	.00	2.500	.000	.00	1	.0
634.000	.0100					.0105	6.65	5.56	.00	2.11	.013	.00	.00	PIPE	
-758.880	2843.260	5.856	2849.116	42.00	8.56	1.14	2850.25	.00	2.17	.00	2.500	.000	.00	1	.0

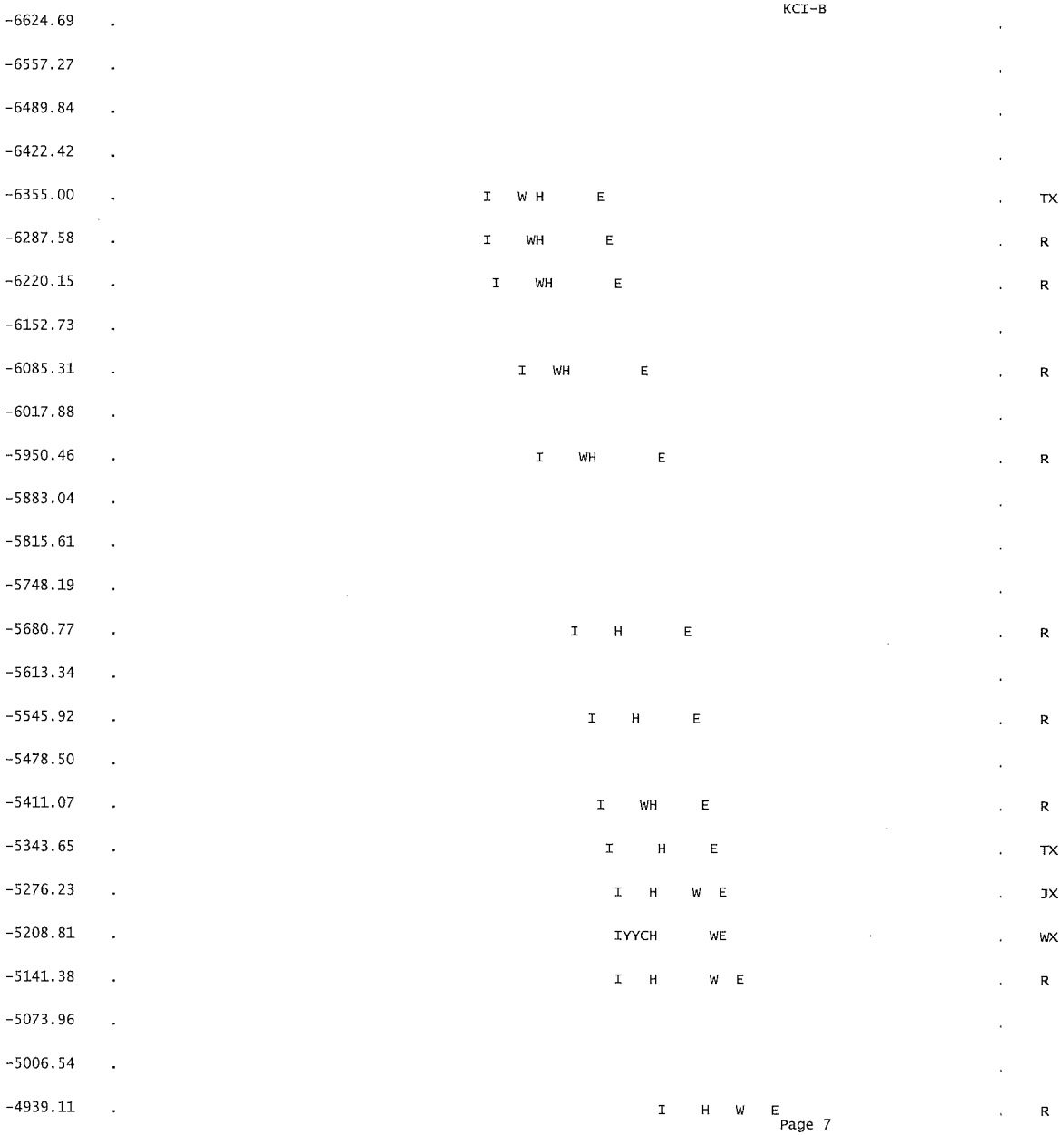
KYLE CANYON INTERCHANGE STORM DRAIN - OLY1608

MPU ULTIMATE CONDITION FACILITY (BLUE ALTERNATIVE)

SKYE VILLAGE - SKYE CANYON PARK TO US-95

-8782.23	.I	WH	E	.	R
-8714.81	.I	H	E	.	R
-8647.38	. I	H	E	.	JX
-8579.96	. I	WH	E	.	R
-8512.54	.			.	
-8445.12	.			.	
-8377.69	.			.	


-8310.27 . I WSH E . R
-8242.85 . I W H E . R
-8175.42 . .
-8108.00 . .
-8040.58 . .
-7973.15 . I WH E . R
-7905.73 . I WH E . R
-7838.31 . .
-7770.88 . I W H E . TX
-7703.46 . I W H E . R
-7636.04 . I W H E . R
-7568.61 . I W H E . R
-7501.19 . I WH E . R
-7433.77 . I W H E . R
-7366.35 . I W H E . R
-7298.92 . I WH E . R
-7231.50 . .
-7164.08 . .
-7096.65 . I W H E . R
-7029.23 . I W H E . R
-6961.81 . I WH E . R
-6894.38 . I W H E . R
-6826.96 . .
-6759.54 . .
-6692.11 . .




```
-6624.69  .                                                                  .
-6557.27  .                                                                  .
-6489.84  .                                                                  .
-6422.42  .                                                                  .
-6355.00  .                    I   W H      E                                .   TX
-6287.58  .                    I    WH       E                               .   R
-6220.15  .                     I    WH       E                              .   R
-6152.73  .                                                                  .
-6085.31  .                        I   WH        E                           .   R
-6017.88  .                                                                  .
-5950.46  .                          I    WH       E                          .   R
-5883.04  .                                                                  .
-5815.61  .                                                                  .
-5748.19  .                                                                  .
-5680.77  .                              I    H       E                       .   R
-5613.34  .                                                                  .
-5545.92  .                                I    H      E                      .   R
-5478.50  .                                                                  .
-5411.07  .                                 I    WH     E                     .   R
-5343.65  .                                  I     H     E                    .   TX
-5276.23  .                                   I   H    W  E                   .   JX
-5208.81  .                                   IYYCH      WE                   .   WX
-5141.38  .                                   I   H      W  E                 .   R
-5073.96  .                                                                  .
-5006.54  .                                                                  .
-4939.11  .                                       I    H   W   E              .   R
```

-4871.69	.		.	
-4804.27	.		.	
-4736.84	.		.	
-4669.42	.		.	
-4602.00	.		.	
-4534.57	.		.	
-4467.15	.		.	
-4399.73	.		.	
-4332.31	.		.	
-4264.88	.	I H W E	.	R
-4197.46	.		.	
-4130.04	.	I HW E	.	R
-4062.61	.	I HW E	.	R
-3995.19	.	I HW E	.	JX
-3927.77	.	I H W E	.	R
-3860.34	.	I H E	.	JX
-3792.92	.	I W H E	.	R
-3725.50	.	I WH E	.	R
-3658.07	.	I WCH E	.	R
-3590.65	.	I WH E	.	R
-3523.23	.	I W H E	.	R
-3455.80	.	I WH E	.	R
-3388.38	.	I WCH E	.	R
-3320.96	.	I WH E	.	R
-3253.54	.	I WH E	.	R

-3186.11	.	I WH E	.	R
-3118.69	.	I H E	.	R
-3051.27	.		.	
-2983.84	.		.	
-2916.42	.		.	
-2849.00	.		.	
-2781.57	.		.	
-2714.15	.		.	
-2646.73	.		.	
-2579.30	.		.	
-2511.88	.		.	
-2444.46	.		.	
-2377.03	.		.	
-2309.61	.	I H E	.	R
-2242.19	.	I H E	.	JX
-2174.77	.	I CH W	.	R
-2107.34	.		.	
-2039.92	.		.	
-1972.50	.		.	
-1905.07	.		.	
-1837.65	.		.	
-1770.23	.		.	
-1702.80	.		.	
-1635.38	.		.	
-1567.96	.	I C HE	.	R

KCI-B

-1500.53	.									I CHE	.	R
-1433.11	.									I CHE	.	TX
-1365.69	.									I CHE	.	R
-1298.27	.									I HE	.	JX
-1230.84	.									I H WE	.	R
-1163.42	.										.	
-1096.00	.										.	
-1028.57	.										.	
-961.15	.										.	
-893.73	.										.	
-826.30	.										.	
-758.88	.									I H WE.		R
	2717.240	2730.541	2743.843	2757.144	2770.445	2783.746	2797.048	2810.349	2823.650	2836.951	2850.253	

N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   S = SUPER-ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

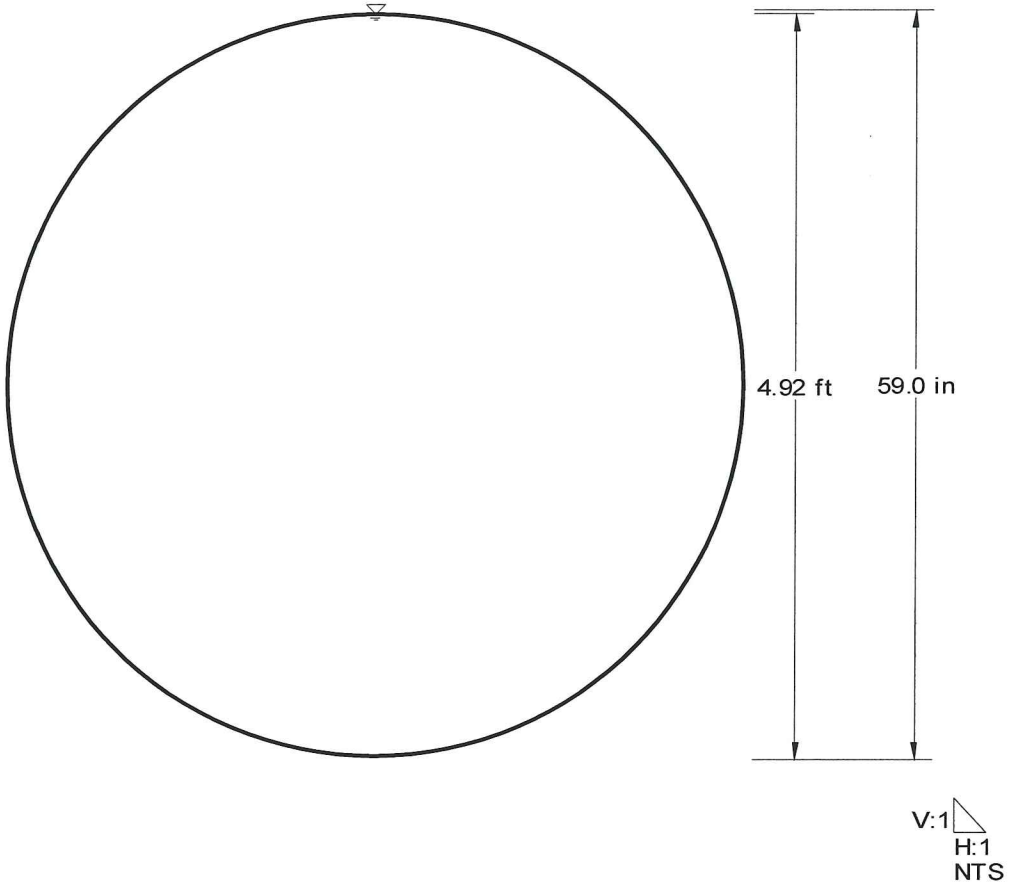
O'Hare Lateral Normal Depth

O'Hare Lateral into Log Cabin RFCD Storm Drain
Cross Section for Circular Channel
(FACILITY ID: 'NEW')

Project Description	
Worksheet	O'Hare Lateral
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Diameter

Section Data		
Mannings Coefficient	0.013	
Channel Slope	3.00	%
Depth	4.92	ft
Diameter	59.0	in
Discharge	432.00	cfs

→ 72" RCP ASSUMED FOR SIZE



O'Hare Lateral into Log Cabin RFCD Storm Drain
Worksheet for Circular Channel

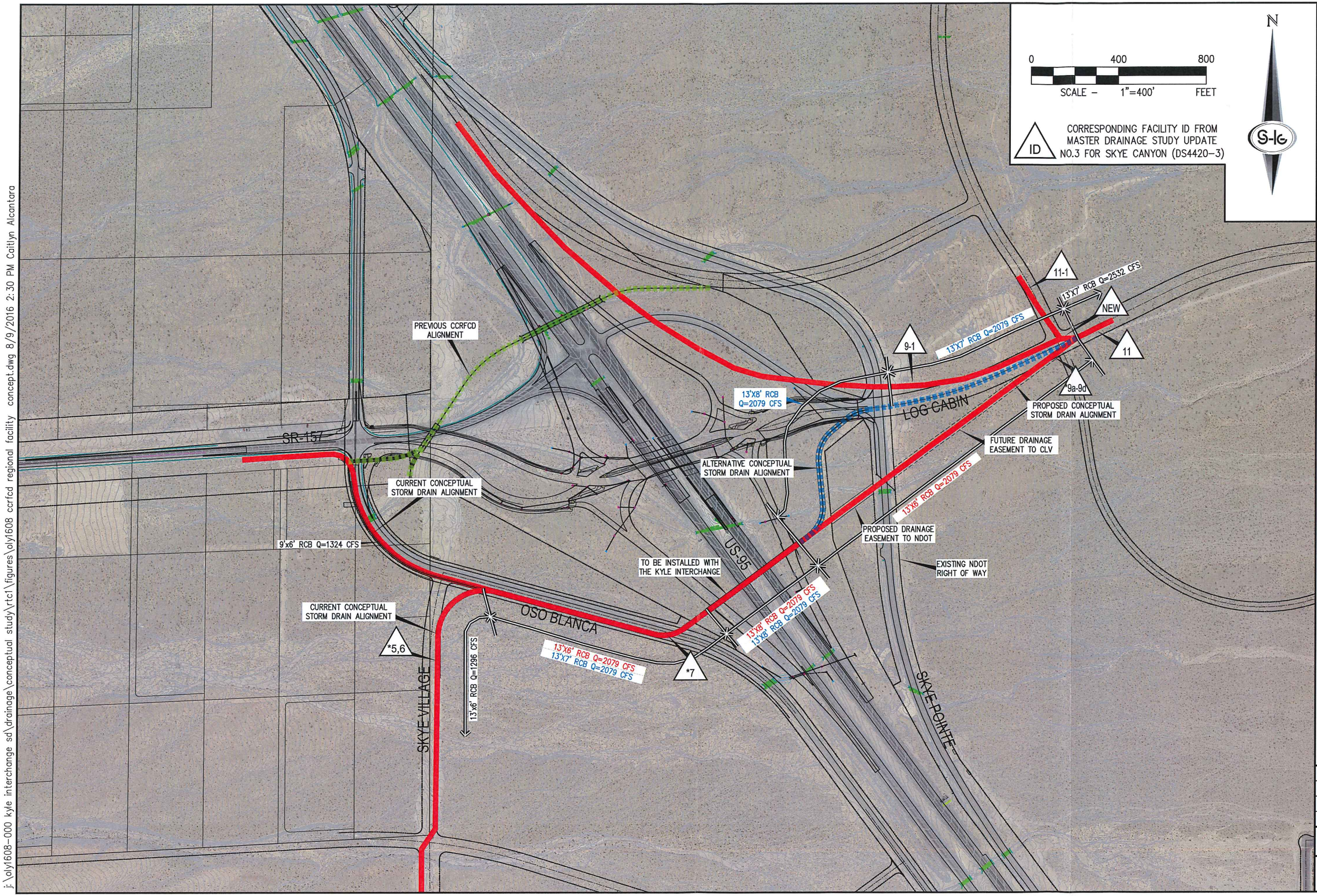
(FACILITY ID: 'NEW')

Project Description	
Worksheet	O'Hare Lateral
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Diameter

Input Data		
Mannings Coefficient	0.013	
Channel Slope	3.00	%
Discharge	432.00	cfs

Results		
Depth	4.92	ft
Diameter	59.0	in
Flow Area	19.0	ft²
Wetted Perimeter	0.00	ft
Top Width	0.00	ft
Critical Depth	4.85	ft
Percent Full	100.0	%
Critical Slope	2.72	%
Velocity	22.73	ft/s
Velocity Head	8.03	ft
Specific Energy	12.95	ft
Froude Number	0.00	
Maximum Discharge	464.71	cfs
Discharge Full	432.00	cfs
Slope Full	3.00	%
Flow Type	N/A	

Concept Summary
Exhibit



SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP DATE	APP

OLYMPIA COMPANIES (COOP. GCW, CLV, NDOT)

US-95 / KYLE CANYON INTERCHANGE

CCRFCD REGIONAL FACILITY CONCEPT

DATE: AUGUST 2016
DRAFTER: CAA
DESIGNER: CAA
CHECKED: SMJ
PROJECT NO. OLY1608.000

EXHIBIT
SHEET 1 OF 1

j:\oly1608-000 kyle interchange sd\drainage\conceptual study\rtc1\figures\oly1608 ccrfcd regional facility concept.dwg 8/9/2016 2:30 PM Caitlyn Alcantara

APPENDIX B

ALTA Survey Exhibits

ALTA/ACSM LAND TITLE SURVEY

LYING WITHIN SECTION 12, TOWNSHIP 19 SOUTH, RANGE 59 EAST AND SECTIONS 6 AND 7, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA

RADIAL	BEARING
R1	N37°04'05"E
R2	N37°49'02"E

LINE	BEARING	DISTANCE
L1	S00°15'32"W	11.09'
L2	S89°49'56"E	14.59'
L3	S36°36'24"E	271.68'
L4	N00°40'57"E	106.94'

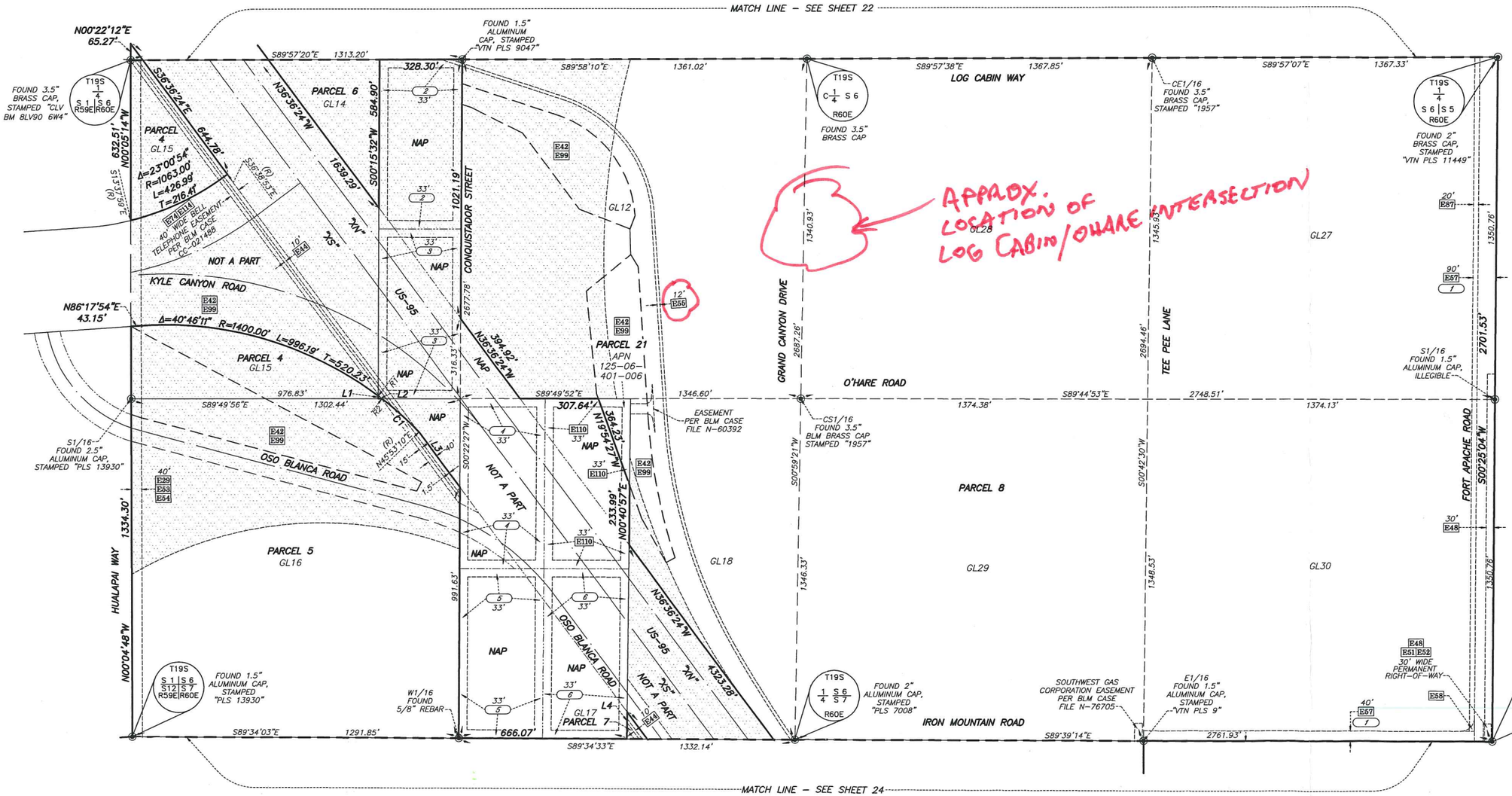
CURVE	DELTA	RADIUS	LENGTH	TANGENT
C1	08°04'08"	1400.00'	197.16'	98.74'

LEGEND

- FOUND MONUMENTATION AS SHOWN AND DESCRIBED
- GL — GOVERNMENT LOT
- NAP — NOT A PART
- R1 — RADIAL BEARING NUMBER
- L1 — LINE SEGMENT NUMBER
- C1 — CURVE SEGMENT NUMBER
- SUBJECT PROPERTY LINE
- STREET CENTERLINE
- MATCH LINE
- SECTION LINE
- QUARTER SECTION LINE
- 16TH SECTION LINE
- EASEMENT LINE
- CITY OF LAS VEGAS RIGHT-OF-WAY GRANT PER TITLE REPORT EXCEPTION NO. 70 AND 97
- E29 — TITLE REPORT EXCEPTION NUMBER
- 1 — ADDITIONAL RESEARCHED DOCUMENTS NOT LISTED IN THE TITLE REPORT

0 100 200 400

(IN FEET)
1 INCH = 200 FT.



REV:	DATE:	DESCRIPTION:
AR	9.5.13	REVISED ALTA SURVEY MAP EXCEPTIONS AND BOUNDARY PER UPDATED TITLE REPORT.
AR	10.7.13	REVISED ALTA SURVEY MAP EXCEPTIONS AND BOUNDARY PER UPDATED TITLE REPORT.
AR	11.4.13	REVISED ALTA SURVEY MAP EXCEPTIONS AND BOUNDARY PER UPDATED TITLE REPORT.

WALLACE · MORRIS
SURVEYING, INC.
LAND SURVEY CONSULTING
5740 SOUTH ARVILLE STREET, #206
LAS VEGAS, NEVADA 89118
PH:702.212.3967 FX:702.212.3963

ALTA/ACSM LAND TITLE SURVEY
KYLE CANYON
EASEMENT DETAIL

DATE:	11/04/2013
DRAFTER:	AR
FIELD:	BP
CHECKED:	JGK
JOB NO.	OLY-13137
SHEET	23
OF	27 SHEETS

ARODRIGUEZ 11/4/2013 7:34 AM P:\OLY\13137\DWG\MAP\ALTA\13137-ALTA-23.DWG

ALTA/ACSM LAND TITLE SURVEY

LYING WITHIN SECTION 12, TOWNSHIP 19 SOUTH, RANGE 59 EAST AND SECTIONS 6 AND 7, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA

TITLE REPORT DATA AND EXCEPTIONS (CONTINUED ON SHEET 4)

FIRST AMERICAN TITLE INSURANCE COMPANY, COMMITMENT NO. NCS-626343-HHLV
EFFECTIVE AS OF: OCTOBER 16, 2013

SURVEYOR'S NOTE: ONLY THOSE EXCEPTIONS LISTED IN THE COMMITMENT FOR TITLE INSURANCE WHICH ARE NOT SOLELY FINANCIAL IN NATURE AND WHICH REFERENCE A DOCUMENT CONTAINING A SUFFICIENT LEGAL DESCRIPTION OF AREAS AFFECTED BY SAID DOCUMENT, WERE CONSIDERED FOR THIS SURVEY. NO ADDITIONAL RESEARCH WAS PERFORMED BY THE CERTIFYING SURVEYOR.

E25 THE EFFECT OF A MAP PURPORTING TO SHOW THE LAND AND OTHER PROPERTY, FILED IN FILE 42, PAGE 15 OF RECORD OF SURVEYS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E26 A RIGHT-OF-WAY GRANTED BY DECISION, DATED JUNE 21, 1996, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-57071 TO NEVADA POWER COMPANY FOR ELECTRIC TRANSMISSION LINE UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON SEPTEMBER 10, 1996 IN BOOK 960910, AS INSTRUMENT NO. 00706 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

DOCUMENT(S) DECLARING MODIFICATIONS THEREOF RECORDED JULY 14, 2004 IN BOOK 20040714 AS INSTRUMENT NO. 02121 OF OFFICIAL RECORDS.

DOCUMENT(S) DECLARING MODIFICATIONS THEREOF RECORDED OCTOBER 28, 2004 IN BOOK 20041028 AS INSTRUMENT NO. 04758 OF OFFICIAL RECORDS.

E27 THE EFFECT OF A MAP PURPORTING TO SHOW THE LAND AND OTHER PROPERTY, FILED IN FILE 88, PAGE 8 OF RECORD OF SURVEYS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

AND AMENDED BY THAT CERTAIN CERTIFICATE OF AMENDMENT RECORDED JULY 8, 1997 IN BOOK 970708 AS INSTRUMENT NO. 01015 OF OFFICIAL RECORDS.

E28 A RIGHT-OF-WAY GRANTED BY DECISION, DATED SEPTEMBER 06, 2002, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75584 TO NEVADA POWER COMPANY FOR UNDERGROUND ELECTRICAL LINE WITH SWITCH CABINETS AND ELECTRIC FACILITIES UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON OCTOBER 10, 2002 IN BOOK 20021010, AS INSTRUMENT NO. 00011 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E29 A RIGHT-OF-WAY GRANTED BY DECISION, DATED JANUARY 16, 2003, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75502-01 TO LAS VEGAS WATER DISTRICT FOR TEMPORARY WORK AREAS FOR A 42" UNDERGROUND WATER PIPELINE UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON FEBRUARY 10, 2003 IN BOOK 20030210, AS INSTRUMENT NO. 00541 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E30 A RIGHT-OF-WAY GRANTED BY DECISION, DATED JUNE 16, 2004, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-78006 TO NEVADA POWER COMPANY FOR ELECTRIC TRANSMISSION LINES UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON JULY 14, 2004 IN BOOK 20040714, AS INSTRUMENT NO. 02122 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E32 A RIGHT-OF-WAY GRANTED BY DECISION, DATED AUGUST 02, 2005, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-78783 TO LAS VEGAS VALLEY WATER DISTRICT TO CONSTRUCT, OPERATE, MAINTAIN AND TERMINATE A WATER DISTRIBUTION SYSTEM UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON AUGUST 03, 2005 IN BOOK 20050803, AS INSTRUMENT NO. 02571 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E34 AN EASEMENT AND RIGHT-OF-WAY FOR THE CONSTRUCTION, OPERATION, MAINTENANCE, REPAIR, RENEWAL, RECONSTRUCTION, AND REMOVAL OF PIPELINES FOR CONDUCTING WATER WITH THE RIGHT OF INGRESS AND EGRESS, AS CONVEYED TO LAS VEGAS VALLEY WATER DISTRICT, A QUASI-MUNICIPAL CORPORATION, BY AN INSTRUMENT RECORDED MARCH 15, 2006, IN BOOK 20060315 AS INSTRUMENT NO. 02282 OF OFFICIAL RECORDS, OVER A PORTION OF THE LAND.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E35 AN EASEMENT AND RIGHT-OF-WAY FOR THE CONSTRUCTION, OPERATION, MAINTENANCE, REPAIR, RENEWAL, RECONSTRUCTION, AND REMOVAL OF PIPELINES FOR CONDUCTING WATER WITH THE RIGHT OF INGRESS AND EGRESS, AS CONVEYED TO LAS VEGAS VALLEY WATER DISTRICT, A QUASI-MUNICIPAL CORPORATION, BY AN INSTRUMENT RECORDED MARCH 15, 2006, IN BOOK 20060315 AS INSTRUMENT NO. 02283 OF OFFICIAL RECORDS, OVER A PORTION OF THE LAND.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E36 AN EASEMENT AND RIGHT-OF-WAY FOR THE CONSTRUCTION, OPERATION, MAINTENANCE, REPAIR, RENEWAL, RECONSTRUCTION, AND REMOVAL OF PIPELINES FOR CONDUCTING WATER WITH THE RIGHT OF INGRESS AND EGRESS, AS CONVEYED TO LAS VEGAS VALLEY WATER DISTRICT, A QUASI-MUNICIPAL CORPORATION, BY AN INSTRUMENT RECORDED MARCH 15, 2006, IN BOOK 20060315 AS INSTRUMENT NO. 02284 OF OFFICIAL RECORDS, OVER A PORTION OF THE LAND.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E37 AN EASEMENT AND RIGHT-OF-WAY FOR THE CONSTRUCTION, OPERATION, MAINTENANCE, REPAIR, RENEWAL, RECONSTRUCTION, AND REMOVAL OF PIPELINES FOR CONDUCTING WATER WITH THE RIGHT OF INGRESS AND EGRESS, AS CONVEYED TO LAS VEGAS VALLEY WATER DISTRICT, A QUASI-MUNICIPAL CORPORATION, BY AN INSTRUMENT RECORDED MARCH 15, 2006, IN BOOK 20060315 AS INSTRUMENT NO. 02285 OF OFFICIAL RECORDS, OVER A PORTION OF THE LAND.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E38 AN EASEMENT AND RIGHT-OF-WAY FOR THE CONSTRUCTION, OPERATION, MAINTENANCE, REPAIR, RENEWAL, RECONSTRUCTION, AND REMOVAL OF PIPELINES FOR CONDUCTING WATER WITH THE RIGHT OF INGRESS AND EGRESS, AS CONVEYED TO LAS VEGAS VALLEY WATER DISTRICT, A QUASI-MUNICIPAL CORPORATION, BY AN INSTRUMENT RECORDED MARCH 15, 2006, IN BOOK 20060315 AS INSTRUMENT NO. 02286 OF OFFICIAL RECORDS, OVER A PORTION OF THE LAND.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E40 A DOCUMENT ENTITLED "SIGHT DISTANCE ANALYSIS ALONG SHAUMBER ROAD WITHIN KYLE CANYON GATEWAY PROJECT" RECORDED DECEMBER 13, 2007 IN BOOK 20071213 AS INSTRUMENT NO. 01681 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY. DOCUMENT CONTAINS NO PLOTTABLE EASEMENTS.

E41 A DOCUMENT ENTITLED "CITY OF LAS VEGAS NOTICE OF ZONING ACTION" RECORDED AUGUST 01, 2008 IN BOOK 20080801 AS INSTRUMENT NO. 01166 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY. DOCUMENT CONTAINS NO PLOTTABLE EASEMENTS.

E42 A RIGHT-OF-WAY GRANTED BY DECISION, DATED AUGUST 21, 1970, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER NEV013376 ET (N-121) TO STATE OF NEVADA, DEPARTMENT OF HIGHWAYS FOR HIGHWAY (U.S. 95) INCLUDING ACCESS RIGHTS UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON DECEMBER 22, 1972 IN BOOK 288, AS INSTRUMENT NO. 247599 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E44 A RIGHT-OF-WAY GRANTED BY DECISION, DATED JANUARY 09, 1995, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-58721 TO NEVADA POWER COMPANY AND SPRINT CENTRAL TELEPHONE COMPANY OF NEVADA FOR OVERHEAD DISTRIBUTION LINE AND TELEPHONE LINE UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON FEBRUARY 15, 1995 IN BOOK 950215, AS INSTRUMENT NO. 01020 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E45 A RIGHT-OF-WAY GRANTED BY DECISION, DATED AUGUST 08, 1996, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-60474 TO NEVADA POWER COMPANY FOR A SUBSTATION SITE UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON SEPTEMBER 09, 1996 IN BOOK 960909, AS INSTRUMENT NO. 00829 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E46 EASEMENTS, DEDICATIONS, RESERVATIONS, PROVISIONS, RELINQUISHMENTS, RECITALS, CERTIFICATES, AND ANY OTHER MATTERS AS PROVIDED FOR OR DELINEATED ON RECORD OF SURVEY FILED IN FILE 87, PAGE 9 OF RECORD OF SURVEYS RECORDED JANUARY 21, 1997 IN BOOK 970121 AS INSTRUMENT NO. 00395 OF OFFICIAL RECORDS. REFERENCE IS HEREBY MADE TO SAID PLAT FOR PARTICULARS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E47 A RIGHT-OF-WAY GRANTED BY DECISION, DATED JUNE 09, 1998, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-55785 TO CITY OF LAS VEGAS FOR FLOOD CONTROL AND DRAINAGE CONTROL UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON NOVEMBER 20, 1998 IN BOOK 981120, AS INSTRUMENT NO. 01497 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E48 A RIGHT-OF-WAY GRANTED BY DECISION, DATED SEPTEMBER 25, 2001, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-62751 TO LAS VEGAS VALLEY WATER DISTRICT FOR WATER MAIN UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON OCTOBER 12, 2001 IN BOOK 20011012, AS INSTRUMENT NO. 01161 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E49 EASEMENTS, DEDICATIONS, RESERVATIONS, PROVISIONS, RELINQUISHMENTS, RECITALS, CERTIFICATES, AND ANY OTHER MATTERS AS PROVIDED FOR OR DELINEATED ON RECORD OF SURVEY FILED IN FILE 123, PAGE 32 OF RECORD OF SURVEYS RECORDED JULY 8, 2002 IN BOOK 20020708 AS INSTRUMENT NO. 01652 OF OFFICIAL RECORDS. REFERENCE IS HEREBY MADE TO SAID PLAT FOR PARTICULARS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY. DOCUMENT CONTAINS NO PLOTTABLE EASEMENTS.

E50 A RIGHT-OF-WAY GRANTED BY DECISION, DATED SEPTEMBER 06, 2002, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75584 TO NEVADA POWER COMPANY FOR UNDERGROUND ELECTRICAL LINE WITH SWITCH CABINETS AND ELECTRIC FACILITIES UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON OCTOBER 10, 2002 IN BOOK 20021010, AS INSTRUMENT NO. 00011 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E51 A RIGHT-OF-WAY GRANTED BY DECISION, DATED DECEMBER 05, 2002, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-62751-01 TO LAS VEGAS VALLEY WATER DISTRICT FOR STORAGE OF PIPELINE MATERIAL, PLACEMENT OF EVACUATION SOILS, CONSTRUCTION EQUIPMENT AND TRAFFIC CONTROL FOR THE CONSTRUCTION OF THE PIPELINE UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON JANUARY 16, 2003 IN BOOK 20030116, AS INSTRUMENT NO. 02001 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E52 A RIGHT-OF-WAY GRANTED BY DECISION, DATED DECEMBER 05, 2002, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-62751-A TO LAS VEGAS VALLEY WATER DISTRICT FOR WATER MAIN UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON JANUARY 16, 2003 IN BOOK 20030116, AS INSTRUMENT NO. 02002 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E53 A RIGHT-OF-WAY GRANTED BY DECISION, DATED JANUARY 16, 2003, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75502 TO LAS VEGAS VALLEY WATER DISTRICT FOR WATER PIPELINE UNDER RIGHTOF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON FEBRUARY 10, 2003 IN BOOK 20030210, AS INSTRUMENT NO. 00538 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E54 A RIGHT-OF-WAY GRANTED BY DECISION, DATED JANUARY 16, 2003, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75502-01 TO LAS VEGAS VALLEY WATER DISTRICT FOR TEMPORARY WORK AREAS FOR A 42" UNDERGROUND WATER PIPELINE UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON FEBRUARY 10, 2003 IN BOOK 20030210, AS INSTRUMENT NO. 00541 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E55 A RIGHT-OF-WAY GRANTED BY DECISION, DATED APRIL 04, 2003, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75702 TO NEVADA POWER COMPANY FOR UNDERGROUND ELECTRICAL DISTRIBUTION LINE UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON APRIL 17, 2003 IN BOOK 20030417, AS INSTRUMENT NO. 02746 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E56 A RIGHT-OF-WAY GRANTED BY DECISION, DATED MAY 22, 2003, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-76812 TO CITY OF LAS VEGAS FOR ROADS, PUBLIC UTILITIES (SEWER), AND/OR FLOOD CONTROL PURPOSES UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON MAY 29, 2003 IN BOOK 20030529, AS INSTRUMENT NO. 01913 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY. DOCUMENT CONTAINS NO PLOTTABLE EASEMENTS.

E57 A RIGHT-OF-WAY GRANTED BY DECISION, DATED MAY 28, 2003, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75757 TO CITY OF LAS VEGAS FOR ROADWAY, SANITARY SEWER AND DRAINAGE PURPOSES AND RELATED PURPOSES UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON JUNE 30, 2003 IN BOOK 20030630, AS INSTRUMENT NO. 00811 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

DOCUMENT(S) DECLARING MODIFICATIONS THEREOF RECORDED JUNE 18, 2004 IN BOOK 20040618 AS INSTRUMENT NO. 01781 OF OFFICIAL RECORDS.
EXACT LOCATION OF EASEMENT NOT PLOTTABLE DUE TO INSUFFICIENT INFORMATION.

A DOCUMENT ENTITLED "PARTIAL RELINQUISHMENT OF RIGHT-OF-WAY GRANT N-75757" RECORDED FEBRUARY 01, 2005 IN BOOK 20050201 AS INSTRUMENT NO. 04670 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

A DOCUMENT ENTITLED "AMENDMENT TO PARTIAL RELINQUISHMENT OF RIGHT-OF WAY GRANT N-75757" RECORDED FEBRUARY 09, 2005 IN BOOK 20050209 AS INSTRUMENT NO. 00994 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

A DOCUMENT ENTITLED "PARTIAL RELINQUISHMENT ACCEPTED" RECORDED SEPTEMBER 19, 2008 IN BOOK 20080919 AS INSTRUMENT NO. 03131 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E58 A RIGHT-OF-WAY GRANTED BY DECISION, DATED MAY 07, 2003, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-76109 TO CITY OF LAS VEGAS FOR RIGHT FOR PERMANENT RIGHT-OF-WAY FOR ROADWAY, SANITARY SEWER AND DRAINAGE PURPOSES AND RELATED PURPOSES ON PUBLIC LANDS UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF THE LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON SEPTEMBER 09, 2003 IN BOOK 20030909, AS INSTRUMENT NO. 02351 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E59 A RIGHT-OF-WAY GRANTED BY DECISION, DATED JUNE 06, 2002, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75025 TO NEVADA POWER COMPANY FOR TRANSMISSION LINE UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON OCTOBER 09, 2003 IN BOOK 20031009, AS INSTRUMENT NO. 01802 OF OFFICIAL RECORDS.
EXACT LOCATION OF EASEMENT NOT PLOTTABLE DUE TO INSUFFICIENT INFORMATION.

E60 A RIGHT-OF-WAY GRANTED BY DECISION, DATED JUNE 06, 2002, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75080 TO NEVADA POWER COMPANY FOR FIBER OPTIC LINE UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON DECEMBER 22, 2003 IN BOOK 20031222, AS INSTRUMENT NO. 02836 OF OFFICIAL RECORDS.
EXACT LOCATION OF EASEMENT NOT PLOTTABLE DUE TO INSUFFICIENT INFORMATION.

E61 A RIGHT-OF-WAY GRANTED BY DECISION, DATED MARCH 18, 2004, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75584A TO NEVADA POWER COMPANY FOR UNDERGROUND 15KV DISTRIBUTION LINE UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON APRIL 06, 2004 IN BOOK 20040406, AS INSTRUMENT NO. 01879 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E62 A RIGHT-OF-WAY GRANTED BY DECISION, DATED JUNE 16, 2004, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-78006 TO NEVADA POWER COMPANY FOR TRANSMISSION LINE UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON JULY 14, 2004 IN BOOK 20040714, AS INSTRUMENT NO. 02122 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E63 A RIGHT-OF-WAY GRANTED BY DECISION, DATED AUGUST 18, 2004, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-42592G TO NEVADA POWER COMPANY FOR RIGHT TO CONSTRUCT, OPERATE, MAINTAIN, AND TERMINATE AN UNDERGROUND 15KV DISTRIBUTION LINE WITH RELATED APPURTENANCES ON PUBLIC LANDS UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF THE LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON SEPTEMBER 24, 2004 IN BOOK 20040924, AS INSTRUMENT NO. 02389 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

E64 A RIGHT-OF-WAY GRANTED BY DECISION, DATED OCTOBER 01, 2004, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-66447 TO NEVADA POWER COMPANY FOR RIGHT TO CONSTRUCT, OPERATE, MAINTAIN, AND TERMINATE AN ELECTRICAL SUBSTATION ON PUBLIC LANDS UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF THE LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON FEBRUARY 02, 2005 IN BOOK 20050202, AS INSTRUMENT NO. 01357 OF OFFICIAL RECORDS.
AFFECTS A PORTION OF THE SUBJECT PROPERTY.

WALLACE · MORRIS
SURVEYING, INC.
LAND SURVEY CONSULTING
5740 SOUTH ARVILLE STREET, #206
LAS VEGAS, NEVADA 89118
PH:702.212.3967 FX:702.212.3963

REV:	DATE:	DESCRIPTION:
AR	9.5.13	REVISED ALTA SURVEY MAP EXCEPTIONS AND BOUNDARY PER UPDATED TITLE REPORT.
AR	10.7.13	REVISED ALTA SURVEY MAP EXCEPTIONS AND BOUNDARY PER UPDATED TITLE REPORT.
AR	11.4.13	REVISED ALTA SURVEY MAP EXCEPTIONS AND BOUNDARY PER UPDATED TITLE REPORT.

ALTA/ACSM LAND TITLE SURVEY
KYLE CANYON
SITE AND TITLE DATA

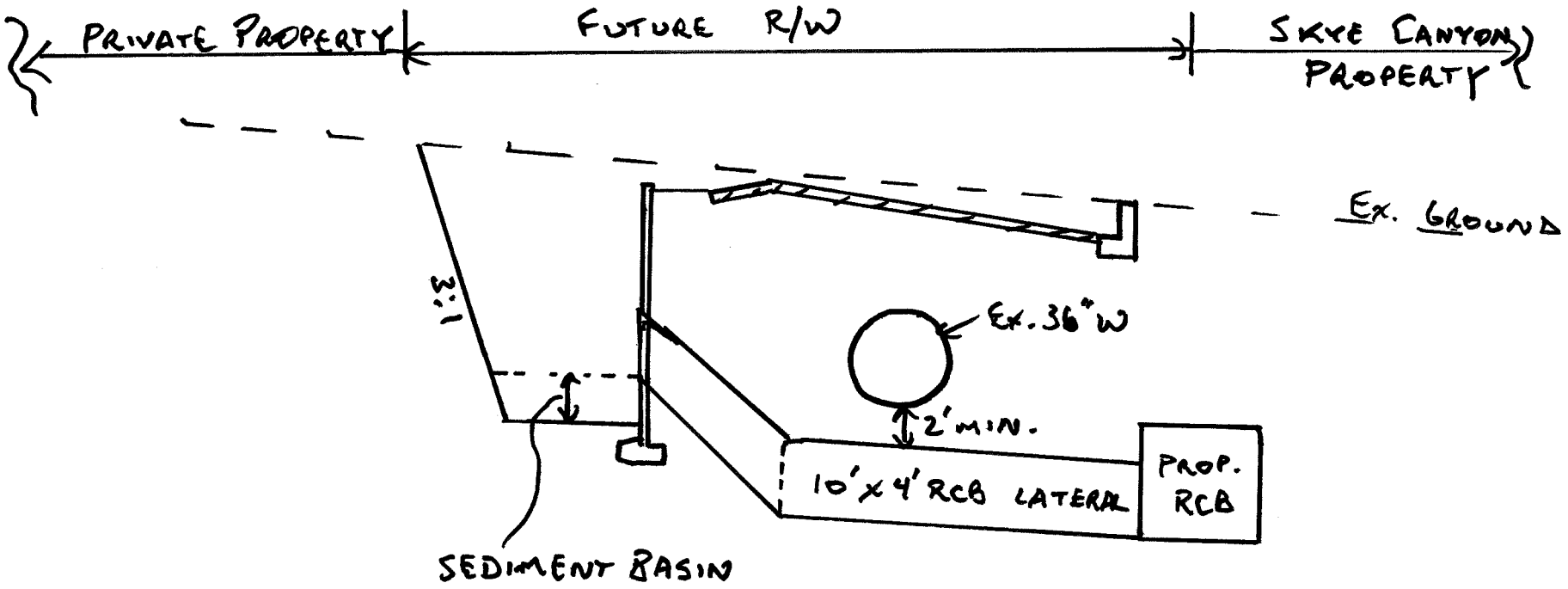
DATE: 11/04/2013
DRAFTER: AR
FIELD: BP
CHECKED: JGK
JOB NO. OLY-13137
SHEET 3 OF 27 SHEETS

ARODRIGUEZ 11/4/2013, 7:25 AM, P:\OLY\13137\DWG\MAP\ALTA\13137-ALTA-01_05.DWG

APPENDIX C

Concept Exhibits – 10-ft by 4-ft RCB Laterals

LATERAL CONCEPT EXHIBIT

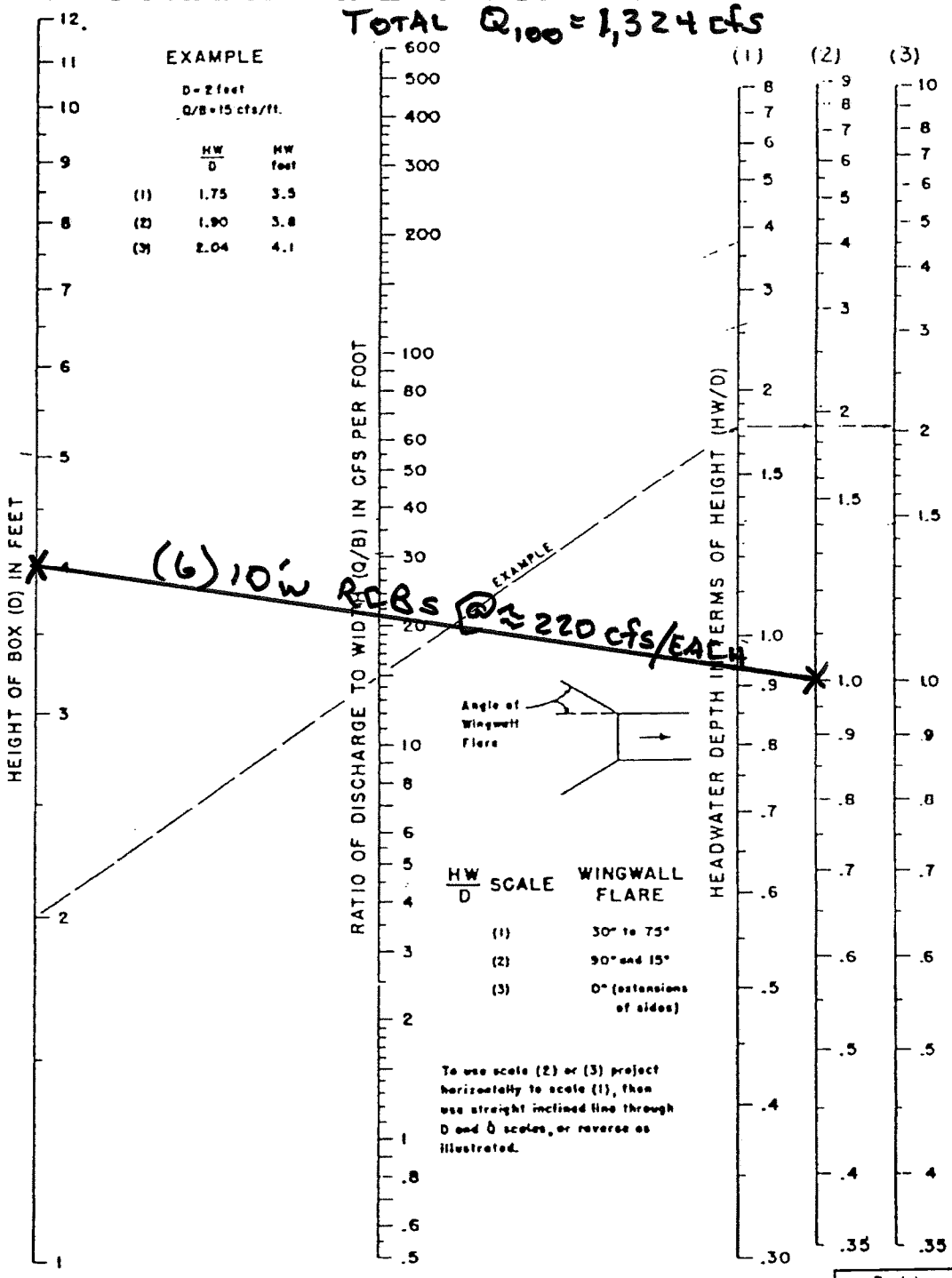


(6) 10'W x 4'H RCB OPENINGS
(217 CFS APPROX. EACH)

* TRUNK HGL IS BELOW WATER LINE; NO TAILWATER CONDITION IMPACTS ON INTERIM FLOW COLLECTION.

NOMOGRAPH – INLET CONTROL BOX CULVERT

TOTAL $Q_{100} = 1,324$ cfs



Revision	Date

WRC ENGINEERING	REFERENCE: USDOT, FHWA, HDS No.5, 1985	FIGURE 1004

APPENDIX D

Reference Material

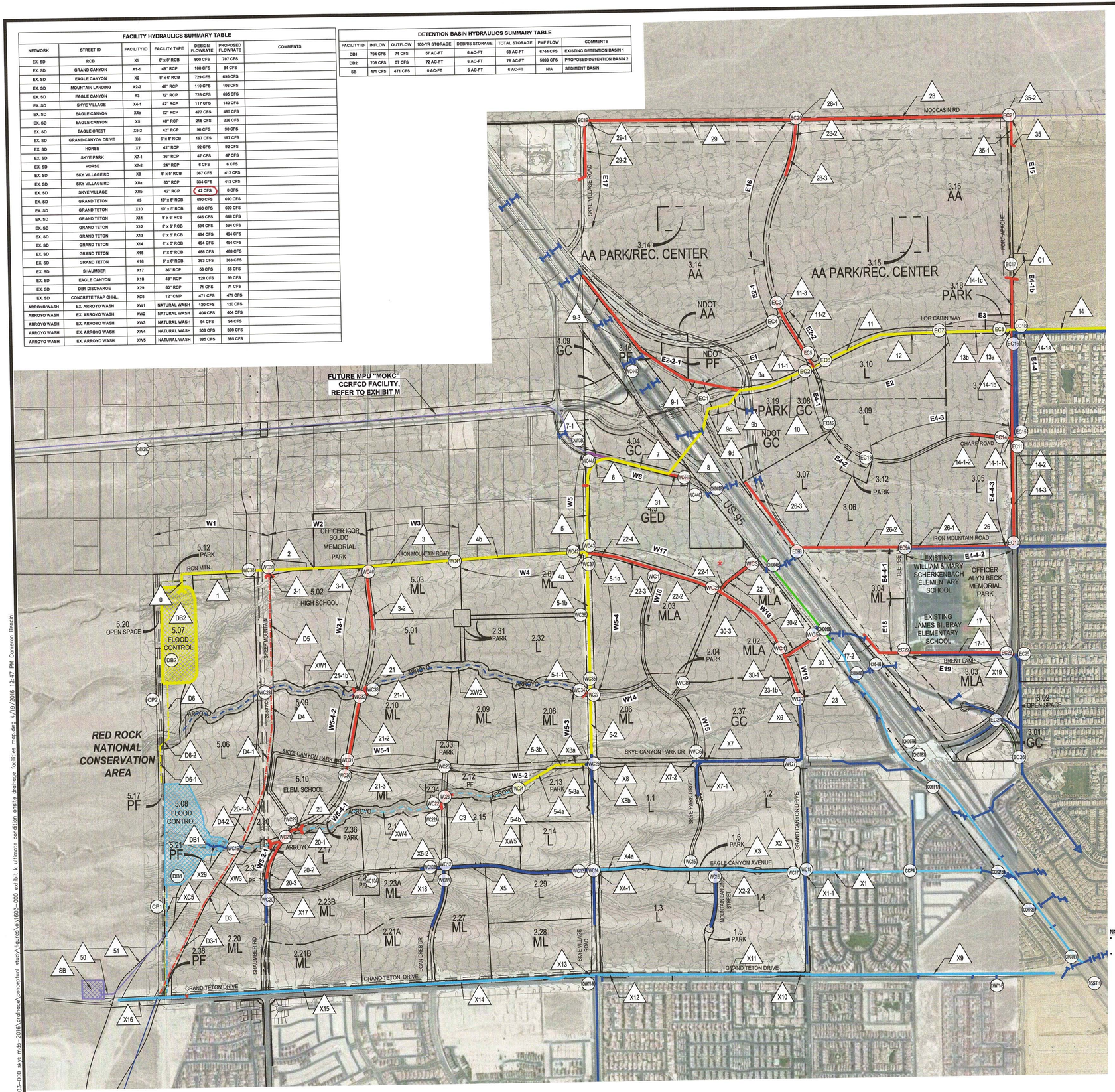
Annotated Master Drainage Study Update #3
Exhibit

FACILITY HYDRAULICS SUMMARY TABLE

NETWORK	STREET ID	FACILITY ID	FACILITY TYPE	DESIGN FLOWRATE	PROPOSED FLOWRATE	COMMENTS
EX. SD	RCB	X1	8' x 8' RCB	800 CFS	787 CFS	
EX. SD	GRAND CANYON	X1-1	48" RCP	100 CFS	84 CFS	
EX. SD	EAGLE CANYON	X2	6' x 6' RCB	725 CFS	695 CFS	
EX. SD	MOUNTAIN LANDING	X2-2	48" RCP	110 CFS	106 CFS	
EX. SD	EAGLE CANYON	X3	72" RCP	728 CFS	695 CFS	
EX. SD	SKYE VILLAGE	X4-1	42" RCP	117 CFS	140 CFS	
EX. SD	EAGLE CANYON	X4a	72" RCP	477 CFS	485 CFS	
EX. SD	EAGLE CANYON	X5	48" RCP	218 CFS	226 CFS	
EX. SD	EAGLE CREST	X5-2	42" RCP	90 CFS	90 CFS	
EX. SD	GRAND CANYON DRIVE	X6	6' x 5' RCB	197 CFS	197 CFS	
EX. SD	HORSE	X7	42" RCP	92 CFS	92 CFS	
EX. SD	SKYE PARK	X7-1	36" RCP	47 CFS	47 CFS	
EX. SD	HORSE	X7-2	24" RCP	6 CFS	6 CFS	
EX. SD	SKY VILLAGE RD	X8	8' x 5' RCB	367 CFS	412 CFS	
EX. SD	SKY VILLAGE RD	X8a	60" RCP	334 CFS	412 CFS	
EX. SD	SKYE VILLAGE	X8b	42" RCP	42 CFS	0 CFS	
EX. SD	GRAND TETON	X9	10' x 5' RCB	690 CFS	690 CFS	
EX. SD	GRAND TETON	X10	10' x 5' RCB	690 CFS	690 CFS	
EX. SD	GRAND TETON	X11	8' x 6' RCB	646 CFS	646 CFS	
EX. SD	GRAND TETON	X12	8' x 6' RCB	594 CFS	594 CFS	
EX. SD	GRAND TETON	X13	6' x 5' RCB	494 CFS	494 CFS	
EX. SD	GRAND TETON	X14	6' x 5' RCB	494 CFS	494 CFS	
EX. SD	GRAND TETON	X15	6' x 6' RCB	488 CFS	488 CFS	
EX. SD	GRAND TETON	X16	6' x 6' RCB	363 CFS	363 CFS	
EX. SD	SHAUMBER	X17	36" RCP	56 CFS	56 CFS	
EX. SD	EAGLE CANYON	X18	48" RCP	128 CFS	99 CFS	
EX. SD	DB1 DISCHARGE	X29	60" RCP	71 CFS	71 CFS	
EX. SD	CONCRETE TRAP CHNL	XC5	12" CMP	471 CFS	471 CFS	
ARROYO WASH	EX. ARROYO WASH	XW1	NATURAL WASH	120 CFS	120 CFS	
ARROYO WASH	EX. ARROYO WASH	XW2	NATURAL WASH	404 CFS	404 CFS	
ARROYO WASH	EX. ARROYO WASH	XW3	NATURAL WASH	94 CFS	94 CFS	
ARROYO WASH	EX. ARROYO WASH	XW4	NATURAL WASH	308 CFS	308 CFS	
ARROYO WASH	EX. ARROYO WASH	XW5	NATURAL WASH	385 CFS	385 CFS	

DETENTION BASIN HYDRAULICS SUMMARY TABLE

FACILITY ID	INFLOW	OUTFLOW	100-YR STORAGE	DEBRIS STORAGE	TOTAL STORAGE	PMF FLOW	COMMENTS
DB1	794 CFS	71 CFS	57 AC-FT	6 AC-FT	63 AC-FT	6744 CFS	EXISTING DETENTION BASIN 1
DB2	708 CFS	57 CFS	72 AC-FT	6 AC-FT	78 AC-FT	5899 CFS	PROPOSED DETENTION BASIN 2
SB	471 CFS	471 CFS	0 AC-FT	6 AC-FT	6 AC-FT	N/A	SEDIMENT BASIN



FACILITY HYDRAULICS SUMMARY TABLE

NETWORK	STREET ID	FACILITY ID	FACILITY TYPE	LENGTH	SLOPE	FLOW RATE	COMMENTS
WEST SD	DB2 OUTLET	0	30" RCP	214'	2.0%	57 CFS	
WEST SD	W1	1	30" RCP	1099'	2.9%	65 CFS	
WEST SD	W2	2	30" RCP	1236'	5.0%	90 CFS	
WEST SD	INFLOW FROM SHEEP MOUNTAIN CHNL	2-1	18" RCP	66'	4.4%	19 CFS	
WEST SD	W3	3	42" RCP	1161'	3.2%	227 CFS	
WEST SD	W3-1	3-1	36" RCP	191'	3.0%	112 CFS	
WEST SD	W3-1	3-2	30" RCP	590'	1.7%	40 CFS	
WEST SD	W3-1	3-3	54" RCP	100'	4.5%	370 CFS	
WEST SD	W4	4a	54" RCP	100'	4.5%	370 CFS	
WEST SD	W4	4b	48" RCP	1500'	4.5%	349 CFS	
WEST SD	W5	5	13' x 6' RCB	931'	1.0%	1236 CFS	
WEST SD	ARROYO WASH INFLOW	5-1-1	6' x 6' RCB	51'	14.6%	404 CFS	
WEST SD	W5-4	5-1a	8' x 6' RCB	100'	0.8%	1300 CFS	
WEST SD	W5-4	5-1b	8' x 6' RCB	1654'	0.9%	816 CFS	
WEST SD	W5-3	5-2	6' x 5' RCB	779'	1.0%	412 CFS	
WEST SD	W5-2	5-3a	60" RCP	79'	3.0%	412 CFS	
WEST SD	W5-2	5-3b	60" RCP	301'	3.0%	359 CFS	
WEST SD	CONVEYS FLOW TO SD 5-3a	5-4a	60" RCP	491'	3.0%	359 CFS	
WEST SD	INFLOW FROM ARROYO WASH	5-4b	6' x 6' RCB	50'	2.8%	359 CFS	
WEST SD	W5	6	13' x 6' RCB	445'	1.8%	1296 CFS	
WEST SD	W6	7	13' x 6' RCB	723'	2.0%	2079 CFS	
WEST SD	MPU FACILITY	7-1	7' x 6' RCB	309'	5.0%	1334 CFS	MOKC-0000 MPU FACILITY
WEST SD	DISCAHRGE TO ARROYO WASH	20	48" RCP	109'	2.0%	201 CFS	
WEST SD	WS-2-1	20-1	48" RCP	194'	2.0%	180 CFS	
WEST SD	INFLOW FROM DB1	20-1-1	48" RCP	135'	2.2%	94 CFS	
WEST SD	WS-2-1	20-2	36" RCP	340'	3.0%	84 CFS	
WEST SD	WS-2-1	20-3	36" RCP	193'	3.5%	84 CFS	
WEST SD	DISCHARGE TO ARROYO WASH	21	48" RCP	42'	4.0%	244 CFS	
WEST SD	WS-4-2	21-1	42" RCP	100'	2.5%	124 CFS	
WEST SD	INFLOW FROM ARROYO WASH	21-1b	48" RCP	68'	3.4%	120 CFS	
WEST SD	WS-4-2	21-2	36" RCP	863'	3.4%	62 CFS	
WEST SD	WS-4-1	21-3	36" RCP	105'	1.3%	62 CFS	
WEST SD	N/A	22	7' x 6' RCB	426'	2.2%	73 CFS	
WEST SD	N/A	22-1	7' x 6' RCB	146'	2.2%	73 CFS	
WEST SD	W17	22-2	8' x 6' RCB	339'	2.0%	73 CFS	
WEST SD	W17	22-3	8' x 6' RCB	1017'	2.0%	0 CFS	
WEST SD	W17	22-4	8' x 6' RCB	382'	2.6%	0 CFS	
WEST SD	W19 OUTLET TO WASH	23	36" RCP	59'	3.4%	289 CFS	
WEST SD	W19	23-1b	54" RCP	529'	1.7%	0 CFS	
WEST SD	N/A	30	42" RCP	476'	2.5%	170 CFS	
WEST SD	W18	30-1	72" RCP	297'	1.2%	135 CFS	
WEST SD	W18	30-2	54" RCP	364'	1.8%	0 CFS	
WEST SD	W18	30-3	54" RCP	527'	1.4%	0 CFS	
WEST SD	RCB	31	8' x 6' RCB	272'	2.0%	0 CFS	
WEST SD	DISCHARGE FROM SB	50	12' x 6' RCB	152'	1.5%	471 CFS	
WEST SD	DISCHARGE TO DB1	51	72" RCP	1015'	2.1%	471 CFS	
WEST SD	ARROYO WASH CULVERT	C3	6' x 5' RCB	164'	6.1%	308 CFS	
WEST SD	SHEEP MOUNTAIN CHNL	D3	EARTHEN TRAP CHNL	815'	3.6%	31 CFS	20' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D3-1	EARTHEN TRAP CHNL	1239'	1.7%	31 CFS	8' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D4	EARTHEN TRAP CHNL	534'	4.5%	11 CFS	5' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D4-1	EARTHEN TRAP CHNL	757'	1.5%	11 CFS	5' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D4-2	EARTHEN TRAP CHNL	691'	1.0%	11 CFS	5' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D5	EARTHEN TRAP CHNL	1252'	1.2%	6 CFS	5' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	CHANNEL TO DB2	D6	CONCRETE TRAP CHNL	723'	3.0%	235 CFS	12' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	CHANNEL TO DB2	D6-1	EARTHEN TRAP CHNL	451'	0.9%	10 CFS	5' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	CHANNEL TO DB2	D6-2	EARTHEN TRAP CHNL	145'	1.4%	10 CFS	5' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP

FACILITY HYDRAULICS SUMMARY TABLE

NETWORK	STREET ID	FACILITY ID	FACILITY TYPE	LENGTH	SLOPE	FLOW RATE	COMMENTS
EAST SD	US-95 SD CROSSING	8	13' x 6' RCB	686'	2.3%	2079 CFS	
EAST SD	US-95	9-1	60" RCP	688'	4.0%	255 CFS	REALIGNED PER SUMMARY EXHIBIT
EAST SD	US-95	9-2	60" RCP	665'	2.3%	250 CFS	
EAST SD	US-95	9-3	60" RCP	1191'	1.3%	250 CFS	
EAST SD	E1	9a	13' x 6' RCB	380'	2.5%	2355 CFS	
EAST SD	US-95 SD CROSSING	9b	13' x 6' RCB	220'	2.0%	2079 CFS	
EAST SD	US-95 SD CROSSING	9c	13' x 6' RCB	265'	2.3%	2079 CFS	
EAST SD	US-95 SD CROSSING	9d	13' x 6' RCB	282'	2.3%	2079 CFS	
EAST SD	E1	10	13' x 6' RCB	602'	2.5%	2355 CFS	
EAST SD	E2	11	13' x 6' RCB	926'	2.5%	2532 CFS	TOTAL FLOW IN SD D/S OF O'HARE
EAST SD	E2-2	11-1	36" RCP	50'	3.0%	(177 CFS)	9-1+11-1=FACILITY 'NEW' P&A
EAST SD	E2-2	11-2	36" RCP	680'	1.2%	73 CFS	SUMMARY EXHIBIT
EAST SD	E2-1	11-3	30" RCP	238'	1.7%	39 CFS	
EAST SD	E2	12	13' x 6' RCB	794'	2.9%	2532 CFS	
EAST SD	E3	13a	14' x 7' RCB	50'	1.6%	2606 CFS	
EAST SD	E3	13b	13' x 6' RCB	809'	2.9%	2532 CFS	
EAST SD	E4-3	14-1-1	42" RCP	50'	5.0%	181 CFS	
EAST SD	E4-3	14-1-2	42" RCP	461'	5.0%	36 CFS	
EAST SD	E4-4	14-1a	72" RCP	51'	1.4%	276 CFS	
EAST SD	E4-4	14-1b	72" RCP	1303'	0.7%	254 CFS	
EAST SD	E4-1b	14-1c	72" RCP	629'	2.0%	349 CFS	
EAST SD	E4-4-3	14-2	48" RCP	50'	6.8%	73 CFS	
EAST SD	E4-4-3	14-3	48" RCP	1299'	0.4%	0 CFS	
EAST SD	E19	17	36" RCP	56'	3.0%	70 CFS	
EAST SD	E19	17-1	6' x 6' RCB	1632'	3.5%	63 CFS	
EAST SD	Parcel 3.04	17-2	48" RCP	298'	2.3%	220 CFS	
EAST SD	E4-4-2	26	60" RCP	209'	2.6%	57 CFS	
EAST SD	E4-4-2	26-1	60" RCP	1180'	2.6%	57 CFS	
EAST SD	PARCEL 3.06	26-2	60" RCP	1355'	2.6%	23 CFS	
EAST SD	PARCEL 3.07	26-3	60" RCP	1016'	2.6%	23 CFS	
EAST SD	MPU FACILITY	28	N/A	N/A	N/A	N/A	LVMD-0164 MPU FACILITY, REPLACES PROP. CONDITION FACIUTY D1
EAST SD	E1/6	28-1	48" RCP	50'	6.0%	199 CFS	
EAST SD	E1/6	28-2	42" RCP	269'	0.8%	81 CFS	
EAST SD	E1/6	28-3	24" RCP	391'	1.0%	81 CFS	LVMD-0164 MPU FACILITY, REPLACES PROP. CONDITION FACIUTY D2
EAST SD	MPU FACILITY	29	N/A	2652'	3.1%	0 CFS	
EAST SD	E17	29-1	60" RCP	50'	4.0%	72 CFS	
EAST SD	E17	29-2	60" RCP	647'	0.6%	25 CFS	
OFFSITE SD	LOG CABIN WAY	14	14' x 7' RCB	1591'	2.2%	3137 CFS	SEE EXHIBIT M FOR CONTINUATION
PROPOSED SD	CROSSING FORT APACHE	35	60" RCP	46'	4.4%	0 CFS	NOT UTILIZED WITHIN THE ULTIMATE CONDITIONS
PROPOSED SD	E15	35-1	60" RCP	359'	0.8%	0 CFS	NOT UTILIZED WITHIN THE ULTIMATE CONDITIONS
PROPOSED SD	MOCCASIN CHNL INFLOW	35-2	60" RCP	120'	3.3%	0 CFS	NOT UTILIZED WITHIN THE ULTIMATE CONDITIONS
PROPOSED SD	E4-1b	C1	60" RCP	147'	2.0%	0 CFS	NOT UTILIZED WITHIN THE ULTIMATE CONDITIONS

NOTES:

- REFER TO EXHIBIT M - ULTIMATE CONDITION US-95 HYDRAULICS SUMMARY MAP FOR DETAILED FLOW THRU EXISTING US-95 CULVERTS & RCB FACILITIES
- REFER TO EXHIBIT K - ULTIMATE CONDITION OFFSITE EAST FACILITIES MAP FOR EXTENSION OF FACILITIES REQUIRED IN MPU ALIGNMENT EAST OF SKYE CANYON.

LEGEND

- PROPOSED LOCAL FACILITIES
- ONSITE CCRFCD REGIONAL FACILITIES
- FUTURE CCRFCD REGIONAL FACILITIES (BY OTHERS)
- FUTURE LOCAL FACILITIES
- EXISTING CCRFCD REGIONAL FACILITIES
- EXISTING LOCAL FACILITIES
- OPEN CHANNEL FACILITIES
- ID — STREET SEGMENT ID

N

0 600 1200

SCALE – 1"=600' FEET

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.
-					

OLYMPIA COMPANIES

SKYE CANYON - MASTER DRAINAGE STUDY

ULTIMATE CONDITION ONSITE DRAINAGE FACILITIES MAP

DATE: APRIL 2016
DRAFTER: ###
DESIGNER: ###
CHECKED: SMJ
PROJECT NO. OLY1603.000

EXHIBIT J
SHEET 1 OF 1

J:\olv1603-000 skye mdds-2016\drainage\conceptual study\figures\olv1603-000 exhibit k ultimate condition onsite drainage facilities mod.dwg 4/19/2016 12:47 PM Cameron Benchli

NDOT Coordination Notes

Steve Jones

From: Steve Jones
Sent: Thursday, June 30, 2016 5:19 AM
To: Jay Guzman (JGuzman@gcwengineering.com); rbelsick@gcwengineering.com; tmccoy@gcwengineering.com
Cc: Chris Holman (cholman@dot.state.nv.us)
Subject: US95/Kyle RFCD Facility
Attachments: NDOT Concept Exhibit-ULTIMATE CONDITIONS FACILITIES SUMMARY.PDF

Jay and Ryan and Tim,

I spoke to Chris Holman, Sajid Sulahria and 'Z' Alemu yesterday (6/29) afternoon regarding the attached exhibit showing the current alignment of our RFCD facility. In order to have assurances that the regional alignment works in the future, there were essentially 2 options we had to satisfy them:

1. Revise the alignment to the s-curve so that the storm drain is back within a roadway by the time it leaves NDOT right-of-way. This gives NDOT the security that the line can be extended in the future from the NDOT right-of-way in what is planned as Log Cabin street without having to go through private property. As Ryan Belsick and I spoke over the phone today, our hydraulic model we have at this point in time will have to be revised to match a new S-Curve alignment. Chris Holman noted that hydraulic criteria for analyzing this storm drain is defaulted to HCDDM. A follow-up question I had after the phone call was if the S-curve alignment is chosen, is this Interchange project going to construct the regional facility in the proposed approaching roadway to the interchange east of US95?
2. Dedicate a drainage easement across the private property so the reservation of the extension of the current line's alignment is in place prior to construction of the Interchange. We were going to investigate how the schedules coordinate if this option is chosen.

SHG and NDOT are planning a follow-up conference call Tuesday next week when the NDOT PM is available to finalize what option we are moving forward with, in order for SHG to commit to supplying the conceptual design to GCW by Friday 7/8 as agreed with Ryan Belsick.

Steve Jones, P.E.
Project Manager II

SLATER HANIFAN GROUP
"The Benchmark of Our Profession."

LAS VEGAS
5740 S. ARVILLE STREET #216
LAS VEGAS, NV 89118
PHONE: (702) 284-5300
FAX: (702) 284-5399
www.shg-inc.com

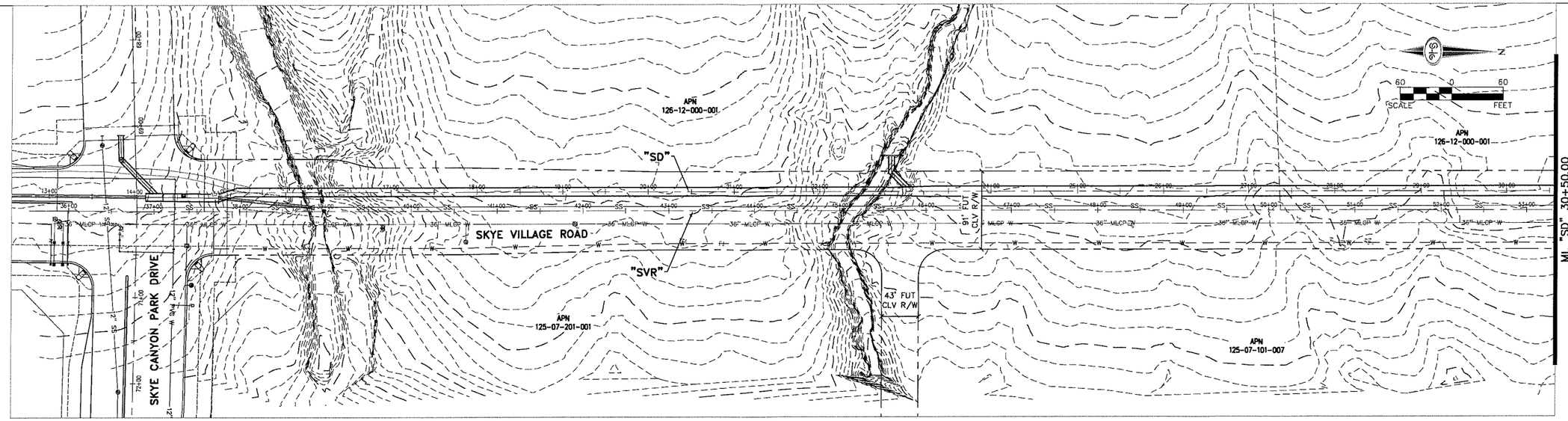
PHOENIX
11201 N. TATUM BLVD. #250
PHOENIX, AZ 85028
PHONE: (602) 687-9664

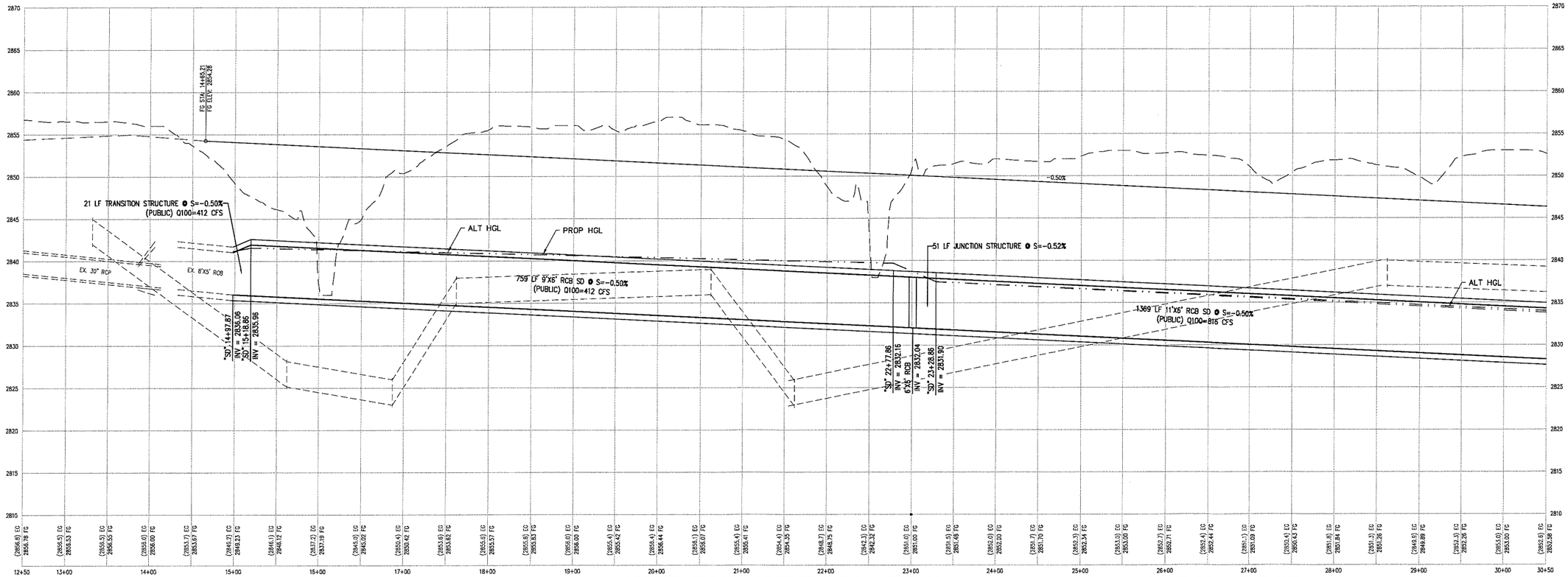
LAKE HAVASU CITY
60 S. ACOMA BLVD. #C104
LAKE HAVASU CITY, AZ 86403
PHONE: (928) 202-4104
FAX: (602) 483-1007

Any files contained within are to be used for information ONLY. Accuracy and/or design information to be verified from approved original plans. Use of electronic media is at the sole risk of the user.

APPENDIX E

Revised Concept Profile Exhibits





NOTE: EQUIVALENT RCA SIZE MAY BE UTILIZED OUTSIDE NDOT R/W

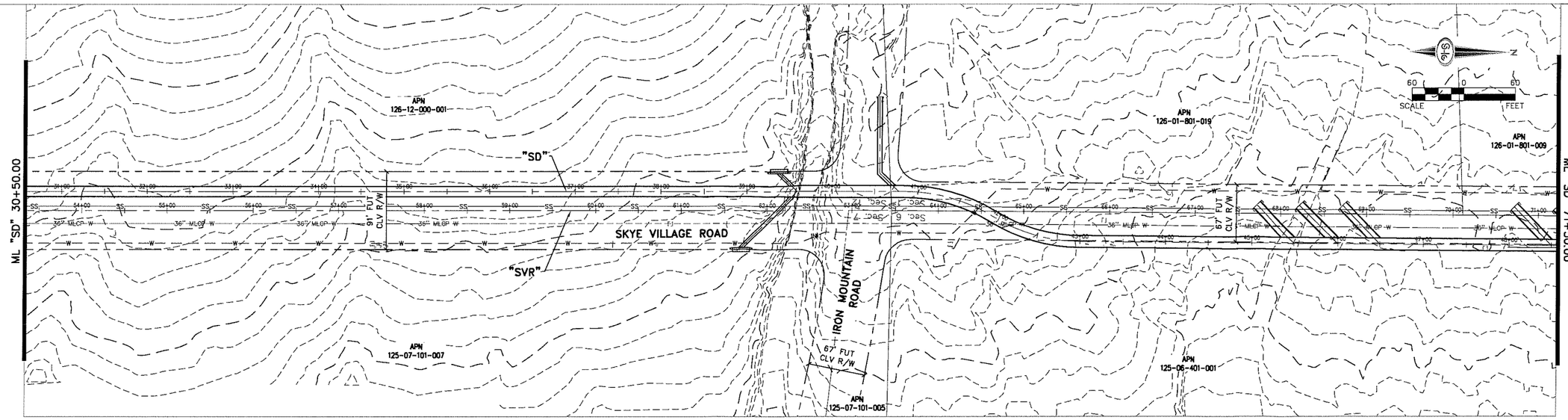
SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

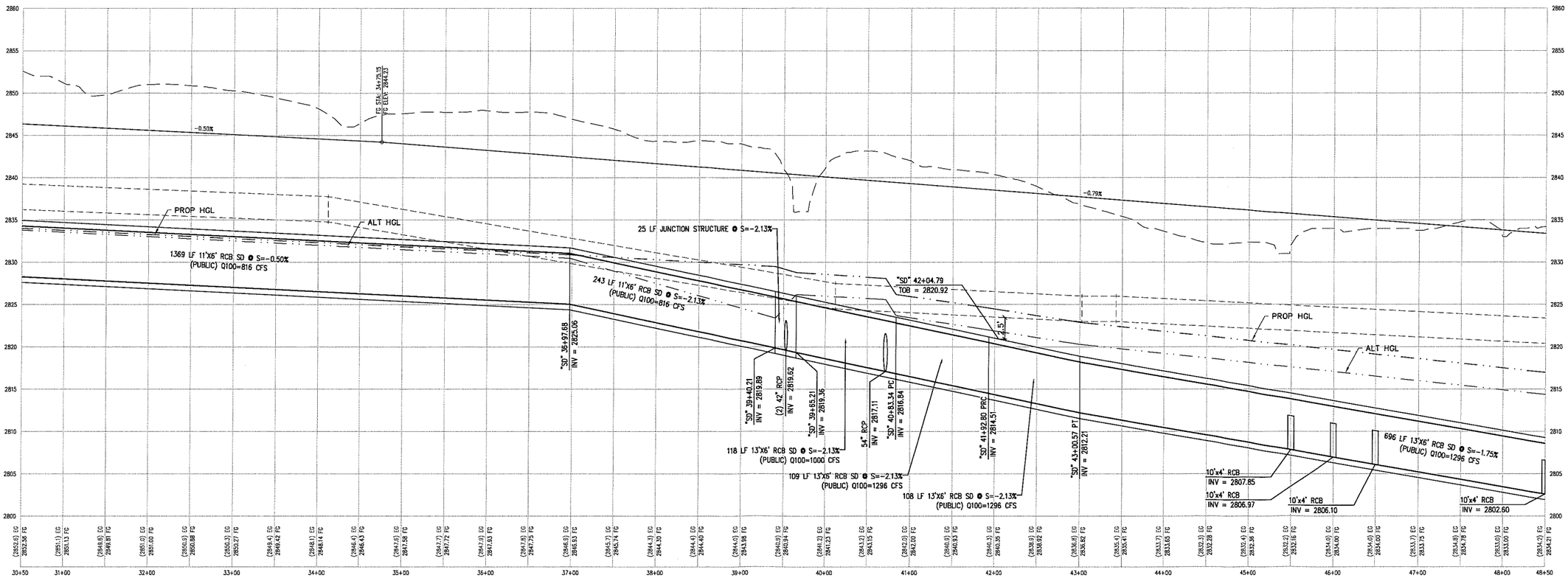
KYLE CANYON INTERCHANGE

SKYE VILLAGE-LOG CABIN REGIONAL ALIGNMENT PROPOSED STORM DRAIN-CONCEPTUAL PROFILE (PROFILE SUBJECT TO CHANGE UPON TECHNICAL DESIGN)

EXHIBIT 1

J:\DL\1608-000 Kyle Interchange SD\Dwg\Design\DL1608_000_SD_NTWK.dwg, 8/9/2016 8:11:42 PM, amyhre





NOTE: EQUIVALENT RCA SIZE MAY BE UTILIZED OUTSIDE NDOT R/W

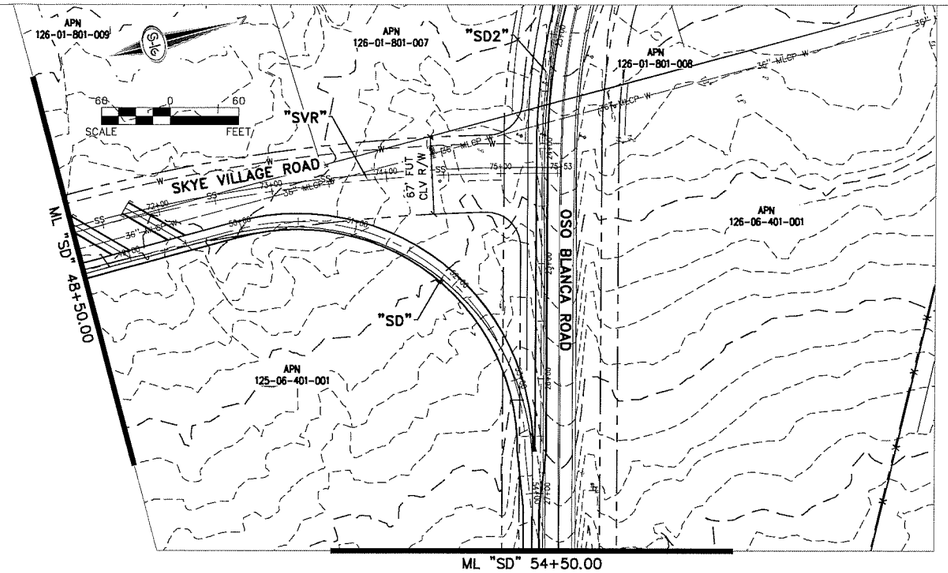
SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

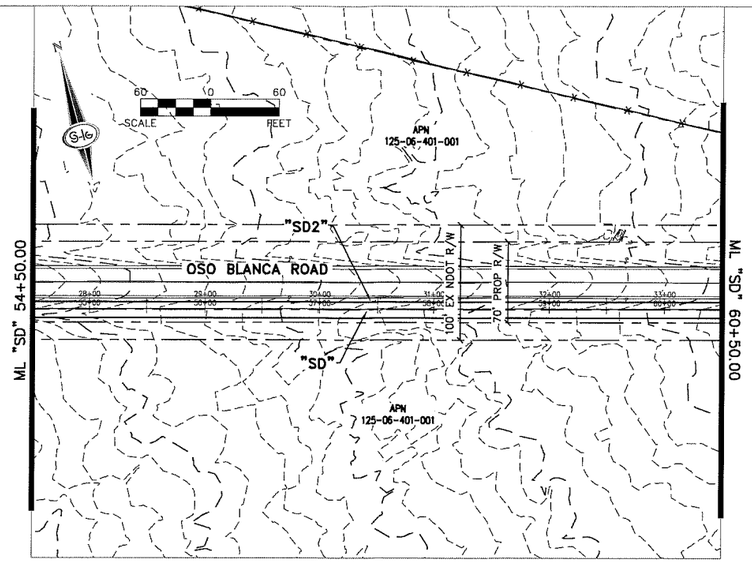
KYLE CANYON INTERCHANGE

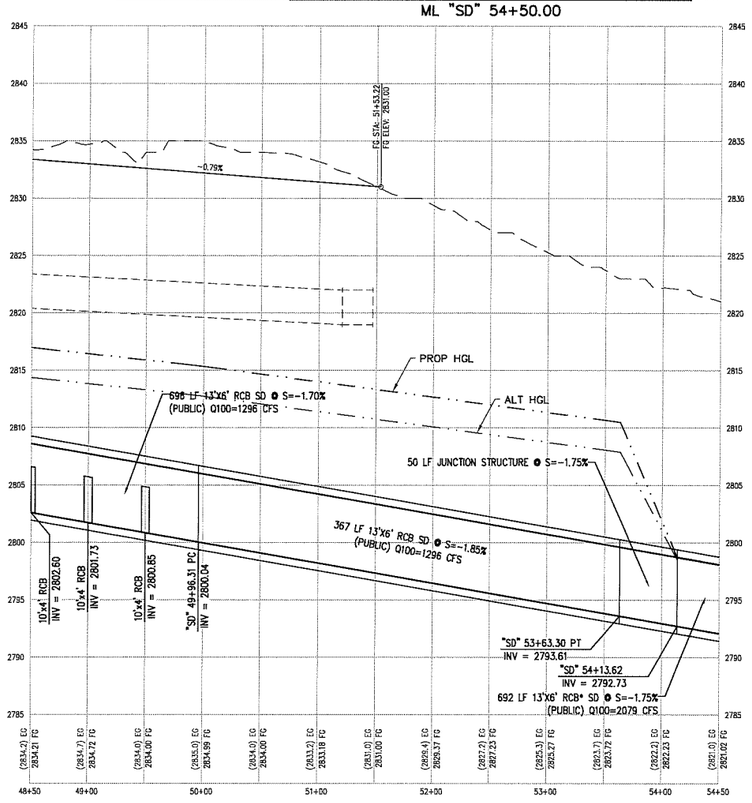
SKYE VILLAGE-LOG CABIN REGIONAL ALIGNMENT
PROPOSED STORM DRAIN-CONCEPTUAL PROFILE
(PROFILE SUBJECT TO CHANGE UPON TECHNICAL DESIGN)

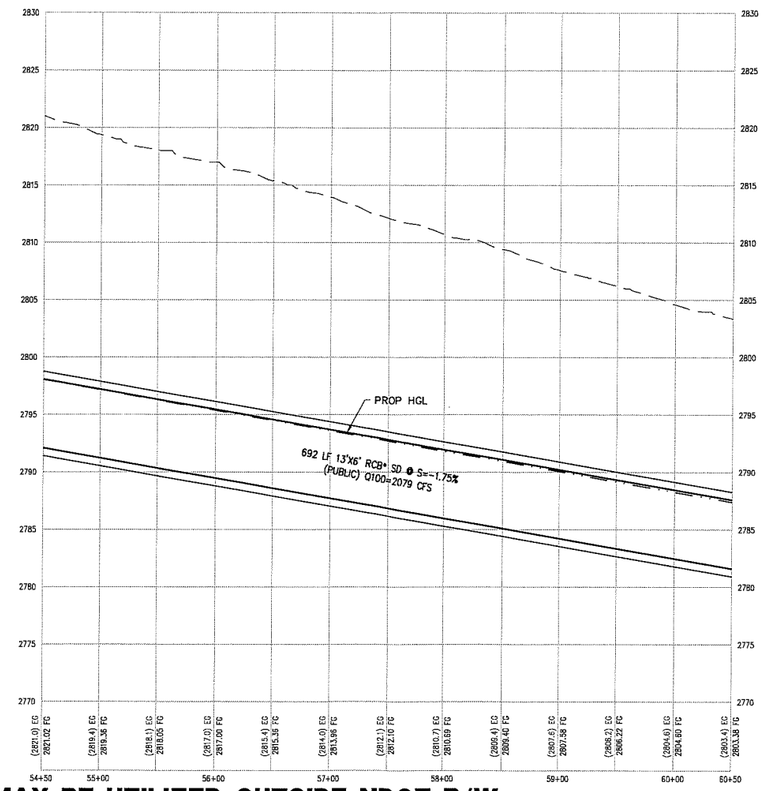
EXHIBIT 2

J:\DLY1608-000 Kyle Interchange SD\Dwg\Design\DLY1608_000_SD_NTWK.dwg, 8/9/2016 8:25:15 PM, dmyhre









NOTE: EQUIVALENT RCA SIZE MAY BE UTILIZED OUTSIDE NDOT R/W

*–SEE RCB SHOP DRAWING

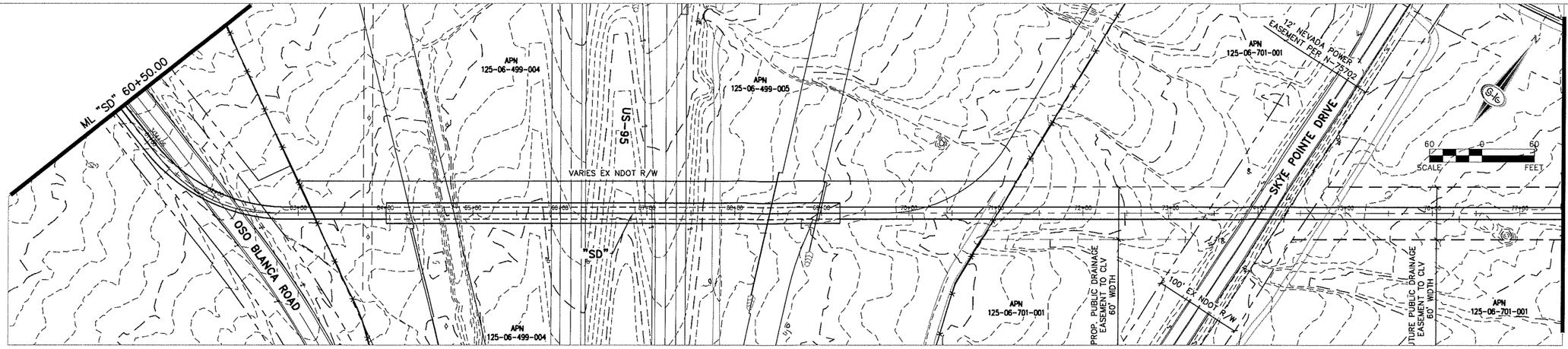
SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

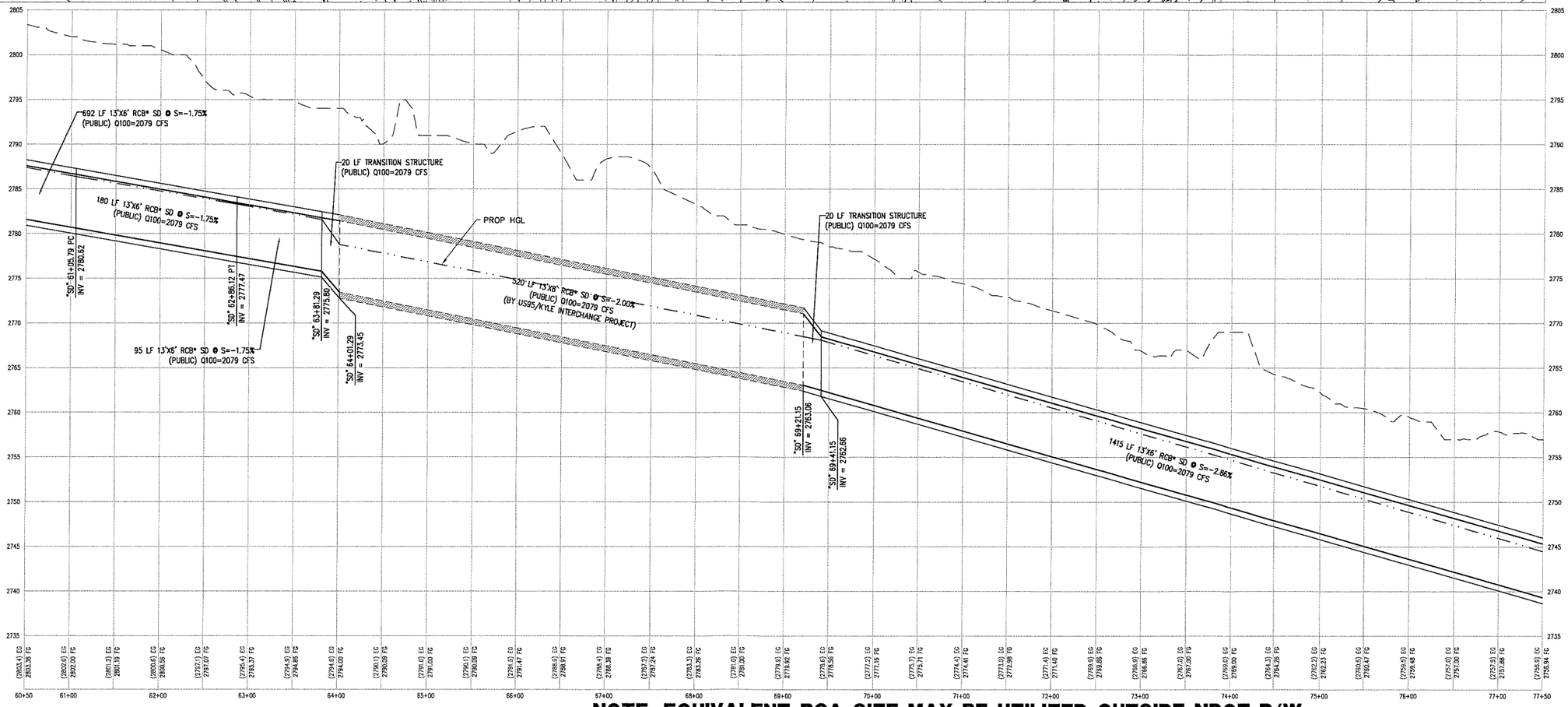
KYLE CANYON INTERCHANGE

SKYE VILLAGE-LOG CABIN REGIONAL ALIGNMENT PROPOSED STORM DRAIN-CONCEPTUAL PROFILE (PROFILE SUBJECT TO CHANGE UPON TECHNICAL DESIGN)

EXHIBIT 3

J:\DLY1608-000 Kyle Interchange SD\Dwg\Design\DLY1608_000_SD_NTWK.dwg, 8/9/2016 8:27:29 PM, dnynre





NOTE: EQUIVALENT RCA SIZE MAY BE UTILIZED OUTSIDE NDOT R/W

*–SEE RCB SHOP DRAWING

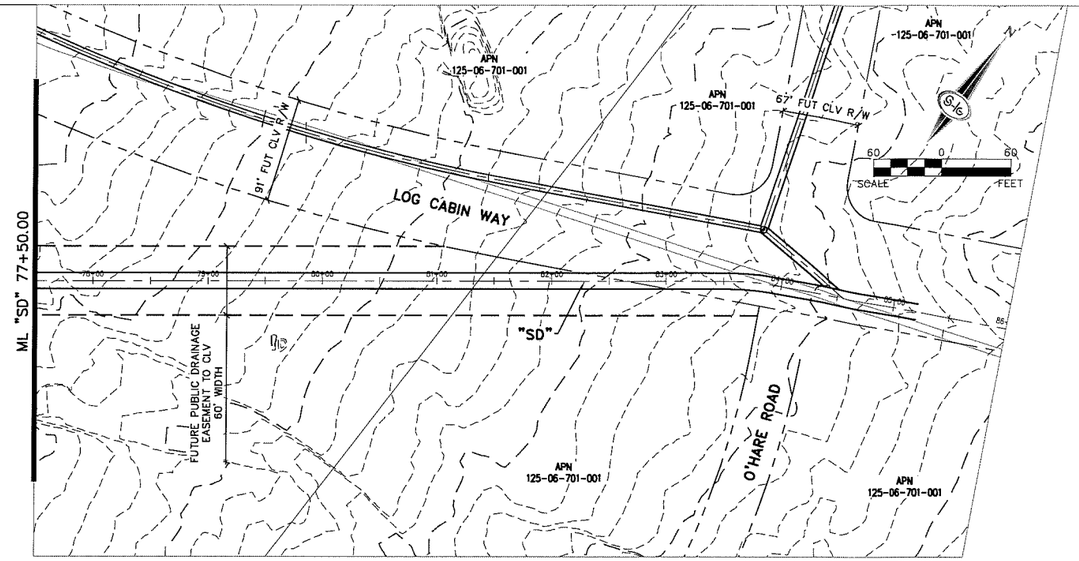
SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

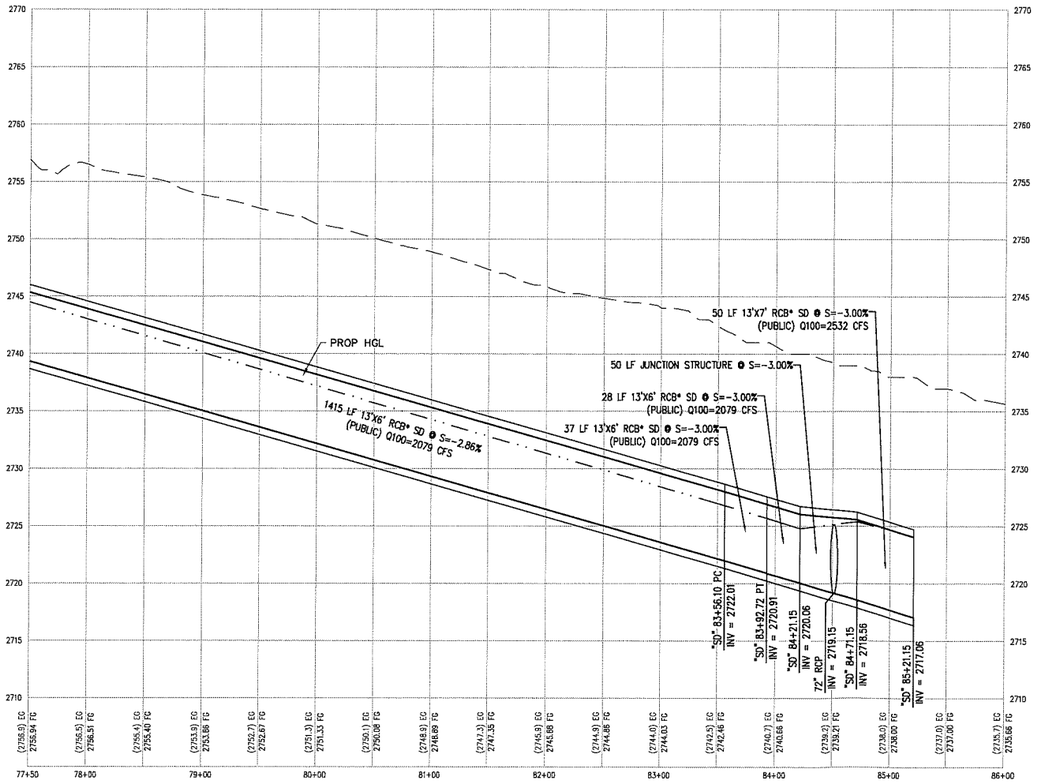
KYLE CANYON INTERCHANGE

SKYE VILLAGE-LOG CABIN REGIONAL ALIGNMENT PROPOSED STORM DRAIN-CONCEPTUAL PROFILE (PROFILE SUBJECT TO CHANGE UPON TECHNICAL DESIGN)

EXHIBIT 4

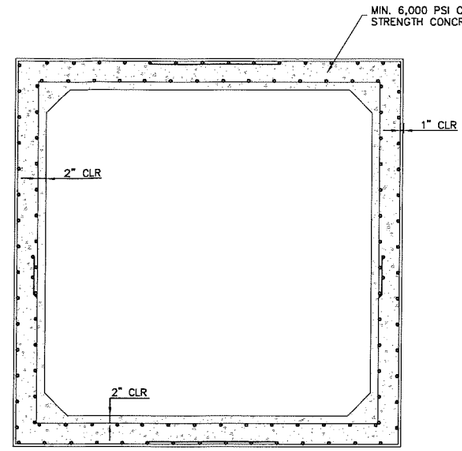
J:\DLY1608-000 Kyle Interchange SD\Dwg\Design\DLY1608_000_SD_NTWK.dwg, 8/9/2016 8:42:06 PM, dmyhre





RCB SHOP DRAWING

(FOR HIGH VELOCITIES)



SECTION CUT OF BOX CULVERT

NOTE: EQUIVALENT RCA SIZE MAY BE UTILIZED OUTSIDE NDOT R/W

*--SEE RCB SHOP DRAWING

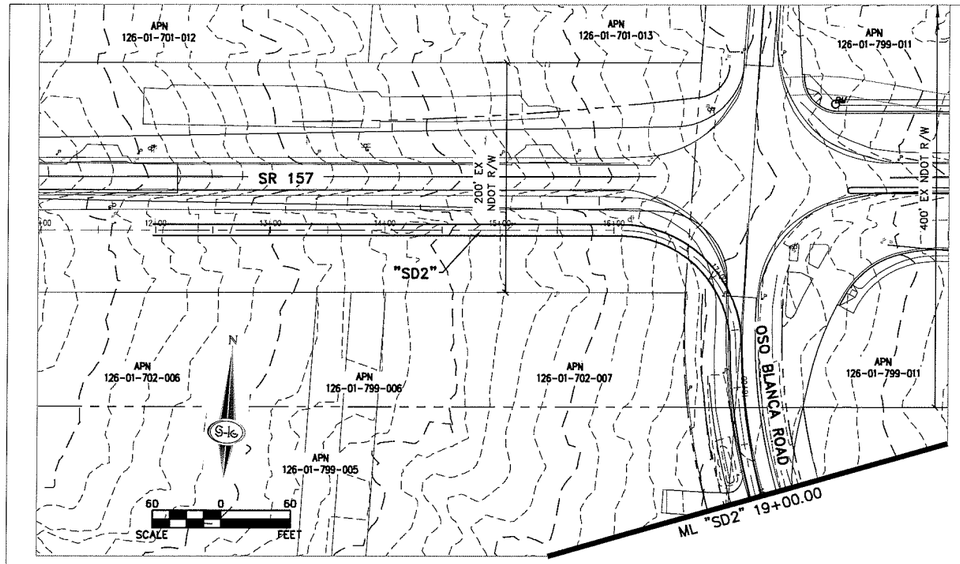
SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

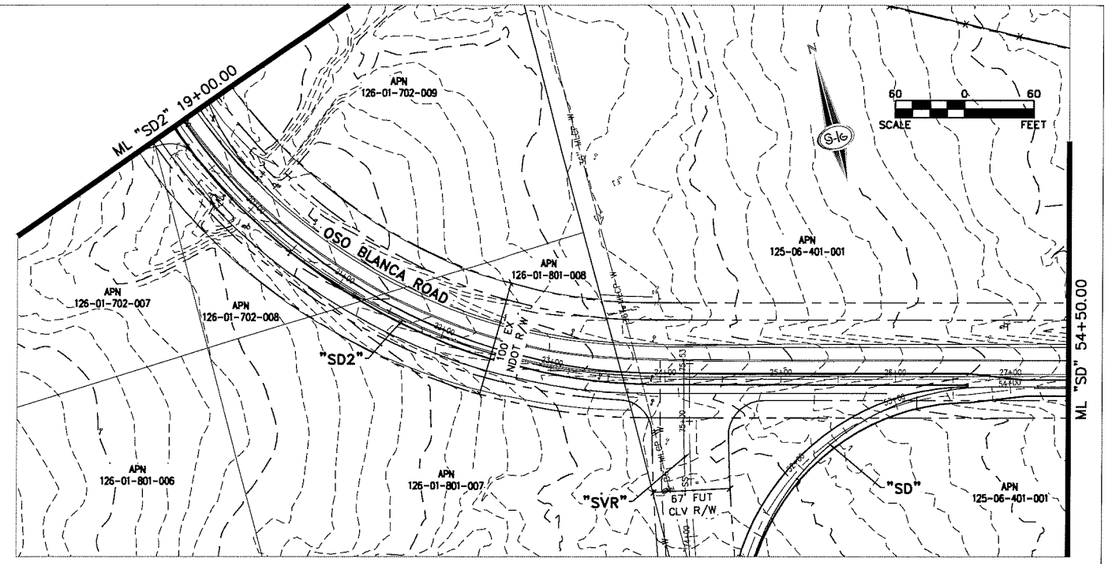
KYLE CANYON INTERCHANGE

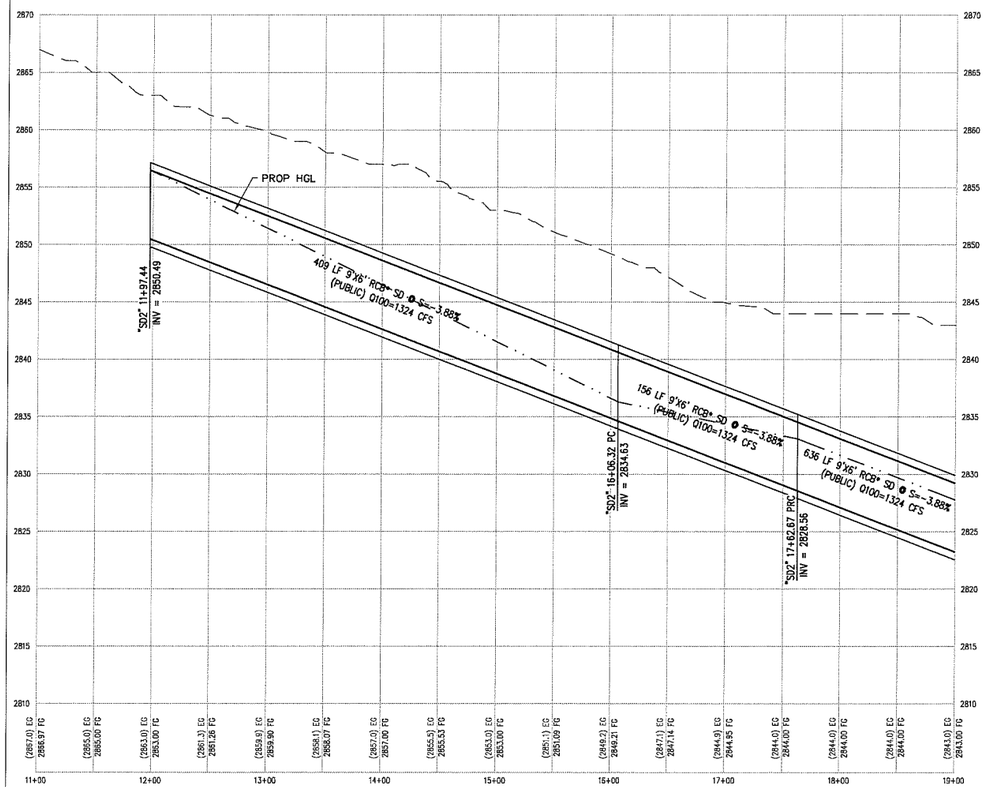
SKYE VILLAGE-LOG CABIN REGIONAL ALIGNMENT PROPOSED STORM DRAIN-CONCEPTUAL PROFILE (PROFILE SUBJECT TO CHANGE UPON TECHNICAL DESIGN)

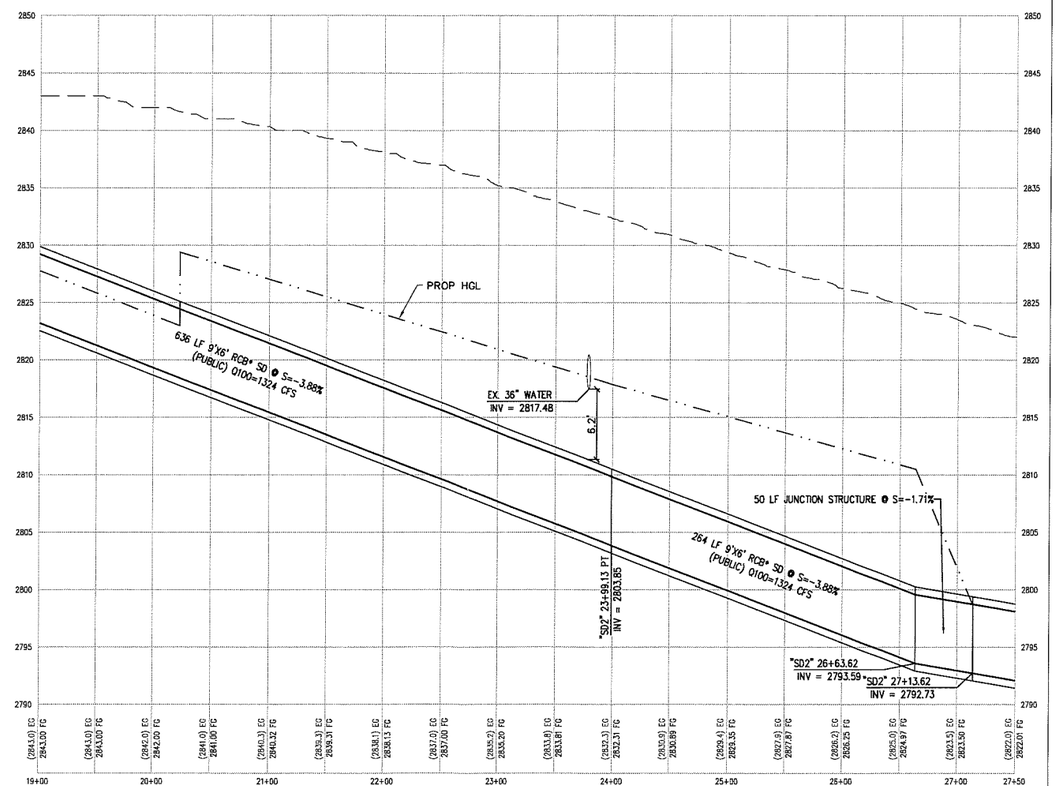
EXHIBIT 5

J:\DLY1608-000 Kyle Interchange SD\Dwg\Design\DLY1608_000_SD_NTWK.dwg, 8/9/2016 8:45:22 PM, dmyhre









NOTE: EQUIVALENT RCA SIZE MAY BE UTILIZED OUTSIDE NDOT R/W

*-SEE RCB SHOP DRAWING

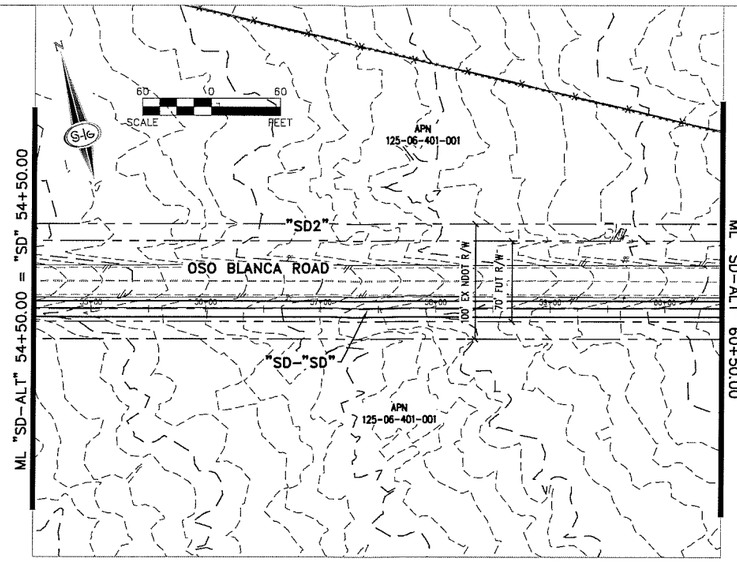
SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

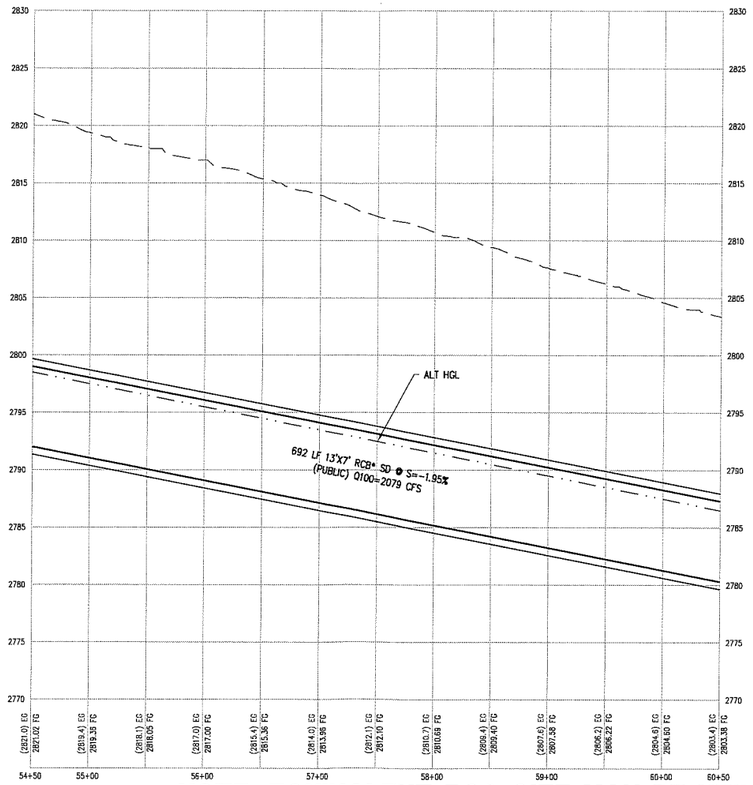
KYLE CANYON INTERCHANGE

SR157-OSO BLANCA REGIONAL ALIGNMENT PROPOSED STORM DRAIN-CONCEPTUAL PROFILE (PROFILE SUBJECT TO CHANGE UPON TECHNICAL DESIGN)

EXHIBIT 6

J:\DLY1608-000 Kyle Interchange SD\Dwg\Design\DLY1608_000_SD_NTWK.dwg, 8/9/2016 8:31:30 PM, dmyhre





NOTE: EQUIVALENT RCA SIZE MAY BE UTILIZED OUTSIDE NDOT R/W

*-SEE RCB SHOP DRAWING

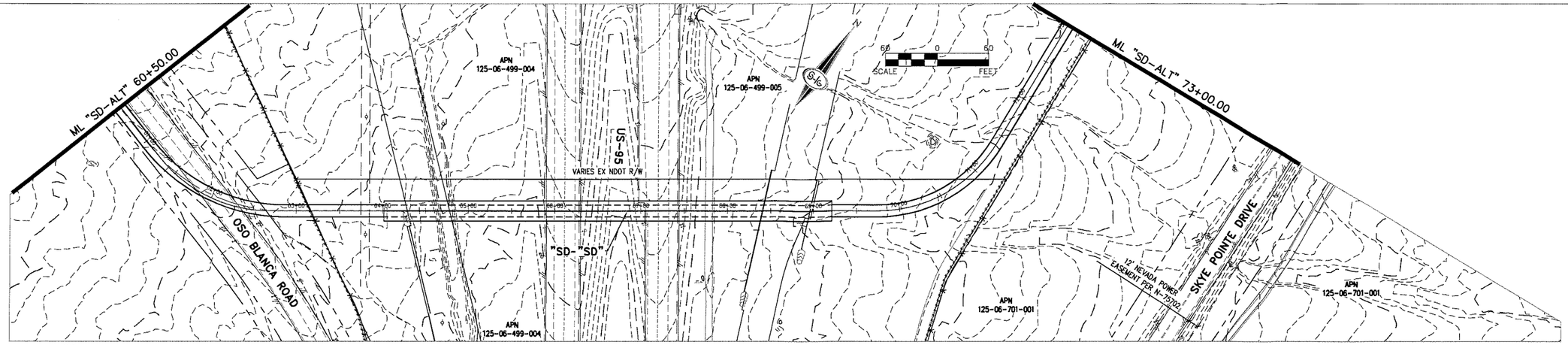
SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

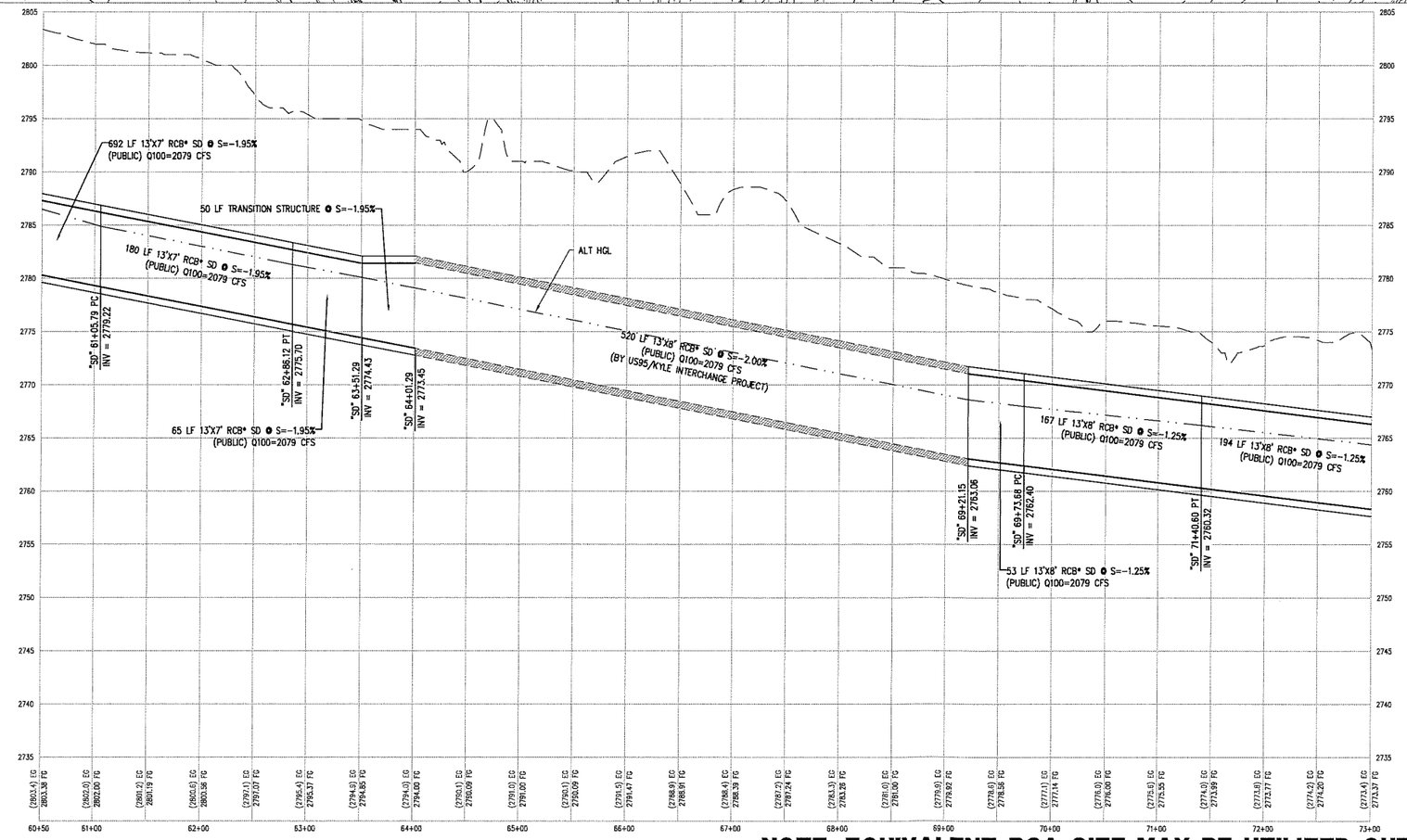
KYLE CANYON INTERCHANGE

SKYE VILLAGE-LOG CABIN REGIONAL ALIGNMENT STORM DRAIN-ALTERNATIVE CONCEPTUAL PROFILE (PROFILE SUBJECT TO CHANGE UPON TECHNICAL DESIGN)

EXHIBIT 3A

J:\DI\Y1608-000 Kyle Interchange SD\Dwg\Design\DI\Y1608_000_SD_NTWK_ALTERNATIVE.dwg, 8/9/2016 8:33:07 PM, dmyhre





NOTE: EQUIVALENT RCA SIZE MAY BE UTILIZED OUTSIDE NDOT R/W

*-SEE RCB SHOP DRAWING

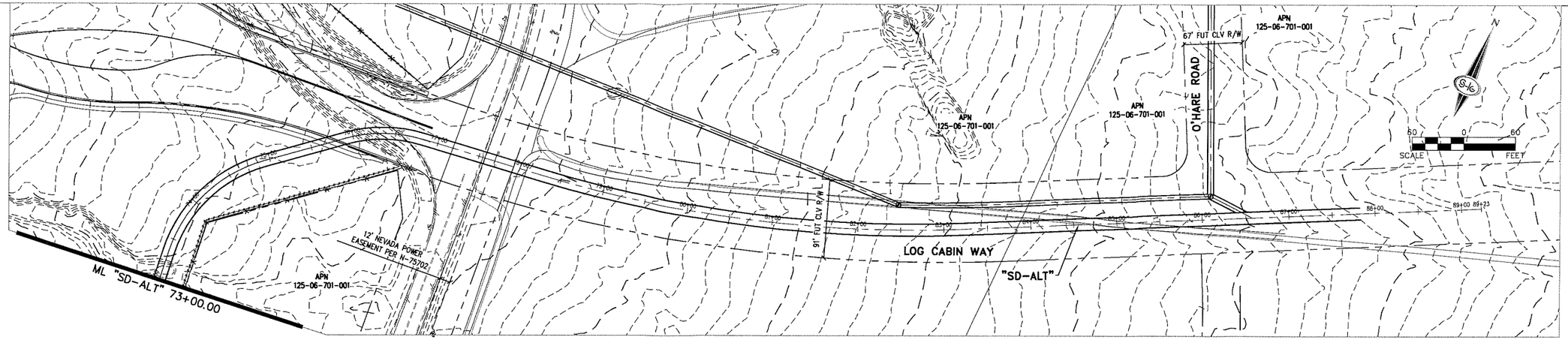
SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

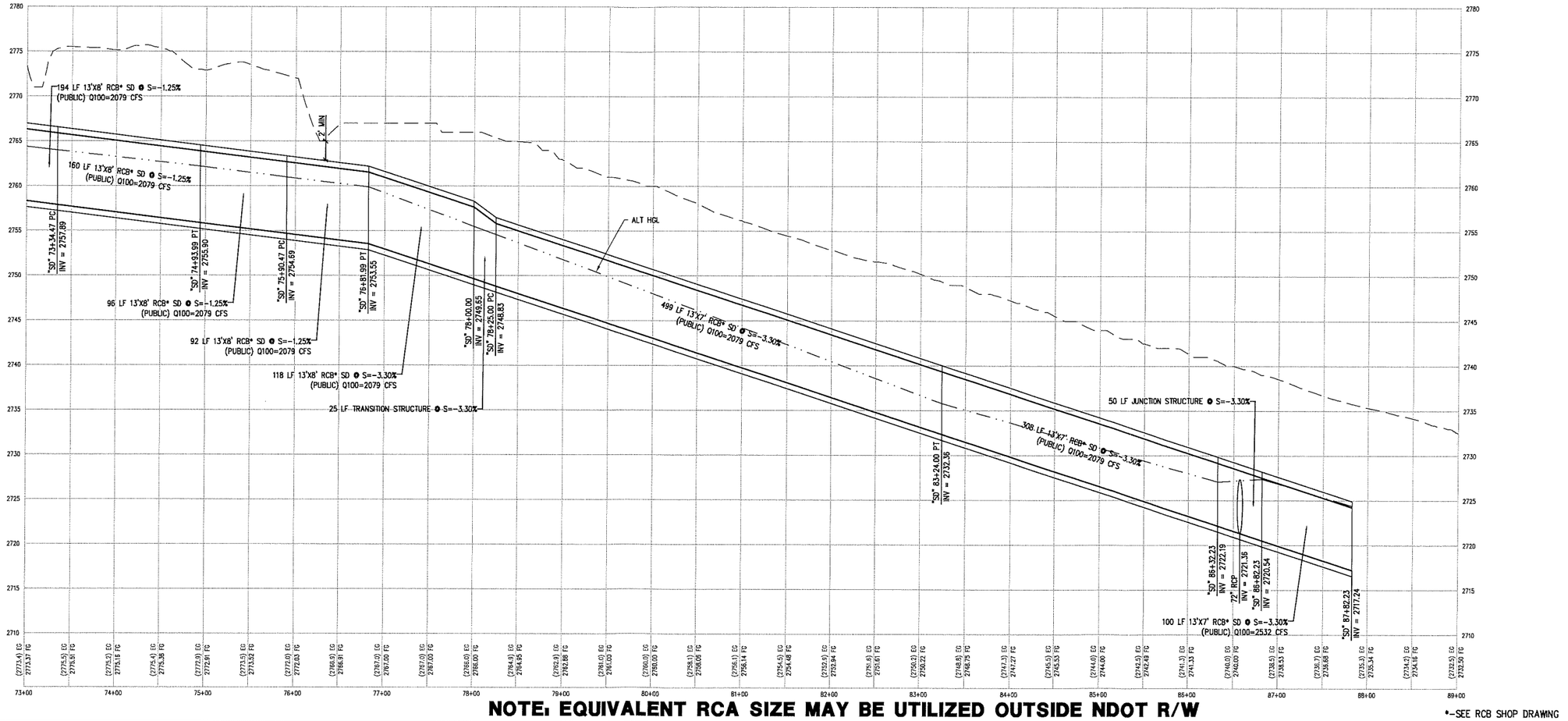
KYLE CANYON INTERCHANGE

SKYE VILLAGE-LOG CABIN REGIONAL ALIGNMENT STORM DRAIN-ALTERNATIVE CONCEPTUAL PROFILE (PROFILE SUBJECT TO CHANGE UPON TECHNICAL DESIGN)

EXHIBIT 4A

J:\DL\Y1608-000 Kyle Interchange SD\Dwg\Design\DL Y1608_000_SD_NTWK_ALTERNATIVE.dwg, 8/9/2016 8:33:52 PM, dmyhre





NOTE: EQUIVALENT RCA SIZE MAY BE UTILIZED OUTSIDE NDOT R/W

*-SEE RCB SHOP DRAWING

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

KYLE CANYON INTERCHANGE

SKYE VILLAGE-LOG CABIN REGIONAL ALIGNMENT STORM DRAIN-ALTERNATIVE CONCEPTUAL PROFILE (PROFILE SUBJECT TO CHANGE UPON TECHNICAL DESIGN)

EXHIBIT 5A

J:\OL\Y160B-000 Kyle Interchange SD\Dwg\Design\OL1Y160B_000_SD_NTWK_ALTERNATIVE.dwg, 8/9/2016 8:34:34 PM, dmyhre





GCW

ENGINEERS \ SURVEYORS

1555 South Rainbow Boulevard
Las Vegas, Nevada 89146
P. 702.804.2000
F. 702.804.2299
www.gcwengineering.com



90% Drainage Design Report
US95/Kyle Canyon Road Interchange
Volume 2 of 2

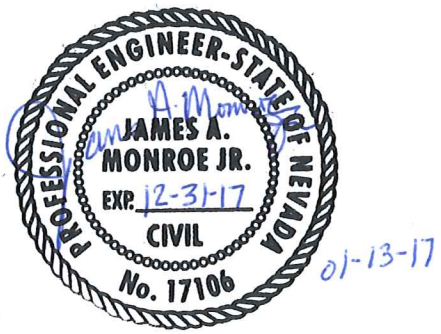
412.634A
January 2017

GCW
ENGINEERS \ SURVEYORS

90%
DRAINAGE DESIGN REPORT
FOR
US 95/KYLE CANYON ROAD
INTERCHANGE
VOLUME 2 OF 2

412.634A

January 2017



01-13-17

Prepared By:

GCW, Inc.
1555 South Rainbow Boulevard
Las Vegas, NV 89146
Phone: (702) 804-2000
Fax: (702) 804-2297

APPENDIX C

Hydraulic Calculations and Information

A design storm frequency shall be selected based on the facility to be designed and the roadway classification. Design storm frequency tables for various facilities are as follows:

Table 3-1
Roadway Surface Drainage Facilities

Roadway Classification (1)	Minimum Design Return Frequency (Years)	Maximum Allowable Spread Into Adjacent Travel Lane (3)
Interstate Highways (2)	25	0
Principal Arterials & Other Freeways and Expressways (2)	25	0
Other Principal Arterial	25	½ lane
Minor Arterial	10	½ lane
Rural Major Collector	10	½ lane
Urban or Rural Minor Collector	10	½ lane
Frontage Roads (if not classified)	10	½ lane

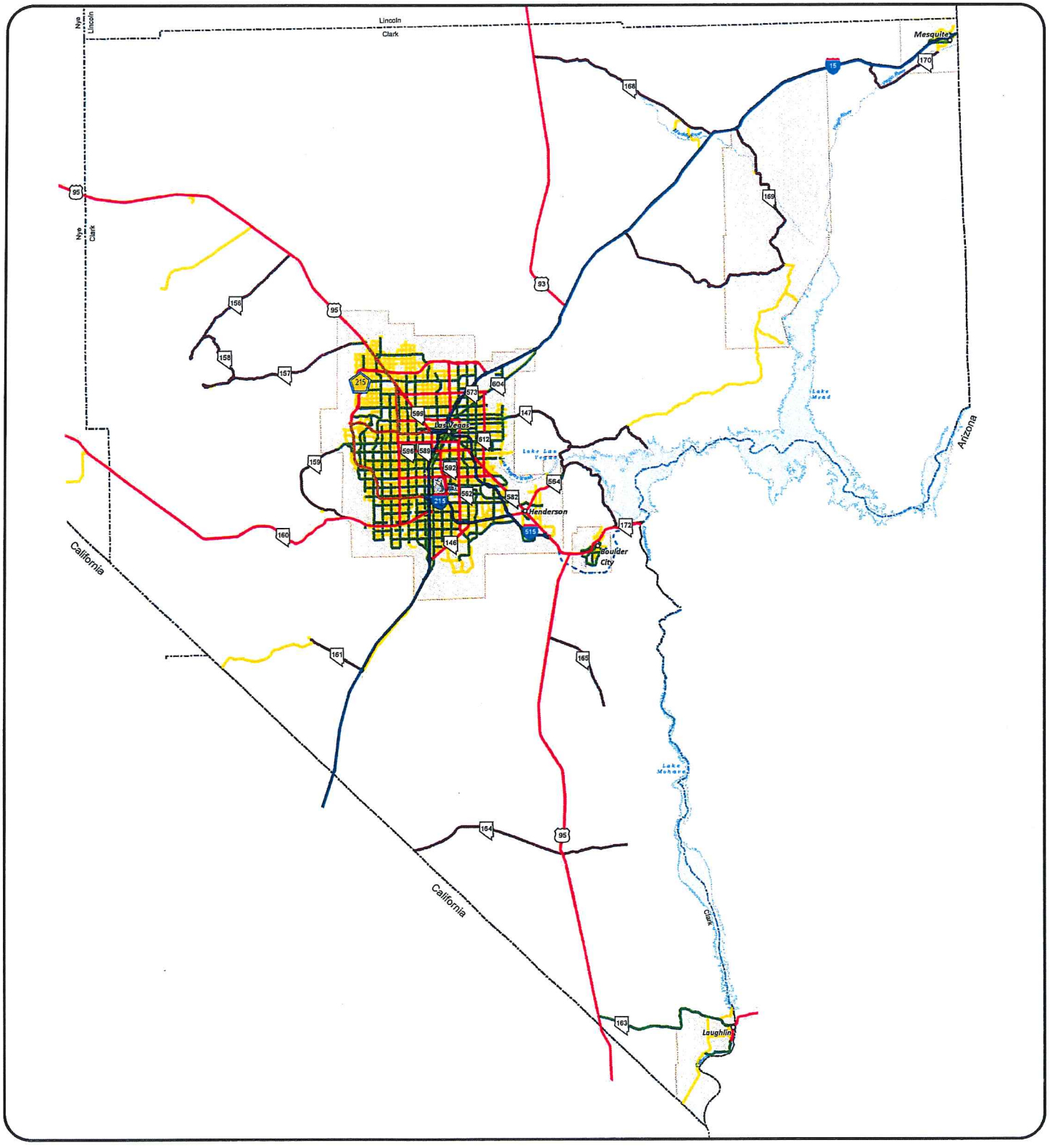
(1) Contact the NDOT Planning Division for the latest roadway functional classification maps.
(2) Including ramps
(3) Spread limits specified are as measured into the traveled lane beyond any available parking lanes, bike lanes, and shoulder widths. Turn pockets and bus turnouts are not considered as the travel lane. Auxiliary lanes are considered as travel lane.

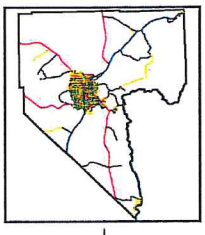
Table 3-2
Design Storm Selection Guidelines for Off-Site Flow Facilities (Culverts, Channels, Bridges)

Roadway Classification (1)	Minimum Design Return Frequency (years) (2)
Interstate Highways (3)	50
Principal Arterials & Other Freeways and Expressways (3)	50
Other Principal Arterial	25
Minor Arterial	25
Rural Major Collector	25
Urban or Rural Minor Collector	10
Frontage Roads (if not classified)	10

(1) Contact the NDOT Planning Division for the latest roadway functional classification maps.
(2) If an existing roadway is known to have been designed for a higher return frequency than indicated in the above table, the higher return frequency shall be used for design.
(3) Including ramps.

The hydrologic analysis shall consider the existing and future 20-year development or ultimate build-out condition in the contributing watershed. Verify assumptions with the Principal Hydraulic Engineer (PHE). The existing conditions shall be evaluated based on current development and current flood control facilities in place. If proposed flood control





2015

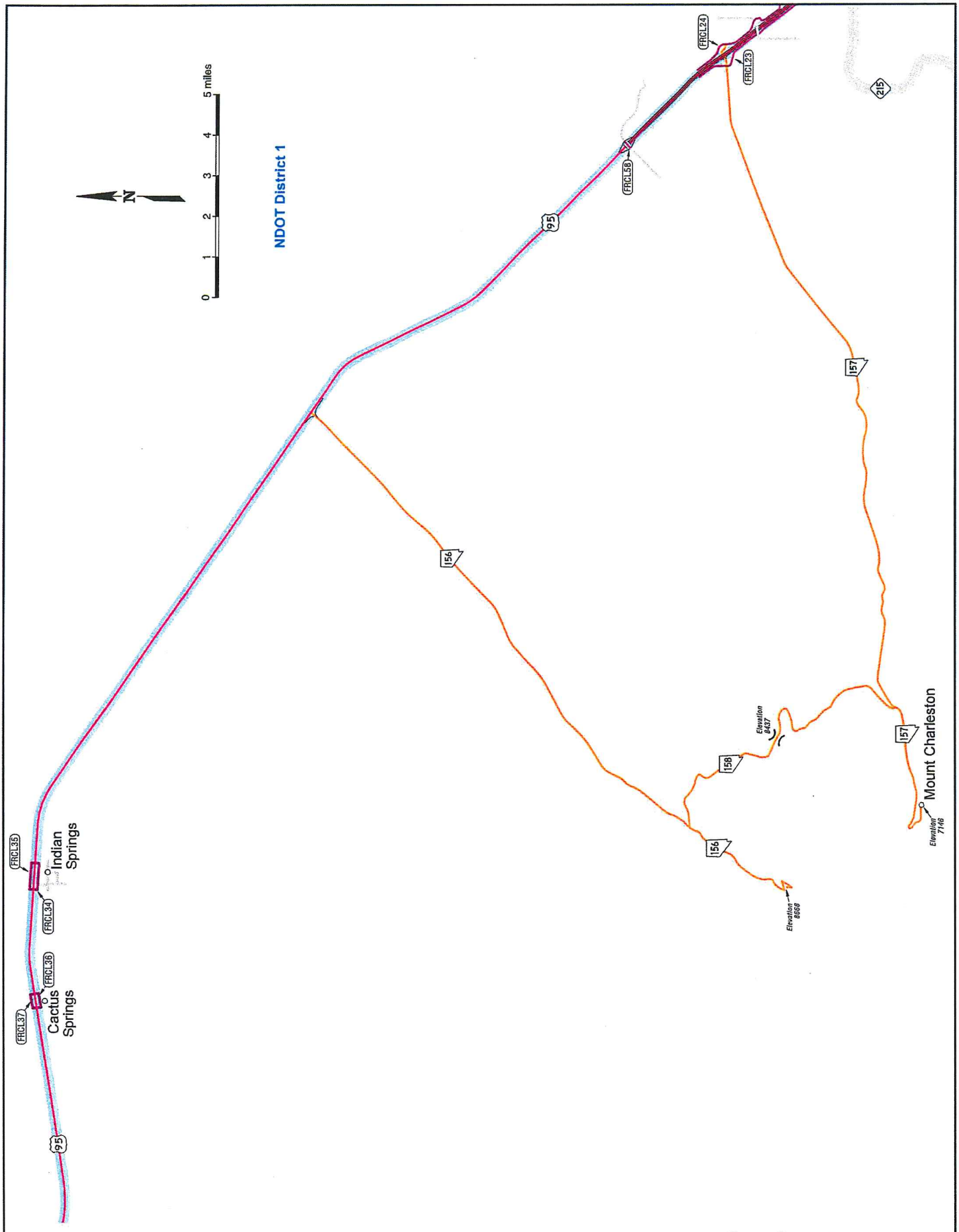
PREPARED BY
THE NEVADA DEPARTMENT OF TRANSPORTATION

Existing	Proposed Unbuilt	
		1 Interstates
		2 Other Freeways and Expressways
		3 Other Principal Arterials
		4 Minor Arterials
		5 Major Collectors
		6 Minor Collectors
		7 Local Roads
		Urban Limits
		State Line
		County Lines

0 4 8 16 24 32 Miles

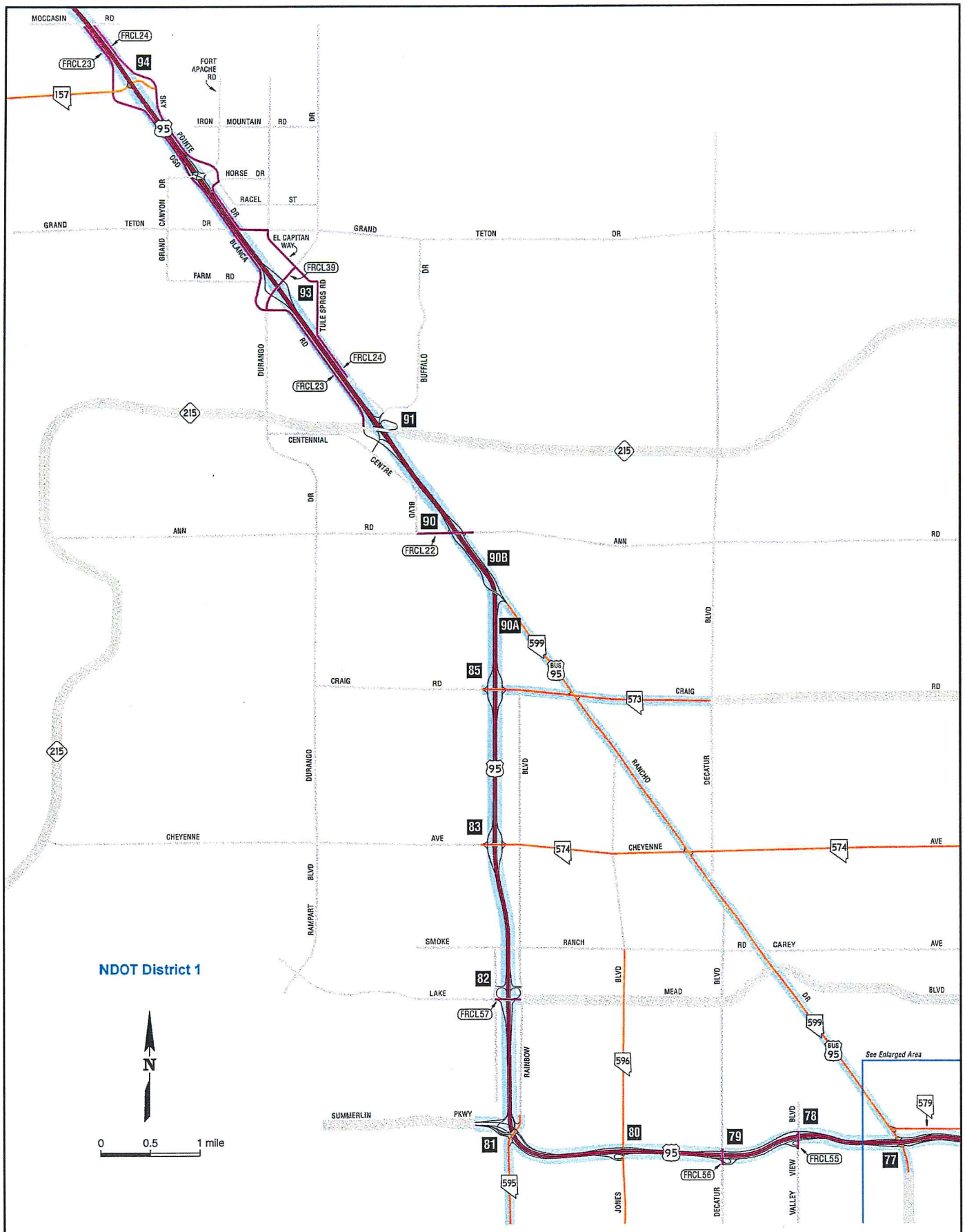
ROADWAY FUNCTIONAL CLASSIFICATION

CLARK COUNTY, NEVADA



Clark County

Mt Charleston and Indian Springs Enlarged Area



Clark County

Northwest Las Vegas Enlarged Area

DROP INLET SUMMARY AND CALCULATIONS

	SUMMARY - DROP INLET CALCULATIONS																
	Alignment	Station	Tributary	Q_{10} (cfs)	Q_{25} (cfs)	$Q_{intercept}$ (cfs)	Q_{bypass} (cfs)	Longitudinal Slope (%)	Cross Slope (%)	Bike Lane (BL) Width (ft)	Curb & Gutter (CG) Width (ft)	Shoulder (SH) Width (ft)	Adjacent Travel Lane (TL) Width (ft)	Max Spread Width (ft) BL+CG+SH+1/2 TL	Spread (ft)	Drop Inlet Size	Inlet Type*	Notes
1	KCE1	12+50	KCE-1A	4.9	-	3.4	1.5	5.97	2	0	2	0	21	12.5	8.4	7' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
2	KCE1	13+40	KCE-$1A_{BYP}$ + KCE-1B	2.3	-	2.0	0.3	4.23	2	0	2	0	21	12.5	6.4	7' Type 11 18" RCP	Capacity	Inlet added to meet spread criteria along KR4 Ramp
3	KR4A	7+95	KCE-$1B_{BYP}$ + KCE-1C	2.1	-	1.7	0.4	3.60	1	0	2	0	15	9.5	9.7	7' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
4	KR4A	7+75	KCE-$1C_{BYP}$	0.4	-	0.4	0.0	3.60	1	0	2	0	15	9.5	2.1	7'Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
5	KCE1	16+40	KCE2	0.4	-	0.3	0.1	2.95	2	6	2	0	15	15.5	2.1	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
6	KCW1	22+78	KCE-2_{BYP} + KCW-3	0.8	-	0.8	0.0	2.95	2	0	2	0	15	9.5	3.8	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off to KR4 Ramp. Estimated slope based on profile of adjacent alignement KCE.
7	KCW1	27+00	KCW4 + KCW5 + KCW-5A	1.6	-	1.6	0.0	1.35	2	0	2	0	18	11	10.6	10' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump. Estimated slope using surface.
8	KCW1	27+76	KCE-6B	0.6	-	0.6	0.0	0.30	2	0	2	0	15	9.5	6.3	7' Type 11 18" RCP	Sag	Inlet added to collect lfow at sag location
9	KCW1	29+15	KCE-6C	0.2	-	0.2	0.0	0.70	2	0	0	12	15	19.5	2.1	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
10	KCE1	29+50	KCE7	3.7	-	3.6	0.1	0.50	2	6	2	0	12	14	12.6	15' Type 11 24" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
11	KCW1	19+00	KCW-1A	4.8	-	3.7	1.1	5.92	2	6	2	0	15	15.5	8.3	10' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
12	KCW1	19+70	KCW-$1A_{BYP}$ + KCW-1B	1.5	-	1.4	0.1	4.30	2	6	2	0	15	15.5	5.0	7' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
13	KR3A	3+60	KCW-$1B_{BYP}$ + KR3-1B	0.4	-	0.3	0.1	2.89	2	0	2	8	14	17	2.1	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off curb to sump
14	KR3	30+89	KR3-3	1.0	-	0.9	0.1	3.00	0.7	0	2	8	14	17	8.3	Type 7 24" RCP	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
15	KCE1	23+30	KR3-3_{BYP} + KCW2 + KCE3 + KCE-4 + KCE-5 + KCE-6A	2.6	-	2.6	0.0	0.85	2	6	2	0	15	15.5	9.7	15' Type 11 24" RCP	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
16	KCW1	26+97	KCE-4B + KCE-5B	0.3	-	0.3	0.0	0.85	2	0	0	0	0	NA	4.6	NDOT Type 2	Capacity	Inlet within Median. Spread contained within median.
17	KCW1	34+00	KR2-5 + KCW-7	2.9	-	2.9	0.0	0.50	2	6	2	0	12	14	11.4	15' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
18	XP	418+20	95-4A	-	2.2	1.3	0.9	1.57	2	0	0	12	12	18	8.7	NDOT Type 2	Capacity	Inlet added to limit bypass flow off curb to sump
19	XP	418+13	95-4A	-	0.9	0.9	0.0	1.57	2	0	0	12	12	18	6.2	Type 5-2G	Capacity	Inlet added to limit bypass flow off curb to sump
20	XP	412+61	95-14 + 95-15A	-	3.8	2.0	1.8	1.70	2	0	0	12	12	18	10.5	NDOT Type 2	Capacity	Inlet added to limit bypass flow off curb to sump
21	XP	412+51	$[95\text{-}14 + 95\text{-}15A]_{BYP}$	-	1.8	1.1	0.7	1.70	2	0	0	12	12	18	7.9	NDOT Type 2	Capacity	Inlet added to limit bypass flow off curb to sump
22	XP	412+41	$[95\text{-}14 + 95\text{-}15A]_{BYP}$	-	0.7	0.6	0.1	1.70	2	0	0	12	12	18	5.7	Type 5-2G	Capacity	Inlet added to limit bypass flow off curb to sump
24	XP	415+63	95-5	-	1.5	1.2	0.3	1.60	1	0	0	12	12	18	11.6	Type 5-2G	Capacity	Inlet added to limit bypass flow off curb to sump

Hydraulic Analysis Report

Project Data

Project Title: Kyle Canyon Interchange

Designer: RD

Project Date: Saturday, December 19, 2015

Project Units: U.S. Customary Units

Notes:

Curb and Gutter Analysis: 1_KCE 12+50 7'Type 11 18" RCP

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0597 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0870 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Design Flow: 4.9000 cfs

Gutter Result Parameters

Width of Spread: 8.3754 ft

Gutter Depression: 1.2060 in

Area of Flow: 0.7769 ft^2

Eo (Gutter Flow to Total Flow): 0.5318

Gutter Depth at Curb: 3.2161 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 2.0000 ft

Length of Inlet: 7.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 3.4218 cfs

Bypass Flow: 1.4782 cfs

Approach Velocity: 5.9929 ft/s

Splash-over Velocity: 8.1290 ft/s

Efficiency: 0.6983

Curb and Gutter Analysis: 2_KCE 13+40 7'Type 11 18" RCP

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0423 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0870 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Width of Spread: 6.3644 ft

Gutter Result Parameters

Design Flow: 2.3000 cfs

Gutter Depression: 1.2060 in

Area of Flow: 0.4804 ft^2

Eo (Gutter Flow to Total Flow): 0.6665

Gutter Depth at Curb: 2.7335 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 2.0000 ft

Length of Inlet: 7.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 2.0152 cfs

Bypass Flow: 0.2848 cfs

Approach Velocity: 4.4750 ft/s

Splash-over Velocity: 8.1290 ft/s

Efficiency: 0.8762

Curb and Gutter Analysis: 3_KR4A 7+95 7'Type 11 18" RCP

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0360 ft/ft

Cross-Slope of Pavement: 0.0100 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0870 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Width of Spread: 9.6884 ft

Gutter Result Parameters

Design Flow: 2.1000 cfs

Gutter Depression: 1.3860 in

Area of Flow: 0.5560 ft^2

Eo (Gutter Flow to Total Flow): 0.5744

Gutter Depth at Curb: 2.5486 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 2.0000 ft

Length of Inlet: 7.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 1.7326 cfs

Bypass Flow: 0.3674 cfs

Approach Velocity: 3.5962 ft/s

Splash-over Velocity: 8.1290 ft/s

Efficiency: 0.8250

Curb and Gutter Analysis: 4_KR4A 7+75 7'Type 11 18" RCP

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0360 ft/ft

Cross-Slope of Pavement: 0.0100 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0870 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Width of Spread: 2.0642 ft

Gutter Result Parameters

Design Flow: 0.4000 cfs

Gutter Depression: 1.3860 in

Area of Flow: 0.1079 ft^2

Eo (Gutter Flow to Total Flow): 0.9982

Gutter Depth at Curb: 1.6337 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 2.0000 ft

Length of Inlet: 7.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 0.4000 cfs

Bypass Flow: 0.0000 cfs

Approach Velocity: 0.7914 ft/s

Splash-over Velocity: 8.1290 ft/s

Efficiency: 1.0000

Curb and Gutter Analysis: 5_KCE 16+40 Type 3 24" RCP or Less

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0295 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0867 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Width of Spread: 2.0489 ft

Gutter Result Parameters

Design Flow: 0.4000 cfs

Gutter Depression: 1.2006 in

Area of Flow: 0.1170 ft^2

Eo (Gutter Flow to Total Flow): 0.9953

Gutter Depth at Curb: 1.6923 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 3.0000 ft

Length of Inlet: 2.5000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 0.3984 cfs

Bypass Flow: 0.0016 cfs

Approach Velocity: 3.4183 ft/s

Splash-over Velocity: 9.9703 ft/s

Efficiency: 0.9960

Curb and Gutter Analysis: 6_KCW 22+78 Type 3 24" RCP or Less

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0295 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0867 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Design Flow: 0.8000 cfs

Gutter Result Parameters

Width of Spread: 3.8435 ft

Gutter Depression: 1.2006 in

Area of Flow: 0.2228 ft^2

Eo (Gutter Flow to Total Flow): 0.8860

Gutter Depth at Curb: 2.1230 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 3.0000 ft

Length of Inlet: 2.5000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 0.7219 cfs

Bypass Flow: 0.0781 cfs

Approach Velocity: 3.5913 ft/s

Splash-over Velocity: 9.9703 ft/s

Efficiency: 0.9023

Curb and Gutter Analysis: 7_KCW1 27+00 10' Type 11 18" RCP

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0135 ft/ft

Cross-Slope of Pavement: 0.0104 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0867 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Width of Spread: 10.5481 ft

Gutter Result Parameters

Design Flow: 1.6000 cfs

Gutter Depression: 1.3734 in

Area of Flow: 0.6644 ft^2

Eo (Gutter Flow to Total Flow): 0.5233

Gutter Depth at Curb: 2.6898 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 2.0000 ft

Length of Inlet: 10.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 1.5678 cfs

Bypass Flow: 0.0322 cfs

Approach Velocity: 2.2061 ft/s

Splash-over Velocity: 8.1290 ft/s

Efficiency: 0.9799

Curb and Gutter Analysis: 8_KCW 27+76 7' Type 11 18" RCP

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0030 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0870 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Width of Spread: 6.2990 ft

Gutter Result Parameters

Design Flow: 0.6000 cfs

Gutter Depression: 1.2060 in

Area of Flow: 0.4722 ft^2

Eo (Gutter Flow to Total Flow): 0.6716

Gutter Depth at Curb: 2.7178 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 0.0000 %

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 2.0000 ft

Length of Inlet: 7.0000 ft

Curb opening height: 0.4200 in

Local Depression: 0.0010 in

Inlet Result Parameters

Perimeter: 12.7000 ft

Effective Perimeter: 12.7000 ft

Area: 2.9456 ft^2

Effective Area: 2.9456 ft^2

Depth at curb face (upstream of local depression): 0.0954 ft

Computed Width of Spread at Sag: 1.0960 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: 9_KCW 29+15 Type 3 24" RCP or Less

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0070 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0867 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Width of Spread: 2.1150 ft

Gutter Result Parameters

Design Flow: 0.2000 cfs

Gutter Depression: 1.2006 in

Area of Flow: 0.1198 ft^2

Eo (Gutter Flow to Total Flow): 0.9938

Gutter Depth at Curb: 1.7082 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 3.0000 ft

Length of Inlet: 2.5000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 0.1992 cfs

Bypass Flow: 0.0008 cfs

Approach Velocity: 1.6698 ft/s

Splash-over Velocity: 9.9703 ft/s

Efficiency: 0.9962

Curb and Gutter Analysis: 10_KCE 29+50 15' Type 11 24" RCP

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0870 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Width of Spread: 12.5749 ft

Gutter Result Parameters

Design Flow: 3.7000 cfs

Gutter Depression: 1.2060 in

Area of Flow: 1.6567 ft^2

Eo (Gutter Flow to Total Flow): 0.3598

Gutter Depth at Curb: 4.2240 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 2.5000 ft

Length of Inlet: 15.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 3.6704 cfs

Bypass Flow: 0.0296 cfs

Approach Velocity: 1.4889 ft/s

Splash-over Velocity: 9.1077 ft/s

Efficiency: 0.9920

Curb and Gutter Analysis: 11_KCW 19+00 10' Type 11 18" RCP

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0592 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0870 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Width of Spread: 8.3142 ft

Gutter Result Parameters

Design Flow: 4.8000 cfs

Gutter Depression: 1.2060 in

Area of Flow: 0.7666 ft^2

Eo (Gutter Flow to Total Flow): 0.5353

Gutter Depth at Curb: 3.2014 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 2.0000 ft

Length of Inlet: 10.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 3.7564 cfs

Bypass Flow: 1.0436 cfs

Approach Velocity: 5.7543 ft/s

Splash-over Velocity: 8.1290 ft/s

Efficiency: 0.7826

Curb and Gutter Analysis: 12_KCW 19+70 7' Type 11 18" RCP

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0430 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0870 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Width of Spread: 5.0511 ft

Gutter Result Parameters

Design Flow: 1.5000 cfs

Gutter Depression: 1.2060 in

Area of Flow: 0.3305 ft^2

Eo (Gutter Flow to Total Flow): 0.7774

Gutter Depth at Curb: 2.4183 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 2.0000 ft

Length of Inlet: 7.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 1.4479 cfs

Bypass Flow: 0.0521 cfs

Approach Velocity: 4.2803 ft/s

Splash-over Velocity: 8.1290 ft/s

Efficiency: 0.9653

Curb and Gutter Analysis: 13_KR3A 3+60 Type 3 24" RCP or Less

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0289 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0867 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Design Flow: 0.4000 cfs

Gutter Result Parameters

Width of Spread: 2.0749 ft

Gutter Depression: 1.2006 in

Area of Flow: 0.1181 ft^2

Eo (Gutter Flow to Total Flow): 0.9947

Gutter Depth at Curb: 1.6986 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 3.0000 ft

Length of Inlet: 2.5000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 0.3982 cfs

Bypass Flow: 0.0018 cfs

Approach Velocity: 3.3872 ft/s

Splash-over Velocity: 9.9703 ft/s

Efficiency: 0.9955

Curb and Gutter Analysis: 14_KR3 30+89 7' Type 11 24" RCP

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0300 ft/ft

Cross-Slope of Pavement: 0.0070 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0870 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Design Flow: 1.0000 cfs

Gutter Result Parameters

Width of Spread: 8.3052 ft

Gutter Depression: 1.4400 in

Area of Flow: 0.3314 ft^2

Eo (Gutter Flow to Total Flow): 0.7254

Gutter Depth at Curb: 2.1376 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 2.5000 ft

Length of Inlet: 7.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 0.9803 cfs

Bypass Flow: 0.0197 cfs

Approach Velocity: 3.2318 ft/s

Splash-over Velocity: 9.1077 ft/s

Efficiency: 0.9803

Curb and Gutter Analysis: 15_KCE 23+30 15' Type 11 24" RCP

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0085 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0870 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Width of Spread: 9.7211 ft

Gutter Result Parameters

Design Flow: 2.6000 cfs

Gutter Depression: 1.2060 in

Area of Flow: 1.0204 ft^2

Eo (Gutter Flow to Total Flow): 0.4636

Gutter Depth at Curb: 3.5391 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 2.5000 ft

Length of Inlet: 15.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 2.6000 cfs

Bypass Flow: 0.0000 cfs

Approach Velocity: 1.6597 ft/s

Splash-over Velocity: 9.1077 ft/s

Efficiency: 1.0000

Curb and Gutter Analysis: 16_KCW1 26+97 Type 2 NDOT Drop Inlet in Median

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0085 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Width of Spread: 4.6182 ft

Gutter Result Parameters

Design Flow: 0.3000 cfs

Gutter Depression: 0.0000 in

Area of Flow: 0.2133 ft^2

Eo (Gutter Flow to Total Flow): 0.6496

Gutter Depth at Curb: 1.1084 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Grate

Grate Type: P - 1-7/8

Grate Width: 2.0000 ft

Grate Length: 3.0000 ft

Local Depression: 0.0001 in

Inlet Result Parameters

Intercepted Flow: 0.2654 cfs

Bypass Flow: 0.0346 cfs

Approach Velocity: 1.4066 ft/s

Splash-over Velocity: 9.9703 ft/s

Efficiency: 0.8845

Curb and Gutter Analysis: 17_KCW 34+00 15' Type 11 18" RCP

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0870 ft/ft

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Width of Spread: 11.3794 ft

Gutter Result Parameters

Design Flow: 2.9000 cfs

Gutter Depression: 1.2060 in

Area of Flow: 1.3703 ft^2

Eo (Gutter Flow to Total Flow): 0.3977

Gutter Depth at Curb: 3.9371 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Sweeper Combo

Grate Type: P - 1-7/8

Grate Width: 1.5000 ft

Grate Length: 2.0000 ft

Length of Inlet: 15.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 2.9000 cfs

Bypass Flow: 0.0000 cfs

Approach Velocity: 0.0000 ft/s

Splash-over Velocity: 8.1290 ft/s

Efficiency: 1.0000

Curb and Gutter Analysis: 18_XP 418+20 NDOT Type 2

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0157 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Design Flow: 2.2000 cfs

Gutter Result Parameters

Width of Spread: 8.6895 ft

Gutter Depression: 0.0000 in

Area of Flow: 0.7551 ft^2

Eo (Gutter Flow to Total Flow): 0.3971

Gutter Depth at Curb: 2.0855 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Grate

Grate Type: P - 1-7/8

Grate Width: 2.0000 ft

Grate Length: 3.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 1.3200 cfs

Bypass Flow: 0.8800 cfs

Approach Velocity: 2.9136 ft/s

Splash-over Velocity: 9.9703 ft/s

Efficiency: 0.6000

Curb and Gutter Analysis: 19_XP 418+13 NDOT Type 5-2G

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0157 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.5000 ft

Width of Spread: 6.2148 ft

Gutter Result Parameters

Design Flow: 0.9000 cfs

Gutter Depression: 0.0000 in

Area of Flow: 0.3862 ft^2

Eo (Gutter Flow to Total Flow): 0.7469

Gutter Depth at Curb: 1.4916 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Grate

Grate Type: P - 1-7/8 - 4

Grate Width: 5.0000 ft

Grate Length: 2.0000 ft

Local Depression: 0.0010 in

Inlet Result Parameters

Intercepted Flow: 0.8899 cfs

Bypass Flow: 0.0101 cfs

Approach Velocity: 2.3301 ft/s

Splash-over Velocity: 4.6910 ft/s

Efficiency: 0.9888

Curb and Gutter Analysis: 20_XP 412+41 NDOT Type 2

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0170 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Design Flow: 3.8000 cfs

Gutter Result Parameters

Width of Spread: 10.5082 ft

Gutter Depression: 0.0000 in

Area of Flow: 1.1042 ft^2

Eo (Gutter Flow to Total Flow): 0.3372

Gutter Depth at Curb: 2.5220 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Grate

Grate Type: P - 1-7/8

Grate Width: 2.0000 ft

Grate Length: 3.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 1.9679 cfs

Bypass Flow: 1.8321 cfs

Approach Velocity: 3.4413 ft/s

Splash-over Velocity: 9.9703 ft/s

Efficiency: 0.5179

Curb and Gutter Analysis: 21_XP 412+31 NDOT Type 2

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0170 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 1.5000 ft

Design Flow: 1.8000 cfs

Gutter Result Parameters

Width of Spread: 7.9403 ft

Gutter Depression: 0.0000 in

Area of Flow: 0.6305 ft^2

Eo (Gutter Flow to Total Flow): 0.4282

Gutter Depth at Curb: 1.9057 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Grate

Grate Type: P - 1-7/8

Grate Width: 2.0000 ft

Grate Length: 3.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Intercepted Flow: 1.1378 cfs

Bypass Flow: 0.6622 cfs

Approach Velocity: 2.8549 ft/s

Splash-over Velocity: 9.9703 ft/s

Efficiency: 0.6321

Curb and Gutter Analysis: 22_XP 412+21 NDOT Type 5-2G

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0157 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.5000 ft

Width of Spread: 5.6559 ft

Gutter Result Parameters

Design Flow: 0.7000 cfs

Gutter Depression: 0.0000 in

Area of Flow: 0.3199 ft^2

Eo (Gutter Flow to Total Flow): 0.7894

Gutter Depth at Curb: 1.3574 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Grate

Grate Type: P - 1-7/8 - 4

Grate Width: 5.0000 ft

Grate Length: 2.0000 ft

Local Depression: 0.0010 in

Inlet Result Parameters

Intercepted Flow: 0.6981 cfs

Bypass Flow: 0.0019 cfs

Approach Velocity: 2.1883 ft/s

Splash-over Velocity: 4.6910 ft/s

Efficiency: 0.9973

Curb and Gutter Analysis: 24_XP 415+63 NDOT Type 5-2G

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0160 ft/ft

Cross-Slope of Pavement: 0.0100 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.5000 ft

Width of Spread: 11.5671 ft

Gutter Result Parameters

Design Flow: 1.5000 cfs

Gutter Depression: 0.0000 in

Area of Flow: 0.6690 ft^2

Eo (Gutter Flow to Total Flow): 0.4780

Gutter Depth at Curb: 1.3881 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Grate

Grate Type: P - 1-7/8 - 4

Grate Width: 5.0000 ft

Grate Length: 2.0000 ft

Local Depression: 0.0010 in

Inlet Result Parameters

Intercepted Flow: 1.1927 cfs

Bypass Flow: 0.3073 cfs

Approach Velocity: 2.2422 ft/s

Splash-over Velocity: 4.6910 ft/s

Efficiency: 0.7951

Vertical Curve Calculations

CALCULATE GRADES ON VERTICAL CURVE
KYLE CANYON INTERCHANGE
KR3A 3+60

GRADE IN	3.06	%	G1
GRADE OUT	0.98	%	G2
LENGTH	120.00	(ft)	L
BEGIN STATION	370.00		
BEGIN ELEV	490.00		
RATE OF CHANGE	-0.02		r
DI STATION	360.00		
GRADE AT DI	2.89	%	

CALCULATE GRADES ON VERTICAL CURVE
KYLE CANYON INTERCHANGE
KCE1 13+40

GRADE IN	5.97	%	G1
GRADE OUT	2.95	%	G2
LENGTH	130.00	(ft)	L
BEGIN STATION	-1265.00		
BEGIN ELEV	2803.45		
RATE OF CHANGE	-0.02		r
DI STATION	-1340.00		
GRADE AT DI	4.23	%	

CALCULATE GRADES ON VERTICAL CURVE
KYLE CANYON INTERCHANGE
KCW1 19+00

GRADE IN	5.92	%	G1
GRADE OUT	3.60	%	G2
LENGTH	100.00	(ft)	L
BEGIN STATION	-1900.00		
BEGIN ELEV	-2000.00		
RATE OF CHANGE	-0.02		r
DI STATION	-1900.00		
GRADE AT DI	5.92	%	

CALCULATE GRADES ON VERTICAL CURVE
KYLE CANYON INTERCHANGE
KCW1 19+70

GRADE IN	5.92	%	G1
GRADE OUT	3.60	%	G2
LENGTH	100.00	(ft)	L
BEGIN STATION	-1900.00		
BEGIN ELEV	-2000.00		
RATE OF CHANGE	-0.02		r
DI STATION	-1970.00		
GRADE AT DI	4.30	%	

CALCULATE GRADES ON VERTICAL CURVE
KCI
KCW1 29+00

GRADE IN	0.70	%	G1
GRADE OUT	-2.45	%	G2
LENGTH	50.00	(ft)	L
BEGIN STATION	2925.00		
BEGIN ELEV	3075.00		
RATE OF CHANGE	-0.06		r
DI STATION	2925.00		
GRADE AT DI	0.70	%	

SUMP DROP INLET CALCULATIONS

NDOT TYPE 2A DROP INLET FOR 18" RCP

I1 (10-YR)

	WEIR		ORIFICE
Q100 =	2.3	Q100 =	2.3
L =	9.67	CLEAR AREA =	2.87
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	4.6	Q = CA(64.4 H)1/2	6.5

CONTROL = WEIR

Q INT = 4.6

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

NDOT TYPE 2B DROP INLET FOR 18" RCP

95-2B (25-YR)

	WEIR		ORIFICE
Q100 =	3.6	Q100 =	3.6
L =	8.96	CLEAR AREA =	2.31
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	4.3	Q = CA(64.4 H)1/2	5.2

CONTROL = WEIR

Q INT = 4.3

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

TWO (2) - NDOT TYPE 2A DROP INLET FOR 18" RCP

95-8 + 95-7 (25-YR)

	WEIR		ORIFICE
Q100 =	4.2	Q100 =	4.2
L =	9.67	CLEAR AREA =	2.87
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	4.6	Q = CA(64.4 H)1/2	6.5

CONTROL = WEIR

Q INT = 4.6

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

NDOT TYPE 2B DROP INLET FOR 18" RCP

95-12 (25-YR)

	WEIR		ORIFICE
Q100 =	4.5	Q100 =	4.5
L =	12.21	CLEAR AREA =	4.47
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	5.8	Q = CA(64.4 H)1/2	10.1

CONTROL = WEIR

Q INT = 5.8

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

NDOT TYPE 2A DROP INLET FOR 18" RCP

95-17 (25-YR)

	WEIR		ORIFICE
Q100 =	2.5	Q100 =	2.5
L =	9.67	CLEAR AREA =	2.87
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	4.6	Q = CA(64.4 H)1/2	6.5

CONTROL = WEIR

Q INT = 4.6

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

NDOT TYPE 2A DROP INLET FOR 18" RCP

95-19 (25-YR)

	WEIR		ORIFICE
Q100 =	1.3	Q100 =	1.3
L =	9.67	CLEAR AREA =	2.87
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	4.6	Q = CA(64.4 H)1/2	6.5

CONTROL = WEIR

Q INT = 4.6

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

NDOT TYPE 2A DROP INLET FOR 18" RCP

95-20 (25-YR)

	WEIR		ORIFICE
Q100 =	1.1	Q100 =	1.1
L =	9.67	CLEAR AREA =	2.87
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	4.6	Q = CA(64.4 H)1/2	6.5

CONTROL = WEIR

Q INT = 4.6

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

NDOT TYPE 2A DROP INLET FOR 18" RCP

95-22 (25-YR)

	WEIR		ORIFICE
Q100 =	2.2	Q100 =	2.2
L =	9.67	CLEAR AREA =	2.87
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	4.6	Q = CA(64.4 H)1/2	6.5

CONTROL = WEIR

Q INT = 4.6

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

TWO (2) - NDOT TYPE 2B DROP INLET FOR 24" RCP

KR1-2 + KR1-3 (25-YR)

	WEIR		ORIFICE
Q100 =	4.4	Q100 =	4.4
L =	10	CLEAR AREA =	3
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	4.8	Q = CA(64.4 H)1/2	6.8

CONTROL = WEIR

Q INT = 4.8

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

NDOT TYPE 2B DROP INLET FOR 18" RCP

KR1-4 + KCW-6 (25-YR)

	WEIR		ORIFICE
Q100 =	4.2	Q100 =	4.2
L =	8.96	CLEAR AREA =	2.31
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	4.3	Q = CA(64.4 H)1/2	5.2

CONTROL = WEIR

Q INT = 4.3

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

NDOT TYPE 2B DROP INLET FOR 18" RCP

KR2-4 (25-YR)

	WEIR		ORIFICE
Q100 =	3.3	Q100 =	3.3
L =	8.96	CLEAR AREA =	2.31
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	4.3	Q = CA(64.4 H)1/2	5.2

CONTROL = WEIR

Q INT = 4.3

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

NDOT TYPE 2B DROP INLET FOR 18" RCP

KR2-2 + KR2-3 (25-YR)

	WEIR		ORIFICE
Q100 =	2.6	Q100 =	2.6
L =	8.96	CLEAR AREA =	2.31
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	4.3	Q = CA(64.4 H)1/2	5.2

CONTROL = WEIR

Q INT = 4.3

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

NDOT TYPE 2A DROP INLET FOR 18" RCP

KR2-6 (10-YR)

	WEIR		ORIFICE
Q100 =	1.3	Q100 =	1.3
L =	9.67	CLEAR AREA =	2.87
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	4.6	Q = CA(64.4 H)1/2	6.5

CONTROL = WEIR

Q INT = 4.6

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

NDOT TYPE 2B DROP INLET FOR 18" RCP

KR3-1A (25-YR)

	WEIR		ORIFICE
Q100 =	2.9	Q100 =	2.9
L =	8.96	CLEAR AREA =	2.31
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	4.3	Q = CA(64.4 H)1/2	5.2

CONTROL = WEIR

Q INT = 4.3

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

NDOT TYPE 2A DROP INLET FOR 18" RCP

KR3-2 (25-YR)

	WEIR		ORIFICE
Q100 =	3.1	Q100 =	3.1
L =	9.67	CLEAR AREA =	2.87
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	4.6	Q = CA(64.4 H)1/2	6.5

CONTROL = WEIR

Q INT = 4.6

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

NDOT TYPE 2B DROP INLET FOR 18" RCP

KR4-1 + KR4-2 (25-YR)

	WEIR		ORIFICE
Q100 =	3.4	Q100 =	3.4
L =	8.96	CLEAR AREA =	2.31
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.5	ASSUME H1 =	0.5
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	4.3	Q = CA(64.4 H)1/2	5.2

CONTROL = WEIR

Q INT = 4.3

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

NDOT TYPE 2B DROP INLET FOR 24" RCP

KR4-3 + KR4-4 (25-YR)

	WEIR		ORIFICE
Q100 =	7.5	Q100 =	7.5
L =	10	CLEAR AREA =	3
		C =	0.65
CLOGGING FACTOR	50%	CLOGGING FACTOR	50%
ASSUME H1 =	0.69	ASSUME H1 =	0.69
C (FOR H1) =	2.7		
$Q_F = CL(H)^{3/2}$	7.7	Q = CA(64.4 H)1/2	7.6

CONTROL = ORIFICE

Q INT = 7.6

Note: H1 is measured from the top of the grate. Orifice calculations accounts for the 3-inch thickness of the grate

DITCH CALCULATIONS

25-YEAR ONSITE DITCH/BERM CHARACTERISTICS										
Ditch/Berm	Min Slope (%)	Q_{25} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch I4	2.19	5.3	0.72	3.45	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	I4 + 95-3 + 95-4B
Ditch I5 East	3.4	3.4	0.56	3.64	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	I5
Ditch I5 South	2.5	5.2	0.69	3.61	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	95-13
Ditch 95-6	1.05	4.4	0.68	2.35	0	V-DITCH / Berm	5:1/3:1	Decorative Rock	2.00	95-6
Ditch 95-7	2.23	5.8	0.66	3.34	0	V-DITCH / Berm	5:1/3:1	Decorative Rock	2.00	95-7
Ditch 95-8	0.6	8.3	0.83	2.03	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	2.00	95-7 + 95-8
Ditch 95-15A	1.85	2.3	0.54	2.63	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	95-15A
Ditch 95-16	0.32	2.8	0.72	1.34	0	V-DITCH / Berm	5:1/3:1	Decorative Rock	2.00	95-16
Ditch 95-17	0.2	2.5	0.57	0.92	0	V-DITCH / Berm	10:1/7:1	Decorative Rock	2.00	95-17
Ditch 95-19	1.3	1.3	0.55	2.14	0	V-DITCH / Berm	2:1/2:1	Decorative Rock	1.50	95-19
Ditch 95-20	1.2	1.1	0.52	2.00	0	V-DITCH / Berm	2:1/2:1	Decorative Rock	2.00	95-20
Ditch KR1-2	1.8	2.0	0.39	2.14	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR1-2
Ditch KR1-3	1.9	8.8	0.68	3.17	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	2.00	KR1-2 + KR1-3
Ditch KR1-4	2.0	3.4	0.47	2.55	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR1-4
Ditch KR2-2	4.4	2.2	0.35	3.07	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR2-2
Ditch KR2-3	3.5	0.4	0.19	1.84	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR2-3
Ditch KR2-4	5.0	3.3	0.39	3.57	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR2-4
Ditch KR3-1A	4.6	2.9	0.38	3.35	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR3-1A
Ditch KR3-2	4.0	3.1	0.40	3.23	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR3-2
Ditch KR4-1	4.1	1.7	0.32	2.80	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-1
Ditch KR4-2	2.6	1.7	0.35	2.36	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-2
Ditch KR4-3	2.0	5.2	0.55	2.83	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	2.00	KR4-3
Ditch KR4-4	8.5	0.9	0.22	3.14	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-4
Ditch KR4-5	1.9	3.2	0.47	2.46	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-5
Ditch 95-9	1.4	6.7	0.60	2.51	0	V-DITCH / Berm	10:1/5:1	Decorative Rock	2.00	95-9

