

Rancho Drive Capacity Improvements Bonanza to Decatur Final Technical Drainage Report



**70% Submittal
APRIL 2014**

Prepared by:
Parsons Brinckerhoff
3753 Howard Hughes Parkway,
Suite 135
Las Vegas, NV 89169
TEL: 702-697-8100
FAX: 702-697-8170

Prepared for:



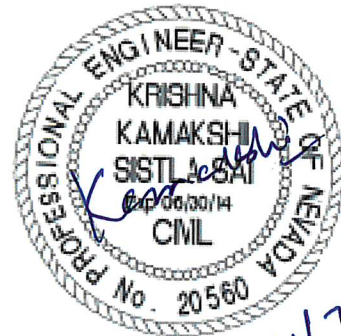
City of Las Vegas, Nevada

**RANCHO DRIVE CAPACITY IMPROVEMENTS
BONANZA TO DECATUR**

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HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Rancho Drive Capacity Improvements- Bonanza to Decatur Date: 04/07/2014

Location of Development: a) Descriptive (Cross Streets) North/South: Rancho Drive

East/West: Decatur Boulevard and Bonanza Road

b) Section: 18,19,20,29 Township: 20 South Range: 61 East

c) APN: _____

Name of Owner: City of Las Vegas

Telephone No.: 702-229-6734 Fax No.: 702-229-2518 E Mail Address: msturdivant@LasVegasNevada.GOV

Address: 333 North Rancho Drive, Suite 700, Las Vegas, NV 89106

Contact Person Name: Kamakshi Sistla Telephone No.: 702-697-8109

* E Mail Address: sistla@pbworld.com Fax No.: 702-697-8170

Firm: Parsons Brinckerhoff

Address: 3953 Howard Hughes Parkway, Suite 135, Las Vegas, NV 89169

Type of Land Development/Land Disturbance Process:

☐	Rezoning	☐	Subdivision Map	☐	Clearing and Grading Only
☐	Parcel Map	☐	Planned Unit Development	☐	Other (Please specify below)
☐	Large Parcel Map	☐	Building Permit	☐	Flood Control Facility

1. Total Owned Land Area: At Site: Public ROW Being Developed/Disturbed: Rancho Drive

2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ Yes** ☒ No

3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☒ Yes** ☐ No

4. Proposed type of development (Residential, Commercial, Etc.): Local Flood Control Facility

5. Approximate upstream land area which drains to the subject site: 9.61 Square Miles

6. Has the site drainage been evaluated in the past? ☐ YES ☒ NO If yes, please identify documentation: _____

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: The proposed storm drain improvements include a storm drain facility within Rancho Drive. The system discharges flows to the existing MPU facilities in Vegas Drive, Washington Avenue and in Rancho Drive.

8. Briefly describe your proposed schedule for the subject project: Tentative Design completion in 2015



Engineer's Seal

Submit this form as part of the required drainage study to the local entity which has jurisdiction over the subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.

*New Required Field

****Review and concurrence of the Clark County Regional Flood Control District is required.**

Local Entity File No.	Revision	Date

REFERENCE:

STANDARD FORM 1

April 7, 2014

Michael Sturdivant, P.E.
Engineering Project Manager
City of Las Vegas
333 N. Rancho Drive
Las Vegas, Nevada 89106

Re: Rancho Drive Capacity Improvements- Bonanza to Decatur, Option "A"
70% Plan Submittal.. Hansen # 41026, WU8169, Task 647
Responses to comments from Flood Control Department

Dear Mr. Sturdivant,

This letter is in response to the comments received from your office on November 8, 2012. The comments are reiterated for your convenience. We believe that the material included with the 70% submittal addresses each of the comments to the previous submittal.

Please see Parsons Brinckerhoff's responses below:

1. The proposed storm drain system needs to be further discussed as the design progresses toward the 70% submittal. Flood Control recommends that progress plans for the storm drain system be provided for review and input prior to the 70% submittal. The Drainage Design Report needs to discuss the system limitations and recommended system changes based upon the hydrology and hydraulics of the area.

Design progress has been discussed in multiple progress meetings held prior to 70% submittal. Key meeting minutes are provided in Appendix C. In addition, Flood Control was contacted via email for any design decisions that deemed Flood Control's input as necessary. 70% design has been discussed in detail with Flood Control during the meeting held on March 27, 2014..

2. The consultant recommended that the system design not meet the NDOT spread width criteria. The design of the project must meet both RTC and NDOT criteria. Providing additional inlets and upsizing the storm drain system to accommodate the criteria must be addressed and the associated costs accounted for with the next submittal.

The proposed system meets both RTC and NDOT criteria. Additional inlets have been proposed where necessary, and the storm drain system sized accordingly to meet the criterion. Cost estimate is prepared based on the proposed design and is provided with 70% submittal.

3. Continue to coordinate the design aspects of the Washington Avenue MPU facility currently under design with the proposed storm drain system needed for Rancho Drive.

Design issues were coordinated with Atkins, the consulting firm for the project-Washington Avenue Storm Drain (WASD) MPU facility. 90% plans and report from the WASD project were referenced into the proposed Rancho System design analysis.

4. Include Standard Form 1 with the next submittal and have the Engineer Stamp the study.

Standard Form 1 is included with 70% submittal.

The following comments are more general in nature and reflect design considerations as the project moves forward:

5. The Drainage Design Report needs an Exhibit that shows the recommended storm drain system and labels the key concentration points with associated flows. The summary should include collected storm drain flows and the remaining street surface flows within the project area.

The exhibit is provided in Appendix E as "Surface and Facility Flow Exhibit".

6. The Drainage Design Report needs to include a discussion on the utility conflicts along the proposed storm drain alignment and the potential impacts on the project construction. Plans must reflect the existing sewer system, including the residential/commercial lateral facility connections.

The drainage report discusses all possible utility conflicts along the storm drain alignment. A list of pothole locations has been identified and elevations will be available at 90% design phase. Plans reflect the existing sewer system; however, no lateral facility connections have been identified from the as-builts. The City has been contacted for the lateral facility locations and will be shown on the plans at next design phase.

7. The engineer must review the pipe size and hydraulics to verify system design parameters to keep the HGL a minimum of 12-inches below the finish grade. If the HGL is less than 18-inches below the finish grade, the City will require the installation of slotted & bolt down manholes. Additionally, the manhole concrete collars will need to be extended to prevent collar blow outs.

Per the discussion with Flood Control, since this system is not an MPU facility, the HGL being 12-inches below finish grade does not apply to the project. However, the HGL is well below 12-inches along the proposed system. A HGL comparison table is provided in the Final Technical Drainage Report.

8. Provide Plan and Profiles of the entire storm drain facility including laterals with the next submittal. Include the pipe system design Q on the storm drain profile sheets. Provide details and sections of the proposed collection system.

Plan and profiles showing the design Q, details and sections of the proposed mainline and laterals are provided with 70% submittal.

9. Provide storm drain design plans with the next submittal that include the design data and the complete construction notes. Include the Inlet type, lengths, depth, number of grates, etc.

Plan and profiles including design data and construction notes are provided with 70% submittal. Inlet types, lengths, depths, and number of grates are called out on the plans.

10. Provide detail sheets showing the drop inlet details for the proposed storm drain using the standard CM –DM / 412A inlets. Other inlet designs will be reviewed on a case by case basis.

Detail sheets show proposed drop inlets which include Type CM-DM/412A, Type F single and double grate and modified drop inlets where needed.

11. The Engineer should acquire and verify utility pothole information as soon as practical to determine additional constraints on the storm drain system design based upon the proposed design information. Consideration on utility relocations and impacts must be identified.

Pothole information will be verified as soon as we obtain from the sub-contractors to determine any revisions to the storm drain alignment. Possible utility relocations and impacts to the proposed system have been discussed and identified in the Final Technical Drainage Report.

12. Provide Manholes along the storm drain at 400-foot maximum spacing. Adjust spacing to include Manholes near the junction structures, if required for maintenance consideration. Consider using pre-cast Manhole Tees where applicable along the storm drain alignment to reduce costs.

Manholes are provided at 400-foot maximum spacing along the storm drain. Refer to SD sheets on 70% submittal plans.

13. Provide an updated geotechnical analysis with the next submittal. The 70% submittal must address design considerations to mitigate the impacts to the storm drain system design based upon the geotechnical analysis.

Geotechnical analysis report is submitted along with 70% submittal.

14. Provide inlet calculations based upon system design with the 70% submittal. Verify the grate type on the calculations to show vaned grates for the CM –DM / 412A inlets.

Drop inlet calculations were completed using FlowMaster. Vaned grates were used for the CM-DM /412A type drop inlets. Refer to Appendices of the report for FlowMaster outputs.

15. The plans need to clearly identify the storm drain removal item limits.

SDR sheets 1 through 9 show the removal item limits of the existing storm drain systems.

16. The existing and proposed utility crossings of the storm drain must be shown on the storm drain plan and profiles sheets and on the lateral profiles.

Existing and proposed utility crossings of the storm drain are shown on the storm drain plan and profile sheets and on lateral profiles, where crossing are feasible. More crossings will be shown at next design phase after pothole information is obtained.

17. Provide detail sheets showing typical details needed for the construction, connection and any special transition structure details. Structural details, if required, must be submitted by the 90% submittal.

Typical details needed for construction, connection details and any special details are provided on sheets D-1 through D-7. Any structural details will be submitted at next design phase.

18. The plans need to clearly identify the size of the existing storm drains.

Plans clearly identify the size of the existing storm drain.

19. Provide preliminary plan and profiles for relocated sewer and/or water lines as necessary with the next submittal. Verify the material type of existing water lines as ACP will require special handling.

Plans and profiles for relocated sewer are shown on storm drain sheets SD-12 through SD-15. Water line material is called out on the line style used on plans.

20. Provide a minimum 1-foot vertical separation between sewer and storm drain crossings. Separations less than 2-feet will require protection of the sewer line.

A minimum separation of 1-foot vertically is provided between sewer and storm drain crossings. Refer to profiles shown on SD and SDP sheets.

21. Show the storm drain angle points by Station location and angle change.

Storm drain alignment did not have any angle points. Any angle changes to the storm drain are accommodated at manhole locations.

22. Provide a detailed cost estimate with the next submittal for review. The cost estimate must be refined prior to the 90% submittal and request for construction funding to assure that the requested and allocated storm drain funds are sufficient for construction. The cost estimate must include the cost allocations by funding source.

Detailed cost estimate for storm drain items is provided along with the final drainage report.

23. The Final Design report needs to include an electronic copy of the entire report with the input and output files for the hydraulics and hydrology.

All input and output files for the hydrology and hydraulic calculations are provided in the Appendices of the Final Drainage Report. An electronic copy is provided with all input and output files.

24. Add a note for all storm drain drop inlets that references the newly adopted USDCCA Drawing No. 421 (Stormwater Quality Management Stamp and Sign Detail).

The note is provided on the plans to reference the newly adopted USDCCA Drawing No. 421.

25. Discuss and show any Traffic Signal underground impacts to the proposed storm drain system.

At 70% design, no traffic signal underground impacts have been identified. After the pothole information is obtained, any conflict locations will be identified and evaluated.

CC: Jeremy Leavitt, P.E. – CLV
Oh-Sang Kwon, P.E. – CLV
James Marrs, P.E. – PB

Sincerely,
Parsons Brinckerhoff

BY: 
Kamakshi Sistla, P.E.
Engineer II

DESIGN REVIEW COMMENT FORM

RANCHO DRIVE CAPACITY IMPROVEMENTS PROJECT

REVIEW AGENCY

DOCUMENT REVIEWED: 30% PLANS & PRELIMINARY TDR ; REVIEWER: JOSELIO RAMIREZ DATE: 1/29/12

AGENCY: NDOT DISCIPLINE: HYDRAULICS

TELEPHONE: 775 888 7532 FAX: 775 888 7177 EMAIL: JRAMIREZ@DOT.STATE.NV.US

Dear Mr. Sturdivant,

This letter is in response to the comments received from your office on 1/29/ 2012. The comments are reiterated for your convenience. We believe that the material included with the 70% submittal addresses each of the comments to the previous submittal.

REVIEW COMMENTS

REF NO.	REF PAGE/ SHEET NO.	REVIEW COMMENT	DESIGN RESPONSE	RESP TYPE
1	TDR (Hydro & Hydra Calcs.)	- Per NDOT Drainage Manual, a minimum time of concentration (T_c) of 5 minutes is used for directly connected impervious drainage basins. - Also a minimum T_c of 10 minutes is used for basins including pervious areas.	The proposed hydrologic analysis takes into account this criterion.	
2	TDR (Hydro & Hydra Calcs.)	As per the "TERMS AND CONDITIONS RELATING TO RIGHT-OF-WAY OCCUPANCY PERMITS", "Construction of new facilities or modifications of existing drainage structures within the Department R/W shall be in compliance with current Department Standard Plans and Specifications for Roadway and Bridge Construction and the Department's Drainage Manual."	Noted	
3	TDR (Hydro & Hydra Calcs.)Report	- Both alternatives show existing hydraulic structures being extended up to or extended outside NDOT R/W line; this condition will have constructability issues and maintenance restrictions, depending who will be responsible to maintain those facilities. - In addition, the proposed design shall have no adverse hydraulic	The proposed design at 70% restricts the improvements to within NDOT R/W. However, where existing offsite storm drain connections are being restored to tie to proposed system; temporary construction easements are being	

DESIGN REVIEW COMMENT FORM

REVIEWER: JOSELIO RAMIREZ DOCUMENT REVIEWED: CONCEPTUAL DRAINAGE REPORT

REF NO.	REF PAGE/ SHEET NO.	REVIEW COMMENT	DESIGN RESPONSE	RESP TYPE
		impact to adjacent property owners as a result of concentrated flows discharging into their property. - The same principles above apply to the proposed hydraulic features being connected to existing structure outside NDOT R/W, who will be responsible to maintain these hydraulic structures? Some of those hydraulic structures may require maintenance access. - If NDOT Maintenance Force becomes responsible to maintain the hydraulic features then maintenance space/access must be provided. - It will be necessary to verify and document that the proposed improvements will not have adverse impact to adjacent properties.	acquired. - Maintenance access is provided where NDOT maintenance is required. - Normal depths are compared to pre- and post improvement scenarios to ensure the existing condition is not made worse and proposed improvements do not negatively impact adjacent properties.	
4	TDR (Hydro & Hydra Calcs.)	- Storm drain (drop inlets, manholes, connections, etc.) shall be constructed per NDOT Standard Plans and Specifications for Roadway and Bridge Construction and the Department's Drainage Manual. - Manholes shall be included as part of the storm drain design. - Manholes are utilized to provide access to storm drain for inspection and culvert cleanout. For manhole design spacing, please refer to Department's Drainage Manual Sec. 3.3.2.2.4 Manholes.	- Storm drain design follows both RTC's Uniform Standard drawings and NDOT's Standard plans. - Manholes are included as part of the storm drain design. - Other comments are noted.	
5	TDR (Hydro & Hydra Calcs.)	- Please consider constructing manholes instead of junction boxes. - When connecting NDOT drainage structures to CLV structures, please construct manholes within NDOT R/W or at the R/W line for access to NDOT Maintenance personnel. - The alignment of the storm drain trunk lines should be set to connect from drop inlet to drop inlet as opposed to have the drain trunk lines under the travel lanes or shoulders. By connection the mainline from drop inlet to drop inlet it should decrease the need for manholes, reduce pipe quantities for laterals and avoid sharp connections.	- Manholes are provided for easy maintenance and access and are provided within NDOT R/W. - The alignment of the storm drain could not be set to connect from drop inlet to drop inlet due to conflict with 21-inch sanitary sewer at the same location. It was determined per a coordination meeting dated 7/31/2013, that the proposed storm drain will be located in the street.	
6	D-4 and E-4 (approx Stat 71+00 to 74+60)	The proposed (2) 7' x 3' x 132' RCB that runs parallel to the roadway the inner box is inside NDOT R/W, the outer box is outside NDOT R/W. Then the extension to the existing RCB on the south side, (2) 7'x3' x 129' RCB, extends from inside NDOT R/W to the outside, who is going to maintain this RCB?	There are (2) 6' x 3' RCBs that run perpendicular to the roadway at stations "L" 93+00 and "L" 84+00. These are not being extended on either side. Please review the 70% plans and provide further information to identify the structures described in the comment.	

EXECUTIVE SUMMARY

This Final Technical Drainage Report has been prepared to describe the design and analysis of the proposed storm drain design, for the Rancho Drive Capacity Improvements - Bonanza to Decatur Project. This project includes design of a 25-year local storm drain system in Rancho Drive, and associated drop inlets and laterals.

Hydrologic analysis has been performed using the HEC-1 computer program to develop 25-year design flows and 100-year flows for the Rancho storm drain system. These design flows were subsequently used in the hydraulic analysis to develop StormCAD models, analyze and size the conveyance and collection facilities.

The design scenario is for interim condition. Interim condition is considered as when the project improvements are in place with all existing MPU facilities, pending proposed MPU facilities in Decatur Blvd to be built in the future. The NDOT 25-year dry-lane criteria is the primary controlling criteria for the design of drop inlets and mainline in Rancho Drive. The design also meets RTC's 10-year and 100-year criteria. It shall be noted that 25-year offsite flows are also analyzed per communication with NDOT to meet NDOT's 25-year dry-lane criteria and the required inlet sizes are incorporated where feasible. Finally NDOT's 100-year street criteria of not making the interim condition worse than the existing condition, is verified. The Hydraulic Grade Line (HGL) for 100-year flow is compared to the HGL from the 25-year design flows.

The existing drop inlets are relocated to match with the curb relocation per roadway improvements. Per NDOT's 100-year street criteria of not making the interim condition worse than the existing condition the proposed drop inlet sizes shall be at minimum the same as the existing drop inlet sizes, such that the 100-year street criteria is either better or the same as in existing condition. Where needed, existing drop inlets are upsized or new drop inlets are proposed to meet the 25-year onsite dry-lane criteria.

The proposed mainline storm drain in Rancho Drive, connects to regional flood control facilities in Vegas Drive and Washington Drive. The proposed sizes range from 24-inch to 48-inch in diameter, running north to south. The proposed drop inlets on west side of Rancho Drive, south of Washington Avenue, connect to an existing storm drain system in Rancho Drive while the inlets on east side of Rancho Drive connect to an existing regional facility in Rancho Drive on the east side. Since the proposed system is not a regional facility, the system is not required to meet the HGL criteria of being 1-foot below the finish grade. However, the proposed storm drain design is adequately designed to meet the HGL criteria.

Other important aspects of the storm drain design effort are presented in this report, including hydrologic/hydraulic analysis, utility conflicts, any future recommendations for consideration.

The overall, estimated drainage construction cost of the project is \$3.74 M, which includes a 20-percent contingency to offset the unknown factors at this submittal phase.

The 70% Design Plans for drainage (SD-, SDP-, D- and SDR- sheets) are provided under Appendix G of this report. The Section 8 Resource Screening Analysis will be obtained at future design phase. The ROW or Easements are identified on roadway plans submitted separately with this submittal.

TABLE OF CONTENTS

1.0 INTRODUCTION AND PURPOSE	7
1.1 Location of Project	7
1.2 Project Description	7
1.3 Drainage Design Scope	8
2.0 GENERAL DRAINAGE DESCRIPTION	8
2.1 Project Site Characteristics and Drainage Patterns	9
2.2 FEMA Flood Insurance Rate Maps	9
2.3 Reference Studies	9
2.4 Regional Flood Control Facilities and Existing Facilities	10
3.0 HYDROLOGY	11
3.1 Design Criteria	11
3.2 Hydrologic Method	11
3.2.1 Rainfall Area and Intensities	12
3.2.2 Curve Number, Soil Types and Land Use	12
3.2.3 Time of Concentration and Lag Time	13
3.3 Existing Condition	14
3.3.1 Offsite Flows	14
3.3.2 Onsite Flows	16
3.4 Interim Condition	16
3.4.1 Offsite Flows	16
3.4.2 Onsite Flows	16
4.0 HYDRAULICS	16
4.1 Design Criteria	17
4.1.1 CCRFCD's HCDDM Criteria	17
4.1.2 NDOT Criteria	17
4.2 Hydraulic Analysis	18
4.3 Drop Inlet and Manhole Design	23
4.4 Rancho Drive Storm Drain Mainline	25
4.4.1 North of Smoke Ranch Road ("L" 113+00 to "L" 111+00)	26
4.4.2 Smoke Ranch Road to Lake Mead Drive ("L" 111+00 to "L" 97+00)	26
4.4.3 Lake Mead Drive to Vegas Drive ("L" 97+00 to "L" 45+00)	27
4.4.4 Vegas Drive to Washington Avenue ("L" 45+00 to "L" 11+00)	28
4.4.5 Washington Avenue to South of Bonanza Road ("L" 11+00 to "C" 9+00)	29
4.5 Lateral Storm Drains	30
4.6 Sanitary Sewer Design	32
5.0 UTILITY INFORMATION AND CONFLICTS	33
5.1 Utility Data Collection	33
5.2 Utility Conflict Locations	33
5.3 Utility Potholing	35
6.0 QUANTITY AND COST ESTIMATE	35
7.0 CONCLUSION	37
8.0 REFERENCES	39

LIST OF TABLES

Table 2.1: MPU Facilities.....	11
Table 3.1: Flow Split Summary at Intersections of Vegas Drive and Washington Avenue, Along Rancho Drive	12
Table 3.2: Offsite Sub-Basin Data and Flows.....	13
Table 4.1: Normal Depth Comparison - East Side.....	21
Table 4.1A: Normal Depth Comparison - West Side	22
Table 4.2: Drop Inlet Summary- Rancho Drive - West Side	24
Table 4.2A: Drop Inlet Summary- Rancho Drive - East Side.....	25
Table 4.2B: Drop Inlet Summary- Rancho Drive - Side Streets	25
Table 4.3: HGL Comparison (NDOT 25-year, 100-year onsite flows)	31
Table 4.4: HGL Comparison (RTC 10-year, 100-year onsite flows)	32
Table 6.1: Quantity and Cost Estimate	36

APPENDICES

Appendix A - Figures & Maps

- Figure 1 - Vicinity Map
- Figure 2 - 2008 MPU Hydrologic Map
- Figure 3 - 2008 MPU Facilities Map
- Figure 3A - 2008 MPU Facility Inventory
- Figure 4 - FEMA FIRM Panels
- Figure 5 - McCarran Airport Rainfall Area - HCDDM Figure 513
- Figure 6 - 25-year Depth-Duration-Frequency - Values - HCDDM Figure 503
- Figure 6A - 25-year Depth-Duration-Frequency - Values - HCDDM Figure 504
- Figure 6B - 100-year Depth-Duration-Frequency - Values - HCDDM Figure 506
- Figure 7 - Depth-Duration-Frequency-Values - HCDDM Table 505
- Figure 8 - Six Hour Storm Distributions (SDN3) - HCDDM Table 503
- Figure 9 - Six Hour Depth - Area Reduction Factors - HCDDM Table 502

Appendix B - Hydrology

- A. Offsite Basin Map
- B. Offsite HEC-1 - 25 year
- C. Offsite HEC-1 - 100 year
- D. Onsite Basin Map - Existing Condition
- E. Time of Concentration Calculations - Existing Condition
- F. Runoff Calculations - Existing Condition
- G. Onsite Basin Map - Option A
- H. Time of Concentration Calculations - Option A
- I. Runoff Calculations - Interim Condition - Option A
- J. Flow Split Calculations (Pima County Method) at Rancho Drive/Vegas Drive Intersection and Rancho Drive/Washington Avenue Intersection
- K. Surface Flow Concentration Points Exhibit

Appendix C

- A. Meeting Minutes
- B. Vegas Drive Improvements - 72" RCP, per CLV Drawing #107V4993
- C. Washington Avenue Storm Drain - 5' x 5' RCB, per CLV Drawing # 731-90
- D. Picture log

Appendix D-Hydraulics (Spreadsheets)

- A. Existing Condition: Offsite 100-year Flows (NDOT Criteria)
 - A-1: East Side
 - A-2: West Side
- B. Interim Condition: Onsite 25-year Flows (NDOT Criteria)
 - B-1: East Side
 - B-2: West Side
- C. Ultimate Condition: Onsite 10-year Flows & 100-year flows (RTC Criteria)
 - C-1: East Side
 - C-2: West Side
- D. Interim Condition: Offsite 25-year Flows- (NDOT Criteria)
 - D-1: West Side
- E. Interim Condition: Offsite 100-year Flows (NDOT Criteria - For Comparison of Normal Depths)
 - E-1: East Side
 - E-2: West Side
- F. Interim Condition: Onsite 100-year Flows (NDOT Criteria - For HGL Comparison to 25-year flows)
 - F-1: East Side
 - F-2: West Side
- G. Table 1: Proposed Drop Inlet Summary For Scenarios (final DI sizes)
Table 2: Cumulative Flows Summary (NDOT & RTC)

Appendix E –

- A. Surface and Facility Flow Exhibit
- B. Summary of Design Criteria Vs. Proposed Design

Appendix F - Utility Contacts/Conflicts/Potholes

Appendix G - 70% Plans and Cost Estimate

- A. Design Plans
- B. Quantity and Cost Estimate

Appendix H - FlowMaster Calculations-(CD)

1.0 INTRODUCTION AND PURPOSE

1.1 Location of Project

The proposed improvements are within the City of Las Vegas (City) on Rancho Drive between Bonanza Road and Decatur Boulevard. The project site for Rancho Drive Capacity Improvements – Bonanza To Decatur (Project) is located entirely within the McCarran Airport Rainfall Area (Figure 5 of Appendix A) and within Nevada Department of Transportation (NDOT) jurisdiction. Refer to Figure 1 in Appendix A for the vicinity map.

The limits of the watershed tributary to the project extend from Rancho Drive on the east to Tenaya Way on the west, and Gowan Road on the north to Bonanza Road on the south. The watershed is a nearly fully developed urban area with exception to some undeveloped lots on the east and west sides of Rancho Drive. Refer to Figure 2 - 2008 MPU Hydrologic Map in Appendix A.

1.2 Project Description

The purpose of the Project is to provide additional traffic capacity to Rancho Drive by constructing improvements such as sawtooths, curb and gutter, 10-foot wide sidewalks, ADA sidewalk ramps, bus turnouts, turn lanes at selected intersections, proposed street lights, traffic signals, signing and striping, median modifications, mill and overlay, adjustments to existing ITS fiber line, and adding lanes on southbound Rancho Drive beginning north of Ernest May to US-95, and left-turn lanes south of Bonanza Road. Two design options, Option A & Option B were prepared at 30% design submittal.

After review of the 30% submittal it was determined by City to design the storm drain system for Option A roadway improvements. This report provides the detailed hydrologic and hydraulic analysis as well as the concept and calculations for the storm drain system that is designed for Option A (referred to as "Interim Condition" in the report).

Option A: Rancho Drive between Vegas Drive and Decatur Boulevard will be redesigned to include a fourth dedicated transit lane, in both directions, using the available 125-foot right-of-way. In this option, the existing curb line will be relocated toward the centerline to provide the needed width for the 10-foot sidewalk and amenity zone.

For the purpose of this report, the following basic definitions are assumed:

- The existing condition is considered as the existing condition of the street, with the existing MPU facilities, including the Vegas Drive MPU facility (LVOW 0241) and the Washington Avenue MPU facility (LV15 0528) as built out facilities and fully functional.

- Interim condition is considered as when the Project improvements are in place with all existing MPU facilities pending proposed MPU facilities in Decatur Blvd to be built in future.
- Ultimate condition will be the period when the Project improvements are in place with all existing and proposed MPU facilities to be built out and fully functional. The Decatur Blvd MPU facility is considered to be "built-out" for this condition. This will drastically minimize the offsite flow reaching Rancho Drive from the west.

1.3 Drainage Design Scope

The purpose of this drainage report is to provide a hydrologic and hydraulic analysis following NDOT and RTC criteria for existing, interim and ultimate conditions. Design includes analysis for offsite and onsite flows, evaluation of existing storm drain facilities, street hydraulics analysis, sizing of proposed drop inlets and proposing a new local storm drain system as required to minimize the impact of flooding along Rancho Drive. The analysis includes providing a cost estimate for drainage facilities proposed for the selected design option in the interim condition.

From the coordination meeting dated 07/03/2013 (See Appendix C) with City and communication with NDOT, it was determined that the hydraulic analysis for this project will be performed based on evaluating the following five (5) scenarios:

1. Existing Condition Analysis to verify NDOT 100-year criteria ($D \times V \leq 8$ & $D < 2$) for offsite flows.
2. Interim Condition Analysis to verify NDOT 25-year criteria (Dry-lane) for onsite flows.
3. Ultimate Condition Analysis to verify Regional Transportation Commission (RTC) 10-year and 100-year criteria for onsite flows.
4. Interim Condition Analysis to verify NDOT 25-year criteria (Dry-lane) for offsite flows.
This scenario is evaluated per the communication with NDOT, dated 11/12/2013, in Appendix C. The feasibility to incorporate any facilities required to meet this criteria is considered in the final proposed design.
5. Interim Condition Analysis to verify NDOT 100-year criteria ($D \times V \leq 8$ & $D < 2$) for offsite flows.

More discussion on the design approach is provided in section 4.2 of report.

2.0 GENERAL DRAINAGE DESCRIPTION

2.1 Project Site Characteristics and Drainage Patterns

The primary drainage conveyance facilities within the watershed are streets. However, several existing MPU facilities convey the flow along and across Rancho Drive. Refer to Figure 3 and Figure 3A in Appendix A for the 2008 MPU Facilities Map and Inventory. Several as-built plans from various studies showing the built-in existing facilities were reviewed for the project.

Per the coordination meeting with City on 12/4/2013, the Vegas Drive MPU facility (LVOW 0241) is under construction during the current project's 70% design phase and the Washington Avenue MPU facility (LV15 0528) is at 90% design completion. The 100-year design flows in the two MPU facilities were obtained from City and are utilized for the hydraulic analysis of this project. For analyses purpose of the project, these facilities are considered as "built-out" and fully functional.

The onsite drainage pattern is generally from north to south along Rancho Drive. The offsite flow pattern is generally flowing from west to east and northwest to southeast. There is a low point at the south end of the project, near the intersection of Rancho Drive and Bonanza Road.

2.2 FEMA Flood Insurance Rate Maps

Special Flood Hazard Areas (SFHA) for City are outlined in the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), dated November 16, 2011. Upon reviewing Map Numbers 32003C2170 F and 32003C2155 F, the proposed site lies within a FEMA designated Zone X. This area is described to be outside of the 0.2% annual chance of flood, which indicates the project area is not located within a FEMA floodplain. Refer to Figure 4 in Appendix A.

2.3 Reference Studies

The Central Neighborhood Flood Control Master Plan study (CNFCMP), approved March 2005, was prepared by PBS&J and obtained from City for review. The study provides a comprehensive hydrologic analysis and storm drain facility plan for the Central Watershed. This study is used as the basis for the hydrologic and hydraulic analysis for the current project.

The 2008 Clark County Regional Flood Control District (CCRFCD) Las Vegas Valley Flood Control Master Plan Update (MPU) study is referenced to identify the most current developments and existing regional flood control facilities within the project's tributary area. The Project is located in the Central Watershed as defined by the 2008 MPU and within the 2005 CNFCMP study area.

Rancho Drive/US 95 Widening Letter of Map Revision (LOMR), prepared for City by The Louis Berger Group, Inc., in November 2006, is also referenced to verify the recently approved FEMA flood zones (Zone X) within the project limits.

Several other as-built plans from various drainage studies within the vicinity of the project limits are obtained for referencing the existing facilities.

2.4 Regional Flood Control Facilities and Existing Facilities

There are several existing regional flood control facilities within the project limits that convey the majority of offsite flows from the west side of the project limits to the east side, that otherwise might impact Rancho Drive on the west side. For convenience, the facilities are grouped into the following major systems. Refer to the MPU facilities map provided in Appendix A

- Peak Channel System (LVRA 0012): An existing 15' wide x 6' deep open channel (Peak Channel) runs west to east just north of Madre Mesa Drive and converts to a 12' x 8' reinforced concrete box (RCB) at Decatur Boulevard and runs south along Rancho Drive. The system turns east at Smoke Ranch Drive, and eventually connects to the 607 ac-ft Carey-Lake Mead Detention Basin.
- Lake Mead Boulevard System (LVLM 0337): An existing 84-inch reinforced concrete pipe (RCP) runs from west to east on Lake Mead Boulevard, across Rancho Drive.
- Vegas Drive System (LVOW 0241): An existing 84-inch RCP runs from west to east on Vegas Drive, across Rancho Drive. A proposed 72-inch RCP is under construction, per Drawing # 107V4993 (see plans provided in Appendix C). Hence, the Vegas Drive system is considered as a "built out" facility. The 100-year design flows from the facility are considered for hydraulic analysis of the current project.
- Washington Avenue System (LV15 0528): A proposed 5' x 5' RCB runs from west to east on Washington Avenue, across Rancho Drive (see plans provided in Appendix C). This system is at 90% design and is anticipated to be built prior to the current project. Hence, the Washington Avenue system is considered as a "built out" facility and the corresponding 100-year design flows from the facility are considered for hydraulic analysis of the current project.
- Rancho Drive System (LCRA 0050/0004): Currently at Washington Avenue and Rancho Drive an existing 8' x 6' RCB (LCRA 0050) is in place and runs south along Rancho Drive starting just west of the intersection. The 8' x 6' RCB transitions to a 12' x 6' RCB (LCRA 0004) just south of Washington Avenue and connects to an existing MPU facility under US95.

Table 2.1 below summarizes the existing MPU facilities in the project vicinity.

Table 2.1: MPU Facilities

FACILITY ID	Q100 (CFS)
LVRA 0012	1317
LVSF 0359	1779
LVLN 0337	904
LVOW 0241	605
LV15 0528	227
LCRA 0050	420
LCRA 0004	630

Any existing storm drain facilities that are impacted significantly due to the proposed improvements are discussed in the corresponding sections of the proposed trunk line design, provided in section 4.4 of this report. As-built plans at key design locations, along project corridor are provided in Appendix C.

3.0 HYDROLOGY

3.1 Design Criteria

- The design events evaluated for this project were the 10-year and 100-year events, for a 6-hour return period, per the design criteria set forth in the CCRFCD Hydrologic Criteria and Drainage Design Manual (HCDDM) and 25-year and 100-year frequency per the requirements of NDOT drainage manual. RTC follows the same criteria as CCRFCD.
- A minimum time of concentration of 5 minutes is used for directly connected impervious sub-basins, in accordance with both the CCRFCD HCDDM and NDOT Drainage Manual.

3.2 Hydrologic Method

Offsite Peak Flows: The US Army Corps of Engineers computer software HEC-1 Flood Hydrograph Package (USACOE, 1998) was used to develop offsite peak flows to assess impacts to the project site. The HEC-1 model for the Project is based on the CNFCMP 10-year HEC-1 model. The 10-year HEC-1 model presented in the CNFCMP study has detailed sub-basins and includes numerous flow splits to precisely estimate street and facility flows. The street flows were then used to determine the need for local drainage facilities and collectors.

After the 30% design submittal, this model is revised to incorporate the flow split analyses performed per the Pima County Method at the intersections of Rancho Drive with Vegas Drive and Washington Avenue. Further, accurate flows for the MPU facilities within Vegas Drive and Washington Avenue were obtained from the City, per the latest design plans of Vegas Drive Improvements (Drawing # 107V4993) and Washington Avenue Storm Drain (Drawing # 781-90) projects respectively and are incorporated in the HEC-1 model.

A summary of the flow splits at these intersections is provided in Table 3.1 below.

Table 3.1: Flow Split Summary at Intersections of Vegas Drive and Washington Avenue, Along Rancho Drive

FLOW SPLIT LOCATION / INTERSECTION	Flow Before Split (cfs)		Flow in Rancho Drive (cfs)		Flow in Side Street (cfs)	
	Name of Street	Q ₁₀₀	Name of Street	Q ₁₀₀	Name of Street	Q ₁₀₀
Rancho Drive/Vegas Drive	Rancho Drive	586	Rancho Drive	300	Vegas Drive	286
Rancho Drive/Washington Avenue	Rancho Drive	280	Rancho Drive	147	Washington Avenue	133

Refer to Appendix B for offsite basin maps, HEC-1 calculations and flow split calculations and Appendix C for plans of Vegas Drive and Washington Avenue facilities.

Onsite Peak Flows: Onsite flows for the project are developed using both the rational method and modified rational method as required by NDOT criteria and CCRFCD HCDDM respectively. The peak flows were determined for the existing condition with the existing street configuration and for the interim condition, with the proposed roadway improvements. Refer to Appendix B for onsite basin maps and runoff calculations.

3.2.1 Rainfall Area and Intensities

The project site is located within the McCarran Airport Rainfall Area, in Section 18, 19, 20, and 29 of Township 20 south, Range 61 east, Clark County, Nevada. Refer to Figure 5 in Appendix A. The Depth-Duration-Frequency curves from Figures 503, 504 and 506 of HCDDM are used to obtain the rainfall depths. Refer to Figures 6, 6A and 6B in Appendix A. The 10-year, 25-year and 100-year 6-hour rainfall depths are 1.58 inches, 2.05 inches and 2.77 inches respectively. Refer to Figure 7 in Appendix A. The storm distribution that will be used for this project is SDN3 due to the total drainage area being less than 8 square miles. Refer to Figure 8 and 9 in Appendix A for the storm distribution and depth-area reduction factor tables.

3.2.2 Curve Number, Soil Types and Land Use

Precipitation losses were determined using the SCS Curve Number Method in accordance with Section 603 of HCDDM. The curve number is a parameter assigned to the drainage basin and used in the HEC-1 model to estimate rainfall loss from infiltration. For urban areas, the value of the curve number is based on the basin land use, soil type, and antecedent moisture condition (AMC). For the CCRFCD area, an AMC-II condition is used for determining storm runoff.

The Project watershed lies within a nearly fully developed urban area consisting of single and multi-family residences. There are sparse commercial and public parcels. The CNFCMP study followed the 2002 MPU considering the existing conditions at the time of the study (2005), to determine the soil group and land use for the offsite watershed tributary of this Project. The Curve Numbers (CN) used in the offsite HEC-1 model for the Project follow the values obtained from the CNFCMP study. The Project watershed consists of A, B, C & D soil types. The CN values utilized for the onsite runoff calculations for the Project were calculated using the soil group and land use information provided in the 2008 MPU.

3.2.3 Time of Concentration and Lag Time

For the offsite HEC-1 model, the time of concentration (Tc) and lag time calculations are used per the CNFCMP study. The Tc and lag time calculations for onsite rational and modified rational method are performed based on the methodology described in Section 606 of the HCDDM. Tc and runoff calculations for onsite basins are provided in Appendix B.

Table 3.2 summarizes the flows of sub-basins and concentration points of the HEC-1 model.

Table 3.2: Offsite Sub-Basin Data and Flows

SUB-BASIN DATA				SUB-BASIN DATA			
BASIN ID	AREA (ACRE)	Q25 (CFS)	Q100 (CFS)	BASIN ID	AREA (ACRE)	Q25 (CFS)	Q100 (CFS)
OG05-C	170.2	172	262	SR05D-C	193.9	157	243
OG04-C	184.3	204	312	LM06B-C	226.5	196	304
OG03-C	208	172	278	LM03-C	215	221	336
OG02-C	203.5	212	327	VG04-C	153.6	162	245
OG011A-C	282.2	201	333	LM05-C	233.5	207	328
CY06B-C	318.7	180	295	WA08A	16.6	26	39
CY04A-C	292.4	210	341	WA10-C	285.4	314	474
PD01-C	241.3	152	260	WA09-C	59.4	65	98
SR00A-C	234.9	150	255	PD05A-C	87	99	145
LM01-C	209.2	119	213	LM09	78.7	115	169
VG02-C	143.4	83	149	LM08	35.8	56	84
WA01-C	141.4	148	238	VG21	62.7	73	116
SR02E-C	193.2	154	253	VG20	85.7	89	138
LM02-C	187.5	141	235	VG22	112.6	113	172
VG03-C	178.8	87	163	VG06	119	118	188
WA04-C	140.2	111	177	WA12	44.2	69	104
CY07B	129.9	111	173	WA13	102.4	119	180
PD04B-C	299.5	216	345	WA14	27.5	37	57
SR05B-C	228.5	157	245	WA11-C	54.4	51	83

3.3 Existing Condition

The existing condition is considered as the existing condition of the street, with the existing MPU facilities, including the Vegas Drive MPU facility (LVOW 0241) and the Washington Avenue MPU facility (LV15 0528) as built out facilities and fully functional.

3.3.1 Offsite Flows

Offsite flows in existing condition are calculated using the HEC-1 model, described in section 3.2 above. Offsite flows impact Rancho Drive on the west side of the street. For most of the project limits, the street capacity of Rancho Drive is able to carry the offsite flows on the west side of the street, without overtopping the median. However, where the flows overtop the median, the offsite flows are considered for analysis on the east side and where no overtopping occurs, only runoff from onsite basins impact Rancho Drive on the east side.

The runoff quantities and locations where offsite flows are impacting surface flows on Rancho Drive are provided in the Surface Flow Point Exhibit, in Appendix B. Most of these concentration points are derived from the HEC-1 model. The corresponding HEC-1 concentration points are provided for reference on the exhibit.

A detailed description of the surface flows, used for hydraulic analysis is provided below per each segment of the project. Refer to Surface Flow Point Exhibit for reference.

- Peak Channel to Smoke Ranch Drive: Per the HEC-1 model, 100-year flow of 1603 cfs (CCPD04B-C) is combined at the Peak System combination point. Per the MPU 2008 the facility LVRA 0012 (12'x8' RCB) within Rancho Drive on the west side of the street collects 1317 cfs. Therefore, out of the 1603 cfs, 284 cfs will remain on west side of Rancho Drive in the 100-year event. The 25-year flow of 931 cfs will be collected in the 12' x 8' RCB, hence, no offsite flow stays on the street during this event. Flow from onsite basins is considered for analysis purpose.
- Smoke Ranch Drive to Lake Mead Boulevard: Per the HEC-1 model, the Smoke Ranch MPU facility (LVSR 0359) collects and conveys all offsite flow west of Rancho Drive between Smoke Ranch Drive and Lake Mead Boulevard. Flows are conveyed west to east in this system, hence, there are no offsite flows between Smoke Ranch Drive and Lake Mead Boulevard (DCCSR05B). Flow from onsite basins is considered for analysis purpose.

- Lake Mead Boulevard to Vegas Drive: Per the HEC-1 model, the Lake Mead MPU facility (LVLM 0337) collects and conveys some of the offsite flow west of Rancho Drive. The surface flow from west to east, along Lake Mead Boulevard is also considered in the HEC-1 model. The 100-year flow of 791 cfs (DSURF2) is the surface runoff on Rancho Drive just south of Lake Mead Boulevard. Out of the 791 cfs, the west side of Rancho Drive has the capacity to convey 440 cfs before overtopping to the east side of the street. For hydraulic analysis purpose, 440 cfs is considered on the west side and the remaining 351 cfs is considered on the east side.

There are two existing 6' x 3' RCB culverts conveying flow across Rancho Drive between Lake Mead Boulevard and Coran Lane. The surface flows on Rancho Drive just downstream of these culverts as seen from HEC-1 (D1LM09, D2LM09) are considered for analysis. The HEC-1 model includes the flow split along Coran Avenue to the east side. The corresponding surface runoff on Rancho Drive (D3LM09) is considered just south of Coran Avenue. Concentration points CVG21 and CVG20 are considered as surface flows on Rancho Drive at the respective locations shown on the exhibit.

- Vegas Drive to Washington Avenue: At the intersection of Rancho Drive and Vegas Drive, the 100-year flow of 605 cfs in the Vegas Drive facility (LVOW 0214) is considered per Drawing #107V4993, provided by City. Pima County flow split analysis is performed on the remaining surface flow at this intersection. The total flow diverted east along Vegas Drive is 891 cfs (DVEG). Refer to flow split calculations provided in Appendix B. Hence, per the HEC-1 model, 300 cfs (DCCVG22) in the 100-year event, affects the west side of Rancho Drive just south of Vegas Drive. However, there are three cul-de-sac locations within the sub-basin WA13, which convey flow from the neighborhood to Rancho Drive, via existing drop inlets, an 18" Corrugated Iron Culvert, a 12" VCP connected to a 24-inch RCP, and a 24" RCP. Per the meeting with City dated 12/4/2013, for the purpose of hydraulic analysis, the storm drain systems at the cul-de-sac locations will be ignored, and the flow from basin WA13 is considered to be surface flow impacting Rancho Drive on the west side. For consistency with regard to flows, these flows are obtained from the Washington Avenue project's Collection System HEC-1 model. This reference is provided in Appendix C.
- Washington Avenue to Bonanza Avenue: At the intersection of Rancho Drive and Washington Avenue, the 100-year flow of 227 cfs in Washington Avenue facility (LV15 0528) is considered per Drawing # 731-90, provided by City. The design flow of 420 cfs in the 8' x 6' RCB MPU facility (LVRA 0004), is also considered as a diversion to Rancho Drive. Pima County flow split analysis is performed on the remaining surface flow at this intersection. The total flow diverted along Washington Avenue and

Rancho Drive combined is 344 cfs (DWASHRAN). Refer to excerpts from Washington Avenue Project Report, provided in Appendix C for all the design flows considered. Refer to flow split calculations provided in Appendix B. Hence, per the HEC-1 model, the 100-year flow of 147 cfs (DCWA14) impacts the west side of Rancho Drive, just south of Washington Avenue.

3.3.2 Onsite Flows

Onsite flows for the existing condition are developed using both rational method and modified rational method. The limits of onsite basins are determined based on several parameters such as right of way limits, major cross streets, medians, grade changes, and existing drop inlets. The peak runoff values are calculated based on the existing geometry of the street, longitudinal slope, cross slope, and surface roughness. Street Capacities are calculated just upstream of existing drop inlets and cross sections are shown at approximate stations on the exhibit provided in Appendix E. Other hydrologic factors used in quantifying the runoff are discussed in sections 3.2.1 through 3.2.3 of this report. Refer to Appendix B for onsite basin maps and runoff calculations for existing condition.

3.4 Interim Condition

Interim condition is considered as when the Project improvements are in place with all existing MPU facilities, pending proposed MPU facilities in Decatur Blvd to be built in the future.

3.4.1 Offsite Flows

Offsite flows in interim condition are the same as the flows calculated in existing condition. Therefore, for hydraulic analysis of the project, offsite flows provided in section 3.3.1 are considered.

3.4.2 Onsite Flows

The geometry of the street cross sections is revised to match the proposed roadway design. Cross sections are shown at approximate stations on the exhibit provided in Appendix E. Interim proposed cross slopes of the road were taken to be the same as existing condition. For interim condition, the 25-year onsite flows were analyzed to meet NDOT 25-year criteria. Onsite flows are analyzed to meet RTC criteria for 10-year and 100-year events. Refer to Appendix B for onsite basin maps and runoff calculations.

4.0 HYDRAULICS

The hydraulic analysis of the storm drain system is performed according to the procedures and criteria presented in the NDOT Drainage Manual, CCRFCD HCDDM and key issues discussed with City during progress meetings. The meeting minutes are provided in Appendix C. The HCDDM criteria and NDOT criteria are presented below:

4.1 Design Criteria

4.1.1 CCRFCD's HCDDM Criteria

- a. The street capacity calculations are based on CCRFCD criteria for the allowable capacity of a street in minor (10-year) and major (100-year) storm events:

Minor Storm - 10 year (Street right-of-way width $\geq$ 80feet)

- A 12-foot wide dry lane shall be maintained in each direction (center turning lane cannot be used for a dry lane)
- The depth of flow at intersections with other streets with ROW widths greater than or equal to 80 feet shall be curb height (typically 6 inches) or less.
- The product of the flow depth (feet) in the gutter flow line times the average flow velocity (feet per second (fps)) shall be less than or equal to 6.

Major Storm - 100 year

- The product of the flow depth (feet) in the gutter flowline times the average flow velocity (fps) shall be less than or equal to 8.
 - The depth of flow in the gutter flowline shall be less than or equal to 2 feet.
 - The transverse street flow on through traffic streets shall be at a depth less than or equal to 1 foot and a depth times velocity less than or equal to 8. This shall not be used to determine the allowable transverse flow depth for a culvert.
- b. A clogging factor of 50% is applied to size the drop inlets.
- c. The minimum slope for storm drains is 0.25% and a minimum velocity of 3 fps shall be maintained.
- d. The minimum pipe size for storm drain laterals is 18 inches.
- e. The HGL for storm drains will be 1 foot below the finished grade. However, the proposed system does not need to meet these criteria, since it is not a regional facility.
- f. Manholes are spaced at a maximum of 400 feet per the CCRFCD HCDDM.

4.1.2 NDOT Criteria

- a. 25-year design storm frequency is the minimum design return frequency for this project, based on the type of roadway classification for Rancho Drive. Rancho Drive is classified as "Other Principal Arterial".
- b. The spread criteria required by NDOT is $\frac{1}{2}$ of travel lane. 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
- c. Roadway surface drainage facilities shall be designed to collect all flows reaching the roadway, surface runoff generated both on the roadway itself, and flows reaching the roadway prism from upstream and adjacent basins such as parking lots or cross streets that direct flows onto the roadway surface.
 - d. The 100-year event (developed conditions flows) must be evaluated to the extent necessary to ensure no adverse impacts are created (for e.g.: impact on sag locations).
 - e. Gutter grades should not be less than 0.3% for curbed pavements (not less than 0.2% in very flat terrain).
 - f. A minimum of 2% typical cross slope is desirable for all roadway surfaces. The typical roadway cross slope shall not be less than 1.5% without approval from the Chief Hydrologic Engineer.
 - g. Inlets shall be placed to intercept flows to meet the spread criteria.
 - h. Use a minimum 25% clogging factor for inlets on grade that are expected to be subject to debris. In sag locations, a 50% clogging factor shall be applied by providing double the required inlet capacity.
 - i. Maintain a minimum flow velocity in storm drain trunk lines (more than 2 upstream inlets) of 3 fps at the design flow.
 - j. Minimum pipe diameters for storm drains are 18 inches for trunk lines, 15 inches for lateral connectors, and 12 inches for down drains.
 - k. NDOT has no specific criteria for 100-year, but requires no adverse impact to the existing conditions in a 100-year event. Refer to NDOT Drainage Manual 2006 section 3.3.2.2.

4.2 Hydraulic Analysis

CCRFCDD HCDDM and NDOT criteria for street capacities are considered for this project. The five scenarios mentioned under design scope are discussed in detail below.

Per the coordination meeting dated 7/3/2013, the Rancho Drive mainline is designed for the worst-case scenario between NDOT criteria and RTC criteria in the interim and ultimate conditions. From the 30% preliminary design analyses, it was determined that NDOT 25 -year dry-lane criteria in the interim condition presented the worst-case scenario, and hence, the system is to be designed for this scenario. Detailed hydraulic analysis performed for all scenarios at 70% design is presented in this section.

Street flow capacity calculations are performed using Bentley FlowMaster, 2008 software. Street carrying capacity is determined based on the agency's criteria, geometry of the street, longitudinal slope, cross slope, and surface roughness. Street flow capacity for Rancho Drive is evaluated at each concentration point and upstream location of existing drop inlets. All cross sections are identified by the approximate station of the different alignments on Rancho Drive. Where the

flows on the street exceed the street carrying capacity, drop inlets are proposed to intercept the excess flows or existing drop inlets are upsized.

Survey provided by HMM Survey Inc, and contour data are used to obtain the existing right-of-way limits and longitudinal slopes of the streets. Where needed, reasonable engineering judgment is utilized to build the cross sections.

1. Existing Condition Analysis to verify NDOT 100-year criteria ($D \times V \leq 8$ & $D < 2$) for offsite flows.

The maximum CCRFCD 100-year street capacity of Rancho Drive in the existing condition is calculated based on the maximum allowable depth (D_{max}) value that is required to meet the criteria mentioned in section 4.1.1 above. The normal depth (D_{Q100}) value, obtained from the offsite runoff (HEC-1) calculated for 100-year storm event is compared with the D_{max} values to see if the street meets the criteria. The D_{Q100} value is also verified if less than 2 feet.

All existing drop inlets are analyzed for interception capacities. Where street criteria is not met, the existing drop inlets are proposed to be extended to meet the required spread. Refer to Appendix F for FlowMaster outputs and Appendix D for calculations.

2. Interim Condition Analysis to verify NDOT 25-year criteria (Dry-lane) for onsite flows.

The runoff corresponding to a maximum allowable depth (D_{max}) for water on the street is calculated using FlowMaster, to meet NDOT's dry-lane criteria. The normal depth (D_{Q25}) value, obtained from the actual on-site 25-year flow is compared with the D_{max} values to see if the street meets the criteria. Refer to Appendix F for FlowMaster calculations and Appendix D for the spreadsheet calculations. All existing drop inlets are analyzed for interception capacities. Where needed, some of the existing drop inlets are extended or, new drop inlets are proposed to meet the required spread. Refer to Appendix F for FlowMaster outputs and Appendix D for calculations.

3. Ultimate Condition Analysis to verify Regional Transportation Commission (RTC) 10-year and 100-year criteria for onsite flows.

The runoff corresponding to a maximum allowable depth (D_{max}) for water on the street is calculated using FlowMaster, to meet RTC's 12-foot dry lane criteria and the $D \times V$ value, nearest to 6. The normal depth (D_{Q10}) value, obtained from the actual on-site 10-year flow (modified rational method) is compared with the D_{max} values to see if the street meets the criteria. Refer to Appendix F for FlowMaster calculations and Appendix D for the spreadsheet calculations.

The runoff corresponding to a maximum allowable depth (D_{max}) to meet RTC's 100-year criteria is calculated using FlowMaster. The D_{max} is the lower value of the product of D times V nearest to 8, or 2. The normal depth (D_{Q100}) value, obtained from the actual on-site 100-year flow (modified rational method) is

compared with the $D_{\max}$ values to see if the street meets the criteria. The D_{Q100} value is also verified if less than 2 feet.

All existing drop inlets are analyzed for interception capacities. Where needed, some of the existing drop inlets are extended or, new drop inlets are proposed to meet the required spread. Refer to Appendix F for FlowMaster outputs and Appendix D for calculations.

4. Interim Condition Analysis to verify NDOT 25-year criteria (Dry-lane) for offsite flows.

Per communication with NDOT, this scenario is evaluated to consider the feasibility to incorporate any facilities required to meet NDOT's 25-year dry lane criteria with the offsite flows (HEC-1) for 25-year storm event impacting Rancho Drive. However, in a 25-year storm event, there are no offsite flows overtopping the median to the east side. Hence, calculations are performed for west side only. Refer to Appendix F for FlowMaster outputs and Appendix D for calculations.

The proposed drop inlets determined to meet scenarios 2 and 3 are analyzed for interception capacities. The inlets are extended where needed to meet the criteria for 25-year offsite flows. However, based on engineering judgment, inlets from the scenario are incorporated in the final design only where feasible. See notes provided, under summary of drop inlets Table, in Appendix D.

5. Interim Condition Analysis to verify NDOT 100-year criteria ($D \times V \leq 8$ & $D < 2$) for offsite flows.

NDOT has no specific criteria for 100-year, but requires no adverse impact to the existing conditions in a 100-year event. Hence, CCRFCD criteria: $D \times V \leq 8$ and $D_{\max} < 2$ feet is applied to verify the street criteria. The offsite runoff (HEC-1) for 100-year is applied to verify the spread criteria.

A comparison of normal depths for the existing and interim conditions, for the 100-year flow is provided in Tables 4.1 and 4.1A below. The normal depths in the interim condition are either better than or the same as the existing condition. Hence, there is no negative impact to Rancho Drive due to the proposed improvements in the interim condition.

Refer to Table 1, Appendix D.G, for a summary of drop inlets proposed for each of the scenarios above, and the final drop inlet sizes incorporated for the project.

Table 4.1: Normal Depth Comparison - East Side

NORMAL DEPTH COMPARISON-EAST SIDE					
Existing Catch Basin Location	Proposed Catch Basin Location	Proposed Catch Basin ID	Existing Condition 100-yr Offsite Flow (NDOT criteria)	Interim Condition 100-yr Offsite Flow (NDOT criteria)	Interim Condition Better Than Or Equal to Existing Condition
			(FT)	(FT)	
N/A	"L" 112+01.75, 52.50' RT	EDI-01	0.84	0.74	Yes
"L" 98+80	"L" 98+82.89, 57.00' RT	EDI-02	0.47	0.47	Yes
"L" 78+25	"L" 77+58.20, 53.00' RT	EDI-03	1.15	1.11	Yes
"L" 65+08	"L" 64+97.77, 52.00' RT	EDI-04	0.94	0.89	Yes
"L" 55+25.50	"L" 55+23.60, 52.00' RT	EDI-05	0.91	0.84	Yes
"L" 49+96	"L" 50+03.45, 44.97' RT	EDI-06	1.21	0.73	Yes
"L" 46+93	"L" 46+80.17, 47.98' RT	EDI-07	0.82	0.42	Yes
"L" 46+16	"L" 46+02.67, 42.61' RT	EDI-08	0.60	0.23	Yes
"L" 39+75	"L" 39+81.63, 39.50' RT	EDI-09	0.39	0.31	Yes
"L" 35+00	"L" 35+02.41, 39.50' RT	EDI-10	0.36	0.28	Yes
"L" 30+33	"L" 30+55.45, 39.50' RT	EDI-11	0.42	0.29	Yes
"L" 24+95	"L" 24+97.16, 39.50' RT	EDI-12	0.38	0.22	Yes
"L" 19+64	"L" 19+75.86, 39.50' RT	EDI-13	0.35	0.22	Yes
"L" 16+09	"L" 16+25.11, 49.50' RT	EDI-16	0.34	0.17	Yes
"L" 11+76	"L" 11+81.51, 39.50' RT	EDI-15	0.44	0.05	Yes
"4" 16+47	"4" 16+25.11, 27.50' RT	EDI-16	0.05	0.05	Yes
"4" 14+96	"4" 14+86.97, 28.54' RT	EDI-17	0.05	0.05	Yes
"4" 13+80	"4" 13+72.63, 24.21' RT	EDI-18	0.05	0.05	Yes
"4" 11+83	"4" 11+80.71, 21.02' RT	EDI-19	0.22	0.21	Yes
"4" 6+76	"4" 6+74.09, 38.95' RT	EDI-20	0.37	0.23	Yes
"C" 3+50	"C" 3+59.56, 25.81' LT	EDI-21	0.36	0.21	Yes

Notes:

Normal Depth values reflect Q after being collected in catch basin location

Table 4.1A: Normal Depth Comparison - West Side

NORMAL DEPTH COMPARISON-WEST SIDE					
Existing Catch Basin Location	Proposed Catch Basin Location	Proposed Catch Basin ID	Existing Condition 100-yr Offsite Flow (NDOT criteria) (FT)	Interim Condition 100-yr Offsite Flow (NDOT criteria) (FT)	Interim Condition Better Than Or Equal to Existing Condition (FT)
None	"L" 112+33.57, 54.66 LT	WDI-01	1.35	0.34	Yes
"L" 92+86, 56.76' LT	"L" 92+84.94, 56.34' LT	WDI-02	1.43	1.43	Yes
"L" 84+00, 57.02' LT	"L" 83+97.38, 52.00' LT	WDI-03	1.74	1.74	Yes
"L" 77+20, 48.97' LT	"L" 77+11.75, 53.00' LT	WDI-05	1.54	1.54	Yes
"L" 75+05, 48.01' LT	"L" 75+03.39, 52.82' LT	WDI-06	1.55	1.55	Yes
"L" 72+91, 47.92' LT	"L" 72+87.22, 52.00' LT	WDI-07	1.38	1.38	Yes
"L" 71+21, 48.04' LT	"L" 71+19.94, 52.00' LT	WDI-08	1.35	1.35	Yes
"L" 69+47, 48.08' LT	"L" 69+55.83, 52.00' LT	WDI-09	1.31	1.31	Yes
"L" 67+75, 48.02' LT	"L" 67+73.28, 52.00' LT	WDI-10	1.61	1.61	Yes
"L" 65+08, 48.24' LT	"L" 64+97.77, 52.00' LT	WDI-11	1.02	0.95	Yes
"L" 64+09, 48.15' LT	"L" 64+06.49, 52.00' LT	WDI-12	1.48	1.39	Yes
"L" 62+15, 48.24' LT	"L" 62+13.21, 52.00' LT	WDI-13	1.51	1.51	Yes
"L" 58+47, 48.24' LT	"L" 58+52.96, 52.00' LT	WDI-14	1.56	1.50	Yes
"L" 55+23.60, 46.23' LT	None; Protect Exs. DI	EX-WDI-01	1.38	1.30	Yes
"L" 49+96, 47.95' LT	"L" 49+92.81, 48.75' LT	WDI-15	1.47	1.41	Yes
"L" 48+16, 47.37' LT	"L" 48+05.47, 41.75' LT	WDI-16	0.92	0.84	Yes
"L" 47+81, 46.43' LT	"L" 47+71.09, 41.44' LT	WDI-17	0.47	0.40	Yes
"L" 47+49, 45.49' LT	"L" 47+38.80, 41.95' LT	WDI-18	0.21	0.12	Yes
"L" 46+03.50, 50.50' LT	"L" 46+04.18, 51.95' LT	WDI-19	0.11	0.05	Yes
"L" 39+75, 42.19' LT	"L" 39+76.98, 39.50' LT	WDI-20	1.42	1.42	Yes
"L" 35+04, 42.12' LT	"L" 35+02.41, 39.50' LT	WDI-21	1.27	1.27	Yes
"L" 30+34, 42.41' LT	"L" 30+55.27, 39.50' LT	WDI-22	2.02	2.02	Yes
"L" 25+01, 42.19' LT	"L" 24+98.89, 39.50' LT	WDI-23	1.31	1.22	Yes
"L" 19+64, 42.17' LT	"L" 19+79.61, 39.50' LT	WDI-24	1.34	1.04	Yes
"L" 16+09, 42.17' LT	"L" 16+07.74, 39.50' LT	WDI-25	1.45	1.12	Yes
None	"L" 13+35.72, 39.50' LT	WDI-26	1.45	1.01	Yes
"L" 12+76, 41.85' LT	"L" 12+73.27, 31.24' LT	WDI-27	1.12	0.79	Yes
"L" 11+17, 44.40' LT	"L" 11+16.33, 41.13' LT	WDI-28	1.03	1.03	Yes
"L" 10+38, 56.68' LT	None	None	1.04	1.04	Yes
"L" 10+18.82, 50.66' LT	"L" 10+10.09, 50.33' LT	WDI-29	0.78	0.85	No
"4" 15+39, 64.12' LT	"4" 15+20.00, 63.50' LT	WDI-30	0.30	0.32	No
"4" 14+00, 64.26' LT	"4" 14+09.28, 70.16' LT	WDI-31	0.05	0.05	Yes
"4" 11+76, 64.29' LT	"4" 11+75.15, 89.18' LT	WDI-32	0.05	0.05	Yes
"4" 7+04, 74.17' LT	"4" 7+13.62, 73.85' LT	WDI-33	0.05	0.05	Yes
None	"C" 2+81.20, 76.70' RT	WDI-34	0.05	0.05	Yes
"C" 3+22, 26.36' LT	"C" 3+28.97, 77.32' RT	WDI-35	0.05	0.05	Yes

Notes:

Normal Depth values reflect Q after being collected in catch basin location

Drop inlet WDI-29 is 7.50 ft, compared to a 10.00 ft in existing condition. However, the 100-year offsite criteria is adequately met with the proposed inlet, at this cross section.

At WDI-30, the upstream bypass flow is slightly higher than in the existing condition, since WDI-29 is smaller than existing. However, the 100-year criteria is adequately met with the proposed inlet, at this cross section.

4.3 Drop Inlet and Manhole Design

Existing drop inlets are analyzed, using FlowMaster for their interception capacity and where the spread criteria is not met, the existing drop inlets are proposed to be extended. At locations where spread criteria is not met and there are no existing drop inlets, new drop inlets are proposed. Proposed drop inlet sizes are designed to match at minimum the sizes of existing drop inlets, so as not to compromise the street hydraulic capacity for a 100-year storm event in interim condition.

Inlet capture calculations were performed for 25-year and 100-year storm events as required by NDOT and RTC respectively. A clogging factor of 25% is applied to size the inlets in accordance with NDOT criteria and a 50% clogging factor is applied to meet RTCs criteria.

Existing drop inlet parameters such as length, width, and type are obtained from field measurements. All existing drop inlets on east and west sides of Rancho Drive are relocated to match roadway improvements and are connected to the main line via laterals and manholes. Based on the available invert data, obtained from survey, where feasible, the existing laterals are utilized as part of the proposed design.

Proposed drop inlets used on the project are combination (curb and grate) inlets which include Type F drop inlets and Type CM or DM drop inlets. Type F drop inlets are used in lengths of 3.0 feet and 6.0 feet. Any drop inlet that required a length over 6.0 feet, is a Type CM or DM drop inlet, starting at a length of 7.5 feet and increased by 2.5 feet increments. For inlets over 10.0 feet or greater, a closed grate of 2.5 feet is utilized at the farthest upstream location intake side of the inlet. One exception to this assumption is the drop inlet on the west side of Rancho Drive, just south of Bonanza Drive. This inlet is a 5.0 feet Type DM drop inlet in order to accommodate the storm drain adjacent to the drop inlet.

FlowMaster is used to analyze the proposed drop inlets per the above discussed parameters, and to obtain the interception capacities of the drop inlets. Based on the intercepted flows, the storm drain system in Rancho Drive is designed. Detailed calculations for drop inlets are discussed in section 4.2.2.

The proposed drop inlets on Rancho Drive are identified as "WDI-#" for the west side and "EDI-#" for the east side. The drop inlets on side streets are identified, with the first letter representing the first letter of the side street. A summary of all proposed drop inlets, with existing and proposed sizes are provided in Tables 4.2, 4.2A & 4.2B below. The number of grates shown in the tables corresponds to Type DM & Type CM drop inlets.

Manholes are spaced at a minimum distance of 400 ft. Type I, Type II, Type III and Type IA manholes from the RTC standard drawings are utilized as needed. NDOT's Type 4 Manhole is also used where shallow height issues are encountered.

Table 4.2: Drop Inlet Summary- Rancho Drive - West Side

Existing DI				Proposed DI				
Existing DI Station	Grate Length (FT)	Curb Opening Length (FT)	No. of Grates (2.5 FT)	Proposed DI Station	Proposed DI ID	Grate Length (FT)	Curb Opening Length (FT)	No. of Grates (2.5 FT)
None	0.0	0.0	0	"L" 112+33.57, 54.66' LT	WDI-01	47.5	50.00	20
"L" 92+86, 56.76' LT	3.0	3.0	0	"L" 92+83.50, 55.00' LT	WDI-02	3.0	3.00	0
"L" 84+00, 57.02' LT	3.0	3.0	0	"L" 83+97.38, 52.00' LT	WDI-03	3.0	3.00	0
"L" 77+20, 48.97' LT	3.0	3.0	0	"L" 77+11.75, 64.00' LT	WDI-05	3.0	3.00	0
"L" 75+05, 48.01' LT	3.0	3.0	0	"L" 75+03.39, 52.82' LT	WDI-06	3.0	3.00	0
"L" 72+91, 47.92' LT	3.0	3.0	0	"L" 72+87.22, 52.00' LT	WDI-07	3.0	3.00	0
"L" 71+21, 48.04' LT	3.0	3.0	0	"L" 71+19.94, 52.00' LT	WDI-08	3.0	3.00	0
"L" 69+47, 48.08' LT	3.0	3.0	0	"L" 69+55.83, 52.00' LT	WDI-09	3.0	3.00	0
"L" 67+75, 48.02' LT	3.0	3.0	0	"L" 67+73.28, 52.00' LT	WDI-10	3.0	3.00	0
"L" 65+08, 48.24' LT	3.0	3.0	0	"L" 64+97.77, 52.00' LT	WDI-11	7.5	7.50	3
"L" 64+09, 48.15' LT	3.0	3.0	0	"L" 64+06.49, 52.00' LT	WDI-12	3.0	3.00	0
"L" 62+15, 48.24' LT	3.0	3.0	0	"L" 62+13.21, 52.00' LT	WDI-13	3.0	3.00	0
"L" 58+47, 48.24' LT	3.0	3.0	0	"L" 58+52.96, 52.00' LT	WDI-14	7.5	7.50	3
"L" 55+23, 46.23' LT	4'x 4'	0.0	0	None - Existing DI-Protect in Place				
"L" 49+96, 47.95' LT	3.0	3.0	0	"L" 49+92.81, 48.75' LT	WDI-15	3.0	3.00	0
"L" 48+16, 47.37' LT	20.0	20.0	8	"L" 48+05.47, 41.75' LT	WDI-16	20.0	22.50	9
"L" 47+81, 46.43' LT	20.0	20.0	8	"L" 47+71.09, 41.44' LT	WDI-17	20.0	22.50	9
"L" 47+49, 45.49' LT	20.0	20.0	8	"L" 47+38.80, 41.95' LT	WDI-18	20.0	22.50	9
"L" 46+03, 50.50' LT	3.0	3.0	0	"L" 46+04.18, 51.95' LT	WDI-19	3.0	3.00	0
"L" 45+07, 40.49' LT	3.0	3.0	0	None - Remove/Abandon Existing DI				
"L" 39+75, 42.19' LT	3.0	3.0	0	"L" 39+76.98, 39.50' LT	WDI-20	3.0	3.00	0
"L" 35+04, 42.12' LT	3.0	3.0	0	"L" 35+02.41, 39.50' LT	WDI-21	3.0	3.00	0
"L" 30+34, 42.41' LT	3.0	3.0	0	"L" 30+55.27, 39.50' LT	WDI-22	3.0	3.00	0
"L" 25+01, 42.19' LT	3.0	3.0	0	"L" 24+98.89, 39.50' LT	WDI-23	7.5	7.50	3
"L" 19+64, 42.17' LT	3.0	3.0	0	"L" 19+79.61, 39.50' LT	WDI-24	10.0	12.50	5
"L" 16+09, 42.17' LT	3.0	3.0	0	"L" 16+07.74, 39.50' LT	WDI-25	3.0	3.00	0
None	0.0	0.0	0	"L" 13+35.72, 39.50' LT	WDI-26	6.0	6.00	0
"L" 12+76, 41.85' LT	3.0	3.0	0	"L" 12+73.27, 31.24' LT	WDI-27	3.0	3.00	0
"L" 11+17, 44.40' LT	3.0	3.0	0	"L" 11+16.33, 41.13' LT	WDI-28	3.0	3.00	0
"L" 10+38, 56.68' LT	10.0	10.0	4	None - Existing DI-Protect in Place				
"L" 10+18.82, 50.66' LT	10.0	10.0	4	"L" 10+10.09, 50.33' LT	WDI-29	7.5	7.50	3
"4" 15+39, 64.12' LT	20.0	20.0	8	"4" 15+31.01, 64.65' LT	WDI-30	20.0	22.50	9
"4" 14+00, 64.26' LT	20.0	20.0	8	"4" 14+09.28, 70.16' LT	WDI-31	20.0	22.50	9
"4" 11+76, 64.29' LT	3.0	3.0	0	"4" 11+75.15, 89.18' LT	WDI-32	3.0	3.00	0
"4" 7+04, 74.17' LT	3.0	3.0	0	"4" 7+13.62, 73.85' LT	WDI-33	7.5	7.50	3
None	0.0	0.0	0	"C" 2+81.44, 76.70' RT	WDI-34	10.0	12.50	5
"C" 3+22, 26.36' LT	10.0	10.0	4	"C" 3+28.97, 77.32' RT	WDI-35	3.0	3.00	0
"C" 7+05.17, 80.50' RT	3.0	3.0	0	"C" 7+05.17, 80.50' RT	WDI-36	5.0	5.00	2
"C" 7+83.13, 79.62' RT	10.0	10.0	4	"C" 7+94.23, 93.31' RT	WDI-37	10.0	12.50	5
"C" 8+49.68, 92.48' RT	12.0	12.5	5	"C" 8+44.76, 93.84' RT	WDI-38	10.0	12.50	5

Notes:

Grate Length of 3.0 ft or 6.0 ft identifies Type F Single or Double Grate inlets

A value in the No. of grates column, identifies Type DM & CM drop inlets

WDI-11 and WDI-14 inlet sizes are incorporated per the NDOT-25year offsite analysis per communication from NDOT

WDI-35: Existing Inlet is downsized, because this location has a ADA ramp and any DI larger than 3ft is not feasible at this station.

Instead, WDI-34 is a new a 10ft DI added upstream to compensate for the interception capacity.

Table 4.2A: Drop Inlet Summary- Rancho Drive - East Side

Existing DI				Proposed DI				
Existing DI Station	Grate Length (FT)	Curb Opening Length (FT)	No. of Grates (2.5 FT)	Proposed DI Station	Proposed DI ID	Grate Length (FT)	Curb Opening Length (FT)	No. of Grates (2.5 FT)
None	None		0	"L" 112+01.75, 52.50' RT	EDI-01	3.0	3.0	0
"L" 98+80, 57.50' RT	3.0	3.0	0	"L" 98+82.89, 57.00' RT	EDI-02	3.0	3.0	0
None	None	None	3	"L" 77+58.20, 53.00 RT	EDI-03	3.0	3.0	0
"L" 65+03.50, 52.50' RT	3.0	3.0	0	"L" 64+97.77, 52.00' RT	EDI-04	3.0	3.0	0
"L" 55+24.00, 50.50' RT	3.0	3.0	0	"L" 55+23.60, 52.00' RT	EDI-05	6.0	6.0	0
"L" 49+96, 48.00' RT	3.0	3.0	0	"L" 50+03.45, 44.97' RT	EDI-06	20.0	22.5	9
"L" 46+93, 46.50' RT	20.0	20.0	8	"L" 46+80.17, 47.98' RT	EDI-07	20.0	22.5	9
"L" 46+16, 43.50' RT	10.0	10.0	4	"L" 46+02.67, 42.61 RT	EDI-08	10.0	12.5	5
"L" 39+75, 42.50' RT	3.0	3.0	0	"L" 39+73.00, 38.00' RT	EDI-09	10.0	12.5	5
"L" 35+00, 42.60' RT	3.0	3.0	0	"L" 35+02.41, 39.50' RT	EDI-10	3.0	3.0	0
"L" 30+33, 42.50' RT	3.0	3.0	0	"L" 30+55.45, 39.50' RT	EDI-11	3.0	3.0	0
"L" 24+95, 42.50' RT	3.0	3.0	0	"L" 24+97.16, 38.00' RT	EDI-12	6.0	6.0	0
"L" 19+64, 42.00' RT	3.0	3.0	0	"L" 19+75.86, 39.50' RT	EDI-13	6.0	6.0	0
"L" 16+09, 42.00' RT	3.0	3.0	0	"L" 16+25.11, 49.50' RT	EDI-14	3.0	3.0	0
"L" 11+76, 42.50' RT	3.0	3.0	0	"L" 11+81.51, 39.50' RT	EDI-15	6.0	6.0	0
"4" 16+47, 21.00' RT	60.0	60.0	24	"4" 16+25.11, 27.50' RT	EDI-16	60.0	62.5	25
"4" 14+96, 20.00' RT	20.0	20.0	8	"4" 14+86.97, 28.54 RT	EDI-17	20.0	22.5	9
"4" 13+80, 20.75' RT	20.0	20.0	8	"4" 13+72.63, 24.21' RT	EDI-18	20.0	22.5	9
"4" 11+83, 20.00' RT	3.0	3.0	0	"4" 11+80.71, 21.02' RT	EDI-19	3.0	3.0	0
"4" 6+76, 35.50' RT	3.0	3.0	0	"4" 6+74.09, 38.95' RT	EDI-20	6.0	6.0	0
"C" 3+62.50, 27.00' RT	3.0	3.0	0	"C" 3+59.56, 25.81' RT	EDI-21	10.0	12.5	5
"C" 6+67.35, 42.41' LT	10.0	10.0	4	"C" 6+71.27, 35.61' LT	EDI-22	10.0	12.5	5
"C" 8+22.90, 36.48' LT	10.0	10.0	4	"C" 8+24.24, 32.43' LT	EDI-23	10.0	12.5	5

Notes:

Grate Length of 3.0 ft or 6.0 ft identifies Type F Single or Double Grate inlets

A value in the No. of grates column, identifies Type DM & CM drop inlets

Table 4.2B: Drop Inlet Summary- Rancho Drive - Side Streets

Side Street Name	Existing DI				Proposed DI				
	Existing DI Station	Grate Length (FT)	Curb Opening Length (FT)	No. of Grates (2.5 FT)	Proposed DI Station	Proposed DI ID	Grate Length (FT)	Curb Opening Length (FT)	No. of Grates (2.5 FT)
Smoke Ranch		3.0	3.0	0	"L"111+09.09, 111.41' LT	SDI-01	3.0	3.0	0
	None				"L" 47+72.59, 284.37' LT	VDI-01	6.0	6.0	0
Vegas	"L" 47+44.59, 237.79' LT	20.0	20.0	8	Existing DI removed; No proposed Inlets at this location				
Vegas	"L" 46+76.91, 50.24' LT	3.0	3.0	0	"L" 46+63.66, 136.04' LT	VDI-02	25.0	25.0	10
Vegas	"L" 46+33.76, 94.35' LT	3.0	3.0	0	"L"46+31.45, 89.78' LT	VDI-03	3.0	3.0	0
Washington	"L"12+52.83, 202.12' LT	18.0	17.5	7	"L"12+52.83, 202.12' LT	WADI-02	17.5	20.0	8
Washington	"L" 11+78.79, 105.24' LT	20.0	20.0	8	"L"11+51.81, 81.61' LT	WADI-01	20.0	22.5	9
Bonanza	"C" 3+50.36, 115.11' RT	3.0	3.0	0	"C"3+50.36, 115.11' RT	BDI-01	3.0	3.0	0

Notes:

Grate Length of 3.0 ft or 6.0 ft identifies Type F Single or Double Grate inlets

A value in the No. of grates column, identifies Type DM & CM drop inlets

4.4 Rancho Drive Storm Drain Mainline

Per the analysis presented in section 4.2, the proposed storm drain in Rancho Drive is designed to collect and convey the on-site 25-year storm event flows to meet the dry-lane criteria for NDOT, in the interim condition. The system

adequately contains the 10-year and 100-year flows, to meet RTC criteria in ultimate condition. Per the criteria mentioned in Section 4.1.1, since the proposed system is not a regional facility, it is not required to capture and convey the offsite flows from a 100-year storm event. For the same reason, the HGL criteria of being 1-foot below finish grade is not applicable as well.

Per the coordination meeting with CLV, dated 07/31/2013 (See Appendix C), it was determined that the existing storm drain system in Rancho Drive, from Coran Lane to Washington Avenue will be abandoned in place due to its conflict with a 21-inch sanitary sewer line and difficulty of constructability around this system. Hence, a new storm drain system on the west half of Rancho Drive is proposed to capture and convey the runoff from the proposed roadway improvements.

StormCAD is utilized to analyze the hydraulic capacity of the proposed system. HGL and the corresponding flows are shown on the profiles for all proposed systems. The systems are also verified for the 100-year flow.

The proposed mainline designed is discussed below, based on the MPU facilities, to which they connect. Refer to Appendix G for 70% design plans. An alignment and approximate station are provided below for reference.

4.4.1 North of Smoke Ranch Road ("L" 113+00 to "L" 111+00)

Two storm drain laterals on the west and east side of Rancho Drive that connect to the existing 12' x 8' RCB are proposed to convey the design flows. There is an existing 4' x 2' grate at the intersection of Rancho Drive and Smoke Ranch Road on the existing triangular refuge island. In the existing condition, part of the 100-year surface flows north of Smoke Ranch Road are collected through the 2' x 4' grate and conveyed to the existing 12' x 8' RCB via an existing 6' x 3' RCB lateral. However, this island is being relocated with the proposed roadway improvements and using a grate that matches the existing grate size is not a feasible design. It has been verified that no other system connects to this grate from the northwest corner of the intersection. Hence, this system is abandoned in place and a 50.00 LF Type DM drop inlet is proposed upstream of this location on the west side to be able to collect and convey the 100-year flows to the 12' x 8' RCB via a 48-inch RCP storm drain lateral. A 100-year flow of 271.54 cfs is collected and conveyed by this lateral. Since, the design requires abandoning an existing 100-year flow conveyance system, this lateral is designed to capture 100-year flows and thus avoid any negative impact on Rancho Drive. The drop inlet on the east side of Rancho Drive collects the design 25-yr flows and conveys to the existing 12' x 8' RCB via an 18-inch RCP. A 25-year design flow of 5.73 cfs is collected.

4.4.2 Smoke Ranch Road to Lake Mead Drive ("L" 111+00 to "L" 97+00)

An existing inlet on north side of Smoke Ranch Road, just west of Rancho Drive is relocated to match roadway improvements. An existing inlet on the east side of

Rancho Drive, just north of Lake Mead Drive, is relocated to match roadway improvements. A 24-inch RCP lateral connects this proposed inlet to the existing 84-inch RCP storm drain (LVLM 0337) in Lake Mead Drive. A 25-year flow of 3.16 cfs is collected.

4.4.3 Lake Mead Drive to Vegas Drive ("L" 97+00 to "L" 45+00)

Lake Mead Drive to Coran Lane ("L" 97+00 to "L" 77+00)

There are two existing 6' x3' RCB culverts between Lake Mead Boulevard and Coran Lane, which drain flows west to east, to the Texas Station property. The existing inlets on the west side of Rancho Drive that connect to these box culverts are relocated to match roadway improvements. Proposed inlets WDI-02 and WDI-03 collect 25-year flows of 2.33 cfs and 4.10 cfs respectively.

Coran Lane to Vegas Drive ("L" 77+00 to "L" 45+00)

The mainline in Rancho Drive starts at Coran Lane and will tie into the existing 8'x 5' RCB section of the 84-inch MPU facility in Vegas Drive. The proposed main line sizes vary from 24-inch to 48-inch. The slope of the trunk line system is limited by the invert at the tie-in location for the existing system.

Just south of Coran Lane on the west side of Rancho Drive, at approximately station "L" 77+11.75, an offsite drop inlet is being relocated to match proposed roadway improvements. WDI-04 is connected to WDI-05 matching the existing design. A minimal offsite flow of 2 cfs in 25-year event, in addition to the onsite design flows is easily contained in the proposed mainline.

Just south of Coran Lane on the west side of Rancho Drive, at approximately station "L" 73+00 and "L" 71+00, there are two existing drainage channels that convey flow to the existing Rancho system via laterals. Refer to pictures provided in Appendix C. The flow from the parking lot of the existing "Wild Fire Casino" is conveyed via these drainage channels. These basins are shown as OFFRAN11LA1 and OFFRAN11LA2 on the On-site Basin Map in Appendix A. Per the proposed roadway improvements, a sidewalk is proposed to extend partly into these drainage channels. The design proposes to re-grade and connect the drainage channels to the proposed mainline in Rancho Drive. Sheet SD-12 shows this design. Offsite 25-year flow of 4 cfs and 5 cfs from the two locations, in addition to the onsite design flows are safely conveyed by the proposed mainline without any negative impact.

At the intersection of Spring Road and Rancho Drive, on the west side, at approximately station 68+80.51, 89.85' LT there is a above ground inlet that connects to the existing 30-inch RCP in Rancho Drive. This lateral will be extended to connect to the proposed mainline.

Just south of the intersection of Spring Road and Rancho Drive, on the west side of Rancho Drive, at approximately station 67+73.30, 65.83' LT there is an existing grate inlet in the parking lot of the property. Due to the proposed

roadway improvements, this inlet will be relocated on the back of the proposed sidewalk and proposed retaining wall. This inlet will be re-connected to the proposed mainline in Rancho Drive.

Just north of Melody Lane at approximately station "L" 65+00 on the east side of Rancho Drive, there are two existing 43-inch x 27-inch CMP's that connect to a retaining wall behind the existing sidewalk. From the as-builts it appears that the two CMPs connect to the existing storm drain on west side of Rancho Drive. Refer to pictures provided in Appendix C. An existing dirt channel with an embankment on the east side conveys flows north from Holly lane to the location of these two CMP culverts. However, the proposed roadway layout has the proposed sidewalk extending past the retaining wall, filling most of the ditch with proposed fill. This results in an embankment that ties into the proposed back of sidewalk, contributing flow onto the sidewalk from station "L" 65+00 to Holly Lane. This basin is shown as OFF15R on the On-site Basin Map in Appendix A. A cross gutter is proposed across Holly Lane to keep the flow on Rancho Drive to the next drop inlet location. The drop inlet at the downstream location "L" 55+23.60, 52.00' RT, is adequately designed to intercept the flow from OFF15R. The embankment behind the proposed sidewalk will be lined with landscape or crushed rock to minimize sediment and erosion from the dirt area east of the sidewalk. Sheets SD-10 and SD-11 show this design.

Just north of Sunset Drive at approximately station "L" 55+23, on the west side of Rancho Drive, an existing 4' x 4' grate inlet is protected in place, due to existing laterals that connect to the inlet from the northwest corner of the intersection. A minimal offsite flow of 2 cfs in 25-year event, in addition to the onsite design flows is easily contained in the proposed mainline.

Total 25-year flow of 76 cfs, including minimal offsite flows is collected by the system that connects to Vegas system.

Any existing drop inlets on Vegas Drive are relocated to match proposed roadway improvements.

4.4.4 Vegas Drive to Washington Avenue ("L" 45+00 to "L"11+00)

The mainline in Rancho Drive starts just north of Turquoise Road and will tie into the proposed 5' x 5' RCB Washington Storm Drain (WASD), being designed by Atkins. In the existing system in Rancho Drive connects to an existing 8'x 6' RCB in Washington Avenue, which transitions to a 12' x 6' RCB in Rancho Drive. With the proposed connection to WASD, the onsite flows that are conveyed to the 12' x 6' RCB in Rancho Drive in the existing condition are greatly reduced since the flows are now diverted to WASD.

It is expected that the WASD system will be constructed prior to the Rancho storm drain system. Per the Atkins 90% plans, a 48-inch lateral stub in the west

half of Rancho Drive and an 18-inch lateral stub in the east half of Rancho Drive are provided for the Rancho system to tie-in to the WASD system. The proposed mainline sizes for the proposed Rancho system vary from 24-inch to 48-inch. The slope of the trunk line system is limited by the invert at the tie-in location for of the 48-inch RCP stub. The east side drop inlets tie to the 18-inch RCP stub. Type IA manholes per RTC Std. drawings and NDOT Type 4 manholes are used for shallow heights along the trunk line.

Just north of Riverside Drive, at approximate station "L" 32+70.88, 31.01' LT, an existing lateral connection from a cul-de-sac location west side of the property wall is also re-connected to the proposed mainline using manhole. The offsite flow for a 25-year storm event from this cul-de sac is 34 cfs. It has been verified that the proposed mainline system can safely convey upto 26 cfs from this location, in addition to the on-site design flow of 37 cfs, in a 25-year event.

Just north of Artesia Way, at approximately station "L" 21+85.57, 31.20' LT and "L" 20+58.74, 31.12' LT, two existing lateral connections from two cul-de-sac locations west side of the property wall are re-connected to the proposed mainline using manholes. Refer to pictures provided in Appendix C. There is a total of 14 cfs offsite flow from these two lateral connections.

Total 25-year flow of 37 cfs is collected by this system.

Any existing drop inlets on Washington Avenue are relocated to match proposed roadway improvements.

4.4.5 Washington Avenue to South of Bonanza Road ("L" 11+00 to "C" 9+00)

The existing 54-inch RCP on the west side of Rancho Drive is protected in place and will be functional. All drop inlets on the west side that are relocated due to proposed roadway improvements are connected to this existing 54-inch RCP. From approximately station "C" 0+98.13, 76.48' RT to "C" 3+67.43, 79.22' RT, the existing 54-inch RCP is proposed to be relocated into the street in order to be able to connect the proposed drop inlets. A total 25-year flow of 15.10 cfs is collected by this system.

Due to the alignment of the existing 54-inch RCP, proposed drop inlets WDI-30 and WDI-33 are designed to be Modified Type CM inlets, to be able tie to the existing 54-inch RCP from the side of the drop inlet. The existing 54-inch to 42-inch transition structures, at these locations as identified in the as-built plans will be removed.

Just south of Bonanza, on west side of Rancho Drive between approximately stations "C" 7+05.17, 80.50' RT to "C" 8+44.76, 93.84' RT, an 18-inch RCP connects three proposed inlets which eventually convey flows to the 12' x 6' RCB. A total 25-year flow of 3.77 cfs is collected and conveyed.

On the east side, the existing inlets are relocated to match proposed roadway improvements. The proposed drop inlets south of Washington Avenue are connected to the existing 12' x 6' RCB in Rancho Drive, using lateral sizes matching the existing sizes.. A total flow of 14.38 cfs is collected and conveyed in the 25-year event.

An existing drop inlet (BDI-01) at the northwest corner of Rancho Drive and Bonanza Road is relocated to match roadway improvements and is connected to the mainline in Rancho Drive. With direction from City, further drainage study research will be conducted to upsize this inlet on north half of Bonanza Drive. Any design changes based on the review of drainage studies will be incorporated at the next design phase.

4.5 Lateral Storm Drains

Lateral pipe connections are proposed to convey flow from drop inlets on east and west sides of Rancho Drive to the mainline. The laterals are designed to convey the 25-year design flows collected by the drop inlets. The lateral sizes vary from 18-inch to 30-inch. At a few locations, the laterals were designed with a steep slope to avoid a conflict with a sewer line, which runs under the proposed drop inlets. Lateral pipes are also analyzed using StormCAD for hydraulic capacities. The HGL with the corresponding flows is shown on the profiles for lateral pipes. For lateral connections on the side streets, HGL's and corresponding flows are not shown, since the hydrology for the project accounts for flows reaching Rancho Drive. Refer to 70% Design Plans in Appendix G.

The mainline sizes, the flows intercepted at the west side and east side drop inlets, and the cumulative flow in the trunk line are summarized for the NDOT 25-year & 100-year, RTC 10-year and RTC 100-year scenarios in Table 2, Appendix D.G.

Table 4.3 below, summarizes the onsite flows for both 25-year and 100-year storm events, to meet NDOT criterion and provides a comparison of the HGL elevation for the mainline systems proposed on Rancho Drive.

Table 4.4 below, summarizes the onsite flows for both 10-year and 100-year storm events, to meet RTC criterion and provides a comparison of the HGL elevation for the mainline systems proposed on Rancho Drive.

Table 4.3: HGL Comparison (NDOT 25-year, 100-year onsite flows)

Label	Approx. Station (ft)	Rim Elevation (ft)	Diameter (in)	Q ₂₅ (ft ³ /s)	HGL Elevation with Q ₂₅ (ft)	Difference (Rim Elevation-HGL with Q ₂₅)	Q ₁₀₀ (ft ³ /s)	HGL Elevation with Q ₁₀₀ (ft)	Difference (Rim Elevation-HGL with Q ₁₀₀)
Coran Ln to Vegas Dr System									
SDMH-03	77+58.32, 34.37' LT	2,156.54	18	4.91	2,148.59	7.95	5.99	2,148.73	7.81
SDMH-04	77+11.75, 34.29' LT	2,155.83	24	10.6	2,147.40	8.43	13.95	2,147.60	8.23
SDMH-05	75+03.26, 34.08' LT	2,152.14	24	13.35	2,144.61	7.53	16.99	2,144.80	7.34
SDMH-06	72+87.26, 33.85' LT	2,148.92	30	19.43	2,142.03	6.89	25.46	2,142.27	6.65
SDMH-07	71+19.91, 33.83' LT	2,147.01	30	26.18	2,140.11	6.90	34.69	2,140.41	6.60
SDMH-08	69+55.83, 33.57' LT	2,144.92	30	27.68	2,137.86	7.06	36.66	2,138.16	6.76
SDMH-09	67+73.25, 33.64' LT	2,142.67	30	29.01	2,135.91	6.76	38.47	2,136.22	6.45
SDMH-10	64+97.73, 33.64' LT	2,139.25	36	36.86	2,132.38	6.87	47.20	2,132.67	6.58
SDMH-11	64+06.47, 33.46' LT	2,138.32	36	37.81	2,131.53	6.79	48.59	2,131.83	6.49
SDMH-12	62+13.19, 33.50' LT	2,135.88	36	38.98	2,129.36	6.52	50.20	2,129.67	6.21
SDMH-13	58+54.21, 33.56' LT	2,130.98	36	41.48	2,124.23	6.75	53.63	2,124.55	6.43
SDMH-14	55+23.52, 33.64' LT	2,126.77	42	56.43	2,119.98	6.79	70.44	2,120.29	6.48
SDMH-15	52+59.02, 33.64' LT	2,124.02	42	56.43	2,117.21	6.81	70.44	2,117.52	6.50
SDMH-16	49+92.71, 30.35' LT	2,121.61	42	73.09	2,114.46	7.15	93.45	2,114.85	6.76
SDMH-17	47+96.32, 25.88' LT	2,119.82	42	75.34	2,112.30	7.52	97.93	2,112.70	7.12
SDMH-18	47+61.86, 25.51' LT	2,119.48	42	78.19	2,111.55	7.93	98.28	2,111.81	7.67
SDMH-19	47+28.78, 25.87' LT	2,119.06	42	78.44	2,110.34	8.72	98.63	2,110.68	8.38
SDMH-21	46+02.95, 30.91' LT	2,117.69	48	79.52	2,106.41	11.28	100.00	2,106.84	10.85
EX-SDMH-03	45+68.40, 44.10' LT	2,117.20	48	79.52	2,105.72	11.48	100.00	2,106.27	10.93
Vegas Dr System to Washington Ave System									
SDMH-23	39+76.94, 31.28' LT	2,113.61	24	5.26	2,110.43	3.18	6.92	2,110.57	3.04
SDMH-24	36+78.72, 31.07' LT	2,111.16	24	5.26	2,108.29	2.87	6.92	2,108.42	2.74
SDMH-25	35+02.41, 31.04' LT	2,110.19	24	9.03	2,107.37	2.82	11.72	2,107.61	2.58
SDMH-26	32+76.88, 31.01' LT	2,109.16	30	14.03	2,106.09	3.07	16.72	2,106.22	2.94
SDMH-27	30+55.22, 31.09' LT	2,108.07	30	18.55	2,104.70	3.37	22.78	2,104.88	3.19
SDMH-28	26+70.30, 30.88' LT	2,104.83	30	18.55	2,101.64	3.19	22.78	2,101.86	2.97
SDMH-29	24+98.64, 30.84' LT	2,103.79	36	25.33	2,100.41	3.38	32.29	2,101.20	2.59
SDMH-30	21+85.57, 31.20' LT	2,102.02	36	32.33	2,098.89	3.13	39.29	2,100.56	1.46
SDMH-31	19+75.85, 30.75' LT	2,101.37	36	46.8	2,097.85	3.52	55.99	2,099.49	1.88
SDMH-32	16+07.79, 30.81' LT	2,099.16	36	49.9	2,095.75	3.41	60.08	2,096.71	2.45
SDMH-33	13+32.61, 31.21' LT	2,097.52	42	52.13	2,093.60	3.92	63.08	2,093.95	3.57
SDMH-34	12+74.52, 30.52' LT	2,097.15	48	52.73	2,092.71	4.44	64.04	2,093.02	4.13
SDMH-35	12+414.75, 38.64' LT	2,096.64	48	52.73	2,092.18	4.46	64.04	2,092.42	4.22
Existing 54-inch RCP system									
SDMH-39	0+98.13, 76.48' RT	2,085.81	54	10.00	2,080.69	5.12	13.26	2,080.85	4.96
SDMH-40	1+60.69, 63.22' RT	2,085.66	54	10.00	2,080.15	5.51	13.26	2,080.29	5.37
SDMH-42	3+31.50, 64.63' RT	2,084.51	54	15.09	2,079.22	5.29	20.48	2,079.48	5.03
SDMH-43	3+67.43, 79.22' RT	2,084.00	54	15.09	2,079.19	4.81	20.48	2,079.42	4.58

Table 4.4: HGL Comparison (RTC 10-year, 100-year onsite flows)

Label	Approx. Station (ft)	Rim Elevation (ft)	Diameter (in)	RTC Q ₁₀ (ft ³ /s)	HGL Elevation with Q ₁₀ (ft)	Difference (Rim Elevation-HGL with Q ₂₅)	RTC Q ₁₀₀ (ft ³ /s)	HGL Elevation with Q ₁₀₀ (ft)	Difference (Rim Elevation-HGL with Q ₁₀₀)
Coran Ln to Vegas Dr System									
SDMH-03	77+58.32, 34.37' LT	2,156.54	18	1.00	2,147.96	8.58	1	2,147.96	8.58
SDMH-04	77+11.75, 34.29' LT	2,155.83	24	5.19	2,147.02	8.81	7.39	2,147.19	8.64
SDMH-05	75+03.26, 34.08' LT	2,152.14	24	8.28	2,144.30	7.84	12.02	2,144.54	7.60
SDMH-06	72+87.26, 33.85' LT	2,148.92	30	13.84	2,141.76	7.16	19.29	2,142.02	6.90
SDMH-07	71+19.91, 33.83' LT	2,147.01	30	16.84	2,139.72	7.29	23.32	2,140.00	7.01
SDMH-08	69+55.83, 33.57' LT	2,144.92	30	17.93	2,137.46	7.46	25.6	2,137.78	7.14
SDMH-09	67+73.25, 33.64' LT	2,142.67	30	18.87	2,135.51	7.16	27.62	2,135.86	6.81
SDMH-10	64+97.73, 33.64' LT	2,139.25	36	25.57	2,132.00	7.25	37.24	2,132.39	6.86
SDMH-11	64+06.47, 33.46' LT	2,138.32	36	26.40	2,131.16	7.16	39.06	2,131.57	6.75
SDMH-12	62+13.19, 33.50' LT	2,135.88	36	27.34	2,128.99	6.89	40.93	2,129.42	6.46
SDMH-13	58+54.21, 33.56' LT	2,130.98	36	28.82	2,123.84	7.14	43.43	2,124.28	6.70
SDMH-14	55+23.52, 33.64' LT	2,126.77	42	36.36	2,119.47	7.30	56.11	2,119.98	6.79
SDMH-15	52+59.02, 33.64' LT	2,124.02	42	36.36	2,116.70	7.32	56.11	2,117.21	6.81
SDMH-16	49+92.71, 30.35' LT	2,121.61	42	42.58	2,113.72	7.89	66.49	2,114.27	7.34
SDMH-17	47+96.32, 25.88' LT	2,119.82	42	44.49	2,111.61	8.21	71.28	2,112.23	7.59
SDMH-18	47+61.86, 25.51' LT	2,119.48	42	44.67	2,110.85	8.63	71.62	2,111.42	8.06
SDMH-19	47+28.78, 25.87' LT	2,119.06	42	44.86	2,109.59	9.47	71.97	2,110.21	8.85
SDMH-21	46+02.95, 30.91' LT	2,117.69	48	46.94	2,105.63	12.06	75.2	2,106.32	11.37
EX-SDMH-03	45+68.40, 44.10' LT	2,117.20	48	46.94	2,104.77	12.43	75.2	2,105.60	11.60
Vegas Dr System to Washington Ave System									
SDMH-23	39+76.94, 31.28' LT	2,113.61	24	4.44	2,110.37	3.24	7.5	2,110.62	2.99
SDMH-24	36+78.72, 31.07' LT	2,111.16	24	4.44	2,108.22	2.94	7.5	2,108.46	2.70
SDMH-25	35+02.41, 31.04' LT	2,110.19	24	7.83	2,107.27	2.92	12.77	2,107.71	2.48
SDMH-26	32+76.88, 31.01' LT	2,109.16	30	8.83	2,105.80	3.36	13.77	2,106.06	3.10
SDMH-27	30+55.22, 31.09' LT	2,108.07	30	12.59	2,104.41	3.66	20.33	2,104.77	3.30
SDMH-28	26+70.30, 30.88' LT	2,104.83	30	12.59	2,101.36	3.47	20.33	2,101.73	3.10
SDMH-29	24+98.64, 30.84' LT	2,103.79	36	16.14	2,100.05	3.74	26.31	2,100.44	3.35
SDMH-30	21+85.57, 31.20' LT	2,102.02	36	17.14	2,098.32	3.70	27.31	2,098.69	3.33
SDMH-31	19+75.85, 30.75' LT	2,101.37	36	21.98	2,097.12	4.25	34.68	2,097.54	3.83
SDMH-32	16+07.79, 30.81' LT	2,099.16	36	25.69	2,094.82	4.34	40.93	2,095.33	3.83
SDMH-33	13+32.61, 31.21' LT	2,097.52	42	26.69	2,092.84	4.68	41.93	2,093.29	4.23
SDMH-34	12+74.52, 30.52' LT	2,097.15	48	28.40	2,092.06	5.09	44.89	2,092.52	4.63
SDMH-35	12+414.75, 38.64' LT	2,096.64	48	28.40	2,091.55	5.09	44.89	2,091.99	4.65
Existing 54-inch RCP system									
SDMH-39	0+98.13, 76.48' RT	2,085.81	54	10.00	2,080.69	5.12	10	2,080.69	5.12
SDMH-40	1+60.69, 63.22' RT	2,085.66	54	10.00	2,080.15	5.51	10	2,080.15	5.51
SDMH-42	3+31.50, 64.63' RT	2,084.51	54	13.50	2,079.13	5.38	15.67	2,079.25	5.26
SDMH-43	3+67.43, 79.22' RT	2,084.00	54	13.50	2,079.12	4.88	15.67	2,079.22	4.78

4.6 Sanitary Sewer Design

The 8-inch sanitary sewer line that extends from Coran Lane to Lake Mead Boulevard on the west side of Rancho Drive is in conflict with the proposed landscaping and street lighting. Per the coordination meeting dated 07/31/2013 (See Appendix C) it was agreed PB shall propose relocating the 8-inch sewer line into Rancho Boulevard to avoid these conflicts. The proposed sanitary sewer

relocation design is shown on the 70% Design Plans, on sheets SD-12 through SD-15.

Just north of Spring Road and Rancho Drive intersection, at approximately station "L" 69+63.16, 52.79' LT, on the west side, an existing 6" PVC sewer lateral ties to an existing sanitary sewer manhole. The sewer manhole appears to be in the proposed roadway gutter line. Hence, the existing sewer manhole is proposed to be removed and the sewer lateral be relocated to the next downstream sewer manhole. Details are shown on SDR-6, SD-11, and SDP-10.

5.0 UTILITY INFORMATION AND CONFLICTS

5.1 Utility Data Collection

This section includes discussion regarding the utility research and coordination effort as well as the utility pothole information that will assist to move forward to the next phase of design.

Existing utilities located within the project limits were obtained by contacting the utility companies. Please refer to Appendix F for the utility matrix. Several other resources for utility information include field visits, survey of surface features, aerial photography, web image search, and obtaining and reviewing design and as-built drawings from utility companies and City of Las Vegas. Based upon as-builts provided by the agencies, the existing water, sewer, storm drain, electrical, and gas utilities were drafted in AutoCAD and are shown on the 70% Design Plans. HMM Survey Inc., provided survey data that included additional utility information such as existing manhole locations, water valves, and invert elevations for drop inlets.

5.2 Utility Conflict Locations

The following are the major locations of conflicts, discussed by approximate station, which affect the design of the proposed storm drain alignment and the laterals. The proposed storm drain alignment is anticipated for revisions at next design phase based on pothole information at the following locations. These locations are identified in the exhibit and summary provided in Appendix F.

Approximate Station "C" 8+50 to "C" 6+80

On the west side of Rancho Drive, a 4-inch fiber optic line is at an unknown depth and might be in conflict with the proposed drop inlet locations.

Approximate Station "C" 7+10 to "L" 10+10

On the west side of Rancho Drive, due to the unavailability of the existing 54-inch RCP storm drain profile from as-built plans, pothole requests are identified along the 54-inch RCP, at proposed tie-in locations.

Approximate Station "4" 1+00 to "4" 4+50

On the west side of Rancho Drive a 4-inch PE Gas line is at an unknown depth and might be in conflict with the proposed 54-inch RCP.

Approximate Station "4" 6+50 to "4" 16+50

On the east side of Rancho Drive a 4-inch fiber optic line is at an unknown depth and might be in conflict with the proposed drop inlets that connect to the existing 12' x 6' RCB.

Approximate Station "4" 11+50 to "4" 16+50

On the east side of Rancho Drive a 4-inch Steel Gas line is at an unknown depth, and might be in conflict with the proposed drop inlets that connect to the existing 12' x 6' RCB.

Approximate Station "L" 11+00 to "L" 40+00

On the west side of Rancho Drive a 16-inch water line is at an unknown depth and might be in conflict with the proposed mainline in Rancho Drive. The proposed mainline is placed at a minimum of 5-feet horizontal clearance from the 16-inch water line, however, the horizontal and vertical location of this water line need to be confirmed from the pothole and the storm drain alignment will be adjusted accordingly.

Approximate Station "L" 12+57.65, 93.00' LT to "L" 12+57.65, 193.5000' LT

On the west side of Rancho Drive, on south half of Washington Avenue, a 60-inch SNWA MLCP water line is at an unknown depth and might be in conflict with the proposed drop inlets.

Approximate Station "L" 15+50 to "L" 40+00

On the east side of Rancho Drive a 4-inch fiber optic line is at an unknown depth and might be in conflict with the proposed drop inlets.

Approximate Station "L" 12+09.00, 39.35' LT

On the west side of Rancho Drive, at the tie-in location of the proposed 48-inch storm drain to the proposed 48-inch stub by Atkins, an 8-inch water line, a (4)-3.5 inch telephone conduit and a traffic signal conduit are at unknown depth and might be in conflict with the proposed 48-inch storm drain.

Approximate Station "L" 45+00, 39.35' LT

On the west side of Rancho Drive, three(3) 2-inch fiber optic lines and a traffic signal are at an unknown depth and might be in conflict with the proposed 48-inch storm drain.

Approximate Station "L" 45+50 to "L" 47+00

On the east side of Rancho Drive a 4-inch fiber optic line and a 14-inch water line are at an unknown depth and might be in conflict with the proposed drop inlets. The horizontal and vertical location of the 14-inch water line needs to be

confirmed from the pothole and the storm drain alignment will be adjusted accordingly.

5.3 Utility Potholing

The major conflict locations discussed above and other locations of concern are all included in the pothole request location summary and corresponding exhibits provided in Appendix F. Pothole information is expected to be obtained for the next phase of design.

6.0 QUANTITY AND COST ESTIMATE

An estimate of quantities and costs for drainage facilities at 70% design phase are calculated based upon the number of drop inlets, manholes, length of storm drain pipe, removal of existing storm drain facilities and details of connections proposed. Per the 70% design plans, it appears that, there might be a need to relocate a 16-inch waterline, which runs parallel to the proposed storm drain alignment between Vegas Drive and Washington Avenue. This need will be determined at next phase, based on the pothole information obtained. For this reason, the contingency on drainage bid items is proposed to be at least 20%.

Table 6.1 summarizes the quantities and the associated costs. Details quantity calculations are provided in Appendix G.

Table 6.1: Quantity and Cost Estimate

ITEM NO.	ITEM DESCRIPTION	U.O/M	APPROX QTY	UNIT PRICE	EXTENDED PRICE
202.01	REMOVAL OF DROP INLET	EA	65	\$1,400	\$91,000
202.02	REMOVAL OF 18" CMP	LF	202	\$30	\$6,067
202.03	REMOVAL OF 18" RCP	LF	247	\$30	\$7,402
202.04	REMOVAL OF 29" X 19" RCP	LF	21	\$30	\$627
202.05	REMOVAL OF 24" RCP	LF	83	\$30	\$2,481
202.06	REMOVAL OF 30" RCP	LF	55	\$30	\$1,647
202.07	REMOVAL OF 36" RCP	LF	27	\$30	\$809
202.08	REMOVAL OF 42" RCP	LF	16	\$40	\$632
202.09	REMOVAL OF 48" RCP	LF	91	\$40	\$3,659
202.10	REMOVAL OF 54" RCP	LF	67	\$40	\$2,688
202.11	REMOVAL OF 60" RCP	LF	17	\$40	\$670
202.12	REMOVAL DUAL 43" X 27" CMP	LF	23	\$40	\$914
202.13	REMOVE TRANSITION STRUCTURE	LF	32	\$50	\$1,622
202.14	REMOVE 8" VCP SANITARY SEWER	LF	5	\$30	\$160
202.15	REMOVE SANITARY SEWER MANHOLE	EA	1	\$1,500	\$1,500
202.16	REMOVE WALL SECTION OF RCB	LF	41	\$100	\$4,099
202.17	CAP EXISTING 8-INCH SANITARY SEWER PIPE	LF	1	\$20	\$20
202.18	REMOVE CONCRETE CHANNEL	SF	281	\$50	\$14,062
502.00	CONSTRUCT DRAINAGE CHANNEL	SF	214	\$15	\$3,210
601.01	CONSTRUCT HEADWALL AND TRASHRACK	EA	2	\$2,500	\$5,000
603.01	18-INCH REINFORCED CONCRETE PIPE (CLASS III)	LF	1,566	\$130	\$203,580
603.02	24-INCH REINFORCED CONCRETE PIPE (CLASS III)	LF	1,531	\$135	\$206,685
603.03	30-INCH REINFORCED CONCRETE PIPE (CLASS III)	LF	1,643	\$170	\$279,310
603.04	36-INCH REINFORCED CONCRETE PIPE (CLASS III)	LF	2,158	\$200	\$431,600
603.05	42-INCH REINFORCED CONCRETE PIPE (CLASS III)	LF	1,134	\$250	\$283,500
603.06	48-INCH REINFORCED CONCRETE PIPE (CLASS III)	LF	119	\$275	\$32,725
603.07	54-INCH REINFORCED CONCRETE PIPE (CLASS III)	LF	286	\$300	\$85,800
603.08	60-INCH REINFORCED CONCRETE PIPE (CLASS III)	LF	11	\$350	\$3,850
603.09	68-INCH X 43-INCH REINFORCED CONCRETE PIPE (CLASS III)	LF	5	\$450	\$2,250
603.10	PLUG EXISTING STORM DRAIN PIPE	EA	81	\$200	\$16,200
603.11	18-INCH CONCRETE COLLAR	EA	2	\$500	\$1,000
603.12	24-INCH CONCRETE COLLAR	EA	2	\$750	\$1,500
603.13	36-INCH CONCRETE COLLAR	EA	1	\$1,000	\$1,000
603.14	48-INCH CONCRETE COLLAR	EA	1	\$1,250	\$1,250
603.15	54-INCH CONCRETE COLLAR	EA	5	\$1,500	\$7,500
609.01	48-INCH TYPE I STORM DRAIN MANHOLE	EA	1	\$4,500	\$4,500
609.02	48-INCH TYPE IA STORM DRAIN MANHOLE	EA	5	\$4,500	\$22,500
609.03	60-INCH TYPE I STORM DRAIN MANHOLE	EA	6	\$5,500	\$33,000
609.04	TYPE II STORM DRAIN MANHOLE	EA	19	\$6,000	\$114,000
609.05	TYPE III STORM DRAIN MANHOLE	EA	2	\$6,500	\$13,000
609.06	NDOT TYPE 4 STORM DRAIN MANHOLE	EA	10	\$7,000	\$70,000
609.07	5.00-FOOT TYPE DM DROP INLET	EA	1	\$8,000	\$8,000
609.08	7.50-FOOT TYPE DM DROP INLET	EA	3	\$9,500	\$28,500
609.09	12.50-FOOT TYPE DM DROP INLET	EA	7	\$12,500	\$87,500
609.10	20-FOOT TYPE DM DROP INLET	EA	1	\$20,000	\$20,000
609.11	22.50-FOOT TYPE DM DROP INLET	EA	9	\$22,500	\$202,500
609.12	25.00-FOOT TYPE DM DROP INLET	EA	1	\$25,000	\$25,000
609.13	50-FOOT TYPE DM DROP INLET	EA	1	\$30,000	\$30,000
609.14	62.50-FOOT TYPE DM DROP INLET	EA	1	\$40,000	\$40,000
609.15	7.50-FOOT TYPE CM DROP INLET	EA	1	\$8,000	\$8,000
609.16	12.50-FOOT TYPE CM DROP INLET	EA	1	\$12,500	\$12,500
609.17	MODIFIED TYPE CM DROP INLET	EA	2	\$15,000	\$30,000
609.18	3-FOOT TYPE F SINGLE GRATE INLET	EA	26	\$4,000	\$104,000
609.19	6-FOOT TYPE F DOUBLE GRATE INLET	EA	6	\$5,000	\$30,000
609.20	MODIFIED TYPE F SINGLE GRATE INLET	EA	4	\$15,000	\$60,000
609.21	NDOT TYPE 2 DI	EA	2	\$5,000	\$10,000
609.22	48-INCH SANITARY SEWER MANHOLE	EA	9	\$9,500	\$85,500
609.23	8-INCH PVC C900 SANITARY SEWER PIPE	LF	2,160	\$75	\$162,000
609.24	6-INCH PVC C900 SANITARY SEWER PIPE	LF	89	\$90	\$8,010
				SUBTOTAL	\$2,914,527
				20% CONTINGENCY	\$581,303
				SUBTOTAL CONSTRUCTION	\$3,495,830
				7% CONSTRUCTION MANAGEMENT	\$244,708
				TOTAL	\$3,740,538

7.0 CONCLUSION

This technical drainage study provides the detailed drainage design completed in accordance with the criteria set forth by the CCRFCD RTC, NDOT and the City of Las Vegas local floodplain ordinances. The proposed storm drain system is designed to propose a storm drain system in Rancho Drive, to relieve flooding during the worst-case condition of the existing, interim and ultimate conditions. The interim condition, is determined as the worst-case, which is considered as when the project improvements are in place with all existing MPU facilities, pending proposed MPU facilities in Decatur Boulevard to be built the in future.

The proposed system is designed to meet street criteria for NDOT 25-year in interim condition and RTC 10-year and 100-year criteria in ultimate condition. The street criteria for NDOT 100-year in interim condition, is also verified to be matching the existing condition or making it better. The existing condition 100-year flows were used as the base model for normal depth comparison to interim condition. A summary table showing the design criteria with respect to the proposed storm drain improvements is presented in Appendix E.

Where existing inlets are being relocated the proposed drop inlet sizes are designed to match at minimum the sizes of existing drop inlets, so as not to compromise the street hydraulic capacity for a 100-year storm event in comparison to the existing condition.

In the ultimate condition when the project improvements are in place with all existing MPU facilities in place and the proposed Decatur Blvd MPU facility built and fully functional, it is anticipated that the offsite flow reaching Rancho Drive from the west will be greatly minimized, as it will be intercepted much upstream of the project. The proposed design does not make the interim condition worse than the existing condition.

All along the project corridor, any offsite lateral connections that currently tie to the existing Rancho System are re-connected to the proposed mainline, to avoid negative impact on the adjacent properties due to the proposed improvements.

It is to be noted that the proposed mainline sizes in Rancho Drive are smaller in comparison to the existing mainline sizes. This is due to sizing the mainline based on onsite flows only, per the criteria. In addition, there are two new regional facilities that are considered "in-place" since the 30% design of this project. The two facilities identified below, intercept the majority of the off-site flows that are otherwise reaching Rancho Drive on the west side. Hence, the 100-year flows are greatly reduced on Rancho Drive, in comparison to the 30% design level.

- the 72" RCP in Vegas Drive (under construction)

- the 5' x 5' RCB in Washington Avenue that is anticipated to be built earlier than the Rancho Drive system

Utility conflicts with the proposed system will be re-evaluated, with the pothole information that will be received for next phase of design. Quantity and cost estimates for the 70% design are based on the design scope discussed in the report and meet the NDOT and RTC criteria.

8.0 REFERENCES

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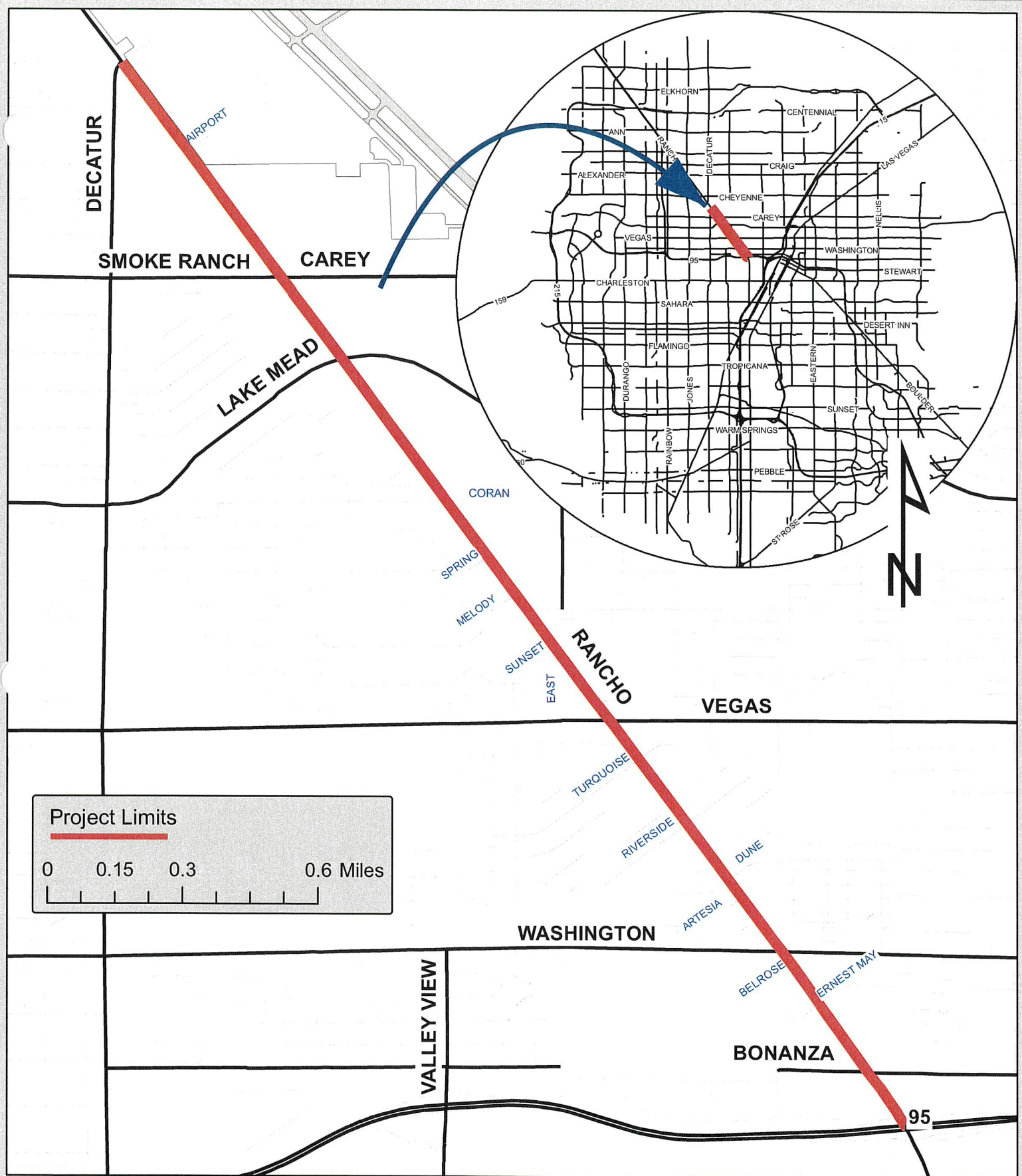
Rancho Drive/US 95 LOMR
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Freeway Channel- Washington, MLK to Rancho, Final Design Report (90% Submittal)
Prepared by: Atkins North America Inc., November 2013, for City of Las Vegas



Appendix A- Figures & Maps

- Figure 1 - Vicinity Map
- Figure 2 - 2008 MPU Hydrologic Map
- Figure 3 - 2008 MPU Facilities Map
- Figure 3A - 2008 MPU Facility Inventory
- Figure 4 - FEMA FIRM Panels
- Figure 5 - McCarran Airport Rainfall Area - HCDDM Figure 513
- Figure 6 - 25-year Depth-Duration-Frequency - Values - HCDDM Figure 503
- Figure 6A - 25-year Depth-Duration-Frequency - Values - HCDDM Figure 504
- Figure 6B - 100-year Depth-Duration-Frequency - Values - HCDDM Figure 506
- Figure 7 - Depth-Duration-Frequency-Values - HCDDM Table 505
- Figure 8 – Six Hour Storm Distributions (SDN3) - HCDDM Table 503
- Figure 9 - Six Hour Depth - Area Reduction Factors - HCDDM Table 502



Rancho Drive Capacity Improvements

FIGURE 1

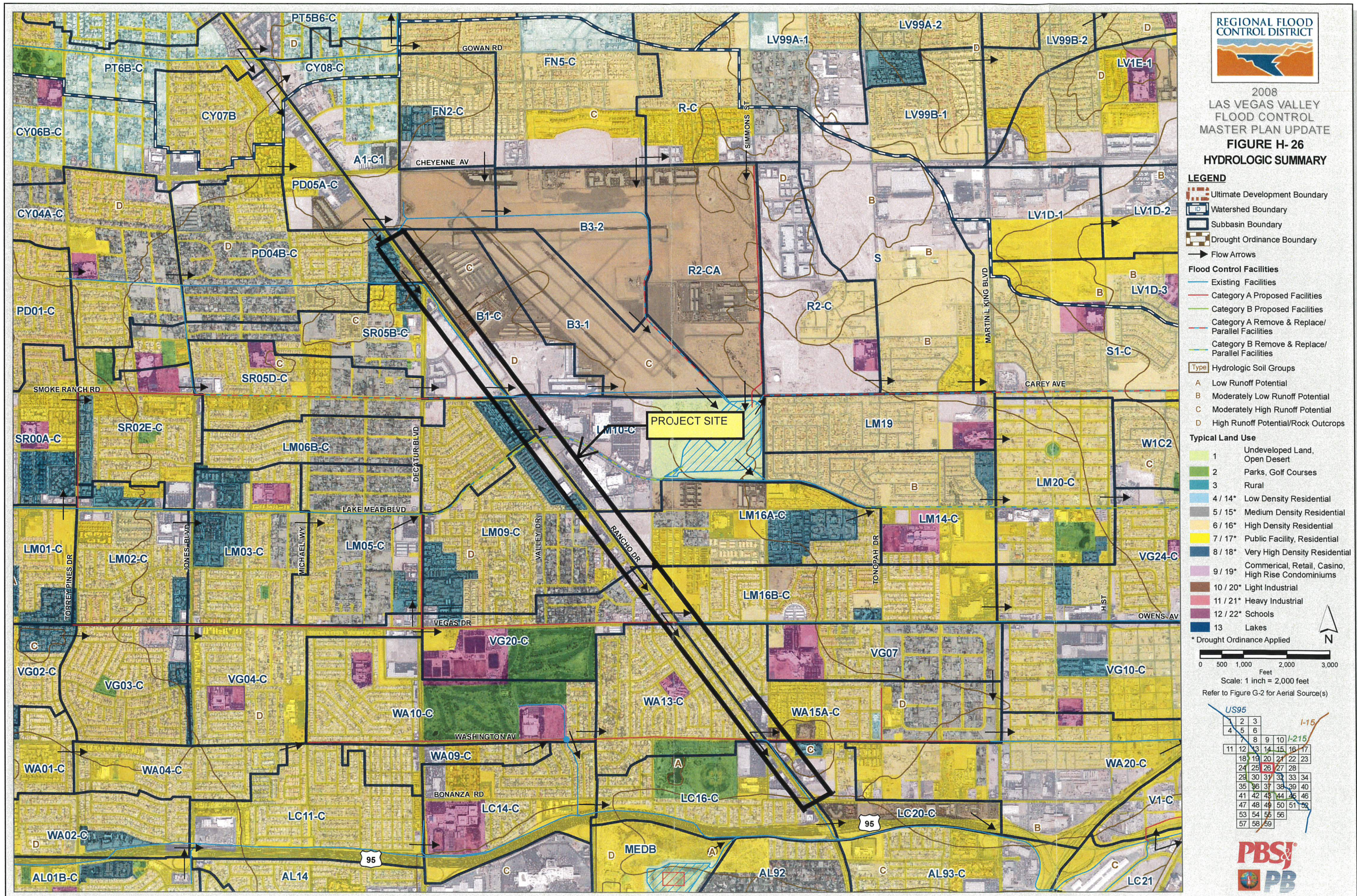
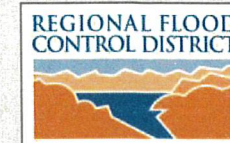


FIGURE 2



2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

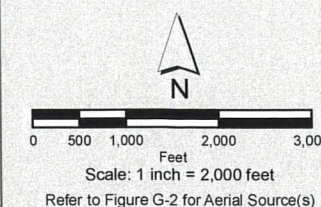
**FIGURE F-26
FLOOD CONTROL FACILITIES**

LEGEND

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

Remove & Replace/Parallel Facilities

- | Category A | Category B |
|------------|------------|
| Channel | Channel |
| Stormdrain | Stormdrain |
| Crossing | Crossing |



US95			I-15		
2	3		12	13	14
4	5	6	8	9	10
11	12	13	14	15	16
17	18	19	20	21	22
23	24	25	26	27	28
29	30	31	32	33	34
35	36	37	38	39	40
41	42	43	44	45	46
47	48	49	50	51	52
53	54	55	56		
57	58	59			

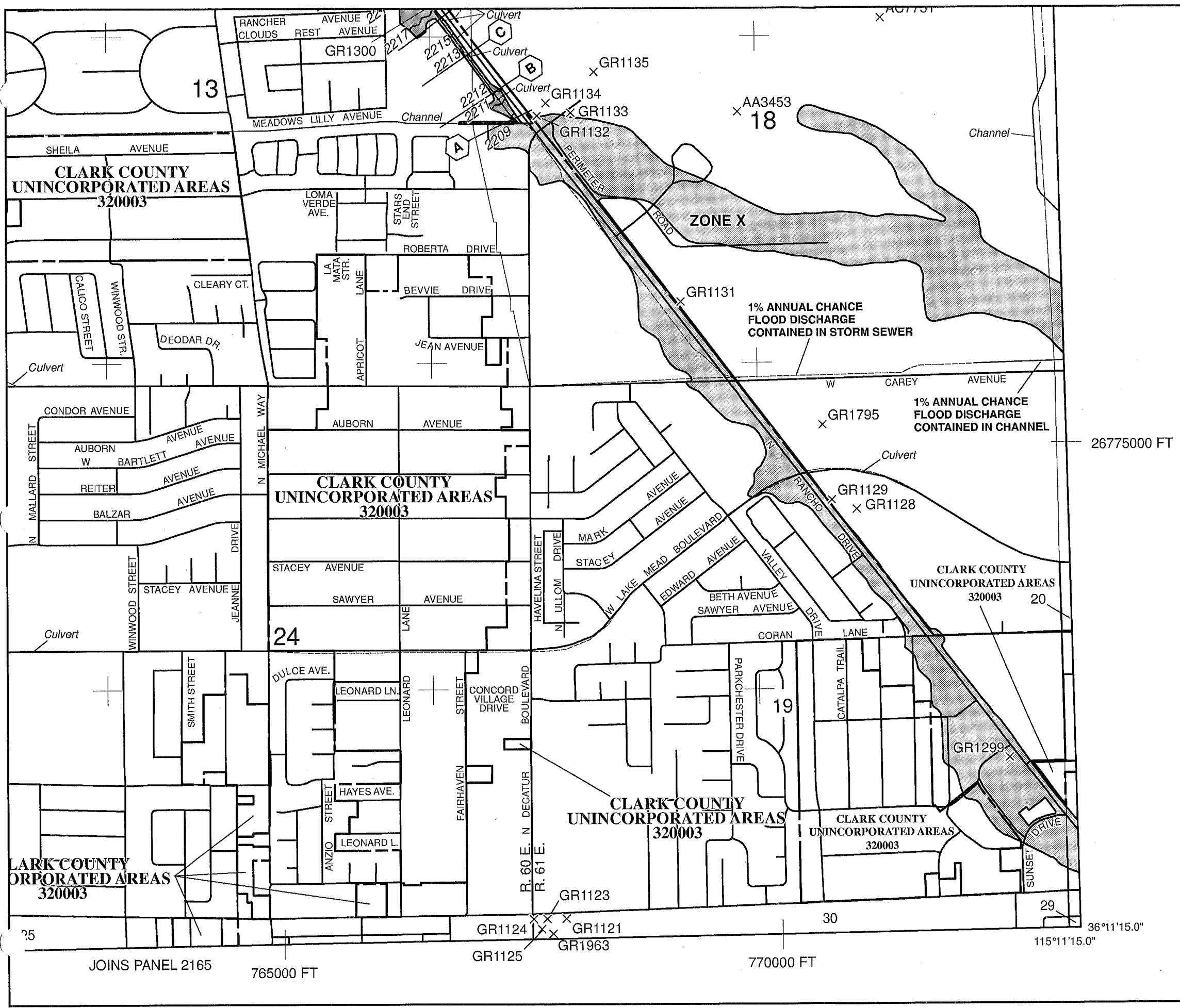


FIGURE 3

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
FW15 0000	E	FREEWAY CHANNEL FROM DESERT INN TO EXPRESSWAY 3: 12' X 10' RCB	2170	3728	CAL93	SW4	10.63	0.17
GOOF		GOWAN OUTFALL FACILITIES						
0485	E	90" RCP	1160	630	DGOW2A	GW3SC	1.38	0.47
0486	E	8' X 5' RCB	3300	630	DGOW2A	GW3SC	1.38	0.60
0511	E	8' X 5' RCB	8390	699	CPT6B-C	GW3SC	1.08	0.50
LAAS		NORTH LAS VEGAS AIR TERMINAL - SIMMONS						
0000	P3	14' X 6' RCB	760	698	CR2-CA	NW3	2.57	0.80
0014	P3	12' X 6' RCB	1350	698	CR2-CA	NW3	2.57	1.12
0040	P3	10' X 6' RCB	2105	698	CR2-CA	NW3	2.57	1.50
0080	P3	66" RCP	157	285	R-C	NW3	0.27	1.10
0083	P3	60" RCP	620	285	R-C	NW3	0.27	1.40
0095	P3	54" RCP	400	285	R-C	NW3	0.27	1.44
0103	P3	48" RCP	405	285	R-C	NW3	0.27	1.75
LAAT		NORTH LAS VEGAS AIR TERMINAL						
0000	E	RCBC - Unknown Characteristics	345	1331	CB3-1	NW3	4.17	0.50
0006	E	Conc Chnl - Unknown Characteristics	375	1331	CB3-1	NW3	4.17	0.50
0013	E	Earth Chnl 27'W 5'-6.5'D 1.5:1 SS (Replace w/ LAAT0014)	934	1331	CB3-1	NW3	4.17	0.50
0014	P3	10' X 6' RCB (Replaces LAAT0013)	934	1331	CB3-1	NW3	4.17	1.84
0030	E	Earth Chnl 27'W 5'-6.5'D 1.5:1 SS (Replace w/ LAAT0031)	1618	1079	CB3-2	NW3	3.87	0.50
0031	P3	10' X 6' RCB (Replaces LAAT0030)	1618	1079	CB3-2	NW3	3.87	1.05
0061	E	Earth Chnl 27'W 5'-6.5'D 1.5:1 SS (Replace w/ LAAT0062)	887	1079	CB3-2	NW3	3.87	0.50
0062	P1	12' X 8' RCB (Replaces LAAT0061)	887	1079	CB3-2	NW3	3.87	0.50
0078	E	10' X 6' RCB	1055	1079	CB3-2	NW3	3.87	0.58
0098	E	10' X 4' RCB	2207	677	CCA1-C	NW3	3.08	0.60
0140	E	Conc Chnl 6'W 4'D 1.5:1 SS	338	677	CCA1-C	NW3	3.08	0.64
0146	E	Conc Chnl 6'W 3'D 1.5:1 SS	1388	677	CCA1-C	NW3	3.08	0.68
0172	E	76" X 48" HERCP	536	480	CA1-C	NW3	2.87	0.75
0182	E	Conc Chnl 6'W 3'D 1.5:1 SS	997	480	CA1-C	NW3	2.87	0.83
0201	E	Conc Chnl 6'W 3'D 1.5:1 SS	184	294	A1-C1	NW3	0.31	0.37
0204	E	76" X 48" RCP	425	294	A1-C1	NW3	0.31	0.37
LANO		NORTH LAS VEGAS AIR TERMINAL NORTH						
0000	E	Conc Chnl 0'W 3'D 1.5:1 SS	470	294	A1-C1	NW3	0.31	0.30
LCCH		LAS VEGAS CREEK CHANNEL						
0000	E	2: 12' X 7" RCB	730	2894	CLC20-C	MEADOWS4	9.68	1.28
0013	E	2: 12' X 6' RCB	2035	2894	CLC20-C	MEADOWS4	9.68	0.82
0051	E	2:14' X 7" RCB	3113	2894	CLC20-C	MEADOWS4	9.68	0.60
0110	E	Transition Structure	220	2798	CCLC16-C	MEADOWS4	9.51	
0114	E	2: 14' X 7" RCB	670	2329	CRMEDET	MEADOWS4	8.25	0.80
0127	E	Transition Structure	110	2329	CRMEDET	MEADOWS4	8.25	
0129	E	2: 14' X 7" RCB	1130	2329	CRMEDET	MEADOWS4	8.25	0.50
0150	E	2: 13' X 7" RCB	200	2329	CRMEDET	MEADOWS4	8.25	0.95
0154	E	Transition Structure	190	2329	CRMEDET	MEADOWS4	8.25	
0157	E	2: 12' X 6' RCB	1650	1631	CCLC14-C	SW3	2.99	1.06
0188	E	2: 12' X 6' RCB	2225	1631	CCLC14-C	SW3	2.99	1.36
0230	E	12' X 6' RCB	2140	1381	CLC14-C	SW3	2.54	1.74
0270	E	12' X 6' RCB	1705	774	CCWA02-C	SW3	1.84	0.54
0302	E	8' X 6' RCB	3940	774	CCWA02-C	SW3	1.84	2.49
0377	E	10' X 7" RCB	1226	774	CCWA02-C	SW3	1.84	0.74
0400	E	Transition Structure	110	437	CWA02-C	SW3	1.47	0.49
0402	E	8' X 6' RCB @ Jones	535	437	CWA02-C	SW3	1.47	0.49
0412	E	60" RCP	1370	437	CWA02-C	SW3	1.47	1.08
0438	E	60" RCP	1090	162	CLC01-C	SW3	1.20	1.60
0458	E	60" RCP	1060	162	CLC01-C	SW3	1.20	1.60
0478	E	60" RCP	1110	162	CLC01-C	SW3	1.20	0.55
LCDE		LAS VEGAS CREEK - DECATUR						
0000	E	6' X 5' RCB	1800	404	LC11-C	SW3	0.38	1.26
0034	E	72" RCP	700	404	LC11-C	SW3	0.38	0.50
LCJO		LAS VEGAS CREEK - JONES						
0000	E	6' X 6' RCB	380	358	AL01B-C	SW3	0.37	0.50
0007	E	6' X 5' RCB	675	358	AL01B-C	SW3	0.37	0.62

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LCLT		LAS VEGAS CREEK - LATERAL						
0000	E	6' X 6' RCB	490	250	WA10D	SW3	0.45	0.50
0006	E	Conc Chnl 10'W 4'D 0:1 SS	1364	250	WA10D	SW3	0.45	0.50
0033	E	10' X 4' RCBC @ Washington	96	405	WA10-C	NW3	0.45	0.50
0034	E	Grass Chnl 12'W 5'D 1:1 SS	1750	405	WA10-C	SW3	0.45	0.20
LCME		LAS VEGAS CREEK - MEADOWS						
0000	E	14' X 8' RCB	895	1423	MEADOWDB	SW3SC	5.67	0.72
0016	E	Stilling Basin	140	1423	MEADOWDB	SW3SC	5.67	0.21
0017	E	3,300 cfs Spillway (Replace w/ LCME0018)		3300	MEADOWIN	SW3SC	5.67	
0018	P1	Modify Spillway, raise height by 1' (Replaces LCME0017)		3300	MEADOWIN	SW3SC	5.67	
0019	E	1: 11' X 5' RCB and 1: 11.5' X 5' RCB	110	1423	MEADOWDB	SW3SC	5.67	0.81
0020	E	213 ac-ft Meadows Detention Basin		4713	MEADOWIN	SW3SC	5.67	
0021	P1	Upgrade to 235 ac-ft Meadows Detention Basin		4713	MEADOWIN	SW3SC	5.67	
LCRA		LAS VEGAS CREEK - RANCHO						
0000	E	12' X 8' RCB	380	783	CLC16-C	SW3	1.71	0.60
0004	E	12' X 6' RCB	2367	783	CLC16-C	SW3	1.71	0.77
0050	E	8' X 6' RCB	355	526	WA13D	SW3	1.40	0.50
LMDE		LAKE MEAD BOULEVARD - DECATUR BRANCH						
0000	P1	10' X 5' RCB	2640	665	DCVG04-C	NW3	1.26	0.90
LV15		FREEWAY CHANNEL						
0316	E	11' X 6' RCB	3010	985	CWA20-C	NW3	4.46	0.59
0372	E	9' X 6' RCB	1970	985	CWA20-C	NW3	4.46	0.66
0409	E	7' X 6' RCB	815	542	CWA15A-C	NW3	3.67	0.91
0424	P1	8' X 6' RCB	2500	542	CWA15A-C	NW3	3.67	0.73
0472	P1	2: 66" RCP	1200	265	WA15A-C	NW3	0.37	0.42
0474	P1	8' X 6' RCB	2880	322	CCWA13-C	NW3	3.29	0.73
0528	P1	8' X 7" RCB	4420	869	CWA13-C	NW3	1.39	1.19
0602	P1	2: 66" RCP	5980	504	CWA09-C	NW3	0.61	1.59
LVLN		LAS VEGAS WASH - LAKE MEAD						
0033	E	60" RCP (Replace w/ LVLN0034)	1186	994	CLM20-C	NW3SC	1.36	1.62
0034	P0	12' X 5' RCB (Replaces LVLN0033)	1186	994	CLM20-C	NW3SC	1.36	1.62
0059	E	72" RCP (Replace w/ LVLN0060)	5952	994	CLM20-C	NW3SC	1.36	0.66
0060	P0	12' X 6' RCB (Replaces LVLN0059)	5952	994	CLM20-C	NW3SC	1.36	0.66
0170	E	78" RCP	2421	378	CLM16A-C	NW3SC	0.38	1.17
0221	E	48" RCP Outlet	270	168	DR2	NW4	11.78	
0222	E	48" RCP Outlet	500	208	DCAREY	NW4	11.78	
0224	E	36" RCP	2429				0.53	
0225	E	90" RCP (Replace w/ LVLN0226)	641	1933	CLM10-C	NW3	3.02	1.35
0226	P0	2: 10' X 8' RCB (Replaces LVLN0225)	641	1933	CLM10-C	NW3	3.02	0.50
0227	E	10,000 cfs PMF Spillway		10000	CARYLMIN	NW4	11.78	
0228	E	607 ac-ft Carey-Lake Mead Detention Basin		5184	CARYLMIN	NW4	11.78	
0270	E	90" RCP (Replace w/ LVLN0271)	3473	1933	CLM10-C	NW3	3.02	1.35
0271	P0	12' X 8' RCB (Replaces LVLN0270)	3473	1933	CLM10-C	NW3	3.02	1.35
0336	E	84" RCP (Replace w/ LVLN0337)	1050	1652	CLM06-C	NW3	2.61	1.16
0337	P0	12' X 8' RCB (Replaces LVLN0336)	1050	1652	CLM06-C	NW3	2.61	1.16
0355	E	90" RCP (Replace w/ LVLN0356)	1840	1652	CLM06-C	NW3	2.61	0.40
0356	P0	12' X 11' RCB (Replaces LVLN0355)	1840	1652	CLM06-C	NW3	2.61	0.40
0388	E	84" RCP	520	852	CLM05-C	NW3	1.00	1.40
0399	E	78" RCP	803	852	CLM05-C	NW3	1.00	1.07
0416	E	72" RCP	1320	852	CLM05-C	NW3	1.00	1.00
0442	E	60" RCP	725	565	CLM03-C	NW3	0.63	1.28
0453	E	54" RCP	589	565	CLM03-C	NW3	0.63	2.37
0460	E	54" RCP	1464	235	LM02-C	NW3	0.29	2.05
0475	E	48" RCP	2632	235	LM02-C	NW3	0.29	1.24
0525	E	48" RCP	2600	542	CLM01-C	NW3	0.64	1.24
LVOE		OWENS AVENUE - EAST						
0345	P1	13' X 11' RCB	1685	2369	DLVOE	SW5	22.79	0.60
LVOV		OWENS AVENUE SYSTEM						
0003	E	96" RCP	7500	1089	CLM16B-C	NW3	2.40	0.70
0146	E	84" RCP	4800	570	DCVG20-C	NW3	2.02	0.90
0241	P3	66" RCP	5800	381	CVG20-C	NW3	1.57	1.40

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LWOW		OWENS AVENUE SYSTEM						
0351	P3	8' X 6' RCB	3000	829	CVG04-C	NW3	1.26	1.44
0360	P1	8' X 6' RCB	2300	829	CVG04-C	NW3	1.26	1.48
0460	P1	7' X 6' RCB	2700	616	CVG03-C	NW3	0.95	1.48
LVPK		PEAK DRIVE SYSTEM						
0000	E	Conc Chnl 15'W 6'D 0:1 SS	606	1024	CPD04B-C	NW3	1.59	1.22
0019	E	Conc Chnl 20'W 5.5'D 0:1 SS	2190	1024	CPD04B-C	NW3	1.59	0.57
0056	E	10' X 5' RCB	103	703	CCY04A-C	NW3	1.12	0.40
0058	E	9' X 6' RCB	2542	703	CCY04A-C	NW3	1.12	0.95
0104	E	10' X 6' RCB	76	703	CCY04A-C	NW3	1.12	1.26
0106	E	8' X 6' RCB	1235	703	CCY04A-C	NW3	1.12	0.54
0130	E	7' X 5' RCB	1435	400	CPD01-C	NW3	0.67	0.61
LVRA		LAS VEGAS WASH - RANCHO						
0000	E	12' X 8' RCB	612	1317	CCPD04BC	NW3	3.87	1.56
0012	E	12' X 8' RCB	2838	1317	CCPD04BC	NW3	3.87	0.78
0066	E	14' X 5' RCB	65	1317	CCPD04BC	NW3	3.87	1.22
LVSF		LAS VEGAS WASH - SMOKE RANCH						
0045	E	54" RCP (Replace w/ LVSF0046)	1180	1244	CS1-C	NW3SC	1.42	3.41
0046	P1	10' X 5' RCB (Replaces LVSF0045)	1180	1244	CS1-C	NW3SC	1.42	3.41
0070	E	66" RCP (Replace w/ LVSF0071)	4118	1244	CS1-C	NW3SC	1.42	0.73
0071	P1	10' X 9' RCB (Replaces LVSF0070)	4118	1244	CS1-C	NW3SC	1.42	0.73
0148	E	54" RCP (Replace w/ LVSF0149)	2587	951	CS	NW3SC	0.95	0.58
0149	P1	11' X 7' RCB (Replaces LVSF0148)	2587	951	CS	NW3SC	0.95	0.58
0197	E	30" RCP (Replace w/ LVSF0198)	581	445	CR2-C	NW3SC	0.38	0.86
0198	P1	8' x 5' RCB (Replaces LVSF0197)	581	445	CR2-C	NW3SC	0.38	0.86
0208	E	54" RCP (Replace w/ LVSF0209)	2060	445	CR2-C	NW3SC	0.38	1.41
0209	P1	7' X 5' RCB (Replaces LVSF0208)	2060	445	CR2-C	NW3SC	0.38	1.41
0210	E	14' X 8' RCB	800	2889	CB1-C	NW3	6.44	1.73
0221	E	Transition Structure	100	2889	CB1-C	NW3	6.44	7.08
0223	E	Conc Chnl 14'W 8'D 1.5:1 SS	2150	2889	CB1-C	NW3	6.44	0.96
0263	E	14' X 8' RCB	707	2889	CB1-C	NW3	6.44	0.63
0273	E	11' X 11' RCB	1140	2889	CB1-C	NW3	6.44	0.92
0295	E	11' X 11' RCB	510	2683	CCSR05B	NW3	6.16	2.85
0312	E	8' X 8' RCB	460	1607	CSR05B	NW3	2.30	1.63
0359	E	66" RCP (Replace w/ LVSF0360)	1690	1607	CSR05B	NW3	2.30	0.67
0360	P1	10' X 10' RCB (Replaces LVSF0359)	1690	1607	CSR05B	NW3	2.30	0.75
0396	E	60" RCP (Replace w/ LVSF0397)	2640	1461	CSR05D	NW3	1.94	1.14
0397	P1	10' X 9' RCB (Replaces LVSF0396)	2640	1461	CSR05D	NW3	1.94	0.87
0446	E	54" RCP (Replace w/ LVSF0447)	2530	1461	CSR05D	NW3	1.94	1.14
0447	P1	10' X 8' RCB (Replaces LVSF0446)	2530	1461	CSR05D	NW3	1.94	1.25
0496	P1	10' X 7' RCB	2855	1245	CSR02E	NW3	1.64	1.27
0500	E	60" RCP	1290					1.97
0525	E	54" RCP	1340					0.30
0546	P1	8' X 8' RCB	2640	758	CSR00A	NW3	1.01	0.57
LVWH		WASHINGTON AVENUE CHANNEL						
0431	E	3: 14.33' X 10' RCB	665	2870	DCLC21	SW5	22.79	0.15
0446	E	Junction Structure	69	2870	DCLC21	SW5	22.79	0.15
0447	E	3: 14.33' X 10' RCB	1955	4978	CCAL93	SW5	22.19	0.15
0484	E	Confluence Structure	455	4978	CCAL93	SW5	22.19	0.15
WAGC		WASHINGTON AVENUE CHANNEL - GRAND CENTRAL						
0000	E	2: 12' X 4' RCB	700	557	LC21	SW3	0.60	0.20
0014	E	1: 12' X 4' RCB and 1: 11' X 4' RCB	2440	557	LC21	SW3	0.60	0.20





MAP SCALE 1" = 1000'

500 0 1000 2000 FEET
METERS

PANEL 2155F

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA

AND INCORPORATED AREAS

PANEL 2155 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	320003	2155	F
LAS VEGAS, CITY OF	325276	2155	F
NORTH LAS VEGAS, CITY OF	320007	2155	F

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



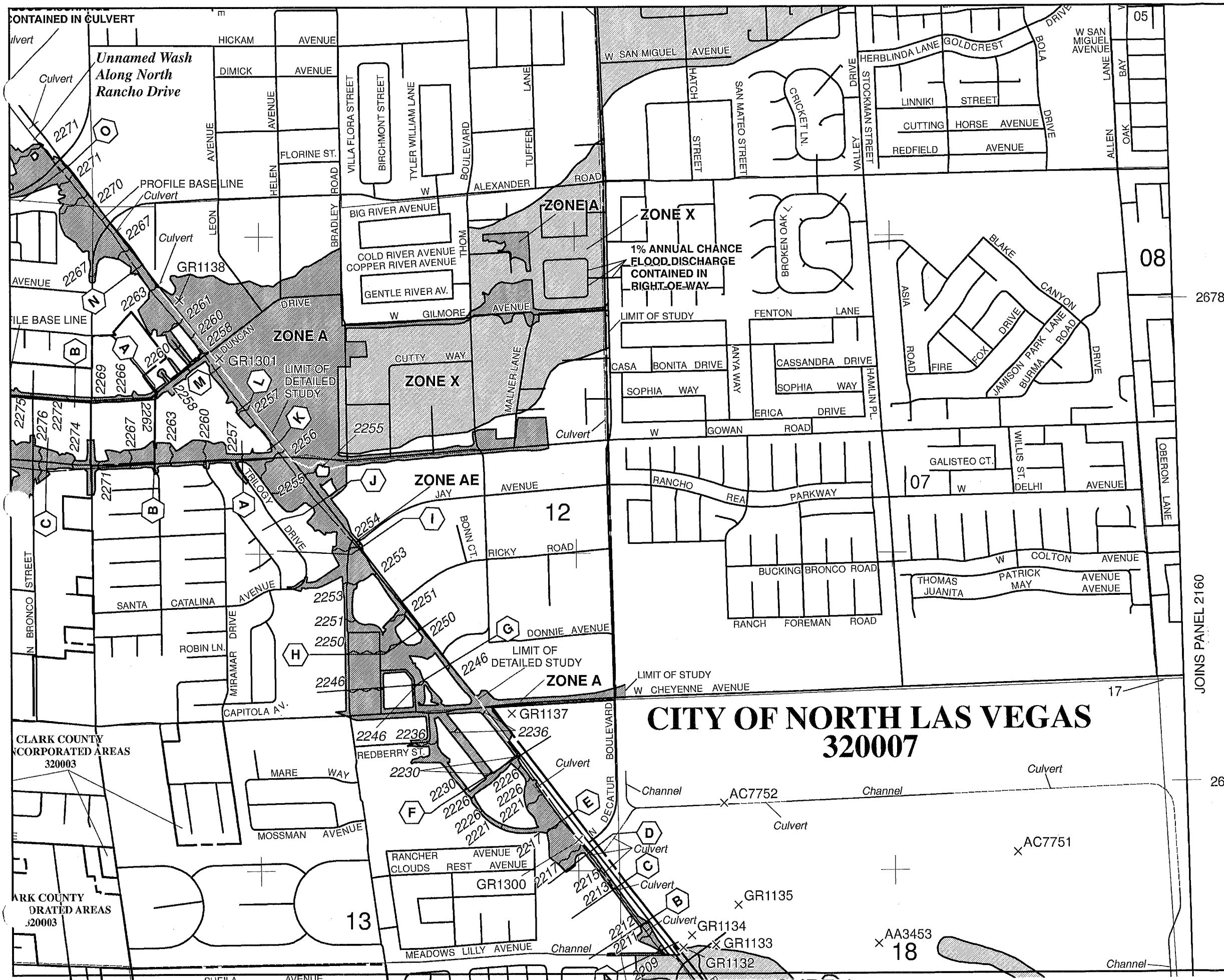
MAP NUMBER
32003C2155F

MAP REVISED
NOVEMBER 16, 2011

Federal Emergency Management Agency

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

FIGURE 4





MAP SCALE 1" = 1000'

500 0 1000 2000 FEET
METERS

PANEL 2155F

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA

AND INCORPORATED AREAS

PANEL 2155 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	320003	2155	F
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NORTH LAS VEGAS, CITY OF	320007	2155	F

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

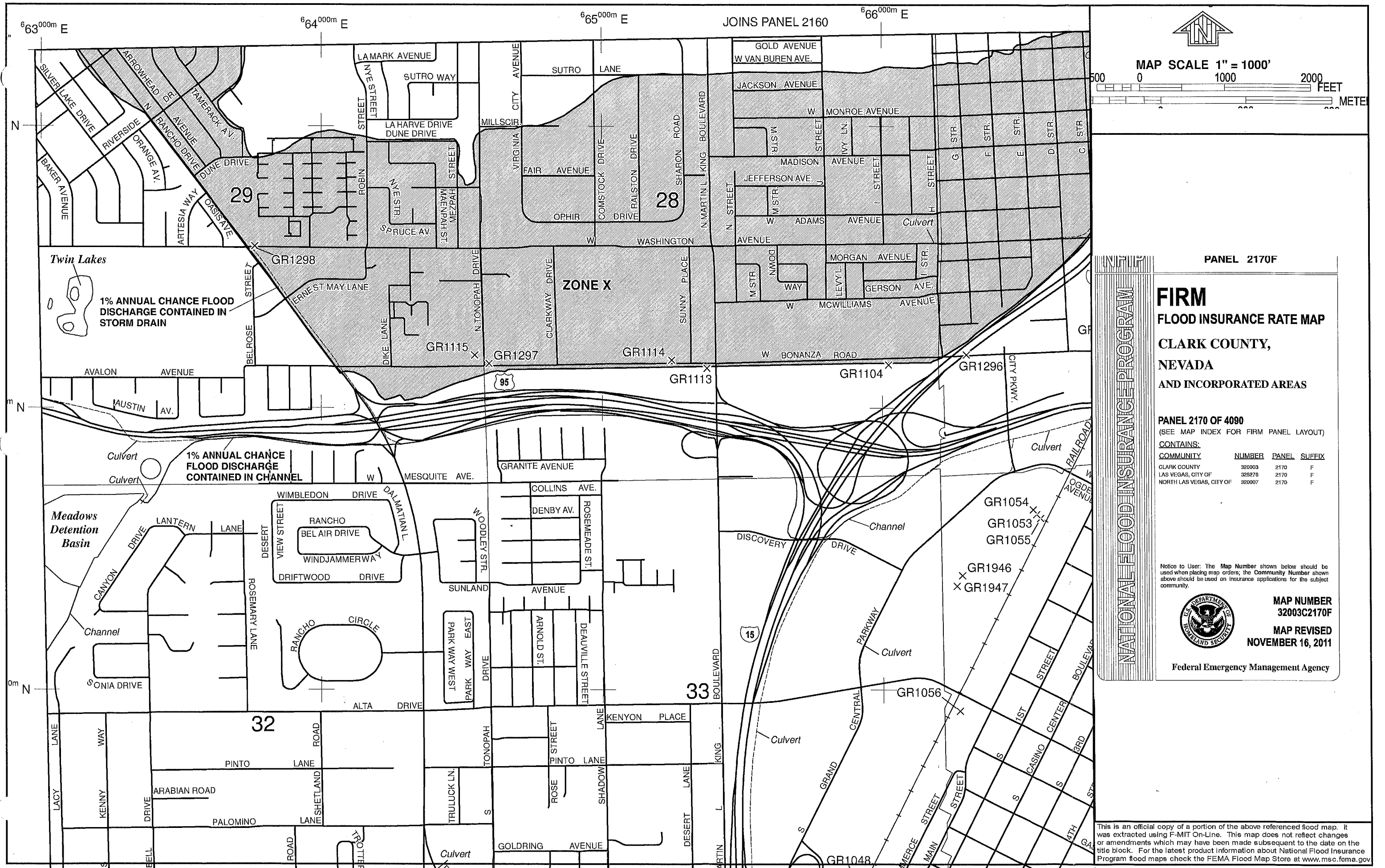


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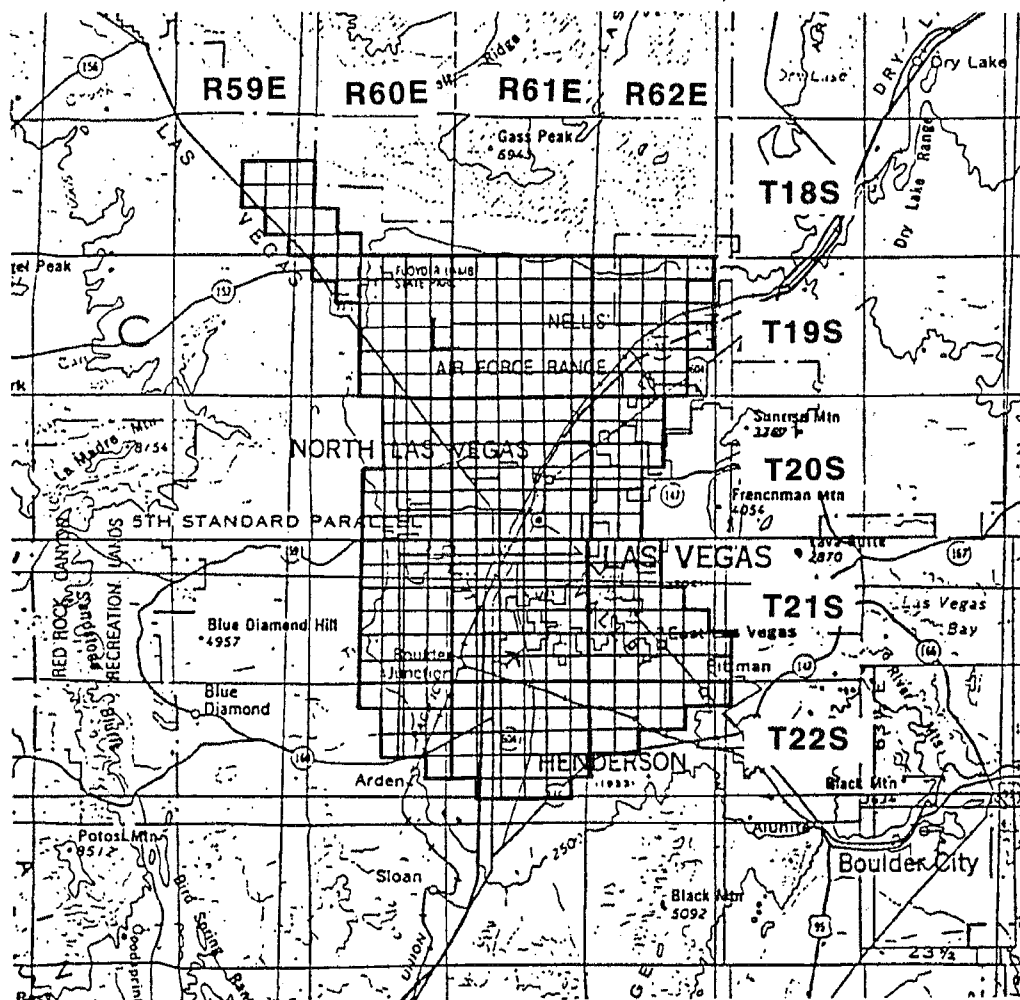
MAP REVISED
NOVEMBER 16, 2011

Federal Emergency Management Agency

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McCARRAN AIRPORT RAINFALL AREA



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

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

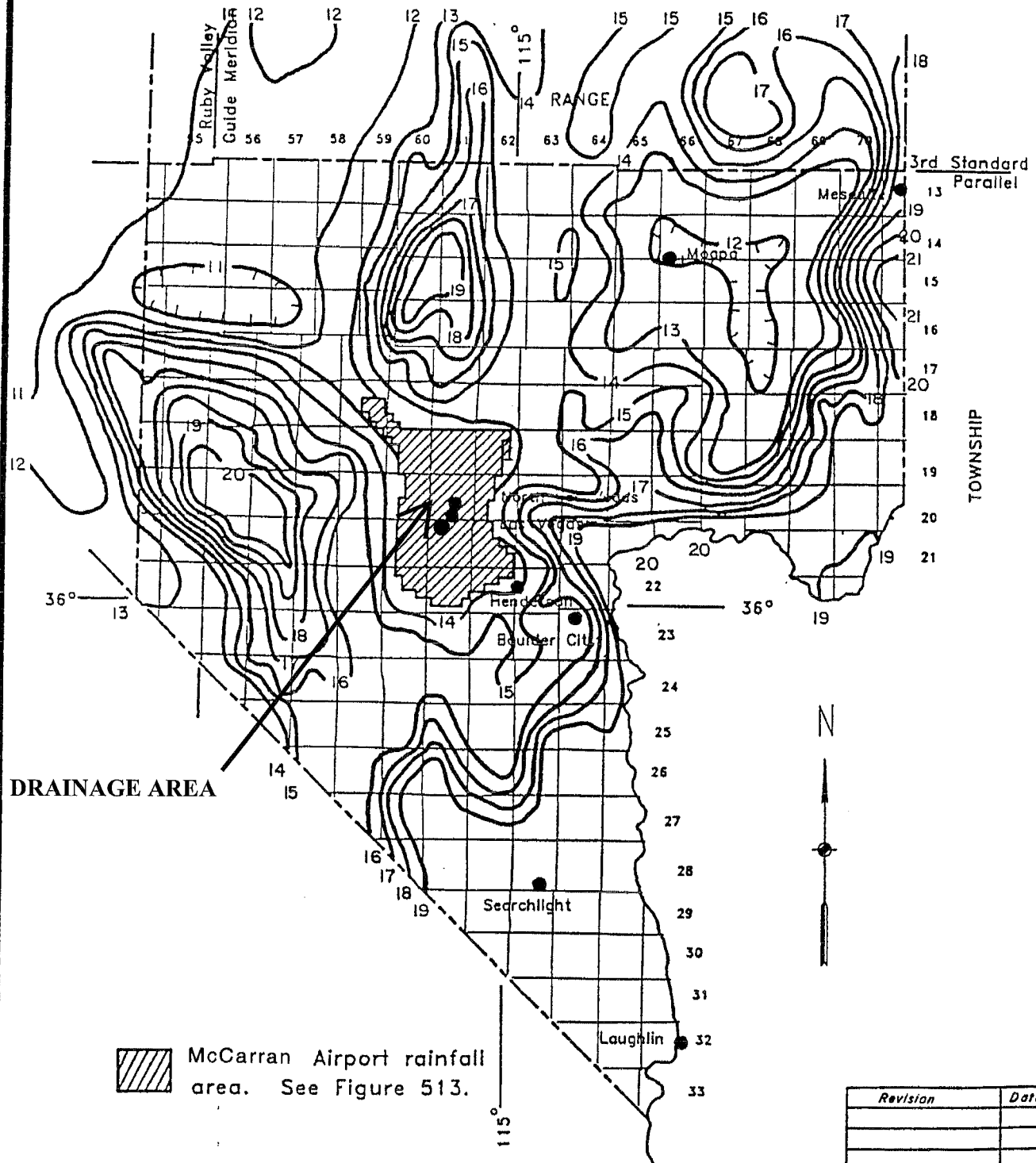
Revision	Date

USACE, Los Angeles District, 1988

FIGURE 513
FIGURE 5

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

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



WRC
ENGINEERING

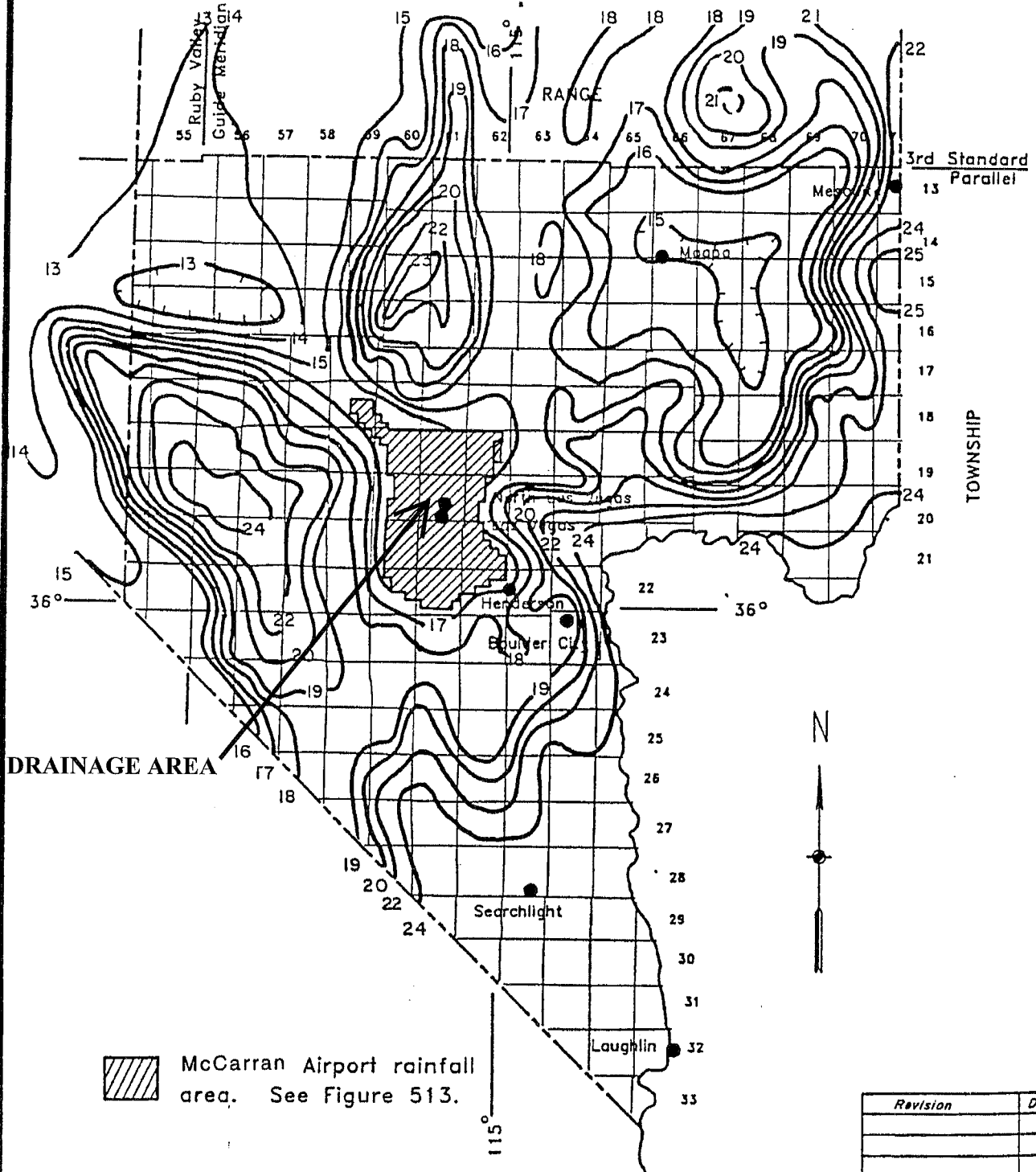
REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 503

FIGURE 6

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RAINFALL DEPTH-DURATION-FREQUENCY 25-YEAR, 6-HOUR (DEPTHS IN TENTHS OF INCHES)



HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

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

**WRC
ENGINEERING**

REFERENCE:

USACE, Los Angeles District, 1988

TABLE 505

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

SIX-HOUR STORM DISTRIBUTIONS

Percent of Total Storm Depth				Percent of Total Storm Depth			
Storm Time (In Minutes)	SDN3	SDN4	SDN5	Storm Time (In Minutes)	SDN3	SDN4	SDN5
0	0.0	0.0	0.0	185	32.2	37.6	43.0
5	2.0	2.0	2.0	190	35.2	41.5	47.7
10	5.7	5.8	5.9	195	40.9	46.2	51.4
15	7.0	7.5	8.0	200	49.9	53.0	56.1
20	8.7	9.9	11.0	205	59.0	61.0	63.0
25	10.8	12.6	14.4	210	71.0	71.0	71.0
30	12.4	13.7	15.0	215	74.4	73.2	72.0
35	13.0	14.5	16.0	220	78.1	75.6	73.1
40	13.0	14.9	16.8	225	81.2	78.2	75.2
45	13.0	15.1	17.1	230	81.9	79.9	77.9
50	13.0	15.5	18.0	235	83.5	81.3	79.0
55	13.0	15.6	18.2	240	85.1	82.3	79.5
60	13.0	15.9	18.7	245	85.6	83.0	80.4
65	13.3	16.2	19.0	250	86.0	83.5	81.0
70	14.0	16.9	19.7	255	86.8	84.4	82.0
75	14.2	17.2	20.2	260	87.6	85.1	82.6
80	14.8	17.9	21.0	265	88.8	86.4	84.0
85	15.8	18.9	22.0	270	91.0	88.5	85.9
90	17.2	20.1	23.0	275	92.6	90.8	88.9
95	18.1	21.1	24.1	280	93.7	92.4	91.0
100	19.0	22.0	25.0	285	95.0	94.4	93.8
105	19.7	22.8	25.9	290	97.0	96.8	96.6
110	19.9	23.2	26.5	295	97.6	97.3	97.0
115	20.0	24.0	28.0	300	98.2	97.8	97.4
120	20.1	24.6	29.0	305	98.5	98.2	97.9
125	20.4	25.2	30.0	310	98.7	98.4	98.1
130	21.4	26.0	30.5	315	98.9	98.6	98.3
135	22.9	26.9	30.9	320	99.0	98.8	98.5
140	24.1	27.6	31.0	325	99.3	99.1	98.9
145	24.9	28.3	31.7	330	99.3	99.2	99.0
150	25.1	28.6	32.1	335	99.4	99.3	99.2
155	25.6	29.2	32.7	340	99.5	99.4	99.3
160	27.0	30.2	33.3	345	99.8	99.7	99.6
165	27.8	31.2	34.6	350	99.8	99.8	99.7
170	28.1	32.1	36.1	355	99.9	99.9	99.9
175	28.3	33.2	38.1	360	100.0	100.0	100.0
180	29.5	35.2	40.8				

- Notes: 1. For drainage areas less than 8 square miles in size, use SDN 3.
 2. For drainage areas greater than or equal to 8 square miles and less than 12 square miles in size, use SDN 4.
 3. For drainage areas greater than or equal to 12 square miles, use SDN 5.
 4. A graphical representation of these values is presented on Figure 515.

Revision	Date

REFERENCE:

TABLE 503

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

SIX HOUR DEPTH-AREA REDUCTION FACTORS

<u>Drainage Area (Square Miles)</u>	<u>Six-Hour Depth-Area Reduction Factor</u>
0.0	1.00
0.5	0.98
1.0	0.97
2.0	0.93
4.0	0.91
6.0	0.90
8.0	0.88
10.0	0.86
20.0	0.79
30.0	0.74
50.0	0.68
100.0	0.60
150.0	0.55
200.0	0.51
300.0	0.46
400.0	0.42
500.0	0.39

- NOTES: 1. A graphical representation of these factors is presented in Figure 514.
2. Consult with the local entity and/or the CCRFCD for guidance in using the Depth-Area Reduction Factors for drainage areas greater than 200 square miles.

<i>Revision</i>	<i>Date</i>

**WRC
ENGINEERING**

REFERENCE:

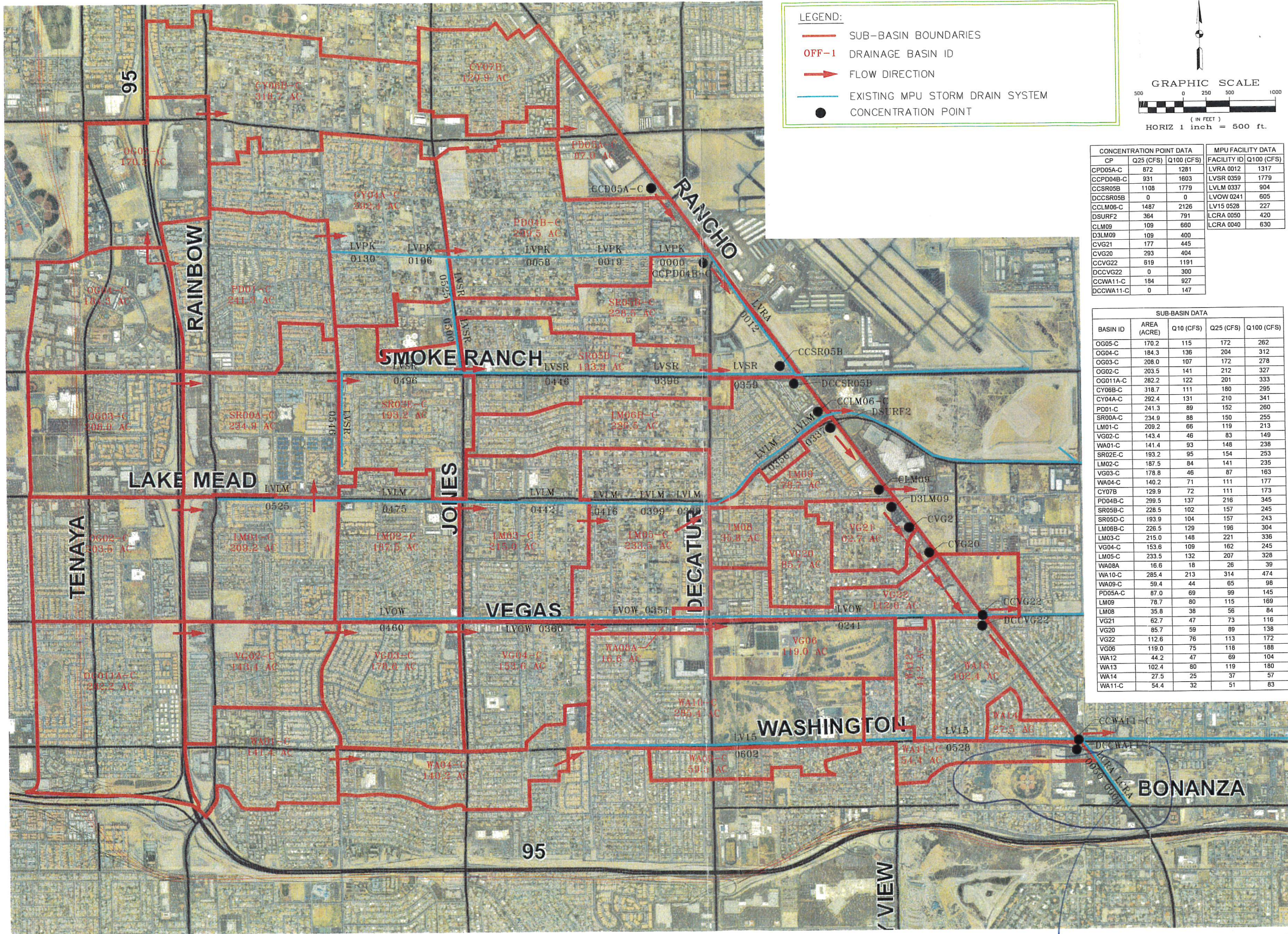
USACE, Los Angeles District, 1988

TABLE 502

Appendix B- Hydrology

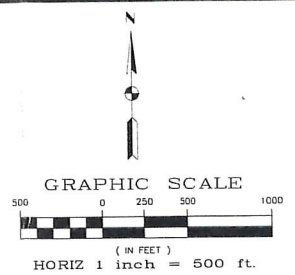
- A. Offsite Basin Map
- B. Offsite HEC-1 - 25 year
- C. Offsite HEC-1 - 100 year
- D. Onsite Basin Map - Existing Condition
- E. Time of Concentration Calculations - Existing Condition
- F. Runoff Calculations - Existing Condition
- G. Onsite Basin Map - Option A
- H. Time of Concentration Calculations - Option A
- I. Runoff Calculations – Interim Condition - Option A
- J. Flow Split Calculations (Pima County Method) at Rancho Drive/Vegas Drive Intersection and Rancho Drive/Washington Avenue Intersection
- K. Surface Flow Concentration Points Exhibit

A. Offsite Basin Map



LEGEND:

- SUB-BASIN BOUNDARIES
- OFF-1 DRAINAGE BASIN ID
- FLOW DIRECTION
- EXISTING MPU STORM DRAIN SYSTEM
- CONCENTRATION POINT



CONCENTRATION POINT DATA			MPU FACILITY DATA	
CP	Q25 (CFS)	Q100 (CFS)	FACILITY ID	Q100 (CFS)
CPD05A-C	872	1281	LVRA 0012	1317
CCPD04B-C	931	1603	LVSR 0359	1779
CCSR05B	1108	1779	LVLN 0337	904
DCCSR05B	0	0	LVOW 0241	605
CCLM06-C	1487	2126	LV15 0528	227
DSURF2	364	791	LCRA 0050	420
CLM09	109	660	LCRA 0040	630
D3LM09	109	400		
CVG21	177	445		
CVG20	293	404		
CCVG22	619	1191		
DCCVG22	0	300		
CCWA11-C	184	927		
DCCWA11-C	0	147		

SUB-BASIN DATA				
BASIN ID	AREA (ACRE)	Q10 (CFS)	Q25 (CFS)	Q100 (CFS)
OG05-C	170.2	115	172	262
OG04-C	184.3	136	204	312
OG03-C	208.0	107	172	278
OG02-C	203.5	141	212	327
OG01A-C	282.2	122	201	333
CY06B-C	318.7	111	180	295
CY04A-C	292.4	131	210	341
PD01-C	241.3	89	152	260
SR00A-C	234.9	88	150	255
LM01-C	209.2	66	119	213
VG02-C	143.4	46	83	149
WA01-C	141.4	93	148	238
SR02E-C	193.2	95	154	253
LM02-C	187.5	84	141	235
VG03-C	178.8	46	87	163
WA04-C	140.2	71	111	177
CY07B	129.9	72	111	173
PD04B-C	299.5	137	216	345
SR05B-C	228.5	102	157	245
SR05D-C	193.9	104	157	243
LM06B-C	226.5	129	196	304
LM03-C	215.0	148	221	336
VG04-C	153.6	109	162	245
LM05-C	233.5	132	207	328
WA08A	16.6	18	26	39
WA10-C	285.4	213	314	474
PD05A-C	59.4	44	65	98
LM09	87.0	69	99	145
LM08	78.7	80	115	169
VG21	35.8	38	56	84
VG20	62.7	47	73	116
VG22	85.7	59	89	138
VG06	112.6	76	113	172
WA12	119.0	75	118	188
WA13	44.2	47	69	104
WA14	102.4	80	119	180
WA11-C	27.5	25	37	57
WA11-C	54.4	32	51	83

REVISIONS	NO	DATE	DESCRIPTION	APPD

TITLE	RANCHO DRIVE CAPACITY IMPROVEMENTS	DESIGNED BY: NA	DATE: XXXXXX
	BONANZA TO DECATUR	DRAWN BY: BN	
		CHECKED BY: EH	

SHEET:	DRAINAGE BASIN EXHIBIT
	OFFSITE BASINS

Sheet	1 of 1
DRAWING NO.	XXXX

70% SUBMITTAL

look at
flow

B. Off-site HEC-1 -25 Year

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JAN 1997
* VERSION 4.1
*
* RUN DATE 13JAN14 TIME 18:11:47
*
*****

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

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

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

1 HEC-1 INPUT PAGE 1

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

*DIAGRAM

*** FREE ***

```

1 ID RANCHO DRIVE CAPACITY IMPROVEMENTS-DECATUR TO BONANZA
2 ID
3 ID IDINPUT FILE = OFFSITE25.DAT
4 ID INPUT FILE DATE = Jan 10, 2014 BY PB
5 ID ORIGINAL INPUT FILE USED = ENW310.DAT MODELED BY PBS&J
6 ID FROM CLV CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN 2003 (CNFCMP)
7 ID CENTRAL BASIN (NORTHWEST AREA)
8 ID DESIGN STORM = 25-YEAR 6-HR STORM
9 ID STORM DISTRIBUTION = SDN #3
10 ID
11 ID REFERENCED HYDROLOGIC MODELS IN THE ORIGINAL INPUT FILE:
12 ID CLV CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN 2003
13 ID CITY OF LAS VEGAS CITY WIDE HYDROLOGY (CWH) ANALYSIS (PBS&J 1997)
14 ID RANCHO DRIVE DRAINAGE IMPROVEMENTS PEAK DRIVE TO LAKE MEAD BOULEVARD
15 ID (MONTGOMERY WATSON 2000)
16 ID CCRFCD 2002 LAS VEGAS VALLEY MASTER PLAN UPDATE (PBS&J, GCW, LBG)
17 ID
18 ID REFERENCED MPU FACILITY FLOWS BY PB:
19 ID FROM CLV VEGAS DRIVE IMPROVEMENTS-72INCH RCP
20 ID FROM CLV WASHINGTON AVENUE STORM DRAIN- 5'X 5' RCB
21 ID
22 ID
23 ID NO STORM CENTERING
24 ID COMPOSITE CURVE NUMBERS
25 ID 2002 MPU SUBBASINS USED FOR OFFSITE AREAS EXCEPT WHERE SPECIFIED
26 ID
27 ID NOTE: LOCATIONS AND DESCRIPTIONS OF PROPOSED MPU FACILITIES ARE STATED IN
28 ID THE MODEL. HOWEVER, ROUTINGS IN THESE LOCATIONS REFLECT THE EXISTING
29 ID CONDITION.
30 ID
31 ID JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
32 ID
33 ID CONCENTRATION AREA DARF
34 ID POINT SQ. MI.
35 ID 0-0.5 0.990
36 ID 0.5-1 0.975
37 ID 1-2 0.950
38 ID 2-3 0.925
39 ID 3-4 0.915
40 ID 4-5 0.908
41 ID 5-6 0.903

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42 ID 6-7 0.895
 43 ID 7-8 0.885
 44 ID
 45 ID
 46 ID
 47 ID JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
 48 ID
 49 ID 100-YEAR, 6-HOUR STORM, SDN3
 50 ID
 51 IT 5 0 0 300
 52 IO 5 0 0
 53 IN 5 0 0

1 HEC-1 INPUT PAGE 2

LINE	ID	1	2	3	4	5	6	7	8	9	10
54	JR	PREC	0.732	0.721	0.703	0.684	0.677	0.671	0.668	0.662	0.654
	*										
55	KK	OG04-C									
56	BA	0.288									
57	PB	2.77									
58	PC	0.000	0.020	0.057	0.070	0.087	0.108	0.124	0.130	0.130	0.130
59	PC	0.130	0.130	0.130	0.133	0.140	0.142	0.148	0.158	0.172	0.181
60	PC	0.190	0.197	0.199	0.200	0.201	0.204	0.214	0.229	0.241	0.249
61	PC	0.251	0.256	0.270	0.278	0.281	0.283	0.295	0.322	0.352	0.409
62	PC	0.499	0.590	0.710	0.744	0.781	0.812	0.819	0.835	0.851	0.856
63	PC	0.860	0.868	0.876	0.888	0.910	0.926	0.937	0.950	0.970	0.976
64	PC	0.982	0.985	0.987	0.989	0.990	0.993	0.993	0.994	0.995	0.998
65	PC	0.997	0.999	1.000							
66	LS	0	90.3								
67	UD	0.320									
	*										
68	KK	DOG04-C									
69	KM	FLOW SPLIT TO PD01-C									
70	KM	OKG289, 270, 264, AND 262									
71	KM	COMBINED CAPACITY = 124 CFS									
72	DT	DPD01									
73	DI	0	51	125	500	1000					
74	DQ	0	50	124	124	124					
	*										
75	KKRDOG04-C										
76	KM	ROUTE DOG04-C TO COG05-C									
77	KM	US95 TO RANCHO									
78	RD	4100	0.0007	0.016	0	TRAP	0	50			
	*										
79	KK	OG05-C									
80	BA	0.266									
81	PB	2.77									
82	LS	0	90.5								
83	UD	0.392									
	*										
84	KK	COG05-C									
85	KM	COMBINE RDOG04-C AND OG05-C									
86	KM	RAINBOW AND CHEYENNE									
87	HC	2									
	*										
88	KKRCOG05-C										
89	KM	ROUTE RCOG05-C TO CCY06B-C									
90	KM	CHEYENNE									
91	RD	7500	0.0097	0.016	0	TRAP	0	50			
	*										

1 HEC-1 INPUT PAGE 3

LINE	ID	1	2	3	4	5	6	7	8	9	10
92	KK	CY06B-C									
93	BA	0.498									
94	PB	2.77									
95	LS	0	86.5								
96	UD	0.697									
	*										
97	KKCCY06B-C										
98	KM	COMBINE RCOG05-C AND CY06B-C									

99 KM MICHAEL AND CHEYENNE
 100 HC 2
 *
 101 KK RCCY06B
 102 KM ROUTE CCY06B TO CRGOWAN
 103 KM CHEYENNE
 104 RD 1400 0.01 0.016 0 TRAP 0 50
 * *****
 * FLOW SPLIT FROM GOWAN WATERSHED
 * *****
 *
 *

105 KK PDGCD-C
 106 BA 0.441
 107 PB 2.77
 108 LS 0 80.3
 109 UD 0.544
 *

110 KKRPDGD-C
 111 KM ROUTE PDGCD-C TO RRPDGD
 112 KM FROM CWH
 113 RD 3080 0.0065 0.03 0 TRAP 30 2
 *

114 KK RRPDGD
 115 KM ROUTE RPDGD-C TO CPDGC10
 116 KM LINING = CONCRETE
 117 KM FROM CWH
 118 RD 1610 0.0062 0.015 0 TRAP 8 2
 *

119 KK NW29B-C
 120 BA 0.286
 121 PB 2.80
 122 LS 0 80.5
 123 UD 0.405
 *

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HEC-1 INPUT

PAGE 4

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

124 KKRNW29B-C
 125 KM ROUTE NW29B-C TO CNW1C2
 126 KM ANN ROAD
 127 RD 4500 0.0122 0.016 0 TRAP 0 50
 *

128 KK NW1C2-C
 129 BA 0.207
 130 PB 2.77
 131 LS 0 88.7
 132 UD 0.411
 *

133 KK CNW1C2
 134 KM COMBINE RNW29B-C AND NW1C2-C
 135 KM ANN ROAD AND RANCHO
 136 HC 2
 *
 *

137 KK RCNW1C2
 138 KM ROUTE CNW1C2 TO CPDGC10
 139 KM RANCHO
 140 RD 2300 0.0087 0.016 0 TRAP 0 50
 *

141 KKPDGCB10-C
 142 BA 0.308
 143 PB 2.77
 144 LS 0 83.8
 145 UD 0.416
 *

146 KKCPDGC10
 147 KM COMBINE PDGCB10-C AND RCNW1C2
 148 KM NEAR US95 AND RANCHO INTERSECTION

149 HC 2
 *
 150 KKDPDGCB10
 151 KM FLOW SPLIT ACROSS RANCHO TO PT3AA1
 152 KM 10'X 3' RCB (139 CFS) CULVERT 3
 153 KM FROM U.S. 95 / RANCHO FIS
 154 KM D95A
 155 DTDPT3AA11
 156 DI 0 51 101 118 140 318 10000
 157 DQ 0 50 100 117 139 139 139
 *

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HEC-1 INPUT

PAGE 5

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

158 KKCPDGCB10
 159 KM COMBINE RRPDGCD AND DDPDGCB10
 160 KM NEAR US95 AND RANCHO INTERSECTION
 161 HC 2
 *
 162 KK RCPDGCB
 163 KM ROUTE DCPDGCB TO CGD20BEC
 164 KM LOCAL FACILITY ALONG U.S. 95
 165 RD 1750 0.0029 0.025 0 TRAP 20 2
 *
 166 KKGD20BE-C
 167 BA 0.427
 168 PB 2.77
 169 LS 0 83.4
 170 UD 0.467
 *
 171 KKCGD20BEC
 172 KM COMBINE GD20BE-C AND RCPDGCB
 173 KM COMBINATION OF US 95 AND LONE MOUNTAIN
 174 HC 2
 *
 175 KKRCGD20BE
 176 KM ROUTE CGD20BEC TO CGD20BMC
 177 KM NEWLY PROPOSED REGIONAL FACILITY
 178 KM FACILITY = GOWAN OUTFALL - ALEXANDER ROAD FACILITY
 179 KM FACILITY # = GOAL 0247
 180 KM LINING = CONCRETE
 181 RD 2640 0.003 0.02 0 TRAP 20 5
 *
 182 KKGD20BM-C
 183 BA 0.343
 184 PB 2.77
 185 LS 0 89.4
 186 UD 0.456
 *
 187 KKCGD20BMC
 188 KM COMBINE GD20BM-C AND RCGD20BE
 189 KM US 95 AND CRAIG ROAD
 190 HC 2
 *
 191 KKRCGD20BM
 192 KM ROUTE CGD20BMC TO CGD17BG
 193 KM NEWLY PROPOSED REGIONAL FACILITY
 194 KM FACILITY = GOWAN OUTFALL - ALEXANDER ROAD FACILITY
 195 KM FACILITY # = GOAL 0168
 196 KM LINING = RCB
 197 RD 2640 0.003 0.02 0 TRAP 20 5
 *

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HEC-1 INPUT

PAGE 6

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

198 KKGD17BG-C
 199 BA 0.364
 200 PB 2.77
 201 LS 0 87.7

202 UD 0.478
 *
 203 KK CGD17BG
 204 KM COMBINE GD11B-C AND GD17BG-C
 205 KM LONE MOUNTAIN AND US 95
 206 HC 2
 *
 207 KK RGD17BG
 208 KM ROUTE CGD17BG TO CGD11B-C
 209 KM FACILITY = GOWAN OUTFALL - U.S. 95 CHANNEL
 210 KM FACILITY # = G095 0000
 211 KM LINING = CONCRETE
 212 RD 2640 0.003 0.02 0 TRAP 20 5
 *
 213 KK GD11B-C
 214 BA 0.262
 215 PB 2.77
 216 LS 0 90.6
 217 UD 0.278
 *
 218 KKCGD11B-C
 219 KM COMBINE GD11B-C AND RGD17BG
 220 KM GOWAN AND US 95
 221 HC 2
 *
 222 KK RCGD11B
 223 KM ROUTE CGD11B-C TO CPT6B-C
 224 KM FACILITY = GOWAN OUTFALL FACILITIES
 225 KM FACILITY # = GOOF 0511
 226 KM LINING = RCB
 227 RD 8500 0.005 0.015 0 TRAP 8 0
 *
 228 KK PT6B-C
 229 BA 0.454
 230 PB 2.77
 231 LS 0 86.1
 232 UD 0.756
 *

1 HEC-1 INPUT PAGE 7

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

233 KK CPT6B-C
 234 KM COMBINE PT6B-C AND RCGD11B
 235 KM GOWAN AND US 95
 236 HC 2
 *
 237 KKDPT6B-C1
 238 KM FLOW SPLIT TO GOWAN OUTFALL
 239 KM DGOW1A
 240 KM FROM CWH
 241 DT DGOW1A
 242 DI 0 31 51 71 101 301 561 600 3000 5000
 243 DQ 0 30 50 70 100 300 560 560 560 560
 *
 244 KKDPT6B-C2
 245 KM FLOW SPLIT TO TRILOGY CHANNEL
 246 KM DTRILGY
 247 KM FROM CWH
 248 DT DTRILGY
 249 DI 0 31 91 202 349 625 1214 1944 2801
 250 DQ 0 3 33 55 95 173 267 374 491
 *
 251 KK PT2B2-C
 252 BA 0.299
 253 PB 2.77
 254 LS 0 92.2
 255 UD 0.417
 *
 256 KK RCPT2B2

257 KM ROUTE CPT2B2 TO CPT41-C
 258 KM NEWLY PROPOSED REGIONAL FACILITY
 259 KM FACILITY = GOWAN OUTFALL - ALEXANDER ROAD FACILITY
 260 KM FACILITY # = GOAL 0111
 261 KM LINING = RCB
 262 RD 3000 0.0083 0.015 0 TRAP 10 0
 *

263 KK PT3-C
 264 BA 0.172
 265 PB 2.77
 266 LS 0 89.5
 267 UD 0.372
 *

268 KK RCPT3-C
 269 KM ROUTE CPT3B-C TO CPT41-C
 270 KM ALEXANDER
 271 RD 5500 0.0081 0.016 0 TRAP 0 50
 *

HEC-1 INPUT

PAGE 8

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

272 KK PT41-C
 273 BA 0.436
 274 PB 2.77
 275 LS 0 88.6
 276 UD 0.424
 *

277 KK CPT41-C
 278 KM COMBINE RCPT2B2, RCPT3-C AND PT41-C
 279 KM ALEXANDER AND RANCHO
 280 HC 3
 *

281 KKRCPT41-C
 282 KM ROUTE CPT41-C TO CPT5A20C
 283 KM NEWLY PROPOSED REGIONAL FACILITY
 284 KM FACILITY = GOWAN OUTFALL - ALEXANDER ROAD FACILITY
 285 KM FACILITY # = GOAL 0100
 286 KM LINING = RCB
 287 RD 600 0.003 0.015 0 TRAP 12 0
 *

288 KK PT5A2-C
 289 BA 0.341
 290 PB 2.77
 291 LS 0 86.7
 292 UD 0.644
 *

293 KKCP5A2-C
 294 KM COMBINE PT5A2-C AND RCPT41-C
 295 KM ALEXANDER AND RANCHO
 296 HC 2
 *

297 KK RCPT5A2
 298 KM ROUTE CPT5A2-C TO CPT5B6
 299 KM FACILITY = GOWAN OUTFALL - ALEXANDER ROAD FACILITY
 300 KM FACILITY # = GOAL 0000
 301 KM LINING = RCB
 302 RD 5280 0.01 0.015 0 TRAP 10 0
 *

303 KKCCPT6B-C
 304 KM COMBINE CPT6B-C AND RCPT5A2
 305 KM GOWAN AND US 95
 306 HC 2
 *

HEC-1 INPUT

PAGE 9

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

307 KK DRANCHO
 308 KM FLOW SPLIT TO GOWAN OUTFALL
 309 KM DGOWAN

310 KM FROM CWH
 311 DT DGOWAN
 312 DI 0 51 101 301 501 600 800 1500 2000 5000
 313 DQ 0 1 1 1 1 100 300 1000 1500 4500
 *

314 KK RDRANCH
 315 KM ROUTE DRANCHO TO CCY07B
 316 KM RANCHO
 317 RD 1300 0.004 0.016 0 TRAP 0 50
 *

318 KK DTRILGY
 319 KM RETRIEVE DTRILGY
 320 DR DTRILGY
 *

321 KK CY07B
 322 BA 0.203
 323 PB 2.77
 324 LS 0 89.1
 325 UD 0.461
 *

326 KK CCY07B
 327 KM COMBINE DRANCHO, DTRILGY AND CY07B
 328 KM GOWAN AND RANCHO
 329 HC 3
 *

330 KK DCY07B
 331 KM FLOW SPLIT TO CENTRAL BASIN
 332 KM DIVERT FLOW EAST IN RAN 190
 333 KM OPPOSITE OF D9RCHO
 334 KM FROM CWH
 335 DT DCENT1
 336 DI 0 19 73 100 1000 2000
 337 DQ 0 1 1 28 928 1928
 *

338 KK DGOWAN
 339 KM RETRIEVE DGOWAN
 340 DR DGOWAN
 *

341 KK RDGOWAN
 342 KM ROUTE DGOWAN TO CCCY08-C
 343 KM GOWAN
 344 RD 3300 0.006 0.016 0 TRAP 0 50
 *

HEC-1 INPUT

PAGE 10

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

345 KK DGOW1A
 346 KM RETRIEVE DGOW1A
 347 DR DGOW1A
 *

348 KK RDGOW1A
 349 KM ROUTE PT6B-C TO CCCY08-C
 350 KM FACILITY = GOWAN OUTFALL FACILITIES
 351 KM FACILITY # = GOOF 0486
 352 KM LINING = RCB
 353 RD 3300 0.006 0.015 0 TRAP 8 0
 *

354 KKCCPT6B-C
 355 KM COMBINE RCPT6B-C AND RDGOW1A
 356 KM GOWAN AND DECATUR
 357 HC 2
 *

358 KK CY08-C
 359 BA 0.094
 360 PB 2.77
 361 LS 0 88.6
 362 UD 0.306
 *