Worksheet for Ditch KR1-2 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.80	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	2.00	ft^3/s

Results

Normal Depth	0.39	ft
Flow Area	0.93	ft^2
Wetted Perimeter	4.84	ft
Hydraulic Radius	0.19	ft
Top Width	4.73	ft
Critical Depth	0.37	ft
Critical Slope	0.02537	ft/ft
Velocity	2.14	ft/s
Velocity Head	0.07	ft
Specific Energy	0.47	ft
Froude Number	0.85	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.39	ft
Critical Depth	0.37	ft
Channel Slope	1.80	%
Critical Slope	0.02537	ft/ft

Cross Section for Ditch KR1-2 (25yr)

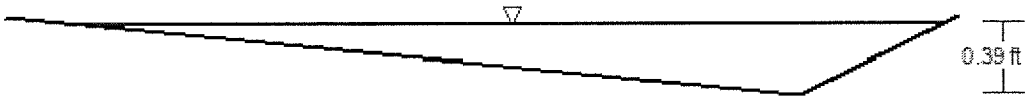
Project Description

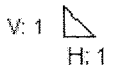
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.80	%
Normal Depth	0.39	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	2.00	ft^3/s

Cross Section Image





Worksheet for Ditch KR1-3 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.90	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	8.80	ft^3/s

Results

Normal Depth	0.68	ft
Flow Area	2.78	ft^2
Wetted Perimeter	8.36	ft
Hydraulic Radius	0.33	ft
Top Width	8.16	ft
Critical Depth	0.67	ft
Critical Slope	0.02082	ft/ft
Velocity	3.17	ft/s
Velocity Head	0.16	ft
Specific Energy	0.84	ft
Froude Number	0.96	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.68	ft
Critical Depth	0.67	ft
Channel Slope	1.90	%
Critical Slope	0.02082	ft/ft

Cross Section for Ditch KR1-3 (25yr)

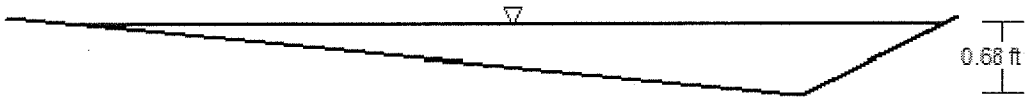
Project Description

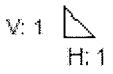
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.90	%
Normal Depth	0.68	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	8.80	ft³/s

Cross Section Image





Worksheet for Ditch KR1-4 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	2.00	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	3.40	ft^3/s

Results

Normal Depth	0.47	ft
Flow Area	1.33	ft^2
Wetted Perimeter	5.79	ft
Hydraulic Radius	0.23	ft
Top Width	5.66	ft
Critical Depth	0.46	ft
Critical Slope	0.02363	ft/ft
Velocity	2.55	ft/s
Velocity Head	0.10	ft
Specific Energy	0.57	ft
Froude Number	0.92	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.47	ft
Critical Depth	0.46	ft
Channel Slope	2.00	%
Critical Slope	0.02363	ft/ft

Cross Section for Ditch KR1-4 (25yr)

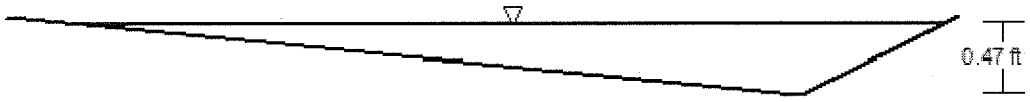
Project Description

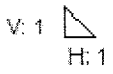
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	2.00	%
Normal Depth	0.47	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	3.40	ft³/s

Cross Section Image





Worksheet for Ditch KR2-2 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	4.40	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	2.20	ft^3/s

Results

Normal Depth	0.35	ft
Flow Area	0.72	ft^2
Wetted Perimeter	4.25	ft
Hydraulic Radius	0.17	ft
Top Width	4.15	ft
Critical Depth	0.38	ft
Critical Slope	0.02505	ft/ft
Velocity	3.07	ft/s
Velocity Head	0.15	ft
Specific Energy	0.49	ft
Froude Number	1.30	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.35	ft
Critical Depth	0.38	ft
Channel Slope	4.40	%
Critical Slope	0.02505	ft/ft

Cross Section for Ditch KR2-2 (25yr)

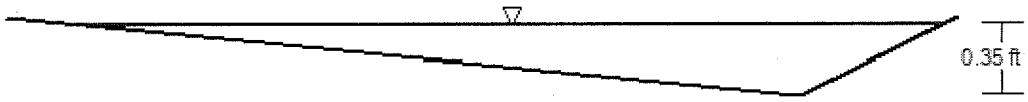
Project Description

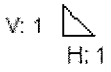
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	4.40	%
Normal Depth	0.35	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	2.20	ft³/s

Cross Section Image





Worksheet for Ditch KR2-3 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	3.50	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	0.40	ft^3/s

Results

Normal Depth	0.19	ft
Flow Area	0.22	ft^2
Wetted Perimeter	2.34	ft
Hydraulic Radius	0.09	ft
Top Width	2.28	ft
Critical Depth	0.19	ft
Critical Slope	0.03145	ft/ft
Velocity	1.84	ft/s
Velocity Head	0.05	ft
Specific Energy	0.24	ft
Froude Number	1.05	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.19	ft
Critical Depth	0.19	ft
Channel Slope	3.50	%
Critical Slope	0.03145	ft/ft

Cross Section for Ditch KR2-3 (25yr)

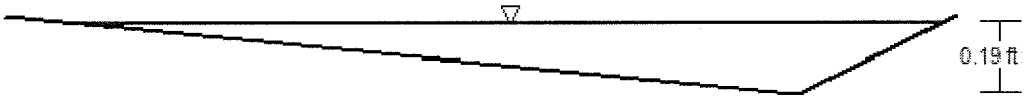
Project Description

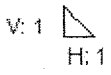
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	3.50	%
Normal Depth	0.19	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	0.40	ft^3/s

Cross Section Image





Worksheet for Ditch KR2-4 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	5.00	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	3.30	ft^3/s

Results

Normal Depth	0.39	ft
Flow Area	0.93	ft^2
Wetted Perimeter	4.83	ft
Hydraulic Radius	0.19	ft
Top Width	4.71	ft
Critical Depth	0.45	ft
Critical Slope	0.02373	ft/ft
Velocity	3.57	ft/s
Velocity Head	0.20	ft
Specific Energy	0.59	ft
Froude Number	1.42	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.39	ft
Critical Depth	0.45	ft
Channel Slope	5.00	%
Critical Slope	0.02373	ft/ft

Cross Section for Ditch KR2-4 (25yr)

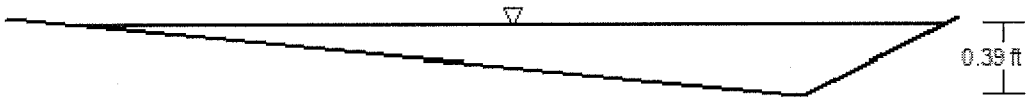
Project Description

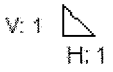
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	5.00	%
Normal Depth	0.39	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	3.30	ft³/s

Cross Section Image





Worksheet for Ditch KR3-1A (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	4.60	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	2.90	ft^3/s

Results

Normal Depth	0.38	ft
Flow Area	0.87	ft^2
Wetted Perimeter	4.67	ft
Hydraulic Radius	0.19	ft
Top Width	4.56	ft
Critical Depth	0.43	ft
Critical Slope	0.02414	ft/ft
Velocity	3.35	ft/s
Velocity Head	0.17	ft
Specific Energy	0.55	ft
Froude Number	1.35	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.38	ft
Critical Depth	0.43	ft
Channel Slope	4.60	%
Critical Slope	0.02414	ft/ft

Cross Section for Ditch KR3-1A (25yr)

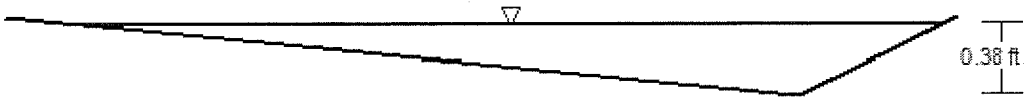
Project Description

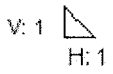
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	4.60	%
Normal Depth	0.38	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	2.90	ft³/s

Cross Section Image





Worksheet for Ditch KR3-2 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	4.00	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	3.10	ft^3/s

Results

Normal Depth	0.40	ft
Flow Area	0.96	ft^2
Wetted Perimeter	4.91	ft
Hydraulic Radius	0.20	ft
Top Width	4.80	ft
Critical Depth	0.44	ft
Critical Slope	0.02393	ft/ft
Velocity	3.23	ft/s
Velocity Head	0.16	ft
Specific Energy	0.56	ft
Froude Number	1.27	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.40	ft
Critical Depth	0.44	ft
Channel Slope	4.00	%
Critical Slope	0.02393	ft/ft

Cross Section for Ditch KR3-2 (25yr)

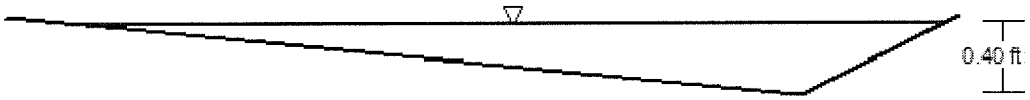
Project Description

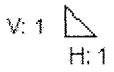
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	4.00	%
Normal Depth	0.40	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	3.10	ft^3/s

Cross Section Image





Worksheet for Ditch KR4-1 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	4.10	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	1.70	ft^3/s

Results

Normal Depth	0.32	ft
Flow Area	0.61	ft^2
Wetted Perimeter	3.91	ft
Hydraulic Radius	0.16	ft
Top Width	3.81	ft
Critical Depth	0.35	ft
Critical Slope	0.02592	ft/ft
Velocity	2.80	ft/s
Velocity Head	0.12	ft
Specific Energy	0.44	ft
Froude Number	1.24	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.32	ft
Critical Depth	0.35	ft
Channel Slope	4.10	%
Critical Slope	0.02592	ft/ft

Cross Section for Ditch KR4-1 (25yr)

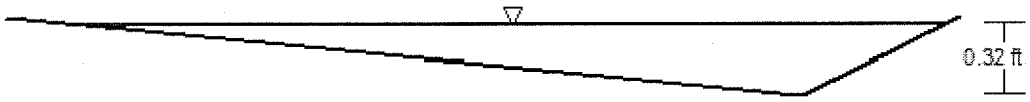
Project Description

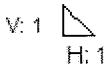
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	4.10	%
Normal Depth	0.32	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	1.70	ft^3/s

Cross Section Image





Worksheet for Ditch KR4-2 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	2.60	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	1.70	ft^3/s

Results

Normal Depth	0.35	ft
Flow Area	0.72	ft^2
Wetted Perimeter	4.25	ft
Hydraulic Radius	0.17	ft
Top Width	4.16	ft
Critical Depth	0.35	ft
Critical Slope	0.02600	ft/ft
Velocity	2.36	ft/s
Velocity Head	0.09	ft
Specific Energy	0.43	ft
Froude Number	1.00	
Flow Type	Critical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.35	ft
Critical Depth	0.35	ft
Channel Slope	2.60	%
Critical Slope	0.02600	ft/ft

Cross Section for Ditch KR4-2 (25yr)

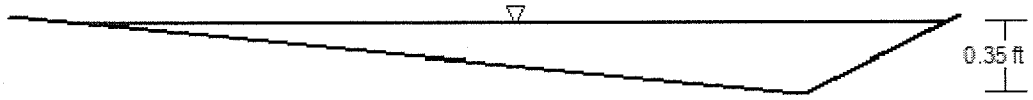
Project Description

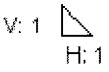
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	2.60	%
Normal Depth	0.35	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	1.70	ft³/s

Cross Section Image





Worksheet for Ditch KR4-3 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	2.00	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	5.20	ft^3/s

Results

Normal Depth	0.55	ft
Flow Area	1.83	ft^2
Wetted Perimeter	6.79	ft
Hydraulic Radius	0.27	ft
Top Width	6.64	ft
Critical Depth	0.54	ft
Critical Slope	0.02233	ft/ft
Velocity	2.83	ft/s
Velocity Head	0.12	ft
Specific Energy	0.68	ft
Froude Number	0.95	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.55	ft
Critical Depth	0.54	ft
Channel Slope	2.00	%
Critical Slope	0.02233	ft/ft

Cross Section for Ditch KR4-3 (25yr)

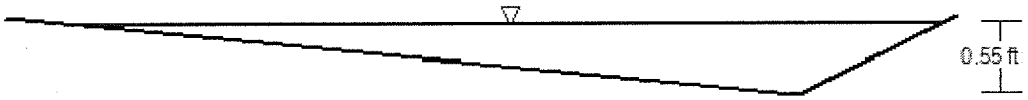
Project Description

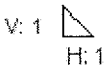
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	2.00	%
Normal Depth	0.55	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	5.20	ft³/s

Cross Section Image





Worksheet for Ditch KR4-4 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	8.50	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	0.90	ft^3/s

Results

Normal Depth	0.22	ft
Flow Area	0.29	ft^2
Wetted Perimeter	2.68	ft
Hydraulic Radius	0.11	ft
Top Width	2.62	ft
Critical Depth	0.27	ft
Critical Slope	0.02822	ft/ft
Velocity	3.14	ft/s
Velocity Head	0.15	ft
Specific Energy	0.37	ft
Froude Number	1.68	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.22	ft
Critical Depth	0.27	ft
Channel Slope	8.50	%
Critical Slope	0.02822	ft/ft

Cross Section for Ditch KR4-4 (25yr)

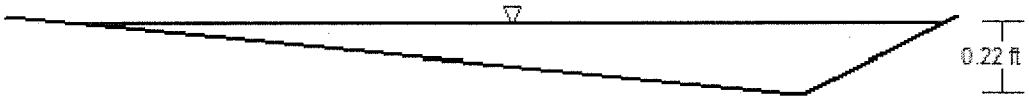
Project Description

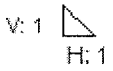
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	8.50	%
Normal Depth	0.22	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	0.90	ft³/s

Cross Section Image





Worksheet for Ditch KR4-5 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.90	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	3.20	ft^3/s

Results

Normal Depth	0.47	ft
Flow Area	1.30	ft^2
Wetted Perimeter	5.72	ft
Hydraulic Radius	0.23	ft
Top Width	5.59	ft
Critical Depth	0.45	ft
Critical Slope	0.02383	ft/ft
Velocity	2.46	ft/s
Velocity Head	0.09	ft
Specific Energy	0.56	ft
Froude Number	0.90	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.47	ft
Critical Depth	0.45	ft
Channel Slope	1.90	%
Critical Slope	0.02383	ft/ft

Cross Section for Ditch KR4-5 (25yr)

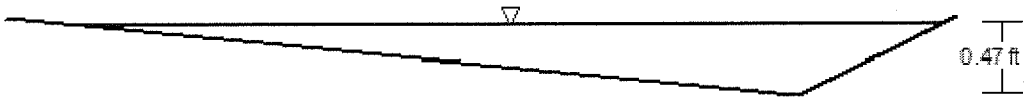
Project Description

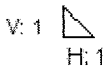
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.90	%
Normal Depth	0.47	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	3.20	ft³/s

Cross Section Image





Worksheet for Ditch 95-9 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.40	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Discharge	6.70	ft^3/s

Results

Normal Depth	0.60	ft
Flow Area	2.67	ft^2
Wetted Perimeter	9.03	ft
Hydraulic Radius	0.30	ft
Top Width	8.95	ft
Critical Depth	0.55	ft
Critical Slope	0.02184	ft/ft
Velocity	2.51	ft/s
Velocity Head	0.10	ft
Specific Energy	0.69	ft
Froude Number	0.81	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.60	ft
Critical Depth	0.55	ft
Channel Slope	1.40	%
Critical Slope	0.02184	ft/ft

Cross Section for Ditch 95-9 (25yr)

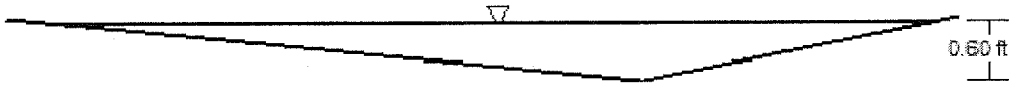
Project Description

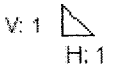
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.40	%
Normal Depth	0.60	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Discharge	6.70	ft³/s

Cross Section Image





Worksheet for Ditch I4 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	2.19	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	5.30	ft^3/s

Results

Normal Depth	0.72	ft
Flow Area	1.54	ft^2
Wetted Perimeter	4.53	ft
Hydraulic Radius	0.34	ft
Top Width	4.29	ft
Critical Depth	0.72	ft
Critical Slope	0.02111	ft/ft
Velocity	3.45	ft/s
Velocity Head	0.19	ft
Specific Energy	0.90	ft
Froude Number	1.02	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.72	ft
Critical Depth	0.72	ft
Channel Slope	2.19	%
Critical Slope	0.02111	ft/ft

Cross Section for Ditch I4 (25yr)

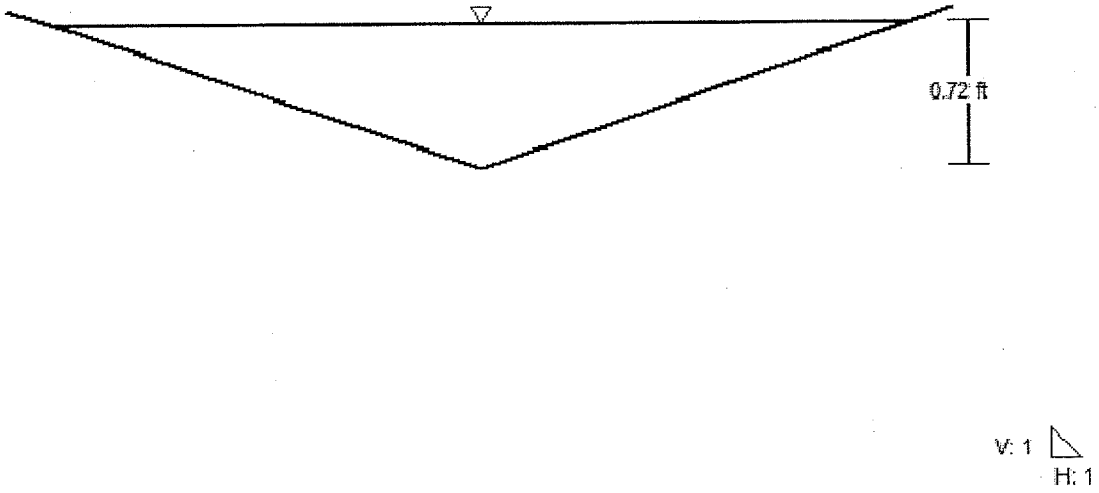
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	2.19	%
Normal Depth	0.72	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	5.30	ft³/s

Cross Section Image



Worksheet for Ditch I5 East (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	3.40	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	3.40	ft^3/s

Results

Normal Depth	0.56	ft
Flow Area	0.93	ft^2
Wetted Perimeter	3.53	ft
Hydraulic Radius	0.26	ft
Top Width	3.35	ft
Critical Depth	0.60	ft
Critical Slope	0.02240	ft/ft
Velocity	3.64	ft/s
Velocity Head	0.21	ft
Specific Energy	0.76	ft
Froude Number	1.22	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.56	ft
Critical Depth	0.60	ft
Channel Slope	3.40	%
Critical Slope	0.02240	ft/ft

Cross Section for Ditch I5 East (25yr)

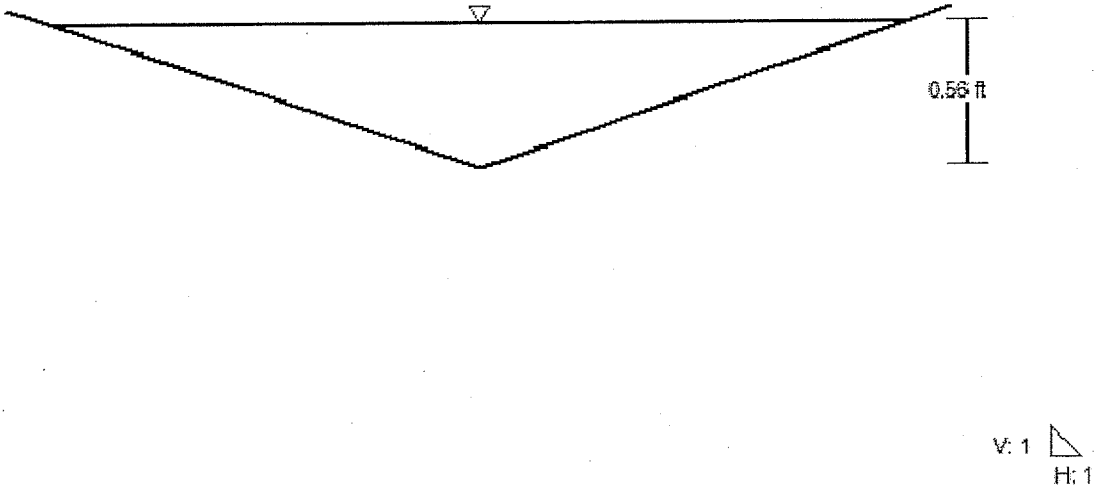
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	3.40	%
Normal Depth	0.56	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	3.40	ft³/s

Cross Section Image



Worksheet for Ditch I5 South (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	2.50	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	5.20	ft^3/s

Results

Normal Depth	0.69	ft
Flow Area	1.44	ft^2
Wetted Perimeter	4.38	ft
Hydraulic Radius	0.33	ft
Top Width	4.16	ft
Critical Depth	0.71	ft
Critical Slope	0.02117	ft/ft
Velocity	3.61	ft/s
Velocity Head	0.20	ft
Specific Energy	0.90	ft
Froude Number	1.08	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.69	ft
Critical Depth	0.71	ft
Channel Slope	2.50	%
Critical Slope	0.02117	ft/ft

Cross Section for Ditch I5 South (25yr)

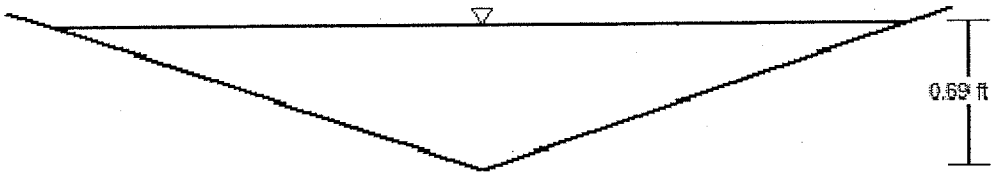
Project Description

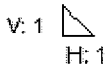
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	2.50	%
Normal Depth	0.69	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	5.20	ft^3/s

Cross Section Image





Worksheet for Ditch 95-6 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.05	%
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	4.40	ft^3/s

Results

Normal Depth	0.68	ft
Flow Area	1.87	ft^2
Wetted Perimeter	5.65	ft
Hydraulic Radius	0.33	ft
Top Width	5.47	ft
Critical Depth	0.60	ft
Critical Slope	0.02188	ft/ft
Velocity	2.35	ft/s
Velocity Head	0.09	ft
Specific Energy	0.77	ft
Froude Number	0.71	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.68	ft
Critical Depth	0.60	ft
Channel Slope	1.05	%
Critical Slope	0.02188	ft/ft

Cross Section for Ditch 95-6 (25yr)

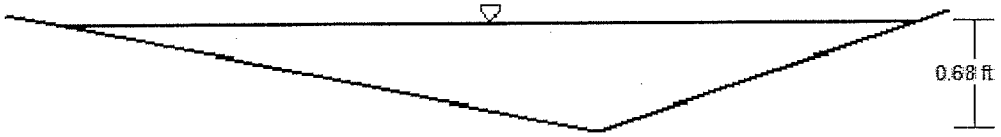
Project Description

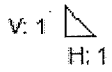
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.05	%
Normal Depth	0.68	ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	4.40	ft^3/s

Cross Section Image





Worksheet for Ditch 95-7 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	2.23	%
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	5.80	ft^3/s

Results

Normal Depth	0.66	ft
Flow Area	1.74	ft^2
Wetted Perimeter	5.44	ft
Hydraulic Radius	0.32	ft
Top Width	5.27	ft
Critical Depth	0.67	ft
Critical Slope	0.02109	ft/ft
Velocity	3.34	ft/s
Velocity Head	0.17	ft
Specific Energy	0.83	ft
Froude Number	1.03	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.66	ft
Critical Depth	0.67	ft
Channel Slope	2.23	%
Critical Slope	0.02109	ft/ft

Cross Section for Ditch 95-7 (25yr)

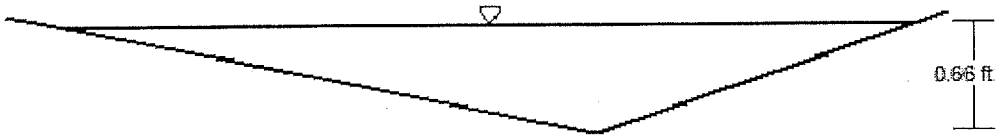
Project Description

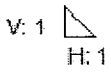
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	2.23	%
Normal Depth	0.66	ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	5.80	ft³/s

Cross Section Image





Worksheet for Ditch 95-8 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	0.60	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	8.30	ft^3/s

Results

Normal Depth	0.83	ft
Flow Area	4.09	ft^2
Wetted Perimeter	10.15	ft
Hydraulic Radius	0.40	ft
Top Width	9.91	ft
Critical Depth	0.65	ft
Critical Slope	0.02098	ft/ft
Velocity	2.03	ft/s
Velocity Head	0.06	ft
Specific Energy	0.89	ft
Froude Number	0.56	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.83	ft
Critical Depth	0.65	ft
Channel Slope	0.60	%
Critical Slope	0.02098	ft/ft

Cross Section for Ditch 95-8 (25yr)

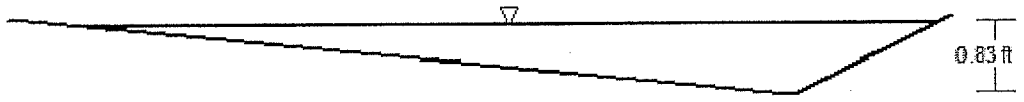
Project Description

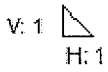
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	0.60	%
Normal Depth	0.83	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	8.30	ft³/s

Cross Section Image





Worksheet for Ditch 95-15A (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.85	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	2.30	ft^3/s

Results

Normal Depth	0.54	ft
Flow Area	0.87	ft^2
Wetted Perimeter	3.42	ft
Hydraulic Radius	0.26	ft
Top Width	3.24	ft
Critical Depth	0.52	ft
Critical Slope	0.02360	ft/ft
Velocity	2.63	ft/s
Velocity Head	0.11	ft
Specific Energy	0.65	ft
Froude Number	0.89	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.54	ft
Critical Depth	0.52	ft
Channel Slope	1.85	%
Critical Slope	0.02360	ft/ft

Cross Section for Ditch 95-15A (25yr)

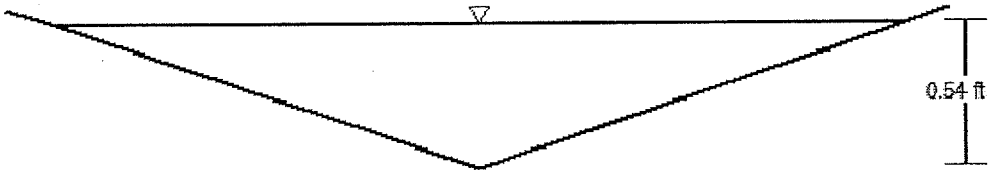
Project Description

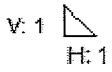
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.85	%
Normal Depth	0.54	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	2.30	ft³/s

Cross Section Image





Worksheet for Ditch 95-16 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	0.32	%
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	2.80	ft^3/s

Results

Normal Depth	0.72	ft
Flow Area	2.08	ft^2
Wetted Perimeter	5.96	ft
Hydraulic Radius	0.35	ft
Top Width	5.77	ft
Critical Depth	0.50	ft
Critical Slope	0.02324	ft/ft
Velocity	1.34	ft/s
Velocity Head	0.03	ft
Specific Energy	0.75	ft
Froude Number	0.39	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.72	ft
Critical Depth	0.50	ft
Channel Slope	0.32	%
Critical Slope	0.02324	ft/ft

Cross Section for Ditch 95-16 (25yr)

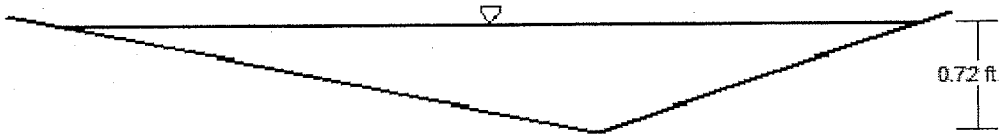
Project Description

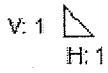
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	0.32	%
Normal Depth	0.72	ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	2.80	ft³/s

Cross Section Image





Worksheet for Ditch 95-17 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	0.20	%
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	7.00	ft/ft (H:V)
Discharge	2.50	ft^3/s

Results

Normal Depth	0.57	ft
Flow Area	2.72	ft^2
Wetted Perimeter	9.68	ft
Hydraulic Radius	0.28	ft
Top Width	9.62	ft
Critical Depth	0.35	ft
Critical Slope	0.02523	ft/ft
Velocity	0.92	ft/s
Velocity Head	0.01	ft
Specific Energy	0.58	ft
Froude Number	0.30	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.57	ft
Critical Depth	0.35	ft
Channel Slope	0.20	%
Critical Slope	0.02523	ft/ft

Cross Section for Ditch 95-17 (25yr)

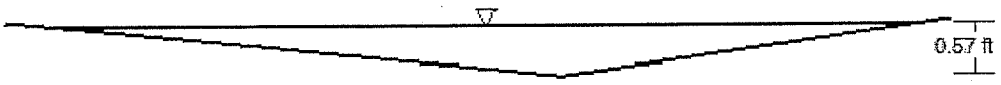
Project Description

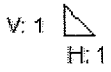
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	0.20	%
Normal Depth	0.57	ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	7.00	ft/ft (H:V)
Discharge	2.50	ft³/s

Cross Section Image





Worksheet for Ditch 95-19 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.30	%
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	1.30	ft^3/s

Results

Normal Depth	0.55	ft
Flow Area	0.61	ft^2
Wetted Perimeter	2.46	ft
Hydraulic Radius	0.25	ft
Top Width	2.20	ft
Critical Depth	0.48	ft
Critical Slope	0.02610	ft/ft
Velocity	2.14	ft/s
Velocity Head	0.07	ft
Specific Energy	0.62	ft
Froude Number	0.72	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.55	ft
Critical Depth	0.48	ft
Channel Slope	1.30	%
Critical Slope	0.02610	ft/ft

Cross Section for Ditch 95-19 (25yr)

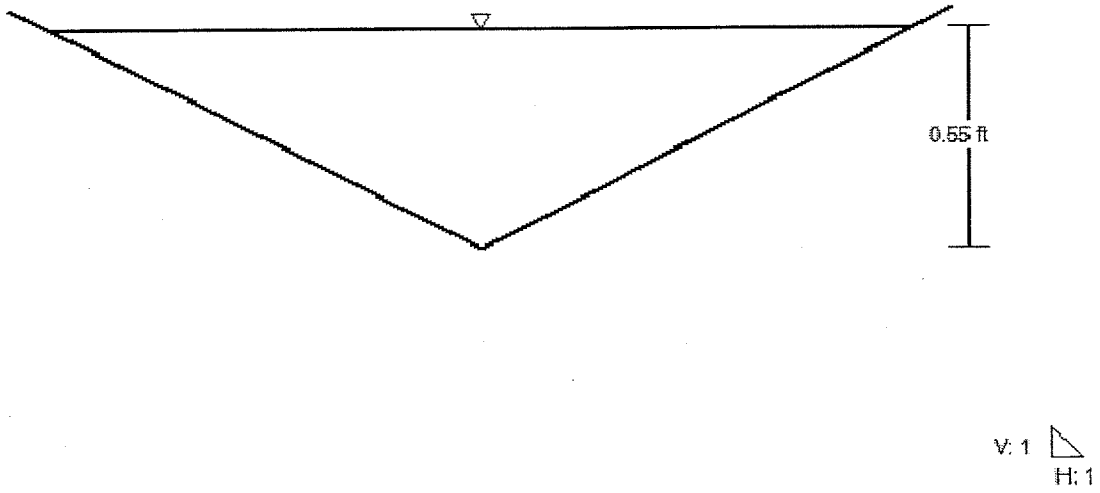
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.30	%
Normal Depth	0.55	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	1.30	ft³/s

Cross Section Image



Worksheet for Ditch 95-20 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.20	%
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	1.10	ft^3/s

Results

Normal Depth	0.52	ft
Flow Area	0.55	ft^2
Wetted Perimeter	2.35	ft
Hydraulic Radius	0.23	ft
Top Width	2.10	ft
Critical Depth	0.45	ft
Critical Slope	0.02668	ft/ft
Velocity	2.00	ft/s
Velocity Head	0.06	ft
Specific Energy	0.59	ft
Froude Number	0.69	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.52	ft
Critical Depth	0.45	ft
Channel Slope	1.20	%
Critical Slope	0.02668	ft/ft

Cross Section for Ditch 95-20 (25yr)

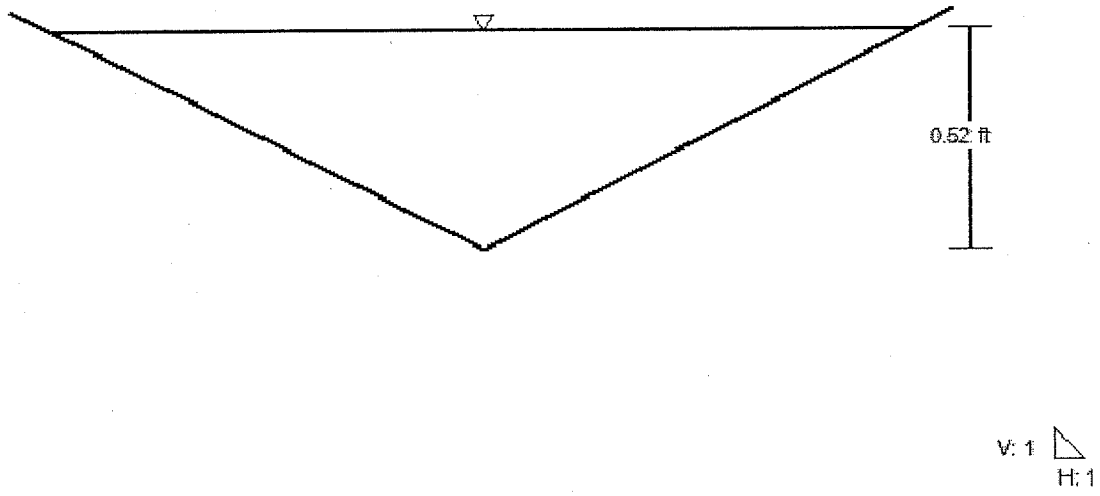
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.20	%
Normal Depth	0.52	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	1.10	ft^3/s

Cross Section Image



Worksheet for Ditch 95-22 (25yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.70	%
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	2.20	ft^3/s

Results

Normal Depth	0.64	ft
Flow Area	0.81	ft^2
Wetted Perimeter	2.85	ft
Hydraulic Radius	0.29	ft
Top Width	2.55	ft
Critical Depth	0.60	ft
Critical Slope	0.02433	ft/ft
Velocity	2.71	ft/s
Velocity Head	0.11	ft
Specific Energy	0.75	ft
Froude Number	0.85	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.64	ft
Critical Depth	0.60	ft
Channel Slope	1.70	%
Critical Slope	0.02433	ft/ft

Cross Section for Ditch 95-22 (25yr)

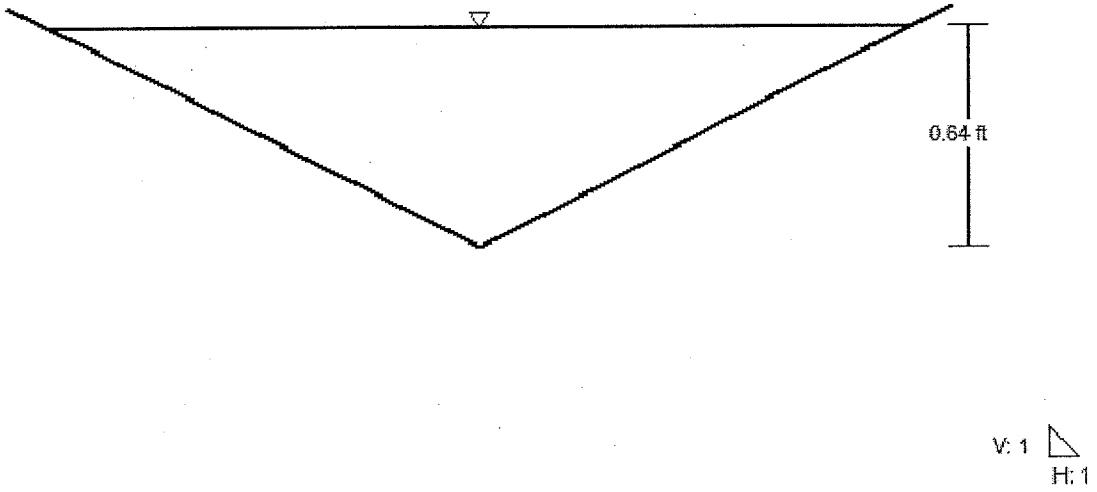
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.70	%
Normal Depth	0.64	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	2.20	ft^3/s

Cross Section Image



50-YEAR OFFSITE DITCH/BERM CHARACTERISTICS										
Ditch/Berm	Min Slope (%)	Q_{50} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch I2 East	1.56	4.8	0.73	2.96	0	V / Berm	3:1/3:1	Decorative Rock	2.00	I2
Ditch I2 South	3.18	2.4	0.50	3.25	0	V / Berm	3:1/3:1	Decorative Rock	1.50	1/2 I2
CP7	2	168	1.48	5.86	15	V / Berm	3:1/3:1	Class 150	2.50	1/2 CP7
95-5P1	2.2	5	0.65	4.00	0	V / Berm	3:1/3:1	Earth	2.00	95-5P1
95-5P2	3	8	0.87	3.56	0	V / Berm	3:1/3:1	Class 150	2.00	95-5P2
OFF8P1	3	15	1.10	4.16	0	V / Berm	3:1/3:1	Class 150	2.00	OFF8P1

Worksheet for Ditch I2 East (50yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.56	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	4.80	ft^3/s

Results

Normal Depth	0.73	ft
Flow Area	1.62	ft^2
Wetted Perimeter	4.65	ft
Hydraulic Radius	0.35	ft
Top Width	4.41	ft
Critical Depth	0.69	ft
Critical Slope	0.02139	ft/ft
Velocity	2.96	ft/s
Velocity Head	0.14	ft
Specific Energy	0.87	ft
Froude Number	0.86	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.73	ft
Critical Depth	0.69	ft
Channel Slope	1.56	%
Critical Slope	0.02139	ft/ft

Cross Section for Ditch I2 East (50yr)

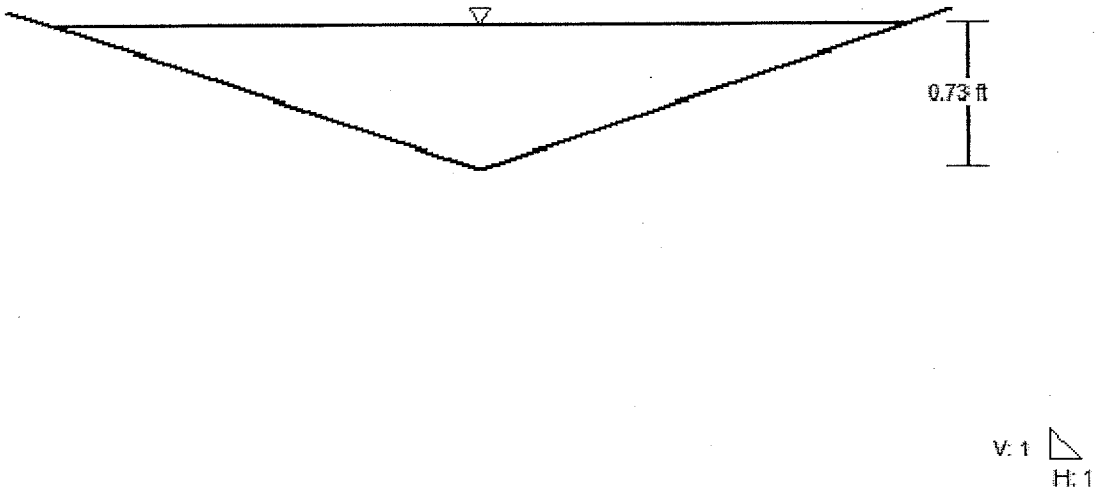
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	1.56	%
Normal Depth	0.73	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	4.80	ft³/s

Cross Section Image



Worksheet for Ditch I2 South (50yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	3.18	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	2.40	ft^3/s

Results

Normal Depth	0.50	ft
Flow Area	0.74	ft^2
Wetted Perimeter	3.14	ft
Hydraulic Radius	0.24	ft
Top Width	2.97	ft
Critical Depth	0.52	ft
Critical Slope	0.02347	ft/ft
Velocity	3.25	ft/s
Velocity Head	0.16	ft
Specific Energy	0.66	ft
Froude Number	1.15	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.52	ft
Channel Slope	3.18	%
Critical Slope	0.02347	ft/ft

Cross Section for Ditch I2 South (50yr)

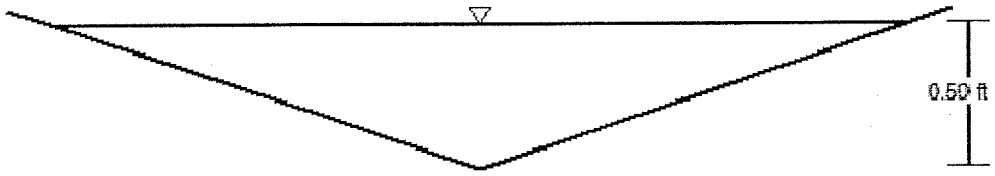
Project Description

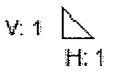
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.031	
Channel Slope	3.18	%
Normal Depth	0.50	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	2.40	ft³/s

Cross Section Image





Worksheet for 1/2 CP7 (50yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040	
Channel Slope	2.00	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	15.00	ft
Discharge	168.00	ft^3/s

Results

Normal Depth	1.48	ft
Flow Area	28.67	ft^2
Wetted Perimeter	24.33	ft
Hydraulic Radius	1.18	ft
Top Width	23.85	ft
Critical Depth	1.42	ft
Critical Slope	0.02274	ft/ft
Velocity	5.86	ft/s
Velocity Head	0.53	ft
Specific Energy	2.01	ft
Froude Number	0.94	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.48	ft
Critical Depth	1.42	ft
Channel Slope	2.00	%

Worksheet for 1/2 CP7 (50yr)

GVF Output Data

Critical Slope	0.02274	ft/ft

Cross Section for 1/2 CP7 (50yr)

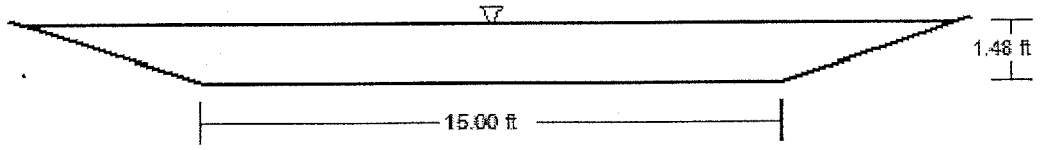
Project Description

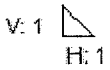
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040	
Channel Slope	2.00	%
Normal Depth	1.48	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	15.00	ft
Discharge	168.00	ft³/s

Cross Section Image





Worksheet for 95-5P1 (50yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	2.20	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	5.00	ft^3/s

Results

Normal Depth	0.65	ft
Flow Area	1.25	ft^2
Wetted Perimeter	4.08	ft
Hydraulic Radius	0.31	ft
Top Width	3.87	ft
Critical Depth	0.70	ft
Critical Slope	0.01384	ft/ft
Velocity	4.00	ft/s
Velocity Head	0.25	ft
Specific Energy	0.89	ft
Froude Number	1.24	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.65	ft
Critical Depth	0.70	ft
Channel Slope	2.20	%
Critical Slope	0.01384	ft/ft

Cross Section for 95-5P1 (50yr)

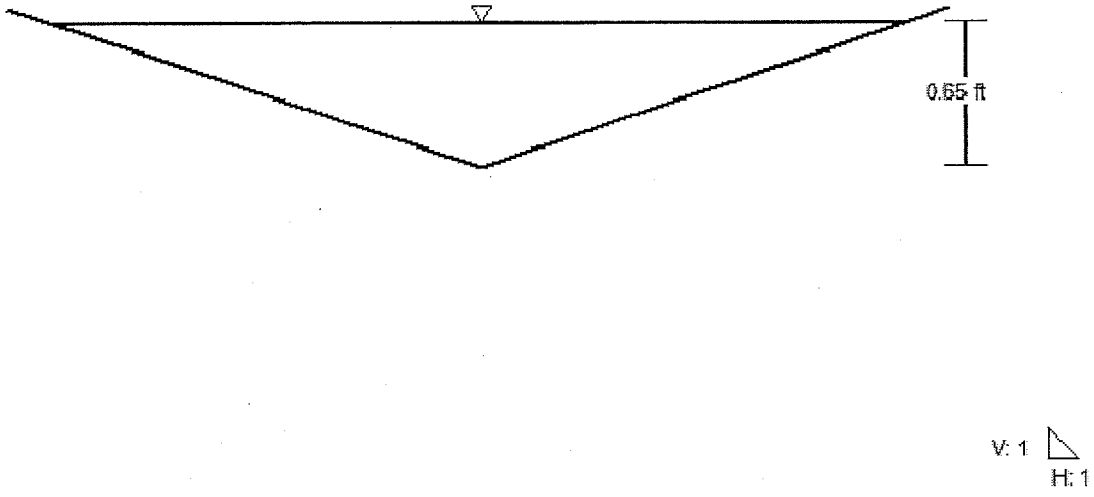
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	2.20	%
Normal Depth	0.65	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	5.00	ft³/s

Cross Section Image



Worksheet for 95-5P2 (50yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040	
Channel Slope	3.00	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	8.00	ft^3/s

Results

Normal Depth	0.87	ft
Flow Area	2.25	ft^2
Wetted Perimeter	5.48	ft
Hydraulic Radius	0.41	ft
Top Width	5.20	ft
Critical Depth	0.85	ft
Critical Slope	0.03328	ft/ft
Velocity	3.56	ft/s
Velocity Head	0.20	ft
Specific Energy	1.06	ft
Froude Number	0.95	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.87	ft
Critical Depth	0.85	ft
Channel Slope	3.00	%
Critical Slope	0.03328	ft/ft

Cross Section for 95-5P2 (50yr)

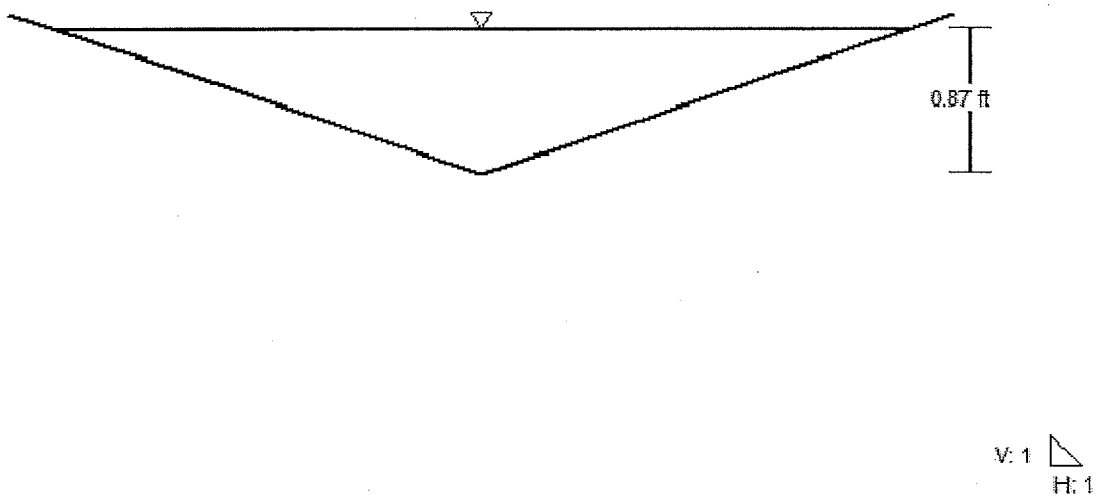
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040	
Channel Slope	3.00	%
Normal Depth	0.87	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	8.00	ft³/s

Cross Section Image



Worksheet for OFF8P1 (50yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040	
Channel Slope	3.00	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	15.00	ft^3/s

Results

Normal Depth	1.10	ft
Flow Area	3.61	ft^2
Wetted Perimeter	6.93	ft
Hydraulic Radius	0.52	ft
Top Width	6.58	ft
Critical Depth	1.09	ft
Critical Slope	0.03060	ft/ft
Velocity	4.16	ft/s
Velocity Head	0.27	ft
Specific Energy	1.37	ft
Froude Number	0.99	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.10	ft
Critical Depth	1.09	ft
Channel Slope	3.00	%
Critical Slope	0.03060	ft/ft

Cross Section for OFF8P1 (50yr)

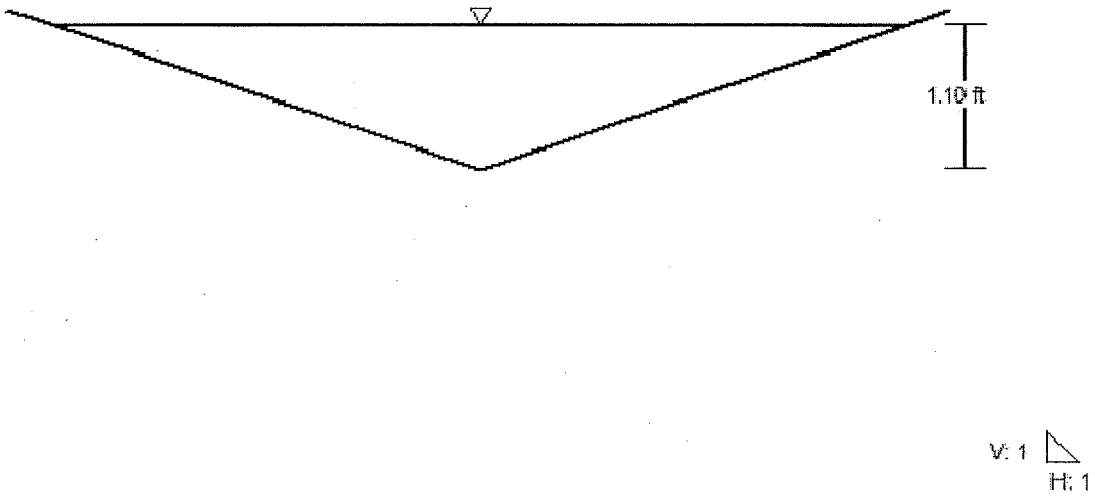
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040	
Channel Slope	3.00	%
Normal Depth	1.10	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	15.00	ft^3/s

Cross Section Image



100-YEAR OFFSITE DITCH/BERM CHARACTERISTICS										
Ditch/Berm	Min Slope (%)	Q_{100} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch DHD02C	1.70	131	3.25	6.21	0	V-DITCH / Berm	2:1/2:1	Class 150	4.50	Culvert HD02BWS
Ditch DHD02B	1.70	172	2.00	4.79	0	V-DITCH / Berm	16:1/2:1	Class 300	3.00	Split South DHD02B
Ditch DHD02B	3.60	172	2.09	7.28	5	TRAP	3:1/3:1	Class 700	3.50	Split South DHD02B

Worksheet for Ditch DHD02C (100yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040	
Channel Slope	1.70	%
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	131.00	ft^3/s

Results

Normal Depth	3.25	ft
Flow Area	21.09	ft^2
Wetted Perimeter	14.52	ft
Hydraulic Radius	1.45	ft
Top Width	12.99	ft
Critical Depth	3.06	ft
Critical Slope	0.02349	ft/ft
Velocity	6.21	ft/s
Velocity Head	0.60	ft
Specific Energy	3.85	ft
Froude Number	0.86	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.25	ft
Critical Depth	3.06	ft
Channel Slope	1.70	%
Critical Slope	0.02349	ft/ft

Cross Section for Ditch DHD02C (100yr)

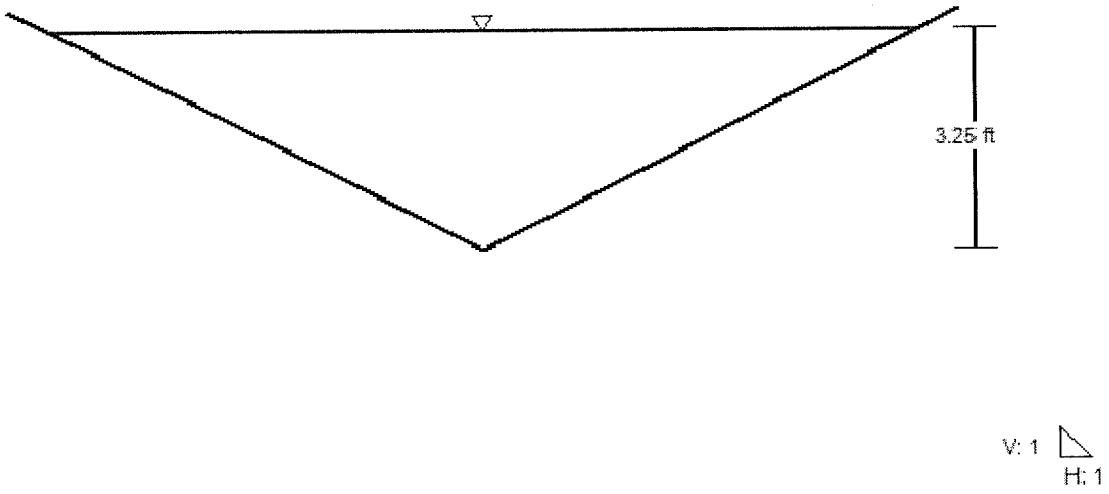
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040	
Channel Slope	1.70	%
Normal Depth	3.25	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	131.00	ft³/s

Cross Section Image



Worksheet for Ditch DHD02B (100yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040	
Channel Slope	1.70	%
Left Side Slope	16.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	172.00	ft^3/s

Results

Normal Depth	2.00	ft
Flow Area	35.90	ft^2
Wetted Perimeter	36.48	ft
Hydraulic Radius	0.98	ft
Top Width	35.95	ft
Critical Depth	1.87	ft
Critical Slope	0.02433	ft/ft
Velocity	4.79	ft/s
Velocity Head	0.36	ft
Specific Energy	2.35	ft
Froude Number	0.85	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	1.87	ft
Channel Slope	1.70	%
Critical Slope	0.02433	ft/ft

Cross Section for Ditch DHD02B (100yr)

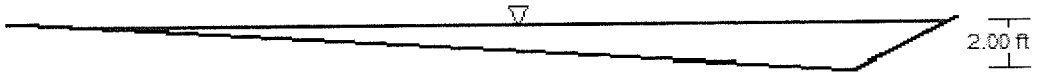
Project Description

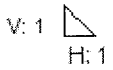
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040	
Channel Slope	1.70	%
Normal Depth	2.00	ft
Left Side Slope	16.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	172.00	ft³/s

Cross Section Image





Worksheet for Ditch (Trap) DHD02B(100yr)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.046	
Channel Slope	3.60	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	172.00	ft^3/s

Results

Normal Depth	2.09	ft
Flow Area	23.62	ft^2
Wetted Perimeter	18.24	ft
Hydraulic Radius	1.29	ft
Top Width	17.56	ft
Critical Depth	2.20	ft
Critical Slope	0.02899	ft/ft
Velocity	7.28	ft/s
Velocity Head	0.82	ft
Specific Energy	2.92	ft
Froude Number	1.11	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.09	ft
Critical Depth	2.20	ft
Channel Slope	3.60	%

Worksheet for Ditch (Trap) DHD02B(100yr)

GVF Output Data

Critical Slope	0.02899	ft/ft

Cross Section for Ditch (Trap) DHD02B(100yr)

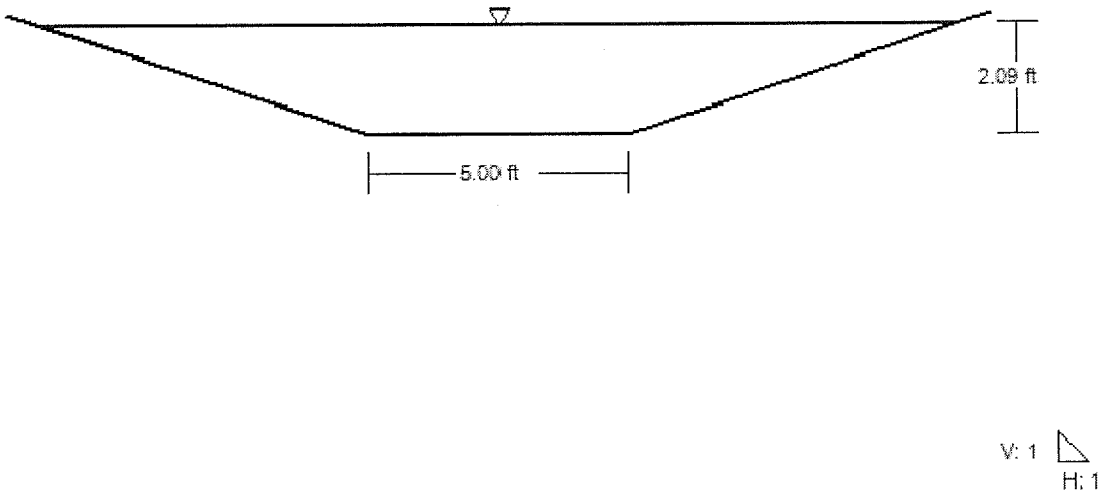
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.046	
Channel Slope	3.60	%
Normal Depth	2.09	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	172.00	ft³/s

Cross Section Image



RIPRAP CALCULATIONS

Channel Protection Sizing Using Equation 718

1/2 CP7

Known:

V=	Velocity (fps)	5.86
Sg=	Specific Gravity of Rock (typ=2.5)	2.5
s=	Longitudinal Channel Slope (ft/ft)	0.020

$d_{50}=((vel*S^{0.17})/(3*(Sg-1)))^2$

Solve For:

d_{50}=	5	inches
thickness=	11	inches

Channel Protection Sizing Using Equation 718

95-5P2

Known:

V=	Velocity (fps)	3.56
Sg=	Specific Gravity of Rock (typ=2.5)	2.5
s=	Longitudinal Channel Slope (ft/ft)	0.030

$$d_{50}=((vel*S^{0.17})/(3*(Sg-1)))^2$$

Solve For:

d_{50}=	2 inches
thickness=	5 inches

Channel Protection Sizing Using Equation 718

OFF8P1

Known:

V=	Velocity (fps)	4.16
Sg=	Specific Gravity of Rock (typ=2.5)	2.5
s=	Longitudinal Channel Slope (ft/ft)	0.030

$$d_{50}=((vel*S^{0.17})/(3*(Sg-1)))^2$$

Solve For:

d_{50}=	3 inches
thickness=	6 inches

Channel Protection Sizing Using Equation 718

DHD02C (Culvert HD02BWS)

Known:

V=	Velocity (fps)	8.87
Sg=	Specific Gravity of Rock (typ=2.5)	2.5
s=	Longitudinal Channel Slope (ft/ft)	0.017

$d_{50}=((vel*S^{0.17})/(3*(Sg-1)))^2$

Solve For:

d_{50}=	12	inches
thickness=	23	inches

Channel Protection Sizing Using Equation 718

95-9 (Split South DHD02B)

Known:

V=	Velocity (fps)	8.87
Sg=	Specific Gravity of Rock (typ=2.5)	2.5
s=	Longitudinal Channel Slope (ft/ft)	0.015

$d_{50}=((vel*S^{0.17})/(3*(Sg-1)))^2$

Solve For:

d_{50}=	11	inches
thickness=	22	inches

Channel Protection Sizing Using Equation 718

DHD02B (TRAP) (DHD02B)

Known:

V=	Velocity (fps)	11.40
Sg=	Specific Gravity of Rock (typ=2.5)	2.5
s=	Longitudinal Channel Slope (ft/ft)	0.036

$d_{50}=((vel*S^{0.17})/(3*(Sg-1)))^2$

Solve For:

	d_{50}=	25 inches
	thickness=	50 inches

Channel Protection Sizing Using Equation 718

DHD02B (DHD02B)

Known:

V=	Velocity (fps)	6.82
Sg=	Specific Gravity of Rock (typ=2.5)	2.5
s=	Longitudinal Channel Slope (ft/ft)	0.017

$d_{50}=((vel*S^{0.17})/(3*(Sg-1)))^2$

Solve For:

d_{50}=	7 inches
thickness=	14 inches

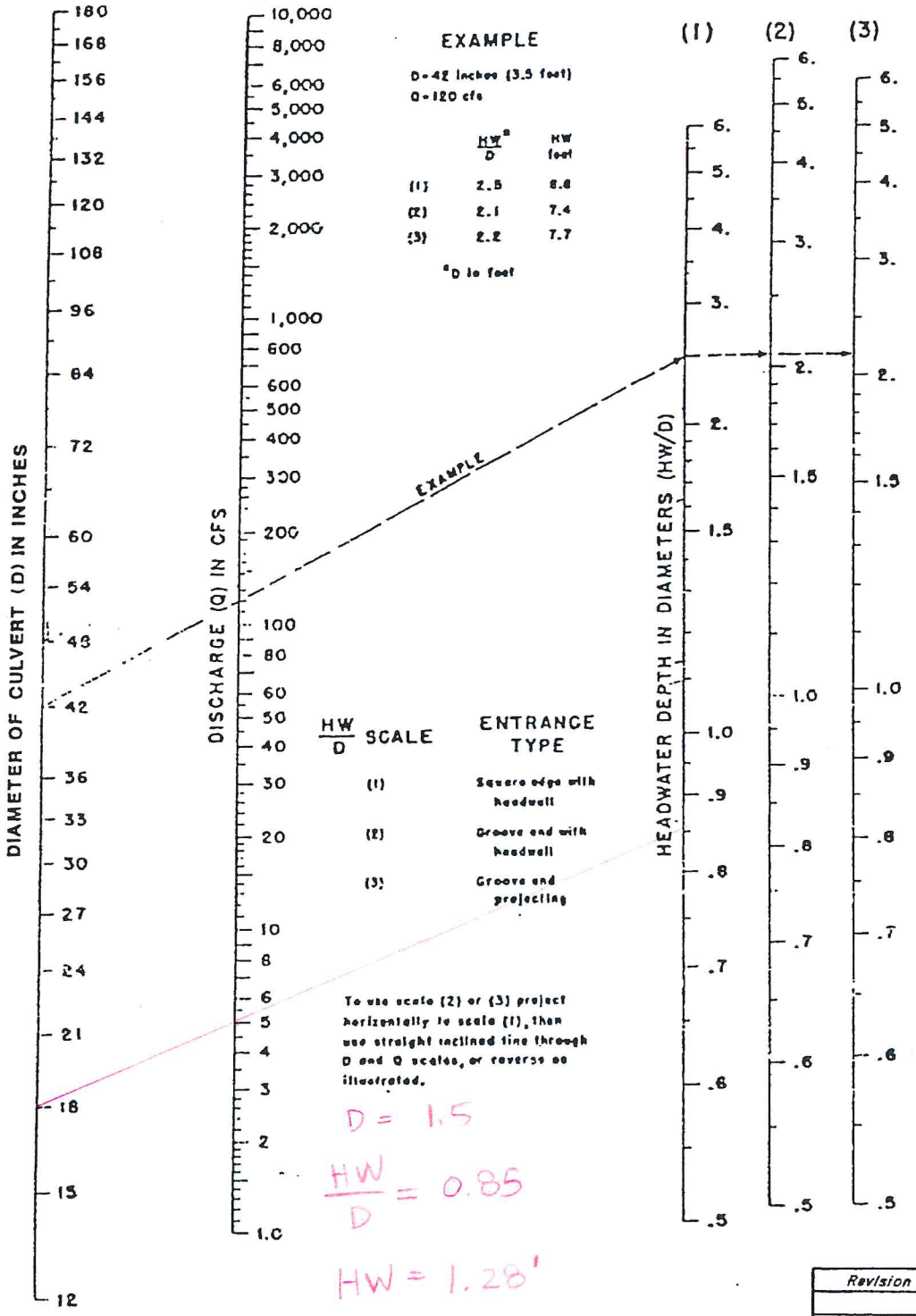
INLET CONTROL CALCULATIONS

I2 (50yr)

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP

18" RCP Q = 5 CFS



D = 1.5

$\frac{HW}{D} = 0.85$

HW = 1.28'

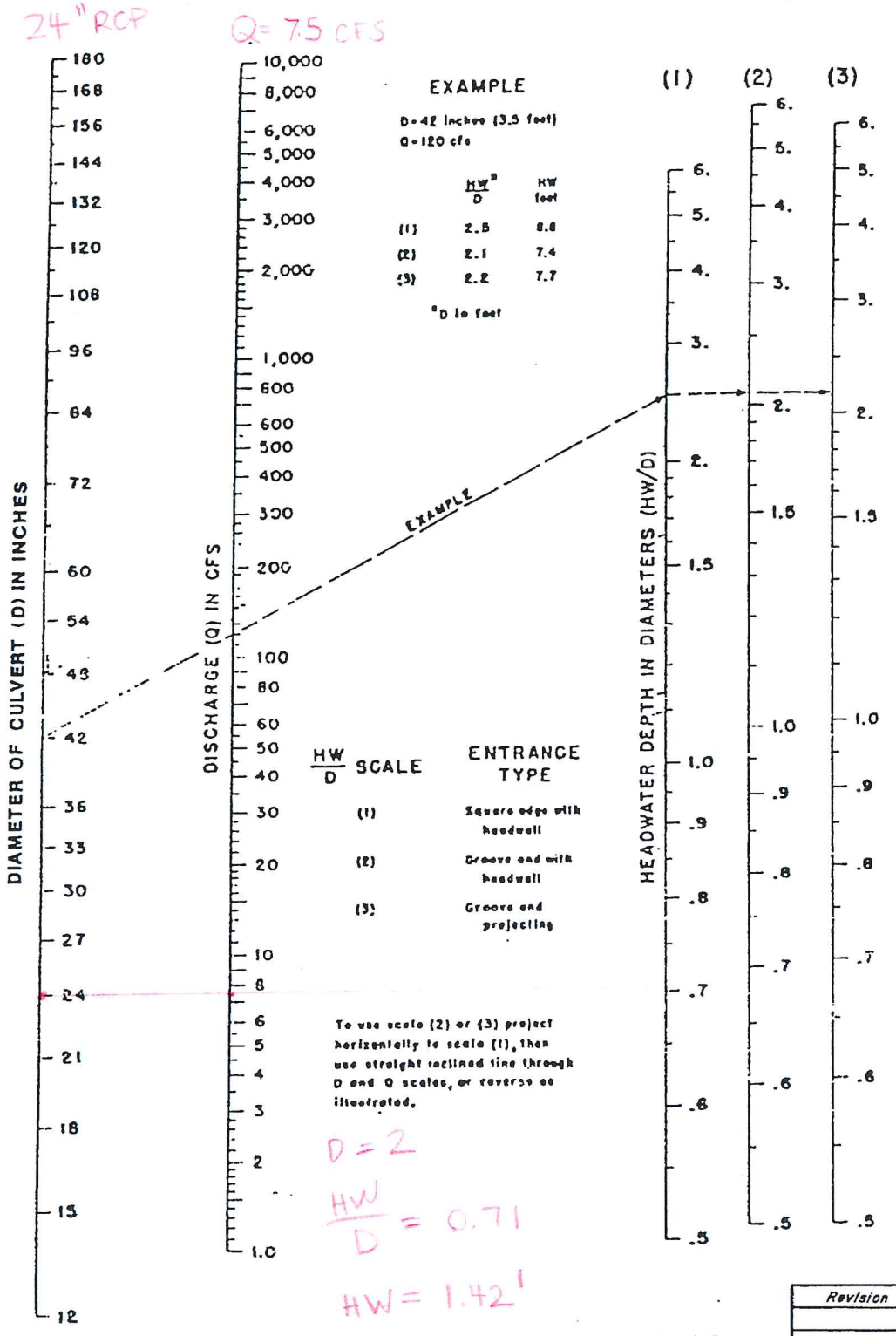
Revision	Date

WRC ENGINEERING	REFERENCE: USDOT, FHWA, HDS, No. 5, 1985	FIGURE 1005

I4 + 95-3 + 95-4A + 95-4B (25yr)

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP



Revision	Date

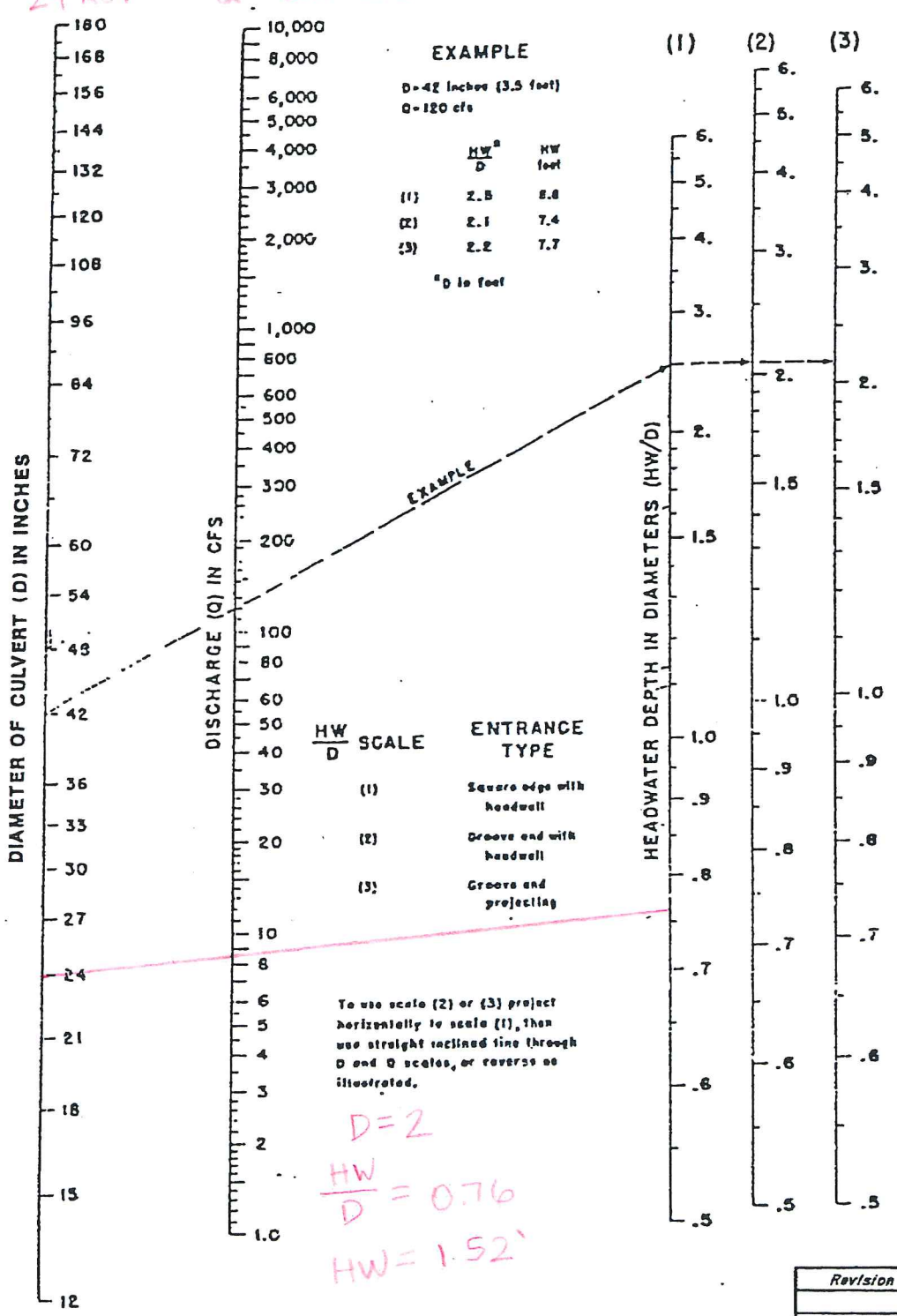
WRC ENGINEERING	REFERENCE: USDOT, FHWA, HDS, No. 5, 1985	FIGURE 1005

IS + 95-13 (25yr)

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

24" RCP Q = 8.6 CFS



D = 2

$\frac{HW}{D} = 0.76$

HW = 1.52'

Revision	Date

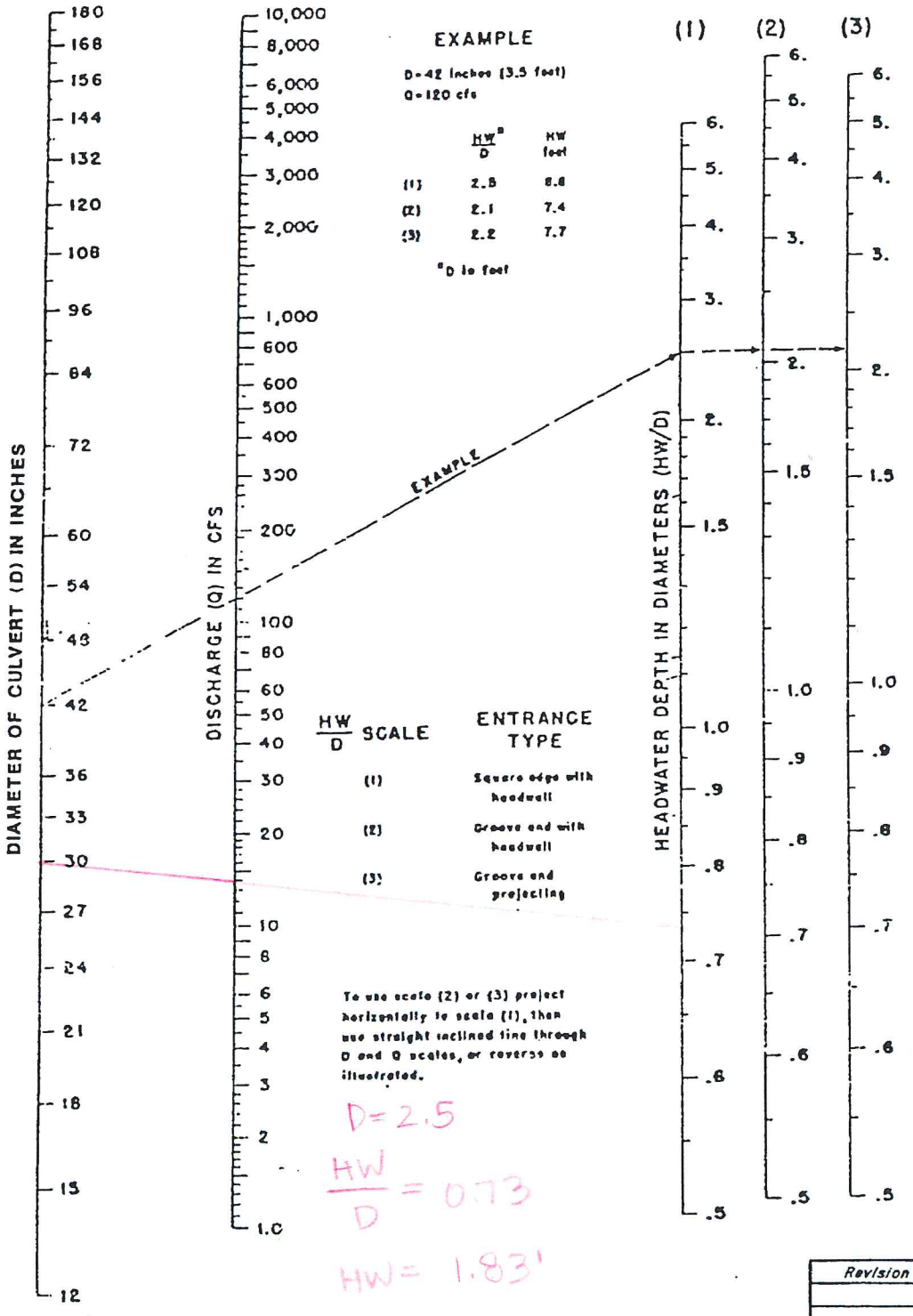
WRC ENGINEERING	REFERENCE: USDOT, FHWA, HDS, No. 5, 1985	FIGURE 1005

I6 (25 yr)

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP

30" RCP Q = 14 CFS



D = 2.5

$\frac{HW}{D} = 0.73$

HW = 1.83'

Revision	Date

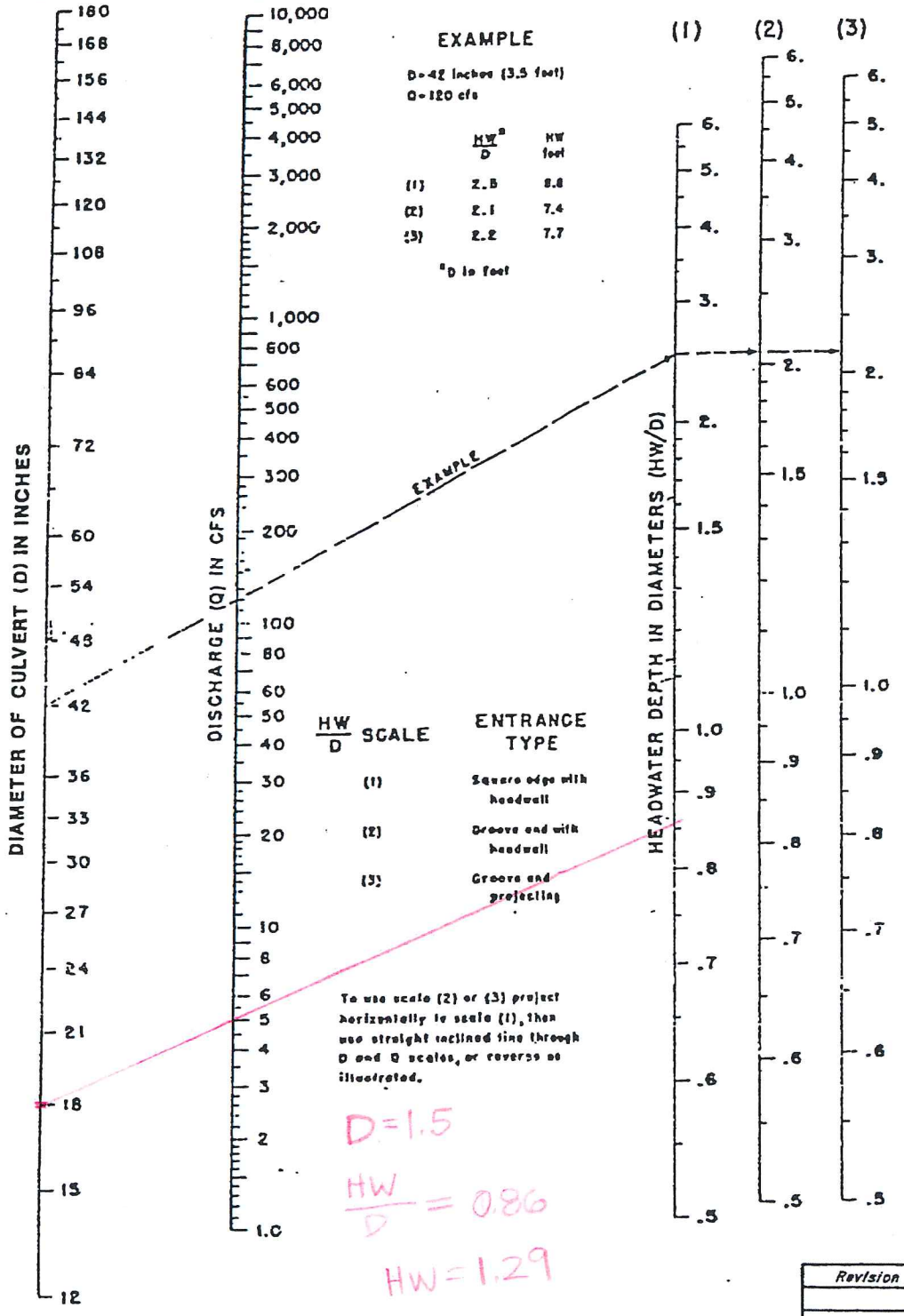
WRC ENGINEERING	REFERENCE: USDOT, FHWA, HDS, No. 5, 1985	FIGURE 1005

95-6 (25 yr)

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP

18" RCP Q = 5 CFS



D = 1.5

$\frac{HW}{D} = 0.86$

HW = 1.29

Revision	Date

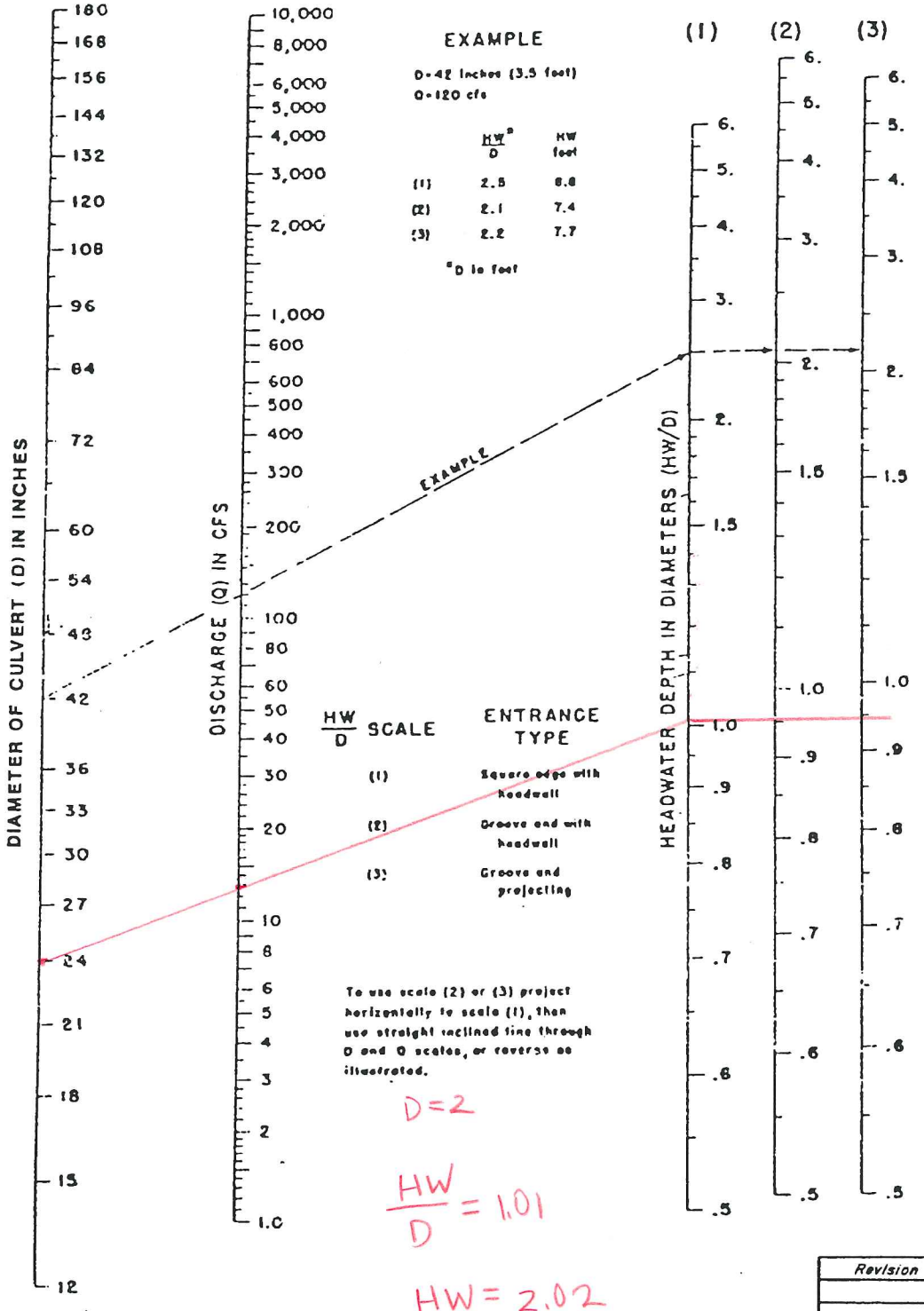
WRC ENGINEERING	REFERENCE: USDOT, FHWA, HDS, No. 5, 1985	FIGURE 1005

95-15A + 95-15B + 95-16 + 95-5 + 7A (25 yr)

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP

24" 12.9 CFS



D=2

$\frac{HW}{D} = 1.01$

HW = 2.02

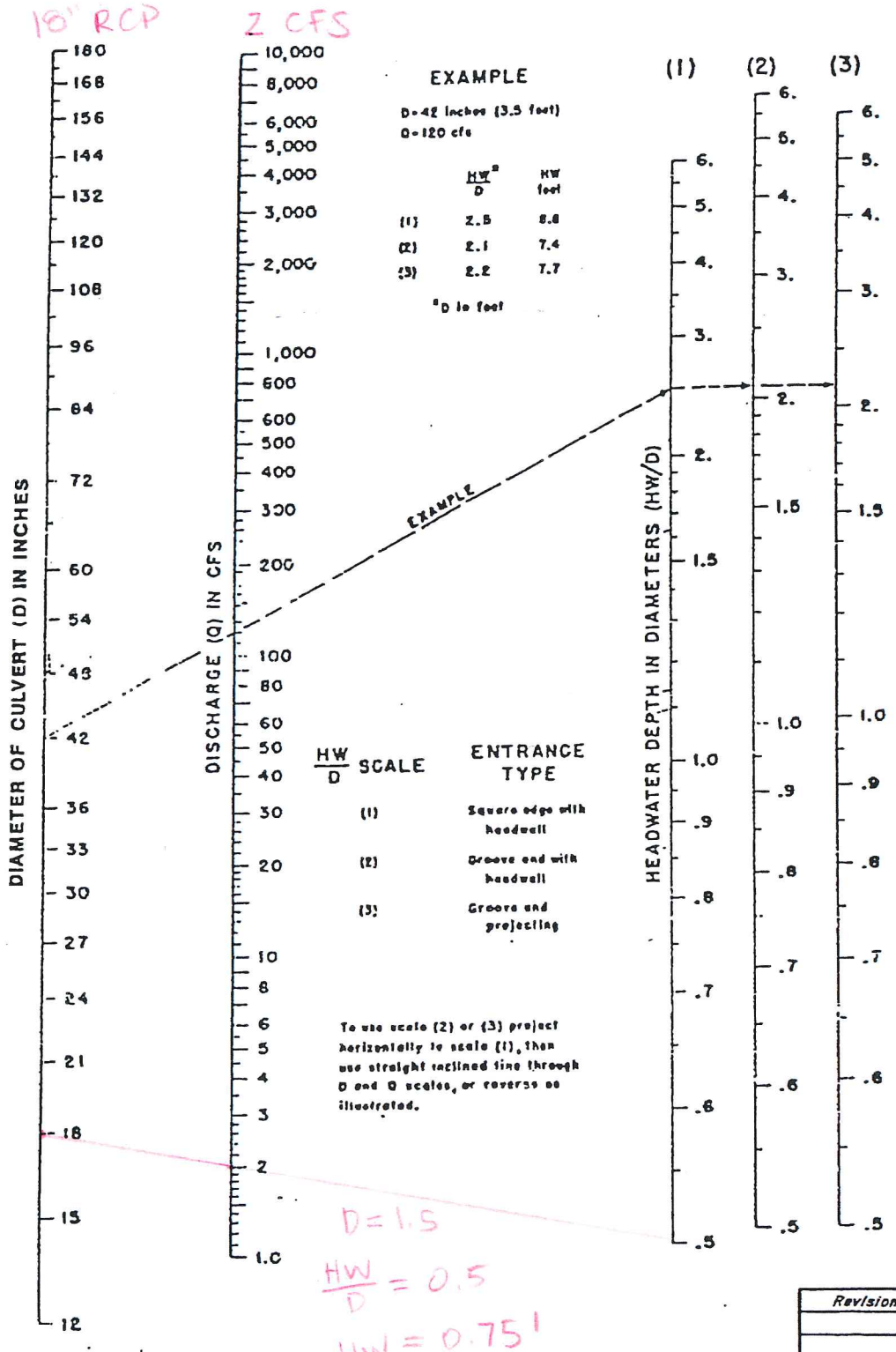
Revision	Date

WRC ENGINEERING	REFERENCE: USDOT, FHWA, HDS, No. 5, 1985	FIGURE 1005

95-21 (25 yr)

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP

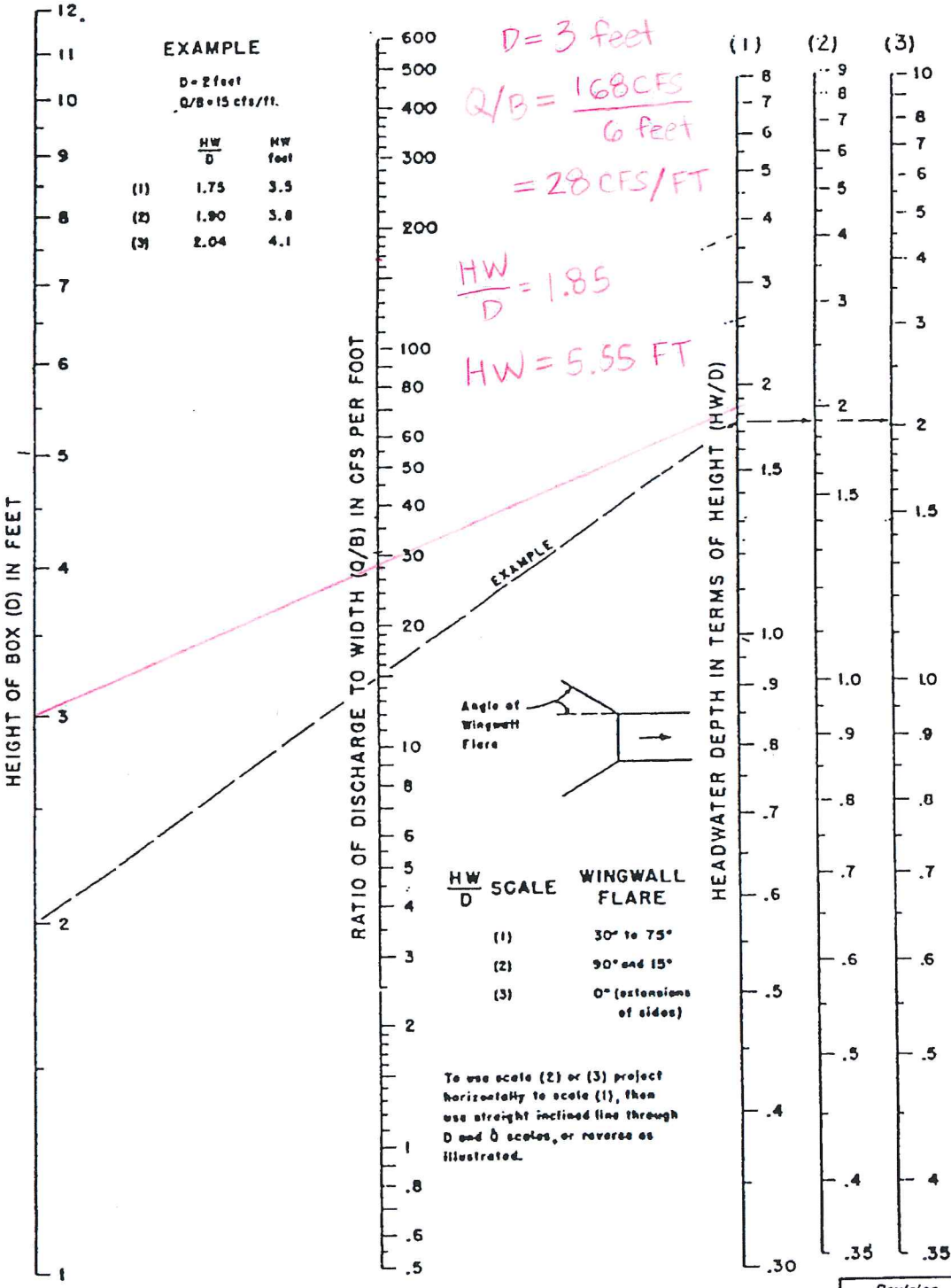


Revision	Date

WRC ENGINEERING	REFERENCE: USDOT, FHWA, HDS, No. 5, 1985	FIGURE 1005

OFFD-B (50yr) 6' WIDE x 3' HIGH RCB Q=168 CFS

NOMOGRAPH – INLET CONTROL BOX CULVERT



Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS No.5, 1985

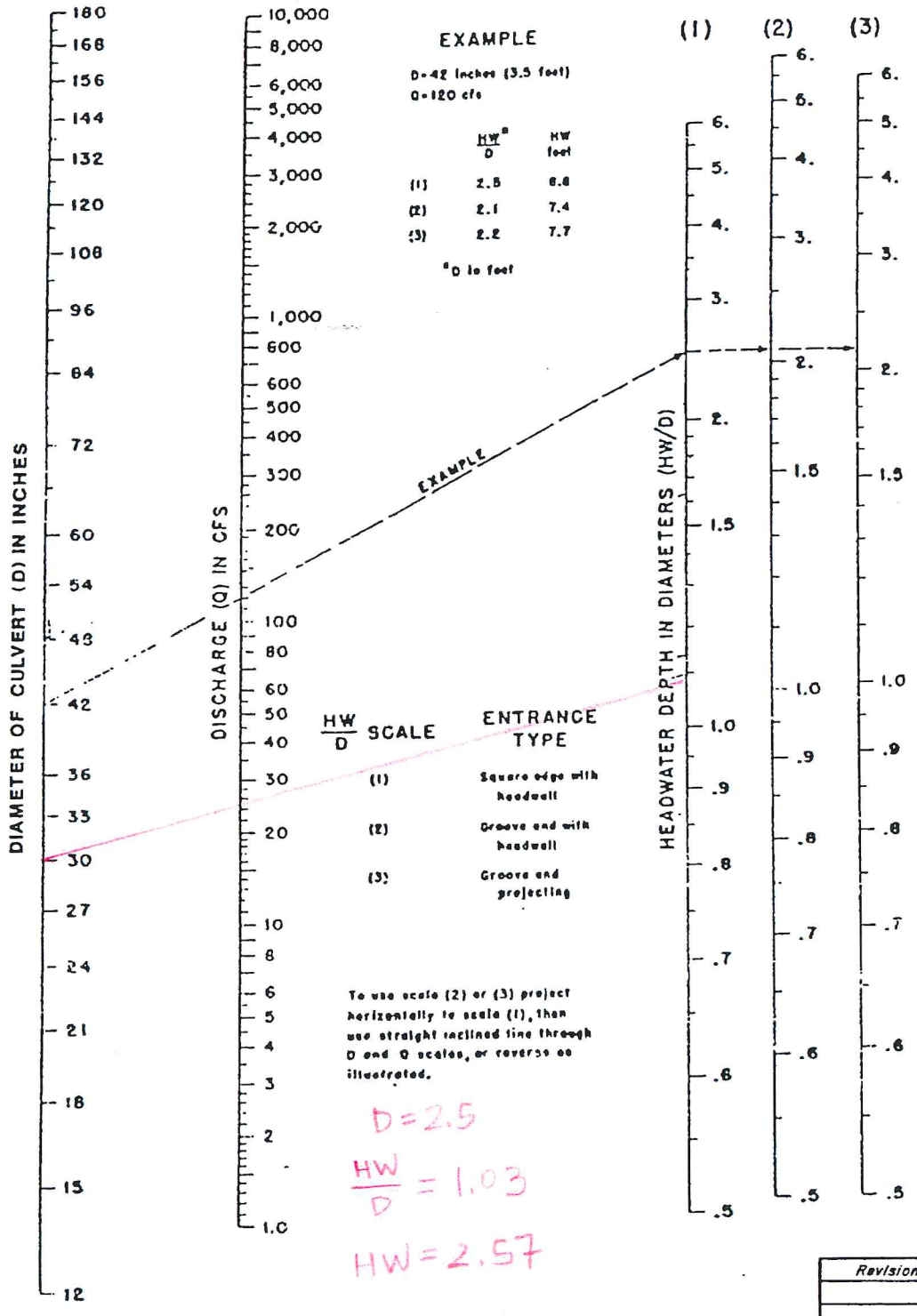
FIGURE 1004

95-5P1 (50yr)

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP

30" RCP Q=24 CFS



D=2.5

$\frac{HW}{D} = 1.03$

HW=2.57

Revision	Date

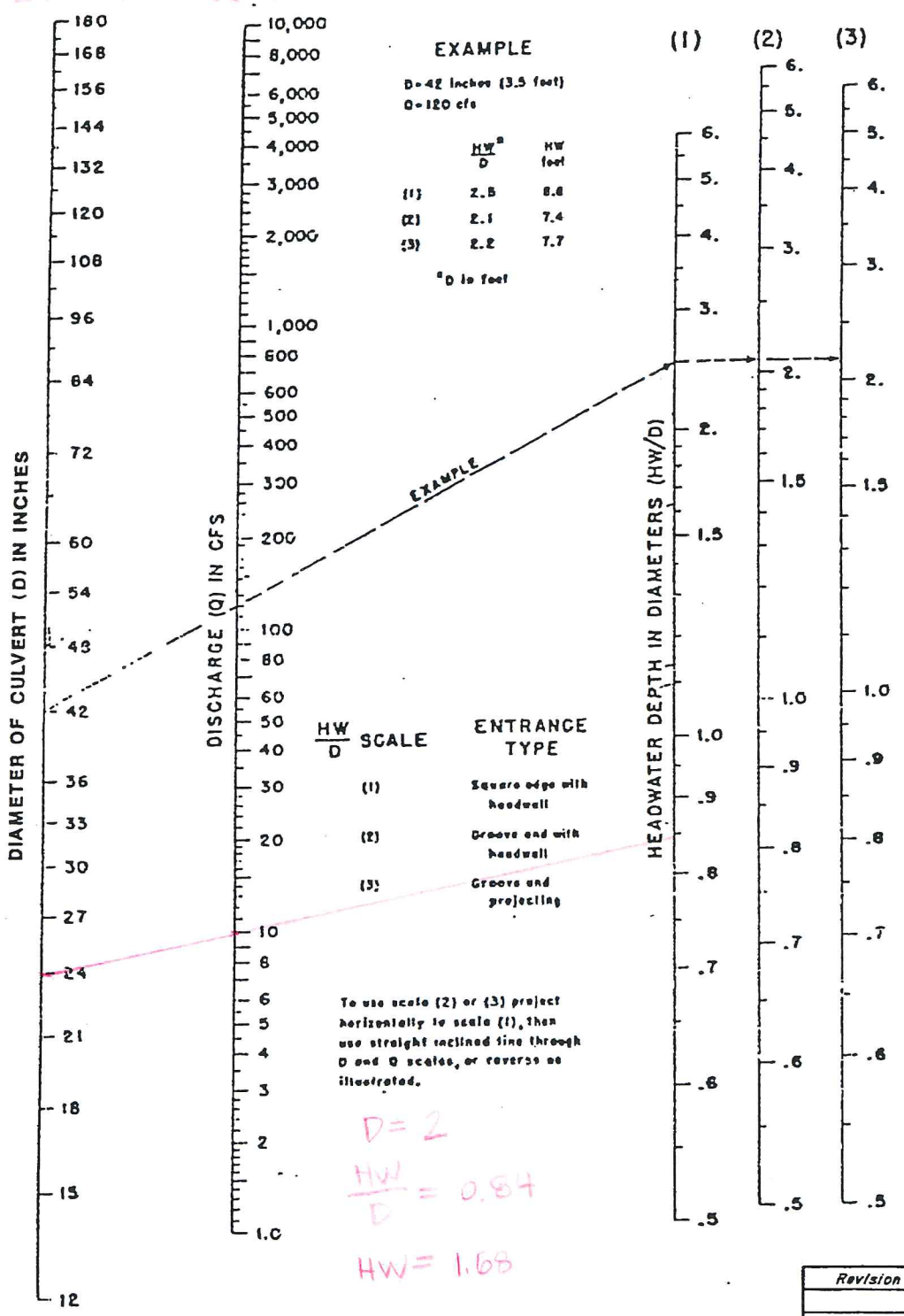
WRC ENGINEERING	REFERENCE: USDOT, FHWA, HDS, No. 5, 1985	FIGURE 1005

95-SP2 (50yr)

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL RCP

24" RCP Q = 10 CFS



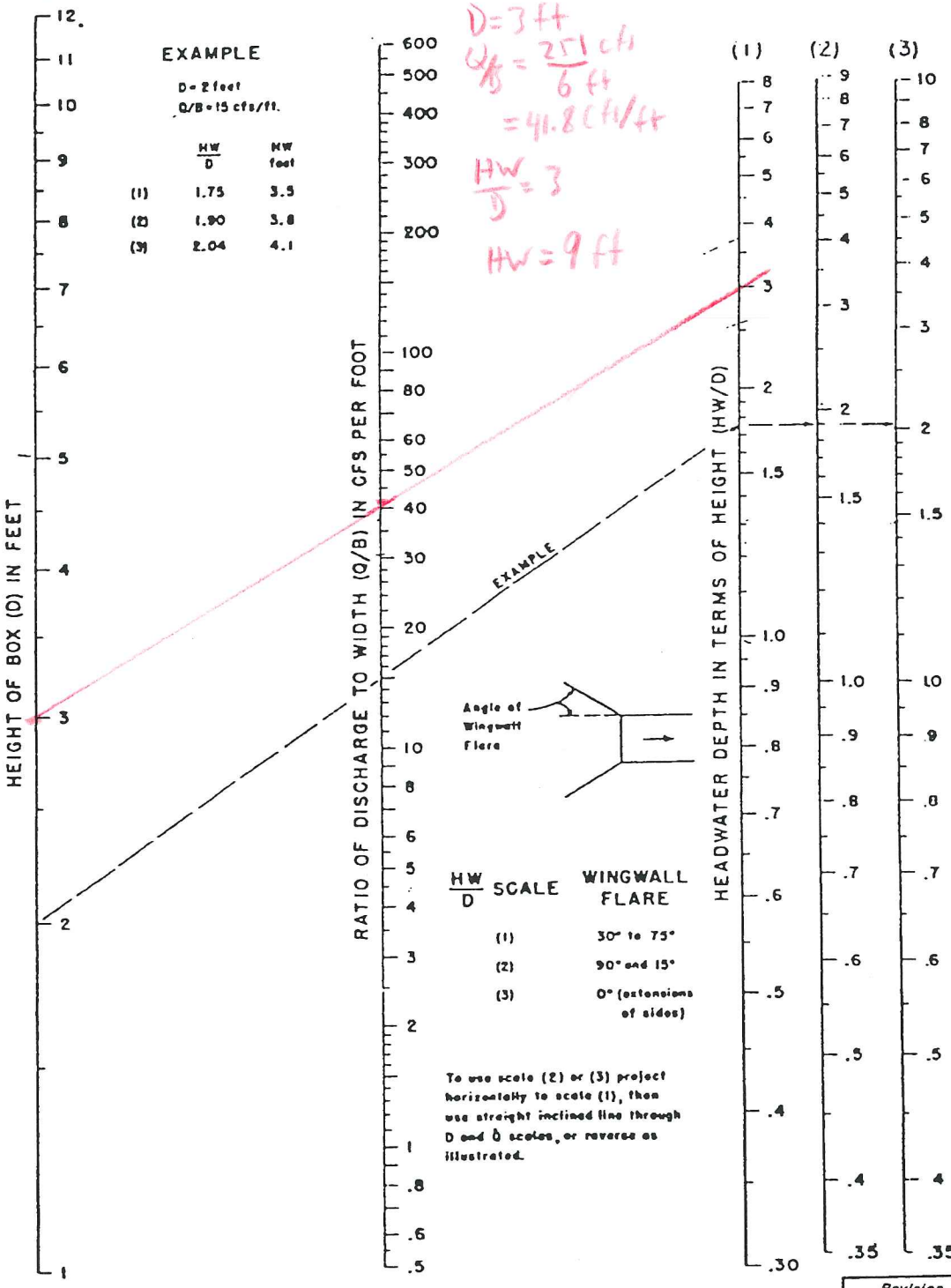
Revision	Date

WRC ENGINEERING	REFERENCE: USDOT, FHWA, HDS, No. 5, 1985	FIGURE 1005

OFFD-B (50yr) 6' Wide x 3' High RCB Q= 251 cfs

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH – INLET CONTROL BOX CULVERT



Revision	Date

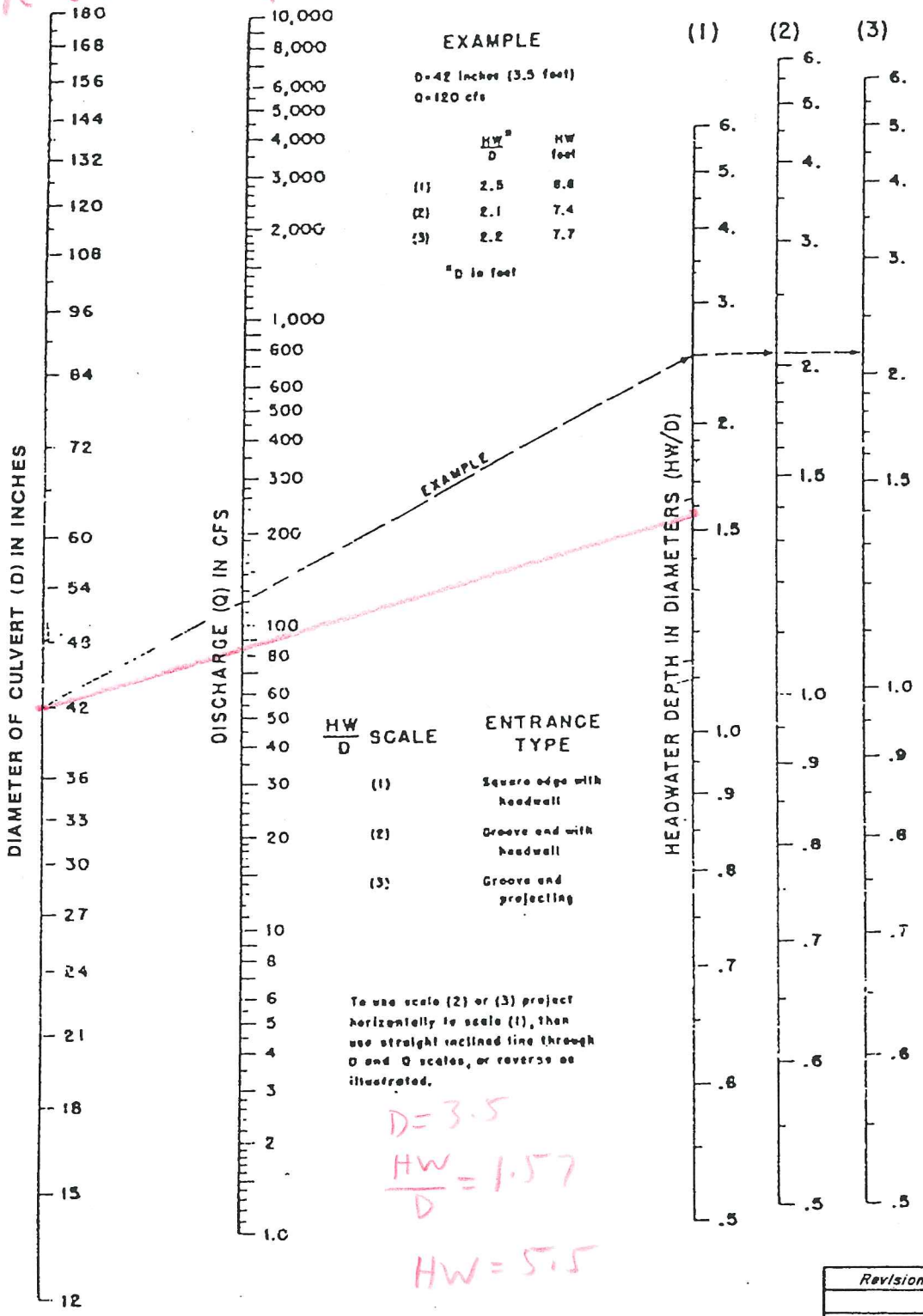
WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS No.5, 1985

FIGURE 1004

NOMOGRAPH – INLET CONTROL RCP

42" CMP Q = 85 cfs



D = 3.5

$\frac{HW}{D} = 1.57$

HW = 5.5

Revision	Date

WRC ENGINEERING	REFERENCE: USDOT, FHWA, HDS, No. 5, 1985	FIGURE 1005

OUTLET PROTECTION CALCULATIONS

Fac ID : SD31A

Box Culvert Outlet Protection

Dual (2) 11-foot by 7-foot RCB Storm Drain Extension

KR 30+00 (1/2 CP7)

Known:

Q=	Flow (cfs)	168
H=	Height of Box (ft)	7.0
W=	Width of Box (ft)	11.0
Ø=	Expansion angle of the culvert flow (typ=20o)	20.0
V=	Allowable downstream velocity (typ=8 ft/s)	5.00
Fr=	Froude Number (0 if full)	2.60
Yn=	Depth of flow in Pipe Culvert (ft)*	
	* Not necessary if Fr<1	

Solve For:

D_{50}=	Required Rip-rap size (ft)	0.29
D_{50}=	Required Rip-rap size (in)	3.4
D_{50}=	Required Rip-rap size (in)	4
A_t=	Req'd Area of flow at allowable velocity (ft^2)	33.6
Y_t=	Tailwater depth (ft)	1.40
L=	Length of Protection (ft)	17.9

Equations are valid for given hydraulic parameters

Error in Eq. 764, see page 783 of CCRFCD Manual

Equations from CCRFCD Manual

$(d_{50}/D)*(Y_t/D)1.2/(Q/D^{2.5})=0.023$	Eq. 760
Da=1/2(D+Yn) (used in place of D if Fr>1)	Eq. 762
$L=(1/(2 \tan Ø))(A_t/Y_t-W)$	Eq. 764
$A_t=Q/V$	Eq. 765

Worksheet for Fac ID SD31A (2) 11'x7' RCB KR 30+00

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	2.07	%
Height	7.00	ft
Bottom Width	11.00	ft
Discharge	168.00	ft^3/s

Results

Normal Depth	1.02	ft
Flow Area	11.27	ft^2
Wetted Perimeter	13.05	ft
Hydraulic Radius	0.86	ft
Top Width	11.00	ft
Critical Depth	1.94	ft
Percent Full	14.6	%
Critical Slope	0.00295	ft/ft
Velocity	14.91	ft/s
Velocity Head	3.46	ft
Specific Energy	4.48	ft
Froude Number	2.60	
Discharge Full	2102.10	ft^3/s
Slope Full	3.24083	ft/ft
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	14.63	%
Downstream Velocity	Infinity	ft/s

Worksheet for Fac ID SD31A (2) 11'x7' RCB KR 30+00

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.02	ft
Critical Depth	1.94	ft
Channel Slope	2.07	%
Critical Slope	0.00295	ft/ft

Cross Section for Fac ID SD31A (2) 11'x7' RCB KR 30+00

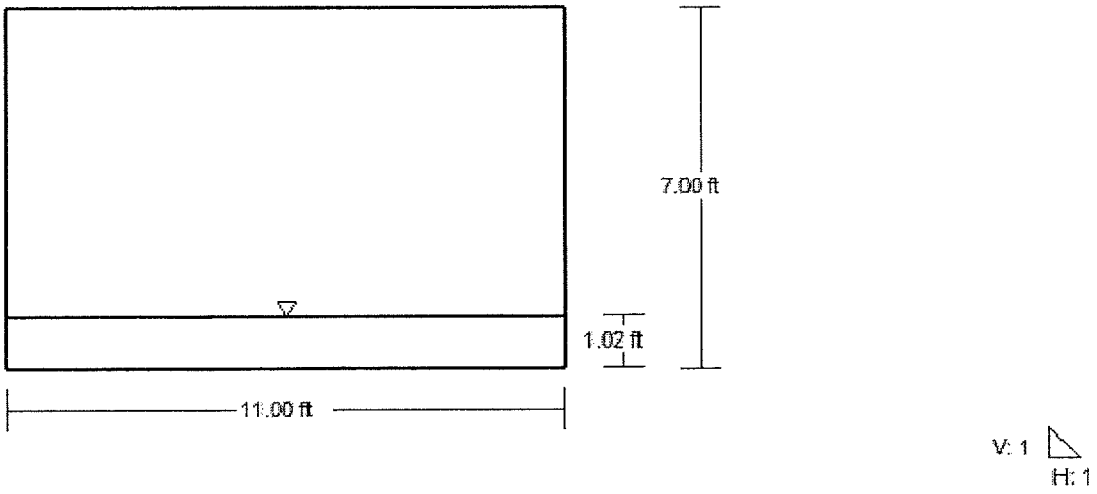
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	2.07	%
Normal Depth	1.02	ft
Height	7.00	ft
Bottom Width	11.00	ft
Discharge	168.00	ft³/s

Cross Section Image



Box Culvert Outlet Protection

5-foot by 3-foot RCB

XP405 (South)

Known:

Q=	Flow (cfs)	130
H=	Height of Box (ft)	3.0
W=	Width of Box (ft)	5.0
Ø=	Expansion angle of the culvert flow (typ=20o)	20.0
V=	Allowable downstream velocity (typ=8 ft/s)	5.00
Fr=	Froude Number (0 if full)	1.36
Yn=	Depth of flow in Pipe Culvert (ft)*	2.24
	* Not necessary if Fr<1	

Solve For:

D_{50}=	Required Rip-rap size (ft)	0.56
D_{50}=	Required Rip-rap size (in)	6.7
D_{50}=	Required Rip-rap size (in)	7
A_t=	Req'd Area of flow at allowable velocity (ft^2)	25.9
Y_t=	Tailwater depth (ft)	1.05
L=	Length of Protection (ft)	27.1

Equation not valid

Equations from CCRFCD Manual

$(d_{50}/D)*(Y_t/D)1.2/(Q/D^{2.5})=0.023$	Eq. 760
Da=1/2(D+Yn) (used in place of D if Fr>1)	Eq. 762
$L=(1/(2 \tan Ø))(A_t/Y_t-W)$	Eq. 764
$A_t=Q/V$	Eq. 765

Worksheet for 5'x3' RCB XP405 (South)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	1.09	%
Height	3.00	ft
Bottom Width	5.00	ft
Discharge	129.60	ft^3/s

Results

Normal Depth	2.24	ft
Flow Area	11.21	ft^2
Wetted Perimeter	9.48	ft
Hydraulic Radius	1.18	ft
Top Width	5.00	ft
Critical Depth	2.75	ft
Percent Full	74.7	%
Critical Slope	0.00630	ft/ft
Velocity	11.56	ft/s
Velocity Head	2.08	ft
Specific Energy	4.32	ft
Froude Number	1.36	
Discharge Full	148.60	ft^3/s
Slope Full	0.01433	ft/ft
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	74.73	%
Downstream Velocity	Infinity	ft/s

Worksheet for 5'x3' RCB XP405 (South)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.24	ft
Critical Depth	2.75	ft
Channel Slope	1.09	%
Critical Slope	0.00630	ft/ft

Cross Section for 5'x3' RCB XP405 (South)

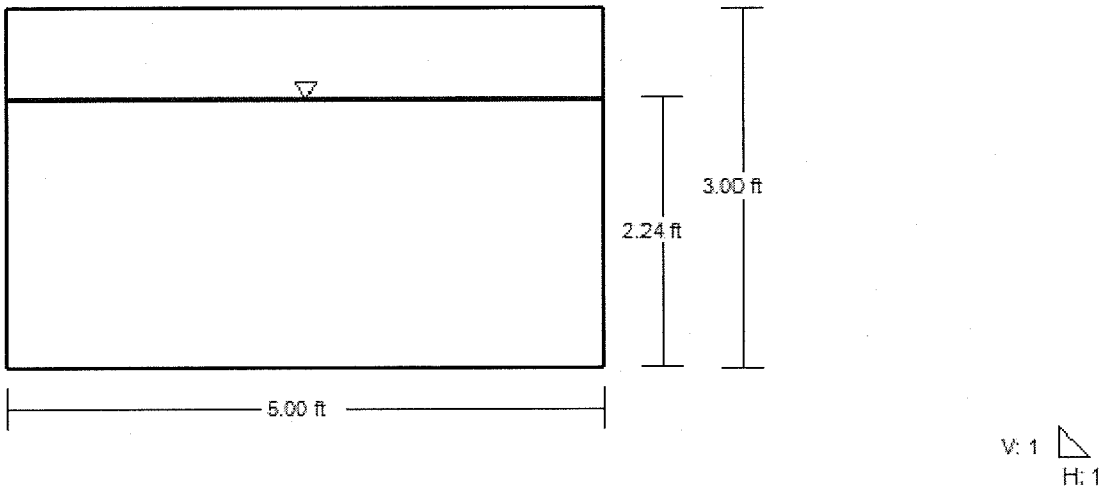
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	1.09	%
Normal Depth	2.24	ft
Height	3.00	ft
Bottom Width	5.00	ft
Discharge	129.60	ft³/s

Cross Section Image



Box Culvert Outlet Protection

5-foot by 3-foot RCB

XP405 (East)

Known:

Q=	Flow (cfs)	130
H=	Height of Box (ft)	3.0
W=	Width of Box (ft)	5.0
Ø=	Expansion angle of the culvert flow (typ=20o)	20.0
V=	Allowable downstream velocity (typ=8 ft/s)	5.00
Fr=	Froude Number (0 if full)	1.49
Yn=	Depth of flow in Pipe Culvert (ft)*	2.11
	* Not necessary if Fr<1	

Solve For:

D_{50}=	Required Rip-rap size (ft)	0.57
D_{50}=	Required Rip-rap size (in)	6.8
D_{50}=	Required Rip-rap size (in)	7
A_t=	Req'd Area of flow at allowable velocity (ft^2)	25.9
Y_t=	Tailwater depth (ft)	1.02
L=	Length of Protection (ft)	27.9

Equation not valid

Equations from CCRFCD Manual

$(d_{50}/D)*(Y_t/D)1.2/(Q/D^{2.5})=0.023$	Eq. 760
Da=1/2(D+Yn) (used in place of D if Fr>1)	Eq. 762
$L=(1/(2 \tan Ø))(A_t/Y_t-W)$	Eq. 764
$A_t=Q/V$	Eq. 765

Worksheet for 5'x3' RCB XP405 (East)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	1.28	%
Height	3.00	ft
Bottom Width	5.00	ft
Discharge	129.50	ft³/s

Results

Normal Depth	2.11	ft
Flow Area	10.56	ft²
Wetted Perimeter	9.22	ft
Hydraulic Radius	1.14	ft
Top Width	5.00	ft
Critical Depth	2.75	ft
Percent Full	70.4	%
Critical Slope	0.00630	ft/ft
Velocity	12.26	ft/s
Velocity Head	2.34	ft
Specific Energy	4.45	ft
Froude Number	1.49	
Discharge Full	161.03	ft³/s
Slope Full	0.01979	ft/ft
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	70.39	%
Downstream Velocity	Infinity	ft/s

Worksheet for 5'x3' RCB XP405 (East)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.11	ft
Critical Depth	2.75	ft
Channel Slope	1.28	%
Critical Slope	0.00630	ft/ft

Cross Section for 5'x3' RCB XP405 (East)

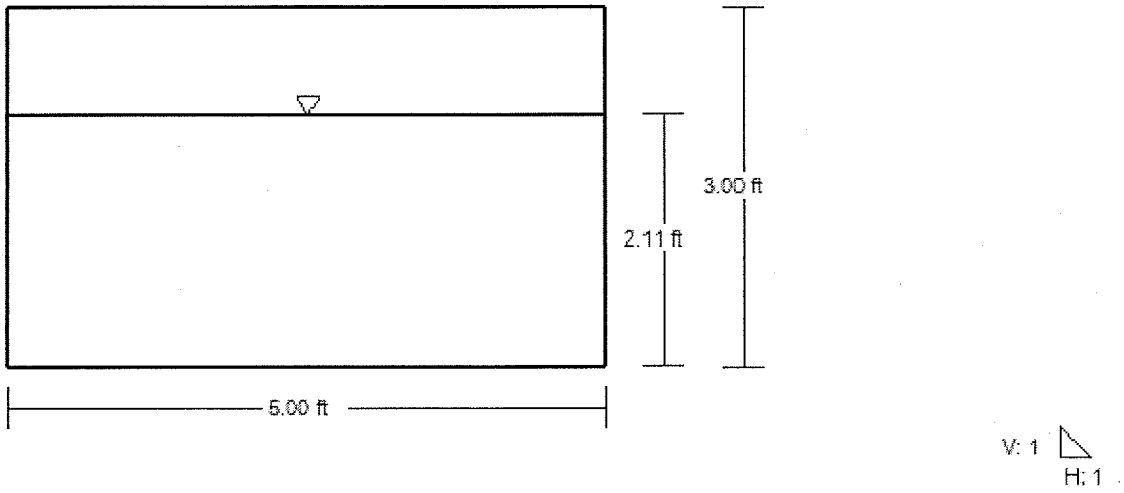
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	1.28	%
Normal Depth	2.11	ft
Height	3.00	ft
Bottom Width	5.00	ft
Discharge	129.50	ft³/s

Cross Section Image



TRAPEZOIDAL CHANNEL

KCMain Outlet Channel

Flow "Q"	108	cfs
Manning's "n"	0.045	
Slope (%)	2.40	
Bottom Width	10.0	ft
Side Slope (Lt)	3.0	H:1V
Side Slope (Rt)	3.0	H:1V
Radius	0.0	ft

OUTPUT:

Velocity	5.34	ft/sec
Depth	1.42	ft
Freeboard	0.94	ft
Total Depth	2.36	ft
Froude No.	0.90	ft
Superelevation	0.00	ft

Normal depth calculations using Manning's equation

Fb = 1+0.025Vd^(1/3) Supercritical; 0.5+V^2/2g Subcritical

G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS

D-LOAD CALCULATIONS

8320 old courthouse road • vienna, virginia 22180
© april 1979 (revised)

design data 7

depth to top of pipe, not invert

american concrete pipe association

CONCRETE PIPE SELECTION: Trench Installations

Trench conduits are usually installed in relatively narrow trenches excavated in undisturbed soil and backfilled to the original ground surface.

When a rigid conduit is installed in a narrow trench and backfilled, the backfill material will tend to settle. This downward movement generates frictional forces along the trench walls, which act upward to help support the weight of the backfill material. The magnitude of the frictional forces depends on the unit weight of the backfill material w, the value of Rankine's lateral pressure ratio K, and the coefficient of sliding friction μ' between the backfill material and the trench walls.

The backfill load on a conduit installed in a trench condition is equal to the weight of the mass of fill material within the trench less the summation of the frictional load transfers, and is expressed by the equation:

$$W_d = C_d\, w\, B_d^2$$

where

W_d=backfill load, pounds per linear foot
C_d=load coefficient for trench condition
w=unit weight of backfill material, pounds per cubic foot
B_d=width of trench at the top of the conduit, feet

Figures 2 through 5, based on the above equation, enable a direct determination of backfill load for a given trench width and depth of cover. As the trench width increases for a given depth of cover and pipe diameter, a point is reached at which an embankment condition develops. The curves showing pipe size indicate the limiting trench width for each pipe diameter beyond which greater trench widths will not affect the load. When this condition occurs, the load on the conduit remains constant. This load should be determined by the intersection of the vertical line representing the depth of cover and the dashed line representing the particular pipe diameter under consideration. For intermediate pipe sizes not shown in *Figures 2 through 5*, interpolation should be used.

The field supporting strength of a concrete pipe line is dependent on the inherent strength of the pipe, the type of foundation on which the pipe is installed and the compaction of the sidefill material adjacent to the pipe. A common method used to determine the inherent strength of a pipe is the three-edge bearing test, in which the pipe is subjected to concentrated loads at the crown and invert. The load that a pipe will support under this condition of loading is called the *three-edge bearing strength* and is expressed in pounds per linear foot.

ASTM Specification C14 covers three strength classes for non-reinforced concrete pipe — Class 1, 2 and 3. These three classes are specified to meet ultimate loads, expressed in terms of minimum strength in three-edge-bearing as listed in *Table I*.

TABLE I: Strength Requirements Non-reinforced Concrete Pipe ASTM C14

Pipe Diameter, Inches	Minimum Three-Edge Bearing Strengths, Pounds per Linear Foot		
	Class 1	Class 2	Class 3
4	1500	2000	2400
6	1500	2000	2400
8	1500	2000	2400
10	1600	2000	2400
12	1800	2250	2600
15	2000	2600	2900
18	2200	3000	3300
21	2400	3300	3850
24	2600	3600	4400
27	2800	3950	4600
30	3000	4300	4750
33	3150	4400	4875
36	3300	4500	5000

Another means of expressing pipe strength is in terms of D-load. The D-load of a pipe is the supporting strength of a pipe loaded under three-edge-bearing test conditions expressed in pounds per linear foot per foot of inside diameter. Thus the bearing strength may be converted to D-load by dividing by the inside diameter in feet.

ASTM Specification C76 specifies five strength classes reinforced concrete pipe. These strength classes are expressed in terms of D-load at 0.01-inch crack and for ultimate load. The D-load to produce the 0.01-inch crack $D_{0.01}$ is the maximum load applied to the concrete pipe before a crack occurs having a width of 0.01-inch measured at close intervals, throughout a length of at least 1-foot. The D-load to produce ultimate load D_u is the maximum three-edge-bearing test load carried by a pipe, expressed as D-load. *Table II* lists 0.01-inch crack and ultimate D-loads for the strength classes covered by ASTM Specification C76.

TABLE II: Strength Requirements Reinforced Concrete Pipe ASTM C76

Strength Class	Minimum D-Load in Three-Edge Bearing Pounds per Linear Foot per Foot of Internal Diameter	
	0.01 Inch Crack-$D_{0.01}$	Ultimate-D_u
I	800	1200
II	1000	1500
→ III	1350	2000
IV	2000	3000
V	3000	3750

Class III 0-1350
Class IV 1350-2000
Class V 2000-3000

PROGRAM SAMM
D-LOAD REQUIREMENTS FOR A 18 IN. DIAMETER CIRCULAR PIPE

****

P I P E D A T A

DIAMETER (in.)	18.00
WALL B, THICKNESS (in.)	2.500

I N S T A L L A T I O N C O N D I T I O N S

MINIMUM DEPTH OF FILL (ft.)	1.00
MAXIMUM DEPTH OF FILL (ft.)	25.00
SOIL DENSITY (lb/cu. ft.)	140.0
SPECIFIED BEDDING FACTOR	1.90
INSTALLATION TYPE	TRENCH
TRENCH WIDTH (ft.)	4.92
SOIL LATERAL PRESSURE/FRICTION TERM (KMU')	0.1650
PARAMETERS TO COMPUTE TRANSITION WIDTH	
POSITIVE PROJECTION RATIO	1.00
POSITIVE SETTLEMENT RATIO	0.50
SOIL LATERAL PRESSURE/FRICTION TERM (KMU)	0.1924
SOIL LATERAL PRESSURE COEFICIENT	0.33

A D D I T I O N A L L O A D S

LIVE LOAD	AASHTO HS-25
NO SURCHARGE LOAD	

F A C T O R S O F S A F E T Y

FACTOR OF SAFETY ON 0.01 INCH CRACK D-LOAD (EARTH,LIVE)	1.00; 1.00
FACTOR OF SAFETY ON ULTIMATE LOAD (EARTH,LIVE) IN ACCORDANCE WITH ASTM C 76	
DL.01 LESS THAN 2000 LBS/FT/FT	1.5
DL.01 GREATER THAN 3000 LBS/FT/FT	1.25
DL.01 BETWEEN 2000 AND 3000 LBS/FT/FT	INTERPOLATED

R E S U L T S O F A N A L Y S I S

PIPE DEPTH (ft.)	ARCHING FACTOR	>TRANS	EARTH LOAD (lb/ft)	LIVE LOAD (lb/ft)	SURCH LOAD (lb/ft)	TOTAL LOAD (lb/ft)	BED FACT	REQUIRED D-LOAD 0.01 in. (lb/ft/ft)	ULT. (lb/ft/ft)
1.0	1.11	Y	297.	3254.	0.	3551.	1.90	1246.	1869.
2.0	1.23	Y	660.	1818.	0.	2479.	1.90	870.	1305.
3.0	1.37	Y	1104.	939.	0.	2043.	1.90	717.	1075.
4.0	1.47	Y	1573.	645.	0.	2218.	1.90	778.	1168.
5.0	1.48	Y	1979.	473.	0.	2452.	1.90	860.	1290.
6.0	1.48	Y	2387.	362.	0.	2749.	1.90	965.	1447.
7.0	1.49	Y	2792.	287.	0.	3079.	1.90	1080.	1621.
8.0	1.49	Y	3197.	233.	0.	3430.	1.90	1204.	1805.
9.0	1.49	Y	3602.	193.	0.	3796.	1.90	1332.	1998.
10.0	1.49	Y	4008.	163.	0.	4170.	1.90	1463.	2195.
11.0	1.50	Y	4413.	139.	0.	4552.	1.90	1597.	2396.
12.0	1.50	Y	4818.	120.	0.	4939.	1.90	1733.	2599.
13.0	1.50	Y	5216.	105.	0.	5321.	1.90	1867.	2800.
14.0	1.50	Y	5620.	93.	0.	5713.	1.90	2005.	3005.
15.0	1.50	Y	6025.	82.	0.	6107.	1.90	2143.	3138.
16.0	1.50	Y	6429.	73.	0.	6503.	1.90	2282.	3262.
17.0	1.50	Y	6834.	66.	0.	6900.	1.90	2421.	3377.
18.0	1.49	N	7199.	60.	0.	7259.	1.90	2547.	3472.
19.0	1.45	N	7398.	54.	0.	7452.	1.90	2615.	3520.
20.0	1.41	N	7584.	50.	0.	7634.	1.90	2679.	3563.
21.0	1.38	N	7759.	45.	0.	7804.	1.90	2738.	3602.
22.0	1.34	N	7921.	42.	0.	7963.	1.90	2794.	3636.
23.0	1.31	N	8074.	39.	0.	8112.	1.90	2846.	3667.
24.0	1.28	N	8216.	36.	0.	8252.	1.90	2895.	3695.
25.0	1.24	N	8349.	33.	0.	8382.	1.90	2941.	3720.

PROGRAM SAMM
D-LOAD REQUIREMENTS FOR A 24 IN. DIAMETER CIRCULAR PIPE

****

P I P E D A T A

DIAMETER (in.)	24.00
WALL B, THICKNESS (in.)	3.000

I N S T A L L A T I O N C O N D I T I O N S

MINIMUM DEPTH OF FILL (ft.)	1.00
MAXIMUM DEPTH OF FILL (ft.)	25.00
SOIL DENSITY (lb/cu. ft.)	140.0
SPECIFIED BEDDING FACTOR	1.90
INSTALLATION TYPE	TRENCH
TRENCH WIDTH (ft.)	5.50
SOIL LATERAL PRESSURE/FRICTION TERM (KMU')	0.1650
PARAMETERS TO COMPUTE TRANSITION WIDTH	
POSITIVE PROJECTION RATIO	1.00
POSITIVE SETTLEMENT RATIO	0.50
SOIL LATERAL PRESSURE/FRICTION TERM (KMU)	0.1924
SOIL LATERAL PRESSURE COEFICIENT	0.33

A D D I T I O N A L L O A D S

LIVE LOAD	AASHTO HS-25
NO SURCHARGE LOAD	

F A C T O R S O F S A F E T Y

FACTOR OF SAFETY ON 0.01 INCH CRACK D-LOAD (EARTH,LIVE)	1.00; 1.00
FACTOR OF SAFETY ON ULTIMATE LOAD (EARTH,LIVE) IN ACCORDANCE WITH ASTM C 76	
DL.01 LESS THAN 2000 LBS/FT/FT	1.5
DL.01 GREATER THAN 3000 LBS/FT/FT	1.25
DL.01 BETWEEN 2000 AND 3000 LBS/FT/FT	INTERPOLATED

R E S U L T S O F A N A L Y S I S

PIPE DEPTH (ft.)	ARCHING FACTOR	>TRANS	EARTH LOAD (lb/ft)	LIVE LOAD (lb/ft)	SURCH LOAD (lb/ft)	TOTAL LOAD (lb/ft)	BED FACT	REQUIRED D-LOAD 0.01 in. (lb/ft/ft)	ULT. (lb/ft/ft)
1.0	1.08	Y	378.	3760.	0.	4138.	1.90	1089.	1633.
2.0	1.17	Y	820.	2226.	0.	3045.	1.90	801.	1202.
3.0	1.27	Y	1334.	1158.	0.	2493.	1.90	656.	984.
4.0	1.38	Y	1935.	801.	0.	2736.	1.90	720.	1080.
5.0	1.46	Y	2562.	590.	0.	3152.	1.90	829.	1244.
6.0	1.47	Y	3091.	454.	0.	3545.	1.90	933.	1399.
7.0	1.48	Y	3625.	361.	0.	3985.	1.90	1049.	1573.
8.0	1.48	Y	4153.	294.	0.	4447.	1.90	1170.	1755.
9.0	1.49	Y	4682.	244.	0.	4926.	1.90	1296.	1944.
10.0	1.49	Y	5210.	206.	0.	5416.	1.90	1425.	2138.
11.0	1.49	Y	5738.	177.	0.	5915.	1.90	1557.	2335.
12.0	1.49	Y	6267.	153.	0.	6420.	1.90	1689.	2534.
13.0	1.49	Y	6795.	134.	0.	6929.	1.90	1823.	2735.
14.0	1.49	N	7293.	118.	0.	7411.	1.90	1950.	2925.
15.0	1.45	N	7616.	105.	0.	7721.	1.90	2032.	3031.
16.0	1.41	N	7920.	94.	0.	8013.	1.90	2109.	3106.
17.0	1.38	N	8206.	84.	0.	8290.	1.90	2182.	3173.
18.0	1.35	N	8475.	76.	0.	8552.	1.90	2250.	3235.
19.0	1.31	N	8729.	70.	0.	8799.	1.90	2315.	3291.
20.0	1.28	N	8968.	64.	0.	9032.	1.90	2377.	3341.
21.0	1.25	N	9193.	58.	0.	9251.	1.90	2435.	3387.
22.0	1.22	N	9405.	54.	0.	9459.	1.90	2489.	3429.
23.0	1.19	N	9605.	49.	0.	9654.	1.90	2541.	3468.
24.0	1.17	N	9793.	46.	0.	9839.	1.90	2589.	3502.
25.0	1.14	N	9970.	43.	0.	10012.	1.90	2635.	3534.

PROGRAM SAMM
D-LOAD REQUIREMENTS FOR A 30 IN. DIAMETER CIRCULAR PIPE

****

P I P E D A T A

DIAMETER (in.)	30.00
WALL B, THICKNESS (in.)	3.500

I N S T A L L A T I O N C O N D I T I O N S

MINIMUM DEPTH OF FILL (ft.)	1.00
MAXIMUM DEPTH OF FILL (ft.)	25.00
SOIL DENSITY (lb/cu. ft.)	140.0
SPECIFIED BEDDING FACTOR	1.90
INSTALLATION TYPE	TRENCH
TRENCH WIDTH (ft.)	6.08
SOIL LATERAL PRESSURE/FRICTION TERM (KMU')	0.1650
PARAMETERS TO COMPUTE TRANSITION WIDTH	
POSITIVE PROJECTION RATIO	1.00
POSITIVE SETTLEMENT RATIO	0.50
SOIL LATERAL PRESSURE/FRICTION TERM (KMU)	0.1924
SOIL LATERAL PRESSURE COEFICIENT	0.33

A D D I T I O N A L L O A D S

LIVE LOAD	AASHTO HS-25
NO SURCHARGE LOAD	

F A C T O R S O F S A F E T Y

FACTOR OF SAFETY ON 0.01 INCH CRACK D-LOAD (EARTH,LIVE)	1.00; 1.00
FACTOR OF SAFETY ON ULTIMATE LOAD (EARTH,LIVE) IN ACCORDANCE WITH ASTM C 76	
DL.01 LESS THAN 2000 LBS/FT/FT	1.5
DL.01 GREATER THAN 3000 LBS/FT/FT	1.25
DL.01 BETWEEN 2000 AND 3000 LBS/FT/FT	INTERPOLATED

R E S U L T S O F A N A L Y S I S

PIPE DEPTH (ft.)	ARCHING FACTOR	>TRANS	EARTH LOAD (lb/ft)	LIVE LOAD (lb/ft)	SURCH LOAD (lb/ft)	TOTAL LOAD (lb/ft)	BED FACT	REQUIRED D-LOAD 0.01 in. (lb/ft/ft)	ULT. (lb/ft/ft)
1.0	1.07	Y	460.	3537.	0.	3997.	1.90	841.	1262.
2.0	1.14	Y	981.	2586.	0.	3567.	1.90	751.	1126.
3.0	1.21	Y	1571.	1355.	0.	2926.	1.90	616.	924.
4.0	1.30	Y	2239.	942.	0.	3182.	1.90	670.	1005.
5.0	1.39	Y	2997.	697.	0.	3694.	1.90	778.	1166.
6.0	1.46	Y	3783.	538.	0.	4322.	1.90	910.	1365.
7.0	1.47	Y	4441.	429.	0.	4870.	1.90	1025.	1538.
8.0	1.47	Y	5093.	351.	0.	5444.	1.90	1146.	1719.
9.0	1.48	Y	5753.	292.	0.	6045.	1.90	1273.	1909.
10.0	1.48	Y	6404.	247.	0.	6652.	1.90	1400.	2101.
11.0	1.48	N	7050.	212.	0.	7262.	1.90	1529.	2293.
12.0	1.45	N	7506.	184.	0.	7690.	1.90	1619.	2429.
13.0	1.41	N	7938.	161.	0.	8099.	1.90	1705.	2558.
14.0	1.38	N	8347.	142.	0.	8490.	1.90	1787.	2681.
15.0	1.35	N	8735.	127.	0.	8862.	1.90	1866.	2798.
16.0	1.32	N	9102.	113.	0.	9215.	1.90	1940.	2910.
17.0	1.29	N	9450.	102.	0.	9552.	1.90	2011.	3011.
18.0	1.26	N	9779.	93.	0.	9872.	1.90	2078.	3077.
19.0	1.23	N	10091.	84.	0.	10175.	1.90	2142.	3137.
20.0	1.20	N	10386.	77.	0.	10463.	1.90	2203.	3193.
21.0	1.18	N	10666.	71.	0.	10737.	1.90	2260.	3243.
22.0	1.15	N	10931.	65.	0.	10996.	1.90	2315.	3290.
23.0	1.13	N	11182.	60.	0.	11242.	1.90	2367.	3333.
24.0	1.10	N	11420.	56.	0.	11476.	1.90	2416.	3373.
25.0	1.08	N	11645.	52.	0.	11697.	1.90	2462.	3409.

PROGRAM SAMM
D-LOAD REQUIREMENTS FOR A 36 IN. DIAMETER CIRCULAR PIPE

****

P I P E D A T A

DIAMETER (in.)	36.00
WALL B, THICKNESS (in.)	4.000

I N S T A L L A T I O N C O N D I T I O N S

MINIMUM DEPTH OF FILL (ft.)	1.00
MAXIMUM DEPTH OF FILL (ft.)	25.00
SOIL DENSITY (lb/cu. ft.)	140.0
SPECIFIED BEDDING FACTOR	1.90
INSTALLATION TYPE	TRENCH
TRENCH WIDTH (ft.)	6.67
SOIL LATERAL PRESSURE/FRICTION TERM (KMU')	0.1650
PARAMETERS TO COMPUTE TRANSITION WIDTH	
POSITIVE PROJECTION RATIO	1.00
POSITIVE SETTLEMENT RATIO	0.50
SOIL LATERAL PRESSURE/FRICTION TERM (KMU)	0.1924
SOIL LATERAL PRESSURE COEFICIENT	0.33

A D D I T I O N A L L O A D S

LIVE LOAD	AASHTO HS-25
NO SURCHARGE LOAD	

F A C T O R S O F S A F E T Y

FACTOR OF SAFETY ON 0.01 INCH CRACK D-LOAD (EARTH,LIVE)	1.00; 1.00
FACTOR OF SAFETY ON ULTIMATE LOAD (EARTH,LIVE) IN ACCORDANCE WITH ASTM C 76	
DL.01 LESS THAN 2000 LBS/FT/FT	1.5
DL.01 GREATER THAN 3000 LBS/FT/FT	1.25
DL.01 BETWEEN 2000 AND 3000 LBS/FT/FT	INTERPOLATED

R E S U L T S O F A N A L Y S I S

PIPE DEPTH (ft.)	ARCHING FACTOR	>TRANS	EARTH LOAD (lb/ft)	LIVE LOAD (lb/ft)	SURCH LOAD (lb/ft)	TOTAL LOAD (lb/ft)	BED FACT	REQUIRED D-LOAD 0.01 in. (lb/ft/ft)	ULT. (lb/ft/ft)
1.0	1.05	Y	541.	3517.	0.	4058.	1.90	712.	1068.
2.0	1.11	Y	1142.	2907.	0.	4049.	1.90	710.	1066.
3.0	1.18	Y	1810.	1533.	0.	3343.	1.90	587.	880.
4.0	1.24	Y	2552.	1071.	0.	3623.	1.90	636.	953.
5.0	1.31	Y	3375.	796.	0.	4171.	1.90	732.	1098.
6.0	1.39	Y	4290.	617.	0.	4907.	1.90	861.	1291.
7.0	1.46	Y	5249.	493.	0.	5742.	1.90	1007.	1511.
8.0	1.47	Y	6029.	404.	0.	6433.	1.90	1129.	1693.
9.0	1.47	N	6782.	337.	0.	7120.	1.90	1249.	1874.
10.0	1.43	N	7366.	286.	0.	7652.	1.90	1342.	2014.
11.0	1.40	N	7922.	246.	0.	8167.	1.90	1433.	2149.
12.0	1.37	N	8450.	213.	0.	8664.	1.90	1520.	2280.
13.0	1.34	N	8954.	187.	0.	9141.	1.90	1604.	2405.
14.0	1.31	N	9432.	166.	0.	9598.	1.90	1684.	2526.
15.0	1.28	N	9888.	147.	0.	10036.	1.90	1761.	2641.
16.0	1.26	N	10322.	132.	0.	10454.	1.90	1834.	2751.
17.0	1.23	N	10735.	119.	0.	10854.	1.90	1904.	2856.
18.0	1.20	N	11128.	108.	0.	11236.	1.90	1971.	2957.
19.0	1.18	N	11502.	98.	0.	11600.	1.90	2035.	3035.
20.0	1.15	N	11857.	90.	0.	11947.	1.90	2096.	3094.
21.0	1.13	N	12196.	83.	0.	12279.	1.90	2154.	3148.
22.0	1.11	N	12518.	76.	0.	12595.	1.90	2210.	3199.
23.0	1.09	N	12825.	70.	0.	12896.	1.90	2262.	3245.
24.0	1.06	N	13117.	65.	0.	13183.	1.90	2313.	3288.
25.0	1.04	N	13395.	61.	0.	13456.	1.90	2361.	3328.

PROGRAM SAMM
D-LOAD REQUIREMENTS FOR A 42 IN. DIAMETER CIRCULAR PIPE

****

P I P E D A T A

DIAMETER (in.)	42.00
WALL B, THICKNESS (in.)	4.500

I N S T A L L A T I O N C O N D I T I O N S

MINIMUM DEPTH OF FILL (ft.)	1.00
MAXIMUM DEPTH OF FILL (ft.)	25.00
SOIL DENSITY (lb/cu. ft.)	140.0
SPECIFIED BEDDING FACTOR	1.90
INSTALLATION TYPE	TRENCH
TRENCH WIDTH (ft.)	7.25
SOIL LATERAL PRESSURE/FRICTION TERM (KMU')	0.1650
PARAMETERS TO COMPUTE TRANSITION WIDTH	
POSITIVE PROJECTION RATIO	1.00
POSITIVE SETTLEMENT RATIO	0.50
SOIL LATERAL PRESSURE/FRICTION TERM (KMU)	0.1924
SOIL LATERAL PRESSURE COEFICIENT	0.33

A D D I T I O N A L L O A D S

LIVE LOAD	AASHTO HS-25
NO SURCHARGE LOAD	

F A C T O R S O F S A F E T Y

FACTOR OF SAFETY ON 0.01 INCH CRACK D-LOAD (EARTH,LIVE)	1.00; 1.00
FACTOR OF SAFETY ON ULTIMATE LOAD (EARTH,LIVE) IN ACCORDANCE WITH ASTM C 76	
DL.01 LESS THAN 2000 LBS/FT/FT	1.5
DL.01 GREATER THAN 3000 LBS/FT/FT	1.25
DL.01 BETWEEN 2000 AND 3000 LBS/FT/FT	INTERPOLATED

R E S U L T S O F A N A L Y S I S

PIPE DEPTH (ft.)	ARCHING FACTOR	>TRANS	EARTH LOAD LOAD (lb/ft)	LIVE LOAD (lb/ft)	SURCH LOAD (lb/ft)	TOTAL LOAD (lb/ft)	BED FACT	REQUIRED D-LOAD 0.01 in. (lb/ft/ft)	ULT.
1.0	1.05	Y	623.	3187.	0.	3810.	1.90	573.	859.
2.0	1.10	Y	1305.	3195.	0.	4499.	1.90	677.	1015.
3.0	1.15	Y	2051.	1695.	0.	3746.	1.90	563.	845.
4.0	1.21	Y	2868.	1190.	0.	4058.	1.90	610.	915.
5.0	1.26	Y	3763.	887.	0.	4650.	1.90	699.	1049.
6.0	1.33	Y	4742.	690.	0.	5432.	1.90	817.	1225.
7.0	1.40	Y	5814.	553.	0.	6367.	1.90	957.	1436.
8.0	1.43	N	6806.	454.	0.	7260.	1.90	1092.	1638.
9.0	1.40	N	7495.	380.	0.	7875.	1.90	1184.	1776.
10.0	1.37	N	8154.	323.	0.	8477.	1.90	1275.	1912.
11.0	1.34	N	8783.	278.	0.	9061.	1.90	1363.	2044.
12.0	1.31	N	9385.	241.	0.	9626.	1.90	1448.	2171.
13.0	1.29	N	9959.	212.	0.	10172.	1.90	1530.	2294.
14.0	1.26	N	10509.	188.	0.	10696.	1.90	1608.	2413.
15.0	1.24	N	11033.	167.	0.	11201.	1.90	1684.	2526.
16.0	1.21	N	11534.	150.	0.	11685.	1.90	1757.	2636.
17.0	1.19	N	12013.	136.	0.	12149.	1.90	1827.	2740.
18.0	1.16	N	12471.	123.	0.	12594.	1.90	1894.	2841.
19.0	1.14	N	12908.	112.	0.	13021.	1.90	1958.	2937.
20.0	1.12	N	13326.	103.	0.	13429.	1.90	2019.	3019.
21.0	1.10	N	13726.	94.	0.	13820.	1.90	2078.	3077.
22.0	1.08	N	14107.	87.	0.	14194.	1.90	2134.	3130.
23.0	1.06	N	14472.	80.	0.	14552.	1.90	2188.	3179.
24.0	1.04	N	14820.	75.	0.	14894.	1.90	2240.	3225.
25.0	1.02	N	15153.	69.	0.	15222.	1.90	2289.	3268.

PROGRAM SAMM
D-LOAD REQUIREMENTS FOR A 48 IN. DIAMETER CIRCULAR PIPE

****

P I P E D A T A

DIAMETER (in.)	48.00
WALL B, THICKNESS (in.)	5.000

I N S T A L L A T I O N C O N D I T I O N S

MINIMUM DEPTH OF FILL (ft.)	1.00
MAXIMUM DEPTH OF FILL (ft.)	25.00
SOIL DENSITY (lb/cu. ft.)	140.0
SPECIFIED BEDDING FACTOR	1.90
INSTALLATION TYPE	TRENCH
TRENCH WIDTH (ft.)	7.83
SOIL LATERAL PRESSURE/FRICTION TERM (KMU')	0.1650
PARAMETERS TO COMPUTE TRANSITION WIDTH	
POSITIVE PROJECTION RATIO	1.00
POSITIVE SETTLEMENT RATIO	0.50
SOIL LATERAL PRESSURE/FRICTION TERM (KMU)	0.1924
SOIL LATERAL PRESSURE COEFICIENT	0.33

A D D I T I O N A L L O A D S

LIVE LOAD	AASHTO HS-25
NO SURCHARGE LOAD	

F A C T O R S O F S A F E T Y

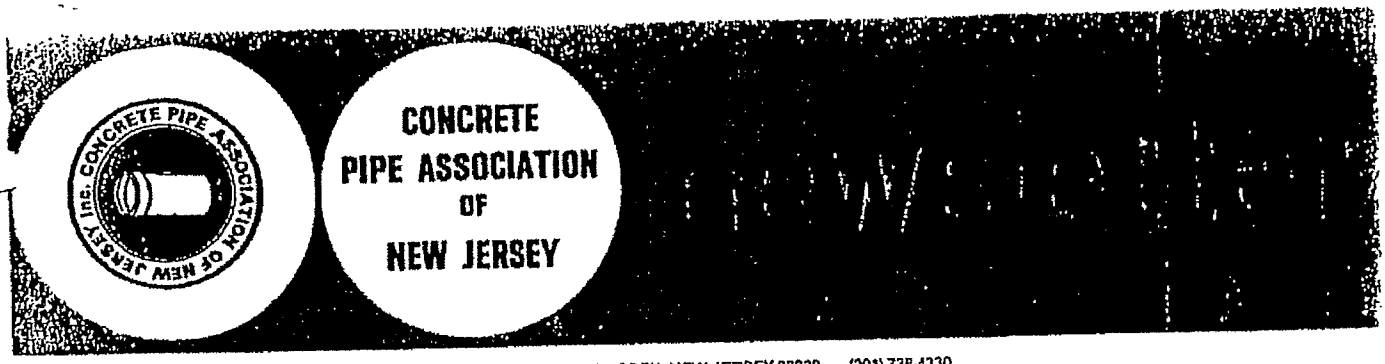
FACTOR OF SAFETY ON 0.01 INCH CRACK D-LOAD (EARTH,LIVE)	1.00; 1.00
FACTOR OF SAFETY ON ULTIMATE LOAD (EARTH,LIVE) IN ACCORDANCE WITH ASTM C 76	
DL.01 LESS THAN 2000 LBS/FT/FT	1.5
DL.01 GREATER THAN 3000 LBS/FT/FT	1.25
DL.01 BETWEEN 2000 AND 3000 LBS/FT/FT	INTERPOLATED

R E S U L T S O F A N A L Y S I S

PIPE DEPTH (ft.)	ARCHING FACTOR	>TRANS	EARTH LOAD LOAD (lb/ft)	LIVE LOAD (lb/ft)	SURCH LOAD (lb/ft)	TOTAL LOAD (lb/ft)	BED FACT	REQUIRED D-LOAD 0.01 in. (lb/ft/ft)	ULT. (lb/ft/ft)
1.0	1.04	Y	704.	2914.	0.	3618.	1.90	476.	714.
2.0	1.08	Y	1467.	3094.	0.	4561.	1.90	600.	900.
3.0	1.13	Y	2293.	1842.	0.	4135.	1.90	544.	816.
4.0	1.18	Y	3187.	1299.	0.	4486.	1.90	590.	885.
5.0	1.23	Y	4156.	972.	0.	5128.	1.90	675.	1012.
6.0	1.28	Y	5204.	758.	0.	5962.	1.90	785.	1177.
7.0	1.34	Y	6340.	609.	0.	6949.	1.90	914.	1372.
8.0	1.38	N	7444.	501.	0.	7945.	1.90	1045.	1568.
9.0	1.35	N	8210.	420.	0.	8630.	1.90	1136.	1703.
10.0	1.32	N	8945.	357.	0.	9302.	1.90	1224.	1836.
11.0	1.30	N	9649.	308.	0.	9957.	1.90	1310.	1965.
12.0	1.27	N	10324.	268.	0.	10593.	1.90	1394.	2091.
13.0	1.25	N	10972.	236.	0.	11208.	1.90	1475.	2212.
14.0	1.22	N	11592.	209.	0.	11801.	1.90	1553.	2329.
15.0	1.20	N	12187.	187.	0.	12374.	1.90	1628.	2442.
16.0	1.18	N	12758.	168.	0.	12925.	1.90	1701.	2551.
17.0	1.16	N	13305.	151.	0.	13456.	1.90	1771.	2656.
18.0	1.14	N	13829.	137.	0.	13967.	1.90	1838.	2757.
19.0	1.11	N	14332.	125.	0.	14457.	1.90	1902.	2853.
20.0	1.09	N	14814.	115.	0.	14929.	1.90	1964.	2946.
21.0	1.08	N	15276.	106.	0.	15381.	1.90	2024.	3024.
22.0	1.06	N	15719.	97.	0.	15816.	1.90	2081.	3079.
23.0	1.04	N	16144.	90.	0.	16234.	1.90	2136.	3131.
24.0	1.02	N	16551.	84.	0.	16634.	1.90	2189.	3180.
25.0	1.00	N	16941.	78.	0.	17019.	1.90	2239.	3225.

HY-8 CALCULATIONS

CALCULATION TO DETERMINE EQUIVALENT RCB TO USE IN H4-8 ANALYSIS FOR 42" RCP



P O BOX 131 KEASBEY, NEW JERSEY 08832 (201) 738-4330

NEWSLETTER NO. 2

Hydraulic data for circular pipe is readily available. This includes the various parameters involved in solving the Manning equation including Manning Roughness "n", area of cross-section, hydraulic radius and wetted perimeter. However, less available is information for elliptical pipe. One of the reasons this is true is probably because the various components are rather difficult to compute for this type of pipe. Below is a table which should be useful to the hydraulic and sanitary engineer in the solution of problems involving elliptical pipe.

Round Equiv.	Rise-Span Ellipt.	Area of Round Sq. Ft.	Area of Ellipt. Sq. Ft.	Wetted Perimeter Feet	Hydraulic Radius (Ellipt.)	Values of 1 486/n xAxR2/3		
						n=0.011	n=0.012 *	n=0.013
18	14 x 23	1.77	1.84	5.01	0.367	125	116	108
24	19 x 30	3.14	3.27	6.67	0.490	274	252	232
27	22 x 34	3.98	4.10	7.50	0.546	368	339	313
30	24 x 38	4.91	5.11	8.34	0.613	497	456	421
33	27 x 42	5.94	6.30	9.18	0.686	662	607	560
36	29 x 45	7.07	7.37	10.01	0.736	810	746	686
39	32 x 49	8.30	8.80	10.85	0.812	1036	948	875
42	34 x 53	9.62	10.21	11.76	0.875	1260	1156	1067
48	38 x 60	12.57	12.91	13.23	0.975	1707	1565	1445
54	43 x 68	15.90	16.59	15.00	1.106	2395	2196	2027
60	48 x 76	19 64	20 49	16.67	1.229	3174	2910	2686
66	53 x 83	23.8	24 78	18.33	1.352	4094	3753	3464
72	58 x 91	28.3	29 50	20.00	1.475	5164	4734	4370
78	63 x 98	33.2	34.62	21.66	1.598	6388	5856	5406
84	68 x 106	38.5	40 15	23.33	1.721	7790	7140	6590
90	72 x 113	44 2	46 10	24.99	1 845	9365	8584	7925
96	77 x 121	50 3	52 43	26 65	1 967	11112	10187	9403
102	82 x 128	56 7	59.22	28.32	2.091	13071	11983	11061
108	87 x 136	63 6	66 41	29.98	2.215	15242	13972	12897
114	92 x 143	70 9	74 00	31.60	2.340	17621	16153	14910
120	97 x 151	78 5	81 97	33.31	2.461	20175	18494	17072
132	106 x 166	95.0	99 20	36.60	2.707	26025	23856	22021
144	116 x 180	113.1	118.64	39.97	2 968	33095	30338	28004

The Concrete Pipe Association of New Jersey is prepared to assist engineers and architects in their design and other problems involving pipe. If these newsletters do not answer your questions concerning round, or elliptical pipe, or other related products, please contact me at Association headquarters, either by mail or telephone and I will be happy to call on you if you so desire

*Recommended for design

Find equivalent RCB dimensions for 53" X 34" HERCP

RCB Height = 34" = 2.83'

Equivalent Area = 10.21 ft² = SPAN x HEIGHT = SPAN X 2.83'

SPAN = 3.61'

USE 3.61' X 2.83' RCB FOR 53" X 34" HERCP

HY-8 Culvert Analysis Report

Table 1 - Summary of Culvert Flows at Crossing: Run22

Headwater Elevation (ft)	Total Discharge (cfs)	HD02BWE (5x3) Discharge (cfs)	HD02BWS (5x3) Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2774.90	0.00	0.00	0.00	0.00	0
2776.46	50.00	25.03	24.96	0.00	5
2777.35	100.00	50.02	49.96	0.00	3
2778.15	150.00	75.05	74.96	0.00	3
2778.98	200.00	99.41	99.33	1.21	4
2779.46	250.00	111.79	111.72	26.41	7
2779.73	300.00	118.35	118.28	63.15	5
2779.94	350.00	123.21	123.15	103.49	5
2780.12	400.00	127.28	127.22	145.39	5
2780.28	450.00	130.82	130.76	188.33	5
2780.43	500.00	133.96	133.90	231.90	4
2778.84	191.06	95.57	95.49	0.00	Overtopping

$Q_{10} = 253$ cfs

$Q_{50} = 343$ cfs

$Q_{100} = 432$ cfs

Q100					
2780.22	432	130	130	172	
Q50					
2779.91	343	123	123	97	
Q10					
2779.47	253	112	112	29	

Rating Curve Plot for Crossing: Run22

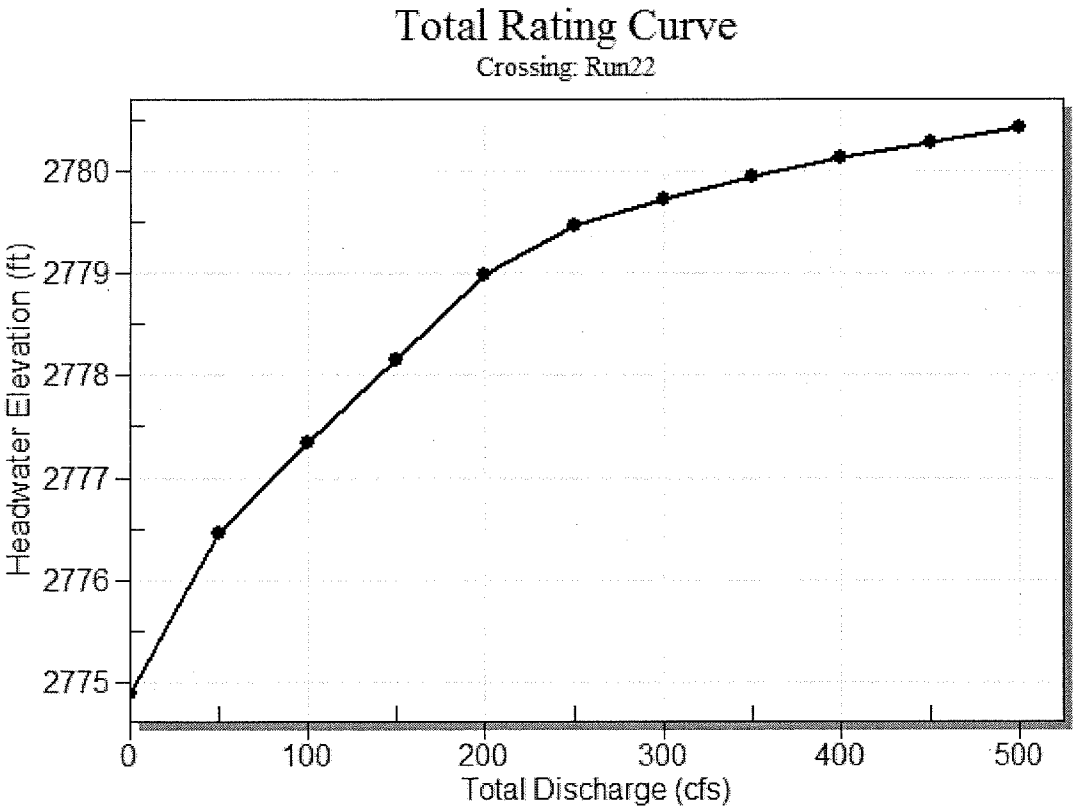


Table 2 - Culvert Summary Table: HD02BWE (5x3)

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2774.90	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
50.00	25.03	2776.46	1.558	0.0*	1-S2n	0.673	0.922	0.681	1.202	7.353	4.832
100.00	50.02	2777.35	2.451	0.0*	1-S2n	1.073	1.463	1.082	1.698	9.250	5.833
150.00	75.05	2778.15	3.247	0.0*	5-S2n	1.423	1.917	1.426	2.064	10.528	6.494
200.00	99.41	2778.98	4.079	0.0*	5-S2n	1.739	2.312	1.741	2.363	11.421	7.002
250.00	111.79	2779.46	4.555	0.0*	5-S2n	1.893	2.500	1.899	2.620	11.774	7.418
300.00	118.35	2779.73	4.826	0.0*	5-S2n	1.973	2.597	1.976	2.848	11.980	7.776
350.00	123.21	2779.94	5.036	5.036	5-S1f	2.032	2.667	2.667	3.055	9.238	8.090
400.00	127.28	2780.12	5.219	3.348	4-FFf	2.082	2.726	2.082	3.244	12.229	8.372
450.00	130.82	2780.28	5.382	3.764	4-FFf	2.124	2.776	2.124	3.419	12.318	8.628
500.00	133.96	2780.43	5.531	4.145	4-FFf	2.161	2.820	2.161	3.583	12.398	8.863

* theoretical depth is impractical. Depth reported is corrected.

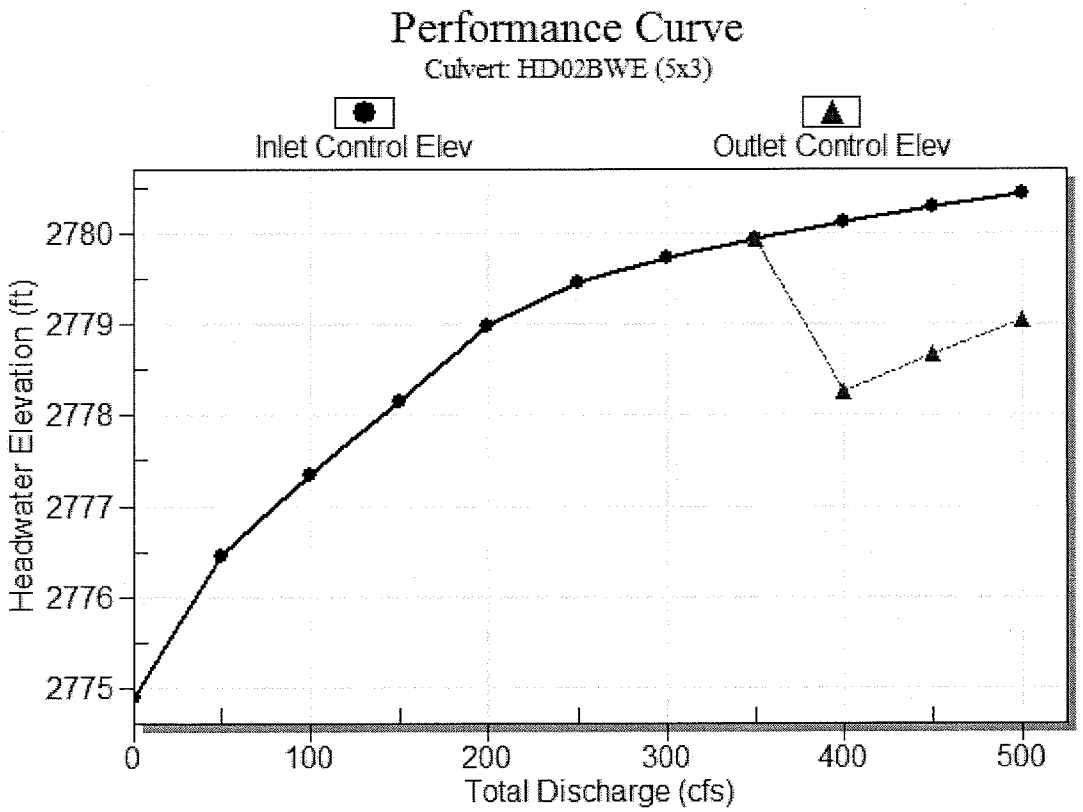
****

Inlet Elevation (invert): 2774.90 ft, Outlet Elevation (invert): 2770.75 ft

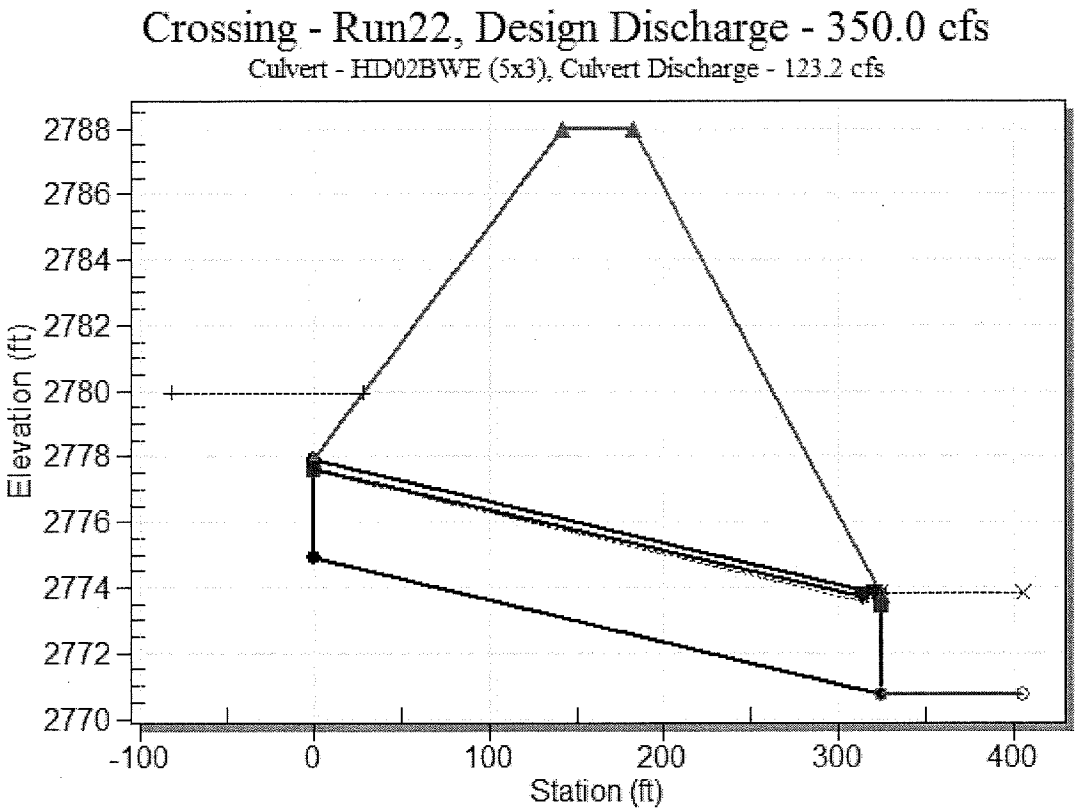
Culvert Length: 324.25 ft, Culvert Slope: 0.0128

****

Culvert Performance Curve Plot: HD02BWE (5x3)



Water Surface Profile Plot for Culvert: HD02BWE (5x3)



Site Data - HD02BWE (5x3)

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2774.90 ft

Outlet Station: 324.22 ft

Outlet Elevation: 2770.75 ft

Number of Barrels: 1

Culvert Data Summary - HD02BWE (5x3)

Barrel Shape: Concrete Box

Barrel Span: 5.00 ft

Barrel Rise: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0150

Inlet Type: Conventional

Inlet Edge Condition: Square Edge (90º) Headwall

Inlet Depression: NONE

Table 3 - Culvert Summary Table: HD02BWS (5x3)

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2774.90	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
50.00	24.96	2776.46	1.558	0.0*	1-S2n	0.707	0.920	0.710	1.202	7.030	4.832
100.00	49.96	2777.35	2.451	0.0*	1-S2n	1.134	1.461	1.140	1.698	8.762	5.833
150.00	74.96	2778.15	3.247	0.0*	5-S2n	1.507	1.915	1.508	2.064	9.940	6.494
200.00	99.33	2778.98	4.079	0.0*	5-S2n	1.842	2.311	1.845	2.363	10.768	7.002
250.00	111.72	2779.46	4.555	0.0*	5-S2n	2.006	2.499	2.008	2.620	11.128	7.418
300.00	118.28	2779.73	4.826	0.0*	5-S2n	2.093	2.596	2.095	2.848	11.293	7.776
350.00	123.15	2779.94	5.036	0.0*	5-S2n	2.155	2.667	2.157	3.055	11.421	8.090
400.00	127.22	2780.12	5.219	0.0*	5-S2n	2.207	2.725	2.214	3.244	11.492	8.372
450.00	130.76	2780.28	5.382	0.0*	5-S2n	2.252	2.775	2.254	3.419	11.601	8.628
500.00	133.90	2780.43	5.531	0.0*	5-S2n	2.292	2.820	2.299	3.583	11.651	8.863

* theoretical depth is impractical. Depth reported is corrected.