```

363 KK CCY08-C
364 KM COMBINE CY08-C, CCPT6B-C, AND DCY07B
365 KM GOWAN AND DECATUR
366 HC 3
*

367 KK DGOW2A
368 KM DIVERT FLOW TO GOWAN OUTFALL (GOOF 0511) AT RANCHO
369 KM DIVERSION BASED ON GOWAN ROAD DRAINAGE STUDY BY POGGEMEYER
370 KM 8'X 5' RCB, CAPACITY = 630 CFS
371 KM REMAINING FLOW CONTINUES EAST IN GOWAN RD. AND ENTERS THE CENTRAL BASIN
372 KM OPPOSITE OF DGOW2A IN CWH
373 DTDCESTRAL
374 DI 0 31 51 71 101 301 601 631 3000 5000
375 DQ 0 1 1 1 1 1 1 1 2370 4370
*

376 KK D3ALL
377 KM DIVERT OUT ALL FLOW TO GOWAN OUTFALL (GOOF 0511) AT RANCHO
378 DT D3ALL
379 DI 0 100 500 1000 5000
380 DQ 0 100 500 1000 5000
*
* *****
* END OF IMPORT FROM GOWAN WATERSHED
* *****
*

1 HEC-1 INPUT PAGE 11

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

381 KK DCENT1
382 KM RETRIEVE DCENT1
383 DR DCENT1
*

384 KK RDCENT1
385 KM ROUTE DCENT1
386 KM RANCHO
* KO 1 1 21
387 RD 2100 0.0076 0.016 0 TRAP 0 50
*

388 KK CRGOWAN
389 KM COMBINE RDCENT1, D3ALL, AND RCCY06B
390 KM RANCHO AND CHEYENNE
391 HC 3
*

392 KKRCRGOWAN
393 KM ROUTE CRGOWAN TO CPD05A-C
394 KM RANCHO
395 RD 1700 0.0088 0.016 0 TRAP 0 50
*

396 KK PD05A-C
397 BA 0.136
398 PB 2.77
399 LS 0 93.1
400 UD 0.406
*

401 KKCPD05A-C
402 KM COMBINE PD05A-C AND RCRGOWAN
403 KM RANCHO AND DECATUR
404 HC 2
*

405 KK DCPD05A
406 KM FLOW SPLIT TO PD04B-C
407 KM OPPOSITE OF DA2 FLOW SPLIT IN CWH
408 KM CAPACITY RAN 170 = 210 CFS
409 KM DIVERTED FLOW GOES DOWN WEST SIDE OF RANCHO
410 DT DA1-C
411 DI 0 51 101 211 500 1000 5000
412 DQ 0 51 101 211 211 211 211
*

413 KK RCPD05
414 KM ROUTE CPD05A-C TO CPD04B-C

```

415 KM RANCHO
416 RD 1500 0.006 0.016 0 TRAP 0 50
*

HEC-1 INPUT

PAGE 12

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

417 KK DPD01
418 KM RETRIEVE DPD01
419 DR DPD01
*

420 KK RDPD01
421 KM ROUTE DPD01 TO CPD01-C
422 KM PEAK DRIVE
423 RD 3500 0.0103 0.016 0 TRAP 0 50
*

424 KK PD01-C
425 BA 0.377
426 PB 2.77
427 LS 0 83.8
428 UD 0.436
*

429 KK CPD01-C
430 KM COMBINE RDPD01 AND PD01-C
431 KM TORREY PINES AND PEAK DRIVE
432 HC 2
*

433 KK RCPD01
434 KM ROUTE CPD01-C TO CCY04A-C
435 KM FACILITY = PEAK DRIVE SYSTEM
436 KM FACILITY # = LVPK 0106
437 KM LINING = RCB
438 RD 2600 0.00542 0.015 0 TRAP 8 0
*

439 KK CY04A-C
440 BA 0.457
441 PB 2.77
442 LS 0 86.8
443 UD 0.489
*

444 KKCCY04A-C
445 KM COMBINE RCPD01 AND CY04A-C
446 KM JONES AND PEAK DRIVE
447 HC 2
*

448 KK DCY04C
449 KM DIVERT FLOW TO EXISTING REGIONAL FACILITY LVSR 0500
450 KM FROM CWH
451 KM CAPACITY LVSR 0500 = 231 CFS
452 DT DLVSR1
453 DI 0 51 101 232 500 1000 5000
454 DQ 0 50 100 231 231 231 231
*

HEC-1 INPUT

PAGE 13

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

455 KK RCCY04A
456 KM ROUTE CCY04A TO CPD04B-C
457 KM FACILITY = LAS VEGAS WASH - PEAK DRIVE
458 KM FACILITY # = LVPK 0000,0019,0058, 0104
459 KM LINING = RCB
460 RD 5730 0.01 0.015 0 TRAP 9 0
*

461 KK PD04B-C
462 BA 0.468
463 PB 2.77
464 LS 0 87.8
465 UD 0.539
*

466 KKCPD04B-C
 467 KM COMBINE RCCY04A AND PD04B-C
 468 KM RANCHO AND PEAK DRIVE
 469 HC 2
 *
 470 KKCCPD04B-C
 471 KM COMBINE RCPD05 AND CPD04B-C
 472 KM RANCHO AND PEAK DRIVE
 473 HC 2
 *
 474 KK RCPD04B
 475 KM ROUTE CCPD04B-C TO CSR05B
 476 KM FACILITY = LAS VEGAS WASH - RANCHO
 477 KM FACILITY # = LVRA 0012
 478 KM LINING = RCB
 479 RD 3300 0.0058 0.015 0 TRAP 12 0
 *
 480 KK OG03-C
 481 BA 0.325
 482 PB 2.77
 483 LS 0 87.0
 484 UD 0.389
 *
 485 KK ROG03-C
 486 KM ROUTE OG03-C TO SR00A-C
 487 KM SMOKE RANCH
 488 RD 3400 0.0121 0.016 0 TRAP 0 50
 *
 489 KK OG02-C
 490 BA 0.318
 491 PB 2.77
 492 LS 0 90.2
 493 UD 0.351
 *

HEC-1 INPUT

PAGE 14

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

494 KK ROG02-C
 495 KM ROUTE OG02-C TO CLM01-C
 496 KM LAKE MEAD BOULEVARD
 497 RD 3400 0.0129 0.016 0 TRAP 0 50
 *
 498 KK LM01-C
 499 BA 0.327
 500 PB 2.77
 501 LS 0 81.8
 502 UD 0.405
 *
 503 KK CLM01-C
 504 KM COMBINE ROG02-C AND LM01-C
 505 KM TORREY PINES AND LAKE MEAD
 506 HC 2
 *
 507 KK SR01E
 508 KM DIVERSION AT LAKE MEAD AND TORREY PINES
 509 KM SPLIT FLOW TO TORREY PINES
 510 KM FROM CWH
 511 KM REMAINING FLOW IN LAKE MEAD RETRIEVED LATER IN MODEL WHEN NEEDED
 512 DT DSR01F
 513 DI 0 41 73 172 572 1072 5000
 514 DQ 0 40 72 132 371 671 3067
 *
 515 KK RCLM01-C
 516 KM ROUTE OG02-C TO CLM01-C
 517 KM FACILITY = LAS VEGAS WASH - SMOKE RANCH
 518 KM FACILITY # = LVSR 0546
 519 KM LINING = RCB
 520 RD 2640 0.0057 0.015 0 TRAP 8 0
 *

521 KK SR00A-C
 522 BA 0.367
 523 PB 2.77
 524 LS 0 84.1
 525 UD 0.446
 *

526 KK CSR00A
 527 KM COMBINE RCLM01-C AND SR00A-C
 528 KM TORREY PINES AND SMOKE RANCH
 529 HC 2
 *

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HEC-1 INPUT

PAGE 15

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

530 KK CCSR00A
 531 KM COMBINE ROG03-C AND CSR00A
 532 KM TORREY PINES AND SMOKE RANCH
 533 HC 2
 *

534 KK RCSR00A
 535 KM ROUTE CSR00A TO CSR02E
 536 KM FACILITY = LAS VEGAS WASH - SMOKE RANCH
 537 KM FACILITY # = LVSR 0496
 538 KM LINING = RCB
 539 RD 2600 0.0127 0.015 0 TRAP 10 0
 *

540 KK DLVSR1
 541 KM RETRIEVE DLVSR1
 542 DR DLVSR1
 *

543 KK RDLVSR1
 544 KM ROUTE DLVSR1 TO CSR02E
 545 KM FACILITY = LAS VEGAS WASH - SMOKE RANCH
 546 KM FACILITY # = LVSR 0500
 547 KM LINING = RCP
 548 RD 2770 0.0054 0.013 0 CIRC 5
 *

549 KK SR02E-C
 550 BA 0.302
 551 PB 2.77
 552 LS 0 86.1
 553 UD 0.374
 *

554 KK CSR02E
 555 KM COMBINE SR02E-C, RDLVSR1, AND RCSR00A
 556 KM JONES AND SMOKE RANCH
 557 HC 3
 *

558 KK RCSR02E
 559 KM ROUTE CSR02E TO CSR05D
 560 KM FACILITY = LAS VEGAS WASH - SMOKE RANCH
 561 KM FACILITY # = LVSR 0396,0446
 562 KM LINING = RCB
 563 RD 5280 0.0106 0.015 0 TRAP 10 0
 *

564 KK SR05D-C
 565 BA 0.303
 566 PB 2.77
 567 LS 0 89.7
 568 UD 0.533
 *

1

HEC-1 INPUT

PAGE 16

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

569 KK CSR05D
 570 KM COMBINE RCSR02E AND SR05D-C
 571 KM SMOKE RANCH AND DECATUR
 572 HC 2
 *

573 KK RCSR05D
 574 KM ROUTE CSR05D TO CSR05B
 575 KM FACILITY = LAS VEGAS WASH - SMOKE RANCH
 576 KM FACILITY # = LVSR 0359
 577 KM LINING = RCB
 578 RD 2000 0.0075 0.015 0 TRAP 10 0
 *
 579 KK SR05B-C
 580 BA 0.357
 581 PB 2.77
 582 LS 0 89.2
 583 UD 0.664
 *
 584 KK CSR05B
 585 KM COMBINE RCSR05D AND SR05B-C
 586 KM SMOKE RANCH AND RANCHO
 587 HC 2
 *
 588 KK DCSR05B
 589 KM DIVERT FLOW IN EXISTING LVSR 0359 (LVSR 0360 IN CWH)
 590 KM CAPACITY = 231 CFS
 591 DT DLVSR2
 592 DI 0 231 5000
 593 DQ 0 231 231
 *
 594 KKDDCSR05B
 595 KM DIVERT FLOW INTO DROP INLETS FOR LVSR 0273 STUB OUT
 596 KM CAPACITY = 182 CFS (109 CFS NORTH, 73 CFS SOUTH)
 597 DT DLVSR3
 598 DI 0 182 5000
 599 DQ 0 182 182
 *
 600 KKD3CSR05B
 601 KM DIVERT FLOW INTO EXISTING CHANNEL SOUTH OF RANCHO
 602 KM D3SR07 IN CWH
 603 KM CAPACITY = 670 CFS
 604 DT DLVRA
 605 DI 0 50 100 200 400 600 670 1000 5000
 606 DQ 0 50 100 200 400 600 670 670 670
 *

1 HEC-1 INPUT PAGE 17

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

607 KKD4CSR05B
 608 KM SPLIT FLOW 50% IN RANCHO. 50% IN CAREY
 609 KM SPLIT TO RANCHO
 610 KM OPPOSITE OF D4SR07 IN CWH
 611 DT DRAN
 612 DI 0 50 100 300 500 1000 2500 5000
 613 DQ 0 25 50 150 250 500 1250 2500
 *
 614 KK DSR05B
 615 KM DIVERT OUT STREET FLOW ALL FLOW TO BE BROUGHT IN LATER IN MODEL
 616 DT DSMOKE
 617 DI 0 1000 5000
 618 DQ 0 1000 5000
 *
 619 KK DLVSR3
 620 KM RETRIEVE FLOW IN LVSR
 621 DR DLVSR3
 *
 622 KK CCSR05B
 623 KM COMBINE RPD04B, LVSR3 AND DSR05B (ZERO FLOW)
 624 KM SMOKE RANCH AND RANCHO
 625 HC 3
 *
 626 KKDCCSR05B
 627 KM DIVERT OUT ALL FLOW IN LVSR FACILITY
 628 DT DLVSR4

629 DI 0 1000 5000
 630 DQ 0 1000 5000
 *
 * NO BYPASS FLOW ON RANCHO - END OF SEG 1 (NORTH OF SMOKE RANCH)
 *
 * ONSITE DRAINAGE DICTATE FLOW RATE - FROM SMOKE RANCH TO LAKE MEAD
 *

631 KK DSR01F
 632 KM RETRIEVE DSR01F
 633 DR DSR01F
 *
 634 KK RDSR01F
 635 KM ROUTE DSR01F TO CLM02-C
 636 KM FACILITY = LAS VEGAS WASH - LAKE MEAD
 637 KM FACILITY # = LVLM 0475
 638 KM LINING = RCP
 639 RD 2632 0.0124 0.013 0 CIRC 4
 *

1

HEC-1 INPUT

PAGE 18

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

640 KK LM02-C
 641 BA 0.293
 642 PB 2.77
 643 LS 0 85.0
 644 UD 0.367
 *
 645 KK CLM02-C
 646 KM COMBINE LM02-C AND RDSR01F
 647 KM
 648 HC 2
 *

649 KKRC LM02-C
 650 KM ROUTE CLM02-C TO CLM03-C
 651 KM FACILITY = LAS VEGAS WASH - LAKE MEAD
 652 KM FACILITY # = LVLM 0442,0453,0460
 653 KM LINING = RCP
 654 RD 2800 0.0139 0.013 0 CIRC 5
 *

655 KK LM03-C
 656 BA 0.336
 657 PB 2.77
 658 LS 0 90.5
 659 UD 0.378
 *

660 KK CLM03-C
 661 KM COMBINE RCLM02-C AND LM03-C
 662 KM MICHAEL AND LAKE MEAD
 663 HC 2
 *

664 KKRC LM03-C
 665 KM ROUTE CLM03-C TO CLM05-C
 666 KM FACILITY = LAS VEGAS WASH - LAKE MEAD
 667 KM FACILITY # = LVLM 0388,0399,0416
 668 KM LINING = RCP
 669 RD 2600 0.0115 0.013 0 CIRC 6
 *

670 KK LM05-C
 671 BA 0.365
 672 PB 2.77
 673 LS 0 88.1
 674 UD 0.387
 *

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HEC-1 INPUT

PAGE 19

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

675 KK CLM05-C
 676 KM COMBINE RCLM03-C AND LM05-C
 677 KM DECATUR AND LAKE MEAD

```

678      HC      2
        *

679      KKRCLM05-C
680      KM ROUTE CLM05-C TO CLM06-C
681      KM FACILITY = LAS VEGAS WASH - LAKE MEAD
682      KM FACILITY # = LVLN 0337,0356
683      KM LINING = RCP
684      RD      3300  0.0061  0.015      0      CIRC      7      0
        *

685      KK LM06B-C
686      BA      0.354
687      PB      2.77
688      LS      0      89.5
689      UD      0.468
        *

690      KK CLM06-C
691      KM COMBINE RCLM05-C AND LM06B-C
692      KM RANCHO AND LAKE MEAD
693      HC      2
        *

694      KK DLVLMRA
695      KM SAME AS DLVLMRA FROM CWH
696      KM FLOW IS DIVERTED TO EXISTING REGIONAL FACILITY LVLN 0270
697      KM 90" RCP CAPACITY = 940 CFS
698      KM 940 CFS IS DIVERTED
699      DT DLVLM4
700      DI      0      50      100      400      600      700      800      940      1000      5000
701      DQ      0      50      100      400      600      700      800      940      940      940
        *

702      KK DSURF1
703      KM SAME AS DSURF1 FROM CWH
704      KM 33% DIVERTED TO VALLEY DRIVE TO LAKE MEAD
705      KM REMAINING IN LAKE MEAD
706      DT DVALDR
707      DI      0      30      90      150      300      600      1200      1800      3000      6000
708      DQ      0      10      30      50      100      200      400      600      1000      2000
        *

709      KK DLVRA
710      KM RETRIEVE DLVRA
711      DR DLVRA
        *

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HEC-1 INPUT
PAGE 20

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

712      KK RDLVRA
713      KM ROUTE RDLVRA TO CLM06-C
714      KM EXISTING CHANNEL
715      RD      1200      0.01      0.02      0      TRAP      8      2
        *

716      KK DRAN
717      KM RETRIEVE DRAN
718      DR DRAN
        *

719      KK RDRAN
720      KM ROUTE RDLVRA TO CLM06-C
721      KM RANCHO
722      RD      1200      0.01      0.02      0      TRAP      0      50
        *

723      KK DLVLM4
724      KM RETRIEVE DLVLM4
725      DR DLVLM4
        *

726      KKCLM06-C
727      KM COMBINE CLM06-C, DLVLM4, RDRAN, AND RDLVRA
728      KM RANCHO AND LAKE MEAD
729      HC      4
        *

730      KK DLVLMRA

```

731 KM SAME AS DLVLMRA FROM CWH
 732 KM REPEAT DIVERSION TO LVLM SYSTEM SINCE THERE IS CAPACITY IN PIPE FOR 10-YEAR
 733 KM FLOW IS DIVERTED TO EXISTING REGIONAL FACILITY LVLM 0270
 734 KM 90" RCP CAPACITY = 940 CFS
 735 KM 940 CFS IS DIVERTED
 736 DT DLVLM5
 737 DI 0 50 100 400 600 700 800 940 1000 5000
 738 DQ 0 50 100 400 600 700 800 940 940
 *

739 KK DSURF2
 740 KM SAME AS DSURF2 FROM CWH
 741 KM DIVERT 30% OR REMAINING FLOW TO LAKE MEAD
 742 KM REMAINING IN RANCHO
 743 DT DLAKEM
 744 DI 0 30 90 150 300 600 1200 1800 3000 6000
 745 DQ 0 10 30 50 100 200 400 600 1000 2000
 *

746 KK D1LM09
 747 KM SAME AS D1LM09 FROM CWH
 748 KM FLOW IS DIVERTED ACROSS RANCHO IN RAN 119
 749 KM 6' X 3' RCB CAPACITY = 168 CFS
 750 KM CAPACITY BASED ON INLET CONTROL NOMOGRAPH
 751 KM THE REMAINING FLOW CONTINUES SOUTHEAST ALONG RANCHO
 HEC-1 INPUT

1

PAGE 21

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

752 DT DRAN119
 753 DI 0 50 100 168 500 1000 5000
 754 DQ 0 50 100 168 168 168 168
 *

755 KK D2LM09
 756 KM SAME AS D2LM09 FROM CWH
 757 KM FLOW IS DIVERTED ACROSS RANCHO IN RAN 118
 758 KM 6' X 3' RCB CAPACITY = 168 CFS
 759 KM CAPACITY BASED ON INLET CONTROL NOMOGRAPH
 760 KM THE REMAINING FLOW CONTINUES SOUTHEAST ALONG RANCHO
 761 DT DRAN118
 762 DI 0 50 100 168 500 1000 5000
 763 DQ 0 50 100 168 168 168 168
 *

764 KK RD2LM09
 765 KM ROUTE D2LM09 TO CLM09
 766 KM RANCHO
 767 RD 800 0.01 0.016 0 TRAP 0 50
 *

768 KK DVALDR
 769 KM RETRIEVE DVALDR
 770 DR DVALDR
 *
 * UNSTABLE ROUTING REMOVED
 * KK RDVALDR
 * KM ROUTE DVALDR TO CLM09
 * KM VALLEY DRIVE
 * RD 2900 0.0086 0.016 0 TRAP 0 50
 *

771 KK LM09
 772 BA 0.123
 773 PB 2.77
 774 LS 0 92.6
 775 UD 0.212
 *

776 KK CLM09
 777 KM COMBINE RDVALDR, RD2LM09, AND LM09
 778 KM RANCHO AND CORAN
 779 HC 3
 *

780 KK D3LM09
 781 KM SAME AS D3LM09 FROM CWH
 782 KM FLOW IS DIVERTED ACROSS RANCHO TO CORAN
 783 KM CAPACITY OF WEST HALF STREET OF RANCHO AT TOP OF MEDIAN WILL
 784 KM REMAIN AND CONTINUE SOUTHEAST IN RANCHO
 785 KM LOW FLOWS WILL REMAIN IN RANCHO AND FLOW SOUTHEAST

786	DT	DCORAN									
787	DI	0	51	201	300	400	500	600	800	1000	5000
788	DQ	0	0	0	50	100	150	200	400	600	4600
	*										

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HEC-1 INPUT

PAGE 22

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

789	KK	RD3LM09									
790	KM	ROUTE D3LM09 TO CVG21									
791	KM	RANCHO									
792	RD	900	0.01	0.016	0	TRAP	0	50			
	*										

793	KK	VG21									
794	BA	0.098									
795	PB	2.77									
796	LS	0	88.1								
797	UD	0.201									
	*										

798	KK	CVG21									
799	KM	COMBINE RD3LM09 AND VG21									
800	KM	RANCHO AND CORAN									
801	HC	2									
	*										

802	KK	DVG21									
803	KM	SAME AS DVG21 FROM CWH									
804	KM	DIVERSION AT RANCHO AND HOLLY									
805	KM	FLOW IS DIVERTED ACROSS RANCHO TO HOLLY									
806	KM	REMAINING FLOW CONTINUES SOUTHEAST IN RANCHO TO VG20									
807	KM	LOW FLOWS WILL REMAIN IN RANCHO AND FLOW SOUTHEAST									
808	KM	MINIMUM OF 1 CFS WILL REMAIN TO AVOID ZERO FLOW									
809	DT	DHOLLY									
810	DI	0	51	201	300	400	500	600	800	1000	
811	DQ	0	0	0	100	200	300	350	450	550	
	*										

812	KK	LM08									
813	BA	0.056									
814	PB	2.77									
815	LS	0	91.3								
816	UD	0.158									
	*										

817	KK	RLM08									
818	KM	ROUTE LRM08 TO CVG20									
819	RD	4100	0.011	0.016	0	TRAP	0	50			
	*										

820	KK	VG20									
821	BA	0.134									
822	PB	2.77									
823	LS	0	90.1								
824	UD	0.349									
	*										

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HEC-1 INPUT

PAGE 23

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

825	KK	CVG20									
826	KM	COMBINE RLM08, DVG21 AND VG20									
827	KM	RANCHO AND HOLLY									
828	HC	3									
	*										

829	KK	RCVG20									
830	KM	ROUTE CVG20 TO CVG22									
831	KM	RANCHO									
832	RD	1500	0.0133	0.015	0	CIRC	7.5				
	*										

833	KK	VG22									
834	BA	0.176									
835	PB	2.77									
836	LS	0	90.9								
837	UD	0.412									
	*										

838 KK CVG22
 839 KM COMBINE RCVG20 AND VG22
 840 KM RANCHO AND VEGAS
 841 HC 2
 *
 842 KKOG011A-C
 843 BA 0.441
 844 PB 2.77
 845 LS 0 85.5
 846 UD 0.428
 *
 847 KK ROG011A
 848 KM ROUTE OG011A-C TO CVG02-C
 849 KM VEGAS DRIVE
 850 RD 3200 0.0172 0.015 0 TRAP 0 50
 *
 851 KK VG02-C
 852 BA 0.224
 853 PB 2.77
 854 LS 0 81.7
 855 UD 0.386
 *
 856 KK CVG02-C
 857 KM COMBINE ROG011A AND VG02-C
 858 KM TORREY PINES AND VEGAS DRIVE
 859 HC 2
 *

1 HEC-1 INPUT PAGE 24

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

860 KK RCVG02
 861 KM ROUTE CVG02-C TO CVG03-C
 862 KM FACILITY = OWENS AVENUE SYSTEM
 863 KM FACILITY # = LVOW 0460
 864 KM LINING = RCB
 865 RD 2700 0.0148 0.015 0 TRAP 0 50
 *
 866 KK VG03-C
 867 BA 0.279
 868 PB 2.77
 869 LS 0 79.7
 870 UD 0.401
 *
 871 KK CVG03-C
 872 KM COMBINE RCVG02 AND VG03-C
 873 KM JONES AND VEGAS DRIVE
 874 HC 2
 *
 875 KK RCVG03
 876 KM ROUTE CVG03-C TO CVG04-C
 877 KM FACILITY = OWENS AVENUE SYSTEM
 878 KM FACILITY # = LVOW 0360
 879 KM LINING = RCB
 880 RD 2700 0.0148 0.016 0 TRAP 0 50
 *
 881 KK VG04-C
 882 BA 0.240
 883 PB 2.77
 884 LS 0 90.9
 885 UD 0.373
 *
 886 KK CVG04-C
 887 KM COMBINE RCVG03 AND VG04-C
 888 KM MICHAEL AND VEGAS DRIVE
 889 HC 2
 *
 890 KK RCVG04
 891 KM ROUTE CVG04 TO CWA08A

892 KM FACILITY = OWENS AVENUE SYSTEM
 893 KM FACILITY # = LVOW 0351
 894 KM LINING = RCB
 895 RD 2600 0.0135 0.016 0 TRAP 0 50
 *

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HEC-1 INPUT

PAGE 25

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

896 KK WA08A
 897 BA 0.026
 898 PB 2.77
 899 LS 0 92.5
 900 UD 0.180
 *

901 KK CWA08A
 902 KM COMBINE WA08A AND RCVG04
 903 KM MICHAEL AND VEGAS DRIVE
 904 HC 2
 *

905 KK RCWA08A
 906 KM ROUTE CWA08A TO CVG06
 907 KM FACILITY = OWENS AVENUE SYSTEM
 908 KM FACILITY # = LVOW 0241
 909 KM LINING = RCB
 910 RD 4000 0.0138 0.016 0 TRAP 0 50
 *

911 KK VG06
 912 BA 0.186
 913 PB 2.77
 914 LS 0 87.5
 915 UD 0.280
 *

916 KK CVG06
 917 KM COMBINE RCWA08A AND VG06
 918 KM VALLEY VIEW AND VEGAS DRIVE
 919 HC 2
 *

920 KK RCVG06
 921 KM ROUTE CVG06 TO CCVG22
 922 KM VEGAS DRIVE
 923 RD 1900 0.0174 0.016 0 TRAP 0 50
 *

924 KK CCVG22
 925 KM COMBINE CVG22 AND RCVG06
 926 KM RANCHO AND VEGAS DRIVE
 927 HC 2
 *

928 KK DCCVG22
 929 KM FLOW SPLIT AT RANCHO AND VEGAS
 930 KM REVISED FROM CNFCMP BASED ON COMMENT FROM CLV
 931 KM 100-YEAR FLOW LISTED ON PLANS FOR VEGAS SYSTEM (LVOW 0146) = 605 CFS
 932 KM FLOWSPLIT NOT APPLICABLE DUE TO NEGLIGIBLE SURFACE FLOWS ON RANCHO DR
 933 DT DVEG
 934 DI 0 200 400 619 819 919 1000
 935 DQ 0 200 400 605 605 605 605
 *

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HEC-1 INPUT

PAGE 26

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

936 KKRDCCVG22
 937 KM ROUTE DCCVG22 SOUTH ALONG RANCHO
 938 RD 800 0.009 0.015 0 TRAP 8 0
 *

939 KK WA12
 940 BA 0.069
 941 PB 2.77
 942 LS 0 90.5
 943 UD 0.130
 *

944 KK WA13
 945 BA 0.160
 946 PB 2.77
 947 LS 0 90.8
 948 UD 0.304
 *
 949 KK CWA13
 950 KM COMBINE WA12 AND WA13
 951 KM RANCHO AND WASHINGTON
 952 HC 2
 *
 953 KK CCWA13
 954 KM COMBINE FLOW - DCCVG22 AND CWA13
 955 HC 2
 *
 956 KK WA14
 957 BA 0.043
 958 PB 2.77
 959 LS 0 90.7
 960 UD 0.202
 *
 961 KK CWA14
 962 KM COMBINE FLOW FROM CCWA13 AND WA14
 963 HC 2
 *
 964 KK WA01-C
 965 BA 0.221
 966 PB 2.77
 967 LS 0 87.5
 968 UD 0.252
 *

1 HEC-1 INPUT PAGE 27

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

969 KK RWA01
 970 KM ROUTE WA01-C TO CWA04-C
 971 KM WASHINGTON STREET
 972 RD 5300 0.0151 0.016 0 TRAP 0 50
 *
 973 KK WA04-C
 974 BA 0.219
 975 PB 2.77
 976 LS 0 88.1
 977 UD 0.473
 *
 978 KK CWA04-C
 979 KM COMBINE RWA01 AND WA04-C
 980 KM MICHAEL AND WASHINGTON
 981 HC 2
 *
 982 KK RCWA04
 983 KM ROUTE CWA04-C TO CWA09-C
 984 KM FACILITY = FREEWAY CHANNEL
 985 KM FACILITY # = LV15 0602
 986 KM LINING = RCP
 987 RD 5900 0.0144 0.016 0 TRAP 0 50
 *
 988 KK WA09-C
 989 BA 0.093
 990 PB 2.77
 991 LS 0 91.3
 992 UD 0.363
 *
 993 KK CWA09-C
 994 KM COMBINE RCWA04 AND WA09-C
 995 KM VALLEY VIEW AND WASHINGTON
 996 HC 2
 *

997 KK RCWA09
 998 KM ROUTE CWA09-C TO CWA10NW
 999 KM FACILITY = FREEWAY CHANNEL
 1000 KM FACILITY # = LV15 0602
 1001 KM LINING = RCP
 1002 RD 700 0.0083 0.016 0 TRAP 0 50
 *

1003 KK WA10-C
 1004 BA 0.446
 1005 PB 2.77
 1006 LS 0 91.4
 1007 UD 0.358
 *

1 HEC-1 INPUT PAGE 28

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

1008 KK WA10D
 1009 KM FLOW SPLIT TO SOUTHEAST CENTRAL BASIN
 1010 KM OPPOSITE SPLIT OF WA10NW IN SOUTHEAST CENTRAL BASIN FLOW
 1011 KM FROM LOUIS BERGER U.S. 95 WIDENING STUDY
 1012 KM CAPACITY OF CHANNEL = 250 CFS IS DIVERTED
 1013 KM EXCESS FLOW CONTINUES DOWN WASHINGTON
 1014 DT WA10SE
 1015 DI 0 10 250 275 300 800 1000 3000
 1016 DQ 0 10 250 250 250 250 250 250
 *

1017 KK CWA10NW
 1018 KM COMBINE WA10D AND RCWA09
 1019 KM VALLEY VIEW AND WASHINGTON
 1020 HC 2
 *

1021 KM ROUTE FLOW ON WASHINGTON
*

1022 KKRCWA10NW
 1023 KM ROUTE CWA10NW TO CWA14
 1024 KM FACILITY = FREEWAY CHANNEL
 1025 KM FACILITY # = LV15 0528
 1026 KM LINING = RCB
 1027 RD 3900 0.0119 0.016 0 TRAP 0 50
 *

1028 KK WA11-C
 1029 BA 0.085
 1030 PB 2.77
 1031 LS 0 86.8
 1032 UD 0.286
 *

1033 KK CWA11-C
 1034 KM COMBINE WA11-C AND RCWA10NW
 1035 KM EAST OF VALLEY VIEW AND WASHINGTON
 1036 HC 2
 *

1037 KKCCWA11-C
 1038 KM COMBINE CWA11-C AND CWA14
 1039 KM SURFACE FLOW ON RANCHO AT RANCHO AND WASHINGTON
 1040 HC 2
 *

1041 KKDCWA11-C
 1042 KM FLOW SPLIT AT RANCHO AND WASHINGTON
 1043 KM REVISED FROM CNFCMP BASED ON COMMENT FROM CLV
 1044 KM Q100 FROM ATKINS 90% PLANS FOR WASHINGTON SYSTEM (LV15 0528) = 227 CFS
 1045 KM Q100 FROM ATKINS 90% REPORT FOR RANCHO SYSTEM (LCRA 0050) = 420 CFS
 1046 KM FLOWSPLIT NOT APPLICABLE DUE TO NEGLIGIBLE SURFACE FLOWS ON RANCHO DR
 1047 DTWASHRAN
 1048 DI 0 100 250 647 847 1047 1247
 HEC-1 INPUT

1 PAGE 29

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

1049 DQ 0 100 250 647 647 647 647
 1050 ZZ

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
55	OG04-C	
	.	
72	.	-----> DPD01
68	DOG04-C	
	V	
	V	
75	RDOG04-C	
	.	
79	.	OG05-C
	.	.
84	COG05-C.....	
	V	
	V	
88	RCOG05-C	
	.	
92	.	CY06B-C
	.	.
97	CCY06B-C.....	
	V	
	V	
101	RCCY06B	
	.	
105	.	PDGCD-C
	.	V
	.	V
110	.	RPDGCDC-C
	.	V
	.	V
114	.	RRPDGCD
	.	.
119	.	NW29B-C
	.	V
	.	V
124	.	RNW29B-C
	.	.
128	.	NW1C2-C
	.	.
133	.	CNW1C2.....
	.	V
	.	V
137	.	RCNW1C2
	.	.
141	.	PDGCB10-
	.	.
146	.	CPDGCB10.....
	.	.
155	.	----->DPT3AA11
150	.	DPDGCB10
	.	.
158	.	CPDGCB10.....
	.	V
	.	V
162	.	RCPDGCB
	.	.
166	.	GD20BE-C
	.	.
171	.	CGD20BEC.....
	.	V
	.	V
175	.	RCGD20BE

182	.	.	GD20BM-C	.
	.	.	.	.
187	.	CGD20BMC.....	.	.
	.	V	.	.
	.	V	.	.
191	.	RCGD20BM	.	.
	.	.	.	.
198	.	.	GD17BG-C	.
	.	.	.	.
203	.	CGD17BG.....	.	.
	.	V	.	.
	.	V	.	.
207	.	RGD17BG	.	.
	.	.	.	.
213	.	.	GD11B-C	.
	.	.	.	.
218	.	CGD11B-C.....	.	.
	.	V	.	.
	.	V	.	.
222	.	RCGD11B	.	.
	.	.	.	.
228	.	.	PT6B-C	.
	.	.	.	.
233	.	CPT6B-C.....	.	.
	.	.	.	.
241	.	.	-----> DGOW1A	.
237	.	DPT6B-C1	.	.
	.	.	.	.
248	.	.	-----> DTRILGY	.
244	.	DPT6B-C2	.	.
	.	.	.	.
251	.	.	PT2B2-C	.
	.	.	V	.
	.	.	V	.
256	.	.	RCPT2B2	.
	.	.	.	.
263	.	.	.	PT3-C
	.	.	.	V
	.	.	.	V
268	.	.	RCPT3-C	.
	.	.	.	.
272	.	.	.	PT41-C
	.	.	.	.
277	.	.	CPT41-C.....	.
	.	.	V	.
	.	.	V	.
281	.	.	RCPT41-C	.
	.	.	.	.
288	.	.	.	PT5A2-C
	.	.	.	.
293	.	.	CPT5A2-C.....	.
	.	.	V	.
	.	.	V	.
297	.	.	RCPT5A2	.
	.	.	.	.
303	.	CCPT6B-C.....	.	.
	.	.	.	.
311	.	.	-----> DGOWAN	.
307	.	DRANCHO	.	.
	.	V	.	.
	.	V	.	.
314	.	RDRANCH	.	.

```

320 . . . . .<----- DTRILGY
318 . . . . .DTRILGY
. . . . .
321 . . . . .CY07B
. . . . .
326 . . . . .CCY07B.....
. . . . .
335 . . . . .-----> DCENT1
330 . . . . .DCY07B
. . . . .
340 . . . . .<----- DGOWAN
338 . . . . .DGOWAN
. . . . .V
. . . . .V
341 . . . . .RDGOWAN
. . . . .
347 . . . . .<----- DGOW1A
345 . . . . .DGOW1A
. . . . .V
. . . . .V
348 . . . . .RDGOW1A
. . . . .
354 . . . . .CCPT6B-C.....
. . . . .
358 . . . . .CY08-C
. . . . .
363 . . . . .CCY08-C.....
. . . . .
373 . . . . .----->DCENTRAL
367 . . . . .DGOW2A
. . . . .
378 . . . . .-----> D3ALL
376 . . . . .D3ALL
. . . . .
383 . . . . .<----- DCENT1
381 . . . . .DCENT1
. . . . .V
. . . . .V
384 . . . . .RDCENT1
. . . . .
388 . . . . .CRGOWAN.....
. . . . .V
. . . . .V
392 . . . . .RCRGOWAN
. . . . .
396 . . . . .PD05A-C
. . . . .
401 . . . . .CPD05A-C.....
. . . . .
410 . . . . .-----> DA1-C
405 . . . . .DCPD05A
. . . . .V
. . . . .V
413 . . . . .RCPD05
. . . . .
419 . . . . .<----- DPD01
417 . . . . .DPD01
. . . . .V
. . . . .V
420 . . . . .RDPD01
. . . . .
424 . . . . .PD01-C

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      .      V
      .      V
558      .      RCSR02E
      .      .
      .      .      SR05D-C
      .      .
564      .      .
      .      .
      .      .      CSR05D.....
      .      .      V
      .      .      V
573      .      .      RCSR05D
      .      .
      .      .      SR05B-C
      .      .
579      .      .
      .      .
      .      .      CSR05B.....
      .      .
584      .      .
      .      .
      .      .      ----->  DLVSR2
591      .      .
588      .      .      DCSR05B
      .      .
      .      .      ----->  DLVSR3
597      .      .
594      .      .      DDCSR05B
      .      .
      .      .      ----->  DLVRA
604      .      .
600      .      .      D3CSR05B
      .      .
      .      .      ----->  DRAN
611      .      .
607      .      .      D4CSR05B
      .      .
      .      .      ----->  DSMOKE
616      .      .
614      .      .      DSR05B
      .      .
      .      .
      .      .      .<-----  DLVSR3
621      .      .
619      .      .      DLVSR3
      .      .
      .      .
622      .      .      CCSR05B.....
      .      .
      .      .
      .      .      ----->  DLVSR4
628      .      .
626      .      .      DCCSR05B
      .      .
      .      .
      .      .      .<-----  DSR01F
633      .      .
631      .      .      DSR01F
      .      .      V
      .      .      V
634      .      .      RDSR01F
      .      .
      .      .
      .      .      LM02-C
      .      .
640      .      .
      .      .
      .      .      CLM02-C.....
645      .      .
      .      .      V
      .      .      V
649      .      .      RCLM02-C
      .      .
      .      .
      .      .      LM03-C
655      .      .
      .      .
      .      .
      .      .      CLM03-C.....
660      .      .
      .      .      V
      .      .      V
664      .      .      RCLM03-C
      .      .
      .      .
      .      .      LM05-C
670      .      .
      .      .
      .      .
      .      .      CLM05-C.....
675      .      .
      .      .      V

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679      .      V
      RCLM05-C
      .
      .
685      .      LM06B-C
      .
      .
690      .      CLM06-C.....
      .
      .
699      .      ----->  DLVLM4
694      .      DLVLMRA
      .
      .
706      .      ----->  DVALDR
702      .      DSURF1
      .
      .
711      .      .<-----  DLVRA
709      .      DLVRA
      .      V
      .      V
712      .      RDLVRA
      .
      .
718      .      .<-----  DRAN
716      .      DRAN
      .      V
      .      V
719      .      RDRAN
      .
      .
725      .      .<-----  DLVLM4
723      .      DLVLM4
      .
      .
726      .      CCLM06-C.....
      .
      .
736      .      ----->  DLVLM5
730      .      DLVLMRA
      .
      .
743      .      ----->  DLAKEM
739      .      DSURF2
      .
      .
752      .      ----->  DRAN119
746      .      D1LM09
      .
      .
761      .      ----->  DRAN118
755      .      D2LM09
      .      V
      .      V
764      .      RD2LM09
      .
      .
770      .      .<-----  DVALDR
768      .      DVALDR
      .
      .
771      .      LM09
      .
      .
776      .      CLM09.....
      .
      .
786      .      ----->  DCORAN
780      .      D3LM09
      .      V
      .      V
789      .      RD3LM09
      .
      .
793      .      VG21
      .
      .
798      .      CVG21.....
      .
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809 . . . . .-----> DHOLLY
802 . . . . .DVG21
. . . . .
. . . . .
812 . . . . .LM08
. . . . .V
. . . . .V
817 . . . . .RLM08
. . . . .
. . . . .
820 . . . . .VG20
. . . . .
. . . . .
825 . . . . .CVG20.....
. . . . .V
. . . . .V
829 . . . . .RCVG20
. . . . .
. . . . .
833 . . . . .VG22
. . . . .
. . . . .
838 . . . . .CVG22.....
. . . . .
. . . . .
842 . . . . .OG011A-C
. . . . .V
. . . . .V
847 . . . . .ROG011A
. . . . .
. . . . .
851 . . . . .VG02-C
. . . . .
. . . . .
856 . . . . .CVG02-C.....
. . . . .V
. . . . .V
860 . . . . .RCVG02
. . . . .
. . . . .
866 . . . . .VG03-C
. . . . .
. . . . .
871 . . . . .CVG03-C.....
. . . . .V
. . . . .V
875 . . . . .RCVG03
. . . . .
. . . . .
881 . . . . .VG04-C
. . . . .
. . . . .
886 . . . . .CVG04-C.....
. . . . .V
. . . . .V
890 . . . . .RCVG04
. . . . .
. . . . .
896 . . . . .WA08A
. . . . .
. . . . .
901 . . . . .CWA08A.....
. . . . .V
. . . . .V
905 . . . . .RCWA08A
. . . . .
. . . . .
911 . . . . .VG06
. . . . .
. . . . .
916 . . . . .CVG06.....
. . . . .V
. . . . .V
920 . . . . .RCVG06
. . . . .
. . . . .
924 . . . . .CCVG22.....
. . . . .
. . . . .
933 . . . . .-----> DVEG
928 . . . . .DCCVG22

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RANCHO DRIVE CAPACITY IMPROVEMENTS-DECATUR TO BONANZA

IDINPUT FILE = OFFSITE25.DAT
INPUT FILE DATE = Jan 10, 2014 BY PB
ORIGINAL INPUT FILE USED = ENW310.DAT MODELED BY PBS&J
FROM CLV CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN 2003 (CNFCMP)
CENTRAL BASIN (NORTHWEST AREA)
DESIGN STORM = 100-YEAR 6-HR STORM
STORM DISTRIBUTION = SDN #3

REFERENCED HYDROLOGIC MODELS IN THE ORIGINAL INPUT FILE:
CLV CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN 2003
CITY OF LAS VEGAS CITY WIDE HYDROLOGY (CWH) ANALYSIS (PBS&J 1997)
RANCHO DRIVE DRAINAGE IMPROVEMENTS PEAK DRIVE TO LAKE MEAD BOULEVARD
(MONTGOMERY WATSON 2000)
CCRFGD 2002 LAS VEGAS VALLEY MASTER PLAN UPDATE (PBS&J, GCW, LBG)

REFERENCED MPU FACILITY FLOWS BY PB:
FROM CLV VEGAS DRIVE IMPROVEMENTS-72INCH RCP
FROM CLV WASHINGTON AVENUE STORM DRAIN- 5'X 5' RCB

NO STORM CENTERING
COMPOSITE CURVE NUMBERS
2002 MPU SUBBASINS USED FOR OFFSITE AREAS EXCEPT WHERE SPECIFIED

NOTE: LOCATIONS AND DESCRIPTIONS OF PROPOSED MPU FACILITIES ARE STATED IN
THE MODEL. HOWEVER, ROUTINGS IN THESE LOCATIONS REFLECT THE EXISTING
CONDITION.

JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:

CONCENTRATION POINT	AREA SQ. MI.	DARF
	0-0.5	0.990
	0.5-1	0.975
	1-2	0.950
	2-3	0.925
	3-4	0.915
	4-5	0.908
	5-6	0.903
	6-7	0.895
	7-8	0.885

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

100-YEAR, 6-HOUR STORM, SDN3

52 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
 .73 .72 .70 .68 .68 .67 .67 .66 .65

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	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8	RATIO 9
					.73	.72	.70	.68	.68	.67	.67	.66	.65
HYDROGRAPH AT													
+	OG04-C	.29	1	FLOW	204.	199.	192.	184.	181.	179.	178.	175.	172.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
DIVERSION TO													
+	DPD01	.29	1	FLOW	124.	124.	124.	124.	124.	124.	124.	124.	124.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT													
+	DOG04-C	.29	1	FLOW	80.	75.	68.	60.	57.	55.	54.	51.	48.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO													
+	RDOG04-C	.29	1	FLOW	40.	37.	32.	27.	25.	23.	23.	21.	20.
				TIME	4.42	4.50	4.50	4.50	4.50	4.50	4.58	4.58	4.58
HYDROGRAPH AT													
+	OG05-C	.27	1	FLOW	172.	168.	162.	155.	153.	151.	150.	148.	145.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT													
+	COG05-C	.55	1	FLOW	172.	168.	162.	155.	153.	151.	150.	148.	145.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
ROUTED TO													
+	RCOG05-C	.55	1	FLOW	172.	169.	163.	156.	154.	152.	151.	149.	146.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT													
+	CY06B-C	.50	1	FLOW	180.	176.	168.	160.	157.	155.	153.	151.	147.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17
2 COMBINED AT													
+	CCY06B-C	1.05	1	FLOW	353.	344.	331.	316.	311.	306.	304.	300.	294.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO													
+	RCCY06B	1.05	1	FLOW	348.	341.	326.	313.	307.	302.	300.	297.	290.
				TIME	4.17	4.17	4.25	4.25	4.25	4.17	4.25	4.25	4.25
HYDROGRAPH AT													
+	PDGCD-C	.44	1	FLOW	121.	117.	111.	104.	101.	99.	98.	96.	94.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08
ROUTED TO													
+	RPDGCD-C	.44	1	FLOW	121.	117.	109.	103.	100.	98.	97.	95.	93.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25	4.25	4.25
ROUTED TO													
+	RRPDGCD	.44	1	FLOW	121.	117.	109.	102.	100.	98.	97.	95.	92.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT													
+	NW29B-C	.29	1	FLOW	97.	94.	89.	84.	82.	80.	79.	78.	75.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO													
+	RNW29B-C	.29	1	FLOW	98.	95.	88.	83.	81.	79.	78.	77.	74.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT													
+	NW1C2-C	.21	1	FLOW	118.	115.	110.	105.	104.	102.	101.	100.	98.

				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT													
+	CNW1C2	.49	1	FLOW TIME	201. 4.00	195. 4.00	183. 4.00	174. 4.00	171. 4.00	168. 4.00	167. 4.00	164. 4.00	160. 4.00
ROUTED TO													
+	RCNW1C2	.49	1	FLOW TIME	201. 4.08	195. 4.08	184. 4.08	174. 4.08	171. 4.08	168. 4.08	167. 4.08	164. 4.08	160. 4.08
HYDROGRAPH AT													
+	PDGCB10-	.31	1	FLOW TIME	127. 3.92	124. 3.92	118. 3.92	112. 3.92	109. 3.92	108. 3.92	107. 3.92	105. 3.92	102. 3.92
2 COMBINED AT													
+	CPDGCB10	.80	1	FLOW TIME	314. 4.00	304. 4.00	287. 4.00	272. 4.00	266. 4.00	261. 4.00	259. 4.00	253. 4.00	247. 4.00
DIVERSION TO													
+	DPT3AA11	.80	1	FLOW TIME	139. 3.67	139. 3.67	139. 3.67	139. 3.75	139. 3.75	139. 3.75	139. 3.75	139. 3.75	139. 3.75
HYDROGRAPH AT													
+	DPDGCB10	.80	1	FLOW TIME	175. 4.00	165. 4.00	148. 4.00	133. 4.00	127. 4.00	122. 4.00	120. 4.00	114. 4.00	108. 4.00
2 COMBINED AT													
+	CPDGCB10	1.24	1	FLOW TIME	277. 4.08	264. 4.08	240. 4.08	219. 4.08	211. 4.08	204. 4.08	201. 4.08	194. 4.08	185. 4.08
ROUTED TO													
+	RCPDGCB	1.24	1	FLOW TIME	275. 4.17	263. 4.17	238. 4.17	218. 4.17	210. 4.17	203. 4.17	200. 4.17	193. 4.17	184. 4.17
HYDROGRAPH AT													
+	GD20BE-C	.43	1	FLOW TIME	161. 3.92	157. 3.92	149. 3.92	141. 3.92	138. 3.92	135. 3.92	134. 3.92	132. 3.92	128. 3.92
2 COMBINED AT													
+	CGD20BEC	1.67	1	FLOW TIME	416. 4.08	398. 4.08	364. 4.08	335. 4.08	325. 4.17	316. 4.17	312. 4.17	303. 4.17	292. 4.17
ROUTED TO													
+	RCGD20BE	1.67	1	FLOW TIME	410. 4.25	394. 4.25	363. 4.25	336. 4.25	326. 4.25	317. 4.25	313. 4.25	304. 4.25	293. 4.25
HYDROGRAPH AT													
+	GD20BM-C	.34	1	FLOW TIME	192. 3.92	187. 3.92	180. 3.92	173. 3.92	170. 3.92	167. 3.92	166. 3.92	164. 3.92	161. 3.92
2 COMBINED AT													
+	CGD20BMC	2.01	1	FLOW TIME	555. 4.17	533. 4.17	494. 4.17	459. 4.17	443. 4.17	430. 4.17	424. 4.17	412. 4.25	399. 4.25
ROUTED TO													
+	RCGD20BM	2.01	1	FLOW TIME	553. 4.25	531. 4.25	493. 4.25	452. 4.33	440. 4.33	429. 4.33	424. 4.33	412. 4.33	398. 4.33
HYDROGRAPH AT													
+	GD17BG-C	.36	1	FLOW TIME	179. 3.92	175. 3.92	168. 3.92	160. 3.92	157. 3.92	155. 3.92	154. 3.92	151. 3.92	148. 3.92
2 COMBINED AT													
+	CGD17BG	2.38	1	FLOW TIME	680. 4.25	655. 4.25	612. 4.25	563. 4.25	545. 4.25	529. 4.25	522. 4.25	505. 4.25	489. 4.33
ROUTED TO													
+	RGD17BG	2.38	1	FLOW TIME	676. 4.33	650. 4.33	605. 4.33	556. 4.33	537. 4.33	523. 4.42	516. 4.42	503. 4.42	485. 4.42
HYDROGRAPH AT													
+	GD11B-C	.26	1	FLOW TIME	199. 3.67	194. 3.67	187. 3.67	180. 3.67	177. 3.67	174. 3.67	173. 3.67	171. 3.67	168. 3.67
2 COMBINED AT													
+	CGD11B-C	2.64	1	FLOW TIME	724. 4.33	697. 4.33	651. 4.33	599. 4.33	580. 4.33	564. 4.33	557. 4.33	540. 4.33	520. 4.42
ROUTED TO													
+	RCGD11B	2.64	1	FLOW TIME	721. 4.42	694. 4.42	648. 4.42	596. 4.42	578. 4.42	561. 4.42	554. 4.42	537. 4.42	518. 4.50

HYDROGRAPH AT +	PT6B-C	.45	1	FLOW TIME	152. 4.25	148. 4.25	141. 4.25	134. 4.25	132. 4.25	130. 4.25	129. 4.25	126. 4.25	124. 4.25
2 COMBINED AT +	CPT6B-C	3.09	1	FLOW TIME	864. 4.42	834. 4.42	781. 4.42	723. 4.42	702. 4.42	684. 4.42	675. 4.42	657. 4.42	632. 4.42
DIVERSION TO +	DGOW1A	3.09	1	FLOW TIME	560. 3.92	560. 4.00	560. 4.00	560. 4.00	560. 4.08	560. 4.08	560. 4.08	560. 4.08	560. 4.08
HYDROGRAPH AT +	DPT6B-C1	3.09	1	FLOW TIME	304. 4.42	274. 4.42	221. 4.42	163. 4.42	142. 4.42	124. 4.42	115. 4.42	97. 4.42	72. 4.42
DIVERSION TO +	DTRILGY	3.09	1	FLOW TIME	83. 4.42	74. 4.42	60. 4.42	47. 4.42	43. 4.42	40. 4.42	38. 4.42	34. 4.42	23. 4.42
HYDROGRAPH AT +	DPT6B-C2	3.09	1	FLOW TIME	221. 4.42	199. 4.42	161. 4.42	116. 4.42	99. 4.42	84. 4.42	78. 4.42	63. 4.42	48. 4.42
HYDROGRAPH AT +	PT2B2-C	.30	1	FLOW TIME	205. 3.83	200. 3.83	194. 3.83	186. 3.83	184. 3.83	181. 3.83	180. 3.83	178. 3.83	175. 3.83
ROUTED TO +	RCPT2B2	.30	1	FLOW TIME	202. 3.92	198. 3.92	191. 3.92	184. 3.92	182. 3.92	179. 3.92	178. 3.92	176. 3.92	173. 3.92
HYDROGRAPH AT +	PT3-C	.17	1	FLOW TIME	108. 3.83	105. 3.83	101. 3.83	97. 3.83	95. 3.83	94. 3.83	93. 3.83	92. 3.83	90. 3.83
ROUTED TO +	RCPT3-C	.17	1	FLOW TIME	109. 4.08	106. 4.08	102. 4.08	98. 4.08	96. 4.08	95. 4.08	94. 4.08	93. 4.08	91. 4.08
HYDROGRAPH AT +	PT41-C	.44	1	FLOW TIME	241. 3.83	235. 3.83	226. 3.83	216. 3.83	212. 3.83	209. 3.83	208. 3.83	205. 3.83	200. 3.83
3 COMBINED AT +	CPT41-C	.91	1	FLOW TIME	526. 3.92	513. 3.92	493. 3.92	471. 3.92	464. 3.92	457. 3.92	453. 3.92	447. 3.92	437. 3.92
ROUTED TO +	RCPT41-C	.91	1	FLOW TIME	522. 3.92	509. 3.92	489. 3.92	468. 4.00	460. 4.00	455. 4.00	452. 4.00	445. 4.00	437. 4.00
HYDROGRAPH AT +	PT5A2-C	.34	1	FLOW TIME	132. 4.08	128. 4.08	123. 4.08	117. 4.08	115. 4.08	113. 4.08	112. 4.08	110. 4.08	108. 4.08
2 COMBINED AT +	CPT5A2-C	1.25	1	FLOW TIME	646. 4.00	631. 4.00	607. 4.00	580. 4.00	571. 4.00	563. 4.00	559. 4.00	551. 4.00	540. 4.00
ROUTED TO +	RCPT5A2	1.25	1	FLOW TIME	643. 4.00	626. 4.00	601. 4.00	576. 4.00	564. 4.00	557. 4.00	553. 4.00	544. 4.00	534. 4.00
2 COMBINED AT +	CCPT6B-C	4.34	1	FLOW TIME	751. 4.08	719. 4.08	666. 4.08	616. 4.08	602. 4.08	588. 4.08	580. 4.08	569. 4.08	543. 4.08
DIVERSION TO +	DGOWAN	4.34	1	FLOW TIME	251. 4.08	219. 4.08	166. 4.08	116. 4.08	102. 4.08	88. 4.08	80. 4.08	69. 4.08	43. 4.08
HYDROGRAPH AT +	DRANCHO	4.34	1	FLOW TIME	500. 3.83	500. 3.83	500. 3.92	500. 3.92	500. 3.92	500. 3.92	500. 3.92	500. 3.92	500. 3.92
ROUTED TO +	RDRANCH	4.34	1	FLOW TIME	502. 4.00	502. 4.00	503. 4.00	502. 4.00	502. 4.00	501. 4.00	501. 4.00	501. 4.08	502. 4.08

HYDROGRAPH AT +	DTRILGY	.00	1	FLOW TIME	83. 4.42	74. 4.42	60. 4.42	47. 4.42	43. 4.42	40. 4.42	38. 4.42	34. 4.42	23. 4.42
HYDROGRAPH AT +	CY07B	.20	1	FLOW TIME	111. 3.92	108. 3.92	104. 3.92	100. 3.92	98. 3.92	97. 3.92	96. 3.92	95. 3.92	93. 3.92
3 COMBINED AT +	CCY07B	4.54	1	FLOW TIME	646. 4.08	639. 4.08	628. 4.08	614. 4.17	610. 4.17	604. 4.17	601. 4.17	594. 4.17	590. 4.00
DIVERSION TO +	DCENT1	4.54	1	FLOW TIME	574. 4.08	567. 4.08	556. 4.08	542. 4.17	538. 4.17	532. 4.17	529. 4.17	522. 4.17	518. 4.00
HYDROGRAPH AT +	DCY07B	4.54	1	FLOW TIME	72. 3.42	72. 3.42	72. 3.50	72. 3.50	72. 3.50	72. 3.50	72. 3.50	72. 3.50	72. 3.50
HYDROGRAPH AT +	DGOWAN	.00	1	FLOW TIME	251. 4.08	219. 4.08	166. 4.08	116. 4.08	102. 4.08	88. 4.08	80. 4.08	69. 4.08	43. 4.08
ROUTED TO +	RDGOWAN	.00	1	FLOW TIME	256. 4.25	230. 4.25	193. 4.25	118. 4.25	102. 4.33	91. 4.33	86. 4.33	74. 4.33	44. 4.33
HYDROGRAPH AT +	DGOW1A	.00	1	FLOW TIME	560. 3.92	560. 4.00	560. 4.00	560. 4.00	560. 4.08	560. 4.08	560. 4.08	560. 4.08	560. 4.08
ROUTED TO +	RDGOW1A	.00	1	FLOW TIME	561. 4.00	560. 4.08	561. 4.08	561. 4.08	560. 4.17	561. 4.17	561. 4.17	561. 4.17	561. 4.17
2 COMBINED AT +	CCPT6B-C	.00	1	FLOW TIME	816. 4.25	790. 4.25	753. 4.25	678. 4.25	662. 4.33	651. 4.33	646. 4.33	634. 4.33	604. 4.33
HYDROGRAPH AT +	CY08-C	.09	1	FLOW TIME	62. 3.75	60. 3.75	58. 3.75	55. 3.75	54. 3.75	54. 3.75	53. 3.75	52. 3.75	51. 3.75
3 COMBINED AT +	CCY08-C	4.64	1	FLOW TIME	910. 4.25	884. 4.25	846. 4.25	770. 4.25	750. 4.33	739. 4.33	734. 4.33	721. 4.33	692. 4.33
DIVERSION TO +	DCENTRAL	4.64	1	FLOW TIME	280. 4.25	254. 4.25	216. 4.25	140. 4.25	120. 4.33	109. 4.33	104. 4.33	91. 4.33	62. 4.33
HYDROGRAPH AT +	DGOW2A	4.64	1	FLOW TIME	630. 3.92	630. 3.92	630. 4.00	630. 4.00	630. 4.00	630. 4.08	630. 4.08	630. 4.08	630. 4.08
DIVERSION TO +	D3ALL	4.64	1	FLOW TIME	630. 3.92	630. 3.92	630. 4.00	630. 4.00	630. 4.00	630. 4.08	630. 4.08	630. 4.08	630. 4.08
HYDROGRAPH AT +	D3ALL	4.64	1	FLOW TIME	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
HYDROGRAPH AT +	DCENT1	.00	1	FLOW TIME	574. 4.08	567. 4.08	556. 4.08	542. 4.17	538. 4.17	532. 4.17	529. 4.17	522. 4.17	518. 4.00
ROUTED TO +	RDCENT1	.00	1	FLOW TIME	576. 4.17	569. 4.17	556. 4.25	544. 4.25	538. 4.25	530. 4.25	526. 4.25	523. 4.08	521. 4.08
3 COMBINED AT +	CRGOWAN	5.69	1	FLOW TIME	925. 4.17	911. 4.17	883. 4.25	857. 4.25	845. 4.25	832. 4.25	826. 4.25	814. 4.25	806. 4.17
ROUTED TO +	RCRGOWAN	5.69	1	FLOW TIME	923. 4.25	906. 4.25	881. 4.25	850. 4.25	840. 4.25	832. 4.25	826. 4.25	811. 4.25	801. 4.25
HYDROGRAPH AT													

+	PD05A-C	.14	1	FLOW TIME	99. 3.83	97. 3.83	94. 3.83	90. 3.83	89. 3.83	88. 3.83	88. 3.83	86. 3.83	85. 3.83
+	2 COMBINED AT CPD05A-C	5.83	1	FLOW TIME	976. 4.25	958. 4.25	931. 4.25	898. 4.25	888. 4.25	879. 4.25	872. 4.25	859. 4.17	850. 4.17
+	DIVERSION TO DA1-C	5.83	1	FLOW TIME	211. 3.75	211. 3.75	211. 3.75	211. 3.75	211. 3.75	211. 3.83	211. 3.83	211. 3.83	211. 3.83
+	HYDROGRAPH AT DCPD05A	5.83	1	FLOW TIME	765. 4.25	747. 4.25	720. 4.25	687. 4.25	677. 4.25	668. 4.25	661. 4.25	648. 4.17	639. 4.17
+	ROUTED TO RCPD05	5.83	1	FLOW TIME	761. 4.25	747. 4.25	713. 4.25	685. 4.25	673. 4.25	663. 4.25	658. 4.25	649. 4.25	639. 4.25
+	HYDROGRAPH AT DPD01	.00	1	FLOW TIME	124. 3.58	124. 3.58	124. 3.58	124. 3.58	124. 3.58	124. 3.58	124. 3.58	124. 3.58	124. 3.58
+	ROUTED TO RDPD01	.00	1	FLOW TIME	132. 3.75	131. 3.75	129. 3.75	128. 3.83	129. 3.83	129. 3.83	129. 3.83	130. 3.83	130. 3.83
+	HYDROGRAPH AT PD01-C	.38	1	FLOW TIME	152. 3.92	148. 3.92	141. 3.92	134. 3.92	131. 3.92	129. 3.92	127. 3.92	125. 3.92	122. 3.92
+	2 COMBINED AT CPD01-C	.38	1	FLOW TIME	274. 3.92	270. 3.83	264. 3.83	258. 3.83	256. 3.83	254. 3.83	253. 3.83	251. 3.83	249. 3.83
+	ROUTED TO RCPD01	.38	1	FLOW TIME	274. 3.92	270. 3.92	263. 3.92	257. 3.92	254. 3.92	252. 3.92	252. 3.92	249. 3.92	246. 3.92
+	HYDROGRAPH AT CY04A-C	.46	1	FLOW TIME	210. 3.92	204. 3.92	195. 3.92	186. 3.92	183. 3.92	180. 3.92	178. 3.92	176. 3.92	172. 3.92
+	2 COMBINED AT CCY04A-C	.83	1	FLOW TIME	484. 3.92	474. 3.92	458. 3.92	443. 3.92	437. 3.92	432. 3.92	430. 3.92	425. 3.92	418. 3.92
+	DIVERSION TO DLVSR1	.83	1	FLOW TIME	231. 3.67	231. 3.67	231. 3.67	231. 3.67	231. 3.67	231. 3.67	231. 3.67	231. 3.67	231. 3.67
+	HYDROGRAPH AT DCY04C	.83	1	FLOW TIME	253. 3.92	243. 3.92	227. 3.92	212. 3.92	206. 3.92	201. 3.92	199. 3.92	194. 3.92	187. 3.92
+	ROUTED TO RCCY04A	.83	1	FLOW TIME	256. 4.00	244. 4.00	225. 4.00	217. 3.92	212. 3.92	209. 3.92	209. 3.92	205. 3.92	198. 3.92
+	HYDROGRAPH AT PD04B-C	.47	1	FLOW TIME	216. 4.00	211. 4.00	202. 4.00	193. 4.00	190. 4.00	187. 4.00	186. 4.00	183. 4.00	179. 4.00
+	2 COMBINED AT CPD04B-C	1.30	1	FLOW TIME	472. 4.00	455. 4.00	428. 4.00	405. 3.92	397. 3.92	391. 3.92	389. 3.92	383. 3.92	372. 3.92
+	2 COMBINED AT CCPD04B-	7.13	1	FLOW TIME	1150. 4.17	1126. 4.17	1074. 4.17	1018. 4.17	995. 4.17	979. 4.17	970. 4.17	953. 4.17	931. 4.17
+	ROUTED TO RCPD04B	7.13	1	FLOW TIME	1136. 4.17	1112. 4.17	1059. 4.17	1005. 4.25	985. 4.25	969. 4.25	962. 4.25	945. 4.25	926. 4.25
+	HYDROGRAPH AT OG03-C	.32	1	FLOW TIME	172. 3.83	168. 3.83	160. 3.83	153. 3.83	150. 3.83	148. 3.83	147. 3.83	144. 3.83	141. 3.83
+	ROUTED TO ROG03-C	.32	1	FLOW	172.	167.	160.	153.	150.	148.	147.	145.	142.

				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT													
+	OG02-C	.32	1	FLOW	212.	208.	200.	192.	189.	186.	185.	182.	179.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO													
+	ROG02-C	.32	1	FLOW	215.	210.	202.	194.	191.	189.	187.	185.	181.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT													
+	LM01-C	.33	1	FLOW	119.	115.	110.	103.	101.	99.	98.	96.	94.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
2 COMBINED AT													
+	CLM01-C	.64	1	FLOW	334.	326.	312.	298.	292.	288.	286.	281.	275.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
DIVERSION TO													
+	DSR01F	.64	1	FLOW	229.	224.	216.	207.	204.	201.	200.	197.	193.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT													
+	SR01E	.64	1	FLOW	105.	102.	96.	91.	88.	87.	86.	84.	81.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO													
+	RCLM01-C	.64	1	FLOW	103.	99.	94.	88.	86.	84.	83.	82.	79.
				TIME	3.92	3.92	3.92	4.00	3.92	4.00	3.92	4.00	3.92
HYDROGRAPH AT													
+	SR00A-C	.37	1	FLOW	150.	145.	139.	131.	129.	126.	125.	123.	120.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
2 COMBINED AT													
+	CSR00A	1.01	1	FLOW	253.	245.	233.	218.	215.	209.	208.	204.	199.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
2 COMBINED AT													
+	CCSR00A	1.34	1	FLOW	423.	410.	391.	369.	363.	355.	352.	346.	338.
				TIME	3.92	3.92	3.92	3.92	3.92	4.00	3.92	4.00	3.92
ROUTED TO													
+	RCSR00A	1.34	1	FLOW	418.	407.	388.	368.	361.	354.	351.	346.	337.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT													
+	DLVSR1	.00	1	FLOW	231.	231.	231.	231.	231.	231.	231.	231.	231.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO													
+	RDLVSR1	.00	1	FLOW	231.	231.	231.	231.	231.	231.	231.	231.	231.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT													
+	SR02E-C	.30	1	FLOW	154.	150.	144.	137.	134.	132.	131.	129.	126.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
3 COMBINED AT													
+	CSR02E	1.64	1	FLOW	791.	774.	749.	720.	711.	702.	699.	690.	679.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO													
+	RCSR02E	1.64	1	FLOW	786.	769.	745.	718.	710.	699.	696.	690.	677.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT													
+	SR05D-C	.30	1	FLOW	157.	154.	148.	142.	140.	138.	137.	135.	132.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
2 COMBINED AT													
+	CSR05D	1.94	1	FLOW	943.	923.	892.	860.	850.	837.	833.	824.	810.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
ROUTED TO													
+	RCSR05D	1.94	1	FLOW	940.	920.	889.	855.	845.	833.	829.	819.	805.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT													
+	SR05B-C	.36	1	FLOW	157.	153.	147.	141.	138.	136.	135.	133.	131.
				TIME	4.08	4.08	4.08	4.17	4.17	4.17	4.17	4.17	4.17

2 COMBINED AT													
+	CSR05B	2.30	1	FLOW TIME	1091. 4.00	1067. 4.00	1030. 4.00	990. 4.00	978. 4.00	964. 4.00	959. 4.00	947. 4.00	930. 4.00
DIVERSION TO													
+	DLVSR2	2.30	1	FLOW TIME	231. 3.58	231. 3.58	231. 3.58	231. 3.58	231. 3.58	231. 3.58	231. 3.58	231. 3.58	231. 3.58
HYDROGRAPH AT													
+	DCSR05B	2.30	1	FLOW TIME	860. 4.00	836. 4.00	799. 4.00	759. 4.00	747. 4.00	733. 4.00	728. 4.00	716. 4.00	699. 4.00
DIVERSION TO													
+	DLVSR3	2.30	1	FLOW TIME	182. 3.67	182. 3.67	182. 3.67	182. 3.67	182. 3.67	182. 3.67	182. 3.67	182. 3.67	182. 3.75
HYDROGRAPH AT													
+	DDCSR05B	2.30	1	FLOW TIME	678. 4.00	654. 4.00	617. 4.00	577. 4.00	565. 4.00	551. 4.00	546. 4.00	534. 4.00	517. 4.00
DIVERSION TO													
+	DLVRA	2.30	1	FLOW TIME	670. 4.00	654. 4.00	617. 4.00	577. 4.00	565. 4.00	551. 4.00	546. 4.00	534. 4.00	517. 4.00
HYDROGRAPH AT													
+	D3CSR05B	2.30	1	FLOW TIME	8. 4.00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
DIVERSION TO													
+	DRAN	2.30	1	FLOW TIME	4. 4.00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
HYDROGRAPH AT													
+	D4CSR05B	2.30	1	FLOW TIME	4. 4.00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
DIVERSION TO													
+	DSMOKE	2.30	1	FLOW TIME	4. 4.00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
HYDROGRAPH AT													
+	DSR05B	2.30	1	FLOW TIME	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
HYDROGRAPH AT													
+	DLVSR3	.00	1	FLOW TIME	182. 3.67	182. 3.67	182. 3.67	182. 3.67	182. 3.67	182. 3.67	182. 3.67	182. 3.67	182. 3.75
3 COMBINED AT													
+	CCSR05B	9.43	1	FLOW TIME	1318. 4.17	1294. 4.17	1241. 4.17	1187. 4.25	1167. 4.25	1151. 4.25	1144. 4.25	1127. 4.25	1108. 4.25
DIVERSION TO													
+	DLVSR4	9.43	1	FLOW TIME	1318. 4.17	1294. 4.17	1241. 4.17	1187. 4.25	1167. 4.25	1151. 4.25	1144. 4.25	1127. 4.25	1108. 4.25
HYDROGRAPH AT													
+	DCCSR05B	9.43	1	FLOW TIME	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
HYDROGRAPH AT													
+	DSR01F	.00	1	FLOW TIME	229. 3.92	224. 3.92	216. 3.92	207. 3.92	204. 3.92	201. 3.92	200. 3.92	197. 3.92	193. 3.92
ROUTED TO													
+	RDSR01F	.00	1	FLOW TIME	227. 3.92	222. 3.92	214. 3.92	204. 3.92	202. 3.92	199. 3.92	197. 3.92	194. 3.92	192. 3.92
HYDROGRAPH AT													
+	LM02-C	.29	1	FLOW TIME	141. 3.83	137. 3.83	131. 3.83	124. 3.83	122. 3.83	120. 3.83	119. 3.83	117. 3.83	114. 3.83
2 COMBINED AT													
+	CLM02-C	.29	1	FLOW TIME	361. 3.92	352. 3.92	338. 3.92	323. 3.92	318. 3.92	313. 3.92	311. 3.92	306. 3.92	300. 3.92
ROUTED TO													
+	RCLM02-C	.29	1	FLOW TIME	359. 3.92	349. 3.92	335. 3.92	320. 3.92	315. 3.92	311. 3.92	308. 3.92	302. 3.92	298. 3.92

HYDROGRAPH AT +	LM03-C	.34	1	FLOW TIME	221. 3.83	216. 3.83	208. 3.83	200. 3.83	197. 3.83	194. 3.83	193. 3.83	190. 3.83	187. 3.83
2 COMBINED AT +	CLM03-C	.63	1	FLOW TIME	567. 3.92	554. 3.92	532. 3.92	509. 3.92	501. 3.92	495. 3.92	490. 3.92	482. 3.92	475. 3.92
ROUTED TO +	RCLM03-C	.63	1	FLOW TIME	565. 3.92	551. 3.92	529. 3.92	506. 3.92	499. 3.92	491. 3.92	487. 3.92	480. 3.92	471. 3.92
HYDROGRAPH AT +	LM05-C	.37	1	FLOW TIME	207. 3.83	202. 3.83	194. 3.83	185. 3.83	182. 3.83	179. 3.83	178. 3.83	175. 3.83	172. 3.83
2 COMBINED AT +	CLM05-C	.99	1	FLOW TIME	764. 3.92	745. 3.92	716. 3.92	684. 3.92	674. 3.92	664. 3.92	658. 3.92	649. 3.92	637. 3.92
ROUTED TO +	RCLM05-C	.99	1	FLOW TIME	752. 3.92	734. 3.92	704. 3.92	672. 3.92	661. 3.92	652. 3.92	647. 3.92	637. 3.92	624. 3.92
HYDROGRAPH AT +	LM06B-C	.35	1	FLOW TIME	196. 3.92	192. 3.92	184. 3.92	177. 3.92	174. 3.92	171. 3.92	170. 3.92	168. 3.92	164. 3.92
2 COMBINED AT +	CLM06-C	1.35	1	FLOW TIME	949. 3.92	926. 3.92	888. 3.92	849. 3.92	835. 3.92	823. 3.92	817. 3.92	804. 3.92	789. 3.92
DIVERSION TO +	DLVLM4	1.35	1	FLOW TIME	940. 3.92	926. 3.92	888. 3.92	849. 3.92	835. 3.92	823. 3.92	817. 3.92	804. 3.92	789. 3.92
HYDROGRAPH AT +	DLVLMRA	1.35	1	FLOW TIME	9. 3.92	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
DIVERSION TO +	DVALDR	1.35	1	FLOW TIME	3. 3.92	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
HYDROGRAPH AT +	DSURF1	1.35	1	FLOW TIME	6. 3.92	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
HYDROGRAPH AT +	DLVRA	.00	1	FLOW TIME	670. 4.00	654. 4.00	617. 4.00	577. 4.00	565. 4.00	551. 4.00	546. 4.00	534. 4.00	517. 4.00
ROUTED TO +	RDLVRA	.00	1	FLOW TIME	663. 4.00	645. 4.00	608. 4.00	570. 4.08	556. 4.08	544. 4.08	539. 4.08	527. 4.08	512. 4.08
HYDROGRAPH AT +	DRAN	.00	1	FLOW TIME	4. 4.00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
ROUTED TO +	RDRAN	.00	1	FLOW TIME	3. 4.17	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
HYDROGRAPH AT +	DLVLM4	.00	1	FLOW TIME	940. 3.92	926. 3.92	888. 3.92	849. 3.92	835. 3.92	823. 3.92	817. 3.92	804. 3.92	789. 3.92
4 COMBINED AT +	CCLM06-C	1.35	1	FLOW TIME	1599. 4.00	1559. 4.00	1487. 4.00	1409. 4.00	1383. 4.00	1358. 4.00	1346. 4.00	1321. 4.00	1292. 4.00
DIVERSION TO +	DLVLM5	1.35	1	FLOW TIME	940. 3.75	940. 3.75	940. 3.83	940. 3.83	940. 3.83	940. 3.83	940. 3.83	940. 3.83	940. 3.83
HYDROGRAPH AT +	DLVLMRA	1.35	1	FLOW TIME	659. 4.00	619. 4.00	547. 4.00	469. 4.00	443. 4.00	418. 4.00	406. 4.00	381. 4.00	352. 4.00
DIVERSION TO													

+	DLAKEM	1.35	1	FLOW TIME	220. 4.00	206. 4.00	182. 4.00	156. 4.00	148. 4.00	139. 4.00	135. 4.00	127. 4.00	117. 4.00
HYDROGRAPH AT +	DSURF2	1.35	1	FLOW TIME	439. 4.00	413. 4.00	364. 4.00	312. 4.00	295. 4.00	279. 4.00	270. 4.00	254. 4.00	234. 4.00
DIVERSION TO +	DRAN119	1.35	1	FLOW TIME	168. 3.83	168. 3.83	168. 3.83	168. 3.92	168. 3.92	168. 3.92	168. 3.92	168. 3.92	168. 3.92
HYDROGRAPH AT +	D1LM09	1.35	1	FLOW TIME	271. 4.00	245. 4.00	196. 4.00	144. 4.00	127. 4.00	111. 4.00	102. 4.00	86. 4.00	66. 4.00
DIVERSION TO +	DRAN118	1.35	1	FLOW TIME	168. 3.92	168. 3.92	168. 4.00	144. 4.00	127. 4.00	111. 4.00	102. 4.00	86. 4.00	66. 4.00
HYDROGRAPH AT +	D2LM09	1.35	1	FLOW TIME	103. 4.00	77. 4.00	28. 4.00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
ROUTED TO +	RD2LM09	1.35	1	FLOW TIME	91. 4.00	62. 4.00	19. 4.08	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
HYDROGRAPH AT +	DVALDR	.00	1	FLOW TIME	3. 3.92	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
HYDROGRAPH AT +	LM09	.12	1	FLOW TIME	115. 3.67	113. 3.67	109. 3.67	105. 3.67	103. 3.67	102. 3.67	102. 3.67	100. 3.67	99. 3.67
3 COMBINED AT +	CLM09	1.47	1	FLOW TIME	138. 4.00	113. 3.67	109. 3.67	105. 3.67	103. 3.67	102. 3.67	102. 3.67	100. 3.67	99. 3.67
DIVERSION TO +	DCORAN	1.47	1	FLOW TIME	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
HYDROGRAPH AT +	D3LM09	1.47	1	FLOW TIME	138. 4.00	113. 3.67	109. 3.67	105. 3.67	103. 3.67	102. 3.67	102. 3.67	100. 3.67	99. 3.67
ROUTED TO +	RD3LM09	1.47	1	FLOW TIME	130. 4.08	113. 3.67	108. 3.67	105. 3.67	103. 3.67	102. 3.67	102. 3.67	100. 3.67	98. 3.67
HYDROGRAPH AT +	VG21	.10	1	FLOW TIME	73. 3.67	71. 3.67	68. 3.67	66. 3.67	64. 3.67	63. 3.67	63. 3.67	62. 3.67	61. 3.67
2 COMBINED AT +	CVG21	1.57	1	FLOW TIME	189. 3.67	185. 3.67	177. 3.67	171. 3.67	167. 3.67	165. 3.67	165. 3.67	162. 3.67	159. 3.67
DIVERSION TO +	DHOLLY	1.57	1	FLOW TIME	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
HYDROGRAPH AT +	DVG21	1.57	1	FLOW TIME	189. 3.67	185. 3.67	177. 3.67	171. 3.67	167. 3.67	165. 3.67	165. 3.67	162. 3.67	159. 3.67
HYDROGRAPH AT +	LM08	.06	1	FLOW TIME	56. 3.58	55. 3.58	53. 3.58	51. 3.58	50. 3.58	49. 3.58	49. 3.58	48. 3.58	48. 3.58
ROUTED TO +	RLM08	.06	1	FLOW TIME	54. 3.83	52. 3.83	51. 3.83	48. 3.83	47. 3.83	47. 3.83	47. 3.83	46. 3.83	47. 3.83
HYDROGRAPH AT +	VG20	.13	1	FLOW TIME	89. 3.75	87. 3.75	84. 3.75	81. 3.75	79. 3.75	78. 3.75	78. 3.75	77. 3.75	75. 3.75
3 COMBINED AT +	CVG20	1.76	1	FLOW	312.	305.	293.	280.	276.	272.	271.	267.	263.

				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO													
+	RCVG20	1.76	1	FLOW	310.	303.	291.	279.	274.	271.	269.	265.	261.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT													
+	VG22	.18	1	FLOW	113.	111.	107.	102.	101.	100.	99.	98.	96.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT													
+	CVG22	1.94	1	FLOW	418.	408.	392.	375.	369.	365.	362.	357.	351.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT													
+	OG011A-C	.44	1	FLOW	201.	196.	187.	178.	174.	172.	170.	167.	163.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO													
+	ROG011A	.44	1	FLOW	202.	196.	188.	178.	175.	172.	171.	168.	164.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT													
+	VG02-C	.22	1	FLOW	83.	81.	76.	72.	70.	69.	68.	67.	65.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT													
+	CVG02-C	.67	1	FLOW	280.	272.	259.	245.	240.	236.	234.	229.	224.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	4.00
ROUTED TO													
+	RCVG02	.67	1	FLOW	280.	272.	259.	245.	240.	236.	234.	230.	225.
				TIME	4.00	4.00	4.00	4.00	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT													
+	VG03-C	.28	1	FLOW	87.	84.	80.	75.	73.	71.	71.	69.	67.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
2 COMBINED AT													
+	CVG03-C	.94	1	FLOW	362.	351.	334.	316.	309.	303.	300.	295.	287.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
ROUTED TO													
+	RCVG03	.94	1	FLOW	363.	352.	334.	316.	309.	304.	301.	295.	287.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT													
+	VG04-C	.24	1	FLOW	162.	159.	153.	147.	145.	143.	142.	140.	137.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT													
+	CVG04-C	1.18	1	FLOW	483.	469.	446.	422.	413.	405.	402.	394.	384.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
ROUTED TO													
+	RCVG04	1.18	1	FLOW	485.	470.	447.	423.	415.	407.	403.	396.	386.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT													
+	WA08A	.03	1	FLOW	26.	26.	25.	24.	24.	23.	23.	23.	22.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CWA08A	1.21	1	FLOW	491.	477.	454.	430.	421.	413.	409.	402.	391.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08
ROUTED TO													
+	RCWA08A	1.21	1	FLOW	489.	475.	453.	430.	422.	415.	411.	404.	395.
				TIME	4.17	4.17	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT													
+	VG06	.19	1	FLOW	118.	115.	110.	105.	104.	102.	101.	100.	98.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT													
+	CVG06	1.40	1	FLOW	537.	521.	495.	468.	457.	449.	444.	437.	427.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.25	4.25
ROUTED TO													
+	RCVG06	1.40	1	FLOW	531.	517.	493.	467.	455.	448.	445.	436.	424.
				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25

2 COMBINED AT														
+	CCVG22	3.33	1	FLOW TIME	791. 4.08	746. 4.17	681. 4.17	633. 4.17	619. 4.17	608. 4.17	604. 4.17	590. 4.17	575. 4.17	
DIVERSION TO														
+	DVEG	3.33	1	FLOW TIME	605. 3.83	605. 3.83	605. 4.00	605. 4.17	605. 4.17	595. 4.17	591. 4.17	578. 4.17	564. 4.17	
HYDROGRAPH AT														
+	DCCVG22	3.33	1	FLOW TIME	186. 4.08	141. 4.17	76. 4.17	28. 4.17	14. 4.17	13. 4.17	13. 4.17	12. 4.17	11. 4.17	
ROUTED TO														
+	RDCCVG22	3.33	1	FLOW TIME	184. 4.17	140. 4.17	72. 4.17	24. 4.17	14. 4.17	13. 4.25	13. 4.25	12. 4.25	11. 4.25	
HYDROGRAPH AT														
+	WA12	.07	1	FLOW TIME	69. 3.58	67. 3.58	65. 3.58	62. 3.58	62. 3.58	61. 3.58	60. 3.58	60. 3.58	58. 3.58	
HYDROGRAPH AT														
+	WA13	.16	1	FLOW TIME	119. 3.75	116. 3.75	112. 3.75	108. 3.75	106. 3.75	105. 3.75	104. 3.75	103. 3.75	101. 3.75	
2 COMBINED AT														
+	CWA13	.23	1	FLOW TIME	170. 3.67	166. 3.67	160. 3.67	153. 3.67	151. 3.67	149. 3.67	148. 3.67	146. 3.67	143. 3.67	
2 COMBINED AT														
+	CCWA13	3.56	1	FLOW TIME	256. 4.08	201. 4.08	163. 3.67	155. 3.67	152. 3.67	150. 3.67	149. 3.67	146. 3.67	144. 3.67	
HYDROGRAPH AT														
+	WA14	.04	1	FLOW TIME	37. 3.58	36. 3.58	35. 3.58	34. 3.58	33. 3.58	33. 3.58	32. 3.58	32. 3.58	31. 3.58	
2 COMBINED AT														
+	CWA14	3.60	1	FLOW TIME	267. 4.08	212. 4.08	198. 3.67	188. 3.67	185. 3.67	182. 3.67	181. 3.67	178. 3.67	175. 3.67	
HYDROGRAPH AT														
+	WA01-C	.22	1	FLOW TIME	148. 3.67	144. 3.67	138. 3.67	132. 3.67	130. 3.67	128. 3.67	127. 3.67	125. 3.67	122. 3.67	
ROUTED TO														
+	RWA01	.22	1	FLOW TIME	149. 3.92	145. 3.92	140. 3.92	134. 3.92	131. 3.92	129. 3.92	129. 3.92	127. 3.92	124. 3.92	
HYDROGRAPH AT														
+	WA04-C	.22	1	FLOW TIME	111. 3.92	108. 3.92	104. 3.92	99. 3.92	98. 3.92	96. 3.92	96. 3.92	94. 3.92	92. 3.92	
2 COMBINED AT														
+	CWA04-C	.44	1	FLOW TIME	260. 3.92	254. 3.92	244. 3.92	233. 3.92	229. 3.92	226. 3.92	224. 3.92	221. 3.92	216. 3.92	
ROUTED TO														
+	RCWA04	.44	1	FLOW TIME	264. 4.08	258. 4.08	248. 4.08	237. 4.08	233. 4.08	230. 4.08	228. 4.08	225. 4.08	220. 4.08	
HYDROGRAPH AT														
+	WA09-C	.09	1	FLOW TIME	65. 3.83	63. 3.83	61. 3.83	59. 3.83	58. 3.83	57. 3.83	57. 3.83	56. 3.83	55. 3.83	
2 COMBINED AT														
+	CWA09-C	.53	1	FLOW TIME	308. 4.08	301. 4.08	289. 4.08	276. 4.08	272. 4.08	269. 4.08	267. 4.08	263. 4.08	258. 4.08	
ROUTED TO														
+	RCWA09	.53	1	FLOW TIME	304. 4.08	295. 4.08	284. 4.08	270. 4.08	265. 4.08	262. 4.08	259. 4.08	255. 4.08	249. 4.08	
HYDROGRAPH AT														
+	WA10-C	.45	1	FLOW TIME	314. 3.75	307. 3.75	296. 3.75	285. 3.75	281. 3.75	277. 3.75	275. 3.75	271. 3.75	267. 3.75	
DIVERSION TO														
+	WA10SE	.45	1	FLOW TIME	250. 3.67	250. 3.67	250. 3.67	250. 3.67	250. 3.67	250. 3.75	250. 3.75	250. 3.75	250. 3.75	

HYDROGRAPH AT	WA10D	.45	1	FLOW	64.	57.	46.	35.	31.	27.	25.	21.	17.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT	CWA10NW	.98	1	FLOW	304.	295.	284.	270.	265.	262.	259.	255.	249.
+				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08
ROUTED TO	RCWA10NW	.98	1	FLOW	300.	295.	288.	280.	278.	275.	273.	269.	262.
+				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT	WA11-C	.09	1	FLOW	51.	50.	48.	46.	45.	44.	44.	43.	42.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT	CWA11-C	1.06	1	FLOW	317.	312.	304.	296.	293.	290.	288.	284.	276.
+				TIME	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25
2 COMBINED AT	CCWA11-C	4.67	1	FLOW	567.	510.	420.	364.	355.	351.	348.	343.	334.
+				TIME	4.17	4.17	4.17	4.25	4.25	4.25	4.25	4.25	4.25
DIVERSION TO	DWASHRAN	4.67	1	FLOW	567.	510.	420.	364.	355.	351.	348.	343.	334.
+				TIME	4.17	4.17	4.17	4.25	4.25	4.25	4.25	4.25	4.25
HYDROGRAPH AT	DCCWA11-	4.67	1	FLOW	0.	0.	0.	0.	0.	0.	0.	0.	0.
+				TIME	.00	.00	.00	.00	.00	.00	.00	.00	.00

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

C. Off-site HEC-1 -100-Year

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   JAN 1997
*   VERSION 4.1
*
* RUN DATE 13JAN14 TIME 18:11:18
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*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSK- 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 ***

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1 ID RANCHO DRIVE CAPACITY IMPROVEMENTS--DECATUR TO BONANZA
2 ID
3 ID IDINPUT FILE = OFFSITE.DAT
4 ID INPUT FILE DATE = Jan 10, 2014 BY PB
5 ID ORIGINAL INPUT FILE USED = ENW310.DAT MODELED BY PBS&J
6 ID FROM CLV CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN 2003 (CNFCMP)
7 ID CENTRAL BASIN (NORTHWEST AREA)
8 ID DESIGN STORM = 100-YEAR 6-HR STORM
9 ID STORM DISTRIBUTION = SDN #3
10 ID
11 ID REFERENCED HYDROLOGIC MODELS IN THE ORIGINAL INPUT FILE:
12 ID CLV CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN 2003
13 ID CITY OF LAS VEGAS CITY WIDE HYDROLOGY (CWH) ANALYSIS (PBS&J 1997)
14 ID RANCHO DRIVE DRAINAGE IMPROVEMENTS PEAK DRIVE TO LAKE MEAD BOULEVARD
15 ID (MONTGOMERY WATSON 2000)
16 ID CCRFCD 2002 LAS VEGAS VALLEY MASTER PLAN UPDATE (PBS&J, GCW, LBG)
17 ID
18 ID REFERENCED MPU FACILITY FLOWS BY PB:
19 ID FROM CLV VEGAS DRIVE IMPROVEMENTS - 72INCH RCP
20 ID FROM CLV WASHINGTON AVENUE STORM DRAIN - 5'X 5' RCB
21 ID
22 ID
23 ID NO STORM CENTERING
24 ID COMPOSITE CURVE NUMBERS
25 ID 2002 MPU SUBBASINS USED FOR OFFSITE AREAS EXCEPT WHERE SPECIFIED
26 ID
27 ID NOTE: LOCATIONS AND DESCRIPTIONS OF PROPOSED MPU FACILITIES ARE STATED IN
28 ID THE MODEL. HOWEVER, ROUTINGS IN THESE LOCATIONS REFLECT THE EXISTING
29 ID CONDITION.
30 ID
31 ID JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
32 ID
33 ID CONCENTRATION AREA DARF
34 ID POINT SQ. MI.
35 ID 0-0.5 0.990
36 ID 0.5-1 0.975
37 ID 1-2 0.950
38 ID 2-3 0.925
39 ID 3-4 0.915
40 ID 4-5 0.908
41 ID 5-6 0.903

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42 ID 6-7 0.895
 43 ID 7-8 0.885
 44 ID
 45 ID
 46 ID
 47 ID JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
 48 ID
 49 ID 100-YEAR, 6-HOUR STORM, SDN3
 50 ID
 51 IT 5 0 0 300
 52 IO 5 0 0
 53 IN 5 0 0

HEC-1 INPUT

PAGE 2

LINE	ID	1	2	3	4	5	6	7	8	9	10
54	JR	PREC	0.990	0.975	0.950	0.925	0.915	0.908	0.903	0.895	0.885
	*										
55	KK	OG04-C									
56	BA	0.288									
57	PB	2.77									
58	PC	0.000	0.020	0.057	0.070	0.087	0.108	0.124	0.130	0.130	
59	PC	0.130	0.130	0.130	0.133	0.140	0.142	0.148	0.158	0.172	0.181
60	PC	0.190	0.197	0.199	0.200	0.201	0.204	0.214	0.229	0.241	0.249
61	PC	0.251	0.256	0.270	0.278	0.281	0.283	0.295	0.322	0.352	0.409
62	PC	0.499	0.590	0.710	0.744	0.781	0.812	0.819	0.835	0.851	0.856
63	PC	0.860	0.868	0.876	0.888	0.910	0.926	0.937	0.950	0.970	0.976
64	PC	0.982	0.985	0.987	0.989	0.990	0.993	0.993	0.994	0.995	0.998
65	PC	0.997	0.999	1.000							
66	LS	0	90.3								
67	UD	0.320									
	*										
68	KK	DOG04-C									
69	KM	FLOW SPLIT TO PD01-C									
70	KM	OKG289, 270, 264, AND 262									
71	KM	COMBINED CAPACITY = 124 CFS									
72	DT	DPD01									
73	DI	0	51	125	500	1000					
74	DQ	0	50	124	124	124					
	*										
75	KK	RD0G04-C									
76	KM	ROUTE DOG04-C TO COG05-C									
77	KM	US95 TO RANCHO									
78	RD	4100	0.0007	0.016	0	TRAP	0	50			
	*										
79	KK	OG05-C									
80	BA	0.266									
81	PB	2.77									
82	LS	0	90.5								
83	UD	0.392									
	*										
84	KK	COG05-C									
85	KM	COMBINE RDOG04-C AND OG05-C									
86	KM	RAINBOW AND CHEYENNE									
87	HC	2									
	*										
88	KK	RCOG05-C									
89	KM	ROUTE RCOG05-C TO CCY06B-C									
90	KM	CHEYENNE									
91	RD	7500	0.0097	0.016	0	TRAP	0	50			
	*										

HEC-1 INPUT

PAGE 3

LINE	ID	1	2	3	4	5	6	7	8	9	10
92	KK	CY06B-C									
93	BA	0.498									
94	PB	2.77									
95	LS	0	86.5								
96	UD	0.697									
	*										
97	KK	CCY06B-C									
98	KM	COMBINE RCOG05-C AND CY06B-C									

99 KM MICHAEL AND CHEYENNE
 100 HC 2
 *
 101 KK RCCY06B
 102 KM ROUTE CCY06B TO CRGOWAN
 103 KM CHEYENNE
 104 RD 1400 0.01 0.016 0 TRAP 0 50
 * *****
 * FLOW SPLIT FROM GOWAN WATERSHED
 * *****
 *
 *

105 KK PDGCD-C
 106 BA 0.441
 107 PB 2.77
 108 LS 0 80.3
 109 UD 0.544
 *

110 KKRPDGCDC
 111 KM ROUTE PDGCD-C TO RRPDGCDC
 112 KM FROM CWH
 113 RD 3080 0.0065 0.03 0 TRAP 30 2
 *

114 KK RRPDGCDC
 115 KM ROUTE RPDGCD-C TO CPDGCBC10
 116 KM LINING = CONCRETE
 117 KM FROM CWH
 118 RD 1610 0.0062 0.015 0 TRAP 8 2
 *

119 KK NW29B-C
 120 BA 0.286
 121 PB 2.80
 122 LS 0 80.5
 123 UD 0.405
 *

HEC-1 INPUT

PAGE 4

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

124 KKRNW29B-C
 125 KM ROUTE NW29B-C TO CNW1C2
 126 KM ANN ROAD
 127 RD 4500 0.0122 0.016 0 TRAP 0 50
 *

128 KK NW1C2-C
 129 BA 0.207
 130 PB 2.77
 131 LS 0 88.7
 132 UD 0.411
 *

133 KK CNW1C2
 134 KM COMBINE RNW29B-C AND NW1C2-C
 135 KM ANN ROAD AND RANCHO
 136 HC 2
 *
 *

137 KK RCNW1C2
 138 KM ROUTE CNW1C2 TO CPDGCBC10
 139 KM RANCHO
 140 RD 2300 0.0087 0.016 0 TRAP 0 50
 *

141 KKPDGCB10-C
 142 BA 0.308
 143 PB 2.77
 144 LS 0 83.8
 145 UD 0.416
 *

146 KKCPDGCBC10
 147 KM COMBINE PDGCB10-C AND RCNW1C2
 148 KM NEAR US95 AND RANCHO INTERSECTION

149 HC 2
 *
 150 KKCPDGCBI0
 151 KM FLOW SPLIT ACROSS RANCHO TO PT3AA1
 152 KM 10'X 3' RCB (139 CFS) CULVERT 3
 153 KM FROM U.S. 95 / RANCHO FIS
 154 KM D95A
 155 DTDPT3AA11
 156 DI 0 51 101 118 140 318 10000
 157 DQ 0 50 100 117 139 139 139
 *

HEC-1 INPUT

PAGE 5

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

158 KKCPDGCBI0
 159 KM COMBINE RRPDGCBI AND DPGCB10
 160 KM NEAR US95 AND RANCHO INTERSECTION
 161 HC 2
 *
 162 KK RCPDGCBI
 163 KM ROUTE DCPDGCBI TO CGD20BEC
 164 KM LOCAL FACILITY ALONG U.S. 95
 165 RD 1750 0.0029 0.025 0 TRAP 20 2
 *
 166 KKGD20BE-C
 167 BA 0.427
 168 PB 2.77
 169 LS 0 83.4
 170 UD 0.467
 *
 171 KKCGD20BEC
 172 KM COMBINE GD20BE-C AND RCPDGCBI
 173 KM COMBINATION OF US 95 AND LONE MOUNTAIN
 174 HC 2
 *
 175 KKRCGD20BE
 176 KM ROUTE CGD20BEC TO CGD20BMC
 177 KM NEWLY PROPOSED REGIONAL FACILITY
 178 KM FACILITY = GOWAN OUTFALL - ALEXANDER ROAD FACILITY
 179 KM FACILITY # = GOAL 0247
 180 KM LINING = CONCRETE
 181 RD 2640 0.003 0.02 0 TRAP 20 5
 *
 182 KKGD20BM-C
 183 BA 0.343
 184 PB 2.77
 185 LS 0 89.4
 186 UD 0.456
 *
 187 KKCGD20BMC
 188 KM COMBINE GD20BM-C AND RCGD20BE
 189 KM US 95 AND CRAIG ROAD
 190 HC 2
 *
 191 KKRCGD20BM
 192 KM ROUTE CGD20BMC TO CGD17BG
 193 KM NEWLY PROPOSED REGIONAL FACILITY
 194 KM FACILITY = GOWAN OUTFALL - ALEXANDER ROAD FACILITY
 195 KM FACILITY # = GOAL 0168
 196 KM LINING = RCB
 197 RD 2640 0.003 0.02 0 TRAP 20 5
 *

HEC-1 INPUT

PAGE 6

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

198 KKGD17BG-C
 199 BA 0.364
 200 PB 2.77
 201 LS 0 87.7

202 UD 0.478
 *
 203 KK CGD17BG
 204 KM COMBINE GD11B-C AND GD17BG-C
 205 KM LONE MOUNTAIN AND US 95
 206 HC 2
 *
 207 KK RGD17BG
 208 KM ROUTE CGD17BG TO CGD11B-C
 209 KM FACILITY = GOWAN OUTFALL - U.S. 95 CHANNEL
 210 KM FACILITY # = GO95 0000
 211 KM LINING = CONCRETE
 212 RD 2640 0.003 0.02 0 TRAP 20 5
 *
 213 KK GD11B-C
 214 BA 0.262
 215 PB 2.77
 216 LS 0 90.6
 217 UD 0.278
 *
 218 KKCGD11B-C
 219 KM COMBINE GD11B-C AND RGD17BG
 220 KM GOWAN AND US 95
 221 HC 2
 *
 222 KK RCGD11B
 223 KM ROUTE CGD11B-C TO CPT6B-C
 224 KM FACILITY = GOWAN OUTFALL FACILITIES
 225 KM FACILITY # = GOOF 0511
 226 KM LINING = RCB
 227 RD 8500 0.005 0.015 0 TRAP 8 0
 *
 228 KK PT6B-C
 229 BA 0.454
 230 PB 2.77
 231 LS 0 86.1
 232 UD 0.756
 *

1

HEC-1 INPUT

PAGE 7

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
233	KK CPT6B-C
234	KM COMBINE PT6B-C AND RCGD11B
235	KM GOWAN AND US 95
236	HC 2 *
237	KKDPT6B-C1
238	KM FLOW SPLIT TO GOWAN OUTFALL
239	KM DGOW1A
240	KM FROM CWH
241	DT DGOW1A
242	DI 0 31 51 71 101 301 561 600 3000 5000
243	DQ 0 30 50 70 100 300 560 560 560 560 *
244	KKDPT6B-C2
245	KM FLOW SPLIT TO TRILOGY CHANNEL
246	KM DTRILGY
247	KM FROM CWH
248	DT DTRILGY
249	DI 0 31 91 202 349 625 1214 1944 2801
250	DQ 0 3 33 55 95 173 267 374 491 *
251	KK PT2B2-C
252	BA 0.299
253	PB 2.77
254	LS 0 92.2
255	UD 0.417 *
256	KK RCPT2B2

257 KM ROUTE CPT2B2 TO CPT41-C
 258 KM NEWLY PROPOSED REGIONAL FACILITY
 259 KM FACILITY = GOWAN OUTFALL - ALEXANDER ROAD FACILITY
 260 KM FACILITY # = GOAL 0111
 261 KM LINING = RCB
 262 RD 3000 0.0083 0.015 0 TRAP 10 0
 *

263 KK PT3-C
 264 BA 0.172
 265 PB 2.77
 266 LS 0 89.5
 267 UD 0.372
 *

268 KK RCPT3-C
 269 KM ROUTE CPT3B-C TO CPT41-C
 270 KM ALEXANDER
 271 RD 5500 0.0081 0.016 0 TRAP 0 50
 *

1

HEC-1 INPUT

PAGE 8

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

272 KK PT41-C
 273 BA 0.436
 274 PB 2.77
 275 LS 0 88.6
 276 UD 0.424
 *

277 KK CPT41-C
 278 KM COMBINE RCPT2B2, RCPT3-C AND PT41-C
 279 KM ALEXANDER AND RANCHO
 280 HC 3
 *

281 KKRCPT41-C
 282 KM ROUTE CPT41-C TO CPT5A20C
 283 KM NEWLY PROPOSED REGIONAL FACILITY
 284 KM FACILITY = GOWAN OUTFALL - ALEXANDER ROAD FACILITY
 285 KM FACILITY # = GOAL 0100
 286 KM LINING = RCB
 287 RD 600 0.003 0.015 0 TRAP 12 0
 *

288 KK PT5A2-C
 289 BA 0.341
 290 PB 2.77
 291 LS 0 86.7
 292 UD 0.644
 *

293 KKRCPT5A2-C
 294 KM COMBINE PT5A2-C AND RCPT41-C
 295 KM ALEXANDER AND RANCHO
 296 HC 2
 *

297 KK RCPT5A2
 298 KM ROUTE CPT5A2-C TO CPT5B6
 299 KM FACILITY = GOWAN OUTFALL - ALEXANDER ROAD FACILITY
 300 KM FACILITY # = GOAL 0000
 301 KM LINING = RCB
 302 RD 5280 0.01 0.015 0 TRAP 10 0
 *

303 KKCCPT6B-C
 304 KM COMBINE CPT6B-C AND RCPT5A2
 305 KM GOWAN AND US 95
 306 HC 2
 *

1

HEC-1 INPUT

PAGE 9

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

307 KK DRANCHO
 308 KM FLOW SPLIT TO GOWAN OUTFALL
 309 KM DGOWAN

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310      KM FROM CWH
311      DT DGOWAN
312      DI      0      51      101      301      501      600      800      1500      2000      5000
313      DQ      0      1      1      1      1      100      300      1000      1500      4500
      *

314      KK RDRANCH
315      KM ROUTE DRANCHO TO CCY07B
316      KM RANCHO
317      RD      1300      0.004      0.016      0      TRAP      0      50
      *

318      KK DTRILGY
319      KM RETRIEVE DTRILGY
320      DR DTRILGY
      *

321      KK CY07B
322      BA      0.203
323      PB      2.77
324      LS      0      89.1
325      UD      0.461
      *

326      KK CCY07B
327      KM COMBINE DRANCHO, DTRILGY AND CY07B
328      KM GOWAN AND RANCHO
329      HC      3
      *

330      KK DCY07B
331      KM FLOW SPLIT TO CENTRAL BASIN
332      KM DIVERT FLOW EAST IN RAN 190
333      KM OPPOSITE OF D9RCHO
334      KM FROM CWH
335      DT DCENT1
336      DI      0      19      73      100      1000      2000
337      DQ      0      1      1      28      928      1928
      *

338      KK DGOWAN
339      KM RETRIEVE DGOWAN
340      DR DGOWAN
      *

341      KK RDGOWAN
342      KM ROUTE DGOWAN TO CCCY08-C
343      KM GOWAN
344      RD      3300      0.006      0.016      0      TRAP      0      50
      *

345      KK DGOW1A
346      KM RETRIEVE DGOW1A
347      DR DGOW1A
      *

348      KK RDGOW1A
349      KM ROUTE PT6B-C TO CCCY08-C
350      KM FACILITY = GOWAN OUTFALL FACILITIES
351      KM FACILITY # = GOOF 0486
352      KM LINING = RCB
353      RD      3300      0.006      0.015      0      TRAP      8      0
      *

354      KKCCPT6B-C
355      KM COMBINE RCPT6B-C AND RDGOW1A
356      KM GOWAN AND DECATUR
357      HC      2
      *

358      KK CY08-C
359      BA      0.094
360      PB      2.77
361      LS      0      88.6
362      UD      0.306
      *

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1

HEC-1 INPUT

PAGE 10

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

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363 KK CCY08-C
364 KM COMBINE CY08-C, CCPT6B-C, AND DCY07B
365 KM GOWAN AND DECATUR
366 HC 3
*

367 KK DGOW2A
368 KM DIVERT FLOW TO GOWAN OUTFALL (GOOF 0511) AT RANCHO
369 KM DIVERSION BASED ON GOWAN ROAD DRAINAGE STUDY BY FOGGEMEYER
370 KM 8'X 5' RCB, CAPACITY = 630 CFS
371 KM REMAINING FLOW CONTINUES EAST IN GOWAN RD. AND ENTERS THE CENTRAL BASIN
372 KM OPPOSITE OF DGOW2A IN CWH
373 DTDCENTRAL
374 DI 0 31 51 71 101 301 601 631 3000 5000
375 DQ 0 1 1 1 1 1 1 1 2370 4370
*

376 KK D3ALL
377 KM DIVERT OUT ALL FLOW TO GOWAN OUTFALL (GOOF 0511) AT RANCHO
378 DT D3ALL
379 DI 0 100 500 1000 5000
380 DQ 0 100 500 1000 5000
*
* *****
* END OF IMPORT FROM GOWAN WATERSHED
* *****
*

1 HEC-1 INPUT PAGE 11

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

381 KK DCENT1
382 KM RETRIEVE DCENT1
383 DR DCENT1
*

384 KK RDCENT1
385 KM ROUTE DCENT1
386 KM RANCHO
* KO 1 1 21
387 RD 2100 0.0076 0.016 0 TRAP 0 50
*

388 KK CRGOWAN
389 KM COMBINE RDCENT1, D3ALL, AND RCCY06B
390 KM RANCHO AND CHEYENNE
391 HC 3
*

392 KKRCRGOWAN
393 KM ROUTE CRGOWAN TO CPD05A-C
394 KM RANCHO
395 RD 1700 0.0088 0.016 0 TRAP 0 50
*

396 KK PD05A-C
397 BA 0.136
398 PB 2.77
399 LS 0 93.1
400 UD 0.406
*

401 KKCPD05A-C
402 KM COMBINE PD05A-C AND RCRGOWAN
403 KM RANCHO AND DECATUR
404 HC 2
*

405 KK DCPD05A
406 KM FLOW SPLIT TO PD04B-C
407 KM OPPOSITE OF DA2 FLOW SPLIT IN CWH
408 KM CAPACITY RAN 170 = 210 CFS
409 KM DIVERTED FLOW GOES DOWN WEST SIDE OF RANCHO
410 DT DA1-C
411 DI 0 51 101 211 500 1000 5000
412 DQ 0 51 101 211 211 211 211
*

413 KK RCPD05
414 KM ROUTE CPD05A-C TO CPD04B-C

```

415 KM RANCHO
416 RD 1500 0.006 0.016 0 TRAP 0 50
*

HEC-1 INPUT

PAGE 12

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

417 KK DPD01
418 KM RETRIEVE DPD01
419 DR DPD01
*

420 KK RDPD01
421 KM ROUTE DPD01 TO CPD01-C
422 KM PEAK DRIVE
423 RD 3500 0.0103 0.016 0 TRAP 0 50
*

424 KK PD01-C
425 BA 0.377
426 PB 2.77
427 LS 0 83.8
428 UD 0.436
*

429 KK CPD01-C
430 KM COMBINE RDPD01 AND PD01-C
431 KM TORREY PINES AND PEAK DRIVE
432 HC 2
*

433 KK RCPD01
434 KM ROUTE CPD01-C TO CCY04A-C
435 KM FACILITY = PEAK DRIVE SYSTEM
436 KM FACILITY # = LVPK 0106
437 KM LINING = RCB
438 RD 2600 0.00542 0.015 0 TRAP 8 0
*

439 KK CY04A-C
440 BA 0.457
441 PB 2.77
442 LS 0 86.8
443 UD 0.489
*

444 KKCCY04A-C
445 KM COMBINE RCPD01 AND CY04A-C
446 KM JONES AND PEAK DRIVE
447 HC 2
*

448 KK DCY04C
449 KM DIVERT FLOW TO EXISTING REGIONAL FACILITY LVSR 0500
450 KM FROM CWH
451 KM CAPACITY LVSR 0500 = 231 CFS
452 DT DLVSR1
453 DI 0 51 101 232 500 1000 5000
454 DQ 0 50 100 231 231 231 231
*

HEC-1 INPUT

PAGE 13

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

455 KK RCCY04A
456 KM ROUTE CCY04A TO CPD04B-C
457 KM FACILITY = LAS VEGAS WASH - PEAK DRIVE
458 KM FACILITY # = LVPK 0000,0019,0058, 0104
459 KM LINING = RCB
460 RD 5730 0.01 0.015 0 TRAP 9 0
*

461 KK PD04B-C
462 BA 0.468
463 PB 2.77
464 LS 0 87.8
465 UD 0.539
*

466 KKCPD04B-C
 467 KM COMBINE RCCY04A AND PD04B-C
 468 KM RANCHO AND PEAK DRIVE
 469 HC 2
 *
 470 KKCCPD04B-C
 471 KM COMBINE RCPD05 AND CPD04B-C
 472 KM RANCHO AND PEAK DRIVE
 473 HC 2
 *
 474 KK RCPD04B
 475 KM ROUTE CCPD04B-C TO CSR05B
 476 KM FACILITY = LAS VEGAS WASH - RANCHO
 477 KM FACILITY # = LVRA 0012
 478 KM LINING = RCB
 479 RD 3300 0.0058 0.015 0 TRAP 12 0
 *
 480 KK OG03-C
 481 BA 0.325
 482 PB 2.77
 483 LS 0 87.0
 484 UD 0.389
 *
 485 KK ROG03-C
 486 KM ROUTE OG03-C TO SR00A-C
 487 KM SMOKE RANCH
 488 RD 3400 0.0121 0.016 0 TRAP 0 50
 *
 489 KK OG02-C
 490 BA 0.318
 491 PB 2.77
 492 LS 0 90.2
 493 UD 0.351
 *

HEC-1 INPUT

PAGE 14

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

494 KK ROG02-C
 495 KM ROUTE OG02-C TO CLM01-C
 496 KM LAKE MEAD BOULEVARD
 497 RD 3400 0.0129 0.016 0 TRAP 0 50
 *
 498 KK LM01-C
 499 BA 0.327
 500 PB 2.77
 501 LS 0 81.8
 502 UD 0.405
 *
 503 KK CLM01-C
 504 KM COMBINE ROG02-C AND LM01-C
 505 KM TORREY PINES AND LAKE MEAD
 506 HC 2
 *
 507 KK SR01E
 508 KM DIVERSION AT LAKE MEAD AND TORREY PINES
 509 KM SPLIT FLOW TO TORREY PINES
 510 KM FROM CWH
 511 KM REMAINING FLOW IN LAKE MEAD RETRIEVED LATER IN MODEL WHEN NEEDED
 512 DT DSR01F
 513 DI 0 41 73 172 572 1072 5000
 514 DQ 0 40 72 132 371 671 3067
 *
 515 KKRCIM01-C
 516 KM ROUTE OG02-C TO CLM01-C
 517 KM FACILITY = LAS VEGAS WASH - SMOKE RANCH
 518 KM FACILITY # = LVSR 0546
 519 KM LINING = RCB
 520 RD 2640 0.0057 0.015 0 TRAP 8 0
 *

521 KK SR00A-C
 522 BA 0.367
 523 PB 2.77
 524 LS 0 84.1
 525 UD 0.446
 *

526 KK CSR00A
 527 KM COMBINE RCLM01-C AND SR00A-C
 528 KM TORREY PINES AND SMOKE RANCH
 529 HC 2
 *

HEC-1 INPUT

PAGE 15

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

530 KK CCSR00A
 531 KM COMBINE ROG03-C AND CSR00A
 532 KM TORREY PINES AND SMOKE RANCH
 533 HC 2
 *

534 KK RCSR00A
 535 KM ROUTE CSR00A TO CSR02E
 536 KM FACILITY = LAS VEGAS WASH - SMOKE RANCH
 537 KM FACILITY # = LVSR 0496
 538 KM LINING = RCB
 539 RD 2600 0.0127 0.015 0 TRAP 10 0
 *

540 KK DLVSR1
 541 KM RETRIEVE DLVSR1
 542 DR DLVSR1
 *

543 KK RDLVSR1
 544 KM ROUTE DLVSR1 TO CSR02E
 545 KM FACILITY = LAS VEGAS WASH - SMOKE RANCH
 546 KM FACILITY # = LVSR 0500
 547 KM LINING = RCP
 548 RD 2770 0.0054 0.013 0 CIRC 5
 *

549 KK SR02E-C
 550 BA 0.302
 551 PB 2.77
 552 LS 0 86.1
 553 UD 0.374
 *

554 KK CSR02E
 555 KM COMBINE SR02E-C, RDLVSR1, AND RCSR00A
 556 KM JONES AND SMOKE RANCH
 557 HC 3
 *

558 KK RCSR02E
 559 KM ROUTE CSR02E TO CSR05D
 560 KM FACILITY = LAS VEGAS WASH - SMOKE RANCH
 561 KM FACILITY # = LVSR 0396,0446
 562 KM LINING = RCB
 563 RD 5280 0.0106 0.015 0 TRAP 10 0
 *

564 KK SR05D-C
 565 BA 0.303
 566 PB 2.77
 567 LS 0 89.7
 568 UD 0.533
 *

HEC-1 INPUT

PAGE 16

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

569 KK CSR05D
 570 KM COMBINE RCSR02E AND SR05D-C
 571 KM SMOKE RANCH AND DECATUR
 572 HC 2
 *

573 KK RCSR05D
 574 KM ROUTE CSR05D TO CSR05B
 575 KM FACILITY = LAS VEGAS WASH - SMOKE RANCH
 576 KM FACILITY # = LVSR 0359
 577 KM LINING = RCB
 578 RD 2000 0.0075 0.015 0 TRAP 10 0
 *

579 KK SR05B-C
 580 BA 0.357
 581 PB 2.77
 582 LS 0 89.2
 583 UD 0.664
 *

584 KK CSR05B
 585 KM COMBINE RCSR05D AND SR05B-C
 586 KM SMOKE RANCH AND RANCHO
 587 HC 2
 *

588 KK DCSR05B
 589 KM DIVERT FLOW IN EXISTING LVSR 0359 (LVSR 0360 IN CWH)
 590 KM CAPACITY = 231 CFS
 591 DT DLVSR2
 592 DI 0 231 5000
 593 DQ 0 231 231
 *

594 KKDDCSR05B
 595 KM DIVERT FLOW INTO DROP INLETS FOR LVSR 0273 STUB OUT
 596 KM CAPACITY = 182 CFS (109 CFS NORTH, 73 CFS SOUTH)
 597 DT DLVSR3
 598 DI 0 182 5000
 599 DQ 0 182 182
 *

600 KKD3CSR05B
 601 KM DIVERT FLOW INTO EXISTING CHANNEL SOUTH OF RANCHO
 602 KM D3SR07 IN CWH
 603 KM CAPACITY = 670 CFS
 604 DT DLVRA
 605 DI 0 50 100 200 400 600 670 1000 5000
 606 DQ 0 50 100 200 400 600 670 670 670
 *

HEC-1 INPUT

PAGE 17

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

607 KKD4CSR05B
 608 KM SPLIT FLOW 50% IN RANCHO. 50% IN CAREY
 609 KM SPLIT TO RANCHO
 610 KM OPPOSITE OF D4SR07 IN CWH
 611 DT DRAN
 612 DI 0 50 100 300 500 1000 2500 5000
 613 DQ 0 25 50 150 250 500 1250 2500
 *

614 KK DSR05B
 615 KM DIVERT OUT STREET FLOW ALL FLOW TO BE BROUGHT IN LATER IN MODEL
 616 DT DSMOKE
 617 DI 0 1000 5000
 618 DQ 0 1000 5000
 *

619 KK DLVSR3
 620 KM RETRIEVE FLOW IN LVSR
 621 DR DLVSR3
 *

622 KK CCSR05B
 623 KM COMBINE RPD04B, LVSR3 AND DSR05B (ZERO FLOW)
 624 KM SMOKE RANCH AND RANCHO
 625 HC 3
 *

626 KKDCCSR05B
 627 KM DIVERT OUT ALL FLOW IN LVSR FACILITY
 628 DT DLVSR4

629 DI 0 1000 5000
 630 DQ 0 1000 5000
 *
 * NO BYPASS FLOW ON RANCHO - END OF SEG 1 (NORTH OF SMOKE RANCH)
 *
 * ONSITE DRAINAGE DICTATE FLOW RATE - FROM SMOKE RANCH TO LAKE MEAD
 *

631 KK DSR01F
 632 KM RETRIEVE DSR01F
 633 DR DSR01F
 *

634 KK RDSR01F
 635 KM ROUTE DSR01F TO CLM02-C
 636 KM FACILITY = LAS VEGAS WASH - LAKE MEAD
 637 KM FACILITY # = LVLM 0475
 638 KM LINING = RCP
 639 RD 2632 0.0124 0.013 0 CIRC 4
 *

HEC-1 INPUT

PAGE 18

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

640 KK LM02-C
 641 BA 0.293
 642 PB 2.77
 643 LS 0 85.0
 644 UD 0.367
 *

645 KK CLM02-C
 646 KM COMBINE LM02-C AND RDSR01F
 647 KM
 648 HC 2
 *

649 KK RCLM02-C
 650 KM ROUTE CLM02-C TO CLM03-C
 651 KM FACILITY = LAS VEGAS WASH - LAKE MEAD
 652 KM FACILITY # = LVLM 0442,0453,0460
 653 KM LINING = RCP
 654 RD 2800 0.0139 0.013 0 CIRC 5
 *

655 KK LM03-C
 656 BA 0.336
 657 PB 2.77
 658 LS 0 90.5
 659 UD 0.378
 *

660 KK CLM03-C
 661 KM COMBINE RCLM02-C AND LM03-C
 662 KM MICHAEL AND LAKE MEAD
 663 HC 2
 *

664 KK RCLM03-C
 665 KM ROUTE CLM03-C TO CLM05-C
 666 KM FACILITY = LAS VEGAS WASH - LAKE MEAD
 667 KM FACILITY # = LVLM 0388,0399,0416
 668 KM LINING = RCP
 669 RD 2600 0.0115 0.013 0 CIRC 6
 *

670 KK LM05-C
 671 BA 0.365
 672 PB 2.77
 673 LS 0 88.1
 674 UD 0.387
 *

HEC-1 INPUT

PAGE 19

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

675 KK CLM05-C
 676 KM COMBINE RCLM03-C AND LM05-C
 677 KM DECATUR AND LAKE MEAD

```

678      HC      2
      *

679      KKRCIM05-C
680      KM ROUTE CLM05-C TO CLM06-C
681      KM FACILITY = LAS VEGAS WASH - LAKE MEAD
682      KM FACILITY # = LVLN 0337,0356
683      KM LINING = RCP
684      RD      3300  0.0061  0.015      0      CIRC      7      0
      *

685      KK LM06B-C
686      BA      0.354
687      PB      2.77
688      LS      0      89.5
689      UD      0.468
      *

690      KK CLM06-C
691      KM COMBINE RCLM05-C AND LM06B-C
692      KM RANCHO AND LAKE MEAD
693      HC      2
      *

694      KK DLVLMRA
695      KM SAME AS DLVLMRA FROM CWH
696      KM FLOW IS DIVERTED TO EXISTING REGIONAL FACILITY LVLN 0270
697      KM 90" RCP CAPACITY = 940 CFS
698      KM 940 CFS IS DIVERTED
699      DT DLVLM4
700      DI      0      50      100      400      600      700      800      940      1000      5000
701      DQ      0      50      100      400      600      700      800      940      940      940
      *

702      KK DSURF1
703      KM SAME AS DSURF1 FROM CWH
704      KM 33% DIVERTED TO VALLEY DRIVE TO LAKE MEAD
705      KM REMAINING IN LAKE MEAD
706      DT DVALDR
707      DI      0      30      90      150      300      600      1200      1800      3000      6000
708      DQ      0      10      30      50      100      200      400      600      1000      2000
      *

709      KK DLVRA
710      KM RETRIEVE DLVRA
711      DR DLVRA
      *

1
                                     HEC-1 INPUT
                                     PAGE 20

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

712      KK RDLVRA
713      KM ROUTE RDLVRA TO CLM06-C
714      KM EXISTING CHANNEL
715      RD      1200  0.01  0.02      0      TRAP      8      2
      *

716      KK DRAN
717      KM RETRIEVE DRAN
718      DR DRAN
      *

719      KK RDRAN
720      KM ROUTE RDLVRA TO CLM06-C
721      KM RANCHO
722      RD      1200  0.01  0.02      0      TRAP      0      50
      *

723      KK DLVLM4
724      KM RETRIEVE DLVLM4
725      DR DLVLM4
      *

726      KKCCLM06-C
727      KM COMBINE CLM06-C, DLVLM4, RDRAN, AND RDLVRA
728      KM RANCHO AND LAKE MEAD
729      HC      4
      *

730      KK DLVLMRA

```

731 KM SAME AS DLVLMRA FROM CWH
 732 KM REPEAT DIVERSION TO LVLN SYSTEM SINCE THERE IS CAPACITY IN PIPE FOR 10-YEAR
 733 KM FLOW IS DIVERTED TO EXISTING REGIONAL FACILITY LVLN 0270
 734 KM 90" RCP CAPACITY = 940 CFS
 735 KM 940 CFS IS DIVERTED
 736 DT DLVLM5
 737 DI 0 50 100 400 600 700 800 940 1000 5000
 738 DQ 0 50 100 400 600 700 800 940 940 940
 *

739 KK DSURF2
 740 KM SAME AS DSURF2 FROM CWH
 741 KM DIVERT 30% OR REMAINING FLOW TO LAKE MEAD
 742 KM REMAINING IN RANCHO
 743 DT DLAKEM
 744 DI 0 30 90 150 300 600 1200 1800 3000 6000
 745 DQ 0 10 30 50 100 200 400 600 1000 2000
 *

746 KK D1LM09
 747 KM SAME AS D1LM09 FROM CWH
 748 KM FLOW IS DIVERTED ACROSS RANCHO IN RAN 119
 749 KM 6' X 3' RCB CAPACITY = 168 CFS
 750 KM CAPACITY BASED ON INLET CONTROL NOMOGRAPH
 751 KM THE REMAINING FLOW CONTINUES SOUTHEAST ALONG RANCHO
 HEC-1 INPUT

PAGE 21

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

752 DT DRAN119
 753 DI 0 50 100 168 500 1000 5000
 754 DQ 0 50 100 168 168 168 168
 *

755 KK D2LM09
 756 KM SAME AS D2LM09 FROM CWH
 757 KM FLOW IS DIVERTED ACROSS RANCHO IN RAN 118
 758 KM 6' X 3' RCB CAPACITY = 168 CFS
 759 KM CAPACITY BASED ON INLET CONTROL NOMOGRAPH
 760 KM THE REMAINING FLOW CONTINUES SOUTHEAST ALONG RANCHO
 761 DT DRAN118
 762 DI 0 50 100 168 500 1000 5000
 763 DQ 0 50 100 168 168 168 168
 *

764 KK RD2LM09
 765 KM ROUTE D2LM09 TO CLM09
 766 KM RANCHO
 767 RD 800 0.01 0.016 0 TRAP 0 50
 *

768 KK DVALDR
 769 KM RETRIEVE DVALDR
 770 DR DVALDR
 *
 * UNSTABLE ROUTING REMOVED
 * KK RDVALDR
 * KM ROUTE DVALDR TO CLM09
 * KM VALLEY DRIVE
 * RD 2900 0.0086 0.016 0 TRAP 0 50
 *

771 KK LM09
 772 BA 0.123
 773 PB 2.77
 774 LS 0 92.6
 775 UD 0.212
 *

776 KK CLM09
 777 KM COMBINE RDVALDR, RD2LM09, AND LM09
 778 KM RANCHO AND CORAN
 779 HC 3
 *

780 KK D3LM09
 781 KM SAME AS D3LM09 FROM CWH
 782 KM FLOW IS DIVERTED ACROSS RANCHO TO CORAN
 783 KM CAPACITY OF WEST HALF STREET OF RANCHO AT TOP OF MEDIAN WILL
 784 KM REMAIN AND CONTINUE SOUTHEAST IN RANCHO
 785 KM LOW FLOWS WILL REMAIN IN RANCHO AND FLOW SOUTHEAST

786	DT	DCORAN									
787	DI	0	51	201	300	400	500	600	800	1000	5000
788	DQ	0	0	0	50	100	150	200	400	600	4600
	*										

HEC-1 INPUT

PAGE 22

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

789	KK	RD3LM09									
790	KM	ROUTE D3LM09 TO CVG21									
791	KM	RANCHO									
792	RD	900	0.01	0.016	0	TRAP	0	50			
	*										

793	KK	VG21									
794	BA	0.098									
795	PB	2.77									
796	LS	0	88.1								
797	UD	0.201									
	*										

798	KK	CVG21									
799	KM	COMBINE RD3LM09 AND VG21									
800	KM	RANCHO AND CORAN									
801	HC	2									
	*										

802	KK	DVG21									
803	KM	SAME AS DVG21 FROM CWH									
804	KM	DIVERSION AT RANCHO AND HOLLY									
805	KM	FLOW IS DIVERTED ACROSS RANCHO TO HOLLY									
806	KM	REMAINING FLOW CONTINUES SOUTHEAST IN RANCHO TO VG20									
807	KM	LOW FLOWS WILL REMAIN IN RANCHO AND FLOW SOUTHEAST									
808	KM	MINIMUM OF 1 CFS WILL REMAIN TO AVOID ZERO FLOW									
809	DT	DHOLLY									
810	DI	0	51	201	300	400	500	600	800	1000	
811	DQ	0	0	0	100	200	300	350	450	550	
	*										

812	KK	LM08									
813	BA	0.056									
814	PB	2.77									
815	LS	0	91.3								
816	UD	0.158									
	*										

817	KK	RLM08									
818	KM	ROUTE LM08 TO CVG20									
819	RD	4100	0.011	0.016	0	TRAP	0	50			
	*										

820	KK	VG20									
821	BA	0.134									
822	PB	2.77									
823	LS	0	90.1								
824	UD	0.349									
	*										

HEC-1 INPUT

PAGE 23

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

825	KK	CVG20									
826	KM	COMBINE RLM08, DVG21 AND VG20									
827	KM	RANCHO AND HOLLY									
828	HC	3									
	*										

829	KK	RCVG20									
830	KM	ROUTE CVG20 TO CVG22									
831	KM	RANCHO									
832	RD	1500	0.0133	0.015	0	CIRC	7.5				
	*										

833	KK	VG22									
834	BA	0.176									
835	PB	2.77									
836	LS	0	90.9								
837	UD	0.412									
	*										

838 KK CVG22
 839 KM COMBINE RCVG20 AND VG22
 840 KM RANCHO AND VEGAS
 841 HC 2
 *
 842 KKOG011A-C
 843 BA 0.441
 844 PB 2.77
 845 LS 0 85.5
 846 UD 0.428
 *
 847 KK ROG011A
 848 KM ROUTE OG011A-C TO CVG02-C
 849 KM VEGAS DRIVE
 850 RD 3200 0.0172 0.015 0 TRAP 0 50
 *
 851 KK VG02-C
 852 BA 0.224
 853 PB 2.77
 854 LS 0 81.7
 855 UD 0.386
 *
 856 KK CVG02-C
 857 KM COMBINE ROG011A AND VG02-C
 858 KM TORREY PINES AND VEGAS DRIVE
 859 HC 2
 *

1

HEC-1 INPUT

PAGE 24

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

860 KK RCVG02
 861 KM ROUTE CVG02-C TO CVG03-C
 862 KM FACILITY = OWENS AVENUE SYSTEM
 863 KM FACILITY # = LVOW 0460
 864 KM LINING = RCB
 865 RD 2700 0.0148 0.015 0 TRAP 0 50
 *
 866 KK VG03-C
 867 BA 0.279
 868 PB 2.77
 869 LS 0 79.7
 870 UD 0.401
 *
 871 KK CVG03-C
 872 KM COMBINE RCVG02 AND VG03-C
 873 KM JONES AND VEGAS DRIVE
 874 HC 2
 *
 875 KK RCVG03
 876 KM ROUTE CVG03-C TO CVG04-C
 877 KM FACILITY = OWENS AVENUE SYSTEM
 878 KM FACILITY # = LVOW 0360
 879 KM LINING = RCB
 880 RD 2700 0.0148 0.016 0 TRAP 0 50
 *
 881 KK VG04-C
 882 BA 0.240
 883 PB 2.77
 884 LS 0 90.9
 885 UD 0.373
 *
 886 KK CVG04-C
 887 KM COMBINE RCVG03 AND VG04-C
 888 KM MICHAEL AND VEGAS DRIVE
 889 HC 2
 *
 890 KK RCVG04
 891 KM ROUTE CVG04 TO CWA08A

892 KM FACILITY = OWENS AVENUE SYSTEM
 893 KM FACILITY # = LVOW 0351
 894 KM LINING = RCB
 895 RD 2600 0.0135 0.016 0 TRAP 0 50
 *

HEC-1 INPUT

PAGE 25

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

896 KK WA08A
 897 BA 0.026
 898 PB 2.77
 899 LS 0 92.5
 900 UD 0.180
 *

901 KK CWA08A
 902 KM COMBINE WA08A AND RCVG04
 903 KM MICHAEL AND VEGAS DRIVE
 904 HC 2
 *

905 KK RCWA08A
 906 KM ROUTE CWA08A TO CVG06
 907 KM FACILITY = OWENS AVENUE SYSTEM
 908 KM FACILITY # = LVOW 0241
 909 KM LINING = RCB
 910 RD 4000 0.0138 0.016 0 TRAP 0 50
 *

911 KK VG06
 912 BA 0.186
 913 PB 2.77
 914 LS 0 87.5
 915 UD 0.280
 *

916 KK CVG06
 917 KM COMBINE RCWA08A AND VG06
 918 KM VALLEY VIEW AND VEGAS DRIVE
 919 HC 2
 *

920 KK RCVG06
 921 KM ROUTE CVG06 TO CCVG22
 922 KM VEGAS DRIVE
 923 RD 1900 0.0174 0.016 0 TRAP 0 50
 *

924 KK CCVG22
 925 KM COMBINE CVG22 AND RCVG06
 926 KM RANCHO AND VEGAS DRIVE
 927 HC 2
 *

928 KK DCCVG22
 929 KM FLOW SPLIT AT RANCHO AND VEGAS
 930 KM REVISED FROM CNFCMP BASED ON COMMENT FROM CLV
 931 KM 100-YEAR FLOW LISTED ON PLANS FOR VEGAS SYSTEM (LVOW 0146) = 605 CFS
 932 KM 100-YEAR SURFACE FLOW ON VEGAS TO EAST FROM PIMA FLOW SPLIT ANALYSIS = 286 CFS
 933 DT DVEG
 934 DI 0 200 400 891 1191 2000 2500
 935 DQ 0 200 400 891 891 891 891
 *

HEC-1 INPUT

PAGE 26

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

936 KKRDCCVG22
 937 KM ROUTE DCCVG22 SOUTH ALONG RANCHO
 938 RD 800 0.009 0.015 0 TRAP 8 0
 *

939 KK WA12
 940 BA 0.069
 941 PB 2.77
 942 LS 0 90.5
 943 UD 0.130
 *

944	KK	WA13		
945	BA	0.160		
946	PB	2.77		
947	LS	0	90.8	
948	UD	0.304		
	*			
949	KK	CWA13		
950	KM	COMBINE WA12 AND WA13		
951	KM	RANCHO AND WASHINGTON		
952	HC	2		
	*			
953	KK	CCWA13		
954	KM	COMBINE FLOW - DCCVG22 AND CWA13		
955	HC	2		
	*			
956	KK	WA14		
957	BA	0.043		
958	PB	2.77		
959	LS	0	90.7	
960	UD	0.202		
	*			
961	KK	CWA14		
962	KM	COMBINE FLOW FROM CCWA13 AND WA14		
963	HC	2		
	*			
964	KK	WA01-C		
965	BA	0.221		
966	PB	2.77		
967	LS	0	87.5	
968	UD	0.252		
	*			

1

HEC-1 INPUT

PAGE 27

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
969	KK RWA01
970	KM ROUTE WA01-C TO CWA04-C
971	KM WASHINGTON STREET
972	RD 5300 0.0151 0.016 0 TRAP 0 50
	*
973	KK WA04-C
974	BA 0.219
975	PB 2.77
976	LS 0 88.1
977	UD 0.473
	*
978	KK CWA04-C
979	KM COMBINE RWA01 AND WA04-C
980	KM MICHAEL AND WASHINGTON
981	HC 2
	*
982	KK RCWA04
983	KM ROUTE CWA04-C TO CWA09-C
984	KM FACILITY = FREEWAY CHANNEL
985	KM FACILITY # = LV15 0602
986	KM LINING = RCP
987	RD 5900 0.0144 0.016 0 TRAP 0 50
	*
988	KK WA09-C
989	BA 0.093
990	PB 2.77
991	LS 0 91.3
992	UD 0.363
	*
993	KK CWA09-C
994	KM COMBINE RCWA04 AND WA09-C
995	KM VALLEY VIEW AND WASHINGTON
996	HC 2
	*

997 KK RCWA09
998 KM ROUTE CWA09-C TO CWA10NW
999 KM FACILITY = FREEWAY CHANNEL
1000 KM FACILITY # = LV15 0602
1001 KM LINING = RCP
1002 RD 700 0.0083 0.016 0 TRAP 0 50
*

1003 KK WA10-C
1004 BA 0.446
1005 PB 2.77
1006 LS 0 91.4
1007 UD 0.358
*

HEC-1 INPUT

PAGE 28

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

1008 KK WA10D
1009 KM FLOW SPLIT TO SOUTHEAST CENTRAL BASIN
1010 KM OPPOSITE SPLIT OF WA10NW IN SOUTHEAST CENTRAL BASIN FLOW
1011 KM FROM LOUIS BERGER U.S. 95 WIDENING STUDY
1012 KM CAPACITY OF CHANNEL = 250 CFS IS DIVERTED
1013 KM EXCESS FLOW CONTINUES DOWN WASHINGTON
1014 DT WA10SE
1015 DI 0 10 250 275 300 800 1000 3000
1016 DQ 0 10 250 250 250 250 250 250
*

1017 KK CWA10NW
1018 KM COMBINE WA10D AND RCWA09
1019 KM VALLEY VIEW AND WASHINGTON
1020 HC 2
*

1021 KM ROUTE FLOW ON WASHINGTON
*

1022 KKRCWA10NW
1023 KM ROUTE CWA10NW TO CWA14
1024 KM FACILITY = FREEWAY CHANNEL
1025 KM FACILITY # = LV15 0528
1026 KM LINING = RCB
1027 RD 3900 0.0119 0.016 0 TRAP 0 50
*

1028 KK WA11-C
1029 BA 0.085
1030 PB 2.77
1031 LS 0 86.8
1032 UD 0.286
*

1033 KK CWA11-C
1034 KM COMBINE WA11-C AND RCWA10NW
1035 KM EAST OF VALLEY VIEW AND WASHINGTON
1036 HC 2
*

1037 KKCCWA11-C
1038 KM COMBINE CWA11-C AND CWA14
1039 KM SURFACE FLOW ON RANCHO AT RANCHO AND WASHINGTON
1040 HC 2
*

1041 KKDCCWA11-C
1042 KM FLOW SPLIT AT RANCHO AND WASHINGTON
1043 KM REVISED FROM CNFCMP BASED ON COMMENT FROM CLV
1044 KM Q100 FROM ATKINS 90% PLANS FOR WASHINGTON SYSTEM (LV15 0528) = 227 CFS
1045 KM Q100 FROM ATKINS 90% REPORT FOR RANCHO SYSTEM (LCRA 0050) = 420 CFS
1046 KM 100-YEAR SURFACE FLOW ON WASHINGTON AVENUE FROM PIMA FLOW SPLIT ANALYSIS = 133
1047 DTDWASHRAN
1048 DI 0 100 250 780 927 1027 1527

HEC-1 INPUT

PAGE 29

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

1049 DQ 0 100 250 780 780 780 780
1050 ZZ

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
55	OG04-C	
	.	
72	.	DPD01
68	DOG04-C	
	V	
	V	
75	RDOG04-C	
	.	
79	.	OG05-C
	.	
84	COG05-C	
	V	
	V	
88	RCOG05-C	
	.	
92	.	CY06B-C
	.	
97	CCY06B-C	
	V	
	V	
101	RCCY06B	
	.	
105	.	PDGCD-C
	V	
	V	
110	.	RPDGCD-C
	V	
	V	
114	.	RRPDGCD
	.	
119	.	NW29B-C
	.	V
	.	V
124	.	RNW29B-C
	.	
128	.	NW1C2-C
	.	
133	.	CNW1C2
	.	V
	.	V
137	.	RCNW1C2
	.	
141	.	PDGCB10-
	.	
146	.	CPDGCB10
	.	
155	.	DPD01
150	.	DPDGCB10
	.	
158	.	CPDGCB10
	V	
	V	
162	.	RCPDGCB
	.	
166	.	GD20BE-C
	.	
171	.	CGD20BEC
	V	
	V	
175	.	RCGD20BE

182	.	.	GD20BM-C
	.	.	.
187	.	CGD20BMC.....	.
	.	V	.
	.	V	.
191	.	RCGD20BM	.
	.	.	.
198	.	GD17BG-C	.
	.	.	.
203	.	CGD17BG.....	.
	.	V	.
	.	V	.
207	.	RGD17BG	.
	.	.	.
213	.	GD11B-C	.
	.	.	.
218	.	CGD11B-C.....	.
	.	V	.
	.	V	.
222	.	RCGD11B	.
	.	.	.
228	.	PT6B-C	.
	.	.	.
233	.	CPT6B-C.....	.
	.	.	.
241	.	-----> DGOW1A	.
237	.	DPT6B-C1	.
	.	.	.
248	.	-----> DTRILGY	.
244	.	DPT6B-C2	.
	.	.	.
251	.	PT2B2-C	.
	.	V	.
	.	V	.
256	.	RCPT2B2	.
	.	.	.
263	.	PT3-C	.
	.	V	.
	.	V	.
268	.	RCPT3-C	.
	.	.	.
272	.	PT41-C	.
	.	.	.
277	.	CPT41-C.....	.
	.	V	.
	.	V	.
281	.	RCPT41-C	.
	.	.	.
288	.	PT5A2-C	.
	.	.	.
293	.	CPT5A2-C.....	.
	.	V	.
	.	V	.
297	.	RCPT5A2	.
	.	.	.
303	.	CCPT6B-C.....	.
	.	.	.
311	.	-----> DGOWAN	.
307	.	DRANCHO	.
	.	V	.
	.	V	.
314	.	RDRANCH	.

```

320 . . . . .<----- DTRILGY
318 . . . DTRILGY
. . . . .
321 . . . . .CY07B
. . . . .
326 . . . CCY07B.....
. . . . .
335 . . .-----> DCENT1
330 . . . DCY07B
. . . . .
340 . . . . .<----- DGOWAN
338 . . . DGOWAN
. . . V
. . . V
341 . . . RDGOWAN
. . . . .
347 . . . . .<----- DGOW1A
345 . . . . .DGOW1A
. . . V
. . . V
348 . . . . .RDGOW1A
. . . . .
354 . . . CCPT6B-C.....
. . . . .
358 . . . . .CY08-C
. . . . .
363 . . . CCY08-C.....
. . . . .
373 . . .----->DCENTRAL
367 . . . DGOW2A
. . . . .
378 . . .-----> D3ALL
376 . . . D3ALL
. . . . .
383 . . . . .<----- DCENT1
381 . . . . .DCENT1
. . . V
. . . V
384 . . . . .RDCENT1
. . . . .
388 . . . CRGOWAN.....
. . . V
. . . V
392 . . . RCRGOWAN
. . . . .
396 . . . PD05A-C
. . . . .
401 . . . CPD05A-C.....
. . . . .
410 . . .-----> DA1-C
405 . . . DCPD05A
. . . V
. . . V
413 . . . RCPD05
. . . . .
419 . . . . .<----- DPD01
417 . . . . .DPD01
. . . V
. . . V
420 . . . . .RDPD01
. . . . .
424 . . . . .PD01-C

```



```

558      .          V
          V
          RCSR02E
564      .          .          SR05D-C
          .          .
569      .          CSR05D.....
          .          V
          .          V
573      .          RCSR05D
          .          .
579      .          .          SR05B-C
          .          .
584      .          CSR05B.....
          .          .
591      .          .----->  DLVSR2
588      .          DCSR05B
          .          .
597      .          .----->  DLVSR3
594      .          DDCSR05B
          .          .
604      .          .----->  DLVRA
600      .          D3CSR05B
          .          .
611      .          .----->  DRAN
607      .          D4CSR05B
          .          .
616      .          .----->  DSMOKE
614      .          DSR05B
          .          .
621      .          .          .<-----  DLVSR3
619      .          .          DLVSR3
          .          .
622      .          CCSR05B.....
          .          .
628      .          .----->  DLVSR4
626      .          DCCSR05B
          .          .
633      .          .<-----  DSR01F
631      .          DSR01F
          .          V
          .          V
634      .          RDSR01F
          .          .
640      .          .          LM02-C
          .          .
645      .          CLM02-C.....
          .          V
          .          V
649      .          RCLM02-C
          .          .
655      .          .          LM03-C
          .          .
660      .          CLM03-C.....
          .          V
          .          V
664      .          RCLM03-C
          .          .
670      .          .          LM05-C
          .          .
675      .          CLM05-C.....
          .          V

```

564 . . SR05D-C

569 CSR05D.....

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573      .      RCSR05D
```

579 . . SR05B-C

584 CSR05B.....

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591      .-----> DLVSR2

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```
588      .      DCSR05B
```

```

597      .-----> DLVSR3

```

594 . DDCSR05B

604> DLVRA

600 . D3CSR05B

```
611      .-----> DRAN
```

607 . D4CSR05B

```

616      .-----> DSMOKE

```

614 . DSR05B

```
621      .          .          .<----- DLVSR3
```

619	.	.	DLVSR3
-----	---	---	--------

622 CCSR05B.....

628 .-----> DLVSR4

626 DCCSR05B

```
633      .<----- DSR01F
```

631 . DSR01F

634 RDSR01F

640 . LM02-C

645 CLM02-C

649 RCLM02-C

655 . . LM03-C

660 CLM03-C.....

664 . RCLM03-C

670 . . LM05-C

675 CLM05-C.....

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679      .      V
      RCLM05-C
      .
      .
685      .      LM06B-C
      .
      .
690      .      CLM06-C.....
      .
      .
699      .      .----->  DLVLM4
694      .      DLVLMRA
      .
      .
706      .      .----->  DVALDR
702      .      DSURF1
      .
      .
711      .      .<-----  DLVRA
709      .      DLVRA
      .      V
      .      V
712      .      RDLVRA
      .
      .
718      .      .<-----  DRAN
716      .      DRAN
      .      V
      .      V
719      .      RDRAN
      .
      .
725      .      .<-----  DLVLM4
723      .      DLVLM4
      .
      .
726      .      CCLM06-C.....
      .
      .
736      .      .----->  DLVLM5
730      .      DLVLMRA
      .
      .
743      .      .----->  DLAKEM
739      .      DSURF2
      .
      .
752      .      .----->  DRAN119
746      .      D1LM09
      .
      .
761      .      .----->  DRAN118
755      .      D2LM09
      .      V
      .      V
764      .      RD2LM09
      .
      .
770      .      .<-----  DVALDR
768      .      DVALDR
      .
      .
771      .      .      LM09
      .
      .
776      .      CLM09.....
      .
      .
786      .      .----->  DCORAN
780      .      D3LM09
      .      V
      .      V
789      .      RD3LM09
      .
      .
793      .      .      VG21
      .
      .
798      .      CVG21.....
      .
      .

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809 . . . . .-----> DHOLLY
802 . . . DVG21
. . . . .
812 . . . . .LM08
. . . . .V
. . . . .V
817 . . . . .RLM08
. . . . .
. . . . .
820 . . . . .VG20
. . . . .
. . . . .
825 . . . CVG20.....
. . . . .V
. . . . .V
829 . . . RCVG20
. . . . .
. . . . .
833 . . . . .VG22
. . . . .
. . . . .
838 . . . CVG22.....
. . . . .
. . . . .
842 . . . . .OG011A-C
. . . . .V
. . . . .V
847 . . . . .ROG011A
. . . . .
. . . . .
851 . . . . .VG02-C
. . . . .
. . . . .
856 . . . . .CVG02-C.....
. . . . .V
. . . . .V
860 . . . . .RCVG02
. . . . .
. . . . .
866 . . . . .VG03-C
. . . . .
. . . . .
871 . . . . .CVG03-C.....
. . . . .V
. . . . .V
875 . . . . .RCVG03
. . . . .
. . . . .
881 . . . . .VG04-C
. . . . .
. . . . .
886 . . . . .CVG04-C.....
. . . . .V
. . . . .V
890 . . . . .RCVG04
. . . . .
. . . . .
896 . . . . .WA08A
. . . . .
. . . . .
901 . . . . .CWA08A.....
. . . . .V
. . . . .V
905 . . . . .RCWA08A
. . . . .
. . . . .
911 . . . . .VG06
. . . . .
. . . . .
916 . . . . .CVG06.....
. . . . .V
. . . . .V
920 . . . . .RCVG06
. . . . .
. . . . .
924 . . . . .CCVG22.....
. . . . .
. . . . .
933 . . . . .-----> DVEG
928 . . . DCCVG22

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      V
      V
936   RDCCVG22
      .
      .
939   .          WA12
      .          .
944   .          .          WA13
      .          .          .
949   .          CWA13.....
      .          .
953   .          CCWA13.....
      .          .
956   .          WA14
      .          .
961   .          CWA14.....
      .          .
964   .          WA01-C
      .          V
      .          V
969   .          RWA01
      .          .
973   .          .          WA04-C
      .          .          .
978   .          CWA04-C.....
      .          V
      .          V
982   .          RCWA04
      .          .
988   .          .          WA09-C
      .          .          .
993   .          CWA09-C.....
      .          V
      .          V
997   .          RCWA09
      .          .
1003  .          .          WA10-C
      .          .          .
1014  .          .          .-----> WA10SE
1008  .          .          WA10D
      .          .          .
1017  .          CWA10NW.....
      .          V
      .          V
1022  .          RCWA10NW
      .          .
1028  .          .          WA11-C
      .          .          .
1033  .          CWA11-C.....
      .          .
1037  .          CCWA11-C.....
      .          .
1047  .          .-----> DWASHRAN
1041  .          DCCWA11-

```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   JAN 1997
*   VERSION 4.1
*
* RUN DATE 13JAN14 TIME 18:11:18
*

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

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RANCHO DRIVE CAPACITY IMPROVEMENTS-DECATUR TO BONANZA

IDINPUT FILE = OFFSITE.DAT
INPUT FILE DATE = Jan 10, 2014 BY PB
ORIGINAL INPUT FILE USED = ENW310.DAT MODELED BY PBS&J
FROM CLV CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN 2003 (CNFCMP)
CENTRAL BASIN (NORTHWEST AREA)
DESIGN STORM = 100-YEAR 6-HR STORM
STORM DISTRIBUTION = SDN #3

REFERENCED HYDROLOGIC MODELS IN THE ORIGINAL INPUT FILE:
CLV CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN 2003
CITY OF LAS VEGAS CITY WIDE HYDROLOGY (CWH) ANALYSIS (PBS&J 1997)
RANCHO DRIVE DRAINAGE IMPROVEMENTS PEAK DRIVE TO LAKE MEAD BOULEVARD
(MONTGOMERY WATSON 2000)
CCRFCD 2002 LAS VEGAS VALLEY MASTER PLAN UPDATE (PBS&J, GCW, LBG)

REFERENCED MPU FACILITY FLOWS BY PB:
FROM CLV VEGAS DRIVE IMPROVEMENTS - 72INCH RCP
FROM CLV WASHINGTON AVENUE STORM DRAIN - 5'X 5' RCB

NO STORM CENTERING
COMPOSITE CURVE NUMBERS
2002 MPU SUBBASINS USED FOR OFFSITE AREAS EXCEPT WHERE SPECIFIED

NOTE: LOCATIONS AND DESCRIPTIONS OF PROPOSED MPU FACILITIES ARE STATED IN
THE MODEL. HOWEVER, ROUTINGS IN THESE LOCATIONS REFLECT THE EXISTING
CONDITION.

JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:

CONCENTRATION POINT	AREA SQ. MI.	DARF
	0-0.5	0.990
	0.5-1	0.975
	1-2	0.950
	2-3	0.925
	3-4	0.915
	4-5	0.908
	5-6	0.903
	6-7	0.895
	7-8	0.885

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

100-YEAR, 6-HOUR STORM, SDN3

52 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	.99	.98	.95	.93	.92	.91	.90	.89	.88					
PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS														
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES														
TIME TO PEAK IN HOURS														
OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION										
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8	RATIO 9		
				.99	.98	.95	.93	.92	.91	.90	.89	.88		
HYDROGRAPH AT														
+	OG04-C	.29	1	FLOW	312.	305.	295.	284.	280.	277.	275.	272.	268.	
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	
DIVERSION TO														
+	DPD01	.29	1	FLOW	124.	124.	124.	124.	124.	124.	124.	124.	124.	
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	
HYDROGRAPH AT														
+	DOG04-C	.29	1	FLOW	188.	181.	171.	160.	156.	153.	151.	148.	144.	
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	
ROUTED TO														
+	RDOG04-C	.29	1	FLOW	122.	117.	108.	101.	98.	95.	94.	91.	88.	
				TIME	4.25	4.25	4.33	4.33	4.33	4.33	4.33	4.33	4.33	
HYDROGRAPH AT														
+	OG05-C	.27	1	FLOW	262.	257.	248.	239.	235.	233.	231.	228.	225.	
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	
2 COMBINED AT														
+	COG05-C	.55	1	FLOW	267.	258.	248.	239.	236.	233.	232.	229.	225.	
				TIME	4.17	4.17	3.83	3.83	3.83	3.83	3.83	3.83	3.83	
ROUTED TO														
+	RCOG05-C	.55	1	FLOW	264.	259.	250.	240.	237.	234.	232.	229.	226.	
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	
HYDROGRAPH AT														
+	CY06B-C	.50	1	FLOW	295.	288.	277.	265.	261.	258.	256.	252.	247.	
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	
2 COMBINED AT														
+	CCY06B-C	1.05	1	FLOW	556.	544.	523.	503.	495.	490.	486.	479.	471.	
				TIME	4.08	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	
ROUTED TO														
+	RCCY06B	1.05	1	FLOW	556.	543.	524.	503.	495.	488.	484.	479.	471.	
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	
HYDROGRAPH AT														
+	PDGCD-C	.44	1	FLOW	224.	218.	208.	197.	193.	190.	188.	185.	181.	
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	
ROUTED TO														
+	RPDGCD-C	.44	1	FLOW	224.	217.	207.	197.	193.	190.	188.	185.	181.	
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	
ROUTED TO														
+	RRPDGCD	.44	1	FLOW	223.	217.	206.	196.	191.	189.	187.	183.	179.	
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	
HYDROGRAPH AT														
+	NW29B-C	.29	1	FLOW	177.	172.	164.	156.	153.	150.	149.	146.	143.	
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	
ROUTED TO														
+	RNW29B-C	.29	1	FLOW	178.	173.	164.	156.	153.	151.	149.	147.	144.	
				TIME	4.00	4.00	4.00	4.08	4.08	4.08	4.08	4.08	4.08	
HYDROGRAPH AT														
+	NW1C2-C	.21	1	FLOW	185.	181.	175.	168.	165.	164.	162.	160.	157.	

				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT													
+	CNW1C2	.49	1	FLOW TIME	344. 3.92	335. 3.92	320. 4.00	306. 4.00	300. 4.00	297. 4.00	294. 4.00	289. 4.00	284. 4.00
ROUTED TO													
+	RCNW1C2	.49	1	FLOW TIME	344. 4.00	335. 4.00	321. 4.08	307. 4.08	301. 4.08	297. 4.08	295. 4.08	290. 4.08	285. 4.08
HYDROGRAPH AT													
+	PDGCB10-	.31	1	FLOW TIME	218. 3.83	213. 3.83	204. 3.83	195. 3.83	191. 3.83	188. 3.83	187. 3.83	184. 3.83	180. 3.83
2 COMBINED AT													
+	CPDGCB10	.80	1	FLOW TIME	545. 4.00	531. 4.00	508. 4.00	485. 4.00	476. 4.00	469. 4.00	465. 4.00	458. 4.00	449. 4.00
DIVERSION TO													
+	DPT3AA11	.80	1	FLOW TIME	139. 3.58	139. 3.58	139. 3.58	139. 3.58	139. 3.58	139. 3.58	139. 3.58	139. 3.58	139. 3.58
HYDROGRAPH AT													
+	DPDGCB10	.80	1	FLOW TIME	406. 4.00	392. 4.00	369. 4.00	346. 4.00	337. 4.00	330. 4.00	326. 4.00	319. 4.00	310. 4.00
2 COMBINED AT													
+	CPDGCB10	1.24	1	FLOW TIME	600. 4.00	581. 4.00	547. 4.08	515. 4.08	502. 4.08	494. 4.08	488. 4.08	477. 4.08	465. 4.08
ROUTED TO													
+	RCPDGCB	1.24	1	FLOW TIME	592. 4.08	578. 4.08	540. 4.08	506. 4.08	499. 4.08	485. 4.08	477. 4.08	473. 4.08	454. 4.08
HYDROGRAPH AT													
+	GD20BE-C	.43	1	FLOW TIME	279. 3.92	272. 3.92	260. 3.92	249. 3.92	244. 3.92	241. 3.92	238. 3.92	235. 3.92	230. 3.92
2 COMBINED AT													
+	CGD20BEC	1.67	1	FLOW TIME	844. 4.08	823. 4.08	775. 4.08	731. 4.08	720. 4.08	704. 4.08	693. 4.08	686. 4.08	663. 4.08
ROUTED TO													
+	RCGD20BE	1.67	1	FLOW TIME	839. 4.17	818. 4.17	771. 4.17	728. 4.17	716. 4.17	700. 4.17	690. 4.17	683. 4.17	660. 4.17
HYDROGRAPH AT													
+	GD20BM-C	.34	1	FLOW TIME	297. 3.92	291. 3.92	281. 3.92	270. 3.92	266. 3.92	263. 3.92	261. 3.92	258. 3.92	254. 3.92
2 COMBINED AT													
+	CGD20BMC	2.01	1	FLOW TIME	1088. 4.08	1055. 4.08	998. 4.08	944. 4.08	926. 4.08	906. 4.08	896. 4.08	883. 4.08	855. 4.08
ROUTED TO													
+	RCGD20BM	2.01	1	FLOW TIME	1083. 4.17	1051. 4.17	995. 4.17	941. 4.17	923. 4.17	904. 4.17	894. 4.17	881. 4.17	854. 4.17
HYDROGRAPH AT													
+	GD17BG-C	.36	1	FLOW TIME	287. 3.92	280. 3.92	270. 3.92	259. 3.92	255. 3.92	252. 3.92	250. 3.92	247. 3.92	242. 3.92
2 COMBINED AT													
+	CGD17BG	2.38	1	FLOW TIME	1312. 4.17	1275. 4.17	1211. 4.17	1149. 4.17	1128. 4.17	1106. 4.17	1095. 4.17	1079. 4.17	1049. 4.17
ROUTED TO													
+	RGD17BG	2.38	1	FLOW TIME	1285. 4.25	1261. 4.25	1196. 4.25	1143. 4.25	1122. 4.25	1101. 4.25	1090. 4.25	1074. 4.25	1045. 4.25
HYDROGRAPH AT													
+	GD11B-C	.26	1	FLOW TIME	304. 3.67	298. 3.67	287. 3.67	277. 3.67	273. 3.67	270. 3.67	268. 3.67	265. 3.67	261. 3.67
2 COMBINED AT													
+	CGD11B-C	2.64	1	FLOW TIME	1395. 4.17	1365. 4.17	1291. 4.17	1231. 4.17	1203. 4.17	1182. 4.17	1168. 4.25	1152. 4.25	1122. 4.25
ROUTED TO													
+	RCGD11B	2.64	1	FLOW TIME	1379. 4.25	1359. 4.25	1290. 4.25	1227. 4.25	1191. 4.25	1188. 4.25	1158. 4.25	1134. 4.25	1114. 4.25

HYDROGRAPH AT													
+	PT6B-C	.45	1	FLOW TIME	250. 4.25	244. 4.25	234. 4.25	224. 4.25	220. 4.25	218. 4.25	216. 4.25	213. 4.25	209. 4.25
2 COMBINED AT													
+	CPT6B-C	3.09	1	FLOW TIME	1629. 4.25	1603. 4.25	1524. 4.25	1452. 4.25	1412. 4.25	1405. 4.25	1374. 4.25	1347. 4.25	1322. 4.25
DIVERSION TO													
+	DGOW1A	3.09	1	FLOW TIME	560. 3.75	560. 3.75	560. 3.75	560. 3.75	560. 3.75	560. 3.75	560. 3.75	560. 3.83	560. 3.83
HYDROGRAPH AT													
+	DPT6B-C1	3.09	1	FLOW TIME	1069. 4.25	1043. 4.25	964. 4.25	892. 4.25	852. 4.25	845. 4.25	814. 4.25	787. 4.25	762. 4.25
DIVERSION TO													
+	DTRILGY	3.09	1	FLOW TIME	244. 4.25	240. 4.25	227. 4.25	216. 4.25	209. 4.25	208. 4.25	203. 4.25	199. 4.25	195. 4.25
HYDROGRAPH AT													
+	DPT6B-C2	3.09	1	FLOW TIME	825. 4.25	803. 4.25	737. 4.25	676. 4.25	643. 4.25	637. 4.25	611. 4.25	588. 4.25	568. 4.25
HYDROGRAPH AT													
+	PT2B2-C	.30	1	FLOW TIME	304. 3.83	299. 3.83	289. 3.83	279. 3.83	275. 3.83	273. 3.83	271. 3.83	268. 3.83	264. 3.83
ROUTED TO													
+	RCPT2B2	.30	1	FLOW TIME	299. 3.92	294. 3.92	284. 3.92	275. 3.92	272. 3.92	268. 3.92	266. 3.92	264. 3.92	260. 3.92
HYDROGRAPH AT													
+	PT3-C	.17	1	FLOW TIME	166. 3.83	163. 3.83	157. 3.83	152. 3.83	149. 3.83	148. 3.83	147. 3.83	145. 3.83	142. 3.83
ROUTED TO													
+	RCPT3-C	.17	1	FLOW TIME	167. 4.08	164. 4.08	158. 4.08	152. 4.08	150. 4.08	149. 4.08	148. 4.08	146. 4.08	143. 4.08
HYDROGRAPH AT													
+	PT41-C	.44	1	FLOW TIME	381. 3.83	373. 3.83	359. 3.83	345. 3.83	340. 3.83	336. 3.83	333. 3.83	329. 3.83	323. 3.83
3 COMBINED AT													
+	CPT41-C	.91	1	FLOW TIME	821. 3.92	804. 3.92	775. 3.92	746. 3.92	735. 3.92	726. 3.92	720. 3.92	712. 3.92	700. 3.92
ROUTED TO													
+	RCPT41-C	.91	1	FLOW TIME	817. 3.92	801. 3.92	771. 3.92	742. 3.92	732. 3.92	723. 3.92	717. 3.92	709. 3.92	697. 3.92
HYDROGRAPH AT													
+	PT5A2-C	.34	1	FLOW TIME	215. 4.08	210. 4.08	201. 4.08	193. 4.08	190. 4.08	188. 4.08	186. 4.08	183. 4.08	180. 4.08
2 COMBINED AT													
+	CPT5A2-C	1.25	1	FLOW TIME	1011. 3.92	990. 3.92	952. 3.92	916. 3.92	902. 3.92	891. 3.92	884. 3.92	874. 3.92	858. 3.92
ROUTED TO													
+	RCPT5A2	1.25	1	FLOW TIME	1008. 4.00	989. 4.00	950. 4.00	914. 4.00	903. 4.00	890. 4.00	885. 4.00	874. 4.00	858. 4.00
2 COMBINED AT													
+	CCPT6B-C	4.34	1	FLOW TIME	1680. 4.17	1638. 4.17	1531. 4.17	1438. 4.17	1391. 4.17	1369. 4.17	1344. 4.17	1311. 4.17	1272. 4.17
DIVERSION TO													
+	DGOWAN	4.34	1	FLOW TIME	1180. 4.17	1138. 4.17	1031. 4.17	938. 4.17	891. 4.17	869. 4.17	844. 4.17	811. 4.17	772. 4.17
HYDROGRAPH AT													
+	DRANCHO	4.34	1	FLOW TIME	500. 3.67	500. 3.67	500. 3.67	500. 3.67	500. 3.75	500. 3.75	500. 3.75	500. 3.75	500. 3.75
ROUTED TO													
+	RDRANCH	4.34	1	FLOW TIME	501. 3.92	501. 3.92	501. 3.92	501. 3.92	501. 3.92	501. 3.92	501. 3.92	501. 3.92	501. 3.92

HYDROGRAPH AT +	DTRILGY	.00	1	FLOW TIME	244. 4.25	240. 4.25	227. 4.25	216. 4.25	209. 4.25	208. 4.25	203. 4.25	199. 4.25	195. 4.25
HYDROGRAPH AT +	CY07B	.20	1	FLOW TIME	173. 3.92	169. 3.92	163. 3.92	157. 3.92	155. 3.92	153. 3.92	152. 3.92	150. 3.92	147. 3.92
3 COMBINED AT +	CCY07B	4.54	1	FLOW TIME	869. 4.17	861. 4.17	842. 4.17	825. 4.17	817. 4.17	813. 4.17	809. 4.17	803. 4.17	796. 4.17
DIVERSION TO +	DCENT1	4.54	1	FLOW TIME	797. 4.17	789. 4.17	770. 4.17	753. 4.17	745. 4.17	741. 4.17	737. 4.17	731. 4.17	724. 4.17
HYDROGRAPH AT +	DCY07B	4.54	1	FLOW TIME	72. 2.75	72. 2.83	72. 2.83	72. 2.92	72. 3.00	72. 3.00	72. 3.00	72. 3.08	72. 3.08
HYDROGRAPH AT +	DGOWAN	.00	1	FLOW TIME	1180. 4.17	1138. 4.17	1031. 4.17	938. 4.17	891. 4.17	869. 4.17	844. 4.17	811. 4.17	772. 4.17
ROUTED TO +	RDGOWAN	.00	1	FLOW TIME	1174. 4.25	1126. 4.25	1021. 4.25	924. 4.25	878. 4.25	860. 4.33	835. 4.25	804. 4.25	765. 4.25
HYDROGRAPH AT +	DGOW1A	.00	1	FLOW TIME	560. 3.75	560. 3.75	560. 3.75	560. 3.75	560. 3.75	560. 3.75	560. 3.75	560. 3.83	560. 3.83
ROUTED TO +	RDGOW1A	.00	1	FLOW TIME	562. 3.83	562. 3.83	562. 3.83	563. 3.83	563. 3.83	563. 3.83	563. 3.83	563. 3.83	561. 3.92
2 COMBINED AT +	CCPT6B-C	.00	1	FLOW TIME	1734. 4.25	1686. 4.25	1581. 4.25	1484. 4.25	1438. 4.25	1420. 4.33	1395. 4.25	1364. 4.25	1325. 4.25
HYDROGRAPH AT +	CY08-C	.09	1	FLOW TIME	97. 3.75	95. 3.75	91. 3.75	88. 3.75	86. 3.75	86. 3.75	85. 3.75	84. 3.75	82. 3.75
3 COMBINED AT +	CCY08-C	4.64	1	FLOW TIME	1840. 4.25	1791. 4.25	1684. 4.25	1587. 4.25	1540. 4.25	1516. 4.33	1496. 4.25	1465. 4.25	1425. 4.25
DIVERSION TO +	DCENTRAL	4.64	1	FLOW TIME	1210. 4.25	1161. 4.25	1054. 4.25	957. 4.25	910. 4.25	886. 4.33	866. 4.25	835. 4.25	795. 4.25
HYDROGRAPH AT +	DGOW2A	4.64	1	FLOW TIME	630. 3.75	630. 3.75	630. 3.75	630. 3.75	630. 3.75	630. 3.75	630. 3.75	630. 3.75	630. 3.75
DIVERSION TO +	D3ALL	4.64	1	FLOW TIME	630. 3.75	630. 3.75	630. 3.75	630. 3.75	630. 3.75	630. 3.75	630. 3.75	630. 3.75	630. 3.75
HYDROGRAPH AT +	D3ALL	4.64	1	FLOW TIME	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
HYDROGRAPH AT +	DCENT1	.00	1	FLOW TIME	797. 4.17	789. 4.17	770. 4.17	753. 4.17	745. 4.17	741. 4.17	737. 4.17	731. 4.17	724. 4.17
ROUTED TO +	RDCENT1	.00	1	FLOW TIME	792. 4.17	784. 4.25	768. 4.25	751. 4.25	742. 4.25	739. 4.25	734. 4.25	728. 4.25	722. 4.25
3 COMBINED AT +	CRGOWAN	5.69	1	FLOW TIME	1349. 4.17	1326. 4.17	1291. 4.17	1250. 4.17	1233. 4.17	1221. 4.17	1214. 4.17	1201. 4.17	1184. 4.17
ROUTED TO +	RCRGOWAN	5.69	1	FLOW TIME	1345. 4.25	1322. 4.25	1287. 4.25	1247. 4.25	1230. 4.25	1221. 4.25	1214. 4.25	1200. 4.25	1183. 4.25
HYDROGRAPH AT													

+	PD05A-C	.14	1	FLOW TIME	145. 3.83	142. 3.83	138. 3.83	133. 3.83	131. 3.83	130. 3.83	129. 3.83	128. 3.83	126. 3.83
+	2 COMBINED AT CPD05A-C	5.83	1	FLOW TIME	1424. 4.17	1403. 4.17	1360. 4.17	1317. 4.25	1299. 4.25	1289. 4.25	1281. 4.25	1267. 4.25	1250. 4.25
+	DIVERSION TO DA1-C	5.83	1	FLOW TIME	211. 3.58	211. 3.58	211. 3.58	211. 3.58	211. 3.67	211. 3.67	211. 3.67	211. 3.67	211. 3.67
+	HYDROGRAPH AT DCPD05A	5.83	1	FLOW TIME	1213. 4.17	1192. 4.17	1149. 4.17	1106. 4.25	1088. 4.25	1078. 4.25	1070. 4.25	1056. 4.25	1039. 4.25
+	ROUTED TO RCPD05	5.83	1	FLOW TIME	1213. 4.25	1190. 4.25	1153. 4.25	1105. 4.25	1089. 4.25	1077. 4.25	1066. 4.25	1055. 4.25	1037. 4.25
+	HYDROGRAPH AT DPD01	.00	1	FLOW TIME	124. 3.50	124. 3.50	124. 3.50	124. 3.50	124. 3.50	124. 3.50	124. 3.50	124. 3.50	124. 3.50
+	ROUTED TO RDPD01	.00	1	FLOW TIME	134. 3.67	133. 3.67	132. 3.67	130. 3.67	129. 3.67	129. 3.67	129. 3.67	128. 3.75	129. 3.75
+	HYDROGRAPH AT PD01-C	.38	1	FLOW TIME	260. 3.92	254. 3.92	243. 3.92	232. 3.92	228. 3.92	225. 3.92	223. 3.92	220. 3.92	215. 3.92
+	2 COMBINED AT CPD01-C	.38	1	FLOW TIME	388. 3.92	381. 3.92	370. 3.92	358. 3.92	354. 3.92	351. 3.92	348. 3.92	345. 3.92	340. 3.92
+	ROUTED TO RCPD01	.38	1	FLOW TIME	385. 3.92	378. 3.92	366. 3.92	355. 3.92	351. 3.92	348. 3.92	346. 3.92	342. 3.92	338. 3.92
+	HYDROGRAPH AT CY04A-C	.46	1	FLOW TIME	341. 3.92	334. 3.92	321. 3.92	308. 3.92	302. 3.92	299. 3.92	296. 3.92	292. 3.92	287. 3.92
+	2 COMBINED AT CCY04A-C	.83	1	FLOW TIME	726. 3.92	712. 3.92	687. 3.92	663. 3.92	653. 3.92	646. 3.92	642. 3.92	634. 3.92	625. 3.92
+	DIVERSION TO DLVSR1	.83	1	FLOW TIME	231. 3.50	231. 3.50	231. 3.58	231. 3.58	231. 3.58	231. 3.58	231. 3.58	231. 3.58	231. 3.58
+	HYDROGRAPH AT DCY04C	.83	1	FLOW TIME	495. 3.92	481. 3.92	456. 3.92	432. 3.92	422. 3.92	415. 3.92	411. 3.92	403. 3.92	394. 3.92
+	ROUTED TO RCCY04A	.83	1	FLOW TIME	487. 4.00	474. 4.00	449. 4.00	429. 4.00	417. 4.00	411. 4.00	408. 4.00	398. 4.00	391. 4.00
+	HYDROGRAPH AT PD04B-C	.47	1	FLOW TIME	345. 4.00	338. 4.00	325. 4.00	312. 4.00	307. 4.00	304. 4.00	301. 4.00	297. 4.00	292. 4.00
+	2 COMBINED AT CPD04B-C	1.30	1	FLOW TIME	833. 4.00	812. 4.00	774. 4.00	741. 4.00	724. 4.00	715. 4.00	710. 4.00	695. 4.00	683. 4.00
+	2 COMBINED AT CCPD04B-	7.13	1	FLOW TIME	1916. 4.17	1874. 4.17	1804. 4.17	1718. 4.17	1696. 4.17	1673. 4.17	1655. 4.17	1634. 4.17	1603. 4.17
+	ROUTED TO RCPD04B	7.13	1	FLOW TIME	1913. 4.17	1870. 4.17	1798. 4.17	1713. 4.17	1689. 4.17	1667. 4.17	1649. 4.17	1629. 4.17	1597. 4.17
+	HYDROGRAPH AT OG03-C	.32	1	FLOW TIME	278. 3.83	272. 3.83	261. 3.83	251. 3.83	247. 3.83	244. 3.83	242. 3.83	238. 3.83	234. 3.83
+	ROUTED TO ROG03-C	.32	1	FLOW	278.	272.	261.	251.	246.	243.	241.	238.	234.

				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT													
+	OG02-C	.32	1	FLOW	327.	320.	309.	298.	293.	290.	288.	284.	280.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO													
+	ROG02-C	.32	1	FLOW	327.	321.	310.	299.	295.	292.	289.	286.	281.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT													
+	LM01-C	.33	1	FLOW	213.	207.	198.	188.	184.	182.	180.	177.	173.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT													
+	CLM01-C	.64	1	FLOW	538.	526.	506.	486.	478.	472.	468.	462.	454.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
DIVERSION TO													
+	DSR01F	.64	1	FLOW	351.	343.	331.	319.	315.	311.	309.	305.	300.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT													
+	SR01E	.64	1	FLOW	187.	182.	174.	166.	163.	161.	159.	157.	153.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO													
+	RCLM01-C	.64	1	FLOW	187.	182.	174.	165.	162.	160.	158.	155.	152.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT													
+	SR00A-C	.37	1	FLOW	255.	248.	238.	227.	223.	220.	218.	215.	211.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
2 COMBINED AT													
+	CSR00A	1.01	1	FLOW	442.	430.	411.	393.	385.	380.	376.	370.	363.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
2 COMBINED AT													
+	CCSR00A	1.34	1	FLOW	720.	702.	673.	643.	632.	624.	618.	608.	597.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO													
+	RCSR00A	1.34	1	FLOW	711.	693.	663.	634.	622.	614.	608.	599.	587.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT													
+	DLVSR1	.00	1	FLOW	231.	231.	231.	231.	231.	231.	231.	231.	231.
				TIME	3.50	3.50	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO													
+	RDLVSR1	.00	1	FLOW	231.	231.	231.	231.	231.	231.	231.	231.	231.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT													
+	SR02E-C	.30	1	FLOW	253.	247.	237.	228.	224.	221.	219.	216.	212.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
3 COMBINED AT													
+	CSR02E	1.64	1	FLOW	1181.	1158.	1119.	1080.	1065.	1054.	1047.	1034.	1019.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO													
+	RCSR02E	1.64	1	FLOW	1168.	1147.	1107.	1064.	1053.	1040.	1030.	1022.	1003.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	4.00	4.00
HYDROGRAPH AT													
+	SR05D-C	.30	1	FLOW	243.	238.	230.	221.	218.	216.	214.	211.	208.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
2 COMBINED AT													
+	CSR05D	1.94	1	FLOW	1410.	1383.	1334.	1283.	1269.	1253.	1244.	1233.	1211.
				TIME	3.92	3.92	3.92	3.92	4.00	4.00	4.00	4.00	4.00
ROUTED TO													
+	RCSR05D	1.94	1	FLOW	1402.	1379.	1330.	1282.	1268.	1253.	1243.	1233.	1210.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT													
+	SR05B-C	.36	1	FLOW	245.	240.	231.	223.	219.	217.	215.	212.	209.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08

2 COMBINED AT													
+	CSR05B	2.30	1	FLOW TIME	1640. 4.00	1611. 4.00	1554. 4.00	1497. 4.00	1480. 4.00	1462. 4.00	1450. 4.00	1438. 4.00	1412. 4.00
DIVERSION TO													
+	DLVSR2	2.30	1	FLOW TIME	231. 3.42	231. 3.42	231. 3.42	231. 3.42	231. 3.50	231. 3.50	231. 3.50	231. 3.50	231. 3.50
HYDROGRAPH AT													
+	DCSR05B	2.30	1	FLOW TIME	1409. 4.00	1380. 4.00	1323. 4.00	1266. 4.00	1249. 4.00	1231. 4.00	1219. 4.00	1207. 4.00	1181. 4.00
DIVERSION TO													
+	DLVSR3	2.30	1	FLOW TIME	182. 3.50	182. 3.58	182. 3.58	182. 3.58	182. 3.58	182. 3.58	182. 3.58	182. 3.58	182. 3.58
HYDROGRAPH AT													
+	DDCSR05B	2.30	1	FLOW TIME	1227. 4.00	1198. 4.00	1141. 4.00	1084. 4.00	1067. 4.00	1049. 4.00	1037. 4.00	1025. 4.00	999. 4.00
DIVERSION TO													
+	DLVRA	2.30	1	FLOW TIME	670. 3.75	670. 3.75	670. 3.75	670. 3.75	670. 3.75	670. 3.75	670. 3.75	670. 3.83	670. 3.83
HYDROGRAPH AT													
+	D3CSR05B	2.30	1	FLOW TIME	557. 4.00	528. 4.00	471. 4.00	414. 4.00	397. 4.00	379. 4.00	367. 4.00	355. 4.00	329. 4.00
DIVERSION TO													
+	DRAN	2.30	1	FLOW TIME	278. 4.00	264. 4.00	235. 4.00	207. 4.00	199. 4.00	189. 4.00	184. 4.00	177. 4.00	164. 4.00
HYDROGRAPH AT													
+	D4CSR05B	2.30	1	FLOW TIME	278. 4.00	264. 4.00	235. 4.00	207. 4.00	199. 4.00	189. 4.00	184. 4.00	177. 4.00	164. 4.00
DIVERSION TO													
+	DSMOKE	2.30	1	FLOW TIME	278. 4.00	264. 4.00	235. 4.00	207. 4.00	199. 4.00	189. 4.00	184. 4.00	177. 4.00	164. 4.00
HYDROGRAPH AT													
+	DSR05B	2.30	1	FLOW TIME	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
HYDROGRAPH AT													
+	DLVSR3	.00	1	FLOW TIME	182. 3.50	182. 3.58	182. 3.58	182. 3.58	182. 3.58	182. 3.58	182. 3.58	182. 3.58	182. 3.58
3 COMBINED AT													
+	CCSR05B	9.43	1	FLOW TIME	2095. 4.17	2052. 4.17	1980. 4.17	1895. 4.17	1871. 4.17	1849. 4.17	1831. 4.17	1811. 4.17	1779. 4.17
DIVERSION TO													
+	DLVSR4	9.43	1	FLOW TIME	2095. 4.17	2052. 4.17	1980. 4.17	1895. 4.17	1871. 4.17	1849. 4.17	1831. 4.17	1811. 4.17	1779. 4.17
HYDROGRAPH AT													
+	DCCSR05B	9.43	1	FLOW TIME	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00	0. .00
HYDROGRAPH AT													
+	DSR01F	.00	1	FLOW TIME	351. 3.92	343. 3.92	331. 3.92	319. 3.92	315. 3.92	311. 3.92	309. 3.92	305. 3.92	300. 3.92
ROUTED TO													
+	RDSR01F	.00	1	FLOW TIME	351. 3.92	342. 3.92	331. 3.92	319. 3.92	313. 3.92	310. 3.92	308. 3.92	305. 3.92	299. 3.92
HYDROGRAPH AT													
+	LM02-C	.29	1	FLOW TIME	235. 3.83	229. 3.83	220. 3.83	211. 3.83	207. 3.83	204. 3.83	203. 3.83	200. 3.83	196. 3.83
2 COMBINED AT													
+	CLM02-C	.29	1	FLOW TIME	572. 3.92	559. 3.83	538. 3.92	518. 3.92	508. 3.92	503. 3.92	499. 3.92	493. 3.92	484. 3.92
ROUTED TO													
+	RCLM02-C	.29	1	FLOW TIME	571. 3.92	558. 3.92	537. 3.92	517. 3.92	507. 3.92	502. 3.92	499. 3.92	492. 3.92	482. 3.92

HYDROGRAPH AT	LM03-C	.34	1	FLOW	336.	329.	318.	307.	302.	299.	297.	293.	289.
+				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT	CLM03-C	.63	1	FLOW	891.	871.	838.	806.	793.	784.	778.	768.	754.
+				TIME	3.83	3.83	3.83	3.92	3.83	3.83	3.92	3.92	3.92
ROUTED TO	RCLM03-C	.63	1	FLOW	887.	867.	836.	804.	791.	783.	777.	767.	754.
+				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT	LM05-C	.37	1	FLOW	328.	321.	309.	297.	292.	289.	287.	283.	278.
+				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT	CLM05-C	.99	1	FLOW	1200.	1174.	1131.	1088.	1071.	1059.	1051.	1037.	1020.
+				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO	RCLM05-C	.99	1	FLOW	1193.	1169.	1123.	1081.	1062.	1051.	1043.	1031.	1011.
+				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT	LM06B-C	.35	1	FLOW	304.	298.	287.	277.	273.	270.	267.	264.	260.
+				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
2 COMBINED AT	CLM06-C	1.35	1	FLOW	1497.	1467.	1410.	1358.	1335.	1320.	1310.	1295.	1271.
+				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
DIVERSION TO	DLVLM4	1.35	1	FLOW	940.	940.	940.	940.	940.	940.	940.	940.	940.
+				TIME	3.67	3.67	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT	DLVLMRA	1.35	1	FLOW	557.	527.	470.	418.	395.	380.	370.	355.	331.
+				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
DIVERSION TO	DVALDR	1.35	1	FLOW	186.	176.	157.	139.	132.	127.	123.	118.	110.
+				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT	DSURF1	1.35	1	FLOW	372.	351.	313.	278.	263.	254.	247.	237.	221.
+				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT	DLVRA	.00	1	FLOW	670.	670.	670.	670.	670.	670.	670.	670.	670.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.83
ROUTED TO	RDLVRA	.00	1	FLOW	670.	670.	670.	670.	670.	670.	670.	670.	670.
+				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	4.00	4.00
HYDROGRAPH AT	DRAN	.00	1	FLOW	278.	264.	235.	207.	199.	189.	184.	177.	164.
+				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
ROUTED TO	RDRAN	.00	1	FLOW	272.	256.	228.	200.	192.	183.	178.	171.	159.
+				TIME	4.00	4.00	4.00	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT	DLVLM4	.00	1	FLOW	940.	940.	940.	940.	940.	940.	940.	940.	940.
+				TIME	3.67	3.67	3.75	3.75	3.75	3.75	3.75	3.75	3.75
4 COMBINED AT	CCLM06-C	1.35	1	FLOW	2224.	2188.	2126.	2062.	2040.	2022.	2009.	1991.	1964.
+				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
DIVERSION TO	DLVLM5	1.35	1	FLOW	940.	940.	940.	940.	940.	940.	940.	940.	940.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT	DLVLMRA	1.35	1	FLOW	1284.	1248.	1186.	1122.	1100.	1082.	1069.	1051.	1024.
+				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
DIVERSION TO													

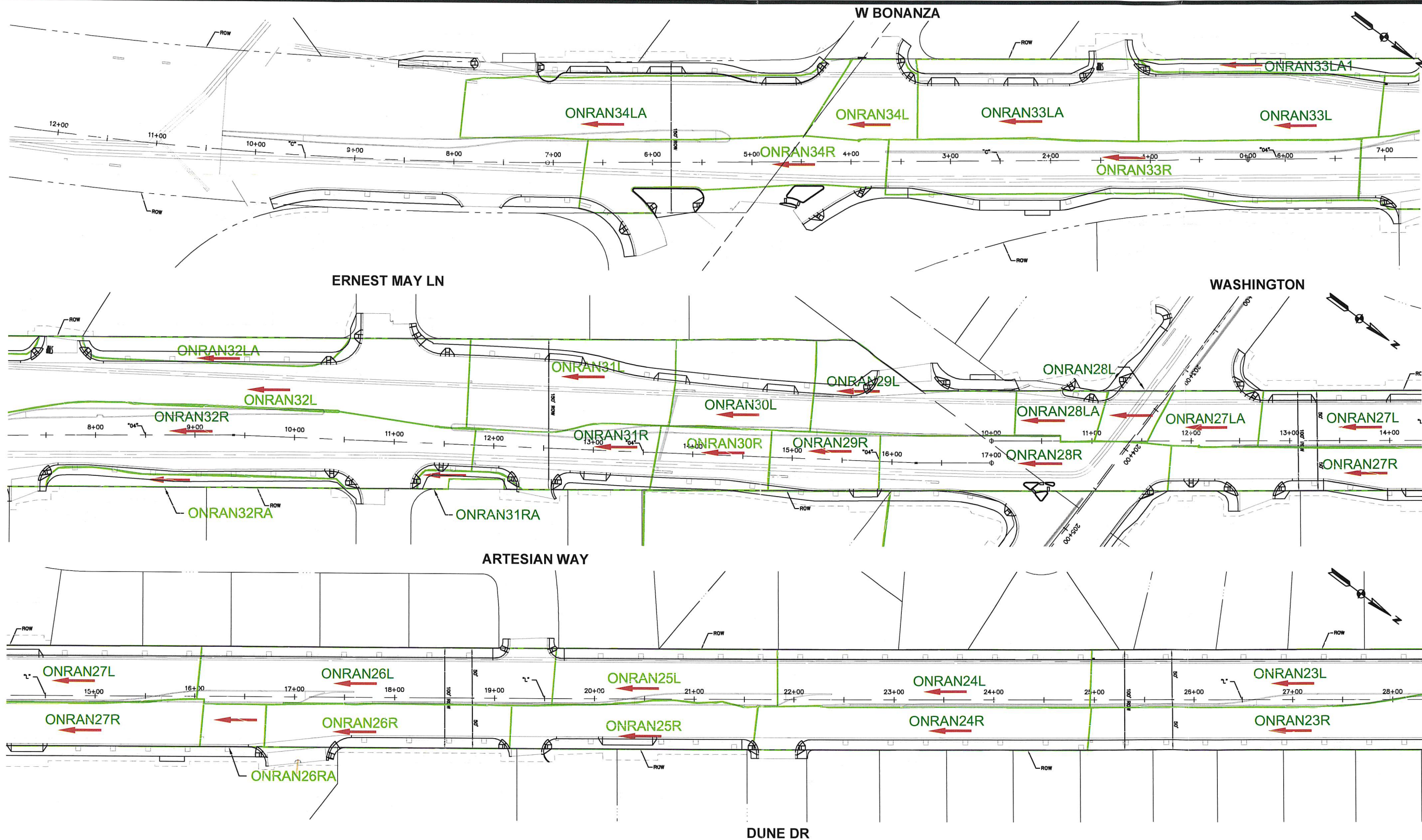
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO													
+	RCVG20	1.76	1	FLOW	413.	409.	402.	395.	392.	390.	389.	387.	384.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
HYDROGRAPH AT													
+	VG22	.18	1	FLOW	172.	168.	163.	157.	155.	153.	152.	150.	148.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT													
+	CVG22	1.94	1	FLOW	585.	577.	565.	552.	547.	543.	541.	537.	532.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
HYDROGRAPH AT													
+	OG011A-C	.44	1	FLOW	333.	325.	311.	298.	293.	289.	287.	283.	278.
				TIME	3.83	3.83	3.83	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO													
+	ROG011A	.44	1	FLOW	333.	325.	312.	299.	294.	290.	287.	283.	278.
				TIME	3.92	3.92	3.92	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT													
+	VG02-C	.22	1	FLOW	149.	145.	139.	132.	129.	128.	126.	124.	122.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT													
+	CVG02-C	.67	1	FLOW	478.	466.	446.	427.	419.	414.	410.	403.	396.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO													
+	RCVG02	.67	1	FLOW	472.	467.	447.	427.	419.	414.	410.	404.	396.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
HYDROGRAPH AT													
+	VG03-C	.28	1	FLOW	163.	158.	151.	143.	140.	138.	136.	134.	131.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT													
+	CVG03-C	.94	1	FLOW	621.	612.	585.	559.	548.	541.	536.	528.	517.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
ROUTED TO													
+	RCVG03	.94	1	FLOW	618.	606.	575.	557.	547.	539.	534.	526.	516.
				TIME	4.00	4.00	4.08	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT													
+	VG04-C	.24	1	FLOW	245.	240.	232.	224.	221.	218.	217.	214.	211.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT													
+	CVG04-C	1.18	1	FLOW	818.	802.	762.	739.	726.	716.	710.	699.	685.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
ROUTED TO													
+	RCVG04	1.18	1	FLOW	807.	788.	755.	726.	717.	713.	706.	689.	673.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT													
+	WA08A	.03	1	FLOW	39.	38.	37.	36.	35.	35.	34.	34.	34.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CWA08A	1.21	1	FLOW	817.	797.	764.	735.	725.	722.	714.	698.	682.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08
ROUTED TO													
+	RCWA08A	1.21	1	FLOW	821.	800.	767.	738.	729.	727.	717.	700.	684.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT													
+	VG06	.19	1	FLOW	188.	184.	177.	170.	167.	165.	164.	162.	159.
				TIME	3.67	3.67	3.67	3.67	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT													
+	CVG06	1.40	1	FLOW	894.	872.	836.	805.	795.	792.	781.	763.	746.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17
ROUTED TO													
+	RCVG06	1.40	1	FLOW	894.	872.	832.	800.	792.	788.	775.	755.	740.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17

2 COMBINED AT													
+	CCVG22	3.33	1	FLOW TIME	1328. 4.08	1297. 4.08	1246. 4.08	1206. 4.08	1191. 4.17	1185. 4.17	1171. 4.17	1148. 4.17	1131. 4.17
DIVERSION TO													
+	DVEG	3.33	1	FLOW TIME	891. 3.75	891. 3.75	891. 3.75	891. 3.83	891. 3.83	891. 3.83	891. 3.83	891. 3.83	891. 3.83
HYDROGRAPH AT													
+	DCCVG22	3.33	1	FLOW TIME	437. 4.08	406. 4.08	355. 4.08	315. 4.08	300. 4.17	294. 4.17	280. 4.17	257. 4.17	240. 4.17
ROUTED TO													
+	RDCCVG22	3.33	1	FLOW TIME	433. 4.08	402. 4.08	351. 4.08	310. 4.17	299. 4.17	293. 4.17	279. 4.17	257. 4.17	239. 4.17
HYDROGRAPH AT													
+	WA12	.07	1	FLOW TIME	104. 3.58	102. 3.58	99. 3.58	95. 3.58	94. 3.58	93. 3.58	92. 3.58	91. 3.58	90. 3.58
HYDROGRAPH AT													
+	WA13	.16	1	FLOW TIME	180. 3.75	176. 3.75	170. 3.75	165. 3.75	162. 3.75	160. 3.75	159. 3.75	157. 3.75	155. 3.75
2 COMBINED AT													
+	CWA13	.23	1	FLOW TIME	257. 3.67	252. 3.67	244. 3.67	235. 3.67	232. 3.67	229. 3.67	228. 3.67	225. 3.67	221. 3.67
2 COMBINED AT													
+	CCWA13	3.56	1	FLOW TIME	547. 4.08	514. 4.08	459. 4.08	414. 4.08	397. 4.08	383. 4.08	370. 4.08	350. 4.08	328. 4.08
HYDROGRAPH AT													
+	WA14	.04	1	FLOW TIME	57. 3.58	55. 3.58	54. 3.58	52. 3.58	51. 3.58	50. 3.58	50. 3.58	49. 3.58	49. 3.58
2 COMBINED AT													
+	CWA14	3.60	1	FLOW TIME	563. 4.08	530. 4.08	475. 4.08	430. 4.08	413. 4.08	399. 4.08	386. 4.08	364. 4.08	343. 4.08
HYDROGRAPH AT													
+	WA01-C	.22	1	FLOW TIME	238. 3.67	232. 3.67	223. 3.67	215. 3.67	211. 3.67	209. 3.67	207. 3.67	204. 3.67	201. 3.67
ROUTED TO													
+	RWA01	.22	1	FLOW TIME	239. 3.83	233. 3.83	224. 3.83	215. 3.83	211. 3.83	209. 3.83	207. 3.83	204. 3.83	200. 3.83
HYDROGRAPH AT													
+	WA04-C	.22	1	FLOW TIME	177. 3.92	173. 3.92	166. 3.92	160. 3.92	157. 3.92	156. 3.92	154. 3.92	152. 3.92	150. 3.92
2 COMBINED AT													
+	CWA04-C	.44	1	FLOW TIME	410. 3.83	401. 3.83	386. 3.83	370. 3.83	364. 3.92	360. 3.92	357. 3.92	353. 3.92	347. 3.92
ROUTED TO													
+	RCWA04	.44	1	FLOW TIME	412. 4.08	404. 4.08	390. 4.08	375. 4.08	370. 4.08	366. 4.08	363. 4.08	358. 4.08	352. 4.08
HYDROGRAPH AT													
+	WA09-C	.09	1	FLOW TIME	98. 3.75	96. 3.75	92. 3.75	89. 3.75	88. 3.75	87. 3.75	86. 3.75	85. 3.75	84. 3.75
2 COMBINED AT													
+	CWA09-C	.53	1	FLOW TIME	489. 4.00	478. 4.00	460. 4.00	441. 4.00	434. 4.00	429. 4.00	425. 4.00	419. 4.00	411. 4.00
ROUTED TO													
+	RCWA09	.53	1	FLOW TIME	480. 4.08	469. 4.08	453. 4.08	435. 4.08	429. 4.08	424. 4.08	421. 4.08	415. 4.08	409. 4.08
HYDROGRAPH AT													
+	WA10-C	.45	1	FLOW TIME	474. 3.75	465. 3.75	449. 3.75	434. 3.75	427. 3.75	423. 3.75	420. 3.75	415. 3.75	409. 3.75
DIVERSION TO													
+	WA10SE	.45	1	FLOW TIME	250. 3.50	250. 3.58	250. 3.58	250. 3.58	250. 3.58	250. 3.58	250. 3.58	250. 3.58	250. 3.58