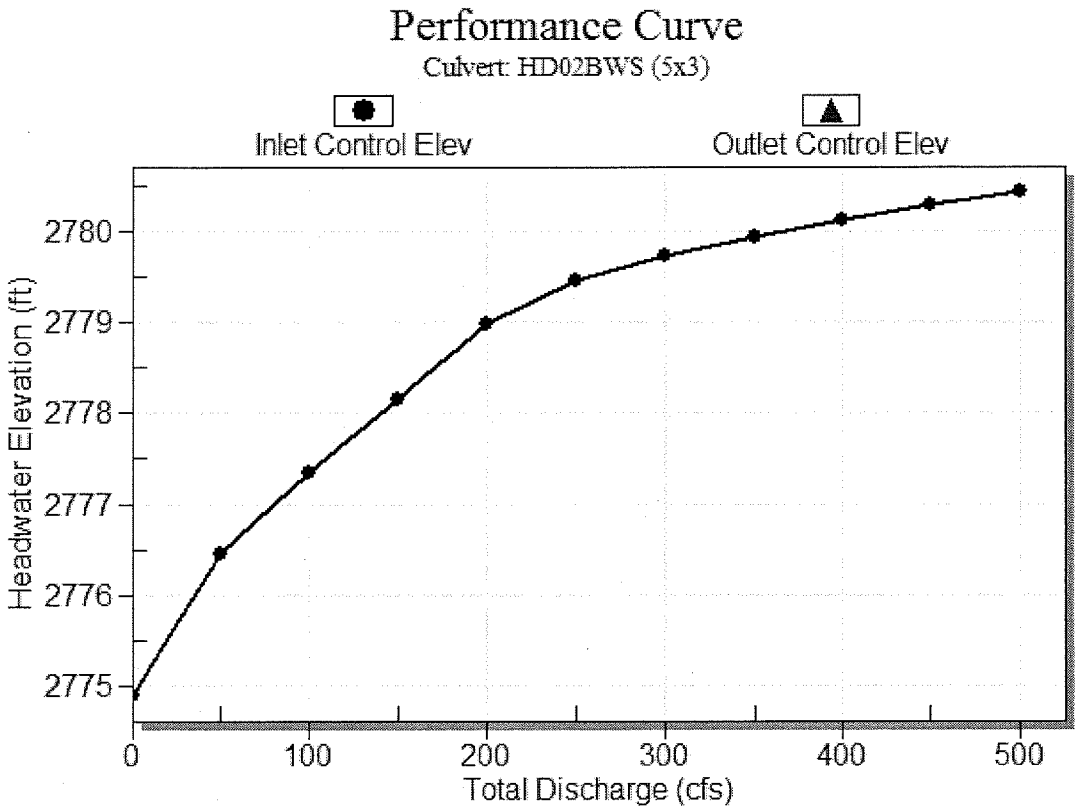
****

Inlet Elevation (invert): 2774.90 ft, Outlet Elevation (invert): 2772.48 ft

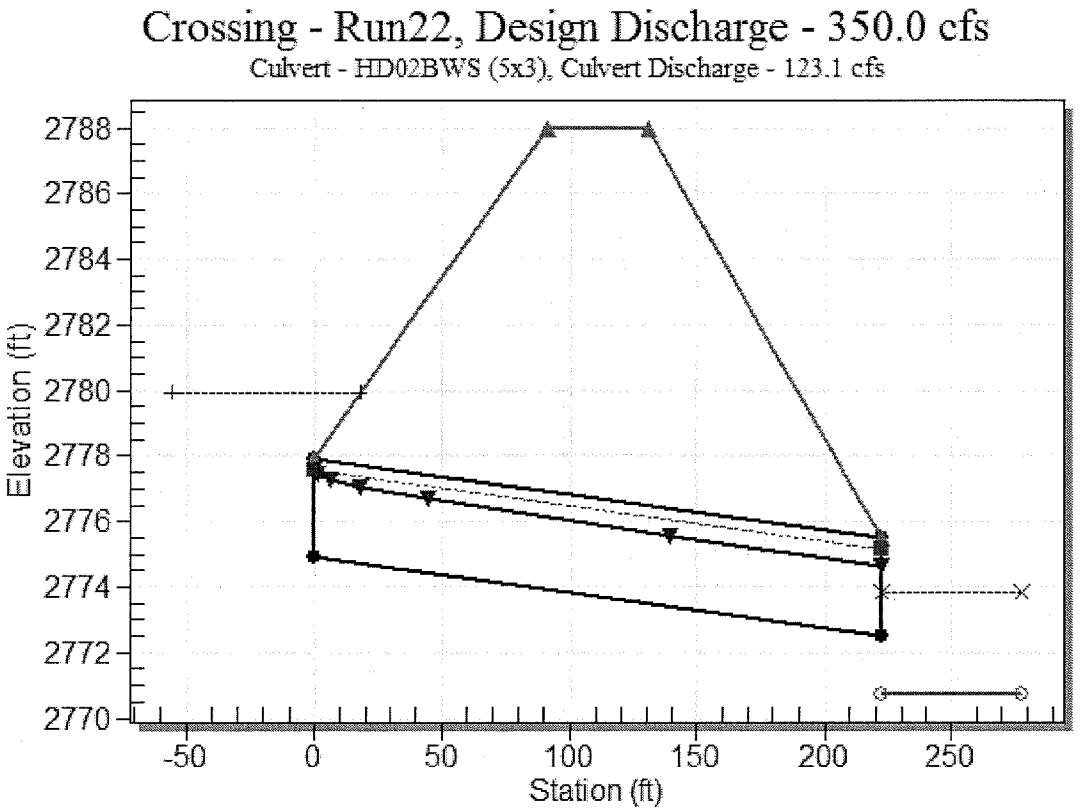
Culvert Length: 222.03 ft, Culvert Slope: 0.0109

****

Culvert Performance Curve Plot: HD02BWS (5x3)



Water Surface Profile Plot for Culvert: HD02BWS (5x3)



Site Data - HD02BWS (5x3)

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2774.90 ft

Outlet Station: 222.02 ft

Outlet Elevation: 2772.48 ft

Number of Barrels: 1

Culvert Data Summary - HD02BWS (5x3)

Barrel Shape: Concrete Box

Barrel Span: 5.00 ft

Barrel Rise: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0150

Inlet Type: Conventional

Inlet Edge Condition: Square Edge (90°) Headwall

Inlet Depression: NONE

Table 4 - Downstream Channel Rating Curve (Crossing: Run22)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2770.75	0.00	0.00	0.00	0.00
50.00	2771.95	1.20	4.83	1.65	0.93
100.00	2772.45	1.70	5.83	2.33	0.97
150.00	2772.81	2.06	6.49	2.83	0.99
200.00	2773.11	2.36	7.00	3.24	1.01
250.00	2773.37	2.62	7.42	3.60	1.03
300.00	2773.60	2.85	7.78	3.91	1.04
350.00	2773.80	3.05	8.09	4.19	1.05
400.00	2773.99	3.24	8.37	4.45	1.06
450.00	2774.17	3.42	8.63	4.69	1.06
500.00	2774.33	3.58	8.86	4.92	1.07

Tailwater Channel Data - Run22

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 5.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0220

Channel Manning's n: 0.0400

Channel Invert Elevation: 2770.75 ft

Roadway Data for Crossing: Run22

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	0.00	2788.00
1	55.55	2787.00
2	107.60	2786.00
3	160.62	2785.00
4	229.21	2784.00
5	277.55	2783.00
6	301.44	2782.21
7	358.13	2779.58
8	400.00	2778.84
9	405.00	2778.84
10	435.00	2786.00

Roadway Surface: Paved

Roadway Top Width: 40.00 ft

WSPGW CALCULATIONS

WSPGW MODEL
KCMAIN.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0

T2 MAINLINE SD
T3 412-634A
SO  -3439.5702761.570 48                          2763.00
R   -3330.5702761.900 48      .013                                .000 -45.000 1
R   -3325.5702762.000 48      .013                                .000    .000 0
R   -3087.8702762.710 48      .013                                .000  61.000 1
R   -3082.8702762.810 48      .013                                .000    .000 0
R   -3007.3702763.040 48      .013                                .000  31.000 1
R   -3002.3702763.140 48      .013                                .000    .000 0
R   -2837.5702763.640 48      .013                                .000    .000 1
TS  -2832.5702763.740 42      .013                                .000       15.000
R   -2556.1702764.460 42      .013                                .000    .000 1
JX  -2551.1702764.560 42 24   .013    7.600          2764.660      73.0       -7.000
R   -2394.4702765.453 42      .013                                .000    .000 1
JX  -2389.4702765.553 42 30   .013   17.400          2766.050     -70.0       14.000
R   -2308.2702767.331 42      .013                                .000    .000 1
JX  -2303.2702767.431 42 18   .013    1.600          2768.830     -90.0      -13.000
R   -2116.1702768.397 42      .013                                .000   5.000 1
JX  -2111.1702768.497 42 18   .013    1.400          2769.900     -65.0        5.000
R   -1961.0702769.264 42      .013                                .000    .000 1
JX  -1956.0702769.364 30 30   .013   23.100          2769.760      47.0      -16.000
R   -1870.8702775.315 30      .013                                .000    .000 1
JX  -1865.8702775.415 30 18   .013    0.800          2775.500      45.0       19.000
R   -1710.4702781.015 30      .013                                .000    .000 1
JX  -1705.4702781.115 30 18   .013    2.600          2781.620     -60.0       -9.000
R   -1577.4702785.595 30      .013                                .000    .000 1
JX  -1572.4702785.695 30 18   .013    2.100          2786.700      67.0       -6.000
R   -1354.9702792.490 30      .013                                .000    .000 1
JX  -1349.9702792.590 30 18   .013    2.000          2793.590      62.0      -27.000
R   -1255.1702797.207 30      .013                                .000    .000 1
JX  -1250.1702797.307 30 18   .013    3.400          2798.210      73.0      -13.000
R   -1038.2702808.131 30      .013                                .000  60.000 1
R   -1033.2702808.231 30      .013                                .000    .000 0
R    -974.3702825.353 30      .013                                .000    .000 0
SH   -974.3702825.353 30      .013
CD  18  4   0     .000   1.500      .000  .000  .000   .00
CD  24  4   0     .000   2.000      .000  .000  .000   .00
CD  30  4   0     .000   2.500      .000  .000  .000   .00
CD  36  4   0     .000   3.000      .000  .000  .000   .00
CD  42  4   0     .000   3.500      .000  .000  .000   .00
CD  48  4   0     .000   4.000      .000  .000  .000   .00
Q            24.000    .0
```

KYLE CANYON INTERCHANGE
MAINLINE SD
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-3439.570	2761.570	2.811	2764.381	86.00	9.11	1.29	2765.67	.00	2.81	3.66	4.000	.000	.00	0 .0
6.078	.0030					.0048	.03	2.81	1.00	4.00	.013	.00	.00	PIPE
-3433.492	2761.588	2.939	2764.527	86.00	8.69	1.17	2765.70	.00	2.81	3.53	4.000	.000	.00	0 .0
26.316	.0030					.0043	.11	2.94	.91	4.00	.013	.00	.00	PIPE
-3407.176	2761.668	3.079	2764.747	86.00	8.29	1.07	2765.81	.00	2.81	3.37	4.000	.000	.00	0 .0
69.179	.0030					.0039	.27	3.08	.83	4.00	.013	.00	.00	PIPE
-3337.997	2761.877	3.234	2765.112	86.00	7.90	.97	2766.08	.00	2.81	3.15	4.000	.000	.00	0 .0
7.426	.0030					.0037	.03	3.23	.75	4.00	.013	.00	.00	PIPE
-3330.570	2761.900	3.245	2765.145	86.00	7.88	.96	2766.11	.00	2.81	3.13	4.000	.000	.00	0 .0
3.722	.0200					.0038	.01	3.25	.74	1.82	.013	.00	.00	PIPE
-3326.848	2761.974	3.089	2765.063	86.00	8.26	1.06	2766.12	.00	2.81	3.36	4.000	.000	.00	0 .0
1.278	.0200					.0041	.01	3.09	.83	1.82	.013	.00	.00	PIPE
-3325.570	2762.000	3.017	2765.017	86.00	8.46	1.11	2766.13	.00	2.81	3.44	4.000	.000	.00	0 .0
44.522	.0030					.0040	.18	3.02	.87	4.00	.013	.00	.00	PIPE
-3281.048	2762.133	3.165	2765.298	86.00	8.06	1.01	2766.31	.00	2.81	3.25	4.000	.000	.00	0 .0
111.183	.0030					.0037	.41	3.17	.78	4.00	.013	.00	.00	PIPE
-3169.865	2762.465	3.332	2765.797	86.00	7.69	.92	2766.71	.00	2.81	2.98	4.000	.000	.00	0 .0
81.995	.0030					.0034	.28	3.33	.70	4.00	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
MAINLINE SD
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-3087.870	2762.710	3.401	2766.111	86.00	7.55	.89	2767.00	.00	2.81	2.86	4.000	.000	.00	0 .0
5.000	.0200					.0035	.02	3.40	.67	1.82	.013	.00	.00	PIPE
-3082.870	2762.810	3.236	2766.046	86.00	7.90	.97	2767.01	.00	2.81	3.14	4.000	.000	.00	0 .0
75.500	.0030					.0036	.27	3.24	.75	4.00	.013	.00	.00	PIPE
-3007.370	2763.040	3.323	2766.363	86.00	7.71	.92	2767.29	.00	2.81	3.00	4.000	.000	.00	0 .0
4.506	.0200					.0037	.02	3.32	.70	1.82	.013	.00	.00	PIPE
-3002.864	2763.130	3.158	2766.288	86.00	8.08	1.01	2767.30	.00	2.81	3.26	4.000	.000	.00	0 .0
.494	.0200					.0039	.00	3.16	.79	1.82	.013	.00	.00	PIPE
-3002.370	2763.140	3.136	2766.276	86.00	8.14	1.03	2767.30	.00	2.81	3.29	4.000	.000	.00	0 .0
99.748	.0030					.0037	.37	3.14	.80	4.00	.013	.00	.00	PIPE
-2902.623	2763.443	3.299	2766.741	86.00	7.76	.93	2767.68	.00	2.81	3.04	4.000	.000	.00	0 .0
36.516	.0030					.0035	.13	3.30	.72	4.00	.013	.00	.00	PIPE
-2866.107	2763.553	3.329	2766.883	86.00	7.69	.92	2767.80	.00	2.81	2.99	4.000	.000	.00	0 .0
HYDRAULIC JUMP														
-2866.107	2763.553	2.357	2765.911	86.00	11.16	1.94	2767.85	.00	2.81	3.94	4.000	.000	.00	0 .0

10.791	.0030					.0087	.09	2.36	1.41	4.00	.013	.00	.00	PIPE		
-2855.316	2763.586	2.301	2765.886	86.00	11.50	2.05	2767.94	.00	2.81	3.95	4.000	.000	.00	0	.0	
17.746	.0030					.0097	.17	2.30	1.47	4.00	.013	.00	.00	PIPE		

KYLE CANYON INTERCHANGE
MAINLINE SD
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-2837.570	2763.640	2.213	2765.853	86.00	12.06	2.26	2768.11	.00	2.81	3.98	4.000	.000	.00	0 .0
TRANS STR	.0200					.0087	.04	2.21	1.59		.013	.00	.00	PIPE
-2832.570	2763.740	2.886	2766.626	86.00	10.13	1.59	2768.22	.00	2.89	2.66	3.500	.000	.00	0 .0
4.645	.0026					.0069	.03	2.89	1.00	3.50	.013	.00	.00	PIPE
-2827.925	2763.752	3.051	2766.803	86.00	9.66	1.45	2768.25	.00	2.89	2.34	3.500	.000	.00	0 .0
20.011	.0026					.0065	.13	3.05	.87	3.50	.013	.00	.00	PIPE
-2807.914	2763.804	3.261	2767.065	86.00	9.21	1.32	2768.38	.00	2.89	1.77	3.500	.000	.00	0 .0
40.136	.0026					.0066	.27	3.26	.71	3.50	.013	.00	.00	PIPE
-2767.778	2763.909	3.500	2767.409	86.00	8.94	1.24	2768.65	.00	2.89	.00	3.500	.000	.00	0 .0
211.608	.0026					.0071	1.51	3.50	.00	3.50	.013	.00	.00	PIPE
-2556.170	2764.460	4.543	2769.003	86.00	8.94	1.24	2770.24	.00	2.89	.00	3.500	.000	.00	0 .0
JUNCT STR	.0200					.0067	.03	.00	.00		.013	.00	.00	PIPE
-2551.170	2764.560	4.878	2769.438	78.40	8.15	1.03	2770.47	.00	2.77	.00	3.500	.000	.00	0 .0
156.700	.0057					.0061	.95	4.88	.00	2.98	.013	.00	.00	PIPE
-2394.470	2765.453	4.988	2770.441	78.40	8.15	1.03	2771.47	.00	2.77	.00	3.500	.000	.00	0 .0
JUNCT STR	.0200					.0049	.02	.00	.00		.013	.00	.00	PIPE
-2389.470	2765.553	5.658	2771.211	61.00	6.34	.62	2771.83	.00	2.45	.00	3.500	.000	.00	0 .0
81.200	.0219					.0037	.30	5.66	.00	1.56	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
MAINLINE SD
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-2308.270	2767.331	4.210	2771.541	61.00	6.34	.62	2772.16	.00	2.45	.00	3.500	.000	.00	0 .0
JUNCT STR	.0200					.0036	.02	.00	.00		.013	.00	.00	PIPE
-2303.270	2767.431	4.192	2771.623	59.40	6.17	.59	2772.22	.00	2.41	.00	3.500	.000	.00	0 .0
187.100	.0052					.0035	.65	4.19	.00	2.42	.013	.00	.00	PIPE
-2116.170	2768.397	3.918	2772.315	59.40	6.17	.59	2772.91	.00	2.41	.00	3.500	.000	.00	0 .0
JUNCT STR	.0200					.0034	.02	.00	.00		.013	.00	.00	PIPE
-2111.170	2768.497	3.888	2772.385	58.00	6.03	.56	2772.95	.00	2.39	.00	3.500	.000	.00	0 .0
150.100	.0051					.0033	.50	3.89	.00	2.38	.013	.00	.00	PIPE
-1961.070	2769.264	3.649	2772.913	58.00	6.03	.56	2773.48	.00	2.39	.00	3.500	.000	.00	0 .0
JUNCT STR	.0200							.00	.00		.013	.00	.00	PIPE
-1956.070	2769.364	1.026	2770.390	34.90	18.40	5.26	2775.65	.00	2.01	2.46	2.500	.000	.00	0 .0
11.135	.0698					.0570	.63	1.03	3.69	.98	.013	.00	.00	PIPE
-1944.935	2770.142	1.037	2771.178	34.90	18.14	5.11	2776.29	.00	2.01	2.46	2.500	.000	.00	0 .0

24.569	.0698						.0525	1.29	1.04	3.62	.98	.013	.00	.00	PIPE				
-1920.365	2771.858	1.075	2772.933	34.90	17.30	4.65	2777.58	.00	2.01	2.48	2.500	.000	.00	0	.0				
16.119	.0698						.0461	.74	1.07	3.38	.98	.013	.00	.00	PIPE				
-1904.246	2772.984	1.115	2774.098	34.90	16.49	4.22	2778.32	.00	2.01	2.49	2.500	.000	.00	0	.0				
11.678	.0698						.0405	.47	1.11	3.15	.98	.013	.00	.00	PIPE				

Program Package Serial Number: 3074

WATER SURFACE PROFILE LISTING Date:12-23-2016 Time:10: 3:37

KYLE CANYON INTERCHANGE
MAINLINE SD
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1892.567	2773.800	1.156	2774.956	34.90	15.72	3.84	2778.79	.00	2.01	2.49	2.500	.000	.00	0 .0
8.934	.0698					.0356	.32	1.16	2.94	.98	.013	.00	.00	PIPE
-1883.633	2774.424	1.199	2775.623	34.90	14.99	3.49	2779.11	.00	2.01	2.50	2.500	.000	.00	0 .0
7.064	.0698					.0314	.22	1.20	2.74	.98	.013	.00	.00	PIPE
-1876.569	2774.917	1.245	2776.162	34.90	14.29	3.17	2779.33	.00	2.01	2.50	2.500	.000	.00	0 .0
5.699	.0698					.0276	.16	1.24	2.55	.98	.013	.00	.00	PIPE
-1870.870	2775.315	1.293	2776.607	34.90	13.63	2.88	2779.49	.96	2.01	2.50	2.500	.000	.00	0 .0
JUNCT STR	.0200					.0304	.15	2.25	2.37		.013	.00	.00	PIPE
-1865.870	2775.415	1.168	2776.583	34.10	15.17	3.57	2780.15	.00	1.98	2.49	2.500	.000	.00	0 .0
29.786	.0360					.0347	1.03	1.17	2.81	1.16	.013	.00	.00	PIPE
-1836.084	2776.489	1.174	2777.662	34.10	15.07	3.52	2781.19	.00	1.98	2.50	2.500	.000	.00	0 .0
73.781	.0360					.0323	2.38	1.17	2.79	1.16	.013	.00	.00	PIPE
-1762.304	2779.147	1.218	2780.365	34.10	14.37	3.20	2783.57	.00	1.98	2.50	2.500	.000	.00	0 .0
32.184	.0360					.0284	.91	1.22	2.60	1.16	.013	.00	.00	PIPE
-1730.120	2780.307	1.264	2781.571	34.10	13.70	2.91	2784.48	.00	1.98	2.50	2.500	.000	.00	0 .0
19.650	.0360					.0250	.49	1.26	2.42	1.16	.013	.00	.00	PIPE
-1710.470	2781.015	1.313	2782.328	34.10	13.06	2.65	2784.98	.42	1.98	2.50	2.500	.000	.00	0 .0
JUNCT STR	.0200					.0289	.14	1.73	2.25		.013	.00	.00	PIPE

Program Package Serial Number: 3074

WATER SURFACE PROFILE LISTING Date:12-23-2016 Time:10: 3:37

KYLE CANYON INTERCHANGE
MAINLINE SD
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1705.470	2781.115	1.123	2782.238	31.50	14.74	3.38	2785.61	.00	1.91	2.49	2.500	.000	.00	0 .0
78.896	.0350					.0331	2.61	1.12	2.80	1.12	.013	.00	.00	PIPE
-1626.573	2783.876	1.146	2785.022	31.50	14.36	3.20	2788.22	.00	1.91	2.49	2.500	.000	.00	0 .0
49.104	.0350					.0300	1.47	1.15	2.70	1.12	.013	.00	.00	PIPE
-1577.470	2785.595	1.189	2786.784	31.50	13.69	2.91	2789.69	.30	1.91	2.50	2.500	.000	.00	0 .0
JUNCT STR	.0200					.0296	.15	1.49	2.51		.013	.00	.00	PIPE
-1572.470	2785.695	1.108	2786.803	29.40	14.00	3.04	2789.85	.00	1.85	2.48	2.500	.000	.00	0 .0
93.003	.0312					.0312	2.91	1.11	2.68	1.11	.013	.00	.00	PIPE
-1479.467	2788.601	1.108	2789.709	29.40	14.00	3.04	2792.75	.00	1.85	2.48	2.500	.000	.00	0 .0
124.497	.0312					.0297	3.69	1.11	2.68	1.11	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1354.970	2792.490	1.142	2793.632	29.40	13.45	2.81	2796.44	1.32	1.85	2.49	2.500	.000	.00	0 .0
JUNCT STR	.0200					.0371	.19	2.46	2.53		.013	.00	.00	PIPE
-1349.970	2792.590	.958	2793.548	27.40	15.83	3.89	2797.44	.00	1.78	2.43	2.500	.000	.00	0 .0
30.509	.0487					.0451	1.37	.96	3.31	.94	.013	.00	.00	PIPE
-1319.461	2794.076	.969	2795.045	27.40	15.58	3.77	2798.82	.00	1.78	2.44	2.500	.000	.00	0 .0
42.070	.0487					.0414	1.74	.97	3.23	.94	.013	.00	.00	PIPE
-1277.391	2796.125	1.004	2797.129	27.40	14.86	3.43	2800.56	.00	1.78	2.45	2.500	.000	.00	0 .0
22.221	.0487					.0363	.81	1.00	3.02	.94	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1255.170	2797.207	1.041	2798.248	27.40	14.17	3.12	2801.36	.70	1.78	2.46	2.500	.000	.00	0 .0
JUNCT STR	.0200					.0428	.21	1.74	2.82		.013	.00	.00	PIPE
-1250.170	2797.307	.865	2798.172	24.00	15.92	3.94	2802.11	.00	1.67	2.38	2.500	.000	.00	0 .0
1.215	.0511					.0517	.06	.87	3.52	.87	.013	.00	.00	PIPE
-1248.955	2797.369	.865	2798.234	24.00	15.93	3.94	2802.17	.00	1.67	2.38	2.500	.000	.00	0 .0
84.505	.0511					.0554	4.68	.86	3.53	.87	.013	.00	.00	PIPE
-1164.450	2801.686	.835	2802.521	24.00	16.70	4.33	2806.85	.00	1.67	2.36	2.500	.000	.00	0 .0
33.337	.0511					.0632	2.11	.84	3.77	.87	.013	.00	.00	PIPE
-1131.113	2803.388	.807	2804.195	24.00	17.52	4.77	2808.96	.00	1.67	2.34	2.500	.000	.00	0 .0
21.290	.0511					.0722	1.54	.81	4.03	.87	.013	.00	.00	PIPE
-1109.823	2804.476	.779	2805.255	24.00	18.37	5.24	2810.50	.00	1.67	2.32	2.500	.000	.00	0 .0
15.884	.0511					.0824	1.31	.78	4.31	.87	.013	.00	.00	PIPE
-1093.938	2805.287	.753	2806.040	24.00	19.27	5.77	2811.81	.00	1.67	2.29	2.500	.000	.00	0 .0
12.798	.0511					.0941	1.20	.75	4.61	.87	.013	.00	.00	PIPE
-1081.140	2805.941	.728	2806.669	24.00	20.21	6.34	2813.01	.00	1.67	2.27	2.500	.000	.00	0 .0
10.796	.0511					.1076	1.16	.73	4.93	.87	.013	.00	.00	PIPE
-1070.344	2806.493	.703	2807.196	24.00	21.20	6.98	2814.17	.00	1.67	2.25	2.500	.000	.00	0 .0
9.386	.0511					.1229	1.15	.70	5.26	.87	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1060.958	2806.972	.680	2807.652	24.00	22.23	7.67	2815.33	.00	1.67	2.22	2.500	.000	.00	0 .0
8.331	.0511					.1405	1.17	.68	5.62	.87	.013	.00	.00	PIPE
-1052.628	2807.398	.657	2808.055	24.00	23.32	8.44	2816.50	.00	1.67	2.20	2.500	.000	.00	0 .0
7.509	.0511					.1606	1.21	.66	6.01	.87	.013	.00	.00	PIPE
-1045.118	2807.781	.635	2808.416	24.00	24.45	9.29	2817.70	.00	1.67	2.18	2.500	.000	.00	0 .0
6.848	.0511					.1836	1.26	.64	6.42	.87	.013	.00	.00	PIPE
-1038.270	2808.131	.614	2808.745	24.00	25.65	10.21	2818.96	.00	1.67	2.15	2.500	.000	.00	0 .0
5.000	.0200					.2093	1.05	.61	6.85	1.12	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1033.270	2808.230	.594	2808.825	24.00	26.84	11.19	2820.01	.00	1.67	2.13	2.500	.000	.00	0 .0
7.091	.2907					.2154	1.53	.59	7.30	.56	.013	.00	.00	PIPE
-1026.179	2810.292	.605	2810.896	24.00	26.21	10.66	2821.56	.00	1.67	2.14	2.500	.000	.00	0 .0
9.922	.2907					.1951	1.94	.60	7.06	.56	.013	.00	.00	PIPE
-1016.257	2813.176	.625	2813.801	24.00	24.99	9.70	2823.50	.00	1.67	2.17	2.500	.000	.00	0 .0
7.160	.2907					.1706	1.22	.63	6.61	.56	.013	.00	.00	PIPE
-1009.098	2815.257	.647	2815.904	24.00	23.82	8.81	2824.72	.00	1.67	2.19	2.500	.000	.00	0 .0
5.507	.2907					.1492	.82	.65	6.19	.56	.013	.00	.00	PIPE
-1003.591	2816.858	.669	2817.527	24.00	22.72	8.01	2825.54	.00	1.67	2.21	2.500	.000	.00	0 .0
4.404	.2907					.1306	.58	.67	5.79	.56	.013	.00	.00	PIPE

Program Package Serial Number: 3074

WATER SURFACE PROFILE LISTING Date:12-23-2016 Time:10: 3:37

KYLE CANYON INTERCHANGE
MAINLINE SD
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-999.187	2818.138	.692	2818.831	24.00	21.66	7.28	2826.11	.00	1.67	2.24	2.500	.000	.00	0 .0
3.617	.2907					.1143	.41	.69	5.42	.56	.013	.00	.00	PIPE
-995.570	2819.190	.716	2819.906	24.00	20.65	6.62	2826.53	.00	1.67	2.26	2.500	.000	.00	0 .0
3.026	.2907					.1000	.30	.72	5.08	.56	.013	.00	.00	PIPE
-992.544	2820.070	.741	2820.811	24.00	19.69	6.02	2826.83	.00	1.67	2.28	2.500	.000	.00	0 .0
2.566	.2907					.0875	.22	.74	4.75	.56	.013	.00	.00	PIPE
-989.978	2820.816	.767	2821.583	24.00	18.77	5.47	2827.06	.00	1.67	2.31	2.500	.000	.00	0 .0
2.199	.2907					.0766	.17	.77	4.44	.56	.013	.00	.00	PIPE
-987.779	2821.455	.794	2822.249	24.00	17.90	4.98	2827.22	.00	1.67	2.33	2.500	.000	.00	0 .0
1.898	.2907					.0671	.13	.79	4.16	.56	.013	.00	.00	PIPE
-985.882	2822.007	.822	2822.829	24.00	17.07	4.52	2827.35	.00	1.67	2.35	2.500	.000	.00	0 .0
1.648	.2907					.0588	.10	.82	3.89	.56	.013	.00	.00	PIPE
-984.234	2822.486	.851	2823.337	24.00	16.27	4.11	2827.45	.00	1.67	2.37	2.500	.000	.00	0 .0
1.437	.2907					.0515	.07	.85	3.63	.56	.013	.00	.00	PIPE
-982.797	2822.903	.882	2823.785	24.00	15.52	3.74	2827.52	.00	1.67	2.39	2.500	.000	.00	0 .0
1.256	.2907					.0452	.06	.88	3.40	.56	.013	.00	.00	PIPE
-981.542	2823.268	.913	2824.181	24.00	14.79	3.40	2827.58	.00	1.67	2.41	2.500	.000	.00	0 .0
1.100	.2907					.0396	.04	.91	3.18	.56	.013	.00	.00	PIPE

Program Package Serial Number: 3074

WATER SURFACE PROFILE LISTING Date:12-23-2016 Time:10: 3:37

KYLE CANYON INTERCHANGE
MAINLINE SD
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-980.442	2823.588	.946	2824.534	24.00	14.10	3.09	2827.62	.00	1.67	2.42	2.500	.000	.00	0 .0
.964	.2907					.0347	.03	.95	2.97	.56	.013	.00	.00	PIPE
-979.478	2823.868	.980	2824.848	24.00	13.45	2.81	2827.66	.00	1.67	2.44	2.500	.000	.00	0 .0
.844	.2907					.0305	.03	.98	2.77	.56	.013	.00	.00	PIPE
-978.634	2824.114	1.016	2825.129	24.00	12.82	2.55	2827.68	.00	1.67	2.46	2.500	.000	.00	0 .0

.739	.2907					.0268	.02	1.02	2.59	.56	.013	.00	.00	PIPE			
-977.895	2824.328	1.053	2825.381	24.00	12.23	2.32	2827.70	.00	1.67	2.47	2.500	.000	.00	0	.0		
.645	.2907					.0235	.02	1.05	2.42	.56	.013	.00	.00	PIPE			
-977.250	2824.516	1.091	2825.607	24.00	11.66	2.11	2827.72	.00	1.67	2.48	2.500	.000	.00	0	.0		
.560	.2907					.0206	.01	1.09	2.25	.56	.013	.00	.00	PIPE			
-976.690	2824.679	1.132	2825.811	24.00	11.11	1.92	2827.73	.00	1.67	2.49	2.500	.000	.00	0	.0		
.485	.2907					.0182	.01	1.13	2.10	.56	.013	.00	.00	PIPE			
-976.205	2824.820	1.174	2825.994	24.00	10.60	1.74	2827.74	.00	1.67	2.50	2.500	.000	.00	0	.0		
.416	.2907					.0160	.01	1.17	1.96	.56	.013	.00	.00	PIPE			
-975.789	2824.940	1.218	2826.159	24.00	10.10	1.59	2827.74	.00	1.67	2.50	2.500	.000	.00	0	.0		
.353	.2907					.0141	.00	1.22	1.83	.56	.013	.00	.00	PIPE			
-975.436	2825.043	1.265	2826.308	24.00	9.63	1.44	2827.75	.00	1.67	2.50	2.500	.000	.00	0	.0		
.296	.2907					.0124	.00	1.26	1.70	.56	.013	.00	.00	PIPE			

Program Package Serial Number: 3074

WATER SURFACE PROFILE LISTING Date:12-23-2016 Time:10: 3:37

KYLE CANYON INTERCHANGE
MAINLINE SD
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-975.140	2825.129	1.313	2826.443	24.00	9.19	1.31	2827.75	.00	1.67	2.50	2.500	.000	.00	0 .0
.243	.2907					.0109	.00	1.31	1.58	.56	.013	.00	.00	PIPE
-974.897	2825.200	1.365	2826.564	24.00	8.76	1.19	2827.76	.00	1.67	2.49	2.500	.000	.00	0 .0
.193	.2907					.0096	.00	1.36	1.47	.56	.013	.00	.00	PIPE
-974.704	2825.256	1.418	2826.674	24.00	8.35	1.08	2827.76	.00	1.67	2.48	2.500	.000	.00	0 .0
.148	.2907					.0085	.00	1.42	1.37	.56	.013	.00	.00	PIPE
-974.556	2825.299	1.475	2826.774	24.00	7.96	.98	2827.76	.00	1.67	2.46	2.500	.000	.00	0 .0
.104	.2907					.0075	.00	1.48	1.27	.56	.013	.00	.00	PIPE
-974.452	2825.329	1.535	2826.865	24.00	7.59	.89	2827.76	.00	1.67	2.43	2.500	.000	.00	0 .0
.062	.2907					.0067	.00	1.54	1.17	.56	.013	.00	.00	PIPE
-974.391	2825.347	1.599	2826.946	24.00	7.24	.81	2827.76	.00	1.67	2.40	2.500	.000	.00	0 .0
.021	.2907					.0059	.00	1.60	1.09	.56	.013	.00	.00	PIPE
-974.370	2825.353	1.668	2827.021	24.00	6.90	.74	2827.76	.00	1.67	2.36	2.500	.000	.00	0 .0

♀

WSPGW MODEL
KCE1_12+53.WSW

KCE1_12+53.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0
T2 Facility D1

T3 412-634A
SO   1000.0002798.210  1                          2799.710
R    1015.0002798.460  1      .013                                .000    .000 0
SH   1015.0002798.460  1
CD   1  4   1    .000   1.500     .000  .000  .000   .00
Q             3.400   .0
```

KYLE CANYON INTERCHANGE
Facility D1
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	2798.210	1.500	2799.710	3.40	1.92	.06	2799.77	.00	.70	.00	1.500	.000	.00	1 .0
.000	.0167					.0010	.00	1.50	.00	.51	.013	.00	.00	PIPE
1000.000	2798.210	1.500	2799.710	3.40	1.92	.06	2799.77	.00	.70	.00	1.500	.000	.00	1 .0
8.432	.0167					.0010	.01	1.50	.00	.51	.013	.00	.00	PIPE
1008.432	2798.351	1.361	2799.711	3.40	2.02	.06	2799.77	.00	.70	.87	1.500	.000	.00	1 .0
4.738	.0167					.0009	.00	1.36	.26	.51	.013	.00	.00	PIPE
1013.170	2798.429	1.280	2799.709	3.40	2.12	.07	2799.78	.00	.70	1.06	1.500	.000	.00	1 .0
1.830	.0167					.0010	.00	1.28	.30	.51	.013	.00	.00	PIPE
1015.000	2798.460	1.248	2799.708	3.40	2.16	.07	2799.78	.00	.70	1.12	1.500	.000	.00	1 .0

♀

WSPGW MODEL
KCE1_13+41.WSW

KCE1_13+41.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0
T2 Facility D2

T3 412-634A
SO   1000.0002793.590  1                          2795.090
R    1009.0002795.000  1      .013                                .000    .000 0
SH   1009.0002795.000  1
CD   1  4   1    .000   1.500     .000  .000  .000   .00
Q             2.000   .0
```

KYLE CANYON INTERCHANGE
Facility D2
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2793.590	1.500	2795.090	2.00	1.13	.02	2795.11	.00	.53	.00	1.500	.000	.00	1 .0
.000	.1567					.0004	.00	1.50	.00	.22	.013	.00	.00	PIPE
1000.000	2793.590	1.500	2795.090	2.00	1.13	.02	2795.11	.00	.53	.00	1.500	.000	.00	1 .0
.871	.1567					.0003	.00	1.50	.00	.22	.013	.00	.00	PIPE
1000.871	2793.727	1.361	2795.087	2.00	1.19	.02	2795.11	.00	.53	.87	1.500	.000	.00	1 .0
.503	.1567					.0003	.00	1.36	.15	.22	.013	.00	.00	PIPE
1001.374	2793.805	1.280	2795.085	2.00	1.24	.02	2795.11	.00	.53	1.06	1.500	.000	.00	1 .0
.411	.1567					.0004	.00	1.28	.18	.22	.013	.00	.00	PIPE
1001.784	2793.870	1.214	2795.083	2.00	1.31	.03	2795.11	.00	.53	1.18	1.500	.000	.00	1 .0
.356	.1567					.0004	.00	1.21	.20	.22	.013	.00	.00	PIPE
1002.140	2793.926	1.155	2795.081	2.00	1.37	.03	2795.11	.00	.53	1.26	1.500	.000	.00	1 .0
.317	.1567					.0004	.00	1.16	.22	.22	.013	.00	.00	PIPE
1002.458	2793.976	1.103	2795.078	2.00	1.44	.03	2795.11	.00	.53	1.32	1.500	.000	.00	1 .0
.287	.1567					.0005	.00	1.10	.25	.22	.013	.00	.00	PIPE
1002.745	2794.021	1.055	2795.075	2.00	1.51	.04	2795.11	.00	.53	1.37	1.500	.000	.00	1 .0
.262	.1567					.0005	.00	1.05	.27	.22	.013	.00	.00	PIPE
1003.008	2794.062	1.010	2795.072	2.00	1.58	.04	2795.11	.00	.53	1.41	1.500	.000	.00	1 .0
.240	.1567					.0006	.00	1.01	.29	.22	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
Facility D2
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1003.248	2794.099	.969	2795.068	2.00	1.66	.04	2795.11	.00	.53	1.43	1.500	.000	.00	1 .0
.222	.1567					.0007	.00	.97	.32	.22	.013	.00	.00	PIPE
1003.470	2794.134	.930	2795.064	2.00	1.74	.05	2795.11	.00	.53	1.46	1.500	.000	.00	1 .0
.109	.1567					.0008	.00	.93	.34	.22	.013	.00	.00	PIPE
1003.579	2794.151	.893	2795.044	2.00	1.82	.05	2795.10	.00	.53	1.47	1.500	.000	.00	1 .0
HYDRAULIC JUMP														
1003.579	2794.151	.279	2794.430	2.00	8.81	1.21	2795.64	.00	.53	1.17	1.500	.000	.00	1 .0
.152	.1567					.0593	.01	.28	3.52	.22	.013	.00	.00	PIPE
1003.732	2794.175	.289	2794.463	2.00	8.40	1.10	2795.56	.00	.53	1.18	1.500	.000	.00	1 .0
.857	.1567					.0517	.04	.29	3.30	.22	.013	.00	.00	PIPE
1004.588	2794.309	.298	2794.607	2.00	8.01	1.00	2795.60	.00	.53	1.20	1.500	.000	.00	1 .0
.721	.1567					.0452	.03	.30	3.09	.22	.013	.00	.00	PIPE
1005.310	2794.422	.309	2794.730	2.00	7.63	.91	2795.64	.00	.53	1.21	1.500	.000	.00	1 .0
.613	.1567					.0395	.02	.31	2.89	.22	.013	.00	.00	PIPE
1005.922	2794.518	.319	2794.837	2.00	7.28	.82	2795.66	.00	.53	1.23	1.500	.000	.00	1 .0

	.523	.1567					.0345	.02	.32	2.71	.22	.013	.00	.00	PIPE				
1006.445	2794.600	.330	2794.930	2.00	6.94	.75	2795.68	.00	.53	1.24	1.500	.000	.00	1	.0				
	.449	.1567					.0302	.01	.33	2.54	.22	.013	.00	.00	PIPE				

KYLE CANYON INTERCHANGE
Facility D2
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1006.895	2794.670	.341	2795.011	2.00	6.62	.68	2795.69	.00	.53	1.26	1.500	.000	.00	1 .0
	.385	.1567				.0264	.01	.34	2.38	.22	.013	.00	.00	PIPE
1007.279	2794.730	.353	2795.083	2.00	6.31	.62	2795.70	.00	.53	1.27	1.500	.000	.00	1 .0
	.330	.1567				.0231	.01	.35	2.23	.22	.013	.00	.00	PIPE
1007.609	2794.782	.365	2795.147	2.00	6.02	.56	2795.71	.00	.53	1.29	1.500	.000	.00	1 .0
	.283	.1567				.0202	.01	.36	2.09	.22	.013	.00	.00	PIPE
1007.892	2794.826	.377	2795.204	2.00	5.74	.51	2795.71	.00	.53	1.30	1.500	.000	.00	1 .0
	.241	.1567				.0176	.00	.38	1.95	.22	.013	.00	.00	PIPE
1008.133	2794.864	.390	2795.254	2.00	5.47	.46	2795.72	.00	.53	1.32	1.500	.000	.00	1 .0
	.203	.1567				.0154	.00	.39	1.83	.22	.013	.00	.00	PIPE
1008.336	2794.896	.404	2795.300	2.00	5.21	.42	2795.72	.00	.53	1.33	1.500	.000	.00	1 .0
	.170	.1567				.0135	.00	.40	1.71	.22	.013	.00	.00	PIPE
1008.507	2794.923	.418	2795.341	2.00	4.97	.38	2795.72	.00	.53	1.34	1.500	.000	.00	1 .0
	.141	.1567				.0118	.00	.42	1.60	.22	.013	.00	.00	PIPE
1008.647	2794.945	.432	2795.377	2.00	4.74	.35	2795.73	.00	.53	1.36	1.500	.000	.00	1 .0
	.114	.1567				.0103	.00	.43	1.50	.22	.013	.00	.00	PIPE
1008.761	2794.962	.448	2795.410	2.00	4.52	.32	2795.73	.00	.53	1.37	1.500	.000	.00	1 .0
	.090	.1567				.0091	.00	.45	1.40	.22	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
Facility D2
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1008.851	2794.977	.463	2795.440	2.00	4.31	.29	2795.73	.00	.53	1.39	1.500	.000	.00	1 .0
	.067	.1567				.0079	.00	.46	1.31	.22	.013	.00	.00	PIPE
1008.917	2794.987	.479	2795.467	2.00	4.11	.26	2795.73	.00	.53	1.40	1.500	.000	.00	1 .0
	.046	.1567				.0069	.00	.48	1.23	.22	.013	.00	.00	PIPE
1008.964	2794.994	.496	2795.491	2.00	3.92	.24	2795.73	.00	.53	1.41	1.500	.000	.00	1 .0
	.027	.1567				.0061	.00	.50	1.15	.22	.013	.00	.00	PIPE
1008.991	2794.999	.514	2795.512	2.00	3.74	.22	2795.73	.00	.53	1.42	1.500	.000	.00	1 .0
	.009	.1567				.0053	.00	.51	1.07	.22	.013	.00	.00	PIPE
1009.000	2795.000	.533	2795.533	2.00	3.55	.20	2795.73	.00	.53	1.44	1.500	.000	.00	1 .0

♀

WSPGW MODEL
KCE1_15+44.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0

T2 KCE1 15+44 Facilities D3 and D4

T3 412-634A
SO   1000.0002786.700 18                          2788.200
R    1032.0002787.890 18      .013                                  .000    .000 1
JX   1037.0002787.990 18 30   .013    0.400          2787.985        45.0       76.000
R    1057.0002788.450 18      .013                                  .000    .000 0
SH   1057.0002788.450 18      .013
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q             1.700   .0
```

KYLE CANYON INTERCHANGE
KCE1 15+44 Facilities D3 and D4
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT or I.D.	Base Wt "N"	ZL X-Fall	ZR	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp					Type Ch
1000.000	2786.700	1.500	2788.200	2.10	1.19	.02	2788.22	.00	.55	.00	1.500	.000	.00	0	.0
.000	.0372					.0004	.00	1.50	.00	.33	.013	.00	.00	PIPE	
1000.000	2786.700	1.500	2788.200	2.10	1.19	.02	2788.22	.00	.55	.00	1.500	.000	.00	0	.0
3.691	.0372					.0004	.00	1.50	.00	.33	.013	.00	.00	PIPE	
1003.691	2786.837	1.361	2788.198	2.10	1.25	.02	2788.22	.00	.55	.87	1.500	.000	.00	0	.0
2.129	.0372					.0004	.00	1.36	.16	.33	.013	.00	.00	PIPE	
1005.820	2786.916	1.280	2788.196	2.10	1.31	.03	2788.22	.00	.55	1.06	1.500	.000	.00	0	.0
1.738	.0372					.0004	.00	1.28	.19	.33	.013	.00	.00	PIPE	
1007.558	2786.981	1.214	2788.195	2.10	1.37	.03	2788.22	.00	.55	1.18	1.500	.000	.00	0	.0
1.507	.0372					.0004	.00	1.21	.21	.33	.013	.00	.00	PIPE	
1009.065	2787.037	1.155	2788.192	2.10	1.44	.03	2788.22	.00	.55	1.26	1.500	.000	.00	0	.0
1.343	.0372					.0005	.00	1.16	.24	.33	.013	.00	.00	PIPE	
1010.408	2787.087	1.103	2788.190	2.10	1.51	.04	2788.23	.00	.55	1.32	1.500	.000	.00	0	.0
1.216	.0372					.0005	.00	1.10	.26	.33	.013	.00	.00	PIPE	
1011.624	2787.132	1.055	2788.187	2.10	1.58	.04	2788.23	.00	.55	1.37	1.500	.000	.00	0	.0
1.110	.0372					.0006	.00	1.05	.28	.33	.013	.00	.00	PIPE	
1012.734	2787.174	1.010	2788.184	2.10	1.66	.04	2788.23	.00	.55	1.41	1.500	.000	.00	0	.0
1.017	.0372					.0007	.00	1.01	.31	.33	.013	.00	.00	PIPE	

KYLE CANYON INTERCHANGE
KCE1 15+44 Facilities D3 and D4
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT or I.D.	Base Wt "N"	ZL X-Fall	ZR	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp					Type Ch
1013.750	2787.211	.969	2788.180	2.10	1.74	.05	2788.23	.00	.55	1.43	1.500	.000	.00	0	.0
.939	.0372					.0008	.00	.97	.33	.33	.013	.00	.00	PIPE	
1014.689	2787.246	.930	2788.176	2.10	1.82	.05	2788.23	.00	.55	1.46	1.500	.000	.00	0	.0
.862	.0372					.0009	.00	.93	.36	.33	.013	.00	.00	PIPE	
1015.552	2787.278	.893	2788.172	2.10	1.91	.06	2788.23	.00	.55	1.47	1.500	.000	.00	0	.0
.798	.0372					.0010	.00	.89	.39	.33	.013	.00	.00	PIPE	
1016.350	2787.308	.859	2788.167	2.10	2.01	.06	2788.23	.00	.55	1.48	1.500	.000	.00	0	.0
.733	.0372					.0011	.00	.86	.42	.33	.013	.00	.00	PIPE	
1017.082	2787.335	.826	2788.161	2.10	2.11	.07	2788.23	.00	.55	1.49	1.500	.000	.00	0	.0
.490	.0372					.0012	.00	.83	.45	.33	.013	.00	.00	PIPE	
1017.573	2787.354	.795	2788.149	2.10	2.21	.08	2788.22	.00	.55	1.50	1.500	.000	.00	0	.0
HYDRAULIC JUMP															
1017.573	2787.354	.350	2787.703	2.10	6.71	.70	2788.40	.00	.55	1.27	1.500	.000	.00	0	.0
1.952	.0372					.0264	.05	.35	2.38	.33	.013	.00	.00	PIPE	
1019.524	2787.426	.361	2787.787	2.10	6.40	.64	2788.42	.00	.55	1.28	1.500	.000	.00	0	.0
3.226	.0372					.0231	.07	.36	2.23	.33	.013	.00	.00	PIPE	
1022.750	2787.546	.374	2787.919	2.10	6.10	.58	2788.50	.00	.55	1.30	1.500	.000	.00	0	.0
2.337	.0372					.0202	.05	.37	2.09	.33	.013	.00	.00	PIPE	

KYLE CANYON INTERCHANGE
KCE1 15+44 Facilities D3 and D4
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT or I.D.	Base Wt "N"	Base Wt X-Fall	Base Wt ZL	Base Wt ZR	No Wth Prs/Pip	Type Ch
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp							
1025.087	2787.633	.387	2788.019	2.10	5.82	.53	2788.55	.00	.55	1.31	1.500	.000	.00	0	.0		
1.763	.0372					.0177	.03	.39	1.96	.33	.013	.00	.00	PIPE			
1026.851	2787.698	.400	2788.098	2.10	5.55	.48	2788.58	.00	.55	1.33	1.500	.000	.00	0	.0		
1.365	.0372					.0155	.02	.40	1.83	.33	.013	.00	.00	PIPE			
1028.216	2787.749	.414	2788.163	2.10	5.29	.43	2788.60	.00	.55	1.34	1.500	.000	.00	0	.0		
1.062	.0372					.0135	.01	.41	1.71	.33	.013	.00	.00	PIPE			
1029.278	2787.789	.428	2788.217	2.10	5.04	.40	2788.61	.00	.55	1.36	1.500	.000	.00	0	.0		
.829	.0372					.0118	.01	.43	1.60	.33	.013	.00	.00	PIPE			
1030.107	2787.819	.443	2788.262	2.10	4.81	.36	2788.62	.00	.55	1.37	1.500	.000	.00	0	.0		
.640	.0372					.0104	.01	.44	1.50	.33	.013	.00	.00	PIPE			
1030.747	2787.843	.459	2788.302	2.10	4.59	.33	2788.63	.00	.55	1.38	1.500	.000	.00	0	.0		
.483	.0372					.0091	.00	.46	1.40	.33	.013	.00	.00	PIPE			
1031.230	2787.861	.475	2788.336	2.10	4.37	.30	2788.63	.00	.55	1.40	1.500	.000	.00	0	.0		
.352	.0372					.0079	.00	.47	1.31	.33	.013	.00	.00	PIPE			
1031.582	2787.874	.492	2788.366	2.10	4.17	.27	2788.64	.00	.55	1.41	1.500	.000	.00	0	.0		
.236	.0372					.0070	.00	.49	1.23	.33	.013	.00	.00	PIPE			
1031.818	2787.883	.509	2788.392	2.10	3.98	.25	2788.64	.00	.55	1.42	1.500	.000	.00	0	.0		
.135	.0372					.0061	.00	.51	1.15	.33	.013	.00	.00	PIPE			

KYLE CANYON INTERCHANGE
KCE1 15+44 Facilities D3 and D4
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT or I.D.	Base Wt "N"	Base Wt X-Fall	Base Wt ZL	Base Wt ZR	No Wth Prs/Pip	Type Ch
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp							
1031.954	2787.888	.527	2788.415	2.10	3.79	.22	2788.64	.00	.55	1.43	1.500	.000	.00	0	.0		
.046	.0372					.0053	.00	.53	1.07	.33	.013	.00	.00	PIPE			
1032.000	2787.890	.547	2788.437	2.10	3.60	.20	2788.64	.15	.55	1.44	1.500	.000	.00	0	.0		
JUNCT STR	.0200					.0030	.02	.70	1.00		.013	.00	.00	PIPE			
1037.000	2787.990	.745	2788.735	1.70	1.94	.06	2788.79	.00	.49	1.50	1.500	.000	.00	0	.0		
.979	.0230					.0011	.00	.74	.45	.33	.013	.00	.00	PIPE			
1037.979	2788.012	.718	2788.730	1.70	2.04	.06	2788.79	.00	.49	1.50	1.500	.000	.00	0	.0		
.897	.0230					.0013	.00	.72	.48	.33	.013	.00	.00	PIPE			
1038.876	2788.033	.692	2788.725	1.70	2.14	.07	2788.80	.00	.49	1.50	1.500	.000	.00	0	.0		
.636	.0230					.0015	.00	.69	.52	.33	.013	.00	.00	PIPE			
1039.512	2788.048	.667	2788.715	1.70	2.24	.08	2788.79	.00	.49	1.49	1.500	.000	.00	0	.0		
HYDRAULIC JUMP																	
1039.512	2788.048	.343	2788.391	1.70	5.57	.48	2788.87	.00	.49	1.26	1.500	.000	.00	0	.0		
1.035	.0230					.0193	.02	.34	2.00	.33	.013	.00	.00	PIPE			
1040.547	2788.071	.348	2788.419	1.70	5.47	.47	2788.88	.00	.49	1.27	1.500	.000	.00	0	.0		
5.686	.0230					.0177	.10	.35	1.95	.33	.013	.00	.00	PIPE			
1046.234	2788.202	.360	2788.562	1.70	5.22	.42	2788.98	.00	.49	1.28	1.500	.000	.00	0	.0		
3.445	.0230					.0154	.05	.36	1.82	.33	.013	.00	.00	PIPE			

KYLE CANYON INTERCHANGE
KCE1 15+44 Facilities D3 and D4
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT or "N"	Base Wt I.D. X-Fall	ZL	ZR	No Wth Prs/Pip Type Ch
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp					
1049.679	2788.281	.372	2788.653	1.70	4.98	.38	2789.04	.00	.49	1.30	1.500	.000	.00	0	.0
2.333	.0230					.0135	.03	.37	1.71	.33	.013	.00	.00	PIPE	
1052.012	2788.335	.385	2788.720	1.70	4.74	.35	2789.07	.00	.49	1.31	1.500	.000	.00	0	.0
1.651	.0230					.0118	.02	.38	1.60	.33	.013	.00	.00	PIPE	
1053.663	2788.373	.398	2788.771	1.70	4.52	.32	2789.09	.00	.49	1.32	1.500	.000	.00	0	.0
1.199	.0230					.0103	.01	.40	1.50	.33	.013	.00	.00	PIPE	
1054.862	2788.401	.412	2788.813	1.70	4.31	.29	2789.10	.00	.49	1.34	1.500	.000	.00	0	.0
.857	.0230					.0090	.01	.41	1.40	.33	.013	.00	.00	PIPE	
1055.719	2788.420	.426	2788.846	1.70	4.11	.26	2789.11	.00	.49	1.35	1.500	.000	.00	0	.0
.595	.0230					.0079	.00	.43	1.31	.33	.013	.00	.00	PIPE	
1056.314	2788.434	.441	2788.875	1.70	3.92	.24	2789.11	.00	.49	1.37	1.500	.000	.00	0	.0
.392	.0230					.0069	.00	.44	1.23	.33	.013	.00	.00	PIPE	
1056.706	2788.443	.456	2788.899	1.70	3.74	.22	2789.12	.00	.49	1.38	1.500	.000	.00	0	.0
.220	.0230					.0061	.00	.46	1.15	.33	.013	.00	.00	PIPE	
1056.926	2788.448	.472	2788.921	1.70	3.56	.20	2789.12	.00	.49	1.39	1.500	.000	.00	0	.0
.074	.0230					.0053	.00	.47	1.07	.33	.013	.00	.00	PIPE	
1057.000	2788.450	.490	2788.940	1.70	3.39	.18	2789.12	.00	.49	1.41	1.500	.000	.00	0	.0

♀

WSPGW MODEL
KCW1_21+39.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0

T2 KCW1 21+39 Facilities S1 and SD5

T3 412-634A
SO   1000.0002781.620 18                          2783.120
R    1056.0002785.002 18      .013                                  .000    .000 1
JX   1061.0002785.102 18 30   .013    0.300          2785.102        45.0       30.000
R    1127.0002787.200 18      .013                                  .000    .000 0
SH   1127.0002787.200 18      .013
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q            2.300   .0
```

KYLE CANYON INTERCHANGE
KCW1 21+39 Facilities S1 and SD5
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2781.620	1.500	2783.120	2.60	1.47	.03	2783.15	.00	.61	.00	1.500	.000	.00	0 .0
.000	.0604					.0006	.00	1.50	.00	.32	.013	.00	.00	PIPE
1000.000	2781.620	1.500	2783.120	2.60	1.47	.03	2783.15	.00	.61	.00	1.500	.000	.00	0 .0
2.252	.0604					.0006	.00	1.50	.00	.32	.013	.00	.00	PIPE
1002.252	2781.756	1.361	2783.117	2.60	1.54	.04	2783.15	.00	.61	.87	1.500	.000	.00	0 .0
1.289	.0604					.0006	.00	1.36	.20	.32	.013	.00	.00	PIPE
1003.541	2781.834	1.280	2783.114	2.60	1.62	.04	2783.15	.00	.61	1.06	1.500	.000	.00	0 .0
1.046	.0604					.0006	.00	1.28	.23	.32	.013	.00	.00	PIPE
1004.587	2781.897	1.214	2783.111	2.60	1.70	.04	2783.16	.00	.61	1.18	1.500	.000	.00	0 .0
.901	.0604					.0007	.00	1.21	.26	.32	.013	.00	.00	PIPE
1005.488	2781.952	1.155	2783.107	2.60	1.78	.05	2783.16	.00	.61	1.26	1.500	.000	.00	0 .0
.798	.0604					.0007	.00	1.16	.29	.32	.013	.00	.00	PIPE
1006.285	2782.000	1.103	2783.103	2.60	1.87	.05	2783.16	.00	.61	1.32	1.500	.000	.00	0 .0
.615	.0604					.0008	.00	1.10	.32	.32	.013	.00	.00	PIPE
1006.901	2782.037	1.055	2783.092	2.60	1.96	.06	2783.15	.00	.61	1.37	1.500	.000	.00	0 .0
HYDRAULIC JUMP														
1006.901	2782.037	.323	2782.360	2.60	9.29	1.34	2783.70	.00	.61	1.23	1.500	.000	.00	0 .0
21.012	.0604					.0555	1.17	.32	3.44	.32	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KCW1 21+39 Facilities S1 and SD5
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1027.913	2783.306	.334	2783.640	2.60	8.86	1.22	2784.86	.00	.61	1.25	1.500	.000	.00	0 .0
8.347	.0604					.0485	.40	.33	3.22	.32	.013	.00	.00	PIPE
1036.260	2783.810	.346	2784.155	2.60	8.45	1.11	2785.26	.00	.61	1.26	1.500	.000	.00	0 .0
4.940	.0604					.0424	.21	.35	3.02	.32	.013	.00	.00	PIPE
1041.200	2784.108	.357	2784.466	2.60	8.06	1.01	2785.47	.00	.61	1.28	1.500	.000	.00	0 .0
3.399	.0604					.0371	.13	.36	2.82	.32	.013	.00	.00	PIPE
1044.599	2784.313	.370	2784.683	2.60	7.68	.92	2785.60	.00	.61	1.29	1.500	.000	.00	0 .0
2.522	.0604					.0324	.08	.37	2.65	.32	.013	.00	.00	PIPE
1047.121	2784.466	.382	2784.848	2.60	7.32	.83	2785.68	.00	.61	1.31	1.500	.000	.00	0 .0
1.951	.0604					.0283	.06	.38	2.48	.32	.013	.00	.00	PIPE
1049.072	2784.584	.396	2784.979	2.60	6.98	.76	2785.74	.00	.61	1.32	1.500	.000	.00	0 .0
1.552	.0604					.0248	.04	.40	2.32	.32	.013	.00	.00	PIPE
1050.624	2784.677	.409	2785.087	2.60	6.66	.69	2785.77	.00	.61	1.34	1.500	.000	.00	0 .0
1.250	.0604					.0217	.03	.41	2.17	.32	.013	.00	.00	PIPE
1051.874	2784.753	.423	2785.176	2.60	6.35	.63	2785.80	.00	.61	1.35	1.500	.000	.00	0 .0

1.016	.0604						.0190	.02	.42	2.03	.32	.013	.00	.00	PIPE				
1052.890	2784.814	.438	2785.252	2.60	6.05	.57	2785.82	.00	.61	1.36	1.500	.000	.00	0	.0				
.834	.0604						.0166	.01	.44	1.90	.32	.013	.00	.00	PIPE				

KYLE CANYON INTERCHANGE
KCW1 21+39 Facilities S1 and SD5
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1053.724	2784.865	.453	2785.318	2.60	5.77	.52	2785.83	.00	.61	1.38	1.500	.000	.00	0 .0
.679	.0604					.0146	.01	.45	1.78	.32	.013	.00	.00	PIPE
1054.403	2784.906	.469	2785.375	2.60	5.50	.47	2785.84	.00	.61	1.39	1.500	.000	.00	0 .0
.551	.0604					.0127	.01	.47	1.66	.32	.013	.00	.00	PIPE
1054.954	2784.939	.486	2785.424	2.60	5.25	.43	2785.85	.00	.61	1.40	1.500	.000	.00	0 .0
.440	.0604					.0112	.00	.49	1.56	.32	.013	.00	.00	PIPE
1055.394	2784.965	.503	2785.468	2.60	5.00	.39	2785.86	.00	.61	1.42	1.500	.000	.00	0 .0
.346	.0604					.0098	.00	.50	1.46	.32	.013	.00	.00	PIPE
1055.740	2784.986	.521	2785.507	2.60	4.77	.35	2785.86	.00	.61	1.43	1.500	.000	.00	0 .0
.260	.0604					.0086	.00	.52	1.36	.32	.013	.00	.00	PIPE
1056.000	2785.002	.539	2785.541	2.60	4.55	.32	2785.86	.10	.61	1.44	1.500	.000	.00	0 .0
JUNCT STR	.0200					.0199	.10	.64	1.27		.013	.00	.00	PIPE
1061.000	2785.102	.355	2785.457	2.30	7.19	.80	2786.26	.00	.57	1.28	1.500	.000	.00	0 .0
6.440	.0318					.0318	.20	.35	2.53	.35	.013	.00	.00	PIPE
1067.440	2785.307	.355	2785.662	2.30	7.19	.80	2786.47	.00	.57	1.28	1.500	.000	.00	0 .0
30.496	.0318					.0300	.92	.35	2.53	.35	.013	.00	.00	PIPE
1097.936	2786.276	.366	2786.642	2.30	6.90	.74	2787.38	.00	.57	1.29	1.500	.000	.00	0 .0
10.274	.0318					.0265	.27	.37	2.39	.35	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KCW1 21+39 Facilities S1 and SD5
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1108.210	2786.603	.378	2786.981	2.30	6.58	.67	2787.65	.00	.57	1.30	1.500	.000	.00	0 .0
5.570	.0318					.0232	.13	.38	2.24	.35	.013	.00	.00	PIPE
1113.780	2786.780	.391	2787.171	2.30	6.27	.61	2787.78	.00	.57	1.32	1.500	.000	.00	0 .0
3.644	.0318					.0203	.07	.39	2.09	.35	.013	.00	.00	PIPE
1117.425	2786.896	.405	2787.301	2.30	5.98	.56	2787.86	.00	.57	1.33	1.500	.000	.00	0 .0
2.593	.0318					.0177	.05	.40	1.96	.35	.013	.00	.00	PIPE
1120.018	2786.978	.419	2787.397	2.30	5.70	.50	2787.90	.00	.57	1.35	1.500	.000	.00	0 .0
1.922	.0318					.0155	.03	.42	1.84	.35	.013	.00	.00	PIPE
1121.940	2787.039	.433	2787.473	2.30	5.44	.46	2787.93	.00	.57	1.36	1.500	.000	.00	0 .0
1.462	.0318					.0136	.02	.43	1.72	.35	.013	.00	.00	PIPE
1123.402	2787.086	.448	2787.534	2.30	5.18	.42	2787.95	.00	.57	1.37	1.500	.000	.00	0 .0
1.117	.0318					.0119	.01	.45	1.61	.35	.013	.00	.00	PIPE
1124.518	2787.121	.464	2787.585	2.30	4.94	.38	2787.96	.00	.57	1.39	1.500	.000	.00	0 .0

.850	.0318					.0104	.01	.46	1.50	.35	.013	.00	.00	PIPE			
1125.369	2787.148	.480	2787.629	2.30	4.71	.34	2787.97	.00	.57	1.40	1.500	.000	.00	0	.0		
.637	.0318					.0091	.01	.48	1.41	.35	.013	.00	.00	PIPE			
1126.006	2787.168	.497	2787.666	2.30	4.49	.31	2787.98	.00	.57	1.41	1.500	.000	.00	0	.0		
.458	.0318					.0080	.00	.50	1.32	.35	.013	.00	.00	PIPE			

Program Package Serial Number: 3074

WATER SURFACE PROFILE LISTING Date:12-26-2016 Time: 9:56:16

KYLE CANYON INTERCHANGE
KCW1 21+39 Facilities S1 and SD5
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1126.463	2787.183	.515	2787.698	2.30	4.28	.28	2787.98	.00	.57	1.42	1.500	.000	.00	0 .0
.303	.0318					.0070	.00	.51	1.23	.35	.013	.00	.00	PIPE
1126.766	2787.193	.533	2787.726	2.30	4.08	.26	2787.98	.00	.57	1.44	1.500	.000	.00	0 .0
.177	.0318					.0061	.00	.53	1.15	.35	.013	.00	.00	PIPE
1126.943	2787.198	.552	2787.750	2.30	3.89	.24	2787.99	.00	.57	1.45	1.500	.000	.00	0 .0
.057	.0318					.0054	.00	.55	1.07	.35	.013	.00	.00	PIPE
1127.000	2787.200	.573	2787.773	2.30	3.70	.21	2787.99	.00	.57	1.46	1.500	.000	.00	0 .0

WSPGW MODEL
KCW1_23+62NORTH.WSW

KCW1_23+62North.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0

T2 KCW1 23+62 North Facilities 3A, SD13, SD16, and S14

T3 412-634A
SO   1000.0002769.760 30                              2772.910
R    1130.0002778.290 30      .013                                  .000    .000 1
JX   1135.0002778.390 30 24   .013    7.500          2778.390       -33.0      47.000
R    1226.0002781.029 30      .013                                  .000    .000 1
JX   1231.0002781.129 24 18 18.013    2.300      .9002782.0302782.030 45.0-59.000 5.000
R    1359.3002784.410 24      .013                                  .000    .000 1
JX   1364.3002784.510 24 18   .013    5.400          2784.910       -45.0      -39.000
R    1424.6002784.848 24      .013                                  .000    .000 1
JX   1429.6002784.948 18 30   .013    2.200          2784.948        45.0      24.000
R    1504.6002811.670 18      .013                                  .000    .000 0
SH   1504.6002811.670 18      .013
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q             4.800   .0
```

KYLE CANYON INTERCHANGE
KCW1 23+62 North Facilities 3A, SD13, SD16, and S14
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2769.760	3.150	2772.910	23.10	4.71	.34	2773.25	.00	1.64	.00	2.500	.000	.00	0 .0
.712	.0656					.0032	.00	3.15	.00	.80	.013	.00	.00	PIPE
1000.712	2769.807	3.105	2772.912	23.10	4.71	.34	2773.26	.00	1.64	.00	2.500	.000	.00	0 .0
HYDRAULIC JUMP														
1000.712	2769.807	.810	2770.617	23.10	16.77	4.37	2774.98	.00	1.64	2.34	2.500	.000	.00	0 .0
45.296	.0656					.0578	2.62	.81	3.85	.80	.013	.00	.00	PIPE
1046.008	2772.779	.838	2773.616	23.10	16.02	3.98	2777.60	.00	1.64	2.36	2.500	.000	.00	0 .0
22.424	.0656					.0508	1.14	.84	3.61	.80	.013	.00	.00	PIPE
1068.432	2774.250	.867	2775.118	23.10	15.27	3.62	2778.74	.00	1.64	2.38	2.500	.000	.00	0 .0
14.137	.0656					.0445	.63	.87	3.38	.80	.013	.00	.00	PIPE
1082.569	2775.178	.898	2776.076	23.10	14.56	3.29	2779.37	.00	1.64	2.40	2.500	.000	.00	0 .0
10.048	.0656					.0390	.39	.90	3.16	.80	.013	.00	.00	PIPE
1092.617	2775.837	.930	2776.767	23.10	13.88	2.99	2779.76	.00	1.64	2.42	2.500	.000	.00	0 .0
7.600	.0656					.0342	.26	.93	2.95	.80	.013	.00	.00	PIPE
1100.216	2776.336	.964	2777.299	23.10	13.24	2.72	2780.02	.00	1.64	2.43	2.500	.000	.00	0 .0
5.969	.0656					.0300	.18	.96	2.75	.80	.013	.00	.00	PIPE
1106.185	2776.727	.999	2777.726	23.10	12.62	2.47	2780.20	.00	1.64	2.45	2.500	.000	.00	0 .0
4.800	.0656					.0264	.13	1.00	2.57	.80	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KCW1 23+62 North Facilities 3A, SD13, SD16, and S14
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1110.985	2777.042	1.035	2778.077	23.10	12.03	2.25	2780.33	.00	1.64	2.46	2.500	.000	.00	0 .0
3.920	.0656					.0231	.09	1.04	2.40	.80	.013	.00	.00	PIPE
1114.905	2777.300	1.073	2778.373	23.10	11.47	2.04	2780.42	.00	1.64	2.47	2.500	.000	.00	0 .0
3.226	.0656					.0203	.07	1.07	2.24	.80	.013	.00	.00	PIPE
1118.131	2777.511	1.113	2778.624	23.10	10.94	1.86	2780.48	.00	1.64	2.48	2.500	.000	.00	0 .0
2.671	.0656					.0179	.05	1.11	2.09	.80	.013	.00	.00	PIPE
1120.802	2777.687	1.154	2778.841	23.10	10.43	1.69	2780.53	.00	1.64	2.49	2.500	.000	.00	0 .0
2.210	.0656					.0157	.03	1.15	1.95	.80	.013	.00	.00	PIPE
1123.011	2777.832	1.197	2779.029	23.10	9.95	1.54	2780.56	.00	1.64	2.50	2.500	.000	.00	0 .0
1.819	.0656					.0138	.03	1.20	1.82	.80	.013	.00	.00	PIPE
1124.831	2777.951	1.243	2779.194	23.10	9.48	1.40	2780.59	.00	1.64	2.50	2.500	.000	.00	0 .0
1.486	.0656					.0122	.02	1.24	1.69	.80	.013	.00	.00	PIPE
1126.317	2778.048	1.290	2779.339	23.10	9.04	1.27	2780.61	.00	1.64	2.50	2.500	.000	.00	0 .0
1.191	.0656					.0107	.01	1.29	1.58	.80	.013	.00	.00	PIPE
1127.508	2778.126	1.340	2779.467	23.10	8.62	1.15	2780.62	.00	1.64	2.49	2.500	.000	.00	0 .0

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL		No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type	Ch
	.933 .0656					.0095	.01	1.34	1.47	.80	.013	.00	.00	PIPE	
1128.441	2778.188	1.393	2779.581	23.10	8.22	1.05	2780.63	.00	1.64	2.48	2.500	.000	.00	0	.0
	.698 .0656					.0084	.01	1.39	1.36	.80	.013	.00	.00	PIPE	
1129.139	2778.234	1.448	2779.682	23.10	7.84	.95	2780.64	.00	1.64	2.47	2.500	.000	.00	0	.0
	.482 .0656					.0074	.00	1.45	1.26	.80	.013	.00	.00	PIPE	
1129.621	2778.265	1.507	2779.772	23.10	7.47	.87	2780.64	.00	1.64	2.45	2.500	.000	.00	0	.0
	.285 .0656					.0065	.00	1.51	1.17	.80	.013	.00	.00	PIPE	
1129.906	2778.284	1.569	2779.853	23.10	7.12	.79	2780.64	.00	1.64	2.42	2.500	.000	.00	0	.0
	.094 .0656					.0058	.00	1.57	1.08	.80	.013	.00	.00	PIPE	
1130.000	2778.290	1.636	2779.926	23.10	6.79	.72	2780.64	.56	1.64	2.38	2.500	.000	.00	0	.0
JUNCT STR	.0200					.0033	.02	2.19	1.00		.013	.00	.00	PIPE	
1135.000	2778.390	2.363	2780.753	15.60	3.25	.16	2780.92	.00	1.33	1.14	2.500	.000	.00	0	.0
	5.184 .0290					.0013	.01	2.36	.28	.80	.013	.00	.00	PIPE	
1140.184	2778.540	2.203	2780.743	15.60	3.41	.18	2780.92	.00	1.33	1.62	2.500	.000	.00	0	.0
	3.757 .0290					.0014	.01	2.20	.36	.80	.013	.00	.00	PIPE	
1143.942	2778.649	2.081	2780.730	15.60	3.57	.20	2780.93	.00	1.33	1.87	2.500	.000	.00	0	.0
	.792 .0290					.0014	.00	2.08	.41	.80	.013	.00	.00	PIPE	
1144.733	2778.672	2.055	2780.728	15.60	3.61	.20	2780.93	.00	1.33	1.91	2.500	.000	.00	0	.0
HYDRAULIC JUMP															
1144.733	2778.672	.822	2779.494	15.60	11.11	1.92	2781.41	.00	1.33	2.35	2.500	.000	.00	0	.0
	27.353 .0290					.0249	.68	.82	2.53	.80	.013	.00	.00	PIPE	

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL		No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type	Ch
1129.139	2778.234	1.448	2779.682	23.10	7.84	.95	2780.64	.00	1.64	2.47	2.500	.000	.00	0	.0
	.482 .0656					.0074	.00	1.45	1.26	.80	.013	.00	.00	PIPE	
1129.621	2778.265	1.507	2779.772	23.10	7.47	.87	2780.64	.00	1.64	2.45	2.500	.000	.00	0	.0
	.285 .0656					.0065	.00	1.51	1.17	.80	.013	.00	.00	PIPE	
1129.906	2778.284	1.569	2779.853	23.10	7.12	.79	2780.64	.00	1.64	2.42	2.500	.000	.00	0	.0
	.094 .0656					.0058	.00	1.57	1.08	.80	.013	.00	.00	PIPE	
1130.000	2778.290	1.636	2779.926	23.10	6.79	.72	2780.64	.56	1.64	2.38	2.500	.000	.00	0	.0
JUNCT STR	.0200					.0033	.02	2.19	1.00		.013	.00	.00	PIPE	
1135.000	2778.390	2.363	2780.753	15.60	3.25	.16	2780.92	.00	1.33	1.14	2.500	.000	.00	0	.0
	5.184 .0290					.0013	.01	2.36	.28	.80	.013	.00	.00	PIPE	
1140.184	2778.540	2.203	2780.743	15.60	3.41	.18	2780.92	.00	1.33	1.62	2.500	.000	.00	0	.0
	3.757 .0290					.0014	.01	2.20	.36	.80	.013	.00	.00	PIPE	
1143.942	2778.649	2.081	2780.730	15.60	3.57	.20	2780.93	.00	1.33	1.87	2.500	.000	.00	0	.0
	.792 .0290					.0014	.00	2.08	.41	.80	.013	.00	.00	PIPE	
1144.733	2778.672	2.055	2780.728	15.60	3.61	.20	2780.93	.00	1.33	1.91	2.500	.000	.00	0	.0
HYDRAULIC JUMP															
1144.733	2778.672	.822	2779.494	15.60	11.11	1.92	2781.41	.00	1.33	2.35	2.500	.000	.00	0	.0
	27.353 .0290					.0249	.68	.82	2.53	.80	.013	.00	.00	PIPE	

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL		No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type	Ch
1172.087	2779.466	.851	2780.316	15.60	10.59	1.74	2782.06	.00	1.33	2.37	2.500	.000	.00	0	.0
	17.892 .0290					.0218	.39	.85	2.37	.80	.013	.00	.00	PIPE	
1189.979	2779.984	.881	2780.865	15.60	10.10	1.58	2782.45	.00	1.33	2.39	2.500	.000	.00	0	.0
	11.414 .0290					.0191	.22	.88	2.21	.80	.013	.00	.00	PIPE	
1201.393	2780.315	.912	2781.228	15.60	9.63	1.44	2782.67	.00	1.33	2.41	2.500	.000	.00	0	.0
	8.025 .0290					.0168	.13	.91	2.07	.80	.013	.00	.00	PIPE	
1209.418	2780.548	.945	2781.493	15.60	9.18	1.31	2782.80	.00	1.33	2.42	2.500	.000	.00	0	.0
	5.942 .0290					.0147	.09	.95	1.93	.80	.013	.00	.00	PIPE	
1215.360	2780.720	.979	2781.699	15.60	8.75	1.19	2782.89	.00	1.33	2.44	2.500	.000	.00	0	.0
	4.516 .0290					.0129	.06	.98	1.80	.80	.013	.00	.00	PIPE	
1219.875	2780.851	1.015	2781.866	15.60	8.34	1.08	2782.95	.00	1.33	2.46	2.500	.000	.00	0	.0
	3.465 .0290					.0113	.04	1.01	1.69	.80	.013	.00	.00	PIPE	
1223.340	2780.952	1.052	2782.004	15.60	7.96	.98	2782.99	.00	1.33	2.47	2.500	.000	.00	0	.0

2.660	.0290							.0100	.03	1.05	1.57	.80	.013	.00	.00	PIPE					
1226.000	2781.029	1.090	2782.119	15.60	7.59	.89	2783.01	.08	1.33	2.48	2.500	.000	.00	0	.0						
JUNCT STR	.0200							.0172	.09	1.17	1.47		.013	.00	.00	PIPE					
1231.000	2781.129	.812	2781.941	12.40	10.36	1.67	2783.61	.00	1.27	1.96	2.000	.000	.00	0	.0						
57.548	.0256							.0239	1.38	.81	2.34	.81	.013	.00	.00	PIPE					

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1288.548	2782.601	.834	2783.434	12.40	10.00	1.55	2784.99	.00	1.27	1.97	2.000	.000	.00	0 .0
26.416	.0256					.0214	.56	.83	2.22	.81	.013	.00	.00	PIPE
1314.965	2783.276	.864	2784.140	12.40	9.54	1.41	2785.55	.00	1.27	1.98	2.000	.000	.00	0 .0
14.205	.0256					.0188	.27	.86	2.07	.81	.013	.00	.00	PIPE
1329.170	2783.639	.896	2784.536	12.40	9.09	1.28	2785.82	.00	1.27	1.99	2.000	.000	.00	0 .0
9.198	.0256					.0165	.15	.90	1.94	.81	.013	.00	.00	PIPE
1338.368	2783.875	.930	2784.804	12.40	8.67	1.17	2785.97	.00	1.27	2.00	2.000	.000	.00	0 .0
6.436	.0256					.0145	.09	.93	1.80	.81	.013	.00	.00	PIPE
1344.804	2784.039	.965	2785.004	12.40	8.27	1.06	2786.06	.00	1.27	2.00	2.000	.000	.00	0 .0
4.680	.0256					.0128	.06	.96	1.68	.81	.013	.00	.00	PIPE
1349.484	2784.159	1.001	2785.160	12.40	7.88	.96	2786.12	.00	1.27	2.00	2.000	.000	.00	0 .0
3.443	.0256					.0113	.04	1.00	1.57	.81	.013	.00	.00	PIPE
1352.927	2784.247	1.040	2785.286	12.40	7.52	.88	2786.16	.00	1.27	2.00	2.000	.000	.00	0 .0
2.519	.0256					.0099	.02	1.04	1.46	.81	.013	.00	.00	PIPE
1355.446	2784.311	1.080	2785.391	12.40	7.17	.80	2786.19	.00	1.27	1.99	2.000	.000	.00	0 .0
1.782	.0256					.0088	.02	1.08	1.36	.81	.013	.00	.00	PIPE
1357.228	2784.357	1.122	2785.479	12.40	6.83	.72	2786.20	.00	1.27	1.98	2.000	.000	.00	0 .0
1.187	.0256					.0077	.01	1.12	1.26	.81	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1358.415	2784.387	1.167	2785.554	12.40	6.51	.66	2786.21	.00	1.27	1.97	2.000	.000	.00	0 .0
.667	.0256					.0068	.00	1.17	1.17	.81	.013	.00	.00	PIPE
1359.082	2784.404	1.215	2785.619	12.40	6.21	.60	2786.22	.00	1.27	1.95	2.000	.000	.00	0 .0
.218	.0256					.0060	.00	1.21	1.08	.81	.013	.00	.00	PIPE
1359.300	2784.410	1.266	2785.676	12.40	5.92	.54	2786.22	.29	1.27	1.93	2.000	.000	.00	0 .0
JUNCT STR	.0200					.0033	.02	1.55	1.00		.013	.00	.00	PIPE
1364.300	2784.510	1.737	2786.247	7.00	2.42	.09	2786.34	.00	.94	1.35	2.000	.000	.00	0 .0
17.982	.0056					.0009	.02	1.74	.29	.90	.013	.00	.00	PIPE
1382.282	2784.611	1.644	2786.255	7.00	2.53	.10	2786.35	.00	.94	1.53	2.000	.000	.00	0 .0
15.371	.0056					.0010	.02	1.64	.33	.90	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1397.653	2784.697	1.563	2786.260	7.00	2.66	.11	2786.37	.00	.94	1.65	2.000	.000	.00	0 .0
9.244	.0056					.0011	.01	1.56	.37	.90	.013	.00	.00	PIPE
1406.897	2784.749	1.513	2786.262	7.00	2.74	.12	2786.38	.00	.94	1.72	2.000	.000	.00	0 .0
HYDRAULIC JUMP														
1406.897	2784.749	.540	2785.289	7.00	10.22	1.62	2786.91	.00	.94	1.78	2.000	.000	.00	0 .0
2.078	.0056					.0375	.08	.54	2.90	.90	.013	.00	.00	PIPE
1408.975	2784.760	.540	2785.301	7.00	10.22	1.62	2786.92	.00	.94	1.78	2.000	.000	.00	0 .0
4.159	.0056					.0402	.17	.54	2.90	.90	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1413.134	2784.784	.522	2785.306	7.00	10.72	1.78	2787.09	.00	.94	1.76	2.000	.000	.00	0 .0
3.985	.0056					.0460	.18	.52	3.10	.90	.013	.00	.00	PIPE
1417.119	2784.806	.505	2785.311	7.00	11.24	1.96	2787.27	.00	.94	1.74	2.000	.000	.00	0 .0
3.820	.0056					.0526	.20	.50	3.31	.90	.013	.00	.00	PIPE
1420.939	2784.827	.488	2785.316	7.00	11.79	2.16	2787.47	.00	.94	1.72	2.000	.000	.00	0 .0
3.661	.0056					.0601	.22	.49	3.53	.90	.013	.00	.00	PIPE
1424.600	2784.848	.472	2785.320	7.00	12.36	2.37	2787.69	.68	.94	1.70	2.000	.000	.00	0 .0
JUNCT STR	.0200					.2102	1.05	1.15	3.77		.013	.00	.00	PIPE
1429.600	2784.947	.281	2785.228	4.80	20.98	6.83	2792.06	.00	.84	1.17	1.500	.000	.00	0 .0
3.775	.3563					.3563	1.35	.28	8.36	.28	.013	.00	.00	PIPE
1433.376	2786.292	.281	2786.573	4.80	20.98	6.83	2793.41	.00	.84	1.17	1.500	.000	.00	0 .0
26.924	.3563					.3479	9.37	.28	8.36	.28	.013	.00	.00	PIPE
1460.299	2795.885	.284	2796.169	4.80	20.62	6.60	2802.77	.00	.84	1.18	1.500	.000	.00	0 .0
15.428	.3563					.3180	4.91	.28	8.17	.28	.013	.00	.00	PIPE
1475.728	2801.382	.294	2801.676	4.80	19.66	6.00	2807.68	.00	.84	1.19	1.500	.000	.00	0 .0
6.830	.3563					.2778	1.90	.29	7.65	.28	.013	.00	.00	PIPE
1482.558	2803.815	.304	2804.119	4.80	18.75	5.46	2809.58	.00	.84	1.21	1.500	.000	.00	0 .0
4.280	.3563					.2428	1.04	.30	7.17	.28	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1486.837	2805.340	.314	2805.654	4.80	17.87	4.96	2810.62	.00	.84	1.22	1.500	.000	.00	0 .0
3.055	.3563					.2122	.65	.31	6.72	.28	.013	.00	.00	PIPE
1489.893	2806.429	.325	2806.754	4.80	17.04	4.51	2811.26	.00	.84	1.24	1.500	.000	.00	0 .0
2.335	.3563					.1855	.43	.32	6.29	.28	.013	.00	.00	PIPE
1492.228	2807.261	.336	2807.597	4.80	16.25	4.10	2811.70	.00	.84	1.25	1.500	.000	.00	0 .0
1.861	.3563					.1621	.30	.34	5.89	.28	.013	.00	.00	PIPE
1494.089	2807.924	.347	2808.271	4.80	15.49	3.73	2812.00	.00	.84	1.27	1.500	.000	.00	0 .0
1.524	.3563					.1417	.22	.35	5.52	.28	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL		No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR		Type Ch
1495.613	2808.467	.359	2808.826	4.80	14.77	3.39	2812.21	.00	.84	1.28	1.500	.000	.00	0	.0
1.273	.3563					.1239	.16	.36	5.17	.28	.013	.00	.00	PIPE	
1496.885	2808.921	.371	2809.292	4.80	14.09	3.08	2812.37	.00	.84	1.29	1.500	.000	.00	0	.0
1.078	.3563					.1084	.12	.37	4.84	.28	.013	.00	.00	PIPE	
1497.964	2809.305	.384	2809.689	4.80	13.43	2.80	2812.49	.00	.84	1.31	1.500	.000	.00	0	.0
.923	.3563					.0948	.09	.38	4.53	.28	.013	.00	.00	PIPE	
1498.886	2809.634	.397	2810.031	4.80	12.80	2.55	2812.58	.00	.84	1.32	1.500	.000	.00	0	.0
.797	.3563					.0829	.07	.40	4.24	.28	.013	.00	.00	PIPE	
1499.683	2809.917	.411	2810.329	4.80	12.21	2.31	2812.64	.00	.84	1.34	1.500	.000	.00	0	.0
.691	.3563					.0726	.05	.41	3.97	.28	.013	.00	.00	PIPE	

Program Package Serial Number: 3074

WATER SURFACE PROFILE LISTING Date:12-23-2016 Time: 8:45:37

KYLE CANYON INTERCHANGE
KCW1 23+62 North Facilities 3A, SD13, SD16, and S14
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL		No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR		Type Ch
1500.374	2810.164	.425	2810.589	4.80	11.64	2.10	2812.69	.00	.84	1.35	1.500	.000	.00	0	.0
.603	.3563					.0635	.04	.43	3.71	.28	.013	.00	.00	PIPE	
1500.977	2810.379	.440	2810.819	4.80	11.10	1.91	2812.73	.00	.84	1.37	1.500	.000	.00	0	.0
.527	.3563					.0556	.03	.44	3.48	.28	.013	.00	.00	PIPE	
1501.504	2810.567	.456	2811.022	4.80	10.58	1.74	2812.76	.00	.84	1.38	1.500	.000	.00	0	.0
.462	.3563					.0487	.02	.46	3.25	.28	.013	.00	.00	PIPE	
1501.966	2810.731	.472	2811.203	4.80	10.09	1.58	2812.78	.00	.84	1.39	1.500	.000	.00	0	.0
.405	.3563					.0426	.02	.47	3.04	.28	.013	.00	.00	PIPE	
1502.372	2810.875	.488	2811.364	4.80	9.62	1.44	2812.80	.00	.84	1.41	1.500	.000	.00	0	.0
.355	.3563					.0373	.01	.49	2.85	.28	.013	.00	.00	PIPE	
1502.727	2811.002	.505	2811.508	4.80	9.17	1.31	2812.81	.00	.84	1.42	1.500	.000	.00	0	.0
.312	.3563					.0327	.01	.51	2.66	.28	.013	.00	.00	PIPE	
1503.039	2811.113	.523	2811.636	4.80	8.75	1.19	2812.82	.00	.84	1.43	1.500	.000	.00	0	.0
.272	.3563					.0287	.01	.52	2.49	.28	.013	.00	.00	PIPE	
1503.311	2811.210	.542	2811.752	4.80	8.34	1.08	2812.83	.00	.84	1.44	1.500	.000	.00	0	.0
.238	.3563					.0251	.01	.54	2.33	.28	.013	.00	.00	PIPE	
1503.549	2811.295	.561	2811.857	4.80	7.95	.98	2812.84	.00	.84	1.45	1.500	.000	.00	0	.0
.207	.3563					.0221	.00	.56	2.17	.28	.013	.00	.00	PIPE	

Program Package Serial Number: 3074

WATER SURFACE PROFILE LISTING Date:12-23-2016 Time: 8:45:37

KYLE CANYON INTERCHANGE
KCW1 23+62 North Facilities 3A, SD13, SD16, and S14
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL		No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR		Type Ch
1503.755	2811.369	.582	2811.950	4.80	7.58	.89	2812.84	.00	.84	1.46	1.500	.000	.00	0	.0
.178	.3563					.0193	.00	.58	2.03	.28	.013	.00	.00	PIPE	
1503.934	2811.432	.603	2812.035	4.80	7.23	.81	2812.85	.00	.84	1.47	1.500	.000	.00	0	.0
.152	.3563					.0170	.00	.60	1.90	.28	.013	.00	.00	PIPE	
1504.086	2811.487	.625	2812.111	4.80	6.89	.74	2812.85	.00	.84	1.48	1.500	.000	.00	0	.0

	.129	.3563					.0149	.00	.62	1.77	.28	.013	.00	.00	PIPE				
1504.215	2811.533	.648	2812.180	4.80	6.57	.67	2812.85	.00	.84	1.49	1.500	.000	.00	0	.0				
	.108	.3563					.0131	.00	.65	1.65	.28	.013	.00	.00	PIPE				
1504.323	2811.571	.672	2812.243	4.80	6.27	.61	2812.85	.00	.84	1.49	1.500	.000	.00	0	.0				
	.088	.3563					.0115	.00	.67	1.54	.28	.013	.00	.00	PIPE				
1504.411	2811.603	.697	2812.299	4.80	5.97	.55	2812.85	.00	.84	1.50	1.500	.000	.00	0	.0				
	.070	.3563					.0101	.00	.70	1.44	.28	.013	.00	.00	PIPE				
1504.481	2811.627	.723	2812.350	4.80	5.70	.50	2812.85	.00	.84	1.50	1.500	.000	.00	0	.0				
	.053	.3563					.0089	.00	.72	1.34	.28	.013	.00	.00	PIPE				
1504.534	2811.646	.750	2812.396	4.80	5.43	.46	2812.85	.00	.84	1.50	1.500	.000	.00	0	.0				
	.037	.3563					.0078	.00	.75	1.25	.28	.013	.00	.00	PIPE				
1504.571	2811.659	.779	2812.438	4.80	5.18	.42	2812.85	.00	.84	1.50	1.500	.000	.00	0	.0				
	.022	.3563					.0069	.00	.78	1.16	.28	.013	.00	.00	PIPE				

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1504.593	2811.667	.809	2812.477	4.80	4.94	.38	2812.85	.00	.84	1.50	1.500	.000	.00	0 .0
	.007	.3563				.0061	.00	.81	1.08	.28	.013	.00	.00	PIPE
1504.600	2811.670	.842	2812.512	4.80	4.70	.34	2812.85	.00	.84	1.49	1.500	.000	.00	0 .0

♀

KR3A_3+99.WSW

T1 KYLE CANYON INTERCHANGE 0
T2 Facilities D11, SD10, and SD11

T3 412-634A

```
SO   1000.0002784.910 18                          2786.250
R    1046.0002787.094 18      .013                                .000    .000 1
JX   1051.0002787.194 18 30   .013    0.300          2787.194      45.0      -21.000
R    1113.0002789.451 18      .013                                .000    .000 1
JX   1118.0002789.551 18 30   .013    1.400          2789.551      45.0      -42.000
R    1186.0002793.230 18      .013                                .000    .000 0
SH   1186.0002793.230 18                                .000
CD  18  4   1    .000   1.500     .000  .000  .000   .00

CD  30  4   1    .000   2.500     .000  .000  .000   .00
Q             3.700   .0
```

KYLE CANYON INTERCHANGE
Facilities D11, SD10, and SD11
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT or "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2784.910	.508	2785.418	5.40	10.25	1.63	2787.05	.00	.90	1.42	1.500	.000	.00	1 .0
1.738	.0475					.0431	.07	.51	2.96	.50	.013	.00	.00	PIPE
1001.738	2784.993	.509	2785.501	5.40	10.22	1.62	2787.12	.00	.90	1.42	1.500	.000	.00	1 .0
18.110	.0475					.0403	.73	.51	2.95	.50	.013	.00	.00	PIPE
1019.848	2785.853	.527	2786.380	5.40	9.75	1.47	2787.85	.00	.90	1.43	1.500	.000	.00	1 .0
9.508	.0475					.0354	.34	.53	2.76	.50	.013	.00	.00	PIPE
1029.356	2786.304	.546	2786.850	5.40	9.29	1.34	2788.19	.00	.90	1.44	1.500	.000	.00	1 .0
6.212	.0475					.0310	.19	.55	2.58	.50	.013	.00	.00	PIPE
1035.568	2786.599	.565	2787.164	5.40	8.86	1.22	2788.38	.00	.90	1.45	1.500	.000	.00	1 .0
4.455	.0475					.0272	.12	.57	2.41	.50	.013	.00	.00	PIPE
1040.023	2786.810	.586	2787.396	5.40	8.45	1.11	2788.50	.00	.90	1.46	1.500	.000	.00	1 .0
3.362	.0475					.0239	.08	.59	2.25	.50	.013	.00	.00	PIPE
1043.385	2786.970	.607	2787.577	5.40	8.05	1.01	2788.58	.00	.90	1.47	1.500	.000	.00	1 .0
2.615	.0475					.0209	.05	.61	2.10	.50	.013	.00	.00	PIPE
1046.000	2787.094	.629	2787.723	5.40	7.68	.92	2788.64	.20	.90	1.48	1.500	.000	.00	1 .0
JUNCT STR	.0200					.0270	.13	.83	1.96		.013	.00	.00	PIPE
1051.000	2787.194	.524	2787.718	5.10	9.28	1.34	2789.06	.00	.87	1.43	1.500	.000	.00	1 .0
22.199	.0364					.0327	.73	.52	2.64	.52	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
Facilities D11, SD10, and SD11
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT or "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1073.199	2788.002	.538	2788.541	5.10	8.94	1.24	2789.78	.00	.87	1.44	1.500	.000	.00	1 .0
12.794	.0364					.0291	.37	.54	2.50	.52	.013	.00	.00	PIPE
1085.993	2788.468	.558	2789.026	5.10	8.52	1.13	2790.15	.00	.87	1.45	1.500	.000	.00	1 .0
7.582	.0364					.0255	.19	.56	2.34	.52	.013	.00	.00	PIPE
1093.575	2788.744	.578	2789.322	5.10	8.13	1.03	2790.35	.00	.87	1.46	1.500	.000	.00	1 .0
5.152	.0364					.0224	.12	.58	2.18	.52	.013	.00	.00	PIPE
1098.728	2788.931	.599	2789.530	5.10	7.75	.93	2790.46	.00	.87	1.47	1.500	.000	.00	1 .0
3.757	.0364					.0196	.07	.60	2.04	.52	.013	.00	.00	PIPE
1102.485	2789.068	.621	2789.689	5.10	7.39	.85	2790.54	.00	.87	1.48	1.500	.000	.00	1 .0
2.838	.0364					.0172	.05	.62	1.90	.52	.013	.00	.00	PIPE
1105.322	2789.171	.643	2789.815	5.10	7.04	.77	2790.59	.00	.87	1.48	1.500	.000	.00	1 .0
2.176	.0364					.0152	.03	.64	1.78	.52	.013	.00	.00	PIPE
1107.499	2789.250	.667	2789.917	5.10	6.72	.70	2790.62	.00	.87	1.49	1.500	.000	.00	1 .0
1.684	.0364					.0133	.02	.67	1.66	.52	.013	.00	.00	PIPE
1109.183	2789.312	.692	2790.004	5.10	6.40	.64	2790.64	.00	.87	1.50	1.500	.000	.00	1 .0
1.296	.0364					.0117	.02	.69	1.55	.52	.013	.00	.00	PIPE
1110.478	2789.359	.718	2790.077	5.10	6.11	.58	2790.66	.00	.87	1.50	1.500	.000	.00	1 .0
.974	.0364					.0103	.01	.72	1.44	.52	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
Facilities D11, SD10, and SD11
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT or I.D. / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1111.453	2789.394	.745	2790.139	5.10	5.82	.53	2790.67	.00	.87	1.50	1.500	.000	.00	1 .0
.708	.0364					.0091	.01	.74	1.34	.52	.013	.00	.00	PIPE
1112.160	2789.420	.773	2790.194	5.10	5.55	.48	2790.67	.00	.87	1.50	1.500	.000	.00	1 .0
.475	.0364					.0080	.00	.77	1.25	.52	.013	.00	.00	PIPE
1112.635	2789.438	.803	2790.241	5.10	5.29	.43	2790.68	.00	.87	1.50	1.500	.000	.00	1 .0
.274	.0364					.0071	.00	.80	1.16	.52	.013	.00	.00	PIPE
1112.909	2789.448	.835	2790.282	5.10	5.05	.40	2790.68	.00	.87	1.49	1.500	.000	.00	1 .0
.091	.0364					.0062	.00	.83	1.08	.52	.013	.00	.00	PIPE
1113.000	2789.451	.869	2790.320	5.10	4.80	.36	2790.68	.16	.87	1.48	1.500	.000	.00	1 .0
JUNCT STR	.0200							1.02	1.00		.013	.00	.00	PIPE
1118.000	2789.551	.397	2789.948	3.70	9.88	1.52	2791.47	.00	.73	1.32	1.500	.000	.00	1 .0
22.804	.0541					.0513	1.17	.40	3.27	.39	.013	.00	.00	PIPE
1140.804	2790.785	.403	2791.188	3.70	9.68	1.45	2792.64	.00	.73	1.33	1.500	.000	.00	1 .0
15.866	.0541					.0466	.74	.40	3.18	.39	.013	.00	.00	PIPE
1156.670	2791.643	.417	2792.060	3.70	9.23	1.32	2793.38	.00	.73	1.34	1.500	.000	.00	1 .0
7.962	.0541					.0408	.33	.42	2.98	.39	.013	.00	.00	PIPE
1164.632	2792.074	.431	2792.505	3.70	8.80	1.20	2793.71	.00	.73	1.36	1.500	.000	.00	1 .0
5.132	.0541					.0357	.18	.43	2.79	.39	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
Facilities D11, SD10, and SD11
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT or I.D. / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1169.765	2792.352	.446	2792.798	3.70	8.39	1.09	2793.89	.00	.73	1.37	1.500	.000	.00	1 .0
3.670	.0541					.0313	.11	.45	2.61	.39	.013	.00	.00	PIPE
1173.434	2792.550	.462	2793.012	3.70	8.00	.99	2794.01	.00	.73	1.39	1.500	.000	.00	1 .0
2.771	.0541					.0274	.08	.46	2.44	.39	.013	.00	.00	PIPE
1176.206	2792.700	.478	2793.178	3.70	7.63	.90	2794.08	.00	.73	1.40	1.500	.000	.00	1 .0
2.169	.0541					.0240	.05	.48	2.28	.39	.013	.00	.00	PIPE
1178.375	2792.817	.495	2793.313	3.70	7.27	.82	2794.13	.00	.73	1.41	1.500	.000	.00	1 .0
1.727	.0541					.0210	.04	.50	2.13	.39	.013	.00	.00	PIPE
1180.102	2792.911	.513	2793.424	3.70	6.93	.75	2794.17	.00	.73	1.42	1.500	.000	.00	1 .0
1.389	.0541					.0184	.03	.51	2.00	.39	.013	.00	.00	PIPE
1181.490	2792.986	.531	2793.517	3.70	6.61	.68	2794.20	.00	.73	1.43	1.500	.000	.00	1 .0
1.127	.0541					.0161	.02	.53	1.87	.39	.013	.00	.00	PIPE
1182.618	2793.047	.550	2793.597	3.70	6.30	.62	2794.21	.00	.73	1.45	1.500	.000	.00	1 .0
.908	.0541					.0142	.01	.55	1.74	.39	.013	.00	.00	PIPE
1183.526	2793.096	.570	2793.666	3.70	6.01	.56	2794.23	.00	.73	1.46	1.500	.000	.00	1 .0
.731	.0541					.0124	.01	.57	1.63	.39	.013	.00	.00	PIPE
1184.257	2793.136	.590	2793.726	3.70	5.73	.51	2794.24	.00	.73	1.47	1.500	.000	.00	1 .0
.575	.0541					.0109	.01	.59	1.52	.39	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
Facilities D11, SD10, and SD11
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT or "N"	Base Wt I.D. or X-Fall	ZL	ZR	No Wth Prs/Pip Type Ch
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp					
1184.833	2793.167	.612	2793.778	3.70	5.46	.46	2794.24	.00	.73	1.47	1.500	.000	.00	.00	1 .0
.445	.0541					.0096	.00	.61	1.42	.39	.013	.00	.00		PIPE
1185.278	2793.191	.634	2793.825	3.70	5.21	.42	2794.25	.00	.73	1.48	1.500	.000	.00	.00	1 .0
.326	.0541					.0084	.00	.63	1.33	.39	.013	.00	.00		PIPE
1185.604	2793.208	.657	2793.866	3.70	4.97	.38	2794.25	.00	.73	1.49	1.500	.000	.00	.00	1 .0
.223	.0541					.0074	.00	.66	1.24	.39	.013	.00	.00		PIPE
1185.827	2793.220	.682	2793.902	3.70	4.74	.35	2794.25	.00	.73	1.49	1.500	.000	.00	.00	1 .0
.129	.0541					.0065	.00	.68	1.15	.39	.013	.00	.00		PIPE
1185.957	2793.228	.707	2793.935	3.70	4.52	.32	2794.25	.00	.73	1.50	1.500	.000	.00	.00	1 .0
.043	.0541					.0057	.00	.71	1.08	.39	.013	.00	.00		PIPE
1186.000	2793.230	.735	2793.965	3.70	4.30	.29	2794.25	.00	.73	1.50	1.500	.000	.00	.00	1 .0

KR3_30+77N.WSW

```
T1 KYLE CANYON INTERCHANGE                                                0
T2 Facility S15

T3 412-634A
SO   1000.0002782.030 18                        2782.130
R    1013.0002782.160 18      .013                                .000    .000 0
SH   1013.0002782.160 18                             .000
CD  18  4   1    .000   1.500     .000  .000  .000   .00
Q             2.300   .0
```

KYLE CANYON INTERCHANGE
Facility S15
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El. / SE Dpth	Super Elev / Froude N	Critical Depth / Norm Dp	Flow Top Width / "N"	Height/ Dia.-FT or X-Fall	Base Wt or I.D. / ZR	ZL	No Wth Prs/Pip / Type Ch
1000.000	2782.030	.492	2782.522	2.30	4.57	.32	2782.85	.00	.57	1.41	1.500	.000	.00	1 .0
3.564	.0100					.0087	.03	.49	1.35	.48	.013	.00	.00	PIPE
1003.564	2782.066	.497	2782.563	2.30	4.49	.31	2782.88	.00	.57	1.41	1.500	.000	.00	1 .0
5.427	.0100					.0080	.04	.50	1.32	.48	.013	.00	.00	PIPE
1008.991	2782.120	.515	2782.635	2.30	4.28	.28	2782.92	.00	.57	1.42	1.500	.000	.00	1 .0
2.506	.0100					.0070	.02	.51	1.23	.48	.013	.00	.00	PIPE
1011.497	2782.145	.533	2782.678	2.30	4.08	.26	2782.94	.00	.57	1.44	1.500	.000	.00	1 .0
1.179	.0100					.0061	.01	.53	1.15	.48	.013	.00	.00	PIPE
1012.676	2782.157	.552	2782.709	2.30	3.89	.24	2782.94	.00	.57	1.45	1.500	.000	.00	1 .0
.324	.0100					.0054	.00	.55	1.07	.48	.013	.00	.00	PIPE
1013.000	2782.160	.573	2782.733	2.30	3.70	.21	2782.95	.00	.57	1.46	1.500	.000	.00	1 .0

♀

KR3_30+77S.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0
T2 Facility D14

T3 412-634A
SO   1000.0002782.030 18                          2782.120
R    1034.0002782.510 18      .013                                .000    .000 0
SH   1034.0002782.510 18                              .000
CD  18  4   1    .000   1.500     .000  .000  .000   .00
Q            0.900   .0
```

KYLE CANYON INTERCHANGE
Facility D14
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2782.030	.273	2782.303	.90	4.10	.26	2782.56	.00	.35	1.16	1.500	.000	.00	1 .0
4.541	.0141					.0141	.06	.27	1.66	.27	.013	.00	.00	PIPE
1004.542	2782.094	.273	2782.367	.90	4.10	.26	2782.63	.00	.35	1.16	1.500	.000	.00	1 .0
16.476	.0141					.0135	.22	.27	1.66	.27	.013	.00	.00	PIPE
1021.018	2782.327	.279	2782.606	.90	3.97	.25	2782.85	.00	.35	1.17	1.500	.000	.00	1 .0
6.279	.0141					.0121	.08	.28	1.59	.27	.013	.00	.00	PIPE
1027.297	2782.416	.288	2782.704	.90	3.79	.22	2782.93	.00	.35	1.18	1.500	.000	.00	1 .0
2.923	.0141					.0105	.03	.29	1.49	.27	.013	.00	.00	PIPE
1030.220	2782.457	.298	2782.755	.90	3.61	.20	2782.96	.00	.35	1.20	1.500	.000	.00	1 .0
1.694	.0141					.0092	.02	.30	1.39	.27	.013	.00	.00	PIPE
1031.914	2782.481	.308	2782.789	.90	3.44	.18	2782.97	.00	.35	1.21	1.500	.000	.00	1 .0
1.044	.0141					.0081	.01	.31	1.31	.27	.013	.00	.00	PIPE
1032.958	2782.495	.319	2782.814	.90	3.28	.17	2782.98	.00	.35	1.23	1.500	.000	.00	1 .0
.609	.0141					.0070	.00	.32	1.22	.27	.013	.00	.00	PIPE
1033.568	2782.504	.329	2782.833	.90	3.13	.15	2782.99	.00	.35	1.24	1.500	.000	.00	1 .0
.330	.0141					.0062	.00	.33	1.15	.27	.013	.00	.00	PIPE
1033.898	2782.509	.341	2782.849	.90	2.98	.14	2782.99	.00	.35	1.26	1.500	.000	.00	1 .0
.102	.0141					.0053	.00	.34	1.07	.27	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
Facility D14
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1034.000	2782.510	.353	2782.863	.90	2.83	.12	2782.99	.00	.35	1.27	1.500	.000	.00	1 .0

♀

KCE1_18+69.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0
T2 Facility 4A

T3 412-634A
SO   1000.0002778.790 24                          2780.750
R    1059.0002801.660 24      .013                                .000    .000 0
SH   1059.0002801.660 24                              .000
CD  24  4   1    .000   2.000     .000  .000  .000   .00
Q             7.500   .0
```

KYLE CANYON INTERCHANGE
Facility 4A
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2778.790	.316	2779.106	7.50	23.54	8.61	2787.71	.00	.97	1.46	2.000	.000	.00	1 .0
19.426	.3876					.3580	6.95	.32	8.88	.31	.013	.00	.00	PIPE
1019.426	2786.320	.324	2786.644	7.50	22.74	8.03	2794.68	.00	.97	1.47	2.000	.000	.00	1 .0
10.458	.3876					.3188	3.33	.32	8.47	.31	.013	.00	.00	PIPE
1029.885	2790.374	.334	2790.708	7.50	21.69	7.30	2798.01	.00	.97	1.49	2.000	.000	.00	1 .0
5.977	.3876					.2785	1.66	.33	7.94	.31	.013	.00	.00	PIPE
1035.862	2792.691	.346	2793.037	7.50	20.68	6.64	2799.67	.00	.97	1.51	2.000	.000	.00	1 .0
4.099	.3876					.2432	1.00	.35	7.44	.31	.013	.00	.00	PIPE
1039.960	2794.280	.357	2794.637	7.50	19.71	6.03	2800.67	.00	.97	1.53	2.000	.000	.00	1 .0
3.063	.3876					.2124	.65	.36	6.97	.31	.013	.00	.00	PIPE
1043.023	2795.467	.369	2795.836	7.50	18.80	5.49	2801.32	.00	.97	1.55	2.000	.000	.00	1 .0
2.406	.3876					.1856	.45	.37	6.53	.31	.013	.00	.00	PIPE
1045.430	2796.400	.382	2796.781	7.50	17.92	4.99	2801.77	.00	.97	1.57	2.000	.000	.00	1 .0
1.953	.3876					.1621	.32	.38	6.12	.31	.013	.00	.00	PIPE
1047.383	2797.157	.395	2797.552	7.50	17.09	4.53	2802.09	.00	.97	1.59	2.000	.000	.00	1 .0
1.621	.3876					.1417	.23	.39	5.74	.31	.013	.00	.00	PIPE
1049.005	2797.785	.408	2798.194	7.50	16.29	4.12	2802.32	.00	.97	1.61	2.000	.000	.00	1 .0
1.368	.3876					.1238	.17	.41	5.37	.31	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
Facility 4A
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1050.372	2798.316	.422	2798.738	7.50	15.53	3.75	2802.48	.00	.97	1.63	2.000	.000	.00	1 .0
1.167	.3876					.1082	.13	.42	5.03	.31	.013	.00	.00	PIPE
1051.540	2798.768	.436	2799.205	7.50	14.81	3.41	2802.61	.00	.97	1.65	2.000	.000	.00	1 .0
1.006	.3876					.0946	.10	.44	4.71	.31	.013	.00	.00	PIPE
1052.546	2799.158	.451	2799.610	7.50	14.12	3.10	2802.71	.00	.97	1.67	2.000	.000	.00	1 .0
.872	.3876					.0827	.07	.45	4.42	.31	.013	.00	.00	PIPE
1053.418	2799.497	.467	2799.963	7.50	13.46	2.82	2802.78	.00	.97	1.69	2.000	.000	.00	1 .0
.761	.3876					.0723	.06	.47	4.14	.31	.013	.00	.00	PIPE
1054.180	2799.792	.483	2800.274	7.50	12.84	2.56	2802.83	.00	.97	1.71	2.000	.000	.00	1 .0
.666	.3876					.0632	.04	.48	3.87	.31	.013	.00	.00	PIPE
1054.846	2800.050	.499	2800.549	7.50	12.24	2.33	2802.88	.00	.97	1.73	2.000	.000	.00	1 .0
.585	.3876					.0553	.03	.50	3.63	.31	.013	.00	.00	PIPE
1055.430	2800.276	.516	2800.793	7.50	11.67	2.12	2802.91	.00	.97	1.75	2.000	.000	.00	1 .0
.514	.3876					.0484	.02	.52	3.39	.31	.013	.00	.00	PIPE
1055.945	2800.476	.534	2801.010	7.50	11.13	1.92	2802.93	.00	.97	1.77	2.000	.000	.00	1 .0
.453	.3876					.0423	.02	.53	3.18	.31	.013	.00	.00	PIPE
1056.397	2800.651	.553	2801.204	7.50	10.61	1.75	2802.95	.00	.97	1.79	2.000	.000	.00	1 .0
.398	.3876					.0370	.01	.55	2.97	.31	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
Facility 4A
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1056.796	2800.806	.572	2801.378	7.50	10.12	1.59	2802.97	.00	.97	1.81	2.000	.000	.00	1 .0
.351	.3876					.0324	.01	.57	2.78	.31	.013	.00	.00	PIPE
1057.146	2800.942	.592	2801.534	7.50	9.65	1.44	2802.98	.00	.97	1.83	2.000	.000	.00	1 .0
.308	.3876					.0284	.01	.59	2.60	.31	.013	.00	.00	PIPE
1057.454	2801.061	.612	2801.674	7.50	9.20	1.31	2802.99	.00	.97	1.84	2.000	.000	.00	1 .0
.270	.3876					.0248	.01	.61	2.44	.31	.013	.00	.00	PIPE
1057.724	2801.166	.634	2801.800	7.50	8.77	1.19	2802.99	.00	.97	1.86	2.000	.000	.00	1 .0
.236	.3876					.0217	.01	.63	2.28	.31	.013	.00	.00	PIPE
1057.960	2801.257	.656	2801.913	7.50	8.36	1.09	2803.00	.00	.97	1.88	2.000	.000	.00	1 .0
.205	.3876					.0191	.00	.66	2.13	.31	.013	.00	.00	PIPE
1058.165	2801.336	.679	2802.016	7.50	7.97	.99	2803.00	.00	.97	1.89	2.000	.000	.00	1 .0
.177	.3876					.0167	.00	.68	1.99	.31	.013	.00	.00	PIPE
1058.342	2801.405	.704	2802.109	7.50	7.60	.90	2803.01	.00	.97	1.91	2.000	.000	.00	1 .0
.151	.3876					.0146	.00	.70	1.86	.31	.013	.00	.00	PIPE
1058.493	2801.464	.729	2802.192	7.50	7.25	.82	2803.01	.00	.97	1.92	2.000	.000	.00	1 .0
.128	.3876					.0128	.00	.73	1.74	.31	.013	.00	.00	PIPE
1058.621	2801.513	.755	2802.268	7.50	6.91	.74	2803.01	.00	.97	1.94	2.000	.000	.00	1 .0
.107	.3876					.0113	.00	.75	1.63	.31	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
Facility 4A
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1058.728	2801.555	.782	2802.337	7.50	6.59	.67	2803.01	.00	.97	1.95	2.000	.000	.00	1 .0
.087	.3876					.0099	.00	.78	1.52	.31	.013	.00	.00	PIPE
1058.815	2801.588	.810	2802.399	7.50	6.28	.61	2803.01	.00	.97	1.96	2.000	.000	.00	1 .0
.069	.3876					.0087	.00	.81	1.42	.31	.013	.00	.00	PIPE
1058.884	2801.615	.840	2802.455	7.50	5.99	.56	2803.01	.00	.97	1.97	2.000	.000	.00	1 .0
.052	.3876					.0076	.00	.84	1.33	.31	.013	.00	.00	PIPE
1058.935	2801.635	.871	2802.506	7.50	5.71	.51	2803.01	.00	.97	1.98	2.000	.000	.00	1 .0
.036	.3876					.0067	.00	.87	1.24	.31	.013	.00	.00	PIPE
1058.972	2801.649	.903	2802.552	7.50	5.44	.46	2803.01	.00	.97	1.99	2.000	.000	.00	1 .0
.021	.3876					.0059	.00	.90	1.15	.31	.013	.00	.00	PIPE
1058.993	2801.657	.937	2802.594	7.50	5.19	.42	2803.01	.00	.97	2.00	2.000	.000	.00	1 .0
.007	.3876					.0052	.00	.94	1.08	.31	.013	.00	.00	PIPE
1059.000	2801.660	.973	2802.633	7.50	4.94	.38	2803.01	.00	.97	2.00	2.000	.000	.00	1 .0

♀

WSPGW MODEL
KCW1_23+62SOUTH.WSW

KCW1_23+62South.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0

T2 KCW1 23+62 South Facilities 2A, SD8, and SD9

T3 412-634A
SO   1000.0002769.760 36                          2772.910
R    1141.0002770.462 36      .013                                  .000    .000 1
JX   1146.0002770.562 24 30   .013    7.300          2770.562        45.0      -14.000
R    1304.0002772.853 24      .013                                  .000    .000 1
JX   1309.0002772.953 24 30   .013    2.800          2772.953        45.0       8.000
R    1387.0002806.470 24      .013                                  .000    .000 0
SH   1387.0002806.470 24      .013
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q             8.000   .0
```

KYLE CANYON INTERCHANGE
KCW1 23+62 South Facilities 2A, SD8, and SD9
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	2769.760	3.150	2772.910	18.10	2.56	.10	2773.01	.00	1.36	.00	3.000	.000	.00	0 .0
35.644	.0050					.0007	.03	3.15	.00	1.29	.013	.00	.00	PIPE
1035.644	2769.938	3.000	2772.938	18.10	2.56	.10	2773.04	.00	1.36	.00	3.000	.000	.00	0 .0
62.354	.0050					.0007	.04	3.00	.00	1.29	.013	.00	.00	PIPE
1097.999	2770.248	2.721	2772.969	18.10	2.69	.11	2773.08	.00	1.36	1.74	3.000	.000	.00	0 .0
34.745	.0050					.0007	.02	2.72	.24	1.29	.013	.00	.00	PIPE
1132.744	2770.421	2.560	2772.981	18.10	2.82	.12	2773.10	.00	1.36	2.12	3.000	.000	.00	0 .0
8.256	.0050					.0007	.01	2.56	.29	1.29	.013	.00	.00	PIPE
1141.000	2770.462	2.522	2772.983	18.10	2.85	.13	2773.11	.03	1.36	2.20	3.000	.000	.00	0 .0
JUNCT STR	.0200					.0015	.01	2.55	.30		.013	.00	.00	PIPE
1146.000	2770.562	2.474	2773.036	10.80	3.44	.18	2773.22	.00	1.18	.00	2.000	.000	.00	0 .0
38.952	.0145					.0023	.09	2.47	.00	.88	.013	.00	.00	PIPE
1184.952	2771.127	2.000	2773.127	10.80	3.44	.18	2773.31	.00	1.18	.00	2.000	.000	.00	0 .0
13.447	.0145					.0021	.03	2.00	.00	.88	.013	.00	.00	PIPE
1198.400	2771.322	1.814	2773.136	10.80	3.61	.20	2773.34	.00	1.18	1.16	2.000	.000	.00	0 .0
7.060	.0145					.0021	.01	1.81	.40	.88	.013	.00	.00	PIPE
1205.460	2771.424	1.706	2773.130	10.80	3.78	.22	2773.35	.00	1.18	1.42	2.000	.000	.00	0 .0
.670	.0145					.0021	.00	1.71	.47	.88	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KCW1 23+62 South Facilities 2A, SD8, and SD9
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1206.130	2771.434	1.706	2773.140	10.80	3.78	.22	2773.36	.00	1.18	1.42	2.000	.000	.00	0 .0
HYDRAULIC JUMP														
1206.130	2771.434	.794	2772.228	10.80	9.30	1.34	2773.57	.00	1.18	1.96	2.000	.000	.00	0 .0
8.067	.0145					.0212	.17	.79	2.13	.88	.013	.00	.00	PIPE
1214.197	2771.551	.782	2772.333	10.80	9.48	1.40	2773.73	.00	1.18	1.95	2.000	.000	.00	0 .0
12.678	.0145					.0233	.30	.78	2.19	.88	.013	.00	.00	PIPE
1226.876	2771.735	.754	2772.489	10.80	9.95	1.54	2774.03	.00	1.18	1.94	2.000	.000	.00	0 .0
10.579	.0145					.0266	.28	.75	2.34	.88	.013	.00	.00	PIPE
1237.455	2771.888	.728	2772.616	10.80	10.43	1.69	2774.31	.00	1.18	1.92	2.000	.000	.00	0 .0
9.113	.0145					.0303	.28	.73	2.51	.88	.013	.00	.00	PIPE
1246.568	2772.020	.703	2772.723	10.80	10.94	1.86	2774.58	.00	1.18	1.91	2.000	.000	.00	0 .0
8.065	.0145					.0346	.28	.70	2.68	.88	.013	.00	.00	PIPE
1254.633	2772.137	.679	2772.816	10.80	11.48	2.05	2774.86	.00	1.18	1.89	2.000	.000	.00	0 .0
7.270	.0145					.0395	.29	.68	2.87	.88	.013	.00	.00	PIPE
1261.904	2772.243	.656	2772.899	10.80	12.04	2.25	2775.15	.00	1.18	1.88	2.000	.000	.00	0 .0
6.640	.0145					.0451	.30	.66	3.07	.88	.013	.00	.00	PIPE
1268.544	2772.339	.634	2772.973	10.80	12.62	2.47	2775.45	.00	1.18	1.86	2.000	.000	.00	0 .0
6.102	.0145					.0515	.31	.63	3.28	.88	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KCW1 23+62 South Facilities 2A, SD8, and SD9
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	ZR	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall			Type Ch
1274.646	2772.427	.612	2773.039	10.80	13.24	2.72	2775.76	.00	1.18	1.84	2.000	.000	.00	0	.0
5.680	.0145					.0587	.33	.61	3.51	.88	.013	.00	.00	PIPE	
1280.326	2772.510	.591	2773.101	10.80	13.89	2.99	2776.10	.00	1.18	1.83	2.000	.000	.00	0	.0
5.315	.0145					.0671	.36	.59	3.75	.88	.013	.00	.00	PIPE	
1285.641	2772.587	.571	2773.158	10.80	14.56	3.29	2776.45	.00	1.18	1.81	2.000	.000	.00	0	.0
4.995	.0145					.0766	.38	.57	4.01	.88	.013	.00	.00	PIPE	
1290.636	2772.659	.552	2773.211	10.80	15.28	3.62	2776.83	.00	1.18	1.79	2.000	.000	.00	0	.0
4.709	.0145					.0876	.41	.55	4.28	.88	.013	.00	.00	PIPE	
1295.344	2772.728	.534	2773.262	10.80	16.02	3.99	2777.25	.00	1.18	1.77	2.000	.000	.00	0	.0
4.442	.0145					.1002	.44	.53	4.57	.88	.013	.00	.00	PIPE	
1299.786	2772.792	.516	2773.308	10.80	16.80	4.38	2777.69	.00	1.18	1.75	2.000	.000	.00	0	.0
4.214	.0145					.1145	.48	.52	4.89	.88	.013	.00	.00	PIPE	
1304.000	2772.853	.499	2773.352	10.80	17.62	4.82	2778.17	.47	1.18	1.73	2.000	.000	.00	0	.0
JUNCT STR	.0200					.2760	1.38	.97	5.22		.013	.00	.00	PIPE	
1309.000	2772.952	.316	2773.268	8.00	25.16	9.83	2783.10	.00	1.01	1.46	2.000	.000	.00	0	.0
.975	.4297					.4298	.42	.32	9.50	.32	.013	.00	.00	PIPE	
1309.975	2773.371	.316	2773.687	8.00	25.16	9.83	2783.52	.00	1.01	1.46	2.000	.000	.00	0	.0
32.038	.4297					.4107	13.16	.32	9.50	.32	.013	.00	.00	PIPE	

KYLE CANYON INTERCHANGE
KCW1 23+62 South Facilities 2A, SD8, and SD9
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	ZR	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall			Type Ch
1342.012	2787.138	.322	2787.460	8.00	24.36	9.22	2796.68	.00	1.01	1.47	2.000	.000	.00	0	.0
13.167	.4297					.3669	4.83	.32	9.09	.32	.013	.00	.00	PIPE	
1355.179	2792.796	.333	2793.129	8.00	23.23	8.38	2801.51	.00	1.01	1.49	2.000	.000	.00	0	.0
6.871	.4297					.3204	2.20	.33	8.52	.32	.013	.00	.00	PIPE	
1362.051	2795.749	.344	2796.093	8.00	22.15	7.62	2803.71	.00	1.01	1.51	2.000	.000	.00	0	.0
4.544	.4297					.2799	1.27	.34	7.98	.32	.013	.00	.00	PIPE	
1366.594	2797.701	.356	2798.057	8.00	21.12	6.93	2804.98	.00	1.01	1.53	2.000	.000	.00	0	.0
3.337	.4297					.2446	.82	.36	7.48	.32	.013	.00	.00	PIPE	
1369.931	2799.135	.368	2799.503	8.00	20.14	6.30	2805.80	.00	1.01	1.55	2.000	.000	.00	0	.0
2.593	.4297					.2136	.55	.37	7.01	.32	.013	.00	.00	PIPE	
1372.524	2800.249	.380	2800.629	8.00	19.20	5.72	2806.35	.00	1.01	1.57	2.000	.000	.00	0	.0
2.087	.4297					.1866	.39	.38	6.57	.32	.013	.00	.00	PIPE	
1374.611	2801.146	.393	2801.539	8.00	18.31	5.20	2806.74	.00	1.01	1.59	2.000	.000	.00	0	.0
1.725	.4297					.1630	.28	.39	6.15	.32	.013	.00	.00	PIPE	
1376.336	2801.887	.406	2802.293	8.00	17.45	4.73	2807.02	.00	1.01	1.61	2.000	.000	.00	0	.0
1.448	.4297					.1424	.21	.41	5.76	.32	.013	.00	.00	PIPE	
1377.784	2802.509	.420	2802.929	8.00	16.64	4.30	2807.23	.00	1.01	1.63	2.000	.000	.00	0	.0
1.232	.4297					.1246	.15	.42	5.40	.32	.013	.00	.00	PIPE	

KYLE CANYON INTERCHANGE
KCW1 23+62 South Facilities 2A, SD8, and SD9
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	ZR	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall			Type Ch
1379.016	2803.039	.435	2803.474	8.00	15.87	3.91	2807.38	.00	1.01	1.65	2.000	.000	.00	.00	0 .0
1.064	.4297					.1089	.12	.44	5.06	.32	.013	.00	.00		PIPE
1380.080	2803.496	.449	2803.945	8.00	15.13	3.55	2807.50	.00	1.01	1.67	2.000	.000	.00	.00	0 .0
.918	.4297					.0952	.09	.45	4.74	.32	.013	.00	.00		PIPE
1380.998	2803.890	.465	2804.355	8.00	14.42	3.23	2807.59	.00	1.01	1.69	2.000	.000	.00	.00	0 .0
.802	.4297					.0832	.07	.47	4.44	.32	.013	.00	.00		PIPE
1381.799	2804.235	.481	2804.716	8.00	13.75	2.94	2807.65	.00	1.01	1.71	2.000	.000	.00	.00	0 .0
.703	.4297					.0728	.05	.48	4.16	.32	.013	.00	.00		PIPE
1382.502	2804.537	.497	2805.034	8.00	13.11	2.67	2807.70	.00	1.01	1.73	2.000	.000	.00	.00	0 .0
.617	.4297					.0636	.04	.50	3.89	.32	.013	.00	.00		PIPE
1383.119	2804.802	.514	2805.316	8.00	12.50	2.43	2807.74	.00	1.01	1.75	2.000	.000	.00	.00	0 .0
.542	.4297					.0556	.03	.51	3.64	.32	.013	.00	.00		PIPE
1383.661	2805.035	.532	2805.567	8.00	11.92	2.21	2807.77	.00	1.01	1.77	2.000	.000	.00	.00	0 .0
.479	.4297					.0487	.02	.53	3.41	.32	.013	.00	.00		PIPE
1384.140	2805.241	.550	2805.791	8.00	11.37	2.01	2807.80	.00	1.01	1.79	2.000	.000	.00	.00	0 .0
.419	.4297					.0426	.02	.55	3.19	.32	.013	.00	.00		PIPE
1384.560	2805.421	.570	2805.991	8.00	10.84	1.82	2807.81	.00	1.01	1.81	2.000	.000	.00	.00	0 .0
.374	.4297					.0373	.01	.57	2.99	.32	.013	.00	.00		PIPE

Program Package Serial Number: 3074

WATER SURFACE PROFILE LISTING Date:12-23-2016 Time: 8:44:14

KYLE CANYON INTERCHANGE
KCW1 23+62 South Facilities 2A, SD8, and SD9
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	ZR	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall			Type Ch
1384.934	2805.582	.589	2806.171	8.00	10.33	1.66	2807.83	.00	1.01	1.82	2.000	.000	.00	.00	0 .0
.327	.4297					.0326	.01	.59	2.79	.32	.013	.00	.00		PIPE
1385.260	2805.722	.610	2806.332	8.00	9.85	1.51	2807.84	.00	1.01	1.84	2.000	.000	.00	.00	0 .0
.289	.4297					.0286	.01	.61	2.61	.32	.013	.00	.00		PIPE
1385.550	2805.846	.631	2806.478	8.00	9.39	1.37	2807.85	.00	1.01	1.86	2.000	.000	.00	.00	0 .0
.251	.4297					.0250	.01	.63	2.45	.32	.013	.00	.00		PIPE
1385.801	2805.954	.654	2806.608	8.00	8.96	1.25	2807.85	.00	1.01	1.88	2.000	.000	.00	.00	0 .0
.221	.4297					.0219	.00	.65	2.29	.32	.013	.00	.00		PIPE
1386.022	2806.050	.677	2806.727	8.00	8.54	1.13	2807.86	.00	1.01	1.89	2.000	.000	.00	.00	0 .0
.192	.4297					.0192	.00	.68	2.14	.32	.013	.00	.00		PIPE
1386.214	2806.132	.701	2806.833	8.00	8.14	1.03	2807.86	.00	1.01	1.91	2.000	.000	.00	.00	0 .0
.166	.4297					.0168	.00	.70	2.00	.32	.013	.00	.00		PIPE
1386.380	2806.204	.726	2806.930	8.00	7.76	.94	2807.87	.00	1.01	1.92	2.000	.000	.00	.00	0 .0
.142	.4297					.0148	.00	.73	1.87	.32	.013	.00	.00		PIPE
1386.523	2806.265	.752	2807.017	8.00	7.40	.85	2807.87	.00	1.01	1.94	2.000	.000	.00	.00	0 .0
.121	.4297					.0130	.00	.75	1.75	.32	.013	.00	.00		PIPE
1386.644	2806.317	.779	2807.096	8.00	7.06	.77	2807.87	.00	1.01	1.95	2.000	.000	.00	.00	0 .0
.101	.4297					.0114	.00	.78	1.63	.32	.013	.00	.00		PIPE

Program Package Serial Number: 3074

WATER SURFACE PROFILE LISTING Date:12-23-2016 Time: 8:44:14

KYLE CANYON INTERCHANGE
KCW1 23+62 South Facilities 2A, SD8, and SD9
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip

L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
1386.745	2806.360	.807	2807.167	8.00	6.73	.70	2807.87	.00	1.01	1.96	2.000	.000	.00	0	.0
.081	.4297				.0100	.00	.81	1.52	.32	.013	.00	.00	PIPE	
1386.826	2806.395	.837	2807.232	8.00	6.42	.64	2807.87	.00	1.01	1.97	2.000	.000	.00	0	.0
.064	.4297				.0088	.00	.84	1.42	.32	.013	.00	.00	PIPE	
1386.890	2806.423	.868	2807.291	8.00	6.12	.58	2807.87	.00	1.01	1.98	2.000	.000	.00	0	.0
.049	.4297				.0077	.00	.87	1.33	.32	.013	.00	.00	PIPE	
1386.939	2806.444	.900	2807.344	8.00	5.83	.53	2807.87	.00	1.01	1.99	2.000	.000	.00	0	.0
.036	.4297				.0068	.00	.90	1.24	.32	.013	.00	.00	PIPE	
1386.975	2806.459	.933	2807.392	8.00	5.56	.48	2807.87	.00	1.01	2.00	2.000	.000	.00	0	.0
.020	.4297				.0059	.00	.93	1.15	.32	.013	.00	.00	PIPE	
1386.995	2806.468	.968	2807.436	8.00	5.30	.44	2807.87	.00	1.01	2.00	2.000	.000	.00	0	.0
.005	.4297				.0052	.00	.97	1.08	.32	.013	.00	.00	PIPE	
1387.000	2806.470	1.007	2807.477	8.00	5.05	.40	2807.87	.00	1.01	2.00	2.000	.000	.00	0	.0

WSPGW MODEL
KCW1_25+12.WSW

```
T1 KYLE CANYON INTERCHANGE                                                    0

T2 KCW1 25+12 Facility 9A

T3 412-634A
SO   1000.0002769.900 18                          2772.390
R    1114.0002775.890 18      .013                                  .000    .000 1
R    1119.0002775.990 18      .013                                  .000    .000 0
R    1177.0002795.220 18      .013                                  .000    .000 1
SH   1177.0002795.220 18      .013                                  .000    .000 0
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q             1.400   .0
```

KYLE CANYON INTERCHANGE
KCW1 25+12 Facility 9A
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2769.900	2.490	2772.390	1.40	.79	.01	2772.40	.00	.44	.00	1.500	.000	.00	0 .0
18.907	.0525					.0002	.00	2.49	.00	.25	.013	.00	.00	PIPE
1018.907	2770.893	1.500	2772.393	1.40	.79	.01	2772.40	.00	.44	.00	1.500	.000	.00	0 .0
2.633	.0525					.0002	.00	1.50	.00	.25	.013	.00	.00	PIPE
1021.540	2771.032	1.360	2772.392	1.40	.83	.01	2772.40	.00	.44	.87	1.500	.000	.00	0 .0
1.507	.0525					.0002	.00	1.36	.11	.25	.013	.00	.00	PIPE
1023.047	2771.111	1.280	2772.391	1.40	.87	.01	2772.40	.00	.44	1.06	1.500	.000	.00	0 .0
1.257	.0525					.0002	.00	1.28	.12	.25	.013	.00	.00	PIPE
1024.303	2771.177	1.213	2772.390	1.40	.91	.01	2772.40	.00	.44	1.18	1.500	.000	.00	0 .0
1.083	.0525					.0002	.00	1.21	.14	.25	.013	.00	.00	PIPE
1025.387	2771.234	1.155	2772.389	1.40	.96	.01	2772.40	.00	.44	1.26	1.500	.000	.00	0 .0
.985	.0525					.0002	.00	1.16	.16	.25	.013	.00	.00	PIPE
1026.372	2771.285	1.102	2772.387	1.40	1.01	.02	2772.40	.00	.44	1.32	1.500	.000	.00	0 .0
.888	.0525					.0002	.00	1.10	.17	.25	.013	.00	.00	PIPE
1027.260	2771.332	1.054	2772.386	1.40	1.05	.02	2772.40	.00	.44	1.37	1.500	.000	.00	0 .0
.809	.0525					.0003	.00	1.05	.19	.25	.013	.00	.00	PIPE
1028.068	2771.375	1.010	2772.385	1.40	1.11	.02	2772.40	.00	.44	1.41	1.500	.000	.00	0 .0
.768	.0525					.0003	.00	1.01	.21	.25	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KCW1 25+12 Facility 9A
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1028.836	2771.415	.968	2772.383	1.40	1.16	.02	2772.40	.00	.44	1.44	1.500	.000	.00	0 .0
.707	.0525					.0003	.00	.97	.22	.25	.013	.00	.00	PIPE
1029.543	2771.452	.929	2772.381	1.40	1.22	.02	2772.40	.00	.44	1.46	1.500	.000	.00	0 .0
.646	.0525					.0004	.00	.93	.24	.25	.013	.00	.00	PIPE
1030.189	2771.486	.893	2772.379	1.40	1.28	.03	2772.40	.00	.44	1.47	1.500	.000	.00	0 .0
.623	.0525					.0004	.00	.89	.26	.25	.013	.00	.00	PIPE
1030.812	2771.519	.858	2772.377	1.40	1.34	.03	2772.40	.00	.44	1.48	1.500	.000	.00	0 .0
.561	.0525					.0005	.00	.86	.28	.25	.013	.00	.00	PIPE
1031.373	2771.548	.826	2772.374	1.40	1.40	.03	2772.40	.00	.44	1.49	1.500	.000	.00	0 .0
.537	.0525					.0006	.00	.83	.30	.25	.013	.00	.00	PIPE
1031.911	2771.576	.795	2772.372	1.40	1.47	.03	2772.41	.00	.44	1.50	1.500	.000	.00	0 .0
.513	.0525					.0006	.00	.80	.33	.25	.013	.00	.00	PIPE
1032.424	2771.603	.765	2772.368	1.40	1.54	.04	2772.41	.00	.44	1.50	1.500	.000	.00	0 .0
.441	.0525					.0007	.00	.77	.35	.25	.013	.00	.00	PIPE
1032.864	2771.626	.737	2772.364	1.40	1.62	.04	2772.40	.00	.44	1.50	1.500	.000	.00	0 .0
HYDRAULIC JUMP														
1032.864	2771.626	.245	2771.872	1.40	7.43	.86	2772.73	.00	.44	1.11	1.500	.000	.00	0 .0
34.001	.0525					.0526	1.79	.25	3.18	.25	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KCW1 25+12 Facility 9A
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1066.866	2773.413	.245	2773.659	1.40	7.43	.86	2774.52	.00	.44	1.11	1.500	.000	.00	0 .0
20.480	.0525					.0557	1.14	.25	3.18	.25	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1087.346	2774.490	.238	2774.728	1.40	7.73	.93	2775.66	.00	.44	1.10	1.500	.000	.00	0 .0
8.013	.0525					.0631	.51	.24	3.35	.25	.013	.00	.00	PIPE
1095.358	2774.910	.230	2775.140	1.40	8.11	1.02	2776.16	.00	.44	1.08	1.500	.000	.00	0 .0
4.809	.0525					.0723	.35	.23	3.58	.25	.013	.00	.00	PIPE
1100.168	2775.163	.223	2775.386	1.40	8.51	1.12	2776.51	.00	.44	1.07	1.500	.000	.00	0 .0
3.468	.0525					.0829	.29	.22	3.82	.25	.013	.00	.00	PIPE
1103.636	2775.345	.216	2775.561	1.40	8.92	1.24	2776.80	.00	.44	1.05	1.500	.000	.00	0 .0
2.746	.0525					.0950	.26	.22	4.07	.25	.013	.00	.00	PIPE
1106.382	2775.490	.209	2775.698	1.40	9.36	1.36	2777.06	.00	.44	1.04	1.500	.000	.00	0 .0
2.293	.0525					.1088	.25	.21	4.35	.25	.013	.00	.00	PIPE
1108.675	2775.610	.202	2775.812	1.40	9.82	1.50	2777.31	.00	.44	1.02	1.500	.000	.00	0 .0
1.983	.0525					.1245	.25	.20	4.64	.25	.013	.00	.00	PIPE
1110.658	2775.714	.195	2775.909	1.40	10.29	1.65	2777.56	.00	.44	1.01	1.500	.000	.00	0 .0
1.762	.0525					.1426	.25	.20	4.94	.25	.013	.00	.00	PIPE
1112.420	2775.807	.189	2775.996	1.40	10.80	1.81	2777.81	.00	.44	1.00	1.500	.000	.00	0 .0
1.580	.0525					.1636	.26	.19	5.27	.25	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1114.000	2775.890	.184	2776.073	1.40	11.32	1.99	2778.06	.00	.44	.98	1.500	.000	.00	0 .0
.864	.0200					.1835	.16	.18	5.63	.31	.013	.00	.00	PIPE
1114.864	2775.907	.179	2776.086	1.40	11.71	2.13	2778.21	.00	.44	.97	1.500	.000	.00	0 .0
1.112	.0200					.2060	.23	.18	5.89	.31	.013	.00	.00	PIPE
1115.976	2775.929	.173	2776.103	1.40	12.28	2.34	2778.44	.00	.44	.96	1.500	.000	.00	0 .0
1.060	.0200					.2362	.25	.17	6.27	.31	.013	.00	.00	PIPE
1117.036	2775.951	.168	2776.119	1.40	12.88	2.58	2778.69	.00	.44	.95	1.500	.000	.00	0 .0
1.004	.0200					.2706	.27	.17	6.70	.31	.013	.00	.00	PIPE
1118.040	2775.971	.162	2776.133	1.40	13.51	2.83	2778.97	.00	.44	.93	1.500	.000	.00	0 .0
.960	.0200					.3102	.30	.16	7.14	.31	.013	.00	.00	PIPE
1119.000	2775.990	.158	2776.148	1.40	14.17	3.12	2779.26	.00	.44	.92	1.500	.000	.00	0 .0
18.277	.3316					.3318	6.06	.16	7.62	.16	.013	.00	.00	PIPE
1137.277	2782.050	.158	2782.207	1.40	14.17	3.12	2785.32	.00	.44	.92	1.500	.000	.00	0 .0
14.027	.3316					.3292	4.62	.16	7.62	.16	.013	.00	.00	PIPE
1151.304	2786.701	.158	2786.859	1.40	14.09	3.08	2789.94	.00	.44	.92	1.500	.000	.00	0 .0
10.613	.3316					.3056	3.24	.16	7.56	.16	.013	.00	.00	PIPE
1161.918	2790.219	.163	2790.383	1.40	13.43	2.80	2793.18	.00	.44	.93	1.500	.000	.00	0 .0
3.830	.3316					.2663	1.02	.16	7.09	.16	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1165.747	2791.489	.168	2791.657	1.40	12.81	2.55	2794.20	.00	.44	.95	1.500	.000	.00	0 .0
2.275	.3316					.2324	.53	.17	6.64	.16	.013	.00	.00	PIPE
1168.022	2792.244	.174	2792.418	1.40	12.21	2.32	2794.73	.00	.44	.96	1.500	.000	.00	0 .0
1.592	.3316					.2031	.32	.17	6.23	.16	.013	.00	.00	PIPE
1169.615	2792.771	.180	2792.952	1.40	11.64	2.11	2795.06	.00	.44	.98	1.500	.000	.00	0 .0
1.202	.3316					.1773	.21	.18	5.84	.16	.013	.00	.00	PIPE
1170.817	2793.170	.186	2793.356	1.40	11.10	1.91	2795.27	.00	.44	.99	1.500	.000	.00	0 .0
.950	.3316					.1547	.15	.19	5.48	.16	.013	.00	.00	PIPE
1171.767	2793.485	.192	2793.677	1.40	10.59	1.74	2795.42	.00	.44	1.00	1.500	.000	.00	0 .0
.774	.3316					.1349	.10	.19	5.14	.16	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1172.541	2793.741	.198	2793.939	1.40	10.09	1.58	2795.52	.00	.44	1.02	1.500	.000	.00	0 .0
.640	.3316					.1177	.08	.20	4.81	.16	.013	.00	.00	PIPE
1173.180	2793.954	.205	2794.159	1.40	9.62	1.44	2795.60	.00	.44	1.03	1.500	.000	.00	0 .0
.541	.3316					.1029	.06	.21	4.51	.16	.013	.00	.00	PIPE
1173.722	2794.133	.212	2794.345	1.40	9.18	1.31	2795.65	.00	.44	1.05	1.500	.000	.00	0 .0
.463	.3316					.0898	.04	.21	4.23	.16	.013	.00	.00	PIPE
1174.184	2794.286	.219	2794.505	1.40	8.75	1.19	2795.69	.00	.44	1.06	1.500	.000	.00	0 .0
.399	.3316					.0784	.03	.22	3.97	.16	.013	.00	.00	PIPE

Program Package Serial Number: 3074
WATER SURFACE PROFILE LISTING
Date:12-23-2016 Time:11:52:43

KYLE CANYON INTERCHANGE
KCW1 25+12 Facility 9A
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1174.583	2794.419	.226	2794.645	1.40	8.34	1.08	2795.73	.00	.44	1.07	1.500	.000	.00	0 .0
.343	.3316					.0684	.02	.23	3.72	.16	.013	.00	.00	PIPE
1174.926	2794.532	.234	2794.767	1.40	7.95	.98	2795.75	.00	.44	1.09	1.500	.000	.00	0 .0
.303	.3316					.0597	.02	.23	3.49	.16	.013	.00	.00	PIPE
1175.229	2794.633	.241	2794.874	1.40	7.58	.89	2795.77	.00	.44	1.10	1.500	.000	.00	0 .0
.258	.3316					.0522	.01	.24	3.26	.16	.013	.00	.00	PIPE
1175.487	2794.719	.250	2794.969	1.40	7.23	.81	2795.78	.00	.44	1.12	1.500	.000	.00	0 .0
.230	.3316					.0456	.01	.25	3.06	.16	.013	.00	.00	PIPE
1175.717	2794.795	.258	2795.053	1.40	6.89	.74	2795.79	.00	.44	1.13	1.500	.000	.00	0 .0
.199	.3316					.0398	.01	.26	2.87	.16	.013	.00	.00	PIPE
1175.916	2794.861	.267	2795.128	1.40	6.57	.67	2795.80	.00	.44	1.15	1.500	.000	.00	0 .0
.175	.3316					.0348	.01	.27	2.69	.16	.013	.00	.00	PIPE
1176.092	2794.919	.276	2795.195	1.40	6.27	.61	2795.80	.00	.44	1.16	1.500	.000	.00	0 .0
.154	.3316					.0304	.00	.28	2.52	.16	.013	.00	.00	PIPE
1176.246	2794.970	.285	2795.255	1.40	5.98	.55	2795.81	.00	.44	1.18	1.500	.000	.00	0 .0
.132	.3316					.0265	.00	.29	2.36	.16	.013	.00	.00	PIPE
1176.378	2795.014	.295	2795.309	1.40	5.70	.50	2795.81	.00	.44	1.19	1.500	.000	.00	0 .0
.116	.3316					.0232	.00	.30	2.21	.16	.013	.00	.00	PIPE

Program Package Serial Number: 3074
WATER SURFACE PROFILE LISTING
Date:12-23-2016 Time:11:52:43

KYLE CANYON INTERCHANGE
KCW1 25+12 Facility 9A
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1176.494	2795.052	.305	2795.357	1.40	5.43	.46	2795.82	.00	.44	1.21	1.500	.000	.00	0 .0
.102	.3316					.0203	.00	.31	2.07	.16	.013	.00	.00	PIPE
1176.596	2795.086	.315	2795.401	1.40	5.18	.42	2795.82	.00	.44	1.22	1.500	.000	.00	0 .0
.086	.3316					.0177	.00	.32	1.94	.16	.013	.00	.00	PIPE
1176.682	2795.114	.326	2795.440	1.40	4.94	.38	2795.82	.00	.44	1.24	1.500	.000	.00	0 .0
.074	.3316					.0155	.00	.33	1.82	.16	.013	.00	.00	PIPE
1176.756	2795.139	.337	2795.476	1.40	4.71	.34	2795.82	.00	.44	1.25	1.500	.000	.00	0 .0
.064	.3316					.0135	.00	.34	1.70	.16	.013	.00	.00	PIPE
1176.820	2795.160	.348	2795.508	1.40	4.49	.31	2795.82	.00	.44	1.27	1.500	.000	.00	0 .0
.051	.3316					.0118	.00	.35	1.59	.16	.013	.00	.00	PIPE
1176.871	2795.177	.360	2795.537	1.40	4.28	.28	2795.82	.00	.44	1.28	1.500	.000	.00	0 .0
.040	.3316					.0103	.00	.36	1.49	.16	.013	.00	.00	PIPE
1176.911	2795.190	.373	2795.563	1.40	4.08	.26	2795.82	.00	.44	1.30	1.500	.000	.00	0 .0
.036	.3316					.0090	.00	.37	1.40	.16	.013	.00	.00	PIPE
1176.947	2795.202	.385	2795.587	1.40	3.89	.24	2795.82	.00	.44	1.31	1.500	.000	.00	0 .0
.023	.3316					.0079	.00	.39	1.31	.16	.013	.00	.00	PIPE
1176.969	2795.210	.399	2795.609	1.40	3.71	.21	2795.82	.00	.44	1.33	1.500	.000	.00	0 .0
.017	.3316					.0069	.00	.40	1.23	.16	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KCW1 25+12 Facility 9A
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1176.986	2795.215	.413	2795.628	1.40	3.54	.19	2795.82	.00	.44	1.34	1.500	.000	.00	0 .0
.011	.3316					.0061	.00	.41	1.15	.16	.013	.00	.00	PIPE
1176.997	2795.219	.427	2795.646	1.40	3.37	.18	2795.82	.00	.44	1.35	1.500	.000	.00	0 .0
.003	.3316					.0053	.00	.43	1.07	.16	.013	.00	.00	PIPE
1177.000	2795.220	.443	2795.663	1.40	3.21	.16	2795.82	.00	.44	1.37	1.500	.000	.00	0 .0

♀

WSPGW MODEL
KCW1_27+00.WSW

```
T1 KYLE CANYON INTERCHANGE                                                    0

T2 KCW1 27+00 Facilities D16

T3 412-634A
SO   1000.0002768.830 18                          2771.620
R    1051.0002770.579 18      .013                                  .000     .000 0
SH   1051.0002770.579 18      .013                                  .000     .000 0
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q             0.300   .0
```

KYLE CANYON INTERCHANGE
KCW1 27+00 Facilities D16
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT or "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2768.830	2.790	2771.620	.30	.17	.00	2771.62	.00	.20	.00	1.500	.000	.00	0 .0
37.625	.0343					.0000	.00	2.79	.00	.13	.013	.00	.00	PIPE
1037.625	2770.120	1.500	2771.620	.30	.17	.00	2771.62	.00	.20	.00	1.500	.000	.00	0 .0
4.050	.0343					.0000	.00	1.50	.00	.13	.013	.00	.00	PIPE
1041.675	2770.259	1.360	2771.619	.30	.18	.00	2771.62	.00	.20	.87	1.500	.000	.00	0 .0
2.332	.0343					.0000	.00	1.36	.02	.13	.013	.00	.00	PIPE
1044.007	2770.339	1.280	2771.619	.30	.19	.00	2771.62	.00	.20	1.06	1.500	.000	.00	0 .0
1.953	.0343					.0000	.00	1.28	.03	.13	.013	.00	.00	PIPE
1045.959	2770.406	1.213	2771.619	.30	.20	.00	2771.62	.00	.20	1.18	1.500	.000	.00	0 .0
1.690	.0343					.0000	.00	1.21	.03	.13	.013	.00	.00	PIPE
1047.649	2770.464	1.155	2771.619	.30	.21	.00	2771.62	.00	.20	1.26	1.500	.000	.00	0 .0
1.544	.0343					.0000	.00	1.16	.03	.13	.013	.00	.00	PIPE
1049.193	2770.517	1.102	2771.619	.30	.22	.00	2771.62	.00	.20	1.32	1.500	.000	.00	0 .0
1.398	.0343					.0000	.00	1.10	.04	.13	.013	.00	.00	PIPE
1050.591	2770.565	1.054	2771.619	.30	.23	.00	2771.62	.00	.20	1.37	1.500	.000	.00	0 .0
.409	.0343					.0000	.00	1.05	.04	.13	.013	.00	.00	PIPE
1051.000	2770.579	1.040	2771.619	.30	.23	.00	2771.62	.00	.20	1.38	1.500	.000	.00	0 .0

♀

WSPGW MODEL
KCW1_27+76.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0

T2 KCW1 27+76 Facilities SD21, S13, and S12

T3 412-634A
SO   1000.0002766.050 30                          2771.210
R    1058.0002766.497 30       .013                                  .000    .000 1
JX   1063.0002766.597 24       .013    2.600          2766.597        45.0      -28.000
R    1136.0002766.969 24       .013                                  .000    .000 1
JX   1141.0002767.069 18 24    .013   12.300          2766.970        63.0    .000 0
R    1256.0002768.460 18       .013                                  .000    .000 0

SH   1256.0002768.460 18       .013                                  .000    .000 0
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q             1.900   .0
```

KYLE CANYON INTERCHANGE
KCW1 27+76 Facilities SD21, S13, and S12
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2766.050	5.160	2771.210	16.80	3.42	.18	2771.39	.00	1.39	.00	2.500	.000	.00	0 .0
58.000	.0077					.0017	.10	5.16	.00	1.20	.013	.00	.00	PIPE
1058.000	2766.497	4.819	2771.316	16.80	3.42	.18	2771.50	.00	1.39	.00	2.500	.000	.00	0 .0
JUNCT STR	.0200					.0028	.01	.00	.00		.013	.00	.00	PIPE
1063.000	2766.597	4.682	2771.279	14.20	4.52	.32	2771.60	.00	1.36	.00	2.000	.000	.00	0 .0
73.000	.0051					.0039	.29	4.68	.00	1.45	.013	.00	.00	PIPE
1136.000	2766.969	4.613	2771.582	14.20	4.52	.32	2771.90	.00	1.36	.00	2.000	.000	.00	0 .0
JUNCT STR	.0200					.0021	.01	4.61	.00		.013	.00	.00	PIPE
1141.000	2767.069	5.034	2772.103	1.90	1.08	.02	2772.12	.00	.52	.00	1.500	.000	.00	0 .0
115.000	.0121					.0003	.04	5.03	.00	.41	.013	.00	.00	PIPE
1256.000	2768.460	3.680	2772.140	1.90	1.08	.02	2772.16	.00	.52	.00	1.500	.000	.00	0 .0

♀

```
T1 KYLE CANYON INTERCHANGE                                                  0

T2 KCE1 23+31 South Facilities 5A, S20, and S13

T3 412-634A
SO   1000.0002766.970 24                          2772.103
R    1098.0002767.646 24      .013                                  .000    .000 1
JX   1103.0002766.746 24 30   .013    2.400          2766.746        45.0       13.000
R    1160.0002792.196 24      .013                                  .000    .000 1

SH   1160.0002792.196 24      .013                                  .000    .000 0
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q             8.600   .0
```

Program Package Serial Number: 3074
WATER SURFACE PROFILE LISTING Date:12-23-2016 Time:10:31:45

KYLE CANYON INTERCHANGE
KCE1 23+31 South Facilities 5A, S20, and S13
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2766.970	5.133	2772.103	11.00	3.50	.19	2772.29	.00	1.19	.00	2.000	.000	.00	0 .0
98.000	.0069					.0024	.23	5.13	.00	1.10	.013	.00	.00	PIPE
1098.000	2767.646	4.698	2772.344	11.00	3.50	.19	2772.53	.00	1.19	.00	2.000	.000	.00	0 .0
JUNCT STR	-.1800					.0019	.01	.00	.00		.013	.00	.00	PIPE
1103.000	2766.746	5.747	2772.494	8.60	2.74	.12	2772.61	.00	1.05	.00	2.000	.000	.00	0 .0
6.314	.4465					.0014	.01	5.75	.00	.32	.013	.00	.00	PIPE
1109.314	2769.565	2.937	2772.503	8.60	2.74	.12	2772.62	.00	1.05	.00	2.000	.000	.00	0 .0
HYDRAULIC JUMP														
1109.314	2769.565	.330	2769.895	8.60	25.37	10.00	2779.89	.00	1.05	1.48	2.000	.000	.00	0 .0
8.238	.4465					.4046	3.33	.33	9.36	.32	.013	.00	.00	PIPE
1117.552	2773.243	.333	2773.576	8.60	24.97	9.68	2783.26	.00	1.05	1.49	2.000	.000	.00	0 .0
11.386	.4465					.3702	4.21	.33	9.15	.32	.013	.00	.00	PIPE
1128.938	2778.327	.344	2778.671	8.60	23.81	8.80	2787.47	.00	1.05	1.51	2.000	.000	.00	0 .0
6.401	.4465					.3234	2.07	.34	8.58	.32	.013	.00	.00	PIPE
1135.339	2781.185	.356	2781.541	8.60	22.70	8.00	2789.54	.00	1.05	1.53	2.000	.000	.00	0 .0
4.365	.4465					.2826	1.23	.36	8.04	.32	.013	.00	.00	PIPE
1139.703	2783.134	.368	2783.502	8.60	21.64	7.27	2790.78	.00	1.05	1.55	2.000	.000	.00	0 .0
3.251	.4465					.2468	.80	.37	7.53	.32	.013	.00	.00	PIPE

Program Package Serial Number: 3074
WATER SURFACE PROFILE LISTING Date:12-23-2016 Time:10:31:45

KYLE CANYON INTERCHANGE
KCE1 23+31 South Facilities 5A, S20, and S13
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1142.954	2784.585	.380	2784.965	8.60	20.64	6.61	2791.58	.00	1.05	1.57	2.000	.000	.00	0 .0
2.547	.4465					.2155	.55	.38	7.06	.32	.013	.00	.00	PIPE
1145.501	2785.722	.393	2786.115	8.60	19.68	6.01	2792.13	.00	1.05	1.59	2.000	.000	.00	0 .0
2.066	.4465					.1883	.39	.39	6.61	.32	.013	.00	.00	PIPE
1147.567	2786.645	.406	2787.051	8.60	18.76	5.47	2792.52	.00	1.05	1.61	2.000	.000	.00	0 .0
1.712	.4465					.1645	.28	.41	6.19	.32	.013	.00	.00	PIPE
1149.279	2787.409	.420	2787.830	8.60	17.89	4.97	2792.80	.00	1.05	1.63	2.000	.000	.00	0 .0
1.443	.4465					.1439	.21	.42	5.80	.32	.013	.00	.00	PIPE
1150.722	2788.054	.435	2788.489	8.60	17.06	4.52	2793.01	.00	1.05	1.65	2.000	.000	.00	0 .0
1.237	.4465					.1258	.16	.44	5.44	.32	.013	.00	.00	PIPE
1151.959	2788.606	.449	2789.055	8.60	16.26	4.11	2793.16	.00	1.05	1.67	2.000	.000	.00	0 .0
1.062	.4465					.1099	.12	.45	5.09	.32	.013	.00	.00	PIPE
1153.020	2789.080	.465	2789.545	8.60	15.50	3.73	2793.28	.00	1.05	1.69	2.000	.000	.00	0 .0
.923	.4465					.0962	.09	.47	4.77	.32	.013	.00	.00	PIPE
1153.943	2789.492	.481	2789.973	8.60	14.78	3.39	2793.37	.00	1.05	1.71	2.000	.000	.00	0 .0
.807	.4465					.0841	.07	.48	4.47	.32	.013	.00	.00	PIPE
1154.750	2789.852	.497	2790.349	8.60	14.10	3.08	2793.43	.00	1.05	1.73	2.000	.000	.00	0 .0
.706	.4465					.0735	.05	.50	4.18	.32	.013	.00	.00	PIPE

Program Package Serial Number: 3074
WATER SURFACE PROFILE LISTING Date:12-23-2016 Time:10:31:45

KYLE CANYON INTERCHANGE
KCE1 23+31 South Facilities 5A, S20, and S13
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1155.457	2790.168	.514	2790.682	8.60	13.44	2.80	2793.49	.00	1.05	1.75	2.000	.000	.00	0 .0
.620	.4465					.0643	.04	.51	3.91	.32	.013	.00	.00	PIPE
1156.077	2790.445	.532	2790.977	8.60	12.81	2.55	2793.53	.00	1.05	1.77	2.000	.000	.00	0 .0
.548	.4465					.0562	.03	.53	3.66	.32	.013	.00	.00	PIPE
1156.624	2790.689	.550	2791.239	8.60	12.22	2.32	2793.56	.00	1.05	1.79	2.000	.000	.00	0 .0
.480	.4465					.0492	.02	.55	3.43	.32	.013	.00	.00	PIPE
1157.104	2790.904	.570	2791.474	8.60	11.65	2.11	2793.58	.00	1.05	1.81	2.000	.000	.00	0 .0
.428	.4465					.0431	.02	.57	3.21	.32	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1157.532	2791.094	.589	2791.684	8.60	11.11	1.92	2793.60	.00	1.05	1.82	2.000	.000	.00	0 .0
.375	.4465					.0377	.01	.59	3.00	.32	.013	.00	.00	PIPE
1157.907	2791.262	.610	2791.872	8.60	10.59	1.74	2793.61	.00	1.05	1.84	2.000	.000	.00	0 .0
.332	.4465					.0330	.01	.61	2.81	.32	.013	.00	.00	PIPE
1158.239	2791.410	.631	2792.041	8.60	10.10	1.58	2793.62	.00	1.05	1.86	2.000	.000	.00	0 .0
.290	.4465					.0289	.01	.63	2.63	.32	.013	.00	.00	PIPE
1158.528	2791.539	.654	2792.193	8.60	9.63	1.44	2793.63	.00	1.05	1.88	2.000	.000	.00	0 .0
.256	.4465					.0253	.01	.65	2.46	.32	.013	.00	.00	PIPE
1158.784	2791.654	.677	2792.331	8.60	9.18	1.31	2793.64	.00	1.05	1.89	2.000	.000	.00	0 .0
.224	.4465					.0222	.00	.68	2.30	.32	.013	.00	.00	PIPE

Program Package Serial Number: 3074
WATER SURFACE PROFILE LISTING Date:12-23-2016 Time:10:31:45

KYLE CANYON INTERCHANGE
KCE1 23+31 South Facilities 5A, S20, and S13
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1159.008	2791.753	.701	2792.455	8.60	8.75	1.19	2793.64	.00	1.05	1.91	2.000	.000	.00	0 .0
.195	.4465					.0195	.00	.70	2.15	.32	.013	.00	.00	PIPE
1159.203	2791.840	.726	2792.566	8.60	8.34	1.08	2793.65	.00	1.05	1.92	2.000	.000	.00	0 .0
.168	.4465					.0171	.00	.73	2.01	.32	.013	.00	.00	PIPE
1159.371	2791.916	.752	2792.668	8.60	7.96	.98	2793.65	.00	1.05	1.94	2.000	.000	.00	0 .0
.145	.4465					.0150	.00	.75	1.88	.32	.013	.00	.00	PIPE
1159.516	2791.980	.779	2792.759	8.60	7.59	.89	2793.65	.00	1.05	1.95	2.000	.000	.00	0 .0
.123	.4465					.0131	.00	.78	1.75	.32	.013	.00	.00	PIPE
1159.638	2792.035	.807	2792.842	8.60	7.23	.81	2793.65	.00	1.05	1.96	2.000	.000	.00	0 .0
.101	.4465					.0115	.00	.81	1.64	.32	.013	.00	.00	PIPE
1159.739	2792.080	.837	2792.917	8.60	6.90	.74	2793.66	.00	1.05	1.97	2.000	.000	.00	0 .0
.083	.4465					.0101	.00	.84	1.53	.32	.013	.00	.00	PIPE
1159.822	2792.117	.868	2792.985	8.60	6.58	.67	2793.66	.00	1.05	1.98	2.000	.000	.00	0 .0
.066	.4465					.0089	.00	.87	1.43	.32	.013	.00	.00	PIPE
1159.888	2792.146	.900	2793.046	8.60	6.27	.61	2793.66	.00	1.05	1.99	2.000	.000	.00	0 .0
.051	.4465					.0078	.00	.90	1.33	.32	.013	.00	.00	PIPE
1159.940	2792.169	.933	2793.102	8.60	5.98	.55	2793.66	.00	1.05	2.00	2.000	.000	.00	0 .0
.033	.4465					.0069	.00	.93	1.24	.32	.013	.00	.00	PIPE

Program Package Serial Number: 3074
WATER SURFACE PROFILE LISTING Date:12-23-2016 Time:10:31:45

KYLE CANYON INTERCHANGE
KCE1 23+31 South Facilities 5A, S20, and S13
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1159.973	2792.184	.969	2793.153	8.60	5.70	.50	2793.66	.00	1.05	2.00	2.000	.000	.00	0 .0
.022	.4465					.0061	.00	.97	1.16	.32	.013	.00	.00	PIPE
1159.995	2792.194	1.005	2793.199	8.60	5.43	.46	2793.66	.00	1.05	2.00	2.000	.000	.00	0 .0
.005	.4465					.0053	.00	1.01	1.08	.32	.013	.00	.00	PIPE
1160.000	2792.196	1.046	2793.241	8.60	5.18	.42	2793.66	.00	1.05	2.00	2.000	.000	.00	0 .0

♀

WSPGW MODEL
KCE1_25+15NORTH.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0
T2 KCE1 25+15 North Facilities D9
T3 412-634A
SO    1000.0002764.660 18                          2769.440
R     1063.0002769.870 18       .013                              .000    .000 0
SH    1063.0002769.870 18       .013                              .000    .000 0
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q             0.200   .0
```

KYLE CANYON INTERCHANGE
KCE1 25+15 North Facilities D9
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	2764.660	4.780	2769.440	.20	.11	.00	2769.44	.00	.16	.00	1.500	.000	.00	0 .0
39.663	.0827					.0000	.00	4.78	.00	.09	.013	.00	.00	PIPE
1039.663	2767.940	1.500	2769.440	.20	.11	.00	2769.44	.00	.16	.00	1.500	.000	.00	0 .0
1.679	.0827					.0000	.00	1.50	.00	.09	.013	.00	.00	PIPE
1041.342	2768.079	1.360	2769.439	.20	.12	.00	2769.44	.00	.16	.87	1.500	.000	.00	0 .0
.967	.0827					.0000	.00	1.36	.02	.09	.013	.00	.00	PIPE
1042.309	2768.159	1.280	2769.439	.20	.12	.00	2769.44	.00	.16	1.06	1.500	.000	.00	0 .0
.810	.0827					.0000	.00	1.28	.02	.09	.013	.00	.00	PIPE
1043.119	2768.226	1.213	2769.439	.20	.13	.00	2769.44	.00	.16	1.18	1.500	.000	.00	0 .0
.701	.0827					.0000	.00	1.21	.02	.09	.013	.00	.00	PIPE
1043.820	2768.284	1.155	2769.439	.20	.14	.00	2769.44	.00	.16	1.26	1.500	.000	.00	0 .0
.641	.0827					.0000	.00	1.16	.02	.09	.013	.00	.00	PIPE
1044.461	2768.337	1.102	2769.439	.20	.14	.00	2769.44	.00	.16	1.32	1.500	.000	.00	0 .0
.580	.0827					.0000	.00	1.10	.02	.09	.013	.00	.00	PIPE
1045.041	2768.385	1.054	2769.439	.20	.15	.00	2769.44	.00	.16	1.37	1.500	.000	.00	0 .0
.532	.0827					.0000	.00	1.05	.03	.09	.013	.00	.00	PIPE
1045.572	2768.429	1.010	2769.439	.20	.16	.00	2769.44	.00	.16	1.41	1.500	.000	.00	0 .0
.507	.0827					.0000	.00	1.01	.03	.09	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KCE1 25+15 North Facilities D9
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1046.080	2768.471	.968	2769.439	.20	.17	.00	2769.44	.00	.16	1.44	1.500	.000	.00	0 .0
.471	.0827					.0000	.00	.97	.03	.09	.013	.00	.00	PIPE
1046.551	2768.510	.929	2769.439	.20	.17	.00	2769.44	.00	.16	1.46	1.500	.000	.00	0 .0
.435	.0827					.0000	.00	.93	.03	.09	.013	.00	.00	PIPE
1046.986	2768.546	.893	2769.439	.20	.18	.00	2769.44	.00	.16	1.47	1.500	.000	.00	0 .0
.423	.0827					.0000	.00	.89	.04	.09	.013	.00	.00	PIPE
1047.408	2768.581	.858	2769.439	.20	.19	.00	2769.44	.00	.16	1.48	1.500	.000	.00	0 .0
.386	.0827					.0000	.00	.86	.04	.09	.013	.00	.00	PIPE
1047.795	2768.613	.826	2769.439	.20	.20	.00	2769.44	.00	.16	1.49	1.500	.000	.00	0 .0
.374	.0827					.0000	.00	.83	.04	.09	.013	.00	.00	PIPE
1048.169	2768.644	.795	2769.439	.20	.21	.00	2769.44	.00	.16	1.50	1.500	.000	.00	0 .0
.362	.0827					.0000	.00	.80	.05	.09	.013	.00	.00	PIPE
1048.531	2768.674	.765	2769.439	.20	.22	.00	2769.44	.00	.16	1.50	1.500	.000	.00	0 .0
.338	.0827					.0000	.00	.77	.05	.09	.013	.00	.00	PIPE
1048.869	2768.701	.737	2769.438	.20	.23	.00	2769.44	.00	.16	1.50	1.500	.000	.00	0 .0
.326	.0827					.0000	.00	.74	.05	.09	.013	.00	.00	PIPE
1049.194	2768.728	.710	2769.438	.20	.24	.00	2769.44	.00	.16	1.50	1.500	.000	.00	0 .0
.313	.0827					.0000	.00	.71	.06	.09	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KCE1 25+15 North Facilities D9
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1049.507	2768.754	.684	2769.438	.20	.25	.00	2769.44	.00	.16	1.49	1.500	.000	.00	0 .0
.289	.0827					.0000	.00	.68	.06	.09	.013	.00	.00	PIPE
1049.797	2768.778	.660	2769.438	.20	.27	.00	2769.44	.00	.16	1.49	1.500	.000	.00	0 .0
.289	.0827					.0000	.00	.66	.07	.09	.013	.00	.00	PIPE
1050.085	2768.802	.636	2769.438	.20	.28	.00	2769.44	.00	.16	1.48	1.500	.000	.00	0 .0
.265	.0827					.0000	.00	.64	.07	.09	.013	.00	.00	PIPE
1050.350	2768.824	.614	2769.438	.20	.29	.00	2769.44	.00	.16	1.48	1.500	.000	.00	0 .0

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
	.265 .0827					.0000	.00	.61	.08	.09	.013	.00	.00	PIPE
1050.615	2768.846	.592	2769.438	.20	.31	.00	2769.44	.00	.16	1.47	1.500	.000	.00	0 .0
	.240 .0827					.0000	.00	.59	.08	.09	.013	.00	.00	PIPE
1050.855	2768.866	.572	2769.438	.20	.32	.00	2769.44	.00	.16	1.46	1.500	.000	.00	0 .0
	.240 .0827					.0000	.00	.57	.09	.09	.013	.00	.00	PIPE
1051.095	2768.885	.552	2769.438	.20	.34	.00	2769.44	.00	.16	1.45	1.500	.000	.00	0 .0
	.228 .0827					.0000	.00	.55	.09	.09	.013	.00	.00	PIPE
1051.322	2768.904	.533	2769.438	.20	.36	.00	2769.44	.00	.16	1.44	1.500	.000	.00	0 .0
	.228 .0827					.0001	.00	.53	.10	.09	.013	.00	.00	PIPE
1051.550	2768.923	.514	2769.437	.20	.37	.00	2769.44	.00	.16	1.42	1.500	.000	.00	0 .0
	.203 .0827					.0001	.00	.51	.11	.09	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1051.753	2768.940	.497	2769.437	.20	.39	.00	2769.44	.00	.16	1.41	1.500	.000	.00	0 .0
	.203 .0827					.0001	.00	.50	.11	.09	.013	.00	.00	PIPE
1051.956	2768.957	.480	2769.437	.20	.41	.00	2769.44	.00	.16	1.40	1.500	.000	.00	0 .0
	.191 .0827					.0001	.00	.48	.12	.09	.013	.00	.00	PIPE
1052.146	2768.973	.464	2769.437	.20	.43	.00	2769.44	.00	.16	1.39	1.500	.000	.00	0 .0
	.190 .0827					.0001	.00	.46	.13	.09	.013	.00	.00	PIPE
1052.337	2768.988	.448	2769.436	.20	.45	.00	2769.44	.00	.16	1.37	1.500	.000	.00	0 .0
	.178 .0827					.0001	.00	.45	.14	.09	.013	.00	.00	PIPE
1052.514	2769.003	.433	2769.436	.20	.47	.00	2769.44	.00	.16	1.36	1.500	.000	.00	0 .0
	.177 .0827					.0001	.00	.43	.15	.09	.013	.00	.00	PIPE
1052.692	2769.018	.418	2769.436	.20	.50	.00	2769.44	.00	.16	1.35	1.500	.000	.00	0 .0
	.165 .0827					.0001	.00	.42	.16	.09	.013	.00	.00	PIPE
1052.857	2769.031	.404	2769.435	.20	.52	.00	2769.44	.00	.16	1.33	1.500	.000	.00	0 .0
	.152 .0827					.0002	.00	.40	.17	.09	.013	.00	.00	PIPE
1053.009	2769.044	.391	2769.435	.20	.55	.00	2769.44	.00	.16	1.32	1.500	.000	.00	0 .0
	.152 .0827					.0002	.00	.39	.18	.09	.013	.00	.00	PIPE
1053.161	2769.056	.378	2769.435	.20	.57	.01	2769.44	.00	.16	1.30	1.500	.000	.00	0 .0
	.151 .0827					.0002	.00	.38	.19	.09	.013	.00	.00	PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1053.313	2769.069	.365	2769.434	.20	.60	.01	2769.44	.00	.16	1.29	1.500	.000	.00	0 .0
	.139 .0827					.0002	.00	.37	.21	.09	.013	.00	.00	PIPE
1053.451	2769.080	.353	2769.433	.20	.63	.01	2769.44	.00	.16	1.27	1.500	.000	.00	0 .0
	.138 .0827					.0003	.00	.35	.22	.09	.013	.00	.00	PIPE
1053.589	2769.092	.341	2769.433	.20	.66	.01	2769.44	.00	.16	1.26	1.500	.000	.00	0 .0
	.125 .0827					.0003	.00	.34	.24	.09	.013	.00	.00	PIPE
1053.714	2769.102	.330	2769.432	.20	.69	.01	2769.44	.00	.16	1.24	1.500	.000	.00	0 .0
	.125 .0827					.0003	.00	.33	.25	.09	.013	.00	.00	PIPE
1053.839	2769.112	.319	2769.431	.20	.73	.01	2769.44	.00	.16	1.23	1.500	.000	.00	0 .0
	.112 .0827					.0004	.00	.32	.27	.09	.013	.00	.00	PIPE
1053.951	2769.122	.309	2769.431	.20	.76	.01	2769.44	.00	.16	1.21	1.500	.000	.00	0 .0
	.111 .0827					.0004	.00	.31	.29	.09	.013	.00	.00	PIPE
1054.061	2769.131	.299	2769.430	.20	.80	.01	2769.44	.00	.16	1.20	1.500	.000	.00	0 .0
	.110 .0827					.0005	.00	.30	.31	.09	.013	.00	.00	PIPE
1054.171	2769.140	.289	2769.429	.20	.84	.01	2769.44	.00	.16	1.18	1.500	.000	.00	0 .0
	.109 .0827					.0006	.00	.29	.33	.09	.013	.00	.00	PIPE
1054.279	2769.149	.279	2769.428	.20	.88	.01	2769.44	.00	.16	1.17	1.500	.000	.00	0 .0
1054.284	2769.149	.270	2769.419	.20	.92	.01	2769.43	.00	.16	1.15	1.500	.000	.00	0 .0

HYDRAULIC JUMP

Program Package Serial Number: 3074
WATER SURFACE PROFILE LISTING
Date:12-26-2016 Time: 9:14: 1

KYLE CANYON INTERCHANGE
KCE1 25+15 North Facilities D9
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1054.284	2769.149	.087	2769.236	.20	4.85	.36	2769.60	.00	.16	.70	1.500	.000	.00	0 .0
.786	.0827					.0804	.06	.09	3.52	.09	.013	.00	.00	PIPE
1055.071	2769.214	.088	2769.302	.20	4.74	.35	2769.65	.00	.16	.71	1.500	.000	.00	0 .0
2.924	.0827					.0729	.21	.09	3.42	.09	.013	.00	.00	PIPE
1057.995	2769.456	.091	2769.547	.20	4.52	.32	2769.86	.00	.16	.72	1.500	.000	.00	0 .0
1.353	.0827					.0636	.09	.09	3.21	.09	.013	.00	.00	PIPE
1059.349	2769.568	.094	2769.662	.20	4.31	.29	2769.95	.00	.16	.73	1.500	.000	.00	0 .0
.853	.0827					.0554	.05	.09	3.01	.09	.013	.00	.00	PIPE
1060.201	2769.638	.097	2769.736	.20	4.11	.26	2770.00	.00	.16	.74	1.500	.000	.00	0 .0
.607	.0827					.0483	.03	.10	2.82	.09	.013	.00	.00	PIPE
1060.808	2769.689	.100	2769.789	.20	3.92	.24	2770.03	.00	.16	.75	1.500	.000	.00	0 .0
.460	.0827					.0421	.02	.10	2.65	.09	.013	.00	.00	PIPE
1061.268	2769.727	.103	2769.830	.20	3.74	.22	2770.05	.00	.16	.76	1.500	.000	.00	0 .0
.342	.0827					.0367	.01	.10	2.48	.09	.013	.00	.00	PIPE
1061.610	2769.755	.107	2769.862	.20	3.56	.20	2770.06	.00	.16	.77	1.500	.000	.00	0 .0
.295	.0827					.0320	.01	.11	2.33	.09	.013	.00	.00	PIPE
1061.905	2769.780	.110	2769.890	.20	3.40	.18	2770.07	.00	.16	.78	1.500	.000	.00	0 .0
.225	.0827					.0279	.01	.11	2.18	.09	.013	.00	.00	PIPE

Program Package Serial Number: 3074
WATER SURFACE PROFILE LISTING
Date:12-26-2016 Time: 9:14: 1

KYLE CANYON INTERCHANGE
KCE1 25+15 North Facilities D9
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1062.130	2769.798	.114	2769.912	.20	3.24	.16	2770.08	.00	.16	.80	1.500	.000	.00	0 .0
.186	.0827					.0244	.00	.11	2.05	.09	.013	.00	.00	PIPE
1062.315	2769.813	.118	2769.932	.20	3.09	.15	2770.08	.00	.16	.81	1.500	.000	.00	0 .0
.154	.0827					.0213	.00	.12	1.92	.09	.013	.00	.00	PIPE
1062.470	2769.826	.122	2769.948	.20	2.95	.13	2770.08	.00	.16	.82	1.500	.000	.00	0 .0
.129	.0827					.0186	.00	.12	1.80	.09	.013	.00	.00	PIPE
1062.599	2769.837	.126	2769.963	.20	2.81	.12	2770.09	.00	.16	.83	1.500	.000	.00	0 .0
.107	.0827					.0162	.00	.13	1.69	.09	.013	.00	.00	PIPE
1062.706	2769.846	.130	2769.976	.20	2.68	.11	2770.09	.00	.16	.84	1.500	.000	.00	0 .0
.089	.0827					.0141	.00	.13	1.59	.09	.013	.00	.00	PIPE
1062.795	2769.853	.134	2769.987	.20	2.55	.10	2770.09	.00	.16	.86	1.500	.000	.00	0 .0
.074	.0827					.0123	.00	.13	1.49	.09	.013	.00	.00	PIPE
1062.869	2769.859	.138	2769.997	.20	2.43	.09	2770.09	.00	.16	.87	1.500	.000	.00	0 .0
.047	.0827					.0107	.00	.14	1.39	.09	.013	.00	.00	PIPE
1062.916	2769.863	.143	2770.006	.20	2.32	.08	2770.09	.00	.16	.88	1.500	.000	.00	0 .0
.036	.0827					.0094	.00	.14	1.31	.09	.013	.00	.00	PIPE
1062.951	2769.866	.148	2770.014	.20	2.21	.08	2770.09	.00	.16	.89	1.500	.000	.00	0 .0
.026	.0827					.0082	.00	.15	1.23	.09	.013	.00	.00	PIPE

Program Package Serial Number: 3074
WATER SURFACE PROFILE LISTING
Date:12-26-2016 Time: 9:14: 1

KYLE CANYON INTERCHANGE
KCE1 25+15 North Facilities D9
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1062.977	2769.868	.153	2770.021	.20	2.11	.07	2770.09	.00	.16	.91	1.500	.000	.00	0 .0
.017	.0827					.0071	.00	.15	1.15	.09	.013	.00	.00	PIPE
1063.000	2769.870	.164	2770.034	.20	1.90	.06	2770.09	.00	.16	.94	1.500	.000	.00	0 .0

WSPGW MODEL
KCE1_25+15SOUTH.WSW

```
T1 KYLE CANYON INTERCHANGE                                                0
T2 KCE1 25+15 South Facilities S10, S9, and SD25

T3 412-634A
SO   1000.0002764.660 30                          2769.440
R    1096.0002765.138 30      .013                                .000    .000 1
JX   1101.0002765.238 30      .013    3.300          2765.238      45.0      -8.000
R    1111.0002765.288 30      .013                                .000    .000 1
JX   1116.0002765.388 18      .013    3.300          2765.388      45.0     -64.000
R    1253.0002766.079 18      .013                                .000    .000 0
SH   1253.0002766.079 18      .013                                .000    .000 0
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q            3.100   .0
```

KYLE CANYON INTERCHANGE
KCE1 25+15 South Facilities S10, S9, and SD25
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2764.660	4.780	2769.440	9.70	1.98	.06	2769.50	.00	1.04	.00	2.500	.000	.00	0 .0
96.000	.0050					.0006	.05	4.78	.00	1.00	.013	.00	.00	PIPE
1096.000	2765.138	4.359	2769.497	9.70	1.98	.06	2769.56	.00	1.04	.00	2.500	.000	.00	0 .0
JUNCT STR	.0200					.0004	.00	.00	.00		.013	.00	.00	PIPE
1101.000	2765.238	4.329	2769.567	6.40	1.30	.03	2769.59	.00	.84	.00	2.500	.000	.00	0 .0
10.000	.0050					.0002	.00	4.33	.00	.80	.013	.00	.00	PIPE
1111.000	2765.288	4.283	2769.571	6.40	1.30	.03	2769.60	.00	.84	.00	2.500	.000	.00	0 .0
JUNCT STR	.0200					.0006	.00	.00	.00		.013	.00	.00	PIPE
1116.000	2765.388	4.213	2769.601	3.10	1.75	.05	2769.65	.00	.67	.00	1.500	.000	.00	0 .0
137.000	.0050					.0009	.12	4.21	.00	.67	.013	.00	.00	PIPE
1253.000	2766.079	3.641	2769.720	3.10	1.75	.05	2769.77	.00	.67	.00	1.500	.000	.00	0 .0

†

WSPGW MODEL
KCE1_27+87NORTH.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0
T2 KCE1 27+87 North Facilities 6A
T3 412-634A
SO   1000.0002764.310 24                          2766.630
R    1110.0002765.784 24      .013                              .000    .000 1
R    1115.0002765.884 24      .013                              .000    .000 0
R    1195.0002771.690 24      .013                              .000    .000 0
SH   1195.0002771.690 24      .013
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q            11.300   .0
```

KYLE CANYON INTERCHANGE
KCE1 27+87 North Facilities 6A
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	2764.310	2.320	2766.630	11.30	3.60	.20	2766.83	.00	1.21	.00	2.000	.000	.00	0 .0
29.579	.0134					.0025	.07	2.32	.00	.92	.013	.00	.00	PIPE
1029.579	2764.706	2.000	2766.706	11.30	3.60	.20	2766.91	.00	1.21	.00	2.000	.000	.00	0 .0
14.869	.0134					.0023	.03	2.00	.00	.92	.013	.00	.00	PIPE
1044.448	2764.906	1.814	2766.720	11.30	3.77	.22	2766.94	.00	1.21	1.16	2.000	.000	.00	0 .0
3.789	.0134					.0022	.01	1.81	.41	.92	.013	.00	.00	PIPE
1048.237	2764.956	1.762	2766.719	11.30	3.86	.23	2766.95	.00	1.21	1.29	2.000	.000	.00	0 .0
HYDRAULIC JUMP														
1048.237	2764.956	.811	2765.767	11.30	9.45	1.39	2767.16	.00	1.21	1.96	2.000	.000	.00	0 .0
7.988	.0134					.0223	.18	.81	2.14	.92	.013	.00	.00	PIPE
1056.225	2765.063	.782	2765.845	11.30	9.91	1.53	2767.37	.00	1.21	1.95	2.000	.000	.00	0 .0
10.428	.0134					.0254	.27	.78	2.29	.92	.013	.00	.00	PIPE
1066.654	2765.203	.755	2765.958	11.30	10.40	1.68	2767.64	.00	1.21	1.94	2.000	.000	.00	0 .0
9.085	.0134					.0290	.26	.76	2.45	.92	.013	.00	.00	PIPE
1075.739	2765.325	.729	2766.054	11.30	10.91	1.85	2767.90	.00	1.21	1.93	2.000	.000	.00	0 .0
8.106	.0134					.0331	.27	.73	2.62	.92	.013	.00	.00	PIPE
1083.844	2765.434	.704	2766.138	11.30	11.44	2.03	2768.17	.00	1.21	1.91	2.000	.000	.00	0 .0
7.352	.0134					.0378	.28	.70	2.80	.92	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KCE1 27+87 North Facilities 6A
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1091.196	2765.532	.680	2766.212	11.30	12.00	2.23	2768.45	.00	1.21	1.89	2.000	.000	.00	0 .0
6.719	.0134					.0431	.29	.68	3.00	.92	.013	.00	.00	PIPE
1097.915	2765.622	.656	2766.278	11.30	12.58	2.46	2768.74	.00	1.21	1.88	2.000	.000	.00	0 .0
6.257	.0134					.0492	.31	.66	3.21	.92	.013	.00	.00	PIPE
1104.172	2765.706	.634	2766.340	11.30	13.20	2.70	2769.04	.00	1.21	1.86	2.000	.000	.00	0 .0
5.828	.0134					.0562	.33	.63	3.43	.92	.013	.00	.00	PIPE
1110.000	2765.784	.613	2766.397	11.30	13.84	2.97	2769.37	.00	1.21	1.84	2.000	.000	.00	0 .0
5.000	.0200					.0633	.32	.61	3.67	.82	.013	.00	.00	PIPE
1115.000	2765.885	.596	2766.481	11.30	14.38	3.21	2769.69	.00	1.21	1.83	2.000	.000	.00	0 .0
12.527	.0726					.0650	.81	.60	3.87	.58	.013	.00	.00	PIPE
1127.527	2766.794	.603	2767.397	11.30	14.13	3.10	2770.50	.00	1.21	1.84	2.000	.000	.00	0 .0
19.901	.0726					.0595	1.18	.60	3.77	.58	.013	.00	.00	PIPE
1147.428	2768.238	.624	2768.862	11.30	13.47	2.82	2771.68	.00	1.21	1.85	2.000	.000	.00	0 .0
11.425	.0726					.0521	.59	.62	3.53	.58	.013	.00	.00	PIPE
1158.853	2769.067	.646	2769.713	11.30	12.85	2.56	2772.28	.00	1.21	1.87	2.000	.000	.00	0 .0
7.788	.0726					.0456	.36	.65	3.30	.58	.013	.00	.00	PIPE
1166.640	2769.632	.669	2770.302	11.30	12.25	2.33	2772.63	.00	1.21	1.89	2.000	.000	.00	0 .0
5.760	.0726					.0400	.23	.67	3.09	.58	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KCE1 27+87 North Facilities 6A
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1172.400	2770.050	.693	2770.743	11.30	11.68	2.12	2772.86	.00	1.21	1.90	2.000	.000	.00	0 .0
4.464	.0726					.0350	.16	.69	2.89	.58	.013	.00	.00	PIPE
1176.864	2770.374	.718	2771.092	11.30	11.13	1.93	2773.02	.00	1.21	1.92	2.000	.000	.00	0 .0
3.584	.0726					.0307	.11	.72	2.70	.58	.013	.00	.00	PIPE
1180.448	2770.634	.743	2771.377	11.30	10.62	1.75	2773.13	.00	1.21	1.93	2.000	.000	.00	0 .0
2.894	.0726					.0269	.08	.74	2.52	.58	.013	.00	.00	PIPE
1183.343	2770.844	.770	2771.614	11.30	10.12	1.59	2773.21	.00	1.21	1.95	2.000	.000	.00	0 .0

2.383	.0726					.0236	.06	.77	2.36	.58	.013	.00	.00	PIPE	
1185.726	2771.017	.798	2771.815	11.30	9.65	1.45	2773.26	.00	1.21	1.96	2.000	.000	.00	0	.0
1.977	.0726					.0207	.04	.80	2.20	.58	.013	.00	.00	PIPE	
1187.703	2771.161	.827	2771.988	11.30	9.20	1.31	2773.30	.00	1.21	1.97	2.000	.000	.00	0	.0
1.629	.0726					.0182	.03	.83	2.05	.58	.013	.00	.00	PIPE	
1189.332	2771.279	.858	2772.137	11.30	8.77	1.20	2773.33	.00	1.21	1.98	2.000	.000	.00	0	.0
1.373	.0726					.0160	.02	.86	1.92	.58	.013	.00	.00	PIPE	
1190.704	2771.378	.889	2772.268	11.30	8.37	1.09	2773.35	.00	1.21	1.99	2.000	.000	.00	0	.0
1.124	.0726					.0141	.02	.89	1.79	.58	.013	.00	.00	PIPE	
1191.829	2771.460	.922	2772.382	11.30	7.98	.99	2773.37	.00	1.21	1.99	2.000	.000	.00	0	.0
.910	.0726					.0124	.01	.92	1.67	.58	.013	.00	.00	PIPE	

Program Package Serial Number: 3074

WATER SURFACE PROFILE LISTING Date:12-26-2016 Time:10:19:49

KYLE CANYON INTERCHANGE
KCE1 27+87 North Facilities 6A
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT "N"	Base Wt or I.D. X-Fall	ZL ZR	No Wth Prs/Pip Type Ch
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp				
1192.739	2771.526	.957	2772.483	11.30	7.60	.90	2773.38	.00	1.21	2.00	2.000	.000	.00	0 .0
.740	.0726					.0109	.01	.96	1.55	.58	.013	.00	.00	PIPE
1193.479	2771.580	.993	2772.573	11.30	7.25	.82	2773.39	.00	1.21	2.00	2.000	.000	.00	0 .0
.575	.0726					.0096	.01	.99	1.45	.58	.013	.00	.00	PIPE
1194.054	2771.622	1.031	2772.653	11.30	6.91	.74	2773.39	.00	1.21	2.00	2.000	.000	.00	0 .0
.428	.0726					.0084	.00	1.03	1.35	.58	.013	.00	.00	PIPE
1194.482	2771.653	1.071	2772.724	11.30	6.59	.67	2773.40	.00	1.21	1.99	2.000	.000	.00	0 .0
.297	.0726					.0074	.00	1.07	1.25	.58	.013	.00	.00	PIPE
1194.779	2771.674	1.113	2772.787	11.30	6.28	.61	2773.40	.00	1.21	1.99	2.000	.000	.00	0 .0
.163	.0726					.0066	.00	1.11	1.16	.58	.013	.00	.00	PIPE
1194.942	2771.686	1.158	2772.844	11.30	5.99	.56	2773.40	.00	1.21	1.97	2.000	.000	.00	0 .0
.058	.0726					.0058	.00	1.16	1.08	.58	.013	.00	.00	PIPE
1195.000	2771.690	1.206	2772.896	11.30	5.71	.51	2773.40	.00	1.21	1.96	2.000	.000	.00	0 .0

†

WSPGW MODEL
KCE1_29+53NORTH.WSW

```
T1 KYLE CANYON INTERCHANGE                                                    0
T2 KCW1 29+53 North Facilities D17
T3 412-634A
SO   1000.0002763.140 18                          2766.360
R    1072.0002763.500 18      .013                                  .000    .000 0
SH   1072.0002763.500 18      .013
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q              2.900   .0
```

KYLE CANYON INTERCHANGE
KCW1 29+53 North Facilities D17
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2763.140	3.220	2766.360	2.90	1.64	.04	2766.40	.00	.65	.00	1.500	.000	.00	0 .0
72.000	.0050					.0008	.05	3.22	.00	.65	.013	.00	.00	PIPE
1072.000	2763.500	2.915	2766.415	2.90	1.64	.04	2766.46	.00	.65	.00	1.500	.000	.00	0 .0

WSPGW MODEL
KCE1_29+53SOUTH.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0
T2 KCW1 29+53 South Facility D10
T3 412-634A
SO    1000.0002763.140 18                          2766.360
R     1014.0002763.210 18       .013                                .000    .000 0
SH    1014.0002763.210 18       .013
CD  18  4   0     .000   1.500      .000  .000  .000   .00
CD  24  4   0     .000   2.000      .000  .000  .000   .00
CD  30  4   0     .000   2.500      .000  .000  .000   .00
CD  36  4   0     .000   3.000      .000  .000  .000   .00
CD  42  4   0     .000   3.500      .000  .000  .000   .00
CD  48  4   0     .000   4.000      .000  .000  .000   .00
Q              3.600   .0
```

WATER SURFACE PROFILE LISTING Date:12-26-2016 Time:10:24:42

KYLE CANYON INTERCHANGE
KCW1 29+53 South Facility D10
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2763.140	3.220	2766.360	3.60	2.04	.06	2766.42	.00	.72	.00	1.500	.000	.00	0 .0
14.000	.0050					.0012	.02	3.22	.00	.74	.013	.00	.00	PIPE
1014.000	2763.210	3.167	2766.376	3.60	2.04	.06	2766.44	.00	.72	.00	1.500	.000	.00	0 .0

WSPGW MODEL
XP_418+13.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0

T2 XP 418+13 Facilities D18 & D19

T3 412-634A
SO   1000.0002802.190 12                          2803.19
R    1020.0002802.490 12      .013                                  .000    .000 1
JX   1025.0002802.590 12 30   .013    0.900          2802.590        45.0      -90.000
R    1033.0002802.620 12      .013                                  .000    .000 0
SH   1033.0002802.620 12      .013
CD  12  4   0    .000   1.000     .000  .000  .000   .00
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q             1.300   .0
```

KYLE CANYON INTERCHANGE
XP 418+13 Facilities D18 & D19
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2802.190	1.000	2803.190	2.20	2.80	.12	2803.31	.00	.63	.00	1.000	.000	.00	0 .0
.000	.0150					.0038	.00	1.00	.00	.50	.013	.00	.00	PIPE
1000.000	2802.190	1.000	2803.190	2.20	2.80	.12	2803.31	.00	.63	.00	1.000	.000	.00	0 .0
6.935	.0150					.0035	.02	1.00	.00	.50	.013	.00	.00	PIPE
1006.935	2802.294	.907	2803.201	2.20	2.94	.13	2803.34	.00	.63	.58	1.000	.000	.00	0 .0
3.498	.0150					.0035	.01	.91	.46	.50	.013	.00	.00	PIPE
1010.433	2802.346	.853	2803.200	2.20	3.08	.15	2803.35	.00	.63	.71	1.000	.000	.00	0 .0
2.633	.0150					.0037	.01	.85	.54	.50	.013	.00	.00	PIPE
1013.065	2802.386	.809	2803.195	2.20	3.23	.16	2803.36	.00	.63	.79	1.000	.000	.00	0 .0
2.083	.0150					.0041	.01	.81	.61	.50	.013	.00	.00	PIPE
1015.148	2802.417	.770	2803.187	2.20	3.39	.18	2803.37	.00	.63	.84	1.000	.000	.00	0 .0
1.644	.0150					.0046	.01	.77	.68	.50	.013	.00	.00	PIPE
1016.792	2802.442	.735	2803.177	2.20	3.55	.20	2803.37	.00	.63	.88	1.000	.000	.00	0 .0
1.259	.0150					.0051	.01	.74	.75	.50	.013	.00	.00	PIPE
1018.051	2802.461	.703	2803.164	2.20	3.73	.22	2803.38	.00	.63	.91	1.000	.000	.00	0 .0
.396	.0150					.0057	.00	.70	.82	.50	.013	.00	.00	PIPE
1018.446	2802.467	.673	2803.140	2.20	3.91	.24	2803.38	.00	.63	.94	1.000	.000	.00	0 .0

HYDRAULIC JUMP

KYLE CANYON INTERCHANGE
XP 418+13 Facilities D18 & D19
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1018.446	2802.467	.562	2803.028	2.20	4.84	.36	2803.39	.00	.63	.99	1.000	.000	.00	0 .0
.254	.0150					.0098	.00	.56	1.26	.50	.013	.00	.00	PIPE
1018.700	2802.470	.584	2803.055	2.20	4.62	.33	2803.39	.00	.63	.99	1.000	.000	.00	0 .0
1.006	.0150					.0086	.01	.58	1.17	.50	.013	.00	.00	PIPE
1019.706	2802.486	.608	2803.094	2.20	4.40	.30	2803.39	.00	.63	.98	1.000	.000	.00	0 .0
.294	.0150					.0076	.00	.61	1.08	.50	.013	.00	.00	PIPE
1020.000	2802.490	.634	2803.124	2.20	4.19	.27	2803.40	.17	.63	.96	1.000	.000	.00	0 .0
JUNCT STR	.0200					.0042	.02	.80	1.00		.013	.00	.00	PIPE
1025.000	2802.590	.971	2803.562	1.30	1.67	.04	2803.60	.00	.48	.33	1.000	.000	.00	0 .0
8.000	.0038					.0012	.01	.97	.19	.56	.013	.00	.00	PIPE
1033.000	2802.620	.950	2803.570	1.30	1.69	.04	2803.61	.00	.48	.44	1.000	.000	.00	0 .0

♀

WSPGW MODEL
KR1_19+48.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0

T2 KR1 19+48 Facilities S5
T3 412-634A
SO   1000.0002776.070 18                          2777.570
R    1091.0002776.525 18      .013                                .000    .000 0
SH   1091.0002776.525 18      .013
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q             2.500   .0
```

KYLE CANYON INTERCHANGE
KR1 19+48 Facilities S5
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT or "N"	Base Wt| or I.D.	ZL	ZR	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp		X-Fall			Type Ch
1000.000	2776.070	1.500	2777.570	2.50	1.41	.03	2777.60	.00	.60	.00	1.500	.000	.00	0	.0
.000	.0050					.0006	.00	1.50	.00	.60	.013	.00	.00	PIPE	
1000.000	2776.070	1.500	2777.570	2.50	1.41	.03	2777.60	.00	.60	.00	1.500	.000	.00	0	.0
30.175	.0050					.0005	.02	1.50	.00	.60	.013	.00	.00	PIPE	
1030.175	2776.221	1.361	2777.582	2.50	1.48	.03	2777.62	.00	.60	.87	1.500	.000	.00	0	.0
17.252	.0050					.0005	.01	1.36	.19	.60	.013	.00	.00	PIPE	
1047.427	2776.307	1.280	2777.587	2.50	1.56	.04	2777.62	.00	.60	1.06	1.500	.000	.00	0	.0
14.143	.0050					.0006	.01	1.28	.22	.60	.013	.00	.00	PIPE	
1061.571	2776.378	1.214	2777.592	2.50	1.63	.04	2777.63	.00	.60	1.18	1.500	.000	.00	0	.0
12.345	.0050					.0006	.01	1.21	.25	.60	.013	.00	.00	PIPE	
1073.916	2776.440	1.155	2777.595	2.50	1.71	.05	2777.64	.00	.60	1.26	1.500	.000	.00	0	.0
11.099	.0050					.0007	.01	1.16	.28	.60	.013	.00	.00	PIPE	
1085.015	2776.495	1.103	2777.598	2.50	1.80	.05	2777.65	.00	.60	1.32	1.500	.000	.00	0	.0
5.985	.0050					.0007	.00	1.10	.31	.60	.013	.00	.00	PIPE	
1091.000	2776.525	1.075	2777.600	2.50	1.85	.05	2777.65	.00	.60	1.35	1.500	.000	.00	0	.0

♀

WSPGW MODEL
XP_412+41.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0

T2  XP 412+41 South Facilities D20, D21, and D22

T3 412-634A
SO   1000.0002786.940 18                          2788.440
R    1017.0002787.946 18      .013                                  .000    .000 1
JX   1022.0002788.046 18 30   .013    0.600          2788.046        45.0         0.000
R    1032.0002788.140 18      .013                                  .000    .000 1
JX   1037.0002788.240 18 30   .013    1.100          2788.240        45.0         0.000
R    1047.0002788.320 18      .013                                  .000    .000 0
SH   1047.0002788.320 18      .013
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q             2.000   .0
```

KYLE CANYON INTERCHANGE
XP 412+41 South Facilities D20, D21, and D22
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2786.940	1.500	2788.440	3.70	2.09	.07	2788.51	.00	.73	.00	1.500	.000	.00	0 .0
.000	.0592					.0012	.00	1.50	.00	.39	.013	.00	.00	PIPE
1000.000	2786.940	1.500	2788.440	3.70	2.09	.07	2788.51	.00	.73	.00	1.500	.000	.00	0 .0
2.262	.0592					.0011	.00	1.50	.00	.39	.013	.00	.00	PIPE
1002.262	2787.074	1.361	2788.435	3.70	2.20	.07	2788.51	.00	.73	.87	1.500	.000	.00	0 .0
1.263	.0592					.0011	.00	1.36	.28	.39	.013	.00	.00	PIPE
1003.525	2787.148	1.280	2788.428	3.70	2.30	.08	2788.51	.00	.73	1.06	1.500	.000	.00	0 .0
1.007	.0592					.0012	.00	1.28	.33	.39	.013	.00	.00	PIPE
1004.532	2787.208	1.214	2788.422	3.70	2.42	.09	2788.51	.00	.73	1.18	1.500	.000	.00	0 .0
.851	.0592					.0013	.00	1.21	.37	.39	.013	.00	.00	PIPE
1005.383	2787.258	1.155	2788.414	3.70	2.53	.10	2788.51	.00	.73	1.26	1.500	.000	.00	0 .0
.487	.0592					.0015	.00	1.16	.42	.39	.013	.00	.00	PIPE
1005.870	2787.287	1.103	2788.390	3.70	2.66	.11	2788.50	.00	.73	1.32	1.500	.000	.00	0 .0
HYDRAULIC JUMP														
1005.870	2787.287	.446	2787.733	3.70	8.39	1.09	2788.83	.00	.73	1.37	1.500	.000	.00	0 .0
.202	.0592					.0313	.01	.45	2.61	.39	.013	.00	.00	PIPE
1006.073	2787.300	.462	2787.762	3.70	8.00	.99	2788.76	.00	.73	1.38	1.500	.000	.00	0 .0
2.331	.0592					.0274	.06	.46	2.44	.39	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
XP 412+41 South Facilities D20, D21, and D22
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1008.404	2787.438	.478	2787.916	3.70	7.63	.90	2788.82	.00	.73	1.40	1.500	.000	.00	0 .0
1.858	.0592					.0240	.04	.48	2.28	.39	.013	.00	.00	PIPE
1010.262	2787.548	.495	2788.043	3.70	7.27	.82	2788.86	.00	.73	1.41	1.500	.000	.00	0 .0
1.499	.0592					.0210	.03	.50	2.13	.39	.013	.00	.00	PIPE
1011.760	2787.636	.513	2788.149	3.70	6.94	.75	2788.90	.00	.73	1.42	1.500	.000	.00	0 .0
1.217	.0592					.0184	.02	.51	2.00	.39	.013	.00	.00	PIPE
1012.977	2787.708	.531	2788.239	3.70	6.61	.68	2788.92	.00	.73	1.43	1.500	.000	.00	0 .0
.995	.0592					.0162	.02	.53	1.87	.39	.013	.00	.00	PIPE
1013.972	2787.767	.550	2788.317	3.70	6.30	.62	2788.93	.00	.73	1.45	1.500	.000	.00	0 .0
.807	.0592					.0142	.01	.55	1.74	.39	.013	.00	.00	PIPE
1014.779	2787.815	.570	2788.385	3.70	6.01	.56	2788.95	.00	.73	1.46	1.500	.000	.00	0 .0
.653	.0592					.0124	.01	.57	1.63	.39	.013	.00	.00	PIPE
1015.432	2787.854	.590	2788.444	3.70	5.73	.51	2788.95	.00	.73	1.47	1.500	.000	.00	0 .0
.515	.0592					.0109	.01	.59	1.52	.39	.013	.00	.00	PIPE
1015.947	2787.884	.612	2788.496	3.70	5.46	.46	2788.96	.00	.73	1.47	1.500	.000	.00	0 .0
.400	.0592					.0096	.00	.61	1.42	.39	.013	.00	.00	PIPE
1016.347	2787.908	.634	2788.542	3.70	5.21	.42	2788.96	.00	.73	1.48	1.500	.000	.00	0 .0
.294	.0592					.0084	.00	.63	1.33	.39	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
XP 412+41 South Facilities D20, D21, and D22
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1016.641	2787.925	.657	2788.582	3.70	4.97	.38	2788.97	.00	.73	1.49	1.500	.000	.00	0 .0
.203	.0592					.0074	.00	.66	1.24	.39	.013	.00	.00	PIPE
1016.845	2787.937	.682	2788.618	3.70	4.74	.35	2788.97	.00	.73	1.49	1.500	.000	.00	0 .0
.117	.0592					.0065	.00	.68	1.15	.39	.013	.00	.00	PIPE
1016.962	2787.944	.707	2788.651	3.70	4.52	.32	2788.97	.00	.73	1.50	1.500	.000	.00	0 .0
.038	.0592					.0057	.00	.71	1.08	.39	.013	.00	.00	PIPE
1017.000	2787.946	.735	2788.681	3.70	4.30	.29	2788.97	.00	.73	1.50	1.500	.000	.00	0 .0
JUNCT STR	.0200					.0037	.02	.73	1.00		.013	.00	.00	PIPE
1022.000	2788.046	.867	2788.913	3.10	2.93	.13	2789.05	.00	.67	1.48	1.500	.000	.00	0 .0
2.803	.0094					.0023	.01	.87	.61	.57	.013	.00	.00	PIPE
1024.803	2788.072	.834	2788.906	3.10	3.07	.15	2789.05	.00	.67	1.49	1.500	.000	.00	0 .0
2.484	.0094					.0026	.01	.83	.66	.57	.013	.00	.00	PIPE
1027.288	2788.096	.803	2788.898	3.10	3.22	.16	2789.06	.00	.67	1.50	1.500	.000	.00	0 .0
2.143	.0094					.0030	.01	.80	.71	.57	.013	.00	.00	PIPE
1029.431	2788.116	.773	2788.889	3.10	3.38	.18	2789.07	.00	.67	1.50	1.500	.000	.00	0 .0
1.786	.0094					.0034	.01	.77	.76	.57	.013	.00	.00	PIPE
1031.218	2788.133	.744	2788.877	3.10	3.54	.19	2789.07	.00	.67	1.50	1.500	.000	.00	0 .0
.782	.0094					.0037	.00	.74	.82	.57	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
XP 412+41 South Facilities D20, D21, and D22
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1032.000	2788.140	.730	2788.870	3.10	3.63	.20	2789.07	.00	.67	1.50	1.500	.000	.00	0 .0
JUNCT STR	.0200					.0024	.01	.73	.85		.013	.00	.00	PIPE
1037.000	2788.240	.862	2789.102	2.00	1.90	.06	2789.16	.00	.53	1.48	1.500	.000	.00	0 .0
3.882	.0080					.0010	.00	.86	.40	.47	.013	.00	.00	PIPE
1040.882	2788.271	.829	2789.100	2.00	2.00	.06	2789.16	.00	.53	1.49	1.500	.000	.00	0 .0
3.626	.0080					.0011	.00	.83	.43	.47	.013	.00	.00	PIPE
1044.508	2788.300	.798	2789.098	2.00	2.09	.07	2789.17	.00	.53	1.50	1.500	.000	.00	0 .0
2.492	.0080					.0012	.00	.80	.46	.47	.013	.00	.00	PIPE
1047.000	2788.320	.776	2789.096	2.00	2.17	.07	2789.17	.00	.53	1.50	1.500	.000	.00	0 .0

WSPGW MODEL
KR1_22+82.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0

T2  KR1 22+82 Facilities 8A, S22

T3 412-634A
SO   1000.0002772.000 24                          2774.000
R    1108.0002772.249 24      .013                              .000    .000 1
R    1113.0002772.349 24      .013                              .000    .000 0
R    1135.0002778.219 24      .013                              .000    .000 0
SH   1135.0002778.219 24      .013
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q             11.400   .0
```

KYLE CANYON INTERCHANGE
KR1 22+82 Facilities 8A, S22
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	2772.000	2.000	2774.000	11.40	3.63	.20	2774.20	.00	1.21	.00	2.000	.000	.00	0 .0
71.532	.0023					.0025	.18	2.00	.00	1.75	.013	.00	.00	PIPE
1071.532	2772.165	2.035	2774.200	11.40	3.63	.20	2774.41	.00	1.21	.00	2.000	.000	.00	0 .0
HYDRAULIC JUMP														
1071.532	2772.165	.681	2772.846	11.40	12.07	2.26	2775.11	.00	1.21	1.90	2.000	.000	.00	0 .0
1.167	.0023					.0407	.05	.68	3.01	1.75	.013	.00	.00	PIPE
1072.699	2772.168	.681	2772.849	11.40	12.07	2.26	2775.11	.00	1.21	1.90	2.000	.000	.00	0 .0
4.920	.0023					.0436	.21	.68	3.01	1.75	.013	.00	.00	PIPE
1077.619	2772.179	.658	2772.837	11.40	12.66	2.49	2775.33	.00	1.21	1.88	2.000	.000	.00	0 .0
4.777	.0023					.0497	.24	.66	3.22	1.75	.013	.00	.00	PIPE
1082.395	2772.190	.636	2772.825	11.40	13.28	2.74	2775.56	.00	1.21	1.86	2.000	.000	.00	0 .0
4.630	.0023					.0568	.26	.64	3.45	1.75	.013	.00	.00	PIPE
1087.025	2772.201	.614	2772.815	11.40	13.93	3.01	2775.83	.00	1.21	1.85	2.000	.000	.00	0 .0
4.485	.0023					.0648	.29	.61	3.68	1.75	.013	.00	.00	PIPE
1091.510	2772.211	.593	2772.804	11.40	14.61	3.31	2776.12	.00	1.21	1.83	2.000	.000	.00	0 .0
4.338	.0023					.0741	.32	.59	3.94	1.75	.013	.00	.00	PIPE
1095.848	2772.221	.573	2772.794	11.40	15.32	3.64	2776.44	.00	1.21	1.81	2.000	.000	.00	0 .0
4.193	.0023					.0846	.35	.57	4.21	1.75	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KR1 22+82 Facilities 8A, S22
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1100.042	2772.231	.554	2772.785	11.40	16.07	4.01	2776.79	.00	1.21	1.79	2.000	.000	.00	0 .0
4.049	.0023					.0967	.39	.55	4.50	1.75	.013	.00	.00	PIPE
1104.091	2772.240	.536	2772.775	11.40	16.85	4.41	2777.19	.00	1.21	1.77	2.000	.000	.00	0 .0
3.909	.0023					.1105	.43	.54	4.81	1.75	.013	.00	.00	PIPE
1108.000	2772.249	.518	2772.767	11.40	17.67	4.85	2777.62	.00	1.21	1.75	2.000	.000	.00	0 .0
.641	.0200					.1192	.08	.52	5.13	.82	.013	.00	.00	PIPE
1108.641	2772.262	.515	2772.777	11.40	17.81	4.92	2777.70	.00	1.21	1.75	2.000	.000	.00	0 .0
4.359	.0200					.1291	.56	.51	5.19	.82	.013	.00	.00	PIPE
1113.000	2772.349	.498	2772.847	11.40	18.68	5.42	2778.26	.00	1.21	1.73	2.000	.000	.00	0 .0
2.787	.2668					.1308	.36	.50	5.54	.42	.013	.00	.00	PIPE
1115.787	2773.093	.511	2773.604	11.40	17.99	5.03	2778.63	.00	1.21	1.74	2.000	.000	.00	0 .0
2.917	.2668					.1162	.34	.51	5.26	.42	.013	.00	.00	PIPE
1118.704	2773.871	.529	2774.400	11.40	17.15	4.57	2778.97	.00	1.21	1.76	2.000	.000	.00	0 .0
2.404	.2668					.1017	.24	.53	4.93	.42	.013	.00	.00	PIPE
1121.108	2774.513	.547	2775.060	11.40	16.36	4.15	2779.21	.00	1.21	1.78	2.000	.000	.00	0 .0
2.017	.2668					.0889	.18	.55	4.61	.42	.013	.00	.00	PIPE
1123.125	2775.051	.566	2775.617	11.40	15.59	3.78	2779.39	.00	1.21	1.80	2.000	.000	.00	0 .0
1.712	.2668					.0778	.13	.57	4.31	.42	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KR1 22+82 Facilities 8A, S22
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT or I.D. / "N"	Base Wt or X-Fall	ZL	ZR	No Wth Prs/Pip / Type Ch
1124.837	2775.508	.586	2776.093	11.40	14.87	3.43	2779.53	.00	1.21	1.82	2.000	.000	.00	0	.0
1.468	.2668					.0681	.10	.59	4.04	.42	.013	.00	.00	PIPE	
1126.305	2775.899	.606	2776.505	11.40	14.18	3.12	2779.63	.00	1.21	1.84	2.000	.000	.00	0	.0
1.267	.2668					.0597	.08	.61	3.78	.42	.013	.00	.00	PIPE	
1127.572	2776.237	.627	2776.865	11.40	13.52	2.84	2779.70	.00	1.21	1.86	2.000	.000	.00	0	.0
1.099	.2668					.0522	.06	.63	3.53	.42	.013	.00	.00	PIPE	
1128.671	2776.531	.650	2777.180	11.40	12.89	2.58	2779.76	.00	1.21	1.87	2.000	.000	.00	0	.0
.957	.2668					.0458	.04	.65	3.30	.42	.013	.00	.00	PIPE	
1129.628	2776.786	.673	2777.458	11.40	12.29	2.34	2779.80	.00	1.21	1.89	2.000	.000	.00	0	.0
.835	.2668					.0401	.03	.67	3.09	.42	.013	.00	.00	PIPE	
1130.463	2777.009	.696	2777.705	11.40	11.72	2.13	2779.84	.00	1.21	1.91	2.000	.000	.00	0	.0
.729	.2668					.0351	.03	.70	2.89	.42	.013	.00	.00	PIPE	
1131.192	2777.203	.721	2777.924	11.40	11.17	1.94	2779.86	.00	1.21	1.92	2.000	.000	.00	0	.0
.637	.2668					.0308	.02	.72	2.70	.42	.013	.00	.00	PIPE	
1131.829	2777.373	.747	2778.120	11.40	10.65	1.76	2779.88	.00	1.21	1.93	2.000	.000	.00	0	.0
.556	.2668					.0270	.02	.75	2.52	.42	.013	.00	.00	PIPE	
1132.385	2777.521	.774	2778.295	11.40	10.16	1.60	2779.90	.00	1.21	1.95	2.000	.000	.00	0	.0
.484	.2668					.0237	.01	.77	2.36	.42	.013	.00	.00	PIPE	

KYLE CANYON INTERCHANGE
KR1 22+82 Facilities 8A, S22
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT or I.D. / "N"	Base Wt or X-Fall	ZL	ZR	No Wth Prs/Pip / Type Ch
1132.868	2777.650	.802	2778.452	11.40	9.68	1.46	2779.91	.00	1.21	1.96	2.000	.000	.00	0	.0
.419	.2668					.0208	.01	.80	2.20	.42	.013	.00	.00	PIPE	
1133.287	2777.762	.831	2778.594	11.40	9.23	1.32	2779.92	.00	1.21	1.97	2.000	.000	.00	0	.0
.361	.2668					.0183	.01	.83	2.06	.42	.013	.00	.00	PIPE	
1133.648	2777.859	.862	2778.720	11.40	8.80	1.20	2779.92	.00	1.21	1.98	2.000	.000	.00	0	.0
.309	.2668					.0160	.00	.86	1.92	.42	.013	.00	.00	PIPE	
1133.958	2777.941	.894	2778.835	11.40	8.39	1.09	2779.93	.00	1.21	1.99	2.000	.000	.00	0	.0
.262	.2668					.0141	.00	.89	1.79	.42	.013	.00	.00	PIPE	
1134.219	2778.011	.927	2778.938	11.40	8.00	.99	2779.93	.00	1.21	1.99	2.000	.000	.00	0	.0
.219	.2668					.0124	.00	.93	1.67	.42	.013	.00	.00	PIPE	
1134.438	2778.069	.962	2779.031	11.40	7.63	.90	2779.93	.00	1.21	2.00	2.000	.000	.00	0	.0
.178	.2668					.0109	.00	.96	1.56	.42	.013	.00	.00	PIPE	
1134.616	2778.117	.998	2779.115	11.40	7.27	.82	2779.94	.00	1.21	2.00	2.000	.000	.00	0	.0
.142	.2668					.0096	.00	1.00	1.45	.42	.013	.00	.00	PIPE	
1134.758	2778.155	1.036	2779.191	11.40	6.94	.75	2779.94	.00	1.21	2.00	2.000	.000	.00	0	.0
.107	.2668					.0085	.00	1.04	1.35	.42	.013	.00	.00	PIPE	
1134.866	2778.183	1.077	2779.260	11.40	6.61	.68	2779.94	.00	1.21	1.99	2.000	.000	.00	0	.0
.075	.2668					.0075	.00	1.08	1.25	.42	.013	.00	.00	PIPE	

KYLE CANYON INTERCHANGE
KR1 22+82 Facilities 8A, S22
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1134.941	2778.203	1.119	2779.322	11.40	6.31	.62	2779.94	.00	1.21	1.99	2.000	.000	.00	0 .0
.044	.2668					.0066	.00	1.12	1.16	.42	.013	.00	.00	PIPE
1134.985	2778.215	1.163	2779.378	11.40	6.01	.56	2779.94	.00	1.21	1.97	2.000	.000	.00	0 .0
.015	.2668					.0058	.00	1.16	1.08	.42	.013	.00	.00	PIPE
1135.000	2778.219	1.212	2779.430	11.40	5.73	.51	2779.94	.00	1.21	1.95	2.000	.000	.00	0 .0

WSPGW MODEL
KR4_44+89.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0

T2 KR4 44+89 Facilities
T3 412-634A
SO   1000.0002776.960 24                          2778.960
R    1101.0002785.180 24      .013                                .000    .000 0
SH   1101.0002785.180 24      .013
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q            22.000   .0
```

KYLE CANYON INTERCHANGE
KR4 44+89 Facilities
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	2776.960	.832	2777.792	22.00	17.80	4.92	2782.71	.00	1.68	1.97	2.000	.000	.00	0 .0
9.690	.0814					.0712	.69	.83	3.96	.81	.013	.00	.00	PIPE
1009.690	2777.749	.838	2778.587	22.00	17.61	4.82	2783.40	.00	1.68	1.97	2.000	.000	.00	0 .0
26.349	.0814					.0659	1.74	.84	3.90	.81	.013	.00	.00	PIPE
1036.039	2779.893	.869	2780.762	22.00	16.79	4.38	2785.14	.00	1.68	1.98	2.000	.000	.00	0 .0
15.598	.0814					.0579	.90	.87	3.64	.81	.013	.00	.00	PIPE
1051.637	2781.162	.901	2782.064	22.00	16.01	3.98	2786.04	.00	1.68	1.99	2.000	.000	.00	0 .0
10.774	.0814					.0509	.55	.90	3.40	.81	.013	.00	.00	PIPE
1062.411	2782.039	.935	2782.974	22.00	15.27	3.62	2786.59	.00	1.68	2.00	2.000	.000	.00	0 .0
8.028	.0814					.0448	.36	.94	3.17	.81	.013	.00	.00	PIPE
1070.439	2782.693	.970	2783.663	22.00	14.56	3.29	2786.95	.00	1.68	2.00	2.000	.000	.00	0 .0
6.248	.0814					.0394	.25	.97	2.95	.81	.013	.00	.00	PIPE
1076.687	2783.201	1.007	2784.208	22.00	13.88	2.99	2787.20	.00	1.68	2.00	2.000	.000	.00	0 .0
4.997	.0814					.0347	.17	1.01	2.75	.81	.013	.00	.00	PIPE
1081.685	2783.608	1.046	2784.654	22.00	13.23	2.72	2787.37	.00	1.68	2.00	2.000	.000	.00	0 .0
4.068	.0814					.0306	.12	1.05	2.56	.81	.013	.00	.00	PIPE
1085.753	2783.939	1.087	2785.025	22.00	12.62	2.47	2787.50	.00	1.68	1.99	2.000	.000	.00	0 .0
3.345	.0814					.0270	.09	1.09	2.38	.81	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KR4 44+89 Facilities
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1089.098	2784.211	1.129	2785.341	22.00	12.03	2.25	2787.59	.00	1.68	1.98	2.000	.000	.00	0 .0
2.765	.0814					.0239	.07	1.13	2.21	.81	.013	.00	.00	PIPE
1091.863	2784.436	1.175	2785.611	22.00	11.47	2.04	2787.65	.00	1.68	1.97	2.000	.000	.00	0 .0
2.287	.0814					.0211	.05	1.17	2.05	.81	.013	.00	.00	PIPE
1094.150	2784.623	1.222	2785.845	22.00	10.94	1.86	2787.70	.00	1.68	1.95	2.000	.000	.00	0 .0
1.884	.0814					.0187	.04	1.22	1.90	.81	.013	.00	.00	PIPE
1096.034	2784.776	1.273	2786.049	22.00	10.43	1.69	2787.74	.00	1.68	1.92	2.000	.000	.00	0 .0
1.536	.0814					.0166	.03	1.27	1.75	.81	.013	.00	.00	PIPE
1097.570	2784.901	1.327	2786.228	22.00	9.94	1.53	2787.76	.00	1.68	1.89	2.000	.000	.00	0 .0
1.226	.0814					.0147	.02	1.33	1.62	.81	.013	.00	.00	PIPE
1098.796	2785.001	1.385	2786.385	22.00	9.48	1.40	2787.78	.00	1.68	1.85	2.000	.000	.00	0 .0
.946	.0814					.0131	.01	1.38	1.49	.81	.013	.00	.00	PIPE
1099.742	2785.078	1.447	2786.525	22.00	9.04	1.27	2787.79	.00	1.68	1.79	2.000	.000	.00	0 .0
.682	.0814					.0118	.01	1.45	1.37	.81	.013	.00	.00	PIPE
1100.424	2785.133	1.515	2786.648	22.00	8.62	1.15	2787.80	.00	1.68	1.71	2.000	.000	.00	0 .0
.424	.0814					.0106	.00	1.51	1.24	.81	.013	.00	.00	PIPE
1100.848	2785.167	1.590	2786.757	22.00	8.22	1.05	2787.81	.00	1.68	1.62	2.000	.000	.00	0 .0
.152	.0814					.0096	.00	1.59	1.12	.81	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
KR4 44+89 Facilities
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1101.000	2785.180	1.675	2786.855	22.00	7.83	.95	2787.81	.00	1.68	1.48	2.000	.000	.00	0 .0

WSPGW MODEL
XP_405+04.WSW

```
T1 KYLE CANYON INTERCHANGE                                                  0

T2 XP 405+04 Facilities D25
T3 412-634A
SO   1000.0002774.880 18                          2776.38
R    1008.0002777.648 18      .013                                  .000    .000 0
SH   1008.0002777.648 18      .013
CD  18  4   0    .000   1.500     .000  .000  .000   .00
CD  24  4   0    .000   2.000     .000  .000  .000   .00
CD  30  4   0    .000   2.500     .000  .000  .000   .00
CD  36  4   0    .000   3.000     .000  .000  .000   .00
CD  42  4   0    .000   3.500     .000  .000  .000   .00
CD  48  4   0    .000   4.000     .000  .000  .000   .00
Q             4.200   .0
```

KYLE CANYON INTERCHANGE
XP 405+04 Facilities D25
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	2774.880	.342	2775.222	4.20	13.87	2.99	2778.21	.00	.79	1.26	1.500	.000	.00	0 .0
.773	.3460					.1183	.09	.34	4.98	.26	.013	.00	.00	PIPE
1000.773	2775.148	.349	2775.497	4.20	13.45	2.81	2778.30	.00	.79	1.27	1.500	.000	.00	0 .0
1.014	.3460					.1060	.11	.35	4.77	.26	.013	.00	.00	PIPE
1001.787	2775.499	.361	2775.860	4.20	12.82	2.55	2778.41	.00	.79	1.28	1.500	.000	.00	0 .0
.867	.3460					.0927	.08	.36	4.47	.26	.013	.00	.00	PIPE
1002.654	2775.799	.374	2776.172	4.20	12.22	2.32	2778.49	.00	.79	1.30	1.500	.000	.00	0 .0
.747	.3460					.0811	.06	.37	4.19	.26	.013	.00	.00	PIPE
1003.401	2776.057	.386	2776.444	4.20	11.65	2.11	2778.55	.00	.79	1.31	1.500	.000	.00	0 .0
.649	.3460					.0709	.05	.39	3.92	.26	.013	.00	.00	PIPE
1004.050	2776.281	.400	2776.681	4.20	11.11	1.92	2778.60	.00	.79	1.33	1.500	.000	.00	0 .0
.565	.3460					.0620	.04	.40	3.67	.26	.013	.00	.00	PIPE
1004.615	2776.477	.414	2776.891	4.20	10.60	1.74	2778.63	.00	.79	1.34	1.500	.000	.00	0 .0
.494	.3460					.0543	.03	.41	3.43	.26	.013	.00	.00	PIPE
1005.109	2776.648	.428	2777.076	4.20	10.10	1.58	2778.66	.00	.79	1.35	1.500	.000	.00	0 .0
.433	.3460					.0475	.02	.43	3.21	.26	.013	.00	.00	PIPE
1005.542	2776.798	.443	2777.240	4.20	9.63	1.44	2778.68	.00	.79	1.37	1.500	.000	.00	0 .0
.379	.3460					.0416	.02	.44	3.01	.26	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
XP 405+04 Facilities D25
412-634A

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1005.921	2776.929	.458	2777.387	4.20	9.18	1.31	2778.70	.00	.79	1.38	1.500	.000	.00	0 .0
.333	.3460					.0364	.01	.46	2.81	.26	.013	.00	.00	PIPE
1006.254	2777.044	.474	2777.519	4.20	8.76	1.19	2778.71	.00	.79	1.39	1.500	.000	.00	0 .0
.291	.3460					.0319	.01	.47	2.63	.26	.013	.00	.00	PIPE
1006.545	2777.145	.491	2777.636	4.20	8.35	1.08	2778.72	.00	.79	1.41	1.500	.000	.00	0 .0
.255	.3460					.0279	.01	.49	2.46	.26	.013	.00	.00	PIPE
1006.800	2777.233	.508	2777.741	4.20	7.96	.98	2778.73	.00	.79	1.42	1.500	.000	.00	0 .0
.222	.3460					.0245	.01	.51	2.30	.26	.013	.00	.00	PIPE
1007.022	2777.310	.527	2777.836	4.20	7.59	.89	2778.73	.00	.79	1.43	1.500	.000	.00	0 .0
.193	.3460					.0215	.00	.53	2.15	.26	.013	.00	.00	PIPE
1007.215	2777.376	.545	2777.922	4.20	7.24	.81	2778.73	.00	.79	1.44	1.500	.000	.00	0 .0
.166	.3460					.0188	.00	.55	2.01	.26	.013	.00	.00	PIPE
1007.381	2777.434	.565	2777.999	4.20	6.90	.74	2778.74	.00	.79	1.45	1.500	.000	.00	0 .0
.142	.3460					.0165	.00	.56	1.88	.26	.013	.00	.00	PIPE
1007.523	2777.483	.585	2778.068	4.20	6.58	.67	2778.74	.00	.79	1.46	1.500	.000	.00	0 .0
.120	.3460					.0145	.00	.59	1.76	.26	.013	.00	.00	PIPE
1007.643	2777.525	.606	2778.131	4.20	6.27	.61	2778.74	.00	.79	1.47	1.500	.000	.00	0 .0
.100	.3460					.0127	.00	.61	1.64	.26	.013	.00	.00	PIPE

KYLE CANYON INTERCHANGE
XP 405+04 Facilities D25
412-634A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1007.744	2777.560	.629	2778.188	4.20	5.98	.56	2778.74	.00	.79	1.48	1.500	.000	.00	0 .0
.082	.3460					.0112	.00	.63	1.53	.26	.013	.00	.00	PIPE
1007.826	2777.588	.652	2778.240	4.20	5.70	.50	2778.74	.00	.79	1.49	1.500	.000	.00	0 .0
.065	.3460					.0098	.00	.65	1.43	.26	.013	.00	.00	PIPE
1007.890	2777.610	.676	2778.286	4.20	5.44	.46	2778.74	.00	.79	1.49	1.500	.000	.00	0 .0
.049	.3460					.0086	.00	.68	1.33	.26	.013	.00	.00	PIPE
1007.939	2777.627	.701	2778.328	4.20	5.18	.42	2778.75	.00	.79	1.50	1.500	.000	.00	0 .0
.034	.3460					.0076	.00	.70	1.24	.26	.013	.00	.00	PIPE
1007.973	2777.639	.727	2778.366	4.20	4.94	.38	2778.75	.00	.79	1.50	1.500	.000	.00	0 .0
.020	.3460					.0067	.00	.73	1.16	.26	.013	.00	.00	PIPE
1007.993	2777.646	.755	2778.401	4.20	4.71	.34	2778.75	.00	.79	1.50	1.500	.000	.00	0 .0
.007	.3460					.0059	.00	.76	1.08	.26	.013	.00	.00	PIPE
1008.000	2777.648	.785	2778.433	4.20	4.49	.31	2778.75	.00	.79	1.50	1.500	.000	.00	0 .0

♀

APPENDIX D

90% Storm Drain Plans





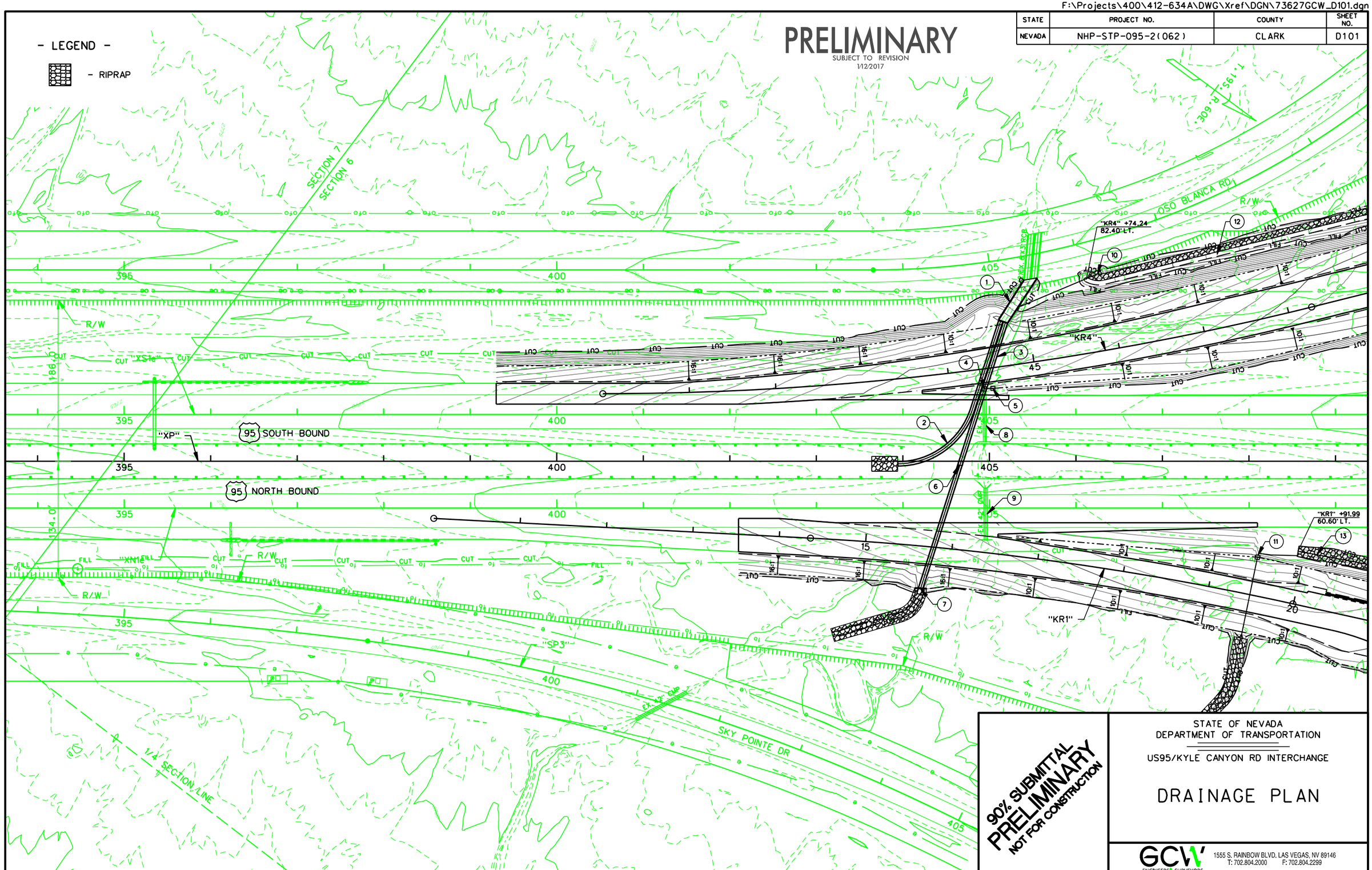
GCW

ENGINEERS \ SURVEYORS

1555 South Rainbow Boulevard
Las Vegas, Nevada 89146
P. 702.804.2000
F. 702.804.2299
www.gcwengineering.com

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D101.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	D101



90% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D101A.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	D101A

PRELIMINARY
SUBJECT TO REVISION
1/13/2017

①	"KR4" 45+10.49 TO "KR4" 44+68.76	CONSTRUCT 5' WIDE U-CHANNEL CONCRETE STRUCTURE FROM "KR4" 45+10.49 (95.27' LT.) TO "KR4"44+68.76 (52.79' LT.) (SEE SHEETS DP105 AND DS101)
②	"KR4" 44+68.76 TO "XP" 403+93.94	CONSTRUCT 5'x3'x222.0' RCB FROM "KR4" 44+68.76 (52.79' LT.) UIE=2774.90 TO "XP" 403+93.94 (3.00' RT.) LIE = 2772.48' CLASS 300 RIPRAP 30' LENGTH AT OUTLET (SEE SHEET DP105)
③	"KR4" 44+74.02 TO "KR1" 15+68.05	CONSTRUCT 5'x3'x324.3' RCB FROM "KR4" 44+74.02 (50.30' LT.) UIE=2774.90 TO "KR1" 15+68.05 (49.12' RT.) LIE = 2770.75' CLASS 300 RIPRAP APRON AT OUTLET (SEE SHEET DP105)
④	"XP" 404+94.09	CONSTRUCT TYPE 2A DROP INLET (84.21' LT.) WITH CONCRETE APRON, (GRATE ELEV= 2781.06', INV ELEV= 2777.34', H= 3.8') INTO 5x3' RCB (SEE SHEETS DP105 AND DS102)
⑤	"XP" 405+04.07	CONSTRUCT TYPE 2 DROP INLET WITH APRON (84.21' LT.) (GRATE ELEV= 2781.15', INV ELEV= 2777.65', H= 3.5') INSTALL 18" X 8' RCP FROM "XP" 405+04.07 (84.21' LT.) UIE= 2775.65' TO "XP" 404+94.09 (83.55' LT.) UIE = 2774.88' CONNECT TO 5'x3' RCB (SEE SHEET DP107)
⑥	"XP" 404+66.66	CONSTRUCT TYPE 2A DROP INLET (2.31' RT.) WITH CONCRETE APRON, (GRATE ELEV= 2778.18', INV ELEV= 2776.18', H= 2.5') INTO 5'x3' RCB (SEE SHEET DP105 AND DS102)
⑦	"KR1" 15+68.05	CONSTRUCT HEADWALL TYPE 1 (49.12' RT.) CLASS 300 RIPRAP APRON AT OUTLET 23'x122', 3:1 SS TRAPEZOIDAL B/W (SEE SHEET DP105)
⑧	"XP" 404+95 TO "XP" 404+96	REMOVE 42" CMP
⑨	"XP" 404+95 TO "XP" 404+96	ABANDON 42" CMP
⑩	"KR4" 45+90.04	INSTALL 24" RCP END SECTION (88.46' LT.) INSTALL 24" X 101' RCP FROM "KR4" 45+90.04 (88.46' LT.) UIE= 2785.18' TO "KR4" 44+89.54 (64.34' LT.) LIE = 2776.96' CONNECT TO CONCRETE U-CHANNEL. (SEE SHEET DP107)
⑪	"KR1" 19+48.39	CONSTRUCT TYPE 2A DROP INLET (44.00' LT.) WITH CONCRETE APRON, (GRATE ELEV= 2779.53', INV ELEV= 2776.53', H= 3.0') INSTALL 18" X 91' RCP FROM "KR1" 19+48.39 (44.00' LT.) UIE= 2776.53' TO "KR1" 19+48.39 (47.23' RT.) LIE = 2776.07' INSTALL 18" RCP END SECTION RT. CLASS 300 RIPRAP APRON AT OUTLET, 3:1 SS TRAPEZIDAL B/W (SEE SHEET DP107)
⑫	"KR4" 54+23.00 TO "KR4" 45+74.24	CONSTRUCT CLASS 300 RIPRAP LINED BERM 3 (SEE SHEET DP117)
⑬	"KR1" 26+73.41 TO "KR1" 19+91.99	CONSTRUCT CLASS 300 RIPRAP LINED CHANNEL (SEE SHEET DP121)

90% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D102.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	D102

PRELIMINARY

SUBJECT TO REVISION
1/12/2017

- LEGEND -

- RIPRAP

RCB BY OTHERS

"MOSM" 63+16.93 P.O.B

"KR4" +44.38
138.36' LT.

"KR4" +23.00
126.65' LT.

"KR4"

"KR4A"

"KCW1"

"KR3A"

"KR3"

"KCR3"

KYLE CANYON RD

T.19S. R.60E. SEC. 6

"KCE1" +09.10
85.95' LT.

"KCE1"

"KCE1" +99.42
68.23' LT.

"KCR4"

"KCW"

"XS1e"

"MOSM"

95 SOUTH BOUND

"XP"

US 95

95 NORTH BOUND

"XN1e"

"KR1" +73.41
82.58' LT.

"KCW1"

"KCE1" +21.84
64.61' LT.

"KCE1"

"KR2" +85.14
69.05' LT.

"KCE"

"KR1"

"KR2"

KYLE CANYON RD (SR 157)

RCB BY OTHERS

R/W

"KR1A"

"KR2A"

NOTE: FOR ALL DRAINAGE INFORMATION ON KYLE CANYON RD SEE SHEET D104-D107.

90% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D102A.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	D102A

PRELIMINARY
SUBJECT TO REVISION
1/12/2017

①	"XP" 412+41.59	CONSTRUCT 5-2G EMBANKMENT PROTECTOR INLET (76.25' RT.) (GRATE ELEV= 2792.45', INV ELEV= 2787.95', H= 4.5') INSTALL 18" X 17' RCP FROM "XP" 412+41.59 (76.25' RT.) UIE= 2787.95' TO "XP" 412+24.48 (76.25' RT.) LIE= 2786.94' CONNECT EXISTING 6' X 3' RCB (SEE SHEET DP108)
②	"XP" 412+51.59	CONSTRUCT TYPE 2 DROP INLET (76.25' RT.) (GRATE ELEV= 2792.64', INV ELEV= 2788.14', H= 4.5') INSTALL 18" X 10' RCP FROM "XP" 412+51.59 (76.25' RT.) UIE= 2788.14' TO "XP" 412+41.59 (76.25' RT.) LIE= 2788.05' CONNECT TO TYPE 2 DROP INLET (SEE SHEET DP108)
③	"XP" 412+61.59	CONSTRUCT TYPE 2 DROP INLET (76.25' RT.) (GRATE ELEV= 2792.82', INV ELEV= 2788.32', H= 4.5') INSTALL 18" X 10' RCP FROM "XP" 412+61.59 (76.25' RT.), UIE= 2788.32' TO "XP" 412+51.59 (76.25' RT.), LIE= 2788.24' CONNECT TO TYPE 2 DROP INLET (SEE SHEET DP108)
④	"XP" 412+49 TO "XP" 412+95	ABANDON 24" CMP
⑤	"XP" 418+13.49	CONSTRUCT TYPE 5-2G EMBANKMENT PROTECTOR (76.25' RT.) (GRATE ELEV= 2804.31', INV ELEV= 2802.49', H= 1.8') INSTALL 12" X 20' CMP FROM "XP" 418+13.49 (76.50' LT.) UIE= 2802.41' TO "XP" 418+13.49 (96.01' LT.) LIE= 2802.49' CLASS 150 RIPRAP APRON AT OUTLET
⑥	"XP" 418+20.99	CONSTRUCT TYPE 5-2G EMBANKMENT PROTECTOR (76.25' RT.) (GRATE ELEV= 2804.42', INV ELEV= 2802.62', H= 1.8') INSTALL 12" X 8' CMP FROM "XP" 418+20.99 (76.50' LT.) UIE= 2802.59' TO "XP" 412+13.29 (76.50' RT.) LIE= 2802.49' CONNECT TO TYPE 5-2G EMBANKMENT PROTECTOR
⑦	"XP" 421+25.00	ABANDON 24" CMP
⑧	"KR1" 23+00.05	CONSTRUCT TYPE 2B DROP INLET (44.00' LT.) WITH CONCRETE APRON, (GRATE ELEV= 2775.28', INV ELEV= 2772.25', H= 3.0') INSTALL 24" X 108' RCP FROM "KR1" 23+00.05 (44.00' LT.) UIE= 2772.25' "KR1" 22+82.21 (62.00' RT.) LIE = 2772.00' INSTALL 24" RCP END SECTION RT. CLASS 300 RIPRAP APRON AT OUTLET, 3:1 SS TRAPEZOIDAL B/W (SEE SHEET DP108)
⑨	"KR1" 23+03.61	INSTALL 24" RCP END SECTION (65.50' LT.) INSTALL 24" X 22' RCP FROM "KR1" 23+00.05 (44.00' LT.) LIE= 2772.35' TO "KR1" 23+03.61 (65.50' LT.) UIE = 2778.22' CONNECT TO TYPE 2B DROP INLET CLASS 300 RIPRAP APRON AT INLET TO EXISTING 6'x3' RCB AT STA "KR1" 23+36.99, 145.11' LT. (SEE SHEET DP108)
⑩	"XP" 415+63.10	CONSTRUCT TYPE 5-2G EMBANKMENT PROTECTOR (76.5' LT.) (GRATE ELEV.= 2800.51, INV ELEV 2798.51, H=2.0') INSTALL 12" X 20' CMP FROM "XP" 415+63.10 (76.5' LT.), UIE= 2798.51 TO "XP" 415+63.10 (96.00' LT.), LIE= 2797.51 CLASS 150 RIPRAP APRON AT OUTLET
⑪	"KCE1" 13+42.52 TO "KR4A" 4+44.38	CONSTRUCT CLASS 300 RIPRAP LINED BERM 2 (SEE SHEET DP116)
⑫	"KCW1" 16+46.34 TO "KR3" 37+08.95	CONSTRUCT CLASS 300 RIPRAP LINED BERM 4 (SEE SHEET DP118)
⑬	"KCE1" 18+09.10 TO "KCE1" 19+99.47	CONSTRUCT CLASS 300 RIPRAP LINED BERM 7 (SEE SHEET DP120)
⑭	"KCE1" 21+21.84 TO "KR2" 26+85.14	CONSTRUCT CLASS 300 RIPRAP LINED BERM 5 (SEE SHEET DP119)
⑮	"MOSM" 64+01.29 TO "MOSM" 69+21.15	CONSTRUCT 13' X 8' RCB FROM "MOSM" 64+01.29 (LIE= 2773.45) TO "MOSM" 69+21.15 (UIE= 2763.06) PLUG BOTH ENDS (SEE SHEET DP104 AND DS102)

90% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

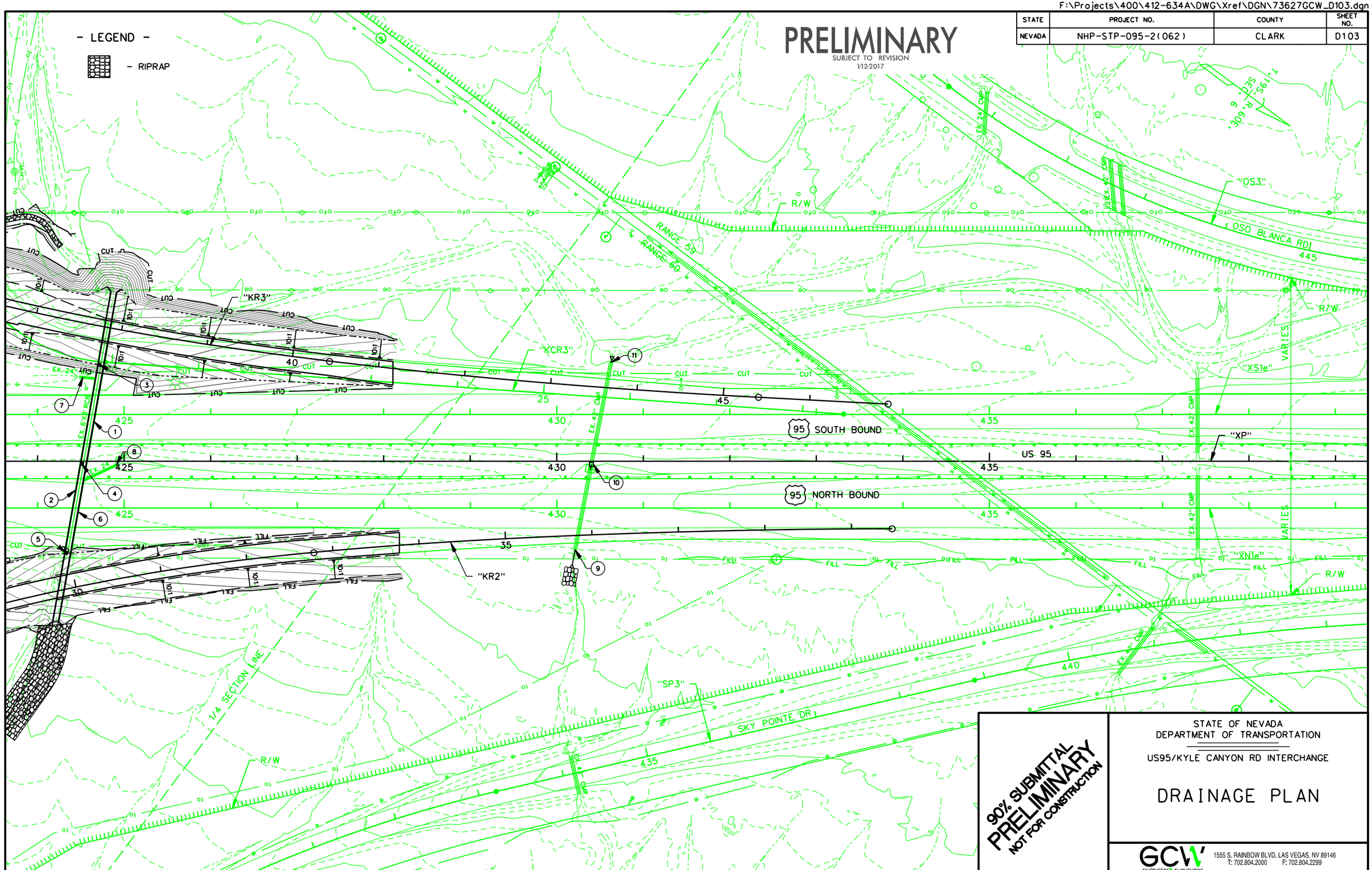
DRAINAGE PLAN

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D103.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	D103



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D103A.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	D103A

PRELIMINARY
SUBJECT TO REVISION
1/12/2017

①	"KR3" 37+82.66 TO "XP" 424+53.91	CONSTRUCT 6' X 3' RCB FROM STA "KR3" 37+82.66, 42.39' LT. TO "XP" 424+53.91, 2.43' LT. CONSTRUCT RCB HEADWALL TYPE 1 AT INLET. (SEE SHEET DP103)
②	"XP" 424+53.91 TO "KR2" 29+68.14	CONSTRUCT 6' X 3' RCB FROM STA "XP" 424+53.91, 2.43' LT. TO "KR2" 29+68.14, 34.87' RT. CONSTRUCT RCB HEADWALL TYPE 1 AT OUTLET. CLASS 300 RIPRAP APRON AT OUTLET, 3:1 TRAPEZOIDAL B/W (SEE SHEET DP103)
③	"KR3" 37+82.27	CONSTRUCT TYPE 2A DROP INLET (43.92' RT.) WITH CONCRETE APRON, (GRATE ELEV= 2810.60', H= 5.7') ON TO 6' X 3' RCB (SEE SHEET DP103 AND DS102)
④	"XP" 424+51.25	CONSTRUCT TYPE 2A DROP INLET (3.09' RT.) WITH CONCRETE APRON, (GRATE ELEV= 2805.28', H= 1.6') ON TO 6' X 3' RCB (SEE SHEET DP103 AND DS102)
⑤	"KR2" 29+97.03	CONSTRUCT TYPE 2A DROP INLET (40.82' LT.) WITH CONCRETE APRON, (GRATE ELEV= 2806.06', H= 2.8') ON TO 6' X 3' RCB (SEE SHEET DP103 AND DS102)
⑥	"KR3" 37+83.25 TO "KR2" 29+99.25	REMOVE 6' X 3' RCB REMOVE HEADWALL "KR3" 37+83.25 (4.49' LT.) AND "KR2" 29+99.25 (41.99' LT.)
⑦	"KR3" 37+62.42 TO "KR3" 37+81.30	REMOVE 24" RCP FROM "KR3" 37+62.42 (62.43' RT.) TO "KR3" 37+81.30 (60.57' RT.) REMOVE RCP END SECTION
⑧	"XP" 424+91.14 TO "XP" 424+52.56	REMOVE 24" CMP FROM "XP" 424+91.14 (4.29' RT.) TO "XP" 424+52.56 (22.51' RT.) REMOVE CMP END SECTION
⑨	"XP" 430+18.03 TO "XP" 430+21.26	EXTEND EXISTING 42" CMP INSTALL 42" X 17' CMP FROM "XP" 430+18.03' (119.06' RT.) LIE= 2809.97' TO "XP" 430+21.26' (102.07' RT.) UIE= 2810.50' INSTALL 42" CMP END SECTION (119.06' RT.) CLASS 300 RIPRAP APRON AT OUTLET (SEE SHEET DP108)
⑩	"XP" 430+39.98	CONSTRUCT TYPE 2A DROP INLET (3.69' RT.) WITH CONCRETE APRON, (GRATE ELEV= 2817.18', INV ELEV= 2813.09', H= 4.1') ONTO EXISTING 42" CMP REMOVE EXISTING DROP INLET INSTALL 42" X 6' CMP FROM "XP" 430+39.98' (3.69' RT.) UIE= 2813.27' TO "XP" 430+38.84' (9.70' RT.) LIE= 2813.09' CONNECT TO EXISTING 42" CMP (SEE SHEET DP108)
⑪	"XP" 430+62.81 TO "XP" 430+63.33	EXTEND EXISTING 42" CMP INSTALL 42" X 3' CMP FROM "XP" 430+62.81' (114.21' LT.) LIE= 2817.24' TO "XP" 430+63.33' (116.84' LT.) UIE= 2817.32' INSTALL 42" CMP END SECTION (116.84' LT.) (SEE SHEET DP108)

90% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D104.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	D104

PRELIMINARY
SUBJECT TO REVISION
1/12/2017

"KCW" 176+08.15 P.O.B.
1/4 SECTION LINE

"KCW"

180

185

KYLE CANYON RD (SR 157)

190

T.19S. R.60E.
SEC. 1

1/4Sec. Line

NO STORM DRAIN FACILITIES

90% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D105.dgn

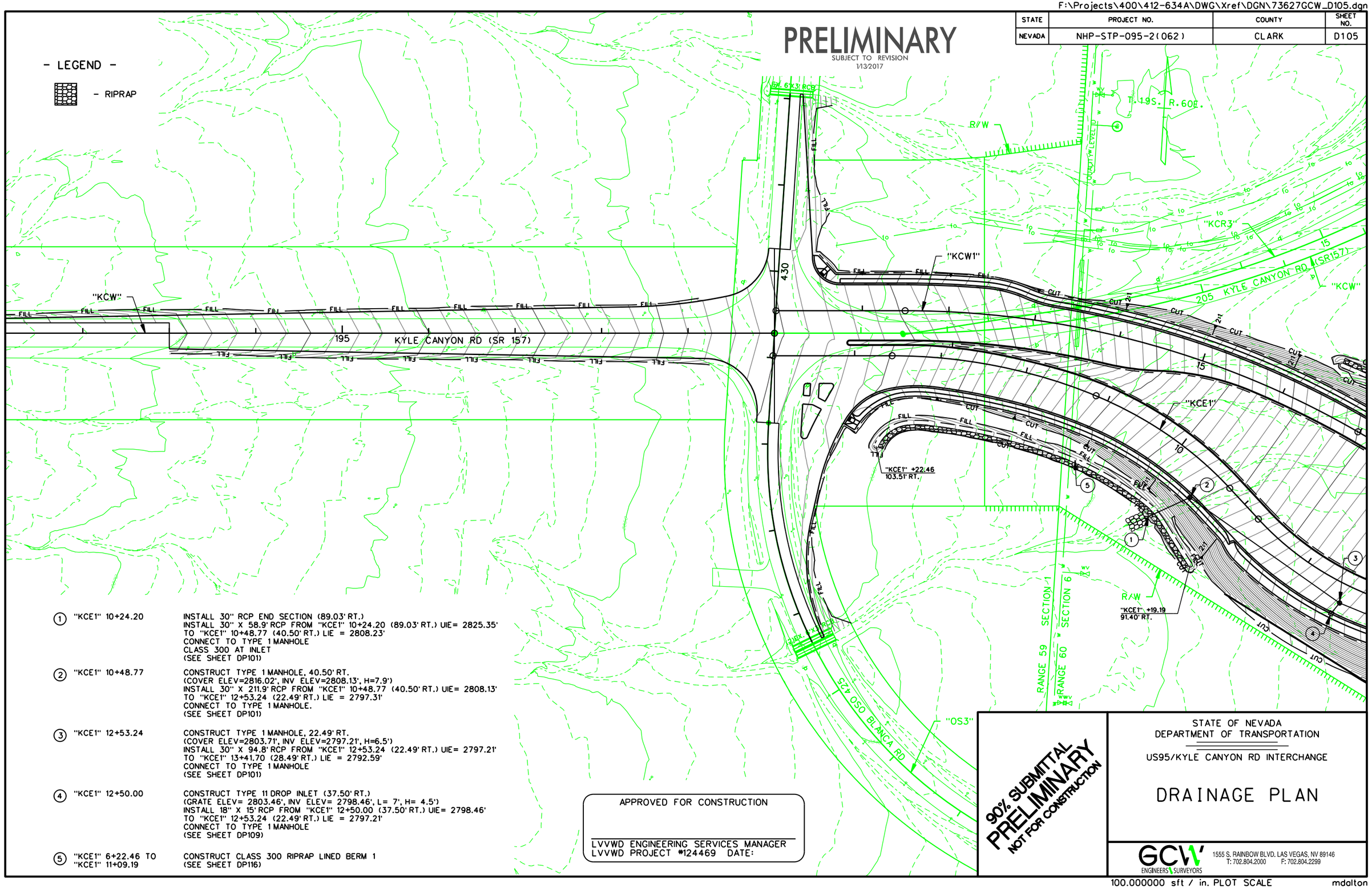
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	D105

PRELIMINARY

SUBJECT TO REVISION
1/13/2017

- LEGEND -

- RIPRAP



(1) "KCE1" 10+24.20
INSTALL 30" RCP END SECTION (89.03' RT.)
INSTALL 30" X 58.9' RCP FROM "KCE1" 10+24.20 (89.03' RT.) UIE= 2825.35'
TO "KCE1" 10+48.77 (40.50' RT.) LIE = 2808.23'
CONNECT TO TYPE 1 MANHOLE
CLASS 300 AT INLET
(SEE SHEET DP101)

(2) "KCE1" 10+48.77
CONSTRUCT TYPE 1 MANHOLE, 40.50' RT.
(COVER ELEV=2816.02', INV ELEV=2808.13', H=7.9')
INSTALL 30" X 211.9' RCP FROM "KCE1" 10+48.77 (40.50' RT.) UIE= 2808.13'
TO "KCE1" 12+53.24 (22.49' RT.) LIE = 2797.31'
CONNECT TO TYPE 1 MANHOLE.
(SEE SHEET DP101)

(3) "KCE1" 12+53.24
CONSTRUCT TYPE 1 MANHOLE, 22.49' RT.
(COVER ELEV=2803.71', INV ELEV=2797.21', H=6.5')
INSTALL 30" X 94.8' RCP FROM "KCE1" 12+53.24 (22.49' RT.) UIE= 2797.21'
TO "KCE1" 13+41.70 (28.49' RT.) LIE = 2792.59'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DP101)

(4) "KCE1" 12+50.00
CONSTRUCT TYPE 11 DROP INLET (37.50' RT.)
(GRATE ELEV= 2803.46', INV ELEV= 2798.46', L= 7', H= 4.5')
INSTALL 18" X 15' RCP FROM "KCE1" 12+50.00 (37.50' RT.) UIE= 2798.46'
TO "KCE1" 12+53.24 (22.49' RT.) LIE = 2797.21'
CONNECT TO TYPE 1 MANHOLE
(SEE SHEET DP109)

(5) "KCE1" 6+22.46 TO "KCE1" 11+09.19
CONSTRUCT CLASS 300 RIPRAP LINED BERM 1
(SEE SHEET DP116)

APPROVED FOR CONSTRUCTION

LVVWD ENGINEERING SERVICES MANAGER
LVVWD PROJECT #124469 DATE:

90% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

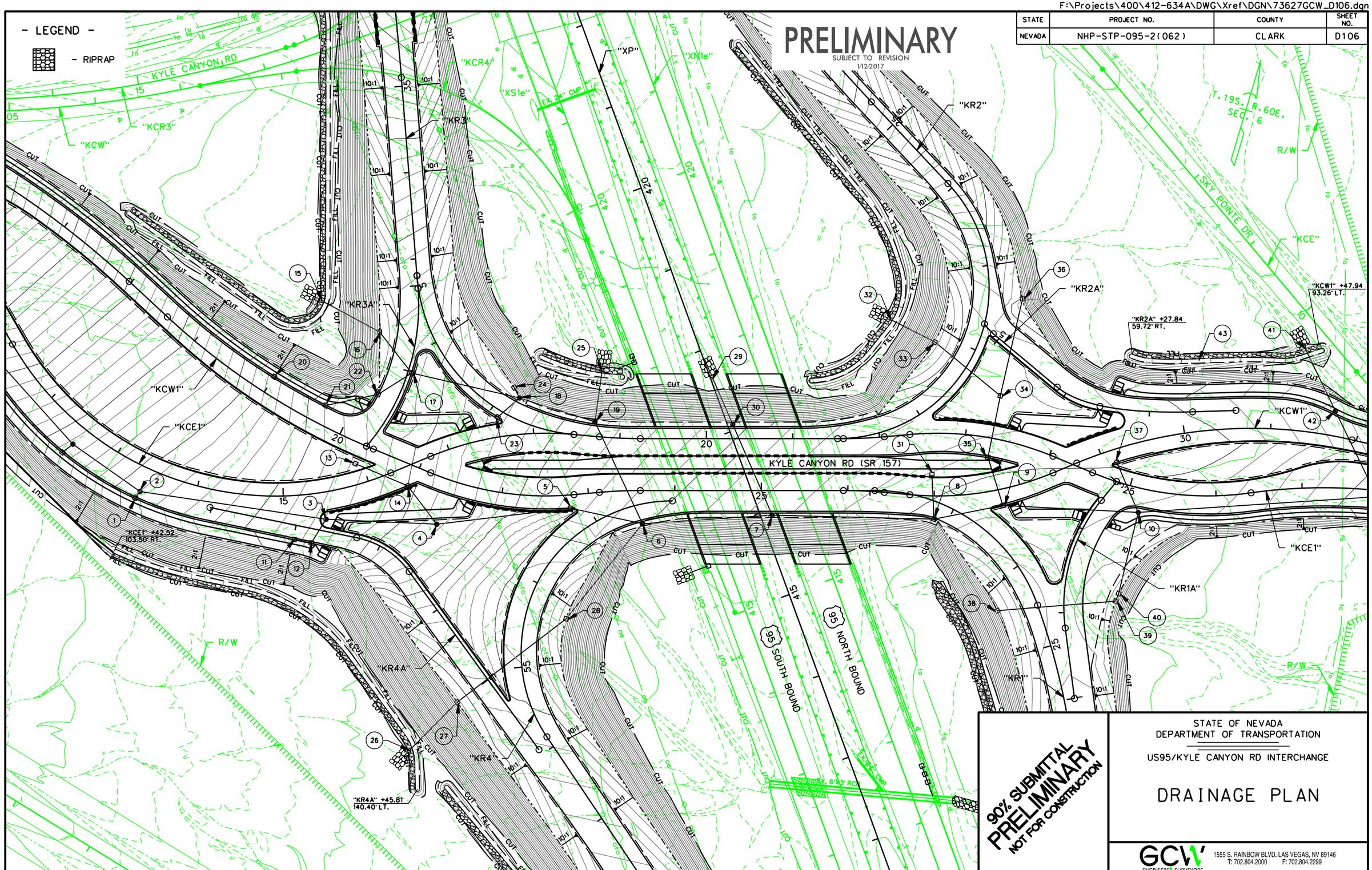
GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D106.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	D106



90% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D106A.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	D106A

PRELIMINARY

SUBJECT TO REVISION
1/12/2017

①	"KCE1" 13+40.00	CONSTRUCT TYPE 11 DROP INLET (37.50' RT.) (GRATE ELEV= 2798.74', INV ELEV= 2795.00', L= 7', H= 5.0') INSTALL 18" X 9' RCP FROM "KCE1" 13+40.00 (37.50' RT.) UIE= 2795.00' TO "KCE1" 13+41.70 (28.49' RT.) LIE = 2793.59' CONNECT TO TYPE 1 MANHOLE (SEE SHEET DP109)
②	"KCE1" 13+41.70	CONSTRUCT TYPE 1 MANHOLE, (28.49' RT.) (COVER ELEV=2798.99', INV ELEV= 2792.49', H= 6.5') INSTALL 30" X 127.5' RCP FROM "KCE1" 13+41.70 (28.49' RT.) UIE= 2792.49' TO "KCE1" 15+44.81 (31.57' RT.) LIE = 2785.70' CONNECT TO TYPE 1 MANHOLE (SEE SHEET DP101)
③	"KCE1" 15+44.81	CONSTRUCT TYPE 1 MANHOLE, (31.57' RT.) (COVER ELEV=2792.99', INV ELEV= 2785.60', H=7.4') INSTALL 30" X 128' RCP FROM "KCE1" 15+44.81 (31.57' RT.) UIE= 2785.60' TO "KCW1" 21+39.53 (53.25' RT.) LIE = 2781.12' CONNECT TO TYPE 1 MANHOLE (SEE SHEET DP101)
④	"KCW1" 21+39.53	CONSTRUCT TYPE 1 MANHOLE, (53.25' RT.) (COVER ELEV=2788.02', INV ELEV= 2781.02', H= 7.0') INSTALL 30" X 155.4' RCP FROM "KCW1" 21+39.53 (53.25' RT.) UIE= 2781.02' TO "KCW1" 22+78.00 (15.25' RT.) LIE = 2775.41' CONNECT TO TYPE 3 DROP INLET (SEE SHEET DP101)
⑤	"KCW1" 22+78.00	CONSTRUCT TYPE 3 DROP INLET (15.25' RT.) (GRATE ELEV= 2782.47', INV ELEV= 2775.31', H= 7.2') INSTALL 30" X 85.2' RCP FROM "KCW1" 22+78.00 (15.25' RT.) UIE= 2777.31' TO "KCW1" 23+62.69 (38.36' RT.) LIE = 2769.36' CONNECT TO TYPE 2 MANHOLE (SEE SHEET DP101)
⑥	"KCW1" 23+62.69	CONSTRUCT TYPE 2 MANHOLE, (38.36' RT.) (COVER ELEV=2780.65', INV ELEV= 2769.26', H= 7.5') INSTALL 42" X 150.1' RCP FROM "KCW1" 23+62.69 (38.36' RT.) UIE= 2769.26' TO "KCW1" 25+12.48 (28.50' RT.) LIE = 2768.50' CONNECT TO TYPE 2 MANHOLE (SEE SHEET DP101)
⑦	"KCW1" 25+12.48	CONSTRUCT TYPE 2 MANHOLE, (28.50' RT.) (COVER ELEV=2777.88', INV ELEV= 2768.40', H=7.5') INSTALL 42" X 187.1' RCP FROM "KCW1" 25+12.48 (28.50' RT.) UIE= 2768.40' TO "KCW1" 27+00.00 (26.84' RT.) LIE = 2767.43' CONNECT TO TYPE 11 DROP INLET (SEE SHEET DP101)
⑧	"KCW1" 27+00.00	CONSTRUCT TYPE 11 DROP INLET (26.84' RT.) (GRATE ELEV= 2774.46', INV ELEV= 2767.33', L= 10', H= 7.2') INSTALL 42" X 81.2' RCP FROM "KCW1" 27+00.00 (26.84' RT.) UIE= 2767.33' TO "KCW1" 27+76.00 (18.98' RT.) LIE = 2765.55' CONNECT TO TYPE 11 DROP INLET (SEE SHEET DP102)
⑨	"KCW1" 27+76.00	CONSTRUCT TYPE 11 DROP INLET (18.98' RT.) (GRATE ELEV= 2774.06', INV ELEV= 2765.45', L= 15', H= 8.6') INSTALL 42" X 156.7' RCP FROM "KCW1" 27+76.00 (18.98' RT.) UIE= 2765.45' TO "KCW1" 25+15.62 (28.02' RT.) LIE = 2764.56' CONNECT TO TYPE 2 MANHOLE (SEE SHEET DP102)
⑩	"KCE1" 25+15.62	CONSTRUCT TYPE 2 MANHOLE, (28.02' RT.) (COVER ELEV=2774.36', INV ELEV= 2764.46', H= 9.9') INSTALL 42" X 276.4' RCP FROM "KCE1" 25+15.62 (28.02' RT.) UIE= 2764.46' TO "KCE1" 27+87.25 (7.20' RT.) LIE = 2763.74' CONNECT TO TYPE 4 MANHOLE (SEE SHEET DP102)
⑪	"KR4A" 7+98.68	CONSTRUCT TYPE 11 DROP INLET (16.50' LT.) (GRATE ELEV= 2793.61', INV ELEV= 2788.45', L= 7', H= 5.0') INSTALL 18" X 20' RCP FROM "KR4A" 7+95.00 (16.50' LT.) UIE= 2788.45' TO "KR4A" 7+78.68 (16.50' LT.) LIE = 2787.99' CONNECT TO TYPE 11 DROP INLET (SEE SHEET DP109)
⑫	"KR4A" 7+78.68	CONSTRUCT TYPE 11 DROP INLET (16.50' LT.) (GRATE ELEV= 2792.51', INV ELEV= 2787.89', L= 7', H= 4.6') INSTALL 18" X 32' RCP FROM "KR4A" 7+78.68 (16.50' LT.) UIE= 2787.89' TO "KCE1" 15+44.81 (31.57' RT.) LIE = 2786.70' CONNECT TO TYPE 1 MANHOLE (SEE SHEET DP109)
⑬	"KCE1" 15+91.52	CONSTRUCT TYPE 2B DROP INLET (23.67' LT.) WITH CONCRETE APRON, (GRATE ELEV= 2792.78', INV ELEV= 2787.28', H= 4.5') INSTALL 24" X 66' RCP FROM "KCE1" 15+91.52 (23.67' LT.) UIE= 2787.28' TO "KCE1" 16+40.00 (21.25' RT.) LIE = 2785.10' CONNECT TO TYPE 3 DROP INLET (SEE SHEET DP110)
⑭	"KCE1" 16+40.00	CONSTRUCT TYPE 3 DROP INLET (21.25' RT.) (GRATE ELEV= 2789.98', INV ELEV= 2785.00', H= 5.0') INSTALL 24" X 56' RCP FROM "KCE1" 16+40.00 (21.25' RT.) UIE= 2785.00' TO "KCW1" 21+39.53 (53.25' RT.) LIE = 2781.62' CONNECT TO TYPE 1 MANHOLE (SEE SHEET DP110)
⑮	"KR3A" 4+86.33	INSTALL 18" RCP END SECTION (111.36' LT.) INSTALL 18" X 75' RCP FROM "KR3A" 4+86.33 (111.36' LT.) UIE= 2811.67' TO "KR3A" 4+40.00 (42.95' LT.) LIE = 2784.95' CONNECT TO TYPE 2B DROP INLET CLASS 300 RIPRAP APRON AT INLET (SEE SHEET DP106)
⑯	"KR3A" 4+40.00	CONSTRUCT TYPE 2B DROP INLET (42.95' LT.) WITH CONCRETE APRON, (GRATE ELEV= 2789.86', INV ELEV= 2784.85', H= 5.0') INSTALL 24" X 60.3' RCP FROM "KR3A" 4+40.00 (42.95' LT.) UIE= 2784.85' TO "KR3A" 3+99.00 (4.25' RT.) LIE = 2784.51' CONNECT TO TYPE 3 DROP INLET (SEE SHEET DP106)
⑰	"KR3A" 3+99.00	CONSTRUCT TYPE 3 DROP INLET (4.25' RT.) (GRATE ELEV= 2790.73', INV ELEV= 2784.41', H= 6.3') INSTALL 24" X 128' RCP FROM "KR3A" 3+99.00 (4.25' RT.) UIE= 2784.41' TO "KC3" 30+77.00 (23.45' RT.) LIE = 2781.13' CONNECT TO TYPE 1 MANHOLE (SEE SHEET DP106)
⑱	"KR3" 30+77.00	CONSTRUCT TYPE 1 MANHOLE, (23.45' RT.) (COVER ELEV=2786.41', INV ELEV= 2781.03', H=5.4') INSTALL 30" X 91.3' RCP FROM "KR3" 30+77.00 (23.45' RT.) UIE= 2781.03' TO "KCE1" 18+69.61 (16.76' LT.) LIE = 2778.39' CONNECT TO TYPE 1 MANHOLE (SEE SHEET DP106)
⑲	"KCE1" 18+69.61	CONSTRUCT TYPE 1 MANHOLE, (16.76' LT.) (COVER ELEV=2784.27', INV ELEV= 2778.29', H=6.0') INSTALL 30" X 130' RCP FROM "KCE1" 18+69.61 (16.76' LT.) UIE= 2778.29' TO "KCW1" 23+62.69 (38.36' RT.) LIE = 2769.36' CONNECT TO TYPE 2 MANHOLE (SEE SHEET DP106)
⑳	"KCW1" 19+00.00	CONSTRUCT TYPE 11 DROP INLET (21.08' LT.) (GRATE ELEV= 2797.93', INV ELEV= 2793.23', L= 10', H= 4.7') INSTALL 18" X 68' RCP FROM "KCW1" 19+00.00 (21.08' LT.) UIE= 2793.23' TO "KCW1" 19+70.00 (22.19' LT.) LIE = 2789.55' CONNECT TO TYPE 11 DROP INLET (SEE SHEET DP114)
㉑	"KCW1" 19+70.00	CONSTRUCT TYPE 11 DROP INLET (22.19' LT.) (GRATE ELEV= 2793.82', INV ELEV= 2789.45', L= 10', H= 4.4') INSTALL 18" X 62' RCP FROM "KCW1" 19+70.00 (22.19' LT.) UIE= 2789.45' TO "KR3A" 3+60.00 (22.25' LT.) LIE = 2787.19' CONNECT TO TYPE 3 DROP INLET (SEE SHEET DP114)
㉒	"KR3A" 3+60.00	CONSTRUCT TYPE 3 DROP INLET (22.25' LT.) (GRATE ELEV= 2791.51', INV ELEV= 2787.09', H= 4.4') INSTALL 18" X 46' RCP FROM "KR3A" 3+60.00 (22.25' LT.) UIE= 2787.09' TO "KR3A" 3+99.00 (4.25' RT.) LIE = 2784.91' CONNECT TO TYPE 3 DROP INLET (SEE SHEET DP114)
㉓	"KR3" 30+89.00	CONSTRUCT TYPE 3 DROP INLET (8.25' LT.) (GRATE ELEV= 2787.08', INV ELEV= 2782.51', H= 4.6') INSTALL 18" X 34' RCP FROM "KR3" 30+89.00 (8.25' LT.) UIE= 2782.51' TO "KR3" 30+77.00 (23.45' RT.) LIE = 2782.03' CONNECT TO TYPE 1 MANHOLE (SEE SHEET DP114)
㉔	"KR3" 30+90.00	CONSTRUCT TYPE 2B DROP INLET (30.90' RT.) WITH CONCRETE APRON, (GRATE ELEV= 2786.27', INV ELEV= 2782.16', H= 4.1') INSTALL 18" X 13' RCP FROM "KR3" 30+90.00 (30.90' RT.) UIE= 2782.16' TO "KR3" 30+77.00 (23.45' RT.) LIE = 2782.03' CONNECT TO TYPE 1 MANHOLE (SEE SHEET DP114)
㉕	"KCE1" 18+72.55	INSTALL 24" RCP END SECTION (75.19' LT.) INSTALL 24" X 59' RCP FROM "KCE1" 18+72.55 (75.19' LT.) UIE= 2801.66' TO "KCE1" 18+69.61 (16.76' LT.) LIE = 2778.79' CONNECT TO TYPE 1 MANHOLE CLASS 300 RIPRAP APRON AT INLET (SEE SHEET DP115)
㉖	"KR4A" 4+89.57	INSTALL 24" RCP END SECTION (121.21' LT.) INSTALL 24" X 78' RCP FROM "KR4A" 4+89.57 (121.21' LT.) UIE= 2806.47' TO "KR4A" 5+00.00 (44.00' LT.) LIE = 2772.95' CONNECT TO TYPE 2B DROP INLET CLASS 300 RIPRAP APRON AT INLET (SEE SHEET DP110)
㉗	"KR4A" 5+00.00	CONSTRUCT TYPE 2B DROP INLET (44.00' LT.) WITH CONCRETE APRON, (GRATE ELEV= 2778.70', INV ELEV= 2772.85', H= 5.8') INSTALL 24" X 158' RCP FROM "KR4A" 5+00.00 (44.00' LT.) UIE= 2772.85' TO "KR4" 55+70.50 (46.00' RT.) LIE = 2770.56' CONNECT TO TYPE 2B DROP INLET (SEE SHEET DP110)
㉘	"KR4" 55+70.50	CONSTRUCT TYPE 2B DROP INLET (46.00' RT.) WITH CONCRETE APRON, (GRATE ELEV= 2775.57', INV ELEV= 2770.46', H= 5.1') INSTALL 30" X 141' RCP FROM "KR4" 55+70.50 (46.00' RT.) UIE= 2770.46' TO "KCW1" 23+62.69 (38.36' RT.) LIE = 2769.76' CONNECT TO TYPE 2 MANHOLE (SEE SHEET DP110)
㉙	"KCE1" 20+07.60	INSTALL 18" RCP END SECTION (69.25' LT.) INSTALL 18" X 58' RCP FROM "KCE1" 20+07.60 (69.25' LT.) UIE= 2795.22' TO "KCE1" 20+30.47 (16.50' LT.) LIE = 2775.99' CONNECT TO TYPE 1 MANHOLE CLASS 300 RIPRAP APRON AT INLET (SEE SHEET DP111)
㉚	"KCE1" 20+30.47	CONSTRUCT TYPE 1 MANHOLE, (16.50' LT.) (COVER ELEV=2780.89', INV ELEV= 2775.89', H=5.0') INSTALL 18" X 114' RCP FROM "KCE1" 20+30.47 (16.50' LT.) UIE= 2775.89' TO "KCW1" 25+12.48 (28.50' RT.) LIE = 2769.90' CONNECT TO TYPE 2 MANHOLE (SEE SHEET DP111)
㉛	"KCW1" 26+97.00	CONSTRUCT TYPE 2 DROP INLET (24.50' LT.) (GRATE ELEV= 2775.92', INV ELEV= 2770.58', H= 5.3') INSTALL 18" X 51' RCP FROM "KCW1" 26+97.00 (24.50' LT.) UIE= 2770.58' TO "KCW1" 27+00.00 (26.84' RT.) LIE = 2769.83' CONNECT TO TYPE 11 DROP INLET (SEE SHEET DP111)
㉜	"KR2" 21+78.92	INSTALL 24" RCP END SECTION (102.83' LT.) INSTALL 24" X 57' RCP FROM "KR2" 21+78.92 (102.83' LT.) UIE= 2789.86' TO "KR2" 21+85.12 (46.00' LT.) LIE = 2767.75' CONNECT TO TYPE 2B DROP INLET CLASS 300 RIPRAP APRON AT INLET (SEE SHEET DP112)

90% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D106B.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	D106B

PRELIMINARY
SUBJECT TO REVISION
1/12/2017

(33) "KR2" 21+85.12
CONSTRUCT TYPE 2B DROP INLET (46.00' LT.) WITH CONCRETE APRON,
(GRATE ELEV= 2772.57', INV ELEV= 2767.65', H= 4.9')
INSTALL 24" X 98' RCP FROM "KR2" 21+85.12 (46.00' LT.) UIE= 2767.65'
TO "KCE1" 23+31.19 (49.98' LT.) LIE = 2766.97'
CONNECT TO TYPE 2B DROP INLET
(SEE SHEET DP112)

(34) "KCE1" 23+31.19
CONSTRUCT TYPE 2B DROP INLET (49.98' LT.) WITH CONCRETE APRON,
(GRATE ELEV= 2776.53', INV ELEV= 2766.97', H= 9.6')
INSTALL 24" X 73' RCP FROM "KCE1" 23+31.19 (49.98' LT.) UIE= 2766.97'
TO "KCE1" 23+30.00 (22.50' RT.) LIE = 2766.60'
CONNECT TO TYPE 3 DROP INLET
(SEE SHEET DP112)

(35) "KCE1" 23+30.00
CONSTRUCT TYPE 3 DROP INLET (22.50' RT.)
(GRATE ELEV= 2775.34', INV ELEV= 2766.50', H= 8.8')
INSTALL 30" X 58' RCP FROM "KCE1" 23+30.00 (22.50' RT.) UIE= 2766.50'
TO "KCW1" 27+76.00 (18.98' RT.) LIE = 2766.05'
CONNECT TO TYPE 11 DROP INLET
(SEE SHEET DP112)

(36) "KR2A" 5+08.52
CONSTRUCT TYPE 2B DROP INLET (52.46' RT.) WITH CONCRETE APRON,
(GRATE ELEV= 2772.96', INV ELEV= 2768.46', H= 4.5')
INSTALL 18" X 115' RCP FROM "KR2A" 5+08.52 (52.46' RT.) UIE= 2768.46'
TO "KCE1" 23+31.19 (49.98' LT.) LIE = 2767.07'
CONNECT TO TYPE 2B DROP INLET
(SEE SHEET DP112)

(37) "KCW1" 29+15.00
CONSTRUCT TYPE 3 DROP INLET (15.25' RT.)
(GRATE ELEV= 2775.18', INV ELEV= 2769.87', H= 5.3')
INSTALL 18" X 63' RCP FROM "KCW1" 29+15.00 (15.25' RT.) UIE= 2769.87'
TO "KCE1" 25+15.62 (28.02' RT.) LIE = 2766.46'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DP113)

(38) "KR1" 25+61.80
CONSTRUCT TYPE 2B DROP INLET (45.63' LT.) WITH CONCRETE APRON,
(GRATE ELEV= 2769.81', INV ELEV= 2766.08', H= 3.7')
INSTALL 18" X 137' RCP FROM "KR1" 25+61.80 (45.63' LT.) UIE= 2766.08'
TO "KR1A" 2+15.77 (59.84' RT.) LIE = 2762.39'
CONNECT TO TYPE 2B DROP INLET
(SEE SHEET DP113)

(39) "KR1A" 2+15.77
CONSTRUCT TYPE 2B DROP INLET (59.84' RT.) WITH CONCRETE APRON,
(GRATE ELEV= 2771.26', INV ELEV= 2765.29', H= 6.0')
INSTALL 24" X 10' RCP FROM "KR1A" 2+15.77 (59.84' RT.) UIE= 2765.29'
TO "KR1A" 2+29.06 (62.59' RT.) LIE = 2765.24'
CONNECT TO TYPE 2B DROP INLET
(SEE SHEET DP113)

(40) "KR1A" 2+29.06
CONSTRUCT TYPE 2B DROP INLET (62.59' RT.) WITH CONCRETE APRON,
(GRATE ELEV= 2771.33', INV ELEV= 2765.14', H= 6.4')
INSTALL 24" X 96' RCP FROM "KR1A" 2+29.06 (62.59' RT.) UIE= 2765.14'
TO "KCE1" 25+15.62 (28.02' RT.) LIE = 2764.66'
CONNECT TO TYPE 2 MANHOLE
(SEE SHEET DP113)

(41) "KCW1" 31+30.25
INSTALL 24" RCP END SECTION (95.48' LT.)
INSTALL 24" X 80' RCP FROM "KCW1" 31+.30.25 (95.48' LT.) UIE= 2773.49'
TO "KCW1" 31+70.20 (28.80' LT.) LIE = 2765.88'
CONNECT TO TYPE 1 MANHOLE
CLASS 300 RIPRAP APRON AT INLET
(SEE SHEET DP113)

(42) "KCW1" 31+70.20
CONSTRUCT TYPE 1 MANHOLE, (28.80' LT.)
(COVER ELEV=2771.78', INV ELEV=2765.78', H=6.0')
INSTALL 24" X 110' RCP FROM "KCW1" 31+70.20 (28.80' LT.) UIE= 2765.78'
TO "KCE1" 27+87.25 (7.20' RT.) LIE = 2764.31'
CONNECT TO TYPE 4 MANHOLE
(SEE SHEET DP113)

(43) "KR2A" 3+27.84 TO "KCW1" 31+47.94
CONSTRUCT CLASS 300 RIPRAP LINED BERM 6
(SEE SHEET DP119)

90% SUBMITTAL PRELIMINARY NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_D107.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	D107

PRELIMINARY

SUBJECT TO REVISION
1/12/2017

① "KCE1" 27+87.25
CONSTRUCT TYPE 4 MANHOLE, (7.20' RT.)
(COVER ELEV=2769.25', INV ELEV=2763.64', H=5.6')
INSTALL 60" X 38" x 164.8 HERCP FROM "KCE1" 27+87.25 (7.20' RT.) UIE= 2763.64'
TO "KCE1" 29+53.04 (6.00' RT.) LIE = 2763.14'
CONNECT TO TYPE 4 MANHOLE
(SEE SHEET DP102)

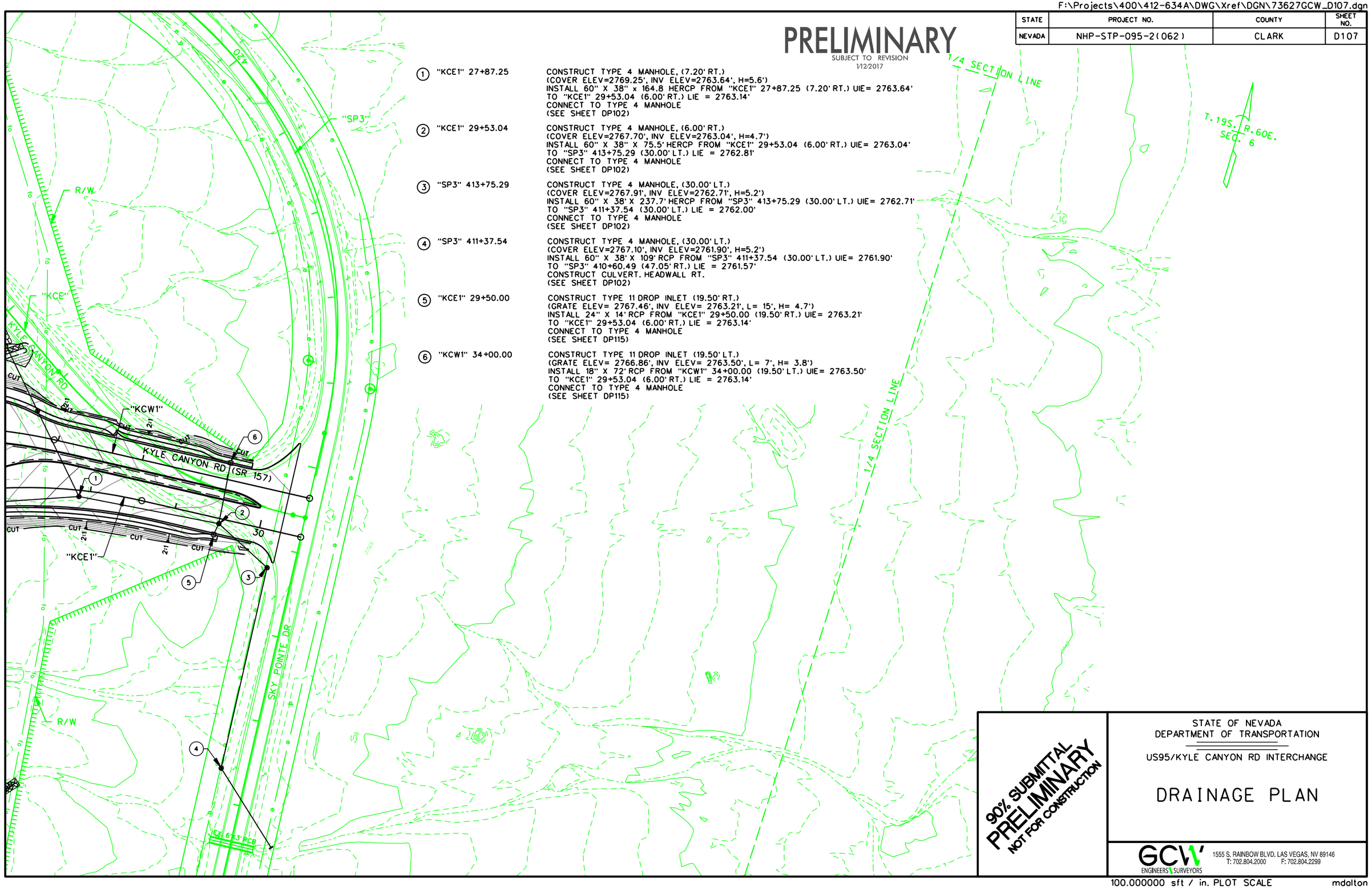
② "KCE1" 29+53.04
CONSTRUCT TYPE 4 MANHOLE, (6.00' RT.)
(COVER ELEV=2767.70', INV ELEV=2763.04', H=4.7')
INSTALL 60" X 38" X 75.5' HERCP FROM "KCE1" 29+53.04 (6.00' RT.) UIE= 2763.04'
TO "SP3" 413+75.29 (30.00' LT.) LIE = 2762.81'
CONNECT TO TYPE 4 MANHOLE
(SEE SHEET DP102)

③ "SP3" 413+75.29
CONSTRUCT TYPE 4 MANHOLE, (30.00' LT.)
(COVER ELEV=2767.91', INV ELEV=2762.71', H=5.2')
INSTALL 60" X 38' X 237.7' HERCP FROM "SP3" 413+75.29 (30.00' LT.) UIE= 2762.71'
TO "SP3" 411+37.54 (30.00' LT.) LIE = 2762.00'
CONNECT TO TYPE 4 MANHOLE
(SEE SHEET DP102)

④ "SP3" 411+37.54
CONSTRUCT TYPE 4 MANHOLE, (30.00' LT.)
(COVER ELEV=2767.10', INV ELEV=2761.90', H=5.2')
INSTALL 60" X 38' X 109' RCP FROM "SP3" 411+37.54 (30.00' LT.) UIE= 2761.90'
TO "SP3" 410+60.49 (47.05' RT.) LIE = 2761.57'
CONSTRUCT CULVERT. HEADWALL RT.
(SEE SHEET DP102)

⑤ "KCE1" 29+50.00
CONSTRUCT TYPE 11 DROP INLET (19.50' RT.)
(GRATE ELEV= 2767.46', INV ELEV= 2763.21', L= 15', H= 4.7')
INSTALL 24" X 14' RCP FROM "KCE1" 29+50.00 (19.50' RT.) UIE= 2763.21'
TO "KCE1" 29+53.04 (6.00' RT.) LIE = 2763.14'
CONNECT TO TYPE 4 MANHOLE
(SEE SHEET DP115)

⑥ "KCW1" 34+00.00
CONSTRUCT TYPE 11 DROP INLET (19.50' LT.)
(GRATE ELEV= 2766.86', INV ELEV= 2763.50', L= 7', H= 3.8')
INSTALL 18" X 72' RCP FROM "KCW1" 34+00.00 (19.50' LT.) UIE= 2763.50'
TO "KCE1" 29+53.04 (6.00' RT.) LIE = 2763.14'
CONNECT TO TYPE 4 MANHOLE
(SEE SHEET DP115)



90% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

DRAINAGE PLAN

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP101.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP101

NOTE: DEPICTED UTILITY LOCATIONS ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.

PRELIMINARY
SUBJECT TO REVISION
1/12/2017

D105 1

"KCE1" 10+24.20, 89.03' RT.
30" RCP END SECTION

D105 2

"KCE1" 10+48.77, 40.50' RT.
TYPE 1 MANHOLE
COVER ELEV = 2816.02'

RIPRAP
CLASS 300

UIE= 2825.35'

30" x 58.9' RCP
S= 29.07%
50

LIE= 2808.23'

UIE= 2808.13'

30" x 211.9' RCP
CLASS III
S= 5.11%
50

D105 3

"KCE1" 12+53.24, 22.49' RT.
TYPE 1 MANHOLE
COVER ELEV = 2803.71'

D106 2

"KCE1" 13+41.70, 28.49' RT.
TYPE 1 MANHOLE
COVER ELEV = 2798.99'

FINISHED GRADE

HGL

LIE= 2797.31'
UIE= 2797.21'

30" x 94.8' RCP
CLASS III
S= 4.87%
Q_{50} = 27.4 CFS

LIE= 2792.59'
UIE= 2792.49'

30" x 217.5' RCP
CLASS III
S= 3.12%
Q_{50} = 29.4 CFS

LIE= 2785.70'
UIE= 2785.60'

30" x 128.0' RCP
CLASS III
S= 3.50%
Q_{50} = 31.5 CFS

D106 3

"KCE1" 15+44.81, 31.57' RT.
TYPE 1 MANHOLE
COVER ELEV = 2792.99'

EXISTING GROUND

D106 4

"KCW1" 21+39.53, 53.25' RT.
TYPE 1 MANHOLE
COVER ELEV = 2788.02'

LIE= 2781.12'
UIE= 2781.02'

30" x 155.4' RCP
CLASS III
S= 3.60%
Q_{50} = 34.1 CFS

D106 5

"KCW1" 22+78.00, 15.25' RT.
TYPE 3 DROP INLET
COVER ELEV = 2782.47'

"KR4"

LIE= 2775.41'
UIE= 2775.31'

30" x 85.2' RCP
CLASS III
S= 6.98%
Q_{50} = 34.8 CFS

LIE= 2769.36'
UIE= 2769.26'

42" x 150.1' RCP
CLASS III
S= 0.51%
Q_{50} = 58 CFS

D106 6

"KCW1" 23+62.69, 38.36' RT.
TYPE 2 MANHOLE
COVER ELEV = 2780.65'

D106 7

"XS1E" "XP" "XN1E"

FINISHED GRADE

"KCW1" 25+12.48, 28.50' RT.
TYPE 2 MANHOLE
COVER ELEV = 2777.88'

Existing Fiber Optic

LIE= 2768.50'
UIE= 2768.40'

42" x 187.1' RCP
CLASS III
S= 0.52%
Q_{50} = 59.4 CFS

D106 8

"KCW1" 27+00.00, 26.84' RT.
TYPE 11 DROP INLET
COVER ELEV = 2774.46'

"KR1"

LIE= 2767.43'
UIE= 2767.33'

42" x 81.2' RCP
CLASS III
S= 2.19%
Q_{100} = 61 CFS

SEE SHEET DP102

MAINLINE DRAINAGE – "KCE1" 10+24.20 TO "SP3" 410+60.49

2835 2830 2825 2820 2815 2810 2805 2800 2795 2790 2785 2780 2775 2770 2765 2760 2755 2750

100.000000 sft / in. PLOT SCALE

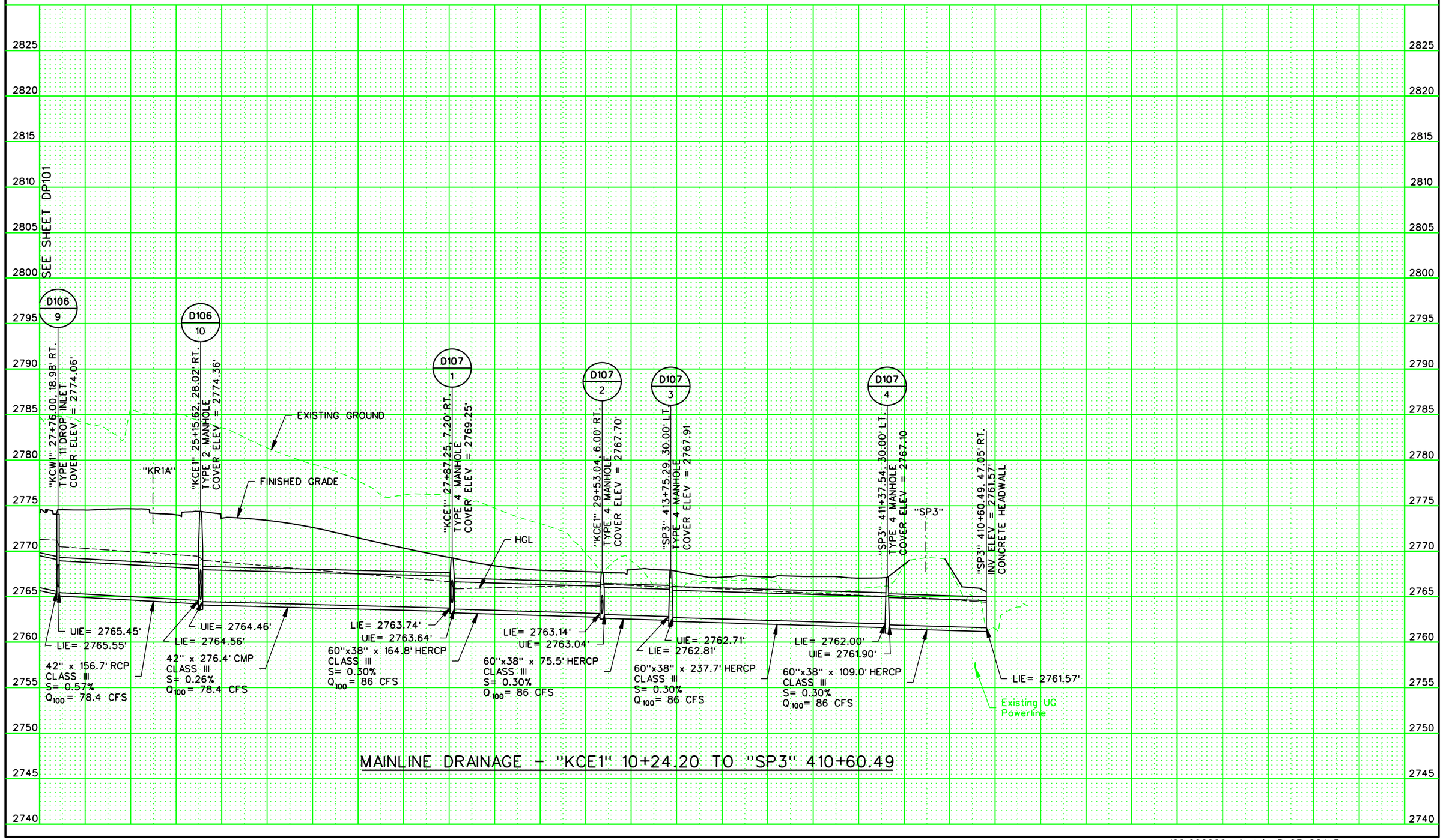
mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP102.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP102

NOTE: DEPICTED UTILITY LOCATIONS ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.

PRELIMINARY
SUBJECT TO REVISION
1/12/2017



MAINLINE DRAINAGE - "KCE1" 10+24.20 TO "SP3" 410+60.49

100.000000 sft / in. PLOT SCALE

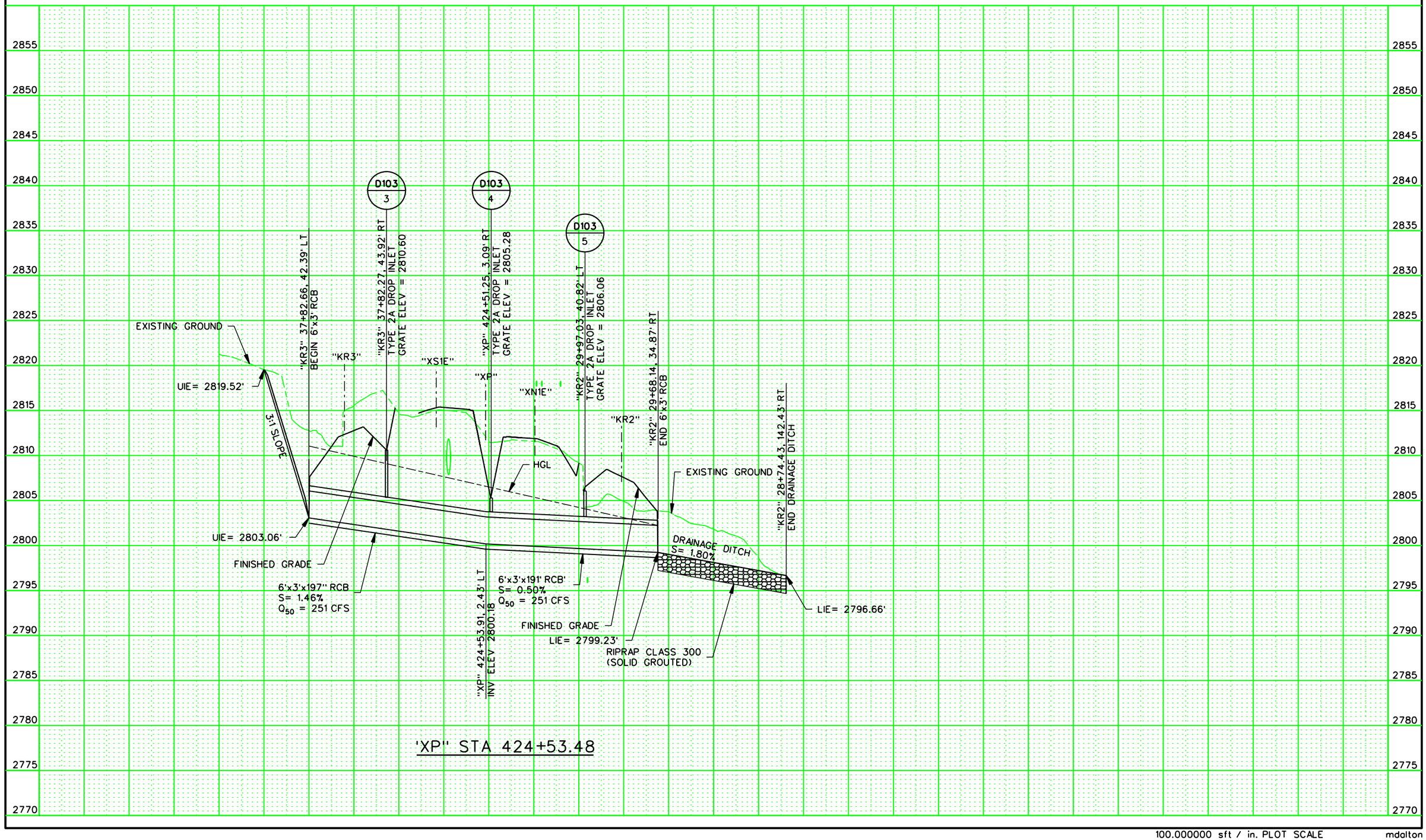
mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP103.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP103

NOTE: DEPICTED UTILITY LOCATIONS ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.

PRELIMINARY
SUBJECT TO REVISION
1/12/2017



'XP' STA 424+53.48

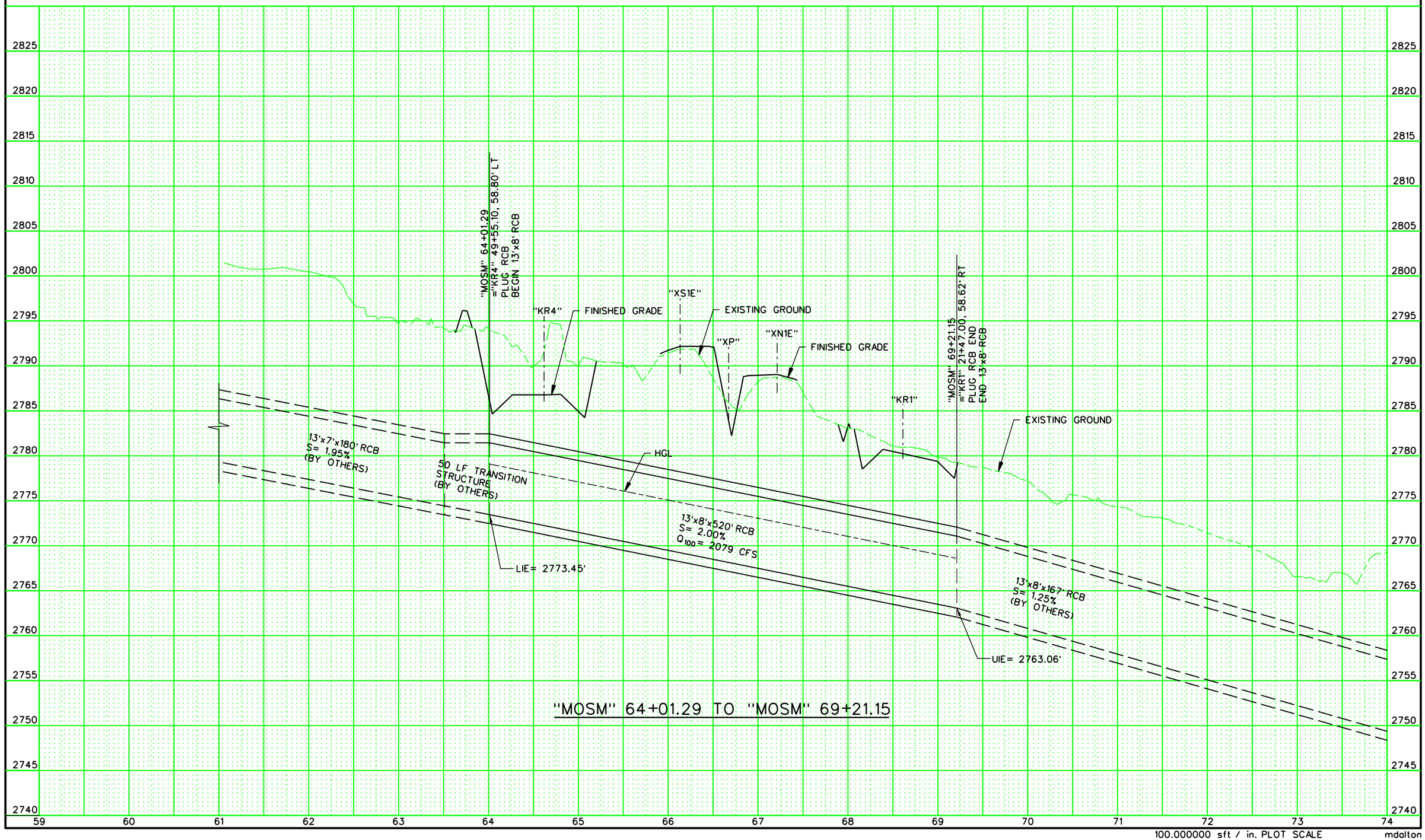
100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP104.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP104

PRELIMINARY
SUBJECT TO REVISION
1/12/2017



"MOSM" 64+01.29 TO "MOSM" 69+21.15

100.000000 sft / in. PLOT SCALE

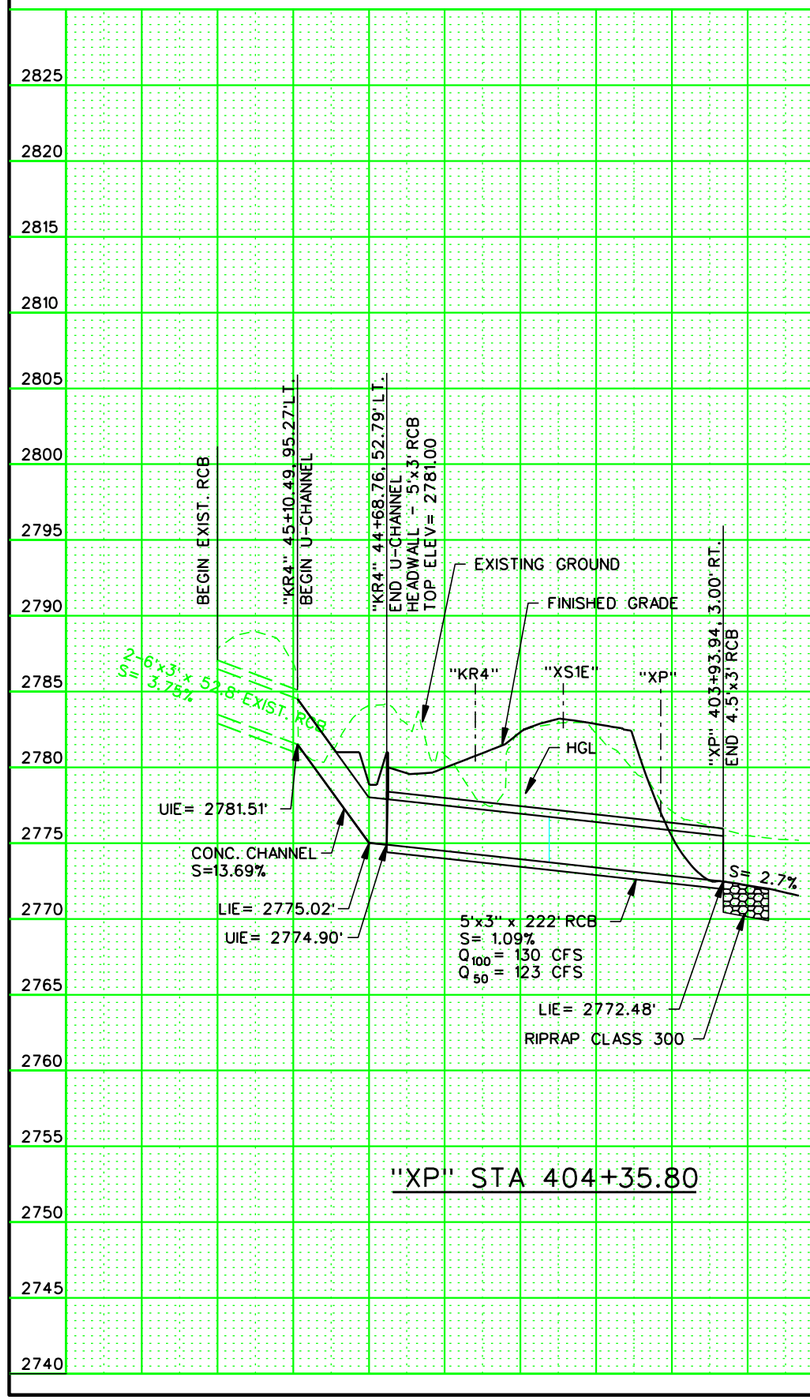
mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP105.dgn

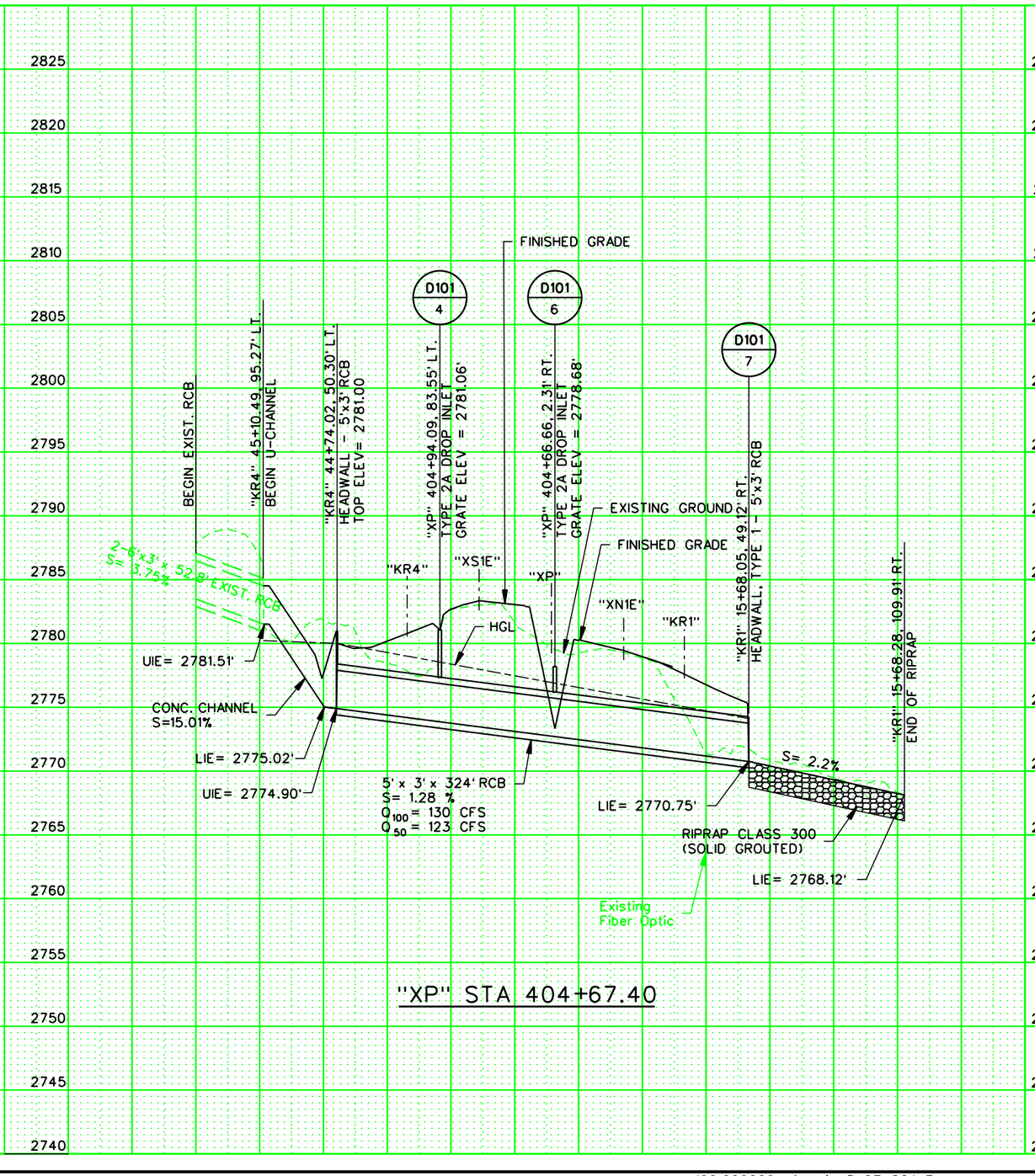
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP105

NOTE: DEPICTED UTILITY LOCATIONS ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.

PRELIMINARY
SUBJECT TO REVISION
1/13/2017



"XP" STA 404+35.80



"XP" STA 404+67.40

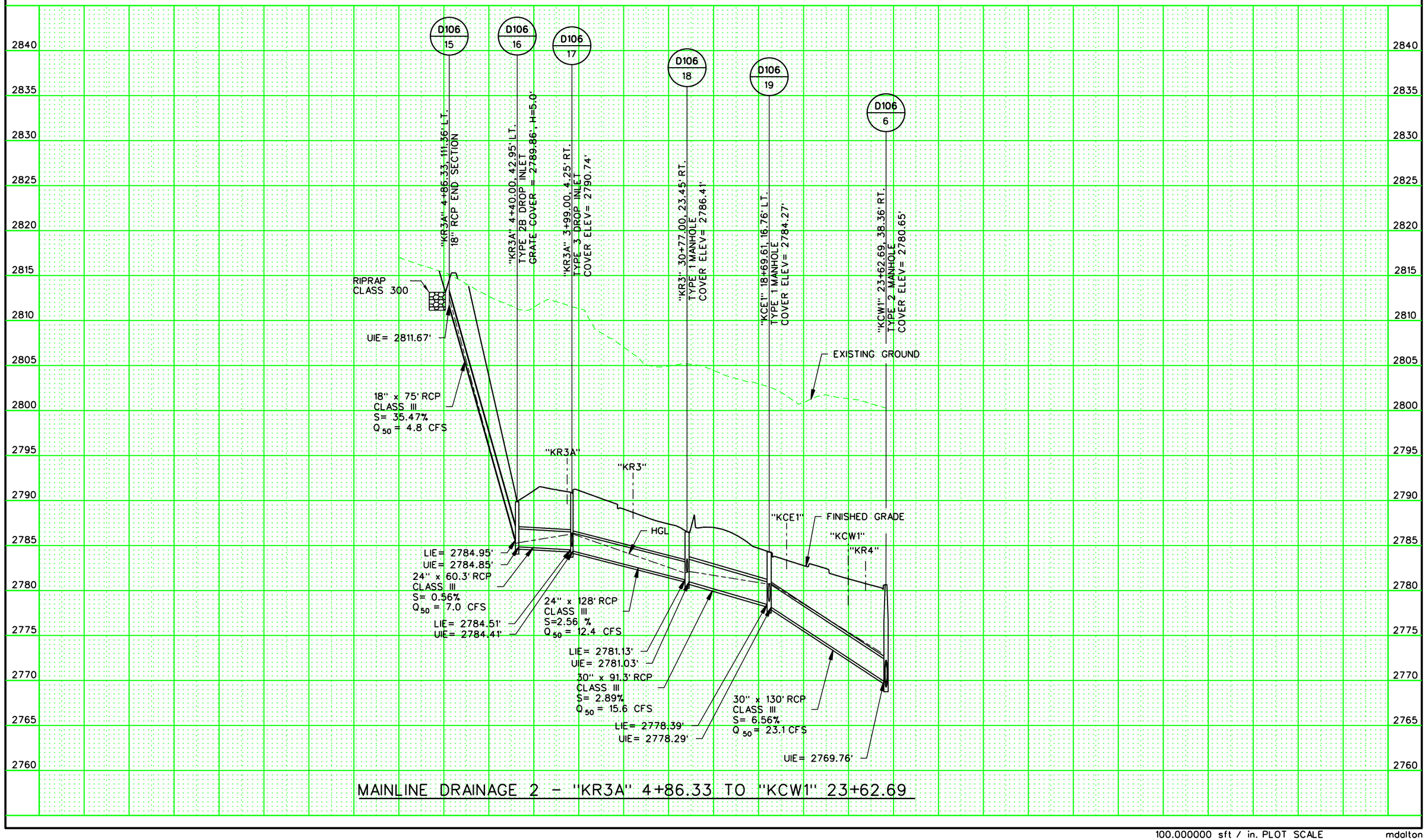
100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP106.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP106

PRELIMINARY
SUBJECT TO REVISION
1/12/2017



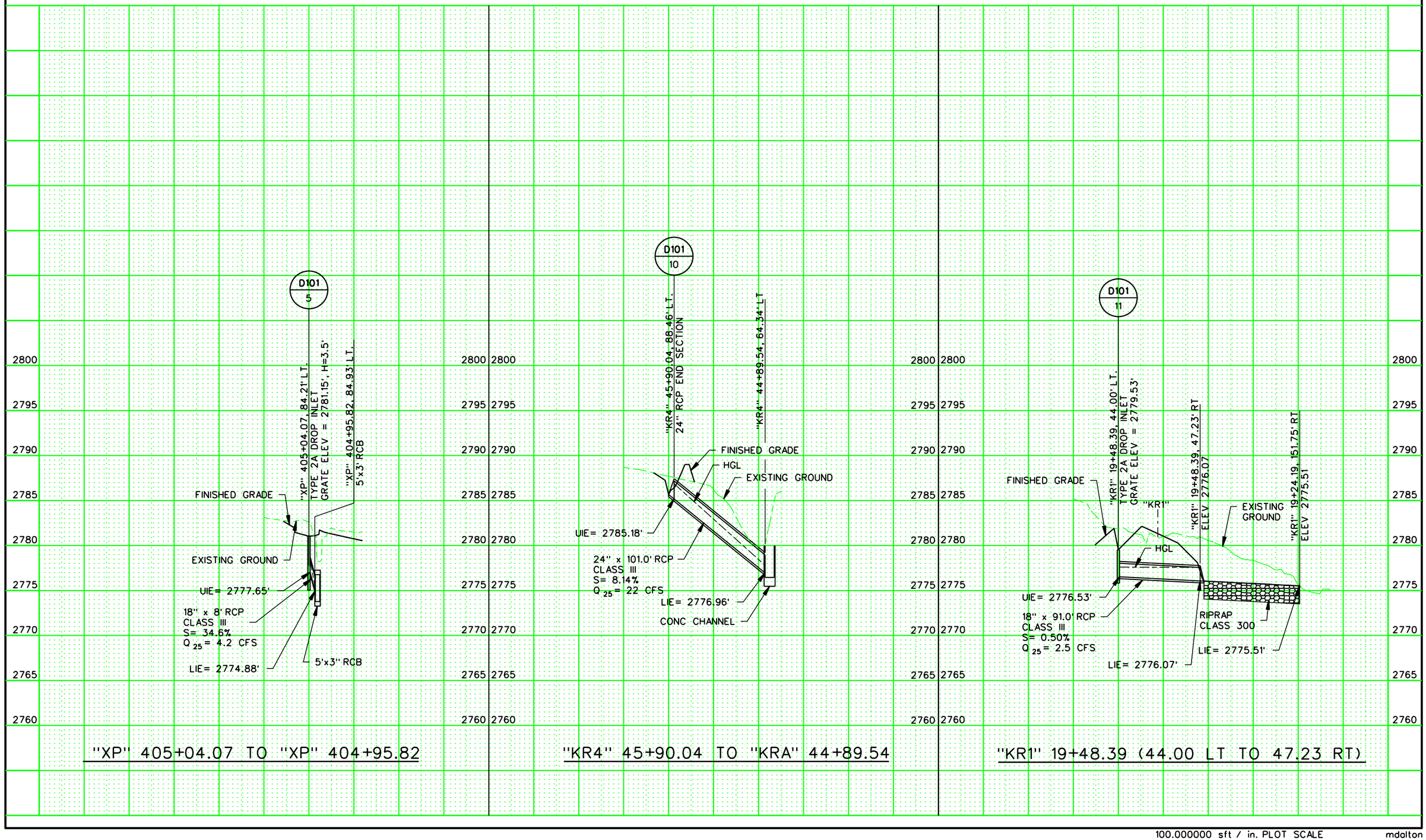
MAINLINE DRAINAGE 2 - "KR3A" 4+86.33 TO "KCW1" 23+62.69

100.000000 sft / in. PLOT SCALE mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP107.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP107

PRELIMINARY
SUBJECT TO REVISION
1/12/2017



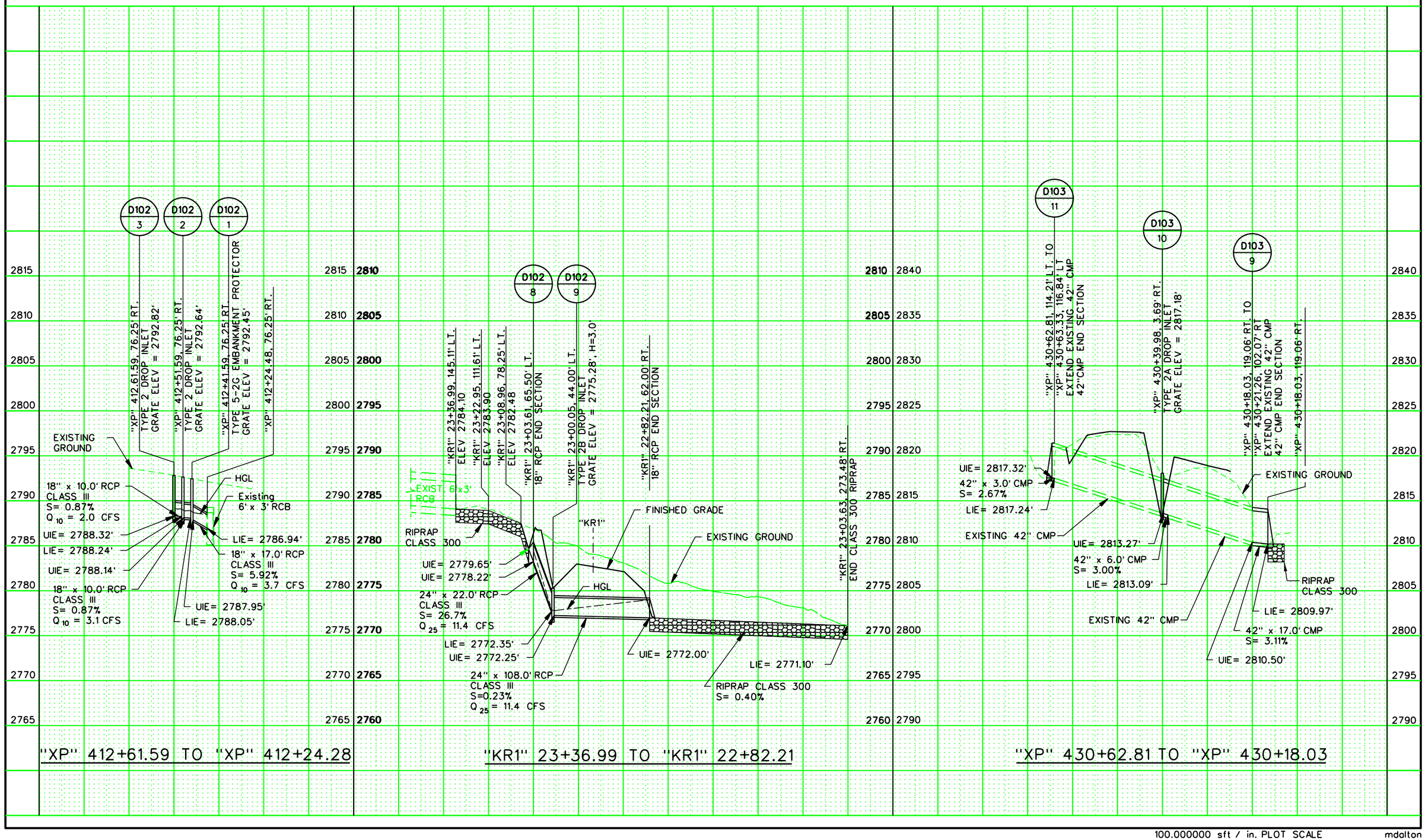
100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP108.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP108

PRELIMINARY
SUBJECT TO REVISION
1/12/2017



"XP" 412+61.59 TO "XP" 412+24.28

"KR1" 23+36.99 TO "KR1" 22+82.21

"XP" 430+62.81 TO "XP" 430+18.03

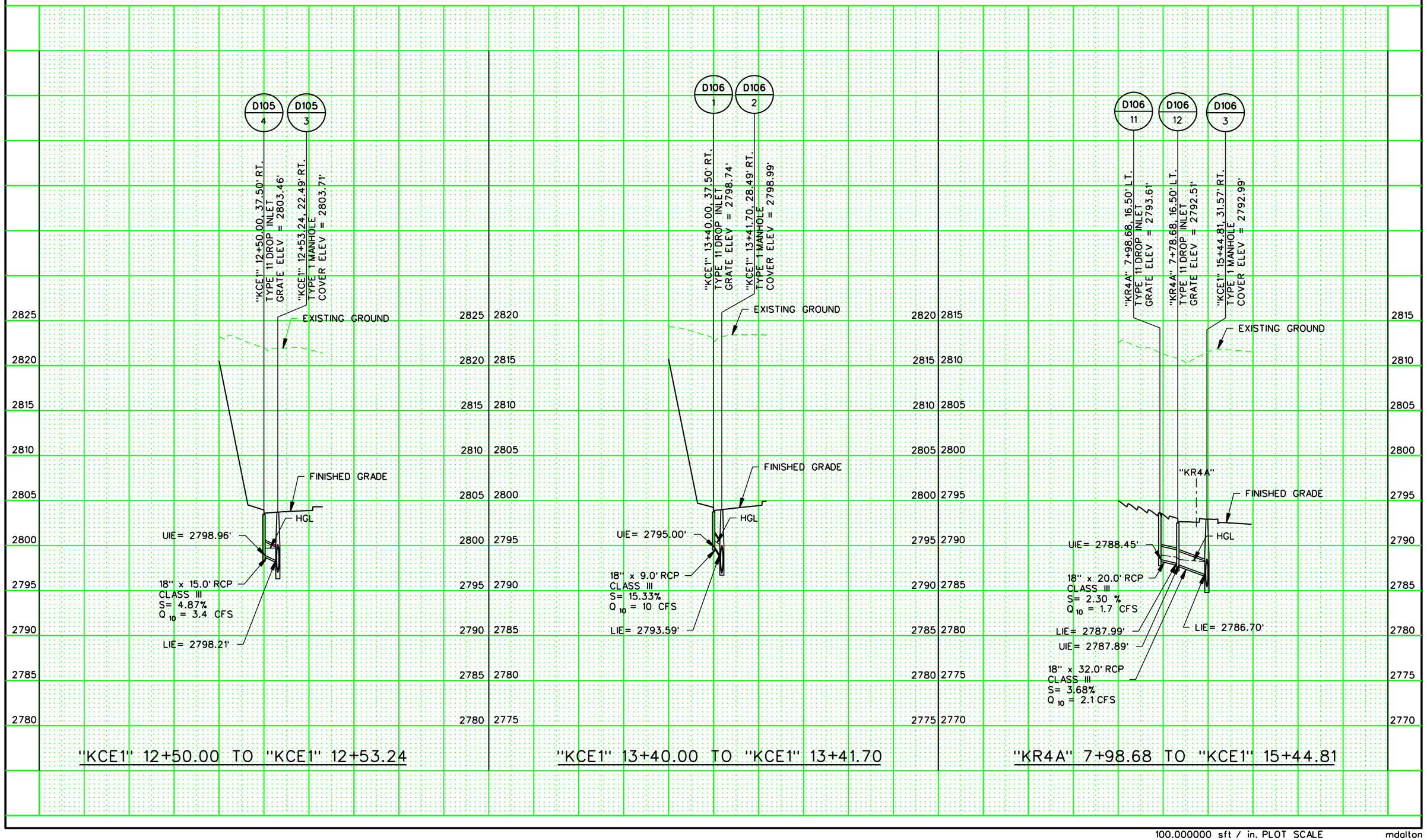
100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP109.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP109

PRELIMINARY
SUBJECT TO REVISION
1/12/2017



100.000000 sft / in. PLOT SCALE mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP110.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP110

PRELIMINARY
SUBJECT TO REVISION
1/13/2017

D106 13 — "KCE1" 15+91.52, 23.67' LT.
TYPE 2B DROP INLET
GRATE ELEV = 2792.78'

D106 14 — "KCE1" 16+40.00, 21.25' RT.
TYPE 3 DROP INLET
GRATE ELEV = 2789.98'

D106 4 — "KCW1" 21+39.53, 53.25' RT.
TYPE 1 MANHOLE
COVER ELEV = 2788.31'

EXISTING GROUND

"KCE1"

FINISHED GRADE

HGL

UIE = 2787.28'

24" x 66.0' RCP
CLASS III
S = 3.33%
Q_{10} = 2.3 CFS

LIE = 2785.10'
UIE = 2785.00'

24" x 56.0' RCP
CLASS III
S = 6.07%
Q_{10} = 2.6 CFS

LIE = 2781.62'

"KCE1" 15+91.52 TO "KCW1" 21+39.53

D106 26 — "KR4A" 4+89.57, 121.21' LT.
24" RCP END SECTION

D106 27 — "KR4A" 5+00.00, 44.00' LT.
TYPE 2B DROP INLET
GRATE ELEV = 2778.70'

D106 28 — "KR4" 55+70.50, 46.00' LT.
TYPE 2B DROP INLET
GRATE ELEV = 2775.57'

D106 6 — "KCW1" 23+62.69, 38.36' RT.
TYPE 2 MANHOLE
COVER ELEV = 2780.65'

EXISTING GROUND

RIPRAP CLASS 300

UIE = 2806.47'

"KR4A" "KR4"

FINISHED GRADE

24" x 78.0' RCP
CLASS III
S = 42.86
Q_{50} = 8.0 CFS

HGL

LIE = 2772.95'
UIE = 2772.85'

24" x 158.0' RCP
CLASS III
S = 1.45%
Q_{50} = 10.8 CFS

LIE = 2770.56'
UIE = 2770.46'

LIE = 2769.76'

30" x 141.0' RCP
CLASS III
S = 0.50%
Q_{50} = 18.1 CFS

"KR4A" 4+89.57 TO "KCW1" 23+62.69

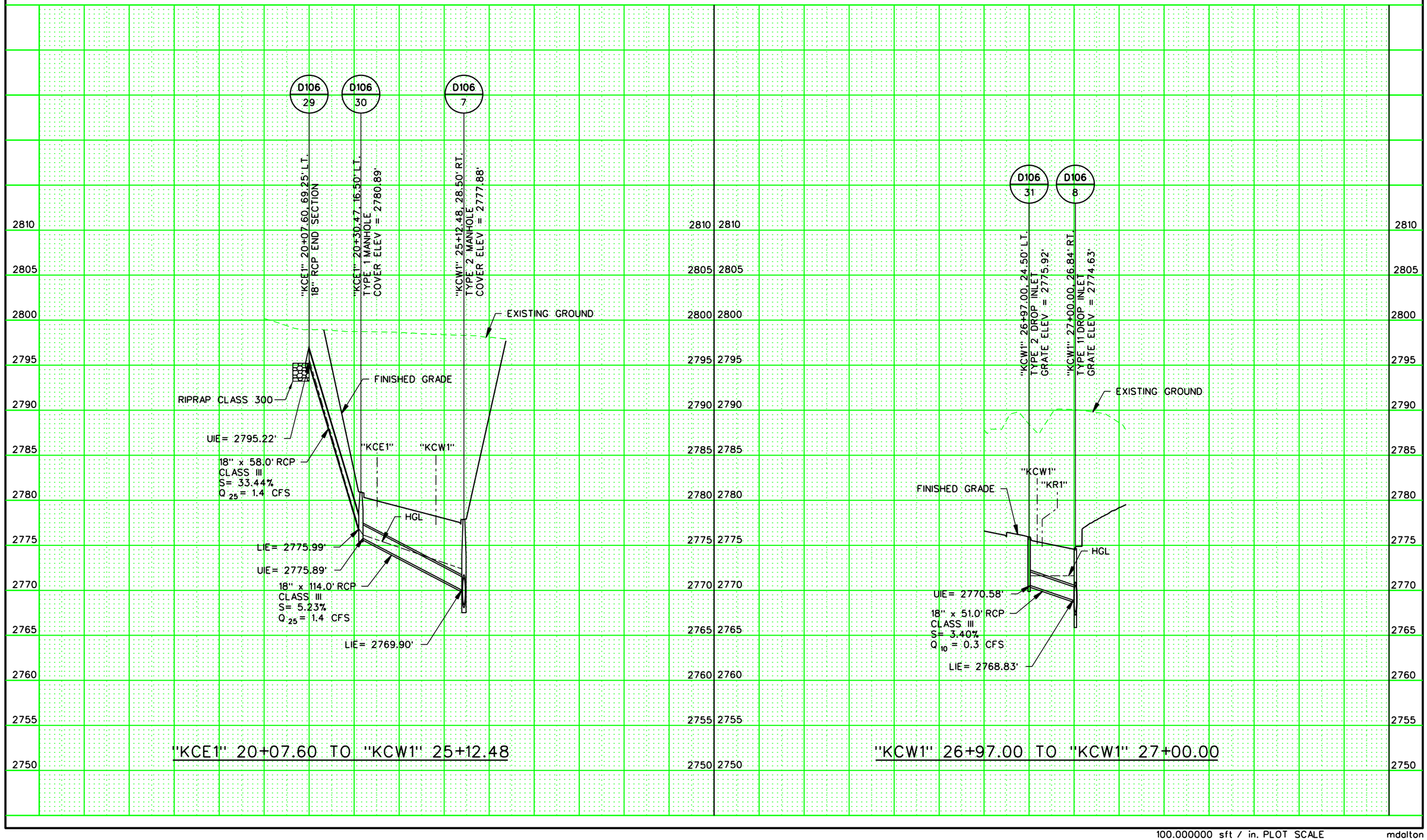
100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP111.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP111

PRELIMINARY
SUBJECT TO REVISION
1/12/2017



"KCE1" 20+07.60 TO "KCW1" 25+12.48

"KCW1" 26+97.00 TO "KCW1" 27+00.00

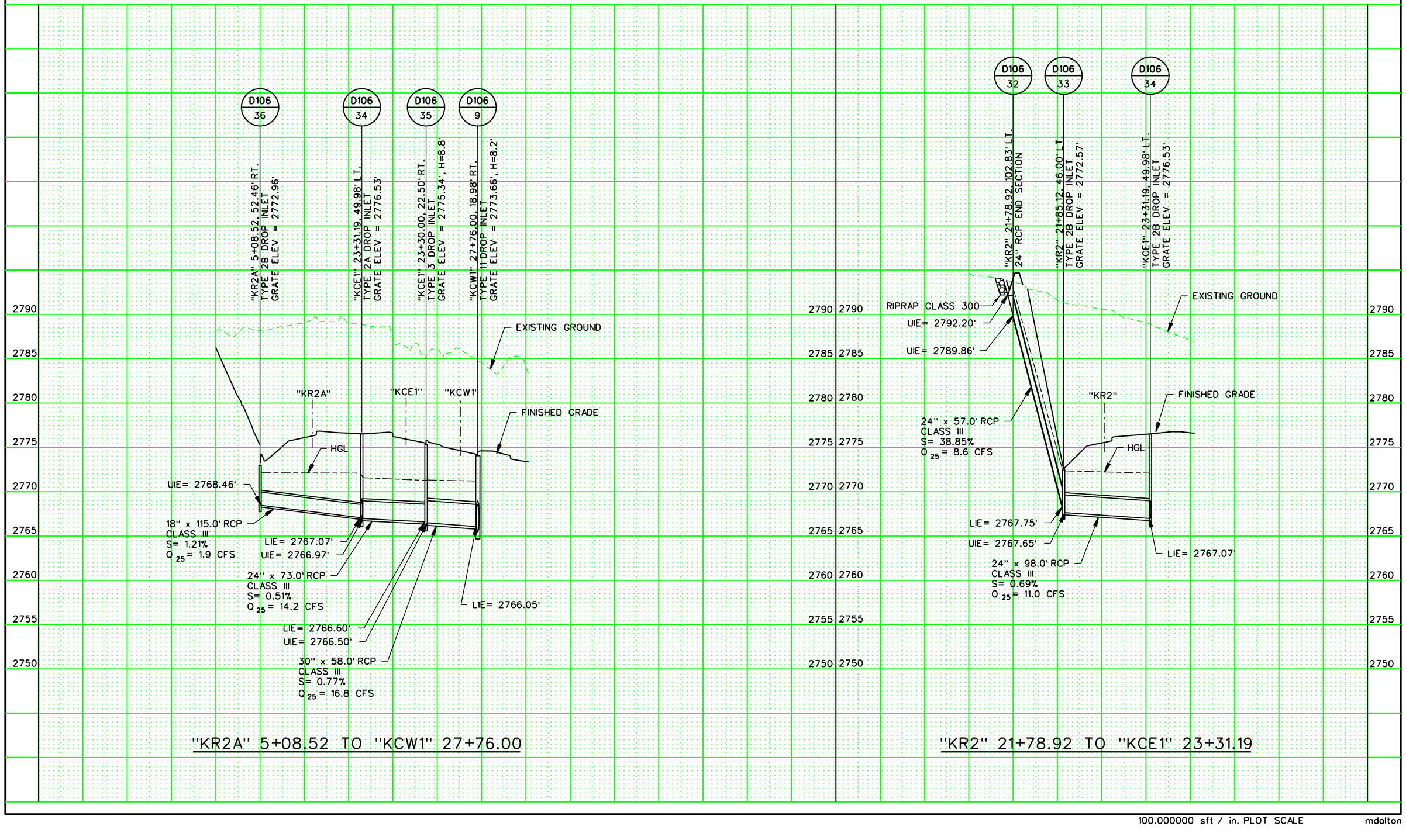
100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP112.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP112

PRELIMINARY
SUBJECT TO REVISION
1/12/2017



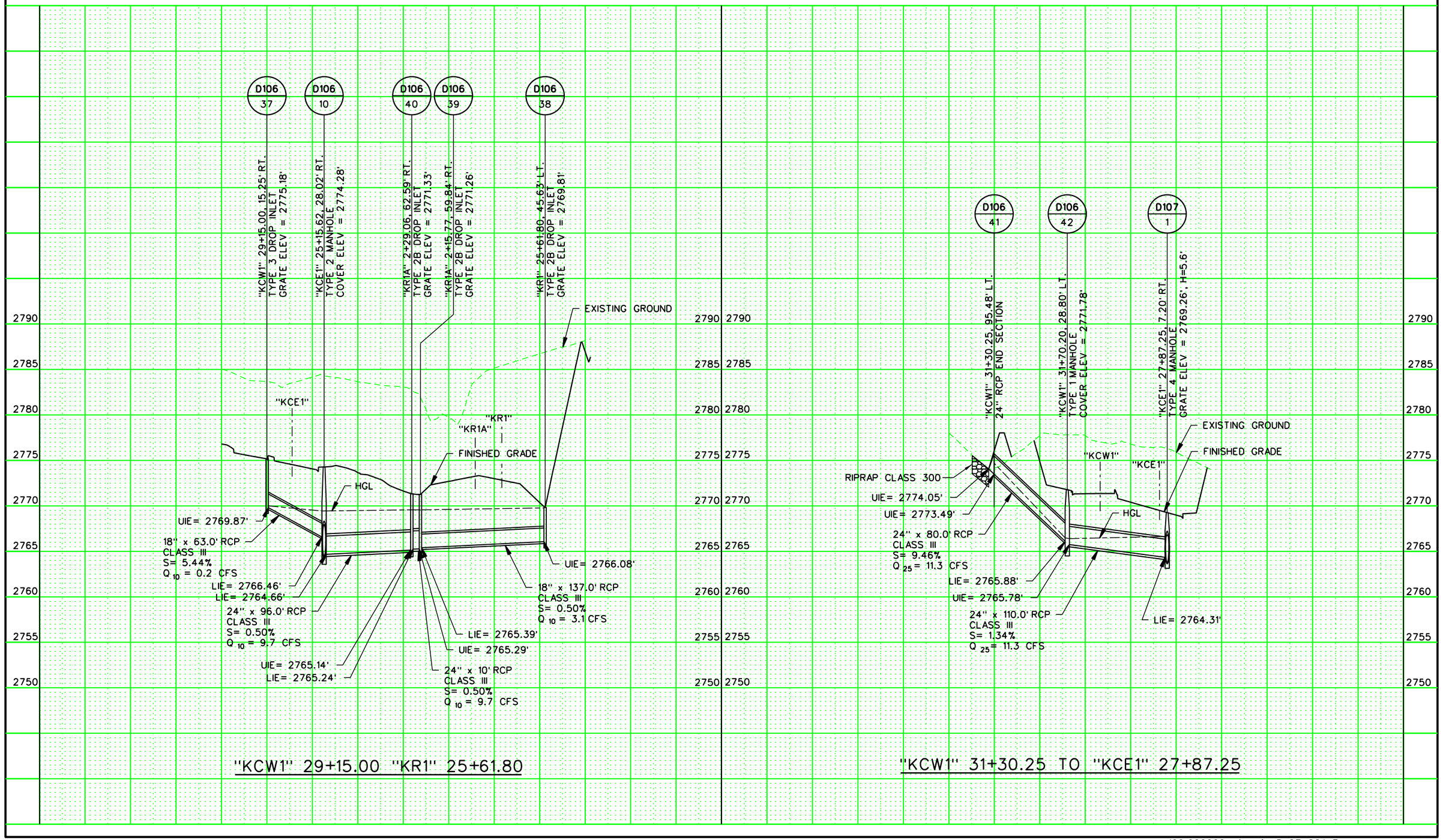
100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP113.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP113

PRELIMINARY
SUBJECT TO REVISION
1/12/2017



"KCW1" 29+15.00 "KR1" 25+61.80

"KCW1" 31+30.25 TO "KCE1" 27+87.25

100.000000 sft / in. PLOT SCALE

mdalton

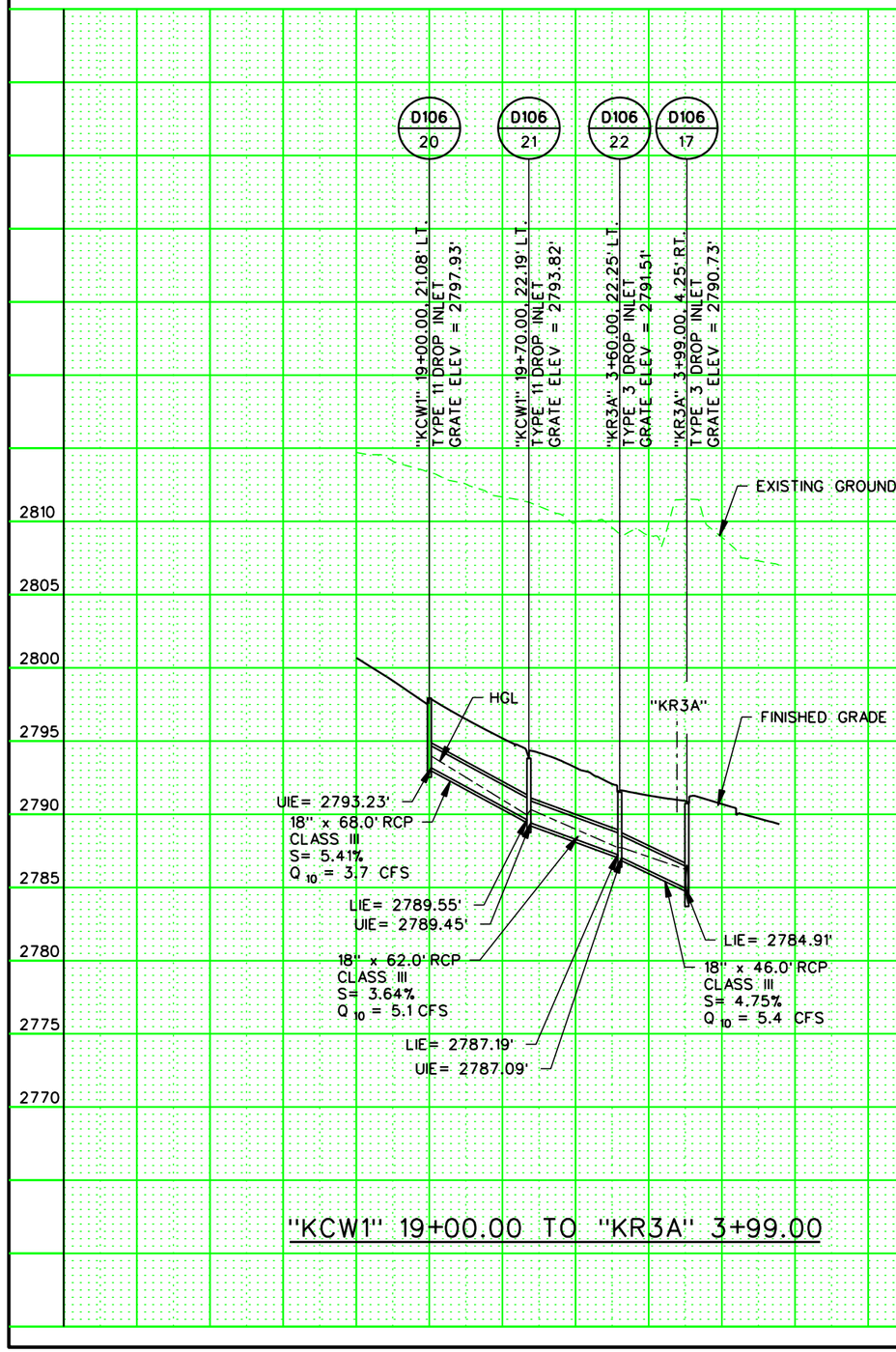
F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP114.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP114

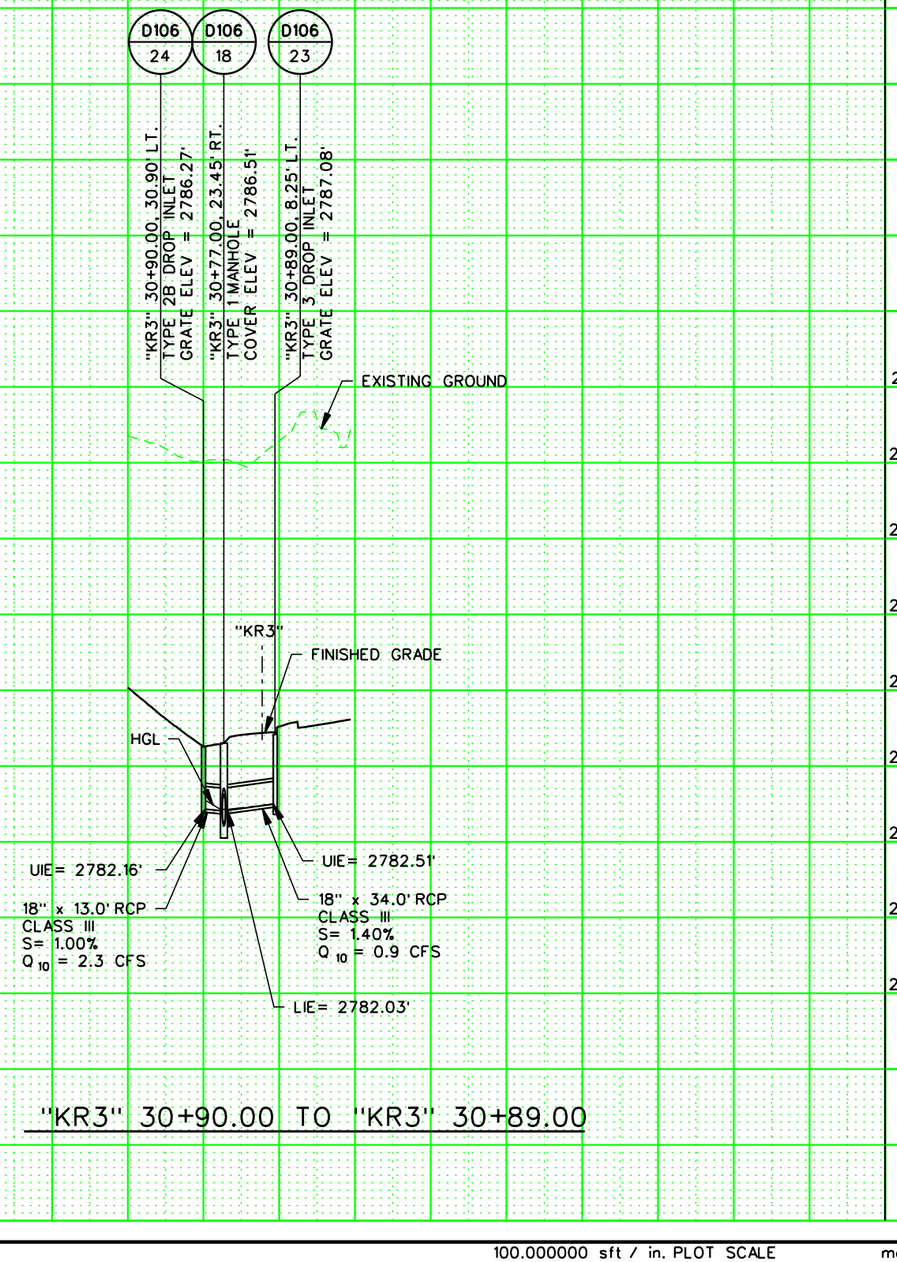
PRELIMINARY

SUBJECT TO REVISION

1/12/2017



"KCW1" 19+00.00 TO "KR3A" 3+99.00



"KR3" 30+90.00 TO "KR3" 30+89.00

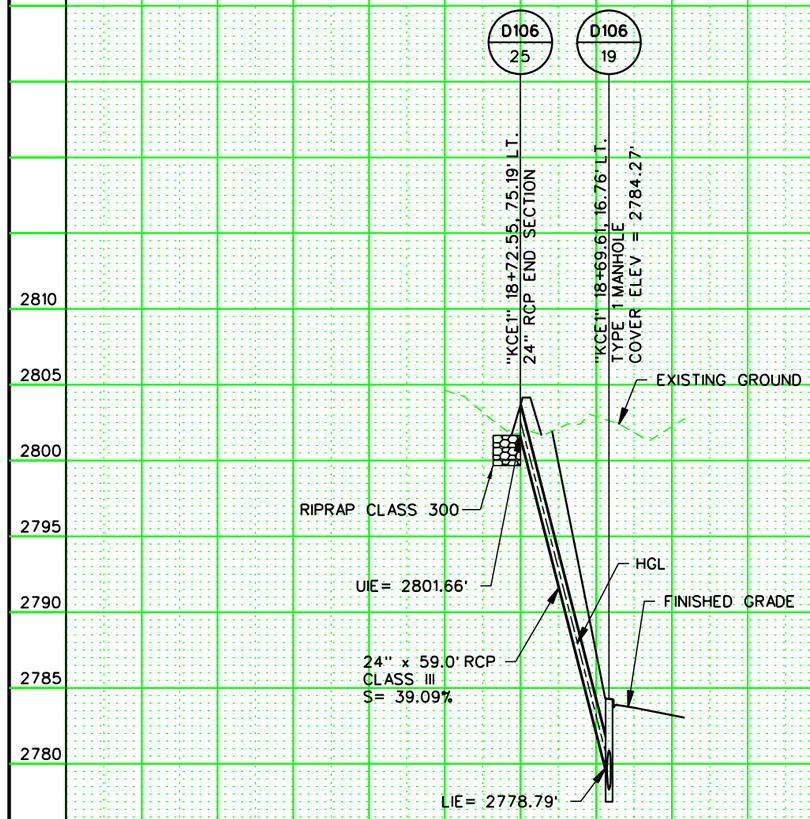
100.000000 sft / in. PLOT SCALE

mdalton

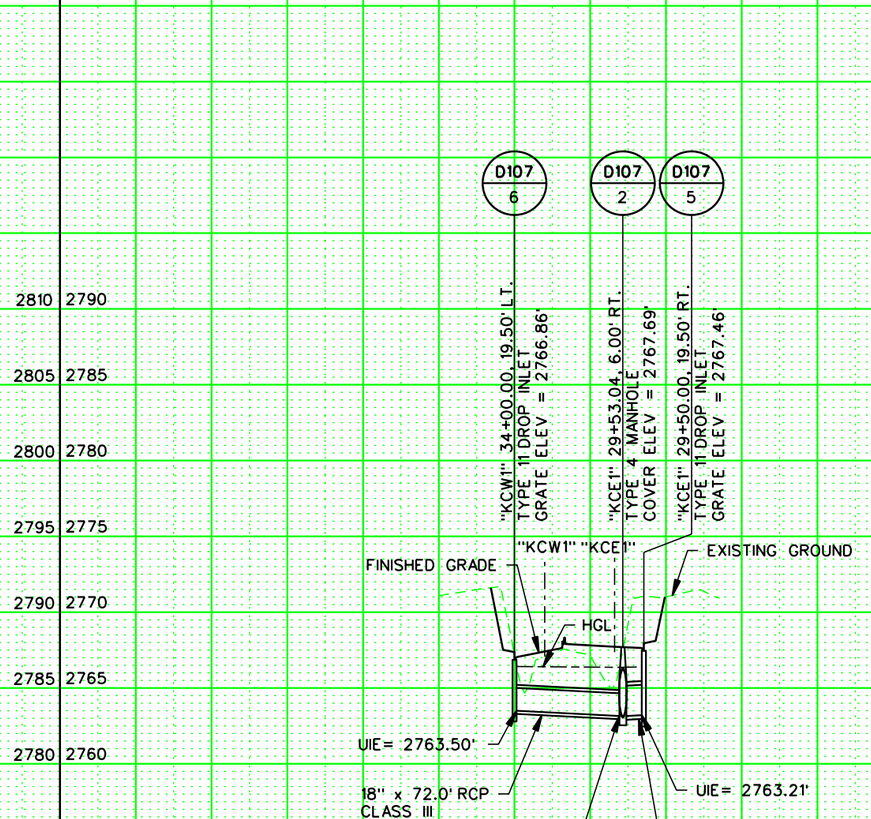
F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP115.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP115

PRELIMINARY
SUBJECT TO REVISION
1/12/2017



"KCE1" 18+72.55 TO "KCE1" 18+69.61



"KCW1" 34+00.00 TO "KCE1" 29+50.00

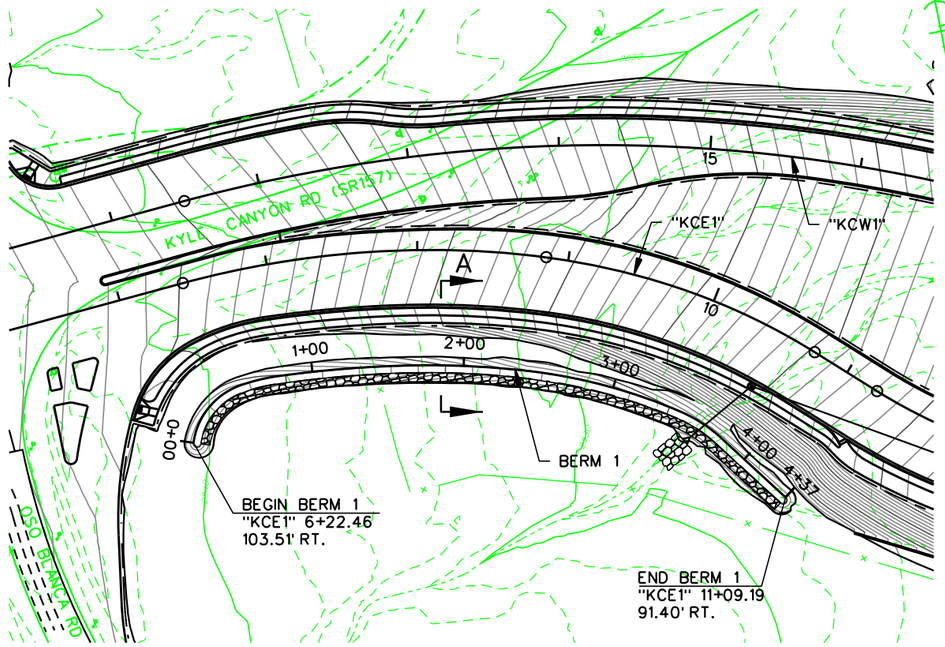
100.000000 sft / in. PLOT SCALE

mdalton

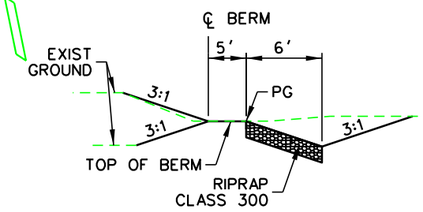
F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP116_BERM 1 & 2.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP116

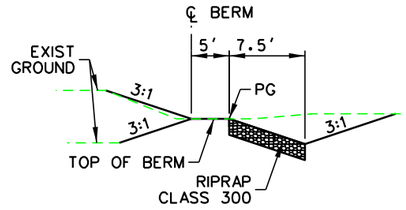
PRELIMINARY
SUBJECT TO REVISION
1/12/2017