HYDROGRAPH AT													
+	WA10D	.45	1	FLOW TIME	224. 3.75	215. 3.75	199. 3.75	184. 3.75	177. 3.75	173. 3.75	170. 3.75	165. 3.75	159. 3.75
2 COMBINED AT													
+	CWA10NW	.98	1	FLOW TIME	594. 4.00	575. 4.00	544. 4.00	513. 4.00	501. 4.00	492. 4.00	486. 4.00	477. 4.00	464. 4.00
ROUTED TO													
+	RCWA10NW	.98	1	FLOW TIME	596. 4.08	577. 4.08	545. 4.08	514. 4.08	500. 4.08	492. 4.08	485. 4.08	474. 4.08	461. 4.08
HYDROGRAPH AT													
+	WA11-C	.09	1	FLOW TIME	83. 3.75	81. 3.75	78. 3.75	75. 3.75	74. 3.75	73. 3.75	72. 3.75	71. 3.75	70. 3.75
2 COMBINED AT													
+	CWA11-C	1.06	1	FLOW TIME	638. 4.08	618. 4.08	585. 4.08	552. 4.08	538. 4.08	529. 4.08	521. 4.08	510. 4.08	497. 4.08
2 COMBINED AT													
+	CCWA11-C	4.67	1	FLOW TIME	1201. 4.08	1148. 4.08	1060. 4.08	981. 4.08	950. 4.08	927. 4.08	907. 4.08	875. 4.08	839. 4.08
DIVERSION TO													
+	DWASHRAN	4.67	1	FLOW TIME	780. 3.83	780. 3.83	780. 3.92	780. 3.92	780. 4.00	780. 4.00	780. 4.00	780. 4.00	780. 4.08
HYDROGRAPH AT													
+	DCCWA11-	4.67	1	FLOW TIME	421. 4.08	368. 4.08	280. 4.08	201. 4.08	170. 4.08	147. 4.08	127. 4.08	95. 4.08	59. 4.08

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

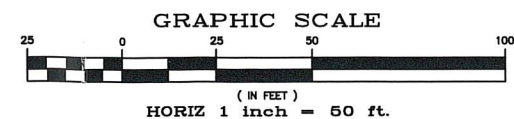
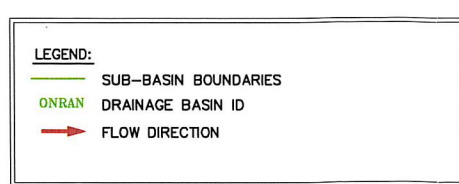
D. Onsite Basin Map - Existing Condition



Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)			Discharge Q (cfs) (Rational)		
		10-year	25-year	100-year	10-year	25-year	100-year
ONRAN23R	0.58	1.93	2.58	3.58	1.98	2.65	3.68
ONRAN23L	0.64	2.20	2.93	4.07	2.25	3.01	4.17
ONRAN24R	0.32	1.18	1.58	2.20	1.20	1.62	2.24
ONRAN24L	0.41	1.51	2.02	2.80	1.54	2.07	2.87
ONRAN25R	0.21	0.79	1.07	1.48	0.79	1.07	1.48
ONRAN25L	0.25	0.93	1.25	1.73	0.95	1.27	1.76
ONRAN26R	0.24	0.91	1.22	1.69	0.91	1.22	1.69
ONRAN26L	0.46	1.62	2.17	3.02	1.67	2.23	3.09
ONRAN26RA	0.06	0.23	0.30	0.42	0.23	0.30	0.42
ONRAN27R	0.43	1.48	1.98	2.75	1.52	2.03	2.81
ONRAN27L	0.42	1.51	2.02	2.80	1.54	2.07	2.86
ONRAN27LA	0.13	0.49	0.66	0.91	0.49	0.66	0.91

Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)			Discharge Q (cfs) (Rational)		
		10-year	25-year	100-year	10-year	25-year	100-year
ONRAN28R	0.34	1.28	1.73	2.39	1.29	1.73	2.39
ONRAN28L	0.06	0.23	0.30	0.42	0.23	0.30	0.42
ONRAN28LA	0.09	0.34	0.46	0.63	0.34	0.46	0.63
ONRAN29R	0.14	0.53	0.71	0.98	0.53	0.71	0.98
ONRAN29L	0.28	1.06	1.42	1.97	1.06	1.42	1.97
ONRAN30R	0.17	0.64	0.86	1.20	0.64	0.86	1.20
ONRAN30L	0.28	1.06	1.42	1.97	1.06	1.42	1.97
ONRAN31R	0.24	0.91	1.22	1.69	0.91	1.22	1.69
ONRAN31RA	0.02	0.06	0.08	0.11	0.06	0.08	0.11
ONRAN31L	0.42	1.59	2.13	2.95	1.59	2.13	2.95
ONRAN32R	0.76	2.60	3.47	4.82	2.67	3.58	4.96
ONRAN32RA	0.08	0.24	0.31	0.44	0.24	0.31	0.44

Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)			Discharge Q (cfs) (Rational)		
		10-year	25-year	100-year	10-year	25-year	100-year
ONRAN32L	0.63	2.21	2.96	4.11	2.27	3.04	4.21
ONRAN32LA	0.14	0.42	0.55	0.76	0.42	0.55	0.76
ONRAN33LA1	0.10	0.30	0.39	0.54	0.30	0.39	0.54
ONRAN33R	0.61	2.13	2.85	3.95	2.18	2.92	4.05
ONRAN33L	0.38	1.42	1.91	2.65	1.44	1.93	2.67
ONRAN33LA	0.40	1.51	2.03	2.81	1.51	2.03	2.81
ONRAN34L	0.16	0.60	0.81	1.12	0.60	0.81	1.12
ONRAN34R	0.37	1.38	1.85	2.56	1.40	1.88	2.60
ONRAN34LA	0.52	1.88	2.52	3.49	1.93	2.59	3.59



70% SUBMITTAL

REVISIONS

NO.	DATE	DESCRIPTION	APPD

DESIGNED BY:
DRAWN BY:
CHECKED BY:

DATE: XXXXXX

DEPARTMENT OF PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT

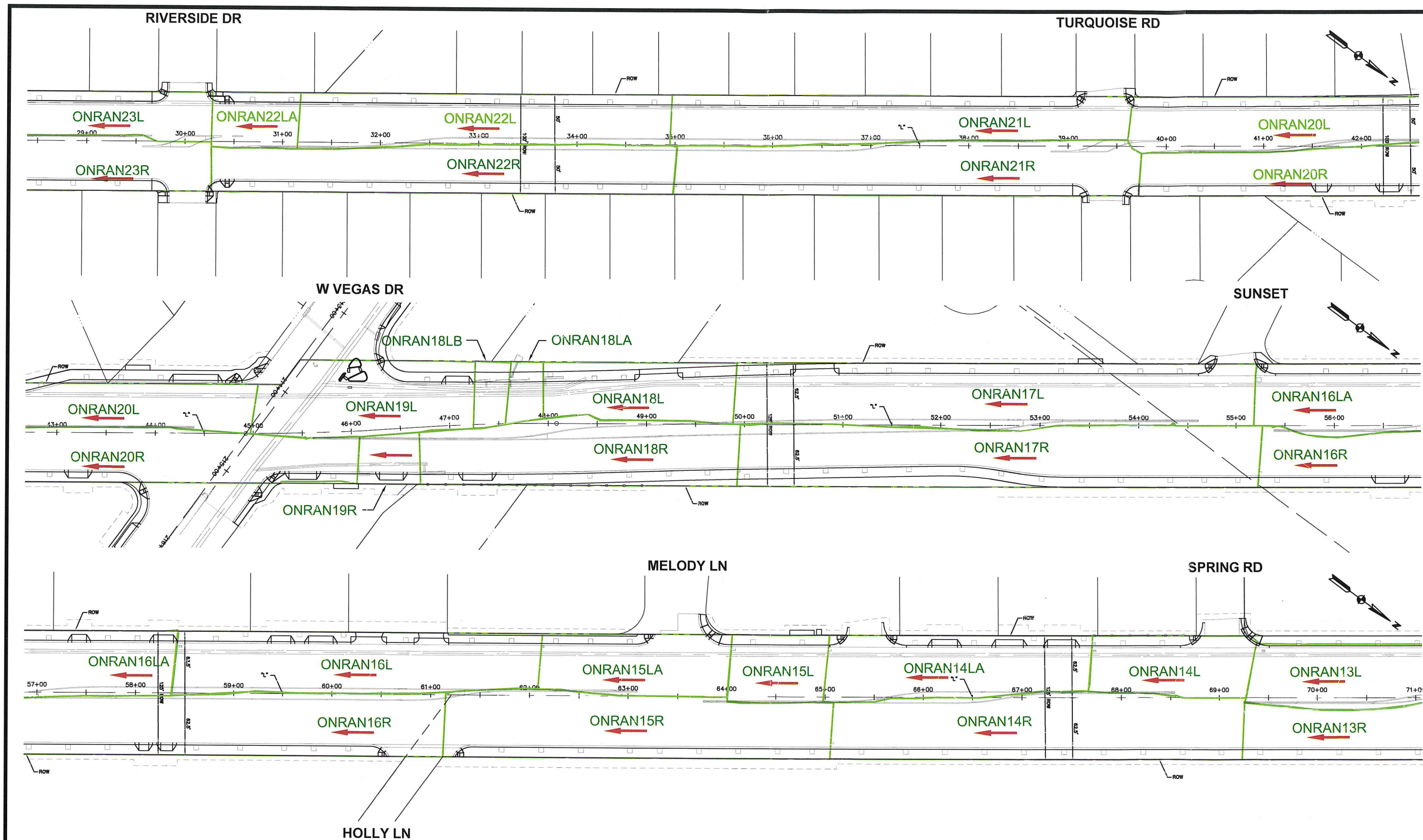
**PARSONS
BRINCKERHOFF**
3753 Howard Hughes Parkway, Suite 135
Las Vegas, NV 89169
Phone: 702.597.9100

TITLE: RANCHO DRIVE CAPACITY IMPROVEMENTS
BONANZA TO DECATUR

SHEET: ONSITE BASIN EXHIBIT
EXISTING CONDITION

Sheet

1 of 4
DRAWING NO.
XXXX



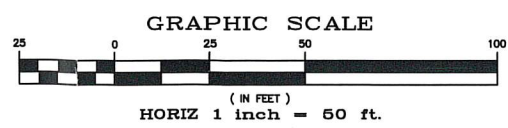
Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)			Discharge Q (cfs) (Rational)		
		10-year	25-year	100-year	10-year	25-year	100-year
ONRAN13R	0.22	0.83	1.12	1.55	0.83	1.12	1.55
ONRAN13L	0.27	1.02	1.37	1.90	1.02	1.37	1.90
ONRAN14R	0.61	2.24	3.00	4.16	2.29	3.08	4.26
ONRAN14L	0.22	0.83	1.12	1.55	0.83	1.12	1.55
ONRAN14LA	0.38	1.44	1.93	2.67	1.44	1.93	2.67
ONRAN15R	0.56	2.05	2.75	3.82	2.10	2.82	3.91
ONRAN15L	0.15	0.57	0.76	1.05	0.57	0.76	1.05
ONRAN15LA	0.26	0.98	1.32	1.83	0.98	1.32	1.83
ONRAN16R	0.80	2.84	3.80	5.27	2.91	3.90	5.40
ONRAN16L	0.52	1.95	2.61	3.62	1.97	2.64	3.66
ONRAN16LA	0.50	1.89	2.54	3.52	1.89	2.54	3.52
ONRAN17R	0.74	2.58	3.45	4.78	2.64	3.54	4.91

Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)			Discharge Q (cfs) (Rational)		
		10-year	25-year	100-year	10-year	25-year	100-year
ONRAN17L	0.77	2.69	3.60	4.99	2.75	3.69	5.12
ONRAN18R	0.47	1.76	2.36	3.27	1.78	2.39	3.30
ONRAN18L	0.26	0.98	1.31	1.82	0.98	1.31	1.82
ONRAN18LA	0.05	0.18	0.25	0.34	0.18	0.25	0.34
ONRAN18LB	0.05	0.19	0.25	0.35	0.19	0.25	0.35
ONRAN19R	0.06	0.23	0.30	0.42	0.23	0.30	0.42
ONRAN19L	0.36	1.36	1.83	2.53	1.36	1.83	2.53
ONRAN20R	0.72	2.36	3.14	4.37	2.42	3.22	4.48
ONRAN20L	0.61	2.05	2.74	3.81	2.10	2.81	3.90
ONRAN21R	0.58	1.98	2.65	3.67	2.03	2.72	3.77
ONRAN21L	0.50	1.73	2.32	3.22	1.77	2.37	3.29
ONRAN22R	0.51	1.67	2.23	3.10	1.71	2.29	3.18

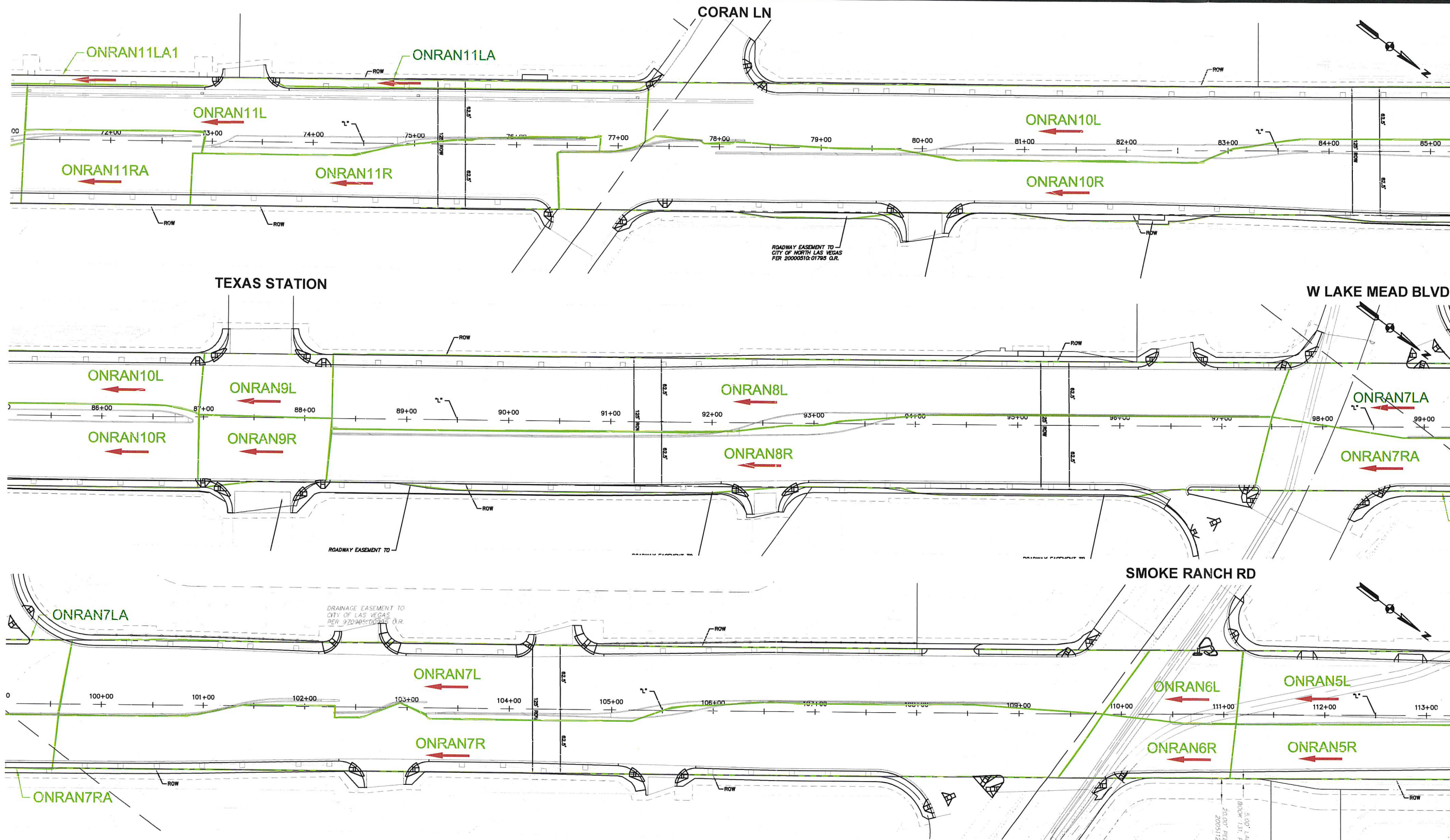
Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)			Discharge Q (cfs) (Rational)		
		10-year	25-year	100-year	10-year	25-year	100-year
ONRAN22L	0.45	1.55	2.07	2.87	1.59	2.12	2.94
ONRAN23R	0.58	1.93	2.58	3.58	1.98	2.65	3.68
ONRAN22LA	0.11	0.43	0.58	0.80	0.43	0.58	0.80
ONRAN23L	0.64	2.20	2.93	4.07	2.25	3.01	4.17

LEGEND:

- SUB-BASIN BOUNDARIES
- ONRAN DRAINAGE BASIN ID
- FLOW DIRECTION



REVISIONS		NO.		DATE		DESCRIPTION		APPD	
DEPARTMENT OF PUBLIC WORKS CAPITAL PROJECT MANAGEMENT PARSONS BRINCKERHOFF 3753 Howard Hughes Parkway, Suite 135 Las Vegas, NV 89169 Phone: 702.897.9100									
TITLE: RANCHO DRIVE CAPACITY IMPROVEMENTS BONANZA TO DECATUR					SHEET: 2 of 4 DRAWING NO. XXXX				
DESIGNED BY: DRAWN BY: CHECKED BY:					DATE: XXXXXX				
ONSITE BASIN EXHIBIT EXISTING CONDITION									
70% SUBMITTAL									



Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)			Discharge Q (cfs) (Rational)		
		10-year	25-year	100-year	10-year	25-year	100-year
ONRAN5R	1.11	3.30	4.38	6.07	3.37	4.47	6.22
ONRAN5L	1.14	3.44	4.57	6.35	3.50	4.65	6.47
ONRAN6R	0.20	0.76	1.02	1.41	0.76	1.02	1.41
ONRAN6L	0.18	0.68	0.91	1.27	0.68	0.91	1.27
ONRAN7R	1.40	4.40	5.84	8.14	4.55	6.06	8.42
ONRAN7L	1.53	5.01	6.68	9.29	5.13	6.85	9.52
ONRAN7LA	0.32	1.21	1.63	2.25	1.21	1.63	2.25
ONRAN7RA	0.28	1.06	1.42	1.97	1.06	1.42	1.97
ONRAN8R	1.38	4.29	5.70	7.94	4.43	5.90	8.21
ONRAN8L	1.44	4.50	5.98	8.33	4.64	6.17	8.59
ONRAN9R	0.19	0.72	0.96	1.34	0.72	0.96	1.34
ONRAN9L	0.18	0.68	0.91	1.27	0.68	0.91	1.27

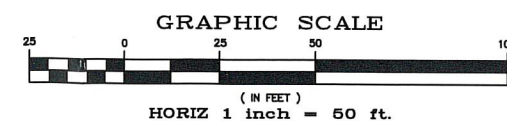
Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)			Discharge Q (cfs) (Rational)		
		10-year	25-year	100-year	10-year	25-year	100-year
ONRAN10R	1.62	5.07	6.74	9.38	5.24	6.97	9.70
ONRAN10L	1.35	4.39	5.84	8.12	4.51	6.01	8.36
ONRAN11R	0.49	1.84	2.48	3.43	1.85	2.49	3.45
ONRAN11L	0.76	2.74	3.67	5.09	2.81	3.76	5.22
ONRAN11LA	0.06	0.18	0.23	0.33	0.18	0.23	0.33
ONRAN11LA1	0.06	0.18	0.23	0.33	0.18	0.23	0.33
ONRAN11RA	0.28	1.06	1.42	1.97	1.06	1.42	1.97

LEGEND:

— SUB-BASIN BOUNDARIES

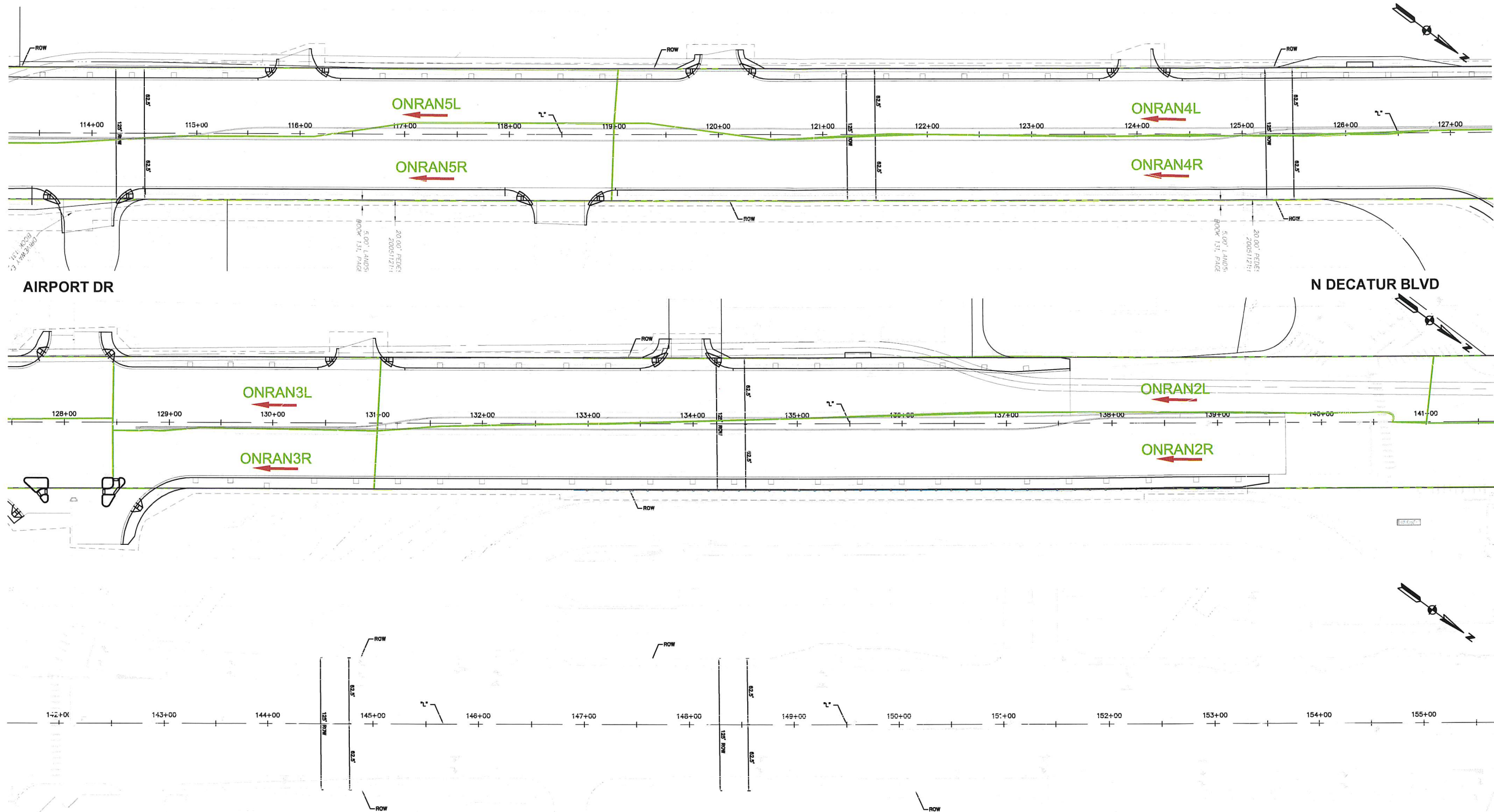
ONRAN DRAINAGE BASIN ID

→ FLOW DIRECTION



70% SUBMITTAL

REVISIONS <table border="1"> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>																											DESIGNED BY: XXXXXX DRAWN BY: XXXXXX CHECKED BY: XXXXXX DATE: XXXXXX		APP'D XXXX
DEPARTMENT OF PUBLIC WORKS CAPITAL PROJECT MANAGEMENT		PARSONS BRINCKERHOFF 3755 Howard Hughes Parkway, Suite 135 Las Vegas, NV 89169 Phone: 702-697-3100																											
TITLE: RANCHO DRIVE CAPACITY IMPROVEMENTS BONANZA TO DECATUR		SHEET: 3 of 4 ONSITE BASIN EXHIBIT EXISTING CONDITION																											

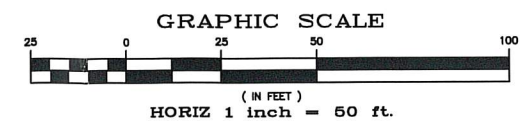


N DECATUR BLVD

Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)			Discharge Q (cfs) (Rational)		
		10-year	25-year	100-year	10-year	25-year	100-year
ONRAN1R	1.43	4.10	5.46	7.51	4.20	5.59	7.72
ONRAN1L	1.43	4.47	5.93	8.26	4.63	6.17	8.58
ONRAN2R	1.65	4.59	6.13	8.38	4.71	6.29	8.64
ONRAN2L	1.32	3.80	5.06	6.96	3.87	5.15	7.11
ONRAN3R	0.32	1.21	1.63	2.25	1.21	1.63	2.25
ONRAN3L	0.40	1.51	2.03	2.81	1.51	2.03	2.81
ONRAN4R	1.37	4.08	5.42	7.50	4.15	5.52	7.67
ONRAN4L	1.26	3.73	4.96	6.86	3.80	5.05	7.01
ONRAN5R	1.11	3.30	4.38	6.07	3.37	4.47	6.22
ONRAN5L	1.14	3.44	4.57	6.35	3.50	4.65	6.47

LEGEND:

- SUB-BASIN BOUNDARIES
- ONRAN DRAINAGE BASIN ID
- FLOW DIRECTION



70% SUBMITTAL

REVISIONS <table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>												DESIGNED BY: XXXXXX DRAWN BY: CHECKED BY:	DATE: XXXXXX NO.	DESCRIPTION APPD
DEPARTMENT OF PUBLIC WORKS CAPITAL PROJECT MANAGEMENT		PARSONS BRINCKERHOFF 3753 Howard Hughes Parkway, Suite 135 Las Vegas, NV 89169 Phone: 702.627.0100												
TITLE: RANCHO DRIVE CAPACITY IMPROVEMENTS BONANZA TO DECATUR		SHEET: ONSITE BASIN EXHIBIT EXISTING CONDITION												
Sheet		4 of 4 DRAWING NO. XXXX												

E. Time of Concentration Calculations - Existing Condition

**RANCHO DRIVE CAPACITY IMPROVEMENTS - BONANZA TO DECATUR
TIME OF CONCENTRATION CALCULATION - EXISTING CONDITIONS - ONSITE BASIN MODEL
RATIONAL AND MODIFIED RATIONAL METHODS**

31650A
Made by: KS
Date 3/2/2012
Checked by NA
Date: 3/10/2012

Sub-Basin Data	2	4	CN	K	5	5A	5B	6	7	8	Initial/Overland Time (T _i)				Travel Time (T _t)			Tc Check (Urbanized Basins)			18	19		
											C ₁₀	K	Area	Area	Lo Initial Length	Slope	T _i (Min)	Modified Rational	Rational	Travel Length			Slope	V ₁
Basin	P/L	Soil group																						
ONRAN1R	P	C	92.00	0.82	0.90	0.90	0.90	1.43	0.0022	58	2.00	3.07	2.23	976	0.005	1.43	2.16	9.50	1034	15.74	12.57	13	11.73	12
ONRAN1L	P	C	92.00	0.82	0.90	0.90	0.90	1.43	0.0022	54	2.00	2.96	2.15	915	0.005	1.43	2.16	9.50	689	13.72	9.68	10	8.87	9
ONRAN2R	P	C	92.00	0.82	0.90	0.90	0.90	1.65	0.0026	70	2.00	3.37	2.45	1070	0.005	1.43	2.16	10.22	1140	13.60	13.60	14	12.67	13
ONRAN2L	P	D	93.00	0.84	0.90	0.90	0.90	1.32	0.0021	52	2.00	2.77	2.11	1000	0.005	1.43	2.16	9.69	1062	15.84	12.45	12	11.79	12
ONRAN3R	P	D	93.00	0.84	0.90	0.90	0.90	0.32	0.0005	42	2.00	2.49	1.90	250	0.010	2.02	3.06	2.06	292	11.62	4.55	5	3.95	5
ONRAN3L	P	D	93.00	0.84	0.90	0.90	0.90	0.40	0.0006	68	2.00	3.16	2.41	250	0.013	2.29	3.48	1.82	318	11.77	4.98	5	4.23	5
ONRAN4R	P	D	93.00	0.84	0.90	0.90	0.90	1.37	0.0021	60	2.00	2.97	2.27	950	0.006	1.60	2.43	8.29	1010	10.10	11.26	11	10.55	11
ONRAN4L	P	D	93.00	0.84	0.90	0.90	0.90	1.26	0.0020	60	2.00	2.97	2.27	950	0.006	1.56	2.37	8.49	1010	15.61	11.46	11	10.76	11
ONRAN5R	P	D	93.00	0.84	0.90	0.90	0.90	1.11	0.0017	72	2.00	3.26	2.48	790	0.005	1.43	2.16	8.07	862	14.79	11.32	11	10.55	11
ONRAN5L	P	D	93.00	0.84	0.90	0.90	0.90	1.14	0.0018	48	2.00	2.66	2.03	790	0.005	1.43	2.16	8.07	838	10.76	10.73	11	10.09	10
ONRAN6R	P	D	93.00	0.84	0.90	0.90	0.90	0.20	0.0003	46	2.00	2.60	1.98	90	0.005	1.43	2.16	1.05	136	10.76	3.65	5	3.03	5
ONRAN6L	P	D	93.00	0.84	0.90	0.90	0.90	0.18	0.0003	52	2.00	2.77	2.11	150	0.005	1.43	2.16	1.75	202	11.12	4.52	5	3.86	5
ONRAN7R	P	D	93.00	0.84	0.90	0.90	0.90	1.40	0.0022	70	2.00	3.21	2.45	942	0.011	2.08	3.15	6.35	1012	15.62	9.56	10	8.79	9
ONRAN7L	P	D	93.00	0.84	0.90	0.90	0.90	1.53	0.0024	38	2.00	2.36	1.80	942	0.011	2.12	3.21	6.23	980	15.44	8.59	9	8.03	8
ONRAN7LA	P	D	93.00	0.84	0.90	0.90	0.90	0.32	0.0005	66	2.00	3.12	2.38	165	0.012	2.22	3.37	1.24	231	11.28	4.35	5	3.61	5
ONRAN7LA	P	D	93.00	0.84	0.90	0.90	0.90	0.28	0.0004	54	2.00	2.82	2.15	165	0.012	2.21	3.35	1.24	219	11.22	4.06	5	3.39	5
ONRAN8R	P	D	93.00	0.84	0.90	0.90	0.90	1.38	0.0022	62	2.00	3.02	2.30	906	0.009	1.89	2.87	6.75	968	15.38	9.78	10	9.06	9
ONRAN8L	P	D	93.00	0.84	0.90	0.90	0.90	1.44	0.0023	54	2.00	2.82	2.15	922	0.009	1.89	2.87	6.85	976	15.42	9.67	10	9.00	9
ONRAN9R	P	D	93.00	0.84	0.90	0.90	0.90	0.19	0.0003	60	2.00	2.97	2.27	126	0.008	1.81	2.74	1.16	186	11.03	4.13	5	3.43	5
ONRAN9L	P	D	93.00	0.84	0.90	0.90	0.90	0.18	0.0003	62	2.00	3.02	2.30	126	0.008	1.81	2.74	1.16	188	11.04	4.18	5	3.46	5
ONRAN10R	P	D	93.00	0.84	0.90	0.90	0.90	1.62	0.0025	66	2.00	3.12	2.38	1053	0.012	2.21	3.35	6.52	1119	16.22	9.63	10	8.89	9
ONRAN10L	P	D	93.00	0.84	0.90	0.90	0.90	1.35	0.0021	49	2.00	2.69	2.05	970	0.012	2.21	3.35	6.10	1019	15.66	8.79	9	8.15	8
ONRAN11R	P	D	93.00	0.84	0.90	0.90	0.90	0.49	0.0008	54	2.00	2.82	2.15	360	0.017	2.61	3.95	2.30	414	12.30	5.12	5	4.45	5
ONRAN11L	P	D	93.00	0.84	0.90	0.90	0.90	0.76	0.0012	46	2.00	2.60	1.98	610	0.017	2.61	3.95	3.66	696	13.64	6.26	6	5.64	6
ONRAN11LA	L	D	93.00	0.84	0.88	0.88	0.88	0.06	0.0001	18	2.00	1.21	1.02	366	0.017	1.93	3.83	3.16	376	12.09	4.37	10	4.18	10
ONRAN11LA1	L	D	93.00	0.84	0.88	0.88	0.88	0.06	0.0001	18	2.00	1.63	1.36	372	0.017	1.93	3.83	3.21	390	12.17	4.84	10	4.58	10
ONRAN11RA	R	D	93.00	0.84	0.90	0.90	0.90	0.28	0.0004	56	2.00	2.87	2.19	166	0.012	2.21	3.35	1.25	222	11.23	4.12	5	3.44	5
ONRAN12R	P	D	93.00	0.84	0.90	0.90	0.90	0.22	0.0003	43	2.00	2.52	1.92	168	0.011	2.09	3.17	1.48	229	11.27	4.00	5	3.40	5
ONRAN13L	P	D	93.00	0.84	0.90	0.90	0.90	0.27	0.0004	58	2.00	2.92	2.23	186	0.011	2.12	3.21	1.46	244	11.36	4.38	5	3.69	5
ONRAN14R	P	D	93.00	0.84	0.90	0.90	0.90	0.61	0.0010	47	2.00	2.63	2.00	418	0.012	2.21	3.35	3.15	465	12.58	5.78	6	5.15	5
ONRAN114L	P	D	93.00	0.84	0.90	0.90	0.90	0.22	0.0003	63	2.00	3.05	2.32	163	0.012	2.21	3.35	1.23	226	11.26	4.27	5	3.55	5
ONRAN14LA	P	D	93.00	0.84	0.90	0.90	0.90	0.38	0.0006	60	2.00	2.97	2.27	265	0.012	2.21	3.35	2.00	325	11.81	4.97	5	4.26	5
ONRAN15R	P	D	93.00	0.84	0.90	0.90	0.90	0.56	0.0009	46	2.00	2.60	1.98	392	0.010	2.04	3.09	3.20	438	12.43	5.80	6	5.19	5
ONRAN15L	P	D	93.00	0.84	0.90	0.90	0.90	0.15	0.0002	66	2.00	3.12	2.38	95	0.010	2.02	3.06	0.78	161	10.89	3.90	5	3.16	5
ONRAN15LA	P	D	93.00	0.84	0.90	0.90	0.90	0.26	0.0004	52	2.00	2.77	2.11	190	0.010	2.02	3.06	1.57	242	11.34	4.33	5	3.68	5
ONRAN16R	P	D	93.00	0.84	0.90	0.90	0.90	0.80	0.0013	47	2.00	2.63	2.00	587	0.013	2.30	3.49	4.03	634	13.52	6.66	7	6.04	6
ONRAN16L	P	D	93.00	0.84	0.90	0.90	0.90	0.52	0.0008	48	2.00	2.66	2.03	369	0.014	2.35	3.56	2.62	417	12.32	5.28	5	4.65	5
ONRAN17R	P	D	93.00	0.84	0.90	0.90	0.90	0.50	0.0008	47	2.00	2.63	2.00	316	0.013	2.27	3.43	2.32	363	12.02	4.95	5	4.33	5
ONRAN17L	P	D	93.00	0.84	0.90	0.90	0.90	0.74	0.0012	46	2.00	2.60	1.98	528	0.009	1.92	2.90	4.51	574	13.19	7.11	7	6.49	6
ONRAN17LA	P	D	93.00	0.84	0.90	0.90	0.90	0.77	0.0012	44	2.00	2.54	1.94	528	0.009	1.92	2.90	4.51	572	13.18	7.05	7	6.45	6
ONRAN18R	P	D	93.00	0.84	0.90	0.90	0.90	0.47	0.0007	48	2.00	2.66	2.03	320	0.010	2.06	3.12	2.59	368	12.04	5.25	5	4.61	5
ONRAN18L	P	D	93.00	0.84	0.90	0.90	0.90	0.26	0.0004	59	2.00	2.95	2.25	192	0.010	2.06	3.12	1.55	251	11.39	4.50	5	3.80	5
ONRAN18LA	P	D	93.00	0.84	0.90	0.90	0.90	0.05	0.0001	57	2.00	2.90	2.21	34	0.010	2.02	3.06	0.28	91	10.51	3.18	5	2.49	5
ONRAN18LB	P	D	93.00	0.84	0.90	0.90	0.90	0.05	0.0001	57	2.00	2.90	2.21	34	0.010	2.02	3.06	0.28	91	10.51	3.18	5	2.49	5
ONRAN19R	P	D	93.00	0.84	0.90	0.90	0.90	0.06	0.0001	41	2.00	2.46	1.87	61	0.010	2.02	3.06	0.50	102	10.57	2.96	5	2.38	5
ONRAN19L	P	D	93.00	0.84	0.90	0.90	0.90	0.36	0.0006	46	2.00	2.60	1.98	106	0.010	2.02	3.06	0.87	152	10.84	3.48	5	2.86	5

RANCHO DRIVE CAPACITY IMPROVEMENTS - BONANZA TO DECATUR
TIME OF CONCENTRATION CALCULATION - EXISTING CONDITIONS - ONSITE BASIN MODEL
RATIONAL AND MODIFIED RATIONAL METHODS31680A
Made by: KS
Date 3/2/2012
Checked by NA
Date: 3/10/2012

Sub-Basin Data	2	P/L	Soil group	CN	4	5	K	5A	5B	6	7	8	Initial/Overland Time (T _i)				Travel Time (T _t)		Tc Check (Urbanized Basins)				18	19	Used																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
													C ₁₀	K	Area	Area	Area	Lo Initial Length	Slope	T _i (Min)	Modified Rational	T _i (Min)				Rational	Travel Length	Slope	V ₁ Velocity	V ₂ Velocity	T _i	Total length	T _c check	Compared Tc (Min)	Used Tc (Min)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
Basin							Modified Rational					(ft)	(%)				(ft)	(ft/ft)	(ft/s)	(ft/s)	(ft)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								</

Made by: KS
Date 3/2/2012
Checked by NA

[illegible]

Equations Used

2 P/L Paved or Desert Landscaping- condition of basin

4 CN For soil group C, use 92 from CCRFCD, 1999 Table 602, 1 of 4
For soil group D, use 93 from CCRFCD, 1999 Table 602, 1 of 4

The surface is "Paved: open dithces (including right of way)
The surface is "Paved: open dithces (including right of way)

C₁₀ 10-Year Runoff Coefficient, for paved; Use 0.9 from CCRFCD, 1999 - Table 601

	K	K=0.0132N+0.39	From CCRFCD, 1999- Equation 603	(For Modified Rational Method)
58	K	Equals C_p	From CCRFCD, 1999 Page 605, first paragraph, Table 601	(For Rational Method)

$$\overline{T} = 1.8(1.1-K)L_0^{0.5}/S^{0.3}$$

From CCRFCD, 1999 - Equation 602

800-275-2773

From page 606, paragraph 2, CCRFCD, 1999

	C=	14.80	(for Non-Urbanized Areas)
	C=	20.20	(for Urbanized Areas, "Paved")

(for Non-Urbanized Areas)
(for Urbanized Areas, "Paved")

14 $V2$ where $C = V2 \cdot CS^{1/2}$

(for Non-Urbanized Areas)
(for Urbanized Areas, "paved")

					(Length-ft; Velocity-fps)
Tt	Length/(Velocity *60) Since L _o is limited to 500ft max per Tt equation, Tt for L <= 500ft, use V1 Tt for L >= 500ft, use V2 for L-500	Con. 1+ Con. 2 Con. 1 Con. 2			

$$T_c \text{ check } T_c = (L/180) + 10$$

From CCRFD, 1999 - Equation 604
 T_c check is for urbanized areas only

18	Tc	If Tc check <= Ti+Tt, use T _c check If Tc check > Ti+Tt, use Ti+Tt
----	----	--

used Tc If Tc Min for paved/ urbanized areas, is less than 5 min, use 5 min
If Tc Min for unpaved/non-urbanized areas, is less than 10 min, use 10 min
The minimum is recommended for non-urban watersheds is 10 minutes. (CORFCD, 1999 - Page 605)
The minimum is recommended for urbanized areas is 5 minutes. (CORFCD, 1999 - Page 606)

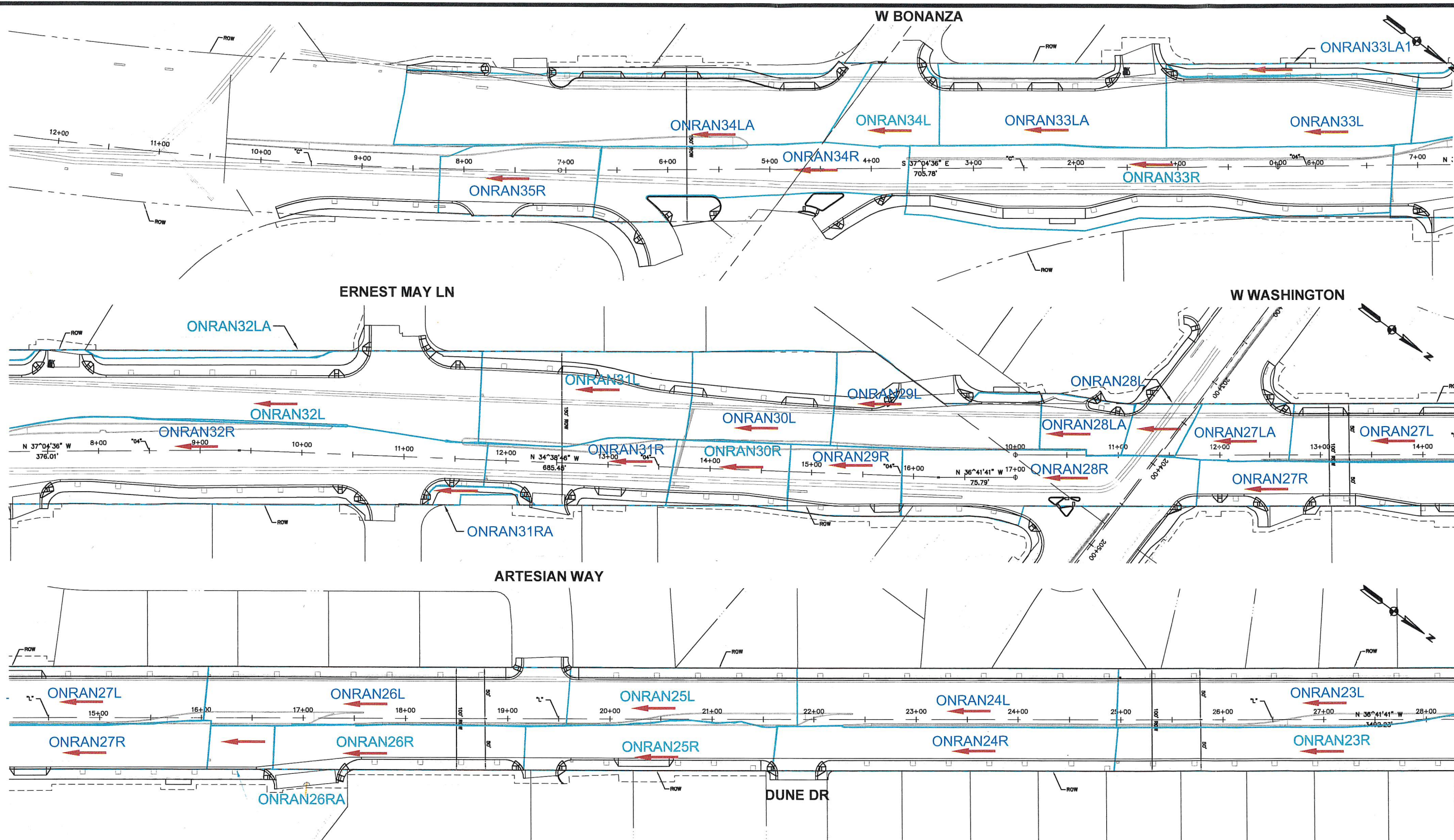
**RANCHO DRIVE CAPACITY IMPROVEMENTS - BONANZA TO DECATUR
RUNOFF CALCULATIONS - EXISTING CONDITIONS - ONSITE BASIN MODEL
RATIONAL AND MODIFIED RATIONAL METHODS**

31690A
Made by: NA
Date 3/2/2012
Checked by KS
Date: 3/10/2012

Basin Name	Area (ac)	P/L	Runoff Coef. (C)			T _c (min)		Intensity (in./hr.) Modified Rational			Intensity (in./hr.) Rational			Discharge (Q) cfs			
			10-year	25-year	100-year	Modified Rational	Rational	10-year	25-year	100-year	10-year	25-year	100-year	10-year	25-year	100-year	(Rational)
ONRAN1R	1.43	P	0.90	0.92	0.93	12.57	11.73	3.18	4.15	5.65	3.26	4.25	5.80	4.10	5.46	7.51	7.72
ONRAN1R	1.43	P	0.90	0.92	0.93	9.68	8.87	3.47	4.51	6.21	3.47	4.59	6.33	4.49	6.17	8.58	8.58
ONRAN2R	1.65	P	0.90	0.92	0.93	13.60	12.67	3.09	4.04	5.46	3.17	4.14	5.63	4.71	6.29	8.64	8.64
ONRAN2L	1.32	P	0.90	0.92	0.93	12.45	11.79	3.19	4.17	5.67	3.26	4.24	5.79	3.87	5.15	7.11	7.11
ONRAN3R	0.32	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.21	1.63	2.25	2.25
ONRAN3L	0.40	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.51	2.03	2.81	2.81
ONRAN4R	1.37	P	0.90	0.92	0.93	11.26	10.55	3.31	4.30	5.89	3.37	4.36	5.92	4.08	5.42	7.67	7.67
ONRAN4L	1.26	P	0.90	0.92	0.93	11.46	10.76	3.29	4.28	5.85	3.35	4.36	5.92	3.80	5.05	7.01	7.01
ONRAN5R	1.11	P	0.90	0.92	0.93	11.32	10.65	3.30	4.29	5.88	3.37	4.38	6.02	3.30	4.37	6.22	6.22
ONRAN5L	1.14	P	0.90	0.92	0.93	10.73	10.09	3.35	4.36	5.89	3.41	4.43	6.10	3.44	4.57	6.35	6.35
ONRAN6R	0.20	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.76	1.02	1.41	1.41
ONRAN6L	0.18	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.68	0.91	1.27	1.27
ONRAN7R	1.40	P	0.90	0.92	0.93	9.56	8.79	3.49	4.54	6.25	3.61	4.70	6.47	4.40	5.84	8.06	8.42
ONRAN7L	1.53	P	0.90	0.92	0.93	8.59	8.03	3.64	4.74	6.53	3.73	4.87	6.69	5.01	6.68	9.29	9.52
ONRAN7L	0.32	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.21	1.63	2.25	2.25
ONRAN7EA	0.28	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.06	1.42	1.97	1.97
ONRAN8R	1.38	P	0.90	0.92	0.93	9.78	9.06	3.46	4.49	6.19	3.57	4.65	6.39	4.29	5.70	7.94	8.21
ONRAN8L	1.44	P	0.90	0.92	0.93	9.67	9.00	3.47	4.51	6.22	3.58	4.66	6.41	4.50	5.98	8.33	8.59
ONRAN9R	0.19	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.72	0.96	1.34	1.34
ONRAN9L	0.18	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.68	0.91	1.27	1.27
ONRAN10R	1.62	P	0.90	0.92	0.93	9.63	8.89	3.48	4.52	6.23	3.59	4.68	6.44	5.07	6.74	9.38	9.70
ONRAN10L	1.35	P	0.90	0.92	0.93	8.79	8.15	3.61	4.70	6.47	3.71	4.84	6.66	4.39	5.84	8.12	8.36
ONRAN11R	0.49	P	0.90	0.92	0.93	5.12	5.00	4.18	5.50	7.53	4.20	5.52	7.56	1.84	2.48	3.43	3.43
ONRAN11L	0.76	P	0.90	0.92	0.93	6.26	5.64	4.01	5.25	7.20	4.10	5.38	7.38	2.74	3.67	5.09	5.22
ONRAN11LA	0.06	L	0.88	0.88	0.89	10.00	10.00	3.42	4.44	6.12	3.42	4.44	6.12	0.18	0.23	0.33	0.33
ONRAN11LA	0.06	L	0.88	0.88	0.89	10.00	10.00	3.42	4.44	6.12	3.42	4.44	6.12	0.18	0.23	0.33	0.33
ONRAN11RA	0.28	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.06	1.42	1.97	1.97
ONRAN13R	0.22	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.83	1.12	1.55	1.55
ONRAN13L	0.27	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.02	1.37	1.90	1.90
ONRAN14R	0.61	P	0.90	0.92	0.93	5.78	5.15	4.08	5.35	7.54	4.18	5.49	7.52	2.24	3.00	4.16	4.28
ONRAN14L	0.22	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.83	1.12	1.55	1.55
ONRAN14LA	0.38	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.44	1.93	2.67	2.67
ONRAN15R	0.56	P	0.90	0.92	0.93	5.80	5.19	4.08	5.35	7.53	4.17	5.48	7.51	2.05	2.75	3.82	3.91
ONRAN15L	0.15	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.57	0.76	1.05	1.05
ONRAN15LA	0.26	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.98	1.32	1.83	1.83
ONRAN16R	0.80	P	0.90	0.92	0.93	6.66	6.04	3.94	5.16	7.08	4.04	5.30	7.26	2.84	3.80	5.27	5.40
ONRAN16L	0.52	P	0.90	0.92	0.93	5.28	5.00	4.16	5.46	7.48	4.20	5.52	7.56	1.95	2.61	3.62	3.66
ONRAN16LA	0.50	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.89	2.54	3.52	3.52
ONRAN17R	0.74	P	0.90	0.92	0.93	7.11	6.49	3.87	5.06	6.95	3.97	5.20	7.13	2.58	3.45	4.78	4.81
ONRAN17L	0.77	P	0.90	0.92	0.93	7.05	6.45	3.88	5.08	6.97	3.98	5.21	7.15	2.69	3.60	4.99	5.12
ONRAN18R	0.47	P	0.90	0.92	0.93	5.25	5.00	4.16	5.47	7.49	4.20	5.52	7.56	1.76	2.36	3.27	3.30
ONRAN18L	0.26	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.96	1.31	1.82	1.82

Column*Referenced from CCRFCD. 1999 (Table 506)

G.Onsite Basin Map - Option A



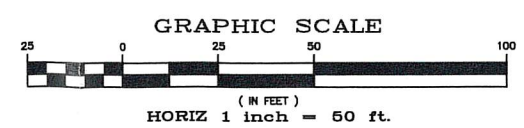
Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)			Discharge Q (cfs) (Rational)		
		10-year	25-year	100-year	10-year	25-year	100-year
ONRAN23R	0.58	1.93	2.58	3.58	1.98	2.65	3.68
ONRAN23L	0.64	2.20	2.93	4.07	2.25	3.01	4.17
ONRAN24R	0.32	1.18	1.58	2.20	1.20	1.62	2.24
ONRAN24L	0.41	1.51	2.02	2.80	1.54	2.07	2.87
ONRAN25R	0.21	0.79	1.07	1.48	0.79	1.07	1.48
ONRAN25L	0.25	0.93	1.25	1.73	0.95	1.27	1.76
ONRAN26R	0.24	0.91	1.22	1.69	0.91	1.22	1.69
ONRAN26L	0.46	1.62	2.17	3.02	1.67	2.23	3.09
ONRAN26RA	0.06	0.23	0.30	0.42	0.23	0.30	0.42
ONRAN27R	0.43	1.48	1.98	2.75	1.52	2.03	2.81
ONRAN27L	0.42	1.51	2.02	2.80	1.54	2.07	2.86
ONRAN27LA	0.13	0.49	0.66	0.91	0.49	0.66	0.91

Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)			Discharge Q (cfs) (Rational)		
		10-year	25-year	100-year	10-year	25-year	100-year
ONRAN28R	0.38	1.44	1.93	2.67	1.44	1.93	2.67
ONRAN28L	0.06	0.23	0.30	0.42	0.23	0.30	0.42
ONRAN28LA	0.10	0.38	0.51	0.70	0.38	0.51	0.70
ONRAN29R	0.17	0.64	0.86	1.20	0.64	0.86	1.20
ONRAN29L	0.30	1.13	1.52	2.11	1.13	1.52	2.11
ONRAN30R	0.17	0.64	0.86	1.20	0.64	0.86	1.20
ONRAN30L	0.28	1.06	1.42	1.97	1.06	1.42	1.97
ONRAN31R	0.24	0.91	1.22	1.69	0.91	1.22	1.69
ONRAN31RA	0.02	0.06	0.08	0.11	0.06	0.08	0.11
ONRAN31L	0.42	1.59	2.13	2.95	1.59	2.13	2.95
ONRAN32R	0.86	2.94	3.93	5.46	3.03	4.05	5.62
ONRAN32L	0.74	2.60	3.48	4.82	2.66	3.57	4.94

Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)			Discharge Q (cfs) (Rational)		
		10-year	25-year	100-year	10-year	25-year	100-year
ONRAN32LA	0.04	0.12	0.16	0.22	0.12	0.16	0.22
ONRAN33LA1	0.10	0.30	0.39	0.54	0.30	0.39	0.54
ONRAN33R	0.78	2.72	3.64	5.05	2.79	3.74	5.18
ONRAN33L	0.38	1.42	1.91	2.65	1.44	1.93	2.67
ONRAN33LA	0.40	1.51	2.03	2.81	1.51	2.03	2.81
ONRAN34L	0.16	0.60	0.81	1.12	0.60	0.81	1.12
ONRAN34R	0.37	1.38	1.85	2.56	1.40	1.88	2.60
ONRAN34LA	0.58	2.10	2.81	3.90	2.15	2.89	4.00
ONRAN35R	0.24	0.89	1.20	1.66	0.89	1.20	1.66

LEGEND:

- SUB-BASIN BOUNDARIES
- ONRAN DRAINAGE BASIN ID
- FLOW DIRECTION



70% SUBMITTAL

REVISIONS

NO.	DATE	DESCRIPTION	APPD

DESIGNED BY:
DRAWN BY:
CHECKED BY:

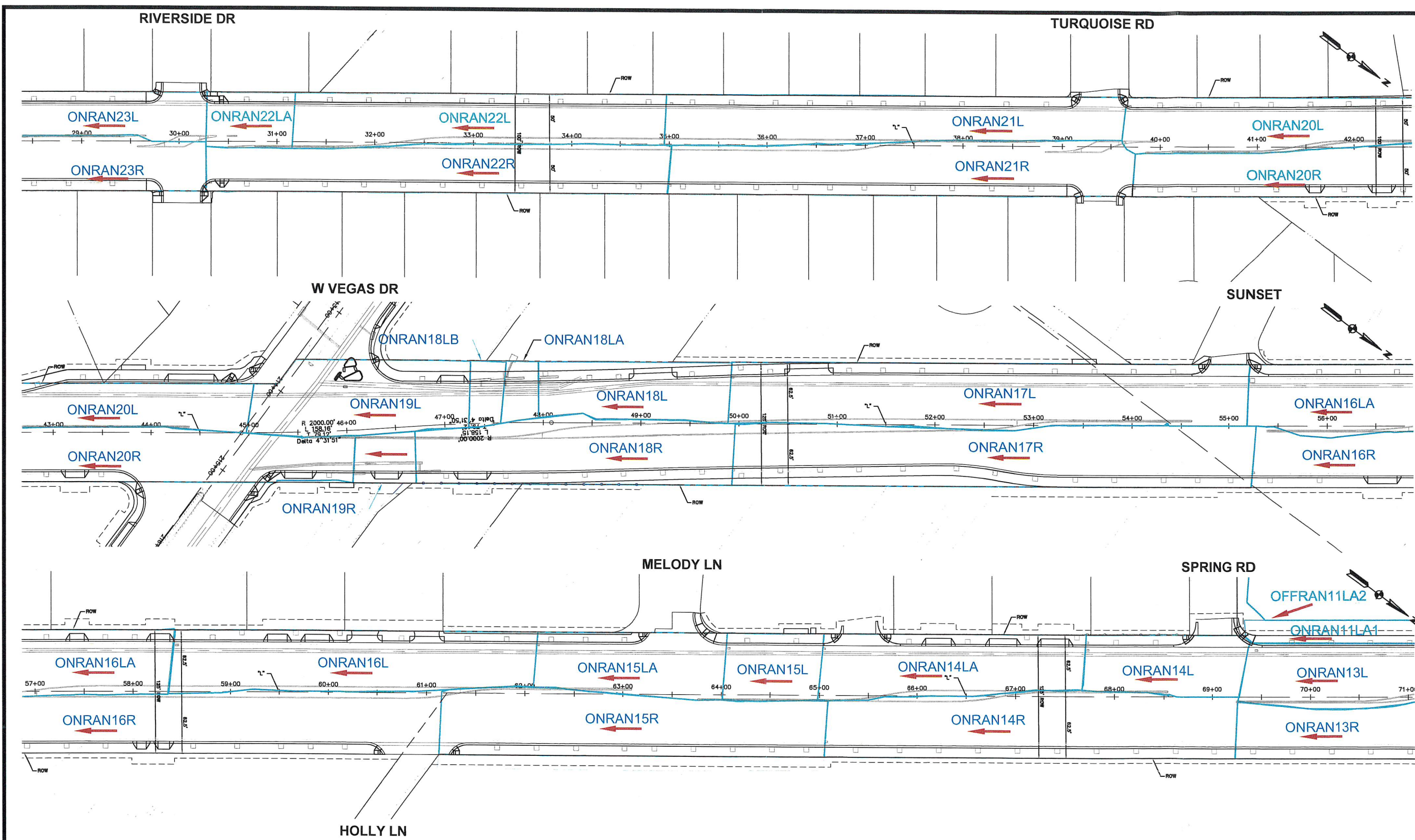
DATE: XXXXXX

DEPARTMENT OF PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT

**PARSONS
BRINCKERHOFF**
3753 Howard Hughes Parkway, Suite 135
Las Vegas, NV 89169
Phone: 702-597-8100

TITLE: RANCHO DRIVE CAPACITY IMPROVEMENTS
BONANZA TO DECATUR

SHEET: ONSITE BASIN EXHIBIT
OPTION A

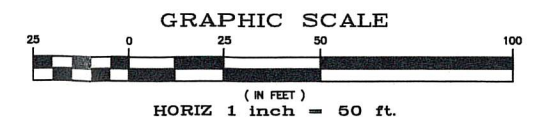


Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)				Discharge Q (cfs) (Rational)			
		10-year	25-year	100-year		10-year	25-year	100-year	
ONRAN13R	0.22	0.83	1.12	1.55		0.83	1.12	1.55	
ONRAN13L	0.27	1.02	1.37	1.90		1.02	1.37	1.90	
ONRAN14R	0.61	2.24	3.00	4.16		2.29	3.08	4.26	
ONRAN14L	0.22	0.83	1.12	1.55		0.83	1.12	1.55	
ONRAN14LA	0.38	1.44	1.93	2.67		1.44	1.93	2.67	
ONRAN15R	0.56	2.05	2.75	3.82		2.10	2.82	3.91	
ONRAN15L	0.15	0.57	0.76	1.05		0.57	0.76	1.05	
ONRAN15LA	0.26	0.98	1.32	1.83		0.98	1.32	1.83	
ONRAN16R	0.80	2.84	3.80	5.27		2.91	3.90	5.40	
ONRAN16L	0.52	1.95	2.61	3.62		1.97	2.64	3.66	
ONRAN16LA	0.50	1.89	2.54	3.52		1.89	2.54	3.52	
ONRAN17R	0.74	2.58	3.45	4.78		2.64	3.54	4.91	

Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)				Discharge Q (cfs) (Rational)			
		10-year	25-year	100-year		10-year	25-year	100-year	
ONRAN17L	0.77	2.69	3.60	4.99		2.75	3.69	5.12	
ONRAN18R	0.47	1.76	2.36	3.27		1.78	2.39	3.30	
ONRAN18L	0.26	0.98	1.31	1.82		0.98	1.31	1.82	
ONRAN18LA	0.05	0.18	0.25	0.34		0.18	0.25	0.34	
ONRAN18LB	0.05	0.19	0.25	0.35		0.19	0.25	0.35	
ONRAN19R	0.06	0.23	0.30	0.42		0.23	0.30	0.42	
ONRAN19L	0.36	1.36	1.83	2.53		1.36	1.83	2.53	
ONRAN20R	0.72	2.36	3.14	4.37		2.42	3.22	4.48	
ONRAN20L	0.61	2.05	2.74	3.81		2.10	2.81	3.90	
ONRAN21R	0.58	1.98	2.65	3.67		2.03	2.72	3.77	
ONRAN21L	0.50	1.73	2.32	3.22		1.77	2.37	3.29	
ONRAN22R	0.51	1.67	2.23	3.10		1.71	2.29	3.18	

Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)				Discharge Q (cfs) (Rational)			
		10-year	25-year	100-year		10-year	25-year	100-year	
ONRAN22L	0.45	1.55	2.07	2.87		1.59	2.12	2.94	
ONRAN22LA	0.11	0.43	0.58	0.80		0.43	0.58	0.80	
ONRAN23R	0.58	1.98	2.64	3.67		2.03	2.71	3.76	
ONRAN23L	0.64	2.20	2.93	4.07		2.25	3.01	4.17	
OFF15R	0.13	0.39	0.51	0.71		0.39	0.51	0.71	
ONRAN11LA1	0.18	0.23	0.33	0.46		0.23	0.33	0.46	
OFFRAN11LA2	0.81	3.06	4.11	5.69		3.06	4.11	5.69	

LEGEND:
SUB-BASIN BOUNDARIES
ONRAN DRAINAGE BASIN ID
FLOW DIRECTION



70% SUBMITTAL

REVISIONS

NO.	DATE	DESCRIPTION	APPD

DESIGNED BY:
DRAWN BY:
CHECKED BY:

DATE: XXXXXX

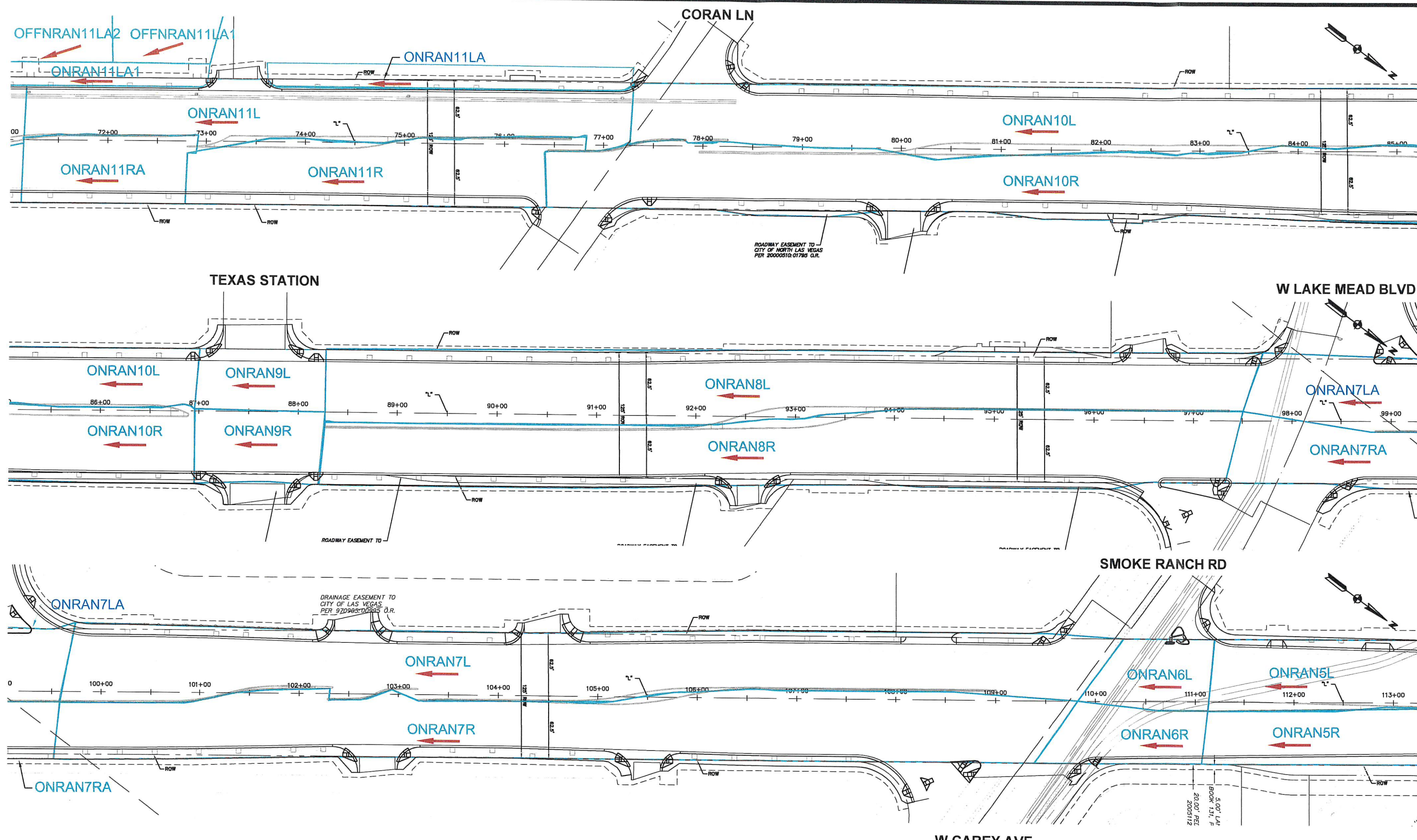
DEPARTMENT OF PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT

**PARSONS
BRINCKERHOFF**
3753 Howard Hughes Parkway, Suite 135
Las Vegas, NV 89169
Phone: 702.499.2300

TITLE: RANCHO DRIVE CAPACITY IMPROVEMENTS
BONANZA TO DECATUR

SHEET: ONSITE BASIN EXHIBIT
OPTION A

Sheet
2 of 4
DRAWING NO. XXXX



Basin Name	Area (ac)	Discharge (Q) cfs (Modified Rational)				Discharge (Q) cfs (Rational)			
		10-year	25-year	100-year		10-year	25-year	100-year	
ONRAN5R	1.11	3.30	4.38	6.07		3.37	4.47	6.22	
ONRAN5L	1.14	3.44	4.57	6.35		3.50	4.65	6.47	
ONRAN6R	0.20	0.76	1.02	1.41		0.76	1.02	1.41	
ONRAN6L	0.18	0.68	0.91	1.27		0.68	0.91	1.27	
ONRAN7R	1.42	4.46	5.93	8.25		4.61	6.14	8.54	
ONRAN7L	1.59	5.21	6.94	9.65		5.33	7.12	9.89	
ONRAN7LA	0.32	1.21	1.63	2.25		1.21	1.63	2.25	
ONRAN7RA	0.29	1.10	1.47	2.04		1.10	1.47	2.04	
ONRAN8R	1.45	4.51	5.99	8.34		4.66	6.20	8.62	
ONRAN8L	1.42	4.44	5.90	8.21		4.57	6.09	8.47	
ONRAN9R	0.21	0.79	1.07	1.48		0.79	1.07	1.48	
ONRAN9L	0.18	0.68	0.91	1.27		0.68	0.91	1.27	

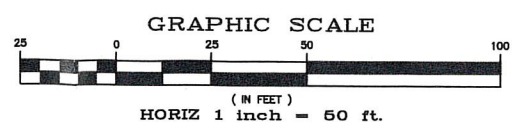
Basin Name	Area (ac)	Discharge (Q) cfs (Modified Rational)				Discharge (Q) cfs (Rational)			
		10-year	25-year	100-year		10-year	25-year	100-year	
ONRAN10R	1.65	5.16	6.86	9.55		5.34	7.10	9.88	
ONRAN10L	1.35	4.39	5.84	8.12		4.51	6.01	8.36	
ONRAN11R	0.49	1.84	2.48	3.43		1.85	2.49	3.45	
ONRAN11L	0.76	2.74	3.67	5.09		2.81	3.76	5.22	
ONRAN11LA	0.06	0.18	0.23	0.33		0.18	0.23	0.33	
ONRAN11LA1	0.06	0.18	0.23	0.33		0.18	0.23	0.33	
ONRAN11RA	0.28	1.06	1.42	1.97		1.06	1.42	1.97	
OFFRAN11LA2	0.97	3.67	4.93	6.82		3.67	4.93	6.82	

LEGEND:

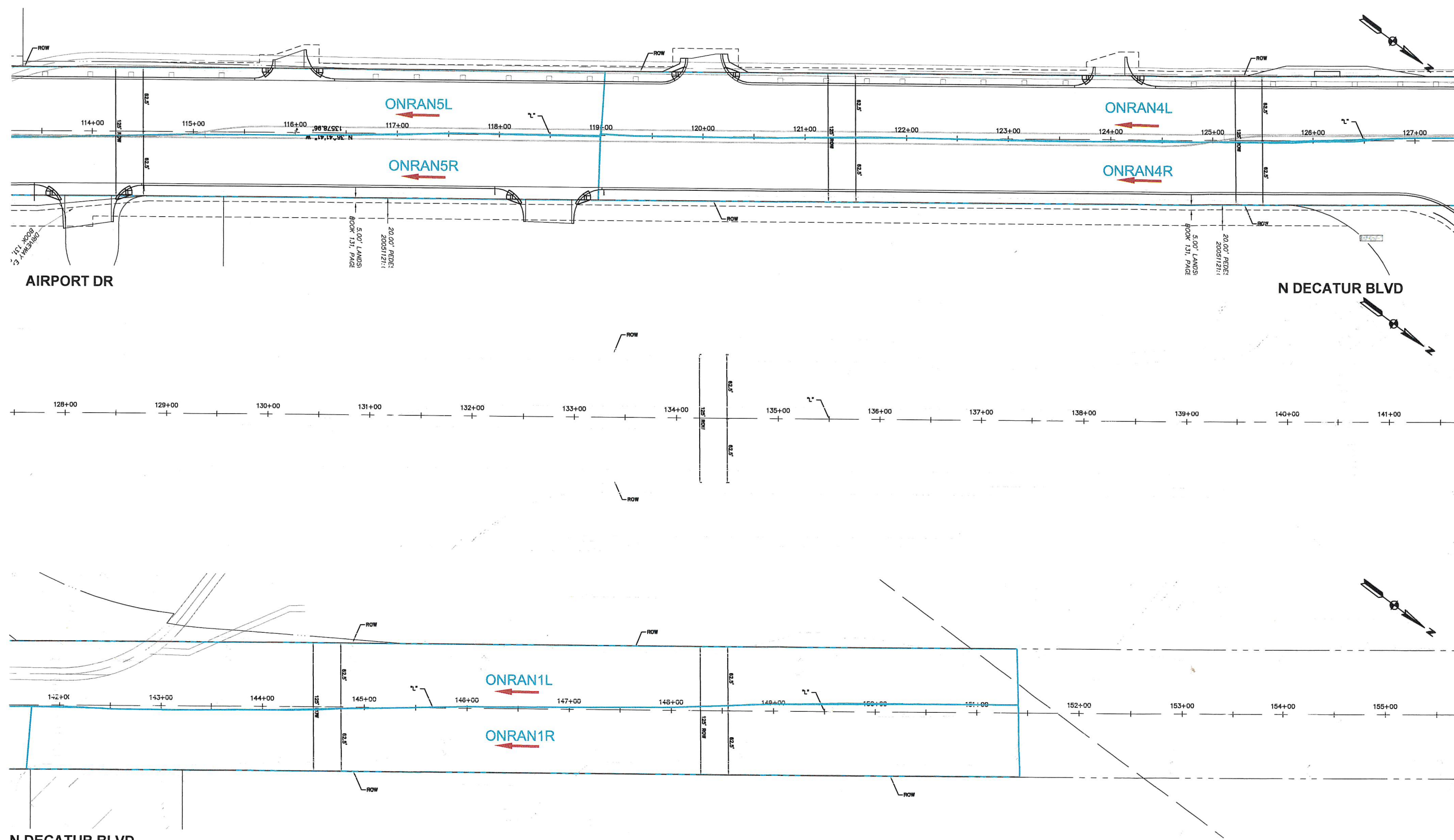
— SUB-BASIN BOUNDARIES

ONRAN DRAINAGE BASIN ID

→ FLOW DIRECTION



REVISIONS <table border="1"> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>																																DESIGNED BY: XXXXXX DRAWN BY: XXXXXX CHECKED BY: XXXXXX DATE: XXXXXX		APP'D DATE: XXXXXX
DEPARTMENT OF PUBLIC WORKS CAPITAL PROJECT MANAGEMENT		TITLE: RANCHO DRIVE CAPACITY IMPROVEMENTS BONANZA TO DECATUR SHEET: 3 of 4																																
PARSONS BRINCKERHOFF 3753 Howard Hughes Parkway, Suite 135 Las Vegas, NV 89169 Phone: 702.587.2100		ONSITE BASIN EXHIBIT OPTION A																																
70% SUBMITTAL DRAWING NO. XXXX																																		



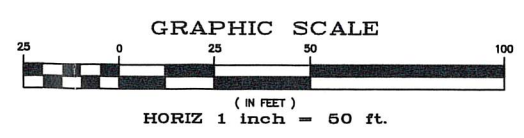
Basin Name	Area (ac)	Discharge Q (cfs) (Modified Rational)			Discharge Q (cfs) (Rational)		
		10-year	25-year	100-year	10-year	25-year	100-year
ONRAN1R	1.43	4.10	5.46	7.51	4.20	5.59	7.72
ONRAN1L	1.43	4.47	5.93	8.26	4.63	6.17	8.58
ONRAN2R	1.65	4.59	6.13	8.38	4.71	6.29	8.64
ONRAN2L	1.32	3.80	5.06	6.96	3.87	5.15	7.11
ONRAN3R	0.32	1.21	1.63	2.25	1.21	1.63	2.25
ONRAN3L	0.40	1.51	2.03	2.81	1.51	2.03	2.81
ONRAN4R	1.37	4.08	5.42	7.50	4.15	5.52	7.67
ONRAN4L	1.26	3.73	4.96	6.86	3.80	5.05	7.01
ONRAN5R	1.11	3.30	4.38	6.07	3.37	4.47	6.22
ONRAN5L	1.14	3.44	4.57	6.35	3.50	4.65	6.47

LEGEND:

— SUB-BASIN BOUNDARIES

ONRAN DRAINAGE BASIN ID

→ FLOW DIRECTION



REVISIONS <table border="1"> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </table>																		DESIGNED BY: X/XX/XXX DRAWN BY: X/XX/XXX CHECKED BY: X/XX/XXX DATE: X/XX/XXX NO. X/XX/XXX APPD X/XX/XXX
DEPARTMENT OF PUBLIC WORKS CAPITAL PROJECT MANAGEMENT 		PARSONS BRINCKERHOFF 3753 Howard Hughes Parkway, Suite 135 Las Vegas, NV 89169 Phone: 702-597-8100																
TITLE: RANCHO DRIVE CAPACITY IMPROVEMENTS BONANZA TO DECATUR SHEET: ONSITE BASIN EXHIBIT OPTION A																		
Sheet 4 of 4 DRAWING NO. XXXX		70% SUBMITTAL																

H. Time of Concentration Calculations - Option A

RANCHO DRIVE CAPACITY IMPROVEMENT - BONANZA TO DECATUR
TIME OF CONCENTRATION CALCULATION - OPTION A INTERIM CONDITION - ONSITE BASIN MODEL
RATIONAL AND MODIFIED RATIONAL METHODS

31690A
Made by: NA
Date 3/2/2012
Checked by KS
Date: 3/10/2012

Sub-Basin Data	2	4	CN	5	K	C ₁₀	5A	5B	K	Area	Area	7	8	Initial/Overland Time (T _i)				Travel Time (T _t)				Tc Check (Unorganized Basins)				Date of Visit					
														9	Slope	T _i (Min)	Modified Rational	10	T _i (Min)	Rational	11	Travel Length	Slope	V ₁ Velocity	12	(ft)	13	V ₁ Velocity	14	V ₂ Velocity	15
Basin	P/L	Soil group																													
ONRANTR	P	C	92.00	0.82	0.90	0.90	0.90	1.43	0.0022	58	2.00	3.07	2.23	976	0.005	1.43	2.16	9.50	1034	15.74	12.57	13	11.73	12							
ONRANTR	P	C	92.00	0.82	0.90	0.90	0.90	1.43	0.0022	54	2.00	2.96	2.15	615	0.005	1.43	2.16	6.72	669	13.72	9.68	10	8.87	9							
ONRANTR	P	C	92.00	0.82	0.90	0.90	0.90	1.65	0.0026	70	2.00	3.37	2.45	1070	0.005	1.43	2.16	10.22	1140	16.33	13.60	14	12.67	13							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	1.32	0.0021	52	2.00	2.77	2.11	1000	0.005	1.43	2.16	9.69	1052	15.84	12.45	12	11.79	12							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	0.32	0.0005	42	2.00	2.49	1.90	250	0.010	2.02	3.06	2.06	292	11.62	4.55	5	3.96	5							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	0.40	0.0006	68	2.00	3.16	2.41	250	0.013	2.28	3.48	1.82	318	11.77	4.98	5	4.23	5							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	1.37	0.0021	60	2.00	2.97	2.27	950	0.006	1.60	2.43	8.29	1010	15.61	11.26	11	10.55	11							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	1.11	0.0017	72	2.00	3.26	2.48	790	0.005	1.43	2.16	8.07	862	14.79	11.32	11	10.55	11							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	1.14	0.0018	48	2.00	2.68	2.03	790	0.005	1.43	2.16	8.07	838	14.66	10.73	11	10.09	10							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	0.20	0.0003	46	2.00	2.60	1.98	90	0.005	1.43	2.16	1.05	136	10.76	3.65	5	3.03	5							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	0.18	0.0003	52	2.00	2.77	2.11	150	0.005	1.43	2.16	1.75	202	11.12	4.52	5	3.86	5							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	1.42	0.0022	70	2.00	3.21	2.45	942	0.011	2.08	3.15	6.35	1012	15.62	9.56	10	8.79	9							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	1.59	0.0025	38	2.00	2.36	1.60	942	0.011	2.12	3.21	6.23	980	15.44	8.59	9	8.03	8							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	0.32	0.0005	66	2.00	3.12	2.38	165	0.012	2.22	3.37	1.24	231	11.28	4.35	5	3.61	5							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	0.29	0.0005	54	2.00	2.82	2.15	166	0.012	2.21	3.35	1.24	219	11.22	4.06	5	3.39	5							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	1.45	0.0023	62	2.00	3.02	2.30	906	0.009	1.89	2.87	6.75	968	15.38	9.78	10	9.06	9							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	1.42	0.0022	54	2.00	2.82	2.15	922	0.009	1.89	2.87	6.85	976	15.42	9.67	10	9.00	9							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	0.21	0.0003	60	2.00	2.97	2.27	126	0.008	1.81	2.74	1.16	186	11.03	4.13	5	3.43	5							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	0.18	0.0003	62	2.00	3.02	2.30	126	0.008	1.81	2.74	1.16	188	11.04	4.18	5	3.46	5							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	1.65	0.0026	66	2.00	3.12	2.38	1053	0.012	2.21	3.35	6.52	1119	16.22	9.63	10	8.89	9							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	1.35	0.0021	49	2.00	2.69	2.05	970	0.012	2.21	3.35	6.10	1019	15.66	8.79	9	8.15	8							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	0.49	0.0008	54	2.00	2.82	2.15	360	0.017	2.61	3.95	2.30	414	12.30	5.12	5	4.45	5							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	0.76	0.0012	46	2.00	2.60	1.98	610	0.017	2.61	3.95	3.66	666	13.64	6.26	6	5.84	6							
ONRANTR	L	D	93.00	0.84	0.88	0.88	0.88	0.06	0.0001	10	2.00	1.21	1.02	366	0.017	1.93	3.83	3.16	376	12.09	4.37	10	4.18	10							
ONRANTR1L1	L	D	93.00	0.84	0.88	0.88	0.88	0.06	0.0001	18	2.00	1.63	1.36	372	0.017	1.93	3.83	3.21	380	12.17	4.84	10	4.58	10							
OFFRANTR1L1A1	P	D	93.00	0.84	0.90	0.90	0.90	0.81	0.0013	65	2.00	3.09	2.36	183	0.050	4.52	6.84	0.68	248	11.38	3.77	5	3.03	5							
OFFRANTR1L1A2	P	D	93.00	0.84	0.90	0.90	0.90	0.97	0.0015	26	2.00	1.96	1.49	250	0.050	4.52	6.84	0.92	276	11.53	2.88	5	2.41	5							
ONRANTR1RA	P	D	93.00	0.84	0.90	0.90	0.90	0.28	0.0004	56	2.00	2.87	2.19	166	0.012	2.21	3.35	1.25	222	11.23	4.12	5	3.44	5							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	0.22	0.0003	43	2.00	2.52	1.92	188	0.011	2.09	3.17	1.48	229	11.27	4.00	5	3.40	5							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	0.27	0.0004	56	2.00	2.92	2.23	186	0.011	2.12	3.21	1.46	244	11.36	4.38	5	3.89	5							
ONRANTR	P	D	93.00	0.84	0.90	0.90	0.90	0.61	0.0010	47	2.00	2.63	2.00	418	0.012	2.21	3.35	3.15	465	12.58	5.78	6	5.15	5							
ONRANTR1L	P	D	93.00	0.84	0.90	0.90	0.90	0.22	0.0003	63	2.00	3.05	2.32	163	0.012	2.21	3.35	1.23	226	11.26	4.27	5	3.55	5							
ONRANTR1L4L	P	D	93.00	0.84	0.90	0.90	0.90	0.38	0.0006	60	2.00	2.97	2.27	265	0.012	2.21	3.35	2.00	325	11.81	4.97	5	4.26	5							
ONRANTR14LA	P	D	93.00	0.84	0.90	0.90	0.90	0.56	0.0009	46	2.00	2.60	1.98	392	0.010	2.04	3.09	3.20	438	12.43	5.80	6	5.19	5							
ONRANTR1R	P	D	93.00	0.84	0.90	0.90	0.90	0.13	0.0002	13	4.00	1.12	0.94	392	0.010	1.49	2.97	4.37	438	12.43	5.49	10	5.31	10							
OFFR1ER	L	D	93.00	0.84	0.88	0.88	0.88	0.13	0.0002	13	4.00	1.12	0.94	392	0.010	1.49	2.97	4.37	438	12.43	5.49	10	5.31	10							
ONRANTR1L	P	D	93.00	0.84	0.90	0.90	0.90	0.15	0.0002	66	2.00	3.12	2.38	95	0.010	2.02	3.06	0.78	161	10.89	3.90	5	3.16	5							
ONRANTR15LA	P	D	93.00	0.84	0.90	0.90	0.90	0.26	0.0004	52	2.00	2.77	2.11	190	0.010	2.02	3.06	1.57	242	11.34	4.33	5	3.68	5							
ONRANTR16R	P	D	93.00	0.84	0.90	0.90	0.90	0.80	0.0013	47	2.00	2.63	2.00	587	0.013	2.30	3.49	4.03	634	13.52	6.66	7	6.04	6							
ONRANTR16L	P	D	93.00	0.84	0.90	0.90	0.90	0.52	0.0008	48	2.00	2.66	2.03	369	0.014	2.35	3.56	2.62	417	12.32	5.28	5	4.85	5							
ONRANTR16LA	P	D	93.00	0.84	0.90	0.90	0.90	0.50	0.0008	47	2.00	2.63	2.00	316	0.013	2.27	3.43	2.32	363	12.02	4.95	5	4.33	5							
ONRANTR17R	P	D	93.00	0.84	0.90	0.90	0.90	0.74	0.0012	46	2.00	2.60	1.98	528	0.009	1.92	2.90	4.51	574	13.19	7.11	7	6.49	6							
ONRANTR17L	P	D	93.00	0.84	0.90	0.90	0.90	0.77	0.0012	44	2.00	2.54	1.94	528	0.009	1.92	2.90	4.51	572	13.18	7.05	7	6.45	6							
ONRANTR18R	P	D	93.00	0.84	0.90	0.90	0.90	0.47	0.0007	48	2.00	2.66	2.03	320	0.010	2.06	3.12	2.59	368	12.04	5.25	5	4.61	5							
ONRANTR18L	P	D	93.00																												

**RANCHO DRIVE CAPACITY IMPROVEMENT - BONANZA TO DECATUR
TIME OF CONCENTRATION CALCULATION - OPTION A INTERIM CONDITION - ONSITE BASIN MODEL
RATIONAL AND MODIFIED RATIONAL METHODS**

31690A
Made by: NA
Date 3/2/2012
Checked by KS
Date: 3/10/2012

Sub-Basin Data	2	P/L	Soil group	CN	K	5	5A	5B	6	7	8	Initial/Overland Time (T _i)				Travel Time (T _t) (min)	12	13	14	15	16	Tc Check (Urbanized Basins)		18	19	Used	Tc (Min)	18	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	Tc (Min)	19	Used	T
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**RANCHO DRIVE CAPACITY IMPROVEMENT - BONANZA TO DECATUR
TIME OF CONCENTRATION CALCULATION - OPTION A INTERIM CONDITION - ONSITE BASIN MODEL
RATIONAL AND MODIFIED RATIONAL METHODS**

31690A
Made by: NA
Date: 3/2/2012
Checked by: KS
Date: 3/10/2012

Sub-Basin Data										Initial/Overland Time (T _i)				Travel Time (T _t)					Tc Check (Urbanized Basins)					
	1	2	4	5	5A	5B	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Used	19	19	
Basin	P/L	Soil group	CN	K	C ₁₀	K	Area	Area	Length	Slope	T _i (Min)	T _t (Min)	Length	Slope	Velocity	V ₁	V ₂	Total length	T _c check	Compared T _c (Min)	Used T _c (Min)	Compared T _c (Min)	Tc (Min)	
ONFAN39R	p	D	93.0	0.840	0.90	Rational	(Acres)	(sq mi)	(ft)	(%)	Modified Rational	Rational	(ft)	(ft/ft)	(ft/s)	(ft/s)	(ft/s)	(ft)	(Min)	Modified Rational	Rational	5	2.93	5

Equations Used

- 2 P/L Paved or Desert Landscaping- condition of basin
- 4 CN For soil group C, use 92 from CCRFCD, 1999 Table 602, 1 of 4
For soil group D, use 93 from CCRFCD, 1999 Table 602, 1 of 4
The surface is "Paved: open ditches (including right of way)"
The surface is "Paved: open ditches (including right of way)"
- 5A C₁₀ 10-Year Runoff Coefficient, for paved; Use 0.9 from CCRFCD, 1999 - Table 601
- 5 K K= 0.0132CN+0.39 From CCRFCD, 1999- Equation 603
Equals C₁₀ From CCRFCD, 1999 Page 605, first paragraph, Table 601 (For Modified Rational Method)
- 5B K K= 0.0132CN+0.39 From CCRFCD, 1999 Page 605, first paragraph, Table 601 (For Rational Method)
- 10 T_i T_i = 1.8(1 - K)₁₀ * 0.5/S * 0.3 From CCRFCD, 1999 - Equation 602
L₀ = 500ft-max
- 13 V₁ where C = V₁ = CS^{1/2}
C = 14.80 (for Non-Urbanized Areas)
20.20 (for Urbanized Areas, "Paved")
- 14 V₂ where C = V₂ = CS^{1/2}
C = 28.40 (for Non-Urbanized Areas)
30.60 (for Urbanized Areas, "Paved")
- 15 T_t Length/(Velocity * 60) Con. 1 + Con. 2 (Length-ft; Velocity-ft/s)
Since L₀ is limited to 500ft max, per T_i equation,
T_t for L < 500ft, use V₁ Con. 1
T_t for L > 500ft, use V₂ for L-500 Con. 2
- 17 T_c check T_c = (L₀/180) + 10 From CCRFCD, 1999 - Equation 604
L = L₀ + Travel length T_c check is for urbanized areas only
- 18 T_c If T_c check <= T_i + T_t, use T_c check
If T_c check > T_i + T_t, use T_i + T_t
- 19 used T_c If T_c Min for paved/ urbanized areas, is less than 5 min, use 5 min
If T_c Min for unpaved/non-urbanized areas, is less than 10 min, use 10 min
The minimum to recommended for non-urban watersheds is 10 minutes. (CCRFCD, 1999 - Page 605)
The minimum to recommended for urbanized areas is 5 minutes. (CCRFCD, 1999 - Page 606)

I. Runoff Calculations – Interim Condition - Option A

**RANCHO DRIVE CAPACITY IMPROVMENTS - BONANZA TO DECATUR
RUNOFF CALCULATIONS - OPTION A INTERIM CONDITION - ONSITE BASIN MODEL
RATIONAL AND MODIFIED RATIONAL METHODS**

31690A
Made by: NA
Date 11/20/2013
Checked by KS
Date: 12/4/2013

Basin Name	Area (ac)	P/L	Runoff Coef. (C)			T _e (min)		Intensity (in./hr.) Modified Rational			Intensity (in./hr.) Rational			Discharge Q (cfs (Modified Rational))			Discharge Q (cfs (Rational))		
			10-year	25-year	100-year	Modified Rational	Rational	10-year	25-year	100-year	10-year	25-year	100-year	10-year	25-year	100-year	10-year	25-year	100-year
ONRAN1R	1.43	P	0.90	0.92	0.93	12.57	11.73	3.18	4.15	5.65	3.26	4.25	5.80	4.10	5.46	7.51	4.20	5.59	7.72
ONRAN1L	1.43	P	0.90	0.92	0.93	9.68	8.87	3.47	4.51	6.21	3.60	4.69	6.45	4.47	5.93	8.26	4.63	6.17	8.58
ONRAN2R	1.65	P	0.90	0.92	0.93	13.60	12.67	3.09	4.04	5.46	3.17	4.14	5.63	4.59	6.13	8.38	4.71	6.29	8.64
ONRAN2L	1.32	P	0.90	0.92	0.93	12.45	11.79	3.19	4.17	5.67	3.26	4.24	5.79	3.80	5.06	6.96	3.87	5.15	7.11
ONRAN3R	0.32	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.21	1.63	2.25	1.21	1.63	2.25
ONRAN3L	0.40	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.51	2.03	2.81	1.51	2.03	2.81
ONRAN4R	1.37	P	0.90	0.92	0.93	11.26	10.55	3.31	4.30	5.89	3.37	4.38	6.02	4.08	5.42	7.50	4.15	5.52	7.67
ONRAN4L	1.26	P	0.90	0.92	0.93	11.46	10.76	3.29	4.28	5.85	3.35	4.36	5.98	3.73	4.96	6.86	3.80	5.05	7.01
ONRAN5R	1.11	P	0.90	0.92	0.93	11.32	10.55	3.30	4.29	5.88	3.37	4.38	6.02	3.30	4.38	6.07	3.37	4.47	6.22
ONRAN5L	1.14	P	0.90	0.92	0.93	10.73	10.09	3.35	4.36	5.99	3.41	4.43	6.10	3.44	4.57	6.35	3.50	4.65	6.47
ONRAN6R	0.20	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.76	1.02	1.41	0.76	1.02	1.41
ONRAN6L	0.18	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.68	0.91	1.27	0.68	0.91	1.27
ONRAN7R	1.42	P	0.90	0.92	0.93	9.56	8.79	3.49	4.54	6.25	3.61	4.70	6.47	4.46	5.93	8.25	4.61	6.14	8.54
ONRAN7L	1.59	P	0.90	0.92	0.93	8.59	8.03	3.64	4.74	6.53	3.73	4.87	6.69	5.21	6.94	9.65	5.33	7.12	9.89
ONRAN7LA	0.32	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.21	1.63	2.25	1.21	1.63	2.25
ONRAN7RA	0.29	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.10	1.47	2.04	1.10	1.47	2.04
ONRAN8R	1.45	P	0.90	0.92	0.93	9.78	9.06	3.46	4.49	6.19	3.57	4.65	6.39	4.51	5.99	8.34	4.66	6.20	8.62
ONRAN8L	1.42	P	0.90	0.92	0.93	9.67	9.00	3.47	4.51	6.22	3.58	4.66	6.41	4.44	5.90	8.21	4.57	6.09	8.47
ONRAN9R	0.21	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.79	1.07	1.48	0.79	1.07	1.48
ONRAN9L	0.18	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.68	0.91	1.27	0.68	0.91	1.27
ONRAN10R	1.65	P	0.90	0.92	0.93	9.63	8.89	3.48	4.52	6.23	3.59	4.68	6.44	5.16	6.86	9.55	5.34	7.10	9.88
ONRAN10L	1.35	P	0.90	0.92	0.93	8.79	8.15	3.61	4.70	6.47	3.71	4.84	6.66	4.39	5.84	8.12	4.51	6.01	8.36
ONRAN11R	0.49	P	0.90	0.92	0.93	5.12	5.00	4.18	5.50	7.53	4.20	5.52	7.56	1.84	2.48	3.43	1.85	2.49	3.45
ONRAN11L	0.76	P	0.90	0.92	0.93	6.26	5.64	4.01	5.25	7.20	4.10	5.38	7.38	2.74	3.67	5.09	2.81	3.76	5.22
ONRAN11LA	0.06	L	0.88	0.88	0.89	10.00	10.00	3.42	4.44	6.12	3.42	4.44	6.12	0.18	0.23	0.33	0.18	0.23	0.33
ONRAN11LA1	0.06	L	0.88	0.88	0.89	10.00	10.00	3.42	4.44	6.12	3.42	4.44	6.12	0.18	0.23	0.33	0.18	0.23	0.33
OFFRAN11LA1	0.81	p	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	3.06	4.11	5.69	3.06	4.11	5.69
OFFRAN11LA2	0.97	p	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	3.67	4.93	6.82	3.67	4.93	6.82
ONRAN11RA	0.28	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.06	1.42	1.97	1.06	1.42	1.97
ONRAN13R	0.22	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.83	1.12	1.55	0.83	1.12	1.55
ONRAN13L	0.27	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.02	1.37	1.90	1.02	1.37	1.90
ONRAN14R	0.61	P	0.90	0.92	0.93	5.78	5.15	4.08	5.35	7.34	4.18	5.49	7.52	2.24	3.00	4.16	2.29	3.08	4.26
ONRAN14L	0.22	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.83	1.12	1.55	0.83	1.12	1.55
ONRAN14LA	0.38	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.44	1.93	2.67	1.44	1.93	2.67
ONRAN15R	0.56	P	0.90	0.92	0.93	5.80	5.19	4.08	5.35	7.33	4.17	5.48	7.51	2.05	2.75	3.82	2.10	2.82	3.91
OFF15R	0.13	L	0.88	0.88	0.89	10.00	10.00	3.42	4.44	6.12	3.42	4.44	6.12	0.39	0.51	0.71	0.39	0.51	0.71
ONRAN15L	0.15	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.57	0.76	1.05	0.57	0.76	1.05
ONRAN15LA	0.26	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.98	1.32	1.83	0.98	1.32	1.83
ONRAN16R	0.80	P	0.90	0.92	0.93	6.66	6.04	3.94	5.16	7.08	4.04	5.30	7.26	2.84	3.80	5.27	2.91	3.90	5.40
ONRAN16L	0.52	P	0.90	0.92	0.93	5.28	5.00	4.16	5.46	7.48	4.20	5.52	7.56	1.95	2.61	3.62	1.97	2.64	3.66
ONRAN16LA	0.50	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.89	2.54	3.52	1.89	2.54	3.52
ONRAN17R	0.74	P	0.90	0.92	0.93	7.11	6.49	3.87	5.06	6.95	3.97	5.20	7.13	2.58	3.45	4.78	2.64	3.54	4.91
ONRAN17L	0.77	P	0.90	0.92	0.93	7.05	6.45	3.88	5.08	6.97	3.98	5.21	7.15	2.69	3.60	4.99	2.75	3.69	5.12
ONRAN18R	0.47	P	0.90	0.92	0.93	5.25	5.00	4.16	5.47	7.49	4.20	5.52	7.56	1.76	2.36	3.27	1.78	2.39	3.30
ONRAN18L	0.26	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.98	1.31	1.82	0.98	1.31	1.82
ONRAN18LA	0.05	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.18	0.25	0.34	0.18	0.25	0.34
ONRAN18LB	0.05	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.19	0.25	0.35	0.19	0.25	0.35
ONRAN19R	0.06	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.23	0.30	0.42	0.23	0.30	0.42
ONRAN19L	0.36	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.36	1.83	2.53	1.36	1.83	2.53

**RANCHO DRIVE CAPACITY IMPROVMENTS - BONANZA TO DECATUR
RUNOFF CALCULATIONS - OPTION A INTERIM CONDITION - ONSITE BASIN MODEL
RATIONAL AND MODIFIED RATIONAL METHODS**

31690A
Made by: NA
Date 11/20/2013
Checked by KS
Date: 12/4/2013

Basin Name	Area (ac)	P/L	Runoff Coef. (C)			T _c (min)		Intensity (in./hr.) Modified Rational			Intensity (in./hr.) Rational			Discharge Q (cfs (Modified Rational))			Discharge Q (cfs (Rational))		
			10-year	25-year	100-year	Modified Rational	Rational	10-year	25-year	100-year	10-year	25-year	100-year	10-year	25-year	100-year	10-year	25-year	100-year
ONRAN20R	0.72	P	0.90	0.92	0.93	8.59	8.03	3.64	4.75	6.53	3.73	4.87	6.69	2.36	3.14	4.37	2.42	3.22	4.48
ONRAN20L	0.61	P	0.90	0.92	0.93	7.97	7.40	3.74	4.88	6.71	3.83	5.00	6.87	2.05	2.74	3.81	2.10	2.81	3.90
ONRAN21R	0.58	P	0.90	0.92	0.93	7.60	6.99	3.79	4.96	6.81	3.89	5.09	6.99	1.98	2.65	3.67	2.03	2.72	3.77
ONRAN21L	0.50	P	0.90	0.92	0.93	7.23	6.69	3.85	5.04	6.92	3.94	5.15	7.07	1.73	2.32	3.22	1.77	2.37	3.29
ONRAN22R	0.51	P	0.90	0.92	0.93	8.56	7.98	3.65	4.75	6.54	3.74	4.88	6.70	1.67	2.23	3.10	1.71	2.29	3.18
ONRAN22L	0.45	P	0.90	0.92	0.93	7.42	6.83	3.82	5.00	6.87	3.92	5.13	7.04	1.55	2.07	2.87	1.59	2.12	2.94
ONRAN22LA	0.11	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.43	0.58	0.80	0.43	0.58	0.80
ONRAN24L	0.41	P	0.90	0.92	0.93	5.74	5.15	4.08	5.36	7.35	4.18	5.49	7.52	1.51	2.02	2.80	1.54	2.07	2.87
ONRAN23R	0.58	P	0.90	0.92	0.93	7.61	7.02	3.79	4.96	6.81	3.88	5.08	6.98	1.98	2.64	3.67	2.03	2.71	3.76
ONRAN23L	0.64	P	0.90	0.92	0.93	7.49	6.93	3.81	4.98	6.84	3.90	5.11	7.01	2.20	2.93	4.07	2.25	3.01	4.17
ONRAN24R	0.32	P	0.90	0.92	0.93	5.64	5.11	4.10	5.38	7.38	4.18	5.50	7.53	1.18	1.58	2.20	1.20	1.62	2.24
ONRAN25R	0.21	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.79	1.07	1.48	0.79	1.07	1.48
ONRAN25L	0.25	P	0.90	0.92	0.93	5.46	5.00	4.13	5.42	7.43	4.20	5.52	7.56	0.93	1.25	1.73	0.95	1.27	1.76
ONRAN26R	0.24	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.91	1.22	1.69	0.91	1.22	1.69
ONRAN26L	0.46	P	0.90	0.92	0.93	6.78	6.14	3.92	5.14	7.05	4.02	5.27	7.23	1.62	2.17	3.02	1.67	2.23	3.09
ONRAN26RA	0.06	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.23	0.30	0.42	0.23	0.30	0.42
ONRAN27R	0.43	P	0.90	0.92	0.93	7.38	6.82	3.83	5.01	6.87	3.92	5.13	7.04	1.48	1.98	2.75	1.52	2.03	2.81
ONRAN27L	0.42	P	0.90	0.92	0.93	6.41	5.80	3.98	5.22	7.16	4.08	5.35	7.33	1.51	2.02	2.80	1.54	2.07	2.86
ONRAN27LA	0.13	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.49	0.66	0.91	0.49	0.66	0.91
ONRAN28R	0.38	P	0.90	0.92	0.93	5.02	5.00	4.20	5.52	7.55	4.20	5.52	7.56	1.44	1.93	2.67	1.44	1.93	2.67
ONRAN28L	0.06	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.23	0.30	0.42	0.23	0.30	0.42
ONRAN28LA	0.10	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.38	0.51	0.70	0.38	0.51	0.70
ONRAN29R	0.17	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.64	0.86	1.20	0.64	0.86	1.20
ONRAN29L	0.30	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.13	1.52	2.11	1.13	1.52	2.11
ONRAN30R	0.17	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.64	0.86	1.20	0.64	0.86	1.20
ONRAN30L	0.28	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.06	1.42	1.97	1.06	1.42	1.97
ONRAN31R	0.24	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.91	1.22	1.69	0.91	1.22	1.69
ONRAN31RA	0.02	L	0.88	0.88	0.89	10.00	10.00	3.42	4.44	6.12	3.42	4.44	6.12	0.06	0.08	0.11	0.06	0.08	0.11
ONRAN31L	0.42	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.59	2.13	2.95	1.59	2.13	2.95
ONRAN32R	0.86	P	0.90	0.92	0.93	7.56	6.86	3.80	4.97	6.83	3.91	5.12	7.02	2.94	3.93	5.46	3.03	4.05	5.62
ONRAN32L	0.74	P	0.90	0.92	0.93	6.92	6.31	3.90	5.11	7.01	4.00	5.24	7.18	2.60	3.48	4.82	2.66	3.57	4.94
ONRAN32LA	0.04	L	0.88	0.88	0.89	10.00	10.00	3.42	4.44	6.12	3.42	4.44	6.12	0.12	0.16	0.22	0.12	0.16	0.22
ONRAN33L	0.39	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.47	1.98	2.74	1.47	1.98	2.74
ONRAN33LA1	0.10	L	0.88	0.88	0.89	10.00	10.00	3.42	4.44	6.12	3.42	4.44	6.12	0.30	0.39	0.54	0.30	0.39	0.54
ONRAN33R	0.78	P	0.90	0.92	0.93	7.09	6.44	3.88	5.07	6.96	3.98	5.21	7.15	2.72	3.64	5.05	2.79	3.74	5.18
ONRAN33LA	0.40	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	1.51	2.03	2.81	1.51	2.03	2.81
ONRAN34L	0.16	P	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.60	0.81	1.12	0.60	0.81	1.12
ONRAN34R	0.37	P	0.90	0.92	0.93	5.44	5.00	4.13	5.42	7.43	4.20	5.52	7.56	1.38	1.85	2.56	1.40	1.88	2.60
ONRAN34LA	0.58	P	0.90	0.92	0.93	6.18	5.51	4.02	5.27	7.22	4.12	5.41	7.42	2.10	2.81	3.90	2.15	2.81	4.00
ONRAN35R	0.24	p	0.90	0.92	0.93	5.00	5.00	4.20	5.52	7.56	4.20	5.52	7.56	0.89	1.20	1.66	0.89	1.20	1.66

Column

D P/L Paved or Desert Landscaping- condition of basin

Runoff Coefficients

	10-year	25-year	100-year
P	0.90	0.92	0.93
L	0.88	0.88	0.89

Time	Intensity (in./hr.)			
minutes	10-year	25-year	50-year	100-year
5	4.20	5.52	6.48	7.56
10	3.42	4.44	5.34	6.12
15	2.96	3.88	4.60	5.28
30	2.02	2.62	3.10	3.58

RANCHO DRIVE CAPACITY IMPROVMENTS - BONANZA TO DECATUR
RUNOFF CALCULATIONS - OPTION A INTERIM CONDITION - ONSITE BASIN MODEL
RATIONAL AND MODIFIED RATIONAL METHODS

31690A
Made by: NA
Date 11/20/2013
Checked by KS
Date: 12/4/2013

Basin Name	Area (ac)	P/L	Runoff Coef. (C)			T _o (min)		Intensity (in./hr.) Modified Rational			Intensity (in./hr.) Rational			Discharge Q (cfs (Modified Rational))			Discharge Q (cfs (Rational))		
			10-year	25-year	100-year	Modified Rational	Rational	10-year	25-year	100-year	10-year	25-year	100-year	10-year	25-year	100-year	10-year	25-year	100-year

*Referenced from CCRFCD, 1999 (Table 506)

**J. Flow Split Calculations (Pima County Method) at
Rancho Drive/Vegas Drive Intersection
Rancho Drive/Washington Avenue Intersection**

RANCHO DRIVE CAPACITY IMPROVEMENTS - BONANZA TO DECATUR
100-Year Flow Calculations**Flow Split Calculations at Rancho Drive & Vegas Drive**

Q100	586 cfs	Q100=	Total flow in main street
Corresponding depth,y from Flow Master	y =	1.37	ft
Q _L	117 cfs	Q _L =	Lateral flow into the side street, in cubic feet per second
Q _m	586 cfs	Q _m =	Main street flow measured between the curbs, in cubic feet per second
W _{ss}	80 ft	W _{ss} =	Width of the side street, in feet
S _s	0.0107	S _s =	Longitudinal slope of the side street, in feet per foot
W _m	125 ft	W _m =	Width of the main street, in feet
S _m	0.006	S _m =	Longitudinal slope of the main street, in feet per foot
Q _o	168 cfs	Q _o =	Overbank flow intercepted by the side street, in cubic feet per second
Y _o	0.435	Y _o =	Average depth of overbank flow intercepted by the side street, in feet

If Q_o is greater than Q_m, Q_o shall be used instead of Q_m

Total Flow into Vegas Drive = Q_L + Q_o = 286 cfs

Total flow in Rancho Dr after flow split = 300 cfs

Flow Split Calculations at Rancho Drive & Washington Avenue

Q100	280 cfs	Q100=	Total flow in main street
Corresponding depth,y from Flow Master	y =	1.05	ft
Q _L	63 cfs	Q _L =	Lateral flow into the side street, in cubic feet per second
Q _m	280 cfs	Q _m =	Main street flow measured between the curbs, in cubic feet per second
W _{ss}	80 ft	W _{ss} =	Width of the side street, in feet
S _s	0.0047	S _s =	Longitudinal slope of the side street, in feet per foot
W _m	100 ft	W _m =	Width of the main street, in feet
S _m	0.008	S _m =	Longitudinal slope of the main street, in feet per foot
Q _o	71 cfs	Q _o =	Overbank flow intercepted by the side street, in cubic feet per second
Y _o	0.275	Y _o =	Average depth of overbank flow intercepted by the side street, in feet

If Q_o is greater than Q_m, Q_o shall be used instead of Q_m

Total Flow into Washington Avenue = Q_L + Q_o = 133 cfs

Total flow in Rancho Drive after flow split = 147 cfs

K. Surface Flow Concentration Points Exhibit

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Appendix C

- A. Meeting Minutes
- B. Vegas Drive Improvements - 72" RCP, per CLV Drawing #107V4993
- C. Washington Avenue Storm Drain - 5' x 5' RCB, per CLV Drawing # 731-90
- D. Picture log

A. Meeting Minutes

Meeting Minutes

July 3, 2013

Time/ Place: July 3, 2013 11:00 a.m.
Opal Conference Room
City of Las Vegas Public Works

Attendance: Peter Jackson, City of Las Vegas
James Marrs, PB
Eric Hsu, PB
Nicholas Appuglise, PB
Diego Carroll, PB
Monika Hagood, PB

Subject: **Rancho Drive Capacity Improvements, Bonanza to Decatur -
70% Submittal Drainage Meeting**

Discussion Items

The meeting started with Peter J., Eric H., Nicholas A., and Monika H. discussing drainage issues of the Rancho Drive Capacity Improvements, Bonanza to Decatur. Halfway through the meeting James M., Diego C. joined to discuss civil and roadway design issues.