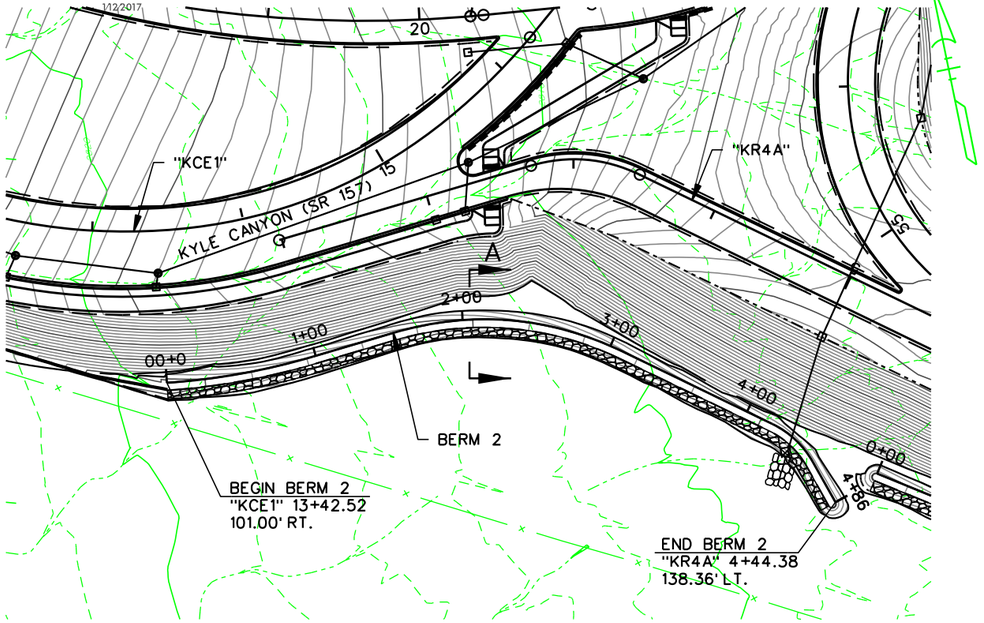
PLAN - BERM 1



SECTION - A

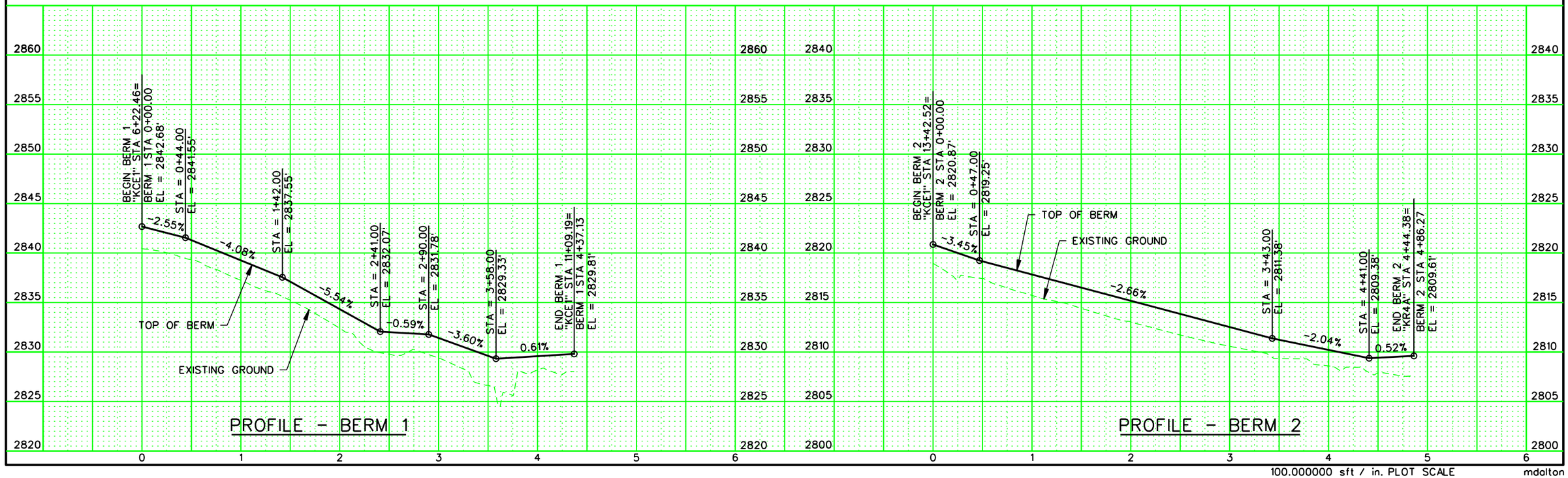


SECTION - B



PLAN - BERM 2

NOTE :
FOR GEOMETRIC ALIGNMENT SEE SHT LC107



100.000000 sft / in. PLOT SCALE

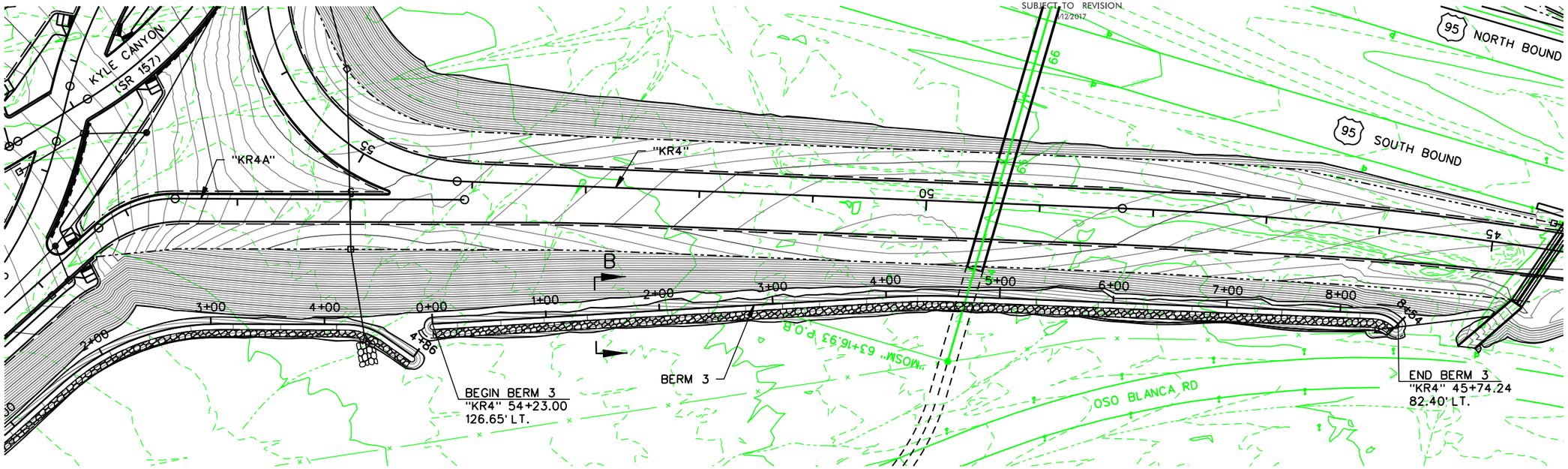
mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP117_BERM_3.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP117

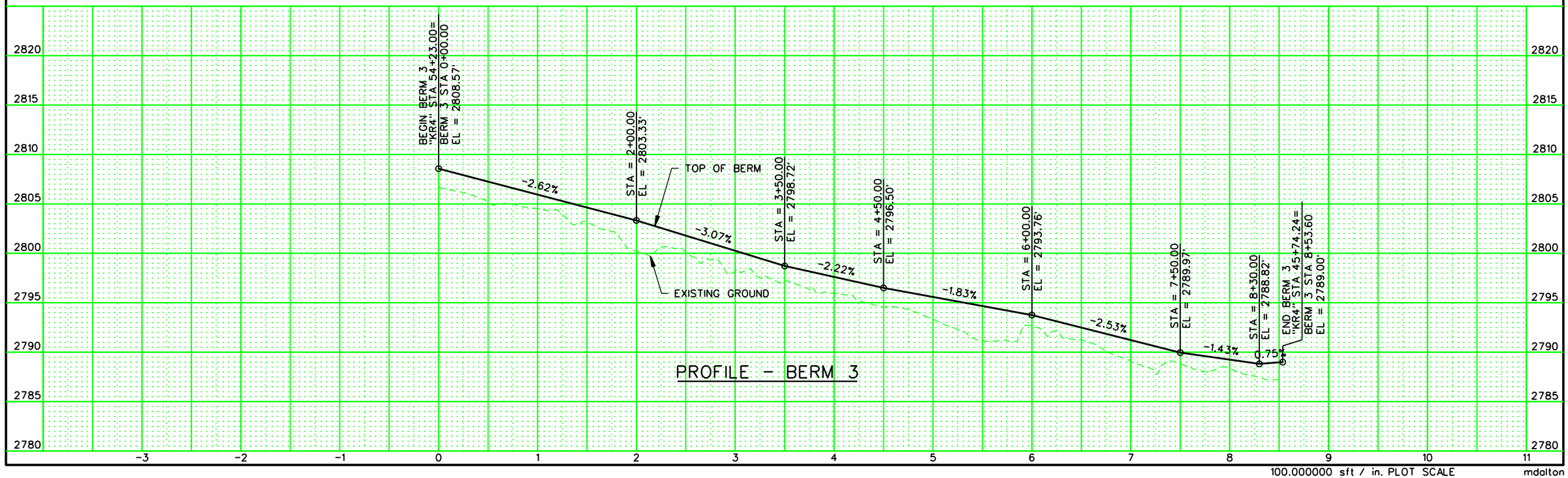
PRELIMINARY

SUBJECT TO REVISION
11/2017



PLAN - BERM 3

NOTES :
1. FOR GEOMETRIC ALIGNMENT SEE SHT LC108
2. SEE SHEET DP116 FOR SECTIONS



PROFILE - BERM 3

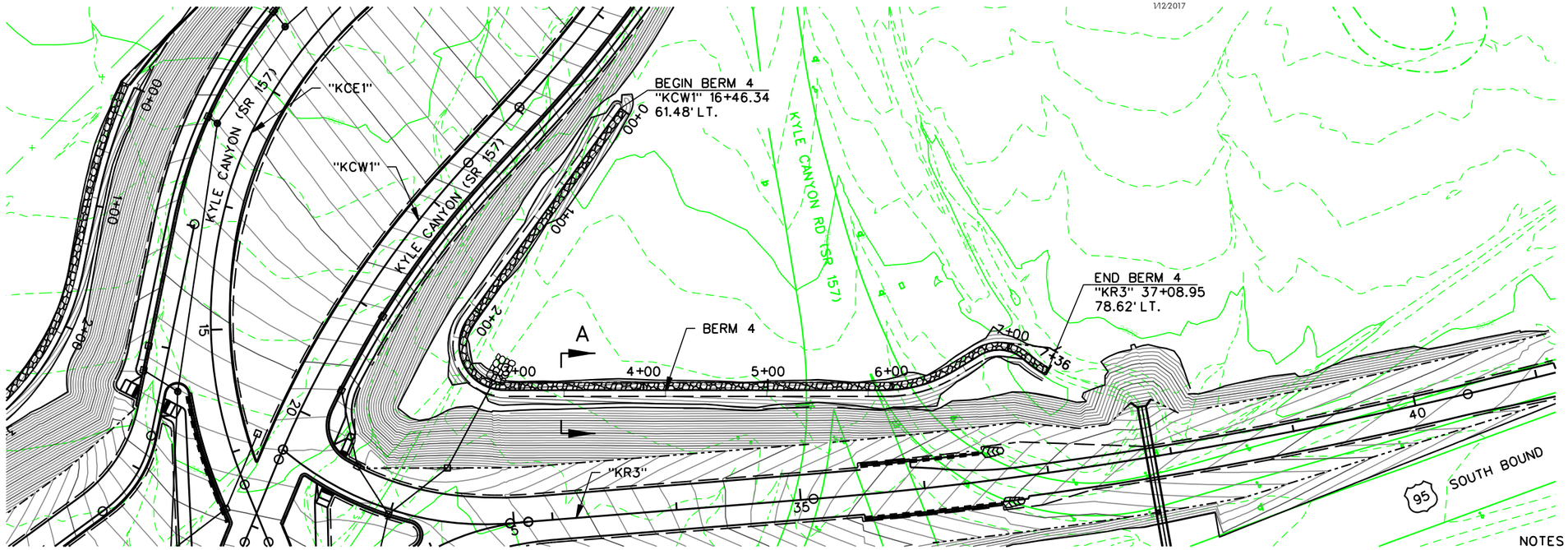
100.000000 sft / in. PLOT SCALE

mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP118_BERM 4.dgn

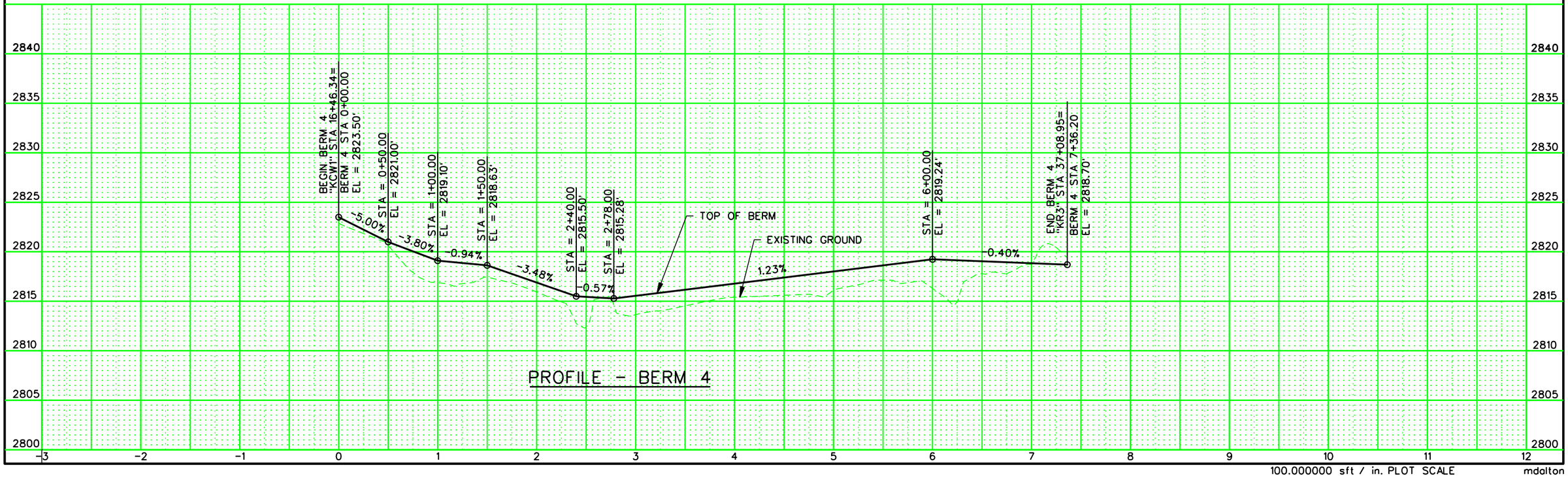
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP118

PRELIMINARY
SUBJECT TO REVISION
1/12/2017



PLAN - BERM 4

NOTES :
1. FOR GEOMETRIC ALIGNMENT SEE SHT LC108
2. SEE SHEET DP116 FOR SECTIONS



PROFILE - BERM 4

100.000000 sft / in. PLOT SCALE

mdalton

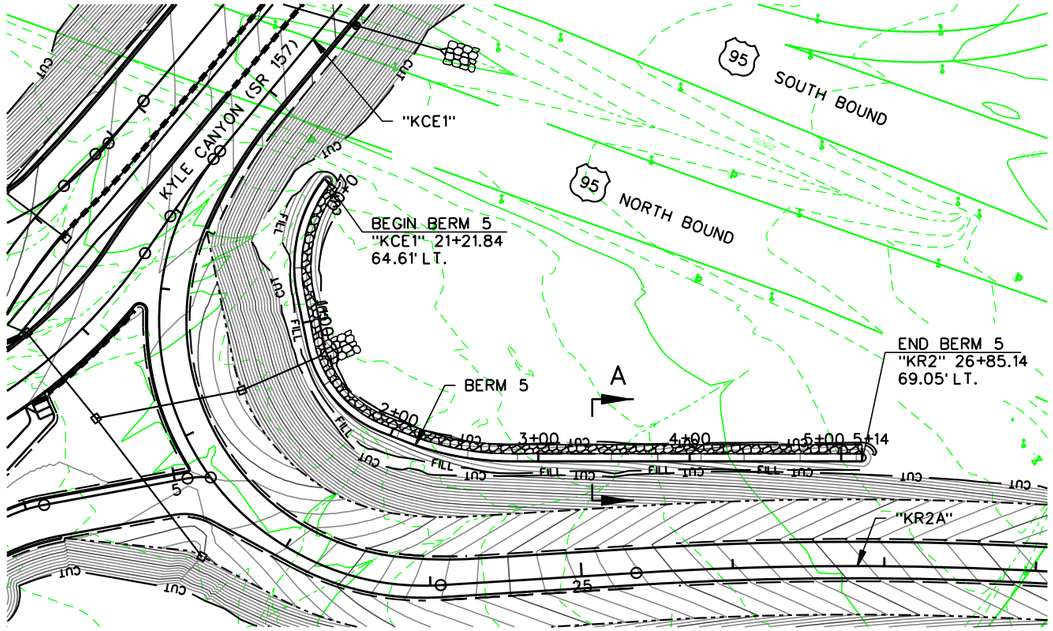
F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP119_BERM 5 & 6.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP119

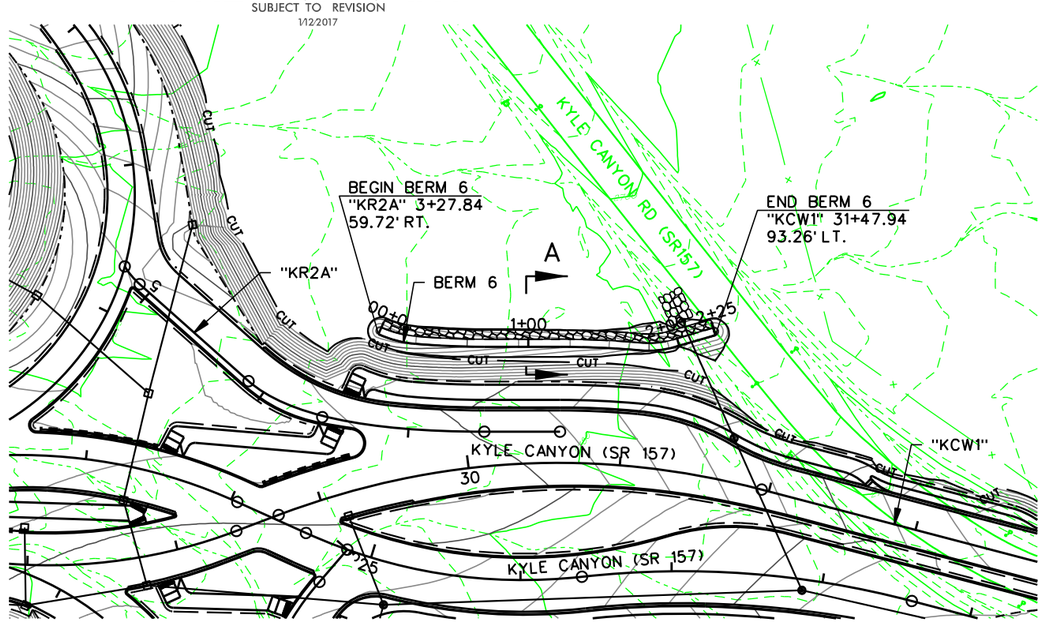
PRELIMINARY

SUBJECT TO REVISION

1/12/2017

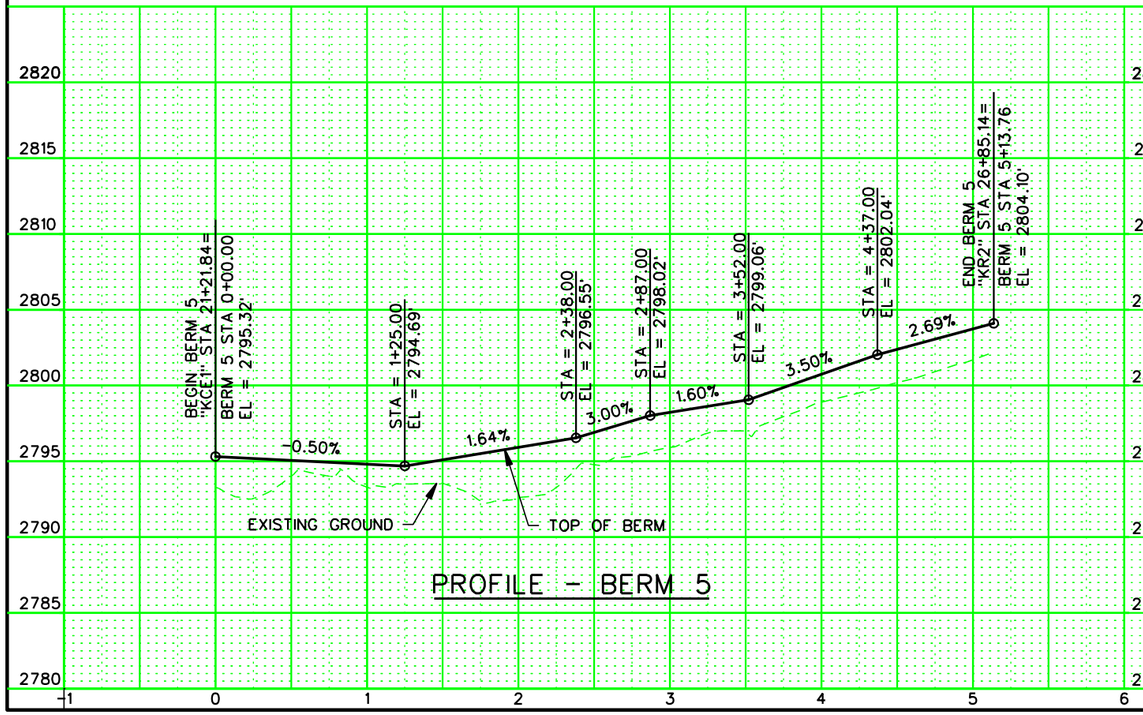


PLAN - BERM 5

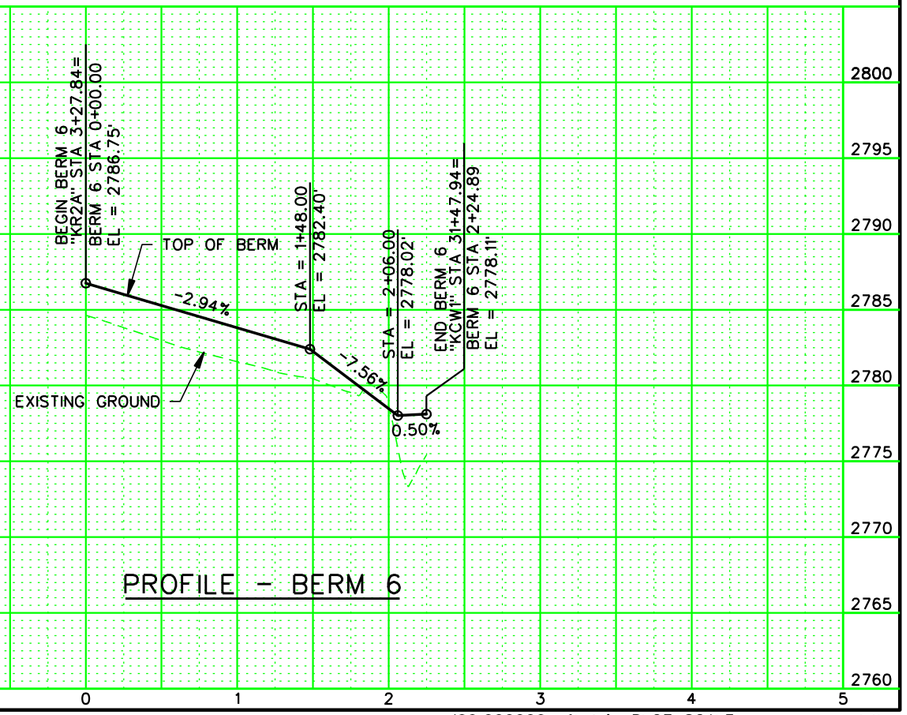


PLAN - BERM 6

NOTES :
1. FOR GEOMETRIC ALIGNMENT SEE SHT LC109
2. SEE SHEET DP116 FOR SECTIONS



PROFILE - BERM 5



PROFILE - BERM 6

100.000000 sft / in. PLOT SCALE

mdalton

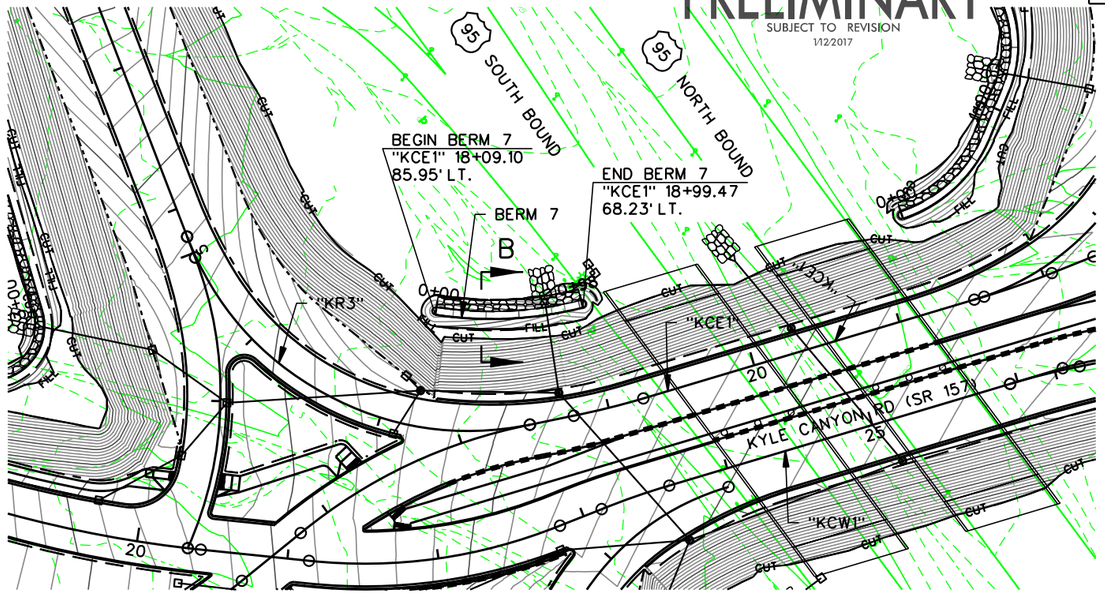
F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP120_BERM_7.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP120

PRELIMINARY

SUBJECT TO REVISION

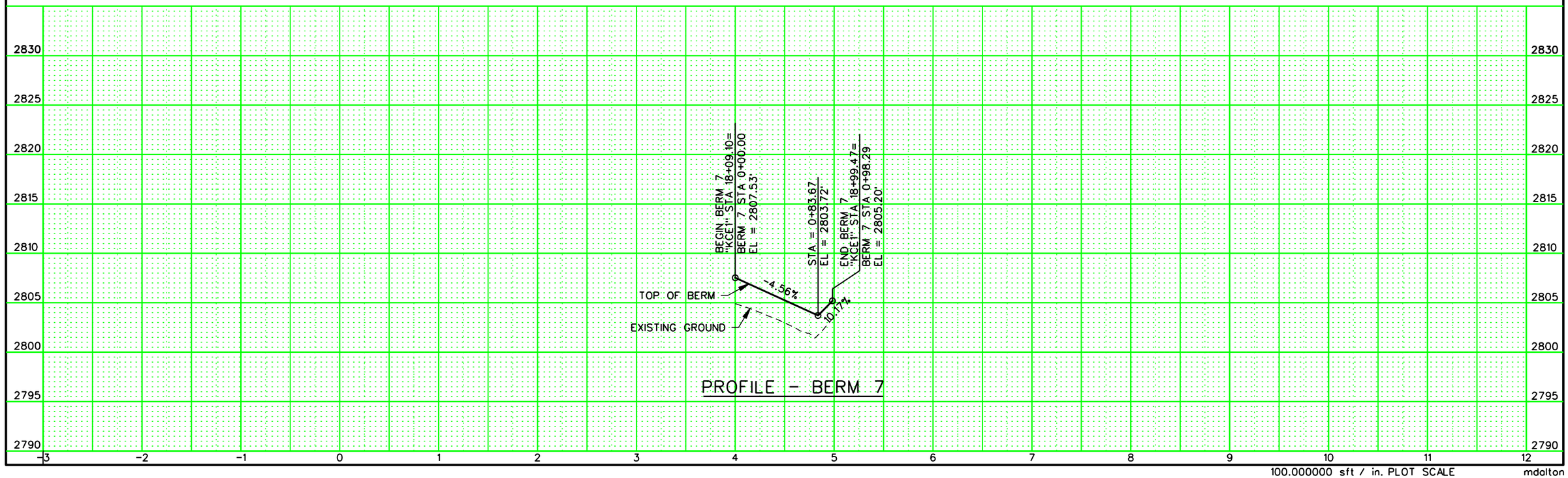
1/12/2017



PLAN - BERM 7

NOTES :

1. FOR GEOMETRIC ALIGNMENT SEE SHT LC110
2. SEE SHEET DP116 FOR SECTIONS



PROFILE - BERM 7

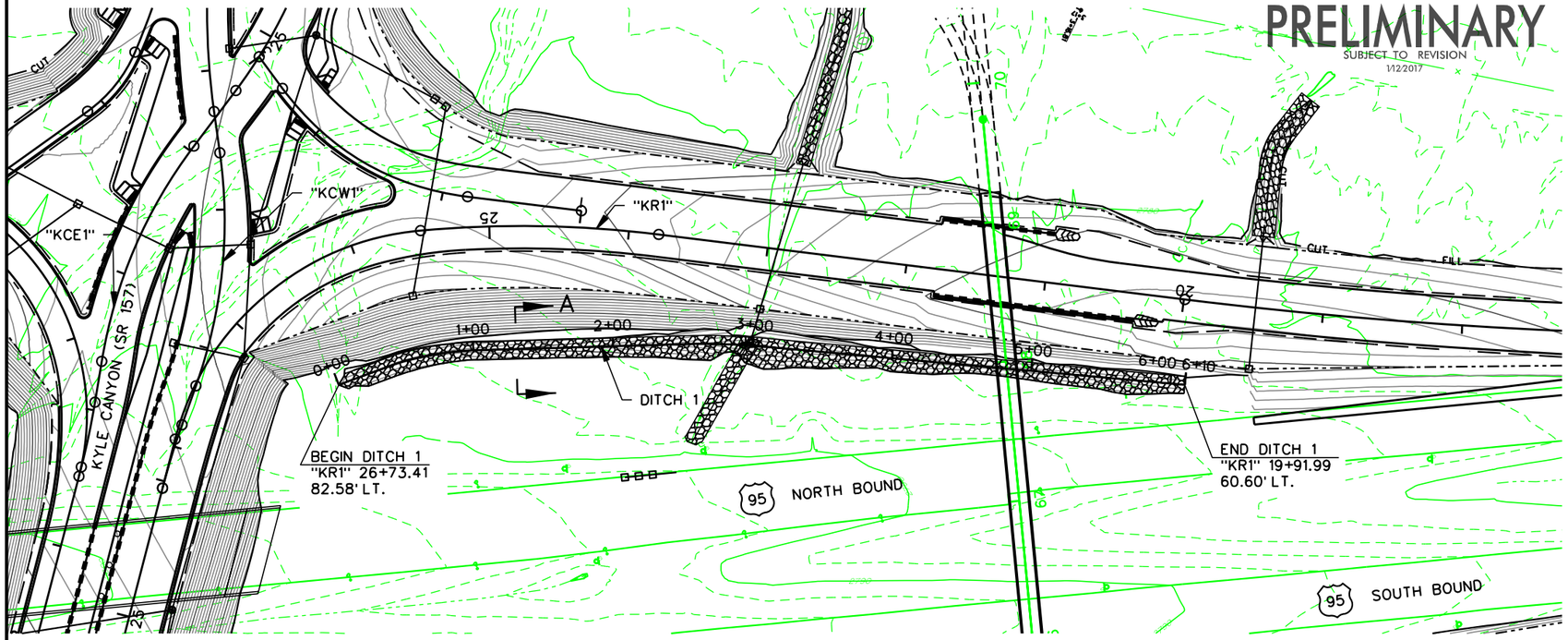
100.000000 sft / in. PLOT SCALE

mdalton

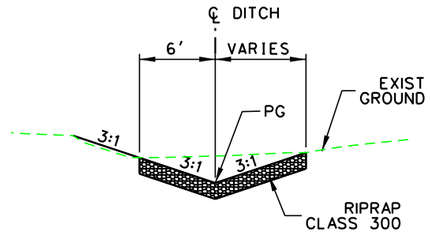
F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DP121_DITCH 1.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DP121

PRELIMINARY
SUBJECT TO REVISION
1/12/2017

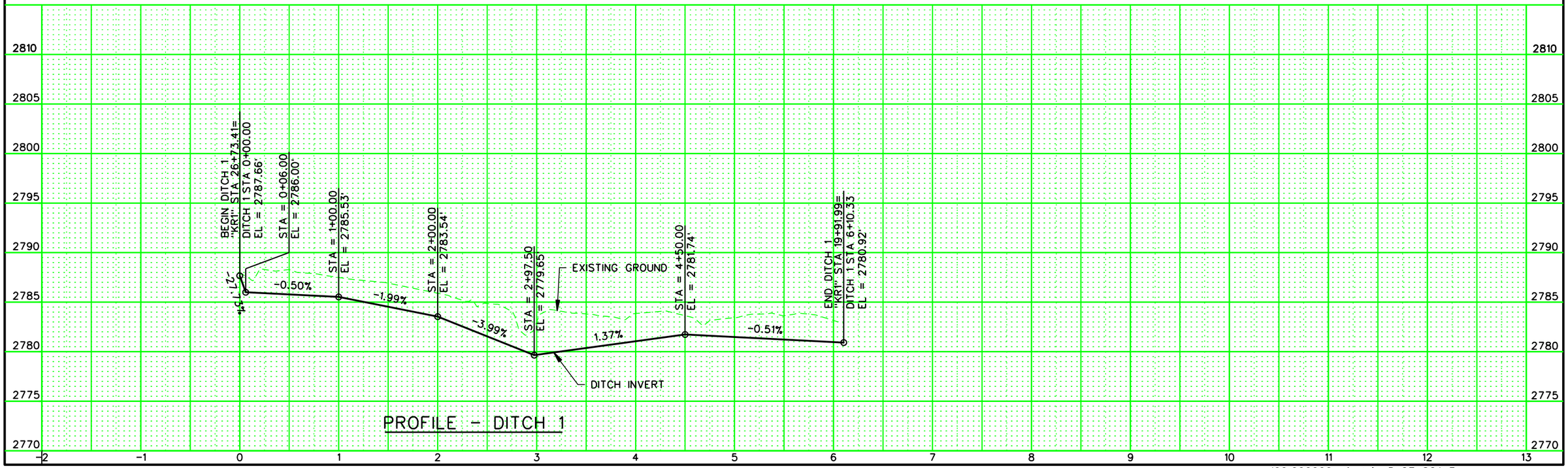


PLAN - DITCH 1



SECTION - A

NOTE :
FOR GEOMETRIC ALIGNMENT SEE SHT LC110



PROFILE - DITCH 1

100.000000 sft / in. PLOT SCALE

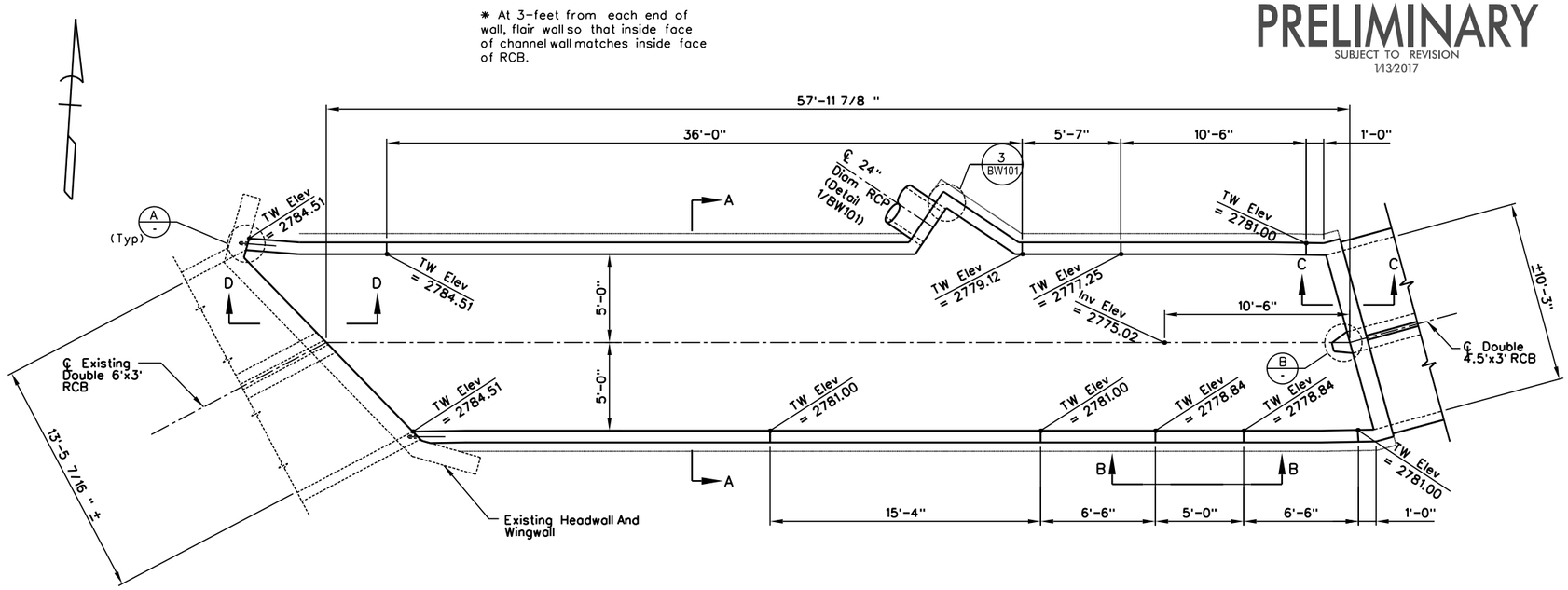
mdalton

F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DS-101.dgn

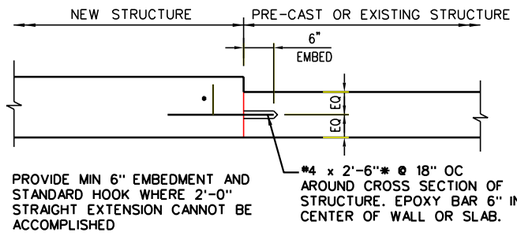
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DS101

PRELIMINARY
SUBJECT TO REVISION
1/13/2017

* At 3-feet from each end of wall, flair wall so that inside face of channel wall matches inside face of RCB.

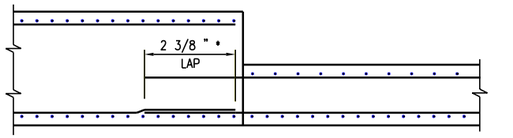


CHANNEL PLAN



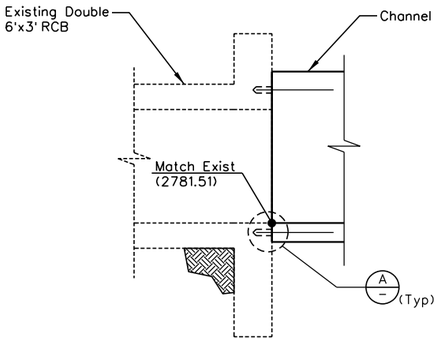
* PROVIDE MIN 6" EMBEDMENT AND STANDARD HOOK WHERE 2'-0" STRAIGHT EXTENSION CANNOT BE ACCOMPLISHED

CAST-IN-PLACE CONNECTION TO PRE-CAST OR EXISTING STRUCTURE

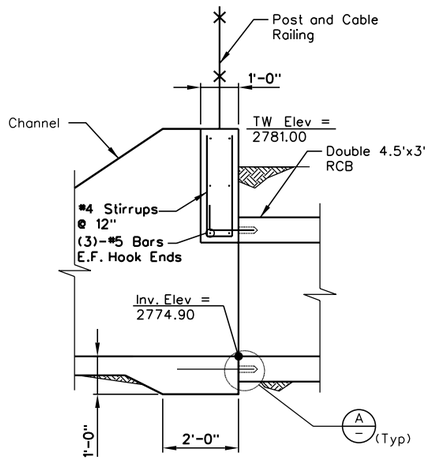


CAST-IN-PLACE CONNECTION TO CAST-IN-PLACE STRUCTURE

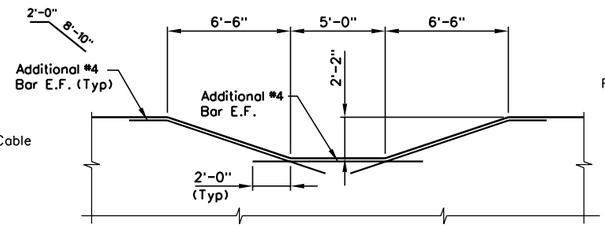
DETAIL "A"



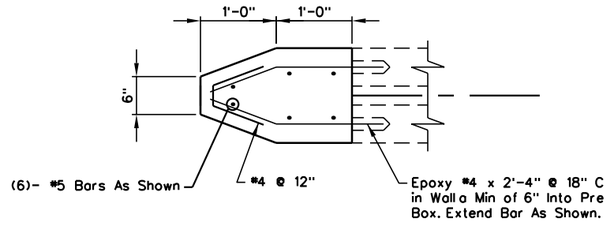
SECTION D-D



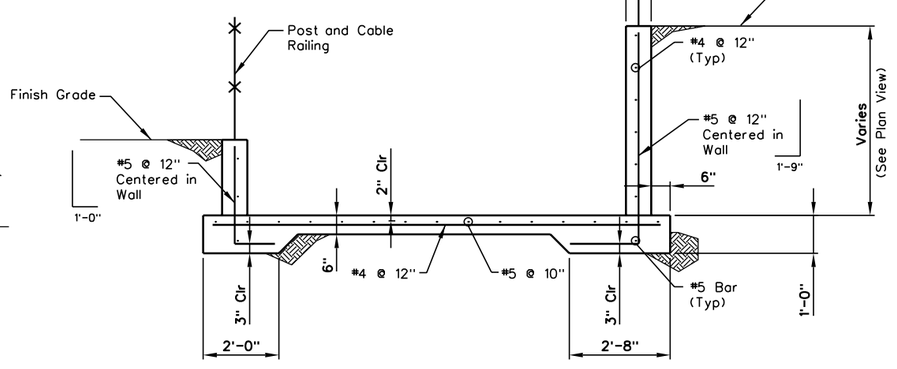
SECTION C-C



ELEVATION B-B



DETAIL "B"



SECTION A-A

90% SUBMITTAL PRELIMINARY NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US95/KYLE CANYON RD INTERCHANGE

OPEN CHANNEL RCB JUNCTION STRUCTURE

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

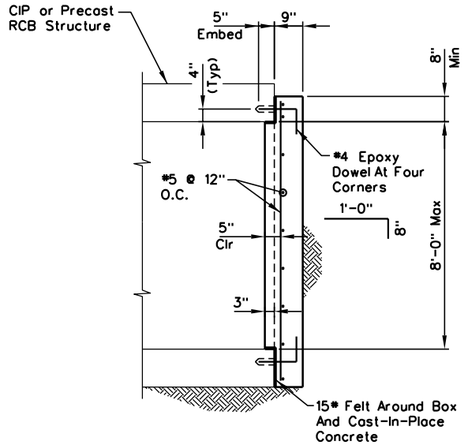
2.0000 ' / in. PLOT SCALE

mdalton

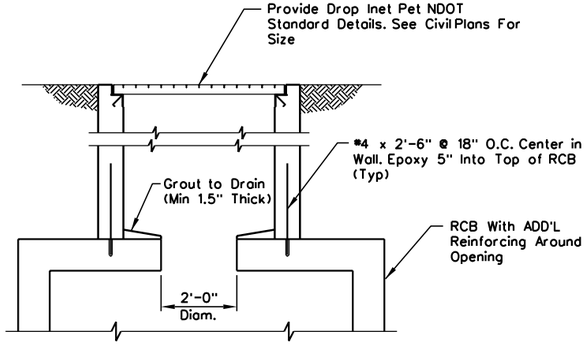
F:\Projects\400\412-634A\DWG\Xref\DGN\73627GCW_DS-102.dgn

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NHP-STP-095-2(062)	CLARK	DS102

PRELIMINARY
SUBJECT TO REVISION
1/13/2017



2 — RCB PLUG DETAIL
SCALE:1/2" = 1'-0"



1 — TYPICAL DROP INLET OVER RCB
SCALE:1/2" = 1'-0"

90% SUBMITTAL
PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

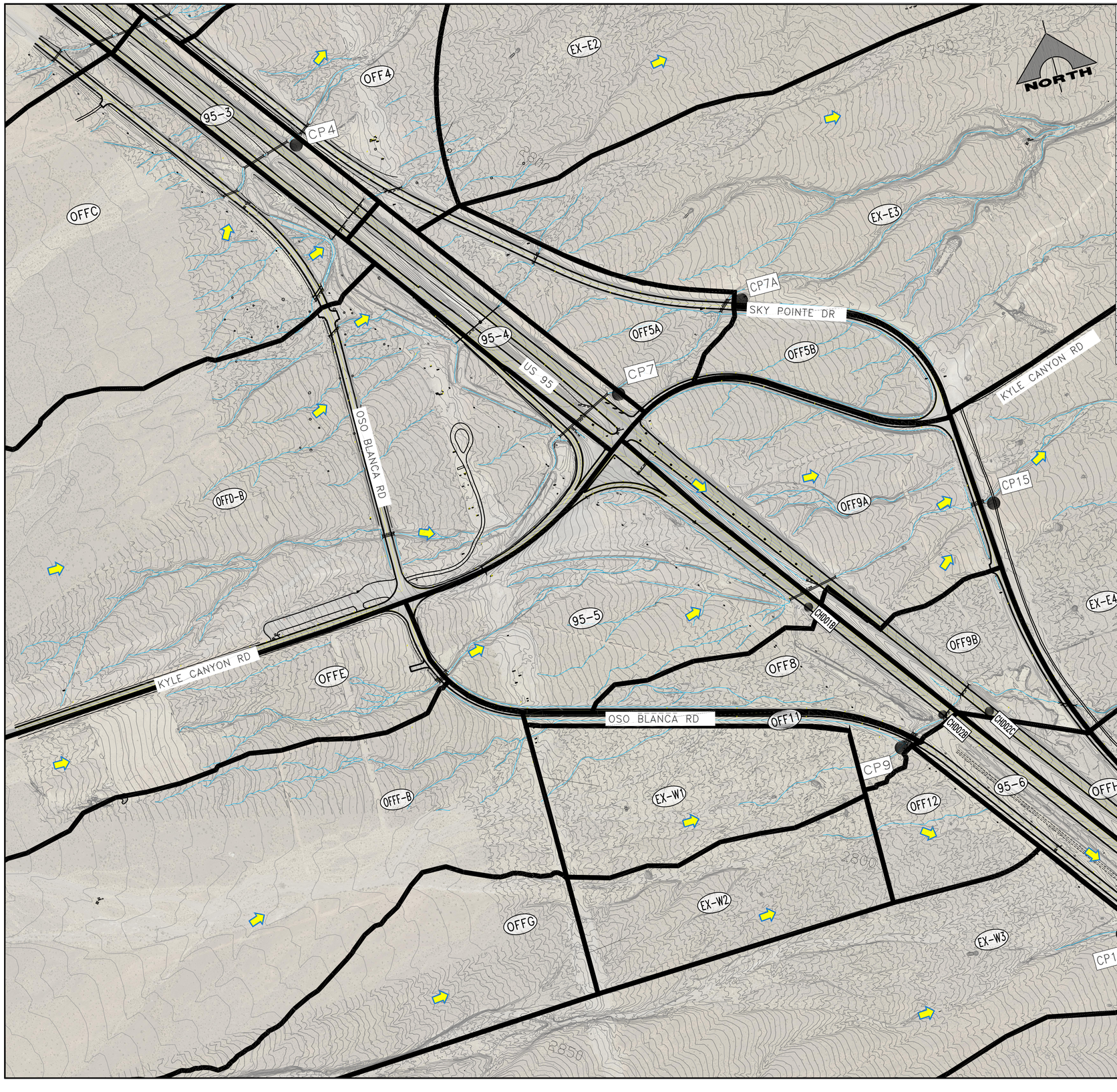
US95/KYLE CANYON RD INTERCHANGE

STORM DRAIN DETAILS

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146
T: 702.804.2000 F: 702.804.2299

2.0000 '/ in. PLOT SCALE

mdalton



SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL
CONCENTRATION POINTS

CONCENTRATION POINT	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
CHD01B	77	62	28
CHD02B	433	344	253
CHD02C	261	207	151
CHD04B	1027	784	388
CHD04B2	526	349	107
CHD04C	673	540	349
CHD04C2	385	293	145
CHD05B	779	582	293
CHD05B2	391	267	94
CHD05C	774	608	345
CHD05C2	536	399	167
CHD06B	1121	911	430
CHD06B2	315	172	9
CHD06C	1325	1119	587
CHD06C2	493	363	37
CHD07B	368	202	24
CHD07B2	305	143	10
CHD07C	556	420	38
CHD07C2	441	343	17
CP1	81	59	21
CP2	129	94	33
CP3	151	110	38
CP4	87	70	22
CP5	105	83	27
CP6	233	177	59
CP7	450	336	134
CP7A	454	339	136
CP8	478	357	144
CP9	1305	1005	556
CP10	1419	1102	550
CP11	558	472	272
CP12	733	583	308
CP13	953	733	358
CP14	182	62	28
CP15	131	106	50
CP16	312	252	144
CP17	290	248	206
CP18	305	263	212
CP19	240	211	179
CP20	833	757	550
CP21	1071	967	728
CP22	1088	983	738
CP23	117	79	23
CP24	118	80	24
CP25	268	214	104
CP26	541	421	213
CP27	880	694	366
CPNM	22	17	6

GRAPHIC SCALE
200 0 100 200
(IN FEET)
1 inch = 200 ft.

LEGEND
- SUBBASIN BOUNDARY
- 95-3 ONSITE SUBBASIN NAME
- FLOW DIRECTION
- CP1 COMBINATION POINT

SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL
ONSITE BASINS

BASIN	AREA (AC)	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
EX-W1	15.36	20	15	5
EX-W2	13.24	22	17	7
EX-W3	172.93	268	223	103
EX-W4	67.06	121	103	47
EX-W5	285.43	443	360	170
EX-W6	9.93	21	17	8
EX-W7	126.63	197	162	76
EX-W8	139.52	213	171	81
EX-W9	116.76	173	135	63
EX-E1	33.75	36	26	9
EX-E2	140.59	141	106	35
EX-E3	119.48	112	83	28
EX-E4	140.56	147	109	36
EX-E5	63.30	79	61	22
EX-E6	10.26	21	17	9
EX-E7	21.31	45	36	18
EX-E8	10.67	22	18	9
EX-E9	6.13	13	10	5
ES1	11.10	29	24	14
ES2	31.40	84	71	43

SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL
FLOW SPLITS

DIVERT	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
DCHD01B	77	62	28
DCHD01C	77	62	28
DCHD02A	431	342	252
DCHD02B	261	207	151
DCHD02C	128	103	83
DCHD04A	854	646	285
DCHD04B	541	436	282
DCHD04C	289	247	204
DCHD05A	259	234	188
DCHD05B	389	316	200
DCHD05C	238	209	178
DCHD06A	784	683	357
DCHD06B	807	741	430
DCHD06C	832	757	549
DCHD07A	55	35	16
DCHD07B	63	59	14
DCHD07C	115	77	22

SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL
OFFSITE BASINS

BASIN	AREA (AC)	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
OFFA	12.99	17	12	4
OFFB	85.55	79	57	21
OFFC	85.34	80	64	20
OFFD-A	411.49	343	257	97
OFFD-B	319.21	232	173	61
OFFE	24.48	26	21	6
OFFF-A	636.03	843	652	322
OFFF-B	391.15	433	331	160
OFFG	25.98	48	40	18
OFFH	5.60	15	12	6
OFF2	59.39	61	45	15
OFF4	20.39	27	20	7
OFF5A	10.30	26	21	11
OFF5B	7.43	18	15	8
OFF8	8.50	19	16	8
OFF9A	22.23	61	50	26
OFF9B	7.65	21	17	9
OFF10	429.46	591	473	248
OFF11	2.92	4	3	1
OFF12	6.02	8	6	2
OFF14	8.56	19	16	8
OFF15	23.15	49	39	19
OFF16	504.67	538	431	220
OFF18	351.44	480	379	196
OFF20	42.00	85	67	33
OFF21	337.93	461	360	186
95-1	2.71	7	6	3
95-2	2.80	7	6	3
95-3	6.06	15	12	6
95-4	6.99	17	14	7
95-5	23.63	60	50	26
95-6	6.65	17	14	7
95-7A	4.41	13	11	6
95-7B	7.15	20	17	10
95-8A	3.32	10	9	5
95-8B	2.56	8	7	4
95-9A	7.06	19	16	9
95-9B	8.51	22	18	10

60% COMPLETE

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOW APP	DATE

PROJECT NO. 412-634A
DESIGN:
DRAWN:
CHECK:
PLOT DATE:
PLOT TIME: 10:31:17

GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gowengineering.com
F: \Projects\412-634\dwg\Hydro\60Percent\Figure 5.dwg
Raymond Blanchard

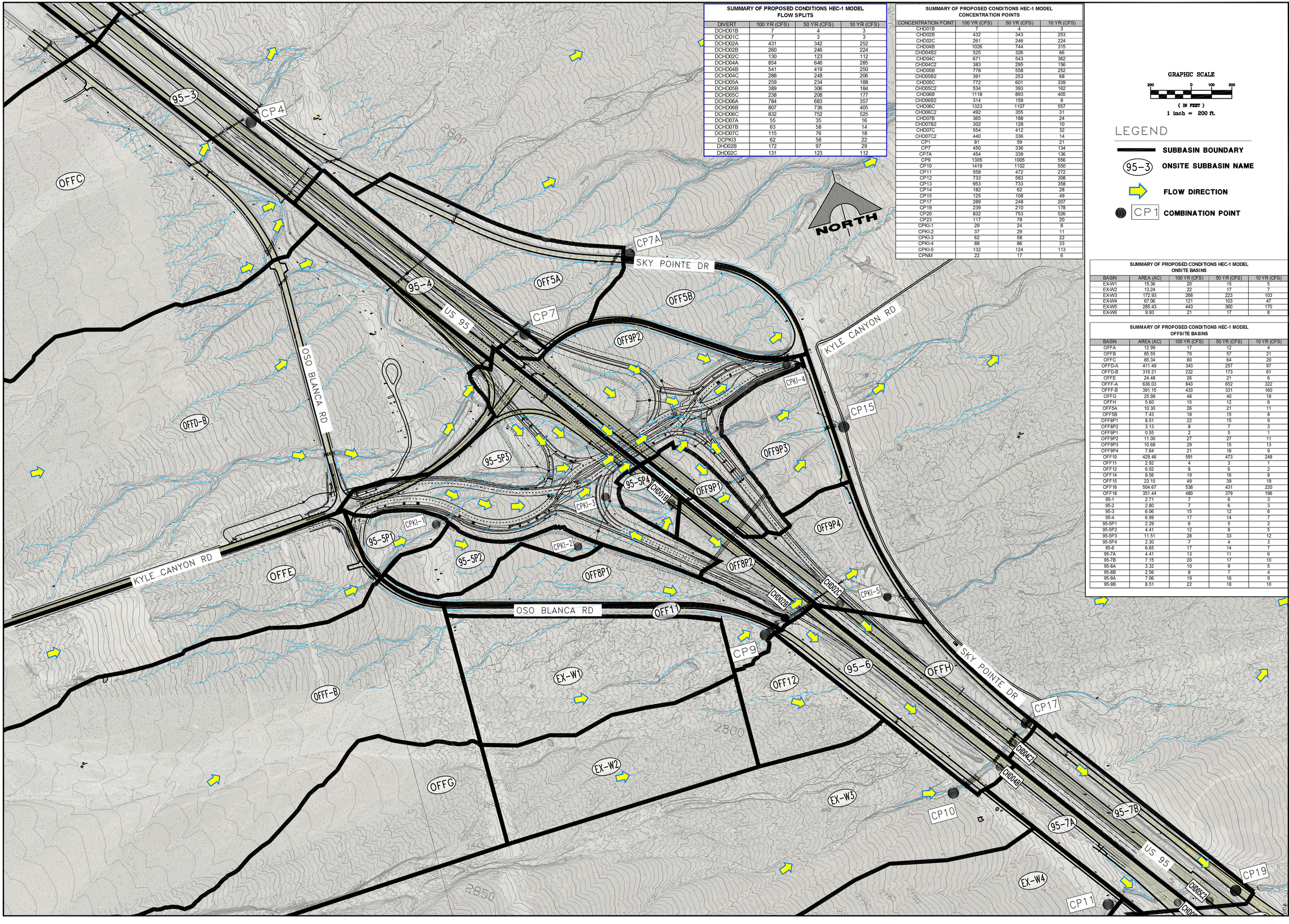
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US 95/KYLE CANYON RD INTERCHANGE

FIGURE 5
EXISTING CONDITIONS DRAINAGE MAP

DRAWING
FIG 5
OF SHTS

HTE: 00-00000



SUMMARY OF PROPOSED CONDITIONS HEC-1 MODEL FLOW SPLITS

DIVERT	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
DCHD01B	7	4	3
DCHD01C	7	3	3
DCHD02A	431	342	252
DCHD02B	260	246	224
DCHD02C	130	123	112
DCHD04A	854	646	285
DCHD04B	541	419	250
DCHD04C	288	248	206
DCHD05A	259	234	188
DCHD05B	389	306	184
DCHD05C	238	208	177
DCHD06A	784	683	357
DCHD06B	807	736	405
DCHD06C	832	752	525
DCHD07A	55	35	16
DCHD07B	63	58	14
DCHD07C	115	76	18
DCPKI3	62	58	22
DHD02B	172	97	29
DHD02C	131	123	112

SUMMARY OF PROPOSED CONDITIONS HEC-1 MODEL CONCENTRATION POINTS

CONCENTRATION POINT	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
CHD01B	7	4	3
CHD02B	432	343	253
CHD02C	261	246	224
CHD04B	1026	744	315
CHD04B2	525	326	66
CHD04C	671	543	362
CHD04C2	383	295	156
CHD05B	778	558	292
CHD05B2	391	253	68
CHD05C	772	601	339
CHD05C2	534	393	162
CHD06B	1118	893	405
CHD06B2	314	159	9
CHD06C	1323	1107	557
CHD06C2	492	355	31
CHD07B	365	188	24
CHD07B2	302	128	10
CHD07C	554	412	32
CHD07C2	440	336	14
CP1	81	59	21
CP7	450	336	134
CP7A	454	339	136
CP9	1305	1005	556
CP10	1419	1102	550
CP11	558	472	272
CP12	733	583	308
CP13	953	733	358
CP14	182	62	28
CP15	125	108	49
CP17	289	248	207
CP19	239	210	178
CP20	832	753	526
CP23	117	78	20
CPKI-1	29	24	8
CPKI-2	37	29	11
CPKI-3	62	58	22
CPKI-4	89	86	33
CPKI-5	132	124	113
CPNM	22	17	6

GRAPHIC SCALE

200 0 100 200

(IN FEET)

1 inch = 200 ft.

LEGEND

- SUBBASIN BOUNDARY
- 95-3 ONSITE SUBBASIN NAME
- FLOW DIRECTION
- CP1 COMBINATION POINT

SUMMARY OF PROPOSED CONDITIONS HEC-1 MODEL ONSITE BASINS

BASIN	AREA (AC)	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
EX-W1	15.36	20	15	5
EX-W2	13.24	22	17	7
EX-W3	172.93	268	223	103
EX-W4	67.06	121	103	47
EX-W5	285.43	443	360	170
EX-W6	9.93	21	17	8

SUMMARY OF PROPOSED CONDITIONS HEC-1 MODEL OFFSITE BASINS

BASIN	AREA (AC)	100 YR (CFS)	50 YR (CFS)	10 YR (CFS)
OFF-A	12.99	17	12	4
OFF B	85.55	79	57	21
OFFC	85.34	80	64	20
OFFD-A	411.49	343	257	97
OFFD-B	319.21	232	173	61
OFFE	24.48	26	21	6
OFFF-A	636.03	843	652	322
OFFF-B	391.15	433	331	160
OFFG	25.98	48	40	18
OFFH	5.60	15	12	6
OFF5A	10.30	26	21	11
OFF5B	7.43	18	15	8
OFF8P1	8.51	22	15	9
OFF8P2	3.13	8	7	3
OFF9P1	0.55	2	5	1
OFF9P2	11.00	27	27	11
OFF9P3	10.68	29	15	13
OFF9P4	7.64	21	16	9
OFF10	429.46	591	473	248
OFF11	2.92	4	3	1
OFF12	6.02	8	6	2
OFF14	8.56	19	16	8
OFF15	23.15	49	39	19
OFF16	504.67	538	431	220
OFF18	351.44	480	379	196
95-1	2.71	7	6	3
95-2	2.80	7	6	3
95-3	6.06	15	12	6
95-4	8.99	17	14	7
95-5P1	2.29	6	5	2
95-5P2	4.41	12	8	5
95-5P3	11.51	28	33	12
95-5P4	2.30	7	4	3
95-6	6.65	17	14	7
95-7A	4.41	13	11	6
95-7B	7.15	20	17	10
95-8A	3.32	10	9	5
95-8B	2.56	8	7	4
95-9A	7.06	19	16	9
95-9B	8.51	22	18	10

90% COMPLETE

REV	DESCRIPTION	DATE
		DATE:
		GCW APP
		DATE
		AGEN APP
		DATE

PROJECT NO. 412-634A

DESIGN:
DRAWN:
CHECK:
PLOT DATE: 01-15-16
PLOT TIME: 16:19:18

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\400\412-634\dwg\hydro\60Percent\Figure 6.dwg
Michelle Castell

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US 95/KYLE CANYON RD INTERCHANGE

FIGURE 6
PROPOSED CONDITIONS DRAINAGE MAP

DRAWING
FIG 6
1 OF 1 SHTS

HTE: 00-00000



25-YEAR ONSITE DITCH/BERM CHARACTERISTICS

Ditch/Berm	Min Slope (%)	Q_{25} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch I4	2.19	5.3	0.72	3.45	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	I4 + 95-3 + 95-4B
Ditch I5 East	3.4	3.4	0.56	3.64	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	I5
Ditch I5 South	2.5	5.2	0.69	3.61	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	95-13
Ditch 95-6	1.05	4.4	0.68	2.35	0	V-DITCH / Berm	5:1/3:1	Decorative Rock	2.00	95-6
Ditch 95-7	2.23	5.8	0.66	3.34	0	V-DITCH / Berm	5:1/3:1	Decorative Rock	2.00	95-7
Ditch 95-8	0.6	8.3	0.83	2.03	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	2.00	95-7 + 95-8
Ditch 95-15A	1.85	2.3	0.54	2.63	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	95-15A
Ditch 95-16	0.32	2.8	0.72	1.34	0	V-DITCH / Berm	5:1/3:1	Decorative Rock	2.00	95-16
Ditch 95-17	0.2	2.5	0.57	0.92	0	V-DITCH / Berm	10:1/7:1	Decorative Rock	2.00	95-17
Ditch 95-19	1.3	1.3	0.55	2.14	0	V-DITCH / Berm	2:1/2:1	Decorative Rock	1.50	95-19
Ditch 95-20	1.2	1.1	0.52	2.00	0	V-DITCH / Berm	2:1/2:1	Decorative Rock	2.00	95-20
Ditch KR1-2	1.8	2.0	0.39	2.14	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR1-2
Ditch KR1-3	1.9	8.8	0.68	3.17	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	2.00	KR1-2 + KR1-3
Ditch KR1-4	2.0	3.4	0.47	2.55	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR1-4
Ditch KR2-2	4.4	2.2	0.35	3.07	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR2-2
Ditch KR2-3	3.5	0.4	0.19	1.84	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR2-3
Ditch KR2-4	5.0	3.3	0.39	3.57	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR2-4
Ditch KR3-1A	4.6	2.9	0.38	3.35	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR3-1A
Ditch KR3-2	4.0	3.1	0.40	3.23	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR3-2
Ditch KR4-1	4.1	1.7	0.32	2.80	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-1
Ditch KR4-2	2.6	1.7	0.35	2.36	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-2
Ditch KR4-3	2.0	5.2	0.55	2.83	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	2.00	KR4-3
Ditch KR4-4	8.5	0.9	0.22	3.14	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-4
Ditch KR4-5	1.9	3.2	0.47	2.46	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-5
Ditch 95-9	1.4	6.7	0.60	2.51	0	V-DITCH / Berm	10:1/5:1	Decorative Rock	2.00	95-9

50-YEAR OFFSITE DITCH/BERM CHARACTERISTICS

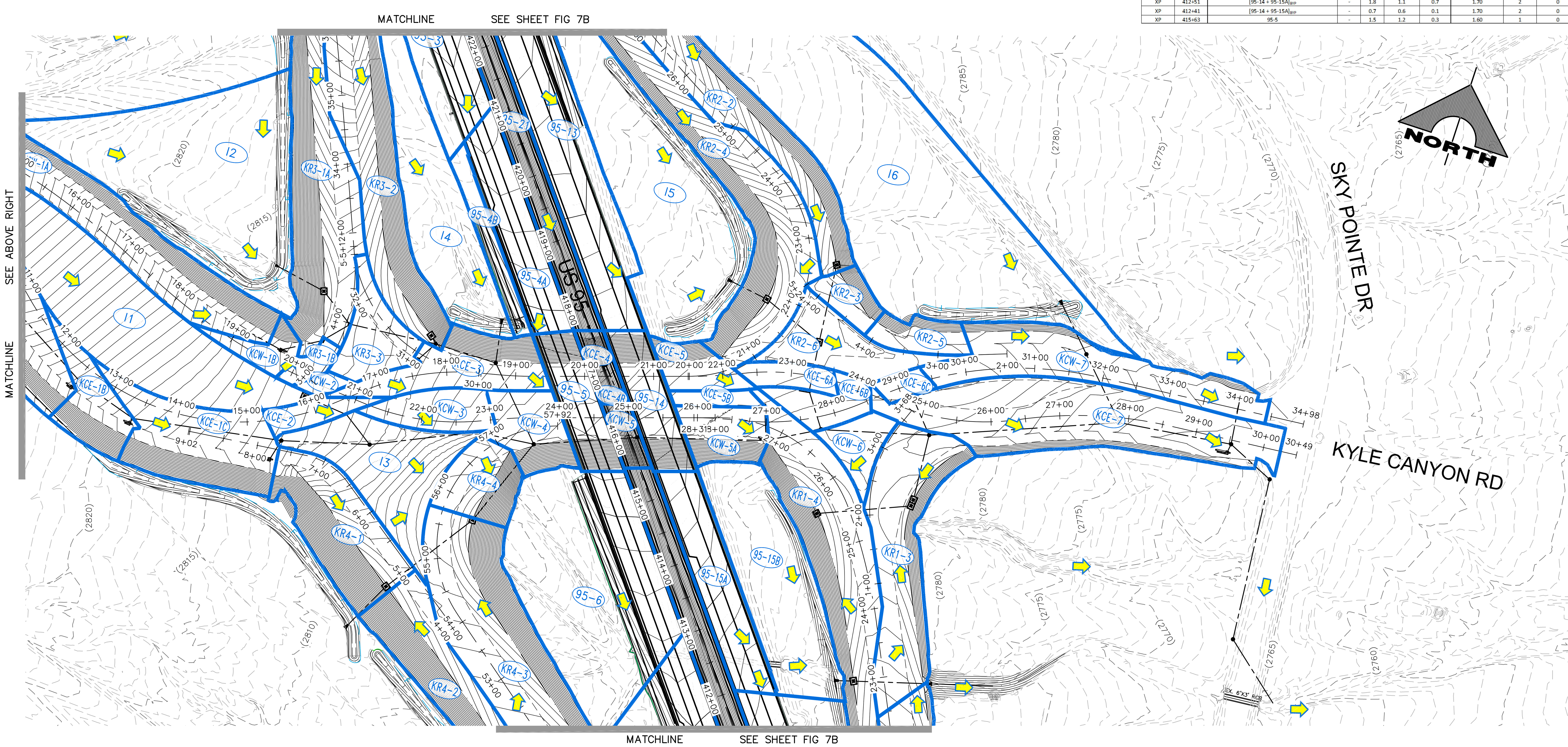
Ditch/Berm	Min Slope (%)	Q_{50} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch I2 East	1.56	4.8	0.73	2.96	0	V / Berm	3:1/3:1	Decorative Rock	2.00	I2
Ditch I2 South	3.18	2.4	0.50	3.25	0	V / Berm	3:1/3:1	Decorative Rock	1.50	1/2 I2
CP7	2.00	168	1.48	5.86	15	V / Berm	3:1/3:1	Class 150	2.50	1/2 CP7
95-5P1	2.20	5	0.65	4.00	0	V / Berm	3:1/3:1	Earth	2.00	95-5P1
95-5P2	3.00	8	0.87	3.56	0	V / Berm	3:1/3:1	Class 150	2.00	95-5P2
OFF8P1	3.00	15	1.10	4.16	0	V / Berm	3:1/3:1	Class 150	2.00	OFF8P1

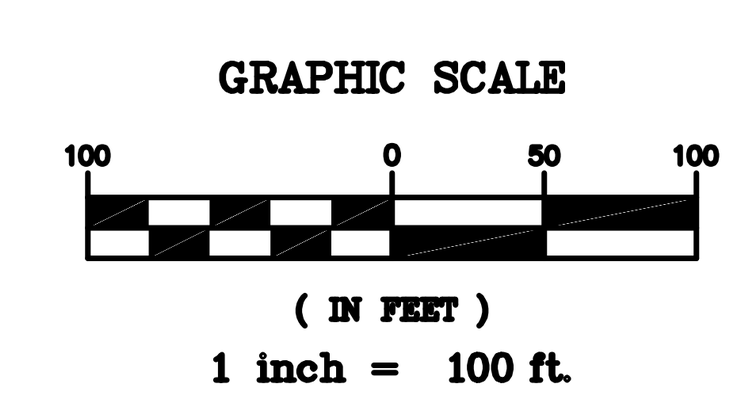
100-YEAR OFFSITE DITCH/BERM CHARACTERISTICS

Ditch/Berm	Min Slope (%)	Q_{100} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch DHD02C	1.70	131	3.25	6.21	0	V-DITCH / Berm	2:1/2:1	Class 150	4.50	Culvert HD02BWS
Ditch DHD02B	1.70	172	2.00	4.79	0	V-DITCH / Berm	16:1/2:1	Class 300	3.00	Split South DHD02B
Ditch DHD02B	3.60	172	2.09	7.28	5	TRAP	3:1/3:1	Class 700	3.50	Split South DHD02B

SUMMARY - DROP INLET CALCULATIONS

Alignment	Station	Tributary	Q_{10} (cfs)	Q_{25} (cfs)	$Q_{Intercept}$ (cfs)	Q_{bypass} (cfs)	Longitudinal Slope (%)	Cross Slope (%)	Bike Lane (BL) Width (ft)	Curb & Gutter (CG) Width (ft)	Shoulder (SH) Width (ft)	Adjacent Travel Lane (TL) Width (ft)	Max Spread Width (ft) BL+CG+SH+1/2 TL	Spread (ft)	Drop Inlet Size	Inlet Type*	Notes
KCE1	12+50	KCE-1A	4.9	-	3.4	1.5	5.97	2	0	2	0	21	12.5	8.4	7' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KCE1	13+40	KCE-1A$_{BYP}$ + KCE-1B	2.3	-	2.0	0.3	4.23	2	0	2	0	21	12.5	6.4	7' Type 11 18" RCP	Capacity	Inlet added to meet spread criteria along KR4 Ramp
KR4A	7+95	KCE-1B$_{BYP}$ + KCE-1C	2.1	-	1.7	0.4	3.60	1	0	2	0	15	9.5	9.7	7' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KR4A	7+75	KCE-1C$_{BYP}$	0.4	-	0.4	0.0	3.60	1	0	2	0	15	9.5	2.1	7'Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KCE1	16+40	KCE2	0.4	-	0.3	0.1	2.95	2	6	2	0	15	15.5	2.1	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
KCW1	22+78	KCE-2$_{BYP}$ + KCW-3	0.8	-	0.8	0.0	2.95	2	0	2	0	15	9.5	3.8	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off to KR4 Ramp. Estimated slope based on profile of adjacent alignement KCE.
KCW1	27+00	KCW4 + KCW5 + KCW-5A	1.6	-	1.6	0.0	1.35	2	0	2	0	18	11	10.6	10' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump. Estimated slope using surface.
KCW1	27+76	KCE-6B	0.6	-	0.6	0.0	0.30	2	0	2	0	15	9.5	6.3	7' Type 11 18" RCP	Sag	Inlet added to collect lfow at sag location
KCW1	29+15	KCE-6C	0.2	-	0.2	0.0	0.70	2	0	0	12	15	19.5	2.1	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
KCE1	29+50	KCE7	3.7	-	3.6	0.1	0.50	2	6	2	0	12	14	12.6	15' Type 11 24" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KCW1	19+00	KCW-1A	4.8	-	3.7	1.1	5.92	2	6	2	0	15	15.5	8.3	10' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KCW1	19+70	KCW-1A$_{BYP}$ + KCW-1B	1.5	-	1.4	0.1	4.30	2	6	2	0	15	15.5	5.0	7' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KR3A	3+60	KCW-1B$_{BYP}$ + KR3-1B	0.4	-	0.3	0.1	2.89	2	0	2	8	14	17	2.1	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off curb to sump
KR3	30+89	KR3-3	1.0	-	0.9	0.1	3.00	0.7	0	2	8	14	17	8.3	Type 7 24" RCP	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
KCE1	23+30	KR3-3$_{BYP}$ + KCW2 + KCE3 + KCE-4 + KCE-5 + KCE-6A	2.6	-	2.6	0.0	0.85	2	6	2	0	15	15.5	9.7	15' Type 11 24" RCP	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
KCW1	26+97	KCE-4B + KCE-5B	0.3	-	0.3	0.0	0.85	2	0	0	0	0	NA	4.6	NDOT Type 2	Capacity	Inlet within Median. Spread contained within median.
KCW1	34+00	KR2-5 + KCW-7	2.9	-	2.9	0.0	0.50	2	6	2	0	12	14	11.4	15' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
XP	418+20	95-4A	-	2.2	1.3	0.9	1.57	2	0	0	12	12	18	8.7	NDOT Type 2	Capacity	Inlet added to limit bypass flow off curb to sump
XP	418+13	95-4A	-	0.9	0.9	0.0	1.57	2	0	0	12	12	18	6.2	Type 5-2G	Capacity	Inlet added to limit bypass flow off curb to sump
XP	412+61	95-14 + 95-15A	-	3.8	2.0	1.8	1.70	2	0	0	12	12	18	10.5	NDOT Type 2	Capacity	Inlet added to limit bypass flow off curb to sump
XP	412+51	[95-14 + 95-15A]$_{BYP}$	-	1.8	1.1	0.7	1.70	2	0	0	12	12	18	7.9	NDOT Type 2	Capacity	Inlet added to limit bypass flow off curb to sump
XP	412+41	[95-14 + 95-15A]$_{BYP}$	-	0.7	0.6	0.1	1.70	2	0	0	12	12	18	5.7	Type 5-2G	Capacity	Inlet added to limit bypass flow off curb to sump
XP	415+63	95-5	-	1.5	1.2	0.3	1.60	1	0	0	12	12	18	11.6	Type 5-2G	Capacity	Inlet added to limit bypass flow off curb to sump





LEGEND

ON 1 — SUBBASIN NAME

SUBBASIN BOUNDARY

FLOW DIRECTION

SUMMARY OF PROPOSED CONDITIONS RATIONAL METHOD ONSITE BASINS

BASIN	AREA (AC)	10 YR (CFS)	25 YR (CFS)	50 YR (CFS)
I1	1.36	2.3	3.1	4.0
I2	1.65	2.8	3.8	4.8
I3	0.59	1.0	1.4	1.7
I4	0.82	1.4	1.9	2.4
I5	1.49	2.5	3.4	4.4
I6	2.85	10.8	14.3	17.1
I11	0.34	1.3	1.7	2.0
95-1A	1.78	5.2	7.0	8.5
95-1B	0.49	1.8	2.4	2.9
95-1C	0.68	2.6	3.4	4.1
95-1D	0.19	0.3	0.4	0.5
95-2A	0.25	0.4	0.6	0.7
95-2B	0.72	2.7	3.6	4.3
95-3	0.74	2.3	3.0	3.6
95-4A	0.44	1.6	2.2	2.6
95-4B	0.16	0.3	0.4	0.5
95-5	0.29	1.1	1.5	1.8
95-6	1.49	3.3	4.4	5.5
95-7	1.69	4.3	5.8	7.1
95-8	0.61	1.9	2.5	3.0
95-9	2.07	4.9	6.7	8.2
95-10	0.95	3.1	4.1	5.0
95-11	1.47	4.8	6.4	7.8
95-12	1.05	3.4	4.5	5.5
95-13	1.23	3.9	5.2	6.3
95-14	0.30	1.1	1.5	1.8
95-15A	0.46	1.7	2.3	2.8
95-15B	0.84	1.4	1.9	2.5
95-16	0.80	2.1	2.8	3.5
95-17	0.65	1.9	2.5	3.1
95-18	0.33	0.5	0.8	1.0
95-19	0.55	0.9	1.3	1.6
95-20	0.49	0.8	1.1	1.4
95-21	0.62	1.0	1.4	1.8
95-22	0.96	1.6	2.2	2.8
95-23	0.62	1.0	1.4	1.8
KCE-1A	1.43	4.9	6.5	7.8
KCE-1B	0.27	0.8	1.0	1.3
KCE-1C	0.58	1.8	2.4	2.9
KCE-2	0.11	0.4	0.6	0.7
KCE-3	0.40	1.3	1.7	2.0
KCE-4	0.08	0.2	0.3	0.4
KCE-4B	0.02	0.1	0.1	0.1
KCE-5	0.17	0.5	0.7	0.8
KCE-5B	0.07	0.2	0.3	0.4
KCE-6A	0.11	0.4	0.6	0.7
KCE-6B	0.17	0.6	0.9	1.0
KCE-6C	0.06	0.2	0.3	0.4
KCE-7	1.09	3.7	4.9	5.9
KCW-1A	1.57	4.8	6.4	7.7
KCW-1B	0.12	0.4	0.5	0.6
KCW-2	0.04	0.1	0.2	0.2
KCW-3	0.22	0.7	0.9	1.1
KCW-4	0.26	0.7	1.0	1.2
KCW-5	0.11	0.3	0.4	0.4
KCW-5A	0.22	0.6	0.8	1.0
KCW-6	0.16	0.6	0.8	0.9
KCW-7	0.64	2.5	3.4	4.0
KR1-1	2.31	7.6	10.1	12.2
KR1-2	0.52	1.5	2.0	2.4
KR1-3	1.83	5.1	6.8	8.3
KR1-4	1.10	2.5	3.4	4.2
KR2-1	0.90	2.5	3.4	4.1
KR2-2	0.73	1.6	2.2	2.7
KR2-3	0.13	0.3	0.4	0.5
KR2-4	1.16	2.4	3.3	4.1
KR2-5	0.15	0.4	0.5	0.6
KR2-6	0.34	1.3	1.7	2.0
KR3-1A	1.03	2.2	2.9	3.7
KR3-1B	0.07	0.3	0.3	0.4
KR3-2	1.04	2.3	3.1	3.8
KR3-3	0.26	1.0	1.3	1.6
KR4-1	0.55	1.2	1.7	2.1
KR4-2	0.73	1.2	1.7	2.1
KR4-3	1.47	3.9	5.2	6.4
KR4-4	0.26	0.7	0.9	1.1
KR4-5	0.82	2.4	3.2	3.8

LID#

90% COMPLETE

DATE:

GCW APP | DATE | AGEN APP | DATE | DESCRIPTION | DATE | REV

PROJECT NO. **412-634A**

DESIGN:
DRAWN:
CHECK:
PLOT DATE: 01-13-17
PLOT TIME: 10:17:41

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

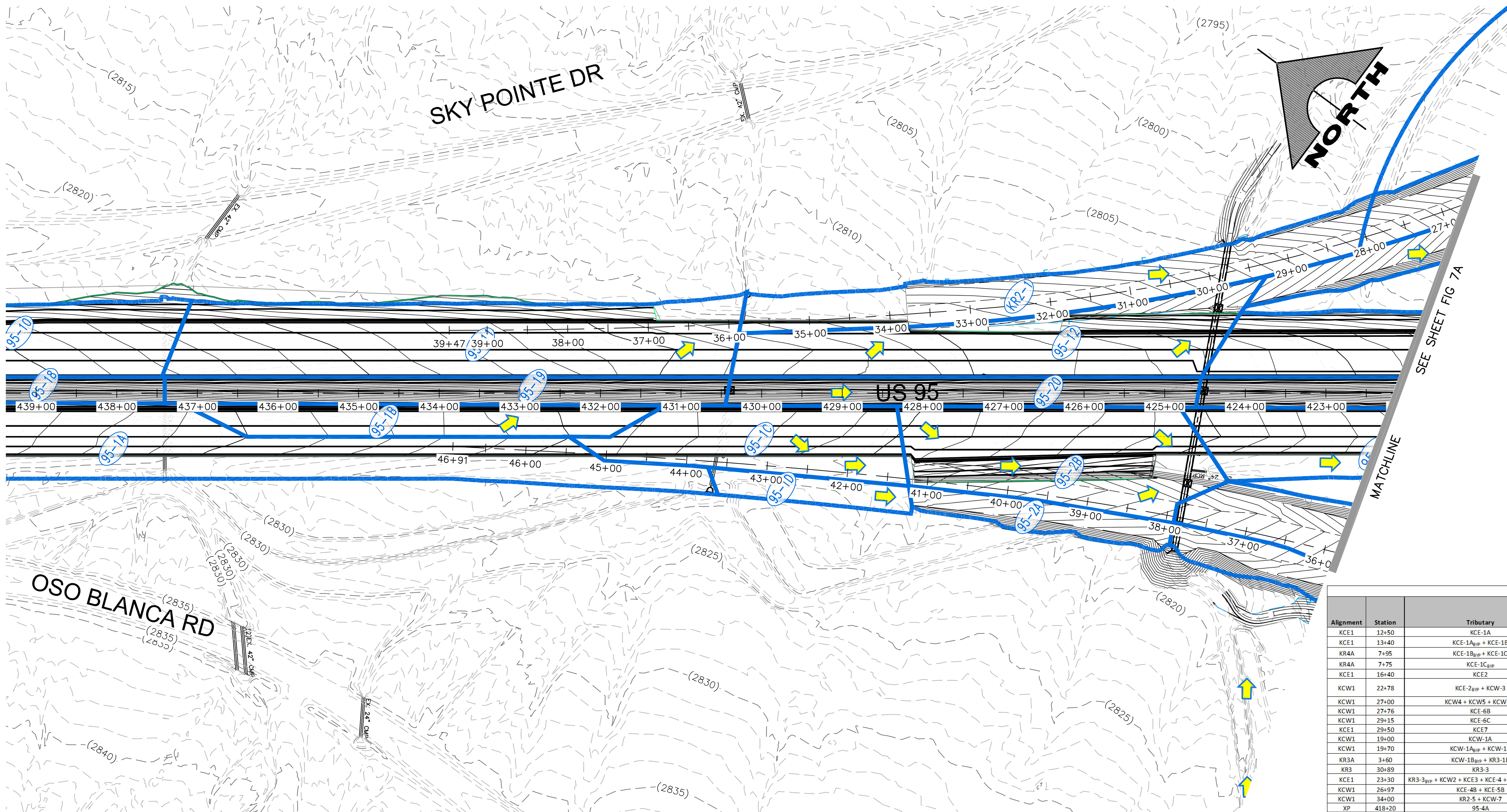
F:\Projects\400\412-634\dwg\hydro\60Percent\Update - 100percent\Figure 7.dwg
Nelson Baggs

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US 95/KYLE CANYON RD INTERCHANGE

FIGURE 7A
ONSITE BASINS MAP 1

DRAWING
FIG 7A
1 OF 2 SHTS



25-YEAR ONSITE DITCH/BERM CHARACTERISTICS

Ditch/Berm	Min Slope (%)	Q_{25} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch I4	2.19	5.3	0.72	3.45	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	I4 + 95-3 + 95-4B
Ditch I5 East	3.4	3.4	0.56	3.64	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	I5
Ditch I5 South	2.5	5.2	0.69	3.61	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	95-13
Ditch 95-6	1.05	4.4	0.68	2.35	0	V-DITCH / Berm	5:1/3:1	Decorative Rock	2.00	95-6
Ditch 95-7	2.23	5.8	0.66	3.34	0	V-DITCH / Berm	5:1/3:1	Decorative Rock	2.00	95-7
Ditch 95-8	0.6	8.3	0.83	2.03	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	2.00	95-7 + 95-8
Ditch 95-15A	1.85	2.3	0.54	2.63	0	V-DITCH / Berm	3:1/3:1	Decorative Rock	2.00	95-15A
Ditch 95-16	0.32	2.8	0.72	1.34	0	V-DITCH / Berm	5:1/3:1	Decorative Rock	2.00	95-16
Ditch 95-17	0.2	2.5	0.57	0.92	0	V-DITCH / Berm	10:1/7:1	Decorative Rock	2.00	95-17
Ditch 95-19	1.3	1.3	0.55	2.14	0	V-DITCH / Berm	2:1/2:1	Decorative Rock	1.50	95-19
Ditch 95-20	1.2	1.1	0.52	2.00	0	V-DITCH / Berm	2:1/2:1	Decorative Rock	2.00	95-20
Ditch KR1-2	1.8	2.0	0.39	2.14	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR1-2
Ditch KR1-3	1.9	8.8	0.68	3.17	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	2.00	KR1-2 + KR1-3
Ditch KR1-4	2.0	3.4	0.47	2.55	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR1-4
Ditch KR2-2	4.4	2.2	0.35	3.07	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR2-2
Ditch KR2-3	3.5	0.4	0.19	1.84	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR2-3
Ditch KR2-4	5.0	3.3	0.39	3.57	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR2-4
Ditch KR3-1A	4.6	2.9	0.38	3.35	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR3-1A
Ditch KR3-2	4.0	3.1	0.40	3.23	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR3-2
Ditch KR4-1	4.1	1.7	0.32	2.80	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-1
Ditch KR4-2	2.6	1.7	0.35	2.36	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-2
Ditch KR4-3	2.0	5.2	0.55	2.83	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	2.00	KR4-3
Ditch KR4-4	8.5	0.9	0.22	3.14	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-4
Ditch KR4-5	1.9	3.2	0.47	2.46	0	V-DITCH / Berm	10:1/2:1	Decorative Rock	1.50	KR4-5
Ditch 95-9	1.4	6.7	0.60	2.51	0	V-DITCH / Berm	10:1/5:1	Decorative Rock	2.00	95-9

50-YEAR OFFSITE DITCH/BERM CHARACTERISTICS

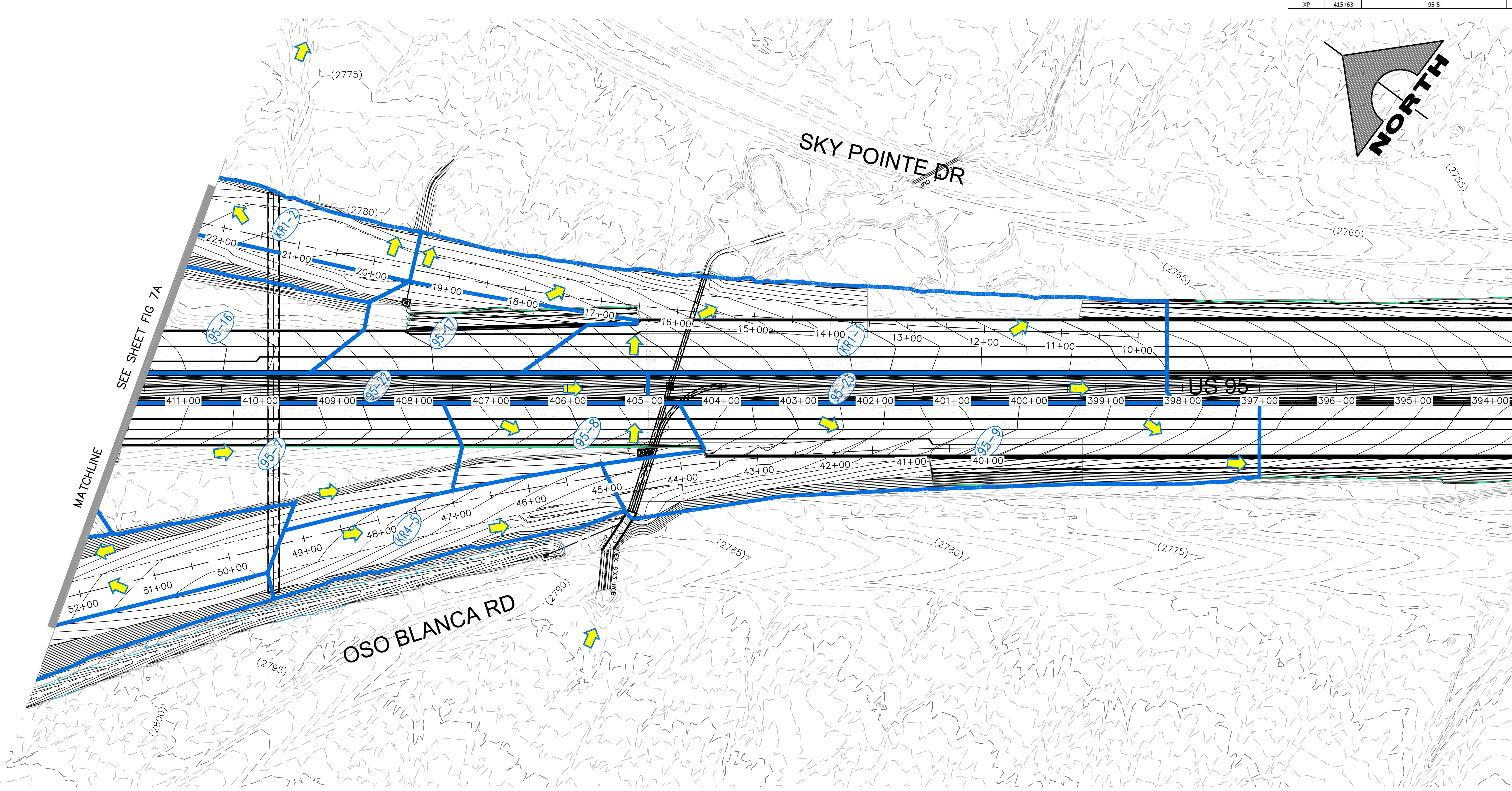
Ditch/Berm	Min Slope (%)	Q_{50} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch I2 East	1.56	4.8	0.73	2.96	0	V / Berm	3:1/3:1	Decorative Rock	2.00	I2
Ditch I2 South	3.18	2.4	0.50	3.25	0	V / Berm	3:1/3:1	Decorative Rock	1.50	1/2 I2
CP7	2.00	168	1.48	5.86	15	V / Berm	3:1/3:1	Class 150	2.50	1/2 CP7
95-5P1	2.20	5	0.65	4.00	0	V / Berm	3:1/3:1	Earth	2.00	95-5P1
95-5P2	3.00	8	0.87	3.56	0	V / Berm	3:1/3:1	Class 150	2.00	95-5P2
OFF8P1	3.00	15	1.10	4.16	0	V / Berm	3:1/3:1	Class 150	2.00	OFF8P1

100-YEAR OFFSITE DITCH/BERM CHARACTERISTICS

Ditch/Berm	Min Slope (%)	Q_{100} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Ditch DHD02C	1.70	131	3.25	6.21	0	V-DITCH / Berm	2:1/2:1	Class 150	4.50	Culvert HD02BWS
Ditch DHD02B	1.70	172	2.00	4.79	0	V-DITCH / Berm	16:1/2:1	Class 300	3.00	Split South DHD02B
Ditch DHD02B	3.60	172	2.09	7.28	5	TRAP	3:1/3:1	Class 700	3.50	Split South DHD02B

SUMMARY - DROP INLET CALCULATIONS

Alignment	Station	Tributary	Q_{10} (cfs)	Q_{25} (cfs)	$Q_{Intercept}$ (cfs)	Q_{bypass} (cfs)	Longitudinal Slope (%)	Cross Slope (%)	Bike Lane (BL) Width (ft)	Curb & Gutter (CG) Width (ft)	Shoulder (SH) Width (ft)	Adjacent Travel Lane (TL) Width (ft)	Max Spread Width (ft) BL+CG+SH+1/2 TL	Spread (ft)	Drop Inlet Size	Inlet Type*	Notes
KCE1	12+50	KCE-1A	4.9	-	3.4	1.5	5.97	2	0	2	0	21	12.5	8.4	7' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KCE1	13+40	KCE-$1A_{BYP}$ + KCE-1B	2.3	-	2.0	0.3	4.23	2	0	2	0	21	12.5	6.4	7' Type 11 18" RCP	Capacity	Inlet added to meet spread criteria along KR4 Ramp
KR4A	7+95	KCE-$1B_{BYP}$ + KCE-1C	2.1	-	1.7	0.4	3.60	1	0	2	0	15	9.5	9.7	7' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KR4A	7+75	KCE-$1C_{BYP}$	0.4	-	0.4	0.0	3.60	1	0	2	0	15	9.5	2.1	7'Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KCE1	16+40	KCE2	0.4	-	0.3	0.1	2.95	2	6	2	0	15	15.5	2.1	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
KCW1	22+78	KCE-2_{BYP} + KCW-3	0.8	-	0.8	0.0	2.95	2	0	2	0	15	9.5	3.8	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off to KR4 Ramp. Estimated slope based on profile of adjacent alignement KCE.
KCW1	27+00	KCW4 + KCW5 + KCW-5A	1.6	-	1.6	0.0	1.35	2	0	2	0	18	11	10.6	10' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump. Estimated slope using surface.
KCW1	27+76	KCE-6B	0.6	-	0.6	0.0	0.30	2	0	2	0	15	9.5	6.3	7' Type 11 18" RCP	Sag	Inlet added to collect lfow at sag location
KCW1	29+15	KCE-6C	0.2	-	0.2	0.0	0.70	2	0	0	12	15	19.5	2.1	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
KCE1	29+50	KCE7	3.7	-	3.6	0.1	0.50	2	6	2	0	12	14	12.6	15' Type 11 24" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KCW1	19+00	KCW-1A	4.8	-	3.7	1.1	5.92	2	6	2	0	15	15.5	8.3	10' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KCW1	19+70	KCW-$1A_{BYP}$ + KCW-1B	1.5	-	1.4	0.1	4.30	2	6	2	0	15	15.5	5.0	7' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
KR3A	3+60	KCW-$1B_{BYP}$ + KR3-1B	0.4	-	0.3	0.1	2.89	2	0	2	8	14	17	2.1	Type 3 24" RCP or Less	Capacity	Inlet added to limit bypass flow off curb to sump
KR3	30+89	KR3-3	1.0	-	0.9	0.1	3.00	0.7	0	2	8	14	17	8.3	Type 7 24" RCP	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
KCE1	23+30	KR3-3_{BYP} + KCW2 + KCE3 + KCE-4 + KCE-5 + KCE-6A	2.6	-	2.6	0.0	0.85	2	6	2	0	15	15.5	9.7	15' Type 11 24" RCP	Capacity	Inlet added to limit bypass flow off curb to intersection and adjacent median
KCW1	26+97	KCE-4B + KCE-5B	0.3	-	0.3	0.0	0.85	2	0	0	0	0	NA	4.6	NDOT Type 2	Capacity	Inlet within Median. Spread contained within median.
KCW1	34+00	KR2-5 + KCW-7	2.9	-	2.9	0.0	0.50	2	6	2	0	12	14	11.4	15' Type 11 18" RCP	Capacity	Inlet added to limit bypass flow off curb to sump
XP	418+20	95-4A	-	2.2	1.3	0.9	1.57	2	0	0	12	12	18	8.7	NDOT Type 2	Capacity	Inlet added to limit bypass flow off curb to sump
XP	418+13	95-4A	-	0.9	0.9	0.0	1.57	2	0	0	12	12	18	6.2	Type 5-2G	Capacity	Inlet added to limit bypass flow off curb to sump
XP	412+61	95-14 + 95-15A	-	3.8	2.0	1.8	1.70	2	0	0	12	12	18	10.5	NDOT Type 2	Capacity	Inlet added to limit bypass flow off curb to sump
XP	412+51	$[95\text{-}14 + 95\text{-}15A]_{BYP}$	-	1.8	1.1	0.7	1.70	2	0	0	12	12	18	7.9	NDOT Type 2	Capacity	Inlet added to limit bypass flow off curb to sump
XP	412+41	$[95\text{-}14 + 95\text{-}15A]_{BYP}$	-	0.7	0.6	0.1	1.70	2	0	0	12	12	18	5.7	Type 5-2G	Capacity	Inlet added to limit bypass flow off curb to sump
XP	415+63	95-5	-	1.5	1.2	0.3	1.60	1	0	0	12	12	18	11.6	Type 5-2G	Capacity	Inlet added to limit bypass flow off curb to sump



GRAPHIC SCALE

100 0 50 100

(IN FEET)
1 inch = 100 ft.

LEGEND

ON 1 — SUBBASIN NAME

SUBBASIN BOUNDARY

FLOW DIRECTION

SUMMARY OF PROPOSED CONDITIONS RATIONAL METHOD ONSITE BASINS

BASIN	AREA (AC)	10 YR (CFS)	25 YR (CFS)	50 YR (CFS)
I1	1.36	2.3	3.1	4.0
I2	1.65	2.8	3.8	4.8
I3	0.59	1.0	1.4	1.7
I4	0.82	1.4	1.9	2.4
I5	1.49	2.5	3.4	4.4
I6	2.85	10.8	14.3	17.1
I11	0.34	1.3	1.7	2.0
95-1A	1.78	5.2	7.0	8.5
95-1B	0.49	1.8	2.4	2.9
95-1C	0.68	2.6	3.4	4.1
95-1D	0.19	0.3	0.4	0.5
95-2A	0.25	0.4	0.6	0.7
95-2B	0.72	2.7	3.6	4.3
95-3	0.74	2.3	3.0	3.6
95-4A	0.44	1.6	2.2	2.6
95-4B	0.16	0.3	0.4	0.5
95-5	0.29	1.1	1.5	1.8
95-6	1.49	3.3	4.4	5.5
95-7	1.69	4.3	5.8	7.1
95-8	0.61	1.9	2.5	3.0
95-9	2.07	4.9	6.7	8.2
95-10	0.95	3.1	4.1	5.0
95-11	1.47	4.8	6.4	7.8
95-12	1.05	3.4	4.5	5.5
95-13	1.23	3.9	5.2	6.3
95-14	0.30	1.1	1.5	1.8
95-15A	0.46	1.7	2.3	2.8
95-15B	0.84	1.4	1.9	2.5
95-16	0.80	2.1	2.8	3.5
95-17	0.65	1.9	2.5	3.1
95-18	0.33	0.5	0.8	1.0
95-19	0.55	0.9	1.3	1.6
95-20	0.49	0.8	1.1	1.4
95-21	0.62	1.0	1.4	1.8
95-22	0.96	1.6	2.2	2.8
95-23	0.62	1.0	1.4	1.8
KCE-1A	1.43	4.9	6.5	7.8
KCE-1B	0.27	0.8	1.0	1.3
KCE-1C	0.58	1.8	2.4	2.9
KCE-2	0.11	0.4	0.6	0.7
KCE-3	0.40	1.3	1.7	2.0
KCE-4	0.08	0.2	0.3	0.4
KCE-4B	0.02	0.1	0.1	0.1
KCE-5	0.17	0.5	0.7	0.8
KCE-5B	0.07	0.2	0.3	0.4
KCE-6A	0.11	0.4	0.6	0.7
KCE-6B	0.17	0.6	0.9	1.0
KCE-6C	0.06	0.2	0.3	0.4
KCE-7	1.09	3.7	4.9	5.9
KCW-1A	1.57	4.8	6.4	7.7
KCW-1B	0.12	0.4	0.5	0.6
KCW-2	0.04	0.1	0.2	0.2
KCW-3	0.22	0.7	0.9	1.1
KCW-4	0.26	0.7	1.0	1.2
KCW-5	0.11	0.3	0.4	0.4
KCW-5A	0.22	0.6	0.8	1.0
KCW-6	0.16	0.6	0.8	0.9
KCW-7	0.64	2.5	3.4	4.0
KR1-1	2.31	7.6	10.1	12.2
KR1-2	0.52	1.5	2.0	2.4
KR1-3	1.83	5.1	6.8	8.3
KR1-4	1.10	2.5	3.4	4.2
KR2-1	0.90	2.5	3.4	4.1
KR2-2	0.73	1.6	2.2	2.7
KR2-3	0.13	0.3	0.4	0.5
KR2-4	1.16	2.4	3.3	4.1
KR2-5	0.15	0.4	0.5	0.6
KR2-6	0.34	1.3	1.7	2.0
KR3-1A	1.03	2.2	2.9	3.7
KR3-1B	0.07	0.3	0.3	0.4
KR3-2	1.04	2.3	3.1	3.8
KR3-3	0.26	1.0	1.3	1.6
KR4-1	0.55	1.2	1.7	2.1
KR4-2	0.73	1.2	1.7	2.1
KR4-3	1.47	3.9	5.2	6.4
KR4-4	0.26	0.7	0.9	1.1
KR4-5	0.82	2.4	3.2	3.8

LID#

90% COMPLETE

DATE:

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 412-634A

DESIGN:
DRAWN:
CHECK:
PLOT DATE: 01-13-17
PLOT TIME: 10:18:21

GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

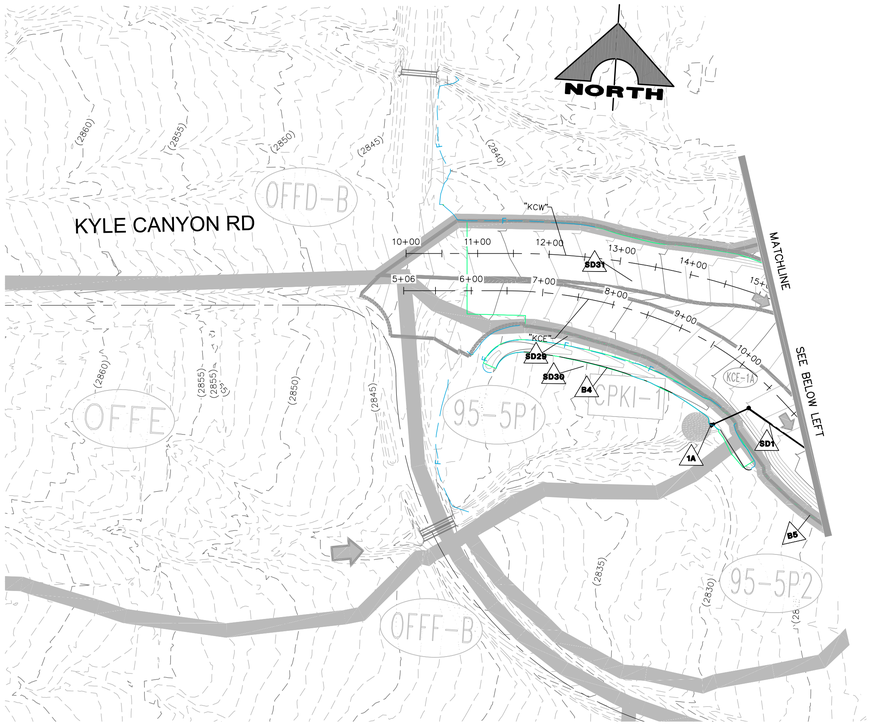
F:\Projects\400\412-634\dwg\hydro\60Percent\Update - 100percent\Figure 7.dwg
Nelson Baggs

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US 95/KYLE CANYON RD INTERCHANGE

FIGURE 7B
ONSITE BASINS MAP 2

DRAWING
FIG 7B
2 OF 2 SHTS



EXISTING US-95 CULVERTS*

LOCATION	Q_{100}/EX [cfs]	CPI/SUBDIVISIONS/DIVERTS	FACILITY
E-4*	44	50% CP4	42" CMP
E-5*	225	50% CP7	42" CMP
E-6*	225	50% E-CP7	6' X7' RCB
E-7*	NA	NA	TRIPLE 36" CMP
E-8*	77	DCHD01B	6' X 3' RCB
E-9*	261/128	DCHD02B/DCHD2C	42" CMP
E-10	Q_{100}=106	CP15	(2) 6' X 3' RCB
E-11	Q_{100}=343 Q_{100}=432	CHD02B	(2) 6' X 3' RCB

*EXISTING FACILITIES REFERENCED FROM THE KYLE CANYON MDS #2 RTC

FLOOD PROTECTION FACILITIES

LOCATION	Q_{10} (cfs)	Q_{25} (cfs)	Q_{100} (cfs)	STATION	RESIMKS	FACILITY	TRIBUTARY	WSPGW MODEL
1A	3.4	-	-	KCE 12+05		NDOT 7 TYPE 11 18" RCP	KCE-1A [4.9]	KCE1_12+53.WSW
1B	2	-	-	KCE 13+48		NDOT 7 TYPE 11 18" RCP	KCE-0_{Res} [3.5] + KCE-1B [0.8]	KCE1_13+41.WSW
1C	1.7	-	-	KR4A7+95		NDOT 7 TYPE 11 18" RCP	KCE-0_{Res} [3.3] + KCE-1C [1.8]	KCE1_16+44.WSW
1D	0.4	-	-	KR4A7+75		NDOT 7 TYPE 11 18" RCP	KCE-1C_{EXP} [0.4]	KCE1_16+44.WSW
2A	0.3	-	-	KCE 16+40		NDOT TYPE 3 24" RCP or Less	KCE-2 [0.4]	KCW1_21+39.WSW
2B	0.8	-	-	KCW 22+78		NDOT TYPE 3 24" RCP or Less	KCE-2_{Res} [0.1] + KCW-3 [0.7]	KCMAIN.WSW
3A	1.6	-	-	KCW 27+08		NDOT 16" TYPE 11 18" RCP	KCW1$_{Res}$ [0.1] + KCW4 [0.7] + KCW5 [0.3] + KCW-5A [0.6]	KCMAIN.WSW
3B	0.6	-	-	KCW 27+76		NDOT 7 TYPE 11 18" RCP	KCE-6B [0.6]	KCMAIN.WSW
4A	0.2	-	-	KCW 29+15		NDOT TYPE 3 24" RCP or Less	KCE-6C [0.2]	KCE1_25+10NORTH.WSW
4B	3.6	-	-	KCE 29+50		NDOT 16" TYPE 11 24" RCP	KCE7 [3.7]	KCE1_29+53_SOUTH.WSW
4C	3.7	-	-	KCW1 19+90		NDOT 16" TYPE 11 18" RCP	KCW-1A [6.8]	KR3A_3+99.WSW
5A	1.4	-	-	KCW1 19+70		NDOT 7 TYPE 11 18" RCP	KCW-1$_{Res}$ [1.3] + KCW-3B [0.4]	KR3A_3+99.WSW
5B	0.3	-	-	KR3A3+68		NDOT TYPE 3 24" RCP or Less	KCW-1$_{Res}$ [0.1] + KR3-1B [0.3]	KR3A_3+99.WSW
5C	0.9	-	-	KR3 30+89		NDOT TYPE 3 24" RCP or Less	KR3-3 [1.0]	KR3_30+77S.WSW
5D	2.6	-	-	KCE1 23+39		NDOT 16" TYPE 11 24" RCP	KR3-3_{Res} [3.0] + KCW2 [0.0] + KCE3 [1.3] + KE1-4 [0.2] + KE3 [0.3] + KE3 [0.2]	KCW1_27+78NORTH.WSW
5E	0.3	-	-	KCW1 26+97		NDOT TYPE 2	KCE-4B [0.1] + KCE-6B [0.3]	KCW_27+40.WSW
6A	2.9	-	-	KCW1 34+95		NDOT 16" TYPE 11 18" RCP	KR2-5 [0.4] + KCW-7 [2.5]	KCE1_29+53_NORTH.WSW
6B	1.3	-	-	XP 418+29		NDOT Type 2	95-4A [1.6]	KP_418+13.WSW
6C	0.9	-	-	XP 418+13		TYPE 5 2G W/ 12" DOWN DRAIN	95-4A [1.6]	KP_418+13.WSW
6D	2.0	-	-	XP 412+61		NDOT Type 2	95-14 [1.1]+ 95-15A [1.7]	KP_412+41.WSW
6E	1.1	-	-	XP 412+51		NDOT Type 2	[95-14 + 95-15A$_{Res}$] [1.6]	KP_412+41.WSW
6F	0.6	-	-	XP 412+41		TYPE 5 2G W/ 12" DOWN DRAIN	[95-14 + 95-15A$_{Res}$] [1.6]	KP_412+41.WSW
6G	NUISANCE	-	-	KR3A 3+99		NDOT TYPE 3 24" RCP or Less		KR3A_3+99.WSW KCE1_23+52NORTH.WSW
6H	-	1.5	-	XP 415+43		TYPE 5 2G W/ 12" DOWN DRAIN	95-5 [1.5]	-
6I	-	4.2	-	XP 405+54		NDOT TYPE 2 DOUBLE GRATE	95-7 [5.8] + 95-8 [2.5]	KP_405+54.WSW
7A	-	-	24	KCE1 10+24	4' DEEP SUMP, 3' DEEP RIPRAP CLASS 150	30" RCP W/ END SECTION	CP9-1 [24]	KCMAIN.WSW
7B	-	-	8	KR4A4+89	2.5' DEEP SUMP, 1.5' DEEP RIPRAP CLASS 150	24" RCP W/ END SECTION	95-9P2 [8]	KCW1_23+62SOUTH.WSW
7C	-	-	4.8	KR3A4+86	2.5' DEEP SUMP, 1.5' DEEP RIPRAP CLASS 150	18" RCP W/ END SECTION	R [4.8]	KCW1_23+62NORTH.WSW
7D	-	7.5	-	KCE1 18+72	2.5' DEEP SUMP, 1.5' DEEP RIPRAP CLASS 150	24" RCP W/ END SECTION	R [15] + 95-3 [3.0] + 95-4A [2.2] + 95-4B [0.4]	KCE1_18+69.WSW
7E	-	8.6	-	KR2 21+78	2.5' DEEP SUMP, 1.5' DEEP RIPRAP CLASS 150	24" RCP W/ END SECTION	R [3.4] + 95-13 [5.2]	KCE1_23+31.WSW
7F	-	14.3	-	KCW1 31+70.20	3.5' DEEP SUMP, 2' DEEP RIPRAP CLASS 150	30" RCP W/ END SECTION	R [14.3]	KCE1_27+57NORTH.WSW
7G	-	4.4	-	XP 413+02	2.5' DEEP SUMP, 1.5' DEEP RIPRAP CLASS 150	6'x3' RCB W/ END SECTION	95-6 [4.4]	-
7H	-	11.4	-	KR1 23+03.61	2.5' DEEP SUMP, 1.5' DEEP RIPRAP CLASS 150	24" RCP W/ END SECTION	95-15A [7.3] + 95-16B [1.9] + 95-16 [2.6] + 7A [4.6] + 95-5 [1.5]	KR1_23+82.WSW
7I	-	1.4	-	KCE1 29+07	2' DEEP SUMP, 1' DEEP RIPRAP CLASS 150	18" RCP W/ END SECTION	95-21 [1.4]	KCW1_25+12.WSW

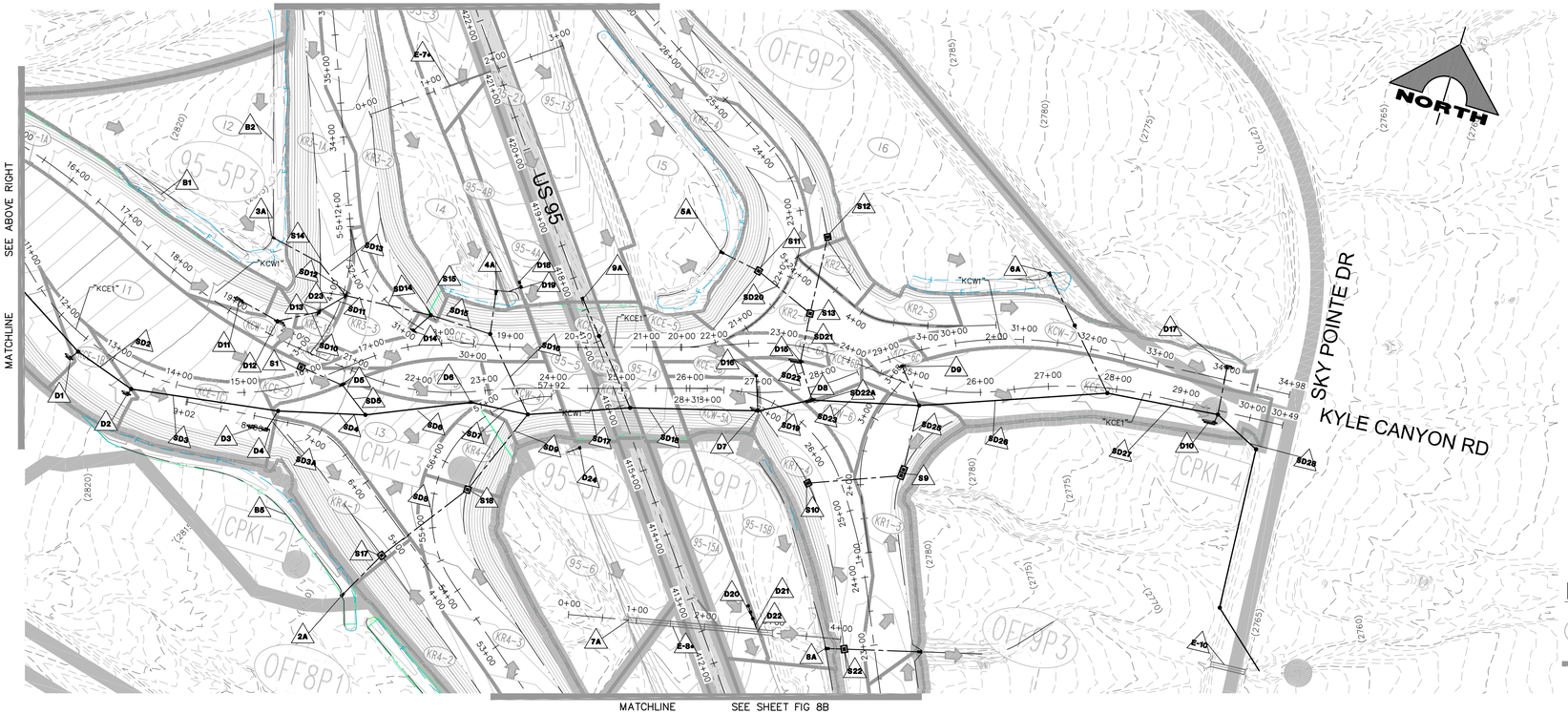
FLOOD PROTECTION FACILITIES

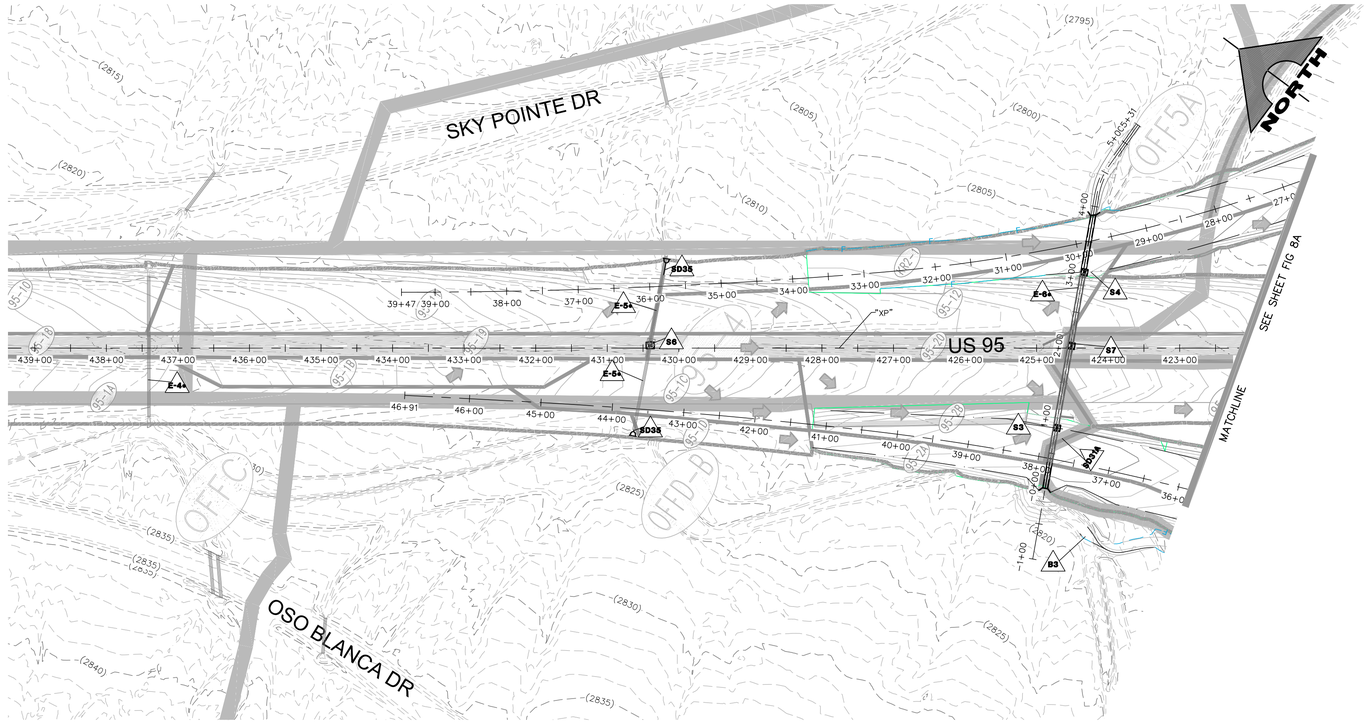
LOCATION	Q_{10} (cfs)	Q_{25} (cfs)	Q_{100} (cfs)	STATION	FACILITY	TRIBUTARY
S1	2.3	-	-	KCE1 15+91	TYPE 2B FOR 30" RCP W/ 18" RCP	I1 [2.3]
S3	-	3.6	-	MOSM 9+54	TYPE 2B FOR 18" RCP	95-2B [3.6]
S4	-	4.5	-	MOSM 11+77	TYPE 2B FOR 42" RCP	95-12 [4.5]
S5	-	2.5	-	XP 404+95	TYPE 2A FOR 18" RCP	95-17 [2.5]
S6	-	1.3	-	XP 430+39	TYPE 2A FOR 18" RCP	95-19 [1.3]
S7	-	1.1	-	MOSM 11+77	TYPE 2A FOR 18" RCP	95-20 [1.1]
S8	-	2.2	-	XP 404+66	TYPE 2A FOR 18" RCP	95-22 [2.2]
S9	-	8.8	-	KR1A 2+15 & KR1A 2+29	(2) - TYPE 2B FOR 24" RCP	KR1-2 [2.0] + KR1-3 [6.8]
S10	-	4.2	-	KR1 25+61	TYPE 2B W/ 18" RCP	KR1-4 [3.4] + KCW-6 [0.8]
S11	-	3.3	-	KR2 21+85	TYPE 2B W/ 24" RCP	KR2-4 [3.3]
S12	-	2.6	-	KR2A 5+08	TYPE 2B W/ 18" RCP	KR2-2 [2.2] + KR2-3 [0.4]
S13	1.3	-	-	KCE1 23+31	TYPE 2A W/ 18" RCP	KR2-6 [1.3]
S14	-	2.9	-	KR3A 4+40	TYPE 2B W/ 24" RCP	KR3-1A [2.9]
S15	-	3.1	-	KR3 30+90	TYPE 2B W/ 18" RCP	KR3-2 [3.1]
S17	-	3.4	-	KR4A 5+00	TYPE 2B W/ 24" RCP	KR4-1 [1.7] + KR4-2 [1.7]
S18	-	7.5	-	KR4 55+70	TYPE 2B W/ 24" RCP	KR4-3 [5.2] + KR2-4 [0.9] + I3 [1.4]
S21	-	8.3	-	XP404+94	(2) - TYPE 2A FOR 18" RCP	95-8 [2.5] + 95-7 [5.8]
S22	-	NUISANCE	-	KR1 23+00	TYPE 2B FOR 18" RCP	KR1-4 [3.4]
B1	-	-	4.8	-	2' HIGH BERM, DECORATIVE ROCK, 3:1 SS	I2 [4.8]
B2	-	-	2.4	-	2' HIGH BERM, DECORATIVE ROCK, 3:1 SS	1/2 I2 [2.4]
B3	-	-	168	-	RIPRAP TRAP CHNL, 15' BW 2.5' DEEP, 3:1 SS, CLASS 150	1/2 CP7 [168]
B4	-	-	5	-	2' HIGH BERM, EARTH-LINED, 3:1 SS	95-5P1 [5]
B5	-	-	8	-	3' HIGH CONCRETE FLOOD WALL	95-5P2 [8]
B6	-	-	15	-	2' HIGH BERM, RIPRAP-LINED, 3:1 SS, CLASS 150	OFFBP1 [15]
B7	-	-	Q_{10}=97 Q_{100}=172	-	DITCH 2:1/16:1 SS	DHD02B
W1	-	-	Q_{10}=97 Q_{100}=172	-	5' WIDE TRAP WEIR AT ELEVATION 2778.84	DHD02B

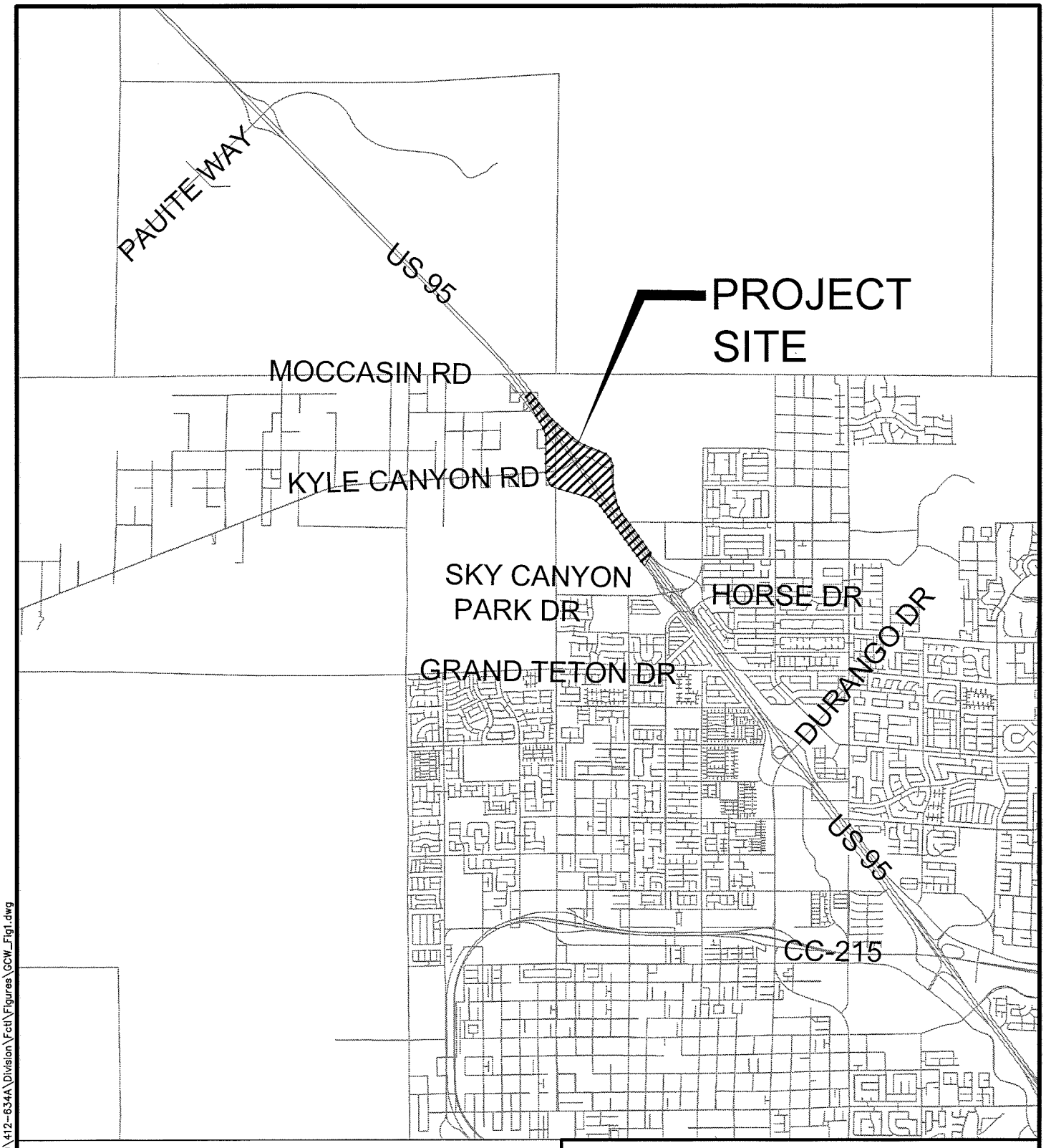
FLOOD PROTECTION FACILITIES

LOCATION	Q_{10} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)	Q_{100} (cfs)	FACILITY	TRIBUTARY	NOTES
S01	-	-	24	-	30" RCP	CP9-1 [24]	KCMAIN.WSW
S02	-	-	27.4	-	30" RCP	CP9-1 [24] + D1 [3.4]	KCMAIN.WSW
S03	-	-	29.4	-	30" RCP	SD2 [27.4] + D2 [2]	KCMAIN.WSW
S03A	2.1	-	-	-	18" RCP	D3 [1.7] + D4 [0.4]	KCE1_15+44.WSW
S04	-	-	31.5	-	30" RCP	SD3 [29.4] + SD3A [2.1]	KCMAIN.WSW
S05	2.6	-	-	-	18" RCP	S1 [2.3] + D5 [0.3]	KCW1_21+39.WSW
S06	-	-	34.1	-	30" RCP	SD4 [31.5] + SD5 [2.6]	KCMAIN.WSW
S07	-	-	34.9	-	30" RCP	SD6 [34.1] + D6 [0.7]	KCMAIN.WSW
S08	-	-	11.4	-	24" RCP	2A [8] + S17 [3.4]	KCW1_23+62SOUTH.WSW
S09	-	-	18.9	-	30" RCP	SD8 [11.4] + S18 [7.5]	KCW1_23+62SOUTH.WSW
S010	5.1	-	-	-	18" RCP	D11 [3.7] + D12 [1.4]	KR3A_3+99.WSW
S011	5.4	-	-	-	18" RCP	SD10 [5.1] + D13 [0.3]	KR3A_3+99.WSW
S012	-	-	7.7	-	24" RCP	3A [4.8] + S14 [2.9]	KCW1_23+62NORTH.WSW
S014	-	-	13.1	-	24" RCP	SD12 [5.4] + SD13 [7.7]	KCW1_23+62NORTH.WSW
S015	-	-	17.1	-	24" RCP	SD14 [13.1]+ D14 [0.9] + S15 [3.1]	KCW1_23+62NORTH.WSW
S016	-	-	24.6	-	30" RCP	SD15 [117.1] + 4A [7.5]	KCW1_23+62NORTH.WSW
S017	-	-	58	-	42" RCP	CP9-3 [58]	KCMAIN.WSW
S018	-	-	59.4	-	42" RCP	SD17 [58] + 9A [1.4]	KCMAIN.WSW
S019	-	-	61	-	42" RCP	SD18 [59.4] + D7 [1.6]	KCMAIN.WSW
S020	-	11.9	-	-	24" RCP	5A [8.6] + S11 [3.3]	KCE1_23+31.WSW
S021	-	15.8	-	-	24" RCP	SD20 [11.9] + S12 [2.6] + S13 [1.3]	KCW_27+76SOUTH.WSW
S022	-	18.4	-	-	30" RCP	SD21 [15.8] + D15 [2.6]	KCW1_27+76NORTH.WSW
SD22A	-	19.0	-	-	30" RCP	SD22 [18.4] + D8 [0.6]	KCW1_27+76NORTH.WSW
S023	-	-	78.4	-	42" RCP	SD22A [19.0] + SD19 [61]	KCMAIN.WSW
S025	13.0	-	-	-	24" RCP	S9 [8.8] + S10 [4.2]	KCE1_25+15SOUTH.WSW
S026	-	-	86	-	42" RCP	CP9-4 [86]	KCMAIN.WSW
S027	-	-	86	-	60" X 38" HERCP	CP9-4 [86]	KCMAIN.WSW
S028	-	-	86	-	60" X 38" HERCP	CP9-4 [86]	KCMAIN.WSW
S030	-	-	-	2709**	11' X 6' RCB	CNV35-C	-
S030	-	-	-	1559**	12' X 10' RCB	HIUIR	-
S031	-	-	-	3318**	(2) - 11' X 6' RCB	CKC5	-
S031A	-	-	-	3411**	(2) - 11' HIGH X 7' WIDE RCB	CKC5	-
S032	253	-	343	432	HEADWALL 5' WIDE TRAP WEIR THW = 2781.00' WEIR = 2778.84'	CHD02B	-
S032A	-	-	-	2079	13' X 6' RCB	-	-
S032B	-	-	-	22	24" RCP	OFFBP1	KR4_44+89.WSW
S033	-	-	-	131	5' X 3' RCB	DHD02C [131]	-
S034	-	-	-	130	5' X 3' RCB	DCHC02C [130]	-
S035	-	-	168	-	42" CMP CULVERT EXTENTIONS	1/2 CP7 [168]	-

*REFERENCED FROM THE UPDATE #2 TO THE SKY CANYON MDS




SKY POINTE DR
US 95
OSO BLANCA DR
MATCHLINE
SEE SHEET FIG 8A
NORTH
OFF5A
OFF9A
OFF8B
OFF8A
OFF7
OFF12
OFF11
OFFD-B
OFFC-30
CPK-5
95-10
95-11
95-12
95-13
95-14
95-15
95-16
95-17
95-18
95-19
95-20
95-21
95-22
95-23
95-24
95-25
95-26
95-27
95-28
95-29
95-30
95-31
95-32
95-33
95-34
95-35
95-36
95-37
95-38
95-39
95-40
95-41
95-42
95-43
95-44
95-45
95-46
95-47
95-48
95-49



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
US 95/KYLE CANYON RD INTERCHANGE

FIGURE 1

VICINITY MAP

GRAPHIC SCALE

5000 0 2500 5000

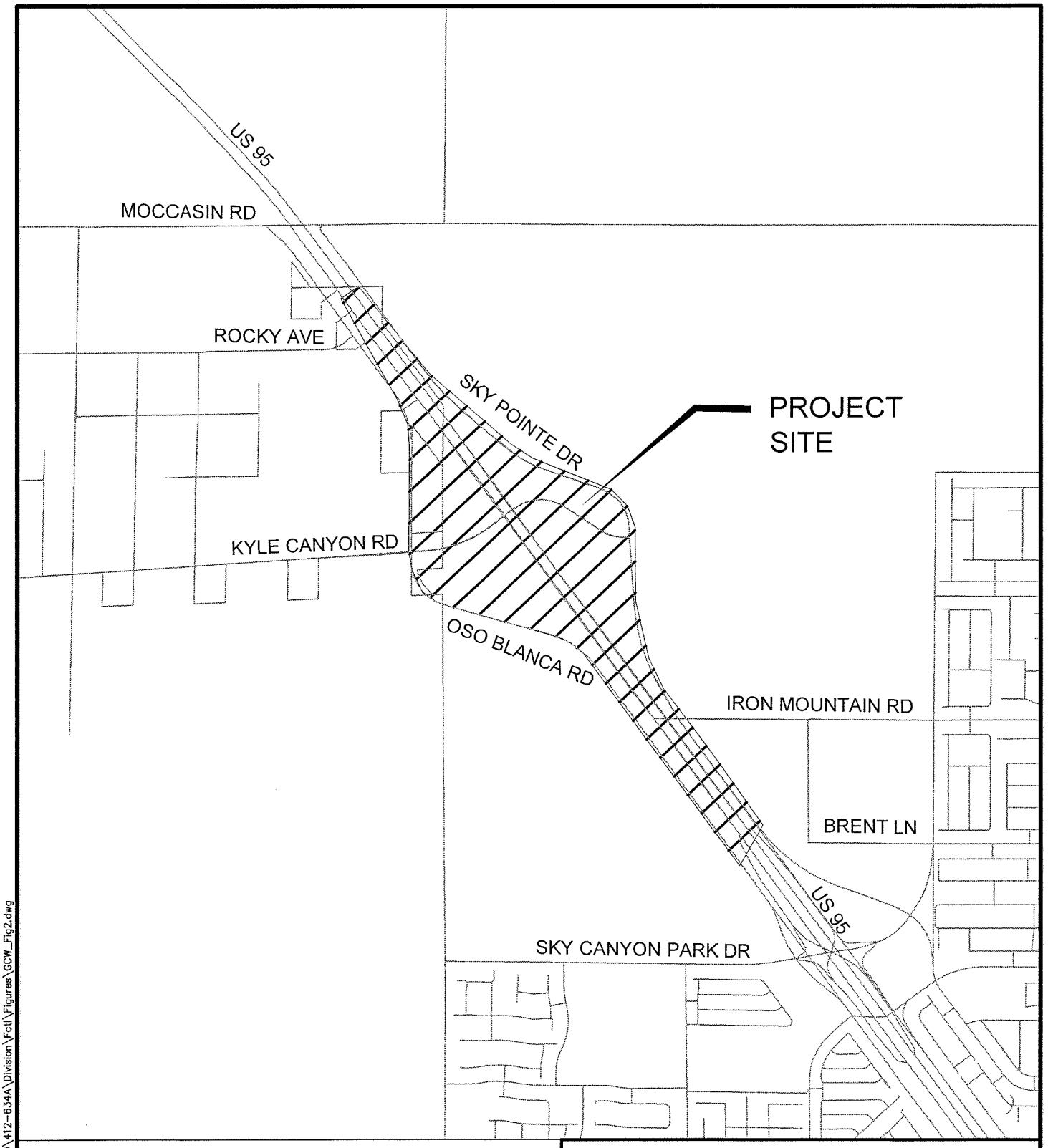
(IN FEET)

1 inch = 5000 ft.

NORTH

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

01-29-16 14:39:23 F:\Projects\400\412-634A\Division\Fct\Figures\GCW_Fig1.dwg
eresop



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
US 95/KYLE CANYON RD INTERCHANGE

FIGURE 2

LOCATION MAP

GRAPHIC SCALE

1500 0 750 1500

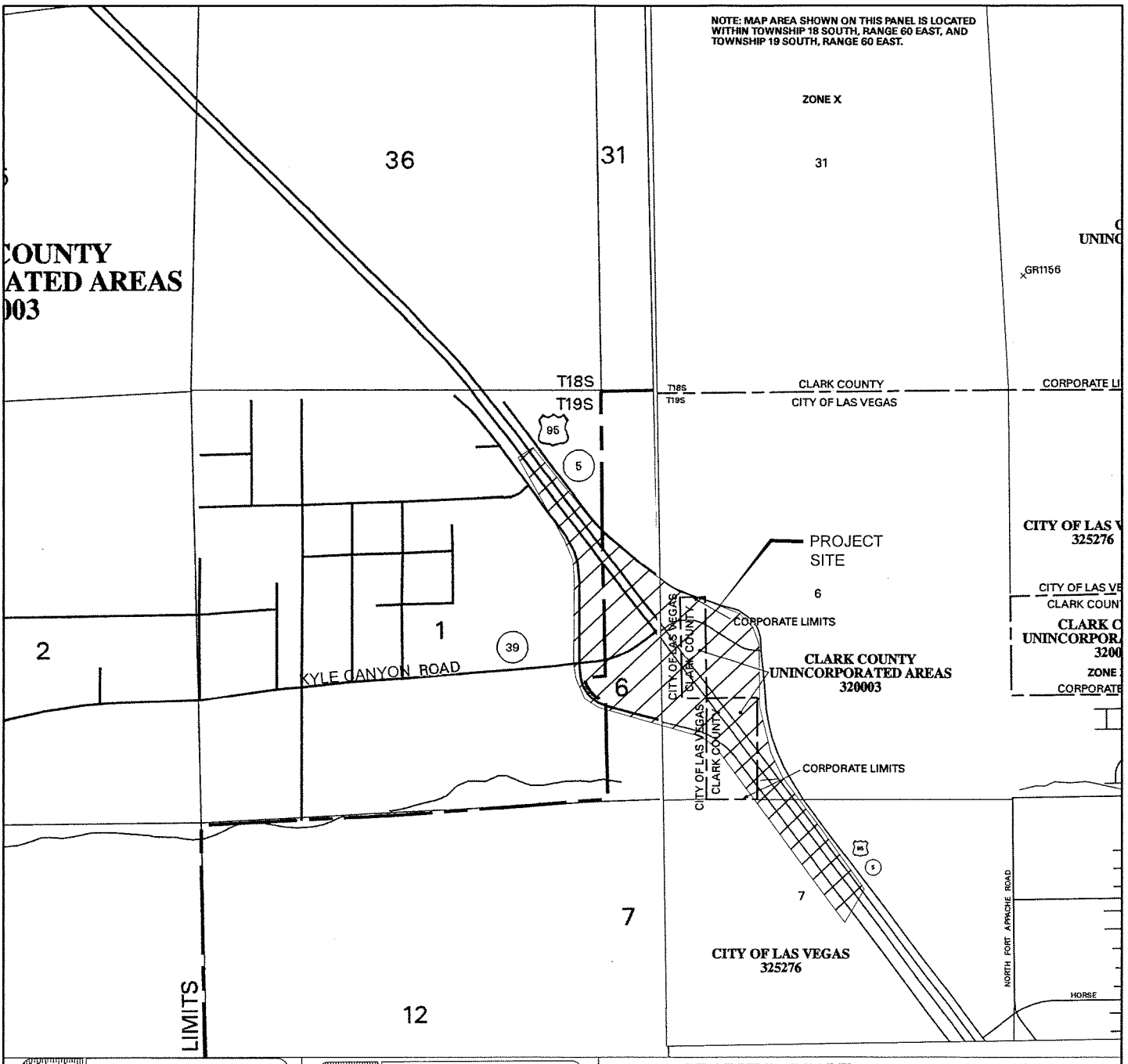
(IN FEET)

1 inch = 1500 ft.

NORTH

GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

eresop 01-29-16 14:40:17 F:\Projects\400\412-634A\Division\Fctl\Figures\GCW_Fig2.dwg



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1735 E

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 1735 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY, UNINCORPORATED AREAS	320003	1735	E
LAS VEGAS, CITY OF	325276	1735	E

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

MAP NUMBER 32003C1735 E

MAP REVISED: SEPTEMBER 27, 2002

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1750 E

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 1750 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LAS VEGAS, CITY OF	325276	1750	E
CLARK COUNTY, UNINCORPORATED AREAS	320003	1750	E

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

MAP NUMBER 32003C1750 E

MAP REVISED: SEPTEMBER 27, 2002

Federal Emergency Management Agency

GRAPHIC SCALE

2000 0 1000 2000

(IN FEET)

1 inch = 2000 ft.

NORTH

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
US 95/KYLE CANYON RD INTERCHANGE

FIGURE 3

F.I.R.M.

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

eresop 01-29-16 14:41:19 F:\Projects\400\412-634A\Division\Fct\Figures\GCW_Fig3.dwg

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVMO		LAS VEGAS WASH - MOCCASIN						
0144	P1	Conc Chnl 27'W 13'D 0:1 SS	1915	12502	2C64-E	LOWER5	77.49	3.10
0184	P1	Conc Chnl 27'W 12.5'D 0:1 SS	2440	12478	2CNW64-C	LOWER5	76.76	3.10
0226	P1	Conc Chnl 27'W 12.5'D 0:1 SS	2500	12478	2CNW64-C	LOWER5	76.76	3.10
0276	P1	Bridge 30'W 10'D	400	11877	CNW51-C	LOWER5	71.44	3.10
MOKC		MOCCASIN AND KYLE CANYON						
0000	P1	11' X 8' RCB	5450	2662	CNW35-C	LOWER3	2.69	3.40
MOSM		MOCCASIN AND SHEEP MOUNTAIN PARKWAY						
0000	P0	14' X 9' RCB	3370	3778	CNW64-C	LOWER3	5.32	2.40
0064	P0	14' X 8' RCB	880	3505	CNW50-C	LOWER3	4.99	3.00
0080	P0	14' X 8' RCB	710	3325	2CNW35-C	LOWER3	4.80	3.00

REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 8
FLOOD CONTROL FACILITIES

LEGEND

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

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

FIGURE 4A

N

0 500 1,000 2,000 3,000
Feet
Scale: 1 inch = 2,000 feet

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

US95 I-15 I-215

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

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
CN95		CENTENNIAL PKWY CHANNEL WEST / U.S 95 BRANCH						
0318	E	Transition Structure	60	653	CNW74-C	WEST3	0.44	1.50
0333	E	5' X 5' RCB	670	339	NW62-S	WEST3	0.22	1.50
MOHU		MOCCASIN - HUALAPAI BRANCH						
0000	P0	14' X 8' RCB	1920	761	2CNW45-N	LOWER3	2.10	0.50
0036	P0	10' X 8' RCB	2590	368	CNW45-N	LOWER3	1.15	0.50
MOIR		MOCCASIN - IRON MOUNTAIN BRANCH						
0000	P0	66" RCP	2770	446	2CNW33-C	LOWER3	1.76	3.60
MOKC		MOCCASIN AND KYLE CANYON						
0000	P1	11' X 8' RCB	5450	2662	CNW35-C	LOWER3	2.69	3.40
MOSM		MOCCASIN AND SHEEP MOUNTAIN PARKWAY						
0000	P0	14' X 9' RCB	3370	3778	CNW64-C	LOWER3	5.32	2.40
0064	P0	14' X 8' RCB	880	3505	CNW50-C	LOWER3	4.99	3.00
0080	P0	14' X 8' RCB	710	3325	2CNW35-C	LOWER3	4.80	3.00

PROJECT SITE

REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 13

FLOOD CONTROL FACILITIES

LEGEND

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

Remove & Replace/Parallel Facilities

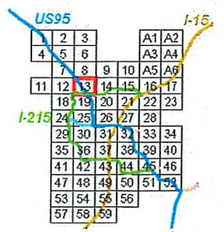
Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

FIGURE 4B

N

0 500 1,000 2,000 3,000
Feet
Scale: 1 inch = 2,000 feet

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



Rainbow Hb. #440.2

RESPONSE TO COMMENTS ON THE MASTER DRAINAGE STUDY FOR KYLE CANYON

784-016-1
784-016-2

December 2006

Prepared For:

Kyle Acquisition Group, LLC
c/o Landtek, LLC
3425 Cliff Edge Shadow Pkwy; Suite 250
Las Vegas, Nevada 89129
Phone: (702) 777-1221
Fax: (702) 645-8852

G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS

CITY OF LAS VEGAS **INTER-OFFICE MEMORANDUM**			**DATE:** March 29, 2007
TO: **Land Development Services** Department of Public Works			**FROM:** Oh Sang Kwon, P.E. OSK Flood Control Department of Public Works
SUBJECT:	Drainage Study for:		**COPIES TO:**
Kyle Canyon Master Drainage Study			G.C. Wallace, Inc.
Cross Streets:	Fort Apache Road & Moccasin Road		Kyle Acquisition Group, LLC.
File Number:	F:\Depot\DSMemos\DS4091B.doc		Jorge Cervantes, P.E., City Eng.
Parcel Number:	125-06-001-001		Bart Anderson, P.E., DevCo
Zoning Action:			Tom Perrigo, Planning
FEMA Flood Zone	YES	NO X	CCRFCD
Proposed Storm Drain	YES X	NO	NDOT

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1st Submittal	10/6/2006	11/9/2006	Not Approved	$1000.00	Paid: $1000
2nd Submittal	12/15/2006	1/12/2007	Conditional Approval	$400.00	Paid: $400
CCRFCD	3/13/2007	3/13/2007	Concurrence	N/C	N/C
CCDS	3/28/2007	3/28/2007	Concurrence	N/C	N/C
			TOTAL FEES (LDDRS):	**$1400.00**	**----**

REMARKS:

The Master Drainage Study for the subject project has been reviewed and:

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.

1. Please note that any future technical drainage study submittals that differ from the Master Drainage Study (ie. Changes in pods, infrastructure, flows etc.) will require an update to the Master Drainage Study and this update must be approved by the City of Las Vegas Flood Control Section prior to final approval of technical drainage study.
2. The proposed interim detention basin will require coordination with the State of Nevada, Division of Water Resources Dam Safety and will require the State's approval prior to permitting.
3. Please coordinate the proposed project with the following projects: **Mountain Edge Parkway, Horse Interchange, Grand Teton Overpass, Brent & Tule Spring Detention Basins, US95 Widening, and Elkhorn Storm Drain System.** These major projects may be impacted by this development and the potential impacts must be addressed from this Master Drainage Study.
4. Please obtain necessary 404 permits from Army Corps of Engineers and provide a copy of the permit to Flood Control prior to issuance of the grading permit. The contact information for Army Corps of Engineers is listed below:

   Steven W. Roberts
   Chief, Regulatory Field Office
   US Army Corps of Engineers

321 North Mall Drive
Suite L-101
St. George, UT 84790

(435) 986-3979 (Office)
(435) 986-3981 (FAX)
steven.w.roberts@usace.army.mil

5. Please note that all storm drain facilities and detention basins shown on Figure 9R, "100-year Flood Protection Facilities Map", and Figure EXH1, "Detention Basin Shadow of Protection Exhibit", that are required to reduce and convey the storm flows must be substantially completed prior to any development as depicted in the Master Drainage Study. Each phase of the development must be individually flood protected.
6. Please note that the proposed 100-year flood protection facilities identified on Figure 9R must be constructed by the Master Developer as a part of the master planned infrastructure. Technical drainage studies are required for each phase of the infrastructure improvements. The technical drainage studies for the infrastructure improvements may be submitted with conditional approval of this Master Drainage Study. However, final approval for the Master Drainage Study must be obtained prior to conditional approval of the infrastructure drainage studies.
7. Technical drainage studies are required for each of the POD's. The technical drainage studies for the POD's may not be submitted until the conditional approval of the pertinent infrastructure drainage study is obtained. Final approval for the infrastructure drainage study must be obtained prior to conditional approval of the impacted POD drainage studies.
8. Building permits for the homes within the individual POD's will not be issued until construction of the street and flood control infrastructure around the POD is substantially complete.
9. As stated in this Master Drainage Study, the proposed developments within ultimate condition Subbasins A-44, A-45, and B-45 cannot be constructed prior to completion of the Horse Drive Interchange storm drain facilities and all pertinent storm drain facilities downstream of the proposed Horse Drive Interchange.
10. Please note that the flows within all non-standard street sections are not allowed to over top the median and overflow onto the lower street. Also, nuisance flows are not allowed to sheet flow across the street. Storm drain facilities must be designed to meet these conditions and these storm drain facilities are the responsibility of the Master Developer.

NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved master drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Amendment and accepted by the *City of Las Vegas Flood Control Section.* Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the Nevada Division of Environmental Protection a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For

more information, including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm or call (775) 687-9429.

END OF REMARKS
osk

T/R/S: T19S/R60E/6 & 7
AREA G-6, 7, & F-12

REGIONAL FLOOD CONTROL DISTRICT

Gale Wm. Fraser, II, P.E.
General Manager/Chief Engineer

BOARD OF DIRECTORS

Larry Brown
Chairman
City of Las Vegas

Chip Maxfield
Vice-Chairman
Clark County

Robert L. Eliason
City of North Las Vegas

Mayor Oscar Goodman
City of Las Vegas

Andy Hafen
City of Henderson

Mayor Bill Nicholes
City of Mesquite

Roger Tobler
City of Boulder City

Bruce L. Woodbury
Clark County

March 8, 2007

Mr. Randy Fultz, P.E.
City of Las Vegas Public Works
731 S. 4th Street
Las Vegas, NV 89101

DISTRICT CONCURRENCE: KYLE CANYON MASTER DRAINAGE STUDY (DS4091) (RFCD No. 06-7114)

Dear Mr. Fultz:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated October 6, 2006, and Addendum No. 1 dated December 15, 2006, for above-mentioned project as submitted by G. C. WALLACE, INC. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Public Works dated January 22, 2007.

District concurs with acceptance of this Technical Drainage Study by City of Las Vegas Public Works.

District's review of this project was limited to issues of Regional Flood Control Significance as defined in *Uniform Regulations for the Control of Drainage*.

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, information submitted by G. C. WALLACE, INC., may be superseded. Compliance with regulatory elements and design standards specified in *Uniform Regulations for the Control of Drainage* does not imply a guarantee that properties will be free from flooding or flood damage. The District, its officials, or employees assume no liability for information, data, or conclusions presented by consulting engineers. We, therefore, make no warranties, either expressed or implied, in conducting this review.

GALE WM. FRASER, II, P.E.
General Manager/Chief Engineer

BY: _____
Abigail Mayrena, P.E.
Associate Engineer

_____
Andrew R. Trelease, P.E., CFM
Principal Civil Engineer

AM:ART:jb

c: James A. Monroe, Jr., P.E., G. C. WALLACE, INC.

\\Soliton\OfficeFiles\Letters and Memos\Local Drainage\Land Development & Drainage\Concurrence Letters\2007\Mar07\19-60-6 GCW.doc

600 S. Grand Central Parkway, Suite 300 • Las Vegas, Nevada 89106-4511
(702) 455-3139 • FAX: (702) 455-3870
Website: *http://www.regionalflood.org*

Department of Development Services
Civil Engineering Division

500 S Grand Central Pky 1st Fl • Box 551799 • Las Vegas NV 89155-1799
(702) 455-4600 • Fax (702) 388-2550

Phil Rosenquist, Director

March 16, 2007

G.C. Wallace, Inc.
1555 S. Rainbow Blvd
Las Vegas, NV 89146

Re: **Technical Drainage Study Concurrence** for Kyle Canyon
Study Dated: August 2006
Addendum #1 Dated: December 2006
Location: SEC of Fort Apache Road and Moccasin Road
(Sec. 6,7,12 T 19 S R 59, 60 E)
CLV# DS4091C
HTE# 07-3957

The above-referenced project is located within the **City of Las Vegas** adjacent to Clark County unincorporated areas. The drainage study was submitted to the County for concurrence on February 23, 2007. In addition, the County has received the City of Las Vegas acceptance letter dated January 22, 2007 for the Technical Drainage Study.

The County concurs with the acceptance of this Technical Drainage Study by the City of Las Vegas. Please note that the County's review of this development is limited to drainage issues significant to Clark County unincorporated areas.

The County's review is solely based on the information submitted by the Engineer of Record. The County's review is strictly limited to compliance with minimum County Codes and Standards. The Engineer of Record is responsible for researching and addressing situations that may require designs above and beyond the minimum codes for issues of public safety and impacts to upstream, downstream and adjacent properties. The County assumes no liability for information data, designs or conclusions of the Engineer of Record.

DEPARTMENT OF DEVELOPMENT SERVICES

By _____
Jeffery J. Jensen, P.E.
Senior Civil Engineer
Civil Engineering Division

BOARD OF COUNTY COMMISSIONERS
RORY REID, Chairman • CHIP MAXFIELD, Vice-Chairman
SUSAN BRAGER • TOM COLLINS • CHRIS GIUNCHIGLIANI • LAWRENCE WEEKLY • BRUCE L. WOODBURY
VIRGINIA VALENTINE, P.E., County Manager

HTE# 07-3957

JJJ/JM

cc: Oh Sang Kwon, P.E., City of Las Vegas
G.C. Wallace, Inc.
Development file

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
1263 S. Stewart Street
Carson City, Nevada 89712

KENNY C. GUINN
Governor

JEFFREY FONTAINE, P.E., *Director*

January 4, 2007

In Reply Refer to:

C010
RYAN BELSICK, PE
GC WALLACE INC
2580 ANTHEM VILLAGE DRIVE
HENDERSON NV 89052

TECHNICAL DRAINAGE STUDY
KYLE CANYON DRAINAGE STUDY
CLARK COUNTY, NV
US95, CL

Dear Mr. Belsick:

The Nevada Department of Transportation (NDOT) Hydraulics Section has received and reviewed the following document for the above-referenced project:

Document:	Dated:
Kyle Canyon Master Drainage Study (KCMDS)	11/18/05
Kyle Canyon Master Drainage Study	11/14/06
Response to Comments on the Kyle Canyon Master Drainage Study	12/20/06

The drainage design information presented in the reviewed document(s):

	is acceptable in concept. Final Hydraulic Section approval will be based on review of final design documents submitted with the NDOT Right-of-Way Occupancy Permit Application that must be submitted for this project.
X	is acceptable in concept. Final Hydraulic Section approval will be based on review of final design documents submitted with the NDOT Right-of-Way Occupancy Permit Application that must be submitted for this project. The following comments should be addressed with the permit application:
	must be supplemented or modified to satisfy the following comment(s) before preliminary Hydraulic Section approval can be granted:

The information presented in the reviewed documents should be updated to reflect the following comments:

1. As previously requested, please discuss and explain any differences in existing condition peak flows along the US95 corridor when comparing the KCMDS to the US95/Horse Drive drainage studies. There are some considerable differences between the two studies for the first couple of US95 cross culverts south of the Kyle Canyon Rd. Additional survey information was collected by VTN to more

MARY APPLE
JAN 08 2007

(NSPO Rev. 11-03)

IOI 4667

accurately model the watersheds for the first couple of culverts south of Kyle Canyon Rd. A tabular comparison of the results from the KCDMS and US95 drainage study would be beneficial.

2. **Pg. 18, 2nd ¶:** Further describe and provide supporting documentation for the potential impacts resulting from the connection of the facilities at CP CHD04A/CHD04B. Please ensure that capacity and overtopping impacts to NDOT roadways are addressed.

3. The improvements proposed as part of the Kyle Canyon Master Drainage Study results in a considerable reduction in peak flow to the US95 corridor and more specifically the Horse Drive Interchange Project. Continued coordination is necessary to ensure MPU facilities constructed as part of the Horse Drive Interchange project (currently at 60% design level) reflects what is proposed and ultimately approved (by CLV and CCRFCD) as part of the KCMDS.

4. The maintenance responsibility for any MPU facilities proposed within NDOT right-of-way as a result of the KCMDS shall be the responsibility of Kyle Canyon Group, CLV or CCRFCD.

All submittals regarding this project must be forwarded through (or copied to) the local NDOT District permitting office. All pertinent drainage design documents (including those previously submitted for preliminary review) must be submitted to the local NDOT District permitting office with the Right-Of-Way Occupancy Permit Application. All plans and reports must be signed and stamped by a Nevada registered civil engineer.

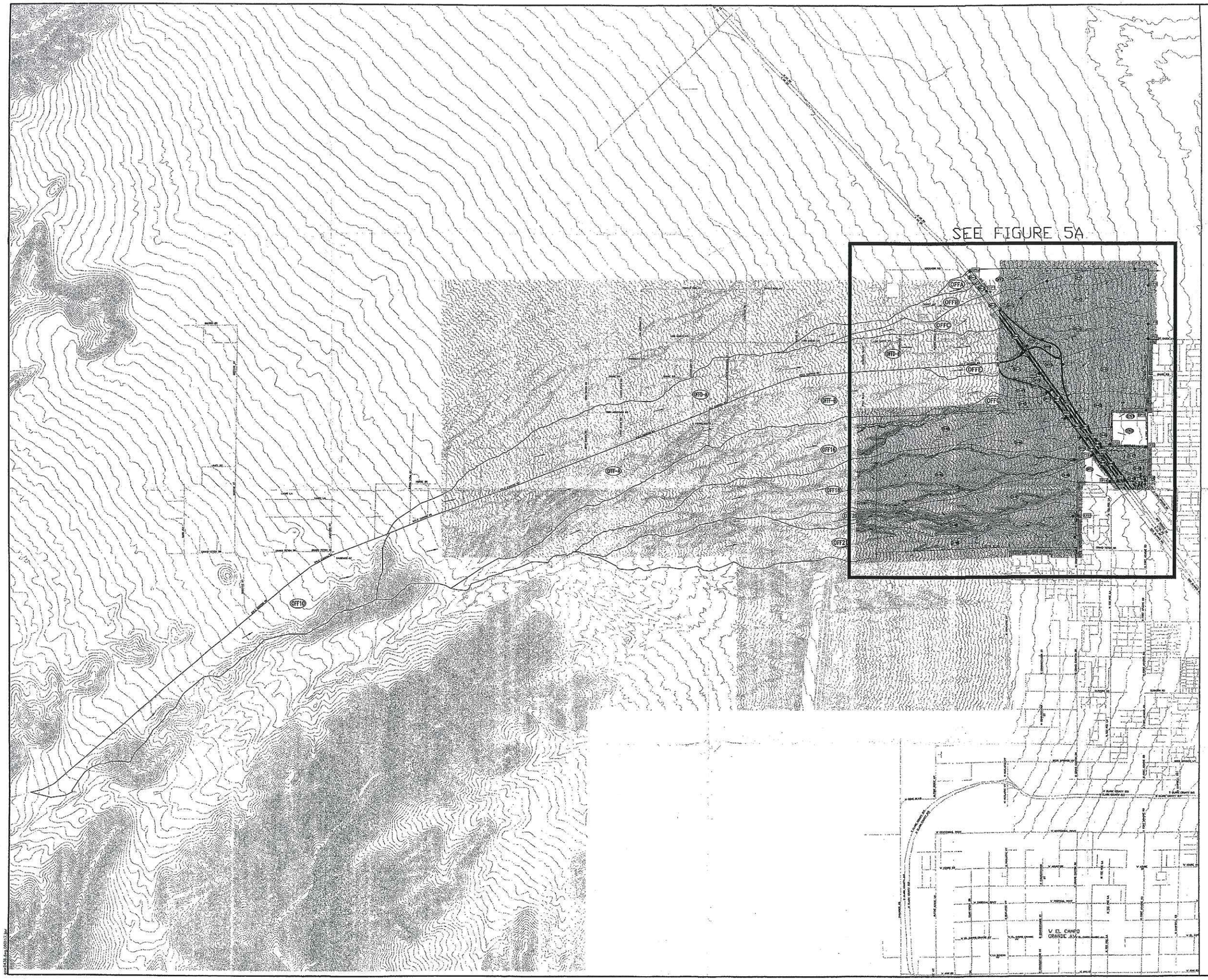
No liability is assumed by the Department in performing this review. Verification and acceptance of all background information, design data and conclusions is the responsibility of the consulting engineer.

Please call me at (775) 888-7623 should you have any questions.

Sincerely,

Matthew L. Nussbaumer, P.E.
Senior Hydraulic Engineer

MLN:bt
cc: Mary Martini, District I Engineer
Kent Sears, District I Admin
Eduardo Miranda, District I Roadway Design
Peter Jackson, City of Las Vegas, Flood Control
Dan Keating, City of Las Vegas
Jill Reilly, Clark County Regional Flood Control District
Steve Wyszomirski, Landtek LLC



NORTH

GRAPHIC SCALE

1500 0 500 1500

(IN FEET)

1 inch = 1600 ft.

LEGEND

SUBBASIN BOUNDARY

ON2 SUBBASIN NAME

FLOW DIRECTION

CP20 COMBINATION POINT

REV	DATE	DESCRIPTION	DATE	AGEN. APP	DATE	GCW. APP	DATE

DESIGN:
DRAWN:
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 08-09-06
PLOT TIME: 13:47:40

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD · LAS VEGAS, NV 89146
T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM

H:\070\784-016\dwg\Hydro\Master Drainage Study\Figures\Fig-Fbuhler

KYLE ACQUISITION GROUP, LLC.

KYLE CANYON MASTER DRAINAGE STUDY

FIGURE 5

EXISTING CONDITIONS DRAINAGE MAP

DRAWING

FIG 5

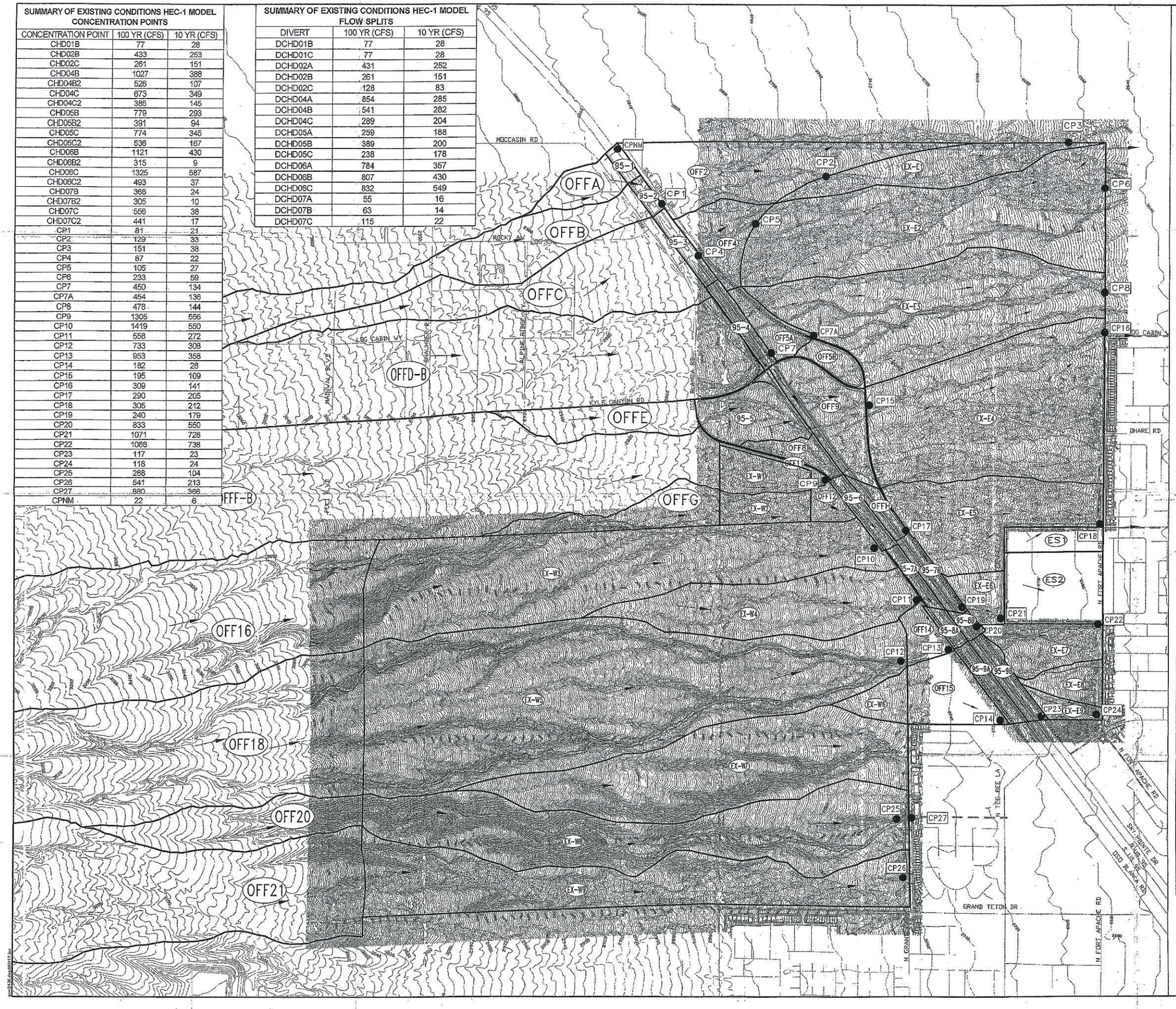
SHT OF SHTS

SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL CONCENTRATION POINTS

CONCENTRATION POINT	100 YR (CFS)	10 YR (CFS)
CHD01B	77	28
CHD02B	433	253
CHD02C	261	151
CHD04B	1027	388
CHD04B2	526	107
CHD04C	673	349
CHD04C2	385	145
CHD05B	779	293
CHD05B2	391	94
CHD05C	774	345
CHD05C2	536	167
CHD06B	1121	430
CHD06B2	315	9
CHD06C	1325	587
CHD06C2	493	37
CHD07B	368	24
CHD07B2	305	10
CHD07C	556	38
CHD07C2	441	17
CP1	81	21
CP2	129	33
CP3	151	38
CP4	87	22
CP5	105	27
CP6	233	59
CP7	450	134
CP7A	454	136
CP8	478	144
CP9	1305	556
CP10	1419	550
CP11	558	272
CP12	733	308
CP13	953	358
CP14	182	28
CP15	195	109
CP16	309	141
CP17	290	205
CP18	305	212
CP19	240	179
CP20	833	550
CP21	1071	728
CP22	1088	738
CP23	117	23
CP24	118	24
CP25	268	104
CP26	541	213
CP27	880	366
CPNM	22	6

SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL FLOW SPLITS

DIVERT	100 YR (CFS)	10 YR (CFS)
DCHD01B	77	28
DCHD01C	77	28
DCHD02A	431	252
DCHD02B	261	151
DCHD02C	128	83
DCHD04A	854	285
DCHD04B	541	282
DCHD04C	289	204
DCHD05A	259	188
DCHD05B	389	200
DCHD05C	238	178
DCHD06A	784	357
DCHD06B	807	430
DCHD06C	832	549
DCHD07A	55	16
DCHD07B	63	14
DCHD07C	115	22



LEGEND

- SUBBASIN BOUNDARY
- ON2 — SUBBASIN NAME
- FLOW DIRECTION
- CP20 — COMBINATION POINT

NORTH

GRAPHIC SCALE

600 0 300 600

(IN FEET)

1 inch = 600 ft.

SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL OFFSITE BASINS

BASIN	AREA (AC)	100 YR (CFS)	10 YR (CFS)
OFFA	12.99	17	4
OFFB	85.55	79	21
OFFC	85.34	80	20
OFFD-A	411.49	343	97
OFFD-B	319.21	232	61
OFFE	24.48	26	6
OFFF-A	636.03	843	322
OFFF-B	391.15	433	160
OFFG	25.98	48	18
OFFH	5.60	15	6
OFF2	59.39	61	15
OFF4	20.39	27	7
OFF5A	10.30	26	11
OFF5B	7.43	18	8
OFF8	8.50	19	8
OFF9	29.87	60	25
OFF10	429.46	591	248
OFF11	2.92	4	1
OFF12	6.02	8	2
OFF14	8.56	19	8
OFF15	23.15	49	19
OFF16	504.67	538	220
OFF18	351.44	480	196
OFF20	42.00	85	33
OFF21	337.93	461	186
95-1	2.71	7	3
95-2	2.80	7	3
95-3	6.06	15	6
95-4	6.99	17	7
95-5	23.63	60	26
95-6	6.65	17	7
95-7A	4.41	13	6
95-7B	7.15	20	10
95-8A	3.32	10	5
95-8B	2.56	8	4
95-9A	7.06	19	9
95-9B	8.51	22	10

SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL ONSITE BASINS

BASIN	AREA (AC)	100 YR (CFS)	10 YR (CFS)
EX-W1	15.36	20	5
EX-W2	13.24	22	7
EX-W3	172.93	268	103
EX-W4	67.06	121	47
EX-W5	285.43	443	170
EX-W6	9.93	21	8
EX-W7	126.63	197	76
EX-W8	139.52	213	81
EX-W9	116.76	173	63
EX-E1	33.75	36	9
EX-E2	140.59	141	35
EX-E3	119.48	112	28
EX-E4	140.56	147	36
EX-E5	63.30	79	22
EX-E6	10.26	21	9
EX-E7	21.31	45	18
EX-E8	10.67	22	9
EX-E9	6.13	13	5
ES1	11.10	29	14
ES2	31.40	84	43

DESIGN:
DRAWN:
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 12-14-06
PLOT TIME: 17:21:55

REV	DATE	DESCRIPTION	DATE	AGENC. APP	DATE	DCNR. APP	DATE

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD - LAS VEGAS, NV 89146
T: 702.804.2000 - F: 702.804.2299 - GCWALLACE.COM

N:\07\0784-01\Dwg\Model\Master Drainage Study\ARTCVFig-5R.dwg

KYLE ACQUISITION GROUP, LLC.

KYLE CANYON MASTER DRAINAGE STUDY

FIGURE 5AR

EXISTING CONDITIONS ONSITE DRAINAGE MAP

DRAWING
FIG 5AR
SHT OF SHTS

EXISTING US 95 CULVERTS			
LOCATION	Q_{100} EX (cfs)	CP/ Subbasin(s)/ Divert	FACILITY
E-1	22	CPNM	6' X 3' RCB
E-2	81	CP1	6' X 3' RCB
E-3	44	50% CP4	6' X 3' RCB
E-4	44	50% CP4	42" CMP
E-5	225	50% CP7	42" CMP
E-6	225	50% CP7	6' X 3' RCB
E-7	NA	NA	Triple 36" CMP
E-8	77	DCHD01B	6' X 3' RCB
E-9	261	DCHD02B	42" CMP
E-10	541	DCHD04B	Triple 42" CMP
E-11	389	DCHD05B	6' X 4' RCB
E-12	807	DCHD06B	DUAL 10' X 4' RCB's
E-13	63	DCHD07B	36" CMP
E-30	267+	DIVCUL8A	6' X 4' RCB
E-31	250+	DIVCUL9A	DUAL 42" CMP
E-32	360+	DIVCUL10A	10' X 4' RCB
E-33	1124+	DIVCUL11A	10' X 10' RCB

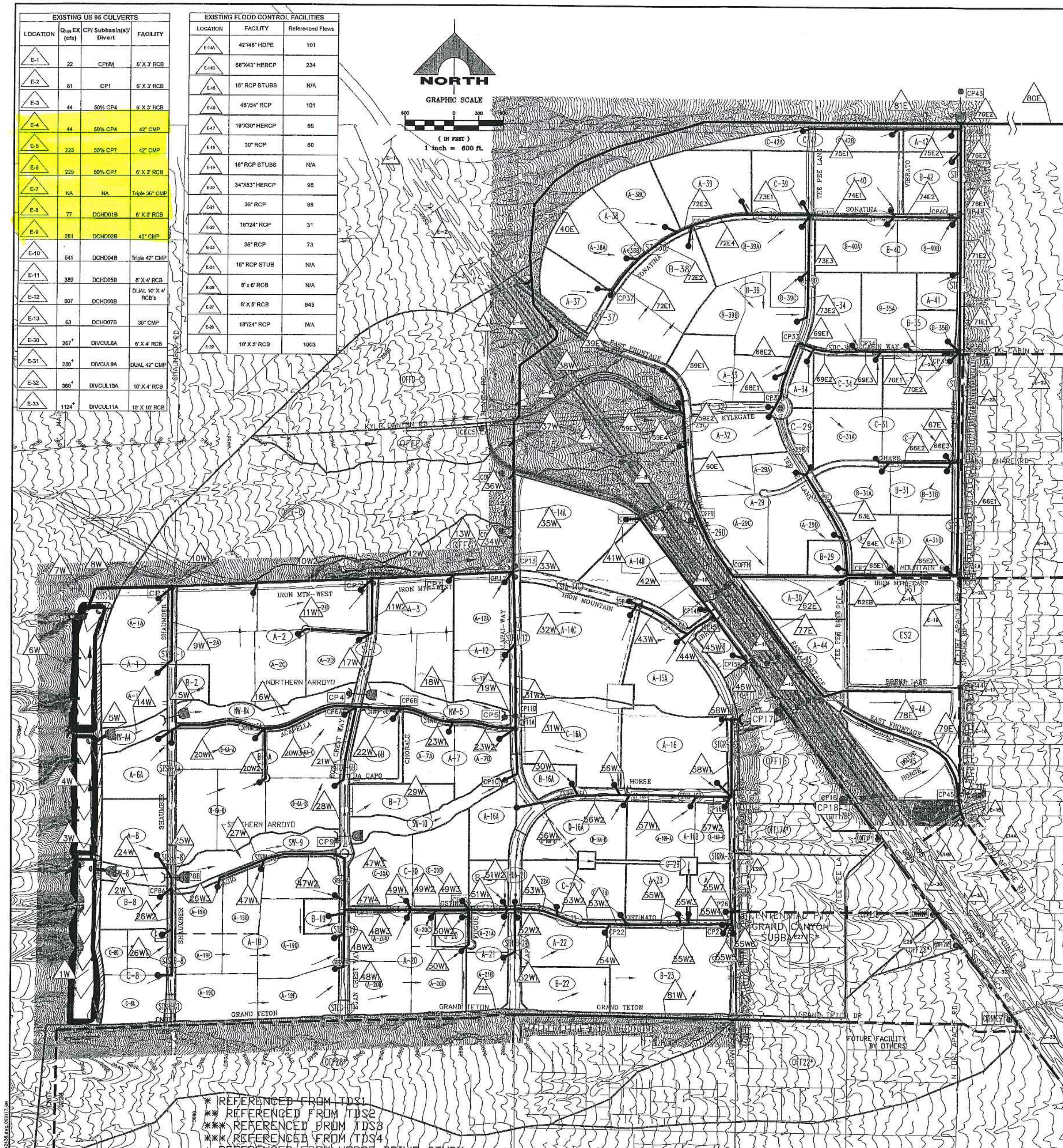
EXISTING FLOOD CONTROL FACILITIES		
LOCATION	FACILITY	Referenced Flows
E-14A	42"/48" HDPE	101
E-14B	68"X43" HERCP	234
E-15	18" RCP STUBS	N/A
E-16	48"/54" RCP	101
E-17	19"X30" HERCP	65
E-18	30" RCP	60
E-19	18" RCP STUBS	N/A
E-20	34"X53" HERCP	98
E-21	36" RCP	98
E-22	18"/24" RCP	31
E-23	36" RCP	73
E-24	18" RCP STUB	N/A
E-25	6' x 6' RCB	N/A
E-27	8' X 5' RCB	845
E-26	18"/24" RCP	N/A
E-29	10' X 5' RCB	1003

NORTH

GRAPHIC SCALE

600 0 300 600

(IN FEET)
1 inch = 600 ft.