Design Storm Event

The question was raised which design storm event should be followed for this project regarding drainage design on Rancho Drive. Peter responded that we should use the worst case scenario between using NDOT criteria and RTC criteria in the interim and ultimate conditions. It was agreed that NDOT 25 year flow criteria in the interim condition presented the worst case scenario and that is what Rancho Drive will be designed to.

Storm Drain Design

Nicholas discussed how analyzing the existing storm drain present in Rancho Drive was of concern due to a lack of as-builts and data being available for the existing system. The concern was that the existing pipe slope cannot be determined unless accurate invert data is obtained. Currently a survey crew has provided existing pipe sizes and invert drop depths at existing inlets, however Peter discussed unless the inlets are properly cleaned out the invert drop depths may not be entirely accurate. Peter stated that PB should coordinate with NDOT to discuss having the existing inlets cleaned for better measurements. Performing a condition assessment on the existing storm drain needs to be brought up as an agenda item with the City as a discussion item so that PB can make a recommendation on how to proceed with the design.

Peter asked PB to look at alternatives for the storm drain design and prepare a recommendation based on having a pipe condition assessment completed, upsizing the existing system if necessary, relocation of sanitary sewer lines, placement of proposed manholes, or if placing a proposed trunkline on the west side of Rancho Drive in lieu of

utilizing the existing system is best. Further, potholing will be done where necessary to determine impacts caused by utility conflicts.

Discussion took place on using a 24 inch L curb versus an 18 inch L curb, from edge of pavement to back of curb. Peter had concern of using an 18 inch L curb due to the grate size needing to be modified to fit within the gutter or possibly not using a grate and only a curb face opening. This would require a type CM drop inlet being used to accommodate a manhole in the inlet box structure so it could be cleaned. James stated 24 inch L curb will be used for the roadway design.

There was discussion on how existing inlets most likely are built above the existing storm drain pipe and connect directly to it. Each existing inlet would need to be relocated to the proposed curb location and a manhole needing to be placed on the existing pipe at these locations so the pipe can be cleaned if necessary. A proposed lateral would need to extend from the inlet to the proposed manhole. Proposed manholes will need to be placed a maximum of 400 feet apart on the existing pipe as well as at each existing inlet location to meet RFCD criteria. There is the potential for proposed manholes to be located within the wheel path of vehicles at the inlets based on where the existing curb line moves, which is undesirable and will be looked at on a case by case basis.

James discussed the Type C-D Modified Drop Inlet Detail (Drawing No. 412A) shows the gutter line extending 8 inches into the roadway from the normal lip of gutter location. This would create the potential for vehicles to drive on this 8 inch lip of gutter extension, which is undesirable. James suggested having the normal lip of gutter location remain constant throughout the project including inlets and instead having the 8 inch extension going away from the roadway and into the sidewalk. Peter said this alternative sounded favorable and it will be looked into further.

Utilities Conflict

Fiber optic and sewer line conflicts were discussed. There most likely will be the need of relocating existing sewer lines and fiber optic lines.

Eric asked for the next progress meeting date. Peter scheduled it for July 31, 2013 in the morning.

Distribution:

To all meeting attendees.

Action items are shown in boldface type.

Meeting Minutes

July 31, 2013

Time/ Place: July 31, 2013 9:00 a.m.
Gravel Conference Room
City of Las Vegas Public Works

Attendance: Mike Sturdivant, City of Las Vegas
Peter Jackson, City of Las Vegas
Tim Parks, City of Las Vegas
Joe Pena, City of Las Vegas
James Marrs, PB
Nicholas Appuglise, PB
Kamakshi Sistla, PB
Kathryn Leonardo, PB

Subject: Rancho Drive Capacity Improvements, Bonanza to Decatur -
70% Submittal Drainage Meeting

Discussion Items

This meeting was held to discuss the impacts to existing utilities by the proposed storm drain system and alternate design options regarding the trunkline location of the storm drain.

Storm Drain Design

Four roll plot exhibits prepared by PB were presented at the meeting. The plans showed existing storm drain facilities, existing utilities, proposed roadway, street lighting and proposed storm drain systems. The exhibits identified key utility conflicts with the proposed storm drain and roadway layout. The project was discussed starting at the north end of the project limits to the south end, essentially Decatur Boulevard to Bonanza Boulevard.

The 4-foot x 2-foot grate, located in the existing pork chop island on the northwest corner of Rancho Drive and Smoke Ranch Road, will now be located in the traffic lane due to the pork chop island becoming smaller. Peter discussed how the grate, which connects to a 3-foot x 6-foot RCB that crosses east to an existing 12-foot x 8-foot RCB, could potentially become a non grated manhole. Inlets could be placed on the northwest corner of the intersection to collect the required flow needed to meet criteria, with a lateral connecting the inlet and the manhole. PB had discussed abandoning the 3-foot x 6-foot RCB and placing additional inlets upstream on the west side of Rancho Drive and connecting those inlets to the existing 12-foot x 8-foot RCB. Peter recommended to propose inlets at the northwest corner and have the 3-foot x 6-foot RCB be functional. Peter said an inlet may exist on the northwest corner property that connects to the 4-foot x 2-foot grate inlet, and might contribute flow to the 3-foot x 6-foot RCB and hence the RCB needs to stay in place. Mike stated a low point would need to be forced with the street grading at either one of the curb returns at the northwest corner away from the ADA ramp, and that is where an inlet should be placed.

Peter stated an NDOT type 10 inlet could be used on the northeast corner of Rancho Drive and Lake Mead Boulevard if needed to avoid conflict with existing sanitary sewer conflicts.

James stated the proposed street light locations from Smoke Ranch Drive south to Coran Lane, on both sides of Rancho Drive may impact the existing sanitary sewer line. Mike said he found it was acceptable to pothole the sewer line if needed. Tim stated he will send PB the CLV GIS database for sanitary sewer located within the project limits to show the depth of the sewer line. Mike and James discussed using a shallow foundation for the light poles if needed to avoid conflict with the existing sanitary sewer line. Mike said that NDOT would need to approve it but CLV would find the shallow foundation acceptable.

The 8-inch sanitary sewer line that extends from Coran Lane to Smoke Ranch Road on the west side of Rancho Drive is in conflict with the proposed landscaping and street lighting. After discussion with Peter, Mike, Tim and James it was agreed PB can recommend relocating the 8-inch sewer line into Rancho Boulevard to avoid these conflicts and a cost proposal will be made.

Discussion with Peter and Joe about the allowable vertical clearance between sanitary sewer and storm drain paralleling each other concluded with 2 feet being the minimum allowable clearance. Peter also stated that if a drop inlet sits above a sanitary sewer line a 2 foot vertical clearance minimum would also apply. Due to it being necessary to upsize the existing storm drain system from Coran Lane to Vegas Drive on the west side of Rancho Drive, the existing 21-inch sanitary sewer under the sidewalk will possibly be in conflict with the upsized storm drain. There was concern due to the upsizing of the storm drain there may be a lack of horizontal clearance between the sanitary sewer and storm drain, as well as trenching concerns with the sewer when replacing the storm drain. Tim said he believes the 21-inch sanitary sewer line has had a condition assessment completed and has either been said to be in acceptable condition or has been rehabilitated. He will follow up with PB on an update, however, discussion on placing the proposed storm drain trunkline 10 feet west of the existing water line in Rancho and away from the sewer line was agreed to by Tim and Peter to be the preferred alternative, rather than relocating the existing 21-inch sewer. There was discussion with Peter on whether the 21-inch sewer line would connect to the existing 42-inch sewer line under the median of Rancho Drive in the future, but Tim stated this was not the case.

James and Mike had discussed on potentially keeping the existing storm drain system the size it is and using a parallel system in lieu of upsizing the existing storm drain system. Mike said he prefers upsizing the storm drain system due to the age of the existing system.

Nick discussed that there is a retaining wall at approximately station "L" 65+00 on the east side of Rancho Drive, just north of Melody Lane, behind the existing sidewalk. This retaining wall has (2) 2'x4' CMP's connecting to it that run from the west side of Rancho Drive to the east side. Peter said as-builts on where the CMP's connect to the west side of Rancho Drive cannot be found, so the pipes may connect to the existing storm drain system on the west side of Rancho Drive or may connect to the parking area behind the existing sidewalk. On the east side of Rancho Drive at this location an existing ditch is

RANCHO DRIVE (DECATUR TO BONANZA)

present which drains flow east, away from Rancho Drive. The proposed roadway layout has the proposed sidewalk extending past the retaining wall, resulting in the retaining wall being relocated further east and the CMP's being extended. A field visit will be scheduled to inspect this area to make an evaluation on the best design approach. Peter stated that NDOT prefers relocating the retaining wall rather than eliminating it because it is already present.

Tim discussed that when excavating existing storm drain pipe that smaller sized storm drain is acceptable to excavate, however larger sized storm pipe will be filled with sand and abandoned in place.

James discussed with Peter and Tim that due to landscape conflicts with the existing sanitary sewer lines, caused from the depth of the tree roots, a planter box with a bottom will be used if over the sewer line. Peter and Tim agreed this was ideal.

Peter said that if there is a clearance issue with a storm drain lateral crossing over a sanitary sewer line, the lateral can be angled or a concrete encasement over the sewer can be used to allow minimum required clearance. Peter mentioned that it was also allowable using a shallow manhole and providing a connection with a sudden slope change to avoid conflicts with utilities.

Nick asked Peter about the Washington Storm Drain System that Atkins is designing and when those plans can be given to PB for review. Peter said that those plans will be reviewed in the coming weeks. PB will be connecting to the Washington system and will need to coordinate with Atkins on design.

Peter stated that all proposed inlets will be based on the Uniform Standard Drawings Clark County Area drawing no. 412A, Type C-D Modified Drop Inlet, unless a special case is found where a different type of inlet is justifiable.

PB stated that there are many locations where potholes will be required to adequately check on depths of existing utilities. Mike said that where potholes are needed CLV will be on board with that.

Action Items:

A field visit is set for August 8th to inspect key locations that are critical to the design.

Tim Parks will provide PB with CLV GIS files for existing sewer data and confirm if the 21-inch sewer line has been assessed for condition recently or, rehabilitated.

Peter Jackson will provide PB with the Washington Storm Drain System plans once reviewed.

Meeting Minutes
Dec 4, 2013

Time/ Place: December 4, 2013 1.30 p.m.
City of Las Vegas Public Works

Attendance: Peter Jackson, City of Las Vegas
Kamakshi Sistla, PB
Nicole Melton, PB

Subject: **Rancho Drive Capacity Improvements, Bonanza to Decatur -
70% Submittal Drainage Meeting**

Discussion Items

This meeting was held to discuss the flows at intersections of Rancho Drive/Vegas Drive and Rancho Drive/Washington Avenue

Peter asked to show combination points and the flows on the Off-site Basin Flow Exhibit; the combination points shall relate to the HEC-1 model.

At Rancho Drive and Vegas Drive intersection:

Peter provided a flow of 605 cfs in the Vegas Drive MPU system (LVOW 0241) from the latest plans of Vegas Drive Improvements Project-by Poggemeyer Design Group.

He suggested deducting the facility flow from the HEC-1 combination point at this intersection and applying Pima Flow split analysis on the remaining surface flow to obtain the flow that stays on Rancho Drive.

HEC-1 model will be revised to include the flows obtained from Pima flow split analysis.

At Rancho Drive and Washington Avenue intersection:

Peter provided a flow of 227 cfs in the Washington Avenue MPU system (LV15 0528) from the latest plans of Freeway Channel-Washington MLK Boulevard to Rancho drive (Washington Avenue Storm Drain) Project-by Atkins.

He suggested deducting the facility flow from the HEC-1 combination point at this intersection and applying Pima Flow split analysis on the remaining surface flow to obtain the flow that stays on Rancho Drive.

HEC-1 model will be revised to include the flows obtained from Pima flow split analysis.

For Interim condition analysis, he recommended not to take into consideration the existing facilities (Squash pipes at approximate station 88+00 and elliptical pipes at approximate station 78+00) in Rancho Drive, between Lake Mead Boulevard and Coran Avenue. These facilities convey the flow from west to east side of Rancho Drive. For analysis purpose, this flow will be accounted in the surface flow that reaches Rancho Drive at the respective locations.

Based on the Ultimate condition analysis, Peter suggested to provide recommendations in the report, in regard to these existing facilities if these facilities will need to be in place or may be abandoned in the ultimate condition.

RANCHO DRIVE (DECATUR TO BONANZA)

For Interim condition analysis, he recommended not to take into consideration the two cul-de sac locations (between Vegas Drive and Washington Avenue) that discharge to Rancho Drive via 18" RCPs. The flow will be considered, reaching Rancho Dr as surface flow, due to the weep holes in the wall that separates the neighborhoods from Rancho Drive.

For Ultimate condition analysis, he suggested to provide recommendations in the report, if more inlets need to be proposed at these cul-de-sac locations to alleviate flooding in ultimate condition. In the ultimate condition analysis, we may also provide recommendation in the report, proposing a short system to tie into Rancho Drive system, from Turquoise Rd that slopes away from Rancho Drive.

For Interim and Ultimate condition analyses, Peter suggested not to consider the future MPU system planned on Decatur Drive, going north from Vegas Drive to Lake Mead Blvd. He mentioned this system is not proposed for construction in near future, and may be neglected for flow analysis for this project.

Sistla, Kamakshi

From: Sistla, Kamakshi
Sent: Friday, March 07, 2014 9:44 AM
To: Sistla, Kamakshi
Subject: FW: Rancho Drive Capacity Improvements - Decatur to Bonanza

From: Yount, Eric M [mailto:eyount@dot.state.nv.us]
Sent: Tuesday, November 12, 2013 5:57 PM
To: Appuglise, Nicholas
Cc: Ramirez, Joselio
Subject: RE: Rancho Drive Capacity Improvements - Decatur to Bonanza

Hi Nick,

Just to clarify and qualify what our thoughts are regarding meeting spread criteria based on the 25 yr offsite ultimate flows, the key word as Joselio stated is to "consider" the feasibility. We are not requiring this; however, if the ultimate offsite flows reaching Rancho are small enough that you might be able to feasibly meet spread criteria, please consider doing so. This is completely dependent on how large those ultimate offsite flows are, if excess capacity exists or how much additional capacity would need to be added to the proposed storm drain systems, are there appropriate locations to take or discharge those flows, etc. We don't want to impose any unreasonable requirements on these projects so feel free to suggest or propose what can reasonably be accomplished.

The main design premise on these projects is going to be to perpetuate existing and improve/meet criteria where possible, practical, and feasible.

Thanks for checking in with us and please give Joselio or I a call if you still have any questions or want to run any design issues/concepts by us.

Thanks,
Eric

Eric Yount, P.E.

*Principal Hydraulic Engineer
Nevada Department of Transportation
1263 South Stewart Street, Room 113
Carson City, NV 89712
Phone: (775)-888-7531
Fax: (775)-888-7177
eyount@dot.state.nv.us*

From: Ramirez, Joselio
Sent: Tuesday, November 12, 2013 4:07 PM
To: Appuglise, Nicholas
Cc: Yount, Eric M
Subject: RE: Rancho Drive Capacity Improvements - Decatur to Bonanza

Nick,

As we discussed over the phone, your onsite design approach is correct; however we would like you to consider for the ultimate design to meet spread criteria based on offsite 25-year event. As well, the 100-year offsite design should be closed analyzed to prevent any adjacent property damages.

Please let us know if you have any questions.
Joselio Ramirez

From: Appuglise, Nicholas [mailto:Appuglise@pbworld.com]
Sent: Tuesday, November 05, 2013 5:22 PM
To: Yount, Eric M
Cc: Ramirez, Joselio
Subject: Rancho Drive Capacity Improvements - Decatur to Bonanza

Eric/Joselio,

I have a question regarding the Rancho Drive Capacity Improvements Project that City of Las Vegas is having designed, specifically the corridor from Decatur Boulevard to Bonanza Road. I was notified that you both were present at the initial startup meetings in September 2011 so it's probably best to direct my question to you. I am inquiring about the approach that is expected to be taken for analyzing NDOT criteria for the 25 year storm in interim condition. Essentially, we are analyzing existing, interim and ultimate hydrologic condition of the roadway.

Per the NDOT Drainage Design Manual 2006, Section 3.3.2.2 Design Criteria and Guidelines states "When practicable, roadway surface drainage facilities shall be designed to collect all flows reaching the roadway surface. This would include run-off generated both on the roadway itself, and flows reaching the roadway prism from upstream and adjacent basins such as parking lots or cross streets that direct flows onto the roadway surface. If significant off-site flows are directed into the on-site system, that system must be designed to accommodate those flows." Per Table 3-1 of the NDOT Drainage Manual, it states for "Other Principal Arterial" the maximum allowable spread into the adjacent travel lane for the 25 year storm event is ½ lane. Should this criteria be checked against the **onsite** 25 year storm flows or the **offsite** 25 year storm flows? All flows are not expected to be collected that reach the roadway surface correct; we are to check that the interim/ultimate condition is not worse than the existing condition?

The difference in flow between onsite flows and offsite flows is significant, with the offsite flows greatly affecting the size of the inlets and size of the storm drain system needed to accommodate the NDOT criteria in interim/ultimate condition.

Per meeting minutes I have between City of Las Vegas and NDOT it mentions:

- NDOT will require ½ dry lane in the lane adjacent to the transit lane for areas affected only by **onsite** flow.
- NDOT would prefer that the project provide necessary protection for the 25 year storm or at least minimize inundation.

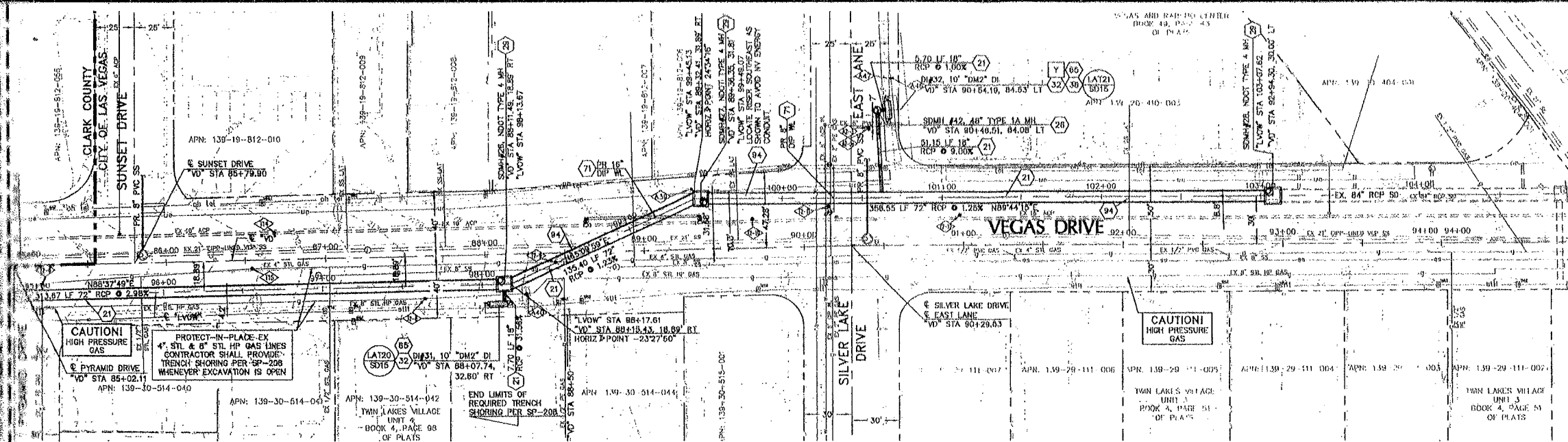
Based on what I've stated above, my question is if the ½ dry lane criteria needs to be met for onsite flows, or for offsite flows. The difference between the two is significant and would result in a much larger system needing to be designed if offsite flows are to be used to maintain the ½ dry lane criteria.

Also, it is not expected that we collect all flows reaching the roadway surface as the NDOT Drainage Design Manual states, but rather make sure the interim condition does not have worse conditions than the existing condition, correct?

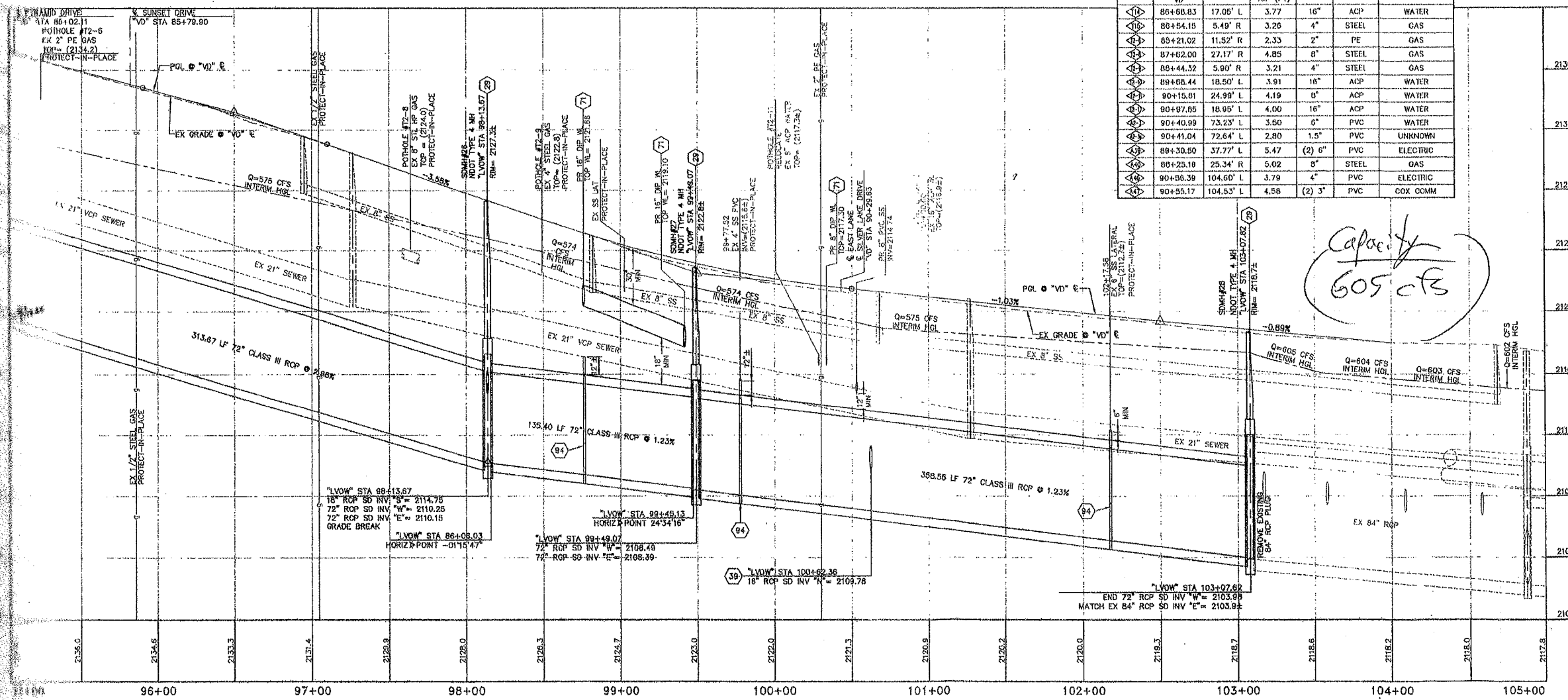
Please feel free to call me at 702-697-8139 to discuss if you feel an e-mail response would not be sufficient.

Thank you.

**B.Vegas Drive Improvements - 72" RCP, per CLV Drawing
#107V4993**



PLAN-STORM DRAIN
CENTERLINE ALIGNMENT "LVOW"
SCALE: 1" = 40'



PROFILE - STORM DRAIN
CENTERLINE ALIGNMENT "LVOW"
1" = 40' HORIZ; 1" = 4' VERT.

UTILITY POOTHING TABLE

PH #	STATION	OFFSET	DEPTH TO TOP (FT)	SIZE	MATL	UTILITY
10	86+68.83	17.05' L	3.77	16"	ACP	WATER
11	86+54.15	5.49' R	3.26	4"	STEEL	GAS
12	89+21.02	11.52' R	2.33	2"	PE	GAS
13	87+62.00	27.17' R	4.85	8"	STEEL	GAS
14	88+44.32	5.90' R	3.21	4"	STEEL	GAS
15	89+68.44	18.50' L	3.91	16"	ACP	WATER
16	90+15.01	24.99' L	4.19	8"	ACP	WATER
17	90+97.85	18.99' L	4.00	16"	ACP	WATER
18	90+40.99	73.23' L	3.50	6"	PVC	WATER
19	90+41.04	72.64' L	2.80	1.5"	PVC	UNKNOWN
20	88+30.50	37.77' L	5.47	(2) 6"	PVC	ELECTRIC
21	88+23.10	25.34' R	5.02	(2) 3"	STEEL	GAS
22	90+86.39	104.60' L	3.79	4"	PVC	ELECTRIC
23	90+55.17	104.53' L	4.58	(2) 3"	PVC	COX COMM

Capacity
605 cfs

CONSTRUCTION NOTES

- (21) CONSTRUCT REINFORCED CONCRETE PIPE STORM DRAIN (SIZE PER PLAN) IN ACCORDANCE WITH DETAIL 2/CD-1
- (28) CONSTRUCT TYPE 1A SDMH IN ACCORDANCE WITH CCAUSD NO. 404.1
- (29) CONSTRUCT NDOT TYPE 4 SDMH IN ACCORDANCE WITH DETAIL 2/CD-5
- (32) CONSTRUCT TYPE "DM2" DROP INLET IN ACCORDANCE WITH CCAUSD NO. 412.1
- (38) PROVIDE ELASTOMERIC JOINT SEALANT THROUGHOUT DROP INLET IN ACCORDANCE WITH UDACS SECT. 2.22.D.2.C
- (39) CONSTRUCT LATERAL PIPE CONNECTION WITHOUT JUNCTION BOX IN ACCORDANCE WITH DETAIL 9/CD-4
- (65) RELOCATE EXISTING STREETLIGHT CONDUIT BEHIND PROPOSED DROP INLET PER SPECIAL PROVISION 600
- (71) RELOCATE WATERLINE OVER PROPOSED STORM DRAIN. MAINTAIN 30" MINIMUM COVER OVER WL AND MINIMUM 6" CLEARANCE BETWEEN WL AND STORM DRAIN. USE CLASS 53 DIP W/ RESTRAINED JOINTS
- (94) PROVIDE PROTECTION OF EXISTING SANITARY SEWER IN ACCORDANCE WITH DETAIL 5/CD-9

UTILITY RELOCATIONS

- Y EXISTING TELEPHONE LINE TO BE RELOCATED BY OTHERS (CENTURYLINK)

WATER/SEWER NOTE

SEE UTILITY PLAN SHEET UT-08 FOR PROPOSED WATER RELOCATION AND SANITARY SEWER LATERALS

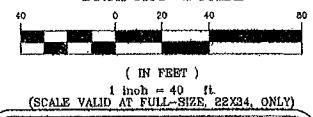
CAUTION !!!
HIGH PRESSURE GAS

CALL SOUTHWEST GAS CORPORATION AT (702) 365-2288 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES

UTILITY NOTE

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GRAPHIC SCALE



APPROVED FOR CONSTRUCTION

Don Gregory
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
DATE 02/21/12 PROJECT NO. 114402 ESN 018

CLARK COUNTY DEVELOPMENT SERVICES
CCDS IS TO INSPECT AND APPROVE ALL WORK DONE IN COUNTY RIGHT OF WAY
HYE #10-33508

CONTRACTOR MUST SUBMIT SHOP DRAWINGS TO LVWD BEFORE CONSTRUCTION TO SHOW HOW WATERLINES SPANNING A TRENCH WILL BE SUPPORTED DURING EXCAVATION & BACKFILL. DRAWINGS WILL INCLUDE ALL LOCATIONS WHERE WATERLINES SPAN A TRENCH GREATER THAN FOUR (4) FEET WIDE.

Call before you dig
Underground
1-800-455-7511
1-702-227-2929

Call before you dig
Overhead
1-800-227-2900
1-702-455-7511

POGGEMEYER DESIGN GROUP
6980 Smoke Ranch Suite 110
Las Vegas, Nevada 89126
702.255.8100 • f 702.255.8175
www.poggemeyerdsg.com

DRAWN BY: A. PILARZ 01/31/12
DESIGNED BY: J. WEED 01/31/12
CHECKED BY: J. WEED 01/31/12
PROJECT NO: 05333-C SCALE: 1" = 40'

CITY OF LAS VEGAS
NEVADA

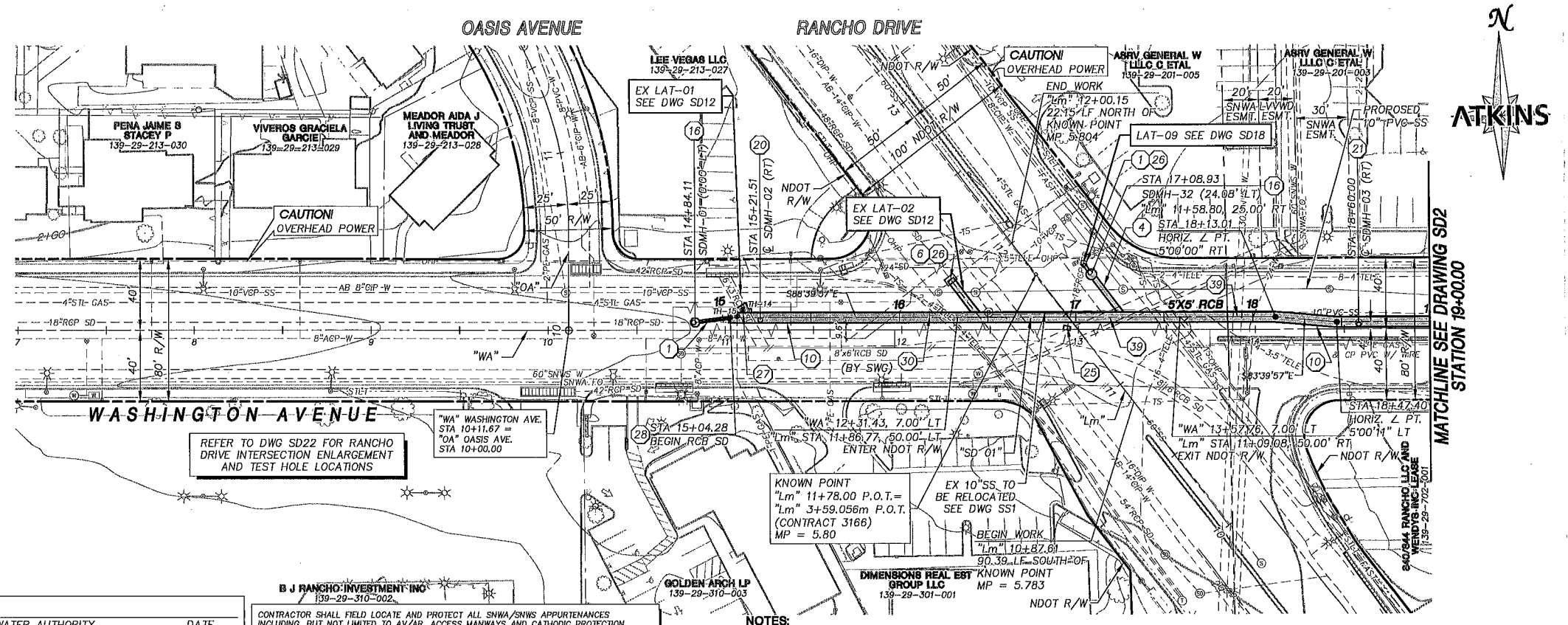
DEPARTMENT OF PUBLIC WORKS
333 NORTH RANCHO • LAS VEGAS, NEVADA 89106 • (702) 229-6276
PROJECT TITLE: VEGAS DRIVE IMPROVEMENTS
SHEET TITLE: STORM DRAIN PLAN & PROFILE
"LVOW" STA 95+00 TO STA 105+00 SHADOW MOUNTAIN PLACE TO RANCHO DRIVE

JASON M. CALHOUN
EX. 12-31-12
CIVIL
No. 17104

HANSEN NO. 11554

SD-9
39 of 86
CLV DRAWING NO. 107V4993

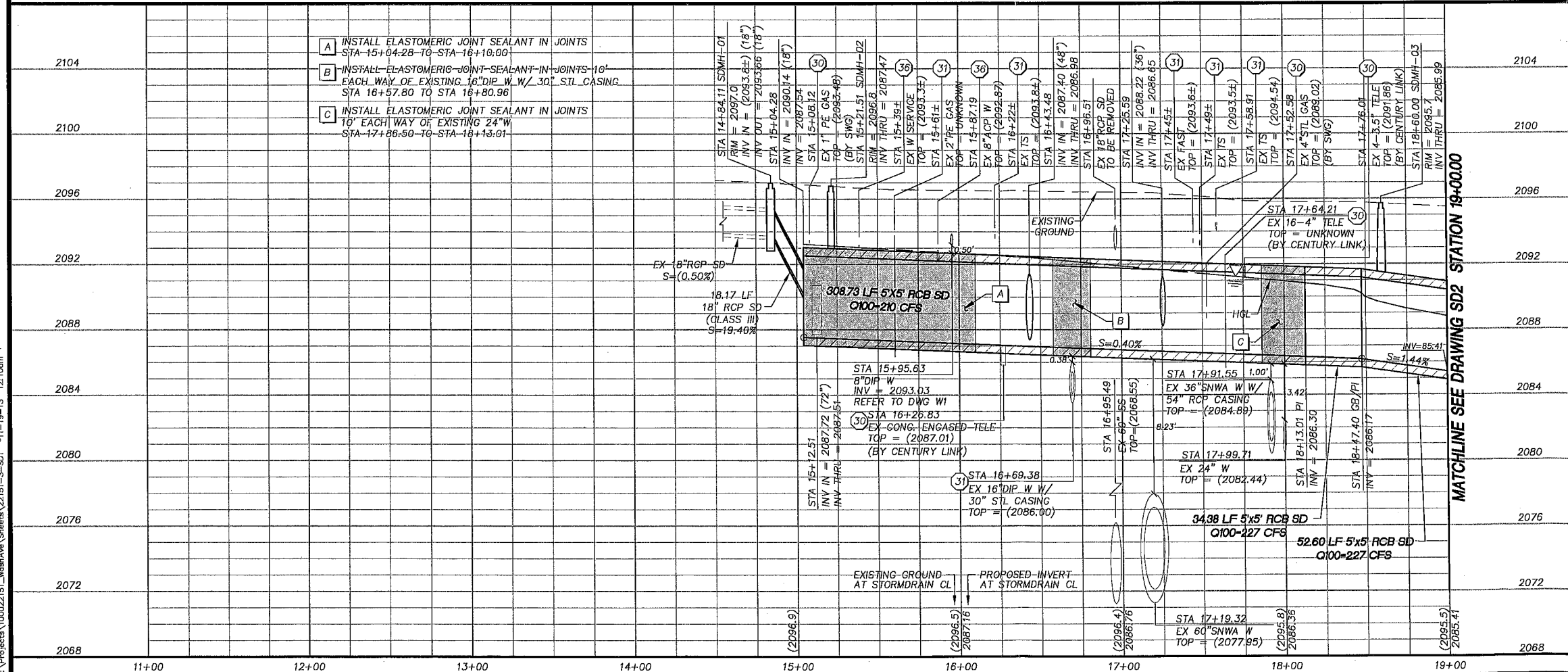
C. Washington Avenue Storm Drain - 5' x 5' RCB, per CLV
Drawing # 731-90



- ### STORM DRAIN CONSTRUCTION NOTES
1. INSTALL 18" RCP SD PER TRENCH DETAIL 1 DRAWING SD19
 2. INSTALL 24" RCP SD PER TRENCH DETAIL 1 DRAWING SD19
 3. INSTALL 30" RCP SD PER TRENCH DETAIL 1 DRAWING SD19
 4. INSTALL 36" RCP SD PER TRENCH DETAIL 1 DRAWING SD19
 5. INSTALL 42" RCP SD PER TRENCH DETAIL 1 DRAWING SD19
 6. INSTALL 48" RCP SD PER TRENCH DETAIL 1 DRAWING SD19
 7. INSTALL 60" RCP SD PER TRENCH DETAIL 1 DRAWING SD19
 8. INSTALL 45"x29" HE RCP SD PER TRENCH DETAIL 1 DRAWING SD19
 9. INSTALL 53"x34" HE RCP SD PER TRENCH DETAIL 1 DRAWING SD19
 10. INSTALL 5'x5' PRECAST RCB SD PER TRENCH DETAIL 2 DRAWING SD19
 11. INSTALL 6'x5' PRECAST RCB SD PER TRENCH DETAIL 2 DRAWING SD19
 12. INSTALL 7'x6' PRECAST RCB SD PER TRENCH DETAIL 2 DRAWING SD19
 13. INSTALL 8'x6' PRECAST RCB SD PER TRENCH DETAIL 2 DRAWING SD19
 14. INSTALL 10'x5' PRECAST RCB SD PER TRENCH DETAIL 2 DRAWING SD19
 15. INSTALL PRECAST RCB TRANSITION
 16. CONSTRUCT TYPE I SDMH PER USD #403.1
 17. CONSTRUCT TYPE II SDMH PER USD #405.1
 18. CONSTRUCT TYPE III SDMH PER USD #406.1
 19. CONSTRUCT JUNCTION STRUCTURE PER DRAWING ST02
 20. CONSTRUCT 36" ACCESS MANHOLE PER DETAIL 3 DRAWING SD19
 21. CONSTRUCT 48" ACCESS MANHOLE PER DETAIL 4 DRAWING SD19
 22. CONSTRUCT TYPE "D" MODIFIED DROP INLET PER USD #412.1
 23. INSTALL PRECAST CURB INLET PER DETAIL 1 DRAWING SD20
 24. CONSTRUCT DOUBLE TYPE 2 INLET PER NDOT STD. DRAWING R-4.2.1 & R-4.2.7
 25. PLUG EXISTING/PROPOSED STORM DRAIN
 26. CONSTRUCT CONCRETE COLLAR PER DETAIL 5 DRAWING SD19
 27. CONNECT EXISTING 6"x3" RCB STORM DRAIN TO PROPOSED 5'x5' RCB PER DRAWING ST03
 28. CONSTRUCT RCB END WALL PER DETAIL A DRAWING ST01
 29. CONNECT EXISTING 7'x6" RCB TO PROPOSED 7'x6" RCB PER DETAIL D DRAWING ST01
 30. RELOCATE EXISTING UTILITY (BY OTHERS)
 31. PROTECT-IN-PLACE CONTRACTOR TO SUPPORT UTILITY ACROSS THE TRENCH. ANY DESIGN REQUIRED TO SUPPORT THE UTILITY SHALL BE DONE BY THE CONTRACTOR'S ENGINEER AND SHALL BE LICENSED IN THE STATE OF NEVADA. (NO DIRECT PAYMENT)
 32. PIPE PENETRATION PER DETAIL C DRAWING ST01
 33. INSTALL SANITARY SEWER PROTECTION PER DCSWCS SD-21
 34. INSTALL PRECAST MANHOLE TEE PER USD #407.1
 35. REMOVE AND REPLACE EXISTING ACP WATERLINE PER DETAIL 1 DRAWING W4
 36. EXISTING WATER UTILITY TO BE RELOCATED. SEE "W" SHEETS
 37. REMOVE AND REPLACE EXISTING VCP SANITARY SEWER PER DCSWCS SD-20
 38. INSTALL SANITARY SEWER PROTECTION PER DETAIL 3 DRAWING SD20
 39. SNWA WATERLINE CROSSING. REFER TO DETAIL 2 DRAWING SD21
- STORM DRAIN NOTES:**
1. ALL PIPE LENGTHS MEASURED ALONG PIPE CENTERLINE TO GRADE BREAK OR TO INSIDE EDGE OF DI, RCB, OR STRUCTURE.
2. ALL DROP INLETS SHALL INCLUDE STORM WATER MANAGEMENT STAMP AND DETAIL PER USDOCA STD. DWG. NO. 421

- NOTES:**
1. SNWA TEST LEADS ARE SHALLOW
 2. SNWA FIBER OPTIC CONDUIT RUNS ALONG THE SOUTH AND EAST SIDE OF THE SNWA 60" LATERAL

APPROVED FOR CONSTRUCTION
Las Vegas Valley Water District Engineering Services Manager
Date: _____ Project No. 12850 ESN 018



Call before you Dig
Call 811
1-800-227-2600

FAST
Call before you UnderGround
1-702-432-5300

CALL BEFORE YOU DIG
1-702-227-2929

GRAPHIC SCALE
(IN FEET)
HORIZ 1 inch = 40ft.
VERTICAL 1 inch = 4 ft.

UTILITY NOTE:
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SHEET INDEX

ATKINS
2270 Corporate Circle Suite
200 Henderson, Nevada
89074 Telephone:
702/263-7275
Fax: 702/263-7200

SD1
14 of 66
DRAWING# 731-90

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

FREWAY CHANNEL - WASHINGTON DRIVE
MLK BOULEVARD TO RANCHO DRIVE
(WASHINGTON AVE. STORM DRAIN)

STORM DRAIN PLAN AND PROFILE
WASHINGTON AVENUE
STA 11+00.00 TO STA 19+00.00

PROJECT MANAGER: MATT BAIRD, P.E.
DESIGN BY: TMS
CHECK BY: SGB
DATE: NOVEMBER 2013

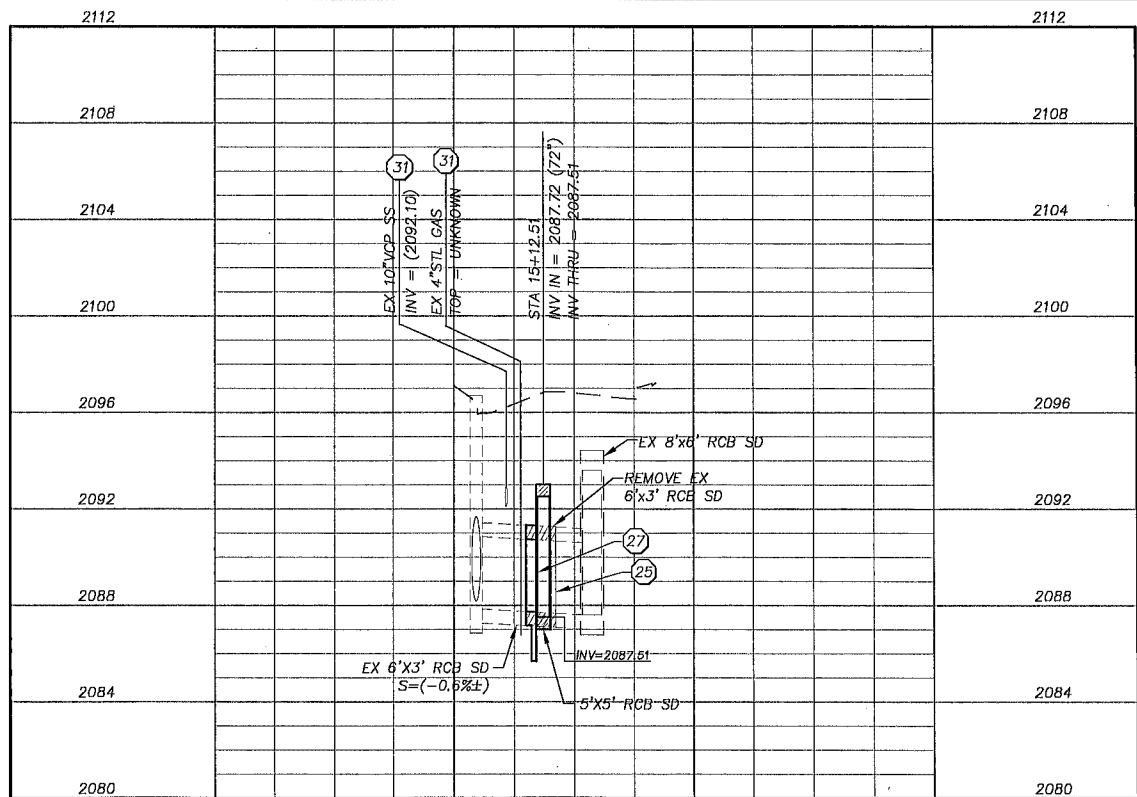
PROJECT ENGINEER: DAVID BOWERS, P.E., P.T.O.E.
CITY PROGRAM MANAGER: MARK SORESEN, P.E.

ATKINS
2270 Corporate Circle Suite
200 Henderson, Nevada
89074 Telephone:
702/263-7275
Fax: 702/263-7200

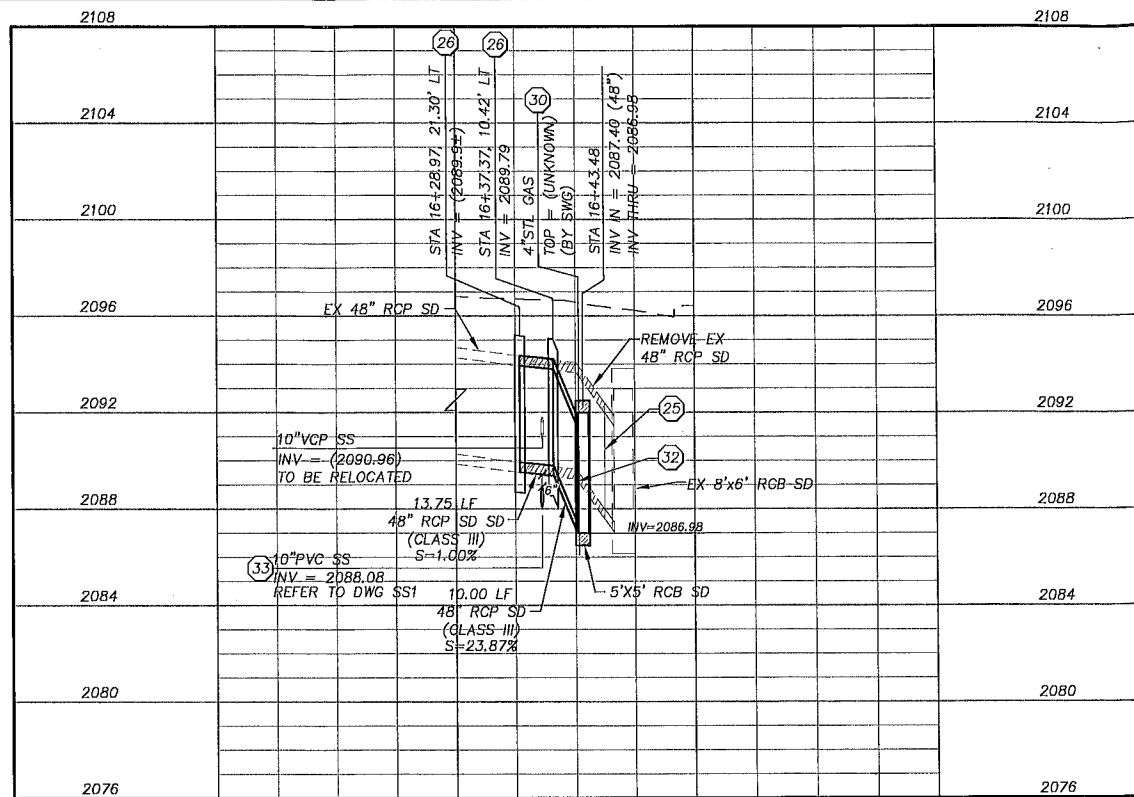
SD1
14 of 66
DRAWING# 731-90

NOT FOR CONSTRUCTION 90% SUBMITTAL

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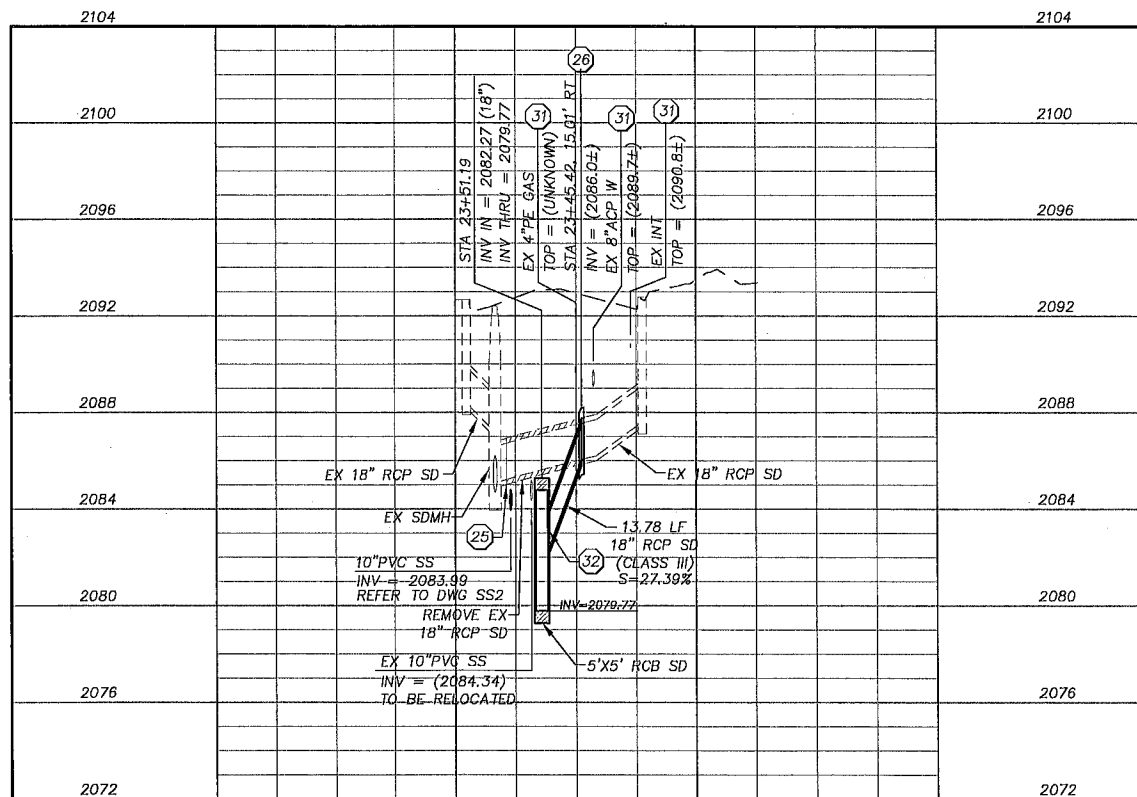
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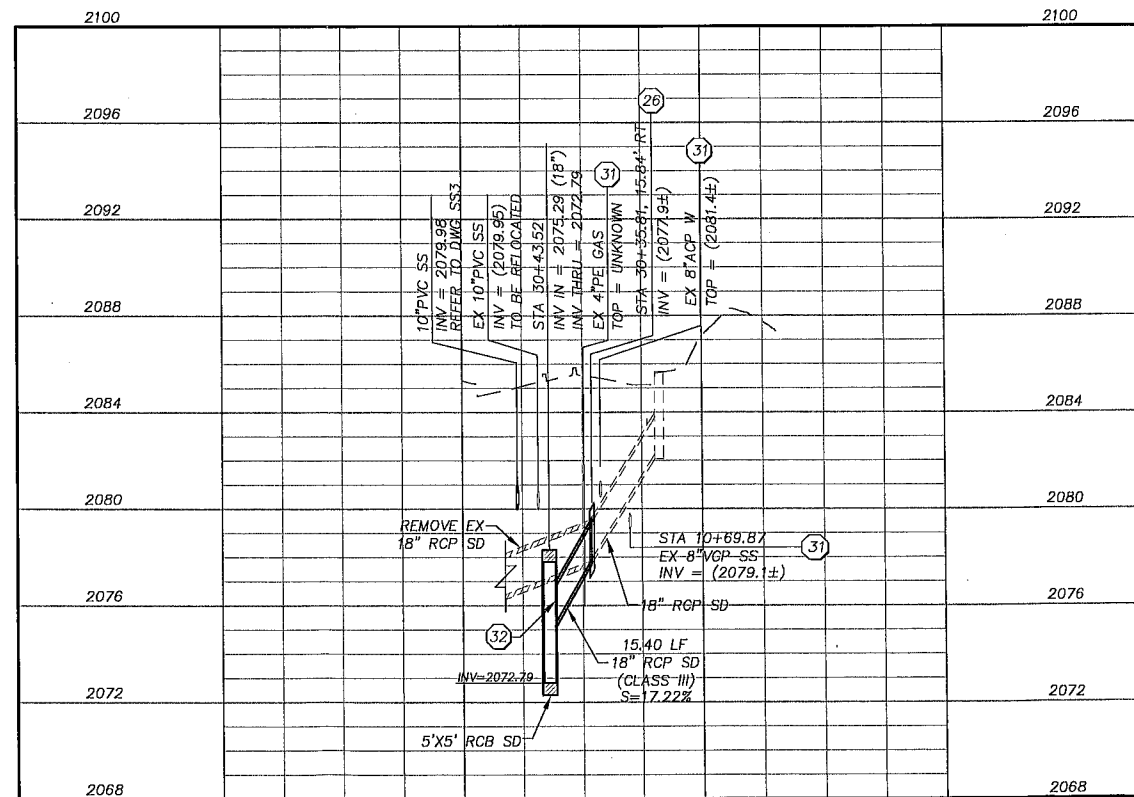
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APPROVED FOR CONSTRUCTION

Las Vegas Valley Water District Engineering Services Manager
Date _____ Project No. 12350 ESN 018



EX LAT-03

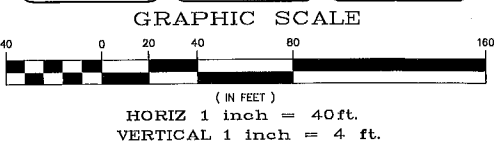


EX LAT-04

STORM DRAIN CONSTRUCTION NOTES

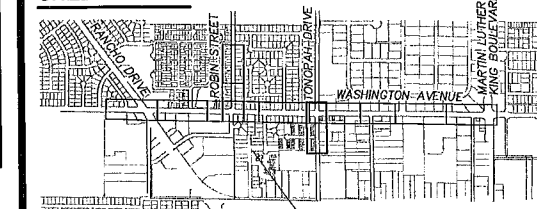
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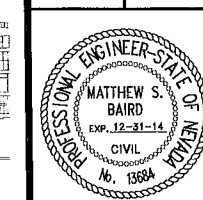
SHEET INDEX



2270 Corporate Circle Suite
200 Henderson, Nevada
89074 Telephone:
702/263-7275
Fax: 702/263-7200

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION
CITY ENGINEER: DAVID BOWERS, P.E., P.T.O.E.
CITY PROGRAM MANAGER: MARK SORESEN, P.E.
PROJECT MANAGER: MATT BAIRD, P.E.
DESIGN BY: SJB
DRAWN BY: TKS
DATE: NOVEMBER 2013

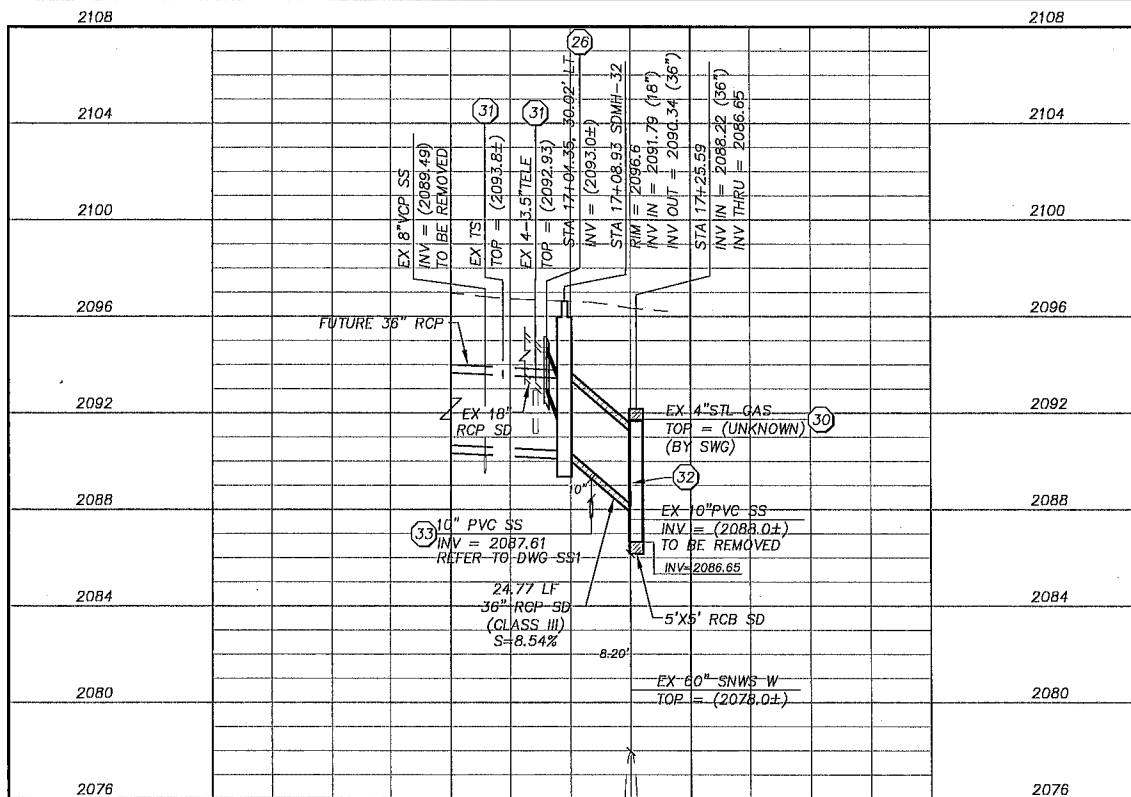
FREWAY CHANNEL - WASHINGTON
MLK BOULEVARD TO RANCHO DRIVE
(WASHINGTON AVE. STORM DRAIN)
STORM DRAIN
LATERALS - 1



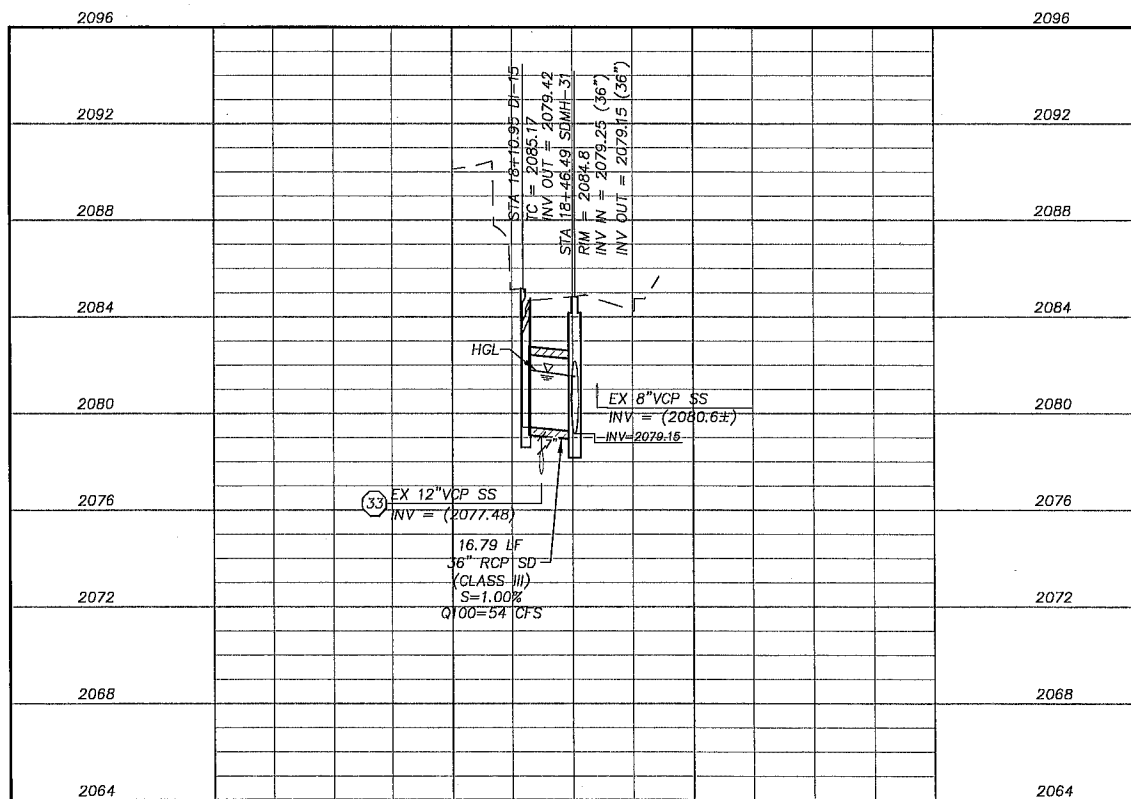
SHEET:
SD12
25 of 66
DRAWING#
731-90

NOT FOR CONSTRUCTION 90% SUBMITTAL

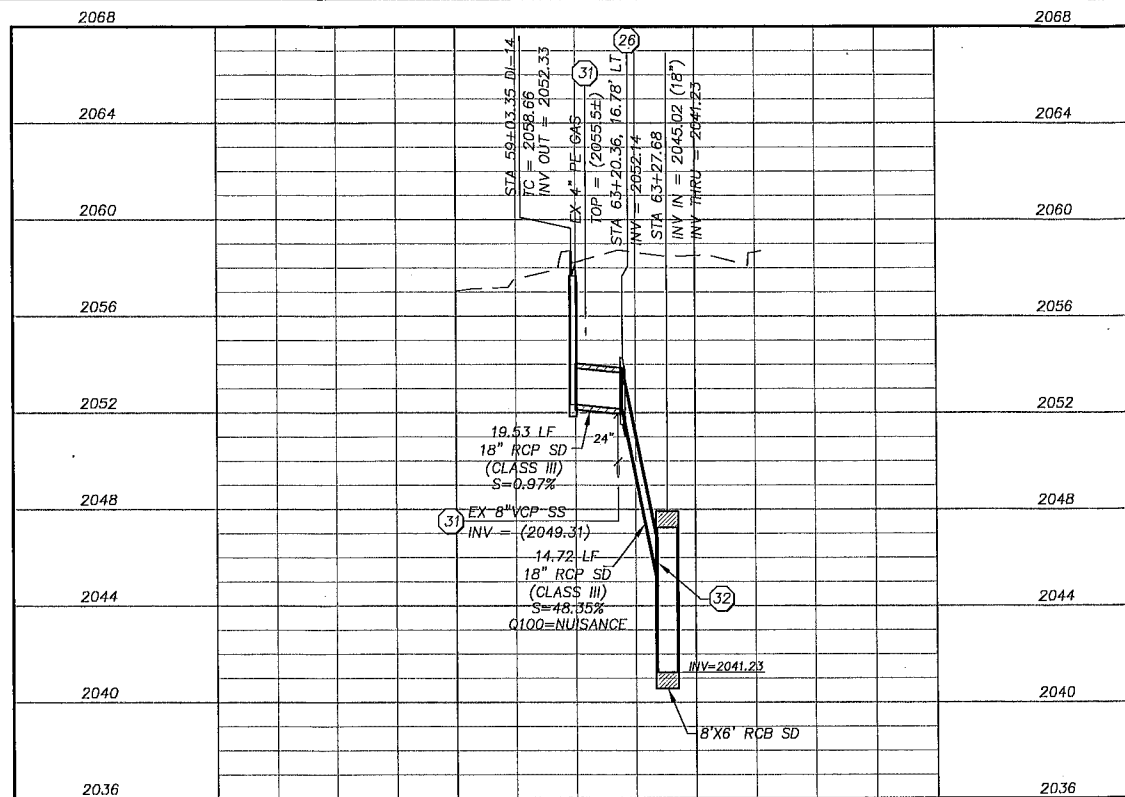
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LAT-09



LAT-11



LAT-10

SOUTHERN NEVADA WATER AUTHORITY DATE
DPR# 2012-00424

SNWA APPROVAL IS VALID ONE (1) YEAR FROM THE SIGNATURE DATE. IF CONSTRUCTION WITHIN THE EASEMENT OR RESTRICTED PIPE SAFETY ZONE IS NOT COMPLETE, PLANS MUST BE RESUBMITTED TO SNWA FOR APPROVAL.

SNWA CONSTRUCTION NOTES

CONTRACTOR SHALL FIELD LOCATE AND PROTECT ALL SNWA/SNWS APPURTENANCES INCLUDING, BUT NOT LIMITED TO, AV/AR'S, ACCESS MANWAYS AND CATHODIC PROTECTION SYSTEMS. ALL ABOVE GROUND STRUCTURES AND AT GRADE STRUCTURES MUST BE ADJUSTED TO NEW GRADE AT CONTRACTOR'S EXPENSE. CATHODIC PROTECTION TEST STATIONS, RECTIFIERS, AND AV/AR'S MUST BE RELOCATED TO THE SIDEWALK PER SNWA STANDARDS AND AT THE CONTRACTOR'S EXPENSE. CONTRACTOR TO NOTIFY SOUTHERN NEVADA WATER AUTHORITY, DEVELOPMENT PLAN REVIEW, AT (702) 258-3165 AT LEAST 48 HOURS PRIOR TO CONSTRUCTION ACTIVITY.

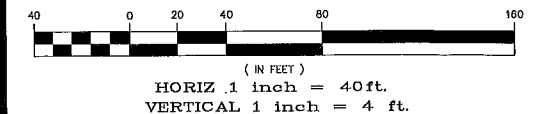
STORM DRAIN CONSTRUCTION NOTES

1. INSTALL 18" RCP SD PER TRENCH DETAIL 1 DRAWING SD19
2. INSTALL 24" RCP SD PER TRENCH DETAIL 1 DRAWING SD19
3. INSTALL 30" RCP SD PER TRENCH DETAIL 1 DRAWING SD19
4. INSTALL 36" RCP SD PER TRENCH DETAIL 1 DRAWING SD19
5. INSTALL 42" RCP SD PER TRENCH DETAIL 1 DRAWING SD19
6. INSTALL 48" RCP SD PER TRENCH DETAIL 1 DRAWING SD19
7. INSTALL 60" RCP SD PER TRENCH DETAIL 1 DRAWING SD19
8. INSTALL 45"x29" HE RCP SD PER TRENCH DETAIL 1 DRAWING SD19
9. INSTALL 53"x34" HE RCP SD PER TRENCH DETAIL 1 DRAWING SD19
10. INSTALL 5'x5' PRECAST RCB SD PER TRENCH DETAIL 2 DRAWING SD19
11. INSTALL 6'x6' PRECAST RCB SD PER TRENCH DETAIL 2 DRAWING SD19
12. INSTALL 7'x6' PRECAST RCB SD PER TRENCH DETAIL 2 DRAWING SD19
13. INSTALL 8'x6' PRECAST RCB SD PER TRENCH DETAIL 2 DRAWING SD19
14. INSTALL 10'x5' PRECAST RCB SD PER TRENCH DETAIL 2 DRAWING SD19
15. INSTALL PRECAST RCB TRANSITION
16. CONSTRUCT TYPE I SDMH PER USD #403.1
17. CONSTRUCT TYPE II SDMH PER USD #405.1
18. CONSTRUCT TYPE III SDMH PER USD #406.1
19. CONSTRUCT JUNCTION STRUCTURE PER DRAWING ST02
20. CONSTRUCT 36" ACCESS MANHOLE PER DETAIL 3 DRAWING SD19
21. CONSTRUCT 48" ACCESS MANHOLE PER DETAIL 4 DRAWING SD19
22. CONSTRUCT TYPE "D" MODIFIED DROP INLET PER USD #412.1
23. INSTALL PRECAST CURB INLET PER DETAIL 1 DRAWING SD20
24. CONSTRUCT DOUBLE TYPE 2 INLET PER NDOT STD. DRAWING R-4.2.1 & R-4.2.7
25. PLUG EXISTING/PROPOSED STORM DRAIN
26. CONSTRUCT CONCRETE COLLAR PER DETAIL 5 DRAWING SD19
27. CONNECT EXISTING 6'x3' RCB STORM DRAIN TO PROPOSED 5'x5' RCB PER DRAWING ST03
28. CONSTRUCT RCB END WALL PER DETAIL A DRAWING ST01
29. CONNECT EXISTING 7'x6' RCB TO PROPOSED 7'x6' RCB PER DETAIL D DRAWING ST01
30. RELOCATE EXISTING UTILITY (BY OTHERS)
31. PROTECT-IN-PLACE. CONTRACTOR TO SUPPORT UTILITY ACROSS THE TRENCH. ANY DESIGN REQUIRED TO SUPPORT THE UTILITY SHALL BE DONE BY THE CONTRACTOR'S ENGINEER AND SHALL BE LICENSED IN THE STATE OF NEVADA. (NO DIRECT PAYMENT)
32. PIPE PENETRATION PER DETAIL C DRAWING ST01
33. INSTALL SANITARY SEWER PROTECTION PER DCSWCS SD-21
34. INSTALL PRECAST MANHOLE TEE PER USD #407.1
35. REMOVE AND REPLACE EXISTING ACP WATERLINE PER DETAIL 1 DRAWING W4
36. EXISTING WATER UTILITY TO BE RELOCATED. SEE "W" SHEETS
37. REMOVE AND REPLACE EXISTING VCP SANITARY SEWER PER DCSWCS SD-20
38. INSTALL SANITARY SEWER PROTECTION PER DETAIL 3 DRAWING SD20
39. SNWA WATERLINE CROSSING. REFER TO DETAIL 2 DRAWING SD21

STORM DRAIN NOTES
1. ALL PIPE LENGTHS MEASURED ALONG PIPE CENTERLINE TO GRADE BREAK OR TO INSIDE EDGE OF DI, RCB, OR STRUCTURE.
2. ALL DROP INLETS SHALL INCLUDE STORM WATER MANAGEMENT STAMP AND DETAIL PER USDCCA STD. DWG. NO. 421



GRAPHIC SCALE



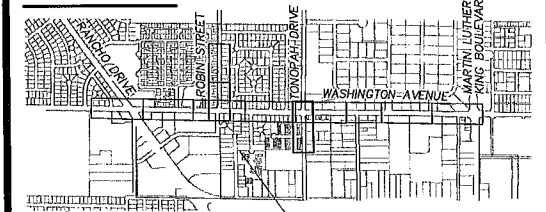
UTILITY NOTE:

ALL EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION.

NO REPRESENTATION IS MADE THAT ALL UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN IN THEIR PROPER LOCATIONS.

THE DEPTH BELOW GRADE OF THE VARIOUS UTILITIES DEPICTED ON THE PLANS VARIES THROUGHOUT THE PROJECT AREA. THE CONTRACTOR SHALL EXERCISE EXTREME CARE WHEN EXCAVATING AND GRADING THE SUBBASE IN THE VICINITY TO AVOID DAMAGE TO THE LATTER.