* REFERENCED FROM TDS1
** REFERENCED FROM TDS2
*** REFERENCED FROM TDS3
**** REFERENCED FROM TDS4
\+ REFERENCED FROM HORSE DRIVE STUDY

LEGEND

- FLOW DIRECTION
- 1W — FLOOD CONTROL FACILITY
- STREET CROSSING/CULVERT
- EXISTING FLOOD CONTROL FACILITY
- PROPOSED FLOOD CONTROL FACILILTY
- FACILITY BREAK LINE
- FUTURE FACILITY BY OTHERS
- RIPRAP OUTLET PROTECTION PAD

100-YEAR FLOOD CONTROL FACILITIES						
LOCATION	Q_{100} INT2 (cfs)	CP/ Subbasin(s)	Q_{100} INT1 (cfs)	CP/ Subbasin(s)	Design Slope	FACILITY
1W	NA	NA	744	CH1	NA	DETENTION BASIN 1
2W	NA	NA	66	DIV-E	NA	30" RCP*
3W	NA	NA	64	DIV-N	NA	30" RCP*
4W	NA	NA	299	PT	NA	DETENTION BASIN 2
5W	NA	NA	51	DIV-2	NA	30" RCP**
6W	NA	NA	538	OFF16	NA	DETENTION BASIN 3
7W	NA	NA	73	DIV-3	NA	30" RCP**
8W	NA	NA	73	DIV-3	NA	36" RCP**
9W	47	A-1B + STSH-1	47	A-1B + STSH-1	0.40%	54" RCP
10W1	91	CP1	115	CP1	NA	48" RCP**
10W2	180	FACILITY 10W1 + A-2A + B-2	204	FACILITY 10W1 + A-2A + B-2	NA	54" RCP**
11W1	34	A-2C	34	A-2C	3.00%	36" RCP
11W2	77	FACILITY 11W1 + A-2D + ST-2	77	FACILITY 11W1 + A-2D + ST-2	0.40%	60" RCP
12W	300	CP2	323	CP2	NA	60" RCP**
13W	382	CP3	404	CP3	NA	66" RCP**
14W	11	NW-A4	62	DIV-2 + NW-A4	NA	Keep Existing Northern Arroyos
15W	11	NW-A4	62	DIV-2 + NW-A4	3.00%	48" RCP
16W	31	CP4	54	CP4	NA	Keep Existing Northern Arroyos
17W	36	CP4	54	CP4	3.00%	48" RCP
18W	46	CP5	63	CP5	NA	Keep Existing Northern Arroyos
19W	46	CP5	63	CP5	3.00%	48" RCP
20W1	46	A-6A + STSH-6A	46	A-6A + STSH-6A	3.00%	42" RCP
20W2	67	B-6A-B	67	B-6A-B	0.40%	54" RCP
20W3	158	FACILITY 20W1 + FACILITY 20W2 + STNW-6A + B-6A-A	158	FACILITY 20W1 + FACILITY 20W2 + STNW-6A + B-6A-A	3.00%	54" RCP
21W	49	B-6A-D + STEG-6B	49	B-6A-D + STEG-6B	0.40%	54" RCP
22W	244	CP6A + STEG-6B	244	CP6A + STEG-6B	3.00%	60" RCP
23W1	278	CP6B	278	CP6B	3.00%	66" RCP
23W2	369	CP7	369	CP7	3.00%	72" RCP
24W	9	SW-8	75	DIV-E + SW-8	NA	Keep Existing Southern Arroyos
25W	149 (9)	CP8B (INLET CONTROL = SW-8)	177 (75)	CP8B (INLET CONTROL = DIV-E + SW-8)	3.00%	54" RCP
26W1	55	C-8A + C-8C + C-8D	55	C-8A + C-8C + C-8D	NA	30" RCP***
26W2	57	C-8	57	C-8	NA	36" RCP***
26W3	93	CP8A	93	CP8A	NA	42" RCP***
27W	176	CP9	204	CP9	NA	Keep Existing Southern Arroyos
28W	176	CP9	204	CP9	3.00%	6' X 6' RCB
29W	184	CP10	211	CP10	NA	Keep Existing Southern Arroyos
30W	184	CP10	211	CP10	0.40%	6' x 6' RCB
31W1	549	CP11A	678	CP11A	0.40%	10' x 6' RCB
31W2	595	CP11B	635	CP11B	0.40%	11' x 6' RCB
32W	660	CP12	703	CP12	0.40%	12' x 6' RCB
33W	1016	CP13	1079	CP13	NA	16' x 7' RCB**
34W	63	OFFG	47	OFFG	NA	42" RCP**
35W	1073	COFFG	1117	COFFG	NA	16' x 7' RCB**
36W	264	OFFF-C	1295	COFFF1	NA	DUAL 14' X 7' RCB**
37W	1356	CKC5	1638	CKC5	NA	20' x 7' RCB**
38W	1356	CKC5	1638	CKC5	NA	20' x 7' RCB**
39E	1500	CP27A	1967	CP27A	NA	20' x 7' RCB**
40E	NA	NA	2116	CP28	NA	TRAP CHANNEL** 200' BW; 3:1 ss
41W	60	CP14A	78	CP14A	3.00%	48" RCP
42W	134	CP14B	132	CP14B	1.70%	54" RCP
43W	117	CP14C	117	CP14C	1.70%	54" RCP
44W	166	FACILITY 43W + A-15A + ST-15A	156	FACILITY 43W + A-15A + ST-15A	1.70%	60" RCP
45W	318	CP15A	315	CP15A	1.70%	72" RCP
46W	330	CP15B	328	CP15B	1.70%	72" RCP
47W1	20	A-19A	20	A-19A	NA	24" RCP***
47W2	42	FACILITY 47W1 + A-19B	42	FACILITY 47W1 + A-19B	NA	30" RCP***
47W3	52	FACILITY 47W2 + STSW-19	52	FACILITY 47W2 + STSW-19	NA	48" RCP***
47W4	87	FACILITY 47W3 + A-19C + STEG-19A	87	FACILITY 47W3 + A-19C + STEG-19A	NA	54" RCP***
48W1	70	A-19F + A-19G	70	A-19F + A-19G	NA	48" RCP***
48W2	147	FACILITY 48W1 + A-19D + A-19E	147	FACILITY 48W1 + A-19D + A-19E	NA	60" RCP***

100-YEAR FLOOD CONTROL FACILITIES						
LOCATION	Q_{100} INT2 (cfs)	CP/ Subbasin(s)	Q_{100} INT1 (cfs)	CP/ Subbasin(s)	Design Slope	FACILITY
48W3	109	FACILITY 48W2 + B-19 + STEG-19B	109	FACILITY 48W2 + B-19 + STEG-19B	NA	60" RCP***
49W1	251	CP19	251	CP19	NA	60" RCP***
49W2	321	FACILITY 49W1 + A-20A + C-20A	321	FACILITY 49W1 + A-20A + C-20A	NA	60" RCP***
49W3	329	FACILITY 49W2 + A-20C	329	FACILITY 49W2 + A-20C	NA	60" RCP***
50W1	66	A-20B + A-20D	66	A-20B + A-20D	NA	42" RCP***
50W2	78	FACILITY 50W1 + B-20	78	FACILITY 50W1 + B-20	NA	42" RCP***
51W1	452	FACILITY 49W3 + FACILITY 50W2 + C-20B	452	FACILITY 49W3 + FACILITY 50W2 + C-20B	NA	6' x 5' RCB***
51W2	531	CP21	531	CP21	NA	6' x 5' RCB***
52W1	22	A-21B	22	A-21B	NA	30" RCP***
52W2	34	FACILITY 52W1 + STHUB-21	34	FACILITY 52W1 + STHUB-21	NA	36" RCP***
53W1	531	CP21	531	CP21	NA	6' x 5' RCB***
53W2	553	FACILITY 53W1 + C-22A	553	FACILITY 53W1 + C-22A	NA	6' x 5' RCB***
53W3	630	FACILITY 53W2 + FACILITY 54W	630	FACILITY 53W2 + FACILITY 54W	NA	6' x 5' RCB***
54W	77	A-22 + B-22	77	A-22 + B-22	NA	48" RCP***
55W1	660	CP22	660	CP22	NA	6' x 5' RCB***
55W2	698	FACILITY 55W1 + A-23	698	FACILITY 55W1 + A-23	NA	6' x 5' RCB***
55W3	708	FACILITY 55W2 + C-23	708	FACILITY 55W2 + C-23	NA	6' x 5' RCB***
55W4	805	CP23	805	CP23	NA	7' X 5' RCB***
55W5	805	CP23	805	CP23	NA	8' X 5' RCB***
55W6	816	FACILITY 55W5 + STGRA-25 + STGRB-25	816	FACILITY 55W5 + STGRA-25 + STGRB-25	NA	8' X 5' RCB***
55W7	835	CP26	835	CP26	NA	8' X 5' RCB***
56W1	28	A-16A	28	A-16A	NA	30" RCP***
56W2	42	FACILITY 56W1 + B-16A	42	FACILITY 56W1 + B-16A	NA	30" RCP***
56W3	69	FACILITY 56W2 + D-16A	69	FACILITY 56W2 + D-16A	NA	42" RCP***
57W1	179	CP16A	179	CP16A	NA	48" RCP***
57W2	216	FACILITY 57W1 + A-16B-A	216	FACILITY 57W1 + A-16B-A	NA	54" RCP***
58W1	319	CP16B + A-16	319	CP16B + A-16	NA	9' x 5' RCB***
59E1	16	ST-29A	16	ST-29A	NA	24" RCP****
59E2	83	FACILITY 59E1 + FACILITY 59E4	76	FACILITY 59E1 + FACILITY 59E4	NA	54" RCP****
59E3	6	ST-29B	8	ST-29B	NA	18" RCP****
59E4	67	FACILITY 59E3 + OFF5A + OFF5B	60	FACILITY 59E3 + OFF5A + OFF5B	NA	36" RCP****
60E	214	COFF9	191	COFF9	NA	60" RCP****
62E	252	COFFH	225	COFFH	NA	66" RCP****
62EB	38	A-30	38	A-30	NA	30" RCP****
63E	46	A-29A + A-29B + C-29	46	A-29A + A-29B + C-29	NA	30" RCP****
64E	125	A-29 + C-29	125	A-29 + C-29	NA	66" RCP****
65E1	366	CP29	359	CP29	NA	66" RCP****
65E2	412	CP29 + A-31A	385	CP29 + A-31A	3.00%	72" RCP
66E1	423	CP31A	309	CP31A	0.40%	6' x 8' RCB
66E2	58	B-31A + C-31A	58	B-31A + C-31A	3.00%	42" RCP
66E3	123	B-31 + C-31 + ST-31	123	B-13 + C-31 + ST-31	3.00%	48" RCP
67E	547	CP31	519	CP31	0.40%	6' x 10' RCB
68E1	45	CP32	45	CP32	NA	42" RCP****
68E2	99	CP33	99	CP33	NA	42" RCP****
69E1	99	FACILITY 68E2	99	FACILITY 68E2	NA	42" RCP****
69E2	100	FACILITY 69E1 + A-34	100	FACILITY 69E1 + A-34	3.00%	48" RCP
69E3	140	FACILITY 69E2 + B-34	140	FACILITY 69E2 + B-34	3.00%	54" RCP
70E1	172	CP34	172	CP34	3.00%	54" RCP
70E2	207	FACILITY 70E1 + B-35A	207	FACILITY 70E1 + B-35A	3.00%	60" RCP
71E1	737	CP36	705	CP36	0.40%	6' x 12' RCB
71E2	751	FACILITY 71E1 + A-41	719	FACILITY 71E1 + A-41	0.40%	6' x 13' RCB
72E1	31	CP37	31	CP37	NA	30" RCP****
72E2	74	FACILITY 72E1 + A-38A + A-38B	74	FACILITY 72E1 + A-38A + A-38B	NA	36" RCP****
72E3	109	FACILITY 72E2 + A-38C	109	FACILITY 72E2 + A-38C	NA	36" RCP****
72E4	165	CP38	165	CP38	NA	48" RCP****
73E1	233	FACILITY 72E4 + A-39	233	FACILITY 72E4 + A-39	NA	54" RCP****
73E2	47	B-39B	47	B-39B	NA	42" RCP****
73E3	57	FACILITY 73E2 + B-39C	57	FACILITY 73E2 + B-39C	NA	42" RCP****
74E1	361	CP39	361	CP39	NA	66" RCP****
74E2	464	FACILITY 74E1 + A-40 + B-40A	464	FACILITY 74E1 + A-40 + B-40A	3.00%	72" RCP
75E1	14	C-42A	14	C-42A	3.00%	30" RCP
75E2	34	C-42	34	C-42	3.00%	36" RCP
76E1	1069	CP41	1052	CP41	0.40%	6' x 16' RCB
76E2	1111	FACILITY 76E1 + B-42	1081	FACILITY 76E1 + B-42	0.40%	6' x 17' RCB
76E3	1126	CP42	1102	CP42	0.40%	6' x 17' RCB
77E	30	CP65-7B	28	CP65-7B	1.70%	36" RCP
78E	551	CP44	545	CP44	3.00%	TRAP CHANNEL 5' BW, 2:1 SS
79E	46	CP45 (10-Year)	44	CP45 (10-Year)	1.70%	42" RCP
80E	NA	NA	NA	NA	NA	2' - 4' LEVEE APPROXIMATELY 8,000 LF
81W	707	NA	NA	NA	3.00%	6' x 6' RCB

REV	DATE	DESCRIPTION	DATE	AGEN. APP.	DATE	GCW. APP.	DATE:

DESIGN:
DRAWN:
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 10-19-07
PLOT TIME: 10:45:44

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD · LAS VEGAS, NV 89146
T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM

H:\070\784-017\200\DWG\Hydro\RTC\Fig-9U2.dwg rhunter

KYLE ACQUISITION GROUP, LLC.

KYLE CANYON MASTER DRAINAGE STUDY - UPDATE 2

FIGURE 9U2

100-YEAR FLOOD PROTECTION FACILITIES MAP

DRAWING
FIG 9U2
SHT OF SHTS

RUNOFF CURVE NUMBERS - RESIDENTIAL DISTRICTS

Average Lot Size or Usage[1]	Percent Impervious[2]	Curve Number for Hydrologic Soil Groups			
		A	B	C	D
Apartments/Condos	72	81	88	91	93
Townhouses/6,000 sq ft lots or less[3]	69	80	87	90	92
7,000 sq ft lots	63	76	84	89	91
8,000 sq ft lots	58	73	82	88	90
10,000 sq ft lots	38	61	75	83	87
14,000 sq ft lots	30	57	72	81	86
20,000 sq ft lots	25	54	70	80	85
40,000 sq ft lots	20	51	68	79	84
80,000 sq ft lots	12	46	65	77	82

1 Lot size should represent the size of the average lot and not the gross acreage divided by the number of lots.

2 Actual percent impervious value should be compared to selected land use type.

3 In cases where average residential lots are smaller than 6,000 sq ft, commercial/business/industrial land use should be used.

Revision	Date

REFERENCE:

TABLE 602A

RUNOFF CURVE NUMBERS
(URBAN AREAS[1])

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
See Table 602A					
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)[5]		77	86	91	94

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system. Impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using Figure 603.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using Figure 603 based on the impervious area percentage (CN #98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using Figure 603 based on the degree of development impervious area percentage) and the CN's for the newly graded pervious areas.

Revision	Date

RUNOFF CURVE NUMBERS
(SEMIARID RANGELANDS[1])

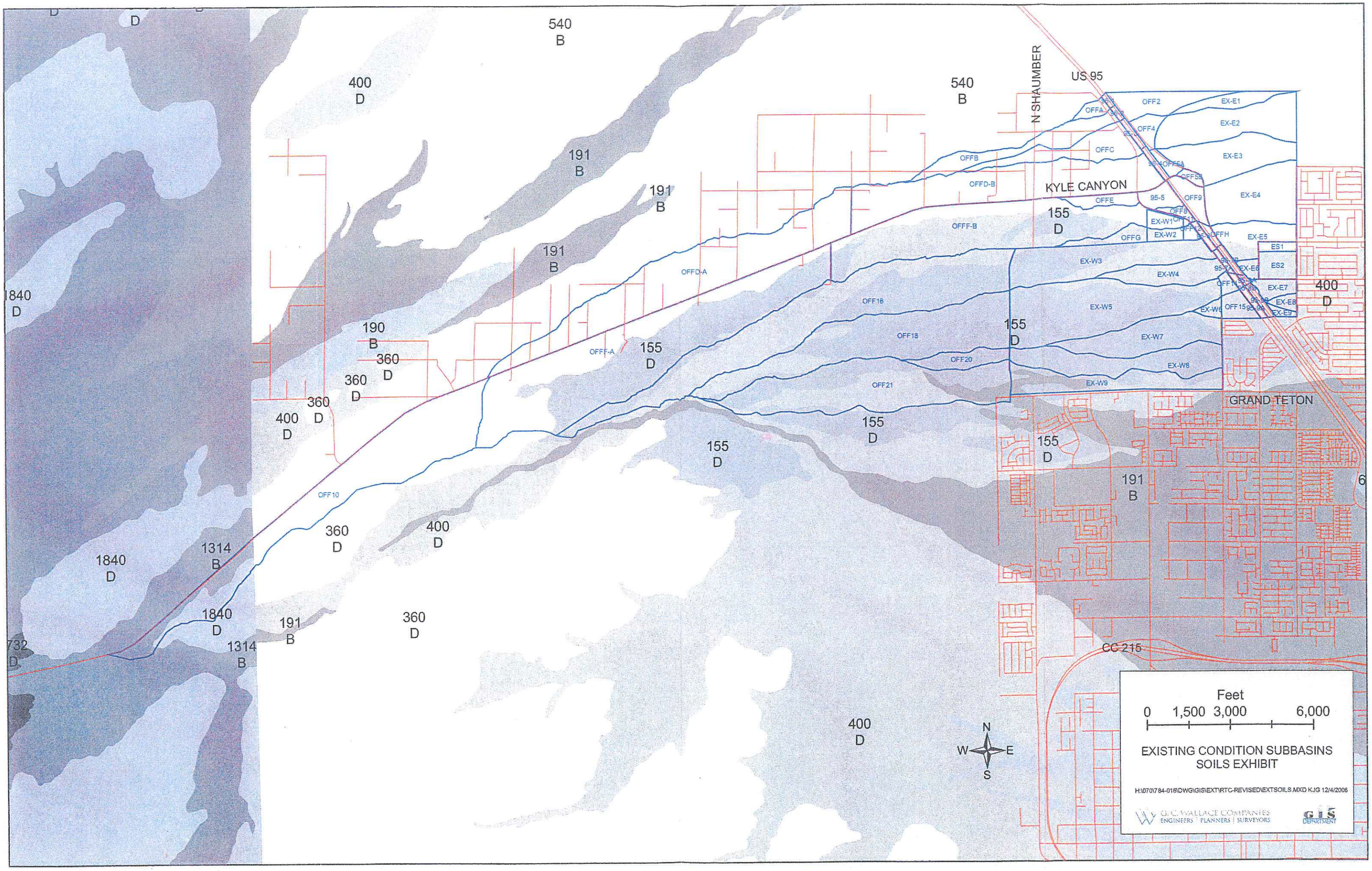
Cover description		Curve numbers for hydrologic soil group—			
Cover type	Hydrologic condition[2]	A[3]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

[1]Average runoff condition, and $I_a = 0.2S$.

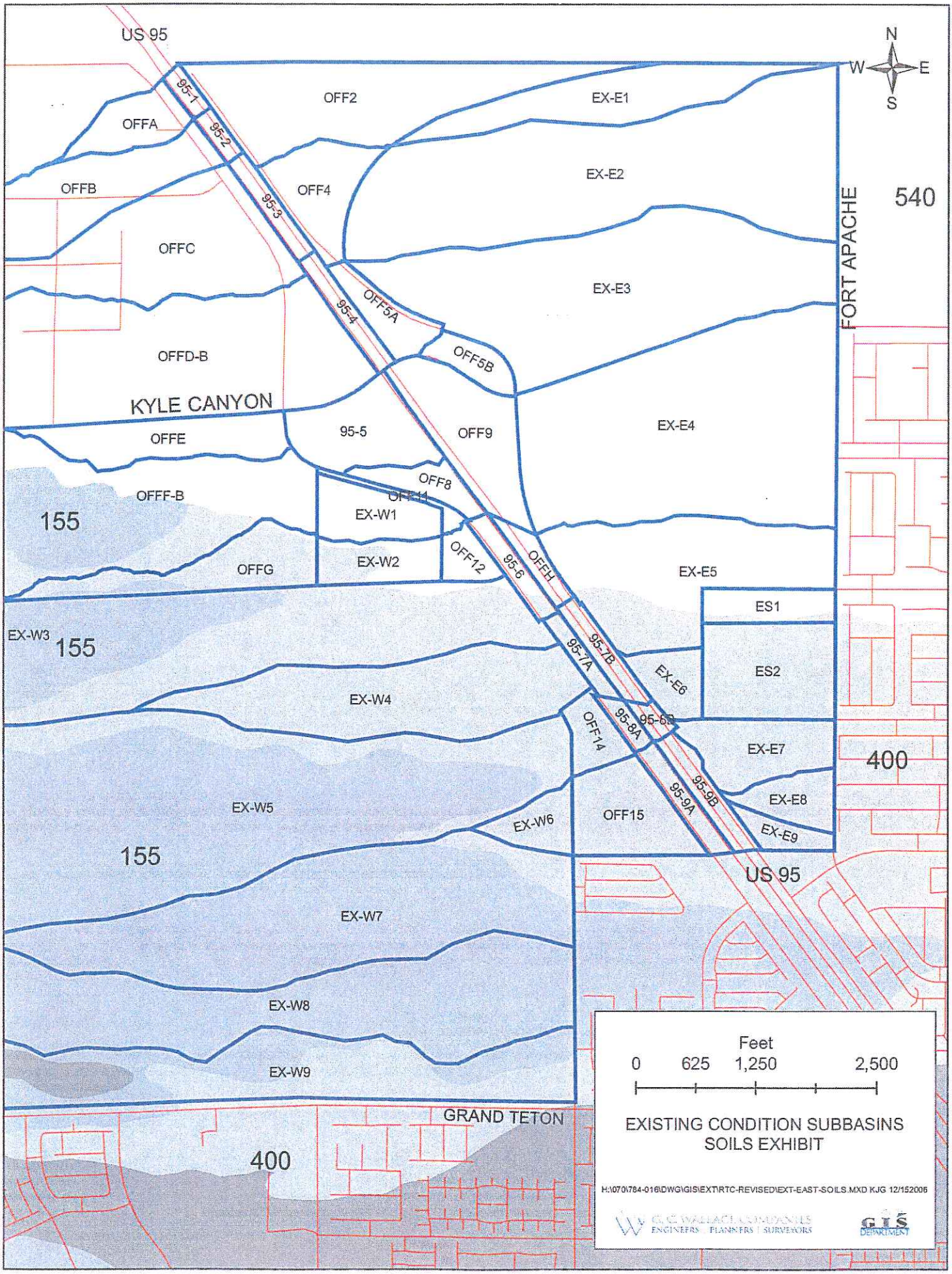
[2]*Poor:* <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: >70% ground cover.

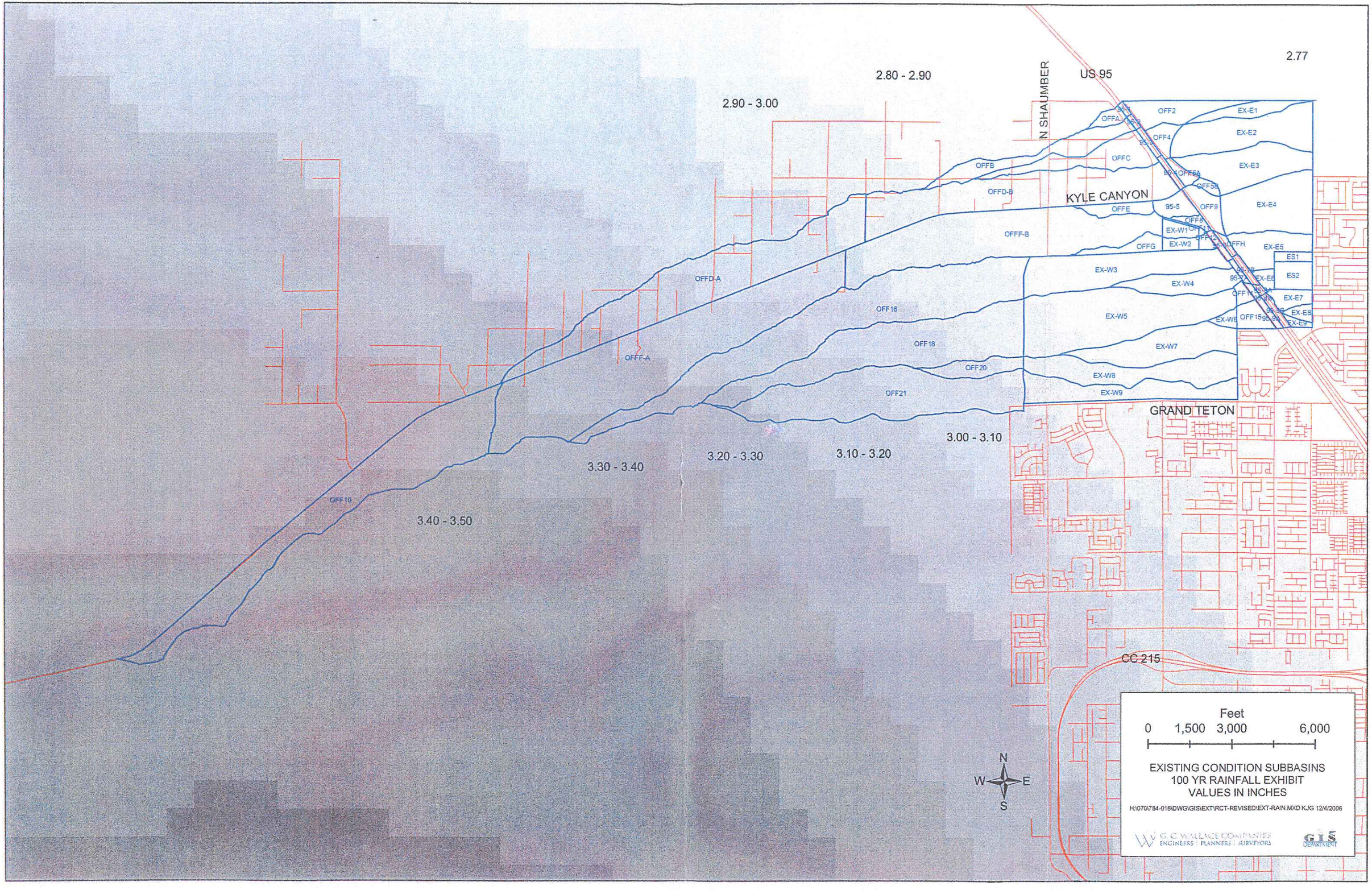
[3]Curve numbers for group A have been developed only for desert shrub.

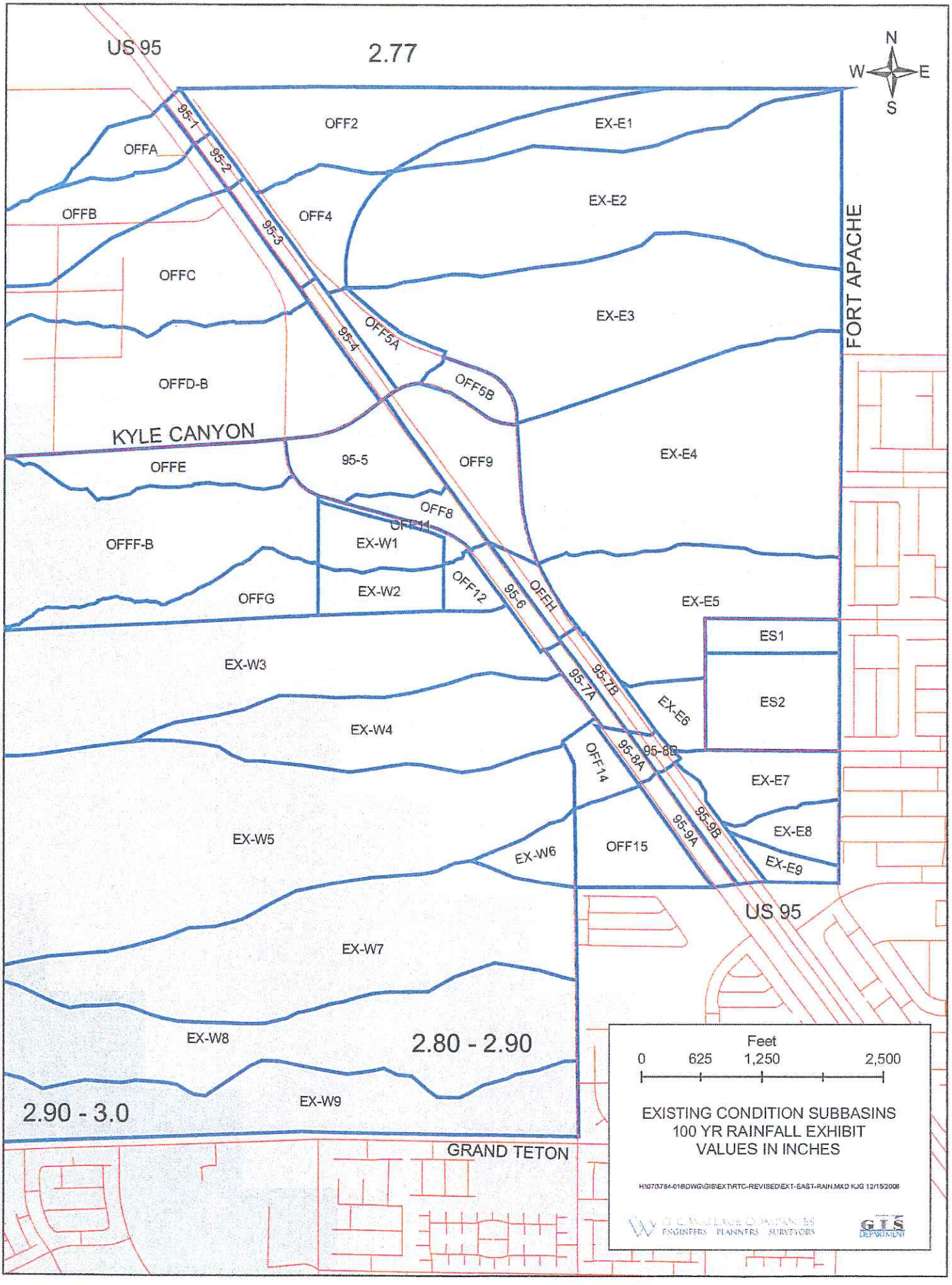
Revision	Date



540
B
400
D
191
B
190
B
360
D
1840
D
1314
B
732
D
155
D
N SHAUMBER
US 95
KYLE CANYON
GRAND TETON
CC 215
OFF2
OFFA
OFF4
OFFC
OFFB
OFFD-B
OFFE
OFFF-B
OFFD-A
OFFF-A
OFF18
OFF20
OFF21
OFF10
OFFG
OFFH
EX-E1
EX-E2
EX-E3
EX-E4
EX-E5
EX-E6
EX-E7
EX-E8
EX-E9
EX-W1
EX-W2
EX-W3
EX-W4
EX-W5
EX-W6
EX-W7
EX-W8
EX-W9
ES1
ES2
95-5
N
W
E
S
Feet
0
1,500
3,000
6,000
EXISTING CONDITION SUBBASINS
SOILS EXHIBIT
H:\070\784-016\DWG\GIS\EXT\RTC-REVISED\EXTSOILS.MXD KJG 12/4/2006
G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
GIS DEPARTMENT


US 95
N
W
E
S
OFF2
EX-E1
OFFA
95-1
95-2
EX-E2
OFFB
OFF4
95-3
540
FORT APACHE
OFFC
EX-E3
OFF5A
95-4
OFF5B
OFFD-B
KYLE CANYON
EX-E4
OFFE
95-5
OFF9
OFF8
OFF11
OFFF-B
155
EX-W1
OFF12
95-6
OFFH
EX-E5
OFFG
EX-W2
ES1
EX-W3
155
95-7B
95-7A
ES2
EX-E6
EX-W4
95-8B
95-8A
OFF14
EX-E7
400
EX-W5
EX-W6
OFF15
95-9B
95-9A
EX-E8
EX-E9
155
US 95
EX-W7
EX-W8
EX-W9
GRAND TETON
400
Feet
0
625
1,250
2,500
EXISTING CONDITION SUBBASINS
SOILS EXHIBIT
H:\070\784-016\DWG\GIS\EXT\RTC-REVISED\EXT-EAST-SOILS.MXD KJG 12/15/2006
G.C. WALLACE, INC.
ENGINEERS | PLANNERS | SURVEYORS
GIS
DEPARTMENT


2.77
2.80 - 2.90
2.90 - 3.00
US 95
N SHAUMBER
KYLE CANYON
GRAND TETON
CC 215
OFF2
EX-E1
EX-E2
OFFA
OFF4
OFFC
EX-E3
OFFB
OFF5A
OFF5B
OFFD-B
OFFE
95-5
OFF9
EX-E4
OFF8
EX-W1
OFF11
OFFF-B
OFFG
EX-W2
OFFH
EX-E5
ES1
ES2
EX-W3
EX-E6
EX-W4
EX-E7
OFFD-A
OFF16
EX-W5
EX-E8
EX-W6
OFF15
EX-E9
OFFF-A
OFF18
EX-W7
OFF20
EX-W8
OFF21
EX-W9
3.00 - 3.10
3.20 - 3.30
3.10 - 3.20
3.30 - 3.40
OFF10
3.40 - 3.50
N
W
E
S
Feet
0 1,500 3,000 6,000
EXISTING CONDITION SUBBASINS
100 YR RAINFALL EXHIBIT
VALUES IN INCHES
H:\070\784-016\DWG\GIS\EXT\RCT-REVISED\EXT-RAIN.MXD KJG 12/4/2006
G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
GIS DEPARTMENT


US 95
2.77
N
W
E
S
95-1
95-2
95-3
95-4
95-5
95-6
95-7A
95-7B
95-8A
95-8B
95-9A
95-9B
OFF2
EX-E1
OFFA
EX-E2
OFFB
OFF4
OFFC
EX-E3
FORT APACHE
OFF5A
OFF5B
OFFD-B
KYLE CANYON
EX-E4
OFFE
OFF9
OFF8
OFF11
EX-W1
OFFF-B
EX-E5
OFFG
EX-W2
OFF12
OFFH
ES1
EX-W3
ES2
EX-E6
EX-W4
OFF14
EX-E7
EX-E8
EX-W5
EX-W6
OFF15
EX-E9
US 95
EX-W7
EX-W8
2.80 - 2.90
EX-W9
2.90 - 3.0
GRAND TETON
Feet
0
625
1,250
2,500
EXISTING CONDITION SUBBASINS
100 YR RAINFALL EXHIBIT
VALUES IN INCHES
H:\07\0784-01\BDWG\GIS\EXT\RTC-REVISED\EXT-EAST-RAIN.MXD KJG 12/15/2006
ENGINEERS PLANNERS SURVEYORS
GIS DEPARTMENT

KYLE CANYON MASTER DRAINAGE STUDY
SOILS DESCRIPTION TABLES

G.C. WALLACE, INC.

DATE: 12/14/2006
FILE: CN-TABLE.xls
BY: REH/RRD

Hydrologic Soil Group	Desert Shrub (Poor Condition)	Newly Graded Areas	Commercial & Business	Streets and Roads**	I-95 Corridor***
A	63.0	77.0	89.0	91.0	83.0
B	77.0	86.0	92.0	93.8	89.0
C	85.0	91.0	94.0	95.4	92.0
D	88.0	94.0	95.0	96.0	93.0
Rock	92.0	92.0	92.0	92.0	92.0

*- Composite residential CN values are 85% residential an
**- Street and Roads CN values are 80% impervious and 20% natural desert la
***- I 95 Corridor is based on Paved roads with open ditches from Table 602 (1 of 4) from the Manual

SOIL 155 Cave (gravelly fine sandy loam)

Description	Type	%	Desert Shrub (Poor Condition)	Newly Graded Areas	Commercial & Business	Streets and Roads**	I-95 Corridor***
Arizo	A	5%	63.0	77.0	89.0	91.0	83.0
Caliza	B	5%	77.0	86.0	92.0	93.8	89.0
Cave	D	90%	88.0	94.0	95.0	96.0	93.0
Composite CN		100%	86.2	92.8	94.6	95.6	92.3

SOIL 191 Dalian (very cobbly fine sandy loam)

Description	Type	%	Desert Shrub (Poor Condition)	Newly Graded Areas	Commercial & Business	Streets and Roads**	I-95 Corridor***
Arizo	A	5%	63.0	77.0	89.0	91.0	83.0
Dalian	B	85%	77.0	86.0	92.0	93.8	89.0
Tencee	D	10%	88.0	94.0	95.0	96.0	93.0
Composite CN		100%	77.4	86.4	92.2	93.9	89.1

SOIL 360 Rock outcrop-St. Thomas complex

Description	Type	%	Desert Shrub (Poor Condition)	Newly Graded Areas	Commercial & Business	Streets and Roads**	I-95 Corridor***
Bracken/Weiser	B	15%	77.0	86.0	92.0	93.8	89.0
St. Thomas	D	35%	88.0	94.0	95.0	96.0	93.0
Rock Outcrop	ROCK	50%	92.0	92.0	92.0	92.0	92.0
Composite CN		100%	88.4	91.8	93.1	93.7	91.9

SOIL 400 Tencee (very gravelly fine sandy loam)

Description	Type	%	Desert Shrub (Poor Condition)	Newly Graded Areas	Commercial & Business	Streets and Roads**	I-95 Corridor***
Dalian	B	10%	77.0	86.0	92.0	93.8	89.0
Tencee	D	90%	88.0	94.0	95.0	96.0	93.0
Composite CN		100%	86.9	93.2	94.7	95.8	92.6

SOIL 540 Weiser (extremely gravelly fine sandy loam)

Description	Type	%	Desert Shrub (Poor Condition)	Newly Graded Areas	Commercial & Business	Streets and Roads**	I-95 Corridor***
Arizo	A	5%	63.0	77.0	89.0	91.0	83.0
Desert Pavement	B	85%	77.0	86.0	92.0	93.8	89.0
Goodsprings	D	10%	88.0	94.0	95.0	96.0	93.0
Composite CN		100%	77.4	86.4	92.2	93.9	89.1

SOIL 630 Badland

Description	Type	%	Desert Shrub (Poor Condition)	Newly Graded Areas	Commercial & Business	Streets and Roads**	I-95 Corridor***
Badlands	D	100%	88.0	94.0	95.0	96.0	93.0
Composite CN		100%	88.0	94.0	95.0	96.0	93.0

SOIL 1314

Description	Type	%	Desert Shrub (Poor Condition)	Newly Graded Areas	Commercial & Business	Streets and Roads**	I-95 Corridor***
	B	81%	77.0	86.0	92.0	93.8	89.0
	C	4%	85.0	91.0	94.0	95.4	92.0
	D	15%	88.0	94.0	95.0	96.0	93.0
Composite CN		100%	79.0	87.4	92.5	94.2	89.7

SOIL 1731

Description	Type	%	Desert Shrub (Poor Condition)	Newly Graded Areas	Commercial & Business	Streets and Roads**	I-95 Corridor***
	C	9%	85.0	91.0	94.0	95.4	92.0
	D	91%	88.0	94.0	95.0	96.0	93.0
Composite CN		100%	87.7	93.7	94.9	95.9	92.9

SOIL 1840

Description	Type	%	Desert Shrub (Poor Condition)	Newly Graded Areas	Commercial & Business	Streets and Roads**	I-95 Corridor***
	A	1%	63.0	77.0	89.0	91.0	83.0
	B	5%	85.0	91.0	94.0	95.4	92.0
	D	84%	88.0	94.0	95.0	96.0	93.0
	Rock	10%	92.0	92.0	92.0	92.0	92.0
Composite CN		100%	88.0	93.5	94.6	95.5	92.8

Kyle Canyon
Composite Curve Numbers
Existing Conditions Onsite

Basin	Soil Type	Percent	CN*	Composite CN
ES1	400	19.9%	94.7	92.7
	540	80.1%	92.2	
ES2	400	100.0%	94.7	94.7
EX-E1	540	100.0%	77.4	77.4
EX-E2	540	100.0%	77.4	77.4
EX-E3	540	100.0%	77.4	77.4
EX-E4	540	100.0%	77.4	77.4
EX-E5	400	21.7%	86.9	79.5
	540	78.3%	77.4	
EX-E6	400	100.0%	86.9	86.9
EX-E7	400	100.0%	86.9	86.9
EX-E8	400	100.0%	86.9	86.9
EX-E9	400	100.0%	86.9	86.9

Basin	Soil Type	Percent	CN*	Composite CN
EX-W1	540	100.0%	77.4	77.4
EX-W2	400	44.2%	86.9	81.6
	540	55.8%	77.4	
EX-W3	155	54.1%	86.2	86.4
	400	44.2%	86.9	
	540	1.7%	77.4	
EX-W4	400	100.0%	86.9	86.9
EX-W5	155	85.6%	86.2	86.3
	400	14.4%	86.9	
EX-W6	400	100.0%	86.9	86.9
EX-W7	155	93.2%	86.2	86.2
	400	6.8%	86.9	
EX-W8	155	100.0%	86.2	86.2
EX-W9	155	47.2%	86.2	84.4
	191	22.9%	77.4	
	400	29.9%	86.9	

DARFs were determined by the amount of area contributing to the flow, including that from diverts. Therefore, the areas used for DARFs are not necessarily those shown on the HEC-1 model.

The areas used for DARFs that differ from that in the HEC-1 model are organized by the HEC-1 model used:

Existing Conditions HEC-1 Model: (EX.OUT)

Name	Area (mi^2)	Explanation	Total Area (mi^2)
CHD02B	2.39	(Area shown + DCHD02A)	(0.09+2.30=2.39)
DCHD02B	2.39	(Area shown + DCHD02A)	(0.09+2.30=2.39)
CHD04B	3.53	(Area shown + DCHD04A)	(0.10+3.43=3.53)
DCHD04B	3.53	(Area shown + DCHD04A)	(0.10+3.43=3.53)
CHD5B	3.65	(Area shown + DCHD05A)	(0.11+3.54=3.65)
DCHD05B	3.65	(Area shown + DCHD05A)	(0.11+3.54=3.65)
CHD06B	4.66	(Area shown + DCHD06A)	(0.11+4.55=4.66)
DCHD06B	4.66	(Area shown + DCHD06A)	(0.11+4.55=4.66)
CHD07B	4.72	(Area shown + DCHD07A)	(0.12+4.60=4.72)
DCHD07B	4.72	(Area shown + DCHD07A)	(0.12+4.60=4.72)
CHD01C	0.08	(DCHD01B)	(0.08)
DCHD01C	0.08	(DCHD01B)	(0.08)
CHD02C	2.39	(DCHD02B)	(2.39)
DCHD02C	2.39	(DCHD02B)	(2.39)
CHD04C	3.53	(DCHD04B)	(3.53)
DCHD04C	3.53	(DCHD04B)	(3.53)
CHD5C	3.65	(DCHD05B)	(3.65)
DCHD05C	3.65	(DCHD05B)	(3.65)
CHD06C	4.66	(DCHD06B)	(4.66)
DCHD06C	4.66	(DCHD06B)	(4.66)
CHD07C	4.72	(DCHD07B)	(4.72)
DCHD07C	4.72	(DCHD07B)	(4.72)
CP15	2.44	(Area shown + DCHD02C)	(0.05+2.39=2.44)
CP16	2.66	(Area shown + DCHD02C)	(0.27+2.39=2.66)
CP17	3.54	(Area shown + DCHD04C)	(0.01+3.53=3.54)
CP18	3.66	(Area shown + DCHD04C)	(0.13+3.53=3.66)
CP19	3.66	(Area shown + DCHD05C)	(0.01+3.65=3.66)
CP20	4.66	(Area shown + DCHD06C)	(0.00+4.66=4.66)
CP21	4.69	(Area shown + DCHD06C)	(0.03+4.66=4.69)
CP22	4.79	(Area shown + DCHD06C)	(0.13+4.66=4.79)
CP23	4.73	(Area shown + DCHD07C)	(0.01+4.72=4.73)
CP24	4.74	(Area shown + DCHD07C)	(0.02+4.72=4.74)

Interim Conditions HEC-1 Model: (INT.OUT)

Name	Area (mi^2)	Explanation	Total Area (mi^2)
CHD02B	0.10	(Area shown + DCHD02A)	(0.05+0.05=0.10)
DCHD02B	0.10	(Area shown + DCHD02A)	(0.05+0.05=0.10)
CHD04B	0.11	(Area shown + DCHD02A)	(0.06+0.05=0.11)
DCHD04B	0.11	(Area shown + DCHD02A)	(0.06+0.05=0.11)
CHD5B	0.27	(Area shown + DCHD05A)	(0.07+0.20=0.27)
DCHD05B	0.27	(Area shown + DCHD05A)	(0.07+0.20=0.27)
CHD06B	0.46	(Area shown + DCHD06A)	(0.07+0.39=0.46)
DCHD06B	0.46	(Area shown + DCHD06A)	(0.07+0.39=0.46)
CHD07B	0.51	(Area shown + DCHD07A)	(0.08+0.43=0.51)
DCHD07B	0.51	(Area shown + DCHD07A)	(0.08+0.43=0.51)
CHD01C	0.04	(DCHD01B)	(0.04)
DCHD01C	0.04	(DCHD01B)	(0.04)

CHD02C	0.10	(DCHD02B)	(0.10)
DCHD02C	0.10	(DCHD02B)	(0.10)
CHD04C	0.11	(DCHD04B)	(0.11)
DCHD04C	0.11	(DCHD04B)	(0.11)
CHD5C	0.27	(DCHD05B)	(0.27)
DCHD05C	0.27	(DCHD05B)	(0.27)
CHD06C	0.46	(DCHD06B)	(0.46)
DCHD06C	0.46	(DCHD06B)	(0.46)
CHD07C	0.51	(DCHD07B)	(0.51)
DCHD07C	0.51	(DCHD07B)	(0.51)
CP27A	4.16	(Area shown + DCKC7)	(1.17+2.99=4.16)
CP28	4.59	(Area shown + DCKC7)	(1.60+2.99=4.59)
COFF9	0.16	(Area shown + DCHD02C)	(0.06+0.10=0.16)
COFFH	0.18	(Area shown + DCHD04C)	(0.07+0.11=0.18)
CP29	0.29	(Area shown + DCHD04C)	(0.18+0.11=0.29)
DECP29	0.29	(Area shown + DCHD04C)	(0.18+0.11=0.29)
CP31	0.37	(Area shown + DCHD04C)	(0.26+0.11=0.37)
DECP31	0.37	(Area shown + DCHD04C)	(0.26+0.11=0.37)
CP36	0.51	(Area shown + DCHD04C)	(0.40+0.11=0.51)
DECP36	0.51	(Area shown + DCHD04C)	(0.40+0.11=0.51)
CP41	0.92	(Area shown + DCHD04C)	(0.81+0.11=0.92)
CP42	0.95	(Area shown + DCHD04C)	(0.84+0.11=0.95)
CP43	5.54	(CP28 + CP42)	(4.59+0.95=5.54)
CP95-7B	0.28	(Area shown + DCHD05C)	(0.01+0.27=0.28)
CP95-8B	0.46	(Area shown + DCHD06C)	(0.00+0.46=0.46)
CP44A	0.49	(Area shown + DCHD06C)	(0.03+0.46=0.49)
CP44B	0.59	(Area shown + DCHD06C)	(0.13+0.46=0.59)
CP95-9B	0.52	(Area shown + DCHD07C)	(0.01+0.51=0.52)
CP45	0.53	(Area shown + DCHD07C)	(0.02+0.51=0.53)
CP30	0.31	(Area shown + DECP29)	(0.02+0.29=0.31)

Ultimate Conditions HEC-1 Model: (ULT.OUT)

Name	Area (mi^2)	Explanation	Total Area (mi^2)
CHD5B	0.27	(Area shown + DCHD05A)	(0.07+0.20=0.27)
DCHD05B	0.27	(Area shown + DCHD05A)	(0.07+0.20=0.27)
CHD06B	0.46	(Area shown + DCHD06A)	(0.07+0.39=0.46)
DCHD06B	0.46	(Area shown + DCHD06A)	(0.07+0.39=0.46)
CHD07B	0.51	(Area shown + DCHD07A)	(0.08+0.43=0.51)
DCHD07B	0.51	(Area shown + DCHD07A)	(0.08+0.43=0.51)
CHD01C	0.04	(DCHD01B)	(0.04)
DCHD01C	0.04	(DCHD01B)	(0.04)
CHD02C	0.05	(DCHD02B)	(0.05)
DCHD02C	0.05	(DCHD02B)	(0.05)
CHD04C	0.06	(DCHD04B)	(0.06)
DCHD04C	0.06	(DCHD04B)	(0.06)
CHD5C	0.27	(DCHD05B)	(0.27)
DCHD05C	0.27	(DCHD05B)	(0.27)
CHD06C	0.46	(DCHD06B)	(0.46)
DCHD06C	0.46	(DCHD06B)	(0.46)
CHD07C	0.51	(DCHD07B)	(0.51)
DCHD07C	0.51	(DCHD07B)	(0.51)
CP27A	1.06	(Area shown + DCKC7)	(0.17+0.89=1.06)
COFF9	0.11	(Area shown + DCHD02C)	(0.06+0.05=0.11)
COFFH	0.13	(Area shown + DCHD04C)	(0.07+0.06=0.13)
CP29	0.24	(Area shown + DCHD04C)	(0.18+0.06=0.24)

DECP29	0.24	(Area shown + DCHD04C)	(0.18+0.06=0.24)
CP31	0.32	(Area shown + DCHD04C)	(0.26+0.06=0.32)
DECP31	0.32	(Area shown + DCHD04C)	(0.26+0.06=0.32)
CP36	0.46	(Area shown + DCHD04C)	(0.40+0.06=0.46)
DECP36	0.46	(Area shown + DCHD04C)	(0.40+0.06=0.46)
CP41	0.87	(Area shown + DCHD04C)	(0.81+0.06=0.87)
CP42	0.90	(Area shown + DCHD04C)	(0.84+0.06=0.90)
CP43	1.96	(CP27A + CP42)	(1.06+0.90=1.96)
CP30	0.26	(Area shown + DECP29)	(0.02+0.24=0.26)

HYDROLOGIC CRITERIA AND DESIGN MANUAL

TIME OF CONCENTRATION

G. C. WALLACE, INC.
Engineers/Planners/Surveyors

Kyle Canyon Master Drainage Study
Existing Conditions
Onsite Analysis

Project No: 784-016
Date: 8/12/05
Calculated by: AKS

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK URBANIZED BASINS		Tc	Tlag	REMARKS
DESIG: (1)	DEV./EX. (D or E)	CN (16)	K (2)	AREA Ac (3)	AREA Sq Mi (4)	INITIAL LENGTH Feet (5)	SLOPE % (6)	Ti Min (7)	TRAVEL LENGTH Feet (8)	SLOPE % (9a)	V1 VELOCITY fps (9b)	V2 VELOCITY fps (10)	Tt Min (11)	TOTAL LENGTH Feet (12)	Tc = (L/180)+10 Min (13)	Min (14)	Tlag = 0.6Tc/60 Hours (15)	Remarks: Precipitation
EX-W1	E	77.4	0.6317	15.36	0.0240	240	2.9	9.1	1086	3.2	2.7	5.3	5.0	1326	N/A	14.1	0.141	2.77
EX-W2	E	81.6	0.6871	13.24	0.0207	171	4.1	6.1	1145	3.3	2.7	5.4	5.1	1316	N/A	11.2	0.112	2.77
EX-W3	E	86.4	0.7505	172.93	0.2702	139	19.4	2.8	7705	3.0	2.6	5.1	26.8	7844	N/A	29.5	0.295	2.82
EX-W4	E	86.9	0.7571	67.06	0.1048	297	13.1	4.5	4450	3.3	2.7	5.3	15.4	4747	N/A	19.9	0.199	2.78
EX-W5	E	86.3	0.7492	285.43	0.4460	152	12.5	3.4	8352	3.3	2.7	5.4	27.4	8504	N/A	30.8	0.308	2.86
EX-W6	E	86.9	0.7571	9.93	0.0155	216	3.7	5.9	877	3.4	2.7	5.4	4.2	1093	N/A	10.1	0.101	2.77
EX-W7	E	86.2	0.7478	126.63	0.1979	405	4.2	7.9	6439	3.4	2.7	5.4	21.3	6844	N/A	29.2	0.292	2.84
EX-W8	E	86.2	0.7478	139.52	0.2180	184	12.8	3.7	8588	3.2	2.7	5.3	28.7	8772	N/A	32.3	0.323	2.88
EX-W9	E	84.4	0.7241	116.76	0.1824	176	15.3	3.6	7922	3.3	2.7	5.3	26.4	8098	N/A	30.0	0.300	2.91
EX-E1	E	77.4	0.6317	33.75	0.0527	196	3.1	8.1	4032	2.8	2.5	4.9	15.4	4228	N/A	23.5	0.235	2.77
EX-E2	E	77.4	0.6317	140.59	0.2197	93	4.8	4.8	5565	2.7	2.4	4.8	20.6	5658	N/A	25.7	0.257	2.77
EX-E3	E	77.4	0.6317	119.48	0.1867	303	2.6	10.6	5304	2.7	2.4	4.8	20.2	5507	N/A	30.8	0.308	2.77
EX-E4	E	77.4	0.6317	140.56	0.2196	233	2.7	9.2	3740	2.7	2.4	4.8	14.7	3973	N/A	24.0	0.240	2.77
EX-E5	E	79.5	0.6594	63.30	0.0989	162	3.4	6.7	3315	2.6	2.4	4.7	13.4	3477	N/A	20.2	0.202	2.77
EX-E6	E	86.9	0.7571	10.26	0.0160	303	3.3	7.2	509	2.2	2.2	4.3	3.9	812	N/A	11.1	0.111	2.77
EX-E7	E	86.9	0.7571	21.31	0.0333	147	4.1	4.7	1608	3.1	2.6	5.2	6.8	1755	N/A	11.6	0.116	2.77
EX-E8	E	86.9	0.7571	10.67	0.0167	364	2.2	9.1	890	3.5	2.8	5.5	4.2	1254	N/A	13.3	0.133	2.77
EX-E9	E	86.9	0.7571	6.13	0.0096	140	2.1	5.7	1115	3.0	2.6	5.1	5.2	1255	N/A	10.9	0.109	2.77
ES1	D	92.7	0.8336	11.10	0.0173	100	1.0	4.8	1620	2.8	3.4	5.1	6.1	1720	19.6	10.9	0.109	2.77
ES2	D	94.7	0.8600	31.40	0.0490	100	1.0	4.3	2337	1.8	2.7	4.1	10.6	2457	23.5	14.8	0.148	2.77

$Tc = Ti + Tt$ $\quad Tlag = 0.6\ Tc$

$Ti = 1.8\ (1.1 - K)\ L^{1/2} / S^{1/3}$

$K = 0.0132\ (CN) - 0.39$

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

Existing: $V1 = 14.8*(S/100)^{1/2}$
$V2 = 29.4*(S/100)^{1/2}$

Developed: $V1 = 20.2*(S/100)^{1/2}$
$V2 = 30.6*(S/100)^{1/2}$

REFERENCE:

STANDARD FORM 4

HYDROLOGIC CRITERIA AND DESIGN MANUAL

TIME OF CONCENTRATION

G. C. WALLACE, INC.
Engineers/Planners/Surveyors

Kyle Canyon Master Drainage Study
Existing Conditions
Offsite Analysis

Project No: 784-016
Date: 8/12/05
Calculated by: RRD/AKS

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK URBANIZED BASINS		Tc	Tlag	REMARKS
DESIG: (1)	DEV./EX. (D or E)	CN (16)	K (2)	AREA Ac (3)	AREA Sq Mi (4)	INITIAL LENGTH Feet (5)	SLOPE % (6)	Ti Min (7)	TRAVEL LENGTH Feet (8)	SLOPE % (9a)	V1 VELOCITY fps (9b)	V2 VELOCITY fps (10)	Tt Min (11)	TOTAL LENGTH Feet (12)	Tc = (L/180)+10 Min (13)	Min (14)	Tlag = 0.6Tc/60 Hours (15)	Remarks: Precipitation
OFFA	E	77.4	0.6317	13.0	0.0203	287	3.5	9.4	1176	3.0	2.6	5.1	5.5	1463	N/A	14.9	0.149	2.77
OFFB	E	77.4	0.6317	85.6	0.1337	500	3.5	12.4	7955	3.2	2.6	5.3	26.8	8455	N/A	39.2	0.392	2.93
OFFC	E	77.4	0.6317	85.3	0.1333	500	3.5	12.4	5576	3.3	2.7	5.4	16.9	6076	N/A	31.3	0.313	2.79
OFFD-A	E	77.4	0.6317	411.5	0.6430	500	3.5	12.4	14360	4.3	3.1	6.1	40.6	14860	N/A	53.0	0.530	3.09
OFFD-B	E	77.4	0.6317	319.2	0.4988	500	3.5	12.4	10906	2.6	2.4	4.8	39.8	11406	N/A	52.2	0.622	2.87
OFFE	E	77.4	0.6317	24.5	0.0383	500	3.0	13.1	2860	3.5	2.6	5.5	10.2	3360	N/A	23.2	0.232	2.78
OFFF-A	E	83.8	0.7162	636.0	0.9938	500	3.5	10.2	14655	6.4	3.7	7.4	33.9	15155	N/A	44.1	0.441	3.19
OFFF-B	E	84.1	0.7201	391.2	0.6112	500	3.5	10.1	11918	3.3	2.7	5.3	39.0	12418	N/A	49.0	0.490	2.93
OFFG	E	86.5	0.7518	26.0	0.0406	500	4.3	8.6	2810	3.5	2.8	5.5	10.0	3310	N/A	18.6	0.186	2.79
OFFH	D	89.5	0.7914	5.6	0.0088	200	4.0	4.9	805	3.1	3.6	5.4	3.8	1005	15.6	8.2	0.082	2.77
OFF2	E	77.4	0.6317	59.4	0.0928	200	2.3	9.0	4241	3.0	2.6	5.1	15.4	4441	N/A	24.5	0.245	2.77
OFF4	E	77.4	0.6317	20.4	0.0319	200	2.3	9.0	849	2.8	2.5	4.9	4.5	1049	N/A	13.6	0.136	2.77
OFF5A	D	89.1	0.7861	10.3	0.0161	200	2.0	6.3	555	3.2	3.6	5.5	2.5	755	14.2	8.8	0.088	2.77
OFF5B	D	89.1	0.7861	7.4	0.0116	200	2.0	6.3	770	2.8	3.4	5.1	3.3	970	15.4	9.7	0.097	2.77
OFF8	D	89.1	0.7861	8.5	0.0133	200	2.6	5.8	1304	2.6	3.3	4.9	5.3	1504	18.4	11.1	0.111	2.77
OFF9	D	89.1	0.7861	29.9	0.0467	200	1.8	6.6	2929	1.8	2.7	4.1	12.9	3129	27.4	19.4	0.194	2.77
OFF10	E	86.2	0.7478	429.5	0.6710	500	4.0	8.9	16775	4.1	3.0	6.0	48.3	17275	N/A	57.3	0.573	3.39
OFF11	D	77.4	0.6317	2.9	0.0046	30	5.2	2.7	1620	2.4	3.1	4.7	6.7	1650	19.2	9.3	0.093	2.77
OFF12	D	77.4	0.6317	6.0	0.0094	200	3.5	7.9	651	1.8	2.7	4.1	3.7	851	14.7	11.5	0.115	2.77
OFF14	D	86.9	0.7571	8.6	0.0134	200	4.0	5.5	773	2.5	3.2	4.8	3.5	973	15.4	9.0	0.090	2.77
OFF15	D	86.9	0.7571	23.2	0.0362	200	3.5	5.7	1678	2.4	3.1	4.7	16.8	1878	20.4	12.6	0.126	2.77
OFF16	E	86.6	0.7531	504.7	0.7885	500	1.2	13.1	18514	3.7	2.8	5.7	56.0	19014	N/A	69.2	0.692	3.06
OFF18	E	86.3	0.7492	351.4	0.5491	500	4.2	8.8	11962	3.9	2.9	5.8	35.8	12462	N/A	44.5	0.445	3.05
OFF20	E	86.2	0.7478	42.0	0.0656	500	4.2	8.8	3502	4.9	3.3	6.8	10.2	4002	N/A	19.0	0.190	3.01
OFF21	E	85.7	0.7412	337.9	0.5280	500	3.0	10.0	11390	3.8	2.9	5.7	34.6	11890	N/A	44.6	0.446	3.10
95-1	D	89.1	0.7861	2.7	0.0042	50	2.0	3.2	599	1.5	2.5	3.8	3.8	649	13.6	6.9	0.069	2.77
95-2	D	89.1	0.7861	2.8	0.0044	50	2.0	3.2	644	0.7	1.7	2.6	5.8	694	13.9	9.0	0.090	2.77
95-3	D	89.1	0.7861	6.1	0.0095	50	2.0	3.2	1322	1.8	2.7	4.1	6.4	1372	17.6	9.5	0.095	2.77
95-4	D	89.1	0.7861	7.0	0.0109	50	2.0	3.2	1336	2.0	2.8	4.3	6.2	1386	17.7	9.4	0.094	2.77
95-5	D	89.1	0.7861	23.6	0.0369	50	2.0	3.2	800	1.3	2.3	3.5	5.1	850	14.7	8.2	0.082	2.77
95-6	D	89.9	0.7967	6.7	0.0104	50	2.0	3.1	1313	1.8	2.7	4.1	6.4	1363	17.6	9.5	0.095	2.77
95-7A	D	92.6	0.8323	4.4	0.0069	50	2.0	2.7	1071	2.2	3.0	4.6	4.8	1121	16.2	7.5	0.075	2.77
95-7B	D	92.6	0.8323	7.2	0.0112	50	2.0	2.7	1296	2.0	2.9	4.3	6.0	1346	17.5	8.7	0.087	2.77
95-8A	D	92.6	0.8323	3.3	0.0052	50	2.0	2.7	664	1.8	2.7	4.1	3.7	714	14.0	6.4	0.064	2.77
95-8B	D	92.6	0.8323	2.6	0.0040	50	2.0	2.7	568	3.2	3.6	5.5	2.6	618	13.4	6.2	0.052	2.77
95-9A	D	92.6	0.8323	7.1	0.0110	50	2.0	2.7	1364	1.6	2.5	3.8	7.1	1414	17.9	9.8	0.098	2.77
95-9B	D	92.6	0.8323	8.5	0.0133	50	2.0	2.7	1534	0.8	1.8	2.7	11.2	1584	18.8	13.9	0.139	2.77

Tc = Ti + Tt Tlag = 0.6 Tc

$Ti = 1.8\ (1.1 - K)\ L^{1/2} / S^{1/3}$

K = 0.0132 (CN) - 0.39

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

Existing: $V1 = 14.8*(S/100)^{1/2}$
$V2 = 29.4*(S/100)^{1/2}$

Developed: $V1 = 20.2*(S/100)^{1/2}$
$V2 = 30.6*(S/100)^{1/2}$

REFERENCE:

STANDARD FORM 4

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN   1998                *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   05DEC06  TIME  15:12:13   *
*                                       *
*****************************************
```

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

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

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

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


```
          LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
                    *DIAGRAM
*** FREE ***
               1    ID   ************************************************************
               2    ID   * ..................................................... *
               3    ID   * :                                                   : *
               4    ID   * :              KYLE CANYON                          : *
               5    ID   * :                                                   : *
               6    ID   * :              EXISTING CONDITIONS                  : *
               7    ID   * :...................................................: *
               8    ID   * :              RETURN PERIOD_ _ _ _100 & 10 -YEAR   : *
               9    ID   * :              DISTRIBUTION_ _ _ _ 6-HOUR SDN3      : *
              10    ID   * :              PROJECT NO_ _ _ _ _ 784.016          : *
              11    ID   * :              FILENAME_ _ _ _ _ _ EX-RTC.H1        : *
              12    ID   * :              DATE MODELED_ _ _ _ 11/28/06         : *
              13    ID   * :              MODELED BY_ _ _ _ _ REH/BJK          : *
              14    ID   * :...................................................: *
              15    ID   * :                                                   : *
              16    ID   * :...................................................: *
              17    ID   ************************************************************
              18    ID    JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
              19    ID
              20    ID
              21    ID
              22    ID                        AREA      DARF
              23    ID                         SQ.MI.
              24    ID
              25    ID                       0.0 - 0.5    0.99
              26    ID                       0.5 - 1.0    0.98
              27    ID                       1.0 - 2.0    0.95
              28    ID                       2.0 - 4.0    0.92
              29    ID                       4.0 - 6.0    0.91
              30    ID                       6.0 - 8.0    0.89
              31    ID
              32    ID
              33    ID
              34    ID
              35    IT      5      0       0     300
              36    IO      5
              37    IN      5      0       0
              38    JR   PREC      1    0.98    0.95    0.92    0.91    0.89    0.57
                    *
              39    KK   OFFA
              40    KM             AREA  13.0 AC
              41    PB   2.77
              42    BA 0.0203
              43    PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
              44    PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
              45    PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
              46    PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
              47    PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
              48    PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
              49    PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
              50    PC    .998    .999   1.00
              51    LS       0   77.4
```



```
          LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
              52    UD    .149
                    *
              53    KK    95-1
              54    KM             AREA  2.7 AC
              55    PB   2.77
              56    BA 0.0042
              57    LS       0   89.1
              58    UD    .069
                    *
              59    KK    CPNM
              60    KM   COMBINATION POINT CPNM
              61    KM   COMBINE OFFA AND 95-1
              62    HC       2
                    *
```

```
KK    OFFB
KM              AREA  85.6 AC
PB    2.93
BA  0.1337
LS       0     77.4
UD    .392
*

KK    95-2
KM              AREA  2.8 AC
PB    2.77
BA  0.0044
LS       0     89.1
UD    .090
*

KK     CP1
KM   COMBINATION POINT CP1
KM   COMBINE OFFB AND 95-2
HC       2
*

KK    RCP1
KM   ROUTE CP1 THRU OFF2
KM   N-STEPS   K    X-FACTOR
RM       1   0.078    0.15
*

KK    OFF2
KM              AREA  59.4 AC
PB    2.77
BA  0.0928
LS       0     77.4
UD    .245
*
```



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

KK     CP2
KM   COMBINATION POINT CP2
KM   COMBINE CP1 AND OFF2
HC       2
*

KK    RCP2
KM   ROUTE CP2 THRU EX-E1
KM   N-STEPS   K    X-FACTOR
RM       1   0.094    0.15
*

KK   EX-E1
KM              AREA  33.75 AC
PB    2.77
BA  0.0527
LS       0     77.4
UD    .235
*

KK     CP3
KM   COMBINATION POINT CP3
KM   COMBINE RCP2 AND EX-E1
HC       2
*

KK    OFFC
KM              AREA  85.3 AC
PB    2.79
BA  0.1333
LS       0     77.4
UD    .313
*

KK    95-3
KM              AREA  6.1 AC
PB    2.77
BA  0.0095
LS       0     89.1
UD    .095
*

KK     CP4
KM   COMBINATION POINT CP4
KM   COMBINE OFFC AND 95-3
HC       2
*

KK    OFF4
KM              AREA  20.4 AC
PB    2.77
BA  0.0319
LS       0     77.4
UD    .136
*
```



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

KK     CP5
KM   COMBINATION POINT CP5
KM   COMBINE CP4 AND OFF4
HC       2
*

KK    RCP5
KM   ROUTE CP5 THRU EX-E2
KM   N-STEPS   K    X-FACTOR
RM       2   0.162    0.15
*
```

```
 137          KK   EX-E2
 138          KM              AREA  140.59 AC
 139          PB    2.77
 140          BA  0.2197
 141          LS       0     77.4
 142          UD    .257
              *

 143          KK     CP6
 144          KM   COMBINATION POINT CP6
 145          KM   COMBINE RCP5 AND EX-E2
 146          HC       2
              *

 147          KK  OFFD-A
 148          KM              AREA  411.5 AC
 149          PB    3.09
 150          BA  0.6430
 151          LS       0     77.4
 152          UD    .530
              *

 153          KK ROFFD-A
 154          KM   ROUTE OFFD-A TO CP7
 155          KM   N-STEPS   K    X-FACTOR
 156          RM       5   0.400    0.15
              *

 157          KK  OFFD-B
 158          KM              AREA  319.2 AC
 159          PB    2.87
 160          BA  0.4988
 161          LS       0     77.4
 162          UD    .522
              *

 163          KK    95-4
 164          KM              AREA  7.0 AC
 165          PB    2.77
 166          BA  0.0109
 167          LS       0     89.1
 168          UD    .094
              *
```



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

 169          KK     CP7
 170          KM   COMBINATION POINT CP7
 171          KM   COMBINE OFFD-A, OFFD-B AND 95-4
 172          HC       3
              *

 173          KK   OFF5A
 174          KM              AREA  10.3 AC
 175          PB    2.77
 176          BA  0.0161
 177          LS       0     89.1
 178          UD    .088
              *

 179          KK   OFF5B
 180          KM              AREA  7.4 AC
 181          PB    2.77
 182          BA  0.0116
 183          LS       0     89.1
 184          UD    .097
              *

 185          KK    CP7A
 186          KM   COMBINATION POINT CP7A
 187          KM   COMBINE CP7, OFF5A AND OFF5B
 188          HC       3
              *

 189          KK   RCP7A
 190          KM   ROUTE CP7A THRU EX-E3
 191          KM   N-STEPS   K    X-FACTOR
 192          RM       2   0.132    0.15
              *

 193          KK   EX-E3
 194          KM              AREA  119.48 AC
 195          PB    2.77
 196          BA  0.1867
 197          LS       0     77.4
 198          UD    .308
              *

 199          KK     CP8
 200          KM   COMBINATION POINT CP8
 201          KM   COMBINE RCP7A AND EX-E3
 202          HC       2
              *

 203          KKCPNE-DUMMY
 204          KM   COMBINATION POINT CPNE-DUMMY
 205          KM   COMBINE CPNM, CP3, CP6 AND CP8
 206          HC       4
              *
```



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

 207          KK   OFF10
 208          KM              AREA  429.5 AC
 209          PB    3.39
 210          BA  0.6710
 211          LS       0     86.2
 212          UD    .573
              *
```

```
 213          KK  ROFF10
 214          KM   ROUTE OFF10 THRU OFFF-A AND OFFF-B
 215          KM   N-STEPS   K    X-FACTOR
 216          RM       7   0.583    0.15
              *

 217          KK  OFFF-A
 218          KM             AREA  636.0 AC
 219          PB    3.19
 220          BA  0.9938
 221          LS       0    83.8
 222          UD    .441
              *

 223          KK ROFFF-A
 224          KM   ROUTE OFFF-A THRU OFFF-B
 225          KM   N-STEPS   K    X-FACTOR
 226          RM       3   0.238    0.15
              *

 227          KK  OFFF-B
 228          KM             AREA  391.2 AC
 229          PB    2.93
 230          BA  0.6112
 231          LS       0    84.1
 232          UD    .490
              *

 233          KK   EX-W1
 234          KM             AREA  15.36 AC
 235          PB    2.77
 236          BA  0.0240
 237          LS       0    77.4
 238          UD    .141
              *

 239          KK   OFF11
 240          KM             AREA  2.9 AC
 241          PB    2.77
 242          BA  0.0046
 243          LS       0    77.4
 244          UD    .093
              *
```



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

 245          KK     CP9
 246          KM   COMBINATION POINT CP9
 247          KM   COMBINE ROFF10, OFFF-A, OFFF-B, EX-W1 AND OFF11
 248          HC       5
              *

 249          KK    DCP9
 250          KM   FLOW SPLIT AT CULVERT
 251          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
 252          DT DCHD02A
 253          DI       0     150     300     450     600     750     900    1050    1100    1350
 254          DI    1500
 255          DQ       0     122     186     230     261     283     316     353     366     445
 256          DQ     497
              *

 257          KK    RCP9
 258          KM   ROUTE TO BASIN OFF12
 259          RD     850  0.0165    0.02       0    TRAP       0      10
              *

 260          KK    OFFG
 261          KM             AREA  26.0 AC
 262          PB    2.79
 263          BA  0.0406
 264          LS       0    86.5
 265          UD    .186
              *

 266          KK   EX-W2
 267          KM             AREA  13.24 AC
 268          PB    2.77
 269          BA  0.0207
 270          LS       0    81.6
 271          UD    .112
              *

 272          KK   OFF12
 273          KM             AREA  6.0 AC
 274          PB    2.77
 275          BA  0.0094
 276          LS       0    77.4
 277          UD    .115
              *

 278          KK   OFF16
 279          KM             AREA  504.7 AC
 280          PB    3.06
 281          BA  0.7885
 282          LS       0    86.6
 283          UD    .692
              *
```



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

 284          KK  ROFF16
 285          KM   ROUTE OFF16 THRU EX-W3
 286          KM   N-STEPS   K    X-FACTOR
 287          RM       2   0.198    0.15
              *

 288          KK   EX-W3
```

```
 289          KM            AREA  172.93 AC
 290          PB    2.82
 291          BA  0.2702
 292          LS       0    86.4
 293          UD    .295
              *

 294          KK    CP10
 295          KM   COMBINATION POINT CP10
 296          KM   COMBINE RCP9, OFFG, EX-W2, OFF12, ROFF16 AND EX-W3
 297          HC       6
              *

 298          KK   DCP10
 299          KM   FLOW SPLIT AT CULVERT
 300          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
 301          DT DCHD04A
 302          DI       0     300     600     900    1200    1500    1800    2100    2400    2540
 303          DI    3000
 304          DQ       0     132     316     514     710     907    1115    1252    1399    1468
 305          DQ    1684
              *

 306          KKDSPHD04A
 307          KM   FLOW SPLIT AT BETWEEN HD04A AND HD05A
 308          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
 309          KM   BASED ON CHANNEL CAPACITY = 527 CFS
 310          DT DSHD04A
 311          DI       0     527    2000
 312          DQ       0       1    1473
              *

 313          KK  RDCP10
 314          KM   ROUTE TO THE NEXT CULVERT AT BASIN OFF11
 315          RD    1068  0.0160    0.02       0    TRAP       0      10
              *

 316          KK   EX-W4
 317          KM            AREA  67.06 AC
 318          PB    2.78
 319          BA  0.1048
 320          LS       0    86.9
 321          UD    .199
              *
```

1 HEC-1 INPUT PAGE 9

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

 322          KK    CP11
 323          KM   COMBINATION POINT CP11
 324          KM   COMBINE RDCP10 AND EX-W4
 325          HC       2
              *

 326          KK   DCP11
 327          KM   FLOW SPLIT AT CULVERT
 328          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
 329          DT DCHD05A
 330          DI       0     170     340     510     680     850    1020    1190    1360    1372
 331          DI    1700
 332          DQ       0     169     200     244     296     372     459     546     632     637
 333          DQ     807
              *

 334          KKDSPHD05A
 335          KM   FLOW SPLIT AT BETWEEN HD05A AND HD06A
 336          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
 337          KM   BASED ON CHANNEL CAPACITY = 605 CFS
 338          DT DSHD05A
 339          DI       0     605    2000
 340          DQ       0       1    1395
              *

 341          KK  RDCP11
 342          KM   ROUTE TO THE NEXT CULVERT AT BASIN OFF12
 343          RD     626  0.0134    0.02       0    TRAP       0      10
              *

 344          KK   OFF18
 345          KM            AREA  351.4 AC
 346          PB    3.05
 347          BA  0.5491
 348          LS       0    86.3
 349          UD    .445
              *

 350          KK  ROFF18
 351          KM   ROUTE OFF18 THRU EX-W5
 352          KM   N-STEPS   K    X-FACTOR
 353          RM       2   0.171    0.15
              *

 354          KK   EX-W5
 355          KM            AREA  285.43 AC
 356          PB    2.86
 357          BA  0.4460
 358          LS       0    86.3
 359          UD    .308
              *
```

1 HEC-1 INPUT PAGE 10

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

 360          KK    CP12
 361          KM   COMBINATION POINT CP12
 362          KM   COMBINE ROFF18 AND EX-W5
 363          HC       2
              *

 364          KK   OFF14
 365          KM            AREA  8.6 AC
```

```
366          PB    2.77
367          BA  0.0134
368          LS       0    86.9
369          UD    .090
             *

370          KK    CP13
371          KM   COMBINATION POINT CP13
372          KM   COMBINE RDCP11, CP12 AND OFF14
373          HC       3
             *

374          KK   DCP13
375          KM   FLOW SPLIT AT CULVERT
376          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
377          DT DCHD06A
378          DI       0   200.0   400.0     600     800    1000    1200    1400    1600    1772
379          DI    2000
380          DQ       0   199.9   399.9     594     727     802     865     927    1017    1095
381          DQ    1207
             *

382          KKDSPHD06A
383          KM   FLOW SPLIT AT BETWEEN HD06A AND HD07A
384          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
385          KM   BASED ON CHANNEL CAPACITY = 1,692 CFS
386          DT DSHD06A
387          DI       0    1692    2000
388          DQ       0       1     308
             *

389          KKRDCRCOFF18
390          KM   ROUTE TO THE NEXT CULVERT AT BASIN OFFH
391          RD    1349  0.0186    0.02       0    TRAP       0      10
             *

392          KK   EX-W6
393          KM             AREA  9.93 AC
394          PB    2.77
395          BA  0.0155
396          LS       0    86.9
397          UD    .101
             *
```



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

398          KK   OFF15
399          KM             AREA  23.2 AC
400          PB    2.77
401          BA  0.0362
402          LS       0    86.9
403          UD    .126
             *

404          KK    CP14
405          KM   COMBINATION POINT CP14
406          KM   COMBINE RDCRCOFF18, EX-W6 AND OFF15
407          HC       3
             *

408          KK   DCP14
409          KM   FLOW SPLIT AT CULVERT
410          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
411          DT DCHD07A
412          DI       0      90     180     270     360     450     540     630     720     771
413          DI     900
414          DQ       0      51      55      58      60      61      65      78      93     101
415          DQ     123
             *

416          KKDSPHD07A
417          KM   FLOW SPLIT AT BETWEEN HD07A AND HD08A
418          KM   DIVERSION TO THE OTHER SIDE OF FRONTAGE ROAD
419          KM   BASED ON CHANNEL CAPACITY = 338 CFS
420          DT DSHD07A
421          DI       0     338    2000
422          DQ       0       1    1662
             *

423          KK    OFFE
424          KM             AREA  24.5 AC
425          PB    2.78
426          BA  0.0383
427          LS       0    77.4
428          UD    .232
             *

429          KK    95-5
430          KM             AREA  23.6 AC
431          PB    2.77
432          BA  0.0369
433          LS       0    89.1
434          UD    .082
             *
```



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

435          KK  CHD01B
436          KM   COMBINATION POINT CHD01B
437          KM   COMBINE OFFE AND 95-5
438          HC       2
             *

439          KK  DHD01B
440          KM   FLOW SPLIT AT CULVERT 1B
441          DT DCHD01B
442          DI       0    15.0    29.0    45.0    60.0    75.0    90.0   105.0     120     135
443          DI     150
444          DQ       0    14.9    28.9    44.9    59.9    74.9    89.9   104.9     116     121
```

```
445          DQ     125
             *

446          KK RDHD01B
447          KM   ROUTE TO THE NEXT CULVERT
448          RD    1000  0.0165    0.02       0    TRAP       0      10
             *

449          KK    OFF8
450          KM            AREA  8.5 AC
451          PB    2.77
452          BA  0.0133
453          LS       0    89.1
454          UD    .111
             *

455          KKRETHD02A
456          KM   RETREIVE FLOW FROM CULVERT HD02A
457          DR DCHD02A
             *

458          KK  CHD02B
459          KM   COMBINATION POINT CHD02B
460          KM   COMBINE RDHD01B, OFF8 AND RETHD02A
461          HC       3
             *

462          KK  DHD02B
463          KM   FLOW SPLIT AT CULVERT HD02B
464          DT DCHD02B
465          DI       0    50.0     100     150     200     250     300     350     400     450
466          DI     500
467          DQ       0    49.9      82      99     124     149     178     211     241     271
468          DQ     299
             *

469          KK RDHD02B
470          KM   ROUTE TO THE NEXT CULVERT
471          RD    1320  0.0165    0.02       0    TRAP       0      10
             *

1                                        HEC-1 INPUT                                        PAGE 13

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

472          KK    95-6
473          KM            AREA  6.7 AC
474          PB    2.77
475          BA  0.0104
476          LS       0    89.9
477          UD    .095
             *

478          KKRETHD04A
479          KM   RETREIVE FLOW FROM CULVERT HD04A
480          DR DCHD04A
             *

481          KK  CHD04B
482          KM   COMBINATION POINT CHD04B
483          KM   COMBINE RDHD02B, 95-6 AND RETHD04A
484          HC       3
             *

485          KK  DHD04B
486          KM   SPLIT FLOW AT CULVERT HD04B
487          DT DCHD04B
488          DI       0   200.0     400     600     800    1000    1200    1400    1600    1800
489          DI    2000
490          DQ       0   199.9     287     359     443     529     620     710     800     895
491          DQ     988
             *

492          KKRETSHD04A
493          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD04A AND HD05A
494          DR DSHD04A
             *

495          KK   95-7A
496          KM            AREA  4.4 AC
497          PB    2.77
498          BA  0.0069
499          LS       0    92.6
500          UD    .075
             *

501          KK CHD04B2
502          KM   COMBINE 95-7A WITH BYPASS AND SPILL FLOW
503          HC       3
             *

504          KKDSPHD04B
505          KM   FLOW SPLIT AT BETWEEN HD04B AND HD05B
506          KM   DIVERSION TO THE OTHER SIDE OF US95
507          KM   BASED ON CHANNEL CAPACITY = 1004 CFS
508          DT DSHD04B
509          DI       0    1004    2000
510          DQ       0       1     996
             *

1                                        HEC-1 INPUT                                        PAGE 14

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

511          KK RDHD04B
512          KM   ROUTE TO THE NEXT CULVERT
513          RD    1068  0.0160    0.02       0    TRAP       0      10
             *

514          KKRETHD05A
515          KM   RETREIVE FLOW FROM CULVERT HD05A
516          DR DCHD05A
             *
```

```
KK  CHD05B
KM   COMBINATION POINT CHD05B
KM   COMBINE RDHD04B AND RETHD05A
HC       2
*

KK  DHD05B
KM   SPLIT FLOW AT CULVERT HD05B
DT DCHD05B
DI       0     200     400     600     800    1000    1200    1400    1600    1800
DI    2000
DQ       0     164     242     323     397     494     600     703     809     913
DQ    1029
*

KK   95-8A
KM            AREA  3.3 AC
PB    2.77
BA  0.0052
LS       0    92.6
UD    .064
*

KKRETSHD05A
KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD05A AND HD06A
DR DSHD05A
*

KK CHD05B2
KM   COMBINE 95-8A WITH BYPASS AND SPILL FLOW
HC       3
*

KKDSPHD05B
KM   FLOW SPLIT AT BETWEEN HD05B AND HD06B
KM   DIVERSION TO THE OTHER SIDE OF US95
KM   BASED ON CHANNEL CAPACITY = 4017 CFS
DT DSHD05B
DI       0    4017    5000
DQ       0       1     983
*
```



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

KK RDHD05B
KM   ROUTE TO THE NEXT CULVERT
RD     626  0.0134    0.02       0    TRAP       0      10
*

KKRETHD06A
KM   RETREIVE FLOW FROM CULVERT HD06A
DR DCHD06A
*

KK  CHD06B
KM   COMBINE BYPASS WITH RETREIVED FLOW
HC       2
*

KK  DHD06B
KM   SPLIT FLOW AT CULVERT HD06B
DT DCHD06B
DI       0   160.0   480.0     640     800     960    1120    1280    1400    1600
DQ       0   159.9   479.9     634     706     757     807     857     899     969
*

KK   95-9A
KM            AREA  7.1 AC
PB    2.77
BA  0.0110
LS       0    92.6
UD    .098
*

KKRETSHD06A
KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD06A AND HD07A
DR DSHD06A
*

KK CHD06B2
KM   COMBINE 95-9A WITH BYPASS AND SPILL FLOW
HC       3
*

KKDSPHD06B
KM   FLOW SPLIT AT BETWEEN HD06B AND HD07B
KM   DIVERSION TO THE OTHER SIDE OF US95
KM   BASED ON CHANNEL CAPACITY = 4876 CFS
DT DSHD06B
DI       0    4876    5000
DQ       0       1     124
*
```



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

KK RDHD06B
KM   ROUTE TO THE NEXT CULVERT
RD    1349  0.0186    0.02       0    TRAP       0      10
*

KKRETHD07A
KM   RETREIVE FLOW FROM CULVERT HD07A
DR DCHD07A
*

KK  CHD07B
KM   COMBINE BYPASS WITH RETREIVED FLOW
HC       2
```

```
                *

 589            KK  DHD07B
 590            KM   SPLIT FLOW AT CULVERT HD07B
 591            DT DCHD07B
 592            DI       0      90     180     270     360     450     540     630     700     810
 593            DI     900
 594            DQ       0      53      58      61      63      65      67      69      70      71
 595            DQ      72
                *

 596            KKRETSHD07A
 597            KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD07A AND HD08A
 598            DR DSHD07A
                *

 599            KK CHD07B2
 600            KM   COMBINE BYPASS WITH SPILL FLOW
 601            HC       2
                *

 602            KKDSPHD07B
 603            KM   FLOW SPLIT AT BETWEEN HD07B AND HD08B
 604            KM   DIVERSION TO THE OTHER SIDE OF US95
 605            KM   BASED ON CHANNEL CAPACITY = 1770 CFS
 606            DT DSHD07B
 607            DI       0    1770    5000
 608            DQ       0       1    3230
                *

 609            KK DCHD01B
 610            KM   RETREIVE FLOW FROM VTN HD01B CULVERT
 611            DR DCHD01B
                *

 612            KK  DHD01C
 613            KM   SPLIT FLOW AT CULVERT HD01C
 614            DT DCHD01C
 615            DI       0    10.0    50.0
 616            DQ       0     9.9    49.9
                *
```



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

 617            KK RDHD01C
 618            KM   ROUTE TO THE NEXT CULVERT
 619            RK    1000  0.0165    0.02       0    TRAP      13      20
                *

 620            KKRETHD02B
 621            KM   RETREIVE FLOW FROM CULVERT HD02B
 622            DR DCHD02B
                *

 623            KK  CHD02C
 624            KM   COMBINE BYPASS WITH RETREIVED FLOW
 625            HC       2
                *

 626            KK  DHD02C
 627            KM   SPLIT FLOW AT CULVERT HD02C
 628            DT DCHD02C
 629            DI       0     100     200     250     400     500     600     700     800     900
 630            DI    1000
 631            DQ       0      65     100     122     201     258     323     384     447     514
 632            DQ     581
                *

 633            KK RDHD02C
 634            KM   ROUTE TO THE NEXT CULVERT
 635            RK    1320  0.0165    0.02       0    TRAP      13      20
                *

 636            KKRETHD04B
 637            KM   RETREIVE FLOW FROM CULVERT HD04B
 638            DR DCHD04B
                *

 639            KK  CHD04C
 640            KM   COMBINE BYPASS WITH RETREIVED FLOW
 641            HC       2
                *

 642            KK  DHD04C
 643            KM   SPLIT FLOW AT CULVERT HD04C
 644            DT DCHD04C
 645            DI       0     200     400     600     800    1000    1200    1400    1600    1800
 646            DI    2000
 647            DQ       0     181     212     262     336     416     503     609     719     823
 648            DQ     933
                *

 649            KKRETSHD04B
 650            KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD04B AND HD05B
 651            DR DSHD04B
                *
```



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

 652            KK CHD04C2
 653            KM   COMBINE BYPASS WITH SPILL FLOW
 654            HC       2
                *

 655            KKDSPHD04C
 656            KM   FLOW SPLIT AT BETWEEN HD04C AND HD05C
 657            KM   DIVERSION TO THE OTHER SIDE OF US95
 658            KM   BASED ON CHANNEL CAPACITY = 1079 CFS
 659            DT DSHD04C
```

```
660          DI       0    1079    2000
661          DQ       0       1     921
             *

662          KK RDHD04C
663          KM   ROUTE TO THE NEXT CULVERT
664          RK    1068  0.0160    0.02       0    TRAP      13      20
             *

665          KKRETHD05B
666          KM   RETREIVE FLOW FROM CULVERT HD05B
667          DR DCHD05B
             *

668          KK  CHD05C
669          KM   COMBINE BYPASS WITH RETREIVED FLOW
670          HC       2
             *

671          KK  DHD05C
672          KM   SPLIT FLOW AT CULVERT HD05C
673          DT DCHD05C
674          DI       0     150     300     450     600     750     800    1050    1200    1350
675          DI    1500
676          DQ       0     132     171     193     208     232     245     321     380     444
677          DQ     513
             *

678          KKRETSHD05B
679          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD05B AND HD06B
680          DR DSHD05B
             *

681          KK CHD05C2
682          KM   COMBINE BYPASS WITH SPILL FLOW
683          HC       2
             *

684          KKDSPHD05C
685          KM   FLOW SPLIT AT BETWEEN HD05C AND HD06C
686          KM   DIVERSION TO THE OTHER SIDE OF US95
687          KM   BASED ON CHANNEL CAPACITY = 2744 CFS
688          DT DSHD05C
689          DI       0    2744    5000
```



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

690          DQ       0       1    2256
             *

691          KK RDHD05C
692          KM   ROUTE TO THE NEXT CULVERT
693          RK     626  0.0134    0.02       0    TRAP      13      20
             *

694          KKRETHD06B
695          KM   RETREIVE FLOW FROM CULVERT HD06B
696          DR DCHD06B
             *

697          KK  CHD06C
698          KM   COMBINE BYPASS WITH RETREIVED FLOW
699          HC       2
             *

700          KK  DHD06C
701          KM   SPLIT FLOW AT CULVERT HD06C
702          DT DCHD06C
703          DI       0   200.0   400.0     600     800    1000    1200    1400    1600    1680
704          DI    2000
705          DQ       0   199.9   399.9     560     647     713     786     860     948     988
706          DQ    1142
             *

707          KKRETSHD06B
708          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD06B AND HD07B
709          DR DSHD06B
             *

710          KK CHD06C2
711          KM   COMBINE BYPASS WITH SPILL FLOW
712          HC       2
             *

713          KKDSPHD06C
714          KM   FLOW SPLIT AT BETWEEN HD06C AND HD07C
715          KM   DIVERSION TO THE OTHER SIDE OF US95
716          KM   BASED ON CHANNEL CAPACITY = 2175 CFS
717          DT DSHD06C
718          DI       0    2175    5000
719          DQ       0       1    2825
             *

720          KK RDHD06C
721          KM   ROUTE TO THE NEXT CULVERT
722          RK    1349  0.0186    0.02       0    TRAP      13      20
             *
```



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

723          KKRETHD07B
724          KM   RETREIVE FLOW FROM CULVERT HD07B
725          DR DCHD07B
             *

726          KK  CHD07C
727          KM   COMBINE BYPASS WITH RETREIVED FLOW
728          HC       2
             *
```

```
729          KK  DHD07C
730          KM   SPLIT FLOW AT CULVERT HD07C
731          DT DCHD07C
732          DI       0      90     180     270     360     450     540     600     720     810
733          DI     900
734          DQ       0      51      58      62      66      83     110     130     174     208
735          DQ     244
             *

736          KKRETSHD07B
737          KM   RETREIVE FLOW FROM SPILL BETWEEN CULVERT HD07B AND HD08B
738          DR DSHD07B
             *

739          KK CHD07C2
740          KM   COMBINE BYPASS WITH SPILL FLOW
741          HC       2
             *

742          KKDSPHD07C
743          KM   FLOW SPLIT AT BETWEEN HD07C AND HD08C
744          KM   DIVERSION TO THE OTHER SIDE OF US95
745          KM   BASED ON CHANNEL CAPACITY = 2396 CFS
746          DT DSHD07C
747          DI       0    2396    5000
748          DQ       0       1    2604
             *

749          KKCPW-DUMMY
750          KM   COMBINATION POINT CPW-DUMMY
751          KM   COMBINE DSPHD07A, DSPHD07B, AND DSPHD07C
752          HC       3
             *

753          KK DCHD01C
754          KM   RETREIVE FLOW FROM VTN HD01B CULVERT
755          DR DCHD01C
             *
```



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

756          KKRDCHD01C
757          KM   ROUTE DCHC01B TO CP15
758          KM   LENGTH  SLOPE   n-VALUE          SHAPE     WIDTH  S-SLOPE
759          RD     905    .025    .025       0    TRAP      20       2
             *

760          KK DCHD02C
761          KM   RETREIVE FLOW FROM VTN HD02C CULVERT
762          DR DCHD02C
             *

763          KKRDCHD02C
764          KM   ROUTE DCHC02C TO CP15
765          KM   LENGTH  SLOPE   n-VALUE          SHAPE     WIDTH  S-SLOPE
766          RD     905    .025    .025       0    TRAP      20       2
             *

767          KK    OFF9
768          KM            AREA  29.9 AC
769          PB    2.77
770          BA  0.0467
771          LS       0    89.1
772          UD    .194
             *

773          KK    CP15
774          KM   COMBINATION POINT CP15
775          KM   COMBINE RDCHD01C, RDCHD02C AND OFF9
776          HC       3
             *

777          KK   RCP15
778          KM   ROUTE CP15 THRU EX-E4
779          KM   N-STEPS   K    X-FACTOR
780          RM       1   0.089    0.15
             *

781          KK   EX-E4
782          KM            AREA  140.56 AC
783          PB    2.77
784          BA  0.2196
785          LS       0    77.4
786          UD    .240
             *

787          KK    CP16
788          KM   COMBINATION POINT CP16
789          KM   COMBINE RCP9 AND EX-E4
790          HC       2
             *
```



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

791          KK DCHD04C
792          KM   RETREIVE FLOW FROM VTN HD04C CULVERT
793          DR DCHD04C
             *

794          KK    OFFH
795          KM            AREA  5.6 AC
796          PB    2.77
797          BA  0.0088
798          LS       0    89.5
799          UD    .082
             *

800          KK    CP17
801          KM   COMBINATION POINT CP17
```

```
802          KM   COMBINE DCHD04C AND OFFH
803          HC       2
             *

804          KK   RCP17
805          KM   ROUTE CP1 THRU EX-E5
806          KM   N-STEPS   K    X-FACTOR
807          RM       1   0.073    0.15
             *

808          KK   EX-E5
809          KM            AREA  63.30 AC
810          PB    2.77
811          BA  0.0989
812          LS       0    79.5
813          UD    .202
             *

814          KK     ES1
815          KM            AREA  11.1 AC
816          PB    2.77
817          BA  0.0173
818          LS       0    92.7
819          UD    .109
             *

820          KK    CP18
821          KM   COMBINATION POINT CP18
822          KM   COMBINE RCP14, EX-E5, AND ES1
823          HC       3
             *

824          KK DSHD04C
825          KM   RETREIVE FLOW THAT OVERTOPS US 95 CHANNEL
826          KM   BETWEEN VTN HD04C AND HD05C CULVERTS
827          DR DSHD04C
             *
```



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

828          KK DCHD05C
829          KM   RETREIVE FLOW FROM VTN HD05C CULVERT
830          DR DCHD05C
             *

831          KK   95-7B
832          KM            AREA  7.2 AC
833          PB    2.77
834          BA  0.0112
835          LS       0    92.6
836          UD    .087
             *

837          KK    CP19
838          KM   COMBINATION POINT CP19
839          KM   COMBINE DSHD04C, DCHD05C AND 95-7B
840          HC       3
             *

841          KK DSHD05C
842          KM   RETREIVE FLOW THAT OVERTOPS US 95 CHANNEL
843          KM   BETWEEN VTN HD05C AND HD06C CULVERTS
844          DR DSHD05C
             *

845          KK DCHD06C
846          KM   RETREIVE FLOW FROM VTN HD06C CULVERT
847          DR DCHD06C
             *

848          KK   95-8B
849          KM            AREA  2.6 AC
850          PB    2.77
851          BA  0.0040
852          LS       0    92.6
853          UD    .052
             *

854          KK    CP20
855          KM   COMBINATION POINT CP20
856          KM   COMBINE DSHD05C, DCHD06C AND 95-8B
857          HC       3
             *

858          KK   EX-E6
859          KM            AREA  10.26 AC
860          PB    2.77
861          BA  0.0160
862          LS       0    86.9
863          UD    .111
             *
```



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

864          KK    CP21
865          KM   COMBINATION POINT CP21
866          KM   COMBINE CP19, CP20, AND EX-E6
867          HC       3
             *

868          KK     ES2
869          KM            AREA  31.4 AC
870          PB    2.77
871          BA  0.0490
872          LS       0    94.7
873          UD    .148
             *

874          KK   EX-E7
```

```
875          KM            AREA  21.31 AC
876          PB    2.77
877          BA  0.0333
878          LS       0     86.9
879          UD    .111
             *

880          KK   EX-E8
881          KM            AREA  10.67 AC
882          PB    2.77
883          BA  0.0167
884          LS       0     86.9
885          UD    .133
             *

886          KK    CP22
887          KM   COMBINATION POINT CP22
888          KM   COMBINE RCP21, ES2, EX-E7, AND EX-E8
889          HC       4
             *

890          KK DSHD06C
891          KM   RETREIVE FLOW THAT OVERTOPS US 95 CHANNEL
892          KM   BETWEEN VTN HD06C AND HD07C CULVERTS
893          DR DSHD06C
             *

894          KK DCHD07C
895          KM   RETREIVE FLOW FROM VTN HD07C CULVERT
896          DR DCHD07C
             *

897          KK   95-9B
898          KM            AREA  8.5 AC
899          PB    2.77
900          BA  0.0133
901          LS       0     92.6
902          UD    .139
             *
```



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

903          KK    CP23
904          KM   COMBINATION POINT CP23
905          KM   COMBINE DSHD06C, DCHD07C AND 95-9B
906          HC       3
             *

907          KK   RCP23
908          KM   ROUTE CP23 THRU EX-E9
909          KM     LEN   SLOPE       N      N/A   SHAPE      BW      SS
910          RD     720    .029    .035        0    TRAP      50       5
             *

911          KK   EX-E9
912          KM            AREA  6.13 AC
913          PB    2.77
914          BA  0.0096
915          LS       0     86.9
916          UD    .109
             *

917          KK    CP24
918          KM   COMBINATION POINT CP24
919          KM   COMBINE CP23 AND EX-E9
920          HC       2
             *

921          KKCPSE-DUMMY
922          KM   COMBINATION POINT CPSE-DUMMY
923          KM   COMBINE CP16, CP18 CP22, AND CP24
924          HC       4
             *

925          KK   EX-W7
926          KM            AREA  126.63 AC
927          PB    2.84
928          BA  0.1979
929          LS       0     86.2
930          UD    .292
             *

931          KK   OFF20
932          KM            AREA  42.0 AC
933          PB    3.01
934          BA  0.0656
935          LS       0     86.2
936          UD    .190
             *

937          KK  ROFF20
938          KM   ROUTE OFF18 THRU EX-W8
939          KM   N-STEPS   K    X-FACTOR
940          RM       4   0.329    0.15
             *
```

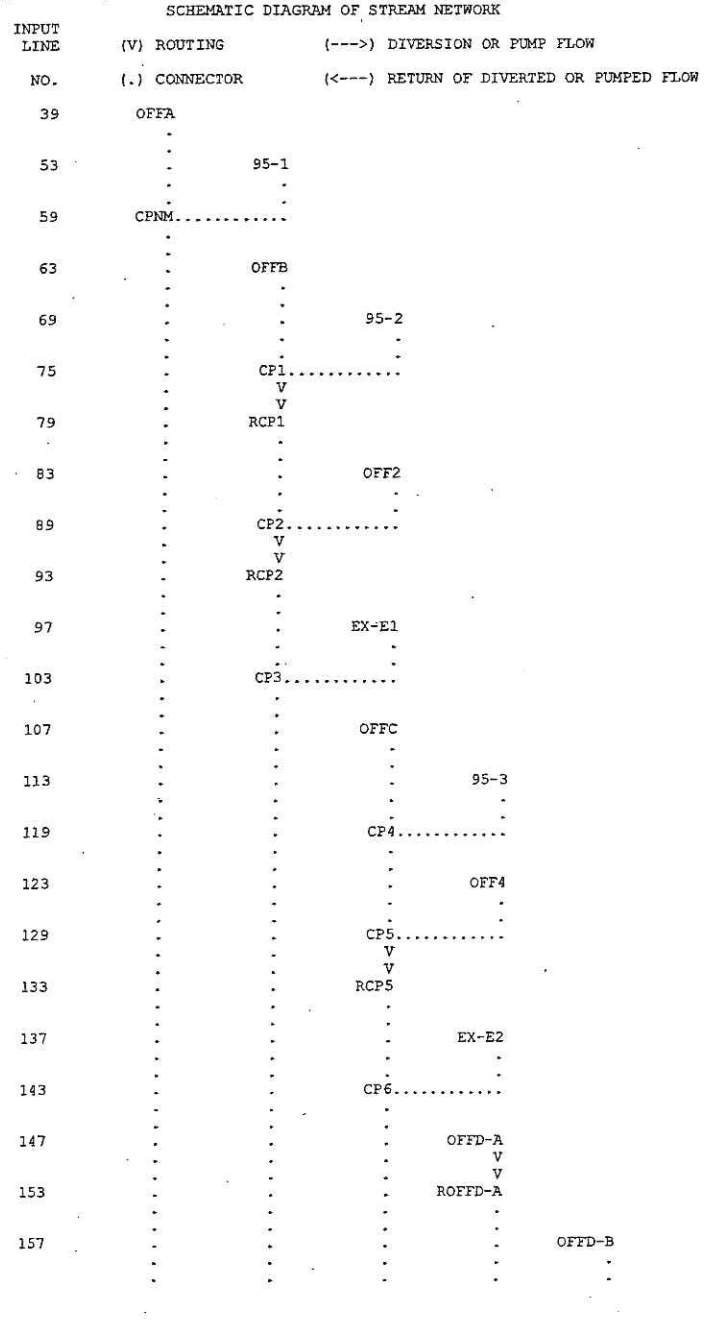


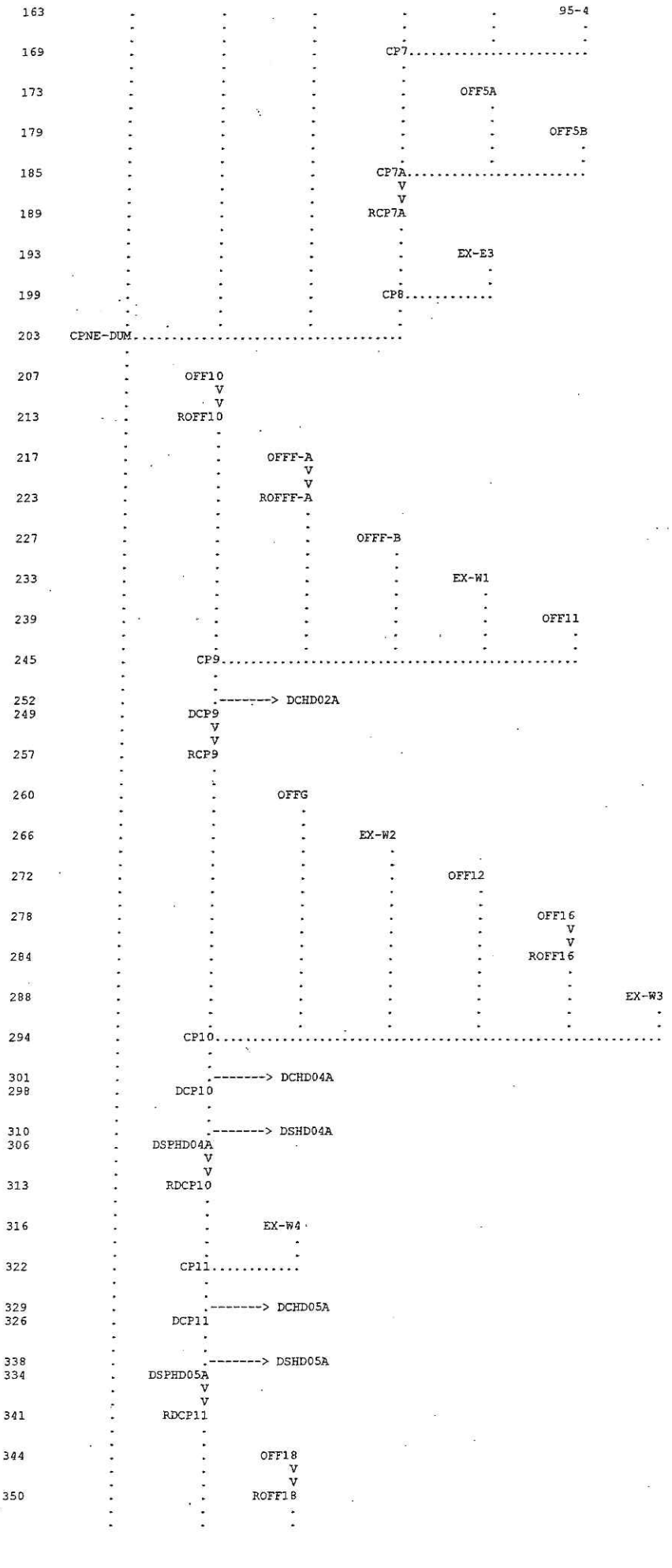
```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

941          KK   EX-W8
942          KM            AREA  139.52 AC
943          PB    2.88
944          BA  0.2180
945          LS       0     86.2
946          UD    .323
             *

947          KK    CP25
948          KM   COMBINATION POINT CP25
949          KM   COMBINE ROFF20 AND EX-W8
```

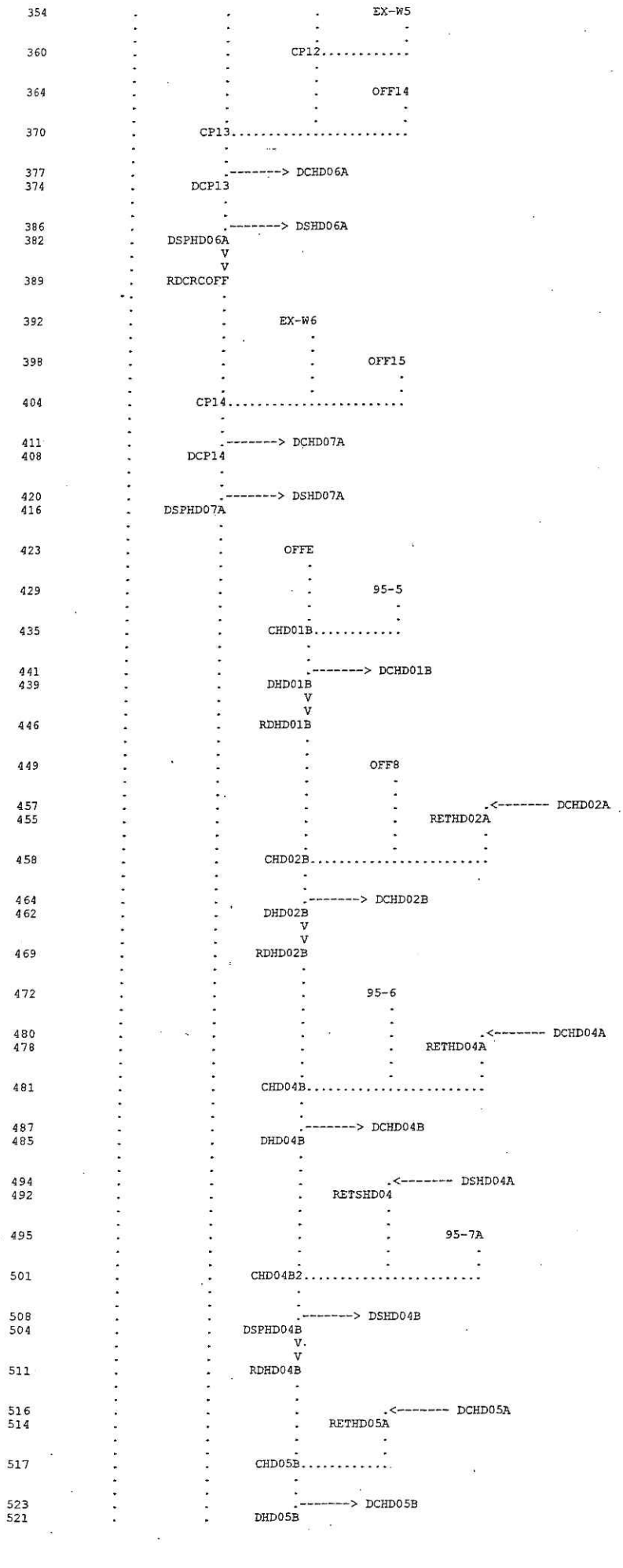
```
950          HC       2
             *

951          KK   OFF21
952          KM              AREA  337.9 AC
953          PB     3.10
954          BA  0.5280
955          LS        0     85.7
956          UD     .446
             *

957          KK  ROFF21
958          KM   ROUTE OFF21 THRU EX-W9
959          KM   N-STEPS    K     X-FACTOR
960          RM        2   0.178     0.15
             *

961          KK   EX-W9
962          KM              AREA  116.76 AC
963          PB     2.91
964          BA  0.1824
965          LS        0     84.4
966          UD     .300
             *

967          KK    CP26
968          KM   COMBINATION POINT CP26
969          KM   COMBINE ROFF21 AND EX-W9
970          HC        2
             *

971          KK    CP27
972          KM   COMBINATION POINT CP27
973          KM   COMBINE EX-W7, CP25 AND CP26
974          HC        3
             *
975          ZZ
```

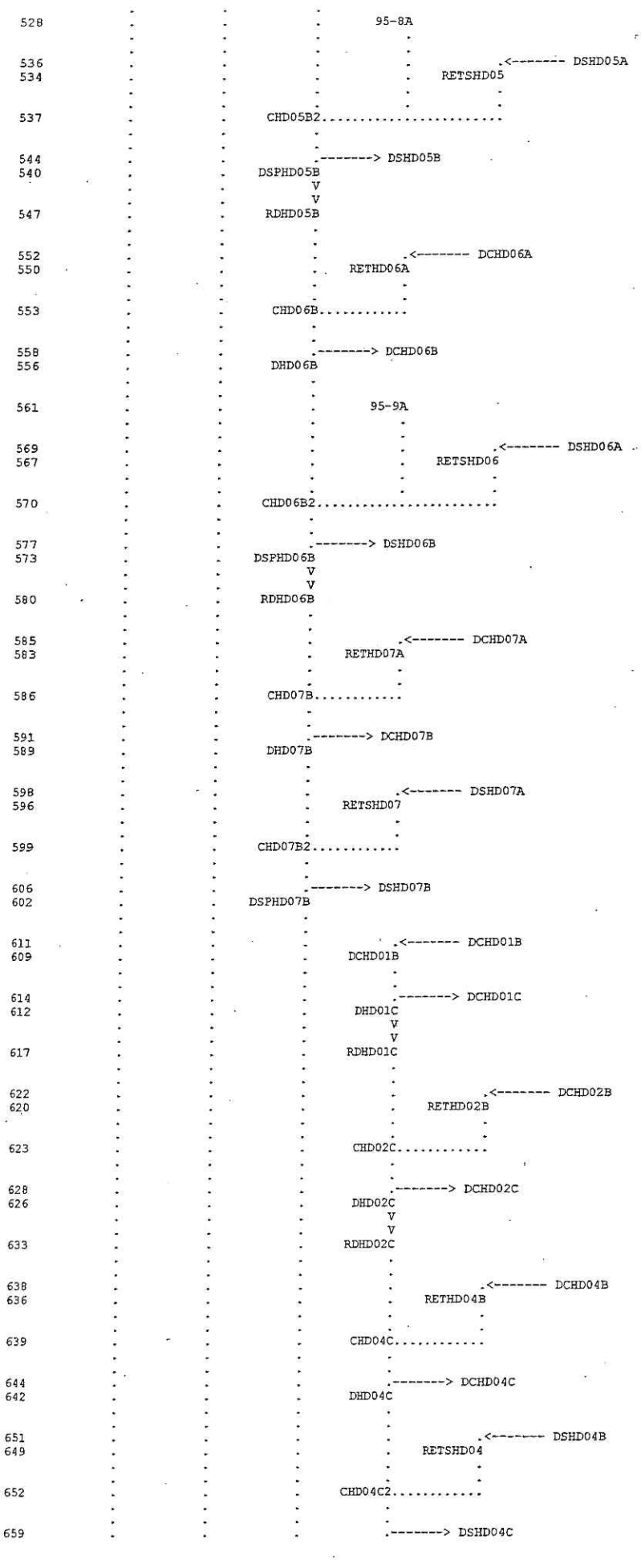
1

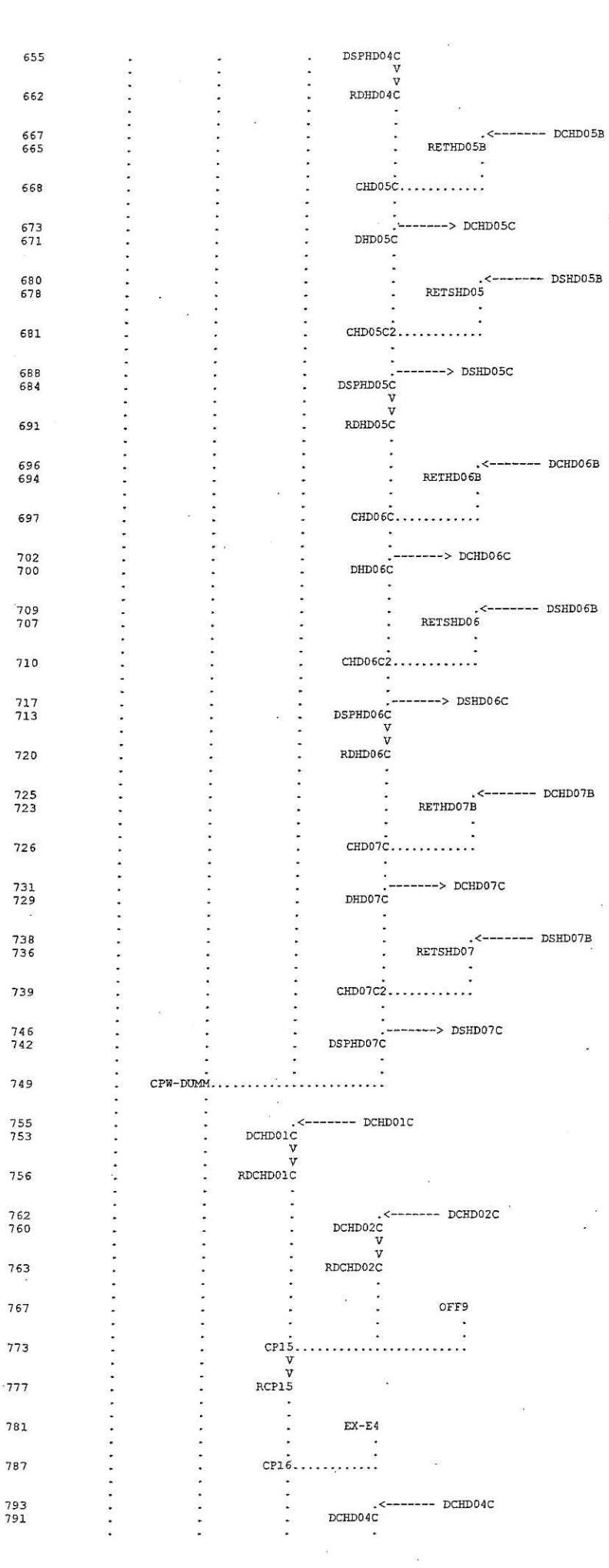
SCHEMATIC DIAGRAM OF STREAM NETWORK

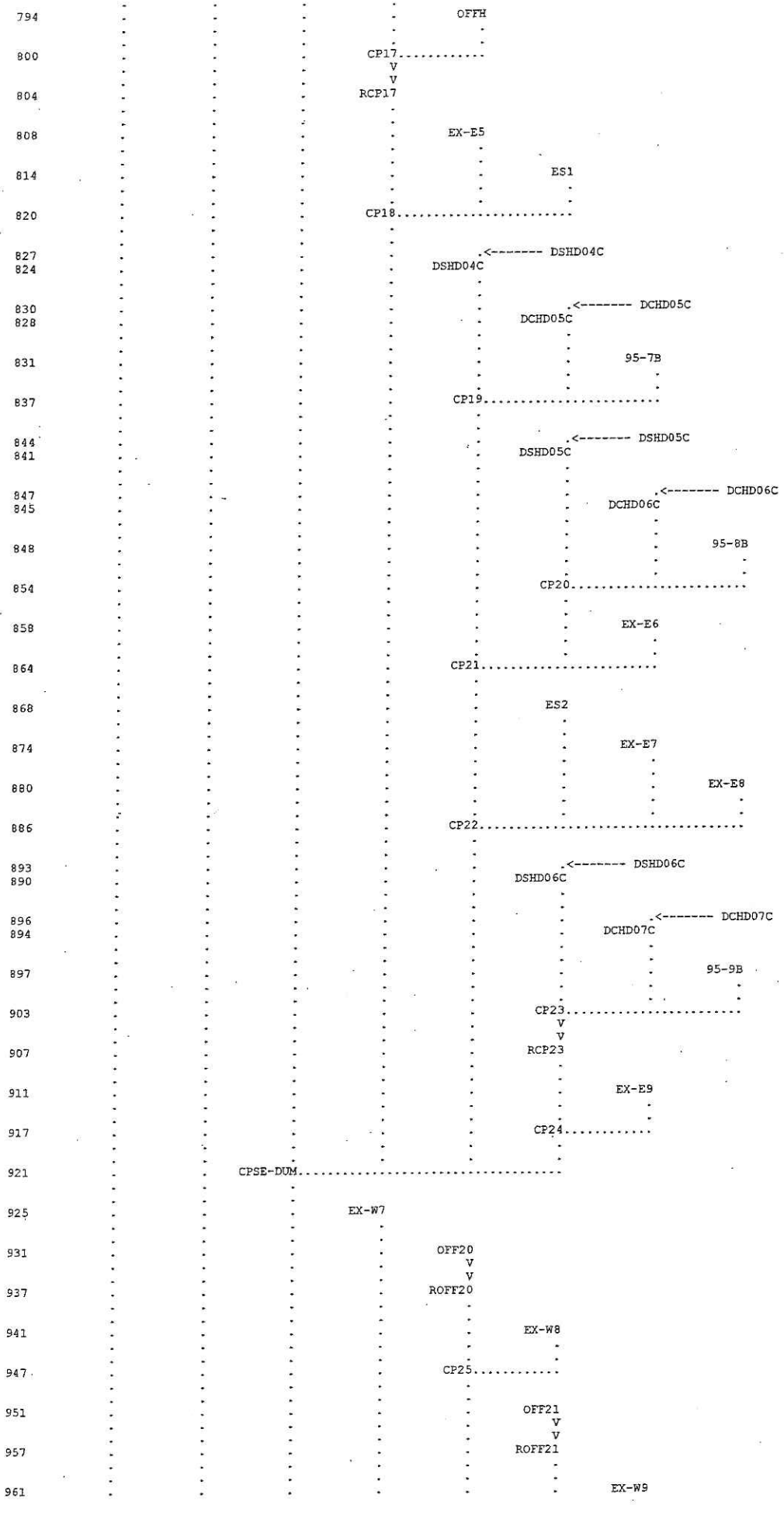



163
95-4
169
CP7
173
OFF5A
179
OFF5B
185
CP7A
189
RCP7A
193
EX-E3
199
CP8
203
CPNE-DUM
207
OFF10
213
ROFF10
217
OFFF-A
223
ROFFF-A
227
OFFF-B
233
EX-W1
239
OFF11
245
CP9
252
DCHD02A
249
DCP9
257
RCP9
260
OFFG
266
EX-W2
272
OFF12
278
OFF16
284
ROFF16
288
EX-W3
294
CP10
301
DCHD04A
298
DCP10
310
DSHD04A
306
DSPHD04A
313
RDCP10
316
EX-W4
322
CP11
329
DCHD05A
326
DCP11
338
DSHD05A
334
DSPHD05A
341
RDCP11
344
OFF18
350
ROFF18


354
EX-W5
360
CP12
364
OFF14
370
CP13
377
DCHD06A
374
DCP13
386
DSHD06A
382
DSPHD06A
389
RDCRCOFF
392
EX-W6
398
OFF15
404
CP14
411
DCHD07A
408
DCP14
420
DSHD07A
416
DSPHD07A
423
OFFE
429
95-5
435
CHD01B
441
DCHD01B
439
DHD01B
446
RDHD01B
449
OFF8
457
DCHD02A
455
RETHD02A
458
CHD02B
464
DCHD02B
462
DHD02B
469
RDHD02B
472
95-6
480
DCHD04A
478
RETHD04A
481
CHD04B
487
DCHD04B
485
DHD04B
494
DSHD04A
492
RETSHD04
495
95-7A
501
CHD04B2
508
DSHD04B
504
DSPHD04B
511
RDHD04B
516
DCHD05A
514
RETHD05A
517
CHD05B
523
DCHD05B
521
DHD05B


528
95-8A
536
DSHD05A
534
RETSHD05
537
CHD05B2
544
DSHD05B
540
DSPHD05B
547
RDHD05B
552
DCHD06A
550
RETHD06A
553
CHD06B
558
DCHD06B
556
DHD06B
561
95-9A
569
DSHD06A
567
RETSHD06
570
CHD06B2
577
DSHD06B
573
DSPHD06B
580
RDHD06B
585
DCHD07A
583
RETHD07A
586
CHD07B
591
DCHD07B
589
DHD07B
598
DSHD07A
596
RETSHD07
599
CHD07B2
606
DSHD07B
602
DSPHD07B
611
DCHD01B
609
DCHD01B
614
DCHD01C
612
DHD01C
617
RDHD01C
622
DCHD02B
620
RETHD02B
623
CHD02C
628
DCHD02C
626
DHD02C
633
RDHD02C
638
DCHD04B
636
RETHD04B
639
CHD04C
644
DCHD04C
642
DHD04C
651
DSHD04B
649
RETSHD04
652
CHD04C2
659
DSHD04C


655 DSPHD04C
662 RDHD04C
667 .<------- DCHD05B
665 RETHD05B
668 CHD05C
673 .-------> DCHD05C
671 DHD05C
680 .<------- DSHD05B
678 RETSHD05
681 CHD05C2
688 .-------> DSHD05C
684 DSPHD05C
691 RDHD05C
696 .<------- DCHD06B
694 RETHD06B
697 CHD06C
702 .-------> DCHD06C
700 DHD06C
709 .<------- DSHD06B
707 RETSHD06
710 CHD06C2
717 .-------> DSHD06C
713 DSPHD06C
720 RDHD06C
725 .<------- DCHD07B
723 RETHD07B
726 CHD07C
731 .-------> DCHD07C
729 DHD07C
738 .<------- DSHD07B
736 RETSHD07
739 CHD07C2
746 .-------> DSHD07C
742 DSPHD07C
749 CPW-DUMM
755 .<------- DCHD01C
753 DCHD01C
756 RDCHD01C
762 .<------- DCHD02C
760 DCHD02C
763 RDCHD02C
767 OFF9
773 CP15
777 RCP15
781 EX-E4
787 CP16
793 .<------- DCHD04C
791 DCHD04C


794
OFFH
800
CP17
804
RCP17
808
EX-E5
814
ES1
820
CP18
827
824
DSHD04C
DSHD04C
830
828
DCHD05C
DCHD05C
831
95-7B
837
CP19
844
841
DSHD05C
DSHD05C
847
845
DCHD06C
DCHD06C
848
95-8B
854
CP20
858
EX-E6
864
CP21
868
ES2
874
EX-E7
880
EX-E8
886
CP22
893
890
DSHD06C
DSHD06C
896
894
DCHD07C
DCHD07C
897
95-9B
903
CP23
907
RCP23
911
EX-E9
917
CP24
921
CPSE-DUM
925
EX-W7
931
OFF20
937
ROFF20
941
EX-W8
947
CP25
951
OFF21
957
ROFF21
961
EX-W9

```
                .         .         .         .         .         .         .
                .         .         .         .         .         .         .
 967            .         .         .         .         .       CP26.....
                .         .         .         .         .         .
                .         .         .         .         .         .
 971            .         .         .       CP27.....................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   05DEC06  TIME  15:12:13   *
*                                       *
*****************************************
```

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

```
************************************************************
* ........................................................ *
* :                                                      : *
* :              KYLE CANYON                             : *
* :                                                      : *
* :              EXISTING CONDITIONS                     : *
* :......................................................: *
* :              RETURN PERIOD_ _ _ _100 & 10 -YEAR      : *
* :              DISTRIBUTION_ _ _ _ 6-HOUR SDN3         : *
* :              PROJECT NO_ _ _ _ _ 784.016             : *
* :              FILENAME_ _ _ _ _ _ EX-RTC.H1           : *
* :              DATE MODELED_ _ _ _ 11/28/06            : *
* :              MODELED BY_ _ _ _ _ REH/BJK             : *
* :......................................................: *
* :                                                      : *
* :......................................................: *
************************************************************
```

JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:

AREA SQ.MI.	DARF
0.0 - 0.5	0.99
0.5 - 1.0	0.98
1.0 - 2.0	0.95
2.0 - 4.0	0.92
4.0 - 6.0	0.91
6.0 - 8.0	0.89

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

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

                COMPUTATION INTERVAL      .08 HOURS
                   TOTAL TIME BASE   24.92 HOURS

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

   JP          MULTI-PLAN OPTION
                    NPLAN          1  NUMBER OF PLANS

   JR          MULTI-RATIO OPTION
                  RATIOS OF PRECIPITATION
               1.00       .98       .95       .92       .91       .89       .57

      *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

      *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

      *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

      *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

      *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

      *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT
```

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

1

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .98	RATIO 3 .95	RATIO 4 .92	RATIO 5 .91	RATIO 6 .89	RATIO 7 .57
HYDROGRAPH AT	OFFA	.02	1	FLOW	17.	16.	15.	14.	14.	13.	4.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	95-1	.00	1	FLOW	7.	7.	7.	6.	6.	6.	3.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CPNM	.02	1	FLOW	22.	21.	20.	19.	18.	18.	6.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	OFFB	.13	1	FLOW	79.	76.	71.	67.	65.	62.	21.
+				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92
HYDROGRAPH AT	95-2	.00	1	FLOW	7.	7.	6.	6.	6.	6.	3.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP1	.14	1	FLOW	81.	78.	73.	69.	67.	64.	21.
+				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92
ROUTED TO	RCP1	.14	1	FLOW	80.	76.	72.	67.	66.	63.	21.
+				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT	OFF2	.09	1	FLOW	61.	59.	55.	51.	50.	48.	15.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
2 COMBINED AT	CP2	.23	1	FLOW	129.	124.	116.	109.	106.	101.	33.
+				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83
ROUTED TO	RCP2	.23	1	FLOW	125.	120.	113.	105.	103.	98.	32.
+				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT	EX-E1	.05	1	FLOW	36.	34.	32.	30.	29.	28.	9.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
2 COMBINED AT	CP3	.28	1	FLOW	151.	145.	136.	127.	124.	118.	38.
+				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92
HYDROGRAPH AT	OFFC	.13	1	FLOW	80.	77.	72.	67.	66.	63.	20.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT	95-3	.01	1	FLOW	15.	14.	14.	13.	13.	13.	6.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CP4	.14	1	FLOW	87.	84.	79.	74.	72.	69.	22.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT	OFF4	.03	1	FLOW	27.	26.	24.	23.	22.	21.	7.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT	CP5	.17	1	FLOW	105.	101.	95.	89.	87.	83.	27.
+				TIME	3.67	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO	RCP5	.17	1	FLOW	100.	96.	90.	84.	82.	79.	26.
+				TIME	3.83	3.83	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT	EX-E2	.22	1	FLOW	141.	136.	127.	119.	116.	111.	35.
+				TIME	3.67	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT	CP6	.39	1	FLOW	233.	223.	209.	196.	191.	182.	59.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT	OFFD-A	.64	1	FLOW	357.	343.	323.	303.	296.	283.	97.
+				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08
ROUTED TO	ROFFD-A	.64	1	FLOW	330.	317.	299.	280.	274.	262.	90.
+				TIME	4.42	4.42	4.42	4.42	4.42	4.42	4.50
HYDROGRAPH AT	OFFD-B	.50	1	FLOW	242.	232.	218.	204.	199.	190.	61.
+				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08
HYDROGRAPH AT	95-4	.01	1	FLOW	17.	17.	16.	15.	15.	14.	7.
+											

				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT												
+	CP7	1.15	1	FLOW	499.	479.	450.	422.	413.	395.	134.
				TIME	4.25	4.25	4.25	4.33	4.33	4.33	4.42
HYDROGRAPH AT												
+	OFF5A	.02	1	FLOW	26.	25.	24.	23.	23.	22.	11.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	OFF5B	.01	1	FLOW	18.	17.	17.	16.	16.	15.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT												
+	CP7A	1.18	1	FLOW	502.	483.	454.	426.	416.	398.	136.
				TIME	4.25	4.25	4.33	4.33	4.33	4.33	4.42
ROUTED TO												
+	RCP7A	1.18	1	FLOW	497.	478.	450.	421.	412.	394.	135.
				TIME	4.42	4.42	4.42	4.42	4.42	4.42	4.50
HYDROGRAPH AT												
+	EX-E3	.19	1	FLOW	112.	107.	101.	94.	92.	87.	28.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83
2 COMBINED AT												
+	CP8	1.37	1	FLOW	528.	508.	478.	448.	438.	419.	144.
				TIME	4.42	4.42	4.42	4.42	4.42	4.42	4.58
4 COMBINED AT												
+	CPNE-DUM	2.07	1	FLOW	739.	709.	665.	622.	608.	580.	190.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	4.17
HYDROGRAPH AT												
+	OFF10	.67	1	FLOW	608.	591.	565.	539.	530.	513.	248.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08
ROUTED TO												
+	ROFF10	.67	1	FLOW	548.	532.	508.	485.	477.	462.	224.
				TIME	4.58	4.58	4.58	4.58	4.58	4.58	4.67
HYDROGRAPH AT												
+	OFFF-A	.99	1	FLOW	870.	843.	803.	763.	750.	723.	322.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO												
+	ROFFF-A	.99	1	FLOW	819.	793.	755.	718.	705.	680.	303.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT												
+	OFFF-B	.61	1	FLOW	447.	433.	411.	390.	383.	369.	160.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT												
+	EX-W1	.02	1	FLOW	20.	19.	18.	17.	16.	16.	5.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT												
+	OFF11	.00	1	FLOW	4.	4.	4.	3.	3.	3.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58
5 COMBINED AT												
+	CP9	2.30	1	FLOW	1489.	1443.	1374.	1305.	1282.	1237.	556.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
DIVERSION TO												
+	DCHD02A	2.30	1	FLOW	493.	477.	453.	431.	424.	409.	252.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT												
+	DCP9	2.30	1	FLOW	996.	965.	920.	874.	859.	828.	304.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
ROUTED TO												
+	RCP9	2.30	1	FLOW	992.	962.	917.	870.	855.	824.	303.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT												
+	OFFG	.04	1	FLOW	48.	47.	44.	42.	41.	40.	18.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT												
+	EX-W2	.02	1	FLOW	22.	21.	20.	19.	19.	18.	7.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT												
+	OFF12	.01	1	FLOW	8.	8.	7.	7.	7.	6.	2.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT												
+	OFF16	.79	1	FLOW	555.	538.	514.	490.	482.	466.	220.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO												
+	ROFF16	.79	1	FLOW	537.	521.	498.	474.	466.	451.	213.
				TIME	4.33	4.33	4.33	4.33	4.33	4.33	4.42
HYDROGRAPH AT												
+	EX-W3	.27	1	FLOW	268.	260.	248.	236.	232.	224.	103.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
6 COMBINED AT												
+	CP10	3.43	1	FLOW	1613.	1564.	1492.	1419.	1395.	1347.	550.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO												
+	DCHD04A	3.43	1	FLOW	985.	952.	902.	854.	838.	806.	285.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT												
+	DCP10	3.43	1	FLOW	628.	613.	590.	565.	557.	540.	265.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25

DIVERSION TO												
+	DSHD04A	3.43	1	FLOW	102.	87.	64.	39.	31.	14.	1.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT												
+	DSPHD04A	3.43	1	FLOW	526.	526.	526.	526.	526.	526.	264.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
ROUTED TO												
+	RDCP10	3.43	1	FLOW	526.	526.	526.	526.	526.	526.	263.
				TIME	4.25	4.08	4.17	4.25	4.25	4.25	4.33
HYDROGRAPH AT												
+	EX-W4	.10	1	FLOW	121.	117.	112.	106.	104.	101.	47.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67
2 COMBINED AT												
+	CP11	3.54	1	FLOW	578.	572.	564.	558.	555.	550.	272.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
DIVERSION TO												
+	DCHD05A	3.54	1	FLOW	265.	263.	261.	259.	258.	256.	188.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
HYDROGRAPH AT												
+	DCP11	3.54	1	FLOW	313.	309.	304.	299.	297.	294.	85.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
DIVERSION TO												
+	DSHD05A	3.54	1	FLOW	1.	1.	1.	0.	0.	0.	0.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
HYDROGRAPH AT												
+	DSPHD05A	3.54	1	FLOW	313.	309.	303.	299.	297.	293.	84.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
ROUTED TO												
+	RDCP11	3.54	1	FLOW	310.	308.	301.	298.	295.	293.	84.
				TIME	4.00	4.00	4.00	4.08	4.08	4.17	4.25
HYDROGRAPH AT												
+	OFF18	.55	1	FLOW	495.	480.	459.	437.	430.	416.	196.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO												
+	ROFF18	.55	1	FLOW	473.	459.	439.	418.	411.	397.	187.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT												
+	EX-W5	.45	1	FLOW	443.	429.	410.	390.	383.	370.	170.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT												
+	CP12	1.00	1	FLOW	792.	768.	733.	698.	686.	663.	308.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT												
+	OFF14	.01	1	FLOW	19.	19.	18.	17.	17.	16.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT												
+	CP13	4.55	1	FLOW	1105.	1076.	1024.	971.	953.	917.	358.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
DIVERSION TO												
+	DCHD06A	4.55	1	FLOW	835.	826.	810.	791.	784.	771.	357.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT												
+	DCP13	4.55	1	FLOW	270.	250.	214.	180.	169.	146.	0.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.67
DIVERSION TO												
+	DSHD06A	4.55	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	.00
HYDROGRAPH AT												
+	DSPHD06A	4.55	1	FLOW	270.	250.	214.	180.	169.	146.	0.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.67
ROUTED TO												
+	RDCRCOFF	4.55	1	FLOW	263.	242.	209.	181.	168.	148.	0.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.92
HYDROGRAPH AT												
+	EX-W6	.02	1	FLOW	21.	21.	20.	19.	19.	18.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58
HYDROGRAPH AT												
+	OFF15	.04	1	FLOW	49.	47.	45.	43.	42.	41.	19.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT												
+	CP14	4.60	1	FLOW	282.	260.	224.	195.	182.	161.	28.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
DIVERSION TO												
+	DCHD07A	4.60	1	FLOW	58.	58.	56.	56.	55.	54.	16.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
HYDROGRAPH AT												
+	DCP14	4.60	1	FLOW	224.	202.	168.	140.	127.	107.	12.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
DIVERSION TO												
+	DSHD07A	4.60	1	FLOW	1.	1.	0.	0.	0.	0.	0.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
HYDROGRAPH AT												
+	DSPHD07A	4.60	1	FLOW	223.	202.	167.	139.	127.	107.	12.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58

HYDROGRAPH AT												
+	OFFE	.04	1	FLOW	26.	25.	24.	22.	22.	21.	6.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
HYDROGRAPH AT												
+	95-5	.04	1	FLOW	60.	59.	56.	54.	53.	51.	26.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT												
+	CHD01B	.08	1	FLOW	77.	74.	71.	67.	66.	64.	28.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO												
+	DCHD01B	.08	1	FLOW	77.	74.	71.	67.	66.	64.	28.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	DHD01B	.08	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	3.25	3.25	3.25	3.25	3.25	3.25	3.42
ROUTED TO												
+	RDHD01B	.08	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.75	4.75	3.50	3.50	3.50	3.50	3.58
HYDROGRAPH AT												
+	OFF8	.01	1	FLOW	19.	19.	18.	17.	17.	17.	8.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT		2.30										
+	RETHD02A	~~.00~~	1	FLOW	493.	477.	453.	431.	424.	409.	252.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
3 COMBINED AT		2.39										
+	CHD02B	~~.09~~	1	FLOW	495.	479.	455.	433.	426.	411.	253.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
DIVERSION TO		2.39										
+	DCHD02B	~~.09~~	1	FLOW	296.	287.	274.	261.	256.	248.	151.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT		2.39										
+	DHD02B	~~.09~~	1	FLOW	199.	192.	181.	172.	169.	164.	102.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
ROUTED TO		2.39										
+	RDHD02B	~~.09~~	1	FLOW	197.	190.	181.	171.	168.	163.	102.
				TIME	4.17	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT												
+	95-6	.01	1	FLOW	17.	16.	16.	15.	15.	14.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT		3.43										
+	RETHD04A	~~.00~~	1	FLOW	985.	952.	902.	854.	838.	806.	285.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
3 COMBINED AT		3.53										
+	CHD04B	~~.10~~	1	FLOW	1184.	1143.	1084.	1027.	1008.	970.	388.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO		3.53										
+	DCHD04B	~~.10~~	1	FLOW	613.	594.	567.	541.	533.	516.	282.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT		3.53										
+	DHD04B	~~.10~~	1	FLOW	571.	549.	517.	485.	475.	454.	106.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT		3.43										
+	RETSHD04	~~.00~~	1	FLOW	102.	87.	64.	39.	31.	14.	1.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT												
+	95-7A	.01	1	FLOW	13.	13.	12.	12.	12.	11.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT		3.54										
+	CHD04B2	~~.11~~	1	FLOW	674.	637.	582.	526.	507.	469.	107.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO		3.54										
+	DSHD04B	~~.10~~	1	FLOW	1.	1.	1.	1.	1.	0.	0.
				TIME	4.17	4.17	4.17	4.25	4.25	4.25	4.25
HYDROGRAPH AT		3.54										
+	DSPHD04B	~~.11~~	1	FLOW	673.	636.	581.	525.	507.	469.	107.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
ROUTED TO		3.54										
+	RDHD04B	~~.11~~	1	FLOW	672.	635.	581.	524.	506.	468.	106.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT		3.54										
+	RETHD05A	~~.00~~	1	FLOW	265.	263.	261.	259.	258.	256.	188.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
2 COMBINED AT		3.65										
+	CHD05B	~~.11~~	1	FLOW	928.	890.	836.	779.	761.	722.	293.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
DIVERSION TO		3.65										
+	DCHD05B	~~.11~~	1	FLOW	459.	441.	414.	389.	382.	368.	200.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT		3.65										
+	DHD05B	~~.11~~	1	FLOW	469.	450.	421.	390.	378.	354.	93.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT												
+	95-8A	.01	1	FLOW	10.	10.	10.	9.	9.	9.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												

+	RETSHD05	3.54	1	FLOW	1.	1.	1.	0.	0.	0.	0.
				TIME	3.92	3.92	4.00	4.08	4.08	4.17	4.25
3 COMBINED AT											
+	CHD05B2	3.65	1	FLOW	470.	451.	422.	391.	379.	355.	94.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
DIVERSION TO											
+	DSHD05B	3.65	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.25	4.25	4.25	4.25
HYDROGRAPH AT											
+	DSPHD05B	3.65	1	FLOW	470.	451.	422.	391.	379.	355.	94.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
ROUTED TO											
+	RDHD05B	3.65	1	FLOW	469.	450.	422.	390.	378.	354.	93.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT											
+	RETHD06A	4.55	1	FLOW	835.	826.	810.	791.	784.	771.	357.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
2 COMBINED AT											
+	CHD06B	4.66	1	FLOW	1251.	1224.	1181.	1137.	1121.	1090.	430.
				TIME	4.08	4.08	4.08	4.17	4.17	4.17	4.08
DIVERSION TO											
+	DCHD06B	4.66	1	FLOW	848.	840.	826.	812.	807.	798.	430.
				TIME	4.08	4.08	4.08	4.17	4.17	4.17	4.08
HYDROGRAPH AT											
+	DHD06B	4.66	1	FLOW	403.	385.	355.	325.	314.	292.	0.
				TIME	4.08	4.08	4.08	4.17	4.17	4.17	3.58
HYDROGRAPH AT											
+	95-9A	.01	1	FLOW	19.	19.	18.	17.	17.	17.	9.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RETSHD06	4.55	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	.00
3 COMBINED AT											
+	CHD06B2	4.67	1	FLOW	406.	387.	358.	326.	315.	294.	9.
				TIME	4.08	4.08	4.08	4.17	4.17	4.17	3.50
DIVERSION TO											
+	DSHD06B	4.67	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	3.42
HYDROGRAPH AT											
+	DSPHD06B	4.67	1	FLOW	406.	387.	358.	326.	315.	294.	9.
				TIME	4.08	4.08	4.08	4.17	4.17	4.17	3.50
ROUTED TO											
+	RDHD06B	4.67	1	FLOW	403.	385.	357.	326.	315.	293.	9.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
HYDROGRAPH AT											
+	RETHD07A	4.60	1	FLOW	58.	58.	56.	56.	55.	54.	16.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
2 COMBINED AT											
+	CHD07B	4.72	1	FLOW	459.	440.	411.	379.	368.	346.	24.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
DIVERSION TO											
+	DCHD07B	4.72	1	FLOW	65.	65.	64.	63.	63.	63.	14.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
HYDROGRAPH AT											
+	DHD07B	4.72	1	FLOW	394.	375.	347.	316.	305.	283.	10.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
HYDROGRAPH AT											
+	RETSHD07	4.60	1	FLOW	1.	1.	0.	0.	0.	0.	0.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	3.58
2 COMBINED AT											
+	CHD07B2	4.72	1	FLOW	394.	376.	347.	316.	305.	283.	10.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
DIVERSION TO											
+	DSHD07B	4.72	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.08	4.17	4.17	4.17	4.17	4.17	3.50
HYDROGRAPH AT											
+	DSPHD07B	4.72	1	FLOW	394.	375.	347.	316.	305.	283.	10.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
HYDROGRAPH AT											
+	DCHD01B	0.08	1	FLOW	77.	74.	71.	67.	66.	64.	28.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO											
+	DCHD01C	0.08	1	FLOW	77.	74.	71.	67.	66.	63.	28.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DHD01C	0.08	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	3.17	3.17	3.17	3.17	3.17	3.25	3.33
ROUTED TO											
+	RDHD01C	0.08	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	3.42	3.42	3.42	3.42	3.42	3.42	3.58
HYDROGRAPH AT											
+	RETHD02B	2.39	1	FLOW	296.	287.	274.	261.	256.	248.	151.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
2 COMBINED AT											
+	CHD02C	2.39	1	FLOW	297.	288.	274.	261.	257.	248.	151.

				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
DIVERSION TO		2.39 .00	1	FLOW	146.	142.	135.	128.	125.	121.	83.
+	DCHD02C			TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT		2.39 .00	1	FLOW	150.	146.	139.	133.	131.	127.	68.
+	DHD02C			TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
ROUTED TO		2.39 .00	1	FLOW	149.	145.	139.	132.	130.	126.	68.
+	RDHD02C			TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT		3.53 .00	1	FLOW	613.	594.	567.	541.	533.	516.	282.
+	RETHD04B			TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
2 COMBINED AT		3.53 .00	1	FLOW	762.	739.	706.	673.	663.	642.	349.
+	CHD04C			TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO		3.53 .00	1	FLOW	322.	313.	301.	289.	285.	278.	204.
+	DCHD04C			TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT		3.53 .00	1	FLOW	440.	426.	405.	384.	378.	365.	145.
+	DHD04C			TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT		3.54 .00	1	FLOW	1.	1.	1.	1.	1.	0.	0.
+	RETSHD04			TIME	4.17	4.17	4.17	4.25	4.25	4.25	4.25
2 COMBINED AT		3.54 .00	1	FLOW	441.	426.	405.	385.	378.	365.	145.
+	CHD04C2			TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
DIVERSION TO		3.54 .00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
+	DSHD04C			TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT		3.54 .00	1	FLOW	440.	426.	405.	384.	378.	365.	145.
+	DSPHD04C			TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
ROUTED TO		3.54 .00	1	FLOW	440.	426.	405.	384.	378.	365.	144.
+	RDHD04C			TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT		3.65 .00	1	FLOW	459.	441.	414.	389.	382.	368.	200.
+	RETHD05B			TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
2 COMBINED AT		3.65 .00	1	FLOW	899.	867.	819.	774.	760.	733.	345.
+	CHD05C			TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
DIVERSION TO		3.65 .00	1	FLOW	275.	265.	251.	238.	235.	229.	178.
+	DCHD05C			TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT		3.65 .00	1	FLOW	624.	601.	568.	535.	525.	504.	167.
+	DHD05C			TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT		3.65 .00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
+	RETSHD05			TIME	4.17	4.17	4.17	4.25	4.25	4.25	4.25
2 COMBINED AT		3.65 .00	1	FLOW	624.	601.	568.	536.	526.	504.	167.
+	CHD05C2			TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
DIVERSION TO		3.65 .00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
+	DSHD05C			TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT		3.65 .00	1	FLOW	624.	601.	568.	535.	525.	503.	167.
+	DSPHD05C			TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
ROUTED TO		3.65 .00	1	FLOW	623.	601.	568.	535.	525.	503.	167.
+	RDHD05C			TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT		4.66 .00	1	FLOW	848.	840.	826.	812.	807.	798.	430.
+	RETHD06B			TIME	4.08	4.08	4.08	4.17	4.17	4.17	4.08
2 COMBINED AT		4.66 .00	1	FLOW	1464.	1433.	1387.	1341.	1325.	1293.	587.
+	CHD06C			TIME	4.17	4.17	4.17	4.25	4.17	4.17	4.17
DIVERSION TO		4.66 .00	1	FLOW	888.	875.	855.	838.	832.	820.	549.
+	DCHD06C			TIME	4.17	4.17	4.17	4.25	4.17	4.17	4.17
HYDROGRAPH AT		4.66 .00	1	FLOW	576.	559.	532.	503.	493.	473.	37.
+	DHD06C			TIME	4.17	4.17	4.17	4.25	4.17	4.17	4.17
HYDROGRAPH AT		4.67 .00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
+	RETSHD06			TIME	4.08	4.08	4.08	4.08	4.08	4.08	3.42
2 COMBINED AT		4.67 .00	1	FLOW	576.	559.	532.	503.	493.	473.	37.
+	CHD06C2			TIME	4.17	4.17	4.17	4.25	4.17	4.17	4.17
DIVERSION TO		4.67 .00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
+	DSHD06C			TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17

HYDROGRAPH AT		4.67										
+	DSPHD06C	.00	1	FLOW	576.	558.	532.	502.	493.	472.	37.
				TIME	4.17	4.17	4.17	4.25	4.17	4.17	4.17
ROUTED TO		4.67										
+	RDHD06C	.00	1	FLOW	575.	558.	531.	502.	493.	472.	36.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT		4.72										
+	RETHD07B	.00	1	FLOW	65.	65.	64.	63.	63.	63.	14.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	3.58
2 COMBINED AT		4.72										
+	CHD07C	.00	1	FLOW	640.	622.	595.	566.	556.	535.	38.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO		4.72										
+	DCHD07C	.00	1	FLOW	144.	138.	128.	119.	115.	108.	22.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT		4.72										
+	DHD07C	.00	1	FLOW	495.	484.	467.	447.	440.	426.	17.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT		4.72										
+	RETSHD07	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.08	4.17	4.17	4.17	4.17	4.17	3.50
2 COMBINED AT		4.72										
+	CHD07C2	.00	1	FLOW	495.	484.	467.	447.	441.	426.	17.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO		4.72										
+	DSHD07C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.25	4.25	4.17	4.25
HYDROGRAPH AT		4.72										
+	DSPHD07C	.00	1	FLOW	495.	484.	467.	447.	440.	426.	17.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
3 COMBINED AT												
+	CPW-DUMM	4.72	1	FLOW	1057.	1012.	940.	866.	838.	787.	28.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	3.58
HYDROGRAPH AT		0.08										
+	DCHD01C	.00	1	FLOW	77.	74.	71.	67.	66.	63.	28.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO		0.08										
+	RDCHD01C	.00	1	FLOW	74.	72.	68.	65.	64.	62.	28.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT		2.39										
+	DCHD02C	.00	1	FLOW	146.	142.	135.	128.	125.	121.	83.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
ROUTED TO		2.39										
+	RDCHD02C	.00	1	FLOW	146.	141.	134.	127.	125.	120.	83.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25
HYDROGRAPH AT												
+	OFF9	.05	1	FLOW	60.	58.	56.	53.	52.	51.	25.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT		2.44										
+	CP15	.05	1	FLOW	215.	210.	203.	195.	193.	188.	109.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67
ROUTED TO		2.44										
+	RCP15	.05	1	FLOW	205.	200.	193.	187.	184.	180.	106.
				TIME	3.67	3.67	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT												
+	EX-E4	.22	1	FLOW	147.	141.	132.	123.	120.	115.	36.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
2 COMBINED AT		2.66										
+	CP16	.27	1	FLOW	352.	341.	325.	309.	304.	294.	141.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75
HYDROGRAPH AT		3.53										
+	DCHD04C	.00	1	FLOW	322.	313.	301.	289.	285.	278.	204.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT												
+	OFFH	.01	1	FLOW	15.	14.	14.	13.	13.	12.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT		3.54										
+	CP17	.01	1	FLOW	323.	315.	302.	290.	286.	279.	205.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25
ROUTED TO		3.54										
+	RCP17	.01	1	FLOW	321.	313.	301.	289.	285.	277.	204.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT												
+	EX-E5	.10	1	FLOW	79.	76.	72.	68.	66.	63.	22.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT												
+	ES1	.02	1	FLOW	29.	28.	27.	26.	26.	25.	14.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT		3.66										
+	CP18	.13	1	FLOW	340.	331.	318.	305.	301.	293.	212.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.58
HYDROGRAPH AT		3.54										
+	DSHD04C	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25

HYDROGRAPH AT		3.65										
+	DCHD05C	~~.00~~	1	FLOW	275.	265.	251.	238.	235.	229.	178.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT												
+	95-7B	.01	1	FLOW	20.	20.	19.	18.	18.	18.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT		3.66										
+	CP19	~~.01~~	1	FLOW	277.	267.	253.	240.	236.	231.	179.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.33
HYDROGRAPH AT		3.65										
+	DSHD05C	~~.00~~	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT		4.66										
+	DCHD06C	~~.00~~	1	FLOW	888.	875.	855.	838.	832.	820.	549.
				TIME	4.17	4.17	4.17	4.25	4.17	4.17	4.17
HYDROGRAPH AT												
+	95-8B	.00	1	FLOW	8.	8.	8.	7.	7.	7.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT		4.66										
+	CP20	~~.00~~	1	FLOW	889.	875.	856.	839.	833.	821.	550.
				TIME	4.17	4.17	4.17	4.25	4.25	4.17	4.17
HYDROGRAPH AT												
+	EX-E6	.02	1	FLOW	21.	21.	20.	19.	19.	18.	9.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT		4.69										
+	CP21	~~.03~~	1	FLOW	1167.	1143.	1110.	1080.	1071.	1053.	728.
				TIME	4.17	4.25	4.25	4.25	4.25	4.25	4.17
HYDROGRAPH AT												
+	ES2	.05	1	FLOW	84.	82.	79.	76.	75.	73.	43.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT												
+	EX-E7	.03	1	FLOW	45.	43.	41.	40.	39.	38.	18.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT												
+	EX-E8	.02	1	FLOW	22.	22.	21.	20.	19.	19.	9.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
4 COMBINED AT		4.79										
+	CP22	~~.13~~	1	FLOW	1187.	1163.	1128.	1098.	1088.	1071.	738.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT		4.67										
+	DSHD06C	~~.00~~	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT		4.72										
+	DCHD07C	~~.09~~	1	FLOW	144.	138.	128.	119.	115.	108.	22.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT												
+	95-9B	.01	1	FLOW	22.	21.	20.	20.	19.	19.	10.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT		4.73										
+	CP23	~~.01~~	1	FLOW	147.	140.	131.	121.	117.	110.	23.
				TIME	4.17	4.25	4.25	4.25	4.25	4.25	4.17
ROUTED TO		4.73										
+	RCP23	~~.01~~	1	FLOW	147.	140.	131.	121.	117.	110.	23.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT												
+	EX-E9	.01	1	FLOW	13.	13.	12.	11.	11.	11.	5.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT		4.74										
+	CP24	~~.02~~	1	FLOW	148.	142.	132.	122.	118.	111.	24.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25
4 COMBINED AT												
+	CPSE-DUM	.54	1	FLOW	1904.	1857.	1788.	1724.	1703.	1665.	1085.
				TIME	4.17	4.17	4.17	4.17	4.17	4.08	4.17
HYDROGRAPH AT												
+	EX-W7	.20	1	FLOW	197.	191.	183.	174.	171.	165.	76.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT												
+	OFF20	.07	1	FLOW	85.	82.	79.	75.	74.	71.	33.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67
ROUTED TO												
+	ROFF20	.07	1	FLOW	70.	68.	65.	62.	61.	59.	28.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT												
+	EX-W8	.22	1	FLOW	213.	207.	197.	188.	184.	178.	81.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT												
+	CP25	.28	1	FLOW	268.	260.	248.	236.	232.	224.	104.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83
HYDROGRAPH AT												
+	OFF21	.53	1	FLOW	475.	461.	440.	419.	412.	398.	186.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO												
+	ROFF21	.53	1	FLOW	453.	440.	420.	400.	393.	380.	176.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT												

+	EX-W9	.18	1	FLOW	173.	168.	159.	151.	149.	143.	63.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT											
+	CP26	.71	1	FLOW	558.	541.	516.	491.	482.	466.	213.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00
3 COMBINED AT											
+	CP27	1.19	1	FLOW	953.	924.	880.	838.	824.	796.	366.
				TIME	3.83	3.83	3.83	3.92	3.92	3.92	3.92

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.04	994.73	250.92	1.00	5.00	992.09	250.00	1.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1224E+03 EXCESS= .0000E+00 OUTFLOW= .1224E+03 BASIN STORAGE= .2934E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.05	964.16	251.80	.96	5.00	961.89	250.00	.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1181E+03 EXCESS= .0000E+00 OUTFLOW= .1181E+03 BASIN STORAGE= .3029E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.06	919.51	251.64	.91	5.00	916.79	250.00	.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1117E+03 EXCESS= .0000E+00 OUTFLOW= .1117E+03 BASIN STORAGE= .2896E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.08	873.48	251.67	.86	5.00	870.50	250.00	.86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1052E+03 EXCESS= .0000E+00 OUTFLOW= .1052E+03 BASIN STORAGE= .2878E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.08	857.94	251.73	.84	5.00	854.95	250.00	.84

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1031E+03 EXCESS= .0000E+00 OUTFLOW= .1031E+03 BASIN STORAGE= .2985E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.09	826.95	251.87	.80	5.00	823.97	250.00	.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9881E+02 EXCESS= .0000E+00 OUTFLOW= .9881E+02 BASIN STORAGE= .2986E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RCP9	MANE	1.40	303.67	256.31	.27	5.00	302.95	255.00	.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3340E+02 EXCESS= .0000E+00 OUTFLOW= .3340E+02 BASIN STORAGE= .2887E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RDCP10	MANE	1.55	526.69	237.48	.51	5.00	526.07	255.00	.51

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9259E+02 EXCESS= .0000E+00 OUTFLOW= .9259E+02 BASIN STORAGE= .4003E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RDCP10	MANE	1.55	527.06	237.48	.50	5.00	526.06	255.00	.50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9077E+02 EXCESS= .0000E+00 OUTFLOW= .9077E+02 BASIN STORAGE= .3931E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RDCP10	MANE	1.55	526.30	242.14	.48	5.00	526.07	250.00	.48

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8782E+02 EXCESS= .0000E+00 OUTFLOW= .8782E+02 BASIN STORAGE= .3755E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RDCP10	MANE	1.55	526.26	246.80	.46	5.00	526.03	255.00	.46

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8474E+02 EXCESS= .0000E+00 OUTFLOW= .8474E+02 BASIN STORAGE= .3646E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RDCP10	MANE	1.55	526.29	248.35	.46	5.00	526.04	255.00	.46

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8364E+02 EXCESS= .0000E+00 OUTFLOW= .8364E+02 BASIN STORAGE= .4061E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RDCP10	MANE	1.55	526.28	251.46	.44	5.00	526.03	255.00	.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8136E+02 EXCESS= .0000E+00 OUTFLOW= .8136E+02 BASIN STORAGE= .3980E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RDCP10	MANE	1.84	263.79	258.17	.21	5.00	262.85	260.00	.21

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3787E+02 EXCESS= .0000E+00 OUTFLOW= .3787E+02 BASIN STORAGE= .4044E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.11	312.32	237.00	.22	5.00	309.85	240.00	.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4168E+02 EXCESS= .0000E+00 OUTFLOW= .4168E+02 BASIN STORAGE= .2346E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.11	308.85	236.64	.21	5.00	308.45	240.00	.21

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4052E+02 EXCESS= .0000E+00 OUTFLOW= .4052E+02 BASIN STORAGE= .2353E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.12	302.80	241.08	.20	5.00	301.08	245.00	.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3861E+02 EXCESS= .0000E+00 OUTFLOW= .3861E+02 BASIN STORAGE= .2278E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.12	298.29	246.44	.19	5.00	297.93	245.00	.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3660E+02 EXCESS= .0000E+00 OUTFLOW= .3661E+02 BASIN STORAGE= .2336E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.12	296.56	246.82	.19	5.00	295.34	245.00	.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3589E+02 EXCESS= .0000E+00 OUTFLOW= .3589E+02 BASIN STORAGE= .2341E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.13	293.19	249.82	.18	5.00	293.17	250.00	.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3442E+02 EXCESS= .0000E+00 OUTFLOW= .3442E+02 BASIN STORAGE= .2350E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCP11	MANE	1.54	84.38	256.56	.03	5.00	83.52	255.00	.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6199E+01 EXCESS= .0000E+00 OUTFLOW= .6199E+01 BASIN STORAGE= .2316E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.19	265.14	238.68	.05	5.00	263.28	235.00	.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1218E+02 EXCESS= .0000E+00 OUTFLOW= .1219E+02 BASIN STORAGE= .4403E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.23	246.10	238.85	.05	5.00	241.62	235.00	.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1104E+02 EXCESS= .0000E+00 OUTFLOW= .1104E+02 BASIN STORAGE= .4565E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.32	212.92	238.90	.04	5.00	209.46	240.00	.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9328E+01 EXCESS= .0000E+00 OUTFLOW= .9331E+01 BASIN STORAGE= .4597E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.42	181.06	239.92	.03	5.00	180.86	240.00	.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7796E+01 EXCESS= .0000E+00 OUTFLOW= .7799E+01 BASIN STORAGE= .4379E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.46	169.01	238.86	.03	5.00	168.02	240.00	.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7269E+01 EXCESS= .0000E+00 OUTFLOW= .7272E+01 BASIN STORAGE= .4541E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	2.55	148.06	239.92	.03	5.00	147.93	240.00	.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6261E+01 EXCESS= .0000E+00 OUTFLOW= .6264E+01 BASIN STORAGE= .4621E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RDCRCOFF	MANE	5.00	.11	235.00	.00	5.00	.11	235.00	.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1625E-01 EXCESS= .0000E+00 OUTFLOW= .1632E-01 BASIN STORAGE= .4497E-03 PERCENT ERROR= -3.2

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.00	.10	285.00	.00	5.00	.10	285.00	.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1986E-01 EXCESS= .0000E+00 OUTFLOW= .1997E-01 BASIN STORAGE= .3515E-03 PERCENT ERROR= -2.3

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.00	.11	285.00	.00	5.00	.11	285.00	.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1955E-01 EXCESS= .0000E+00 OUTFLOW= .1967E-01 BASIN STORAGE= .3484E-03 PERCENT ERROR= -2.4

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.00	.10	210.00	.00	5.00	.10	210.00	.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1907E-01 EXCESS= .0000E+00 OUTFLOW= .1919E-01 BASIN STORAGE= .3392E-03 PERCENT ERROR= -2.4

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.00	.11	210.00	.00	5.00	.11	210.00	.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1858E-01 EXCESS= .0000E+00 OUTFLOW= .1870E-01 BASIN STORAGE= .3582E-03 PERCENT ERROR= -2.5

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.00	.11	210.00	.00	5.00	.11	210.00	.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1841E-01 EXCESS= .0000E+00 OUTFLOW= .1852E-01 BASIN STORAGE= .3597E-03 PERCENT ERROR= -2.6

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.00	.11	210.00	.00	5.00	.11	210.00	.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1804E-01 EXCESS= .0000E+00 OUTFLOW= .1814E-01 BASIN STORAGE= .3559E-03 PERCENT ERROR= -2.5

FOR PLAN = 1 RATIO= .00

RDHD01B	MANE	3.50	.10	217.00	.00	5.00	.10	225.00	.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1083E-01 EXCESS= .0000E+00 OUTFLOW= .1088E-01 BASIN STORAGE= .3582E-03 PERCENT ERROR= -3.8

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.42	198.24	253.92	6.61	5.00	197.42	250.00	6.61

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3119E+02 EXCESS= .0000E+00 OUTFLOW= .3119E+02 BASIN STORAGE= .4506E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.44	191.22	253.78	6.42	5.00	190.44	255.00	6.42

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3031E+02 EXCESS= .0000E+00 OUTFLOW= .3031E+02 BASIN STORAGE= .4537E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.47	180.72	252.44	6.15	5.00	180.63	255.00	6.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2904E+02 EXCESS= .0000E+00 OUTFLOW= .2904E+02 BASIN STORAGE= .4546E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.51	171.64	253.24	5.89	5.00	171.32	255.00	5.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2779E+02 EXCESS= .0000E+00 OUTFLOW= .2779E+02 BASIN STORAGE= .4705E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.52	168.85	254.31	5.80	5.00	168.48	255.00	5.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2740E+02 EXCESS= .0000E+00 OUTFLOW= .2740E+02 BASIN STORAGE= .4752E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.54	163.11	253.98	5.64	5.00	162.73	255.00	5.64

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2661E+02 EXCESS= .0000E+00 OUTFLOW= .2661E+02 BASIN STORAGE= .4836E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD02B	MANE	2.86	102.16	257.11	3.24	5.00	101.93	255.00	3.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1528E+02 EXCESS= .0000E+00 OUTFLOW= .1528E+02 BASIN STORAGE= .4631E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.46	673.49	252.47	11.76	5.00	671.99	255.00	11.76

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6635E+02 EXCESS= .0000E+00 OUTFLOW= .6635E+02 BASIN STORAGE= .3807E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.48	636.76	253.12	11.09	5.00	634.99	255.00	11.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6260E+02 EXCESS= .0000E+00 OUTFLOW= .6261E+02 BASIN STORAGE= .3649E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.51	581.76	252.84	10.15	5.00	580.54	255.00	10.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5725E+02 EXCESS= .0000E+00 OUTFLOW= .5725E+02 BASIN STORAGE= .3773E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.55	525.42	253.12	9.22	5.00	524.05	255.00	9.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5202E+02 EXCESS= .0000E+00 OUTFLOW= .5202E+02 BASIN STORAGE= .3759E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.57	506.09	253.84	8.92	5.00	505.77	255.00	8.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5033E+02 EXCESS= .0000E+00 OUTFLOW= .5034E+02 BASIN STORAGE= .3794E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	1.60	467.82	254.04	8.34	5.00	467.71	255.00	8.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4707E+02 EXCESS= .0000E+00 OUTFLOW= .4708E+02 BASIN STORAGE= .3805E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD04B	MANE	2.31	106.81	258.90	1.31	5.00	106.12	260.00	1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7389E+01 EXCESS= .0000E+00 OUTFLOW= .7390E+01 BASIN STORAGE= .3805E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.00	469.24	255.07	9.04	5.00	469.21	255.00	9.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5352E+02 EXCESS= .0000E+00 OUTFLOW= .5352E+02 BASIN STORAGE= .2300E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.01	450.15	255.72	8.62	5.00	450.04	255.00	8.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5104E+02 EXCESS= .0000E+00 OUTFLOW= .5104E+02 BASIN STORAGE= .2289E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.03	421.93	255.78	8.01	5.00	421.71	255.00	8.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4740E+02 EXCESS= .0000E+00 OUTFLOW= .4740E+02 BASIN STORAGE= .2362E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.05	390.08	255.57	7.38	5.00	389.82	255.00	7.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4370E+02 EXCESS= .0000E+00 OUTFLOW= .4370E+02 BASIN STORAGE= .2364E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.06	378.38	255.39	7.17	5.00	378.15	255.00	7.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4248E+02 EXCESS= .0000E+00 OUTFLOW= .4248E+02 BASIN STORAGE= .2350E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.07	354.23	255.32	6.77	5.00	354.01	255.00	6.77

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4009E+02 EXCESS= .0000E+00 OUTFLOW= .4009E+02 BASIN STORAGE= .2360E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD05B	MANE	1.50	93.42	260.55	1.71	5.00	93.40	260.00	1.71

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1012E+02 EXCESS= .0000E+00 OUTFLOW= .1012E+02 BASIN STORAGE= .2342E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	1.98	405.38	247.16	4.91	5.00	403.29	250.00	4.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3197E+02 EXCESS= .0000E+00 OUTFLOW= .3197E+02 BASIN STORAGE= .4348E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.00	387.34	248.03	4.56	5.00	385.03	250.00	4.56

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2968E+02 EXCESS= .0000E+00 OUTFLOW= .2968E+02 BASIN STORAGE= .4506E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.04	358.39	248.90	4.04	5.00	356.83	250.00	4.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2629E+02 EXCESS= .0000E+00 OUTFLOW= .2629E+02 BASIN STORAGE= .4358E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.09	326.33	248.50	3.51	5.00	325.57	250.00	3.50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2282E+02 EXCESS= .0000E+00 OUTFLOW= .2282E+02 BASIN STORAGE= .4379E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.11	315.60	248.48	3.34	5.00	314.85	250.00	3.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2173E+02 EXCESS= .0000E+00 OUTFLOW= .2173E+02 BASIN STORAGE= .4506E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDHD06B	MANE	2.14	294.33	248.64	3.01	5.00	293.38	250.00	3.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1957E+02 EXCESS= .0000E+00 OUTFLOW= .1958E+02 BASIN STORAGE= .4642E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RDHD06B MANE 4.50 8.95 216.00 .08 5.00 8.69 215.00 .08

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5514E+00 EXCESS= .0000E+00 OUTFLOW= .5518E+00 BASIN STORAGE= .5125E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= 1.00
RDHD01C MANE 4.57 .10 251.47 -1.00 5.00 .10 255.00 -1.00

FOR PLAN = 1 RATIO= .98
RDHD01C MANE 4.49 .10 251.78 -1.00 5.00 .10 255.00 -1.00

FOR PLAN = 1 RATIO= .95
RDHD01C MANE 4.45 .10 200.70 -1.00 5.00 .10 250.00 -1.00

FOR PLAN = 1 RATIO= .92
RDHD01C MANE 4.42 .10 305.40 -1.00 5.00 .10 305.00 -1.00

FOR PLAN = 1 RATIO= .91
RDHD01C MANE 4.50 .10 200.57 -1.00 5.00 .10 285.00 -1.00

FOR PLAN = 1 RATIO= .89
RDHD01C MANE 4.50 .10 279.55 -1.00 5.00 .10 280.00 -1.00

FOR PLAN = 1 RATIO= .57
RDHD01C MANE 4.47 .10 212.98 -1.00 5.00 .10 235.00 -1.00

FOR PLAN = 1 RATIO= 1.00
RDHD02C MANE .97 149.85 251.63 -1.00 5.00 149.16 250.00 -1.00

FOR PLAN = 1 RATIO= .98
RDHD02C MANE .97 145.67 251.84 -1.00 5.00 144.90 250.00 -1.00

FOR PLAN = 1 RATIO= .95
RDHD02C MANE .92 139.39 251.83 -1.00 5.00 138.55 255.00 -1.00

FOR PLAN = 1 RATIO= .92
RDHD02C MANE 1.08 133.02 252.05 -1.00 5.00 132.39 255.00 -1.00

FOR PLAN = 1 RATIO= .91
RDHD02C MANE 1.07 130.89 252.71 -1.00 5.00 130.38 255.00 -1.00

FOR PLAN = 1 RATIO= .89
RDHD02C MANE 1.07 126.70 252.02 -1.00 5.00 126.07 255.00 -1.00

FOR PLAN = 1 RATIO= .57
RDHD02C MANE 1.17 67.89 256.74 -1.00 5.00 67.81 255.00 -1.00

FOR PLAN = 1 RATIO= 1.00
RDHD04C MANE .55 440.28 251.48 -1.00 5.00 439.92 255.00 -1.00

FOR PLAN = 1 RATIO= .98
RDHD04C MANE .57 425.89 251.24 -1.00 5.00 425.71 255.00 -1.00

FOR PLAN = 1 RATIO= .95
RDHD04C MANE .69 404.72 254.76 -1.00 5.00 404.72 255.00 -1.00

FOR PLAN = 1 RATIO= .92
RDHD04C MANE .67 384.40 255.64 -1.00 5.00 384.37 255.00 -1.00

FOR PLAN = 1 RATIO= .91
RDHD04C MANE .59 377.74 255.96 -1.00 5.00 377.68 255.00 -1.00

FOR PLAN = 1 RATIO= .89
RDHD04C MANE .64 364.60 255.28 -1.00 5.00 364.56 255.00 -1.00

FOR PLAN = 1 RATIO= .57
RDHD04C MANE .77 145.14 257.01 -1.00 5.00 144.43 260.00 -1.00

FOR PLAN = 1 RATIO= 1.00

RDHD05C	MANE	.44	623.33	255.30	-1.00	5.00	623.18	255.00	-1.00

FOR PLAN = 1 RATIO= .98

RDHD05C	MANE	.40	600.96	255.35	-1.00	5.00	600.76	255.00	-1.00

FOR PLAN = 1 RATIO= .95

RDHD05C	MANE	.36	567.90	255.74	-1.00	5.00	567.60	255.00	-1.00

FOR PLAN = 1 RATIO= .92

RDHD05C	MANE	.41	535.09	255.47	-1.00	5.00	534.80	255.00	-1.00

FOR PLAN = 1 RATIO= .91

RDHD05C	MANE	.47	525.04	255.56	-1.00	5.00	524.78	255.00	-1.00

FOR PLAN = 1 RATIO= .89

RDHD05C	MANE	.35	503.38	255.71	-1.00	5.00	502.79	255.00	-1.00

FOR PLAN = 1 RATIO= .57

RDHD05C	MANE	.47	167.22	260.32	-1.00	5.00	167.20	260.00	-1.00

FOR PLAN = 1 RATIO= 1.00

RDHD06C	MANE	.73	575.53	251.57	-1.00	5.00	574.67	255.00	-1.00

FOR PLAN = 1 RATIO= .98

RDHD06C	MANE	.74	558.26	251.82	-1.00	5.00	557.61	255.00	-1.00

FOR PLAN = 1 RATIO= .95

RDHD06C	MANE	.79	531.61	252.06	-1.00	5.00	531.36	255.00	-1.00

FOR PLAN = 1 RATIO= .92

RDHD06C	MANE	.68	502.48	255.32	-1.00	5.00	502.48	255.00	-1.00

FOR PLAN = 1 RATIO= .91

RDHD06C	MANE	.76	492.87	252.19	-1.00	5.00	492.81	255.00	-1.00

FOR PLAN = 1 RATIO= .89

RDHD06C	MANE	.81	472.41	251.88	-1.00	5.00	472.13	255.00	-1.00

FOR PLAN = 1 RATIO= .57

RDHD06C	MANE	1.34	36.97	252.21	-1.00	5.00	36.36	255.00	-1.00

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	2.04	76.47	212.01	-1.00	5.00	74.33	215.00	-1.00

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	2.06	74.12	212.24	-1.00	5.00	72.21	215.00	-1.00

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	2.10	70.23	213.73	-1.00	5.00	68.39	215.00	-1.00

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	2.13	66.73	213.23	-1.00	5.00	65.10	215.00	-1.00

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	2.15	65.76	212.37	-1.00	5.00	64.28	215.00	-1.00

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	2.17	63.30	212.83	-1.00	5.00	62.08	215.00	-1.00

FOR PLAN = 1 RATIO= .00

RDCHD01C	MANE	2.85	28.11	214.06	-1.00	5.00	27.58	215.00	-1.00

FOR PLAN = 1 RATIO= .00

RDCHD02C	MANE	1.64	146.14	250.95	-1.00	5.00	145.71	250.00	-1.00

FOR PLAN = 1 RATIO= .00

RDCHD02C	MANE	1.66	141.63	252.07	-1.00	5.00	140.96	250.00	-1.00

```
 FOR PLAN = 1  RATIO=  .00
 RDCHD02C  MANE        1.69    134.53    251.37     -1.00      5.00    133.87    250.00      -1.00


 FOR PLAN = 1  RATIO=  .00
 RDCHD02C  MANE        1.72    127.54    252.47     -1.00      5.00    126.93    250.00      -1.00


 FOR PLAN = 1  RATIO=  .00
 RDCHD02C  MANE        1.73    125.32    252.28     -1.00      5.00    124.64    250.00      -1.00


 FOR PLAN = 1  RATIO=  .00
 RDCHD02C  MANE        1.75    121.07    251.79     -1.00      5.00    120.37    250.00      -1.00


 FOR PLAN = 1  RATIO=  .00
 RDCHD02C  MANE        1.99     82.68    256.30     -1.00      5.00     82.68    255.00      -1.00


 FOR PLAN = 1  RATIO=  .00
    RCP23  MANE        2.09    147.24    253.24     23.92      5.00    146.80    255.00      23.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1697E+02 EXCESS= .0000E+00 OUTFLOW= .1697E+02 BASIN STORAGE= .9547E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
    RCP23  MANE        2.13    140.58    252.91     22.82      5.00    140.45    255.00      22.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1619E+02 EXCESS= .0000E+00 OUTFLOW= .1619E+02 BASIN STORAGE= .9405E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
    RCP23  MANE        2.18    130.71    254.83     21.29      5.00    130.66    255.00      21.30

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1510E+02 EXCESS= .0000E+00 OUTFLOW= .1510E+02 BASIN STORAGE= .9337E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
    RCP23  MANE        2.24    120.70    255.05     19.73      5.00    120.69    255.00      19.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1399E+02 EXCESS= .0000E+00 OUTFLOW= .1400E+02 BASIN STORAGE= .9014E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
    RCP23  MANE        2.26    117.30    255.24     19.24      5.00    117.28    255.00      19.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1364E+02 EXCESS= .0000E+00 OUTFLOW= .1364E+02 BASIN STORAGE= .9074E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
    RCP23  MANE        2.31    110.47    253.66     18.20      5.00    110.30    255.00      18.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1291E+02 EXCESS= .0000E+00 OUTFLOW= .1291E+02 BASIN STORAGE= .9050E-03 PERCENT ERROR=    .0

 FOR PLAN = 1  RATIO=  .00
    RCP23  MANE        3.93     23.29    255.51      2.83      5.00     23.07    255.00       2.83

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2010E+01 EXCESS= .0000E+00 OUTFLOW= .2011E+01 BASIN STORAGE= .1000E-02 PERCENT ERROR=   -.1


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

Conceptual Offsite Hydrology Report

For

US-95 Environmental Document
Cheyenne Avenue to Kyle Canyon Road

May 2004

E.A. NO. 73013

Prepared for:

PARSONS TRANSPORTATION GROUP

AND

NEVADA DEPARTMENT OF TRANSPORTATION

Prepared by:
VTN Nevada
2727 South Rainbow Boulevard
Las Vegas, NV 89146

2.10.1 Project Existing Hydrology Model

The Project Existing Conditions Hydrology Model is derived from several different models, including the creation of its own original subbasins. The watershed tributary to the project area was thoroughly studied. The model drew upon the existing City of Las Vegas Northwest Neighborhood Study (Phases 1 and 2) drainage basins, refined and modified to account for MPU facilities assumed in place, existing routing facilities, and subdivided further to account for the project design points (culvert locations along the western edge of US-95 or west frontage road). At the project's north end (north of Grand Teton Drive), hydrologic modeling from the Horse Drive Interchange Final Feasibility Study for Off-site Drainage Report were utilized. At the project's south end (south of Cheyenne Avenue), hydrologic modeling from the US-95 Widening Projects 1A and 1B were incorporated into the model.

2.10.2 Facilities

For the Existing Conditions Model, offsite MPU facilities scheduled to be constructed prior to 2006 (before construction of the project begins), are to be assumed in place (see Section 1.3, Exhibit 11, Drainage Criteria Memo and Meeting Minutes - Appendix A). For modeling purposes, the geometry of these facilities will be taken from the MPU. For facilities that will not be in place prior to 2006, changes were made to the base model to account for flow pattern differences. Facilities affecting the project that will not be in place prior to 2006 include:

1. Between Gowan Road to the south and Lone Mountain Road to the north, segments of existing open channels are proposed to be upgraded to MPU facilities as concrete open channels with the capacity to convey the 100-year flow reaching US-95. They are the Gowan Outfall – US-95 Channel (MPU Designation GO95 0000 thru 0050), which discharges 287 cfs into the existing GOOF 0531 at Gowan Road. The other is the Gowan Outfall – Alexander Road Facilities (MPU Designation GOAL 0247), which is proposed to cross US-95 at Craig Road, and head east to Rancho Road (10'x9' RCB – MPU Designation GOAL 0168), conveying 1156 cfs.

2. To the north of the Northern Las Vegas Beltway/US-95 Interchange, up to just north of the proposed Horse Drive/US-95 Interchange, and aligned between the west frontage roads and the southbound lanes of US-95, are the Centennial Parkway Channel West/US-95 Branch Facilities (MPU Designation CN95 0000 thru 0295), which conveys

up to 3853 cfs. This facility heads east and crosses US-95, north of the (future system) interchange, where it becomes Centennial Parkway Channel West (MPU Designation CNWE 0304 to 0277). It is situated along the north side, and parallel to the Beltway, it then ties into the existing 32'x10' RCBC beneath the Tenaya Bridge (MPU Designation CNWE 0274), 4390 cfs conveyance. At Grand Teton Drive, there is a western branch to CN95. It is the Centennial Parkway Channel West/Grand Teton Branch (MPU Designation CNGT 0234 thru 0000), the outfall facility to the Kyle Canyon Detention (located approximately 3 miles west of US-95 from the Durango Drive Interchange) that conveys 399 cfs. Portions of the above facilities that are proposed to be constructed with the Horse Drive Interchange and Grand Teton Bridge projects (both in design), are not considered in place, because even if they happen to be constructed before the US-95 widening project begins construction, the segments already constructed calls for plugging, and designed to not be in operation, until the connecting downstream MPU facilities are in place.