SHEET INDEX



ATKINS
2270 Corporate Circle Suite
200 Henderson, Nevada
89074 Telephone:
702/263-7275
Fax: 702/263-7200

2270 Corporate Circle Suite
200 Henderson, Nevada
89074 Telephone:
702/263-7275
Fax: 702/263-7200

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

DAVID BOWERS, P.E., P.T.O.E.
MARK SORESENSEN, P.E.
MATT BAIRD, P.E.
CHECK BY: SCR
DATE: NOVEMBER 2013
DRAWN BY: TKS



FREEWAY CHANNEL - WASHINGTON
MLK BOULEVARD TO RANCHO DRIVE
(WASHINGTON AVE. STORM DRAIN)

STORM DRAIN
LATERALS - 7

SHEET: SD18



SHEET: SD18

31 of 66

DRAWING: 731-90

NOT FOR CONSTRUCTION 90% SUBMITTAL

D. Picture log

Approximate Station "L" 73+00 and "L" 71+00, on West Side of Rancho Drive: Drainage Channels from Wild Fire Casino Parking Lot



Approximate Station "L" 65+00 , on East Side of Rancho Drive: Two existing 43-inch x 27-inch CMP's



Approximate Station "L" 32+70 , on West Side of Rancho Drive: Just north of Riverside Drive, Drop Inlet at cul-de-sac



Approximate Station "L" 21+85 , on West Side of Rancho Drive: Just north of Artesia Way, Drop Inlet at cul-de-sac



EX-WDI-02: Shown on plans



Approximate Station "L" 20+58 , on West Side of Rancho Drive: Just north of Artesia Way, Drop Inlet at cul-de-sac



Above ground inlet at Spring Road and Rancho Drive



Parking Lot Inlet just south of Spring Road and Rancho Drive



Appendix D-Hydraulics (Spreadsheets)

- A. Existing Condition: Offsite 100-year Flows (NDOT Criteria)
 - A-1: East Side
 - A-2: West Side
- B. Interim Condition: Onsite 25-year Flows (NDOT Criteria)
 - B-1: East Side
 - B-2: West Side
- C. Ultimate Condition: Onsite 10-year Flows & 100-year flows (RTC Criteria)
 - C-1: East Side
 - C-2: West Side
- D. Interim Condition: Offsite 25-year Flows- (NDOT Criteria)
 - D-1: West Side
- E. Interim Condition: Offsite 100-year Flows (NDOT Criteria - For Comparison of Normal Depths)
 - E-1: East Side
 - E-2: West Side
- F. Interim Condition: Onsite 100-year Flows (NDOT Criteria - For HGL Comparison to 25-year flows)
 - F-1: East Side
 - F-2: West Side
- G. Table 1: Proposed Drop Inlet Summary For Scenarios (final DI sizes)
Table 2: Cumulative Flows Summary (NDOT & RTC)

- A. Existing Condition: Offsite 100-year Flows (NDOT Criteria)
 - A-1: East Side
 - A-2: West Side

EXISTING CONDITION

Street Flow Capacity-NDOT 100-Year East

			Discharge : Calculated by FM					Normal Depth: D _{Q100} Calculated by FM				
Cross-Section	Street Location	Slope (%)	100-Year Flow Capacity					100-Year Flow Capacity (on-site Rational flow) D X V < 8 & D _{Q100} <2 Criteria for NDOT				
			D _{max} (ft)	V (fps)	DxV _{max}	Q _{max} (cfs)	Q _{Q100} (cfs)	D _{Q100}	V _{Q100}	DQ100 x VQ100	D _{Q100} x V _{Q100} /8 (Met/Not met)	D _{Q100} < 2 (Met/ Not met)
"L" 112+00	North of Smoke Ranch	0.30	1.67	4.75	7.93	186.18	24.77	0.84	2.77	2.33	Met	Met
"L" 100+00	North of Lake Mead	1.81	0.98	8.13	7.97	137.05	9.95	0.34	4.03	1.37	Met	Met
"L" 98+80	North of Lake Mead	0.74	1.20	6.67	8.00	212.69	10.56	0.37	2.74	1.01	Met	Met
"L" 96+00	South of Lake Mead	1.34	1.04	7.60	7.90	198.88	351.00	1.26	9.46	11.92	Not Met	Met
"L" 92+86	South of Lake Mead	0.80	1.17	6.74	7.89	218.02	283.50	1.28	7.44	9.52	Not Met	Met
"L" 84+00	South of Lake Mead	1.49	1.04	7.57	7.87	88.95	283.50	1.60	9.18	14.69	Not Met	Met
"L" 78+25	North of Coran	1.39	1.00	7.91	7.91	211.74	283.50	1.12	8.88	9.95	Not Met	Met
"L" 65+08	South of Spring	2.38	0.97	8.23	7.98	92.86	283.50	1.36	11.47	15.60	Not Met	Met
"L" 55+25	South of Spring	1.51	0.86	7.38	6.35	164.28	265.98	1.03	8.93	9.20	Not Met	Met
"L" 49+96	South of Melody	0.89	1.09	7.32	7.98	190.91	245.18	1.21	8.07	9.76	Not Met	Met
"L" 46+93	South of Melody	1.07	1.19	6.60	7.85	127.52	221.88	1.21	8.20	9.92	Not Met	Met
"L" 46+16	South of Melody	1.15	1.00	7.95	7.95	187.45	63.61	0.68	5.20	3.54	Met	Met
"L" 39+75	South of Vegas	1.15	1.33	5.99	7.97	127.92	34.00	0.78	5.50	4.29	Met	Met
"L" 35+00	South of Vegas	1.15	0.93	8.52	7.92	215.08	26.14	0.38	3.69	1.40	Met	Met
"L" 30+33	South of Vegas	0.30	1.37	5.82	7.97	232.59	21.31	0.45	2.27	1.02	Met	Met
"L" 24+95	South of Vegas	0.30	1.37	5.82	7.97	232.59	16.68	0.41	2.06	0.84	Met	Met
"L" 19+64	South of Vegas	0.48	1.19	6.64	7.90	225.53	16.39	0.38	2.36	0.90	Met	Met
"L" 16+09	South of Vegas	0.50	1.18	6.74	7.95	226.50	14.72	0.36	2.29	0.82	Met	Met
"L" 11+76	South of Vegas	0.70	1.14	6.92	7.89	184.63	13.99	0.44	2.98	1.31	Met	Met
"4" 16+47	South of Washington	0.50	1.38	5.79	7.99	211.65	11.77	0.47	2.66	1.25	Met	Met
"4" 14+96	South of Washington	0.88	1.15	6.92	7.96	211.94	1.20	0.17	1.77	0.30	Met	Met
"4" 13+80	South of Washington	0.88	1.17	6.72	7.86	199.05	1.20	0.17	1.80	0.31	Met	Met
"4" 11+83	South of Washington	0.60	1.24	6.41	7.95	180.66	1.80	0.22	1.76	0.76	Met	Met
"4" 6+76	South of Washington	0.50	1.41	5.63	7.94	212.48	6.18	0.38	2.27	0.86	Met	Met
"C" 3+50	South of Washington	0.66	1.28	6.19	7.92	298.96	8.56	0.34	2.46	0.84	Met	Met

EXISTING CONDITION											
Drop Inlet Analysis-NDOT 100-Year East											
Existing Drop Inlet Station/Offset	Upstream Drop Inlet Bypass	Upstream 100-Year Bypass Q (cfs)	100-Year (Onsite Rational)					DI Length (ft)	Intercept Flow (cfs)	Bypass Flow (cfs)	Does DI need to be extended based on bypass flow 100-Year
			Gutter Flow-Half Street (cfs)	100-Year Criteria Half Street (cfs)	Analysis (Need DI/ DI not needed)						
"L" 98+80, 57.50' RT	"L" 100+00	9.95	10.56	212.69	DI not needed	3.00	3.87	6.69	OK		
"L" 96+00	"L" 98+80, 57.50' RT	6.69	351.00	198.88	Need DI	No Drop inlets in existing condition; Flow continues down Rancho					
"L" 92+86	N/A	0.00	283.50	218.02	Need DI						
"L" 84+00	"L" 92+86	0.00	283.50	88.95	Need DI						
"L" 77+20	"L" 84+00	0.00	283.50	211.74	Need DI						
"L" 65+08, 48.25 ' RT	"L" 77+20	0.00	283.50	92.86	Need DI	3.00	17.52	265.98	Extend DI		
"L" 55+25.50, 48.10' RT	"L" 65+08, 48.25 ' RT	265.98	265.98	164.28	Need DI	3.00	20.80	245.18	Extend DI		
"L" 49+96, 48.00' RT	"L" 55+25.50, 48.10' RT	245.18	245.18	190.91	Need DI	3.00	23.30	221.88	Extend DI		
"L" 46+93, 46.50' RT	"L" 49+96	221.88	221.88	127.52	Need DI	20.00	158.27	63.61	OK		
"L" 46+16, 43.50' RT	"L" 46+93	63.61	63.61	187.45	DI not needed	10.00	29.17	34.44	OK		
"L" 39+75, 42.50' RT	N/A	0.00	34.00	127.92	DI not needed	3.00	7.86	26.14	OK		
"L" 35+00, 42.60' RT	"L" 39+75, 42.50' RT	26.14	26.14	215.08	DI not needed	3.00	4.83	21.31	OK		
"L" 30+33, 42.50' RT	"L" 35+00, 42.60' RT	21.31	21.31	232.59	DI not needed	3.00	4.63	16.68	OK		
"L" 24+95, 42.50' RT	"L" 30+33, 42.50' RT	16.68	16.68	232.59	DI not needed	3.00	4.01	12.67	OK		
"L" 19+64, 42.00' RT	"L" 24+95, 42.50' RT	12.67	16.39	225.53	DI not needed	3.00	3.78	12.61	OK		
"L" 16+09, 42.00' RT	"L" 19+64, 42.00' RT	12.61	14.72	226.50	DI not needed	3.00	3.54	11.18	OK		
"L" 11+76, 42.50' RT	"L" 16+09, 42.00' RT	11.18	13.99	184.63	DI not needed	3.00	4.61	9.38	OK		
"4" 16+47	"L" 11+76, 42.50' RT	9.38	11.77	184.63	DI not needed	60.00	11.77	0.00	OK		
"4" 14+96	"4" 16+47	0.00	1.20	211.65	DI not needed	20.00	1.20	0.00	OK		
"4" 13+80	"4" 14+96	0.00	1.20	211.94	DI not needed	20.00	1.20	0.00	OK		
"4" 11+83	"4" 13+80	0.00	1.80	199.05	DI not needed	3.00	1.24	0.56	OK		
"4" 6+76	"4" 11+83	0.56	6.18	180.66	DI not needed	3.00	2.80	3.38	OK		
"C" 3+50	"4" 6+76	3.38	8.56	212.48	DI not needed	3.00	3.37	5.19	OK		

EXISTING CONDITION

Street Flow Capacity-Offsite 100-Year West

Cross-Section	Street Location	Slope (%)	Discharge : Calculated by FM				Normal Depth: D _{Q100} Calculated by FM						
			100-Year Flow Capacity				100-Year Flow Capacity (HEC-1 Off-site flow)						
			D _{max} (FT)	V (FPS)	DxV _{max}	Q _{max} (CFS)	Surface Flow Point ₁	Q ₁₀₀ (CFS)	D _{Q100}	V _{Q100}	D _{Q100} x V _{Q100}	D _{Q100} x V _{Q100} < 8 (Met/Not Met)	D _{Q100} < 2 (Met/Not Met)
"L" 137+00	Peak System	0.50	1.42	5.59	7.94	241.21	1	286.00	1.50	5.98	8.97	Not Met	Met
"L" 112+00	North of Smoke Ranch	0.30	1.44	5.51	7.93	330.26	1	286.00	1.35	5.21	7.03	Met	Met
"L" 100+00	North of Lake Mead	1.81	0.97	8.21	7.96	242.39	2	11.00	0.30	3.74	1.12	Met	Met
"L" 96+00	South of Lake Mead	1.34	1.04	7.60	7.90	198.88	3	440.00	1.38	10.38	14.32	Not Met	Met
"L" 92+86	South of Lake Mead	0.80	1.17	6.74	7.89	218.02	4	340.00	1.38	8.02	11.07	Not Met	Met
"L" 84+00	South of Lake Mead	1.49	1.04	7.57	7.87	88.95	5	455.00	1.83	2.38	4.36	Met	Met
"L" 79+00	North of Coran	1.39	0.99	7.95	7.87	299.23		427.02	1.13	9.15	10.34	Not Met	Met
"L" 77+20	South of Coran	1.36	1.18	6.75	7.87	202.12	6	400.00	1.50	10.01	15.02	Not Met	Met
"L" 75+05	South of Coran	1.63	1.01	7.88	7.96	126.13		373.04	1.48	11.24	16.64	Not Met	Met
"L" 72+91	South of Coran	1.76	0.98	8.05	7.89	148.69		348.10	1.31	11.15	14.61	Not Met	Met
"L" 71+21	South of Coran	1.47	1.01	7.79	7.87	161.02		325.47	1.30	10.26	13.34	Not Met	Met
"L" 69+47	South of Coran	1.04	1.16	6.82	7.91	187.36		301.28	1.35	8.23	11.11	Not Met	Met
"L" 67+75	South of Spring	0.82	1.19	6.66	7.93	160.32	7	445.00	1.77	9.90	17.52	Not Met	Met
"L" 65+08	South of Spring	2.38	0.80	9.87	7.90	243.61		414.26	1.00	12.17	12.17	Not Met	Met
"L" 64+09	South of Spring	0.96	1.25	6.33	7.91	164.86		395.52	1.63	8.92	14.54	Not Met	Met
"L" 62+15	South of Melody	1.34	1.03	7.70	7.93	157.56	8	404.00	1.47	11.11	16.33	Not Met	Met
"L" 58+47	South of Melody	1.63	1.15	6.95	7.99	105.17		378.49	1.64	11.48	18.83	Not Met	Met
"L" 55+26	South of Melody	0.50	1.32	6.06	8.00	289.01		355.53	1.43	6.57	9.40	Not Met	Met
"L" 49+96	South of Melody	0.89	1.16	6.83	7.92	159.22		278.86	1.42	8.50	12.07	Not Met	Met
"L" 48+16	South of Melody	0.70	1.22	6.54	7.98	186.24		250.83	1.30	7.90	10.27	Not Met	Met
"L" 47+81	South of Melody	1.18	1.11	7.17	7.96	170.68		63.42	0.76	5.60	5.82	Met	Met
"L" 47+49	South of Melody	1.07	1.11	7.21	8.00	194.55		10.91	0.41	3.54	1.45	Met	Met
"L" 46+03	South of Melody	0.85	1.26	6.32	7.96	134.88		0.72	0.22	1.92	0.42	Met	Met
"L" 45+06	South of Vegas	0.85	1.26	6.32	7.96	134.88		0.09	0.10	1.35	0.78	Met	Met
"L" 39+75	South of Vegas	1.15	1.07	7.41	7.93	156.81	9	300.00	1.36	9.54	12.97	Not Met	Met
"L" 35+04	South of Vegas	1.15	1.02	7.83	7.99	175.85		273.98	1.31	9.21	12.07	Not Met	Met
"L" 30+34	South of Vegas	0.30	1.64	4.83	7.92	257.13	10	302.33	1.73	5.15	8.91	Not Met	Met
"L" 25+01	South of Vegas	0.65	1.33	6.02	8.01	188.16		256.94	1.47	6.80	10.00	Not Met	Met
"L" 19+64	South of Vegas	0.48	1.28	6.23	7.97	257.83	11	253.04	1.27	6.18	7.85	Met	Met
"L" 16+09	South of Vegas	0.50	1.31	6.04	7.91	181.69		227.01	1.43	6.58	9.41	Not Met	Met
"L" 12+76	South of Vegas	0.70	1.16	6.85	7.95	243.52		198.56	1.07	6.32	6.76	Met	Met
"L" 11+17	South of Washington	0.60	1.19	6.67	7.94	236.11	12	147.00	0.98	5.54	5.43	Met	Met
"L" 10+38	South of Washington	0.60	1.43	5.55	7.94	160.47		129.91	1.33	5.27	7.01	Met	Met
"L" 10+18	South of Washington	0.60	1.43	5.55	7.94	160.47		63.18	1.06	4.42	4.69	Met	Met
"4" 15+39	South of Washington	0.82	1.16	6.90	8.00	168.25		25.29	0.59	3.90	2.30	Met	Met
"4" 14+00	South of Washington	0.88	1.10	7.22	7.94	178.64		1.98	0.22	2.03	0.45	Met	Met
"4" 11+76	South of Washington	0.80	1.12	7.08	7.93	239.53		0.00	0.03	0.49	0.01	Met	Met
"4" 7+04	South of Washington	0.50	1.34	5.94	7.96	233.17		0.00	0.03	0.43	0.01	Met	Met
"C" 3+22	South of Washington	0.66	1.31	6.05	7.93	170.01		0.00	0.03	0.52	0.02	Met	Met

EXISTING CONDITION

Drop Inlet Analysis-Offsite 100-Year West

Existing Drop Inlet Station/Offset	Upstream Bypass DI	Upstream 100-Year Bypass Q (CFS)	100-Year					Does DI need to be extended based on bypass flow 100-Year	
			Gutter Flow- Half Street (CFS)	100-Year Criteria Half Street (CFS)	Analysis (Need DI/ DI not needed)	DI Length (FT)	Intercept Flow (CFS)		Bypass Flow (CFS)
"L" 92+86, 56.76' LT	N/A	N/A	340.00	218.02	Need DI	3.00	27.78	311.72	Extend DI
"L" 84+00, 57.02' LT	"L" 92+86, 56.76' LT	311.72	455.00	88.95	Need DI	3.00	27.98	427.02	Extend DI
"L" 77+20, 48.97' LT	"L" 84+00, 57.02' LT	427.02	400.00	202.12	Need DI	3.00	26.96	373.04	Extend DI
"L" 75+05, 48.01' LT	"L" 77+20, 48.97' LT	373.04	373.04	126.13	Need DI	3.00	24.94	348.10	Extend DI
"L" 72+91, 47.92' LT	"L" 75+05, 48.01' LT	348.10	348.10	148.69	Need DI	3.00	22.63	325.47	Extend DI
"L" 71+21, 48.04' LT	"L" 72+91, 47.92' LT	325.47	325.47	161.02	Need DI	3.00	24.19	301.28	Extend DI
"L" 69+47, 48.08' LT	"L" 71+21, 48.04' LT	301.28	301.28	187.36	Need DI	3.00	24.25	277.03	Extend DI
"L" 67+75, 48.02' LT	"L" 69+47, 48.08' LT	277.03	445.00	160.32	Need DI	3.00	30.74	414.26	Extend DI
"L" 65+08, 48.24' LT	"L" 67+75, 48.02' LT	414.26	414.26	243.61	Need DI	3.00	18.74	395.52	Extend DI
"L" 64+09, 48.15' LT	"L" 65+08, 48.24' LT	395.52	395.52	164.86	Need DI	3.00	28.47	367.05	Extend DI
"L" 62+15, 48.24' LT	"L" 64+09, 48.15' LT	367.05	404.00	157.56	Need DI	3.00	25.51	378.49	Extend DI
"L" 58+47, 48.24' LT	"L" 62+15, 48.24' LT	378.49	378.49	105.17	Need DI	3.00	22.96	355.53	Extend DI
"L" 55+26, 56.61' LT	"L" 58+47, 48.24' LT	355.53	355.53	289.01	Need DI	4'x4'	76.67	278.86	OK
"L" 49+96, 47.95' LT	"L" 55+26, 56.61' LT	278.86	278.86	159.22	Need DI	3.00	28.03	250.83	Extend DI
"L" 48+16, 47.37' LT	"L" 49+96, 47.95' LT	250.83	250.83	186.24	Need DI	20.00	187.41	63.42	OK
"L" 47+81, 46.43' LT	"L" 48+16, 47.37' LT	63.42	63.42	170.68	DI not needed	20.00	52.51	10.91	OK
"L" 47+49, 45.49' LT	"L" 47+81, 46.43' LT	10.91	10.91	194.55	DI not needed	20.00	10.19	0.72	OK
"L" 46+03.50, 50.50' LT	"L" 47+49, 45.49' LT	0.72	0.72	134.88	DI not needed	3.00	0.63	0.09	OK
"L" 45+06.50, 40.25' LT	"L" 46+03.50, 50.50' LT	0.09	0.09	134.88	DI not needed	3.00	0.09	0.00	OK
"L" 39+75, 42.19' LT	"L" 47+49, 45.49' LT	300.00	300.00	156.81	Need DI	3.00	26.02	273.98	Extend DI
"L" 35+04, 42.12' LT	"L" 39+70, 42.19' LT	273.98	273.98	175.85	Need DI	3.00	22.65	251.33	Extend DI
"L" 30+34, 42.41' LT	"L" 35+04, 42.12' LT	251.33	302.33	257.13	Need DI	3.00	45.39	256.94	OK
"L" 25+01, 42.19' LT	"L" 30+34, 42.41' LT	256.94	256.94	188.16	Need DI	3.00	24.90	232.04	Extend DI
"L" 19+64, 42.17' LT	"L" 25+01, 42.19' LT	232.04	253.04	257.83	DI not needed	3.00	26.03	227.01	OK
"L" 16+09, 42.17' LT	"L" 19+64, 42.17' LT	227.01	227.01	181.69	Need DI	3.00	28.45	198.56	Extend DI
"L" 12+76, 41.85' LT	"L" 16+09, 42.17' LT	198.56	198.56	243.52	DI not needed	3.00	20.33	178.23	OK
"L" 11+17, 44.40' LT	No Upstream Bypass		147.00	236.11	DI not needed	3.00	17.09	129.91	OK
"L" 10+38, 56.68' LT	"L" 11+17, 44.40' LT	129.91	129.91	160.47	DI not needed	10.00	66.73	63.18	OK
"L" 10+18.82, 50.66' LT	"L" 10+38, 56.68' LT	63.18	63.18	160.47	DI not needed	10.00	37.89	25.29	OK
"L" 15+39, 64.12' LT	"L" 10+18, 56.68' LT	25.29	25.29	168.25	DI not needed	20.00	23.31	1.98	OK
"L" 14+00, 64.26' LT	"L" 15+39, 64.12' LT	1.98	1.98	178.64	DI not needed	20.00	1.98	0.00	OK
"L" 11+76, 64.29' LT	"L" 14+00, 64.26' LT	0.00	0.01	239.53	DI not needed	3.00	0.01	0.00	OK
"L" 7+04, 74.17' LT	"L" 11+76, 64.29' LT	0.00	0.01	233.17	DI not needed	3.00	0.01	0.00	OK
"C" 3+22, 26.36' LT	"L" 7+04, 74.17' LT	0.00	0.01	170.01	DI not needed	6.00	0.01	0.00	OK

B. Interim Condition: Onsite 25-year Flows (NDOT Criteria)

B-1: East Side

B-2: West Side

Interim Condition

Street Flow Capacity-NDOT 25-year East

Cross-Section	Street Location	Slope (%)	Cross Slope (%)	Bus Lane Width (FT)	Adjacent Lane Width (FT)	Normal Depth: D _{Q25} Calculated by FM			
						25-Year Flow Capacity		25-Year Actual Flow (Onsite)	
						D _{max} (FT)	Q (Half Street) (CFS)	Q ₂₅ (Half Street) (CFS)	D _{Q25} Vs. D _{max} (Met/ Not Met)
"L" 112+00	North of Smoke Ranch	0.30	3.48	12.50	10.50	0.74	17.76	17.90	0.74 Met
"L" 100+00	North of Lake Mead	1.81	3.94	12.50	10.50	0.82	52.44	7.16	0.42 Met
"L" 98+80	North of Lake Mead	0.74	2.22	12.50	10.50	0.52	14.29	7.60	0.43 Met
"L" 78+25	North of Coran	1.39	1.84	12.50	10.50	0.45	14.67	15.40	0.46 Not Met
"L" 65+08	South of Spring	2.38	1.45	12.50	10.50	0.38	13.26	18.60	0.42 Not Met
"L" 55+25.50	South of Spring	2.38	1.45	12.50	10.50	0.38	13.26	20.13	0.43 Not Met
"L" 55+25.50 D/S of DI	South of Spring	2.38	1.45	12.50	10.50	0.38	13.26	12.03	0.37 Met
"L" 49+96	South of Melody	0.89	2.08	0.00	10.50	0.23	0.95	15.57	0.50 Not Met
"L" 49+96 D/S of DI	South of Melody	0.89	2.08	0.00	10.50	0.23	0.95	0.82	0.22 Met
"L" 46+93	South of Melody	1.07	2.58	0.00	10.50	0.26	1.48	3.21	0.32 Not Met
"L" 46+16	South of Melody	1.15	1.88	0.00	10.50	0.22	0.95	0.31	0.17 Met
"L" 39+75	South of Vegas	1.15	2.68	0.00	11.00	0.27	0.48	3.22	0.23 Met
"L" 39+75 D/S of DI	South of Vegas	1.15	2.68	0.00	11.00	0.27	0.48	0.09	0.10 Met
"L" 35+00	South of Vegas	1.15	2.13	0.00	11.00	0.24	3.57	2.81	0.23 Met
"L" 30+33	South of Vegas	0.30	4.05	0.00	11.00	0.35	9.71	3.41	0.27 Met
"L" 24+95	South of Vegas	0.30	1.93	0.00	11.00	0.23	1.47	4.18	0.28 Not Met
"L" 24+95 D/S of DI	South of Vegas	0.30	1.93	0.00	11.00	0.23	1.47	0.86	0.21 Met
"L" 19+64	South of Vegas	0.48	1.67	0.00	11.00	0.22	1.47	3.54	0.26 Not Met
"L" 19+64 D/S of DI	South of Vegas	0.48	1.67	0.00	11.00	0.22	1.47	0.77	0.19 Met
"L" 16+09	South of Vegas	0.50	2.64	0.00	11.00	0.27	4.48	2.29	0.24 Met
"L" 11+76	South of Vegas	0.70	2.04	0.00	11.00	0.24	1.01	2.87	0.32 Not Met
"L" 11+76 D/S of DI	South of Vegas	0.70	2.04	0.00	11.00	0.24	1.01	0.58	0.21 Met
"4" 16+47	South of Washington	0.50	2.57	10.00	11.00	0.52	10.09	2.51	0.34 Met
"4" 14+96	South of Washington	0.88	2.98	0.00	11.00	0.29	1.78	0.86	0.23 Met
"4" 13+80	South of Washington	0.88	2.30	0.00	11.00	0.25	1.21	0.86	0.23 Met
"4" 11+83	South of Washington	0.60	2.46	0.00	11.00	0.26	1.13	1.22	0.27 Not Met
"4" 6+76	South of Washington	0.50	2.63	0.00	11.00	0.27	1.15	4.41	0.40 Not Met
"4" 6+76 D/S of DI	South of Washington	0.50	2.63	0.00	11.00	0.27	1.15	1.10	0.22 Met
"C" 3+62.50	South of Washington	0.66	1.69	0.00	11.00	0.22	0.76	4.84	0.35 Not Met
"C" 3+62.50 D/S of DI	South of Washington	0.66	1.69	0.00	11.00	0.22	0.76	0.29	0.18 Met
"C" 6+64.30, 35.27' LT	South of Bonanza	0.66	1.69	0.00	11.00	0.22	0.76	2.17	0.28 Not Met
"C" 8+22.98, 31.10' LT	South of Bonanza	0.66	1.69	0.00	11.00	0.22	0.76	1.22	0.25 Not Met

INTERIM CONDITION

Drop Inlet Analysis-NDOT-25 Year East

Existing Drop Inlet Station/Offset	Proposed Drop Inlet Station/Offset	Proposed DI	Contributing Basins (Onsite)	Upstream Drop Inlet Bypass	Upstream 25-Year Bypass Q (CFS)	Gutter Flow- Half Street (CFS)	25-Year Criteria (Dry- Lane) Flow Half Street (CFS)	Analysis (Need DI/ DI not needed)	Existing DI Length (FT)	Proposed DI Length (FT)		Intercept Flow (CFS)	Bypass Flow (CFS)	Does DI need to be extended based on bypass flow 25-Year
										Grate	Curb			
N/A	"L" 112+01.75, 52.50' RT	EDI-01	ONRAN2R, ONRAN3R, ONRAN4R, ONRAN5R	N/A	N/A	17.90	17.76	Need DI	None	3.00	3.00	5.73	12.17	OK
"L" 98+80, 57.50' RT	"L" 98+82.89, 57.00' RT	EDI-02	ONRAN6R, ONRAN7R, 0.3" ONRAN7RA 0.7" ONRAN7RA, ONRAN8R, ONRAN9R, ONRAN10R	N/A	N/A	7.60	14.29	DI not needed	3.00	3.00	3.00	3.16	4.44	OK
N/A	"L" 77+58.20, 53.00' RT	EDI-03	ONRAN10R	N/A	N/A	15.40	14.67	Need DI	None	3.00	3.00	4.91	10.49	OK
"L" 65+08, 48.25' RT	"L" 64+97.77, 52.00' RT	EDI-04	ONRAN10R+ONRAN13R+ ONRAN14R	"L" 77+58.20, 53.00' RT	10.49	18.60	13.26	Need DI	3.00	3.00	3.00	5.70	12.90	OK
"L" 55+25.50, 48.10' RT	"L" 55+23.60, 52.00' RT	EDI-05	ONRAN15R+OFF15R+ONRAN16R	"L" 64+97.77, 52.00' RT	12.90	20.13	13.26	Need DI	3.00	3.00	3.00	5.98	14.15	Extend DI
	"L" 55+23.60, 52.00' RT		ONRAN15R+OFF15R+ONRAN16R	"L" 64+97.77, 52.00' RT	12.90	20.13	13.26	Need DI	3.00	6.00	6.00	8.10	12.03	OK
"L" 49+96, 48.00' RT	"L" 50+03.45, 44.97' RT	EDI-06	ONRAN17R	"L" 55+23.60, 52.00' RT	12.03	15.57	0.95	Need DI	3.00	3.00	3.00	4.90	10.67	Extend DI
"L" 46+93, 46.50' RT	"L" 46+80.17, 47.98' RT	EDI-07	ONRAN17R	"L" 55+23.60, 52.00' RT	12.03	15.57	0.95	Need DI	20.00	22.50	14.75	0.82	0.82	OK
"L" 46+16, 43.50' RT	"L" 46+02.67, 42.61' RT	EDI-08	ONRAN18R	"L" 50+03.45, 44.97' RT	0.82	3.21	1.48	Need DI	20.00	20.00	22.50	3.20	0.01	OK
			ONRAN19R	"L" 46+80.17, 47.98' RT	0.01	0.31	0.95	DI not needed	10.00	10.00	12.50	0.31	0.00	OK
"L" 39+75, 42.50' RT	"L" 39+81.63, 39.50' RT	EDI-09	ONRAN20R	"L" 46+02.67, 42.61' RT	0.00	3.22	0.48	Need DI	3.00	3.00	3.00	1.99	1.23	Extend DI
"L" 35+00, 42.60' RT	"L" 35+02.41, 39.50' RT	EDI-10	ONRAN20R	"L" 46+02.67, 42.61' RT	0.00	3.22	0.48	Need DI	10.00	10.00	12.50	3.13	0.09	OK
"L" 30+33, 42.50' RT	"L" 30+55.45, 39.50' RT	EDI-11	ONRAN21R	"L" 39+81.63, 39.50' RT	0.09	2.81	3.57	DI not needed	3.00	3.00	3.00	1.69	1.12	OK
"L" 24+95, 42.50' RT	"L" 24+97.16, 39.50' RT	EDI-12	ONRAN22R	"L" 35+02.41, 39.50' RT	1.12	3.41	9.71	DI not needed	3.00	3.00	3.00	1.94	1.47	OK
			ONRAN23R	"L" 30+55.45, 39.50' RT	1.47	4.18	1.47	Need DI	3.00	3.00	3.00	2.23	1.95	Extend DI
			ONRAN24R, ONRAN25R	"L" 30+55.45, 39.50' RT	1.47	4.18	1.47	Need DI	3.00	6.00	6.00	3.32	0.86	OK
"L" 19+64, 42.00' RT	"L" 19+75.86, 39.50' RT	EDI-13	ONRAN24R, ONRAN25R	"L" 24+97.16, 39.50' RT	0.86	3.54	1.47	Need DI	3.00	3.00	3.00	1.94	1.60	Extend DI
"L" 16+09, 42.00' RT	"L" 16+07.87, 49.50' RT	EDI-14	ONRAN26R, 26RA	"L" 19+75.86, 39.50' RT	0.86	3.54	4.48	DI not needed	3.00	3.00	3.00	1.45	0.84	OK
"L" 11+76, 42.50' RT	"L" 11+81.51, 39.50' RT	EDI-15	ONRAN27R	"L" 16+07.87, 49.50' RT	0.84	2.87	1.01	Need DI	3.00	3.00	3.00	1.70	1.17	Extend DI
"L" 16+47, 21.00' RT	"L" 16+25.11, 27.50' RT	EDI-16	ONRAN27R	"L" 16+07.87, 49.50' RT	0.84	2.87	1.01	Need DI	3.00	6.00	6.00	2.29	0.58	OK
"L" 14+96, 20.00' RT	"L" 14+86.97, 28.54' RT	EDI-17	ONRAN28R	"L" 11+81.51, 39.50' RT	0.58	2.51	10.09	DI not needed	60.00	60.00	62.50	2.51	0.00	OK
"L" 13+80, 20.75' RT	"L" 13+72.63, 24.21' RT	EDI-18	ONRAN29R	"L" 16+25.11, 27.50' RT	0.00	0.86	1.78	DI not needed	20.00	20.00	22.50	0.86	0.00	OK
"L" 11+83, 20.00' RT	"L" 11+80.71, 21.02' RT	EDI-19	ONRAN30R	"L" 14+86.97, 28.54' RT	0.00	0.86	1.21	DI not needed	20.00	20.00	22.50	0.86	0.00	OK
			ONRAN31R	"L" 13+72.63, 24.21' RT	0.00	1.22	1.13	Need DI	3.00	3.00	3.00	0.94	0.28	OK
"L" 6+76, 35.50' RT	"L" 6+74.09, 38.95' RT	EDI-20	ONRAN32R+ONRAN32RA	"L" 11+80.71, 21.02' RT	0.28	4.41	1.15	Need DI	3.00	3.00	3.00	2.26	2.15	Extend DI
			ONRAN32R+ONRAN32RA	"L" 11+80.71, 21.02' RT	0.28	4.41	1.15	Need DI	3.00	6.00	6.00	3.31	1.10	OK
"C" 3+62.50, 27.00' LT	"C" 3+59.56, 25.81' LT	EDI-21	ONRAN33R	"L" 6+74.09, 38.95' RT	1.10	4.84	0.76	Need DI	3.00	3.00	3.00	2.38	2.46	Extend DI
"C" 6+64.30, 35.27' LT	"C" 6+64.30, 35.27' LT	EDI-22	ONRAN33R	"L" 6+74.09, 38.95' RT	1.10	4.84	0.76	Need DI	10.00	10.00	12.50	4.55	0.29	OK
"C" 8+22.98, 31.10' LT	"C" 8+22.98, 31.10' LT	EDI-23	ONRAN34R	"C" 3+59.56, 25.81' LT	0.29	2.17	0.76	Need DI	10.0	10.0	12.50	2.15	0.02	OK
			ONRAN35R	"C" 6+64.30, 35.27' LT	0.02	1.22	0.76	Need DI	10.0	10.0	12.50	1.20	0.00	OK

INTERIM CONDITION

Drop Inlet Analysis-NDOT-25 Year West

Existing Drop Inlet Station/Offset	Proposed Drop Inlet Station/Offset	Contributing Basins (Onsite)	Upstream Drop Inlet Bypass	Upstream 25yr Bypass Q (CFS)	25-year							Does DI Need To Be Extended Based On Bypass Flow 25- Year	
					Gutter Flow- Half Street (CFS)	25-yr Criteria (Dry-Lane) Flow Half Street (CFS)	Analysis (Need DI/DI not needed)	Existing DI Length	Proposed DI Length (Ft')		Intercept Flow (CFS)		Bypass Flow (CFS)
									Grate	Curb			
None	"L" 112+33.57, 54.66' LT	ONRAN2L, 3L, 4L, 5L	N/A	N/A	15.67	3.51	Need DI	0.00	47.50	50.00	15.64	0.00	OK
"L" 92+86, 56.76' LT	"L" 92+84.94, 56.34' LT	ONRAN7LA, 1/2 ONRAN8L	N/A	N/A	4.67	11.66	DI not needed	3.00	3.00	3.00	2.33	2.34	OK
"L" 84+00, 57.02' LT	"L" 83+97.38, 52.00' LT	1/2 ONRAN8L, ONRAN9L, 1/3 ONRAN10L	"L" 92+84.94, 56.34' LT	2.34	8.30	36.71	DI not needed	3.00	3.00	3.00	4.10	4.20	OK
"L" 77+20, 48.97' LT	"L" 77+11.75, 64.00' LT	2/3 ONRAN 10L	"L" 83+97.38, 52.00' LT	4.20	8.21	22.38	DI not needed	3.00	3.00	3.00	3.69	4.52	OK
"L" 75+05, 48.01' LT	"L" 75+03.39, 52.82' LT	1/2 ONRAN11LA, 1/3 ONRAN11L	"L" 77+11.75, 64.00' LT	4.52	4.72	32.83	DI not needed	3.00	3.00	3.00	2.75	1.97	OK
"L" 72+91, 47.92' LT	"L" 72+87.22, 52.00' LT	1/2 ONRAN11LA, 1/3 ONRAN11L	"L" 75+03.39, 52.82' LT	1.97	3.34	24.74	DI not needed	3.00	3.00	3.00	2.08	1.26	OK
"L" 71+21, 48.04' LT	"L" 71+19.94, 52.00' LT	1/2 ONRAN11LA1, 1/3 ONRAN11L	"L" 72+87.22, 52.00' LT	1.26	2.63	21.33	DI not needed	3.00	3.00	3.00	1.75	0.88	OK
"L" 69+47, 48.08' LT	"L" 69+55.83, 52.00' LT	1/2 ONRAN11LA1, ONRAN13L	"L" 71+19.94, 52.00' LT	0.88	2.42	12.23	DI not needed	3.00	3.00	3.00	1.50	0.87	OK
"L" 67+75, 48.02' LT	"L" 67+73.28, 52.00' LT	ONRAN14L	"L" 69+55.83, 52.00' LT	0.87	2.24	13.16	DI not needed	3.00	3.00	3.00	1.33	0.66	OK
"L" 65+08, 48.24' LT	"L" 64+97.77, 52.00' LT	ONRAN14LA	"L" 67+73.28, 52.00' LT	0.66	3.74	6.47	DI not needed	3.00	3.00	3.00	1.69	0.90	OK
	"L" 64+97.77, 52.00' LT	ONRAN14LA	"L" 67+73.28, 52.00' LT	0.66	3.74	6.47	DI not needed	3.00	7.50	7.50	2.15	0.44	Extend DI based on 25-yr offsite
"L" 64+09, 48.15' LT	"L" 64+06.49, 52.00' LT	ONRAN15L	"L" 64+97.77, 52.00' LT	0.44	2.37	13.63	DI not needed	3.00	3.00	3.00	0.95	0.25	OK
"L" 62+15, 48.24' LT	"L" 62+13.21, 52.00' LT	ONRAN15LA	"L" 64+06.49, 52.00' LT	0.25	3.07	21.73	DI not needed	3.00	3.00	3.00	1.17	0.40	OK
"L" 58+47, 48.24' LT	"L" 58+52.96, 52.00' LT	ONRAN16L	"L" 62+13.21, 52.00' LT	0.40	1.16	32.64	DI not needed	3.00	3.00	3.00	1.84	1.20	OK
	"L" 58+52.96, 52.00' LT	ONRAN16L	"L" 58+52.96, 52.00' LT	0.40	1.16	32.64	DI not needed	3.00	7.50	7.50	2.50	0.54	Extend DI based on 25-yr offsite
"L" 55+26, 44.00' LT	"L" 55+23.60, 46.23' LT	ONRAN16LA	"L" 58+52.96, 52.00' LT	0.54	1.86	10.56	DI not needed	4'x4'	4'x4'	4'x4'	2.98	0.10	OK
"L" 49+96, 47.95' LT	"L" 49+92.81, 48.75' LT	ONRAN17L	"L" 55+23.60, 46.23' LT	0.10	2.74	21.02	DI not needed	3.00	3.00	3.00	2.25	1.54	OK
"L" 48+16, 47.37' LT	"L" 48+05.47, 41.75' LT	ONRAN18L	"L" 49+92.81, 48.75' LT	1.54	5.08	15.21	DI not needed	20.00	20.00	22.50	2.85	0.00	OK
"L" 47+81, 46.43' LT	"L" 47+71.09, 41.44' LT	ONRAN18LA	"L" 48+05.47, 41.75' LT	0.00	3.69	20.29	DI not needed	20.00	20.00	22.50	0.25	0.00	OK
"L" 47+49, 45.49' LT	"L" 47+38.80, 41.95' LT	ONRAN18LB	"L" 47+71.09, 41.44' LT	0.00	2.39	10.33	DI not needed	20.00	20.00	22.50	0.25	0.00	OK
"L" 46+03, 41.75' LT	"L" 46+04.18, 51.95' LT	3/4 of ONRAN19L	"L" 47+38.80, 41.95' LT	0.00	0.19	25.17	DI not needed	3.00	3.00	3.00	1.08	0.29	OK
"L" 45+06, 40.25' LT	"L" 45+07.81, 40.49' LT	1/4 of ONRAN19L	"L" 46+04.18, 51.95' LT	0.00	0.06	28.14	DI not needed	3.00	N/A	N/A	N/A	N/A	N/A
"L" 39+70, 42.19' LT	"L" 39+76.98, 39.50' LT	ONRAN20L, 1/4 of ONRAN19L	"L" 46+04.18, 51.95' LT	0.29	0.66	1.65	DI not needed	3.00	3.00	3.00	2.13	1.43	OK
"L" 35+04, 42.12' LT	"L" 35+02.41, 39.50' LT	ONRAN21L	"L" 39+76.98, 39.50' LT	1.43	4.65	14.02	DI not needed	3.00	3.00	3.00	2.08	1.72	OK
"L" 30+34, 42.41' LT	"L" 30+55.27, 39.50' LT	ONRAN22L, ONRAN22LA	"L" 35+02.41, 39.50' LT	1.72	4.44	1.62	Need DI	3.00	3.00	3.00	2.58	1.26	OK
"L" 25+01, 42.19' LT	"L" 24+98.89, 39.50' LT	ONRAN23L	"L" 30+55.27, 39.50' LT	1.26	1.84	0.81	Need DI	3.00	3.00	3.00	2.15	2.12	Extend DI
	"L" 24+98.89, 39.50' LT	ONRAN23L	"L" 30+55.27, 39.50' LT	1.26	1.84	0.81	Need DI	3.00	7.50	7.50	3.46	0.81	OK
"L" 19+64, 42.17' LT	"L" 19+79.61, 39.50' LT	ONRAN24L, ONRAN25L	"L" 24+98.89, 39.50' LT	0.81	6.91	0.63	Need DI	3.00	3.00	3.00	2.39	2.57	Extend DI
	"L" 19+79.61, 39.50' LT	ONRAN24L, ONRAN25L	"L" 24+98.89, 39.50' LT	0.81	6.91	0.63	Need DI	3.00	10.00	12.50	4.70	0.26	OK
"L" 16+09, 42.17' LT	"L" 16+07.74, 39.50' LT	ONRAN26L	"L" 19+79.61, 39.50' LT	0.26	1.33	1.11	Need DI	3.00	3.00	3.00	1.65	0.84	OK
None	"L" 13+35.72, 39.50' LT	ONRAN27L	"L" 16+07.74, 39.50' LT	0.84	3.07	0.76	Need DI	None	6.00	6.00	2.23	0.68	OK
"L" 12+76, 41.85' LT	"L" 12+73.27, 31.24' LT	bypass from previous inlet	"L" 13+35.72, 39.50' LT	0.68	0.68	0.76	DI not needed	3.00	3.00	3.00	0.60	0.08	OK
"L" 11+17, 44.40' LT	"L" 11+16.33, 41.13' LT	ONRAN27LA, ONRAN28L	"L" 12+73.27, 31.24' LT	0.08	2.45	0.70	Need DI	3.00	3.00	3.00	0.81	0.23	OK
"L" 10+38, 56.68' LT	"L" 10+32.35, 54.25' LT	ONRAN28LA	"L" 11+16.33, 41.13' LT	0.23	0.89	6.86	DI not needed	10.00	10.00	10.00	0.74	0.00	OK
"L" 10+18, 50.66 LT	"L" 10+10.09, 50.33 LT	bypass from previous inlet	"L" 10+32.35, 54.25' LT	0.00	0.00	6.86	DI not needed	10.00	7.50	7.50	0.00	0.00	OK
"4" 15+39, 64.12' LT	"4" 15+31.01, 64.65' LT	ONRAN29L	"L" 10+10.09, 50.33 LT	0.00	0.30	1.42	DI not needed	20.00	20.00	22.50	1.52	0.00	OK
"4" 14+00, 64.26' LT	"4" 14+09.28, 70.16' LT	ONRAN30L	"4" 15+31.01, 64.65' LT	0.00	0.86	1.21	DI not needed	20.00	20.00	22.50	1.43	0.00	OK
"4" 11+76, 64.29' LT	"4" 11+75.15, 89.18' LT	ONRAN31L	"4" 14+09.28, 70.16' LT	0.00	1.42	0.81	Need DI	3.00	3.00	3.00	1.48	0.65	OK
"4" 7+04, 74.17' LT	"4" 7+13.62, 73.85' LT	ONRAN32LA, ONRAN32L	"4" 11+75.15, 89.18' LT	0.65	2.86	0.76	Need DI	3.00	3.00	3.00	2.29	2.08	Extend DI
	"4" 7+13.62, 73.85' LT	ONRAN32LA, ONRAN32L	"4" 7+13.62, 73.85' LT	0.65	2.86	0.76	Need DI	3.00	7.50	7.50	4.03	0.71	OK
None	"C" 2+81.44, 76.70' RT	ONRAN33L, ONRAN33LA, ONRAN33LA1	"4" 7+13.62, 73.85' LT	0.71	10.31	0.62	Need DI	None	10.00	12.50	4.68	0.43	OK
"C" 3+22, 78.00' RT	"C" 3+28.97, 77.32' LT	bypass from previous inlet	"C" 2+81.44, 76.70' RT	0.43	0.43	0.62	DI not needed	10.00	3.00	3.00	0.41	0.02	OK
"C" 7+05.17, 80.50' RT	"C" 7+05.17, 80.50' RT	bypass from previous inlet, 2/3 OF 34LA	"C" 3+28.97, 77.32' LT	0.02	1.89	1.93	DI not needed	3	5	5.00	1.46	0.43	OK
"C" 7+94.23, 93.31' RT	"C" 7+94.23, 93.31' RT	bypass from previous inlet, 1/3 OF 34LA	"C" 7+05.17, 80.50' RT	0.43	1.37	1.93	DI not needed	10.0	10.0	12.50	1.62	0.00	OK
"C" 8+44.76, 93.84' RT	"C" 8+44.76, 93.84' RT	bypass from previous inlet, 1/3 OF 34LA	"C" 7+94.23, 93.31' RT	0.00	0.94	1.93	DI not needed	10.0	10.0	12.50	0.94	0.00	OK

Interim Condition

Street Flow Capacity-NDOT 25-Year West

		Normal Depth: D _{Q25} Calculated by FM				25-Year Actual Flow (Onsite) D _{Q25} Vs. D _{max}			
Cross-Section	Street Location	Slope (%)	Cross Slope (%)	Bus Lane Width (FT)	Adjacent Lane Width (FT)	25-Year Flow Capacity Dry Lane Criteria for NDOT			D _{Q25} < D _{dry-lane} (Met/ Not Met)
						D _{max} (FT)	Q (Half Street) (CFS)	Q ₂₅ (Half Street) (CFS)	
"L" 112+33.57	North of Smoke Ranch	0.30	1.34	12.50	10.00	0.36	3.51	15.67	0.55 Not Met
"L" 92+84.94	South of Lake Mead	0.80	2.06	12.50	10.00	0.49	11.66	4.67	0.37 Met
"L" 83+97.38	South of Lake Mead	1.49	3.51	12.50	10.00	0.74	36.71	8.30	0.45 Met
"L" 77+11.75	South of Coran	1.36	2.68	12.50	10.00	0.59	22.38	8.21	0.43 Met
"L" 75+03.39	South of Coran	1.63	3.19	12.50	10.00	0.68	32.83	4.72	0.36 Met
"L" 72+87.22	South of Coran	1.76	2.61	12.50	10.00	0.58	24.74	3.34	0.31 Met
"L" 71+19.94	South of Coran	1.47	2.47	12.50	10.00	0.56	21.33	2.63	0.29 Met
"L" 69+55.83	South of Coran	1.04	2.00	12.50	10.00	0.47	12.23	2.42	0.29 Met
"L" 67+73.28	South of Spring	0.82	2.18	12.50	10.00	0.51	13.16	2.24	0.29 Met
"L" 64+97.77	South of Spring	2.38	1.00	12.50	10.00	0.30	6.47	3.74	0.24 Met
D/S "L" 64+97.77	South of Spring	2.38	1.00	12.50	10.00	0.30	6.47	0.44	0.16 Met
"L" 64+06.49	South of Spring	0.96	2.12	12.50	10.00	0.50	13.63	2.37	0.24 Met
"L" 62+13.21	South of Melody	1.34	2.58	12.50	10.00	0.58	21.73	3.07	0.26 Met
"L" 58+52.96	South of Melody	1.63	3.20	12.50	10.00	0.68	32.64	1.16	0.31 Met
D/S "L" 58+52.96	South of Melody	1.63	3.20	12.50	10.00	0.68	33.64	0.54	0.19 Met
"L" 55+23.60	South of Melody	0.50	2.28	12.50	10.00	0.52	10.56	1.86	0.36 Met
"L" 49+92.81	South of Melody	0.89	2.86	12.50	10.00	0.63	21.02	2.74	0.36 Met
"L" 48+05.47	South of Melody	0.70	2.52	12.50	10.00	0.57	15.21	5.08	0.34 Met
"L" 47+71.09	South of Melody	1.18	2.62	12.50	10.00	0.58	20.29	3.69	0.15 Met
"L" 47+38.80	South of Melody	1.07	1.74	12.50	10.00	0.43	10.33	2.39	0.16 Met
"L" 46+04.18	South of Melody	0.92	2.59	12.50	10.00	0.58	25.17	0.19	0.26 Met
"L" 45+07.81	South of Vegas	1.15	2.68	11.50	11.00	0.58	28.14	0.06	0.19 Met
"L" 39+76.98	South of Vegas	1.15	2.68	11.50	11.00	0.27	1.65	0.66	0.34 Not Met
"L" 35+02.41	South of Vegas	1.15	2.13	11.50	11.00	0.49	14.02	4.65	0.33 Met
"L" 30+55.27	South of Vegas	0.30	4.05	0.00	11.00	0.35	1.62	4.44	0.47 Not Met
"L" 24+98.89	South of Vegas	0.65	1.93	0.00	11.00	0.23	0.81	1.84	0.37 Not Met
"L" 19+79.61	South of Vegas	0.48	1.67	0.00	11.00	0.22	0.63	6.91	0.39 Not Met
"L" 16+07.74	South of Vegas	0.50	2.64	0.00	11.00	0.27	1.11	1.33	0.34 Not Met
"L" 13+35.72	South of Vegas	0.70	1.68	0.00	11.00	0.22	0.76	3.07	0.31 Not Met
"L" 12+73.27	South of Vegas	0.70	1.68	0.00	11.00	0.22	0.76	0.68	0.21 Met
"L" 11+16.33	South of Washington	0.60	1.66	0.00	11.00	0.22	0.70	2.45	0.24 Not Met
"L" 10+32.35	South of Washington	0.60	2.70	10.00	11.00	0.54	6.86	0.89	0.22 Met
"L" 10+10.09	South of Washington	0.60	2.70	10.00	11.00	0.54	6.86	0.00	0.04 Met
"L" 15+31.01	South of Washington	0.82	2.65	0.00	11.00	0.27	1.42	0.30	0.28 Not Met
"L" 14+09.28	South of Washington	0.88	2.24	0.00	11.00	0.25	1.21	0.86	0.26 Not Met

Interim Condition

Street Flow Capacity-NDOT 25-Year West

		Normal Depth: D _{Q25} Calculated by FM				25-Year Actual Flow (Onsite) D _{Q25} Vs. D _{max}		
Cross-Section	Street Location	Slope (%)	Cross Slope (%)	Bus Lane Width (FT)	Adjacent Lane Width (FT)	25-Year Flow Capacity		
						Dry Lane Criteria for NDOT		
						D _{max} (FT)	Q (Half Street) (CFS)	D _{Q25} (Half Street) (CFS)
"4" 11+75.15	South of Washington	0.80	1.68	0.00	11.00	0.22	0.81	1.42
"4" 7+13.62	South of Washington	0.50	1.68	0.00	12.00	0.23	0.76	2.86
"C" 2+81.44	South of Washington	0.66	1.61	0.00	11.00	0.21	0.62	10.31
"C" 3+28.97	South of Washington	0.66	1.61	0.00	11.00	0.21	0.62	0.43
								D _{Q25} < D _{dry-lane} (Met/ Not Met)
								0.28
								0.37
								0.37
								Met

C. Ultimate Condition: Onsite 10-year Flows & 100-year flows (RTC Criteria)

C-1: East Side

C-2: West Side

ULTIMATE CONDITION

Drop Inlet Analysis-RTC 10-yr & 100-yr East Option A

Existing Drop Inlet Station/Offset	Proposed Drop Inlet Station/Offset	Proposed DI	Contributing Basins (Offsite/Onsite)	Upstream 10-Year Bypass Q (CFS)	Upstream 100-yr Bypass Q (CFS)	10-year								Does DI need to be extended based on bypass flow 100-Year	100-Year								Does DI need to be extended based on bypass flow 100-Year
						Gutter Flow- Half Street (CFS)	Criteria (Dry- Lane) Flow Half Street (CFS)	Analysis (Need DI/ DI not needed)	Existing DI Length (FT)	Propose DI Length (FT)		Intercept Flow (CFS)	Bypass Flow (CFS)		Gutter Flow- Half Street (CFS)	100-Year Criteria Half Street (CFS)	Analysis (Need DI/ DI not needed)	Existing DI Length (FT)	Propose DI Length (FT)		Intercept Flow (CFS)	Bypass Flow (CFS)	
										Grate	Curb								Grate	Curb			
N/A	"L" 112+01.75, 52.50' RT	EDI-01	ONRAN2R, 3R, 4R, 5R	N/A		13.2	60.4	DI not needed	N/A	N/A	N/A	N/A	N/A	N/A	24.20	199.94	DI not needed	N/A	N/A	N/A	N/A	N/A	N/A
N/A	"L" 100+00		ONRAN6R, 7R	N/A		5.2	58.2	DI not needed	N/A	N/A	N/A	N/A	N/A	N/A	9.66	95.34	DI not needed	N/A	N/A	N/A	N/A	N/A	N/A
"L" 98+80, 57.50' RT	L 98+82.89, 57.00' RT	EDI-02	ONRAN6R, ONRAN7R, 0.3*ONRAN7RA	N/A	N/A	5.55	37.80	DI not needed	3.00	3.00	3.00	2.69	2.86	OK	10.27	217.29	DI not needed	3.00	3.00	3.00	3.87	6.40	OK
N/A	"L" 77+58.20, 53.00 RT	EDI-03	0.7*ONRAN7RA +8R+9R+10R	N/A		11.24	35.47	DI not needed	N/A	N/A	N/A	N/A	N/A	N/A	20.80	197.38	DI not needed	N/A	N/A	N/A	N/A	N/A	N/A
"L" 65+08, 48.25 ' RT	"L" 64+97.77, 52.00' RT	EDI-04	ONRAN11R+ONRAN11RA+ONRAN13R + ONRAN14R	11.24	20.80	17.21	27.82	DI not needed	3.00	3.00	3.00	5.41	11.80	OK	31.91	206.24	DI not needed	3.00	3.00	3.00	7.20	24.71	OK
"L" 55+25.50, 48.10' RT	"L" 55+23.60, 52.00' RT	EDI-05	ORAN15R+ONRAN16R	11.80	24.71	15.20	21.76	DI not needed	3.00	3.00	3.00	5.05	10.15	OK	33.80	223.09	DI not needed	3.00	3.00	3.00	7.73	26.07	OK
"L" 49+96 , 48.00' RT	"L" 50+03.45, 44.97' RT	EDI-06	ONRAN17R	10.15	26.07	12.73	10.00	Need DI	3.00	3.00	3.00	4.42	8.31	OK	30.85	176.19	DI not needed	3.00	3.00	3.00	7.39	23.46	OK
"L" 46+93, 46.50' RT	"L" 46+80.17, 47.98' RT	EDI-07	ONRAN18R	8.31	23.46	10.07	17.46	DI not needed	20.00	20.00	22.50	9.76	0.31	OK	26.73	155.98	DI not needed	20.00	20.00	22.50	23.15	3.58	OK
"L" 46+16, 43.50' RT	"L" 46+02.67, 42.61 RT	EDI-08	ONRAN19R	0.31	3.58	0.54	9.12	DI not needed	10.00	10.00	12.50	0.54	0.00	OK	4.00	174.71	DI not needed	10.00	10.00	12.50	3.83	0.17	OK
"L" 39+75, 42.50' RT	"L" 39+73.00, 38.00' RT		ONRAN20R	0.00	0.17	2.36	0.21	Need DI	3.00	3.00	3.00	1.62	0.74	Extend DI	4.54	215.08	DI not needed	3.00	3.00	3.00	2.43	2.11	OK
"L" 39+73.00, 38.00' RT-Extend		EDI-09	ONRAN20R	0.00	0.17	2.36	0.21	Need DI		10.00	12.50	2.36	0.00	OK	4.54	215.08	DI not needed		10.00	12.50	4.27	0.27	OK
"L" 35+00, 42.60' RT	"L" 35+02.41, 39.50' RT	EDI-10	ONRAN21R	0.00	0.27	1.36	73.20	DI not needed	3.00	3.00	3.00	1.47	0.51	OK	2.80	215.19	DI not needed	3.00	3.00	3.00	2.27	1.67	OK
"L" 30+33, 42.50' RT	"L" 30+55.45, 39.50' RT	EDI-11	ONRAN22R	0.51	2.27	2.56	89.14	DI not needed	3.00	3.00	3.00	1.51	0.67	OK	6.08	237.40	DI not needed	3.00	3.00	3.00	2.65	2.72	OK
"L" 24+95, 42.50' RT	"L" 24+97.16, 38.00' RT	EDI-12	ONRAN23R	0.67	2.65	2.22	15.42	DI not needed	3.00	3.00	3.00	1.71	0.94	OK	5.52	237.40	DI not needed	3.00	3.00	3.00	2.93	3.39	OK
"L" 19+64, 42.00' RT	"L" 19+75.86, 39.50' RT	EDI-13	ONRAN24R,25R	0.94	2.93	4.43	11.72	DI not needed	3.00	3.00	3.00	1.80	1.11	OK	9.40	230.43	DI not needed	3.00	3.00	3.00	2.97	3.63	OK
"L" 16+09, 42.00' RT	"L" 16+25.11, 49.50' RT	EDI-14	ONRAN26R, 26RA	1.11	2.97	3.22	44.09	DI not needed	3.00	3.00	3.00	1.53	0.71	OK	6.89	231.43	DI not needed	3.00	3.00	3.00	2.54	2.54	OK
"L" 11+76, 42.50' RT	"L" 11+81.51, 39.50' RT	EDI-15	ONRAN27R	0.71	2.54	2.19	7.21	DI not needed	3.00	3.00	3.00	2.19	0.00	OK	5.29	179.96	DI not needed	3.00	3.00	3.00	2.61	2.68	OK
"4" 16+47, 21.00' RT	"4" 16+25.11, 27.50' RT	EDI-16	ONRAN28R	0.00	2.68	1.44	33.66	DI not needed	60.00	60.00	62.50	8.36	0.00	OK	5.35	215.99	DI not needed	60.00	60.00	62.50	5.35	0.00	OK
"4" 14+96, 20.00' RT	"4" 14+86.97, 28.54 RT	EDI-17	ONRAN29R	0.00	0.00	0.64	48.86	DI not needed	20.00	20.00	22.50	0.64	0.00	OK	1.20	159.75	DI not needed	20.00	20.00	22.50	1.20	0.00	OK
"4" 13+80, 20.75' RT	"4" 13+72.63, 24.21' RT	EDI-18	ONRAN30R	0.00	0.00	0.64	45.18	DI not needed	20.00	20.00	22.50	0.64	0.00	OK	1.20	191.76	DI not needed	20.00	20.00	22.50	1.20	0.00	OK
"4" 11+83, 20.00' RT	"4" 11+80.71, 21.02' RT	EDI-19	ONRAN31R	0.00	0.00	0.91	13.55	DI not needed	3.00	3.00	3.00	0.82	0.09	OK	1.69	176.75	DI not needed	3.00	3.00	3.00	1.27	0.42	OK
"4" 6+76, 35.50' RT	"4" 6+74.09, 38.95' RT	EDI-20	ONRAN32R+ONRAN32RA	0.09	0.42	3.09	14.64	DI not needed	3.00	3.00	3.00	1.87	1.22	OK	5.99	177.12	DI not needed	3.00	3.00	3.00	2.80	3.19	OK
"C" 3+62.50, 27.00' RT	"C" 3+59.56 , 25.81' RT	EDI-21	ONRAN33R	1.22	3.19	3.94	5.74	DI not needed	3.00	3.00	3.00	2.18	1.76	OK	8.24	198.87	DI not needed	3.00	3.00	3.00	3.39	4.85	OK
"C" 6+67.35, 42.41' LT	"C" 6+71.27, 35.61' LT	EDI-22	ONRAN34R	1.76	4.85	2.60	5.47	DI not needed	3.00	3.00	3.00	2.18	1.76	OK	5.75	201.00	DI not needed	3.00	3.00	3.00	3.39	4.85	OK
"C" 8+22.90, 36.48' LT	"C" 8+24.24, 32.43' LT	EDI-23	ONRAN35R	1.76	4.85	2.65	5.47	DI not needed	3.00	3.00	3.00	2.18	1.76	OK	6.51	201.00	DI not needed	3.00	3.00	3.00	3.39	4.85	OK

ULTIMATE CONDITION

Street Flow Capacity-RTC 10-year West

							Discharge : Calculated by FM				Normal Depth: D _{Q10} Calculated by FM					
Cross-Section	Street Location	Slope (%)	Cross Slope (%)	Non Dry Length (FT)	Total Length (FT)	Center Turn Lane (FT)	10-Year Flow Capacity Dry Lane Criteria for RTC				Dry Lane and D X V < 6 Criteria for RTC					
							D (FT)	V (FPS)	DxV	Q (Half Street) (CFS)	Q ₁₀ (Half Street) (CFS)	D _{Q10} (FT)	V _{Q10} (FT)	D _{Q10} < D _{dry-lane} (Met/ Not Met)	D _{Q10} X V _{Q10}	D _{Q10} X V _{Q10} < 6
"L" 112+00	North of Smoke Ranch	0.30	1.34	32.50	56.00	10.00	0.56	2.01	1.13	15.86	12.47	0.52	1.90	Met	0.99	MET
"L" 100+00	North of Lake Mead	1.81	2.35	42.50	66.00	10.00	0.86	6.96	5.99	88.44	5.89	0.36	3.56	Met	1.28	MET
"L" 92+84.94	South of Lake Mead	0.80	2.06	23.00	46.50	10.00	0.60	3.51	2.10	22.15	3.43	0.34	2.22	Met	0.75	MET
"L" 83+97.38	South of Lake Mead	1.49	3.51	20.50	45.00	11.00	0.84	6.25	5.25	53.09	5.90	0.40	3.63	Met	1.45	MET
"L" 79+00.00	North of Coran	1.39	2.00	32.50	58.00	12.00	0.77	5.60	4.34	64.53	6.27	0.37	3.15	Met	1.17	MET
"L" 77+11.75	South of Coran	1.36	2.68	44.50	58.00	0.00	0.93	6.40	5.95	87.20	6.27	0.39	3.34	Met	1.30	MET
"L" 75+03.39	South of Coran	1.63	3.19	32.50	46.00	0.00	0.88	6.78	5.97	69.66	3.33	0.32	3.20	Met	1.02	MET
"L" 72+87.22	South of Coran	1.76	2.61	32.50	46.00	0.00	0.86	6.90	5.93	80.15	2.14	0.27	2.83	Met	0.76	MET
"L" 71+19.94	South of Coran	1.47	2.47	32.50	46.00	0.00	0.74	5.60	4.14	49.60	1.58	0.25	2.43	Met	0.61	MET
"L" 69+55.83	South of Coran	1.04	2.00	32.50	56.00	10.00	0.77	4.87	3.77	56.58	1.44	0.25	1.98	Met	0.50	MET
"L" 67+73.28	South of Spring	0.82	2.18	32.50	46.00	0.00	0.83	4.58	3.82	58.19	1.18	0.25	1.76	Met	0.44	MET
"L" 64+97.77	South of Spring	2.38	1.00	42.50	56.00	0.00	0.55	5.60	3.08	55.37	1.68	0.22	2.40	Met	0.53	MET
"L" 64+06.49	South of Spring	0.96	2.12	32.50	56.00	10.00	0.81	4.86	3.95	59.82	0.96	0.23	1.77	Met	0.41	MET
"L" 62+13.21	South of Melody	1.34	2.58	32.50	46.00	0.00	0.93	6.37	5.92	88.53	1.11	0.23	2.19	Met	0.50	MET
"L" 58+52.96	South of Melody	1.63	3.20	32.50	46.00	0.00	0.88	6.78	5.97	69.24	2.12	0.28	2.87	Met	0.80	MET
"L" 55+23.60	South of Melody	0.50	2.28	32.50	56.00	10.00	0.87	3.70	3.20	50.25	2.53	0.34	1.77	Met	0.60	MET
"L" 49+92.81	South of Melody	0.89	2.86	32.50	46.00	0.00	1.05	5.68	5.99	93.76	2.73	0.33	2.36	Met	0.78	MET
"L" 48+05.47	South of Melody	0.70	2.52	35.00	48.50	0.00	1.01	4.89	4.92	83.21	1.91	0.30	1.93	Met	0.58	MET
"L" 47+71.09	South of Melody	1.18	2.62	32.50	56.00	10.00	0.97	6.17	5.98	93.32	0.18	0.14	1.51	Met	0.21	MET
"L" 47+38.80	South of Melody	1.07	1.74	32.50	56.00	10.00	0.69	4.53	3.13	46.52	0.19	0.14	1.45	Met	0.20	MET
"L" 46+04.18	South of Melody	0.92	2.59	32.50	56.00	10.00	0.97	5.23	5.05	79.86	0.14	0.24	1.86	Met	0.45	MET
"L" 45+07.81	South of Vegas	1.15	2.68	42.50	56.00	0.00	1.26	6.31	7.97	169.13	0.05	0.17	1.62	Met	0.28	MET
"L" 39+76.98	South of Vegas	1.15	2.68	30.00	43.50	0.00	0.93	5.91	5.49	77.31	3.41	0.34	2.72	Met	0.92	MET
"L" 35+02.41	South of Vegas	1.15	2.13	20.00	33.50	0.00	0.55	3.97	2.19	20.18	3.06	0.31	2.49	Met	0.77	MET
"L" 30+55.27	South of Vegas	0.30	4.05	19.00	43.50	11.00	0.89	2.94	2.63	25.11	3.12	0.43	1.75	Met	0.75	MET
"L" 24+98.89	South of Vegas	0.65	1.93	20.00	43.50	10.00	0.51	2.80	1.43	12.81	3.07	0.33	1.98	Met	0.65	MET
"L" 19+79.61	South of Vegas	0.48	1.67	20.00	43.50	10.00	0.46	2.20	1.01	8.86	3.67	0.36	1.79	Met	0.64	MET
"L" 16+07.74	South of Vegas	0.50	2.64	20.00	33.50	0.00	0.65	2.99	1.95	18.47	3.78	0.39	2.02	Met	0.79	MET
"L" 12+73.27	South of Vegas	0.70	1.68	20.00	43.50	10.00	0.46	2.66	1.22	10.70	2.87	0.31	1.93	Met	0.60	MET
"L" 11+16.33	South of Washington	0.60	1.66	26.00	39.50	0.00	0.56	2.88	1.60	18.68	1.88	0.29	1.64	Met	0.48	MET
"L" 10+32.35	South of Washington	0.60	2.70	30.00	43.50	0.00	0.93	4.00	3.74	42.09	0.95	0.25	1.89	Met	0.47	MET
"L" 10+10.09	South of Washington	0.60	2.70	30.00	43.50	0.00	0.93	4.00	3.74	42.09	0.00	0.00	0.00	Met	0.00	MET
"4" 15+31.01	South of Washington	0.82	2.65	21.00	34.50	0.00	0.68	3.96	2.70	27.16	1.13	0.25	1.82	Met	0.46	MET
"4" 14+09.28	South of Washington	0.88	2.24	36.00	49.50	0.00	0.93	5.16	4.80	81.89	1.06	0.24	1.78	Met	0.43	MET
"4" 11+75.15	South of Washington	0.80	1.68	41.50	67.00	12.00	0.82	4.62	3.80	80.36	1.59	0.26	1.76	Met	0.46	MET
"4" 7+13.62	South of Washington	0.50	1.68	47.00	70.50	10.00	0.91	3.81	3.48	75.61	2.72	0.32	1.67	Met	0.53	MET
"C" 3+28.97	South of Washington	0.66	1.61	54.00	77.50	10.00	0.99	4.66	4.63	115.44	3.32	0.33	1.93	Met	0.64	MET
"C" 7+05.17	South of Bonanza	0.90	2.64	54.00	77.50	10.00	1.05	5.68	5.964	160	2.22	0.28	1.97	Met	0.55	MET
"C" 7+94.23	South of Bonanza	0.90	2.64	54.00	77.50	10.00	1.05	5.68	5.964	160	1.52	0.21	1.51	Met	0.32	MET
"C" 8+44.76	South of Bonanza	0.90	2.64	54.00	77.50	10.00	1.05	5.68	5.964	160	4.67	0.21	1.51	Met	0.32	MET

ULTIMATE CONDITION

Street Flow Capacity-RTC 100-year West

Cross-Section	Street Location	Slope (%)	Discharge: Calculated by FM				Normal Depth: D_{Q100} Calculated by FM					
			100-Year Flow Capacity				DXV < 8 & D_{Q100} < 2 Criteria for RTC					
			D_{max} (FT)	V (FPS)	DXV _{max}	Q_{max} (CFS)	Q_{Q100} (CFS)	D_{Q100}	V_{Q100}	$D_{Q100} \times V_{Q100}$	$D_{Q100} \times V_{Q100} < 8$ (Met/Not Met)	$D_{Q100} < 2$ (Met/Not Met)
"L" 112+00	North of Smoke Ranch	0.30	1.49	5.34	7.96	303.36	22.98	0.63	2.21	1.39	Met	Met
"L" 100+00	North of Lake Mead	1.81	1.01	7.83	7.91	141.78	10.92	0.43	4.14	1.78	Met	Met
"L" 92+84.94	South of Lake Mead	0.80	1.22	6.52	7.95	196.84	6.36	0.40	2.58	1.03	Met	Met
"L" 83+97.38	South of Lake Mead	1.49	1.07	7.46	7.98	107.33	11.68	0.50	4.29	2.15	Met	Met
"L" 79+00.00	North of Coran	1.39	1.09	7.26	7.91	182.09	12.02	0.45	3.69	1.66	Met	Met
"L" 77+11.75	South of Coran	1.36	1.10	7.25	7.98	142.70	12.02	0.48	3.92	1.88	Met	Met
"L" 75+03.39	South of Coran	1.63	1.04	7.64	7.95	112.52	9.25	0.45	4.10	1.85	Met	Met
"L" 72+87.22	South of Coran	1.76	1.02	7.81	7.97	131.55	6.72	0.38	3.73	1.42	Met	Met
"L" 71+19.94	South of Coran	1.47	1.08	7.41	8.00	148.73	5.31	0.36	3.24	1.17	Met	Met
"L" 69+55.83	South of Coran	1.04	1.19	6.69	7.96	202.95	4.59	0.35	2.61	0.91	Met	Met
"L" 67+73.28	South of Spring	0.82	1.22	6.48	7.91	188.73	3.86	0.35	2.33	0.82	Met	Met
"L" 64+97.77	South of Spring	2.38	0.86	9.18	7.89	243.53	4.51	0.27	3.01	0.81	Met	Met
"L" 64+06.49	South of Spring	0.96	1.22	6.55	7.99	197.56	3.14	0.32	2.35	0.75	Met	Met
"L" 62+13.21	South of Melody	1.34	1.10	7.19	7.91	143.75	3.15	0.32	2.79	0.89	Met	Met
"L" 58+52.96	South of Melody	1.63	1.15	6.95	7.99	105.17	4.90	0.37	3.52	1.30	Met	Met
"L" 55+23.60	South of Melody	0.50	1.44	5.52	7.95	221.90	5.92	0.43	2.18	0.94	Met	Met
"L" 49+92.81	South of Melody	0.89	1.24	6.39	7.92	150.64	5.96	0.42	2.86	1.20	Met	Met
"L" 48+05.47	South of Melody	0.70	1.31	6.07	7.95	180.15	4.79	0.39	2.41	0.94	Met	Met
"L" 47+71.09	South of Melody	1.18	1.14	6.93	7.90	148.53	0.34	0.17	1.63	0.28	Met	Met
"L" 47+38.80	South of Melody	1.07	1.15	6.94	7.98	221.16	0.35	0.17	1.57	0.27	Met	Met
"L" 46+04.18	South of Melody	0.92	1.25	6.28	7.85	165.34	0.26	0.29	2.15	0.62	Met	Met
"L" 45+07.81	South of Vegas	1.15	1.25	6.28	7.85	165.34	0.09	0.21	1.77	0.37	Met	Met
"L" 39+76.98	South of Vegas	1.15	1.15	6.88	7.91	142.32	6.33	0.41	3.17	1.30	Met	Met
"L" 35+02.41	South of Vegas	1.15	1.06	7.47	7.92	155.70	6.33	0.38	2.98	1.13	Met	Met
"L" 30+55.27	South of Vegas	0.30	1.71	4.65	7.95	155.76	7.00	0.57	2.14	1.22	Met	Met
"L" 24+98.89	South of Vegas	0.65	1.25	6.36	7.95	203.66	7.16	0.43	2.43	1.04	Met	Met
"L" 19+79.61	South of Vegas	0.48	1.32	6.04	7.97	225.63	8.64	0.46	2.20	1.01	Met	Met
"L" 16+07.74	South of Vegas	0.50	1.34	5.92	7.93	161.93	8.26	0.50	2.45	1.23	Met	Met
"L" 12+73.27	South of Vegas	0.70	1.20	6.62	7.94	212.81	7.35	0.41	2.43	1.00	Met	Met
"L" 11+16.33	South of Washington	0.60	1.25	6.39	7.99	219.40	5.73	0.39	2.16	0.84	Met	Met
"L" 10+32.35	South of Washington	0.60	1.43	5.55	7.94	160.47	4.56	0.46	2.46	1.13	Met	Met
"L" 10+10.09	South of Washington	0.60	1.43	5.55	7.94	160.47	0.32	0.10	1.05	0.11	Met	Met
"4" 15+31.01	South of Washington	0.82	1.19	6.68	7.95	151.82	2.11	0.30	2.11	0.63	Met	Met
"4" 14+09.28	South of Washington	0.88	1.23	6.41	7.88	186.74	1.97	0.29	2.06	0.60	Met	Met
"4" 11+75.15	South of Washington	0.80	1.26	6.25	7.88	250.83	2.95	0.31	0.31	2.04	Met	Met
"4" 7+13.62	South of Washington	0.50	1.34	5.94	7.96	233.17	5.04	0.39	1.95	0.76	Met	Met
"C" 3+28.97	South of Washington	0.66	1.42	5.61	7.97	290.38	8.64	0.43	2.45	1.05	Met	Met
"C" 7+05.17	South of Bonanza	0.90	1.24	6.41	7.95	259.71	6.57	0.80	2.57	2.06	Met	Met
"C" 7+94.23	South of Bonanza	0.90	1.24	6.41	7.95	259.71	5.27	0.24	1.74	0.42	Met	Met
"C" 8+44.76	South of Bonanza	0.90	1.24	6.41	7.95	259.71	5.27	0.24	1.74	0.4176	Met	Met

ULTIMATE CONDITION																					
Drop Inlet Analysis-RTC 10-yr & 100-yr West																					
Proposed Drop Inlet Station/Offset		Contributing Basins	Upstream 10-Year Bypass Q (CFS)	Upstream 100-Year Bypass Q (CFS)	10-year							100-Year							Does DI Need To Be Extended Based On Bypass Flow 10-Year	Does DI Need To Be Extended Based On Bypass Flow 100-Year	
					Gutter Flow- Half Street (CFS)	10-yr Criteria (Dry-Lane) Flow Half Street (CFS)	Analysis (Need DI/ DI not needed)	Drop Inlet Length (FT)		Intercept Flow (CFS)	Bypass Flow (CFS)	Gutter Flow- Half Street (CFS)	100-Year Criteria Half Street (CFS)	Analysis (Need DI/ DI not needed)	DI Length (FT)		Intercept Flow (CFS)	Bypass Flow (CFS)			
								Grate	Curb						Grate	Curb					
"L" 92+84.94, 56.34' LT	WDI-02	ONRAN7LA, 1/2 ONRAN8L	N/A	N/A	3.43	22.15	DI not needed	3.00	3.00	1.89	1.54	6.36	196.84	DI not needed	3.00	3.00	2.76	3.60	OK	OK	
"L" 83+97.38, 52.00'LT	WDI-03	1/2 ONRAN8L, ONRAN9L, 1/3 ONRAN10L	1.54	3.60	5.90	53.09	DI not needed	3.00	3.00	3.65	3.35	11.68	107.33	DI not needed	3.00	3.00	5.08	6.60	OK	OK	
"L" 77+11.75, 64.00' LT	WDI-05	2/3 ONRAN 10L	3.35	6.60	6.27	87.20	DI not needed	3.00	3.00	3.09	3.18	12.02	142.70	DI not needed	3.00	3.00	4.63	7.39	OK	OK	
"L" 75+03.39, 52.82' LT	WDI-06	1/2 ONRAN11LA, 1/3 ONRAN11L	3.18	7.39	3.33	69.66	DI not needed	3.00	3.00	2.19	1.14	9.25	112.52	DI not needed	3.00	3.00	4.39	4.86	OK	OK	
"L" 72+87.22, 52.00' LT	WDI-07	1/2 ONRAN11LA, 1/3 ONRAN11L	1.14	4.86	2.14	80.15	DI not needed	3.00	3.00	1.56	0.58	6.72	131.55	DI not needed	3.00	3.00	3.27	3.45	OK	OK	
"L" 71+19.94, 52.00' LT	WDI-08	1/2 ONRAN11LA1, 1/3 ONRAN11L	0.58	3.45	1.58	49.60	DI not needed	3.00	3.00	1.25	0.33	5.31	148.73	DI not needed	3.00	3.00	2.78	2.53	OK	OK	
"L" 69+55.83, 52.00' LT	WDI-09	1/2 ONRAN11LA1, ONRAN13L	0.33	2.53	1.44	56.58	DI not needed	3.00	3.00	1.09	0.35	4.59	202.95	DI not needed	3.00	3.00	2.28	2.31	OK	OK	
"L" 67+73.28, 52.00' LT	WDI-10	ONRAN14L	0.35	2.31	1.18	58.19	DI not needed	3.00	3.00	0.94	0.24	3.86	188.73	DI not needed	3.00	3.00	2.02	1.84	OK	OK	
"L" 64+97.77, 52.00' LT	WDI-11	ONRAN14LA	0.24	1.84	1.68	55.37	DI not needed	3.00	3.00	1.29	0.39	4.51	243.53	DI not needed	3.00	3.00	2.42	2.09	OK	OK	
"L" 64+06.49, 52.00' LT	WDI-12	ONRAN15L	0.39	2.09	0.96	59.82	DI not needed	3.00	3.00	0.83	0.13	3.14	197.56	DI not needed	3.00	3.00	1.82	1.32	OK	OK	
"L" 62+13.21, 52.00' LT	WDI-13	ONRAN15LA	0.13	1.32	1.11	88.53	DI not needed	3.00	3.00	0.94	0.17	3.15	143.75	DI not needed	3.00	3.00	1.87	1.28	OK	OK	
"L" 58+52.96, 52.00' LT	WDI-14	ONRAN16L	0.17	1.28	2.12	69.24	DI not needed	3.00	3.00	1.48	0.64	4.90	105.17	DI not needed	3.00	3.00	2.50	2.40	OK	OK	
"L" 55+23.60, 46.23' LT	EX WDI-01	ONRAN16LA	0.64	2.40	2.53	50.25	DI not needed	4'x4'	4'x4'	2.49	0.04	5.92	221.90	DI not needed	4'x4'	4'x4'	4.95	0.97	OK	OK	
"L" 49+92.81, 48.75' LT	WDI-15	ONRAN17L	0.04	0.97	2.73	93.76	DI not needed	3.00	3.00	1.80	0.93	5.96	150.64	DI not needed	3.00	3.00	2.99	2.97	OK	OK	
"L" 48+05.47, 41.75' LT	WDI-16	ONRAN18L	0.93	2.97	1.91	83.21	DI not needed	20.00	22.50	1.91	0.00	4.79	180.15	DI not needed	20.00	22.50	4.79	0.00	OK	OK	
"L" 47+71.09, 41.44' LT	WDI-17	ONRAN18LA	0.00	0.00	0.18	93.32	DI not needed	20.00	22.50	0.18	0.00	0.34	148.53	DI not needed	20.00	22.50	0.34	0.00	OK	OK	
"L" 47+38.80, 41.95' LT	WDI-18	ONRAN18LB	0.00	0.00	0.19	46.52	DI not needed	20.00	22.50	0.19	0.00	0.35	221.16	DI not needed	20.00	22.50	0.35	0.00	OK	OK	
"L" 46+04.18, 51.95' LT	WDI-19	3/4 of ONRAN19L	0.00	0.00	0.14	79.86	DI not needed	3.00	3.00	0.89	0.13	0.26	165.34	DI not needed	3.00	3.00	1.35	0.55	OK	OK	
"L" 45+07.81, 40.49' LT	None	1/4 of ONRAN19L	0.00	0.01	0.05	169.13	DI not needed	3.00	3.00	0.34	0.00	0.09	165.34	DI not needed	3.00	3.00	0.62	0.01	OK	OK	
"L" 39+76.98, 39.50' LT	WDI-20	ONRAN20L	0.00	0.00	3.41	77.31	DI not needed	3.00	3.00	2.08	1.33	6.33	142.32	DI not needed	3.00	3.00	3.23	3.11	OK	OK	
"L" 35+02.41, 39.50' LT	WDI-21	ONRAN21L	1.33	3.11	3.06	20.18	DI not needed	3.00	3.00	1.92	1.14	6.33	155.70	DI not needed	3.00	3.00	3.00	3.33	OK	OK	
"L" 30+55.27, 39.50' LT	WDI-22	ONRAN22L, ONRAN22LA	1.14	3.33	3.12	25.11	DI not needed	3.00	3.00	2.25	0.87	7.00	155.76	DI not needed	3.00	3.00	3.91	3.09	OK	OK	
"L" 24+98.89, 39.50' LT	WDI-23	ONRAN23L	0.87	3.09	3.07	12.81	DI not needed	3.00	3.00	1.84	1.23	7.16	203.66	DI not needed	3.00	3.00	3.05	4.11	OK	OK	
"L" 19+79.61, 39.50' LT	WDI-24	ONRAN24L, ONRAN25L	1.23	4.11	3.67	8.86	DI not needed	3.00	3.00	2.04	2.16	8.64	225.63	DI not needed	3.00	3.00	3.40	5.24	OK	OK	
"L" 16+07.74, 39.50' LT	WDI-25	ONRAN26L	2.16	5.24	3.54	18.47	DI not needed	3.00	3.00	2.18	1.36	8.26	161.93	DI not needed	3.00	3.00	3.71	4.55	OK	OK	
"L" 12+73.27, 31.24' LT	WDI-27	ONRAN27L	1.36	4.55	2.87	10.70	DI not needed	3.00	3.00	1.71	1.16	7.35	212.81	DI not needed	3.00	3.00	2.96	4.39	OK	OK	
"L" 11+16.33, 41.13' LT	WDI-28	ONRAN27LA, ONRAN28L	1.16	4.39	1.88	18.68	DI not needed	3.00	3.00	1.31	0.57	5.73	219.40	DI not needed	3.00	3.00	3.19	3.86	OK	OK	
"L" 10+32.35, 54.25' LT	None	ONRAN28LA	0.57	3.86	0.95	42.09	DI not needed	10.00	10.00	0.95	0.00	4.56	160.47	DI not needed	10.00	10.00	4.24	0.32	OK	OK	
"L" 10+10.09, 50.33 LT	WDI-29	Bypass from Upstream Inlet	0.00	0.32	0.00	42.09	DI not needed	7.50	10.00	0.00	0.00	0.32	160.47	DI not needed	7.50	10.00	0.32	0.00	OK	OK	
"4" 15+31.01, 64.65' LT	WDI-30	ONRAN29L	0.00	0.00	1.13	27.16	DI not needed	20.00	22.50	1.13	0.00	2.11	151.82	DI not needed	20.00	22.50	2.11	0.00	OK	OK	
"4" 14+09.28, 70.16' LT	WDI-31	ONRAN30L	0.00	0.00	1.06	81.89	DI not needed	20.00	22.50	1.06	0.00	1.97	186.74	DI not needed	20.00	22.50	1.97	0.00	OK	OK	
"4" 11+75.15, 89.18' LT	WDI-32	ONRAN31L	0.00	0.00	1.59	80.36	DI not needed	3.00	3.00	1.19	0.40	2.95	250.83	DI not needed	3.00	3.00	1.75	1.22	OK	OK	
"4" 7+13.62, 73.85' LT	WDI-33	ONRAN32LA, ONRAN32L	0.40	1.22	2.72	75.61	DI not needed	3.00	3.00	2.72	0.00	5.04	233.17	DI not needed	3.00	3.00	2.58	2.47	OK	OK	
"C" 3+28.97, 77.32' LT	WDI-35	ONRAN33L, ONRAN33LA, ONRAN33LA1	0.00	2.47	3.32	115.44	DI not needed	3.00	3.00	2.50	0.82	8.64	290.38	DI not needed	3.00	3.00	4.67	3.97	OK	OK	
"C" 7+05.17, 80.50' RT	WDI-36	bypass from previous inlet, 2/3 OF 34LA	0.82	3.97	2.22	160.00	DI not needed	3.00	3.00	2.50	0.82	6.57	259.71	DI not needed	3.00	3.00	4.67	3.97	OK	OK	
"C"7+94.23, 93.31' RT	WDI-37	bypass from previous inlet, 1/3 OF 34LA	0.82	3.97	1.52	160.00	DI not needed	10.00	10.00	2.50	0.82	5.27	259.71	DI not needed	3.00	3.00	4.67	3.97	OK	OK	
"C" 8+44.76, 93.84' RT	WDI-38	bypass from previous inlet, 1/3 OF 34LA	0.82	3.97	4.67	160.00	DI not needed	12.00	12.50	2.50	0.82	5.27	259.71	DI not needed	3.00	3.00	4.67	3.97	OK	OK	

D. Interim Condition: Offsite 25-year Flows- (NDOT Criteria)
D-1: West Side

INTERIM CONDITION

Street Flow Capacity-NDOT 25-Year West (Offsite Flow)

		Normal Depth: D _{Q25} Calculated by FM									
Cross-Section	Street Location	Slope (%)	Cross Slope (%)	Bus Lane Width (FT)	Adjacent Lane Width (FT)	25-Year Flow Capacity		25-Year Actual Flow D _{Q25} Vs. D _{max}			
						Dry Lane Criteria for NDOT		Surface Flow Point ₁	Q ₂₅ (Half Street) (CFS)	D _{Q25}	D _{Q25} < D _{dry-lane} (Met/ Not Met)
						D _{max} (FT)	Q (Half Street) (CFS)				
"L" 112+33.57	North of Smoke Ranch	0.30	1.34	12.50	10.00	0.36	3.17	1	0.00	0.55	Not Met
"L" 100+00	North of Lake Mead	1.81	2.15	12.50	10.00	0.50	16.85	2	8.00	0.41	Met
"L" 96+00	South of Lake Mead	1.34	2.12	12.50	11.00	0.51	17.16	3	364.00	1.34	Not Met
"L" 92+84.94	South of Lake Mead	0.80	2.06	12.50	10.00	0.49	10.18	4	196.00	1.22	Not Met
"L" 83+97.38	South of Lake Mead	1.49	3.51	12.50	10.00	0.74	33.88	5	28.00	0.67	Met
"L" 77+11.75	South of Coran	1.36	2.68	12.50	10.00	0.59	21.24	6	109.00	1.00	Not Met
"L" 75+03.39	South of Coran	1.63	3.19	12.50	10.00	0.68	31.42		19.34	0.57	Met
"L" 72+87.22	South of Coran	1.76	2.61	12.50	10.00	0.58	23.46		12.51	0.47	Met
"L" 71+19.94	South of Coran	1.47	2.47	12.50	10.00	0.56	19.06		7.69	0.40	Met
"L" 69+55.83	South of Coran	1.04	2.00	12.50	10.00	0.47	11.41		4.11	0.34	Met
"L" 67+73.28	South of Spring	0.82	2.18	12.50	10.00	0.51	12.36	7	177.00	1.20	Not Met
"L" 64+97.77	South of Spring	2.38	1.00	12.50	10.00	0.30	5.67		12.33	0.36	Not Met
"L" 64+06.49	South of Spring	0.96	2.12	12.50	10.00	0.50	11.97		7.92	0.38	Met
"L" 62+13.21	South of Melody	1.34	2.58	12.50	10.00	0.58	19.52	8	293.00	1.39	Not Met
"L" 58+52.96	South of Melody	1.63	3.20	12.50	10.00	0.68	31.24		18.85	0.55	Met
"L" 55+23.60	South of Melody	0.50	2.28	12.50	10.00	0.52	9.93		9.28	0.50	Met
"L" 49+92.81	South of Melody	0.89	2.86	12.50	10.00	0.63	19.07		2.18	0.31	Met
"L" 48+05.47	South of Melody	0.70	2.52	12.50	10.00	0.57	13.63		0.64	0.22	Met
"L" 47+71.09	South of Melody	1.18	2.62	12.50	10.00	0.58	19.24		0.00	0.00	Met
"L" 47+38.80	South of Melody	1.07	1.74	12.50	10.00	0.43	9.55		0.00	0.00	Met
"L" 46+04.18	South of Melody	0.92	2.59	12.50	10.00	0.58	22.53		0.00	0.00	Met
"L" 45+07.81	South of Vegas	1.15	2.68	11.50	11.00	0.58	28.14		0.00	0.00	Met
"L" 39+76.98	South of Vegas	1.15	2.68	11.50	11.00	0.27	1.65	9	14.00	0.52	Not Met
"L" 35+02.41	South of Vegas	1.15	2.13	11.50	11.00	0.49	14.02		1.25	0.24	Met
"L" 30+55.27	South of Vegas	0.30	4.05	0.00	11.00	0.35	1.62	10	34.00	0.99	Not Met
"L" 24+98.89	South of Vegas	0.65	1.93	0.00	11.00	0.23	0.81		1.25	0.26	Not Met

INTERIM CONDITION

Street Flow Capacity-NDOT 25-Year West (Offsite Flow)

		Normal Depth: D _{Q25} Calculated by FM									
Cross-Section	Street Location	Slope (%)	Cross Slope (%)	Bus Lane Width (FT)	Adjacent Lane Width (FT)	25-Year Flow Capacity		25-Year Actual Flow D _{Q25} Vs. D _{max}			
						Dry Lane Criteria for NDOT		Surface Flow Point ₁	Q ₂₅ (Half Street) (CFS)	D _{Q25}	D _{Q25} < D _{dry-lane} (Met/ Not Met)
						D _{max} (FT)	Q (Half Street) (CFS)				
"L" 19+79.61	South of Vegas	0.48	1.67	0.00	11.00	0.22	0.63	11	14.00	0.53	Not Met
"L" 16+07.74	South of Vegas	0.50	2.64	0.00	11.00	0.27	1.11		0.63	0.23	Met
"L" 13+35.72	South of Vegas	0.70	1.68	0.00	11.00	0.22	0.76		0.05	0.05	Met
"L" 12+73.27	South of Vegas	0.70	1.68	0.00	11.00	0.22	0.76		0.00	0.05	Met
"L" 11+16.33	South of Washington	0.60	1.66	0.00	11.00	0.22	0.70	12	0.00	0.05	Met
"L" 10+32.35	South of Washington	0.60	2.70	10.00	11.00	0.54	6.86		0.00	0.04	Met
"L" 10+10.09	South of Washington	0.60	2.70	10.00	11.00	0.54	6.86		0.00	0.04	Met
"4" 15+31.01	South of Washington	0.82	2.65	0.00	11.00	0.27	1.42		0.00	0.05	Met
"4" 14+09.28	South of Washington	0.88	2.24	0.00	11.00	0.25	1.21		0.00	0.05	Met
"4" 11+75.15	South of Washington	0.80	1.68	0.00	11.00	0.22	0.81		0.00	0.05	Met
"4" 7+13.62	South of Washington	0.50	1.68	0.00	11.00	0.21	0.62		0.00	0.05	Met
"C" 2+81.44	South of Washington	0.66	1.61	0.00	11.00	0.21	0.62		0.00	0.05	Met
"C" 3+28.97	South of Washington	0.66	1.61	0.00	11.00	0.21	0.62		0.00	0.05	Met

INTERIM CONDITION

Drop Inlet Analysis-NDOT-25 Year West (offsite Flow)

Existing Drop Inlet Station/Offset	Proposed Drop Inlet Station/Offset	Upstream Drop Inlet Bypass	Upstream 25yr Bypass Q (CFS)	25-year						Does DI need to be extended based on bypass flow 25-Year		
				Gutter Flow- Half Street (CFS)	25-yr Criteria (Dry-Lane) Flow Half Street (CFS)	Analysis (Need DI/ DI not needed)	Existing DI Length	Proposed DI Length (FT)			Intercept Flow (CFS)	Bypass Flow (CFS)
								Grate	Curb			
None	"L" 112+33.57, 54.66' LT ¹	N/A	N/A	0.00	3.17	DI not needed	0.00	47.5 ¹	50 ¹	15.64	0.03	OK
None	"L" 96+00, 55.50' LT	N/A	N/A	364.00	17.16	Need DI	0.00	62.50	65.00	348.07	15.93	OK
"L" 92+86, 56.76' LT	"L" 92+84.94, 56.34' LT	N/A	N/A	196.00	10.18	Need DI	3.00	45.00	47.50	187.14	8.86	OK
"L" 84+00, 57.02' LT	"L" 83+97.38, 52.00' LT	"L" 92+84.94, 56.34' LT	N/A	28.00	33.88	DI not needed	3.00	3.00	3.00	8.94	19.06	OK
"L" 77+20, 48.97' LT	"L" 77+11.75, 64.00' LT	"L" 83+97.38, 52.00' LT	N/A	109.00	21.24	Need DI	3.00	3.00	3.00	15.94	93.06	Extend DI
	"L" 77+11.75, 64.00' LT Extended	"L" 77+11.75, 64.00' LT	N/A	109.00	21.24	Need DI	3.00	22.50	25.00	89.66	19.34	OK
"L" 75+05, 48.01' LT	"L" 75+03.39, 52.82' LT	"L" 77+11.75, 64.00' LT	19.34	19.34	31.42	DI not needed	3.00	3.00	3.00	6.83	12.51	OK
"L" 72+91, 47.92' LT	"L" 72+87.22, 52.00' LT	"L" 75+03.39, 52.82' LT	12.51	12.51	23.46	DI not needed	3.00	3.00	3.00	4.82	7.69	OK
"L" 71+21, 48.04' LT	"L" 71+19.94, 52.00' LT	"L" 72+87.22, 52.00' LT	7.69	7.69	19.06	DI not needed	3.00	3.00	3.00	3.50	4.11	OK
"L" 69+47, 48.08' LT	"L" 69+55.83, 52.00' LT	"L" 71+19.94, 52.00' LT	4.11	4.11	11.41	DI not needed	3.00	3.00	3.00	2.14	1.97	OK
"L" 67+75, 48.02' LT	"L" 67+73.28, 52.00' LT	"L" 69+55.83, 52.00' LT	1.97	177.00	12.36	Need DI	3.00	37.50	40.00	164.67	12.33	Extend DI
	"L" 67+73.28, 52.00' LT Extended	"L" 69+55.83, 52.00' LT	1.97	177.00	12.36	Need DI	3.00	3.00	3.00	4.41	7.92	Extend DI
"L" 65+08, 48.24' LT	"L" 64+97.77, 52.00' LT	"L" 67+73.28, 52.00' LT	12.33	12.33	5.67	Need DI	3.00	3.00	3.00	6.69	5.64	OK
	"L" 64+97.77, 52.00' LT Extended	"L" 67+73.28, 52.00' LT	12.33	12.33	5.67	Need DI	3.00	7.50	7.50	6.69	5.64	OK
"L" 64+09, 48.15' LT	"L" 64+06.49, 52.00' LT	"L" 64+97.77, 52.00' LT	7.92	7.92	11.97	DI not needed	3.00	3.00	3.00	2.65	2.99	OK
"L" 62+15, 48.24' LT	"L" 62+13.21, 52.00' LT	"L" 64+06.49, 52.00' LT	2.99	293.00	19.52	Need DI	3.00	3.00	3.00	22.67	270.33	Extend DI
	"L" 62+13.21, 52.00' LT Extended	"L" 62+13.21, 52.00' LT	2.99	293.00	19.52	Need DI	3.00	50.00	52.50	274.15	18.85	OK
"L" 58+47, 48.24' LT	"L" 58+52.96, 52.00' LT	"L" 62+13.21, 52.00' LT	18.85	18.85	31.24	DI not needed	3.00	3.00	3.00	5.38	11.91	OK
	"L" 58+52.96, 52.00' LT Extended	"L" 62+13.21, 52.00' LT	18.85	18.85	31.24	DI not needed	3.00	7.50	7.50	9.57	9.28	OK
"L" 55+26, 44.00' LT	"L" 55+23.60, 46.23' LT	"L" 58+52.96, 52.00' LT	9.28	9.28	9.93	DI not needed	3.00	4'x4'	0.00	7.10	2.18	OK
"L" 49+96, 47.95' LT	"L" 49+92.81, 48.75' LT	"L" 55+23.60, 46.23' LT	2.18	2.18	19.07	DI not needed	3.00	3.00	3.00	1.54	0.64	OK
"L" 48+16, 47.37' LT	"L" 48+05.47, 41.75' LT	"L" 49+92.81, 48.75' LT	0.64	0.64	13.63	DI not needed	20.00	20.00	22.50	0.83	0.00	OK
"L" 47+81, 46.43' LT	"L" 47+71.09, 41.44' LT	"L" 48+05.47, 41.75' LT	0.00	0.00	19.24	DI not needed	20.00	20.00	22.50	0.00	0.00	OK
"L" 47+49, 45.49' LT	"L" 47+38.80, 41.95' LT	"L" 47+71.09, 41.44' LT	0.00	0.00	9.55	DI not needed	20.00	20.00	22.50	0.00	0.00	OK
"L" 46+03.00, 41.75' LT	"L" 46+04.18, 51.95' LT	"L" 47+38.80, 41.95' LT	0.00	0.00	22.53	DI not needed	3.00	3.00	3.00	0.00	0.00	OK
"L" 45+06, 40.25' LT	"L" 45+07.81, 40.49' LT	"L" 46+04.18, 51.95' LT	0.00	0.00	28.14	DI not needed	3.00	0.00	0.00	0.45	0.01	OK
"L" 39+70, 42.19' LT	"L" 39+76.98, 39.50' LT	"L" 47+38.80, 41.95' LT	0.00	14.00	1.65	Need DI	3.00	0.00	0.00	5.13	8.87	Extend DI
	"L" 39+76.98, 39.50' LT Extended	"L" 47+38.80, 41.95' LT	0.00	14.00	1.65	Need DI	3.00	15.00	17.50	12.75	1.25	OK
"L" 35+04, 42.12' LT	"L" 35+02.41, 39.50' LT	"L" 39+76.98, 39.50' LT	1.25	1.25	14.02	DI not needed	3.00	3.00	3.00	0.99	0.26	OK
"L" 30+34, 42.41' LT	"L" 30+55.27, 39.50' LT	"L" 35+02.41, 39.50' LT	N/A	34.00	1.62	Need DI	3.00	3.00	3.00	11.54	22.46	Extend DI
	"L" 30+55.27, 39.50' LT Extended	"L" 35+02.41, 39.50' LT	N/A	34.00	1.62	Need DI	3.00	17.50	20.00	32.75	1.25	OK
"L" 25+01, 42.19' LT	"L" 24+98.89, 39.50' LT	"L" 30+55.27, 39.50' LT	1.25	1.25	0.81	Need DI	3.00	7.50	7.50	1.20	0.05	OK
"L" 19+64, 42.17' LT	"L" 19+79.61, 39.50' LT	"L" 24+98.89, 39.50' LT	0.05	14.00	0.63	Need DI	3.00	3.00	3.00	4.58	9.47	Extend DI
	"L" 19+79.61, 39.50' LT Extended	"L" 24+98.89, 39.50' LT	0.05	14.00	0.63	Need DI	3.00	17.50	20.00	3.42	0.63	OK
"L" 16+09, 42.17' LT	"L" 16+07.74, 39.50' LT	"L" 19+79.61, 39.50' LT	0.63	0.63	1.11	DI not needed	3.00	3.00	3.00	0.58	0.05	OK
None	"L" 13+35.72, 39.50' LT	"L" 16+07.74, 39.50' LT	0.05	0.05	0.76	DI not needed	None	6.00	6.00	0.05	0.00	OK
"L" 12+76, 41.85' LT	"L" 12+73.27, 31.24' LT	"L" 13+35.72, 39.50' LT	0.00	0.00	0.76	DI not needed	3.00	3.00	3.00	0.05	0.00	OK
"L" 11+17, 44.40' LT	"L" 11+16.33, 41.13' LT	"L" 12+73.27, 31.24' LT	0.00	0.00	0.70	DI not needed	3.00	3.00	3.00	0.74	0.22	OK
"L" 10+38, 56.68' LT	"L" 10+32.35, 54.25' LT	"L" 11+16.33, 41.13' LT	0.22	0.00	6.86	DI not needed	10.00	10.00	10.00	0.00	0.00	OK

INTERIM CONDITION										
Drop Inlet Analysis-NDOT-25 Year West (offsite Flow)										
Existing Drop Inlet Station/Offset	Proposed Drop Inlet Station/Offset	Upstream Drop Inlet Bypass	Upstream 25yr Bypass Q (CFS)	25-year					Proposed DI Length (FT)	Intercept Flow (CFS)
				Gutter Flow- Half Street (CFS)	25-yr Criteria (Dry-Lane) Flow Half Street (CFS)	Analysis (Need DI/ DI not needed)	Existing DI Length	Bypass Flow (CFS)		
"L" 10+18.82, 50.66' LT	"L" 10+10.09, 50.33' LT	"L" 10+32.35, 54.25' LT	0.00	0.00	6.86	DI not needed	10.00	0.00	7.50	0.00
"4" 15+39, 64.12' LT	"4" 15+31.01, 64.65' LT	"L" 10+32.35, 54.25' LT	0.00	0.00	1.42	DI not needed	20.00	0.00	22.50	0.01
"4" 14+00, 64.26' LT	"4" 14+09.28, 70.16' LT	"4" 15+31.01, 64.65' LT	0.01	0.00	1.21	DI not needed	20.00	0.00	22.50	0.01
"4" 11+76, 64.29' LT	"4" 11+75.15, 89.18' LT	"4" 14+09.28, 70.16' LT	0.01	0.00	0.81	DI not needed	3.00	0.00	3.00	0.00
"4" 7+04, 74.17' LT	"4" 7+13.62, 73.85' LT	"4" 11+75.15, 89.18' LT	0.00	0.00	0.62	DI not needed	3.00	0.00	3.00	0.00
None	"C" 2+81.44, 76.70' LT	"4" 7+13.62, 73.85' LT	0.00	0.00	0.62	DI not needed	None	0.00	12.50	0.00
"C" 3+22, 78.00' LT	"C" 3+28.97, 77.32' LT	"C" 2+81.44, 76.70' LT	0.00	0.00	0.62	DI not needed	10.00	0.00	3.00	0.00

¹ This is the minimum drop inlet size required at this station to capture as much as the 100-year flow (286cfs), due to abandoning of an existing downstream facility (6' x3' RCB, with a 2' x 4' grate, connecting to MPU facility LVRA 0012) at Rancho Dr and Smoke Ranch.

General Note: Existing drop inlet sizes are considered where applicable, even at cross sections where the criteria does not require a inlet.