3. Along Kyle Canyon Road, an MPU facility, which crosses US-95, is proposed, namely the Moccasin and Kyle Canyon (MPU Designation MOKC 0120 thru 0000), up to 3891 cfs conveyance. This facility would cut off 100-year runoff from the project's northerly limits in the future condition. There is also a proposed southern branch to this facility, starting at about half a mile west of US-95 – Kyle Canyon and Hualapai (MPU Designation KCHU 0048 thru 0000), up to 1203 cfs conveyance. This facility is planned to intercept the 100-year runoff from the west, within its reach.

2.10.3 Summary of Resulting Existing Flows

To adequately account for the routed flows along the west side of US-95, drainage facilities were analyzed to determine the amount of flow crossing US-95 (either thru culverts, or from roadway overtopping, see Section 3.2.2). DARF-s were used to interpolate the HEC-1 model output to obtain the resulting peak flows at each design point (US-95 culvert locations). The resulting design point existing conditions peak flows are listed under the "Total Flow" columns in Table 3.2.2 and shown with the corresponding flow paths in Exhibits 13 thru 21.

2.10.4 Project Future Hydrology Model

Two future condition hydrology studies exist for reference: The City of Las Vegas Northwest Neighborhood Flood Control Master Plan (Phases 1 & 2 – future case), and The Clark

County Regional Flood Control District 2002 Master Plan Update (MPU). The VTN Future Condition model uses the Northwest Neighborhood Study (NWNS) as a basis. The routing was updated to account for the 2002 MPU proposed facilities. Although the 2002 MPU is a more recent study, the neighborhood study is slightly more detailed in this area, with 27 subbasins bordering US 95 between Kyle Canyon Road and Cheyenne Avenue compared to 14 for the MPU study. The VTN Future Condition model features 105 total subbasins with a total watershed area of 8.70 mi^2 and 36 design points along US 95. Most of the future runoff reaching US-95 will be discharged into the proposed MPU facilities within US-95.

2.10.5 Subbasin Revisions

Offsite subbasin refinements will most likely be required in and surrounding the project area, as the project design progresses. Subbasin revisions that were made in this study along with explanations for the changes for the future conditions model are included with the VTN Future Condition HEC-1 Mode inside Appendix B.

2.10.6 Flow Comparison

Flow comparison Table 2.10, below, has been compiled to compare future conditions flows at key points in the project area from the different studies. For the most part, the Northwest Neighborhood Study, the 2002 MPU, and the VTN Future Condition models are comparable in resulting design point flows. Proposed regional facilities are slightly different between the NWNS and the MPU, so some differences are expected. The VTN future condition model basically updates the NWNS to follow the routing facilities proposed in the 2002 MPU study. This allows for a better comparison of flow rates between the VTN future model and MPU model. The major facility differences between the models occur at the Northern Beltway, Ann Road, and Craig Road. The NWNS splits the flow at the Northern Beltway with 2,500 cfs crossing US95 and 4,700 cfs continuing south to the Rancho Detention Basin, while the MPU and VTN models routes all of 3,686 or 3,607 cfs respectively, to the east across US-95 along the Northern Beltway (via MPU Facility CNWE 0304), with no flows continuing south. At Ann Road, 445 cfs crosses US-95 in the NWNS while the MPU and VTN models continue all flow south at Ann Road. Also, the MPU and VTN models routes all flow across US-95 at Craig Road (via MPU Facility GOAL 0168) while the NWNS continues all flow south. Table 2.10 below includes flow rates from all three models at comparable design points.

At the Durango Drive interchange, the existing 100-year flow into the two west detention basins overtops southbound US-95 and heads east. The computation of these flows are discussed in Section 3.2.2

5. Along both sides of Kyle Canyon Road, there are 20-foot wide V-ditches. The average height from the flow line of the ditch to the crown of the pavement is about 4 to 5 feet. This ditch routes flows that impact Kyle Canyon Road east and prevents flows from overtopping the road. See picture below.



In general, roadside ditches exist on the west side of the west frontage road, southbound US-95, northbound US-95 (median ditch), and east frontage road. These ditches are generally V-shaped or flat trapezoidal that are unlined and with flow line profiles closely following the adjacent road, sloping south. There are several segments of these ditches with cross-sections that do not have the capacity to fully convey the flows reaching them. Also, it should be noted that median ditches cease to exist from the Craig Road Interchange, south (the construction limit of the US-95 Widening Project 1B). Analysis of the ditches is discussed in Section 3.2.2.

3.2.2 Existing Culvert Analysis and Routing

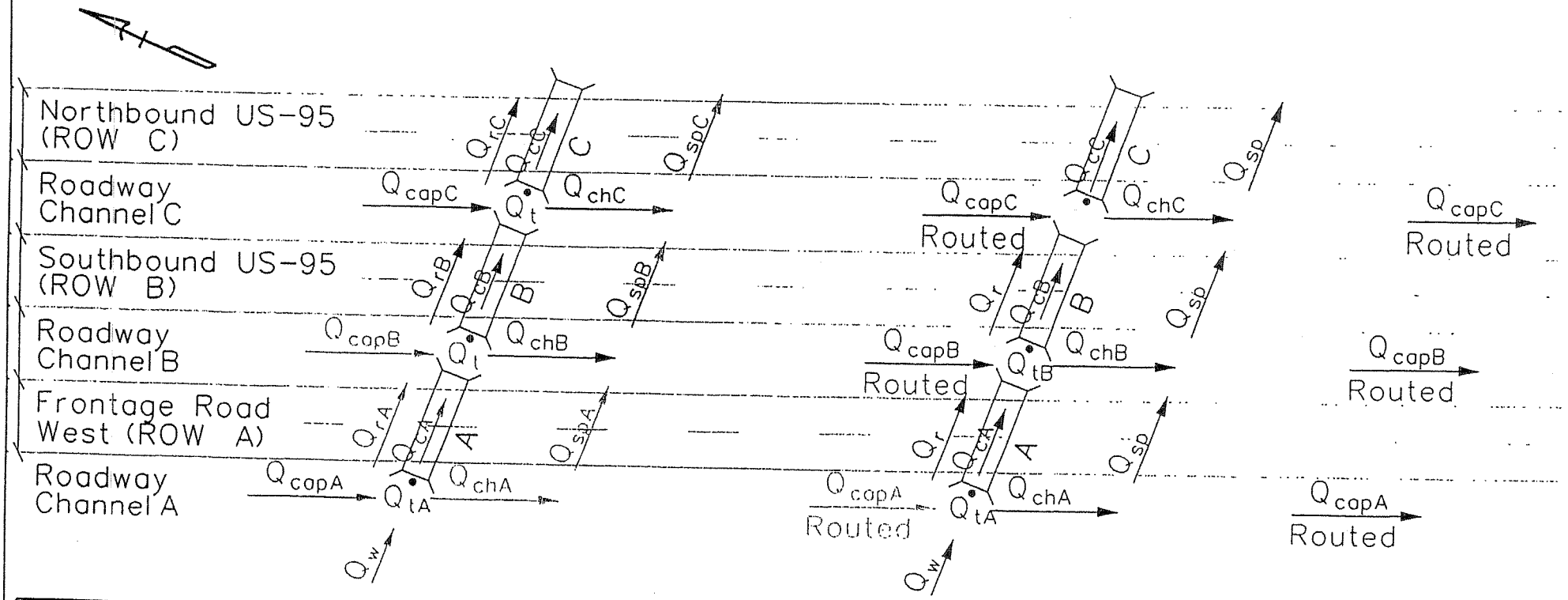
Previous drainage design studies such as the one completed by Louis Berger (LBG) for the US-95 Frontage Road Phase III had analyzed the existing culvert crossings along US-95 from Kyle Canyon Road - south. That data was used to design the existing culverts along the frontage roads (west and east of US-95). The logic from that study shows that all flows developed from a particular basin (or series of basins) would impact a discreet culvert location. Culvert hydraulic analysis as modeled by LBG shows a portion of flows would

cross a culvert, and the remaining portion would overtop the roadway. All flows overtopping the roadway would continue, in their entirety, directly east to the next culvert in series. The possibility of flow splits at the culvert locations (west side, between the west frontage road or interchange ramps and southbound US-95, and at the highway median), and at every other culvert locations in series were not considered.

VTN's analysis reveals that some of the roadside ditches do not have the capacity to convey all of the 100-year flows reaching it, south to the next culvert downstream. A portion of the flow would spill over the roadway, onto the next roadway ditch to the east, on the opposite side of the roadway (This next roadside ditch may also not have the capacity to convey all of the flows reaching it). At the downstream culvert, the flow that remains inside the roadside ditch is combined with the flow from the west. This total flow at the culvert is used in the analysis of the culvert. A schematic of the 100-year general flow paths was prepared to aid in visualizing and tracking the flows for an area with overtopping conditions (See Figure 2 on the following page).

1. In general, based on two-foot topography data, as-build survey data performed by Tri State Surveying, and VTN staff site visits, detailed information regarding the culvert inlet, roadway, and side berm were obtained. Analysis (utilizing FHWA HY-8 culvert analysis program and HEC-1 100-year flows) shows that in some cases, 100-year runoff will both overtop the roadway and overtop the side berm (side weir). The side flows will flow south in roadside ditches to the next downstream culvert, and combine with basin runoff directly upstream of the culvert from the west.

   For each culvert, a rating table was created using the Microsoft Excel spreadsheet that computed (for a given upstream water surface elevation and the corresponding total flow) the culvert flow, roadway overtopping flow, and side weir flow. To determine the culvert flow and total (side weir and roadway) overtopping flows, the HY-8 analysis is performed first. HY-8 generates a rating table containing the headwater depths and the corresponding culvert flows and combined overtopping flows. To determine the breakdown of the overtopping flow into roadway overtopping and side weir overtopping flows, a separate spreadsheet was created to calculate weir flows using the rating data from the HY-8 computation. The resulting data is presented in a rating table, to be used in the HEC-1 analysis diversion cards. After the total flow is obtained from the HEC-1 analysis (after diversions, routing, and combining of flows), the final interpolated results



NOTES	LEGEND
HEC-1 SPILL OUT: $Q_{spA} = Q_{chA} - Q_{capA}$	Q_{cap} – The lesser of Channel Capacity or Channel Flow (CFS)
Q_{sp} will be accounted for in HEC-1	Q_{ch} – Side Berm Overtopping Flow (CFS)
HEC-1 COMBO POINT: $Q_{spC} + Q_{capC} = Q_{chC} + Q_{spB}$	Q_c – Culvert Flow (CFS)
$Q_{tA} = Q_{capA} + Q_w$	Q_r – Roadway Overtopping Flow (CFS)
$Q_{tB} = Q_{capB} + Q_{cA} + Q_{rA}$	Q_{sp} – Channel Spill Overtopping Roadway (CFS)
See Calculation Methodology For Typical Analyzed Points In Appendix E	Q_t – Total Flow From Analyzed Point (CFS)
	Q_w – Flow Coming From West (CFS)
	→ – Flow Direction
	A – Culvert A

FIGURE 2
SCHEMATIC FLOW DIVERSION

I:\6200\Design\Exhibits\figure2.dgn 05/17/2004

are obtained from the rating table. Appendix E includes a detailed description of the computation procedure, along with the associated computation results for each culvert.

The rating tables for each culvert was used to establish diversion and routing criteria and incorporated into the HEC-1 analysis. At each culvert, the HEC-1 model was set up such that a portion of the total flow would be diverted east (the sum of the flows in the culvert and overtopping of the road) and the remaining portion would be routed south to combine with flows routed from the west at the next culvert downstream south.

Along the southbound lanes of US-95, another set of culverts exists in series with the frontage road culverts. Using the same methodology as described above, a culvert rating table was developed to determine the flows diverted east, versus flows traveling south at each culvert location. At these locations, flows were again tracked by routing them in the HEC-1 model. It was found that substantial flows would be conveyed south in the area between the west frontage road and southbound US-95. The same analysis is repeated through the US-95 median, where the culvert inlets there would convey the combined flow routed from the west and the north, to the east (across northbound US-95) and to the south to combine with flows routed from the west at the next culvert downstream south. In this conceptual offsite hydrology report, analysis of the culverts located east of northbound US-95 (across the east frontage road) were not performed, since in this study, the emphasis is to quantify the amount of 100-year flow that is conveyed (inside the culvert and overtopping the roadway) across the US-95 southbound and northbound lanes. If overtopping occurs over a segment of the mainline US-95, then it can be assumed that overtopping of the same segment of the east frontage road occurs also, because of its lower crown elevation. Table 3.2.2 (11"x17" Sheet) shows the resulting flows in relation to the highway cross drainage facilities, and Appendix E contains the methodology of the analysis, HY-8 analysis, weir flow analysis, and rating tables used.

2. To determine the diverted flows at the median drop inlets, a similar spreadsheet with rating tables (as with the culvert analysis) was created. Incremental ponding depths were assumed, to develop a rating table for water surface elevation versus the total flow at the drop inlet. Drop inlet interception computation is performed in the spreadsheet for both orifice flow or weir flow (the lower value is used). Weir analysis were then performed to determine both the roadway overtopping and berm overtopping flows

W. D.:5200 MAY-2004

TABLE 3.2.2
US-95 EXISTING CONDITIONS CULVERT ANALYSES SUMMARY

West Frontage Road (Row "A")										Southbound Interchange Ramps (Row "W")										Southbound US-95 (Row "B")										Northbound US-95 (Row "C")										LOCATION
FACILITY	DRAIN AREA (sq mi)	DARF	Q_t TOTAL FLOW (cfs)	Q_c CULVERT FLOW (cfs)	Q_r ROADWAY OVERTOP FLOW - At Culvert (cfs)	Q_{ch} FLOW IN CHANNEL / BERM (cfs)	Q_{cap} ROADSIDE[1] CHANNEL FLOW (cfs)	Q_{sp} CHANNEL SPILL OVER ROADWAY (cfs)		FACILITY	DRAIN AREA (sq mi)	DARF	Q_t TOTAL FLOW (cfs)	Q_c CULVERT FLOW (cfs)	Q_r ROADWAY OVERTOP FLOW - At Culvert (cfs)	Q_{ch} FLOW IN CHANNEL / BERM (cfs)	Q_{cap} ROADSIDE[1] CHANNEL FLOW (cfs)	Q_{sp} CHANNEL SPILL OVER ROADWAY (cfs)		FACILITY	DRAIN AREA (sq mi)	DARF	Q_t TOTAL FLOW (cfs)	Q_c CULVERT[2] FLOW (cfs)	Q_r ROADWAY OVERTOP FLOW - At Culvert (cfs)	Q_{ch} FLOW IN CHANNEL / BERM (cfs)	Q_{cap} ROADSIDE[1] CHANNEL FLOW (cfs)	Q_{sp} CHANNEL SPILL OVER ROADWAY (cfs)		FACILITY	DRAIN AREA (sq mi)	DARF	Q_t TOTAL FLOW (cfs)	Q_c CULVERT[2] FLOW (cfs)	Q_r ROADWAY OVERTOP FLOW - At Culvert (cfs)	Q_{ch} FLOW IN CHANNEL / BERM (cfs)	Q_{cap} ROADSIDE[1] CHANNEL FLOW (cfs)	Q_{sp} CHANNEL SPILL OVER ROADWAY (cfs)	
Culvert HD03A 2: 6' x 3' RCBC	0.03	0.999	15	15	0	0	0	0												Culvert HD01B 6' x 3' RCBC	0.06	0.998	29	29	0	0	0	0		Culvert HD01C 6' x 3' RCBC	0.06	0.998	29	29	0	0	0	0	BETWEEN GRAND TETON & KYLE CANYON
Culvert HD02A 2: 6' x 3' RCBC	0.05	0.998	22	18	0	4	4	0												Culvert HD02B 42" CMP	0.07	0.997	25	25	0	0	0	0		Culvert HD02C 42" CMP	0.07	0.997	25	16	0	9	9	0	
Culvert HD04A 2: 10' x 4' RCBC	3.32	0.917	2564	1025	454	1085	526	559												Culvert HD04B 3: 42" CMP	3.32	0.917	1479	324	422	733	1003	289		Culvert HD04C 3: 42" CMP	3.32	0.917	753	214	105	434	723	0	
Culvert HD05A 6' x 3' RCBC	3.42	0.916	630	212	68	350	350	0												Culvert HD05B 6' x 4' RCBC	3.42	0.916	1273	260	378	635	635	0		Culvert HD05C 6' x 4' RCBC	3.42	0.916	1333	248	190	895	895	0	
Culvert HD06A 2: 10' x 4' RCBC	4.44	0.908	1527	897	87	543	543	0												Culvert HD06B 2: 10' x 4' RCBC	4.44	0.908	1540	807	141	592	592	0		Culvert HD06C 2: 10' x 4' RCBC	4.44	0.908	1797	829	216	752	752	0	
Culvert HD07A 36" CMP	4.49	0.908	584	63	8	513	337	176												Culvert HD07B 36" CMP	4.49	0.908	649	69	0	580	702	0		Culvert HD07C 36" CMP	4.49	0.908	811	74	135	602	602	0	
Culvert HD08A 6' x 3' RCBC	4.73	0.906	590	167	0	423	368	55												Culvert HD08BC 6' x 4' RCBC	4.73	0.906	864	192	31	641	668	0		Culvert HD08C-DI Type 2A	4.73	0.906	606	10	218	378	378	0	
Culvert HD09A 2: 42" CMP	6.23	0.898	1562	231	521	810	273	537												Culvert HD09BC 2: 42" CMP	6.23	0.898	1393	221	16	1156	1070	623		Culvert HD09C Spill	6.23	0.898	374	0	0	374	951	35	
Culvert HD10A 2: 10' x 4' RCBC	6.25	0.898	301	301	0	0	0	0												Culvert HD10BC 10' x 4' RCBC	6.25	0.898	1370	348	22	1000	1000	0		Culvert HD10C-DI Type 2A	6.25	0.898	962	10	813	139	139	0	
Culvert HD11A 10' x 10' RCBC	0.21	0.992	161	161	0	0	0	0												Culvert HD11B 10' x 10' RCBC	6.46	0.895	1126	1096	0	30	30	0		Culvert HD11C 10' x 10' RCBC	6.46	0.895	1222	1111	0	111	111	0	
Culvert NB01A 24" CMP	0.01	1.000	5	5	0	0	0	0												Culvert NB01B 24" CMP	6.47	0.895	32	7	0	25	25	0		Culvert NB01C 24" CMP	6.47	0.895	115	2	0	113	113	0	BETWEEN NORTHERN BELTWAY & GRAND TETON
Culvert NB02A 2: 42" CMP	0.09	0.996	40	40	0	0	0	0												Culvert NB02BC 2: 42" CMP	6.56	0.894	53	53	0	0	0	0		Culvert NB02C-DI 2: 42" CMP	6.56	0.894	106	7	0	99	99	0	
Culvert NB03A 30" CMP	0.04	0.998	21	21	0	0	0	0												Culvert NB03B 30" CMP	0.04	0.998	26	25	0	1	1	0		Culvert NB03C 30" CMP	6.60	0.894	115	33	0	82	82	0	
Culvert NB04A 6' x 3' RCBC	0.61	0.978	558	152	97	309	309	0												Culvert NB04BC 6' x 3' RCBC	0.61	0.978	249	130	9	110	110	0		Culvert NB04C-DI Type 2A	7.21	0.888	81	3	31	47	47	0	
Culvert NB05A 6' x 3' RCBC	0.70	0.976	340	156	24	160	160	0	Culvert NB05W 6' x 4' RCBC	0.70	0.976	289	166	0	123	123	0	Culvert NB05BC 6' x 4' RCBC	0.70	0.976	166	122	0	44	44	0		Culvert NB05C-DI Type 2A	7.30	0.887	45	5	0	40	40	0	
Culvert NB06A 30" CMP	0.74	0.975	177	36	0	141	141	0	Culvert NB06BW 30" CMP	0.74	0.975	157	140	0	17	17	0	Culvert NB06CB 30" CMP	0.76	0.975	113	36	7	70	70	0		Culvert NB05CC 30" CMP	7.36	0.886	63	32	0	31	31	0	
Culvert NB07AA 24" CMP	0.76	0.975	143	34	74	35	35	0	Culvert NB08W 6' x 3' RCBC	0.77	0.975	129	129	0	0	0	0	Culvert NB08AB 30" CMP	0.79	0.974	83	62	0	21	21	0		Culvert NB08AC 30" CMP	7.39	0.886	81	31	0	50	50	0	
Culvert NB07BA 30" CMP	0.89	0.972	90	34	0	56	56	0	Culvert NB09W 30" CMP	0.91	0.972	39	39	0	0	0	0	Culvert NB09ABC 6' x 3' RCBC	0.96	0.971	53	53	0	0	0	0											
Culvert NB10A 2: 24" CMP	0.02	0.999	11	7	0	4	4	0												Culvert NB10B 2: 24" CMP	0.02	0.999	7	3	0	4	4	0		Culvert NB10C 2: 24" CMP	7.59	0.884	50	25	0	25	25	0	
Culvert NB11A 6' x 3' RCBC	0.91	0.972	109	109	0	0	0	0												Culvert NB11BC 6' x 3' RCBC	0.91	0.972	111	102	0	9	9	0		Culvert NB11C-DI 6' x 3' RCBC	7.71	0.883	25	6	0	19	19	0	
Culvert NB12A 2: 24" CMP	0.01	1.000	6	6	0	0	0	0												Culvert NB12B 2: 30" CMP	0.92	0.972	13	6	0	7	7	0		Culvert NB12C 2: 30" CMP	7.72	0.883	19	19	0	0	0	0	
Culvert NB13A 24" CMP	0.01	1.000	7	4	0	3	3	0												Culvert NB13B 30" CMP	0.93	0.971	9	4	0	5	5	0		Culvert NB13C 2: 24" CMP	0.93	0.883	4	4	0	0	0	0	
Culvert NB14A 24" CMP	0.01	1.000	6	3	0	3	3	0												Culvert NB14B 24" CMP	0.94	0.971	7	1	0	6	6	0		Culvert NB14C 24" CMP	0.94	0.971	1	1	0	0	0	0	
Culvert NB15A 6' x 3' RCBC	0.55	0.979	171	80	0	91	91	0												Culvert NB15BC 6' x 3' RCBC	1.49	0.950	79	64	0	15	15	0		Culvert NB15C-DI 6' x 3' RCBC	1.49	0.950	0	0	0	0	0	0	
Culvert NB16A 30" RCP	0.56	0.979	93	21	0	72	72	0												Culvert NB16B 30" RCP	1.50	0.950	34	13	0	21	21	0		Culvert NB16C 30" RCP	1.50	0.950	13	13	0	0	0	0	
Culvert NB17A 6' x 3' RCBC	0.76	0.975	126	99	0	27	27	0												Culvert NB17B 6' x 3' RCBC	1.70	0.942	111	87	0	24	24	0		Culvert NB17C 6' x 3' RCBC	1.70	0.942	88	82	0	6	6	0	
Culvert NB22A 6' x 3' RCBC	0.92	0.974	84	84	0	0	0	0												Culvert NB22B 6' x 3' RCBC	1.86	0.936	79	38	0	41	41	0		Culvert NB22C 6' x 3' RCBC	1.86	0.936	43	43	0	0	0	0	
Culvert NB23A 10' x 4' RCBC	0.65	0.977	198	198	0	0	0	0												Culvert NB23BC 10' x 4' RCBC	2.51	0.925	210	210	0	0	0	0											
									Culvert EB01BW 6' x 3' RCBC	0.03	0.999	24	24	0	0	0	0	Culvert EB01B 36" CMP	0.04	0.998	22	22	0	0	0	0		Culvert EB01C 36" CMP	0.04	0.998	22	22	0	0	0	0	BETWEEN CHEYENNE & NORTHERN BELTWAY
																				Culvert EB01BB 6' x 3' RCBC	0.03	0.999	24	24	0	0	0	0		Culvert EB01BC 6' x 3' RCBC	0.03	0.999	24	24	0	0	0	0	
																				Culvert EB01AB 36" CMP	0.02	0.999	15	6	0	9	9	0		Culvert EB01AC 36" CMP	0.02	0.999	7	7	0	0	0	0	
									Culvert NW1C2-CB 2: 30" CMP	N.A.									Culvert EB02BC 36" CMP	0.04	0.998	20	18	0	2	2	0		Culvert EB02C-DI 36" CMP	0.04	0.998	0	0	0	0	0	0	
									Culvert NW1C2-CW 10' x 4' RCB	0.68	0.976	369	369	0	0	369	0												Culvert NW1C2-CC 2: 30" CMP	N.A.								
																				Culvert PDGCC4 10' x 3' RCBC	0.77	0.975	398	154	0	244	244	0											
																				Culvert PDGCB11BC 2: 6' x 2' RCBC	1.54	0.948	513	121	0	392	392	0											
																				GD20BGB CONCRETE CHANN	5.10	0.905	1359	0	278	1081	1081	0											
									Culvert GD20BMW 6: 8' x 3' RCBC	5.39	0.903	1180	1075	105	0	1180	0	Culvert GD20BMBC 2: 6' x 2' RCBC, 4: 10' x 4' RCBC, 31' x 5' CONC. CHANN	5.39	0.903	1180	100	0	1080	1080	0											
									Culvert GD17BIW 5: 8' x 3' RCBC	5.44	0.903	1099	1035	52	1087	1087	0	Culvert GD17BIW Spill					12														
																				Culvert GD17BJBC 2: 6' x 2' RCBC, 4: 10' x 4' RCBC, 28' x 4' CONC. CHANN	5.75	0.901	1180	147	4	1029	1029	0											
																				Culvert GD11CBC 2: 30" RCP	5.80	0.901	1042	85	0	957	957	0											
																				Culvert CHY-N1 30" RCP	0.08	0.997	61	25	0	36	36	0											
																				Gowan Rd	6.09	0.899	1022																

N.A. = Not Analyzed (Not Offsite Flow Design Point)
Locations Where Roadway Overtopping Occurs

1. Registers the lesser value between overtopping flow in channel/berm and channel capacity. For Roadside Channels east of the Frontage Road, spill flow over roadway from the west is added.
2. At detention basin locations detention basin outflow is registered
3. At drop inlet locations drop inlet flow is registered

corresponding to each incremental water surface elevation. From the rating table resulting values, the HEC-1 model was set up such that a portion of the total flow would be diverted east (the sum of the flows into the drop inlet and overtopping the road) and the remaining portion would be routed south to combine with flows routed from the west at the next drop inlet or culvert downstream south. Table 3.2.2 shows the resulting flows in relation to the highway cross drainage facilities, and Appendix E contains the methodology of the analysis, drop inlet computations, weir flow analyses, and rating tables used.

3. For the purposes of this study, only the west detention basins within the Durango Drive Interchange were analyzed, due to their overtopping flows. Again, to determine the diverted flows at the detention basin outlet, a similar spreadsheet with rating tables (as with the culvert analysis) was created. Representative key ponding depths were assumed, to develop a rating table for water surface elevation versus the total flow at the outlet. Outlet flow is computed in the spreadsheet using orifice flow. Weir analysis were then performed to determine both the roadway overtopping and berm overtopping flows corresponding to each key water surface elevation. From the rating table resulting values, the HEC-1 model was set up such that a portion of the total flow would be diverted east (the sum of the flows in the outfall and overtopping the road) and the remaining portion would be routed south to combine with flows routed from the west at the next culvert downstream south. The detention basin storage was also analyzed in the HEC-1 model (using the corresponding rating table water surface elevations, and waster surface areas). Table 3.2.2 shows the resulting flows in relation to the highway cross drainage facilities, and Appendix E contains the methodology of the analysis, detention basin outlet flow computation, weir flow analyses, and rating tables used.

4. Roadside ditches were analyzed, when overtopping of a downstream culvert for a particular segment of ditch occurs, and where the magnitude of flow in a particular ditch was considered to be potentially high. When the channel flow exceeds the ditch cross-section capacity, spill occurs over the adjacent roadway. This flow is accounted for in the HEC-1 model by diverting the spilled flow east to the next roadside ditch (across the roadway), and routing the remaining flow south to the next downstream cross drainage facility. Further overtopping of the next roadway to the east may occur, depending on the roadside ditch capacity between the two roadways. The analysis is repeated in a similar manner for the next ditch. Analyses of the ditch cross-sections were performed in

flowmaster (using Manning's Equation), for a representative irregular channel cross-section on a particular segment of ditch. See Appendix E for the results.

4.0 SUMMARY

Due to the interconnectivity of culverts, side weir hydraulics, and flow network within the project limits, VTN's findings reveal that as soon as flows overtop the (berm) check dam at the culvert, side weir flow is conveyed along roadside ditches next to US-95 and the frontage road to the next downstream (south) culvert. This in turn increases the downstream culvert's likelihood for overtopping. Analysis of the entire culvert system is highly dependent on upstream flows, because of the system's interconnectivity. Flow split analysis were performed at the culvert locations, and roadside ditch capacities were checked for overtopping. The resulting directional flow magnitudes at each analyzed point are shown in Table 3.2.2, and Exhibits 13 thru 21. Locations where roadway overtopping occurs and the magnitude of overtopping flows (in the existing condition) are highlighted in yellow in Table 3.2.2. In general, the area where roadway overtopping occurs the most is between Kyle Canyon Road and Grand Teton Drive, with some occurring between Grand Teton Drive and the Northern Beltway, and a few between Lone Mountain Road and Alexander Road.

At the Gowan Underpass, VTN's existing conditions (MPU facilities in place by 2006) combined flow is 1,022 cfs (with 6.09 square miles of drainage area), which is much lower than the flow obtained from the CCRFCD August 19, 2003 flood model that depicted the condition with only existing facilities (at the time of the storm), which had 3,854 cfs combined flow at this location (with 22.26 square miles of drainage area). By assuming that the MPU facilities that will be constructed by the year 2006 to be in place (which were not in place at the time of the storm), the resulting flow at the Gowan underpass is greatly reduced for the existing conditions model.

In general, for the VTN future conditions model, the magnitude of the flows reaching US-95 are much lower when compared with the existing conditions model. In the future conditions model, all proposed MPU facilities are considered to be in place, thereby reducing the total contributing watershed area for the future conditions model. The VTN future conditions resulting design point flow amounts compares very closely with the 2002 MPU flow amounts.

SEE MATCHLINE THIS SHEET

SEE MATCHLINE THIS SHEET

KYLE CANYON DETENTION BASIN

CAM-10 DETENTION BASIN

FORT APACHE DETENTION BASIN

SEE EXHIBIT 5 MAP 2 OF 2 FOR THIS AREA

GRAPHIC SCALE

1500 0 750 1500 3000 6000

(IN FEET)
1" = 1500'

LEGEND

- HORSE DR BASIN BOUNDARY
- NB BASIN BOUNDARY
- RANCHO BASIN WATERSHED AREA
- EB/NWNS BASIN BOUNDARY
- CHEYENNE BASIN BOUNDARY
- NB01 BASIN NAMES
- FLOW DIRECTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US 95 ENVIRONMENTAL DOCUMENT
FROM CHEYENNE AVENUE TO KYLE CANYON

VTN EXISTING BASIN MAP (1 OF 2)
EXHIBIT 4

VTN nevada
● CONSULTING ENGINEERS
● PLANNERS
● LAND SURVEYORS
2727 S. RAINBOW BLVD
LAS VEGAS, NV 89146
PHONE (702) 247-4000
FAX (702) 2474262

DESIGN BY
DRAWN BY
CHECKED BY
REVIEWED BY

$$DATE$$ $$TIME$$ $$FILE$$

TABLE 3.2.2
US-95 EXISTING CONDITIONS CULVERT ANALYSES SUMMARY

West Frontage Road (Row "A")

FACILITY	Qt TOTAL FLOW (cfs)	Q= CULVERT FLOW (cfs)	Q= ROADWAY OVERTOP FLOW - At Culvert (cfs)	Q= FLOW IN CHANNEL / BERM (cfs)	Q= ROADSIDE[1] CHANNEL FLOW (cfs)	Q= CHANNEL SPILL OVER ROADWAY (cfs)
Culvert HD04A 2- 10' x 4' RCBC	2564	1025	454	1085	526	559
Culvert HD05A 6' x 3' RCBC	630	212	68	350	350	0
Culvert HD06A 2- 10' x 4' RCBC	1527	897	87	543	543	0
Culvert HD07A 36" CMP	584	63	8	513	337	176
Culvert HD08A 8' x 3' RCBC	590	167	0	423	368	55
Culvert HD09A 2- 42" CMP	1562	231	521	810	273	537
Culvert HD10A 2- 10' x 4' RCBC	301	301	0	0	0	0

N.A. = Not Analyzed (Not Offsite Flow Design Point)

Southbound Interchange Ramps (Row "W")

FACILITY	Qt TOTAL FLOW (cfs)	Q= CULVERT FLOW (cfs)	Q= ROADWAY OVERTOP FLOW - At Culvert (cfs)	Q= FLOW IN CHANNEL / BERM (cfs)	Q= ROADSIDE[1] CHANNEL FLOW (cfs)	Q= CHANNEL SPILL OVER ROADWAY (cfs)

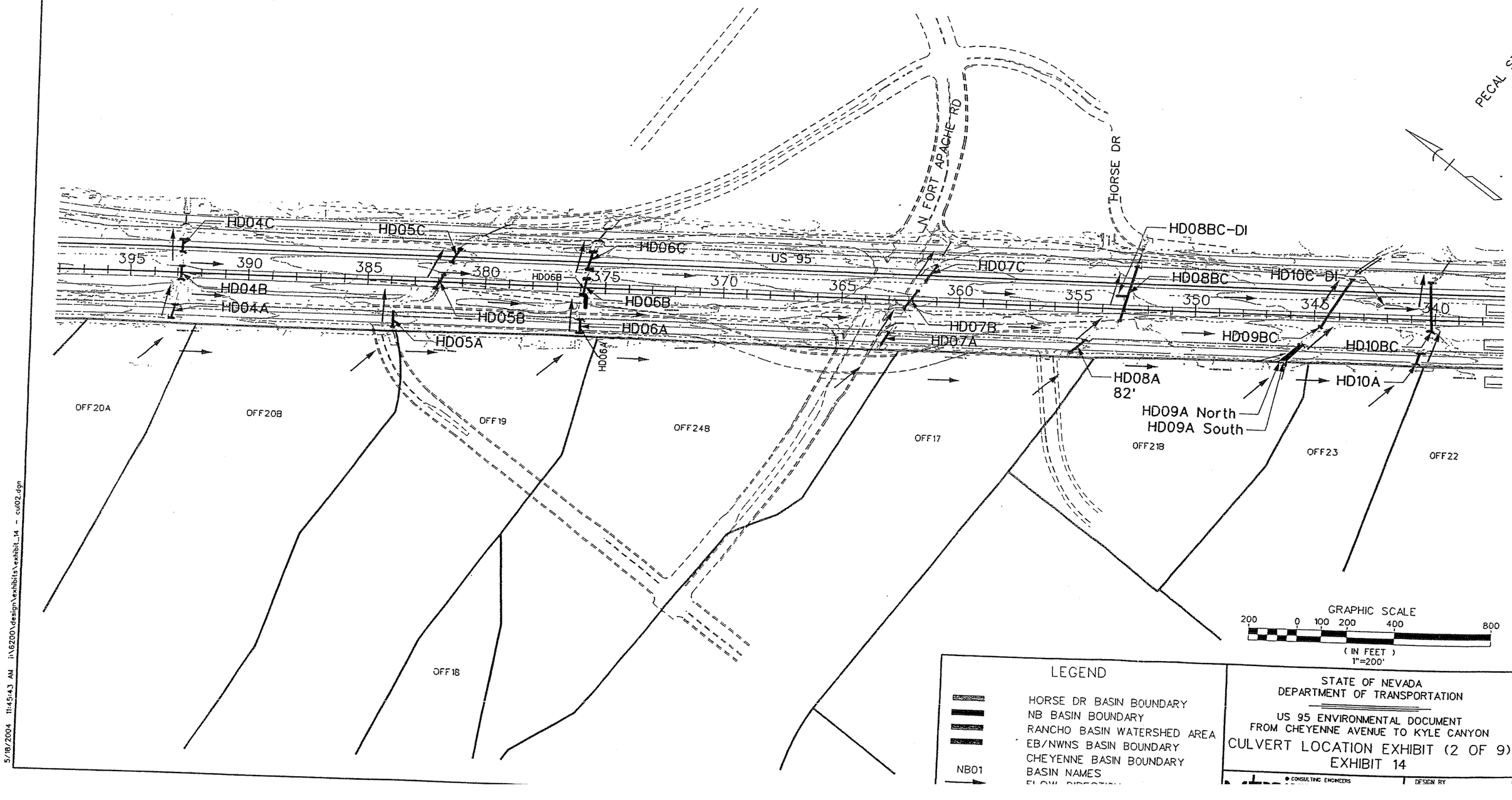
Southbound US-95 (Row "B")

FACILITY	Qt TOTAL FLOW (cfs)	Q= CULVERT[2] FLOW (cfs)	Q= ROADWAY OVERTOP FLOW - At Culvert (cfs)	Q= FLOW IN CHANNEL / BERM (cfs)	Q= ROADSIDE[1] CHANNEL FLOW (cfs)	Q= CHANNEL SPILL OVER ROADWAY (cfs)
Culvert HD04B 3- 42" CMP	1479	324	422	733	1003	289
Culvert HD05B 6' x 4' RCBC	1273	260	378	635	635	0
Culvert HD06B 2- 10' x 4' RCBC	1540	807	141	592	592	0
Culvert HD07B 36" CMP	649	69	0	580	702	0
Culvert HD08BC 6' x 4' RCBC	864	192	31	641	668	0
Culvert HD09BC 2- 42" CMP	1393	221	16	1156	1070	623
Culvert HD10BC 10' x 4' RCBC	1370	348	22	1000	1000	0

Northbound US-95 (Row "C")

FACILITY	Qt TOTAL FLOW (cfs)	Q= CULVERT[2] FLOW (cfs)	Q= ROADWAY OVERTOP FLOW - At Culvert (cfs)	Q= FLOW IN CHANNEL / BERM (cfs)	Q= ROADSIDE[1] CHANNEL FLOW (cfs)	Q= CHANNEL SPILL OVER ROADWAY (cfs)
Culvert HD04C 3- 42" CMP	753	214	105	434	723	0
Culvert HD05C 6' x 4' RCBC	1333	248	190	895	895	0
Culvert HD06C 2- 10' x 4' RCBC	1797	829	216	752	752	0
Culvert HD07C 36" CMP	811	74	135	602	602	0
Culvert HD08BC-DI Type 2A	606	10	218	378	378	0
Culvert HD09C Grill	374	0	0	374	951	35
Culvert HD10C-DI Type 2A	962	10	813	139	139	0

1. Registers the lesser value between overtopping flow in channel/berm and channel capacity. For Roadside Channels east of the Frontage Road, split flow over roadway from the west is added.
2. At detention basin locations detention basin outflow is registered
3. At drop inlet locations drop inlet flow is registered



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US 95 ENVIRONMENTAL DOCUMENT
FROM CHEYENNE AVENUE TO KYLE CANYON

CULVERT LOCATION EXHIBIT (2 OF 9)
EXHIBIT 14

CONSULTING ENGINEERS

DESIGN BY

5/18/2004 11:45:43 AM i:\6200\design\exhibits\exhibit_14 - cul02.dgn

TABLE 3.2.2
US-95 EXISTING CONDITIONS CULVERT ANALYSES SUMMARY

W.O.46200 MAY-2004

West Frontage Road (Row "A")

FACILITY	Qt TOTAL FLOW (cfs)	Q_c CULVERT FLOW (cfs)	Q_r ROADWAY OVERTOP FLOW - At Culvert (cfs)	Q_{ch} FLOW IN CHANNEL / BERM (cfs)	Q_{rsd} ROADSIDE[1] CHANNEL FLOW (cfs)	Q_{sp} CHANNEL SPILL OVER ROADWAY (cfs)
Culvert HD03A 2: 6' x 3' RCBC	15	15	0	0		
Culvert HD02A 2: 6' x 3' RCBC	22	18	0	4		

N.A. = Not Analyzed (Not Offsite Flow Design Point)

Southbound Interchange Ramps (Row "W")

FACILITY	Qt TOTAL FLOW (cfs)	Q_c CULVERT FLOW (cfs)	Q_r ROADWAY OVERTOP FLOW - At Culvert (cfs)	Q_{ch} FLOW IN CHANNEL / BERM (cfs)	Q_{rsd} ROADSIDE[1] CHANNEL FLOW (cfs)	Q_{sp} CHANNEL SPILL OVER ROADWAY (cfs)

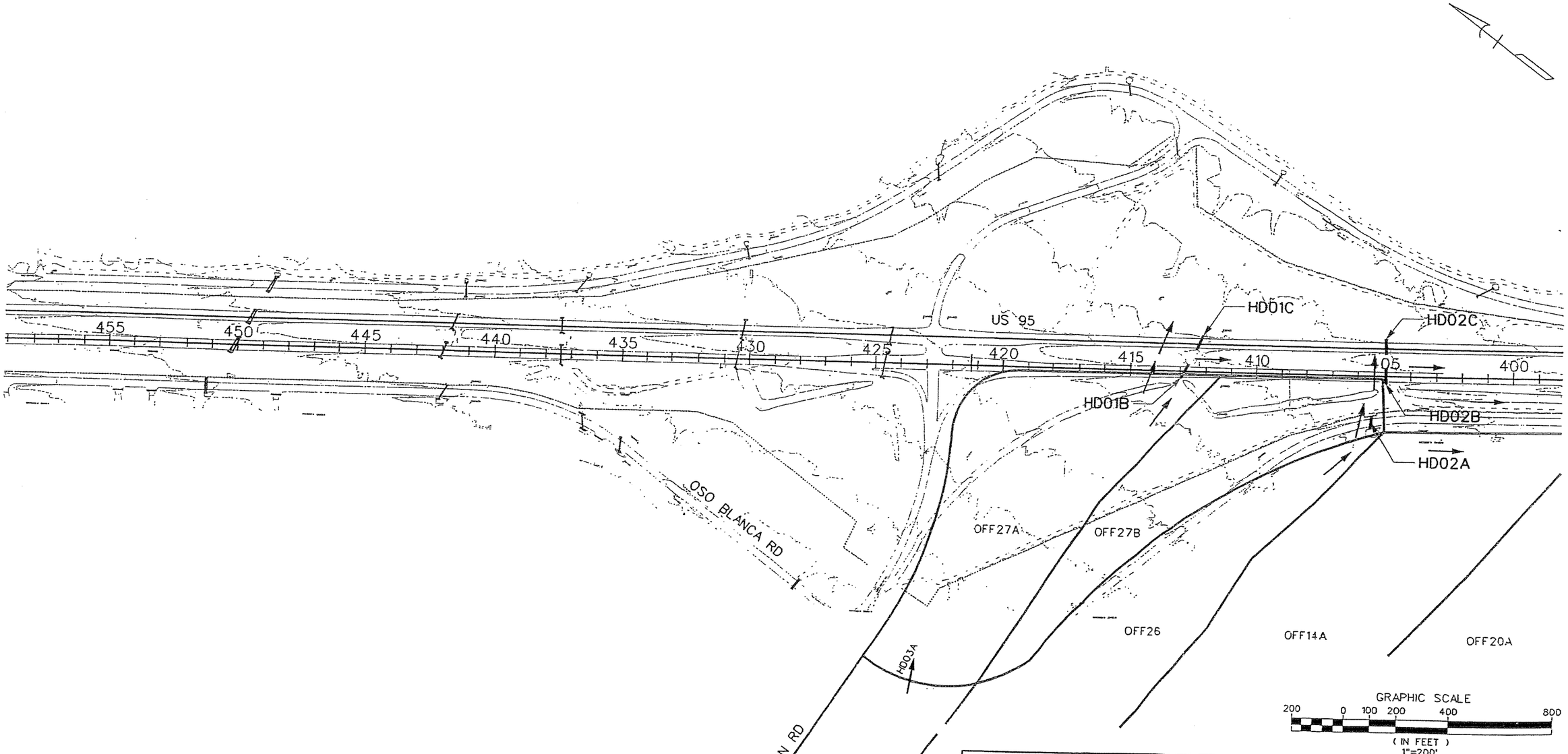
Southbound US-95 (Row "B")

FACILITY	Qt TOTAL FLOW (cfs)	Q_c CULVERT[2] FLOW (cfs)	Q_r ROADWAY OVERTOP FLOW - At Culvert (cfs)	Q_{ch} FLOW IN CHANNEL / BERM (cfs)	Q_{rsd} ROADSIDE[1] CHANNEL FLOW (cfs)	Q_{sp} CHANNEL SPILL OVER ROADWAY (cfs)
Culvert HD01B 6' x 3' RCBC	29	29	0	0		
Culvert HD02B 42" CMP	25	25	0	0		

Northbound US-95 (Row "C")

FACILITY	Qt TOTAL FLOW (cfs)	Q_c CULVERT[2] FLOW (cfs)	Q_r ROADWAY OVERTOP FLOW - At Culvert (cfs)	Q_{ch} FLOW IN CHANNEL / BERM (cfs)	Q_{rsd} ROADSIDE[1] CHANNEL FLOW (cfs)	Q_{sp} CHANNEL SPILL OVER ROADWAY (cfs)
Culvert HD01C 6' x 3' RCBC	29	29	0	0		
Culvert HD02C 42" CMP	25	16	0	9		

1. Registers the lesser value between overtopping flow in channel/berm and channel capacity. For Roadside Channels east of the Frontage Road, spill flow over roadway from the west is added.
2. At detention basin locations detention basin outflow is registered
3. At drop inlet locations drop inlet flow is registered



LEGEND

- HORSE DR BASIN BOUNDARY
- NB BASIN BOUNDARY
- RANCHO BASIN WATERSHED AREA
- EB/NWNS BASIN BOUNDARY
- CHEYENNE BASIN BOUNDARY
- NB01 BASIN NAMES
- FLOW DIRECTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

US 95 ENVIRONMENTAL DOCUMENT
FROM CHEYENNE AVENUE TO KYLE CANYON

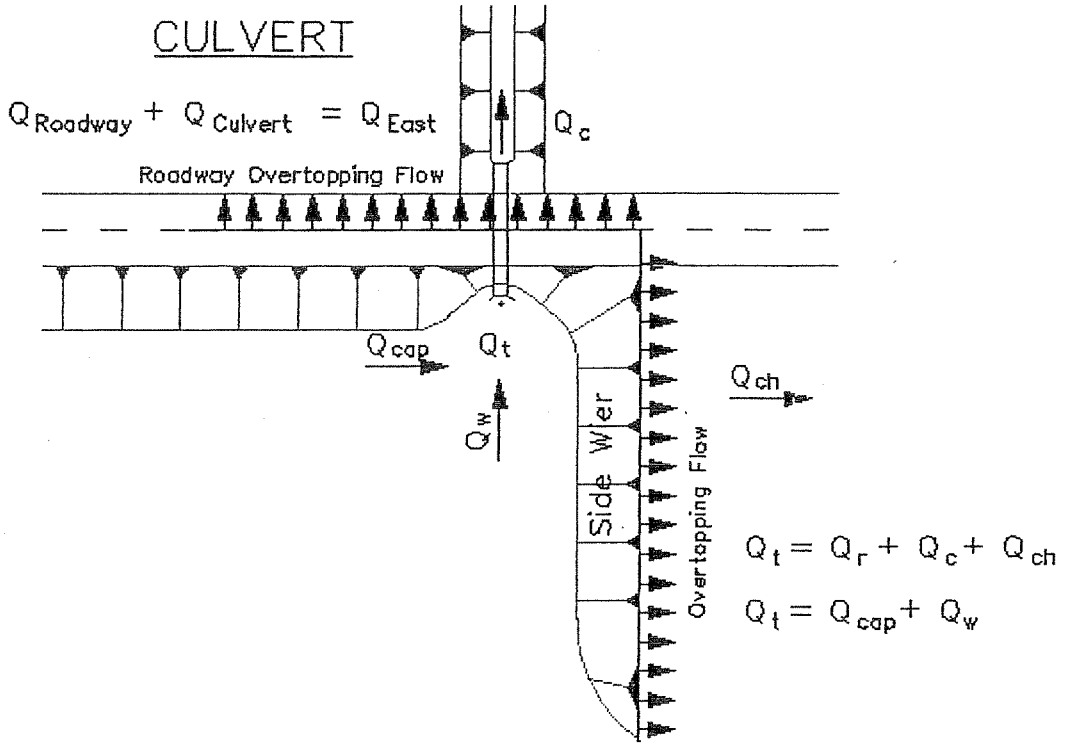
CULVERT LOCATION EXHIBIT (1 OF 9)
EXHIBIT 13

CONSULTING ENGINEERS
PLANNERS

DESIGN BY

5/18/2004 11:45:29 AM i:\6200\design\exhibits\exhibit_13 - cul01.dgn

METHODOLOGY FOR EXISTING CULVERT AND WEIR ANALYSIS



1) Topographic, survey data, as-built plan, and photograph information used to determine:
   a. Culvert Size, Length, Type and Invert Data
   b. Downstream Culvert Tailwater Data
   c. Roadway Profile Data Points (Station & Elevation)
   d. Side Weir Data Points (Station & Elevation)

2) HY-8 Software used to develop rating table giving Water Surface Elevation – vs. – Q_{Total} ($Q_{Culvert}$ + $Q_{Roadway\ Overtopping}$ + $Q_{Channel}$). $Q_{Culvert}$ values are also obtained.

3) Weir analysis spreadsheet used to develop rating table, giving Water Surface Elevation – vs. – $Q_{Roadway\ Overtopping}$ (Water Surface input values are same values from HY-8).

4) The rating table is set up such that for each value of $W_iS_iE_i$ (HY-8 and Weir), the values of $Q_{Culvert\ i}$, $Q_{Roadway\ Overtopping\ i}$ and $Q_{Channel\ i}$ are listed, and such that $Q_{Total} = Q_{Culvert} + Q_{Roadway\ Overtopping} + Q_{Channel}$.

5) Side weir flows are obtained for each listed water surface elevation using: $Q_{Channel} = Q_{Total}(Q_{In}) - (Q_{Culvert} + Q_{Roadway\ Overtopping})$.

6) The rating table is used in the HEC-1 model for flow diversion using values from Q_{Total} as the DI card and $Q_{Culvert} + Q_{Roadway\ Overtopping}$ as the DQ card.

7) Actual Q_{Total} is obtained from HEC-1 model results (with DARF and routing accounted for), and plugged into cell below rating table to obtain interpolated results for $Q_{Culvert}$, $Q_{Roadway\ Overtopping}$ and $Q_{Channel}$.

FACILITY:

CULVERT HD02A

US-95 WEIR FLOW SPLIT
CULVERT HD02A CHANNEL WEIR

Qweir=Cr L HWr^1.5
Qweir=Overtopping flow rate
Cr = Ovetopping Discharge Coefficient (per HDS No. 5, Sept 1985)
L = Length of the roadway crest
Lr = Weir Crest Length
HWr = Upstream Depth (WSE-Crest Elevation)
WSE= Water Surface Elevation taken from the HY8
Q TOTAL= From the HY8. Used as the DI card in the HEC-1 Analysis
HEC-1 DQ Card = Q CULVERTS + Q OVERTOP ROAD
The Q-TOTAL number on the Interpolated Results is
the DARF flow value from the HEC-1

RATING TABLE							
SHEET TAG	WSE HY8	Q TOTAL HY8 = DI HEC-1	Q CULVERT 1 EAST	Q CULVERT 2 EAST	Q OVERTOP ROAD	DQ HEC-1	Q CHANNEL
Q01	2783.87	0	0	0	0	0	0
Q02	2786.28	150	61	61	0	122	29
Q03	2787.14	300	93	93	0	186	114
Q04	2787.76	450	115	115	0	230	221
Q05	2788.25	600	130	130	0	261	340
Q06	2788.61	750	141	141	1	283	467
Q07	2788.89	900	149	149	18	316	584
Q08	2789.14	1050	155	155	44	353	697
Q09	2789.21	1100	157	157	52	366	734
Q10	2789.55	1350	165	165	115	445	905
Q11	2789.73	1500	170	170	158	497	1003
INTERPOLATED RESULTS:	2784.22	22	9	9	0	18	4

Enter 1 for gravel. 0 for paved

	0									
WSE	2789.73	2789.73	2789.73							
Beg Sta	0+02	0+23	0+51							
Beg Crest	2789.96	2789.51	2788.89							
End Sta	0+23	0+51	0+84							
End Crest	2789.51	2788.89	2788.23							
Ave Crest	2789.735	2789.200	2788.560							
L	20.92	27.68	32.72							
Lr	30	30	30							
HWr	-0.005	0.530	1.170							
HWr/Lr	0.00	0.02	0.04							
Cr	#N/A	3.012	3.030							
Qweir	0.00	32.17	125.47							Total Weir Flow Through Channel: 157.64
HWr/Lr<.15	#N/A	3.012	3.030	2.890	2.890	2.890	2.890	2.890	2.890	
HWr/Lr>.15	#N/A	3.060	3.060	3.060	3.060	3.060	3.060	3.060	3.060	

US-95 WEIR FLOW SPLIT
CULVERT HD02A CHANNEL WEIR

Qweir=Cr L HWr^1.5
Qweir=Overtopping flow rate

Cr = Ovetopping Discharge Coefficient (per HDS No. 5, Sept 1985)
L = Length of the roadway crest
Lr = Weir Crest Length
HWr = Upstream Depth (WSE-Crest Elevation)

Enter 1 for gravel, 0 for paved

	0									
WSE	2789.21	2789.21	2789.21	2789.21	2789.21	2789.21	2789.21	2789.21	2789.21	
Beg Sta	0+02	0+23	0+51	0+00	0+00	0+00	0+00	0+00	0+00	
Beg Crest	2789.96	2789.51	2788.89	0	0	0	0	0	0	
End Sta	0+23	0+51	0+84	0+00	0+00	0+00	0+00	0+00	0+00	
End Crest	2789.51	2788.89	2788.23	0	0	0	0	0	0	
Ave Crest	2789.735	2789.200	2788.560	0.000	0.000	0.000	0.000	0.000	0.000	
L	20.92	27.68	32.72	0.00	0.00	0.00	0.00	0.00	0.00	
Lr	30	30	30	30	30	30	30	30	30	
HWr	-0.525	0.010	0.650	2789.210	2789.210	2789.210	2789.210	2789.210	2789.210	
HWr/Lr	-0.02	0.00	0.02	92.97	92.97	92.97	92.97	92.97	92.97	
Cr	#N/A	2.892	3.019	3.090	3.090	3.090	3.090	3.090	3.090	
Qweir	0.00	0.08	51.76	0.00	0.00	0.00	0.00	0.00	0.00	51.84

Total Weir Flow Through Channel

HWr/Lr<.15	#N/A	2.892	3.019	3.060	3.060	3.060	3.060	3.060	3.060
HWr/Lr>.15	#N/A	3.060	3.060	3.090	3.090	3.090	3.090	3.090	3.090

CURRENT DATE: 04-09-2004
CURRENT TIME: 16:02:18

FILE DATE: 04-09-2004
FILE NAME: HD02A

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.0

CULV NO.	SITE DATA: INLET ELEV. (ft)	SITE DATA: OUTLET ELEV. (ft)	SITE DATA: CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	2783.87	2781.61	53.05	1 RCB	6.00	3.00	.012	CONVENTIONAL
2	2783.87	2781.61	51.05	1 RCB	6.00	3.00	.012	CONVENTIONAL
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: HD02A DATE: 04-09-2004

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
2783.87	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
2786.28	150.0	60.7	60.8	0.0	0.0	0.0	0.0	28.07	6
2787.14	300.0	92.9	92.9	0.0	0.0	0.0	0.0	114.06	3
2787.76	450.0	114.7	114.8	0.0	0.0	0.0	0.0	219.19	3
2788.25	600.0	130.2	130.3	0.0	0.0	0.0	0.0	338.57	4
2788.61	750.0	140.8	140.9	0.0	0.0	0.0	0.0	467.01	4
2788.89	900.0	148.5	148.6	0.0	0.0	0.0	0.0	595.98	3
2789.14	1050.0	154.9	154.9	0.0	0.0	0.0	0.0	734.03	3
2789.21	1100.0	157.0	157.1	0.0	0.0	0.0	0.0	782.71	3
2789.55	1350.0	165.2	165.3	0.0	0.0	0.0	0.0	1015.22	3
2789.73	1500.0	169.6	169.7	0.0	0.0	0.0	0.0	1157.30	3
2784.98	37.9	19.0	19.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: HD02A DATE: 04-09-2004

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
2783.87	0.000	0.00	0.00	0.00
2786.28	-0.003	150.00	0.44	0.29
2787.14	0.000	300.00	0.13	0.04
2787.76	-0.005	450.00	1.36	0.30
2788.25	-0.002	600.00	0.89	0.15
2788.61	-0.002	750.00	1.30	0.17
2788.89	-0.010	900.00	6.90	0.77
2789.14	-0.008	1050.00	6.19	0.59
2789.21	-0.004	1100.00	3.22	0.29
2789.55	-0.005	1350.00	4.27	0.32
2789.73	-0.003	1500.00	3.40	0.23

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 04-09-2004
CURRENT TIME: 16:02:18

FILE DATE: 04-09-2004
FILE NAME: HD02A

PERFORMANCE CURVE FOR CULVERT 2 - 1(6.00 (ft) BY 3.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	2783.87	0.00	-2.26	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
60.79	2786.29	2.42	0.28	1-S2n	0.61	1.47	0.73	0.89	13.79	8.13
92.95	2787.15	3.28	0.93	1-S2n	0.80	1.96	1.04	1.33	14.93	10.27
114.77	2787.77	3.89	1.45	1-S2n	0.92	2.25	1.23	1.67	15.51	11.71
130.31	2788.25	4.38	1.86	1-S2n	1.00	2.45	1.35	1.96	16.06	12.81
140.89	2788.61	4.74	2.16	1-S2n	1.05	2.58	1.45	2.22	16.16	13.72
148.60	2788.89	5.02	2.39	1-S2n	1.09	2.68	1.53	2.45	16.23	14.49
154.92	2789.13	5.25	2.59	1-S2n	1.13	2.75	1.55	2.66	16.64	15.18
157.07	2789.21	5.34	2.65	1-S2n	1.14	2.78	1.58	2.73	16.60	15.39
165.29	2789.54	5.67	3.03	4-FFt	1.18	2.87	1.18	3.05	23.39	16.33
169.68	2789.72	5.85	3.32	4-FFt	1.20	2.92	1.20	3.22	23.57	16.84

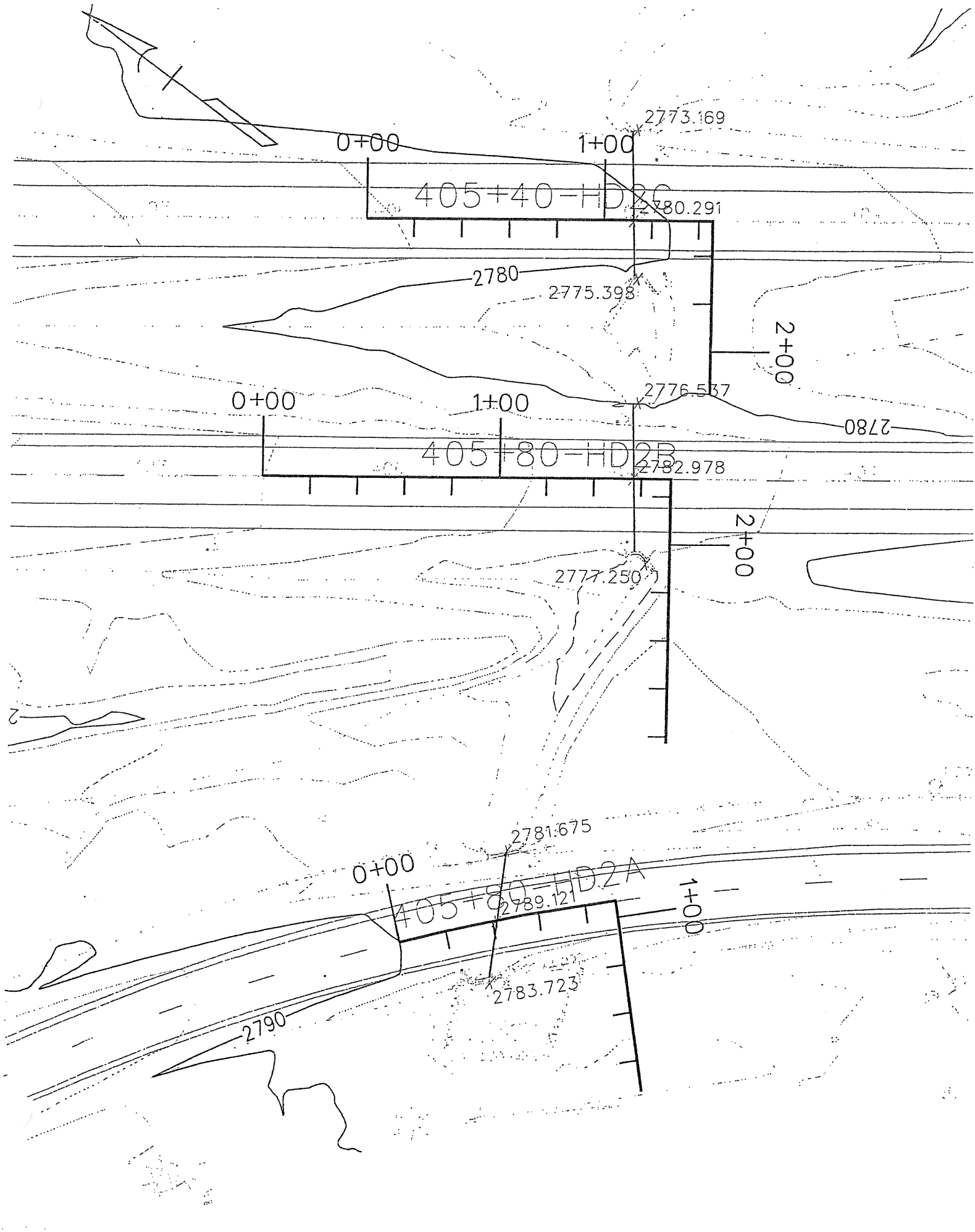
El. inlet face invert 2783.87 ft El. outlet invert 2781.61 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

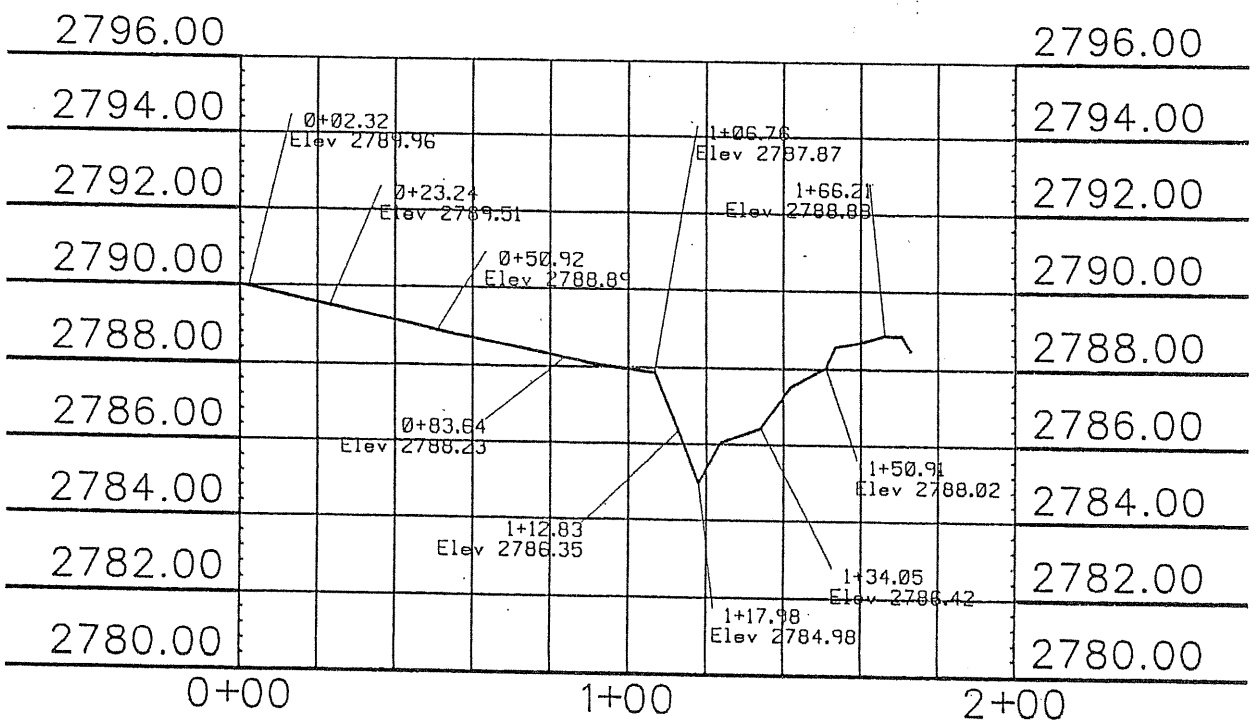
***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	2783.87 ft
OUTLET STATION	51.00 ft
OUTLET ELEVATION	2781.61 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0443
CULVERT LENGTH ALONG SLOPE	51.05 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	6.00 ft
BARREL RISE	3.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (90-45 DEG.)
INLET DEPRESSION	NONE


0+00
1+00
2773.169
405+40-HD2C
2780.291
2780
2775.398
2+00
0+00
1+00
2776.537
405+80-HD2B
2782.978
2780
2+00
2777.250
2781.675
0+00
405+80-HD2A
2789.121
1+00
2783.723
2790


2796.00
2794.00
2792.00
2790.00
2788.00
2786.00
2784.00
2782.00
2780.00
0+00
1+00
2+00
0+02.32
Elev 2789.96
0+23.24
Elev 2789.51
0+50.92
Elev 2788.89
0+83.64
Elev 2788.23
1+12.83
Elev 2786.35
1+17.98
Elev 2784.98
1+34.05
Elev 2786.42
1+50.91
Elev 2788.02
1+66.21
Elev 2788.83
1+06.76
Elev 2787.87

405+80-HD2A

FACILITY:

CULVERT HD02C

US-95 WIDENING

Information Compilation for Culvert: HD02C

Information found at project 5678 (Durango Drive Improvements) file 5706TOPO.DWG

By: Date: 4/2/2004

Checked by: _____ Date: _____

Q (cfs)= 23 ~~416~~

Culvert characteristics

Inlet edge and wall. =	
Inlet depression =	
Inlet inv. Elev. (Ft)=	2775.398
Outlet inv. Elev. (Ft) =	2773.169
Length (Ft)=	62
Size and Type =	42" CSP
Number of barrels =	1

Tailwater Characteristics

Constant elevation =	
Channel slope % =	
Channel side slope =	
Channel width =	

Roadway overtopping

Roadway surface :	Paved	Gravel X
Embankment top width =		

Exhibits

Profile (including report)	X
Plan view	X
Culvert photos:	

US-95 WEIR FLOW SPLIT
CULVERT HD02C CHANNEL WEIR

Qweir=Cr L HWr^1.5
Qweir=Overtopping flow rate
Cr = Ovetopping Discharge Coefficient (per HDS No. 5, Sept 1985)
L = Length of the roadway crest
Lr = Weir Crest Length
HWr = Upstream Depth (WSE-Crest Elevation)
WSE= Water Surface Elevation taken from the HY8
Q TOTAL= From the HY8. Used as the DI card in the HEC-1 Analysis
HEC-1 DQ Card = Q CULVERTS + Q OVERTOP ROAD
The Q-TOTAL number on the Interpolated Results is
the DARF flow value from the HEC-1

RATING TABLE							
SHEET TAG	WSE HY8	Q TOTAL HY8 = DI HEC-1	Q CULVERT 1 EAST	Q CULVERT 2 EAST	Q OVERTOP ROAD	DQ HEC-1	Q CHANNEL
Q01	2776.67	0	0		0.00	0.00	0.00
Q02	2779.36	100	62.6		2.37	64.97	35.03
Q03	2779.84	200	71.3		29.06	100.36	99.64
Q04	2780.01	250	74		47.79	121.79	128.21
Q05	2780.38	400	79.9		121.12	201.02	198.98
Q06	2780.58	500	82.9		175.14	258.04	241.96
Q07	2780.76	600	85.5		237.07	322.57	277.43
Q08	2780.91	700	87.6		295.91	383.51	316.49
Q09	2781.05	800	89.6		357.46	447.06	352.94
Q10	2781.18	900	91.4		422.67	514.07	385.93
Q11	2781.3	1000	93		488.47	581.47	418.53
INTERPOLATED RESULTS:	2777.34	25	16	0	1	16	9

Enter 1 for gravel. 0 for paved

	0									
WSE	2781.30	2781.30	2781.30	2781.30	2781.30	2781.30	2781.30			Total Weir Flow Through Channel
Beg Sta	0+06	0+29	0+57	0+85	1+12	1+42	1+61			
Beg Crest	2782.11	2781.69	2781.22	2780.75	2780.28	2779.73	2779.67			
End Sta	0+29	0+57	0+85	1+12	1+42	1+61	1+80			
End Crest	2781.69	2781.22	2780.75	2780.28	2779.73	2779.67	2778.8			
Ave Crest	2781.900	2781.455	2780.985	2780.515	2780.005	2779.700	2779.235			
L	23.40	27.72	27.73	27.78	29.48	19.31	18.38			
Lr	37	37	37	37	37	37	37			
HWr	-0.600	-0.155	0.315	0.785	1.295	1.600	2.065			
HWr/Lr	-0.02	0.00	0.01	0.02	0.04	0.04	0.06			
Cr	#N/A	#N/A	2.965	3.020	3.030	3.030	3.035			
Qweir	0.00	0.00	14.54	58.36	131.64	118.41	165.53			488.47
HWr/Lr<.15	#N/A	#N/A	2.965	3.020	3.030	3.030	3.035	2.890	2.890	
HWr/Lr>.15	#N/A	#N/A	3.060	3.060	3.060	3.060	3.060	3.060	3.060	

US-95 WEIR FLOW SPLIT
CULVERT HD02C CHANNEL WEIR

Qweir=Cr L HWr^1.5
Qweir=Overtopping flow rate

Cr = Ovetopping Discharge Coefficient (per HDS No. 5, Sept 1985)
L = Length of the roadway crest
Lr = Weir Crest Length
HWr = Upstream Depth (WSE-Crest Elevation)

Enter 1 for gravel, **0** for paved

	0									
WSE	2780.01	2780.01	2780.01	2780.01	2780.01	2780.01	2780.01	2780.01	2780.01	
Beg Sta	0+06	0+29	0+57	0+85	1+12	1+42	1+61	0+00	0+00	
Beg Crest	2782.11	2781.69	2781.22	2780.75	2780.28	2779.73	2779.67	0	0	
End Sta	0+29	0+57	0+85	1+12	1+42	1+61	1+80	0+00	0+00	
End Crest	2781.69	2781.22	2780.75	2780.28	2779.73	2779.67	2778.8	0	0	
Ave Crest	2781.900	2781.455	2780.985	2780.515	2780.005	2779.700	2779.235	0.000	0.000	
L	23.40	27.72	27.73	27.78	29.48	19.31	18.38	0.00	0.00	
Lr	37	37	37	37	37	37	37	37	37	
HWr	-1.890	-1.445	-0.975	-0.505	0.005	0.310	0.775	2780.010	2780.010	
HWr/Lr	-0.05	-0.04	-0.03	-0.01	0.00	0.01	0.02	75.14	75.14	
Cr	#N/A	#N/A	#N/A	#N/A	2.890	2.965	3.020	3.090	3.090	
Qweir	0.00	0.00	0.00	0.00	0.03	9.88	37.87	0.00	0.00	47.79
										Total Weir Flow Through Channel
HWr/Lr<.15	#N/A	#N/A	#N/A	#N/A	2.890	2.965	3.020	3.060	3.060	
HWr/Lr>.15	#N/A	#N/A	#N/A	#N/A	3.060	3.060	3.060	3.090	3.090	

CURRENT DATE: 04-09-2004
CURRENT TIME: 17:14:40

FILE DATE: 04-09-2004
FILE NAME: HD02C

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.0

CULV NO.	SITE DATA: INLET ELEV. (ft)	SITE DATA: OUTLET ELEV. (ft)	SITE DATA: CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	2775.40	2773.17	60.04	1 CSP	3.50	3.50	.024	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: HD02C DATE: 04-09-2004

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
2776.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
2779.36	100.0	62.6	0.0	0.0	0.0	0.0	0.0	37.20	7
2779.84	200.0	71.3	0.0	0.0	0.0	0.0	0.0	128.10	5
2780.01	250.0	74.0	0.0	0.0	0.0	0.0	0.0	173.99	4
2780.38	400.0	79.9	0.0	0.0	0.0	0.0	0.0	318.22	4
2780.58	500.0	82.9	0.0	0.0	0.0	0.0	0.0	415.44	4
2780.76	600.0	85.5	0.0	0.0	0.0	0.0	0.0	513.09	4
2780.91	700.0	87.6	0.0	0.0	0.0	0.0	0.0	607.22	3
2781.05	800.0	89.6	0.0	0.0	0.0	0.0	0.0	704.60	3
2781.18	900.0	91.4	0.0	0.0	0.0	0.0	0.0	803.05	3
2781.30	1000.0	93.0	0.0	0.0	0.0	0.0	0.0	901.96	3
2778.80	51.6	51.6	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: HD02C DATE: 04-09-2004

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
2776.67	0.000	0.00	0.00	0.00
2779.36	-0.007	100.00	0.25	0.25
2779.84	-0.007	200.00	0.62	0.31
2780.01	-0.004	250.00	2.00	0.80
2780.38	-0.003	400.00	1.86	0.47
2780.58	-0.010	500.00	1.62	0.32
2780.76	-0.008	600.00	1.41	0.23
2780.91	-0.006	700.00	5.17	0.74
2781.05	-0.006	800.00	5.83	0.73
2781.18	-0.006	900.00	5.58	0.62
2781.30	-0.005	1000.00	5.05	0.50

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 04-06-2004
CURRENT TIME: 15:48:14

FILE DATE: 04-06-2004
FILE NAME: HD02B

TAILWATER

******* REGULAR CHANNEL CROSS SECTION ****************

BOTTOM WIDTH	10.00 ft
SIDE SLOPE H/V (X:1)	3.0
CHANNEL SLOPE V/H (ft/ft)	0.005
MANNING'S n (.01-0.1)	0.025
CHANNEL INVERT ELEVATION	2776.39 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	2776.39 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	2776.39	0.000	0.00	0.00	0.00
50.00	2777.43	0.638	1.04	3.68	0.32
100.00	2777.90	0.651	1.51	4.55	0.47
150.00	2778.27	0.658	1.88	5.11	0.59
200.00	2778.57	0.662	2.18	5.55	0.68
250.00	2778.83	0.665	2.44	5.90	0.76
300.00	2779.07	0.668	2.68	6.20	0.84
350.00	2779.28	0.670	2.90	6.47	0.90
400.00	2779.48	0.672	3.09	6.71	0.96
450.00	2779.67	0.674	3.28	6.93	1.02
500.00	2779.84	0.676	3.45	7.12	1.08

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	GRAVEL
EMBANKMENT TOP WIDTH	40.00 ft

***** USER DEFINED ROADWAY PROFILE

CROSS-SECTION COORD. NO.	X ft	Y ft
1	6.06	2785.89
2	40.87	2785.32
3	81.06	2784.68
4	121.04	2783.83
5	156.51	2782.98
6	192.15	2782.64
7	211.21	2781.85
8	224.38	2783.38
9	243.56	2784.10
10	282.63	2784.89

CURRENT DATE: 04-09-2004
CURRENT TIME: 17:14:40

FILE DATE: 04-09-2004
FILE NAME: HD02C

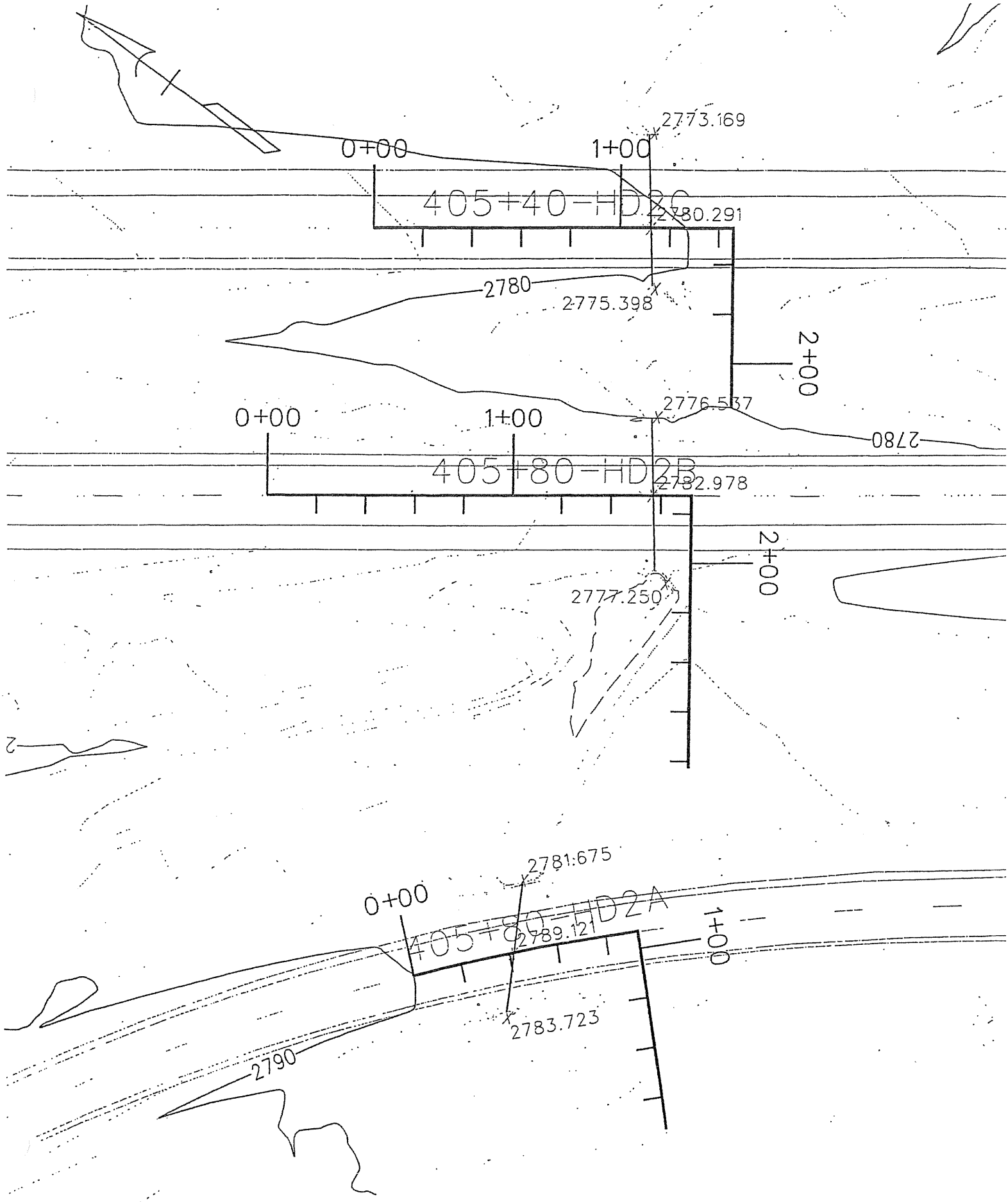
TAILWATER

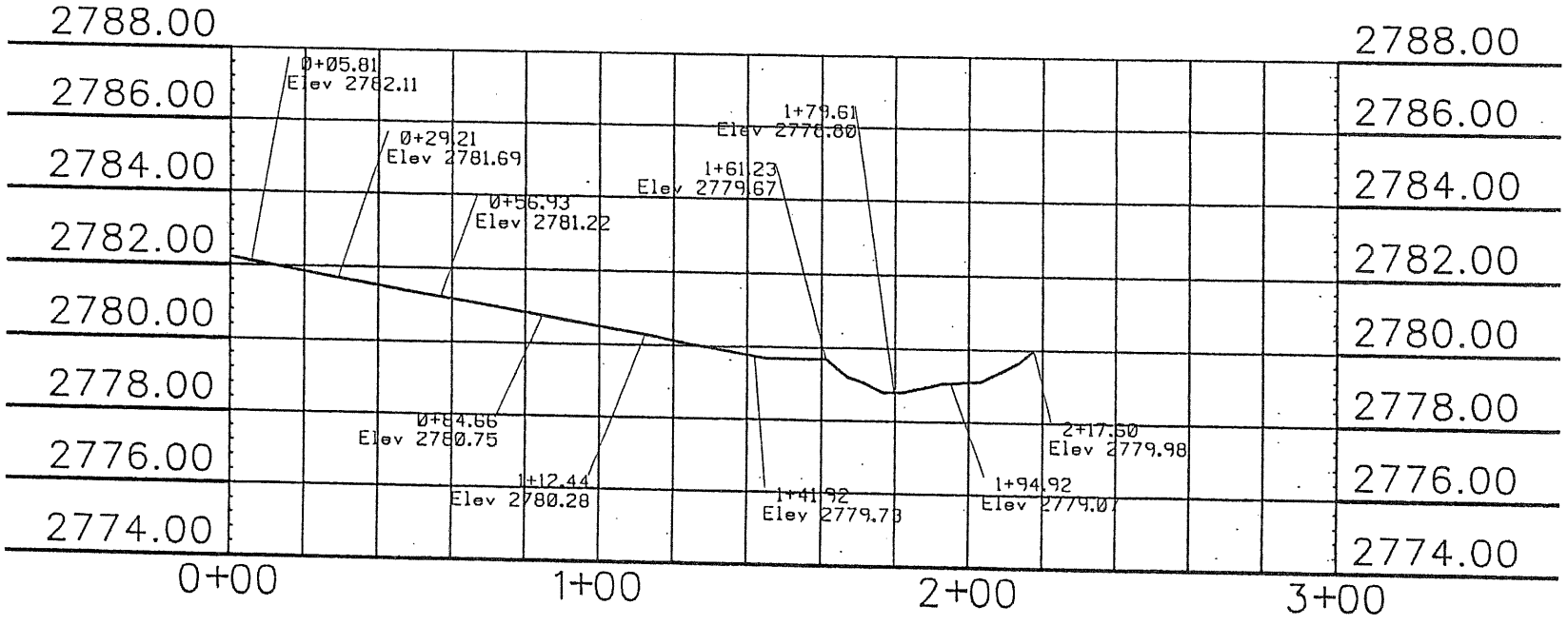
CONSTANT WATER SURFACE ELEVATION
2776.67

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE GRAVEL
EMBANKMENT TOP WIDTH 37.00 ft
***** USER DEFINED ROADWAY PROFILE

CROSS-SECTION COORD. NO.	X ft	Y ft
1	5.81	2782.11
2	29.21	2781.69
3	56.93	2781.22
4	84.66	2780.75
5	112.44	2780.28
6	141.92	2779.73
7	161.23	2778.80
8	179.61	2778.80
9	194.92	2779.07
10	217.60	2779.98


0+00
1+00
2773.169
405+40-HD2C
2780.291
2780
2775.398
2+00
0+00
1+00
2776.537
2780
405+80-HD2B
2782.978
2+00
2777.250
2781.675
0+00
405+60-HD2A
2789.121
2+00
2783.723
2790


2788.00
2786.00
2784.00
2782.00
2780.00
2778.00
2776.00
2774.00
0+00
1+00
2+00
3+00
0+05.81
Elev 2782.11
0+29.21
Elev 2781.69
0+56.93
Elev 2781.22
0+84.66
Elev 2780.75
1+12.44
Elev 2780.28
1+41.92
Elev 2779.73
1+61.23
Elev 2779.67
1+79.61
Elev 2778.80
1+94.92
2+17.50
Elev 2779.98

405+40-HD2C

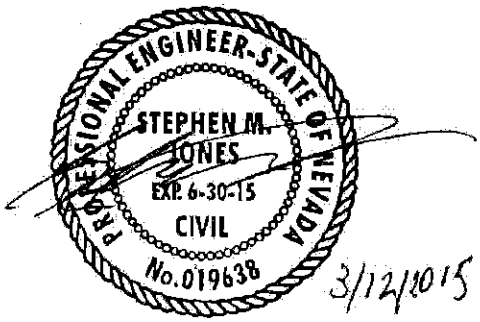
MASTER DRAINAGE STUDY
UPDATE #2

Skye Canyon
City of Las Vegas, Nevada

Job No.: OLY1401.001
Date: March 2015

Prepared By:
Slater Hanifan Group, Inc.
5740 S. Arville Street, Suite 216
Las Vegas, Nevada 89118
Phone: 702-284-5300 • Fax: 702-284-5399

Prepared For:
Ninety-Five Management, LLC
11411 Southern Highlands Parkway, Suite 300
Las Vegas, NV 89141
Phone: 702-220-6565 • Fax: 702-220-6566



3/12/2015

Steve Jones, P.E.
NV Professional Engineer No. 19638

Assisted by: Erick Mata, EI

REGIONAL FLOOD CONTROL DISTRICT

Steven C. Parrish, P.E.
General Manager/Chief Engineer

BOARD OF DIRECTORS

Lawrence L. Brown, III
Chairman
Clark County

Debra March
Vice-Chairman
City of Henderson

Chris Giunchigliani
Clark County

Mayor Carolyn Goodman
City of Las Vegas

Mayor John J. Lee
City of North Las Vegas

Mayor Allan Litman
City of Mesquite

Dr. Lois Tarkanian
City of Las Vegas

Mayor Rodney Woodbury
City of Boulder City

January 6, 2016

Mr. Oh Sang Kwon, P.E.
City of Las Vegas
333 North Rancho Drive
Las Vegas, NV 89106

DISTRICT CONCURRENCE: UPDATE #2 FOR SKYE CANYON MASTER DRAINAGE STUDY (DS4420M) (RFCD No. 15-9599)

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated March 12, 2015, Addendum No. 1 dated June 18, 201 and Addendum No. 2 dated October 6, 2015 for above-mentioned project as submitted by SLATER HANNIFAN GROUP. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas dated November 23, 2015.

District concurs with acceptance of this Technical Drainage Study by City of Las Vegas with the following condition(s):

1. Due to possible issues of sediment, erosion and clogging of proposed interim facilities, address the following for the Detention Basin #1 (DB #1) outfall:

   a. Provide an engineered facility to contain the long term discharge from DB #1 between east of US-95 culvert and the existing storm drain on Fort Apache Road.

   b. Provide a sediment basin west of the US-95 culvert crossing.

2. The Regional alignment along Moccasin Road is adjacent to U.S. Bureau of Land Management (BLM) property, U.S. National Park Service's Tule Springs Fossil Beds National Monument area, and City of North Las Vegas. Obtain necessary approval/concurrence from these entities.

3. Exhibit J: For future submittals, show entire limit of the Regional facility on Moccasin Road, including connectivity to the existing Regional facility.

District's review of this project was limited to issues of Regional Flood Control Significance as defined in *Uniform Regulations for the Control of Drainage*.

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, information submitted by SLATER HANNIFAN GROUP may be superseded. Compliance with regulatory elements and design standards specified in *Uniform Regulations for the Control of Drainage* does not imply a guarantee that properties will be free from flooding or flood damage. The District, its officials, or employees assume

600 S. Grand Central Parkway, Suite 300 • Las Vegas, Nevada 89106-4511
(702) 685-0000 • FAX: (702) 685-0001
Website: *http://www.regionalflood.org*

REGIONAL FLOOD CONTROL DISTRICT

no liability for information, data, or conclusions presented by consulting engineers. We, therefore, make no warranties, either expressed or implied, in conducting this review.

STEVEN C. PARRISH, P.E.
General Manager/Chief Engineer

BY: _____
Abigail Mayrena, P.E., CFM
Principal Civil Engineer

AM:eb

c: Steve Jones, P.E., Slater Hannifan Group

P:\Letters and Memos\Local Drainage\Land Development & Drainage\2015\L-15-9599with condition(s).doc

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: November 23, 2015
TO: **Land Development Services** Department of Public Works				FROM: Oh Sang Kwon, P.E. Flood Control Section Department of Public Works
SUBJECT:	Drainage Study for:			**COPIES TO:**
Skye Canyon Master Drainage Study – **Update #2 (Addendum #2) to Kyle Canyon Master Drainage Study – Phase 2 Interim Impacts**				Slater Hanifan Group
Cross Streets:	Fort Apache Road & Moccasin Road			KAG Development South, LLC
File Number:	F:\Depot\DSMemos\DS4420M.doc			Bart Anderson, P.E., DevCo
Parcel Number:	125-06-001-001			CCRFCD
Zoning Action:				CCPW
FEMA Flood Zone	YES	NO **X**		NDOT; NV Energy
Proposed Storm Drain	YES **X**	NO		PB America, Inc.

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1st Submittal	6/22/2010	7/13/2010	Not Approved	$1,000.00	147216: $1000
2nd Submittal	9/17/2010	10/4/2010	Not Approved	$400.00	153788: $400
3rd Submittal	10/15/2011	11/14/2011	Not Approved	$400.00	153788: $400
4th Submittal	2/13/2012	3/1/2012	Conditional Approval	$400.00	274196: $400
CCRFCD	5/23/2012	5/24/2012	Concurrence Recv'd	N/C	N/C
5th Submittal NDOT Comments	9/10/2012	9/19/2012	Conditional Approval	N/C	N/C
6th Submittal	12/4/2014	12/30/2014	Conditional Approval	$400.00	378889: $400
7th Submittal	2/17/2015	3/3/2015	Conditional Approval	$400.00	385987: $400
8th Submittal	3/16/2015	4/6/2015	See Comments Below	$400.00	388961: $400
CCRFCD	4/2/2015	4/6/2015	Concurrence Recv'd	N/C	N/C
9th Submittal	6/23/2015	7/21/2015	See Comments Below	$400.00	403025: $400
Revised Memo	8/12/2015	8/12/2015	See Comments Below	N/A	N/A
10th Submittal	10/19/2015	11/23/2015	See Comments Below	$400.00	N/A
			TOTAL FEES (LDDRS):	**$4,200.00**	**----**

REMARKS: Revised Memo – National Monument Drainage Impacts

10th Submittal - Phase 2 interim impacts.

<u>The City of Las Vegas will not allow further development outside of the limits of Phase 2 at this time.</u> This is a temporary hold of any further development until the Master Plan changes due to the National Monument Grant issues are resolved. Flood Control cannot issue any further drainage study approvals until given clearance to do so. We are working with CCRFCD to help identify and alleviate these impacts.

The Master Drainage Study for the subject project has been reviewed and:

	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
X	is conditionally approved subject to Clark County Regional Flood Control District concurrence.

	is conditionally approved subject to Clark County Department of Public Works concurrence.
	is conditionally approved subject to Nevada Department of Transportation concurrence.
	is conditionally approved subject to BLM concurrence/approval.

A Flood Control Master Plan Amendment (MPA) has been approved that covers the Skye Canyon Development. Flood Control understands that the Skye Canyon Master Plan is undergoing significant changes that will impact the adopted Master Plan Amendment. Any further changes to the identified Master Plan facilities shall require further review and the submittal of a new MPA for approval by the City of Las Vegas prior to submitting development plans outside of the shadow of protection from Detention Basin #1 and outside of the limits of the Phase 2 pods.

1. Flood Control cannot support further review of infrastructure outside of Phase 2 or phasing plans without first addressing the changes to the overall Master Study. Flood Control still requires that the developer constructed facilities identified as Facility P38 – 40E be constructed to the larger facility size to match the contributing flows from the contributing P32E facility and the added flow from development northwest of P32E. Further changes to the Master Plan may have impacts on these proposed facilities and alignments.
2. The ***Master Land Use Plan*** has been provided however, any further changes to the adopted Master Land Use Plan shall require a complete update to the Master Drainage Study.
3. This comment and the need for the construction of the identified CCRFCD MPU facilities by the Skye Canyon Developer will remain. Per the previous Master Drainage Study – Update #2, page 3, *"this project now proposes a RCB conveyance facility intended to maintain all discharge within the existing grant from BLM that extends from **Fort Apache Road** to the existing **Upper Las Vegas** levee, located east of **Durango Drive**, designed to accommodate the runoff from **Skye Canyon**"*. This proposed RCB facility (shown as P40E on Exhibit J) shall be shown on all plans and exhibits as being constructed with this development. This facility extension is needed to convey flows from the Skye Canyon development without impacting the existing BLM lands within the newly designated National Monument. The design of this facility shall be permanent in nature and constructed per CCRFCD criteria. The plan conceptually shows this facility along the north ½ of the Moccasin alignment. Flood Control requires that this interim facility, which will become a part of the ultimate CCRFCD facility, be located within the south ½ of the Moccasin alignment in order to allow for the remainder of the CCRFCD facility to convey the flows within the north ½ of the alignment. This allows for the continued implementation of the Future MPU facilities.
4. A copy of the approved 404 Permit from the Army Corps of Engineers has been provided.
5. Flood Control has reviewed the provided Phasing Plan that identified the preliminary drainage infrastructure necessary for each phase of development. Phase 1 & 2 have addressed the interim condition and associated downstream impacts to address the impact of the long term discharge from the outfall of the Detention Basin #1. This includes upgrading the existing storm drain system near the intersection of Brent Lane and Fort Apache. These improvements shall be required with the Detention Basin #1 improvements and are subject to further design review upon the technical submittal.
6. Flood Control requires an interim condition drainage analysis in support of the Phasing Plan that clearly shows the impacts to each Phase, existing washes, upstream concentration points and the downstream concentration points. Flood Control needs to make sure that each Phase of Development is protected during the interim and full build-out of this overall project. The current Phasing Plan does not adequately address these issues beyond Phase 2.
7. The interim conditions of the Phasing Plan need to address the impact of the long term discharge from the outfall of any future detention basins. It is noted that Only Detention Basin #1 has been

reviewed. The technical review of Detention Basin #2 will determine the impacts downstream along the Iron Mountain Road alignment and/or other needed facilities to mitigate that impact. The provided Basin Attenuated Outfall Exhibit is only conceptual in nature and is subject to further review as a part of the technical reviews. Existing flow conditions do not have a drawn out discharge from a detention basin. This discharge impact must be accounted for in the interim condition without negatively impacting the existing downstream neighborhoods.

8. CCRFCD concurrence has been provided for Update #1. A new concurrence for Update #2 shall be required of CCRFCD after Conditional Approval by the City of Las Vegas.
9. CCPW concurrence has been provided.
10. NDOT concurrence has been provided.

The following comments are repeated until they are complete:

1. Please note that the Traffic Study must be approved prior to final approval of the Master Drainage Study. If the street layout does not match the Master Drainage Study, an update to the Master Drainage Study must be submitted to address the changes.
2. Per a meeting held in August 18, 2011 between the developer and the *City of Las Vegas*, it was agreed that NV Energy's approval of any proposed drainage facilities within their access easements (such as the proposed detention basins) must be obtained prior to the final approval of the Master Drainage Study. Please provide documentation for such approval or acknowledgment.
3. Please note that any future technical drainage study submittals that differ from the Master Drainage Study (ie. Changes in pods, infrastructure, flows etc.) will require an update to the Master Drainage Study and this update must be approved by the *City of Las Vegas Flood Control Section* prior to final approval of technical drainage study.
4. The proposed detention basins will require coordination with the State of Nevada, Division of Water Resources Dam Safety and will require the State's approval prior to permitting.
5. Please note that the proposed 100-year flood protection facilities identified on Exhibit F must be constructed by the Master Developer as a part of the master planned infrastructure. Technical drainage studies are required for each phase of the master planned infrastructure improvements. The technical drainage studies for the infrastructure improvements may be submitted with conditional approval of this Master Drainage Study. However, final approval for the Master Drainage Study must be obtained prior to conditional approval of the infrastructure drainage studies.
6. Technical drainage studies are required for each of the Pod's. The technical drainage studies for the Pod's may not be submitted until the conditional approval of the pertinent infrastructure drainage study is obtained. Final approval for the infrastructure drainage study must be obtained prior to conditional approval of the impacted Pod drainage studies.
7. Building permits for the homes within the individual Pod's will not be issued until construction of the street and flood control infrastructure around the Pod is substantially complete or interim protection is provided per the approved technical drainage study.
8. This project no longer proposes to surface discharge flows onto U.S. Bureau of Land Management (BLM) property. Therefore, BLM concurrence is no longer required prior to final approval of the Master Drainage Study.
9. The design of debris basins at all major culvert entrances to limit the amount of sediment and debris entering the storm drain facilities will be required in a future infrastructure study.
10. Please note that all detention basins must be designed per CCRFCD criteria including a low flow facility around the detention basin.

11. Please note that all proposed interim facilities must be maintained by the master developer.
12. Provide a legal description of the proposed detention basins prior to recordation of the parent final map.
13. Coordinate the proposed drainage facilities with *Sheep Mountain Parkway* project. Please contact Greg McDermott, P.E., at 702-229-2143 to coordinate the proposed drainage facilities.

NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved master drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Amendment and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the Nevada Division of Environmental Protection a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm or call (775) 687-9429.

END OF REMARKS
osk

T/R/S: T19S/R60E/6 & 7
AREA G-6, 7, & F-12

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: May 24, 2012
TO: **Land Development Services** Department of Public Works				FROM: Oh Sang Kwon, P.E. Flood Control Section Department of Public Works
SUBJECT:	Drainage Study for:			**COPIES TO:**
Kyle Canyon Master Drainage Study				Slater Hanifan Group
Cross Streets:	Fort Apache Road & Moccasin Road			Wachovia Bank / Carwin Advisors
File Number:	F:\Depot\DSMemos\DS4420E.doc			Bart Anderson, P.E., DevCo
Parcel Number:	125-06-001-001			Randy Fultz
Zoning Action:				CCPW, CCRFCD
FEMA Flood Zone	YES	NO X		NDOT; NV Energy
Proposed Storm Drain	YES X	NO		PB America, Inc.

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1st Submittal	6/22/2010	7/13/2010	Not Approved	$1,000.00	147216; $1000
2nd Submittal	9/17/2010	10/4/2010	Not Approved	$400.00	153788; $400
3rd Submittal	10/15/2011	11/14/2011	Not Approved	$400.00	153788; $400
4th Submittal	2/13/2012	3/1/2012	Conditional Approval	$400.00	274196; $400
CCRFCD	5/23/2012	5/24/2012	Concurrence Recv'd	N/C	N/C
			TOTAL FEES (LDDRS):	**$2,200.00**	---

REMARKS:

Update to original Kyle Canyon Master Drainage Study (DS4091). Site layout has been changed.

The Master Drainage Study for the subject project has been reviewed and:

	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
X	is conditionally approved subject to Clark County Department of Public Works concurrence.
X	is conditionally approved subject to Nevada Department of Transportation concurrence.
X	is conditionally approved subject to BLM concurrence/approval.

1. Please note that the traffic study must be approved prior to final approval of the Master Drainage Study. If the street layout does not match the Master Drainage study, an update to the Master Drainage Study must be submitted to address the changes.
2. The Kyle Canyon Master Drainage Study is proposing to revise the hydrology and facilities indentified in the *Clark County Regional Flood Control District's (CCRFCD) 2008 Las Vegas Valley Flood Control Master Plan Update*. A Master Plan Amendment (MPA) must be submitted to the City of Las Vegas for approval. The City of Las Vegas will coordinate the MPA submittal to CCRFCD for approval. The Master Developer will be responsible for preparing all submittals needed for CCRFCD

along with any and all presentations. The MPU must be approved by CCRFCD prior to the final approval of the Master Drainage Study.

3. Per a meeting held in August 18, 2011 between the developer and the *City of Las Vegas*, it was agreed that NV Energy's approval of any proposed drainage facilities within their access easements (such as the proposed detention basins) must be obtained prior to the final approval of the Master Drainage Study. Please provide documentation for such approval or acknowledgment.
4. Please note that any future technical drainage study submittals that differ from the Master Drainage Study (ie. Changes in pods, infrastructure, flows etc.) will require an update to the Master Drainage Study and this update must be approved by the *City of Las Vegas Flood Control Section* prior to final approval of technical drainage study.
5. The proposed detention basins will require coordination with the State of Nevada, Division of Water Resources Dam Safety and will require the State's approval prior to permitting.
6. Please obtain necessary 404 permits from Army Corps of Engineers and provide a copy of the permit to Flood Control prior to issuance of the grading permit. The contact information for Army Corps of Engineers is listed below:

   Patricia L. McQueary
   Chief, USACE S. George Regulatory Office
   US Army Corps of Engineers
   321 North Mall Drive
   Suite L-101
   St. George, UT 84790

   (435) 986-3979 (Office)
   (435) 986-3981 (FAX)
   Patricia.L.McQueary@usace.army.mil

7. Please note that the proposed 100-year flood protection facilities identified on Exhibit F must be constructed by the Master Developer as a part of the master planned infrastructure. Technical drainage studies are required for each phase of the master planned infrastructure improvements. The technical drainage studies for the infrastructure improvements may be submitted with conditional approval of this Master Drainage Study. However, final approval for the Master Drainage Study must be obtained prior to conditional approval of the infrastructure drainage studies.
8. Technical drainage studies are required for each of the POD's. The technical drainage studies for the POD's may not be submitted until the conditional approval of the pertinent infrastructure drainage study is obtained. Final approval for the infrastructure drainage study must be obtained prior to conditional approval of the impacted POD drainage studies.
9. Building permits for the homes within the individual POD's will not be issued until construction of the street and flood control infrastructure around the POD is substantially complete or interim protection is provided per the approved technical drainage study.
10. The site is adjacent to Clark County jurisdictional boundaries. The engineer must coordinate the Master Drainage Study with *Clark County Public Works Department* (CCPW) and incorporate any concerns for boundary conditions. CCPW concurrence is required prior to final acceptance of the Master Drainage Study.
11. The project proposed to construct facilities and/or increase flows within *Nevada Department of Transportation* (NDOT) right-of-way. Therefore, NDOT concurrence is required prior to final approval of the Master Drainage Study.
12. The project proposed to discharge flows onto and proposed facilities within U.S. Bureau of Land Management (BLM) property. Therefore, BLM concurrence is required prior to final approval of the Master Drainage Study.

13. The proposed berm/levee along Moccasin Road will require approval from *Federal Emergency Management Agency* (FEMA) in the future. The proposed berm/levee must be designed to meet the minimum requirements set by FEMA and CCRFCD by a future technical drainage study.
14. The design of debris basins at all major culvert entrances to limit the amount of sediment and debris entering the storm drain facilities will be required in a future infrastructure study.
15. Please note that all detention basins must be designed per CCRFCD criteria including a low flow facility around the detention basin. Also, include new water quality feature per Storm Water Management Plan.
16. Please note that all proposed interim facilities must be maintained by the master developer.
17. Provide a legal description of the proposed detention basins prior to recordation of the parent final map.
18. Coordinate the proposed drainage facilities with *Sheep Mountain Parkway* project. Please contact Greg McDermott at 702-229-2143 to coordinate the proposed drainage facilities.

NOTE:

In an effort to increase administrative efficiency, the City of Las Vegas Public Works Department requires all soil reports, drainage studies and traffic impact analysis submittals to be accompanied by an electronic copy of the submittal. Electronic documents must be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output replicating your submittal to be used for archival or display purposes. This may be more than one file if necessary. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats, but provided it is a high quality digitized replication of the submittal, other formats may be acceptable. If figures are in color, they must be scanned in color and saved as a separate file. The new submittal requirement is effective on July 1, 2011. If there are any questions regarding these new requirements, please contact Oh Sang Kwon in the Flood Section at (702) 229-2177 or Rick Schroder in Traffic Engineering at (702) 229-6327.

Any future changes to the proposed design (or design assumptions) as outlined in the approved master drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Amendment and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the Nevada Division of Environmental Protection a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm or call (775) 687-9429.

END OF REMARKS
osk

T/R/S: T19S/R60E/6 & 7
AREA G-6, 7, & F-12

REGIONAL FLOOD CONTROL DISTRICT

Gale Wm. Fraser, II, P.E.
General Manager/Chief Engineer

BOARD OF DIRECTORS

Lawrence L. Brown, III
Chairman
Clark County

Robert L. Ellason
Vice-Chairman
City of North Las Vegas

Chris Giunchigliani
Clark County

Kraig Hafen
City of Mesquite

Debra March
City of Henderson

Steven D. Ross
City of Las Vegas

Dr. Lois Tarkanian
City of Las Vegas

Mayor Roger Tobler
City of Boulder City

May 7, 2012

Mr. Oh Sang Kwon, P.E.
City of Las Vegas
333 North Rancho Drive
Las Vegas, NV 89106

DISTRICT CONCURRENCE: KYLE CANYON
(DS #4420D) (RFCD No. 12-8054)

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated June 22, 2010, Addendum No. 1 dated September 17, 2010, Addendum No. 2 dated October 18, 2011, and Addendum No. 3 dated February 13, 2012 for above-mentioned project as submitted by SLATER HANIFAN GROUP. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas dated March 1, 2012.

District concurs with acceptance of this Technical Drainage Study by City of Las Vegas.

District's review of this project was limited to issues of Regional Flood Control Significance as defined in *Uniform Regulations for the Control of Drainage*.

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, information submitted by SLATER HANIFAN GROUP may be superseded. Compliance with regulatory elements and design standards specified in *Uniform Regulations for the Control of Drainage* does not imply a guarantee that properties will be free from flooding or flood damage. The District, its officials, or employees assume no liability for information, data, or conclusions presented by consulting engineers. We, therefore, make no warranties, either expressed or implied, in conducting this review.

GALE WM. FRASER, II, P.E.
General Manager/Chief Engineer

BY: _____
Abigail Mayrena, P.E., CFM
Senior Engineer

_____ FOR
Andrew R. Trelease, P.E., CFM
Principal Civil Engineer

AM:ART:sa

c: Stephen Jones, P.E., Slater Hanifan Group

P:\Letters and Memos\Local Drainage\Land Development & Drainage\2012\L-12-8054.doc

600 S. Grand Central Parkway, Suite 300 • Las Vegas, Nevada 89106-4511
(702) 685-0000 • FAX: (702) 685-0001
Website: *http://www.regionalflood.org*

Department of Public Works

500 S Grand Central Pky • Box 554000 • Las Vegas NV 89155-4000
(702) 455-6000 • Fax (702) 455-6040

Denis Cederburg, P.E., Director • E-Mail: dlc@ClarkCountyNV.gov

Concurrence Letter

Date: July 19, 2012
Firm: SHG
Engineer: Steve Jones, P.E.
Address: 5740 S. Arville Street, Suite 216, Las Vegas, NV 89118
Phone: (702) 284-5300
Fax: (702) 284-5399
E-mail: sjones@shg-inc.com

Subject: Conceptual Drainage Study for Kyle Canyon Conceptual Master Study
Location: NWC of Grand Teton Drive and Grand Canyon Drive
APN: 126-12-000-001; et al.
Sec, Township, Range: S12, S06, S07, T19S, R59E, R60E
Flood Zone & Panel: Zone X, 1750, 1745, 1735, Dated November 16, 2011
Application Tracking #: 12-25985

HTE12-25985

Submittals	Date Received	Date Returned	Reviewer	Miscellaneous
Concurrence	07/02/2012	07/19/2012	WG	
Addendum #1	07/02/2012	07/19/2012	WG	
Addendum #2	07/02/2012	07/19/2012	WG	
Addendum #3	07/02/2012	07/19/2012	WG	
Supplement	07/02/2012	07/19/2012	WG	

The above-referenced project is located within the **City of Las Vegas** adjacent to Clark County unincorporated areas. The drainage study was submitted to the County for concurrence on July 2, 2012. In addition, the County has received the City of Las Vegas acceptance letter dated May 24, 2012 for the Conceptual Drainage Study.

The County concurs with the acceptance of this Drainage Study by the City of Las Vegas. Please note that the County's review of this development is limited to drainage issues significant to Clark County unincorporated areas.

BOARD OF COUNTY COMMISSIONERS
SUSAN BRAGER, Chair • STEVE SISOLAK, Vice-Chair
LARRY BROWN • TOM COLLINS • CHRIS GIUNCHIGLIANI • MARY BETH SCOW • LAWRENCE WEEKLY
DONALD G. BURNETTE, County Manager

Additional Conditions:

1. This Conceptual Drainage Study establishes existing hydrologic conditions impacting the site by defining onsite and offsite flows.

2. This approval does not allow any construction activity including grading, placement of fill or excavation of any kind.

3. An approved Technical Drainage Study is required prior to any construction activity. In addition the Technical Drainage Study must address any required drainage easements, establish FF elevations and provide hydraulic calculations for all required drainage facilities.

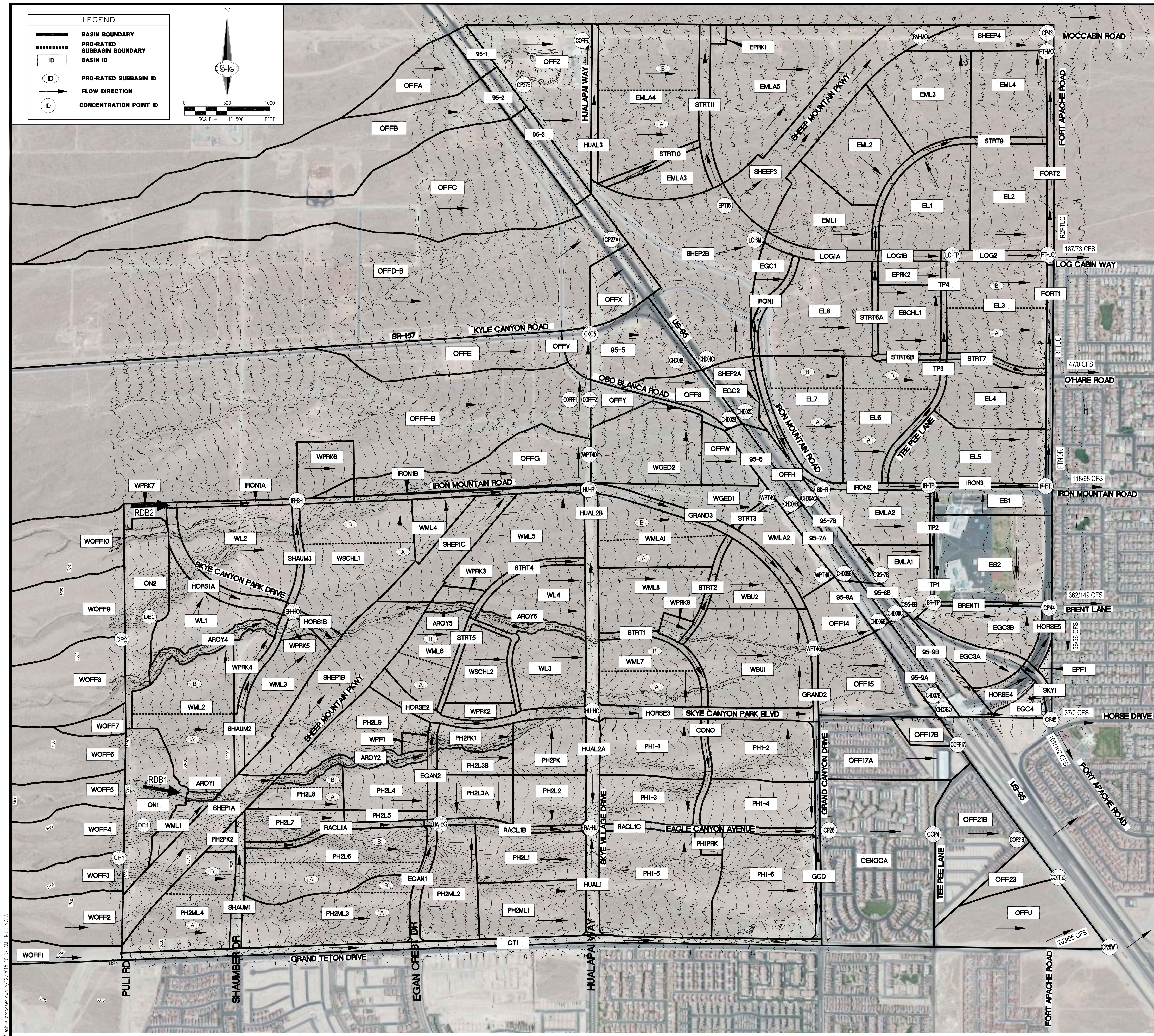
4. Future Technical Drainage Studies for the detention basin and drainage facilities will need to analyze possible upstream flow split from erosion and scour of alluvial fan. Note, possible upsizing of the detention basin and drainage facilities may be needed if additional flow from alluvial fan is shown.

The County's review is solely based on the information submitted by the Engineer of Record. The County's review is strictly limited to compliance with minimum County Codes and Standards. The Engineer of Record is responsible for researching and addressing situations that may require designs above and beyond the minimum codes for issues of public safety and impacts to upstream, downstream and adjacent properties. The County assumes no liability for information data, designs or conclusions of the Engineer of Record.

By /s/ Layne Weber

W. Layne Weber, P.E., CFM
Principal Engineer
Clark County Public Works
Development Review

cc: Carwin Advisors
Andrew Trelease, P.E., RFCD
Albert Sung, P.E., City of Las Vegas



NOTE: PHASE 1 BASINS (PH1-1, PH1-2, PH1-3, PH1-4, PH1-5, PH1-6, CONQ, RACL1C, PH1PRK AND GCD) HAVE BEEN REFERENCED FROM THE APPROVED SKYE CANYON PHASE 1 INFRASTRUCTURE STUDY

Storm Flow Summary
Skye Canyon West Basins
Proposed Condition

Basin ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
AROY1	0.8	2	1
AROY2	5.2	13	6
AROY4	4.8	12	5
AROY5	1.3	3	1
AROY6	3.6	9	4
ON1	19.4	8	4
ON2	20.2	9	4
PH2L1	17.4	45	21
PH2L2	11.5	31	14
PH2L3A	10.5	29	13
PH2L3B	6.1	17	8
PH2L4	11.9	33	15
PH2L5	2.7	8	4
PH2L6	30.0	77	34
PH2L7	8.3	23	10
PH2L8	8.1	22	10
PH2L9	16.8	52	23
PH2ML1	18.8	60	31
PH2ML2	18.1	59	31
PH2ML3	28.7	81	40
PH2ML4	22.7	66	32
PH2PK	13.1	29	10
PH2PK1	5.5	13	5
PH2PK2	1.6	4	2
WBU1	33.8	102	53
WBU2	11.6	37	19
WGED1	10.7	33	17
WGED2	25.1	66	31
WL1	15.5	41	18
WL2	28.6	75	34
WL3	16.4	43	20
WL4	15.1	37	16
WMLA1	21.6	67	35
WMLA2	11.8	39	20
WML1	4.2	13	7
WML2	32.9	98	51
WML3	16.0	51	26
WML4	6.9	23	12
WML5	24.8	75	39
WML6	14.8	48	25
WML7	19.8	64	33
WML8	19.4	59	31
WPF1	1.4	6	3
WPRK2	3.6	8	3
WPRK3	2.1	5	2
WPRK4	4.8	11	4
WPRK5	1.4	3	1
WPRK6	10.0	21	7
WPRK7	2.4	6	2
WPRK8	1.9	4	2
WSCHL1	37.4	101	47
WSCHL2	11.8	34	15
Roadway Basins			
EGAN1	3.7	12	7
EGAN2	2.8	10	6
GRAND2	2.1	6	4
GRAND3	7.5	23	13
GTI	15.3	40	22
HORS1A	6.9	22	12
HORS1B	2.4	9	5
HORSE2	8.1	27	15
HORSE3	7.5	25	14
HUAL1	4.5	14	8
HUAL2A	4.0	13	7
HUAL2B	9.9	26	14
IRON1A	3.2	11	6
IRON1B	4.7	16	9
RACL1A	3.8	13	7
RACL1B	3.3	12	7
SHAUM1	4.2	13	7
SHAUM2	4.3	14	8
SHAUM3	2.3	8	4
SHEP1A	18.7	44	18
SHEP1B	31.4	72	30
SHEP1C	14.3	34	14
STRT1	3.1	11	6
STRT2	2.3	8	5
STRT3	1.0	4	2
STRT4	2.8	10	6
STRT5	3.4	12	7
Referenced Phase 1 Basins			
CONQ	2.2	6	3
GCD	3.4	10	5
PH1-1	17.8	47	21
PH1-2	19.3	45	18
PH1-3	14.8	39	17
PH1-4	16.1	49	24
PH1-5	37.3	107	52
PH1-6	32.3	93	46
PH1PRK	1.8	4	1
RACL1C	4.6	13	6

Storm Flow Summary
Skye Canyon East Basins
Proposed Condition

Basin ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
EGC1	4.9	14	7
EGC2	1.4	15	9
EGC3A	11.8	36	19
EGC3B	11.2	36	19
EGC4	3.2	12	6
EL1	25.1	39	12
EL2	25.6	39	12
EL3	30.8	48	15
EL4	19.9	33	11
EL5	26.5	42	13
EL6	27.2	43	13
EL7	24.7	41	13
EL8	29.6	48	15
EML1	18.4	46	22
EML2	22.8	57	27
EML3	24.7	62	29
EML4	20.6	51	24
EMLA1	11.1	33	17
EMLA2	15.0	41	21
EMLA3	9.3	25	12
EMLA4	43.7	105	49
EMLA5	46.8	115	54
EPF1	1.0	4	2
EPRK1	0.9	1	<1
EPRK2	4.6	4	<1
ESCHL1	13.6	27	10
Roadway Basins			
BRENT1	1.2	5	3
FORT1	5.8	14	8
FORT2	5.7	14	8
HORSE4	4.0	16	9
HORSE5	2.4	9	5
HUAL3	2.4	7	4
IRON1	2.4	8	4
IRON2	5.4	15	9
IRON3	1.4	5	3
LOG1A	4.0	14	8
LOG1B	2.2	8	4
LOG2	3.7	13	7
SKY1	1.6	6	3
SHEP2A	7.3	8	2
SHEP2B	56.7	59	14
SHEEP3	28.2	28	7
SHEEP4	9.2	10	2
STRT6A	1.7	5	3
STRT6B	1.2	4	2
STRT7	2.1	7	4
STRT9	4.9	14	8
STRT10	2.2	8	4
STRT11	5.5	15	8
TP1	0.6	2	1
TP2	0.6	2	1
TP3	3.0	9	5
TP4	1.8	5	3

Storm Flow Summary
Skye Canyon Offsite Basins
Proposed Condition

Basin ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
CENGCA	51.2	152	73
ES1	11.1	29	14
ES2	31.4	84	43
OFF10	429.5	591	248
OFF14	9.3	20	8
OFF15	22.3	47	19
OFF17A	19.5	51	24
OFF17B	5.1	15	7
OFF21B	26.5	75	38
OFF23	5.8	17	8
OFFA	13.0	17	4
OFFB	85.6	73	18
OFFC	85.3	80	20
OFFDA	411.5	343	97
OFFDB	316.6	235	59
OFFE	24.5	26	6
OFFFA	636.0	843	322
OFFFB	384.0	414	152
OFFG	25.5	47	18
OFFU	25.5	246	110
OFFV	3.6	4	1
OFFW	7.7	9	2
OFFY	6.4	7	2
OFFZ	33.4	35	8
Offsite Basins Contributing to Detention Basins			
WOFF1	274.6	387	150
WOFF2	26.8	54	20
WOFF3	16.6	38	15
WOFF4	37.2	84	34
WOFF5	164.4	236	93
WOFF6	25.5	59	24
WOFF7	4.3	10	4
WOFF8	137.0	230	90
WOFF9	74.5	144	57
WOFF10	417.5	467	190

Detention basins and basins OFFF14, OFFU, OFFV, OFFW, OFFY and OFFZ have **NOT** been referenced from the GC Wallace Master Drainage Study. All other offsite basins have been referenced from GC Wallace Master Drainage Study.

Areas for Basins OFFFB and OFFG have been adjusted to account for addition Iron Mountain Park (Basin WPRK6).

Basin CENGCA is a combination of multiple basins referenced from the Centennial Point and Grand Canyon Apartments HEC-1 models.

Storm Flow Summary
Skye Canyon Offsite Concentration Points
Proposed Conditions

Concentration Point	Area (mi^2)	Q_{100} (cfs)	Q_{10} (cfs)
WPT40 = HU-IR + OFFG	2.66	1192	611
COFFF1 = OFF10 + OFFFA + OFFFB	2.26	1310	549
COFFF2 = WPT40 + COFFF1 + WPRK6	4.94	1546	733
CKC5 = COFFF2 + OFFE + OFFV	4.99	1559	739
CCP4 = CENGCA + CP26	0.52	907	451
CP27A = OFFDA + OFFDB	1.14	463	131
CP27B = OFFA + OFFB + OFFC + 95-1 + 95-2 + 95-3	0.31	173	44
COFFZ = CP27B + OFFZ	0.36	206	52

Storm Flow Summary
Skye Canyon East Concentration Points
Proposed Condition

Concentration Point	Area (mi^2)	Q_{100} (cfs)	Q_{10} (cfs)
BR-TP = C95-7B + C95-8B + EMLA1 + TP1	0.35	281	138
CP44 = BR-TP + ES2 + BRENT1 + EGC3B + HORSE5 + EPF1	0.42	411	205
CP45 = SOUTH + SKY1 + HORSE4 + EGC3A +EGC4 + 95-9B	0.46	138	102
SK-IR = RETC4C + RETC2C + SHEP2A + EGC2 + IRON2 + OFFH	0.26	190	86
IR-TP = SK-IR + EMLA2 + TP2	0.28	233	108
IR-FT = IR-TP + ES1 + IRON3	0.30	267	124
LC-SM = RETC1C + SHEP2B	0.12	76	18
LC-TP = EL7 + EL6 + TP3 + STRT6 + TP4 + ESCHL1 + LOG1B + EPRK2	0.12	135	48
FT-LC = LC-TP + FTNOR + EL5 + EL4 + STRT7 + RFTLC + EL3 + FORT1 + LOG2	0.56	370	127
FT-MO = LC-SM + EGC1 + IRON1 + EL8 + LOG1A + STRT6A + EL1 + EML1 + EL2 + EML2 + STRT9 + FT-LC + R2FTLC + FORT2 + EML3 + EML4 + SHEEP4	1.00	645	246
EPT16 = CP27A + DCKC7 + OFFX	6.15	1888	801
SM-MO = COFFZ + EPT16 + HUAL3 + EMLA4 + STRT10 + EMLA3 + STRT11 + SHEEP3 + EMLA5 + EPRK1	6.71	2056	926
CP43 = FT-MO + SM-MO	7.71	2589	1173

Storm Flow Summary
Skye Canyon US-95 Concentration Points
Proposed Conditions

Concentration Point	Area (mi^2)	Q_{100} (cfs)	Q_{10} (cfs)
CHD01B = 95-5	0.03	26	6
CHD02B = DHD01B + OFF8 + OFFY + WGED2	0.09	92	41
CHD04B = DHD02B + WPT49 + 95-6 + OFFW	0.13	61	28
CHD05B = DHD04B + WPT48 + 95-7A	0.26	251	130
CHD06B = WPT46 + 95-8A + OFF14	0.18	325	159
CHD07B = DHD06B + 95-9A	0.01	19	9
CHD7B2 = CHD05B + CHD07B + OFF15	0.49	314	155
COFF17 = OFF17B + OFF17A	0.04	66	31
COF21B = CCP4 + OFF21B	0.56	980	489
COFF23 = DCOF17 + DOF21B + DOFF23 + OFF23	0.01	19	9
CP26WT = DCOF23 + GT1 + OFFU + 203/95 cfs (Interim Grand Teton Storm Drain)	0.06	286	133
CHD01C = DCHD1B	0.03	23	6
CHD02C = DHD1C + DCHD2B	0.09	92	41
CHD04C = DHD2C + DCHD4B	0.13	93	42
CHD06C = DHD5C + DCHD6B	0.18	217	107
CRET8 = DVCUL8	0.04	66	31
CRET9 = DCRET8 + DVCUL9	0.60	980	489
CRET10 = DCCUL9 + DCUL10	0.61	743	285
DIV11A = CHD7B2 + DCU10A + DCUL11 + DCMPU6	1.95	1037	455
C95-7B = DCHD5C + 95-7B	0.14	22	11
C95-8B = DCHD6C + 95-8B	0.19	224	110
CP27B = OFFC + 95-3 + OFFB + 95-2 + OFFA + 95-1	0.31	173	44

Storm Flow Summary
Skye Canyon West Concentration Points
Proposed Condition

Basin/Concentration Point ID	Area (sqmi)	Q_{100} (cfs)	Q_{10} (cfs)
CP1 WOFF1 + WOFF2 + WOFF3	0.50	417	167
DB1 CP1 + WOFF4 + WOFF5 + WOFF6 + ON1	0.88	735	297
RDB1 (DETENTION OUTFLOW)	0.88	70	35
CP2 WOFF7 + WOFF8	0.22	235	93
DB2 CP2 + WOFF9 + WOFF10 + ON2	1.02	700	287
RDB2 (DETENTION OUTFLOW)	1.02	76	46
RA-EG PH2ML3 + PH2L6 + EGAN1 + PH2L5 + PH2L7 + RACL1A	0.12	209	100
RA-HU RA-EG + PH2ML1 + PH2ML2 + PH2L1 + PH2L2 + PH2L3A + HUAL1 + RACL1B + HUAL2A	0.26	469	226
CP26 RA-HU + PH1-3 + CONQ + PH1-5 + PH1PRK + RACL1C + PH1-4 + PH1-6 + GCD	0.43	777	381
HU-HO RDB1 + AROY1 + WML1 + SHEP1A + AROY2 + PH2L4 + PHYL8 + PHYL9 + WPF1 + EGAN2 + WPRK2 + PH2PK1 + PH2L3B + PH2PK + HORSE2 + PH2PK2 + PH2ML4 + SHAUM1	1.09	363	168
SH-HO = AROY4 + WML2 + WPRK4 + SHAUM2 + WL1 + HORS1A	0.11	195	98
IR-SH = SH-HO + RDB2 + WPRK7 + WL2 +SHAUM3 + IRON1A	1.19	306	149
HU-IR = HU-HO + WML6 + AROY5 + SHEP1B + WSCHL2 + STRT5 + WL3 + AROY6 + WPRK3 + WL4 + STRT4 + WML5 + HUAL2B + IR-SH + WML3 + HORS1B + WPRK5 + WSCHL1 + IRON1B + WML4 + SHEP1C	2.62	1158	593
WPT46 = WML7 + STRT1 + WBU1 + PH1-1 + PH1-2 + GRAND2 + HORSE3	0.16	294	146
WPT48 = WMLA1 + WML8 + WPRK8 + STRT2 + GRAND3 + WBU2 + WMLA2	0.12	238	124
WPT49 = WGED1 + STRT3	0.02	37	19

Prorated Flow Summary

Basin	Q_{100} (cfs)	Area (acres)	Unit Flow (cfs/acre)
EL3	48	30.8	1.6
EL6	43	27.2	1.6
EL7	41	24.7	1.7
EMLA4	105	43.7	2.4
PH2ML3	81	28.7	2.8
PH2ML4	66	22.7	2.9
PH2L6	77	30.0	2.6
PH2L8	22	8.1	2.7
WMLA1	67	21.6	3.1
WML2	98	32.9	3.0
WML6	48	14.8	3.2
WML7	64	19.8	3.2
WSCHL1	101	37.4	2.7
Subbasin	**Q_{100} (cfs)**	**Area (acres)**	**Unit Flow (cfs/acre)**
EL3-A	25	16.1	1.6
EL3-B	23	14.7	1.6
TOTAL	***48***	***30.8***	***1.6***
EL6-A	29	18.1	1.6
EL6-B	14	9.1	1.6
TOTAL	***43***	***27.2***	***1.6***
EL7-A	28	16.7	1.7
EL7-B	13	8.0	1.7
TOTAL	***41***	***24.7***	***1.7***
EMLA4-A	55	22.8	2.4
EMLA4-B	50	20.9	2.4
TOTAL	***105***	***43.7***	***2.4***
PH2ML3-A	73	25.8	2.8
PH2ML3-B	8	2.9	2.8
TOTAL	***81***	***28.7***	***2.8***
PH2ML4-A	47	16.0	2.9
PH2ML4-B	19	6.7	2.9
TOTAL	***66***	***22.7***	***2.9***
PH2L6-A	39	15.0	2.6
PH2L6-B	39	15.0	2.6
TOTAL	***77***	***30.0***	***2.6***
PH2L8-A	16	5.9	2.7
PH2L8-B	6	2.2	2.7
TOTAL	***22***	***8.1***	***2.7***
WMLA1-A	34	10.9	3.1
WMLA1-B	33	10.7	3.1
TOTAL	***67***	***21.6***	***3.1***
WML2-A	51	16.9	3.0
WML2-B	48	16.0	3.0
TOTAL	***99***	***32.9***	***3.0***
WML6-A	22	6.7	3.2
WML6-B	26	8.1	3.2
TOTAL	***48***	***14.8***	***3.2***
WML7-A	36	11.2	3.2
WML7-B	28	8.6	3.2
TOTAL	***64***	***19.8***	***3.2***
WSCHL1-A	62	22.8	2.7
WSCHL1-B	39	14.6	2.7
TOTAL	***101***	***37.4***	***2.7***

Storm Flow Summary
Skye Canyon US-95 Basins
Proposed Conditions

Basin ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
95-1	2.7	7	3
95-2	2.8	7	3
95-3	6.1	15	6
95-5	19.4	50	21
95-6	6.7	17	7
95-7A	4.4	13	6
95-7B	5.2	15	7
95-8A	3.3	10	5
95-8B	2	6	3
95-9A	7.1	19	9
95-9B	8.5	22	10
OFF8	8.5	19	8
OFFH	4.8	12	5
OFFX	11.3	13	3

Basins 95-5 and OFFX have **NOT** been referenced from the GC Wallace Master Drainage Study. All other basins have been referenced from the GC Wallace Master Drainage Study.

Storm Flow Summary
Skye Canyon Offsite Diversions
Proposed Conditions

Diversion ID	Q_{100} (cfs)	Q_{10} (cfs)	Diverted From	Diverted To
DCKC7	1559	739	CKC5	EPT16

Storm Flow Summary
Skye Canyon US-95 Diversions
Proposed Conditions

Diversion ID	Q_{100} (cfs)	Q_{10} (cfs)	Diverted From	Diverted To
DCHD1B	23	6	CHD01B	CHD01C
DCHD2B	92	41	CHD02B	CHD02C
DCHD4B	61	28	CHD04B	CHD04C
DCHD6B	216	106	CHD06B	CHD06C
DCMPU6	109	53	CHD06B	DIV11A
DVCUL8	66	31	COFF17	CRET8
DVCUL9	980	489	COF21B	CRET9
DCUL10	18	8	COFF23	CRET10
DCUL11	283	240	CP26WT	DIV11A
DCHD1C	23	6	CHD01C	COFF9
DCHD2C	59	27	CHD02C	COFF9
DCHD4C	84	38	CHD04C	EPT5
DCHD5C	8	4	CHD05C	C95-7B
DCHD6C	217	107	CHD06C	C95-8B
DIV8A	66	31	CRET8	N/A
DIV9A	254	213	CRET9	N/A
DIV10A	367	267	CRET10	N/A
DIV11A	1037	455	CRET11	N/A

Storm Flow Summary
Skye Canyon East Diversions
Proposed Conditions

Diversion ID	Q_{100} (cfs)	Q_{10} (cfs)	Diverted From	Diverted To
BRENT	362	149	CP44	Brent Lane
SOUTH	56	56	CP44	Racel Street
HORSE	37	0	CP45	Horse Drive
RACEL	101	102	CP45	Racel Street
IREAST	118	98	IR-FT	Iron Mountain Road
FTNOR	149	26	IR-FT	Fort Apache Road
OHARE	47	0	FT-LC	O'Hare Road
RFTLC	177	52	FTNOR	Fort Apache Road
LOGCAB	187	73	RFTLC	Log Cabin Way
R2FTLC	183	54	FT-LC	Fort Apache Road

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT, LLC.

SKYE CANYON MASTER DRAINAGE STUDY UPDATE NO.2

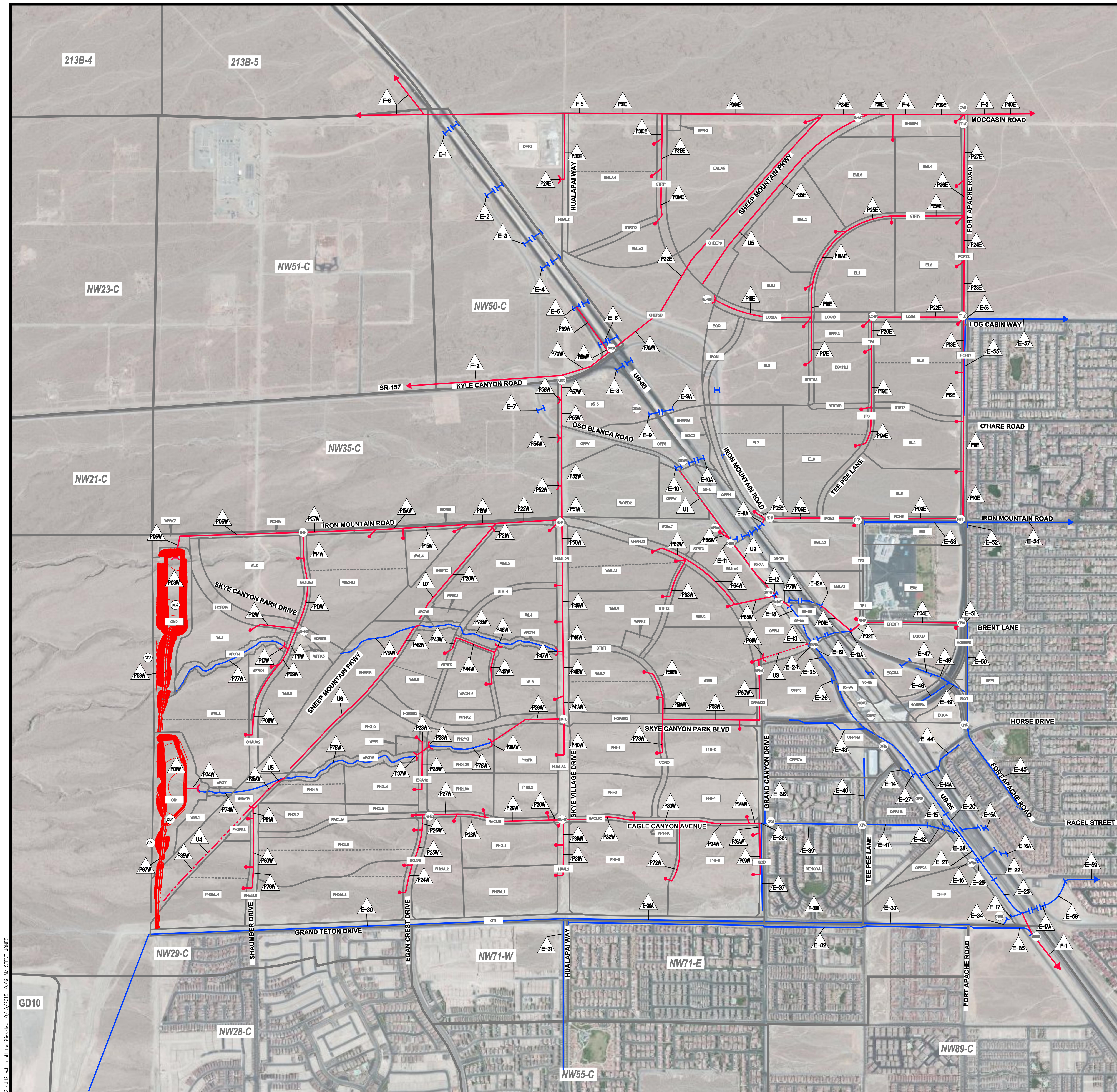
PROPOSED CONDITION DRAINAGE MAP

DATE: MARCH 2015
DRAFTER: ETM
DESIGNER: ETM
CHECKED: SMJ

PROJECT NO. OLY1401.001

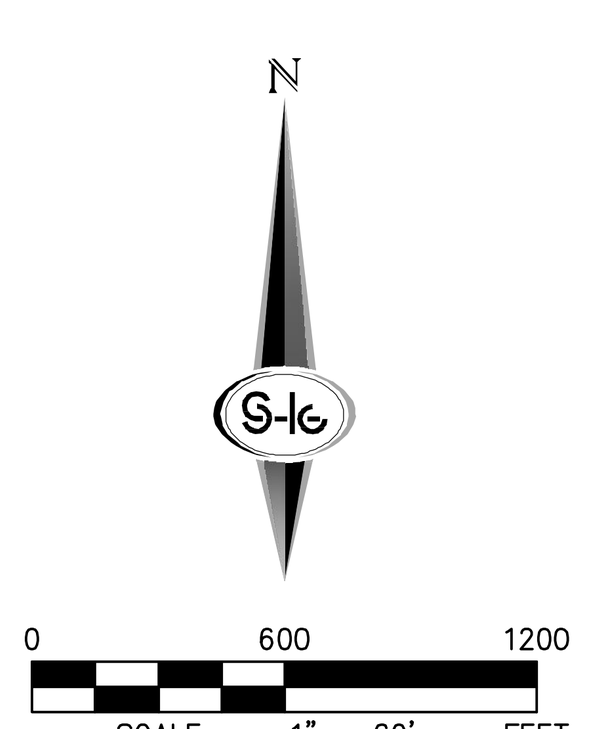
EXHIBIT E
SHEET 1 OF 1

\\shgfs1\data\oly1401.001 skye canyon\drainage\conceptual study\figures\oly1401.001 mds up2 exh e proposed.dwg 3/12/2015 10:02 AM ERICK MATA



LEGEND

Symbol	Meaning
(solid grey line)	BASIN BOUNDARY
(dashed grey line)	PRO-RATED SUBBASIN BOUNDARY
ID	LOCAL BASIN ID
NW45-C	REGIONAL BASIN ID
(ID)	PRO-RATED SUBBASIN ID
(ID)	CONCENTRATION POINT
(blue line)	EXISTING FACILITY
(red line)	PROPOSED FACILITY
(triangle) ID	FACILITY ID



Summary of Future Facilities
Kyle Canyon East - Ultimate Condition

Facility ID	Q_{100} (cfs)	Design Slope (%)	Length (ft)	Description	Flow Breakdown[1]
U5	80	N/A	3188	Future Offsite Local Facility (By Others)	SHEEP3
F-3	10872	N/A	N/A	Future Offsite Regional Facility (By Others), Replaces Facility P40E	CP43
F-4	10869	N/A	N/A	Future Onsite Regional Facility (By Others), Replaces Facilities P34E, P38E & P39E	CNW64-C
F-5	10298	N/A	N/A	Future Onsite Regional Facility (By Others), Replaces Facility P31E	C213B-5
F-6	N/A	N/A	N/A	Future Offsite Regional Facility (By Others)	N/A

1 - Contributing HEC-1 flows to Regional Facilities obtained from Exhibit G Regional Ultimate Condition hydrologic analysis.

Summary of Future Facilities
Skye Canyon West - Ultimate Condition

Facility ID	Q_{100} (cfs)	Design Slope (%)	Length (ft)	Description	Flow Breakdown[1]
U1	110	N/A	1139	Future Offsite Local Facility (By Others)	WGED2 + OFFW + OFFY
U2	147	N/A	865	Future Offsite Local Facility (By Others)	CHD04B
U3	323	N/A	620	Future Offsite Local Facility (By Others)	WPT46 + OFF14
U4	51	N/A	1740	Future Offsite Local Facility (By Others), Replaces Facility P35W	SHEP1A
U5	144	N/A	565	Future Offsite Local Facility (By Others), Replaces Facility P35AW	SHEP1A + PH2ML4 + PH2PK2 + SHAUM1
U6	99	N/A	2594	Future Offsite Local Facility (By Others), Replaces Facility P42W	SHEP1B
U7	47	N/A	1551	Future Offsite Local Facility (By Others), Replaces Facility P20W	SHEP1C
F-2	2709	N/A	N/A	Future Offsite Regional Facility (By Others)	CNW35-C

1 - Contributing HEC-1 flows obtained from Local Ultimate Condition hydrologic analysis.

Summary of Proposed Facilities
Skye Canyon West - Ultimate Condition

Facility ID	Proposed Q_{100} (cfs)	Ultimate Q_{100} (cfs)	Design Slope (%)	Length (ft)	Description	Flow Breakdown[1]
P01W	786	798	N/A	N/A	Orifice Size: 30-inch (Into P04W) Total Storage Volume: 70.9 acre-ft Debris Volume: 5.9 acre-ft 100-year Storage Volume: 65 acre-ft 100-year Water Surface Elevation: 3036.0-ft PMF Flow: 5,852 cfs Low Flow Conveyance at Bottom	DB1/RDB1
P02W	Detention Basin removed with Update No.1					
P03W	700	655	N/A	N/A	Orifice Size: 30-inch (Into P06W) Total Storage Volume: 77.6 acre-ft Debris Volume: 5.6 acre-ft 100-year Storage Volume: 72 acre-ft 100-year Water Surface Elevation: 3008.5-ft PMF Flow: 5,899 cfs Low Flow Conveyance at Bottom	DB2/RDB2
P04W	70	71	2.0	167	30-inch RCP	RDB1
P04AW	N/A	N/A	N/A	N/A	Outlet from Detention removed	N/A
P05W	N/A	N/A	N/A	N/A	Outlet from Detention removed	N/A
P06W	76	57	3.1	1937	30-inch RCP	RDB2
P07W	306	309	4.6	970	72-inch RCP	IR-SH
P08W	51	51	1.4	1030	30-inch RCP	WML2-A
P09W	62	62	4.2	237	30-inch RCP	WML2-A + WPRK4
P10W	12	12	N/A	70	18-inch RCP Inlet	AROY4
P11W	121	121	0.5	296	54-inch RCP	WML2 + AROY4 + WPRK4
P12W	41	41	3.1	490	24-inch RCP	WL1
P13W	195	195	3.6	963	54-inch RCP	SH-HO
P14W	270	270	0.5	345	72-inch RCP	SH-HO + WL2
P15AW	345	348	0.5	360	6-ft wide by 6-ft high RCB	IR-SH + WSCHL1-B
P15W	407	410	3.5	857	6-ft wide by 6-ft high RCB	IR-SH + WSCHL1
P16W	Removed by this Update No.2					
P17W	Removed by this Update No.2					
P18W	Removed by this Update No.2					
P19W	446	449	5.2	386	6-ft wide by 6-ft high RCB	IR-SH + WCHL1 + WML4 + IRON1B
P20W	15	N/A	3.0	1551	Interim Channel, Earthen, 35' BW, 3:1 SS, d=2.5'	SHEP1C
P21W	15	47	N/A	80	36-inch RCP Inlet	SHEP1C
P22W	461	496	2.2	877	6-ft wide by 6-ft high RCB	IR-SH + WCHL1 + WML4 + IRON1B + SHEP1C
P23W	58	58	0.7	211	36-inch RCP	PH2L9 + WPF1
P24W	73	73	0.5	372	42-inch RCP	PH2ML3-A
P25W	120	120	0.5	490	54-inch RCP	PH2ML3 + PH2L6-A
P26W	158	158	0.5	202	60-inch RCP	PH2ML3 + PH2L6
P27W	209	209	3.0	460	48-inch RCP	RA-EG
P28W	268	268	3.0	381	54-inch RCP	RA-EG + PH2ML2
P29W	297	297	3.0	855	54-inch RCP	RA-EG + PH2ML2 + PH2L3A
P30W	328	328	3.0	192	54-inch RCP	RA-EG + PH2ML2 + PH2L3A + PH2L2
P31W	60	60	N/A	N/A	24-inch RCP (Phase 1)	PH2ML1
P31AW	105	105	N/A	N/A	42-inch RCP (Phase 1)	PH2ML1 + PH2L1
P32W	469	469	N/A	N/A	72-inch RCP (Phase 1)	RA-HU
P33W	508	508	N/A	N/A	72-inch RCP (Phase 1)	RA-HU + PH1-3
P34W	619	619	N/A	N/A	72-inch RCP (Phase 1)	RA-HU + PH1-3 + PH1-5 + PH1PRK
P34AW	681	681	N/A	N/A	8-ft wide by 6-ft high RCB (Phase 1)	RA-HU + PH1-3 + PH1-5 + PH1PRK + PH1-4 + RACL1C
P35W	44	N/A	2.8	1740	Interim Channel, Earthen, 30' BW, 3:1 SS, d=2.5'	SHEP1A
P35AW	127	N/A	5.3	565	Interim Channel, 30' BW, 3:1 SS, d=2.5', 8" Riprap	SHEP1A + PH2ML4 + PH2PK2 + SHAUM1
P36W	49	49	0.5	506	36-inch RCP	PH2L4 + PH2L8-A
P37W	231	249	N/A	98	66-inch RCP Inlet	SHEP1A + AROY2 + PH2L8-B + RDB1 + AROY1 + WML1 + PH2ML4 + PH2PK2 + SHAUM1
P38W	332	350	3.2	124	66-inch RCP	SHEP1A + AROY2 + PH2L8-B + RDB1 + AROY1 + WML1 + PH2ML4 + PH2PK2 + SHAUM1 + PH2L9 + WPF1 + EGAN2 + PH2L4
P39AW	345	363	N/A	60	72-inch RCP Inlet	SHEP1A + AROY2 + PH2L8-B + RDB1 + AROY1 + WML1 + PH2ML4 + PH2PK2 + SHAUM1 + PH2L9 + WPF1 + EGAN2 + + PH2L4 + PH2PK1
P39W	363	387	3.0	996	60-inch RCP	HU-HO
P40W	46	46	N/A	N/A	30-inch RCP (Phase 1)	PH2L3B + PH2PK
P41AW	363	387	0.5	307	7-ft wide by 5-ft high RCB	HU-HO
P41BW	406	430	0.5	588	9-ft wide by 5-ft high RCB	HU-HO + WL3
P42W	32	N/A	3.2	2594	Interim Channel, Earthen, 25' BW, 3:1 SS, d=2.5'	SHEP1B
P43W	48	48	0.8	262	36-inch RCP	WML6
P44W	48	48	2.7	548	36-inch RCP	WML6
P45W	34	34	0.5	428	36-inch RCP	WSCHL2
P46W	94	94	0.5	91	48-inch RCP	WML6 + WSCHL2 + STRT5
P47W	241	268	N/A	78	66-inch RCP Inlet	WML3 + WPRK5 + HORS1B + SHEP1B + AROY5 + WML6 + WSCHL2 + STRT5 + AROY6
P48W	647	698	0.5	397	12-ft wide by 5-ft high RCB	HU-HO + WL3 + WML3 + WPRK5 + HORS1B + SHEP1B + AROY5 + WML6 + WSCHL2 + STRT5 + AROY6
P49W	684	735	0.5	481	13-ft wide by 5-ft high RCB	HU-HO + WL3 + WML3 + WPRK5 + HORS1B + SHEP1B + AROY5 + WML6 + WSCHL2 + STRT5 + AROY6 + WL4
P50W	699	750	0.5	875	13-ft wide by 5-ft high RCB	HU-HO + WL3 + WML3 + WPRK5 + HORS1B + SHEP1B + AROY5 + WML6 + WSCHL2 + STRT5 + AROY6 + WL4 + WPRK3 + STRT4
P51W	1158	1232	0.5	450	13-ft wide by 7-ft high RCB	HU-IR
P52W	47	N/A	N/A	70	36-inch RCP Inlet	HU-IR
P53W	1192	1232	0.5	634	13-ft wide by 7-ft high RCB	HU-IR
P54W	1310	N/A	N/A	70	(2) 10-ft wide by 8-ft high RCBs	HU-IR
P55W	1546	1232	0.5	506	14-ft wide by 8-ft high RCB	HU-IR
P56W	30	N/A	N/A	70	30-inch RCP Inlet	HU-IR
P57W	1559	1232	0.5	327	14-ft wide by 8-ft high RCB	HU-IR
P58BW	39	39	0.5	350	42-inch RCP	WML7-B + STRT1
P58AW	75	75	0.5	284	36-inch RCP	WML7 + STRT1
P58W	128	128	N/A	N/A	42-inch RCP (Phase 1)	WML7 + STRT1 + PH1-1 + CONQ
P59W	62	62	N/A	N/A	36-inch RCP (Phase 1)	PH1-6
P59AW	93	93	N/A	N/A	48-inch RCP (Phase 1)	PH1-6
P60W	198	198	N/A	N/A	6-ft wide by 5-ft high RCB (Phase 1)	WML7 + STRT1 + PH1-1 + CONQ + HORSE3 + PH1-2
P61W	294	294	0.5	61	6-ft wide by 5-ft high RCB	WPT46
P62W	33	33	2.2	361	24-inch RCP	WMLA1-B
P63W	63	63	1.3	538	36-inch RCP	WML8 + WPRK8
P64W	138	138	2.5	886	42-inch RCP	WML8 + WPRK8 + STRT2 + WMLA1
P65W	238	238	0.5	525	72-inch RCP	WPT48
P66W	37	37	1.7	173	30-inch RCP	WPT49
P67W	417	471	0.5	1360	Collector Channel, Concrete, 12' BW, 3:1 SS, d = 5.0'	CP1
P68W	235	204	0.5	1200	Collector Channel, 12' BW, 3:1 SS, d = 5.0', 8" Riprap	CP2
P69W	232	228	1.2	592	60-inch RCP	NW50-C
P69AW	476	228	1.3	145	6-ft wide by 5-ft high RCB	NW50-C
P70W	1559	3318	3.0	707	14-ft wide by 7-ft high RCB, Crossing of US-95	CKC5
P70AW	1888	3411	3.0	879	14-ft wide by 7-ft high RCB, Crossing of US-95	CKC6
P71W	251	385	1.6	235	5-ft wide by 5-ft high RCB	CHD05B
P72W	110	110	N/A	N/A	36-inch RCP (Phase 1)	PH1-5 + PH1PRK
P73W	47	47	N/A	N/A	36-inch RCP (Phase 1)	PH1-1
P74W	85	86	N/A	520	Existing Arroyo	RDB1 + AROY1 + WML1
P75W	231	249	N/A	2650	Existing Arroyo	SHEP1A + AROY2 + PH2L8-B + RDB1 + AROY1 + WML1 + PH2ML4 + PH2PK2 + SHAUM1
P76W	345	363	N/A	847	Existing Arroyo	SHEP1A + AROY2 + PH2L8-B + RDB1 + AROY1 + WML1 + PH2ML4 + PH2PK2 + SHAUM1 + PH2L9 + WPF1 + EGAN2 + + PH2L4 + PH2PK1
P77W	12	12	N/A	1778	Existing Arroyo	AROY4
P78AW	135	162	N/A	1148	Existing Arroyo	WML3 + WPRK5 + HORS1B + SHEP1B
P78BW	138	165	N/A	1979	Existing Arroyo	WML3 + WPRK5 + HORS1B + SHEP1B + AROY5
P79W	47	47	0.5	279	36-inch RCP	PH2ML4-A
P80W	66	66	0.5	645	42-inch RCP	PH2ML4
P81W	83	83	0.5	147	48-inch RCP	PH2ML4 + PH2PK2 + SHAUM1

1 - Contributing HEC-1 flows obtained from Ultimate Condition hydrologic analysis.

Summary of Proposed Facilities
Skye Canyon East - Ultimate Condition

Facility ID	Proposed Q_{100} (cfs)	Ultimate Q_{100} (cfs)	Design Slope (%)	Length (ft)	Description	Flow Breakdown[1]
P01E	22	30	1.8	517	24-inch RCP	95-7A + 95-7B
P02E	246	47	2.6	188	54-inch RCP	95-7A + 95-7B + 95-8A + 95-8B
P03E	Removed by this Update No.2					
P04E	281	82	3.2	1343	54-inch RCP w/ Interim Bubbler at Brent/Ft. Apache Intersection to release Surface Flow that exceeds Storm Drain Capacity	BR-TP
P05E	38	51	2.4	163	30-inch RCP	SHEP2A + EGC2 + IRON2
P06E	190	109	3.1	1291	48-inch RCP	SK-IR
P07E	Removed by this Update No.2					
P08E	Removed by this Update No.2					
P09E	202	121	3.1	1351	48-inch RCP	IR-TP - 31 CFS (REMAINING CAPACITY EXISTING SD)
P10E	149	68	0.5	622	60-inch RCP	FTNOR
P11E	191	110	0.5	667	60-inch RCP	FTNOR + EL5
P12E	231	150	0.5	652	66-inch RCP	FTNOR + EL5 + EL4 + STRT7
P13E	256	175	0.5	734	72-inch RCP	FTNOR + EL5 + EL4 + STRT7 + EL3-A
P14E	Removed by this Update No.2					
P15E	Removed by this Update No.2					
P16E	76	208	2.6	1324	48-inch RCP	LC-SM
P17E	24	24	0.5	573	30-inch RCP	50% OF EL8
P18E	165	297	0.5	453	72-inch RCP	LC-SM +EGC1 + IRON1 + EL8 + LOG1A + STRT6A
P18AE	211	343	2.1	840	72-inch RCP	LC-SM +EGC1 + IRON1 + EL8 + LOG1A + STRT6A + EML1
P19AE	57	57	1.4	500	36-inch RCP	EL6-A + EL7-A
P19E	97	97	0.5	780	48-inch RCP	EL6 + EL7 + TP3 + STRT6B
P20E	124	124	0.5	413	54-inch RCP	EL6 + EL7 + TP3 + STRT6B + ESCHL1
P21E	Removed by this Update No.2					
P22E	135	135	2.7	1223	54-inch RCP	LC-TP
P23E	183	112	0.5	745	72-inch RCP	R2FTLC
P24E	222	151	0.5	603	72-inch RCP	R2FTLC + EL2
P25E	268	400	2.6	643	72-inch RCP	LC-SM +EGC1 + IRON1 + EL8 + LOG1A + STRT6A + EML1 + EML2
P25AE	307	439	2.4	970	72-inch RCP	LC-SM +EGC1 + IRON1 + EL8 + LOG1A + STRT6A + EML1 + EML2 + EL1
P26E	543	604	0.5	473	10-ft wide by 6-ft high RCB	R2FTLC + EL2 + LC-SM +EGC1 + IRON1 + EL8 + LOG1A + STRT6A + EML1 + EML2 + EL1 + STRT9
P27E	594	655	0.5	874	10-ft wide by 6-ft high RCB	R2FTLC + EL2 + LC-SM +EGC1 + IRON1 + EL8 + LOG1A + STRT6A + EML1 + EML2 + EL1 + STRT9 + EML4
P28E	Removed by this Update No.2					
P29E	206	69	N/A	60	66-inch RCP Inlet	OFFZ
P30E	206	69	0.5	876	66-inch RCP	OFFZ
P31E	212	76	2.7	1297	66-inch RCP	OFFZ + HUAL3
P31AE	33	33	0.5	625	36-inch RCP	EMLA3 + STRT10
P31BE	88	88	0.5	398	48-inch RCP	EMLA3 + STRT10 + EMLA4-A
P31CE	138	138	0.5	329	54-inch RCP	EMLA3 + STRT10 + EMLA4
P32E	1888	3411	2.3	3420	14-ft wide by 8-ft high RCB	CKC6
P33E	Removed by this Update No.2					
P34AE	366	230	2.6	2145	66-inch RCP	OFFZ + HUAL3 + EMLA3 + STRT10 + EMLA4 + STRT11 + EPRK1
P34E	2369	3756	2.6	571	14-ft wide by 8-ft high RCB	OFFZ + HUAL3 + EMLA3 + STRT10 + EMLA4 + STRT11 + EPRK1 + CKC6 + EMLA5
P35E	28	80	2.3	3188	Interim Channel, Earthen, 25' BW, 3:1 SS, d=2.5'	SHEEP3
P36E	Removed by this Update No.2					
P37E	Removed by this Update No.2					
P38E	2056	3766	3.0	357	14-ft wide by 8-ft high RCB	SM-MO
P39E	2118	3828	2.1	951	14-ft wide by 8-ft high RCB	SM-MO + EML3
P40E	2589	N/A	N/A	7400	12-ft wide by 8-ft high RCB within the 50-ft BLM grant in Moccasin alignment to the Upper Las Vegas wash levee. See Conceptual Profile	CP43

1 - Contributing HEC-1 flows obtained from the Ultimate Condition hydrologic analysis.

Summary of Existing US-95 Culverts - Ultimate Condition

Facility ID	Q_{EXIST} (cfs)	Q_{DESIGN} (cfs)[3]	Proposed Q_{SHG} (cfs)	Ultimate Q_{SHG} (cfs)	HEC-1 Node[4]	Description	Comments
E-1	22*	N/A	24	N/A	N/A	6-ft by 3-ft RCB	N/A
E-2	81*	N/A	80	N/A	N/A	6-ft by 3-ft RCB	N/A
E-3	44*	N/A	47.5	N/A	N/A	6-ft by 3-ft RCB	N/A
E-4	44*	N/A	47.5	N/A	N/A	42-inch CMP	N/A
E-5	225*	N/A	232	N/A	N/A	42-inch CMP	N/A
E-6	225*	N/A	244	N/A	N/A	6-ft by 3-ft RCB	N/A
E-7[1]	19**	44**	26	N/A	N/A	(2) 6-ft by 3-ft RCB	VTN Culvert 3
E-8	N/A*	N/A	N/A	N/A	N/A	(3) 36-inch CMP	N/A
E-9[1]	30**	54*	23	51	DCHD1B	6-ft by 3-ft RCB	VTN Culvert 1
E-9A[2]	30**	54*	23	51	DCHD1B	6-ft by 3-ft RCB	VTN Culvert 1
E-10[1]	360**	75**	92	28	DCHD2B	(2) 6-ft by 3-ft RCB	VTN Culvert 2
E-10A[2]	347**	100**	59	28	DCHD2B	(2) 6-ft by 3-ft RCB	VTN Culvert 2
E-11[1]	1098**	1141**	61	N/A	N/A	(2) 10-ft by 4-ft RCB	VTN Culvert 4
E-11A[2]	853**	872**	84	33	95-6 + OFFH	(3) 42-inch CMP	VTN Culvert 4
E-12[1]	494**	330*	251	238	WPT48	6-ft by 3-ft RCB	VTN Culvert 5
E-12A[2]	346**	153**	8	30	95-7A + 95-7B	6-ft by 3-ft RCB	VTN Culvert 5
E-13[1]	948**	403**	216	708	CHD06B	(2) 10-ft by 4-ft RCB	VTN Culvert 6
E-13A[2]	788**	403**	217	18	95-8A + 95-8B	(2) 10-ft by 4-ft RCB	VTN Culvert 6
E-14[1]	525**	66**	66	N/A	N/A	6-ft by 3-ft RCB	VTN Culvert 8
E-14A[2]	267**	66**	66	N/A	N/A	6-ft by 4-ft RCB	VTN Culvert 8
E-15[1]	770**	1008**	980	N/A	N/A	(2) 42-inch CMP	VTN Culvert 9
E-15A[2]	250**	256**	254	N/A	N/A	(2) 42-inch CMP	VTN Culvert 9
E-16[1]	15**	18**	18	N/A	N/A	(2) 10-ft by 4-ft RCB	VTN Culvert 10
E-16A[2]	360**	369*	367	N/A	N/A	10-ft by 4-ft RCB	VTN Culvert 10
E-17[1]	585**	643*	283	N/A	N/A	10-ft by 10-ft RCB	VTN Culvert 11
E-17A[2]	1160**	1093*	1037	N/A	N/A	10-ft by 10-ft RCB	VTN Culvert 11

1 - i.e. VTN Culvert 5E Flow.
2 - i.e. VTN Culvert 5AE Flow, or GCW Culvert 5DE Flow.
3 - GCW and VTN proposed condition flows were compared and the higher is shown.
4 - Contributing HEC-1 flows obtained from Local Ultimate Condition hydrologic analysis.
* - Referenced from GCW Update No. 2 to Kyle Canyon Master Drainage Study.
** - Referenced from VTN Horse Drive / US-95 Interchange Study.

Summary of US-95 MPU Facility - Ultimate Condition

Facility ID	Description	Comments
E-18	5-ft by 5-ft RCB	Existing CCRFCD MPU Facility ID = CN95 0333, Q_{SHG} = 327 cfs @ Regional Ultimate Condition Basin NW62-S
E-19	10-ft by 6-ft RCB	
E-20	15-ft by 9-ft RCB	
E-21	15-ft by 9-ft RCB	
E-22	15-ft by 9-ft RCB	
E-23	15-ft by 9-ft RCB	Existing CCRFCD MPU Facility ID = CN95 0199, Q_{SHG} = 1,522 cfs @ Regional Ultimate Condition Concentration Point (95STH - CNW71-E)
E-24	8-ft by 6-ft RCB	Shares Headwall with Facility E-13
E-25	36-inch RCP	
E-26	36-inch RCP	
E-27	6-ft by 3-ft RCB	Stubbed and Capped
E-28	12-ft by 4-ft RCB	Stubbed and Capped
E-29	10-ft by 4-ft RCB	Stubbed and Capped
F-1	(2) 10-ft by 6-ft RCBs	Future CCRFCD MPU Facility ID = CN95 0167, Q_{SHG} = 2,132 cfs @ Regional Ultimate Condition Concentration Point 95STH

Note that the US-95 is planned as a hydrologic cut-off for all flow generated by Kyle Canyon west of the highway.

Summary of Existing Perimeter Facilities

Facility ID	Q_{DESIGN} (cfs)	Description	Comments	Referenced Improvement Plans
E-30	494	6-ft by 5-ft RCB	CCRFCD MPU Facility CNGT 0118	2008 CCRFCD MPU
E-30A	594	8-ft by 6-ft high RCB	CCRFCD MPU Facility CNGT 0043	Grand Teton Storm Drain - Hualapai to Tee Pee
E-30B	707	10-ft wide by 5-ft high RCB	CCRFCD MPU Facility CNGT 0020	Grand Teton Storm Drain - Hualapai to Tee Pee
E-31	231	6-ft by 4-ft RCA		Hualapai Improvements
E-32	N/A	18-inch RCP		Grand Teton Village / Grand View Apartments
E-33	761	10-ft by 5-ft RCB	Parallel 18-inch RCP on south half of road to be abandoned and flow is collected by 10-ft by 5-ft RCB	Grand Teton Drive Storm Drain
E-35	761	10-ft by 5-ft RCB	Outlets in to US-95 Channel	Grand Teton Drive Storm Drain
E-36	N/A	24-inch RCP	Flow from Grand Canyon Drive	Grand Canyon Apartments / Grand Canyon Terraces
E-37	802	Riprap Trapezoidal Channel	West Half of Grand Canyon Drive	Box Culvert for Centennial Point and Grand Canyon Apartments
E-38	802	8-ft by 8-ft RCB	Concrete Headwall	Box Culvert for Centennial Point and Grand Canyon Apartments
E-39	851	8-ft by 5-ft RCB	CCRFCD MPU Facility CNKC 0024	Box Culvert for Centennial Point and Grand Canyon Apartments
E-40	N/A	18-inch RCP		2008 CCRFCD MPU
E-41	999	10-ft by 5-ft RCB	CCRFCD MPU Facility CNKC 0007	2008 CCRFCD MPU
E-42	999	12-ft by 4-ft RCB	CCRFCD MPU Facility CNKC 0000	2008 CCRFCD MPU
E-43	9[1]	24-inch RCP	Collects roadway flow via drop inlets	Horse Drive / US-95 Interchange
E-44	234	68-inch by 43-inch HERCP	Discharges as surface flow into Horse Drive	Spring Mountain Twilight
E-45	101	48-inch HDPE		Spring Mountain Ranch Unit 90
E-46	13[1]	24-inch RCP	Collects roadway flow via drop inlets	Horse Drive / US-95 Interchange
E-47	2[1]	24-inch RCP	Collects roadway flow via drop inlets	Horse Drive / US-95 Interchange
E-48	16[1]	48-inch RCP	Stubbed to collect flow between US-95 and Sky Pointe Drive	Horse Drive / US-95 Interchange
E-49	29[1]	38-inch by 60-inch HERCP		Horse Drive / US-95 Interchange
E-50	101	54-inch RCP	18/24-inch RCP Stubs for west half of road	Spring Mountain Ranch Fort Apache Road
E-51	N/A	19-inch by 30-inch HERCP	Flow from school	James Bilbray Elementary School
E-52	N/A	18-inch RCP	Drop Inlets in Ft. Apache south of Iron Mtn.	James Bilbray Elementary School
E-53	60	30-inch HDPE	18-inch HDPE Stubs for north half of road	James Bilbray Elementary School
E-54	98	36-inch RCP		Iron Mountain Estates West Units 1 and 2
E-55	31	24-inch RCP	18-inch RCP Stubs for west half of road	Spring Mountain Ranch Unit 60 Phase 1
E-56	N/A	18-inch RCP	Stubbed and Capped	Spring Mountain Ranch Unit 60 Phase 1
E-57	73	36-inch RCP	18-inch RCP Stubs for north half of road	Spring Mountain Ranch Unit 60 Phase 1
E-58	1160**	Trapezoidal Channel	Outfall for Facility E-17	Site Visit
E-59	1160**	RCA Culvert	Outfall for Facility E-17	Site Visit

1 - 25-year Flow
** - Referenced from VTN Horse Drive / US-95 Interchange Study.

NOTE:

THE DEVELOPER WILL BE RESPONSIBLE TO SHOW NO ADVERSE IMPACT FROM ITS INCREASE IN RUNOFF. HOWEVER, ALL FACILITIES WITHIN SHEEP MOUNTAIN PARKWAY ALIGNMENT WILL BE COORDINATED WITH FUTURE DESIGN CONSTRAINTS, AND A FUTURE FACILITY AND/OR DESIGN UPDATE MAY BE REQUIRED.

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300
FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

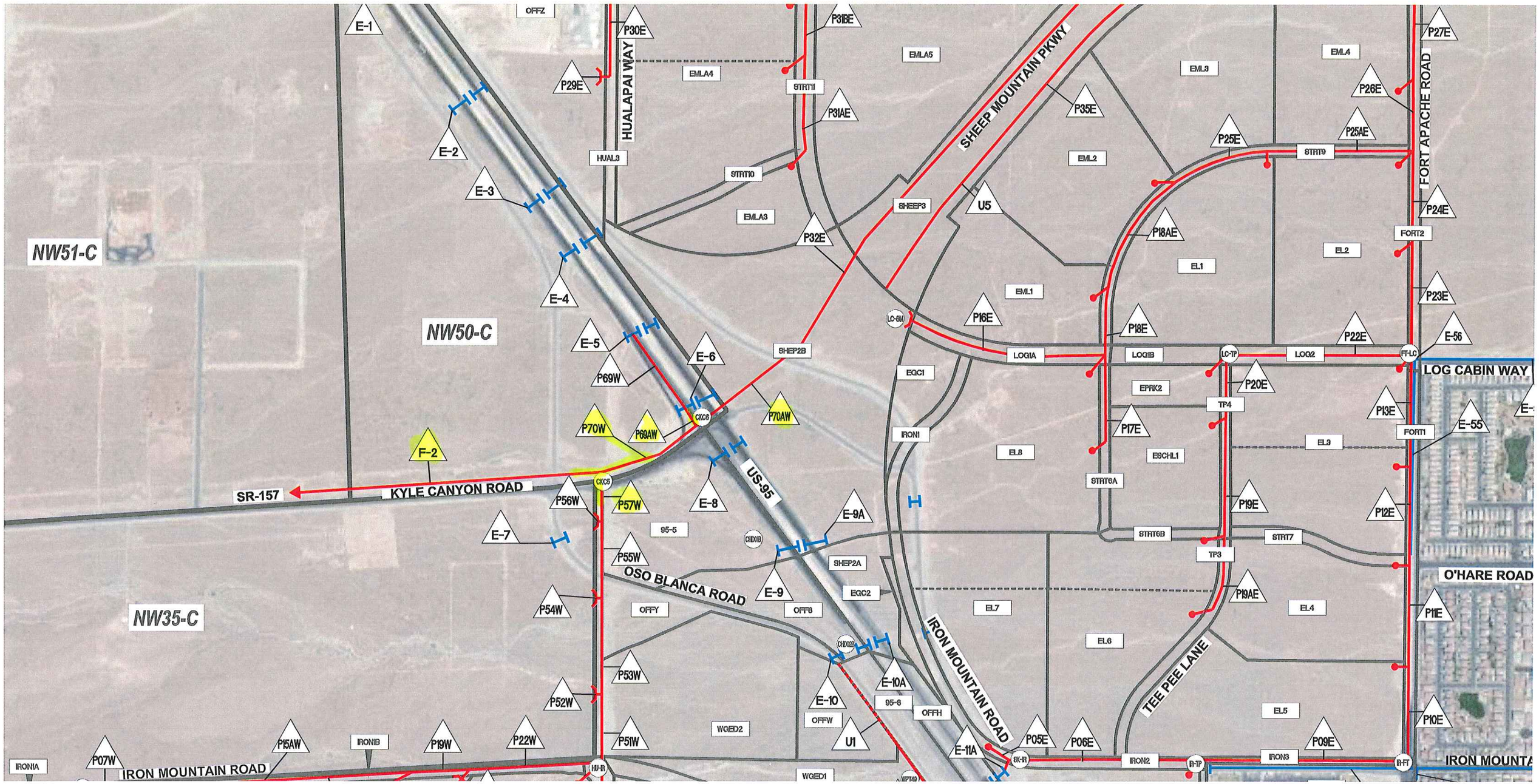
NINETY-FIVE MANAGEMENT, LLC,

SKYE CANYON MASTER DRAINAGE STUDY UPDATE NO.2
ULTIMATE CONDITION FLOOD CONTROL FACILITIES MAP

DATE: MARCH 2015
DRAFTER: ETM
DESIGNER: ETM
CHECKED: SMJ
PROJECT NO. OLY1401.001

EXHIBIT H
SHEET 1 OF 1

j:\oly1401.001 skye canyon\drainage\conceptual study\addendum 2\figures\oly1401.001 mds up2 add2 exh h ult facilities.dwg 10/15/2015 10:09 AM STEVE JONES



NW51-C
NW50-C
NW35-C
SR-157
KYLE CANYON ROAD
HUALAPAI WAY
SHEEP MOUNTAIN PKWY
FORT APACHE ROAD
LOG CABIN WAY
O'HARE ROAD
IRON MOUNTAIN ROAD
OSO BLANCA ROAD
TEE PEE LANE
US-95
E-1
E-2
E-3
E-4
E-5
E-6
E-7
E-8
E-9
E-9A
E-10
E-10A
E-11A
E-55
E-56
F-2
P07W
P09E
P10E
P11E
P12E
P13E
P15AW
P16E
P17E
P18E
P18AE
P19E
P19AE
P19W
P20E
P22E
P22W
P23E
P24E
P25E
P25AE
P26E
P27E
P29E
P30E
P31AE
P31BE
P32E
P35E
P51W
P52W
P53W
P54W
P55W
P56W
P57W
P69W
P69AW
P70W
P70AW
P05E
P06E
P07W
P09E
P10E
P11E
P12E
P13E
P15AW
P16E
P17E
P18E
P18AE
P19AE
P19E
P19W
P20E
P22E
P22W
P23E
P24E
P25E
P25AE
P26E
P27E
P29E
P30E
P31AE
P31BE
P32E
P35E
P51W
P52W
P53W
P54W
P55W
P56W
P57W
P69W
P69AW
P70W
P70AW
U1
U5
OFFZ
HUAL3
STRT10
STRT11
EMLA3
EMLA4
EMLA5
SHEEP3
SHEP2B
SHEP2A
EGC1
EGC2
EML1
EML2
EML3
EML4
EL1
EL2
EL3
EL4
EL5
EL6
EL7
EL8
EPRK2
ESCHL1
STRT6A
STRT6B
STRT7
STRT9
TP3
TP4
FORT1
FORT2
LOG1A
LOG1B
LOG2
LC-TP
FT-LC
LC-SM
CKC5
CKC6
95-5
95-6
OFFY
OFFB
OFFW
OFFH
WGED1
WGED2
IRON1
IRON1A
IRON1B
IRON2
IRON3
IR-TP
IR-FT
SK-IR
HU-IR



Proposed Q100 | Unit Q100 | slope | Length

P41BW	406	430	0.5	588	9-ft wide by 5-ft high RCB	HU-HO + WL3
P42W	32	N/A	3.2	2594	Interim Channel, Earthen, 25' BW, 3:1 SS, d=2.5'	SHEP1B
P43W	48	48	0.8	262	36-inch RCP	WML6
P44W	48	48	2.7	548	36-inch RCP	WML6
P45W	34	34	0.5	428	36-inch RCP	WSCHL2
P46W	94	94	0.5	91	48-inch RCP	WML6 + WSCHL2 + STRT5
P47W	241	268	N/A	78	66-inch RCP Inlet	WML3 + WPRK5 + HORS1B + SHEP1B + AROY5 + WML6 + WSCHL2 + STRT5 + AROY6
P48W	647	698	0.5	397	12-ft wide by 5-ft high RCB	HU-HO + WL3 + WML3 + WPRK5 + HORS1B + SHEP1B + AROY5 + WML6 + WSCHL2 + STRT5 + AROY6
P49W	684	735	0.5	481	13-ft wide by 5-ft high RCB	HU-HO + WL3 + WML3 + WPRK5 + HORS1B + SHEP1B + AROY5 + WML6 + WSCHL2 + STRT5 + AROY6 + WL4
P50W	699	750	0.5	875	13-ft wide by 5-ft high RCB	HU-HO + WL3 + WML3 + WPRK5 + HORS1B + SHEP1B + AROY5 + WML6 + WSCHL2 + STRT5 + AROY6 + WL4 + WPRK3 + STRT4
P51W	1158	1232	0.5	450	13-ft wide by 7-ft high RCB	HU-IR
P52W	47	N/A	N/A	70	36-inch RCP Inlet	HU-IR
P53W	1192	1232	0.5	634	13-ft wide by 7-ft high RCB	HU-IR
P54W	1310	N/A	N/A	70	(2) 10-ft wide by 8-ft high RCBs	HU-IR
P55W	1546	1232	0.5	506	14-ft wide by 8-ft high RCB	HU-IR
P56W	30	N/A	N/A	70	30-inch RCP Inlet	HU-IR
P57W	1559	1232	0.5	327	14-ft wide by 8-ft high RCB	HU-IR
P58BW	39	39	0.5	350	42-inch RCP	WML7-B + STRT1
P58AW	75	75	0.5	284	36-inch RCP	WML7 + STRT1
P58W	128	128	N/A	N/A	42-inch RCP (Phase 1)	WML7 + STRT1 + PH1-1 + CONQ
P59W	62	62	N/A	N/A	36-inch RCP (Phase 1)	PH1-6
P59AW	93	93	N/A	N/A	48-inch RCP (Phase 1)	PH1-6
P60W	198	198	N/A	N/A	6-ft wide by 5-ft high RCB (Phase 1)	WML7 + STRT1 + PH1-1 + CONQ + HORSE3 + PH1-2
P61W	294	294	0.5	61	6-ft wide by 5-ft high RCB	WPT46
P62W	33	33	2.2	361	24-inch RCP	WMLA1-B
P63W	63	63	1.3	538	36-inch RCP	WML8 + WPRK8
P64W	138	138	2.5	886	42-inch RCP	WML8 + WPRK8 + STRT2 + WMLA1
P65W	238	238	0.5	525	72-inch RCP	WPT48
P66W	37	37	1.7	173	30-inch RCP	WPT49
P67W	417	471	0.5	1360	Collector Channel, Concrete, 12' BW, 3:1 SS, d = 5.0'	CP1
P68W	235	204	0.5	1200	Collector Channel, 12' BW, 3:1 SS, d = 5.0', 8" Riprap	CP2
P69W	232	228	1.2	592	60-inch RCP	NW50-C
P69AW	476	228	1.3	145	6-ft wide by 5-ft high RCB	NW50-C
P70W	1559	3318	3.0	707	14-ft wide by 7-ft high RCB, Crossing of US-95	CKC5
P70AW	1888	3411	3.0	879	14-ft wide by 7-ft high RCB, Crossing of US-95	CKC6
P71W	251	385	1.6	235	5-ft wide by 5-ft high RCB	CHD05B
P72W	110	110	N/A	N/A	36-inch RCP (Phase 1)	PH1-5 + PH1PRK
P73W	47	47	N/A	N/A	36-inch RCP (Phase 1)	PH1-1
P74W	85	86	N/A	520	Existing Arroyo	RDB1 + AROY1 + WML1
P75W	231	249	N/A	2650	Existing Arroyo	SHEP1A + AROY2 + PH2L8-B + RDB1 + AROY1 + WML1 + PH2ML4 + PH2PK2 + SHAUM1
P76W	345	363	N/A	847	Existing Arroyo	SHEP1A + AROY2 + PH2L8-B + RDB1 + AROY1 + WML1 + PH2ML4 + PH2PK2 + SHAUM1 + PH2L9 + WPF1 + EGAN2 + + PH2L4 + PH2PK1
P77W	12	12	N/A	1778	Existing Arroyo	AROY4
P78AW	135	162	N/A	1148	Existing Arroyo	WML3 + WPRK5 + HORS1B + SHEP1B

E-24	8-ft by 6-ft RCB	
E-25	36-inch RCP	
E-26	36-inch RCP	
E-27	6-ft by 3-ft RCB	
E-28	12-ft by 4-ft RCB	
E-29	10-ft by 4-ft RCB	
F-1	(2) 10-ft by 6-ft RCBs	Futur Q_{SHG}

Note that the US-95 is planned as a hydrologic cut-off for all flow generated by

Summary of Existing Perimeter Facil

Facility ID	Q_{DESIGN} (cfs)	Description	Comments
E-30	494	6-ft by 5-ft RCB	CCRFCD MPU Facility C 0118
E-30A	594	8-ft by 6-ft high RCB	CCRFCD MPU Facility C 0043
E-30B	707	10-ft wide by 5-ft high RCB	CCRFCD MPU Facility C 0020
E-31	231	6-ft by 4-ft RCA	
E-32	N/A	18-inch RCP	
E-33	761	10-ft by 5-ft RCB	Parallel 18-inch RCP on s half of road to be abandone flow is collected by 10-ft b RCB
E-35	761	10-ft by 5-ft RCB	Outlets in to US-95 Cha
E-36	N/A	24-inch RCP	Flow from Grand Canyon
E-37	802	Riprap Trapezoidal Channel	West Half of Grand Canyo
E-38	802	8-ft by 8-ft RCB	Concrete Headwall
E-39	851	8-ft by 5-ft RCB	CCRFCD MPU Facility C 0024
E-40	N/A	18-inch RCP	
E-41	999	10-ft by 5-ft RCB	CCRFCD MPU Facility C 0007
E-42	999	12-ft by 4-ft RCB	CCRFCD MPU Facility C



P30E	206	69	0.5	876	
P31E	212	76	2.7	1297	
P31AE	33	33	0.5	625	
P31BE	88	88	0.5	398	
P31CE	138	138	0.5	329	
P32E	1888	3411	2.3	3420	14-ft v
P33E					Removed I
P34AE	366	230	2.6	2145	
P34E	2369	3756	2.6	571	14-ft v
P35E	28	80	2.3	3188	Interim Channel,
P36E					Removed I
P37E					Removed I
P38E	2056	3766	3.0	357	14-ft v
P39E	2118	3828	2.1	951	14-ft v
P40E	2589	N/A	N/A	7400	12-ft wide by 8-ft grant in Mocca Vegas wash I

1 - Contributing HEC-1 flow s obtained from the Ultimate Condition hydrologic analysis.

Flow Breakdown[1]
SHEEP3
CP43
CNW64-C
C213B-5
N/A

alysis.

Summary of Future Facilities
Skye Canyon West - Ultimate Condition

Facility ID	Q_{100} (cfs)	Design Slope (%)	Length (ft)	Description	Flow Breakdown[1]
U1	110	N/A	1139	Future Offsite Local Facility (By Others)	WGED2 + OFFW + OFFY
U2	147	N/A	865	Future Offsite Local Facility (By Others)	CHD04B
U3	323	N/A	620	Future Offsite Local Facility (By Others)	WPT46 + OFF14
U4	51	N/A	1740	Future Offsite Local Facility (By Others), Replaces Facility P35W	SHEP1A
U5	144	N/A	565	Future Offsite Local Facility (By Others), Replaces Facility P35AW	SHEP1A + PH2ML4 + PH2PK2 + SHAUM1
U6	99	N/A	2594	Future Offsite Local Facility (By Others), Replaces Facility P42W	SHEP1B
U7	47	N/A	1551	Future Offsite Local Facility (By Others), Replaces Facility P20W	SHEP1C
F-2	2709	N/A	N/A	Future Offsite Regional Facility (By Others)	CNW35-C

1 - Contributing HEC-1 flow s obtained from Local Ultimate Condition hydrologic analysis.

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
TIME OF CONCENTRATION

Company: SHG, Inc
By: ETM
Date: 03/12/15

Project Name: Master Drainage Study Update No.2
Description: Ultimate Condition
File Name: OLY1401.001 MDS UP2 SF4.xls

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check Urbanized Basins		Tlag
DESIG:	DEV./EX. (D or E)	CN	K [1]	AREA Ac	AREA Mi^2 [2]	INITIAL LENGTH Feet	SLOPE %	Ti Min [3]	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS [4]	V2 VELOCITY FPS [5]	Tt Min [6]	Tc Calc. [7]	Total Length Feet [8]	Tc Check [9]	Tlag Hours [10]
WEST - ROADWAY INFRASTRUCTURE																	
SHEP1A	D	98.0	0.9036	18.7	0.0292	302	6.6	3.27	2150	2.8	3.37	5.11	7.85	11.12	2452	23.622	0.111
SHEP1B	D	98.0	0.9036	31.4	0.0490	380	4.5	4.18	2612	3.3	3.64	5.52	8.67	12.85	2991.88	26.622	0.129
SHEP1C	D	98.0	0.9036	14.3	0.0224	500	3.9	5.04	1564	3.1	3.57	5.41	5.61	10.65	2064	21.467	0.106
EAST - ROADWAY INFRASTRUCTURE																	
SHEP2A	D	98.0	0.9036	7.3	0.0114	442	3.4	4.94	766	0.7	1.63	2.47	6.91	11.86	1208	16.711	0.119
SHEP2B	D	98.0	0.9036	56.7	0.0886	500	3.0	5.48	1208	1.0	2.02	3.06	7.98	13.46	1708	19.489	0.135
SHEEP3	D	98.0	0.9036	28.2	0.0441	500	3.0	5.48	2684	2.5	3.17	4.80	10.21	15.70	3184	27.689	0.157
SHEEP4	D	98.0	0.9036	9.2	0.0144	262	0.8	6.27	984	2.1	2.95	4.47	4.63	10.90	1246	16.922	0.109
OFFSITES																	
OFFH*	D	92.5	0.831	4.8	0.0075	200	4.00	4.31	805	3.10	3.56	5.39	3.29	7.60	1005	15.583	0.076
OFFU**	D	94.8	0.861	25.4	0.0397	100	1.00	4.30	2080	2.90	3.44	5.21	7.48	11.77	2180	22.111	0.118
OFFW**	D	92.0	0.824	7.8	0.0122	100	1.00	4.96	900	2.50	3.19	4.84	3.99	8.95	1000	15.556	0.089
OFFY**	D	95.0	0.864	8.0	0.0125	100	1.00	4.25	1800	2.50	3.19	4.84	7.09	11.34	1900	20.556	0.113
OFFZ**	D	87.0	0.7584	33.5	0.0523	100	1.00	6.15	2060	2.70	3.32	5.03	7.68	13.83	2160	22.000	0.138
OFF6*	D	92.2	0.827	8.5	0.0133	200	2.60	5.05	1304	2.60	3.26	4.93	5.27	10.33	1504	18.356	0.103
OFF14	D	94.7	0.8600	9.3	0.0145	250	2.40	5.10	748	3.34	3.69	5.59	3.00	8.10	998	15.544	0.081
OFF15*	D	94.7	0.860	22.3	0.0348	200	3.50	4.02	1678	2.40	3.13	4.74	6.80	10.83	1878	20.433	0.108
95-5**	D	92.2	0.827	19.4	0.0303	100	1.00	4.91	500	2.70	3.32	5.03	2.51	7.42	600	13.333	0.074
95-6*	D	92.8	0.8350	6.7	0.0105	50	2.00	2.68	1313	1.80	2.71	4.11	6.38	9.05	1363	17.572	0.091
95-7A*	D	94.7	0.8600	4.4	0.0069	50	2.00	2.42	1071	2.20	3.00	4.54	4.88	7.30	1121	16.228	0.073
95-7B*	D	94.7	0.860	5.2	0.0081	50	2.00	2.42	1296	2.00	2.86	4.33	5.98	8.41	1346	17.478	0.084
95-8A*	D	94.7	0.860	3.3	0.0052	50	2.00	2.42	664	1.80	2.71	4.11	3.74	6.16	714	13.967	0.062
95-8B*	D	94.7	0.8600	2.0	0.0031	50	2.00	2.42	568	3.20	3.61	5.47	2.51	4.94	618	13.433	0.050
95-9A*	D	94.7	0.860	7.1	0.0111	50	2.00	2.42	1364	1.60	2.56	3.87	6.98	9.41	1414	17.856	0.094
95-9B*	D	94.7	0.860	8.5	0.0133	50	2.00	2.42	1534	0.80	1.81	2.74	10.91	13.33	1584	18.800	0.133
WOFF1	E	86.4	0.751	260.7	0.4073	262	7.60	5.17	9751	3.64	2.82	5.61	30.44	35.61			0.356
WOFF2	E	85.0	0.732	22.7	0.0355	171	4.10	5.42	2754	3.85	2.90	5.77	9.36	14.80			0.148
WOFF8	E	86.2	0.748	106.5	0.1663	257	12.44	4.39	6259	3.85	2.90	5.77	19.51	23.89			0.239
WOFF10	E	86.5	0.752	157.6	0.2463	205	17.08	3.48	6369	3.34	2.70	5.37	21.29	24.77			0.248
WOFF11	D	96.0	0.877	18.0	0.0281	100	1.00	4.01	2600	4.00	4.04	6.12	7.78	11.79	2700	25.000	0.118

* Referenced from GCW Master Drainage Study - Update No.2 Interim 2 Condition.
** Referenced from Kyle Canyon Master Drainage Study - Addendum No.3

[1] K = 0.0132 (CN) - 0.39
[2] A = Area/640
[3] Ti = (1.8 (1.1-K) L^0.5)/S^0.33
[4] For Existing Conditions: V1 = 14.8 * (S/100)^0.5
For Developed Conditions: V1 = 20.2 * (S/100)^0.5
[5] For Existing Conditions: V2 = 29.4 * (S/100)^0.5
For Developed Conditions: V2 = 30.6 * (S/100)^0.5
[6] Tt = L/(60*V)
[7] Tc = Ti + Tt
[8] Total L = Initial L + Travel L
[9] Tc = (L/180) + 10
[10] Tlag = (0.6*Tc)/60
[11] Min Tlag =0.05

Note: For Travel Time Calcs: V1 applies to first 500 feet and V2 applies to remaining distance.

REFERENCE :

STANDARD FORM 4

```
1**************************************
*                                    *
*   FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*         JUN  1998                  *
*       VERSION 4.1                  *
*                                    *
*  RUN DATE  10MAR15  TIME  14:28:45 *
*                                    *
**************************************
```

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

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

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

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

1 HEC-1 INPUT PAGE 1

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

              *DIAGRAM
    1         ID     SLATER HANIFAN GROUP
    2         ID     OLYMPIA COMPANIES
    3         ID     SKYE CANYON - MASTER DRAINAGE STUDY UPDATE 2
    4         ID     OVERALL PROPERTY ULTIMATE DRAINAGE CONDITION
    5         ID
    6         ID     RETURN PERIOD ------- 100 & 10-YEAR
    7         ID     DISTRIBUTION -------- 6-HOUR SDN3
    8         ID     PROJECT NO. --------- OLY1401.001
    9         ID     FILENAME ------------ Ultimate.H1
   10         ID     DATE ---------------- 03/10/15
   11         ID     MODELED BY ---------- SMJ/ETM
   12         ID
   13         ID        SIX HOUR DEPTH-AREA REDUCTION FACTORS
   14         ID        DRAINAGE AREA (MI^2)     DARF
   15         ID        0.0-0.49                 1.00
   16         ID        0.5-0.99                 0.98
   17         ID        1.0-1.99                 0.97
   18         ID        2.0-3.99                 0.93
   19         ID        4.0-5.99                 0.91
   20         ID        6.0-7.99                 0.90
   21         ID        25-YR                    0.70
   22         ID        10-YR                    0.57
   23         ID
   24         IT      5       0       0     300
   25         ID      5       0       0
   26         IN      5       0       0
   27         JR   PREC    1.00    0.98    0.97    0.93    0.91    0.90    0.70    0.57
              *
   28         KK    95-5
   29         KM    REVISED FROM GCW MASTER DRAINAGE STUDY, MINUS OFFV
   30         BA    .0303
   31         PB    2.77
   32         PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   33         PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   34         PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   35         PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   36         PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   37         PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   38         PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   39         PC   0.998   0.999   1.000
   40         LS       0    92.2
   41         UD   0.074
              *
   42         KK   DHD01B
   43         KM    FACILITY E-9
   44         KM    FLOW SPLIT AT VTN CULVERT 1
   45         KM    FLOW SPLITS TO BETWEEN NB AND SB ROADS OF US-95
   46         KM    REFERENCED FROM GCW MASTER DRAINAGE STUDY
   47         DT   DCHD1B
   48         DI       0     133     187     250
   49         DQ       0     120     135     150
              *
```

1 HEC-1 INPUT PAGE 2

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

   50         KK    OFF8
   51         KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
   52         BA   .0133
   53         PB    2.77
   54         LS       0    92.2
   55         UD   0.103
              *
```

```
 56          KK  CHD02B
 57          KM   COMBINE RDHD1B, OFF8, OFFY
 58          KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
 59          HC       2
             *

 60          KK  DHD02B
 61          KM   FACILITY E-10
 62          KM   FLOW SPLIT AT VTN CULVERT 2
 63          KM   FLOW SPLITS TO BETWEEN NB AND SB ROADS OF US-95
 64          KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
 65          DT  DCHD2B
 66          DI       0     100     138
 67          DQ       0      99     135
             *

 68          KK   WGED1
 69          BA   .0167
 70          PB    2.93
 71          LS       0    94.6
 72          UD    .096
             *

 73          KK   STRT3
 74          BA   .0016
 75          PB    2.93
 76          LS       0    98.0
 77          UD    .050
             *

 78          KK   WPT49
 79          KM   TOTAL KYLE CANYON DEVELOPMENT DISCHARGE TOWARD VTN CULVERT 4
 80          HC       2
             *

 81          KK    OFFY
 82          BA   .0125
 83          PB    2.77
 84          LS       0    95.0
 85          UD   0.113
             *
```



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

 86          KK   WGED2
 87          BA   .0393
 88          PB    2.77
 89          LS       0    92.7
 90          UD    .110
             *

 91          KK    OFFW
 92          BA   .0122
 93          PB    2.77
 94          LS       0    92.0
 95          UD    .089
             *

 96          KK  CHD04B
 97          KM   COMBINE RDHD2B, WPT49, OFFW
 98          KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
 99          HC       5
             *

100          KK   WMLA1
101          BA   .0338
102          PB    2.93
103          LS       0    95.0
104          UD    .099
             *

105          KK    WML8
106          BA   .0302
107          PB    2.93
108          LS       0    95.0
109          UD    .102
             *

110          KK   WPRK8
111          BA   .0030
112          PB    2.93
113          LS       0    84.0
114          UD    .078
             *

115          KK   STRT2
116          BA   .0037
117          PB    2.93
118          LS       0    98.0
119          UD    .080
             *

120          KK   DUMMY
121          HC       4
             *
```



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

122          KK  GRAND3
123          BA   .0117
124          PB    2.93
125          LS       0    98.0
```

```
126          UD    .124
             *

127          KK    WBU2
128          BA   .0181
129          PB    2.93
130          LS       0     95.0
131          UD    .088
             *

132          KK    WMLA2
133          BA   .0185
134          PB    2.93
135          LS       0     95.0
136          UD    .083
             *

137          KK    WPT48
138          KM    TOTAL KYLE CANYON DEVELOPMENT DISCHARGE TOWARD VTN CULVERT 5
139          HC       4
             *

140          KK  CHD05B
141          KM    COMBINE CHD04B, WPT48
142          KM    REFERENCED FROM GCW MASTER DRAINAGE STUDY
143          KM    DISCHARGE DIRECTLY INTO EXISTING US-95 INTERIM MPU FACILITY
144          HC       2
             *

145          KK    WML7
146          BA   .0309
147          PB    2.93
148          LS       0     95.0
149          UD    .088
             *

150          KK    STRT1
151          BA   .0048
152          PB    2.93
153          LS       0     98.0
154          UD    .086
             *

155          KK    WBU1
156          BA   .0528
157          PB    2.93
158          LS       0     95.0
159          UD    .106
             *
```



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

160          KK    DUMMY
161          HC       3
             *

162          KK    PH1-1
163          KM    NORTHWEST QUAD ONSITE BASIN
164          PB    2.93
165          BA   .0278
166          LS       0     91.2
167          UD   0.114
             *

168          KK    PH1-2
169          KM    NORTHEAST QUAD ONSITE BASIN
170          PB    2.93
171          BA   .0301
172          LS       0     88.8
173          UD   0.152
             *

174          KK  GRAND2
175          BA   .0033
176          PB    2.93
177          LS       0     98.0
178          UD    .146
             *

179          KK  HORSE3
180          BA   .0117
181          PB    2.93
182          LS       0     98.0
183          UD    .098
             *

184          KK    WPT46
185          KM    TOTAL KYLE CANYON DEVELOPMENT DISCHARGE TOWARD VTN CULVERT 6
186          HC       5
             *

187          KK    OFF14
188          KM    REFERENCED FROM GCW MASTER DRAINAGE STUDY
189          BA   .0145
190          PB    2.77
191          LS       0     94.7
192          UD   0.061
             *

193          KK  CHD06B
194          KM    COMBINE CHD05B, WPT46, OFF14
195          KM    REVISED FROM GCW MASTER DRAINAGE STUDY
196          KM    TO ACCOUNT FOR DIRECT CONNECTION FROM CHD05B TO US-95 INTERIM MPU FACILITY
197          HC       3
```

1 HEC-1 INPUT PAGE 6

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

  198     KK  95-9A
  199     KM  REFERENCED FROM GCW MASTER DRAINAGE STUDY
  200     BA  .0110
  201     PB  2.77
  202     LS     0    94.7
  203     UD  0.095
          *
  204     KK  CHD07B
  205     KM  COMBINE CHD06B, 95-9A
  206     KM  REFERENCED FROM GCW MASTER DRAINAGE STUDY
  207     HC     2
          *
  208     KK  OFF15
  209     KM  REFERENCED FROM GCW MASTER DRAINAGE STUDY
  210     BA  .0348
  211     PB  2.77
  212     LS     0    94.7
  213     UD  0.108
          *
  214     KK  CHD782
  215     KM  COMBINE CHD07B, OFF15
  216     KM  COMBINE FLOWS IN MPU FACILITY
  217     KM  REVISED FROM GCW MASTER DRAINAGE STUDY
  218     HC     2
          *
  219     KK  OFF17B
  220     KM  REFERENCED FROM GCW MASTER DRAINAGE STUDY
  221     KM  ADDED FROM HORSE INTERCHANGE MODEL
  222     BA  .0080
  223     PB  2.773
  224     LS     0    92.1
  225     UD  0.069
          *
  226     KK  OFF17A
  227     KM  REFERENCED FROM GCW MASTER DRAINAGE STUDY
  228     KM  ADDED FROM HORSE INTERCHANGE MODEL
  229     BA  .0305
  230     PB  2.773
  231     LS     0    92.1
  232     UD  0.104
          *
  233     KK  COFF17
  234     KM  REFERENCED FROM GCW MASTER DRAINAGE STUDY
  235     KM  ADDED FROM HORSE INTERCHANGE MODEL
  236     KM  COMBINE OFF17A, OFF17B
  237     KM  CULVERT AT BASIN OFF24B
  238     HC     2
          *
```

1 HEC-1 INPUT PAGE 7

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

  239     KK    ON1
  240     KM  START CENTENNIAL POINT HEC-1 DATA
  241     BA  .0042
  242     PB  2.86
  243     LS     0    91.2
  244     UD  0.085
          *
  245     KK    ON4A
  246     BA  .0045
  247     LS     0    91.2
  248     UD  0.077
          *
  249     KK    C1
  250     KM  COMBINE ON1 AND ON4A
  251     HC     2
          *
  252     KK    D1
  253     KM  DIVERT FLOW INTO BASIN ON6
  254     DT  DIV1
  255     DI     0     16
  256     DQ     0     13
          *
  257     KK    ON5
  258     BA  .0052
  259     LS     0    91.2
  260     UD  0.080
          *
  261     KK    C2
  262     KM  COMBINE C1 AND ON5
  263     HC     2
          *
  264     KK    D1A
  265     KM  DIVERT FLOW FOR LATER USE IN HEC-1 RUN
  266     DT  DIV1A
  267     DI     0     50
```

```
268          DQ       0      50
             *

269          KK    ON4B
270          BA   .0031
271          LS        0    91.2
272          UD   0.085
             *
```



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

273          KK    RET1
274          KM   RETRIEVE FLOW FROM D1
275          DR    DIV1
             *

276          KK     ON6
277          BA   .0039
278          LS        0    91.2
279          UD   0.074
             *

280          KK      C3
281          KM   COMBINE RET1 AND ON6
282          HC       2
             *

283          KK     D1B
284          KM   DIVERT FLOW FOR LATER USE IN HEC-1 RUN
285          DT   DIV1B
286          DI        0      50
287          DQ        0      50
             *

288          KK     ON2
289          BA   .0050
290          LS        0    91.2
291          UD   0.080
             *

292          KK     ON3
293          BA   .0063
294          LS        0    91.5
295          UD   0.079
             *

296          KK     ON9
297          BA   .0045
298          LS        0    91.4
299          UD   0.096
             *

300          KK      C4
301          KM   COMBINE ON2, ON3 AND ON9
302          HC       3
             *

303          KK      D2
304          KM   DIVERT FLOW INTO BASIN ON8
305          DT    DIV2
306          DI        0      29
307          DQ        0      24
             *
```



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

308          KK    ON10
309          BA   .0025
310          LS        0    91.5
311          UD   0.071
             *

312          KK      C5
313          KM   COMBINE C4 AND ON10
314          HC       2
             *

315          KK      D3
316          KM   DIVERT FLOW INTO BASIN ON7
317          DT    DIV3
318          DI        0      10
319          DQ        0       8
             *

320          KK    ON11
321          BA   .0025
322          LS        0    91.5
323          UD   0.067
             *

324          KK      C6
325          KM   COMBINE C5 AND ON11
326          HC       2
             *

327          KK     D1C
328          KM   DIVERT FLOW FOR LATER USE IN HEC-1 RUN
329          DT   DIV1C
330          DI        0      50
331          DQ        0      50
             *
```

```
332          KK   CO1C
333          KM   COMBINE D1A, ON4B, D1B AND D1C
334          KM   PICK UP AT OFF23
335          HC      4
             *

336          KK   RCD1C
337          KM   ROUTE CO1C TO BASIN OFF23
338          RK    2640  0.0346    0.02          TRAP     100       2
             *

339          KK  DRCD1C
340          KM   DIVERT FLOW TO BASIN OFF23
341          DT  DOFF23
342          DI       0       50      100
343          DQ       0       50      100
             *
```



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

344          KK    ON8
345          BA   .0042
346          LS       0     83.5
347          UD   0.074
             *

348          KK    RET2
349          KM   RETRIEVE FLOW FROM D2
350          DR    DIV2
             *

351          KK      C7
352          KM   COMBINE ON11 AND RET2
353          HC       2
             *

354          KK    RET3
355          KM   RETRIEVE FLOW FROM D3
356          DR    DIV3
             *

357          KK    ON7
358          BA   .0073
359          LS       0     91.3
360          UD   0.077
             *

361          KK      C8
362          KM   COMBINE C7, RET3 AND ON7
363          HC       3
             *

364          KK   RET1A
365          KM   RETRIEVE FLOW FROM D1A IN TEE PEE
366          DR   DIV1A
             *

367          KK   RET1B
368          KM   RETRIEVE FLOW FROM D1B IN TEE PEE
369          DR   DIV1B
             *

370          KK   RET1C
371          KM   RETRIEVE FLOW FROM D1C IN TEE PEE
372          DR   DIV1C
             *

373          KK      C9
374          KM   COMBINE C8, RET1A, RET1B, RET1C IN TEE PEE
375          KM   END CENTENNIAL POINT HEC-1 DATA
376          HC       3
             *
```



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

377          KK   ON2D
378          KM   START GRAND CANYON APARTMENTS HEC-1 DATA
379          BA   .0105
380          PB    2.90
381          LS       0       95
382          UD   0.094
             *

383          KK   ON5D
384          BA   .0038
385          LS       0       95
386          UD   0.067
             *

387          KK    CP1
388          KM   COMBINE ON2D AND ON5D
389          HC       2
             *

390          KK   ON3D
391          BA   .0036
392          LS       0       95
393          UD   0.084
             *

394          KK    CP2
395          KM   COMBINE CP1 AND ON3D
```

```
396          HC       2
             *

397          KK    ON1D
398          BA   .0075
399          LS       0       95
400          UD   0.079
             *

401          KK    ON4D
402          BA   .0041
403          LS       0       95
404          UD   0.096
             *

405          KK     CP3
406          KM   COMBINE ON1D AND ON4D
407          HC       2
             *

408          KK     CP4
409          KM   COMBINE CP2 AND CP3
410          KM   END GRAND CANYON APARTMENTS HEC-1 DATA
411          HC       2
             *
```

1 HEC-1 INPUT PAGE 12

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

412          KK  CENGCA
413          KM   COMBINE DRCD1C, C9, CP4
414          KM   CD1C IS DIVERSION OF FLOW ON TEE PEE FROM CENTENNIAL POINT
415          KM   CP4 AND C9 ARE ENDING OF THE APARTMENT COMPLEX AND DEVELOPMENT
416          HC       4
             *

417          KK  PH2ML3
418          BA   .0448
419          PB    3.00
420          LS       0     92.7
421          UD    .121
             *

422          KK   PH2L6
423          BA   .0468
424          PB    3.00
425          LS       0     89.6
426          UD    .128
             *

427          KK   EGAN1
428          BA   .0058
429          PB    3.00
430          LS       0     98.0
431          UD    .104
             *

432          KK   DUMMY
433          HC       3
             *

434          KK   PH2L5
435          BA   .0043
436          PB    3.00
437          LS       0     90.0
438          UD    .087
             *

439          KK   PH2L7
440          BA   .0130
441          PB    3.00
442          LS       0     90.0
443          UD    .097
             *

444          KK  RACL1A
445          BA   .0059
446          PB    3.00
447          LS       0     98.0
448          UD    .084
             *
```

1 HEC-1 INPUT PAGE 13

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

449          KK   RA-EG
450          KM   TOTAL FLOW AT INTERSECTION OF RACEL AND EGAN CREST
451          KM   ROUTED EAST IN RACEL
452          HC       4
             *

453          KK  PH2ML1
454          BA   .0294
455          PB    3.00
456          LS       0     95.0
457          UD    .101
             *

458          KK  PH2ML2
459          BA   .0283
460          PB    3.00
461          LS       0     94.9
462          UD    .091
             *
```

```
463          KK   PH2L1
464          BA   .0272
465          PB    3.00
466          LS       0     90.0
467          UD    .126
             *

468          KK   PH2L2
469          BA   .0180
470          PB    3.00
471          LS       0     90.0
472          UD    .103
             *

473          KK   DUMMY
474          HC       5
             *

475          KK   PH2L3A
476          BA   .0164
477          PB    3.00
478          LS       0     90.0
479          UD    .102
             *

480          KK   HUAL1
481          BA   .0070
482          PB    3.00
483          LS       0     98.0
484          UD    .130
             *
```



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

485          KK   RACL1B
486          BA   .0051
487          PB    3.00
488          LS       0     98.0
489          UD    .070
             *

490          KK   HUAL2A
491          BA   .0063
492          PB    3.00
493          LS       0     98.0
494          UD    .129
             *

495          KK   RA-HU
496          KM   TOTAL FLOW AT INTERSECTION OF RACEL AND HUALAPAI
497          KM   ROUTED EAST IN RACEL
498          HC       5
             *

499          KK   PH1-3
500          KM   ONSITE BASIN NORTH OF RACEL AND WEST OF CONQUISTADOR
501          PB    2.93
502          BA   .0232
503          LS       0     91.2
504          UD   0.116
             *

505          KK    CONQ
506          KM   STREET BASIN FOR CONQUISTADOR ST
507          PB    2.93
508          BA   .0035
509          LS       0     92.5
510          UD   0.133
             *

511          KK   DUMMY
512          KM   COMBINES RA-HU, PH1-3 AND CONQ
513          HC       3
             *

514          KK   PH1-5
515          KM   SOUTHWEST QUAD ONSITE BASIN
516          PB    2.93
517          BA   .0583
518          LS       0     94.6
519          UD   0.139
             *
```



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

520          KK   PH1PRK
521          KM   ONSITE BASIN FOR COMMUNITY PARK
522          PB    2.93
523          BA   .0028
524          LS       0     81.5
525          UD   0.082
             *

526          KK   RACL1C
527          BA   .0071
528          PB    2.93
529          LS       0     92.5
530          UD    .097
             *

531          KK   DUMMY
```

```
 532          KM   COMBINES CP0, PH1-5, PH1PRK AND RACLIC
 533          HC      4
              *

 534          KK   PH1-4
 535          KM   ONSITE BASIN NORTH OF RACEL AND EAST OF CONQUISTADOR ST
 536          PB    2.93
 537          BA   .0252
 538          LS      0     94.6
 539          UD   0.105
              *

 540          KK   PH1-6
 541          KM   SOUTHEAST QUAD ONSITE BASIN
 542          PB    2.93
 543          BA   .0505
 544          LS      0     94.6
 545          UD   0.128
              *

 546          KK    GCD
 547          BA   .0053
 548          PB    2.93
 549          LS      0     93.8
 550          UD    .137
              *

 551          KK    CP26
 552          KM   KYLE CANYON DEVELOPMENT TOTAL DISCHARGE AT GRAND CANYON AND OSTINATO
 553          KM   ROUTED THRU CENTENNIAL POINT TOWARD US-95
 554          HC      4
              *
1                                        HEC-1 INPUT                                    PAGE 15

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

 555          KK    CCP4
 556          KM   COMBINE CENGCA, CP26
 557          KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
 558          HC      2
              *

 559          KK  OFF21B
 560          KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
 561          KM   BASIN IS DEVELOPED, CHECK FOR REFERENCE MATERIAL
 562          BA   .0414
 563          PB   2.775
 564          LS      0      95
 565          UD   0.110
              *

 566          KK  COF21B
 567          KM   COMBINE OFF21B WITH FLOW FROM CENTENNIAL POINT AND GRAND CANYON APTS
 568          KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
 569          HC      2
              *

 570          KK  ROFF23
 571          KM   RETRIEVE FLOW FROM DIVOFF23
 572          KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
 573          DR  DOFF23
              *

 574          KK   OFF23
 575          KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
 576          BA   .0091
 577          PB   2.787
 578          LS      0      95
 579          UD   0.109
              *

 580          KK  COFF23
 581          KM   COMBINE OFF23, DOFF23
 582          KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
 583          HC      2
              *

 584          KK  NW29-C
 585          KM   REFERENCED FROM 2008 MPU
 586          BA   0.132
 587          PB    3.00
 588          LS      0     92.4
 589          UD   0.214
              *
1                                        HEC-1 INPUT                                    PAGE 17

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

 590          KK  RNW29C
 591          KM  ROUTE NW29-C TO CNW71-W
 592          KM  FACILITY = CENTENNIAL PARKWAY CHANNEL WEST/GRAND TETON BRANCH
 593          KM  FACILITY ID-MILE = CNGT 0118
 594          KM  LINING = ARCH CON
 595          KM   REFERENCED FROM 2008 MPU
 596          RD    2100   0.037   0.015       0    TRAP       6       0
              *

 597          KK  NW71-W
 598          KM   REFERENCED FROM 2008 MPU
 599          BA   0.104
 600          PB    2.92
 601          LS      0     92.5
 602          UD   0.206
              *
```

```
603          KK  CNW71W
604          KM  COMBINE RNW29C AND NW71-W
605          KM  CENTENNIAL PKWY CHANNEL WEST/GRAND TETON BRANCH @ HUALAPAI
606          KM   REFERENCED FROM 2008 MPU
607          HC       2
             *

608          KK  RCNW71-W
609          KM  ROUTE CNW71-W TO CNW71-E
610          KM  FACILITY = CENTENNIAL PARKWAY CHANNEL WEST/GRAND TETON BRANCH
611          KM  FACILITY ID-MILE = CNGT 0000.0043
612          KM  LINING = RCB
613          KM   REFERENCED FROM 2008 MPU
614          RD    6270   0.030   0.015       0    TRAP       6       0
             *

615          KK  NW71-E
616          KM   REFERENCED FROM 2008 MPU
617          BA  0.238
618          PB   2.85
619          LS      0    88.3
620          UD  0.293
             *

621          KK  CNW71E
622          KM  COMBINE NW71-E AND RCNW71-W
623          KM  CENTENNIAL PKWY CHANNEL WEST/GRAND TETON BRANCH @ US 95
624          KM   REFERENCED FROM 2008 MPU
625          HC       2
             *

626          KK    GT1
627          BA  .0243
628          PB   3.00
629          LS      0    98.0
630          UD   .256
             *
```



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

631          KK    OFFU
632          BA  .0398
633          PB   2.93
634          LS      0    94.8
635          UD  0.118
             *

636          KK  CP26WT
637          KM   COMBINE CNW71-E, GT1, OFFU
638          HC       3
             *

639          KK   95STH
640          KM   FLOW CONVEYED SOUTH IN US-95 AT GRAND TETON
641          KM   FLOW CONVEYED IN FACILITY ID = CN95 0167
642          KM   COMBINE CP26WT, COFF23, COF218, COFF17, CHD7B2
643          HC       5
             *

644          KK   WOFF1
645          KM   EXISTING OFFSITE DRAINAGE BASIN
646          KM   DISCHARGES INTO DETENTION BASIN "DB1"
647          BA  .4073
648          PB   3.00
649          LS      0    86.4
650          UD  0.356
             *

651          KK  WOFF11
652          KM   DEVELOPED OFFSITE DRAINAGE BASIN
653          KM   DISCHARGES INTO DETENTION BASIN "DB2"
654          BA  .0281
655          LS      0    96.0
656          UD  0.118
             *

657          KK   WOFF2
658          KM   EXISTING OFFSITE DRAINAGE BASIN
659          KM   DISCHARGES INTO DETENTION BASIN "DB1"
660          BA  .0355
661          LS      0    85.0
662          UD  0.148
             *

663          KK   WOFF3
664          KM   EXISTING OFFSITE DRAINAGE BASIN
665          KM   DISCHARGES INTO DETENTION BASIN "DB1"
666          BA  .0259
667          LS      0    86.2
668          UD  0.112
             *
```



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

669          KK    CP1
670          KM   COMBINE WOFF1, WOFF11, WOFF2, AND WOFF3
671          HC       4
             *

672          KK   WOFF4
673          KM   EXISTING OFFSITE DRAINAGE BASIN
```

```
674          KM   DISCHARGES INTO DETENTION BASIN "DB1"
675          BA   .0581
676          LS      0    86.2
677          UD   0.136
             *

678          KK   WOFF5
679          KM   EXISTING OFFSITE DRAINAGE BASIN
680          KM   DISCHARGES INTO DETENTION BASIN "DB1"
681          BA   .2569
682          LS      0    86.5
683          UD   0.419
             *

684          KK   WOFF6
685          KM   EXISTING OFFSITE DRAINAGE BASIN
686          KM   DISCHARGES INTO DETENTION BASIN "DB1"
687          BA   .0399
688          LS      0    86.2
689          UD   0.121
             *

690          KK    ON1
691          KM   PROPOSED ONSITE DRAINAGE BASIN
692          BA   .0303
693          LS      0    92.8
694          UD   0.116
             *

695          KK    DB1
696          KM   COMBINE CP1, WOFF4, WOFF5, WOFF6 AND ON1
697          HC      5
             *

698          KK   ROB1
699          KM   OUTLET = 30" ORIFICE @ INVERT ELEVATION = 3025.5-FT
700          RS      1    VOL     -1
701          SV      0   7.78   13.43   19.26   58.03   96.21  132.22
702          SE   25.5     27      28      29      35      40      44
703          SQ      0  25.59   36.20   44.33   76.78  335.94 1413.68 2946.76 4825.05
704          SE   25.5     29      30      31      37      38      40      42      44
             *
```



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

705          KK   AROY1
706          KM   DOWNSTREAM OF SOUTHERN MAINTAINED ARROYO OUTFALL DISCHARGE
707          BA   .0012
708          PB   3.00
709          LS      0    88.0
710          UD   .100
             *

711          KK    WML1
712          BA   .0065
713          PB   3.00
714          LS      0    95.0
715          UD   .094
             *

716          KK  SHEPIA
717          KM   UNDEVELOPED FUTURE SHEEP MOUNTAIN PARKWAY
718          BA   .0292
719          PB   3.00
720          LS      0    98.0
721          UD   .111
             *

722          KK   AROY2
723          KM   DOWNSTREAM OF SOUTHERN MAINTAINED ARROYO DISCHARGE
724          BA   .0081
725          PB   3.00
726          LS      0    88.0
727          UD   .100
             *

728          KK   DUMMY
729          HC      5
             *

730          KK   PH2L4
731          BA   .0186
732          PB   3.00
733          LS      0    90.0
734          UD   .097
             *

735          KK   PH2L8
736          BA   .0126
737          PB   3.00
738          LS      0    90.0
739          UD   .102
             *
```



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

740          KK   DUMMY
741          HC      3
             *

742          KK   PH2L9
743          BA   .0262
```

```
744          PB    3.00
745          LS       0     90.0
746          UD    .093
             *
747          KK    WPF1
748          BA   .0023
749          PB    3.00
750          LS       0     95.0
751          UD    .050
             *
752          KK   EGAN2
753          BA   .0044
754          PB    3.00
755          LS       0     98.0
756          UD    .073
             *
757          KK   DUMMY
758          HC       4
             *
759          KK   WPRK2
760          BA   .0057
761          PB    3.00
762          LS       0     84.0
763          UD    .084
             *
764          KK  PH2PK1
765          BA   .0086
766          PB    3.00
767          LS       0     84.0
768          UD    .084
             *
769          KK  PH2L3B
770          BA   .0095
771          PB    3.00
772          LS       0     90.0
773          UD    .097
             *
```

1 HEC-1 INPUT PAGE 22

```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
774          KK   DUMMY
775          HC       4
             *
776          KK   PH2PK
777          BA   .0205
778          PB    3.00
779          LS       0     84.0
780          UD    .099
             *
781          KK  HORSE2
782          BA   .0126
783          PB    3.00
784          LS       0     98.0
785          UD    .103
             *
786          KK   DUMMY
787          HC       3
             *
788          KK  PH2PK2
789          BA   .0025
790          PB    3.00
791          LS       0     84.0
792          UD    .061
             *
793          KK  PH2ML4
794          BA   .0354
795          PB    3.00
796          LS       0     93.1
797          UD    .110
             *
798          KK  SHAUM1
799          BA   .0066
800          PB    3.00
801          LS       0     98.0
802          UD    .155
             *
803          KK   HU-HO
804          KM   TOTAL FLOW AT INTERSECTION OF HUALAPAI AND HORSE
805          KM   ROUTED NORTH IN  HUALAPAI
806          HC       4
             *
```

1 HEC-1 INPUT PAGE 23

```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
807          KK   WML6
808          BA   .0231
809          PB    3.00
810          LS       0     95.0
811          UD    .094
```

```
                *

812             KK   AROY5
813             BA   .0021
814             PB    3.00
815             LS       0     88.0
816             UD    .100
                *

817             KK  SHEP1B
818             BA   .0490
819             PB    3.00
820             LS       0     98.0
821             UD    .129
                *

822             KK   DUMMY
823             HC       3
                *

824             KK  WSCHL2
825             BA   .0185
826             PB    3.00
827             LS       0     91.0
828             UD    .100
                *

829             KK   STRT5
830             BA   .0053
831             PB    3.00
832             LS       0     98.0
833             UD    .083
                *

834             KK     WL3
835             BA   .0257
836             PB    3.00
837             LS       0     90.0
838             UD    .113
                *

839             KK   AROY6
840             BA   .0056
841             PB    3.00
842             LS       0     88.0
843             UD    .100
                *
```



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

844             KK   DUMMY
845             HC       5
                *

846             KK   WPRK3
847             BA   .0033
848             PB    3.00
849             LS       0     84.0
850             UD    .075
                *

851             KK     WL4
852             BA   .0237
853             PB    3.00
854             LS       0     90.0
855             UD    .175
                *

856             KK   STRT4
857             BA   .0043
858             PB    3.00
859             LS       0     98.0
860             UD    .069
                *

861             KK   DUMMY
862             HC       5
                *

863             KK    WML5
864             BA   .0388
865             PB    3.00
866             LS       0     95.0
867             UD    .116
                *

868             KK  HUAL2B
869             BA   .0154
870             PB    3.00
871             LS       0     98.0
872             UD    .241
                *

873             KK   DUMMY
874             HC       3
                *

875             KK   AROY4
876             KM   DOWNSTREAM OF NORTHERN MAINTAINED ARROYO OUTFALL DISCHARGE
877             BA   .0075
878             PB    3.00
879             LS       0     88.0
880             UD    .100
                *
```

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

  881     KK    WML2
  882     BA   .0514
  883     PB    3.00
  884     LS       0    95.0
  885     UD    .123
          *

  886     KK   WPRK4
  887     BA   .0075
  888     PB    3.00
  889     LS       0    84.0
  890     UD    .087
          *

  891     KK  SHAUM2
  892     BA   .0068
  893     PB    3.00
  894     LS       0    98.0
  895     UD    .110
          *

  896     KK   DUMMY
  897     HC       4
          *

  898     KK     WL1
  899     BA   .0243
  900     PB    3.00
  901     LS       0    90.0
  902     UD    .126
          *

  903     KK  HORS1A
  904     BA   .0107
  905     PB    3.00
  906     LS       0    98.0
  907     UD    .111
          *

  908     KK   SH-HO
  909     KM   TOTAL FLOW AT INTERSECTION OF SHAUMBER AND HORSE
  910     KM   ROUTED NORTH IN SHAUMBER
  911     HC       3
          *

  912     KK   WOFF7
  913     KM   EXISTING OFFSITE DRAINAGE BASIN
  914     KM   DISCHARGES INTO DETENTION BASIN "DB2"
  915     BA   .0068
  916     PB    3.00
  917     LS       0    86.2
  918     UD   0.100
          *
```



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

  919     KK   WOFF8
  920     KM   EXISTING OFFSITE DRAINAGE BASIN
  921     KM   DISCHARGES INTO DETENTION BASIN "DB2"
  922     BA   .1663
  923     LS       0    86.2
  924     UD   0.239
          *

  925     KK     CP2
  926     KM   COMBINE WOFF7, AND WOFF8
  927     HC       2
          *

  928     KK   WOFF9
  929     KM   EXISTING OFFSITE DRAINAGE BASIN
  930     KM   DISCHARGES INTO DETENTION BASIN "DB2"
  931     BA   .1164
  932     LS       0    86.2
  933     UD   0.203
          *

  934     KK  WOFF10
  935     KM   EXISTING OFFSITE DRAINAGE BASIN
  936     KM   DISCHARGES INTO DETENTION BASIN "DB2"
  937     BA   .2463
  938     LS       0    86.5
  939     UD   0.248
          *

  940     KK     ON2
  941     KM   PROPOSED ONSITE DRAINAGE BASIN
  942     BA   .0315
  943     LS       0    92.8
  944     UD   0.084
          *

  945     KK     DB2
  946     KM   COMBINE CP2, WOFF9, WOFF10 AND ON2
  947     HC       4
          *

  948     KK    RDB2
  949     KM   OUTLET = 27" ORIFICE @ INVERT ELEVATION = 2993-FT
```

```
950          RS      1     VOL      -1
951          SV      0    3.27    6.87   10.63   27.34   46.77   75.03
952          SE   2993    2994    2995    2996    3000    3004    3009
953          SQ      0   17.95   27.43   34.38   40.15   45.18   57.71   67.97   76.88
954          SE   2993    2996    2997    2998    2999    3000    3003    3006    3009
             *
```



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

955          KK  WPRK7
956          BA  .0037
957          PB   3.00
958          LS     0     84.0
959          UD  .069
             *

960          KK   WL2
961          BA  .0447
962          PB   3.00
963          LS     0     90.0
964          UD  .126
             *

965          KK  DUMMY
966          HC     4
             *

967          KK  SHAUM3
968          BA  .0036
969          PB   3.00
970          LS     0     98.0
971          UD  .088
             *

972          KK  IRON1A
973          BA  .0049
974          PB   3.00
975          LS     0     98.0
976          UD  .083
             *

977          KK  IR-SH
978          KM  TOTAL FLOW AT INTERSECTION OF IRON MOUNTAIN AND SHAUMBER
979          KM  ROUTED EAST IN IRON MOUNTAIN
980          HC     3
             *

981          KK   WML3
982          BA  .0250
983          PB   3.00
984          LS     0     95.0
985          UD  .100
             *

986          KK  HORS1B
987          BA  .0037
988          PB   3.00
989          LS     0     98.0
990          UD  .050
             *
```



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

991          KK  WPRK5
992          BA  .0022
993          PB   3.00
994          LS     0     84.0
995          UD  .086
             *

996          KK  DUMMY
997          HC     3
             *

998          KK  WSCHL1
999          BA  .0585
1000         PB   3.00
1001         LS     0     91.0
1002         UD  .118
             *

1003         KK  IRON1B
1004         BA  .0073
1005         PB   3.00
1006         LS     0     98.0
1007         UD  .101
             *

1008         KK   WML4
1009         BA  .0108
1010         PB   3.00
1011         LS     0     95.0
1012         UD  .083
             *

1013         KK  DUMMY
1014         HC     5
             *

1015         KK  SHEP1C
1016         BA  .0224
1017         PB   3.00
```

```
1018          LS       0    98.0
1019          UD    .106
              *

1020          KK   HU-IR
1021          KM   TOTAL FLOW AT INTERSECTION OF HUALAPAI AND IRON MOUNTAIN
1022          KM   ROUTED NORTH IN REGIONAL FACILITY ALIGNMENT
1023          HC       3
              *
```



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

1024          KK  OFF4-1
1025          KM  REFERENCED FROM 2008 MPU
1026          BA   0.301
1027          PB    3.40
1028          LS       0    86.8
1029          UD   0.295
              *

1030          KK  ROFF41
1031          KM  ROUTE OFF4-1 TO COFF4-2
1032          KM  KYLE CANYON ROAD
1033          KM  REFERENCED FROM 2008 MPU
1034          RD    5800  0.0414   0.016       0    TRAP       0      50
              *

1035          KK  OFF4-2
1036          KM  REFERENCED FROM 2008 MPU
1037          BA   0.420
1038          PB    3.34
1039          LS       0    85.2
1040          UD   0.140
              *

1041          KK  COFF42
1042          KM  COMBINE ROFF4-1 AND OFF4-2
1043          KM  REFERENCED FROM 2008 MPU
1044          HC       2
              *

1045          KK  RCOFF4-2
1046          KM  ROUTE COFF4-2 TO COFF5-1
1047          KM  KYLE CANYON ROAD
1048          KM  REFERENCED FROM 2008 MPU
1049          RD    2800  0.0392   0.016       0    TRAP       0      50
              *

1050          KK  OFF5-1
1051          KM  REFERENCED FROM 2008 MPU
1052          BA   0.296
1053          PB    3.26
1054          LS       0    84.1
1055          UD   0.222
              *

1056          KK  COFF51
1057          KM  COMBINE RCOFF4-2 AND OFF5-1
1058          KM  REFERENCED FROM 2008 MPU
1059          HC       2
              *
```



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

1060          KK  RCOFF5-1
1061          KM  ROUTE COFF5-1 TO 2CNW1-C
1062          KM  FACILITY = MOCCASIN AND KYLE CANYON ROAD
1063          KM  FACILITY ID-MILE = MOKC 0380
1064          KM  LINING = RCP
1065          KM  REFERENCED FROM 2008 MPU
1066          RD    5800  0.0373   0.013       0    CIRC     7.5       0
              *

1067          KK  OFF5-2
1068          KM  REFERENCED FROM 2008 MPU
1069          BA   0.395
1070          PB    3.20
1071          LS       0    86.9
1072          UD   0.317
              *

1073          KK  ROFF52
1074          KM  ROUTE OFF5-2 TO CNW1-C
1075          KM  FACILITY =KYLE CANYON ROAD AND UNKNOWN
1076          KM  FACILITY ID-MILE = KCUN 0000
1077          KM  LINING = RCP
1078          KM  REFERENCED FROM 2008 MPU
1079          RD    2300   0.022   0.013       0    CIRC       7       0
              *

1080          KK   NW1-C
1081          KM  REFERENCED FROM 2008 MPU
1082          BA   0.293
1083          PB    3.12
1084          LS       0    84.3
1085          UD   0.263
              *

1086          KK  CNW1-C
1087          KM  COMBINE ROFF5-2 AND NW1-C
1088          KM  REFERENCED FROM 2008 MPU
1089          HC       2
```

```
                *

1090            KK  2CNW1C
1091            KM  COMBINE RCOFF5-1 AND CNW1-C
1092            KM  REFERENCED FROM 2008 MPU
1093            HC       2
                *

1094            KK  R2CNW1-C
1095            KM  ROUTE 2CNW1-C TO CNW-7
1096            KM  FACILITY =MOCCASIN AND KYLE CANYON ROAD
1097            KM  FACILITY ID-MILE = MOKC 0325
1098            KM  LINING = RCB
1099            KM  REFERENCED FROM 2008 MPU
1100            RD    5700  0.0365   0.015       0    TRAP       9       0
                *
```

1 HEC-1 INPUT PAGE 31

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

1101            KK   NW7-C
1102            KM  REFERENCED FROM 2008 MPU
1103            BA   0.488
1104            PB    3.03
1105            LS       0     87.2
1106            UD   0.364
                *

1107            KK   CNW-7
1108            KM  COMBINE NW7-C AND R2CNW1-C
1109            KM  REFERENCED FROM 2008 MPU
1110            HC       2
                *

1111            KK  RCNW7C
1112            KM  ROUTE CNW7-C TO CNW21-C
1113            KM  FACILITY =MOCCASIN AND KYLE CANYON ROAD
1114            KM  FACILITY ID-MILE = MOKC
1115            KM  LINING = RCB
1116            KM  REVISED FROM 2008 MPU
1117            RD    2660  0.0338   0.015       0    TRAP      20       0
                *

1118            KK  NW21-C
1119            KM   PROPOSED ULTIMATE CONDITION MPA BASIN
1120            BA   .1552
1121            PB    3.00
1122            LS       0     92.0
1123            UD   0.199
                *

1124            KK  CNW21C
1125            KM   COMBINE NW21-C AND CNW-7
1126            HC       2
                *

1127            KK  RCNW21-C
1128            KM  ROUTE CNW21-C TO CNW35-C
1129            KM  FACILITY =MOCCASIN AND KYLE CANYON ROAD
1130            KM  FACILITY ID-MILE = MOKC
1131            KM  LINING = RCB
1132            KM  REVISED FROM 2008 MPU
1133            RD    5450  0.0339   0.015       0    TRAP      20       0
                *

1134            KK  NW35-C
1135            KM   PROPOSED ULTIMATE CONDITION MPA BASIN
1136            BA   .3447
1137            PB    2.93
1138            LS       0     90.5
1139            UD   0.291
                *
```

1 HEC-1 INPUT PAGE 32

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

1140            KK  CNW35C
1141            KM   COMBINE NW35-C AND CNW21-C
1142            HC       2
                *

1143            KK    CKC5
1144            KM   COMBINE HU-IR, CNW35C
1145            HC       2
                *

1146            KK  NW50-C
1147            KM   PROPOSED ULTIMATE CONDITION MPA BASIN
1148            BA   .1677
1149            PB    2.92
1150            LS       0     87.8
1151            UD   0.179
                *

1152            KK    CKC6
1153            KM   COMBINE CKC5, NW50-C
1154            HC       2
                *

1155            KK    OFFZ
1156            BA   .0523
1157            PB    2.77
1158            LS       0     87.0
1159            UD   0.138
```

```
                *

1160            KK   HUAL3
1161            BA   .0038
1162            PB    2.77
1163            LS       0     98.0
1164            UD    .177
                *

1165            KK   EMLA4
1166            BA   .0683
1167            PB    2.77
1168            LS       0     92.0
1169            UD    .162
                *

1170            KK  STRT10
1171            BA   .0035
1172            PB    2.77
1173            LS       0     98.0
1174            UD    .057
                *
```

1 HEC-1 INPUT PAGE 33

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

1175            KK   DUMMY
1176            HC       4
                *

1177            KK   EMLA3
1178            BA   .0145
1179            PB    2.77
1180            LS       0     92.0
1181            UD    .095
                *

1182            KK  STRT11
1183            BA   .0086
1184            PB    2.77
1185            LS       0     98.0
1186            UD    .178
                *

1187            KK   DUMMY
1188            HC       3
                *

1189            KK  SHEEP3
1190            BA   .0441
1191            PB    2.77
1192            LS       0     98.0
1193            UD    .157
                *

1194            KK   EMLA5
1195            BA   .0731
1196            PB    2.77
1197            LS       0     92.0
1198            UD    .149
                *

1199            KK   EPRK1
1200            BA   .0015
1201            PB    2.77
1202            LS       0     69.0
1203            UD    .095
                *

1204            KK   SM-MO
1205            KM   TOTAL KYLE CANYON DEVELOPMENT DISCHARGE IN SHEEP MOUNTAIN PKWY @ MOCCASIN
1206            HC       5
                *

1207            KK  RETD1B
1208            KM   RETRIEVE FLOW FROM VTN CULVERT 1
1209            KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
1210            DR  DCHD1B
                *
```

1 HEC-1 INPUT PAGE 34

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

1211            KK  SHEP2B
1212            BA   .0886
1213            PB    2.77
1214            LS       0     98.0
1215            UD   0.135
                *

1216            KK   LC-SM
1217            KM   TOTAL FLOW AT INTERSECTION OF LOG CABIN AND SKY
1218            KM   FLOW ROUTED EAST IN LOG CABIN
1219            HC       2
                *

1220            KK    EGC1
1221            BA   .0077
1222            PB    2.77
1223            LS       0     92.0
1224            UD    .078
                *

1225            KK   IRON1
```

```
1226          BA    .0037
1227          PB     2.77
1228          LS        0     98.0
1229          UD     .087
              *

1230          KK      EL8
1231          BA    .0463
1232          PB     2.77
1233          LS        0     82.0
1234          UD     .151
              *

1235          KK    DUMMY
1236          HC        4
              *

1237          KK   LOG1A
1238          BA    .0063
1239          PB     2.77
1240          LS        0     98.0
1241          UD     .069
              *

1242          KK   STRT6A
1243          BA    .0027
1244          PB     2.77
1245          LS        0     98.0
1246          UD     .114
              *
```

1 HEC-1 INPUT PAGE 35

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

1247          KK    DUMMY
1248          HC        3
              *

1249          KK      EL1
1250          BA    .0392
1251          PB     2.77
1252          LS        0     82.0
1253          UD     .169
              *

1254          KK     EML1
1255          BA    .0288
1256          PB     2.77
1257          LS        0     92.0
1258          UD     .116
              *

1259          KK      EL2
1260          BA    .0400
1261          PB     2.77
1262          LS        0     82.0
1263          UD     .172
              *

1264          KK     EML2
1265          BA    .0356
1266          PB     2.77
1267          LS        0     92.0
1268          UD     .121
              *

1269          KK    DUMMY
1270          HC        5
              *

1271          KK    STRT9
1272          BA    .0077
1273          PB     2.77
1274          LS        0     98.0
1275          UD     .123
              *

1276          KK    DUMMY
1277          HC        2
              *

1278          KK      EL7
1279          BA    .0387
1280          PB     2.77
1281          LS        0     82.0
1282          UD     .139
              *
```

1 HEC-1 INPUT PAGE 36

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

1283          KK      EL6
1284          BA    .0424
1285          PB     2.77
1286          LS        0     82.0
1287          UD     .164
              *

1288          KK      TP3
1289          BA    .0046
1290          PB     2.77
1291          LS        0     98.0
1292          UD     .095
              *
```

```
1293          KK  STRT6B
1294          BA   .0019
1295          PB    2.77
1296          LS       0    98.0
1297          UD    .050
              *

1298          KK   DUMMY
1299          HC       4
              *

1300          KK     TP4
1301          BA   .0028
1302          PB    2.77
1303          LS       0    98.0
1304          UD    .118
              *

1305          KK  ESCHL1
1306          BA   .0231
1307          PB    2.77
1308          LS       0    84.0
1309          UD    .123
              *

1310          KK   LOG1B
1311          BA   .0034
1312          PB    2.77
1313          LS       0    98.0
1314          UD    .050
              *

1315          KK   EPRK2
1316          BA   .0072
1317          PB    2.77
1318          LS       0    69.0
1319          UD    .115
              *
```



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

1320          KK   LC-TP
1321          KM   TOTAL FLOW AT INTERSECTION OF LOG CABIN AND TEE PEE
1322          KM   FLOW ROUTED EAST IN LOG CABIN
1323          HC       5
              *

1324          KK  RETD2B
1325          KM   RETRIEVE FLOW FROM VTN CULVERT 2
1326          KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
1327          DR  DCHD2B
              *

1328          KK    95-6
1329          KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
1330          BA   .0104
1331          PB    2.77
1332          LS       0    92.8
1333          UD   0.091
              *

1334          KK    OFFH
1335          KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
1336          BA   .0074
1337          PB    2.77
1338          LS       0    89.5
1339          UD   0.082
              *

1340          KK   DUMMY
1341          HC       3
              *

1342          KK  SHEP2A
1343          BA   .0114
1344          PB    2.77
1345          LS       0    98.0
1346          UD    .119
              *

1347          KK    EGC2
1348          BA   .0084
1349          PB    2.77
1350          LS       0    98.0
1351          UD    .145
              *

1352          KK   IRON2
1353          BA   .0084
1354          PB    2.77
1355          LS       0    98.0
1356          UD    .145
              *
```



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

1357          KK   SK-IR
1358          KM   COMBINE DCHD2B, 95-6, OFFH, SHEP2A, EGC2, IRON2
1359          HC       4
              *
```

```
1360          KK   EMLA2
1361          BA   .0234
1362          PB    2.77
1363          LS       0     94.6
1364          UD    .115
              *

1365          KK     TP2
1366          BA   .0009
1367          PB    2.93
1368          LS       0     98.0
1369          UD    .079
              *

1370          KK   IR-TP
1371          KM   COMBINE SK-IR, EMLA2, TP2
1372          HC       3
              *

1373          KK     ES1
1374          KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
1375          BA   .0173
1376          PB    2.77
1377          LS       0     92.7
1378          UD   0.109
              *

1379          KK   IRON3
1380          BA   .0022
1381          PB    2.93
1382          LS       0     98.0
1383          UD    .062
              *

1384          KK   IR-FT
1385          KM   COMBINE IR-TP, ES1, IRON3
1386          HC       3
              *

1387          KK   FTNOR
1388          KM   FLOW SPLIT AT IRON MOUNTAIN/FORT APACHE
1389          KM   DIVERT FLOW EAST IN IRON MOUNTAIN ROAD
1390          KM   DIVERT MAX. SD FLOW + MAX. STREET FLOW (118/98 CFS) LESS THAN NWNS Z35/98 CFS
1391          DT  IREAST
1392          DI       0      93     186
1393          DQ       0      98     118
              *
```



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

1394          KK     EL5
1395          BA   .0414
1396          PB    2.77
1397          LS       0     82.0
1398          UD    .165
              *

1399          KK     EL4
1400          BA   .0311
1401          PB    2.77
1402          LS       0     82.0
1403          UD    .142
              *

1404          KK   STRT7
1405          BA   .0033
1406          PB    2.77
1407          LS       0     98.0
1408          UD    .060
              *

1409          KK   DUMMY
1410          HC       4
              *

1411          KK   RFTLC
1412          KM   DIVERT FLOW SPLIT INTO O'HARE ROAD
1413          DT   OHARE
1414          DI       0      26     140
1415          DQ       0       0      47
              *

1416          KK     EL3
1417          BA   .0481
1418          PB    2.77
1419          LS       0     82.0
1420          UD    .163
              *

1421          KK   FORT1
1422          BA   .0091
1423          PB    2.77
1424          LS       0     98.0
1425          UD    .238
              *

1426          KK    LOG2
1427          BA   .0057
1428          PB    2.77
1429          LS       0     98.0
1430          UD    .063
              *
```

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

1431      KK   DUMMY
1432      HC      4
          *
1433      KK   FT-LC
1434      KM   TOTAL FLOW AT INTERSECTION OF FORT APACHE AND LOG CABIN
1435      KM   FLOW ROUTED NORTH IN FORT APACHE
1436      HC      2
          *
1437      KK  D2FTLC
1438      KM   DIVERT FLOW SPLIT INTO LOG CABIN WAY
1439      DT  LOGCAB
1440      DI      0     101     299
1441      DQ      0      73     187
          *
1442      KK   FORT2
1443      BA  .0089
1444      PB   2.77
1445      LS      0    98.0
1446      UD   .253
          *
1447      KK   EML3
1448      BA  .0385
1449      PB   2.77
1450      LS      0    92.0
1451      UD   .124
          *
1452      KK   EML4
1453      BA  .0322
1454      PB   2.77
1455      LS      0    92.0
1456      UD   .143
          *
1457      KK   DUMMY
1458      HC      5
          *
1459      KK  SHEEP4
1460      BA  .0144
1461      PB   2.77
1462      LS      0    98.0
1463      UD   .109
          *
```



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

1464      KK   FT-MO
1465      KM   TOTAL KYLE CANYON DEVELOPMENT DISCHARGE IN FORT APACHE @ MOCCASIN
1466      KM   FLOW ROUTED EAST ADJACENT TO MOCCASIN
1467      HC      2
          *
1468      KK   CP43
1469      KM   TOTAL KYLE CANYON DEVELOPMENT DISCHARGE IN MOCCASIN REGIONAL ALIGNMENT
1470      HC      2
          *
1471      KK   95-7A
1472      KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
1473      BA   .0069
1474      PB   2.77
1475      LS      0    94.7
1476      UD  0.073
          *
1477      KK   95-7B
1478      KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
1479      BA   .0081
1480      PB   2.77
1481      LS      0    94.7
1482      UD  0.084
          *
1483      KK   95-8A
1484      KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
1485      BA   .0052
1486      PB   2.77
1487      LS      0    94.7
1488      UD  0.061
          *
1489      KK   95-8B
1490      KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
1491      BA   .0031
1492      PB   2.77
1493      LS      0    94.7
1494      UD  0.050
          *
1495      KK  C95-8B
1496      KM   COMBINE 95-7A, 95-7B, 95-8A, 95-8B
1497      HC      4
          *
1498      KK   EMLA1
1499      BA   .0174
```

```
1500          PB    2.93
1501          LS       0    95.0
1502          UD    .115
              *
```



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

1503          KK     TP1
1504          BA   .0009
1505          PB    2.93
1506          LS       0    98.0
1507          UD    .082
              *

1508          KK   BR-TP
1509          KM   TOTAL FLOW AT INTERSECTION OF BRENT AND TEE PEE
1510          KM   FLOW ROUTED EAST IN BRENT
1511          HC       3
              *

1512          KK     ES2
1513          KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
1514          BA   .0491
1515          PB    2.77
1516          LS       0    94.7
1517          UD   0.149
              *

1518          KK  BRENT1
1519          BA   .0019
1520          PB    2.93
1521          LS       0    98.0
1522          UD    .062
              *

1523          KK   EGC3B
1524          BA   .0175
1525          PB    2.93
1526          LS       0    95.0
1527          UD    .090
              *

1528          KK   DUMMY
1529          HC       4
              *

1530          KK  HORSE5
1531          BA   .0038
1532          PB    2.93
1533          LS       0    98.0
1534          UD    .055
              *

1535          KK    EPF1
1536          BA   .0016
1537          PB    2.93
1538          LS       0    95.0
1539          UD    .050
              *
```



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

1540          KK    CP44
1541          KM   TOTAL KYLE CANYON DEVELOPMENT DISCHARGE AT INTERSECTION OF BRENT LANE AND FOR
1542          KM   PROPOSED FLOW SPLIT INTO EXISTING STORM DRAIN SOUTH
1543          HC       3
              *

1544          KK   SOUTH
1545          KM   FLOW SPLIT AT BRENT/FT. APACHE
1546          KM   DIVERT STORM DRAIN DESIGN FLOW 65 CFS SOUTH IN FORT APACHE
1547          DT   BRENT
1548          DI       0     109     212
1549          DQ       0      62     165
              *

1550          KK    SKY1
1551          BA   .0025
1552          PB    2.93
1553          LS       0    98.0
1554          UD    .053
              *

1555          KK  HORSE4
1556          BA   .0063
1557          PB    2.93
1558          LS       0    98.0
1559          UD    .050
              *

1560          KK   EGC3A
1561          BA   .0184
1562          PB    2.93
1563          LS       0    95.0
1564          UD    .101
              *

1565          KK    EGC4
1566          BA   .0050
1567          PB    2.93
1568          LS       0    95.0
1569          UD    .055
```

```
                *
1570            KK   DUMMY
1571            HC      5
                *
1572            KK   95-98
1573            KM   REFERENCED FROM GCW MASTER DRAINAGE STUDY
1574            BA   .0133
1575            PB    2.77
1576            LS      0    94.7
1577            UD   0.136
                *
```



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

1578            KK    CP45
1579            KM   TOTAL KYLE CANYON DISCHARGE AT INTERSECTION OF FORT APACHE AND HORSE
1580            KM   PROPOSED FLOW SPLIT AT INTERSECTION
1581            HC      2
                *
1582            KK   HORSE
1583            KM   FLOW SPLIT AT HORSE/RACEL
1584            KM   DIVERT NWNS 101 CFS SOUTH IN FORT APACHE/RACEL
1585            DT   RACEL
1586            DI      0     101    1000
1587            DQ      0     101     101
                *
1588            ZZ
```

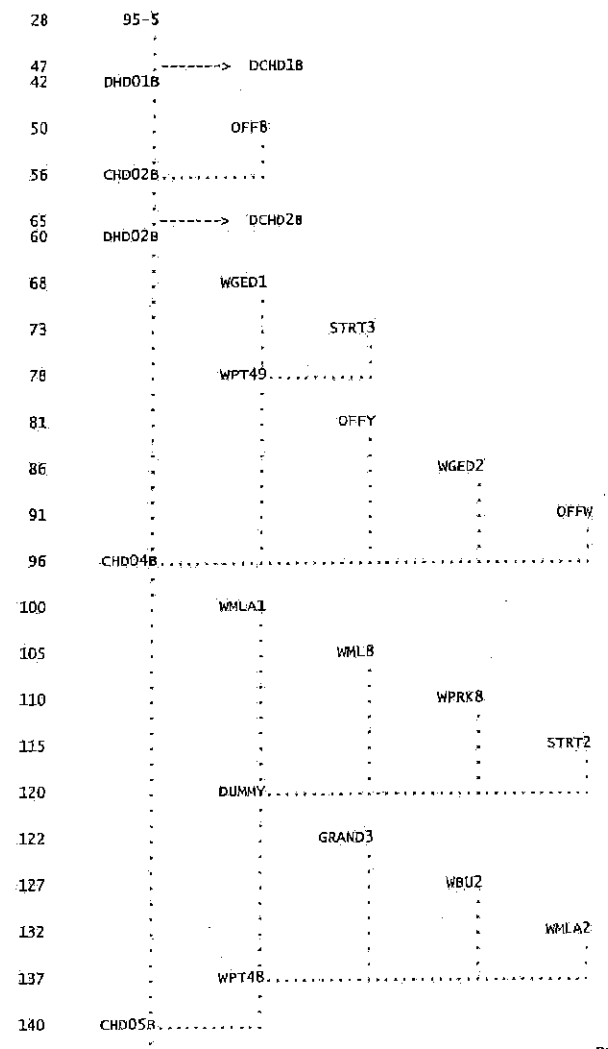
1

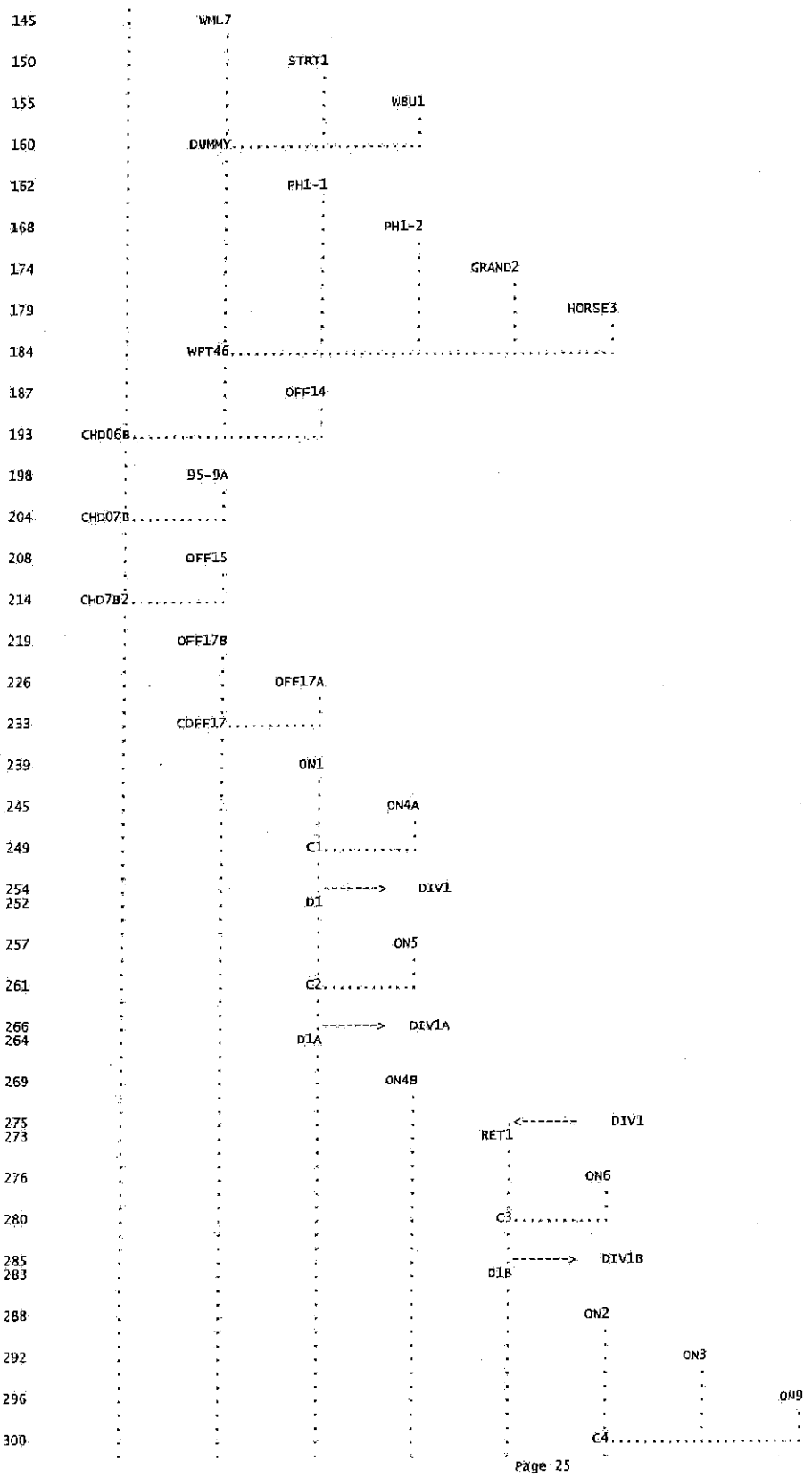
SCHEMATIC DIAGRAM OF STREAM NETWORK

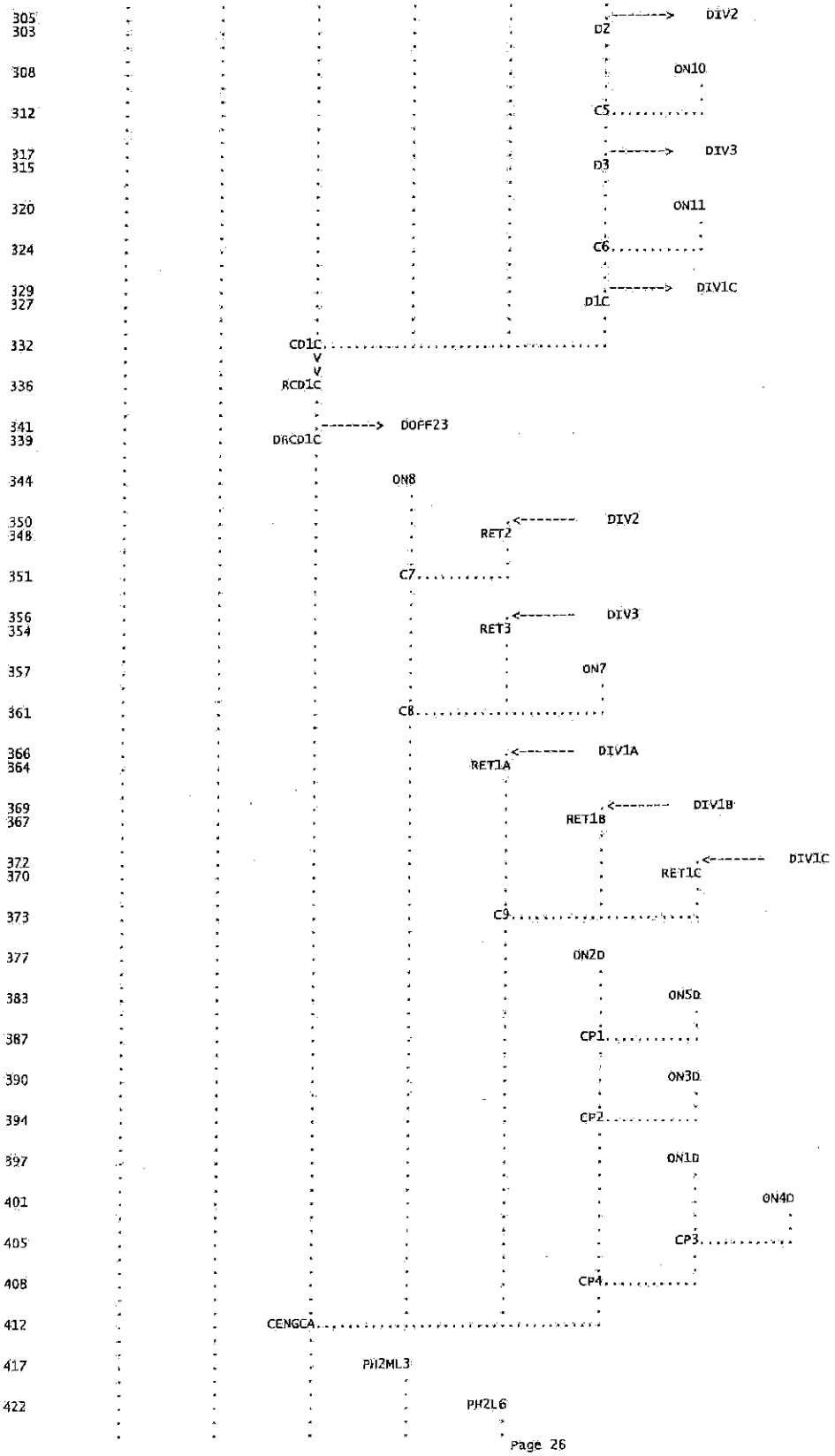
INPUT LINE NO.

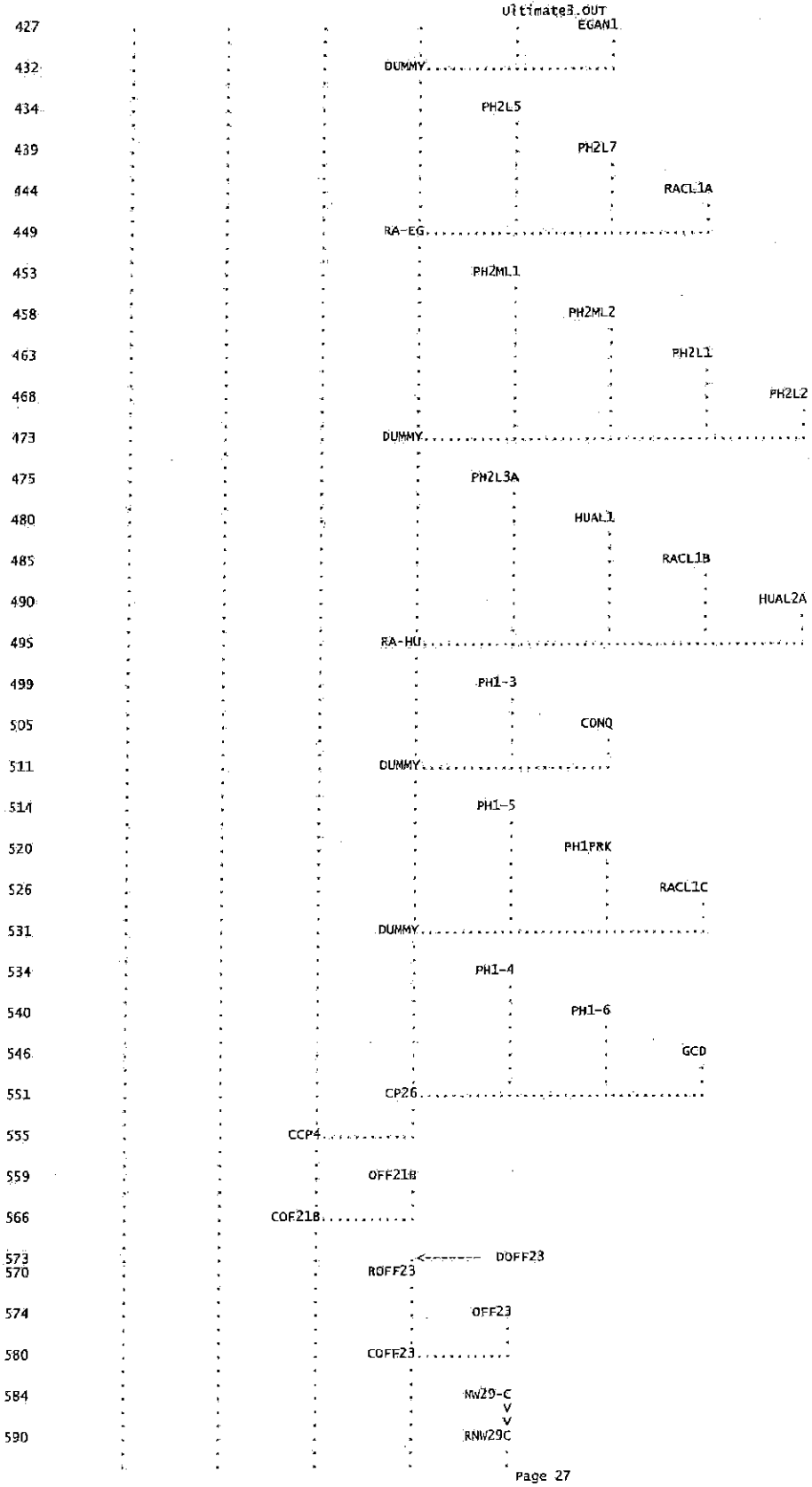
(V) ROUTING (---->) DIVERSION OR PUMP FLOW

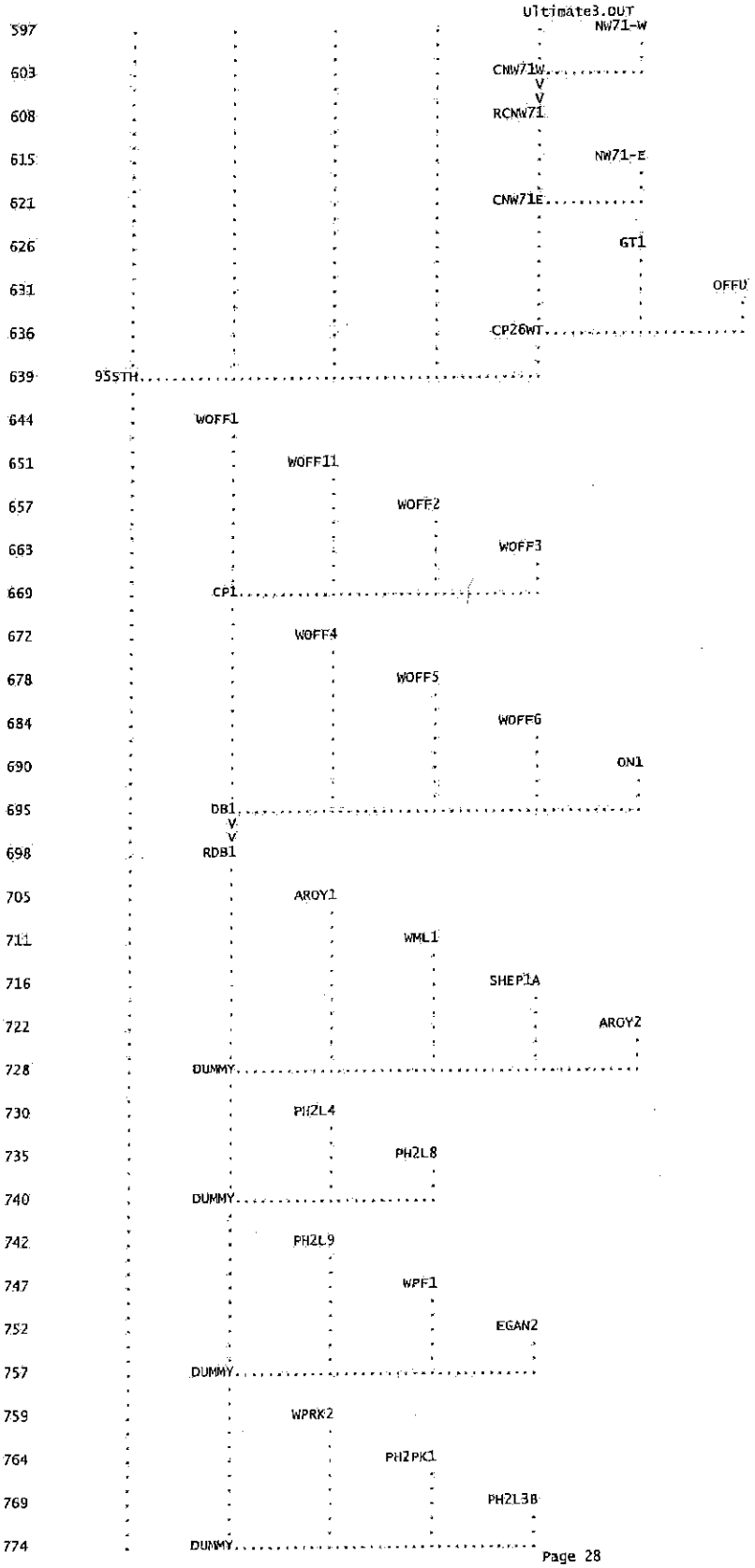
(.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW

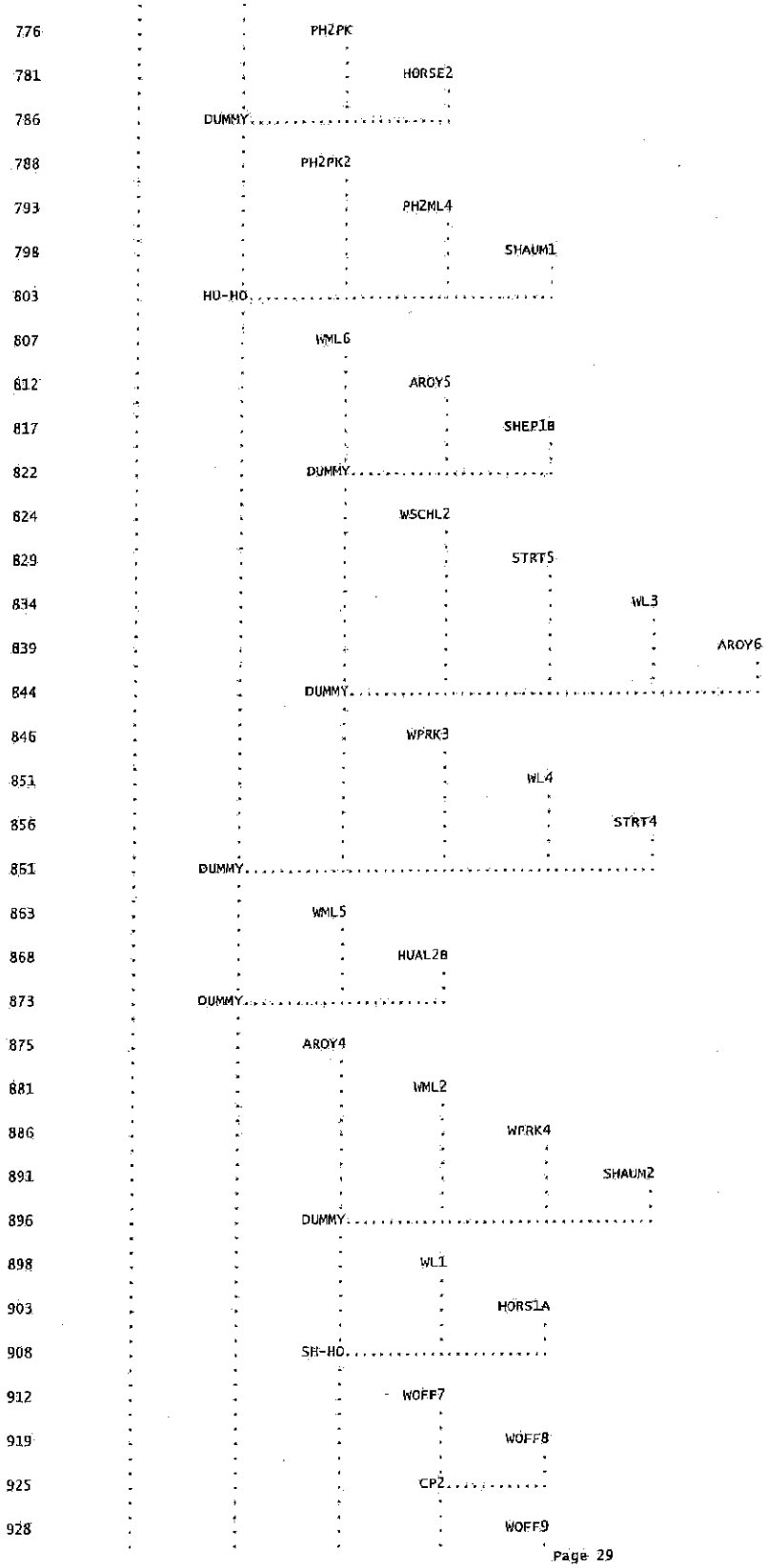


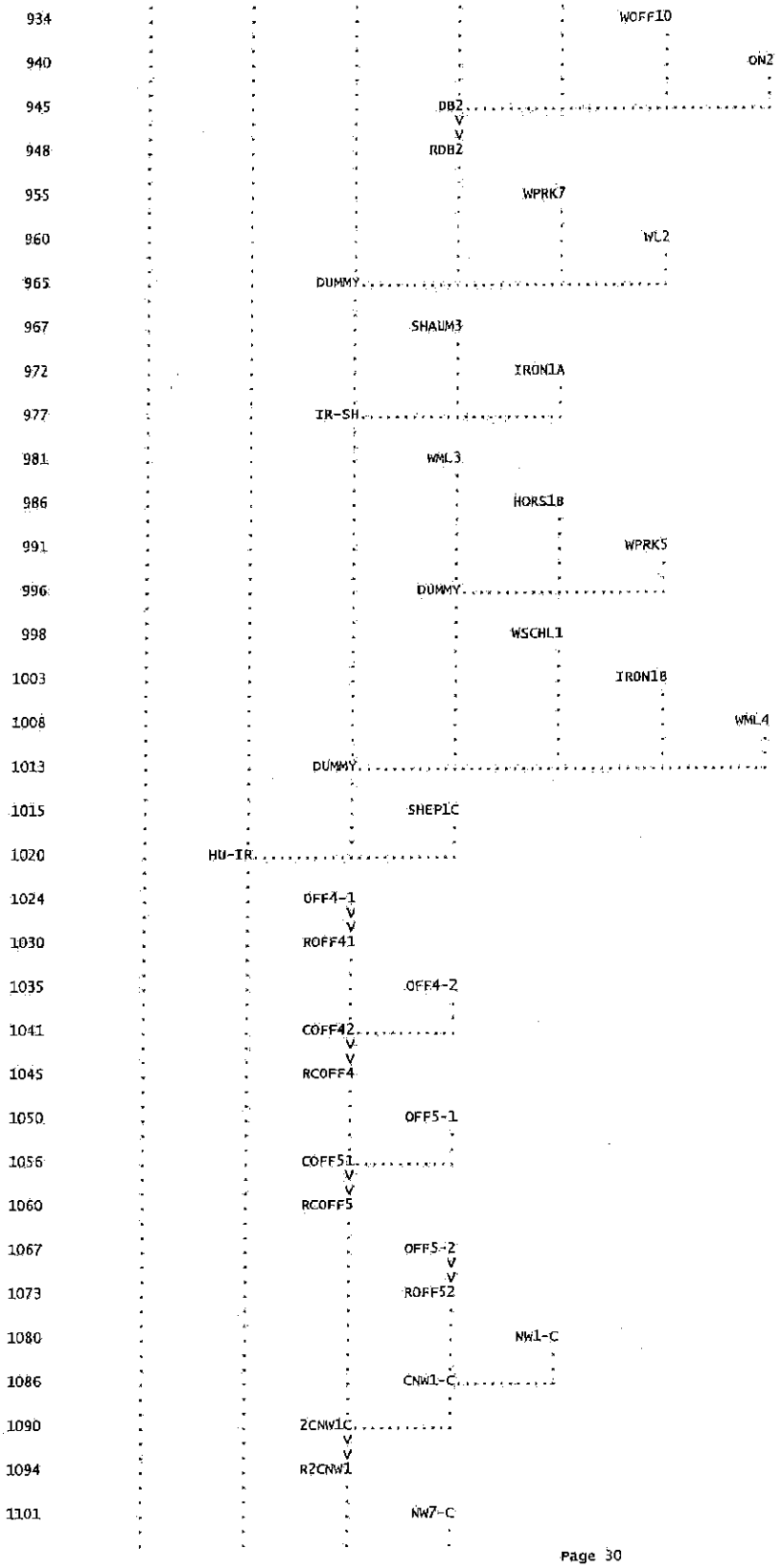

145 WML7
150 STRT1
155 WBU1
160 DUMMY
162 PH1-1
168 PH1-2
174 GRAND2
179 HORSE3
184 WPT46
187 OFF14
193 CHD06B
198 95-9A
204 CHD07B
208 OFF15
214 CHD7B2
219 OFF17B
226 OFF17A
233 COFF17
239 ON1
245 ON4A
249 C1
254 DIV1
252 D1
257 ON5
261 C2
266 DIV1A
264 D1A
269 ON4B
275 DIV1
273 RET1
276 ON6
280 C3
285 DIV1B
283 D1B
288 ON2
292 ON3
296 ON9
300 C4

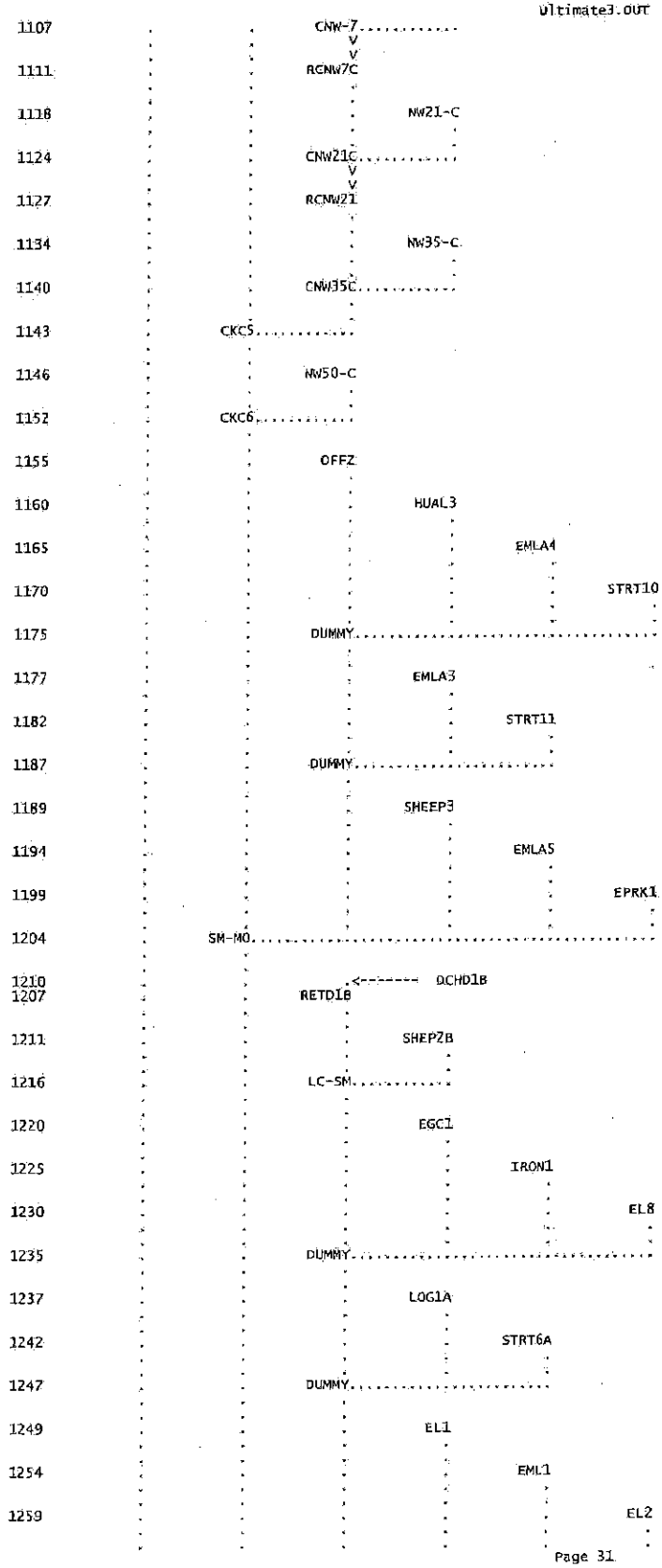

305
303
DIV2
DZ
308
ON10
312
C5
317
315
DIV3
D3
320
ON11
324
C6
329
327
DIV1C
D1C
332
CD1C
336
RCD1C
341
339
DOFF23
DRCD1C
344
ON8
350
348
DIV2
RET2
351
C7
356
354
DIV3
RET3
357
ON7
361
C8
366
364
DIV1A
RET1A
369
367
DIV1B
RET1B
372
370
DIV1C
RET1C
373
C9
377
ON2D
383
ON5D
387
CP1
390
ON3D
394
CP2
397
ON1D
401
ON4D
405
CP3
408
CP4
412
CENGCA
417
PH2ML3
422
PH2L6

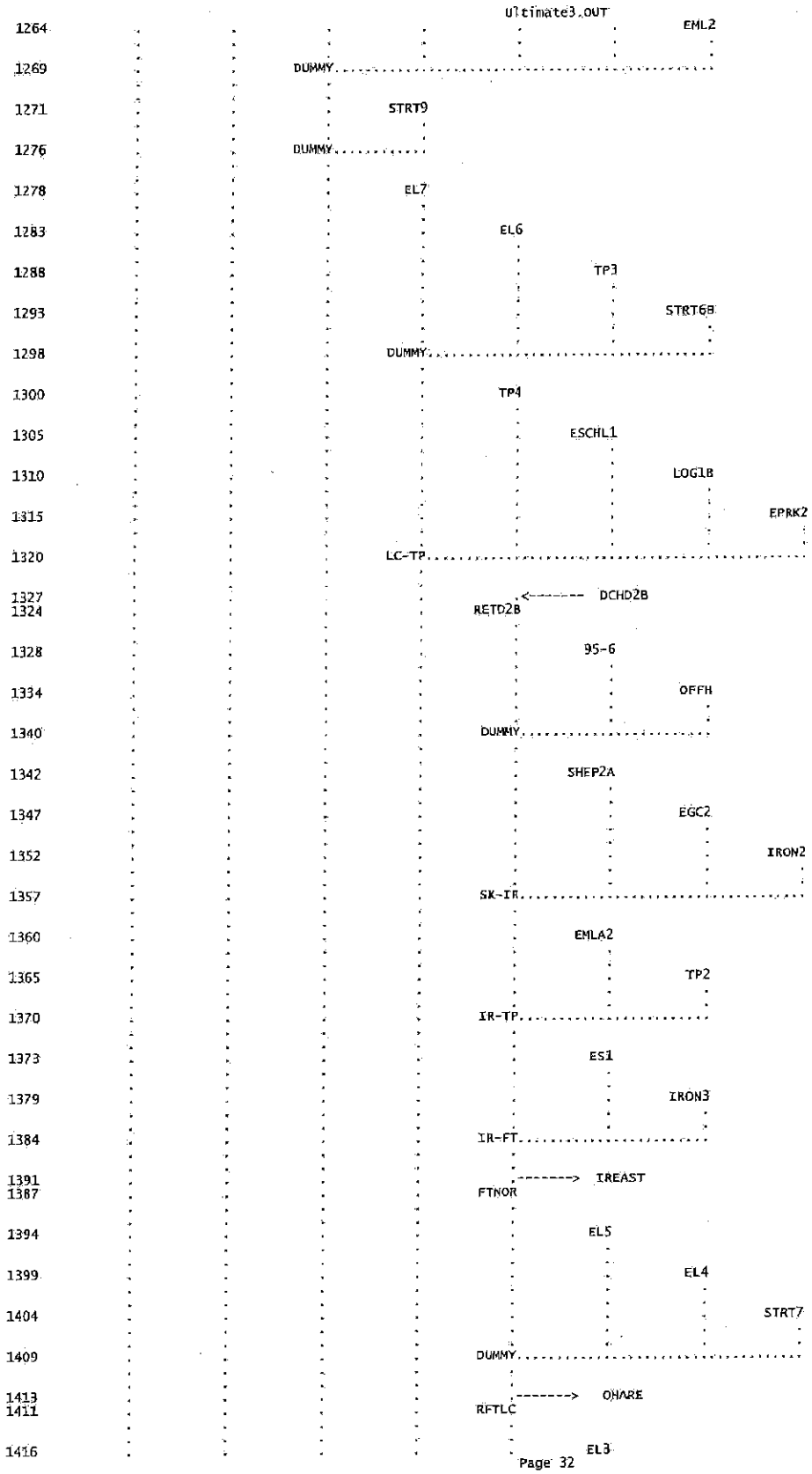

427
EGAN1
432
DUMMY
434
PH2L5
439
PH2L7
444
RACL1A
449
RA-EG
453
PH2ML1
458
PH2ML2
463
PH2L1
468
PH2L2
473
DUMMY
475
PH2L3A
480
HUAL1
485
RACL1B
490
HUAL2A
495
RA-HU
499
PH1-3
505
CONQ
511
DUMMY
514
PH1-5
520
PH1PRK
526
RACL1C
531
DUMMY
534
PH1-4
540
PH1-6
546
GCD
551
CP26
555
CCP4
559
OFF21B
566
COF21B
573
DOFF23
570
ROFF23
574
OFF23
580
COFF23
584
NW29-C
590
RNW29C

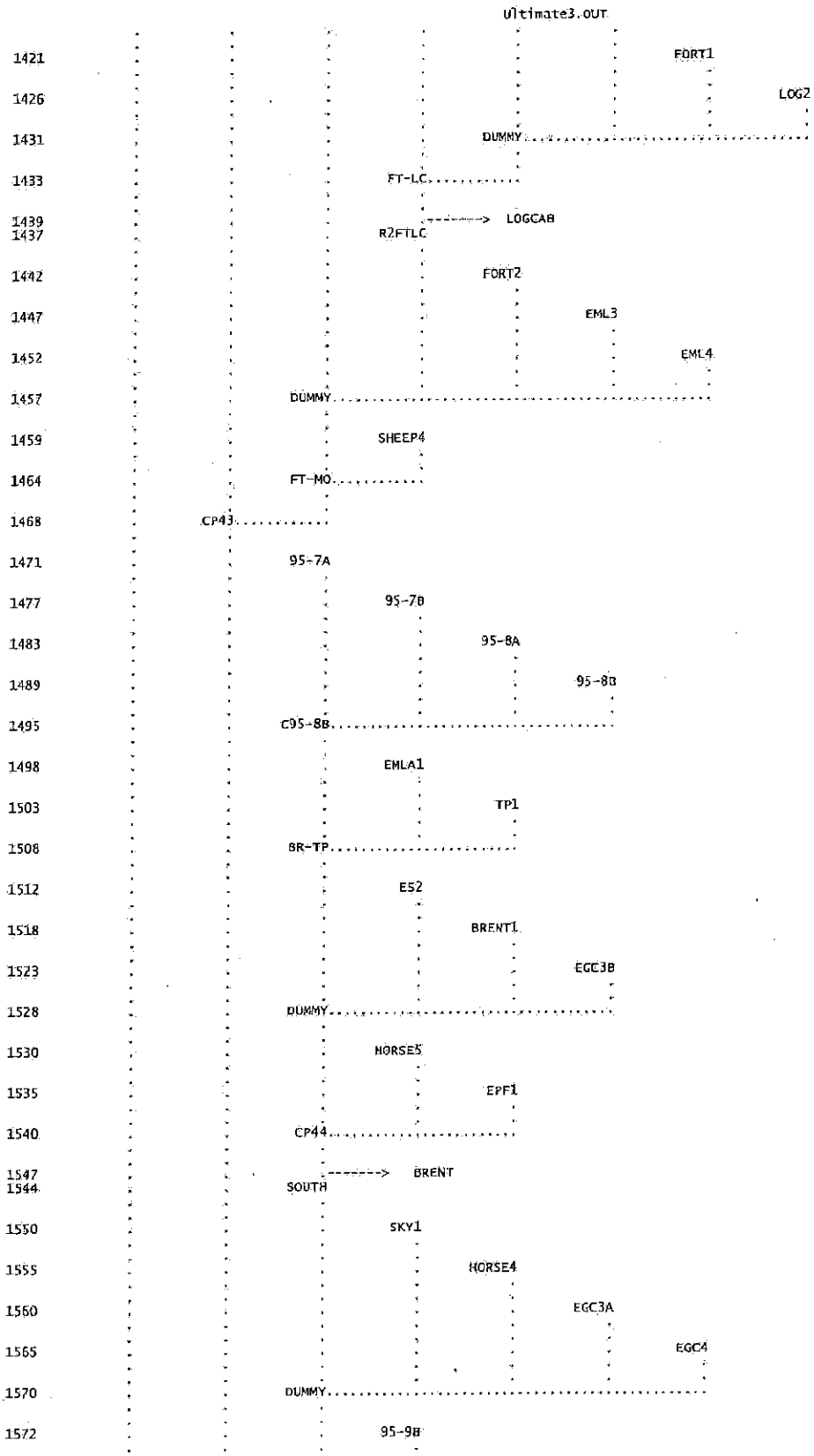

597
NW71-W
603
CNW71W
608
RCNW71
615
NW71-E
621
CNW71E
626
GT1
631
OFFU
636
CP26WT
639
95STH
644
WOFF1
651
WOFF11
657
WOFF2
663
WOFF3
669
CP1
672
WOFF4
678
WOFF5
684
WOFF6
690
ON1
695
DB1
698
RDB1
705
AROY1
711
WML1
716
SHEP1A
722
AROY2
728
DUMMY
730
PH2L4
735
PH2L8
740
DUMMY
742
PH2L9
747
WPF1
752
EGAN2
757
DUMMY
759
WPRK2
764
PH2PK1
769
PH2L3B
774
DUMMY


776
PH2PK
781
HORSE2
786
DUMMY
788
PH2PK2
793
PH2ML4
798
SHAUM1
803
HU-HO
807
WML6
812
AROY5
817
SHEP1B
822
DUMMY
824
WSCHL2
829
STRT5
834
WL3
839
AROY6
844
DUMMY
846
WPRK3
851
WL4
856
STRT4
861
DUMMY
863
WML5
868
HUAL2B
873
DUMMY
875
AROY4
881
WML2
886
WPRK4
891
SHAUM2
896
DUMMY
898
WL1
903
HORS1A
908
SH-HO
912
WOFF7
919
WOFF8
925
CP2
928
WOFF9


934
940
945
948
955
960
965
967
972
977
981
986
991
996
998
1003
1008
1013
1015
1020
1024
1030
1035
1041
1045
1050
1056
1060
1067
1073
1080
1086
1090
1094
1101
WOFF10
ON2
DB2
RDB2
WPRK7
WL2
DUMMY
SHAUM3
IRONIA
IR-SH
WML3
HORS1B
WPRK5
DUMMY
WSCHL1
IRON1B
WML4
DUMMY
SHEP1C
HU-IR
OFF4-1
ROFF41
OFF4-2
COFF42
RCOFF4
OFF5-1
COFF51
RCOFF5
OFF5-2
ROFF52
NW1-C
CNW1-C
2CNW1C
R2CNW1
NW7-C


1107
CNW-7
1111
RCNW7C
1118
NW21-C
1124
CNW21C
1127
RCNW21
1134
NW35-C
1140
CNW35C
1143
CKC5
1146
NW50-C
1152
CKC6
1155
OFFZ
1160
HUAL3
1165
EMLA4
1170
STRT10
1175
DUMMY
1177
EMLA3
1182
STRT11
1187
DUMMY
1189
SHEEP3
1194
EMLA5
1199
EPRK1
1204
SM-MO
1210
OCHD1B
1207
RETD1B
1211
SHEP2B
1216
LC-SM
1220
EGC1
1225
IRON1
1230
EL8
1235
DUMMY
1237
LOG1A
1242
STRT6A
1247
DUMMY
1249
EL1
1254
EML1
1259
EL2


Ultimate3.OUT
1264
EML2
1269
DUMMY
1271
STRT9
1276
DUMMY
1278
EL7
1283
EL6
1288
TP3
1293
STRT6B
1298
DUMMY
1300
TP4
1305
ESCHL1
1310
LOG1B
1315
EPRK2
1320
LC-TP
1327
1324
DCHD2B
RETD2B
1328
95-6
1334
OFFH
1340
DUMMY
1342
SHEP2A
1347
EGC2
1352
IRON2
1357
SK-IR
1360
EMLA2
1365
TP2
1370
IR-TP
1373
ES1
1379
IRON3
1384
IR-FT
1391
1387
IREAST
FTNOR
1394
EL5
1399
EL4
1404
STRT7
1409
DUMMY
1413
1411
OHARE
RFTLC
1416
EL3


1421
FORT1
1426
LOG2
1431
DUMMY
1433
FT-LC
1439
LOGCAB
1437
R2FTLC
1442
FORT2
1447
EML3
1452
EML4
1457
DUMMY
1459
SHEEP4
1464
FT-MO
1468
CP43
1471
95-7A
1477
95-7B
1483
95-8A
1489
95-8B
1495
C95-8B
1498
EMLA1
1503
TP1
1508
BR-TP
1512
E52
1518
BRENT1
1523
EGC3B
1528
DUMMY
1530
NORSE5
1535
EPF1
1540
CP44
1547
BRENT
1544
SOUTH
1550
SKY1
1555
NORSE4
1560
EGC3A
1565
EGC4
1570
DUMMY
1572
95-9B

```
 1578          .          .        CP45............
               .          .          .
               .          .          .
 1585          .          .          .-------->   RACEL
 1582          .          .       HORSE

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   10MAR15  TIME  14:28:45   *
*                                       *
*****************************************
```

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

SLATER HANIFAN GROUP
OLYMPIA COMPANIES
SKYE CANYON - MASTER DRAINAGE STUDY UPDATE 2
OVERALL PROPERTY ULTIMATE DRAINAGE CONDITION

RETURN PERIOD ------- 100 & 10-YEAR
DISTRIBUTION -------- 6-HOUR SDN3
PROJECT NO. --------- OLY1401.001
FILENAME ---------- Ultimate.H1
DATE ---------- 03/10/15
MODELED BY ---------- SMJ/ETM

SIX HOUR DEPTH-AREA REDUCTION FACTORS

DRAINAGE AREA (MI^2)	DARF
0.0-0.49	1.00
0.5-0.99	0.98
1.0-1.99	0.97
2.0-3.99	0.93
4.0-5.99	0.91
6.0-7.99	0.90
25-YR	0.70
10-YR	0.57

```
 25 ID        OUTPUT CONTROL VARIABLES
                   IPRNT          5  PRINT CONTROL
                   IPLOT          0  PLOT CONTROL
                   QSCAL         0.  HYDROGRAPH PLOT SCALE

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

              COMPUTATION INTERVAL     .08 HOURS
                   TOTAL TIME BASE   24.92 HOURS

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

    JP        MULTI-PLAN OPTION
                   NPLAN          1  NUMBER OF PLANS

    JR        MULTI-RATIO OPTION
                  RATIOS OF PRECIPITATION
                 1.00      .98      .97      .93      .91      .90      .70      .57
1
```

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .98	RATIO 3 .97	RATIO 4 .93	RATIO 5 .91	RATIO 6 .90	RATIO 7 .70	RATIO 8 .57
HYDROGRAPH AT +	95-5	.03	1	FLOW	57.	55.	55.	52.	51.	50.	36.	27.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO +	DCHD1B	.03	1	FLOW	51.	50.	49.	47.	46.	45.	32.	24.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT +	DHD01B	.03	1	FLOW	6.	5.	5.	5.	5.	5.	4.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT +	OFF8	.01	1	FLOW	22.	22.	22.	20.	20.	20.	14.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT +	CHD02B	.04	1	FLOW	28.	27.	27.	26.	25.	25.	18.	13.

				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO	DCHD2B	.04	1	FLOW	28.	27.	27.	25.	25.	24.	17.	13.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	DHD02B	.04	1	FLOW	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
HYDROGRAPH AT	WGED1	.02	1	FLOW	33.	32.	32.	31.	30.	29.	22.	17.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	STRT3	.00	1	FLOW	4.	4.	4.	4.	4.	4.	3.	2.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	WPT49	.02	1	FLOW	37.	36.	36.	34.	33.	33.	25.	19.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	OFFY	.01	1	FLOW	22.	22.	21.	20.	20.	20.	15.	11.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	WGED2	.04	1	FLOW	66.	64.	63.	60.	58.	58.	42.	31.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.58
HYDROGRAPH AT	OFFW	.01	1	FLOW	22.	21.	21.	20.	19.	19.	14.	10.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
5 COMBINED AT	CHD04B	.13	1	FLOW	147.	143.	142.	135.	131.	129.	94.	72.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	WMLA1	.03	1	FLOW	67.	66.	65.	62.	60.	60.	45.	35.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	WML8	.03	1	FLOW	59.	58.	57.	55.	53.	53.	39.	31.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	WPRK8	.00	1	FLOW	4.	4.	4.	4.	4.	4.	2.	2.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	STRT2	.00	1	FLOW	8.	8.	8.	8.	8.	7.	6.	5.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
4 COMBINED AT	DUMMY	.07	1	FLOW	139.	136.	135.	128.	125.	124.	92.	71.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	GRAND3	.01	1	FLOW	23.	23.	22.	21.	21.	21.	16.	13.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	WBU2	.02	1	FLOW	37.	37.	36.	34.	34.	33.	25.	19.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	WMLA2	.02	1	FLOW	39.	38.	37.	36.	35.	34.	26.	20.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
4 COMBINED AT	WPT48	.12	1	FLOW	238.	233.	230.	220.	214.	212.	158.	124.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CHD05B	.24	1	FLOW	385.	376.	372.	354.	346.	341.	253.	195.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	WML7	.03	1	FLOW	64.	62.	62.	59.	57.	57.	42.	33.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	STRT1	.00	1	FLOW	11.	10.	10.	10.	10.	9.	7.	6.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	WBU1	.05	1	FLOW	102.	100.	99.	94.	92.	91.	68.	53.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT	DUMMY	.09	1	FLOW	177.	173.	171.	163.	159.	157.	117.	92.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	PH1-1	.03	1	FLOW	47.	46.	45.	43.	42.	41.	29.	22.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	PH1-2	.03	1	FLOW	45.	44.	44.	41.	40.	39.	27.	19.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	GRAND2	.00	1	FLOW	6.	6.	6.	6.	6.	6.	4.	4.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58

HYDROGRAPH AT												
+	HORSE3	.01	1	FLOW	25.	24.	24.	23.	22.	22.	17.	14.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
5 COMBINED AT												
+	WPT46	.16	1	FLOW	294.	287.	284.	270.	263.	260.	191.	146.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	OFF14	.01	1	FLOW	29.	28.	28.	26.	26.	25.	19.	15.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT												
+	CHD06B	.42	1	FLOW	708.	691.	683.	651.	634.	626.	462.	356.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	95-9A	.01	1	FLOW	21.	20.	20.	19.	19.	18.	14.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT												
+	CHD07B	.43	1	FLOW	728.	712.	703.	670.	653.	644.	476.	367.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	OFF15	.03	1	FLOW	62.	61.	60.	57.	56.	55.	41.	32.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT												
+	CHD7B2	.47	1	FLOW	791.	773.	763.	727.	709.	700.	517.	398.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	OFF17B	.01	1	FLOW	15.	15.	15.	14.	14.	13.	10.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	OFF17A	.03	1	FLOW	51.	50.	49.	47.	45.	45.	32.	24.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT												
+	COFF17	.04	1	FLOW	66.	65.	64.	61.	59.	58.	42.	31.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	ON1	.00	1	FLOW	8.	7.	7.	7.	7.	7.	5.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	ON4A	.00	1	FLOW	8.	8.	8.	8.	7.	7.	5.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT												
+	C1	.01	1	FLOW	16.	16.	15.	15.	14.	14.	10.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO												
+	DIV1	.01	1	FLOW	13.	13.	13.	12.	12.	11.	8.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	D1	.01	1	FLOW	3.	3.	3.	3.	3.	3.	2.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	ON5	.01	1	FLOW	10.	9.	9.	9.	9.	8.	6.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT												
+	C2	.01	1	FLOW	13.	12.	12.	12.	11.	11.	8.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO												
+	DIV1A	.01	1	FLOW	13.	12.	12.	12.	11.	11.	8.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	D1A	.01	1	FLOW	0.	0.	0.	0.	0.	0.	0.	0.
				TIME	.00	.00	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT												
+	ON4B	.00	1	FLOW	6.	5.	5.	5.	5.	5.	3.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	RET1	.00	1	FLOW	13.	13.	13.	12.	12.	11.	8.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	ON6	.00	1	FLOW	7.	7.	7.	7.	7.	6.	5.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT												
+	C3	.00	1	FLOW	20.	20.	20.	19.	18.	18.	13.	9.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO												
+	DIV1B	.00	1	FLOW	20.	20.	20.	19.	18.	18.	13.	9.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	D1B	.00	1	FLOW	0.	0.	0.	0.	0.	0.	0.	0.
				TIME	.00	.00	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT												
+	ON2	.00	1	FLOW	9.	9.	9.	8.	8.	8.	6.	4.

				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	ON3	.01	1	FLOW	12.	12.	11.	11.	10.	10.	7.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	ON9	.00	1	FLOW	8.	8.	8.	7.	7.	7.	5.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT												
+	C4	.02	1	FLOW	29.	28.	28.	26.	26.	25.	18.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO												
+	DIV2	.02	1	FLOW	24.	23.	23.	22.	21.	21.	15.	11.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	D2	.02	1	FLOW	5.	5.	5.	5.	4.	4.	3.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	ON10	.00	1	FLOW	5.	5.	5.	4.	4.	4.	3.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT												
+	C5	.02	1	FLOW	10.	10.	9.	9.	9.	9.	6.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO												
+	DIV3	.02	1	FLOW	8.	8.	8.	7.	7.	7.	5.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	D3	.02	1	FLOW	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
HYDROGRAPH AT												
+	ON11	.00	1	FLOW	5.	5.	5.	4.	4.	4.	3.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT												
+	C6	.02	1	FLOW	7.	7.	7.	6.	6.	6.	4.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO												
+	DIV1C	.02	1	FLOW	7.	7.	7.	6.	6.	6.	4.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	D1C	.02	1	FLOW	0.	0.	0.	0.	0.	0.	0.	0.
				TIME	.00	.00	.00	.00	.00	.00	.00	.00
4 COMBINED AT												
+	CD1C	.04	1	FLOW	6.	5.	5.	5.	5.	5.	3.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO												
+	RCD1C	.04	1	FLOW	5.	5.	5.	5.	5.	4.	3.	2.
				TIME	3.67	3.67	3.67	3.75	3.75	3.75	3.75	3.83
DIVERSION TO												
+	DOFF23	.04	1	FLOW	5.	5.	5.	5.	5.	4.	3.	2.
				TIME	3.67	3.67	3.67	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT												
+	DRCD1C	.04	1	FLOW	0.	0.	0.	0.	0.	0.	0.	0.
				TIME	.00	.00	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT												
+	ON8	.00	1	FLOW	6.	6.	6.	5.	5.	5.	3.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	RET2	.00	1	FLOW	24.	23.	23.	22.	21.	21.	15.	11.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT												
+	C7	.00	1	FLOW	30.	29.	29.	27.	26.	26.	18.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	RET3	.00	1	FLOW	8.	8.	8.	7.	7.	7.	5.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	ON7	.01	1	FLOW	14.	13.	13.	12.	12.	12.	9.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT												
+	C8	.01	1	FLOW	51.	50.	49.	47.	45.	45.	32.	23.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	RET1A	.00	1	FLOW	13.	12.	12.	12.	11.	11.	8.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	RET1B	.00	1	FLOW	20.	20.	20.	19.	18.	18.	13.	9.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	RET1C	.00	1	FLOW	7.	7.	7.	6.	6.	6.	4.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50

+ 3 COMBINED AT	C9	.00	1	FLOW	40.	39.	38.	36.	35.	35.	25.	18.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	ON2D	.01	1	FLOW	21.	21.	20.	19.	19.	19.	14.	11.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	ON5D	.00	1	FLOW	8.	8.	8.	8.	7.	7.	6.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ 2 COMBINED AT	CP1	.01	1	FLOW	29.	29.	28.	27.	26.	26.	19.	15.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	ON3D	.00	1	FLOW	7.	7.	7.	7.	7.	7.	5.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ 2 COMBINED AT	CP2	.02	1	FLOW	37.	36.	36.	34.	33.	33.	24.	19.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	ON1D	.01	1	FLOW	16.	15.	15.	15.	14.	14.	10.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	ON4D	.00	1	FLOW	8.	8.	8.	8.	7.	7.	5.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ 2 COMBINED AT	CP3	.01	1	FLOW	24.	23.	23.	22.	21.	21.	16.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ 2 COMBINED AT	CP4	.03	1	FLOW	61.	59.	59.	56.	55.	54.	40.	31.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ 4 COMBINED AT	CENGCA	.08	1	FLOW	152.	148.	146.	139.	135.	134.	97.	73.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	PH2ML3	.04	1	FLOW	81.	79.	78.	74.	72.	71.	52.	40.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	PH2LG	.05	1	FLOW	77.	75.	74.	70.	68.	67.	47.	34.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	EGAN1	.01	1	FLOW	12.	12.	12.	11.	11.	11.	9.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ 3 COMBINED AT	DUMMY	.10	1	FLOW	170.	165.	163.	155.	151.	149.	107.	81.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	PH2L5	.00	1	FLOW	8.	8.	8.	7.	7.	7.	5.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	PH2L7	.01	1	FLOW	23.	22.	22.	21.	20.	20.	14.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	RACL1A	.01	1	FLOW	13.	13.	13.	12.	12.	12.	9.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ 4 COMBINED AT	RA-EG	.12	1	FLOW	209.	204.	201.	191.	186.	183.	132.	100.
				TIME	3.50	3.50	3.50	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	PH2ML1	.03	1	FLOW	60.	58.	58.	55.	54.	53.	40.	31.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	PH2ML2	.03	1	FLOW	59.	58.	57.	55.	53.	53.	39.	31.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	PH2L1	.03	1	FLOW	45.	44.	44.	41.	40.	40.	28.	21.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	PH2L2	.02	1	FLOW	31.	30.	30.	28.	28.	27.	19.	14.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ 5 COMBINED AT	DUMMY	.22	1	FLOW	402.	392.	387.	367.	358.	353.	255.	192.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	PH2L3A	.02	1	FLOW	29.	28.	27.	26.	25.	25.	17.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	HUAL1	.01	1	FLOW	14.	14.	14.	13.	13.	13.	10.	8.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	RACL1B	.01	1	FLOW	12.	12.	12.	11.	11.	11.	8.	7.

				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	HUAL2A	.01	1	FLOW	13.	12.	12.	12.	12.	11.	9.	7.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
5 COMBINED AT	RA-HU	.26	1	FLOW	469.	457.	451.	429.	417.	412.	298.	226.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	PH1-3	.02	1	FLOW	39.	38.	38.	36.	35.	34.	25.	18.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	CONQ	.00	1	FLOW	6.	6.	6.	6.	5.	5.	4.	3.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT	DUMMY	.28	1	FLOW	513.	500.	494.	469.	457.	450.	326.	246.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	PH1-5	.06	1	FLOW	107.	104.	103.	98.	96.	95.	71.	55.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	PH1PRK	.00	1	FLOW	4.	3.	3.	3.	3.	3.	2.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	RACL1C	.01	1	FLOW	13.	13.	13.	12.	12.	12.	8.	6.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
4 COMBINED AT	DUMMY	.35	1	FLOW	630.	615.	607.	577.	561.	554.	402.	305.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.58
HYDROGRAPH AT	PH1-4	.03	1	FLOW	49.	47.	47.	45.	44.	43.	32.	25.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	PH1-6	.05	1	FLOW	93.	91.	90.	86.	84.	83.	62.	48.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	GCD	.01	1	FLOW	10.	9.	9.	9.	9.	8.	6.	5.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
4 COMBINED AT	CP26	.43	1	FLOW	777.	759.	749.	712.	694.	684.	498.	381.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.58
2 COMBINED AT	CCP4	.52	1	FLOW	929.	907.	896.	851.	829.	818.	595.	451.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	OFF21B	.04	1	FLOW	75.	73.	72.	69.	67.	66.	49.	38.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CDF21B	.56	1	FLOW	1004.	980.	968.	920.	896.	884.	644.	489.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	ROFF23	.00	1	FLOW	5.	5.	5.	5.	5.	4.	3.	2.
+				TIME	3.67	3.67	3.67	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT	OFF23	.01	1	FLOW	17.	16.	16.	15.	15.	15.	11.	8.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	COFF23	.01	1	FLOW	19.	18.	18.	17.	17.	16.	11.	9.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.50
HYDROGRAPH AT	NW29-C	.13	1	FLOW	200.	195.	193.	183.	178.	176.	128.	96.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO	RNW29C	.13	1	FLOW	200.	195.	193.	184.	179.	176.	127.	96.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT	NW71-W	.10	1	FLOW	156.	153.	151.	143.	139.	137.	99.	74.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67
2 COMBINED AT	CNW71W	.24	1	FLOW	354.	345.	341.	324.	316.	312.	225.	170.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO	RCNW71	.24	1	FLOW	354.	344.	341.	322.	315.	310.	222.	165.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT	NW71-E	.24	1	FLOW	259.	252.	249.	234.	227.	223.	152.	108.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT	CNW71E	.47	1	FLOW	610.	593.	585.	552.	537.	529.	370.	272.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75

HYDROGRAPH AT	GT1	.02	1	FLOW	40.	39.	39.	37.	36.	36.	28.	22.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT	QFFU	.04	1	FLOW	74.	72.	71.	68.	66.	66.	49.	38.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT	CP26WT	.54	1	FLOW	704.	685.	676.	639.	622.	613.	433.	319.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
5 COMBINED AT	95STH	1.61	1	FLOW	2421.	2361.	2334.	2216.	2160.	2128.	1548.	1172.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	WOFF1	.41	1	FLOW	403.	391.	385.	361.	349.	343.	230.	160.
+				TIME	3.75	3.75	3.75	3.75	3.83	3.83	3.83	3.83
HYDROGRAPH AT	WOFF11	.03	1	FLOW	55.	54.	53.	51.	50.	49.	37.	29.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58	3.58
HYDROGRAPH AT	WOFF2	.04	1	FLOW	48.	47.	46.	43.	42.	41.	27.	18.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	WOFF3	.03	1	FLOW	38.	37.	36.	34.	33.	33.	22.	15.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
4 COMBINED AT	CP1	.50	1	FLOW	485.	471.	464.	435.	421.	415.	278.	194.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT	WOFF4	.06	1	FLOW	84.	82.	81.	76.	73.	72.	48.	34.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	WOFF5	.26	1	FLOW	236.	229.	226.	212.	205.	201.	134.	93.
+				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.92
HYDROGRAPH AT	WOFF6	.04	1	FLOW	59.	57.	56.	53.	51.	50.	34.	24.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	DN1	.03	1	FLOW	55.	54.	53.	50.	49.	48.	35.	27.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
5 COMBINED AT	DB1	.88	1	FLOW	822.	798.	786.	738.	715.	703.	472.	329.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO	RDB1	.88	1	FLOW	73.	71.	71.	68.	66.	65.	49.	37.
+				TIME	5.58	5.58	5.58	5.58	5.58	5.58	5.50	5.50
			** PEAK STAGES IN FEET **									
			1	STAGE	36.28	36.00	35.87	35.32	35.05	34.90	31.86	30.09
				TIME	5.58	5.58	5.58	5.58	5.58	5.58	5.50	5.50
HYDROGRAPH AT	AROY1	.00	1	FLOW	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
HYDROGRAPH AT	WML1	.01	1	FLOW	13.	13.	13.	12.	12.	12.	9.	7.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	SHEP1A	.03	1	FLOW	61.	59.	59.	56.	55.	54.	42.	34.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	AROY2	.01	1	FLOW	13.	13.	13.	12.	12.	11.	8.	6.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
5 COMBINED AT	DUMMY	.93	1	FLOW	110.	107.	106.	100.	98.	96.	70.	53.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	PH2L4	.02	1	FLOW	33.	32.	32.	30.	29.	29.	20.	15.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	PH2L8	.01	1	FLOW	22.	21.	21.	20.	19.	19.	13.	10.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT	DUMMY	.96	1	FLOW	164.	160.	158.	149.	145.	143.	103.	77.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	PH2L9	.03	1	FLOW	47.	46.	45.	43.	42.	41.	29.	21.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	WPF1	.00	1	FLOW	6.	5.	5.	5.	5.	5.	4.	3.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EGAN2	.00	1	FLOW	10.	10.	10.	10.	9.	9.	7.	6.
+												

				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
4 COMBINED AT												
+	DUMMY	.99	1	FLOW	227.	221.	218.	207.	201.	198.	142.	107.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	WPRK2	.01	1	FLOW	8.	8.	8.	8.	7.	7.	5.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	PH2PK1	.01	1	FLOW	13.	12.	12.	11.	11.	11.	7.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	PH2L3B	.01	1	FLOW	17.	16.	16.	15.	15.	15.	10.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
4 COMBINED AT												
+	DUMMY	1.01	1	FLOW	265.	258.	255.	241.	234.	231.	164.	122.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	PH2PK	.02	1	FLOW	29.	28.	27.	25.	25.	24.	15.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	HORSE2	.01	1	FLOW	27.	26.	26.	25.	24.	24.	19.	15.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT												
+	DUMMY	1.05	1	FLOW	320.	312.	308.	292.	283.	279.	198.	147.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	PH2PK2	.00	1	FLOW	4.	4.	4.	4.	4.	3.	2.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	PH2ML4	.04	1	FLOW	66.	64.	64.	61.	59.	58.	42.	32.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	SHAUM1	.01	1	FLOW	13.	13.	13.	12.	12.	12.	9.	7.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
4 COMBINED AT												
+	HU-HO	1.09	1	FLOW	402.	392.	387.	367.	357.	352.	251.	188.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	WML6	.02	1	FLOW	48.	47.	46.	44.	43.	43.	32.	25.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	AROY5	.00	1	FLOW	3.	3.	3.	3.	3.	3.	2.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	SHEP1B	.05	1	FLOW	99.	97.	96.	92.	89.	88.	68.	55.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT												
+	DUMMY	.07	1	FLOW	147.	144.	143.	136.	133.	132.	100.	80.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	WSCHL2	.02	1	FLOW	34.	33.	32.	31.	30.	29.	21.	15.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	STRT5	.01	1	FLOW	12.	12.	12.	11.	11.	11.	8.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	WL3	.03	1	FLOW	43.	42.	41.	39.	38.	37.	26.	20.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT												
+	AROY6	.01	1	FLOW	9.	9.	9.	8.	8.	8.	5.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
5 COMBINED AT												
+	DUMMY	.13	1	FLOW	245.	239.	237.	225.	220.	217.	161.	124.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	WPRK3	.00	1	FLOW	5.	5.	5.	5.	4.	4.	3.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	WL4	.02	1	FLOW	37.	36.	35.	33.	32.	32.	22.	16.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT												
+	STRT4	.00	1	FLOW	10.	10.	10.	9.	9.	9.	7.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
5 COMBINED AT												
+	DUMMY	1.25	1	FLOW	694.	677.	668.	634.	617.	609.	440.	333.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT												
+	WML5	.04	1	FLOW	75.	73.	72.	69.	67.	66.	49.	39.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58	3.58

HYDROGRAPH AT +	HUAL2B	.02	1	FLOW	26.	25.	25.	24.	24.	23.	18.	14.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
3 COMBINED AT +	DUMMY	1.31	1	FLOW	789.	769.	760.	722.	703.	693.	504.	383.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT +	AROY4	.01	1	FLOW	12.	12.	12.	11.	11.	11.	7.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT +	WML2	.05	1	FLOW	98.	96.	95.	91.	89.	88.	66.	51.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT +	WPRK4	.01	1	FLOW	11.	11.	10.	10.	9.	9.	6.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT +	SHAUM2	.01	1	FLOW	14.	14.	14.	13.	13.	13.	10.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
4 COMBINED AT +	DUMMY	.07	1	FLOW	134.	131.	129.	123.	120.	118.	87.	68.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58	3.58
HYDROGRAPH AT +	WL1	.02	1	FLOW	41.	40.	39.	37.	36.	35.	25.	18.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT +	HORSIA	.01	1	FLOW	22.	22.	22.	21.	20.	20.	15.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT +	SH-HO	.11	1	FLOW	195.	191.	188.	179.	175.	172.	127.	98.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT +	WOFF7	.01	1	FLOW	10.	10.	10.	9.	9.	9.	6.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT +	WOFF8	.17	1	FLOW	198.	192.	189.	177.	171.	169.	112.	77.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT +	CP2	.17	1	FLOW	204.	198.	195.	183.	177.	174.	116.	80.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT +	WOFF9	.12	1	FLOW	144.	140.	138.	129.	125.	123.	82.	57.
				TIME	3.58	3.58	3.58	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT +	WOFF10	.25	1	FLOW	292.	283.	279.	262.	253.	249.	166.	115.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT +	ON2	.03	1	FLOW	64.	62.	62.	59.	57.	56.	41.	31.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
4 COMBINED AT +	OB2	.57	1	FLOW	674.	655.	645.	606.	586.	577.	387.	269.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO +	ROB2	.57	1	FLOW	58.	57.	56.	54.	53.	52.	40.	29.
				TIME	5.33	5.33	5.33	5.33	5.33	5.33	5.33	5.33
			**	PEAK STAGES IN FEET **								
			1	STAGE	3002.99	3002.72	3002.58	3002.04	3001.77	3001.64	2998.97	2997.29
				TIME	5.33	5.33	5.33	5.33	5.33	5.33	5.33	5.33
HYDROGRAPH AT +	WPRK7	.00	1	FLOW	6.	6.	6.	5.	5.	5.	3.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT +	WL2	.04	1	FLOW	75.	73.	72.	68.	66.	65.	46.	34.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
4 COMBINED AT +	DUMMY	.72	1	FLOW	301.	294.	290.	274.	266.	263.	188.	141.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT +	SHAUM3	.00	1	FLOW	8.	8.	8.	7.	7.	7.	6.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT +	IRONIA	.00	1	FLOW	11.	11.	11.	10.	10.	10.	8.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT +	IR-SH	.73	1	FLOW	317.	309.	305.	289.	281.	277.	199.	150.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT +	WML3	.03	1	FLOW	51.	50.	49.	47.	46.	45.	34.	26.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT +	HORS1B	.00	1	FLOW	9.	9.	9.	9.	8.	8.	6.	5.

				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	WPRK5	.00	1	FLOW	3.	3.	3.	3.	3.	3.	2.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT	DUMMY	.03	1	FLOW	63.	62.	61.	58.	57.	56.	42.	33.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	WSCHL1	.06	1	FLOW	101.	98.	97.	92.	90.	88.	63.	47.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	IRON1B	.01	1	FLOW	16.	15.	15.	15.	14.	14.	11.	9.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	WML4	.01	1	FLOW	23.	23.	22.	21.	21.	21.	15.	12.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
5 COMBINED AT	DUMMY	.84	1	FLOW	511.	498.	492.	467.	454.	448.	323.	244.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.58
HYDROGRAPH AT	SHEP1C	.02	1	FLOW	47.	46.	46.	44.	43.	42.	33.	26.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT	HU-IR	2.17	1	FLOW	1346.	1314.	1297.	1232.	1199.	1183.	860.	653.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	OFF4-1	.30	1	FLOW	397.	386.	380.	358.	347.	342.	234.	167.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO	ROFF41	.30	1	FLOW	402.	390.	385.	362.	351.	346.	235.	166.
+				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.92
HYDROGRAPH AT	OFF4-2	.42	1	FLOW	682.	662.	652.	613.	594.	584.	393.	274.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT	COFF42	.72	1	FLOW	871.	844.	830.	777.	751.	737.	480.	325.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67
ROUTED TO	RCOFF4	.72	1	FLOW	866.	841.	824.	772.	749.	734.	476.	326.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT	OFF5-1	.30	1	FLOW	375.	364.	358.	335.	324.	319.	209.	143.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT	COFF51	1.02	1	FLOW	1241.	1205.	1182.	1108.	1074.	1052.	685.	469.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO	RCOFF5	1.02	1	FLOW	1206.	1167.	1151.	1078.	1043.	1025.	682.	464.
+				TIME	3.67	3.67	3.67	3.75	3.67	3.75	3.75	3.75
HYDROGRAPH AT	OFF5-2	.40	1	FLOW	467.	454.	447.	421.	408.	401.	272.	191.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO	ROFF52	.40	1	FLOW	462.	449.	441.	415.	402.	396.	267.	187.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT	NW1-C	.29	1	FLOW	327.	317.	312.	291.	281.	276.	179.	121.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75
2 COMBINED AT	CNW1-C	.69	1	FLOW	780.	757.	746.	700.	677.	666.	445.	308.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT	2CNW1C	1.70	1	FLOW	1985.	1914.	1895.	1778.	1716.	1691.	1126.	772.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO	R2CNW1	1.70	1	FLOW	1975.	1904.	1886.	1768.	1706.	1676.	1109.	755.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT	NW7-C	.49	1	FLOW	500.	486.	479.	450.	436.	429.	290.	204.
+				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT	CNW-7	2.19	1	FLOW	2473.	2388.	2363.	2213.	2140.	2103.	1394.	955.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83
ROUTED TO	RCNW7C	2.19	1	FLOW	2451.	2369.	2342.	2191.	2118.	2081.	1373.	954.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT	NW21-C	.16	1	FLOW	242.	236.	233.	221.	215.	212.	152.	114.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58

+ 2 COMBINED AT	CNW21C	2.35	1	FLOW	2649.	2562.	2533.	2373.	2295.	2255.	1500.	1030.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83
+ ROUTED TO	RCNW21	2.35	1	FLOW	2605.	2517.	2486.	2323.	2251.	2209.	1483.	1030.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.83
+ HYDROGRAPH AT	NW35-C	.34	1	FLOW	423.	413.	407.	385.	374.	369.	260.	191.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
+ 2 COMBINED AT	CNW35C	2.69	1	FLOW	3028.	2929.	2893.	2709.	2626.	2578.	1721.	1206.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.83
+ 2 COMBINED AT	CKC5	4.86	1	FLOW	3802.	3685.	3639.	3419.	3318.	3260.	2209.	1550.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
+ HYDROGRAPH AT	NW50-C	.17	1	FLOW	228.	222.	218.	205.	199.	196.	132.	93.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ 2 COMBINED AT	CKC6	5.03	1	FLOW	3979.	3860.	3807.	3577.	3471.	3411.	2313.	1625.
				TIME	3.67	3.67	3.75	3.75	3.75	3.75	3.75	3.75
+ HYDROGRAPH AT	OFFZ	.05	1	FLOW	69.	67.	66.	62.	60.	59.	40.	28.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	HUAL3	.00	1	FLOW	7.	7.	6.	6.	6.	6.	5.	4.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	EMLA4	.07	1	FLOW	105.	103.	101.	96.	93.	92.	66.	49.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	STRT10	.00	1	FLOW	8.	8.	8.	7.	7.	7.	6.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ 4 COMBINED AT	DUMMY	.13	1	FLOW	186.	181.	179.	169.	164.	162.	113.	83.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	EMLA3	.01	1	FLOW	25.	24.	24.	23.	22.	22.	16.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	STRT11	.01	1	FLOW	15.	15.	15.	14.	14.	13.	10.	8.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ 3 COMBINED AT	DUMMY	.15	1	FLOW	224.	218.	215.	204.	198.	195.	138.	102.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	SHEEP3	.04	1	FLOW	80.	78.	77.	74.	72.	72.	55.	44.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	EMLA5	.07	1	FLOW	115.	112.	111.	105.	102.	101.	72.	54.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	EPRK1	.00	1	FLOW	1.	1.	1.	1.	1.	1.	0.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.75
+ 5 COMBINED AT	SM-MO	5.30	1	FLOW	4330.	4202.	4140.	3888.	3766.	3699.	2486.	1757.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75
+ HYDROGRAPH AT	RETD1B	.00	1	FLOW	51.	50.	49.	47.	46.	45.	32.	24.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	SHEP2B	.09	1	FLOW	164.	160.	159.	152.	149.	147.	113.	91.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ 2 COMBINED AT	LC-SM	.09	1	FLOW	208.	204.	202.	193.	188.	186.	141.	111.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	EGC1	.01	1	FLOW	14.	14.	14.	13.	13.	12.	9.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	IRON1	.00	1	FLOW	8.	7.	7.	7.	7.	7.	5.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	EL8	.05	1	FLOW	48.	46.	45.	42.	41.	40.	24.	15.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ 4 COMBINED AT	DUMMY	.15	1	FLOW	270.	264.	261.	248.	241.	238.	174.	134.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58	3.58
+ HYDROGRAPH AT	LOG1A	.01	1	FLOW	14.	13.	13.	13.	12.	12.	10.	8.

				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	STRT6A	.00	1	FLOW	5.	5.	5.	5.	5.	5.	4.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ 3 COMBINED AT	DUMMY	.16	1	FLOW	289.	282.	279.	265.	258.	255.	187.	144.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	EL1	.04	1	FLOW	39.	37.	37.	34.	33.	32.	20.	12.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	EML1	.03	1	FLOW	46.	45.	45.	42.	41.	41.	29.	22.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	EL2	.04	1	FLOW	39.	38.	37.	34.	33.	32.	20.	12.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	EML2	.04	1	FLOW	57.	56.	55.	52.	51.	50.	36.	27.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ 5 COMBINED AT	DUMMY	.30	1	FLOW	465.	453.	447.	424.	412.	406.	289.	216.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	STRT9	.01	1	FLOW	14.	14.	14.	13.	13.	13.	10.	8.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ 2 COMBINED AT	DUMMY	.31	1	FLOW	480.	467.	461.	437.	425.	419.	299.	224.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	EL7	.04	1	FLOW	41.	40.	39.	36.	35.	34.	21.	13.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	EL6	.04	1	FLOW	43.	41.	40.	37.	36.	35.	21.	13.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	TP3	.00	1	FLOW	9.	9.	9.	9.	8.	8.	6.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	STRT6B	.00	1	FLOW	4.	4.	4.	4.	4.	4.	3.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ 4 COMBINED AT	DUMMY	.09	1	FLOW	94.	91.	90.	83.	80.	79.	50.	33.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	TP4	.00	1	FLOW	5.	5.	5.	5.	5.	5.	4.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	ESCHL1	.02	1	FLOW	27.	27.	26.	24.	24.	23.	15.	10.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	LOG1B	.00	1	FLOW	8.	8.	8.	7.	7.	7.	5.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	EPRK2	.01	1	FLOW	4.	3.	3.	3.	3.	3.	1.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.75
+ 5 COMBINED AT	LC-TP	.12	1	FLOW	135.	130.	128.	120.	115.	113.	72.	48.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	RETD2B	.00	1	FLOW	28.	27.	27.	25.	25.	24.	17.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	95-6	.01	1	FLOW	19.	18.	18.	17.	17.	16.	12.	9.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	OFFH	.01	1	FLOW	12.	12.	12.	11.	11.	11.	7.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ 3 COMBINED AT	DUMMY	.02	1	FLOW	59.	57.	57.	54.	52.	51.	37.	27.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	SHEP2A	.01	1	FLOW	21.	21.	21.	20.	19.	19.	15.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	EGC2	.01	1	FLOW	15.	15.	15.	14.	14.	14.	11.	9.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	IRON2	.01	1	FLOW	15.	15.	15.	14.	14.	14.	11.	9.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58

+ 4 COMBINED AT	SK-IR	.05	1	FLOW	109.	106.	105.	100.	98.	96.	71.	55.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	EMLA2	.02	1	FLOW	41.	40.	39.	38.	37.	36.	27.	21.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58	3.58
+ HYDROGRAPH AT	TP2	.00	1	FLOW	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 COMBINED AT	IR-TP	.07	1	FLOW	152.	148.	146.	139.	136.	134.	99.	77.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	ES1	.02	1	FLOW	29.	28.	28.	27.	26.	25.	18.	14.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	IRON3	.00	1	FLOW	5.	5.	5.	5.	5.	5.	4.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ 3 COMBINED AT	IR-FT	.09	1	FLOW	186.	182.	179.	171.	167.	164.	121.	93.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ DIVERSION TO	IREAST	.09	1	FLOW	118.	117.	117.	115.	114.	113.	104.	93.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ HYDROGRAPH AT	FTNOR	.09	1	FLOW	68.	65.	63.	56.	53.	51.	17.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	.00
+ HYDROGRAPH AT	EL5	.04	1	FLOW	42.	40.	39.	36.	35.	34.	21.	13.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	EL4	.03	1	FLOW	33.	32.	31.	29.	28.	27.	17.	11.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	STRT7	.00	1	FLOW	7.	7.	7.	7.	7.	7.	5.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ 4 COMBINED AT	DUMMY	.17	1	FLOW	140.	135.	132.	120.	114.	111.	55.	26.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ DIVERSION TO	OHARE	.17	1	FLOW	47.	45.	44.	39.	36.	35.	12.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	RFTLC	.17	1	FLOW	93.	90.	88.	81.	78.	76.	43.	26.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	EL3	.05	1	FLOW	48.	47.	46.	43.	41.	40.	24.	15.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	FORT1	.01	1	FLOW	14.	14.	14.	13.	13.	13.	10.	8.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
+ HYDROGRAPH AT	LOG2	.01	1	FLOW	13.	12.	12.	12.	12.	11.	9.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ 4 COMBINED AT	DUMMY	.23	1	FLOW	164.	158.	155.	144.	139.	136.	83.	54.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ 2 COMBINED AT	FT-LC	.35	1	FLOW	299.	289.	284.	264.	254.	249.	155.	101.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ DIVERSION TO	LOGCAB	.35	1	FLOW	187.	181.	178.	167.	161.	158.	104.	73.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	R2FTLC	.35	1	FLOW	112.	108.	105.	97.	93.	91.	51.	28.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	FORT2	.01	1	FLOW	14.	13.	13.	13.	12.	12.	9.	8.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
+ HYDROGRAPH AT	EML3	.04	1	FLOW	62.	61.	60.	57.	55.	54.	39.	29.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	EML4	.03	1	FLOW	51.	50.	49.	47.	45.	45.	32.	24.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ 5 COMBINED AT	DUMMY	.74	1	FLOW	717.	698.	688.	649.	630.	620.	430.	312.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
+ HYDROGRAPH AT	SHEEP4	.01	1	FLOW	28.	27.	27.	26.	25.	25.	19.	15.

				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	FT-MO	.75	1	FLOW	744.	724.	714.	674.	654.	644.	448.	327.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT	CP43	6.05	1	FLOW	4913.	4769.	4700.	4416.	4278.	4203.	2834.	1988.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT	95-7A	.01	1	FLOW	14.	14.	13.	13.	13.	12.	9.	7.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	95-7B	.01	1	FLOW	16.	15.	15.	15.	14.	14.	10.	8.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	95-8A	.01	1	FLOW	11.	11.	11.	10.	10.	10.	7.	6.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	95-8B	.00	1	FLOW	7.	7.	7.	6.	6.	6.	4.	3.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
4 COMBINED AT	C95-8B	.02	1	FLOW	47.	46.	46.	44.	43.	42.	31.	24.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EMLA1	.02	1	FLOW	33.	32.	32.	30.	29.	29.	22.	17.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.58
HYDROGRAPH AT	TP1	.00	1	FLOW	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 COMBINED AT	BR-TP	.04	1	FLOW	82.	80.	79.	76.	74.	73.	54.	42.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	ES2	.05	1	FLOW	84.	82.	81.	77.	75.	74.	55.	43.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	BRENT1	.00	1	FLOW	5.	4.	4.	4.	4.	4.	3.	3.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EGC3B	.02	1	FLOW	36.	35.	35.	33.	32.	32.	24.	19.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
4 COMBINED AT	DUMMY	.11	1	FLOW	199.	195.	192.	183.	179.	176.	131.	101.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	HORSE5	.00	1	FLOW	9.	9.	9.	9.	8.	8.	6.	5.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EPF1	.00	1	FLOW	4.	4.	4.	3.	3.	3.	3.	2.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT	CP44	.12	1	FLOW	212.	207.	205.	195.	191.	188.	140.	109.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO	BRENT	.12	1	FLOW	165.	160.	158.	148.	144.	141.	93.	62.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	SOUTH	.12	1	FLOW	47.	47.	47.	47.	47.	47.	47.	47.
+				TIME	3.33	3.33	3.33	3.33	3.42	3.42	3.50	3.50
HYDROGRAPH AT	SKY1	.00	1	FLOW	6.	6.	6.	5.	6.	5.	4.	3.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	HORSE4	.01	1	FLOW	16.	15.	15.	14.	14.	14.	11.	9.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EGC3A	.02	1	FLOW	36.	36.	35.	33.	33.	32.	24.	19.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	EGC4	.00	1	FLOW	12.	11.	11.	11.	10.	10.	8.	6.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
5 COMBINED AT	DUMMY	.15	1	FLOW	116.	115.	114.	111.	110.	109.	94.	84.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	95-9B	.01	1	FLOW	23.	22.	22.	21.	21.	20.	15.	12.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT	CP45	.16	1	FLOW	138.	136.	135.	131.	129.	128.	108.	95.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50

DIVERSION TO
+ RACEL .16 1 FLOW 101. 101. 101. 101. 101. 101. 101. 95.
TIME 3.33 3.42 3.42 3.42 3.42 3.42 3.50 3.50

HYDROGRAPH AT
+ HORSE .16 1 FLOW 37. 35. 34. 30. 28. 27. 7. 0.
TIME 3.50 3.50 3.50 3.50 3.50 3.50 3.50 .00

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= 1.00									
RCD1C	MANE	5.00	5.67	221.08	.16	5.00	5.16	220.00	.16

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3238E+00 EXCESS= .0000E+00 OUTFLOW= .3523E+00 BASIN STORAGE= .1286E-03 PERCENT ERROR= -8.8

FOR PLAN = 1 RATIO= .98									
RCD1C	MANE	5.00	5.11	219.85	.15	5.00	5.11	220.00	.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3150E+00 EXCESS= .0000E+00 OUTFLOW= .3298E+00 BASIN STORAGE= .1227E-03 PERCENT ERROR= -4.7

FOR PLAN = 1 RATIO= .97									
RCD1C	MANE	5.00	5.16	220.26	.15	5.00	5.04	220.00	.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3106E+00 EXCESS= .0000E+00 OUTFLOW= .3258E+00 BASIN STORAGE= .1231E-03 PERCENT ERROR= -4.9

FOR PLAN = 1 RATIO= .93									
RCD1C	MANE	5.00	4.93	223.66	.14	5.00	4.64	225.00	.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2932E+00 EXCESS= .0000E+00 OUTFLOW= .3030E+00 BASIN STORAGE= .1264E-03 PERCENT ERROR= -3.4

FOR PLAN = 1 RATIO= .91									
RCD1C	MANE	5.00	4.66	225.48	.13	5.00	4.59	225.00	.13

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2845E+00 EXCESS= .0000E+00 OUTFLOW= .2939E+00 BASIN STORAGE= .1102E-03 PERCENT ERROR= -3.4

FOR PLAN = 1 RATIO= .90									
RCD1C	MANE	5.00	4.29	226.36	.13	5.00	4.22	225.00	.13

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2801E+00 EXCESS= .0000E+00 OUTFLOW= .2856E+00 BASIN STORAGE= .1289E-03 PERCENT ERROR= -2.0

FOR PLAN = 1 RATIO= .70									
RCD1C	MANE	4.95	3.43	226.03	.09	5.00	3.07	225.00	.09

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1951E+00 EXCESS= .0000E+00 OUTFLOW= .2013E+00 BASIN STORAGE= .1055E-03 PERCENT ERROR= -3.2

FOR PLAN = 1 RATIO= .57									
RCD1C	MANE	5.00	2.44	230.11	.07	5.00	2.42	230.00	.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1422E+00 EXCESS= .0000E+00 OUTFLOW= .1470E+00 BASIN STORAGE= .1296E-03 PERCENT ERROR= -3.5

FOR PLAN = 1 RATIO= .00									
RNW29C	MANE	1.16	200.70	216.99	2.20	5.00	199.82	220.00	2.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1547E+02 EXCESS= .0000E+00 OUTFLOW= .1547E+02 BASIN STORAGE= .1101E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RNW29C	MANE	1.17	195.60	216.78	2.14	5.00	195.08	220.00	2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1507E+02 EXCESS= .0000E+00 OUTFLOW= .1507E+02 BASIN STORAGE= .1164E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RNW29C	MANE	1.18	193.06	216.68	2.11	5.00	192.77	220.00	2.12

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1487E+02 EXCESS= .0000E+00 OUTFLOW= .1487E+02 BASIN STORAGE= .1183E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RNW29C	MANE	1.20	183.62	219.98	2.00	5.00	183.59	220.00	2.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1408E+02 EXCESS= .0000E+00 OUTFLOW= .1408E+02 BASIN STORAGE= .1103E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RNW29C	MANE	1.21	178.86	219.91	1.94	5.00	178.72	220.00	1.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1368E+02 EXCESS= .0000E+00 OUTFLOW= .1368E+02 BASIN STORAGE= .1120E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RNW29C MANE 1.22 176.46 219.89 1.91 5.00 176.30 220.00 1.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1348E+02 EXCESS= .0000E+00 OUTFLOW= .1348E+02 BASIN STORAGE= .1152E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RNW29C MANE 1.39 127.40 220.84 1.36 5.00 126.98 220.00 1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9562E+01 EXCESS= .0000E+00 OUTFLOW= .9563E+01 BASIN STORAGE= .1193E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RNW29C MANE 1.55 95.94 220.65 1.01 5.00 95.76 220.00 1.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7101E+01 EXCESS= .0000E+00 OUTFLOW= .7101E+01 BASIN STORAGE= .1210E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00
RCNW71 MANE 2.94 355.46 220.39 2.17 5.00 354.10 220.00 2.17

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2731E+02 EXCESS= .0000E+00 OUTFLOW= .2733E+02 BASIN STORAGE= .3491E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RCNW71 MANE 2.97 345.10 219.57 2.11 5.00 344.48 220.00 2.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2660E+02 EXCESS= .0000E+00 OUTFLOW= .2662E+02 BASIN STORAGE= .4070E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RCNW71 MANE 2.98 342.49 220.64 2.09 5.00 340.66 220.00 2.09

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2625E+02 EXCESS= .0000E+00 OUTFLOW= .2627E+02 BASIN STORAGE= .4628E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RCNW71 MANE 3.04 322.83 222.04 1.98 5.00 322.13 220.00 1.97

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2485E+02 EXCESS= .0000E+00 OUTFLOW= .2486E+02 BASIN STORAGE= .3489E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RCNW71 MANE 3.07 316.43 221.36 1.92 5.00 314.51 220.00 1.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2415E+02 EXCESS= .0000E+00 OUTFLOW= .2416E+02 BASIN STORAGE= .3970E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RCNW71 MANE 3.09 310.02 219.48 1.89 5.00 309.77 220.00 1.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2379E+02 EXCESS= .0000E+00 OUTFLOW= .2381E+02 BASIN STORAGE= .4236E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RCNW71 MANE 3.52 224.69 221.80 1.34 5.00 222.14 220.00 1.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1687E+02 EXCESS= .0000E+00 OUTFLOW= .1688E+02 BASIN STORAGE= .4211E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
RCNW71 MANE 3.94 167.37 220.66 .99 5.00 164.87 220.00 .99

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1251E+02 EXCESS= .0000E+00 OUTFLOW= .1252E+02 BASIN STORAGE= .4172E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
ROFF41 MANE 5.00 401.70 230.00 2.08 5.00 401.70 230.00 2.08

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3333E+02 EXCESS= .0000E+00 OUTFLOW= .3335E+02 BASIN STORAGE= .1750E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
ROFF41 MANE 5.00 390.47 230.00 2.02 5.00 390.47 230.00 2.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3236E+02 EXCESS= .0000E+00 OUTFLOW= .3237E+02 BASIN STORAGE= .2744E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
ROFF41 MANE 5.00 384.86 230.00 1.99 5.00 384.86 230.00 1.99

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3187E+02 EXCESS= .0000E+00 OUTFLOW= .3189E+02 BASIN STORAGE= .2723E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00
ROFF41 MANE 5.00 362.42 230.00 1.87 5.00 362.42 230.00 1.87

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2994E+02 EXCESS= .0000E+00 OUTFLOW= .2996E+02 BASIN STORAGE= .2637E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

ROFF41	MANE	5.00	351.22	230.00	1.81	5.00	351.22	230.00	1.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2899E+02 EXCESS= .0000E+00 OUTFLOW= .2900E+02 BASIN STORAGE= .2593E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

ROFF41	MANE	5.00	345.62	230.00	1.78	5.00	345.62	230.00	1.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2851E+02 EXCESS= .0000E+00 OUTFLOW= .2853E+02 BASIN STORAGE= .2571E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

ROFF41	MANE	5.00	235.01	230.00	1.20	5.00	235.01	230.00	1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1923E+02 EXCESS= .0000E+00 OUTFLOW= .1925E+02 BASIN STORAGE= .2167E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

ROFF41	MANE	5.00	166.38	235.00	.85	5.00	166.38	235.00	.85

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1358E+02 EXCESS= .0000E+00 OUTFLOW= .1360E+02 BASIN STORAGE= .1829E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCOFF4	MANE	3.24	865.73	220.01	1.97	5.00	865.68	220.00	1.97

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7577E+02 EXCESS= .0000E+00 OUTFLOW= .7578E+02 BASIN STORAGE= .1079E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCOFF4	MANE	3.26	842.05	221.73	1.91	5.00	840.86	220.00	1.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7352E+02 EXCESS= .0000E+00 OUTFLOW= .7352E+02 BASIN STORAGE= .9388E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCOFF4	MANE	3.27	825.35	219.35	1.88	5.00	824.16	220.00	1.88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7236E+02 EXCESS= .0000E+00 OUTFLOW= .7237E+02 BASIN STORAGE= .1105E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCOFF4	MANE	3.33	772.80	219.69	1.77	5.00	772.08	220.00	1.77

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6788E+02 EXCESS= .0000E+00 OUTFLOW= .6788E+02 BASIN STORAGE= .9246E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCOFF4	MANE	3.36	752.34	221.60	1.71	5.00	749.29	220.00	1.71

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6567E+02 EXCESS= .0000E+00 OUTFLOW= .6567E+02 BASIN STORAGE= .1193E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCOFF4	MANE	3.37	734.27	219.22	1.68	5.00	733.69	220.00	1.68

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6454E+02 EXCESS= .0000E+00 OUTFLOW= .6455E+02 BASIN STORAGE= .9505E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCOFF4	MANE	3.76	482.18	221.57	1.12	5.00	476.02	220.00	1.12

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4305E+02 EXCESS= .0000E+00 OUTFLOW= .4306E+02 BASIN STORAGE= .1196E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCOFF4	MANE	4.14	330.33	223.45	.78	5.00	326.15	220.00	.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3008E+02 EXCESS= .0000E+00 OUTFLOW= .3009E+02 BASIN STORAGE= .1165E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCOFF5	MANE	2.25	1228.06	222.36	1.90	5.00	1205.92	220.00	1.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1033E+03 EXCESS= .0000E+00 OUTFLOW= .1033E+03 BASIN STORAGE= .3651E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCOFF5	MANE	2.26	1185.89	223.68	1.85	5.00	1167.37	220.00	1.85

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1001E+03 EXCESS= .0000E+00 OUTFLOW= .1001E+03 BASIN STORAGE= .4261E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCOFF5	MANE	2.27	1169.63	222.25	1.82	5.00	1150.99	220.00	1.82

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9855E+02 EXCESS= .0000E+00 OUTFLOW= .9855E+02 BASIN STORAGE= .4446E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCOFF5	MANE	2.30	1095.29	222.88	1.70	5.00	1077.77	225.00	1.70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9234E+02 EXCESS= .0000E+00 OUTFLOW= .9234E+02 BASIN STORAGE= .4656E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCOFF5	MANE	2.31	1055.93	224.27	1.65	5.00	1042.62	220.00	1.65

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8931E+02 EXCESS= .0000E+00 OUTFLOW= .8932E+02 BASIN STORAGE= .4131E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCOFF5	MANE	2.32	1040.15	222.85	1.62	5.00	1024.57	225.00	1.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8773E+02 EXCESS= .0000E+00 OUTFLOW= .8773E+02 BASIN STORAGE= .4439E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCOFF5	MANE	2.53	681.78	225.10	1.07	5.00	681.59	225.00	1.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5812E+02 EXCESS= .0000E+00 OUTFLOW= .5812E+02 BASIN STORAGE= .3873E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCOFF5	MANE	2.73	465.13	223.77	.74	5.00	463.68	225.00	.74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4036E+02 EXCESS= .0000E+00 OUTFLOW= .4036E+02 BASIN STORAGE= .3573E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

ROFF52	MANE	1.35	464.06	226.77	1.91	5.00	461.60	225.00	1.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4017E+02 EXCESS= .0000E+00 OUTFLOW= .4017E+02 BASIN STORAGE= .1739E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

ROFF52	MANE	1.36	451.14	226.72	1.85	5.00	448.50	225.00	1.85

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3898E+02 EXCESS= .0000E+00 OUTFLOW= .3898E+02 BASIN STORAGE= .2037E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

ROFF52	MANE	1.36	445.36	226.03	1.82	5.00	441.49	225.00	1.82

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3839E+02 EXCESS= .0000E+00 OUTFLOW= .3839E+02 BASIN STORAGE= .2024E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

ROFF52	MANE	1.38	419.07	226.04	1.71	5.00	415.13	225.00	1.71

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3603E+02 EXCESS= .0000E+00 OUTFLOW= .3603E+02 BASIN STORAGE= .1941E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

ROFF52	MANE	1.39	406.06	226.09	1.65	5.00	402.05	225.00	1.66

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3486E+02 EXCESS= .0000E+00 OUTFLOW= .3486E+02 BASIN STORAGE= .1879E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

ROFF52	MANE	1.39	398.62	226.83	1.63	5.00	395.81	225.00	1.63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3428E+02 EXCESS= .0000E+00 OUTFLOW= .3428E+02 BASIN STORAGE= .1844E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

ROFF52	MANE	1.50	270.32	227.13	1.09	5.00	267.08	225.00	1.09

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2297E+02 EXCESS= .0000E+00 OUTFLOW= .2297E+02 BASIN STORAGE= .1880E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

ROFF52	MANE	1.61	190.57	227.49	.76	5.00	187.21	225.00	.77

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1611E+02 EXCESS= .0000E+00 OUTFLOW= .1611E+02 BASIN STORAGE= .2012E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R2CNW1	MANE	1.49	1981.82	225.82	1.86	5.00	1974.68	225.00	1.86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1690E+03 EXCESS= .0000E+00 OUTFLOW= .1691E+03 BASIN STORAGE= .3892E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R2CNW1	MANE	1.51	1912.07	223.11	1.80	5.00	1904.02	225.00	1.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1639E+03 EXCESS= .0000E+00 OUTFLOW= .1639E+03 BASIN STORAGE= .3878E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R2CNW1	MANE	1.51	1888.16	225.53	1.77	5.00	1886.09	225.00	1.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1613E+03 EXCESS= .0000E+00 OUTFLOW= .1613E+03 BASIN STORAGE= .3547E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R2CNW1	MANE	1.55	1769.31	226.69	1.66	5.00	1765.56	225.00	1.66

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1511E+03 EXCESS= .0000E+00 OUTFLOW= .1512E+03 BASIN STORAGE= .3480E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R2CNW1	MANE	1.57	1707.90	223.62	1.61	5.00	1706.46	225.00	1.61

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1462E+03 EXCESS= .0000E+00 OUTFLOW= .1462E+03 BASIN STORAGE= .3701E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R2CNW1	MANE	1.58	1687.56	226.52	1.58	5.00	1676.39	225.00	1.58

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1436E+03 EXCESS= .0000E+00 OUTFLOW= .1436E+03 BASIN STORAGE= .4003E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R2CNW1	MANE	1.86	1120.27	227.36	1.05	5.00	1108.60	225.00	1.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9509E+02 EXCESS= .0000E+00 OUTFLOW= .9509E+02 BASIN STORAGE= .3506E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R2CNW1	MANE	2.17	766.32	227.62	.72	5.00	755.28	225.00	.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6589E+02 EXCESS= .0000E+00 OUTFLOW= .6590E+02 BASIN STORAGE= .3445E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW7C	MANE	.89	2462.18	226.26	1.84	5.00	2451.36	225.00	1.84

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2155E+03 EXCESS= .0000E+00 OUTFLOW= .2155E+03 BASIN STORAGE= .2461E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW7C	MANE	.91	2383.87	225.83	1.79	5.00	2368.76	225.00	1.79

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2089E+03 EXCESS= .0000E+00 OUTFLOW= .2089E+03 BASIN STORAGE= .2472E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW7C	MANE	.91	2359.23	225.87	1.76	5.00	2342.07	225.00	1.76

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2057E+03 EXCESS= .0000E+00 OUTFLOW= .2057E+03 BASIN STORAGE= .2299E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW7C	MANE	.93	2206.43	226.24	1.65	5.00	2191.30	225.00	1.65

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1928E+03 EXCESS= .0000E+00 OUTFLOW= .1928E+03 BASIN STORAGE= .2334E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW7C	MANE	.95	2130.60	225.53	1.59	5.00	2118.47	225.00	1.60

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1864E+03 EXCESS= .0000E+00 OUTFLOW= .1864E+03 BASIN STORAGE= .2256E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW7C	MANE	.95	2098.20	226.16	1.57	5.00	2080.99	225.00	1.57

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1831E+03 EXCESS= .0000E+00 OUTFLOW= .1831E+03 BASIN STORAGE= .2490E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW7C	MANE	1.12	1392.22	226.06	1.04	5.00	1373.42	225.00	1.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1214E+03 EXCESS= .0000E+00 OUTFLOW= .1214E+03 BASIN STORAGE= .2317E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW7C	MANE	1.31	957.73	227.73	.72	5.00	954.41	230.00	.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8430E+02 EXCESS= .0000E+00 OUTFLOW= .8430E+02 BASIN STORAGE= .2502E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW21	MANE	1.78	2629.57	226.17	1.87	5.00	2604.73	225.00	1.87

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2336E+03 EXCESS= .0000E+00 OUTFLOW= .2336E+03 BASIN STORAGE= .4681E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW21	MANE	1.80	2550.70	227.42	1.81	5.00	2516.67	225.00	1.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2265E+03 EXCESS= .0000E+00 OUTFLOW= .2265E+03 BASIN STORAGE= .4816E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW21	MANE	1.81	2525.46	226.65	1.78	5.00	2485.75	225.00	1.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2231E+03 EXCESS= .0000E+00 OUTFLOW= .2231E+03 BASIN STORAGE= .5740E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW21	MANE	1.86	2368.81	227.07	1.67	5.00	2323.41	225.00	1.67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2092E+03 EXCESS= .0000E+00 OUTFLOW= .2092E+03 BASIN STORAGE= .4579E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW21	MANE	1.89	2276.25	226.34	1.62	5.00	2251.38	225.00	1.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2024E+03 EXCESS= .0000E+00 OUTFLOW= .2024E+03 BASIN STORAGE= .4940E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW21	MANE	1.90	2242.47	227.93	1.59	5.00	2209.02	225.00	1.59

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1988E+03 EXCESS= .0000E+00 OUTFLOW= .1988E+03 BASIN STORAGE= .5501E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW21	MANE	2.24	1497.78	228.05	1.06	5.00	1483.14	230.00	1.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1325E+03 EXCESS= .0000E+00 OUTFLOW= .1325E+03 BASIN STORAGE= .4606E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCNW21	MANE	2.60	1030.60	228.67	.74	5.00	1030.01	230.00	.74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9245E+02 EXCESS= .0000E+00 OUTFLOW= .9247E+02 BASIN STORAGE= .4743E-02 PERCENT ERROR= .0

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

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVMO		LAS VEGAS WASH - MOCCASIN						
0144	P1	Conc Chnl 27'W 13'D 0:1 SS	1915	12502	2C64-E	LOWER5	77.49	3.10
0184	P1	Conc Chnl 27'W 12.5'D 0:1 SS	2440	12478	2CNW64-C	LOWER5	76.76	3.10
0226	P1	Conc Chnl 27'W 12.5'D 0:1 SS	2500	12478	2CNW64-C	LOWER5	76.76	3.10
0276	P1	Bridge 30'W 10'D	400	11877	CNW51-C	LOWER5	71.44	3.10
MOKC		MOCCASIN AND KYLE CANYON						
0000	P1	11' X 8' RCB	5450	2662	CNW35-C	LOWER3	2.69	3.40
MOSM		MOCCASIN AND SHEEP MOUNTAIN PARKWAY						
0000	P0	14' X 9' RCB	3370	3778	CNW64-C	LOWER3	5.32	2.40
0064	P0	14' X 8' RCB	880	3505	CNW50-C	LOWER3	4.99	3.00
0080	P0	14' X 8' RCB	710	3325	2CNW35-C	LOWER3	4.80	3.00

PROJECT SITE

MOCCASIN RD

LOG CABIN WY

DURANGO DR

APACHE RD

KYLE CANYON RD

REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 8
FLOOD CONTROL FACILITIES

LEGEND

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

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

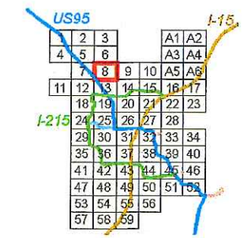
FIGURE 4A

N

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

Scale: 1 inch = 2,000 feet

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



REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 12
FLOOD CONTROL FACILITIES

LEGEND

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

Remove & Replace/Parallel Facilities

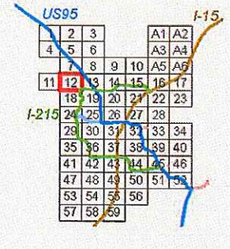
Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

N

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

Scale: 1 inch = 2,000 feet

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



ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
CNGT		CENTENNIAL PKWY CHANNEL WEST / GRAND TETON BRANCH						
0118	E	6' X 5' RCAP	5472	363	KYLEDET*	KYLEDB	57.73	3.72
0222	E	6' X 6' RCAP	305	363	KYLEDET	KYLEDB	57.73	1.16
0234	E	6' X 4' RCAP	885	363	KYLEDET	KYLEDB	57.73	4.50
0247	E	6' X 5' RCAP	1600	363	KYLEDET	KYLEDB	57.73	1.63
EKHU		ELKHORN AND HUALAPAI						
0003	E	6' X 4' RCAP	980	638	CNW26-C	WEST3	0.51	3.61
0020	E	6' X 5' RCAP	150	638	CNW26-C	WEST3	0.51	3.61
0023	E	8' X 5' RCAP	1200	638	CNW26-C	WEST3	0.51	0.90
GOAN		GOWAN ANN ROAD DETENTION BASIN FACILITIES						
0070	E	Soil Cement Chnl 10'W 4'-7'D 4:1 SS	3125	1045	CCAMDK3	ALLGOW3	0.65	3.00
0127	E	Soil Cement Chnl 10'W 2'-6'D 4:1 SS	1292	531	CAMDK3	ALLGOW3	0.32	1.73
GOBW		GOWAN BELTWAY WEST						
0291	P1	8' X 6' RCB	1255	795	CMNA2	ALLGOW3	0.49	1.70
0315	P1	6' X 6' RCB	1360	591	CDMNA3	ALLGOW3	0.35	4.00
KCUN		KYLE CANYON AND UNKNOWN						
0000	P1	84" RCP	685	751	CNW1-C	LOWER3	0.69	2.20
LVMD		LAS VEGAS WASH - MIDDLE						
3313	E	120,000 cfs PMF Spillway		120000	KYLEDB	KYLEDB	57.73	
3314	E	78" RCP Outlet	385	363	KYLEDET	KYLEDB	57.73	
3315	E	3,200 ac-ft Kyle Canyon Detention Basin		13554	KYLEDB	KYLEDB	57.73	
3316	E	Riprap Levee (South) 5'	1250	13554	KYLEDB	KYLEDB	57.73	3.00
MOHU		MOCCASIN - HUALAPAI BRANCH						
0085	P0	72" RCP	790	368	CNW45-N	LOWER3	1.15	3.00
0100	P0	Natural Wash	850	65	DMODB1	LOWER3	0.81	3.00
0116	P0	60" RCPC	120	65	DMODB1	LOWER3	0.81	3.00
0118	P0	Natural Wash	3485	65	DMODB1	LOWER3	0.81	3.00
0184	P0	30" RCP Outlet	50	65	DMODB1	LOWER3	0.81	3.00
0185	P0	3,145 cfs PMF Spillway		3145	COFF20	LOWER3	0.81	
0186	P0	55 ac-ft Moccasin Outfall Detention Basin #1		721	COFF20	LOWER3	0.81	
MOIR		MOCCASIN - IRON MOUNTAIN BRANCH						
0000	P0	66" RCP	2770	446	2CNW33-C	LOWER3	1.76	3.60
0052	P0	42" RCP	2530	51	MODB3	LOWER3	0.39	3.60
0096	P0	30" RCP Outlet	50	51	MODB3	LOWER3	0.39	3.00
0097	P0	3,310 cfs PMF Spillway		3310	MODB3	LOWER3	0.39	
0098	P0	60 ac-ft Moccasin Outfall Detention Basin #3		396	OFF16	LOWER3	0.39	
MOKC		MOCCASIN AND KYLE CANYON						
0000	P1	11' X 8' RCB	5450	2662	CNW35-C	LOWER3	2.69	3.40
0222	P1	9' X 8' RCB	3900	2192	CNW-7	LOWER3	2.19	3.46
0325	P1	9' X 8' RCB	5700	2192	CNW-7	LOWER3	2.19	3.65
0380	P1	90" RCP	3000	1146	COFF5-1	LOWER3	1.02	3.73
MOSH		MOCCASIN AND SHEEP MOUNTAIN						
0000	P1	Conc Chnl 12'W 7.5'D 0:1 SS	2640	1963	COFF1A-6	LOWER3	3.70	2.71
0053	P1	Conc Chnl 12'W 8.5'D 0:1 SS	2640	1758	COFF2B	LOWER3	3.23	1.39
MOSR		MOCCASIN - SHAUMBER BRANCH						
0000	P0	54" RCP	1860	94	MODB2	LOWER3	1.44	2.40
0035	P0	Natural Wash	1215	46	MODB2	LOWER3	1.05	3.00
0058	P0	27" RCP Outlet	50	46	MODB2	LOWER3	1.05	3.00
0059	P0	3,145 cfs PMF Spillway		3145	COFF18	LOWER3	1.05	
0060	P0	40 ac-ft Moccasin Outfall Detention Basin #2		275	COFF18	LOWER3	1.05	
0061	P0	30" RCP Outlet from MOHU0186 to MOSR0060	100	76	DMODB2	LOWER3	0.81	3.00
RCBC		RANCHO ROAD SYSTEM - BELTWAY CHANNEL						
0100	E	Conc Chnl 12'W 5.5'D 0:1 SS	2085	598	CDMNA1	WEST3	0.48	2.88
0140	E	Conc Chnl 10'W 5'D 0:1 SS	2155	598	CDMNA1	WEST3	0.48	1.65

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

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

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

REGIONAL FLOOD CONTROL DISTRICT

2013 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

FACILITY INVENTORY FIGURE F - 12

LEGEND

ID (Facility Identifier) AABB
Parent Stream Name
Stream Name
River Mile 0000
Distance Above Confluence with Parent Stream (Miles)
Miles in Hundredths

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

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

Construction Features

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

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
CN95		CENTENNIAL PKWY CHANNEL WEST / U.S 95 BRANCH						
0318	E	Transition Structure	60	653	CNW74-C	WEST3	0.44	1.50
0333	E	5' X 5' RCB	670	339	NW62-S	WEST3	0.22	1.50
MOHU		MOCCASIN - HUALAPAI BRANCH						
0000	P0	14' X 8' RCB	1920	761	2CNW45-N	LOWER3	2.10	0.50
0036	P0	10' X 8' RCB	2590	368	CNW45-N	LOWER3	1.15	0.50
MOIR		MOCCASIN - IRON MOUNTAIN BRANCH						
0000	P0	66" RCP	2770	446	2CNW33-C	LOWER3	1.76	3.60
MOKC		MOCCASIN AND KYLE CANYON						
0000	P1	11' X 8' RCB	5450	2662	CNW35-C	LOWER3	2.69	3.40
MOSM		MOCCASIN AND SHEEP MOUNTAIN PARKWAY						
0000	P0	14' X 9' RCB	3370	3778	CNW64-C	LOWER3	5.32	2.40
0064	P0	14' X 8' RCB	880	3505	CNW50-C	LOWER3	4.99	3.00
0080	P0	14' X 8' RCB	710	3325	2CNW35-C	LOWER3	4.80	3.00

PROJECT SITE

REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 13

FLOOD CONTROL FACILITIES

LEGEND

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

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

FIGURE 4B

N

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

Scale: 1 inch = 2,000 feet

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

US95 I-15 I-215