INTERIM CONDITION

Street Flow Capacity-NDOT 100-Year East (Offsite)

			Discharge : Calculated by FM				Normal Depth: D _{Q100} Calculated by FM					
Cross-Section	Street Location	Slope (%)	100-Year Flow Capacity					100-Year Flow Capacity (on-site Rational flow) D X V < 8 & D _{Q100} <2 Criteria for NDOT				
			D _{max} (ft)	V (fps)	DxV _{max}	Q _{max} (cfs)	Q ₁₀₀ (cfs)	D _{Q100}	V _{Q100}	DQ100 x VQ100	D _{Q100} x V _{Q100} < 8 (Met/Not met)	D _{Q100} < 2 (Met/ Not met)
"L" 112+00	North of Smoke Ranch	0.30	1.67	4.75	7.93	186.18	24.77	0.83	2.77	2.30	Met	Met
"L" 100+00	North of Lake Mead	1.81	0.98	8.13	7.97	137.05	9.95	0.63	2.28	1.44	Met	Met
"L" 98+80	North of Lake Mead	0.74	1.20	6.67	8.00	212.69	10.56	0.54	1.99	1.07	Met	Met
"L" 96+00	South of Lake Mead	1.34	1.04	7.60	7.90	198.88	351.00	N/A				
"L" 92+86	South of Lake Mead	0.80	1.17	6.74	7.89	218.02	283.50					
"L" 84+00	South of Lake Mead	1.49	1.04	7.57	7.87	88.95	283.50					
"L" 78+25	North of Coran	1.39	1.00	7.91	7.91	211.74	283.50	1.15	8.95	10.29	Not Met	Met
"L" 65+08	South of Spring	2.38	0.97	8.23	7.98	92.86	261.59	0.93	10.19	9.48	Not Met	Met
"L" 55+25	South of Spring	1.51	0.86	7.38	6.35	164.28	227.13	0.89	9.63	8.57	Not Met	Met
"L" 49+96	South of Melody	0.89	1.09	7.32	7.98	190.91	194.04	1.14	7.49	8.54	Not Met	Met
"L" 46+93	South of Melody	1.07	1.19	6.60	7.85	127.52	51.91	0.77	4.92	3.79	Met	Met
"L" 46+16	South of Melody	1.15	1.00	7.95	7.95	187.45	7.89	0.38	2.89	1.10	Met	Met
"L" 39+75	South of Vegas	1.15	1.33	5.99	7.97	127.92	34.00	0.42	4.13	1.73	Met	Met
"L" 35+00	South of Vegas	1.15	0.93	8.52	7.92	215.08	12.90	0.31	2.81	0.87	Met	Met
"L" 30+33	South of Vegas	0.30	1.37	5.82	7.97	232.59	8.51	0.34	1.59	0.54	Met	Met
"L" 24+95	South of Vegas	0.30	1.37	5.82	7.97	232.59	4.97	0.29	1.28	0.37	Met	Met
"L" 19+64	South of Vegas	0.48	1.19	6.64	7.90	225.53	4.86	0.28	1.46	0.41	Met	Met
"L" 16+09	South of Vegas	0.50	1.18	6.74	7.95	226.50	1.30	0.21	0.96	0.20	Met	Met
"L" 11+76	South of Vegas	0.70	1.14	6.92	7.89	184.63	0.32	0.18	1.18	0.21	Met	Met
"4" 16+47	South of Washington	0.50	1.38	5.79	7.99	211.65	0.00	0.05	0.58	0.03	Met	Met
"4" 14+96	South of Washington	0.88	1.15	6.92	7.96	211.94	1.20	0.26	1.91	0.50	Met	Met
"4" 13+80	South of Washington	0.88	1.17	6.72	7.86	199.05	1.20	0.25	1.76	0.44	Met	Met
"4" 11+83	South of Washington	0.60	1.24	6.41	7.95	180.66	1.80	0.30	1.71	0.76	Met	Met
"4" 6+76	South of Washington	0.50	1.41	5.63	7.94	212.48	6.17	0.44	2.19	0.96	Met	Met
"C" 3+50	South of Washington	0.66	1.28	6.19	7.92	298.96	7.06	0.39	2.22	0.87	Met	Met

E. Interim Condition: Offsite 100-year Flows (NDOT Criteria - For Comparison of
Normal Depths)
E-1: East Side
E-2: West Side

INTERIM CONDITION

Drop Inlet Analysis-NDOT 100-Year East (Offsite)

Existing Drop Inlet Station/Offset	Proposed Drop Inlet Station/Offset	Proposed DI	100-Year (Onsite Rational)						Does DI need to be extended based on bypass flow 100-Year		
			Gutter Flow-Half Street (cfs)	100-Year Criteria Half Street (cfs)	Analysis (Need DI/ DI not needed)	DI Length (ft)	Intercept Flow (cfs)	Bypass Flow (cfs)			
N/A	"L" 112+01.75, 52.50' RT	EDI-01	24.77	212.69	DI not needed	3.00	3.00	7.01	17.76	OK	
"L" 98+80, 57.50' RT	"L" 98+82.89, 57.00' RT	EDI-02	10.56	198.88	DI not needed	3.00	3.00	3.87	6.69	OK	
"L" 96+00	None	N/A	351.00	Not Applicable; No Inlets in Existing Condition							OK
"L" 92+86	None	N/A	283.50								OK
"L" 84+00	None	N/A	283.50								OK
N/A	"L" 77+58.20, 53.00' RT	EDI-03	283.50	218.02	Need DI	3.00	3.00	21.91	261.59	Extend DI	
"L" 65+08, 48.25 ' RT	"L" 64+97.77, 52.00' RT	EDI-04	261.59	88.95	Need DI	3.00	3.00	34.46	227.13	Extend DI	
"L" 55+25.50, 48.10' RT	"L" 55+23.60 Extend, 52.00' RT	EDI-05	227.13	211.74	Need DI	6.00	6.00	33.09	194.04	OK	
"L" 49+96, 48.00' RT	"L" 50+03.45 Extend, 44.97' RT	EDI-06	194.04	92.86	Need DI	20.00	22.50	142.13	51.91	OK	
"L" 46+93, 46.50' RT	"L" 46+80.17, 47.98' RT	EDI-07	51.91	164.28	DI not needed	20.00	22.50	44.02	7.89	OK	
"L" 46+16, 43.50' RT	"L" 46+02.67, 42.61' RT	EDI-08	7.89	190.91	DI not needed	10.00	12.50	6.72	1.17	OK	
"L" 39+75, 42.50' RT	"L" 39+81.63 Extend, 39.50' RT	EDI-09	34.00	127.52	DI not needed	10.00	12.50	21.10	12.90	OK	
"L" 35+00, 42.60' RT	"L" 35+02.41, 39.50' RT	EDI-10	12.90	187.45	DI not needed	3.00	3.00	4.39	8.51	OK	
"L" 30+33, 42.50' RT	"L" 30+55.45, 39.50' RT	EDI-11	8.51	187.45	DI not needed	3.00	3.00	3.54	4.97	OK	
"L" 24+95, 42.50' RT	"L" 24+97.16 Extend, 39.50' RT	EDI-12	4.97	127.92	DI not needed	6.00	6.00	3.83	1.14	OK	
"L" 19+64, 42.00' RT	"L" 19+75.86 Extend, 39.50' RT	EDI-13	4.86	215.08	DI not needed	6.00	6.00	3.56	1.30	OK	
"L" 16+09, 42.00' RT	"L" 16+07.87, 49.50' RT	EDI-14	1.30	232.59	DI not needed	3.00	3.00	0.98	0.32	OK	
"L" 11+76, 42.50' RT	"L" 11+81.51 Extend, 39.50' RT	EDI-15	0.32	232.59	DI not needed	6.00	6.00	0.32	0.00	OK	
"4" 16+47, 21.00' RT	"4" 16+25.11, 27.50' RT	EDI-16	0.00	225.53	DI not needed	60.00	62.50	0.00	0.00	OK	
"4" 14+96, 20.00' RT	"4" 14+86.97, 28.54' RT	EDI-17	1.20	226.50	DI not needed	20.00	22.50	1.20	0.00	OK	
"4" 13+80, 20.75' RT	"4" 13+72.63, 24.21' RT	EDI-18	1.20	184.63	DI not needed	20.00	22.50	1.20	0.00	OK	
"4" 11+83, 20.00' RT	"4" 11+80.71, 21.02' RT	EDI-19	1.80	184.63	DI not needed	3.00	3.00	1.25	0.55	OK	
"4" 6+76, 35.50' RT	"4" 6+74.09 Extend, 38.95' RT	EDI-20	6.17	211.65	DI not needed	6.00	6.00	4.29	1.88	OK	
"C" 3+62.50, 27.00' LT	"C" 3+59.56 Extend, 25.81' LT	EDI-21	7.06	211.94	DI not needed	10.00	12.50	6.37	0.69	OK	

INTERIM CONDITION											
Drop Inlet Analysis-NDOT 100-Year East (Offsite)											
	Existing Drop Inlet Station/Offset	Proposed Drop Inlet Station/Offset	Proposed DI	100-Year (Onsite Rational)					Intercept Flow (cfs)	Bypass Flow (cfs)	Does DI need to be extended based on bypass flow 100-Year
				Gutter Flow-Half Street (cfs)	100-Year Criteria Half Street (cfs)	Analysis (Need DI/ DI not needed)	DI Length (ft)				
	"C" 6+64.30, 35.27' LT	"C" 6+71.27, 35.61' LT	EDI-22	3.29	199.05	DI not needed	10.0	12.5	3.20	0.09	OK
	"C" 8+22.98, 31.10' LT	"C" 8+24.24, 32.43' LT	EDI-23	1.75	180.66	DI not needed	10.0	12.5	1.75	0.00	OK

INTERIM CONDITION

Street Flow Capacity-NDOT 100-year West (Offsite)

			Discharge : Calculated by FM				Normal Depth: D _{Q100} Calculated by FM						
Cross-Section	Street Location	Slope (%)	100-Year Flow Capacity				D X V < 8 & D _{Q100} <2 Criteria for NDOT						
			D _{max} (ft)	V (FPS)	DxV _{max}	Q _{max} (CFS)	Surface Flow Point ¹	Q ₁₀₀ (CFS)	D _{Q100}	V _{Q100}	D _{Q100} x V _{Q100}	D _{Q100} x V _{Q100} < 8 (Met/Not Met)	D _{Q100} < 2 (Met/ Not Met)
"L" 112+33.57	North of Smoke Ranch	0.30	1.49	5.34	7.96	303.36	1	286.00	1.35	5.19	7.01	Met	Met
"L" 96+00	South of Lake Mead	1.34	1.04	7.58	7.88	200.15	3	440.00	1.38	10.33	14.26	Not Met	Met
"L" 92+84.94	South of Lake Mead	0.80	1.22	6.52	7.95	196.84	4	340.00	1.47	8.07	11.86	Not Met	Met
"L" 83+97.38	South of Lake Mead	1.49	1.07	7.46	7.98	107.33	5	455.00	1.77	10.98	19.43	Not Met	Met
"L" 77+11.75	South of Coran	1.36	1.10	7.25	7.98	142.70	6	400.00	1.58	9.38	14.82	Not Met	Met
"L" 75+03.39	South of Coran	1.63	1.04	7.64	7.95	112.52		373.04	1.58	10.44	16.50	Not Met	Met
"L" 72+87.22, 52.00' LT	South of Coran	1.76	1.02	7.81	7.97	131.55		348.10	1.41	10.40	14.66	Not Met	Met
"L" 71+19.94, 52.00' LT	South of Coran	1.47	1.08	7.41	8.00	148.73		325.47	1.39	9.59	13.33	Not Met	Met
"L" 69+55.83, 52.00' LT	South of Coran	1.04	1.19	6.69	7.96	202.95		301.28	1.34	7.77	10.41	Not Met	Met
"L" 67+73.28, 52.00' LT	South of Spring	0.82	1.22	6.48	7.91	188.73	7	445.00	1.65	9.07	14.97	Not Met	Met
"L" 64+97.77, 52.00' LT	South of Spring	2.38	0.86	9.18	7.89	243.53		414.26	1.04	11.32	11.77	Not Met	Met
"L" 64+06.49, 52.00' LT	South of Spring	0.96	1.22	6.55	7.99	197.56		325.32	1.43	7.81	11.17	Not Met	Met
"L" 62+13.21, 52.00' LT	South of Melody	1.34	1.10	7.19	7.91	143.75	8	404.00	1.54	10.15	15.63	Not Met	Met
"L" 58+52.96, 52.00' LT	South of Melody	1.63	1.15	6.95	7.99	105.17		378.49	1.59	10.50	16.70	Not Met	Met
"L" 55+23.60, 46.23' LT	South of Melody	0.50	1.38	5.80	8.00	280.97		312.74	1.43	6.05	8.65	Not Met	Met
"L" 49+92.75, 47.25' LT	South of Melody	0.89	1.24	6.39	7.92	150.64		241.91	1.45	7.33	10.63	Not Met	Met
"L" 48+05.47, 41.75' LT	South of Melody	0.70	1.31	6.07	7.95	180.15		215.60	1.38	6.51	8.98	Not Met	Met
"L" 47+71.09, 41.44' LT	South of Melody	1.18	1.14	6.93	7.90	148.53		48.35	0.77	5.24	4.03	Met	Met
"L" 47+38.80, 41.95' LT	South of Melody	1.07	1.15	6.94	7.98	221.16		6.32	0.41	3.05	1.25	Met	Met
"L" 46+04.18, 51.95' LT	South of Melody	0.92	1.19	6.72	8.00	229.43		0.14	0.13	1.34	0.17	Met	Met
"L" 45+07.81, 40.49' LT	South of Melody	1.15	1.13	7.03	7.94	216.11		0.00	0.04	0.79	0.03	Met	Met
"L" 39+76.98, 39.50' LT	South of Vegas	1.15	1.15	6.88	7.91	142.32	9	300.00	1.46	8.77	12.80	Not Met	Met
"L" 35+02.41, 39.50' LT	South of Vegas	1.15	1.06	7.47	7.92	155.70		273.98	1.31	9.32	12.21	Not Met	Met
"L" 30+55.27, 39.50' LT	South of Vegas	0.30	1.71	4.65	7.95	155.76	10	301.81	2.13	5.86	12.48	Not Met	Not Met
"L" 24+98.89, 39.50' LT	South of Vegas	0.65	1.25	6.36	7.95	203.66		256.47	1.36	6.96	9.47	Not Met	Met
"L" 19+79.61, 39.50' LT	South of Vegas	0.48	1.32	6.04	7.97	225.63	11	212.55	1.30	5.95	7.74	Met	Met
"L" 16+07.74, 39.50' LT	South of Vegas	0.50	1.34	5.92	7.93	161.93		115.61	1.19	5.19	6.18	Met	Met
"L" 13+35.72, 39.50' LT	South of Vegas	0.50	1.34	5.92	7.93	161.93		96.52	1.12	4.84	5.42	Met	Met
"L" 12+73.27, 31.24' LT	South of Vegas	0.70	1.20	6.62	7.94	212.81		69.57	0.84	4.26	3.58	Met	Met

INTERIM CONDITION

Street Flow Capacity-NDOT 100-year West (Offsite)

			Discharge : Calculated by FM				Normal Depth: D _{Q100} Calculated by FM						
Cross-Section	Street Location	Slope (%)	100-Year Flow Capacity				D X V < 8 & D _{Q100} <2 Criteria for NDOT						
			D _{max} (ft)	V (FPS)	DxV _{max}	Q _{max} (CFS)	Surface Flow Point ¹	Q _{Q00} (CFS)	D _{Q100}	V _{Q100}	D _{Q100} x V _{Q100}	D _{Q100} x V _{Q100} < 8 (Met/Not Met)	D _{Q100} < 2 (Met/ Not Met)
"L" 11+16.33, 41.13' LT	South of Washington	0.60	1.25	6.39	7.99	219.40	12	147.00	1.08	5.46	5.90	Met	Met
"L" 10+32.35, 54.25' LT	South of Washington	0.60	1.43	5.55	7.94	160.47		129.91	1.32	5.27	6.96	Met	Met
"L" 10+10.09, 50.33 LT	South of Washington	0.60	1.43	5.55	7.94	160.47		63.18	1.04	4.42	4.60	Met	Met
"4" 15+31.01, 64.65' LT	South of Washington	0.82	1.19	6.68	7.95	151.82		33.46	0.73	4.18	3.05	Met	Met
"4" 14+09.28, 70.16' LT	South of Washington	0.88	1.23	6.41	7.88	186.74		2.65	0.31	2.21	0.69	Met	Met
"4" 11+75.15, 89.18' LT	South of Washington	0.80	1.26	6.25	7.88	250.83		0.01	0.05	0.70	0.04	Met	Met
"4" 7+13.62, 73.85' LT	South of Washington	0.50	1.34	5.94	7.96	233.17		0.01	0.05	0.58	0.03	Met	Met
"C" 2+81.44, 76.70' LT	South of Washington	0.66	1.42	5.61	7.97	290.38		0.01	0.05	0.65	0.03	Met	Met
"C" 3+28.97, 77.32' LT	South of Washington	0.66	1.42	5.61	7.97	290.38		0.01	0.05	0.65	0.03	Met	Met

¹ Refer to Surface Flow Point Exhibit in Appendix B.

INTERIM CONDITION

Drop Inlet Analysis-NDOT 100-year West (Offsite)

Existing Drop Inlet Station/Offset	Proposed Drop Inlet Station/Offset	Proposed Drop Inlet ID	Upstream 100-Year Bypass Q (CFS)	Gutter Flow- Half Street (CFS)	100-Year Criteria Half Street (CFS)	Analysis (Need DI/DI not needed)	Proposed DI Lengths To Meet Design Criteria		Intercept Flow (CFS)	Bypass Flow (CFS)	Criteria Met After Extension
							Grate	Curb			
None	"L" 112+33.57, 54.66' LT	WDI-01	0	286.00	303.00	DI not needed	47.50	50.00	276.80	7.20	OK
"L" 92+86, 56.76' LT	"L" 92+84.94, 56.34' LT	WDI-02	N/A	340.00	196.84	Need DI	3.00	3.00	27.78	311.72	Extend DI
"L" 84+00, 57.02' LT	"L" 83+97.38, 52.00' LT	WDI-03	N/A	455.00	107.33	Need DI	3.00	3.00	27.98	427.02	Extend DI
"L" 77+20, 48.97' LT	"L" 77+11.75, 64.00' LT	WDI-05	N/A	400.00	142.70	Need DI	3.00	3.00	26.96	373.04	Extend DI
"L" 75+05, 48.01' LT	"L" 75+03.39, 52.82' LT	WDI-06	373.04	373.04	112.52	Need DI	3.00	3.00	24.94	348.10	Extend DI
"L" 72+91, 47.92' LT	"L" 72+87.22, 52.00' LT	WDI-07	348.10	348.10	131.55	Need DI	3.00	3.00	22.63	325.47	Extend DI
"L" 71+21, 48.04' LT	"L" 71+19.94, 52.00' LT	WDI-08	325.47	325.47	148.73	Need DI	3.00	3.00	24.19	301.28	Extend DI
"L" 69+47, 48.08' LT	"L" 69+55.83, 52.00' LT	WDI-09	301.28	301.28	202.95	Need DI	3.00	3.00	24.25	277.03	Extend DI
"L" 67+75, 48.02' LT	"L" 67+73.28, 52.00' LT	WDI-10	N/A	445.00	188.73	Need DI	3.00	3.00	30.74	414.26	Extend DI
"L" 65+08, 48.24' LT	"L" 64+97.77, 52.00' LT	WDI-11	414.26	414.26	243.53	Need DI	7.50	7.50	61.94	325.32	Extend DI
"L" 64+09, 48.15' LT	"L" 64+06.49, 52.00' LT	WDI-12	325.32	325.32	197.56	Need DI	3.00	3.00	26.21	299.11	Extend DI
"L" 62+15, 48.24' LT	"L" 62+13.21, 52.00' LT	WDI-13	N/A	404.00	143.75	Need DI	3.00	3.00	25.51	378.49	Extend DI
"L" 58+47, 48.24' LT	"L" 58+52.96, 52.00' LT	WDI-14	378.49	378.49	105.17	Need DI	7.50	7.50	65.75	312.74	Extend DI
"L" 55+26, 56.61' LT	"L" 55+23.60, 46.23' LT	EX-WDI-01	312.74	312.74	280.97	Need DI	4'x4'	0.00	70.83	241.91	OK
"L" 49+96, 47.95' LT	"L" 49+92.75, 47.25' LT	WDI-15	241.91	241.91	150.64	Need DI	3.00	3.00	26.31	215.60	Extend DI
"L" 48+16, 47.37' LT	"L" 48+05.47, 41.75' LT	WDI-16	215.60	215.60	180.15	Need DI	20.00	22.50	167.25	48.35	OK
"L" 47+81, 46.43' LT	"L" 47+71.09, 41.44' LT	WDI-17	48.35	48.35	148.53	DI not needed	20.00	22.50	42.03	6.32	OK
"L" 47+49, 45.49' LT	"L" 47+38.80, 41.95' LT	WDI-18	6.32	6.32	221.16	DI not needed	20.00	22.50	6.18	0.14	OK
"L" 46+03, 41.75' LT	"L" 46+04.18, 51.95' LT	WDI-19	0.14	0.14	221.16	DI not needed	3.00	3.00	0.14	0.00	OK
"L" 45+06, 40.25' LT	"L" 45+07.81, 40.49' LT		0.00	0.00	216.11	DI not needed	0.00	0.00	0.00	0.00	OK
"L" 39+70, 42.19' LT	"L" 39+76.98, 39.50' LT	WDI-20	0.00	300.00	142.32	Need DI	3.00	3.00	26.02	273.98	Extend DI
"L" 35+04, 42.12' LT	"L" 35+02.41, 39.50' LT	WDI-21	273.98	273.98	155.70	Need DI	3.00	3.00	23.17	250.81	Extend DI
"L" 30+34, 42.41' LT	"L" 30+55.27, 39.50' LT	WDI-22	250.81	301.81	155.76	Need DI	3.00	3.00	45.34	256.47	Extend DI
"L" 25+01, 42.19' LT	"L" 24+98.89, 39.50' LT	WDI-23	256.47	256.47	203.66	Need DI	7.50	7.50	64.92	191.55	OK
"L" 19+64, 42.17' LT	"L" 19+79.61, 39.50' LT	WDI-24	191.55	212.55	225.63	DI not needed	10.00	12.50	96.94	115.61	OK
"L" 16+09, 42.17' LT	"L" 16+07.74, 39.50' LT	WDI-25	115.61	115.61	161.93	DI not needed	3.00	3.00	19.09	96.52	OK
None	"L" 13+35.72, 39.50' LT	WDI-26	96.52	96.52	161.93	DI not needed	6.00	6.00	26.95	69.57	OK
"L" 12+76, 41.85' LT	"L" 12+73.27, 31.24' LT	WDI-27	69.57	69.57	212.81	DI not needed	3.00	3.00	10.96	58.61	OK

"L" 11+17, 44.40' LT	"L" 11+16.33, 41.13' LT	WDI-28	N/A	147.00	219.40	DI not needed	3.00	3.00	14.54	129.91	OK
"L" 10+38, 56.68' LT	None	None	129.91	129.91	160.47	DI not needed	10.00	10.00	66.73	63.18	OK
"L" 10+18, 50.66' LT	"L" 10+10.09, 50.33' LT	WDI-29	63.18	63.18	160.47	DI not needed	7.50	7.50	29.75	33.46	OK
"4" 15+39, 64.12' LT	"4" 15+31.01, 64.65' LT	WDI-30	33.46	33.46	151.82	DI not needed	20.00	22.50	30.81	2.65	OK
"4" 14+00, 64.26' LT	"4" 14+09.28, 70.16' LT	WDI-31	2.65	2.65	186.74	DI not needed	20.00	22.50	2.80	0.00	OK
"4" 11+76, 64.29' LT	"4" 11+75.15, 89.18' LT	WDI-32	0.00	0.01	250.83	DI not needed	3.00	3.00	0.01	0.00	OK
"4" 7+04, 74.17' LT	"4" 7+13.62, 73.85' LT	WDI-33	0.00	0.01	233.17	DI not needed	7.50	7.50	0.01	0.00	OK
None	"C" 2+81.44, 76.70' LT	WDI-34	0.00	0.01	290.38	DI not needed	10.00	12.50	0.01	0.00	OK
"C" 3+22, 78.00' LT	"C" 3+28.97, 77.32' LT	WDI-35	0.00	0.01	290.38	DI not needed	3.00	3.00	0.01	0.00	OK

F. Interim Condition: Onsite 100-year Flows (NDOT Criteria - For HGL Comparison to
25-year flows)
F-1: East Side
F-2: West Side

Interim Condition

Street Flow Capacity-NDOT 100-year East (Onsite Flows- For HGL)

Cross-Section	Street Location	Slope (%)	Cross Slope (%)	Bus Lane Width (FT)	Adjacent Lane Width (FT)	25-Year Flow Capacity			100-Year Actual Flow (Onsite)		
						Dry Lane Criteria for NDOT			D _{Q25} Vs. D _{max}		
						D _{max} (FT)	Q (Half Street) (CFS)	Gutter Flow-Half Street (CFS)	D _{Q25}	D _{dry-lane} (Met/ Not Met)	
"L" 112+00	North of Smoke Ranch	0.30	3.48	12.50	10.50	0.74	17.76	24.77	0.74	Met	
"L" 100+00	North of Lake Mead	1.81	3.94	12.50	10.50	0.82	52.44	9.95	0.42	Met	
"L" 98+80	North of Lake Mead	0.74	2.22	12.50	10.50	0.52	14.29	10.56	0.43	Met	
"L" 78+25	North of Coran	1.39	1.84	12.50	10.50	0.45	14.67	21.41	0.46	Not Met	
"L" 65+08	South of Spring	2.38	1.45	12.50	10.50	0.38	13.26	32.93	0.42	Not Met	
"L" 55+25.50	South of Spring	2.38	1.45	12.50	10.50	0.38	13.26	23.89	0.42	Not Met	
"L" 55+25.50 D/S of DI	South of Spring	2.38	1.45	12.50	10.50	0.38	13.26	14.86	0.37	Met	
"L" 49+96	South of Melody	0.89	2.08	0.00	10.50	0.23	0.95	20.26	0.50	Not Met	
"L" 49+96 D/S of DI	South of Melody	0.89	2.08	0.00	10.50	0.23	0.95	1.37	0.22	Met	
"L" 46+93	South of Melody	1.07	2.58	0.00	10.50	0.26	1.48	4.89	0.32	Not Met	
"L" 46+16	South of Melody	1.15	1.88	0.00	10.50	0.22	0.95	1.87	0.17	Met	
"L" 39+75	South of Vegas	1.15	2.68	0.00	11.00	0.27	0.48	0.35	0.23	Met	
"L" 39+75 D/S of DI	South of Vegas	1.15	2.68	0.00	11.00	0.27	0.48	0.00	0.10	Met	
"L" 35+00	South of Vegas	1.15	2.13	0.00	11.00	0.24	3.57	2.53	0.23	Met	
"L" 30+33	South of Vegas	0.30	4.05	0.00	11.00	0.35	9.71	4.85	0.27	Met	
"L" 24+95	South of Vegas	0.30	1.93	0.00	11.00	0.23	1.47	5.33	0.28	Not Met	
"L" 24+95 D/S of DI	South of Vegas	0.30	1.93	0.00	11.00	0.23	1.47	1.28	0.21	Met	
"L" 19+64	South of Vegas	0.48	1.67	0.00	11.00	0.22	1.47	7.91	0.26	Not Met	
"L" 19+64 D/S of DI	South of Vegas	0.48	1.67	0.00	11.00	0.22	1.47	2.73	0.19	Met	
"L" 16+09	South of Vegas	0.50	2.64	0.00	11.00	0.27	4.48	6.73	0.24	Met	
"L" 11+76	South of Vegas	0.70	2.04	0.00	11.00	0.24	1.01	5.49	0.32	Not Met	
"L" 11+76 D/S of DI	South of Vegas	0.70	2.04	0.00	11.00	0.24	1.01	1.71	0.21	Met	
"4" 16+47	South of Washington	0.50	2.57	10.00	11.00	0.52	10.09	4.52	0.34	Met	
"4" 14+96	South of Washington	0.88	2.98	0.00	11.00	0.29	1.78	2.67	0.23	Met	
"4" 13+80	South of Washington	0.88	2.30	0.00	11.00	0.25	1.21	0.70	0.23	Met	
"4" 11+83	South of Washington	0.60	2.46	0.00	11.00	0.26	1.13	2.11	0.27	Not Met	
"4" 6+76	South of Washington	0.50	2.63	0.00	11.00	0.27	1.15	3.61	0.40	Not Met	
"4" 6+76 D/S of DI	South of Washington	0.50	2.63	0.00	11.00	0.27	1.15	0.13	0.22	Met	
"C" 3+62.50	South of Washington	0.66	1.69	0.00	11.00	0.22	0.76	5.07	0.35	Not Met	
"C" 3+62.50 D/S of DI	South of Washington	0.66	1.69	0.00	11.00	0.22	0.76	0.32	0.18	Met	

INTERIM CONDITION														
Drop Inlet Analysis-NDOT-100 Year East (Onsite Flows-For HGL)														
Existing Drop Inlet Station/Offset	Proposed Drop Inlet Station/Offset	Proposed DI	Contributing Basins (Onsite)	Upstream Drop Inlet Bypass	Upstream 100-Year Bypass Q (CFS)	100-year								Does DI need to be extended based on bypass flow 25-Year
						Gutter Flow- Half Street (CFS)	25-Year Criteria (Dry-Lane) Flow Half Street (CFS)	Analysis (Need DI/ DI not needed)	Existing DI Length (FT)	Proposed DI Length (FT)		Intercept Flow (CFS)	Bypass Flow (CFS)	
										Grate	Curb			
N/A	"L" 112+01.75, 52.50' RT	EDI-01	ONRAN2R, ONRAN3R, ONRAN4R, ONRAN5R	N/A	N/A	24.77	17.76	Need DI	None	3.00	3.00	7.01	17.76	OK
"L" 98+80, 57.50' RT	"L" 98+82.89, 57.00' RT	EDI-02	ONRAN6R, ONRAN7R,0.3*ONRAN7RA	N/A	N/A	10.56	14.29	DI not needed	3.00	3.00	3.00	3.87	6.69	OK
N/A	"L" 77+58.20, 53.00' RT	EDI-03	0.7*ONRAN7RA, ONRAN8R, ONRAN9R, ONRAN10R	N/A	N/A	21.41	14.67	Need DI	None	3.00	3.00	5.99	15.42	Extend DI
"L" 65+08, 48.25 ' RT	"L" 64+97.77, 52.00' RT	EDI-04	ONRAN11R+ONRAN11RA+ONRAN13R+ ONRAN14R	"L" 77+58.20, 53.00' RT	15.42	32.93	13.26	Need DI	3.00	6.00	6.00	10.67	22.26	Extend DI
"L" 55+25.50, 48.10' RT	"L" 55+23.60 Extend, 52.00' RT	EDI-05 EXTEND	ORAN15R+ONRAN16R	"L" 64+97.77, 52.00' RT	22.26	23.89	13.26	Need DI	3.00	6.00	6.00	9.03	14.86	Extend DI
"L" 49+96 , 48.00' RT	"L" 50+03.45 Extend, 44.97' RT	EDI-06 EXTEND	ONRAN17R	"L" 55+23.60 Extend, 52.00' RT	14.86	20.26	0.95	Need DI	3.00	20.00	22.50	18.89	1.37	Extend DI
"L" 46+93, 46.50' RT	"L" 46+80.17, 47.98' RT	EDI-07	ONRAN18R	"L" 50+03.45 Extend, 44.97' RT	1.37	4.89	1.48	Need DI	20.00	20.00	22.50	4.84	0.05	OK
"L" 46+16, 43.50' RT	"L" 46+02.67, 42.61' RT	EDI-08	ONRAN19R	"L" 46+80.17, 47.98' RT	0.05	1.87	0.95	Need DI	10.00	10.00	12.50	1.86	0.00	OK
"L" 39+75, 42.50' RT	"L" 39+81.63 Extend, 39.50' RT	EDI-09 EXTEND	ONRAN20R	"L" 46+02.67, 42.61' RT	0.00	0.35	0.48	DI not needed	3.00	10.00	12.50	0.35	0.00	OK
"L" 35+00, 42.60' RT	"L" 35+02.41, 39.50' RT	EDI-10	ONRAN21R	"L" 39+81.63 Extend, 39.50' RT	0.00	2.53	3.57	DI not needed	3.00	3.00	3.00	1.58	0.95	OK
"L" 24+95, 42.50' RT	"L" 24+97.16 Extend, 39.50' RT	EDI-12 EXTEND	ONRAN23R	"L" 30+55.45, 39.50' RT	2.39	5.33	1.47	Need DI	3.00	6.00	6.00	4.05	1.28	OK
"L" 19+64, 42.00' RT	"L" 19+75.86 Extend, 39.50' RT	EDI-13 EXTEND	ONRAN24R, ONRAN25R	"L" 24+97.16 Extend, 39.50' RT	1.28	7.91	1.47	Need DI		6.00	6.00	5.18	2.73	Extend DI
"L" 16+09, 42.00' RT	"L" 16+07.87, 49.50' RT	EDI-14	ONRAN26R, 26RA	"L" 19+75.86 Extend, 39.50' RT	2.73	6.73	4.48	Need DI	3.00	3.00	3.00	2.93	3.80	OK
"L" 11+76, 42.50' RT	"L" 11+81.51 Extend, 39.50' RT	EDI-15 EXTEND	ONRAN27R	"L" 16+07.87, 49.50' RT	3.80	5.49	1.01	Need DI	3.00	6.00	6.00	3.78	1.71	Extend DI
"4" 16+47, 21.00' RT	"4" 16+25.11, 27.50' RT	EDI-16	ONRAN28R	"L" 11+81.51 Extend, 39.50' RT	1.71	4.52	10.09	DI not needed	60.00	60.00	62.50	4.52	0.00	OK
"4" 14+96, 20.00' RT	"4" 14+86.97, 28.54' RT	EDI-17	ONRAN29R	"4" 16+25.11, 27.50' RT	0.00	2.67	1.78	Need DI	20.00	20.00	22.50	2.67	0.00	OK
"4" 13+80, 20.75' RT	"4" 13+72.63, 24.21' RT	EDI-18	ONRAN30R	"4" 14+86.97, 28.54' RT	0.00	0.70	1.21	DI not needed	20.00	20.00	22.50	0.70	0.00	OK
"4" 11+83, 20.00' RT	"4" 11+80.71, 21.02' RT	EDI-19	ONRAN31R	"4" 13+72.63, 24.21' RT	0.00	2.11	1.13	Need DI	3.00	3.00	3.00	1.38	0.73	OK
"4" 6+76, 35.50' RT	"4" 6+74.09 Extend, 38.95' RT	EDI-20 EXTEND	ONRAN32R+ONRAN32RA	"4" 11+80.71, 21.02' RT	0.73	3.61	1.15	Need DI		6.00	6.00	3.48	0.13	OK
"C" 3+62.50, 27.00' LT	"C" 3+59.56 Extend, 25.81' LT	EDI-21 EXTEND	ONRAN33R	"4" 6+74.09 Extend, 38.95' RT	0.13	5.07	0.76	Need DI		10.00	12.50	4.75	0.32	OK
"C" 6+64.30, 35.27' LT	"C" 6+71.27, 35.61' LT	EDI-22	ONRAN34R	"C" 6+64.30, 35.27' LT	0.32	2.92	0.76	Need DI	10.00	10.00	12.50	2.92	0.06	OK
"C" 8+22.98, 31.10' LT	"C" 8+24.24, 32.43' LT	EDI-23	ONRAN35R	"C" 8+22.98, 31.10' LT	0.06	1.72	0.76	Need DI	10.00	10.00	12.50	1.72	0.00	OK

Interim Condition									
Street Flow Capacity-NDOT 100-Year West (Onsite Flows- For HGL)									
Cross-Section	Street Location	Slope (%)	Cross Slope (%)	Bus Lane Width (FT)	Adjacent Lane Width (FT)	Normal Depth: D _{Q25} Calculated by FM			
						25-Year Flow Capacity		100-Year Actual Flow (Onsite)	
						Dry Lane Criteria for NDOT		D _{Q25} Vs. D _{max}	
						D _{max} (FT)	Q (Half Street) (CFS)	Q ₂₅ (Half Street) (CFS)	D _{Q25} < D _{dry-lane} (Met/ Not Met)
"L" 112+33.57	North of Smoke Ranch	0.30	1.34	12.50	10.00	0.36	3.51	23.40	0.55 Not Met
"L" 92+84.94	South of Lake Mead	0.80	2.06	12.50	10.00	0.49	11.66	6.48	0.37 Met
"L" 83+97.38	South of Lake Mead	1.49	3.51	12.50	10.00	0.74	36.71	11.90	0.45 Met
"L" 77+11.75	South of Coran	1.36	2.68	12.50	10.00	0.59	22.38	9.19	0.43 Met
"L" 75+03.39	South of Coran	1.63	3.19	12.50	10.00	0.68	32.83	5.50	0.36 Met
"L" 72+87.22	South of Coran	1.76	2.61	12.50	10.00	0.58	24.74	4.36	0.31 Met
"L" 71+19.94	South of Coran	1.47	2.47	12.50	10.00	0.56	21.33	3.79	0.29 Met
"L" 69+55.83	South of Coran	1.04	2.00	12.50	10.00	0.47	12.23	3.62	0.29 Met
"L" 67+73.28	South of Spring	0.82	2.18	12.50	10.00	0.51	13.16	3.20	0.29 Met
"L" 64+97.77	South of Spring	2.38	1.00	12.50	10.00	0.30	6.47	4.06	0.24 Met
D/S "L" 64+97.77	South of Spring	2.38	1.00	12.50	10.00	0.30	6.47	1.03	0.16 Met
"L" 64+06.49	South of Spring	0.96	2.12	12.50	10.00	0.50	13.63	2.08	0.24 Met
"L" 62+13.21	South of Melody	1.34	2.58	12.50	10.00	0.58	21.73	2.52	0.26 Met
"L" 58+52.96	South of Melody	1.63	3.20	12.50	10.00	0.68	32.64	4.57	0.31 Met
D/S "L" 58+52.96	South of Melody	1.63	3.20	12.50	10.00	0.68	33.64	1.14	0.19 Met
"L" 55+23.60	South of Melody	0.50	2.28	12.50	10.00	0.52	10.56	4.66	0.36 Met
"L" 49+92.81	South of Melody	0.89	2.86	12.50	10.00	0.63	21.02	5.58	0.36 Met
"L" 48+05.47	South of Melody	0.70	2.52	12.50	10.00	0.57	15.21	4.49	0.34 Met
"L" 47+71.09	South of Melody	1.18	2.62	12.50	10.00	0.58	20.29	0.35	0.15 Met
"L" 47+38.80	South of Melody	1.07	1.74	12.50	10.00	0.43	10.33	0.35	0.16 Met
"L" 46+04.18	South of Melody	0.92	2.59	12.50	10.00	0.58	25.17	1.90	0.26 Met
"L" 45+07.81	South of Vegas	1.15	2.68	11.50	11.00	0.58	28.14	0.63	0.19 Met
"L" 39+76.98	South of Vegas	1.15	2.68	11.50	11.00	0.27	1.65	5.06	0.34 Not Met
"L" 35+02.41	South of Vegas	1.15	2.13	11.50	11.00	0.49	14.02	5.66	0.33 Met
"L" 30+55.27	South of Vegas	0.30	4.05	0.00	11.00	0.35	1.62	5.92	0.47 Not Met
"L" 24+98.89	South of Vegas	0.65	1.93	0.00	11.00	0.23	0.81	6.56	0.37 Not Met
"L" 19+79.61	South of Vegas	0.48	1.67	0.00	11.00	0.22	0.63	6.31	0.39 Not Met
"L" 16+07.74	South of Vegas	0.50	2.64	0.00	11.00	0.27	1.11	3.56	0.34 Not Met
"L" 13+35.72	South of Vegas	0.70	1.68	0.00	11.00	0.22	0.76	4.31	0.31 Not Met
"L" 12+73.27	South of Vegas	0.70	1.68	0.00	11.00	0.22	0.76	1.31	0.21 Met
"L" 11+16.33	South of Washington	0.60	1.66	0.00	11.00	0.22	0.70	1.69	0.24 Not Met
"L" 10+32.35	South of Washington	0.60	2.70	10.00	11.00	0.54	6.86	1.26	0.22 Met
"L" 10+10.09	South of Washington	0.60	2.70	10.00	11.00	0.54	6.86	0.01	0.04 Met
"4" 15+31.01	South of Washington	0.82	2.65	0.00	11.00	0.27	1.42	2.11	0.28 Not Met

Interim Condition									
Street Flow Capacity-NDOT 100-Year West (Onsite Flows- For HGL)									
Cross-Section	Street Location	Slope (%)	Cross Slope (%)	Bus Lane Width (FT)	Adjacent Lane Width (FT)	Normal Depth: D _{Q25} Calculated by FM			
						25-Year Flow Capacity		100-Year Actual Flow (Onsite)	
						Dry Lane Criteria for NDOT		D _{Q25} Vs. D _{max}	
						D _{max} (FT)	Q (Half Street) (CFS)	Q ₂₅ (Half Street) (CFS)	D _{Q25} < D _{dry-lane} (Met/ Not Met)
"4" 14+09.28	South of Washington	0.88	2.24	0.00	11.00	0.25	1.21	1.97	0.26
"4" 11+75.15	South of Washington	0.80	1.68	0.00	11.00	0.22	0.81	2.95	0.28
"4" 7+13.62	South of Washington	0.50	1.68	0.00	12.00	0.23	0.76	6.26	0.37
"C" 2+81.44	South of Washington	0.66	1.61	0.00	11.00	0.21	0.62	11.81	0.37
"C" 3+28.97	South of Washington	0.66	1.61	0.00	11.00	0.21	0.62	0.95	0.19
"C" 7+05.17	South of Bonanza	0.90	2.64	0.00	11.00	0.27	1.93	2.62	0.29
"C" 7+94.23	South of Bonanza	0.90	2.64	0.00	11.00	0.27	1.93	1.73	0.25
"C" 8+44.76	South of Bonanza	0.90	2.64	0.00	11.00	0.27	1.93	1.30	0.24
									Met

INTERIM CONDITION												
Drop Inlet Analysis-NDOT-100 Year West (Onsite Flows- For HGL)												
Existing Drop Inlet Station/Offset	Proposed Drop Inlet Station/Offset	Contributing Basins (Onsite)	Upstream Drop Inlet Bypass	Upstream 100yr Bypass Q (CFS)	100-year							
					Gutter Flow- Half Street (CFS)	25-yr Criteria (Dry-Lane) Flow Half Street (CFS)	Analysis (Need DI/DI not needed)	Existing DI Length	Proposed DI Length (FT)		Intercept Flow (CFS)	Bypass Flow (CFS)
									Grate	Curb		
None	"L" 112+33.57, 54.66' LT	ONRAN2L, 3L, 4L, 5L	N/A	N/A	23.40	3.51	Need DI	0.00	47.50	50.00	23.32	0.08
"L" 92+86, 56.76' LT	"L" 92+84.94, 56.34' LT	ONRAN7LA, 1/2 ONRAN8L	N/A	N/A	6.48	11.66	DI not needed	3.00	3.00	3.00	2.86	3.62
"L" 84+00, 57.02' LT	"L" 83+97.38, 52.00'LT	1/2 ONRAN8L, ONRAN9L, 1/3 ONRAN10L	"L" 92+84.94, 56.34' LT	3.62	11.90	36.71	DI not needed	3.00	3.00	3.00	5.18	6.72
"L" 77+20, 48.97' LT	"L" 77+11.75, 64.00' LT	2/3 ONRAN 10L	"L" 83+97.38, 52.00'LT	6.72	9.19	22.38	DI not needed	3.00	3.00	3.00	3.96	5.23
"L" 75+05, 48.01' LT	"L" 75+03.39, 52.82' LT	1/2 ONRAN11LA, 1/3 ONRAN11L	"L" 77+11.75, 64.00' LT	5.23	5.50	32.83	DI not needed	3.00	3.00	3.00	3.04	2.46
"L" 72+91, 47.92' LT	"L" 72+87.22, 52.00' LT	1/2 ONRAN11LA, 1/3 ONRAN11L	"L" 75+03.39, 52.82' LT	2.46	4.36	24.74	DI not needed	3.00	3.00	3.00	2.47	1.89
"L" 71+21, 48.04' LT	"L" 71+19.94, 52.00' LT	1/2 ONRAN11LA1, 1/3 ONRAN11L	"L" 72+87.22, 52.00' LT	1.89	3.79	21.33	DI not needed	3.00	3.00	3.00	2.23	1.56
"L" 69+47, 48.08' LT	"L" 69+55.83, 52.00' LT	1/2 ONRAN11LA1, ONRAN13L	"L" 71+19.94, 52.00' LT	1.56	3.62	12.23	DI not needed	3.00	3.00	3.00	1.97	1.65
"L" 67+75, 48.02' LT	"L" 67+73.28, 52.00' LT	ONRAN14L	"L" 69+55.83, 52.00' LT	1.65	3.20	13.16	DI not needed	3.00	3.00	3.00	1.81	1.39
"L" 65+08, 48.24' LT	"L" 64+97.77, 52.00' LT	ONRAN14LA	"L" 67+73.28, 52.00' LT	1.39	4.06	6.47	DI not needed	3.00	3.00	3.00	2.24	1.82
	"L" 64+97.77, 52.00' LT	ONRAN14LA	"L" 67+73.28, 52.00' LT	1.39	4.06	6.47	DI not needed	3.00	7.50	7.50	3.03	1.03
"L" 64+09, 48.15' LT	"L" 64+06.49, 52.00' LT	ONRAN15L	"L" 64+97.77, 52.00' LT	1.03	2.08	13.63	DI not needed	3.00	3.00	3.00	1.39	0.69
"L" 62+15, 48.24' LT	"L" 62+13.21, 52.00' LT	ONRAN15LA	"L" 64+06.49, 52.00' LT	0.69	2.52	21.73	DI not needed	3.00	3.00	3.00	1.61	0.91
"L" 58+47, 48.24' LT	"L" 58+52.96, 52.00' LT	ONRAN16L	"L" 62+13.21, 52.00' LT	0.91	4.57	32.64	DI not needed	3.00	3.00	3.00	2.38	2.19
	"L" 58+52.96, 52.00' LT	ONRAN16L	"L" 58+52.96, 52.00' LT	0.91	4.57	32.64	DI not needed	3.00	7.50	7.50	3.43	1.14
"L" 55+26, 44.00' LT	"L" 55+23.60, 46.23' LT	ONRAN16LA	"L" 58+52.96, 52.00' LT	1.14	4.66	10.56	DI not needed	4'x4'	4'x4'	4'x4'	4.20	0.46
"L" 49+96, 47.95' LT	"L" 49+92.81, 48.75' LT	ONRAN17L	"L" 55+23.60, 46.23' LT	0.46	5.58	21.02	DI not needed	3.00	3.00	3.00	2.91	2.67
"L" 48+16, 47.37' LT	"L" 48+05.47, 41.75' LT	ONRAN18L	"L" 49+92.81, 48.75' LT	2.67	4.49	15.21	DI not needed	20.00	20.00	22.50	4.48	0.01
"L" 47+81, 46.43' LT	"L" 47+71.09, 41.44' LT	ONRAN18LA	"L" 48+05.47, 41.75' LT	0.01	0.35	20.29	DI not needed	20.00	20.00	22.50	0.35	0.00
"L" 47+49, 45.49' LT	"L" 47+38.80, 41.95' LT	ONRAN18LB	"L" 47+71.09, 41.44' LT	0.00	0.35	10.33	DI not needed	20.00	20.00	22.50	0.35	0.00
"L" 46+03, 41.75' LT	"L" 46+04.18, 51.95' LT	3/4 of ONRAN19L	"L" 47+38.80, 41.95' LT	0.00	1.90	25.17	DI not needed	3.00	3.00	3.00	1.37	0.53
"L" 45+06, 40.25' LT	"L" 45+07.81, 40.49' LT	1/4 of ONRAN19L	"L" 46+04.18, 51.95' LT	0.00	0.63	28.14	DI not needed	3.00	N/A	N/A	0.58	0.05
"L" 39+70, 42.19' LT	"L" 39+76.98, 39.50' LT	ONRAN20L, 1/4 of ONRAN19L	"L" 46+04.18, 51.95' LT	0.53	5.06	1.65	Need DI	3.00	3.00	3.00	2.69	2.37
"L" 35+04, 42.12' LT	"L" 35+02.41, 39.50' LT	ONRAN21L	"L" 39+76.98, 39.50' LT	2.37	5.66	14.02	DI not needed	3.00	3.00	3.00	2.68	2.98
"L" 30+34, 42.41' LT	"L" 30+55.27, 39.50' LT	ONRAN22L, ONRAN22LA	"L" 35+02.41, 39.50' LT	2.98	5.92	1.62	Need DI	3.00	3.00	3.00	3.53	2.39
"L" 25+01, 42.19' LT	"L" 24+98.89, 39.50' LT	ONRAN23L	"L" 30+55.27, 39.50' LT	2.39	6.56	0.81	Need DI	3.00	3.00	3.00		

INTERIM CONDITION												
Drop Inlet Analysis-NDOT-100 Year West (Onsite Flows- For HGL)												
Existing Drop Inlet Station/Offset	Proposed Drop Inlet Station/Offset	Contributing Basins (Onsite)	Upstream Drop Inlet Bypass	Upstream 100yr Bypass Q (CFS)	100-year							
					Gutter Flow- Half Street (CFS)	25-yr Criteria (Dry-Lane) Flow Half Street	Analysis (Need DI/DI not needed)	Existing DI Length	Proposed DI Length (FT)		Intercept Flow (CFS)	Bypass Flow (CFS)
	"L" 24+98.89, 39.50' LT	ONRAN23L	"L" 30+55.27, 39.50' LT	2.39	6.56	0.81	Need DI	3.00	7.50	7.50	4.87	1.69
"L" 19+64, 42.17' LT	"L" 19+79.61, 39.50' LT	ONRAN24L, ONRAN25L	"L" 24+98.89, 39.50' LT	1.69	6.31	0.63	Need DI	3.00	3.00	3.00		
	"L" 19+79.61, 39.50' LT	ONRAN24L, ONRAN25L	"L" 24+98.89, 39.50' LT	1.69	6.31	0.63	Need DI	3.00	10.00	12.50	5.84	0.47
"L" 16+09, 42.17' LT	"L" 16+07.74, 39.50' LT	ONRAN26L	"L" 19+79.61, 39.50' LT	0.47	3.56	1.11	Need DI	3.00	3.00	3.00	2.11	1.45
None	"L" 13+35.72, 39.50' LT	ONRAN27L	"L" 16+07.74, 39.50' LT	1.45	4.31	0.76	Need DI	None	6.00	6.00	3.00	1.31
"L" 12+76, 41.85' LT	"L" 12+73.27, 31.24' LT	bypass from previous inlet	"L" 13+35.72, 39.50' LT	1.31	1.31	0.76	Need DI	3.00	3.00	3.00	0.96	0.35
"L" 11+17, 44.40' LT	"L" 11+16.33, 41.13' LT	ONRAN27LA, ONRAN28L	"L" 12+73.27, 31.24' LT	0.35	1.69	0.70	Need DI	3.00	3.00	3.00	1.13	0.56
"L" 10+38, 56.68' LT	"L" 10+32.35, 54.25' LT	ONRAN28LA	"L" 11+16.33, 41.13' LT	0.56	1.26	6.86	DI not needed	10.00	10.00	10.00	1.25	0.01
"L" 10+18, 50.66 LT	"L" 10+10.09, 50.33 LT	bypass from previous inlet	"L" 10+32.35, 54.25' LT	0.01	0.01	6.86	DI not needed	10.00	7.50	7.50	0.01	0.00
"4" 15+39, 64.12' LT	"4" 15+31.01, 64.65' LT	ONRAN29L	"L" 10+10.09, 50.33 LT	0.00	2.11	1.42	Need DI	20.00	20.00	22.50	2.11	0.00
"4" 14+00, 64.26' LT	"4" 14+09.28, 70.16' LT	ONRAN30L	"4" 15+31.01, 64.65' LT	0.00	1.97	1.21	Need DI	20.00	20.00	22.50	1.97	0.00
"4" 11+76, 64.29' LT	"4" 11+75.15, 89.18' LT	ONRAN31L	"4" 14+09.28, 70.16' LT	0.00	2.95	0.81	Need DI	3.00	3.00	3.00	1.85	1.10
"4" 7+04, 74.17' LT	"4" 7+13.62, 73.85' LT	ONRAN32LA, ONRAN32L	"4" 11+75.15, 89.18' LT	1.10	6.26	0.76	Need DI	3.00	3.00	3.00		
	"4" 7+13.62, 73.85' LT	ONRAN32LA, ONRAN32L	"4" 7+13.62, 73.85' LT	1.10	6.26	0.76	Need DI	3.00	7.50	7.50	4.95	1.31
None	"C" 2+81.44, 76.70' RT	ONRAN33L, ONRAN33LA, ONRAN33LA1	"4" 7+13.62, 73.85' LT	1.31	11.81	0.62	Need DI	None	10.00	12.50	6.46	0.95
"C" 3+22, 78.00' RT	"C" 3+28.97, 77.32' LT	bypass from previous inlet	"C" 2+81.44, 76.70' RT	0.95	0.95	0.62	Need DI	10.00	3.00	3.00	0.76	0.19
"C" 7+05.17, 80.50' RT	"C" 7+05.17, 80.50' RT	bypass from previous inlet, 2/3 OF 34LA	"C" 3+28.97, 77.32' LT	0.19	2.62	1.93	Need DI	3	5	5.00	1.85	0.77
"C" 7+94.23, 93.31' RT	"C" 7+94.23, 93.31' RT	bypass from previous inlet, 1/3 OF 34LA	"C" 7+05.17, 80.50' RT	0.77	1.73	1.93	DI not needed	10.0	10.0	12.50	1.72	0.01
"C" 8+44.76, 93.84' RT	"C" 8+44.76, 93.84' RT	bypass from previous inlet, 1/3 OF 34LA	"C" 7+94.23, 93.31' RT	0.01	1.30	1.93	DI not needed	10.0	10.0	12.50	1.30	0.00

G. Table 1:Proposed Drop Inlet Summary For Scenarios (final DI sizes)
Table 2: Cumulative Flows Summary (NDOT & RTC)

Table 1: Proposed Drop Inlets Summary For Scenarios - East Side													
			Existing Condition			Proposed Condition					Proposed DI Length Considered for Design		
Existing DI Station	Proposed DI Station	Proposed DI ID				Interim 25-Year Onsite NDOT Dry-Lane Criteria	Interim 10- Year and 100-Year RTC Criteria	Interim 25-year Offsite NDOT Dry-Lane Criteria					
			Grate	Curb	No. of Grates (2.5 FT)	Grate	Curb	Grate	Curb	Grate	Grate	Curb	No. of Grates (2.5 FT)
None	"L" 112+01.75, 52.50' RT	EDI-01	None		0	3.00	3.00	None		N/A-Since offsite flow (25-Year) does not overtop to east side	3.00	3.00	
"L" 98+80, 57.50' RT	L 98+82.89, 57.00' RT	EDI-02	3.0	3.0	0	3.00	3.00	3.00	3.00		3.00	3.00	
None	"L" 77+58.20, 53.00 RT	EDI-03	None	None	3	3.00	3.00	None			3.00	3.00	
"L" 64+97.77, 52.00' RT	"L" 64+97.77, 52.00' RT	EDI-04	3.0	3.0	0	3.00	3.00	3.00	3.00		3.00	3.00	
"L" 55+24.00, 50.50' RT	"L" 55+23.60, 52.00' RT	EDI-05	3.0	3.0	0	6.00	6.00	3.00	3.00		6.00	6.00	
"L" 49+96 , 48.00' RT	"L" 50+03.45, 44.97' RT	EDI-06	3.0	3.0	0	20.00	22.50	3.00	3.00		20.00	22.50	9.00
"L" 46+93, 46.50' RT	"L" 46+80.17, 47.98' RT	EDI-07	20.0	20.0	8	20.00	22.50	20.00	22.50		20.00	22.50	9.00
"L" 46+16, 43.50' RT	"L" 46+02.67, 42.61 RT	EDI-08	10.0	10.0	4	10.00	12.50	10.00	12.50		10.00	12.50	5.00
"L" 39+75, 42.50' RT	"L" 39+73.00, 38.00' RT	EDI-09	3.0	3.0	0	7.50	7.50	10.00	12.50		10.00	12.50	5.00
"L" 35+00, 42.60' RT	"L" 35+02.41, 39.50' RT	EDI-10	3.0	3.0	0	3.00	3.00	3.00	3.00		3.00	3.00	
"L" 30+33, 42.50' RT	"L" 30+55.45, 39.50' RT	EDI-11	3.0	3.0	0	3.00	3.00	3.00	3.00		3.00	3.00	
"L" 24+95, 42.50' RT	"L" 24+97.16, 38.00' RT	EDI-12	3.0	3.0	0	6.00	6.00	3.00	3.00		6.00	6.00	
"L" 19+64, 42.00' RT	"L" 19+75.86, 39.50' RT	EDI-13	3.0	3.0	0	6.00	6.00	3.00	3.00		6.00	6.00	
"L" 16+09, 42.00' RT	"L" 16+07.87, 49.50' RT	EDI-14	3.0	3.0	0	3.00	3.00	3.00	3.00		3.00	3.00	
"L" 11+76, 42.50' RT	"L" 11+81.51, 39.50' RT	EDI-15	3.0	3.0	0	6.00	6.00	3.00	3.00		6.00	6.00	
"4" 16+47, 21.00' RT	"4" 16+25.11, 27.50' RT	EDI-16	60.0	60.0	24	60.00	62.50	60.00	62.50		60.00	62.50	25.00
"4" 14+96, 20.00' RT	"4" 14+86.97, 28.54 RT	EDI-17	20.0	20.0	8	20.00	22.50	20.00	22.50		20.00	22.50	9.00
"4" 13+80, 20.75' RT	"4" 13+72.63, 24.21' RT	EDI-18	20.0	20.0	8	20.00	22.50	20.00	22.50		20.00	22.50	9.00
"4" 11+83, 20.00' RT	"4" 11+80.71, 21.02' RT	EDI-19	3.0	3.0	0	3.00	3.00	3.00	3.00		3.00	3.00	
"4" 6+76, 35.50' RT	"4" 6+74.09, 38.95' RT	EDI-20	3.0	3.0	0	6.00	6.00	3.00	3.00		6.00	6.00	
"C" 3+62.50, 27.00' RT	"C" 3+59.56 , 25.81' RT	EDI-21	3.0	3.0	0	10.00	12.50	3.00	3.00		10.00	12.50	5.00
"C" 6+67.35, 42.41' LT	"C" 6+71.27, 35.61' LT	EDI-22	10.0	10.0	4	10.0	12.5	10.0	12.5		10.0	12.5	5.00
"C" 8+22.90, 36.48' LT	"C" 8+24.24, 32.43' LT	EDI-23	10.0	10.0	4	10.0	12.5	10.0	12.5		10.0	12.5	5.00

Table 1: Proposed Drop Inlets Summary For Scenarios - West Side														
Existing DI Station	Proposed DI Station	Proposed DI ID	Existing Condition			Proposed Condition						Proposed DI Length Considered for Design		
						Interim 25-Year Onsite NDOT Dry-Lane Criteria		Interim 10- Year and 100-Year RTC Criteria		Interim 25-year Offsite NDOT Dry-Lane Criteria				
			Grate	Curb	No. of Grates (2.5 FT)	Grate	Curb	Grate	Curb	Grate	Curb	Grate	Curb	No. of Grates (2.5 FT)
None	"L" 112+33.57, 54.66' LT	WDI-01	None	0.00	0.00	47.50	50.00	0.00	0.00	47.50	50.00	47.50	50.00	20.00
"L" 92+86, 56.76' LT	"L" 92+83.50, 55.00' LT	WDI-02	3.00	3.00	0.00	3.00	3.00	3.00	3.00	45.00	47.50	3.00	3.00	0.00
"L" 84+00, 57.02'LT	"L" 83+97.38, 52.00'LT	WDI-03	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00
"L" 77+20, 48.97' LT	"L" 77+11.75, 64.00' LT	WDI-05	3.00	3.00	0.00	3.00	3.00	3.00	3.00	22.50	25.00	3.00	3.00	0.00
"L" 75+05, 48.01' LT	"L" 75+03.39, 52.82' LT	WDI-06	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00
"L" 72+91, 47.92' LT	"L" 72+87.22, 52.00' LT	WDI-07	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00
"L" 71+21, 48.04' LT	"L" 71+19.94, 52.00' LT	WDI-08	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00
"L" 69+47, 48.08' LT	"L" 69+55.83, 52.00' LT	WDI-09	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00
"L" 67+75, 48.02' LT	"L" 67+73.28, 52.00' LT	WDI-10	3.00	3.00	0.00	3.00	3.00	3.00	3.00	37.50	40.00	3.00	3.00	0.00
"L" 65+08, 48.24' LT	"L" 64+97.77, 52.00' LT	WDI-11	3.00	3.00	0.00	3.00	3.00	3.00	3.00	7.50	7.50	7.50	7.50	3.00
"L" 64+09, 48.15' LT	"L" 64+06.49, 52.00' LT	WDI-12	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00
"L" 62+15, 48.24' LT	"L" 62+13.21, 52.00' LT	WDI-13	3.00	3.00	0.00	3.00	3.00	3.00	3.00	50.00	52.50	3.00	3.00	0.00
"L" 58+47, 48.24' LT	"L" 58+52.96, 52.00' LT	WDI-14	3.00	3.00	0.00	3.00	3.00	3.00	3.00	7.50	7.50	7.50	7.50	3.00
"L" 55+23, 46.23' LT	"L" 55+23.60, 46.23' LT	EX WDI-01	4'x 4'	0.00	0.00	Existing DI-Protect in Place;								
"L" 49+96, 47.95' LT	"L" 49+92.81, 48.75' LT	WDI-15	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00
"L" 48+16, 47.37' LT	"L" 48+05.47, 41.75' LT	WDI-16	20.00	20.00	8.00	20.00	22.50	20.00	22.50	20.00	22.50	20.00	22.50	9.00
"L" 47+81, 46.43' LT	"L" 47+71.09, 41.44' LT	WDI-17	20.00	20.00	8.00	20.00	22.50	20.00	22.50	20.00	22.50	20.00	22.50	9.00
"L" 47+49, 45.49' LT	"L" 47+38.80, 41.95' LT	WDI-18	20.00	20.00	8.00	20.00	22.50	20.00	22.50	20.00	22.50	20.00	22.50	9.00
"L" 46+03, 50.50' LT	"L" 46+04.18, 51.95' LT	WDI-19	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00
"L" 45+07, 40.49' LT	"L" 45+07.81, 40.49' LT	None	3.00	3.00	0.00	Remove/Abandon Existing DI								
"L" 39+75, 42.19' LT	"L" 39+76.98, 39.50' LT	WDI-20	3.00	3.00	0.00	3.00	3.00	3.00	3.00	15.00	17.50	3.00	3.00	0.00
"L" 35+04, 42.12' LT	"L" 35+02.41, 39.50' LT	WDI-21	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00
"L" 30+34, 42.41' LT	"L" 30+55.27, 39.50' LT	WDI-22	3.00	3.00	0.00	3.00	3.00	3.00	3.00	17.50	20.00	3.00	3.00	0.00
"L" 25+01, 42.19' LT	"L" 24+98.89, 39.50' LT	WDI-23	3.00	3.00	0.00	7.50	7.50	3.00	3.00	7.50	7.50	7.50	7.50	3.00
"L" 19+64, 42.17' LT	"L" 19+79.61, 39.50' LT	WDI-24	3.00	3.00	0.00	10.00	12.50	3.00	3.00	17.50	20.00	10.00	12.50	5.00
"L" 16+09, 42.17' LT	"L" 16+07.74, 39.50' LT	WDI-25	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00
None	"L" 13+35.72, 39.50' LT	WDI-26	0.00	0.00	0.00	6.00	6.00	N/A		6.00	6.00	6.00	6.00	0.00
"L" 12+76, 41.85' LT	"L" 12+73.27, 31.24' LT	WDI-27	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00
"L" 11+17, 44.40' LT	"L" 11+16.33, 41.13' LT	WDI-28	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00
"L" 10+38, 56.68' LT	"L" 10+32.35, 54.25' LT	None	10.00	10.00	4.00	Existing DI-Protect in Place;								
"L" 10+18.82, 50.66 LT	"L" 10+10.09, 50.33 LT	WDI-29	10.00	10.00	4.00	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	3.00
"4" 15+39, 64.12' LT	"4" 15+31.01, 64.65' LT	WDI-30	20.00	20.00	8.00	20.00	22.50	20.00	22.50	20.00	22.50	20.00	22.50	9.00
"4" 14+00, 64.26' LT	"4" 14+09.28, 70.16' LT	WDI-31	20.00	20.00	8.00	20.00	22.50	20.00	22.50	20.00	22.50	20.00	22.50	9.00
"4" 11+76, 64.29' LT	"4" 11+75.15, 89.18' LT	WDI-32	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00
"4" 7+04, 74.17' LT	"4" 7+13.62, 73.85' LT	WDI-33	3.00	3.00	0.00	75.00	7.50	3.00	3.00	3.00	3.00	7.50	7.50	3.00
None	"C" 2+81.44, 76.70' RT	WDI-34	0.00	0.00	0.00	10.00	12.50	N/A		10.00	12.50	10.00	12.50	5.00
"C" 3+22, 26.36' LT	"C" 3+28.97, 77.32' RT	WDI-35	10.00	10.00	4.00	3.00	3.00	6.00	6.00	3.00	3.00	3.00	3.00	0.00
"C" 7+05.17, 80.50' RT	"C" 7+05.17, 80.50' RT	WDI-36	3.00	3.00	0.00	5.00	5.00	3.00	3.00	3.00	3.00	5.00	5.00	2.00
"C" 7+83.13, 79.62' RT	"C" 7+94.23, 93.31' RT	WDI-37	10.00	10.00	4.00	10.00	12.50	10.00	10.00	10.00	10.00	10.00	12.50	5.00
"C" 8+49.68, 92.48' RT	"C" 8+44.76, 93.84' RT	WDI-38	12.00	12.50	5.00	10.00	12.50	12.00	12.50	12.00	12.50	10.00	12.50	5.00

No. of grates apply to Type DM & CM drop inlets

WDI-11 & WDI-14 are designed based on Interim 25-year offsite flows, for NDOT criteria

WDI-26 and WDI-34 are designed to meet Interim 25-year onsite flows, for NDOT Criteria. RTC Criteria does not require drop inlets at these locations

WDI-35: Existing Inlet is downsized, because this location has a ADA ramp and any DI larger than 3ft is not feasible at this station.

Instead, WDI-34 is a new a 10ft DI added upstream to compensate for the interceptiophn capacity.

Table 2: Interim Condition (Q25 cfs) and (Q100 cfs) flows for Proposed Storm Drain (NDOT)

West Side				East Side				Trunk line			
ID	Intercept West	Intercept West	ID	Intercept East	Intercept East	Manhole ID	Total Flow	Total Flow	Trunk line/line/Lateral		
	Q 25 (CFS)	Q 100 (CFS)		Q 25(CFS)	Q 100 (CFS)		Q 25(CFS)	Q 100(CFS)	Pipe Size (FT)		
WDI-01 ¹	271.54	271.54	N/A	N/A	N/A	N/A	271.54	271.54	48-inch RCP		
N/A	N/A	N/A	EDI-01	5.73	7.01		5.73	7.01	18-inch RCP		
N/A	N/A	N/A	EDI-02	3.16	3.87	SDMH-02	3.16	3.87	24-inch RCP		
WDI-02	2.33	2.86	N/A	N/A	N/A		2.33	2.86	N/A		
WDI-03	4.10	5.18	N/A	N/A	N/A		4.10	5.18	N/A		
WDI-05 ²	5.69	7.96	EDI-03	4.91	5.99	SDMH-03	4.91	5.99	1.5		
WDI-06	2.75	3.04				SDMH-04	10.60	13.95	2.0		
WDI-07 ²	6.08	8.47				SDMH-05	13.35	16.99	2.0		
WDI-08 ²	6.75	9.23				SDMH-06	19.43	25.46	2.5		
WDI-09	1.50	1.97				SDMH-07	26.18	34.69	2.5		
WDI-10	1.33	1.81				SDMH-08	27.68	36.66	2.5		
WDI-11	2.15	3.03	EDI-04	5.70	7.00	SDMH-09	29.01	38.47	2.5		
WDI-12	0.95	1.39				SDMH-10	36.86	48.50	3.0		
WDI-13	1.17	1.61				SDMH-11	37.81	49.89	3.0		
WDI-14	2.50	3.43				SDMH-12	38.98	51.50	3.0		
EX WDI-01 ²	4.98	7.20	EDI-05 ²	8.10	9.61	SDMH-13	41.48	54.93	3.0		
WDI-15	2.25	2.91	EDI-06	14.75	20.10	SDMH-14	54.56	71.74	3.5		
WDI-16	2.85	4.48				SDMH-15	71.56	94.75	3.5		
WDI-17	0.25	0.35				SDMH-16	74.41	99.23	3.5		
WDI-18	0.25	0.35				SDMH-17	74.66	99.58	3.5		
WDI-19	1.08	1.37				SDMH-18	74.91	99.93	3.5		
						SDMH-19	75.99	101.30	3.5		
			EDI-07	3.20	4.81	SDMH-21	75.99	101.30	4.0		
			EDI-08	0.31	0.47	SDMH-02	3.20	4.81			
							3.51	5.28			
WDI-20	2.13	2.69	EDI-09	3.13	4.23	SDMH-23	5.26	6.92	2.0		
WDI-21	2.08	2.68	EDI-10	1.69	2.12	SDMH-25	9.03	11.72	2.0		
Culvert ²	5.00	5.00				SDMH-26	14.03	16.72	2.5		
WDI-22	2.58	3.53	EDI-11	1.94	2.53	SDMH-27	18.55	22.78	2.5		
						SDMH-28	18.55	22.78	2.5		
WDI-23	3.46	4.87	EDI-12	3.32	4.64	SDMH-29	25.33	32.29	3.0		
EX-WDI-02 ²	7.00	10.50				SDMH-30	32.33	42.79	3.0		
Culvert ²	7.00	10.50				SDMH-44	39.33	53.29	3.0		
WDI-24	4.70	5.84	EDI-13	2.77	3.86	SDMH-31	46.80	62.99	3.0		
WDI-25	1.65	2.11	EDI-14	1.45	1.98	SDMH-32	49.90	67.08	3.0		
WDI-26	2.23	3.00				SDMH-33	52.13	70.08	3.5		
WDI-27	0.60	0.96				SDMH-34	52.73	71.04	4.0		
			EDI-15	1.70	3.23		1.70	3.23	1.5		
WDI-28	0.81	1.13					0.81	1.13	N/A		
WDI-29	0.74	1.25					1.55	2.38	N/A		
WDI-30	1.52	2.11					3.07	4.49	N/A		
WDI-31	1.43	1.97				SDMH-36	4.50	6.46	N/A		
WDI-32	1.48	1.85				SDMH-37	5.98	8.31	N/A		
WDI-33	4.03	4.95				SDMH-39,40	10.01	13.26	N/A		
WDI-34	4.68	6.46					14.69	19.72	N/A		
WDI-35	0.41	0.76				SDMH-42	15.10	20.48	N/A		
			EDI-16	2.51	3.91		3.32	5.04	N/A		
			EDI-17	0.86	1.20		3.37	5.11	N/A		
			EDI-18	0.86	1.20		4.23	6.31	N/A		
			EDI-19	0.94	1.32		5.17	7.63	N/A		
			EDI-20	3.31	4.40		8.48	12.03	N/A		
			EDI-21	4.55	6.25		13.03	18.28	18-inch RCP		
			EDI-22	2.15	3.17		15.18	21.45	18-inch RCP		
			EDI-23	1.20	1.75		16.38	23.20	18-inch RCP		
WDI-36	1.46	1.85					4.02	4.87	18-inch RCP		
WDI-37	1.62	1.72					2.56	3.02	18-inch RCP		
WDI-38	0.94	1.30					0.94	1.30	18-inch RCP		
							4.02	4.87			

1 This Drop inlet is designed to capture Q100, to replace an existing downstream facility is being abandoned.
2 Offsite flows from adjacent parking lots/neighborhood Cul-de-Sac locations or an existing drop inlet connection are included in the total flow shown.

Table 2 (Continued):Ultimate Condition (Q10 cfs) and (Q100 cfs) flows for Proposed Storm Drain (RTC)

West Side				East Side			Trunk line			
ID	Intercept West	Intercept West	ID	Intercept East	Intercept East	Manhole ID	Total Flow Q 10(CFS)	Total Flow Q 100(CFS)	Trunk line	line/Lateral Pipe Size (FT)
WDI-01 ¹	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	48-inch RCP
N/A			EDI-01				0.00	0.00	0.00	18-inch RCP
N/A			EDI-02	2.69	3.87	SDMH-02	2.69	3.87	3.87	24-inch RCP
WDI-02	1.89	2.76	N/A	N/A	N/A		1.89	2.76	2.76	N/A
WDI-03	3.65	5.08	N/A	N/A	N/A		3.65	5.08	5.08	N/A
			EDI-03							
WDI-05 ²	2.19	4.39				SDMH-03	0.00	0.00	0.00	1.5
WDI-06	3.09	4.63				SDMH-04	2.19	4.39	4.39	2.0
WDI-07 ²	1.56	3.27				SDMH-05	5.28	9.02	9.02	2.0
WDI-08 ²	1.25	2.78				SDMH-06	6.84	12.29	12.29	2.5
WDI-09	1.09	2.28				SDMH-07	8.09	15.07	15.07	2.5
WDI-10	0.94	2.02				SDMH-08	9.18	17.35	17.35	2.5
WDI-11	1.29	2.42	EDI-04	5.41	7.20	SDMH-09	10.12	19.37	19.37	2.5
WDI-12	0.83	1.82				SDMH-10	16.82	28.99	28.99	3.0
WDI-13	0.94	1.87				SDMH-11	17.65	30.81	30.81	3.0
WDI-14	1.48	2.50				SDMH-12	18.59	32.68	32.68	3.0
EX WDI-01 ²	2.49	4.95	EDI-05 ²	5.05	7.73	SDMH-13	20.07	35.18	35.18	3.0
WDI-15	1.80	2.99	EDI-06	4.42	7.39	SDMH-14	27.61	47.86	47.86	3.5
WDI-16	1.91	4.79				SDMH-15	33.83	58.24	58.24	3.5
WDI-17	0.18	0.34				SDMH-16	35.74	63.03	63.03	3.5
WDI-18	0.19	0.35				SDMH-17	35.92	63.37	63.37	3.5
WDI-19	2.08	3.23				SDMH-18	36.11	63.72	63.72	3.5
						SDMH-19	38.19	66.95	66.95	3.5
						SDMH-21	38.19	66.95	66.95	4.0
			EDI-07	9.76	23.15		9.76	23.15	23.15	
			EDI-08	0.54	3.83	SDMH-02	10.30	26.98	26.98	
WDI-20	2.08	3.23	EDI-09	2.36	4.27	SDMH-23	4.44	7.50	7.50	2.0
WDI-21	1.92	3.00	EDI-10	1.47	2.27	SDMH-25	7.83	12.77	12.77	2.0
Culvert ²						SDMH-26	7.83	12.77	12.77	2.5
WDI-22	2.25	3.91	EDI-11	1.51	2.65	SDMH-27	11.59	19.33	19.33	2.5
						SDMH-28	11.59	19.33	19.33	2.5
WDI-23	1.84	3.05	EDI-12	1.71	2.93	SDMH-29	15.14	25.31	25.31	3.0
EX-WDI-02 ²						SDMH-30	15.14	25.31	25.31	3.0
Culvert ²						SDMH-44	15.14	25.31	25.31	3.0
WDI-24	2.04	3.40	EDI-13	1.80	2.97	SDMH-31	18.98	31.68	31.68	3.0
WDI-25	2.18	3.71	EDI-14	1.53	2.54	SDMH-32	22.69	37.93	37.93	3.0
WDI-26	0.00	0.00				SDMH-33	22.69	37.93	37.93	3.5
WDI-27	1.71	2.96				SDMH-34	24.40	40.89	40.89	4.0
			EDI-15	2.19	2.61		2.19	2.61	2.61	1.5
WDI-28	1.31	3.19					1.31	3.19	3.19	N/A
WDI-29	0.00	0.00					1.31	3.19	3.19	N/A
WDI-30	1.13	2.11					2.44	5.30	5.30	N/A
WDI-31	1.06	1.97				SDMH-36	3.50	7.27	7.27	N/A
WDI-32	1.19	1.75				SDMH-37	4.69	9.02	9.02	N/A
WDI-33	2.72	2.58				SDMH-39,40	7.41	11.60	11.60	N/A
WDI-34	0.00	0.00					7.41	11.60	11.60	N/A
WDI-35	2.50	4.67				SDMH-42	9.91	16.27	16.27	N/A
			EDI-16	8.36	5.35		9.67	8.54	8.54	N/A
			EDI-17	0.64	1.20		9.00	6.55	6.55	N/A
			EDI-18	0.64	1.20		9.64	7.75	7.75	N/A
			EDI-19	0.82	1.27		10.46	9.02	9.02	N/A
			EDI-20	1.87	2.80		12.33	11.82	11.82	N/A
			EDI-21	2.18	3.39		14.51	15.21	15.21	18-inch RCP
			EDI-22	2.18	3.39		16.69	18.60	18.60	18-inch RCP
			EDI-23	2.18	3.39		18.87	21.99	21.99	18-inch RCP
WDI-36	2.50	4.67					7.50	14.01	14.01	18-inch RCP
WDI-37	2.50	4.67					5.00	9.34	9.34	18-inch RCP
WDI-38	2.50	4.67					2.50	4.67	4.67	18-inch RCP

1 This Drop inlet is designed to capture Q100, to replace an existing downstream facility is being abandoned.
2 Offsite flows from adjacent parking lots/neighborhood Cul-de-Sac locations or an existing drop inlet connection are included in the total flow shown.

Appendix E –

- A. Surface and Facility Flow Exhibit
- B. Summary of Design Criteria Vs. Proposed Design

Design Criteria Vs. Proposed Design Comparison Tables

Street Hydraulic Criteria

Met	✓
Not met	✖
Criteria not applicable	N/A

Proposed Drop Inlet	Interim 25-Year NDOT Dry-Lane Criteria (Onsite Flows)	Interim 10-Year and 100-Year RTC Criteria (Onsite Flows)	Interim 25-Year NDOT Dry-Lane Criteria (Offsite Flows)	Interim 100-Year Criteria (Offsite Flows) Normal Depth compared to Existing Condition
EDI-01	✓	✓	N/A	✓
EDI-02	✓	✓	N/A	✓
EDI-03	✓	✓	N/A	✓
EDI-04	✓	✓	N/A	✓
EDI-05	✓	✓	N/A	✓
EDI-06	✓	✓	N/A	✓
EDI-07	✓	✓	N/A	✓
EDI-08	✓	✓	N/A	✓
EDI-09	✓	✓	N/A	✓
EDI-10	✓	✓	N/A	✓
EDI-11	✓	✓	N/A	✓
EDI-12	✓	✓	N/A	✓
EDI-13	✓	✓	N/A	✓
EDI-14	✓	✓	N/A	✓
EDI-15	✓	✓	N/A	✓
EDI-16	✓	✓	N/A	✓
EDI-17	✓	✓	N/A	✓
EDI-18	✓	✓	N/A	✓
EDI-19	✓	✓	N/A	✓
EDI-20	✓	✓	N/A	✓
EDI-21	✓	✓	N/A	✓
EDI-22	✓	✓	N/A	✓
EDI-23	✓	✓	N/A	✓

Street Hydraulic Criteria

Met	✓
Not met	✖
Criteria not applicable	N/A

Proposed Drop Inlet	Interim 25-Year NDOT Dry-Lane Criteria (Onsite Flows)	Interim 10- Year and 100-Year RTC Criteria (Onsite Flows)	Interim 25-year NDOT Dry-Lane Criteria (Offsite Flows)	Interim 100-Year Criteria (Offsite Flows) Normal Depth compared to Existing Condition
WDI-01	✓	✓	✖	✓
WDI-02	✓	✓	✖	✓
WDI-03	✓	✓	✖	✓
WDI-05	✓	✓	✖	✓
WDI-06	✓	✓	✖	✓
WDI-07	✓	✓	✖	✓
WDI-08	✓	✓	✖	✓
WDI-09	✓	✓	✖	✓
WDI-10	✓	✓	✖	✓
WDI-11	✓	✓	✓	✓
WDI-12	✓	✓	✖	✓
WDI-13	✓	✓	✖	✓
WDI-14	✓	✓	✓	✓
EX WDI-01	✓	✓	✖	✓
WDI-15	✓	✓	✖	✓
WDI-16	✓	✓	✖	✓
WDI-17	✓	✓	✖	✓
WDI-18	✓	✓	✖	✓
WDI-19	✓	✓	✖	✓
WDI-20	✓	✓	✖	✓
WDI-21	✓	✓	✖	✓
WDI-22	✓	✓	✖	✓
WDI-23	✓	✓	✖	✓

Street Hydraulic Criteria

Met	✓
Not met	✖
Criteria not applicable	N/A

Proposed Drop Inlet	Interim 25-Year NDOT Dry-Lane Criteria (Onsite Flows)	Interim 10- Year and 100-Year RTC Criteria (Onsite Flows)	Interim 25-Year NDOT Dry-Lane Criteria (Offsite Flows)	Interim 100-Year Criteria (Offsite Flows) Normal Depth compared to Existing Condition
WDI-24	✓	✓	✖	✓
WDI-25	✓	✓	✖	✓
WDI-26	✓	✓	✖	✓
WDI-27	✓	✓	✖	✓
WDI-28	✓	✓	✖	✓
WDI-29	✓	✓	✖	✓
WDI-30	✓	✓	✖	✓
WDI-31	✓	✓	✖	✓
WDI-32	✓	✓	✖	✓
WDI-33	✓	✓	✖	✓
WDI-34	✓	✓	✖	✓
WDI-35	✓	✓	✖	✓
WDI-36	✓	✓	✖	✓
WDI-37	✓	✓	✖	✓
WDI-38	✓	✓	✖	✓

Design Criteria Vs. Proposed Design Comparison Table

Storm Drain Hydraulic Capacity

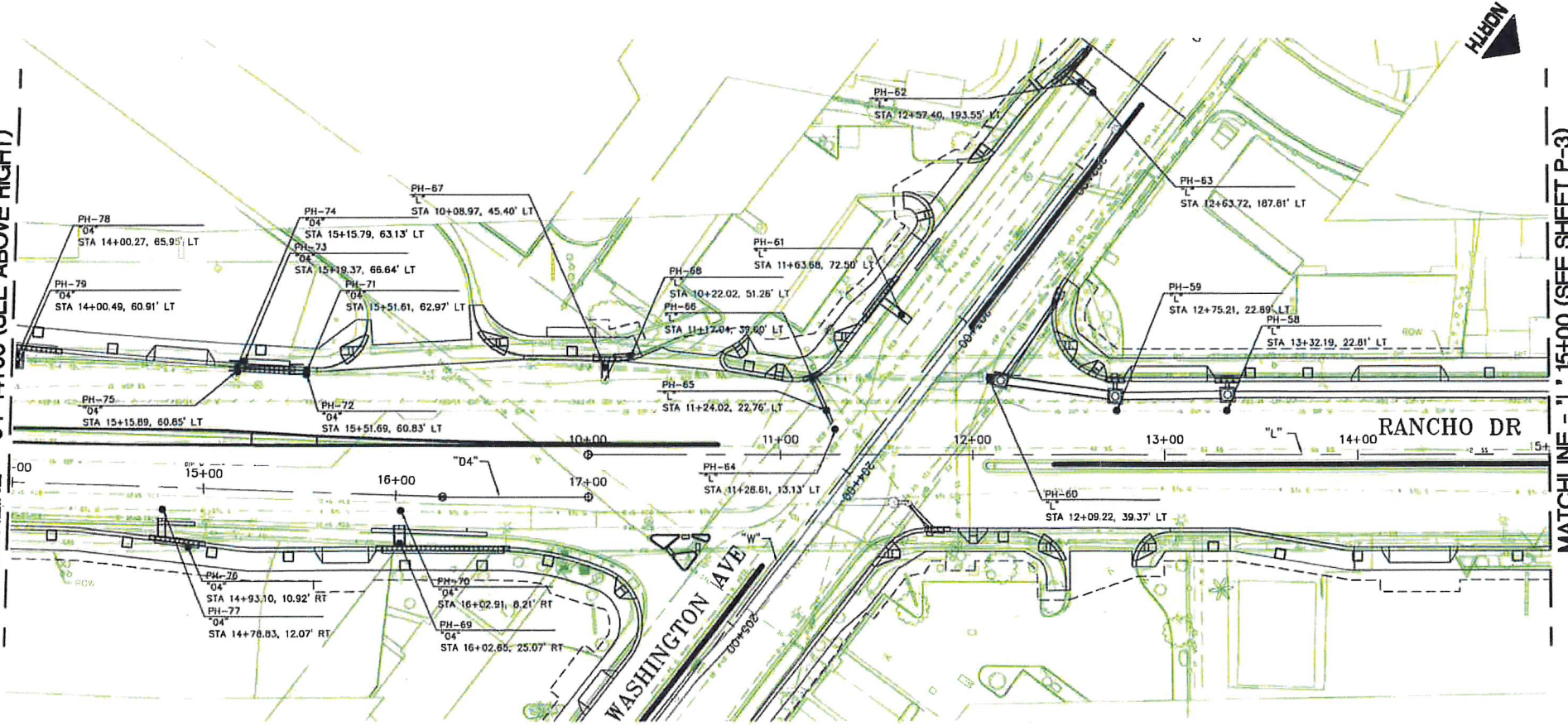
Flow contained in the system	✓
Flow not contained in the system	✗
Criteria not applicable	N/A

Proposed Storm Drain Pipe Facility (limits shown by street names)	Interim 25-Year NDOT Dry-Lane Criteria (Onsite Flows)	Interim 10-Year and 100-Year RTC Criteria (Onsite Flows)	Interim 25-Year NDOT Dry-Lane Criteria (Offsite Flows)	Interim 100-Year NDOT Criteria (Offsite Flows)
North of Smoke Ranch Road	✓	✓	N/A	✓*
Smoke Ranch to Lake Mead Blvd	✓	✓	N/A	N/A
Lake Mead to Coran Lane	✓	✓	N/A	N/A
Coran Lane to Vegas Drive	✓	✓	N/A	N/A
Vegas Drive to Washington Avenue	✓	✓	N/A	N/A
Washington Avenue to Bonanza Road	✓	✓	N/A	N/A
South of Bonanza Road	✓	✓	N/A	N/A

* The drop inlet on the west side of Rancho Drive is designed to convey 100-year offsite flows, due to abandoning of the existing 6' x3' RCB that connects to MPU facility LVRA 0012 at Rancho Drive and Smoke Ranch.

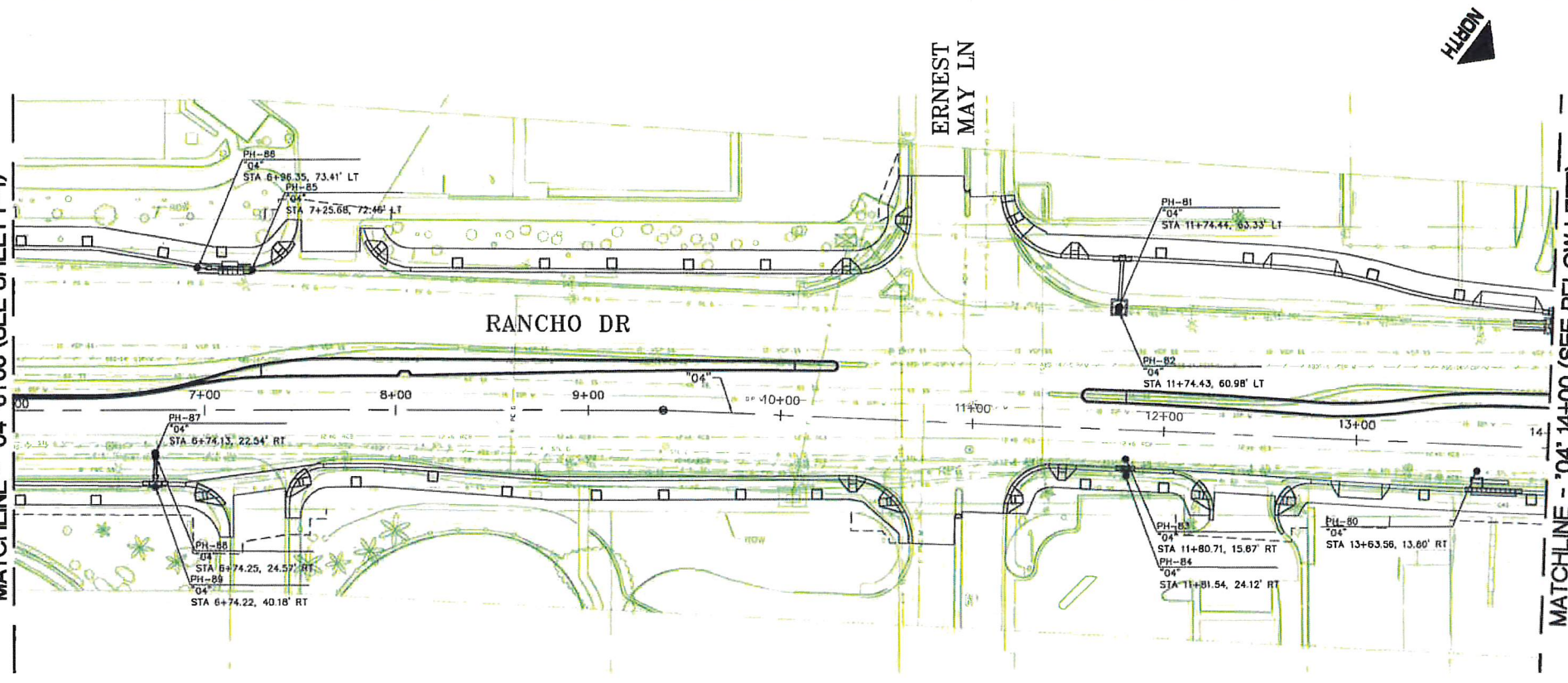
Appendix F - Utility Contacts/Conflicts/Potholes

MATCHLINE - '04' 14+00 (SEE ABOVE RIGHT)

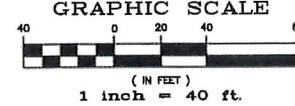


MATCHLINE - 'L' 15+00 (SEE SHEET P-3)

MATCHLINE - '04' 6+00 (SEE SHEET P-1)



MATCHLINE - '04' 14+00 (SEE BELOW LEFT)



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1-702-455-7544

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Call before you do Overhead
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OVERHEAD SERVICE ALERT

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1-702-229-6611

REVISIONS		NO	DATE	DESCRIPTION	APPRO

DEPARTMENT OF PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT



**PARSONS
BRINCKERHOFF**
3700 Las Vegas Blvd. S., Suite 100
Las Vegas, NV 89119
Phone: 702-297-6100

DESIGNED BY: KS
DRAWN BY: NM
CHECKED BY: JAM
DATE: XXXX 2014

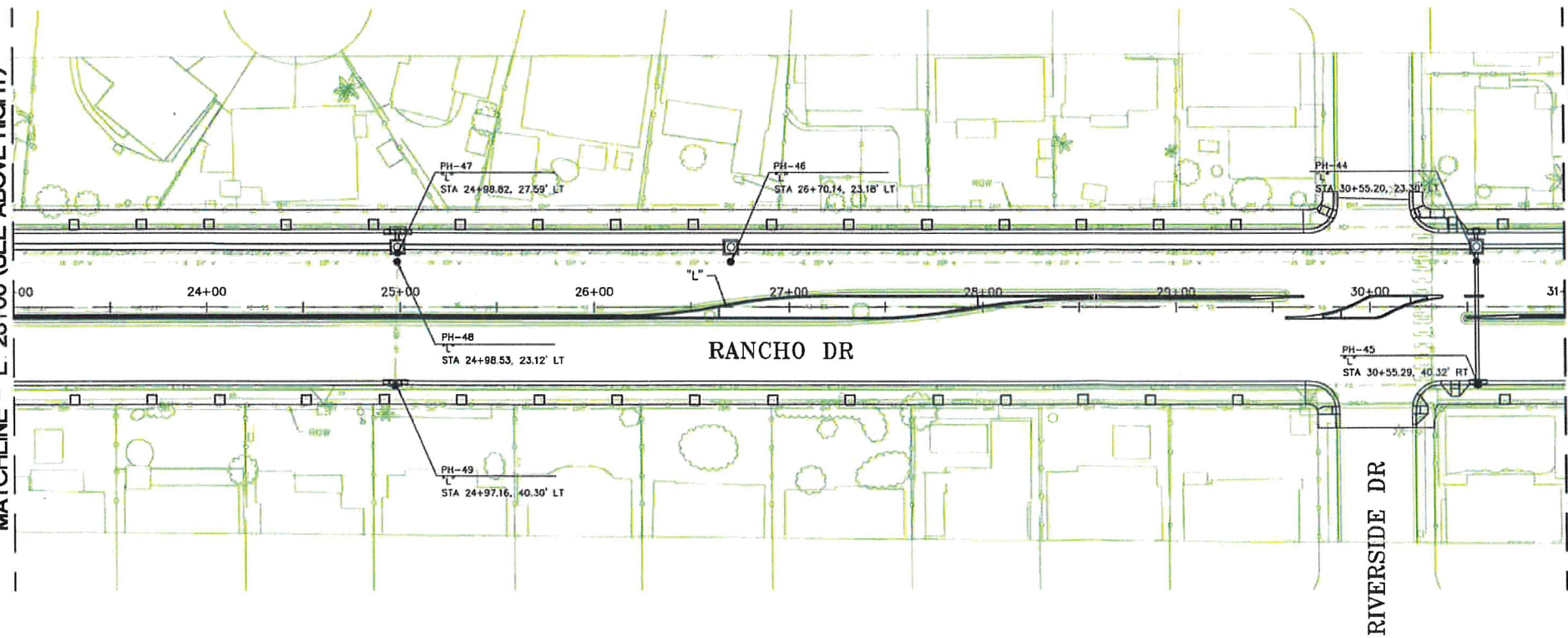
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BONANZA TO DECATUR

SHEET:
POT HOLE EXHIBIT
'04' 6+00 TO 'L' 15+00

Sheet
P-2
1 of
DRAWING NO

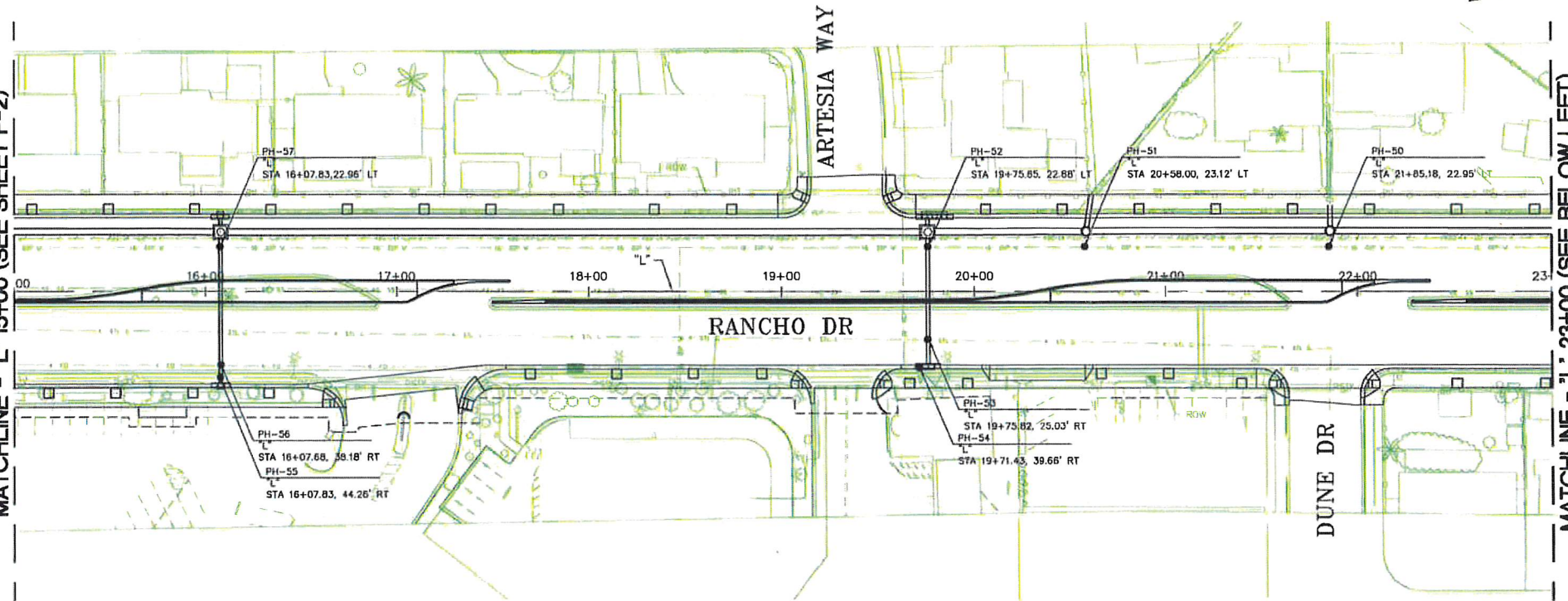
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MATCHLINE - "L" 23+00 (SEE ABOVE RIGHT)

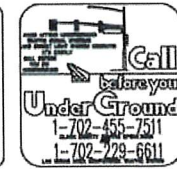
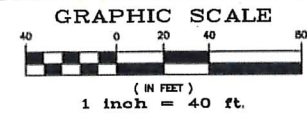


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MATCHLINE - "L" 15+00 (SEE SHEET P-2)



MATCHLINE - "L" 23+00 (SEE BELOW LEFT)



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3725 Howard Hughes Parkway, Suite 150
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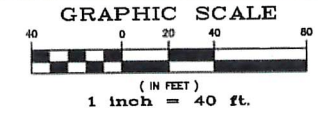
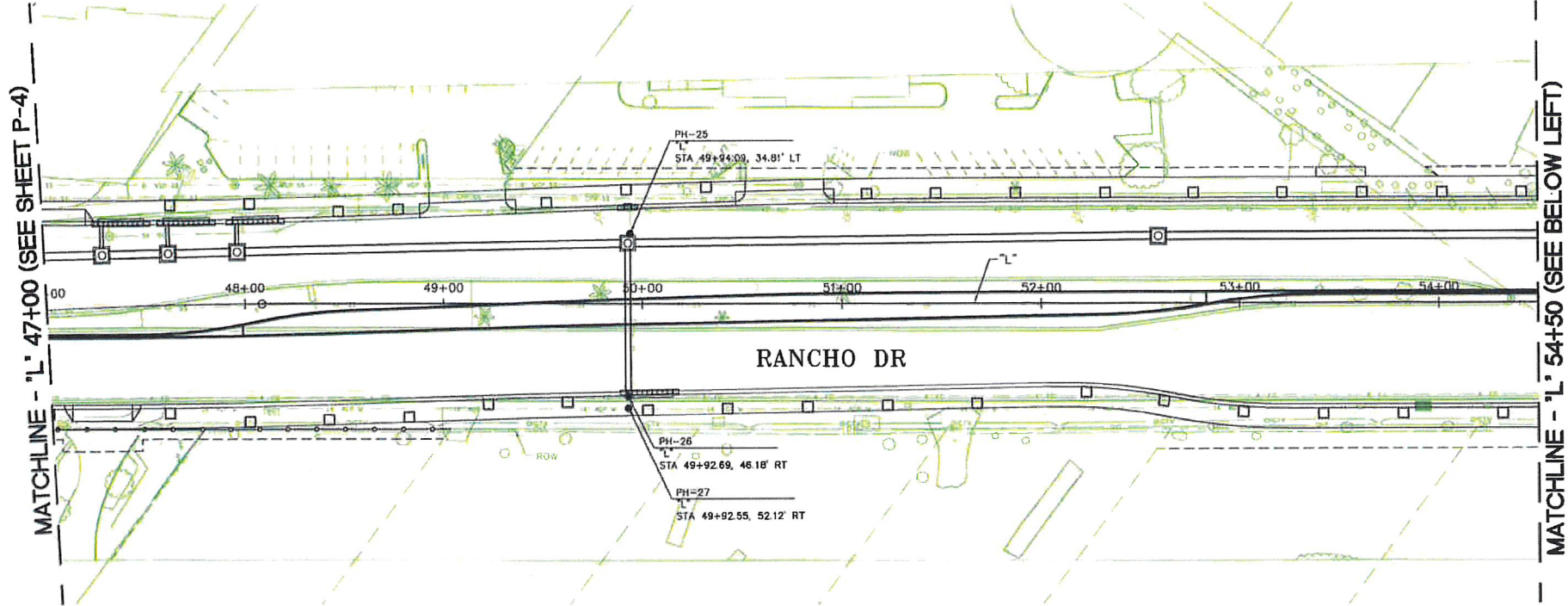
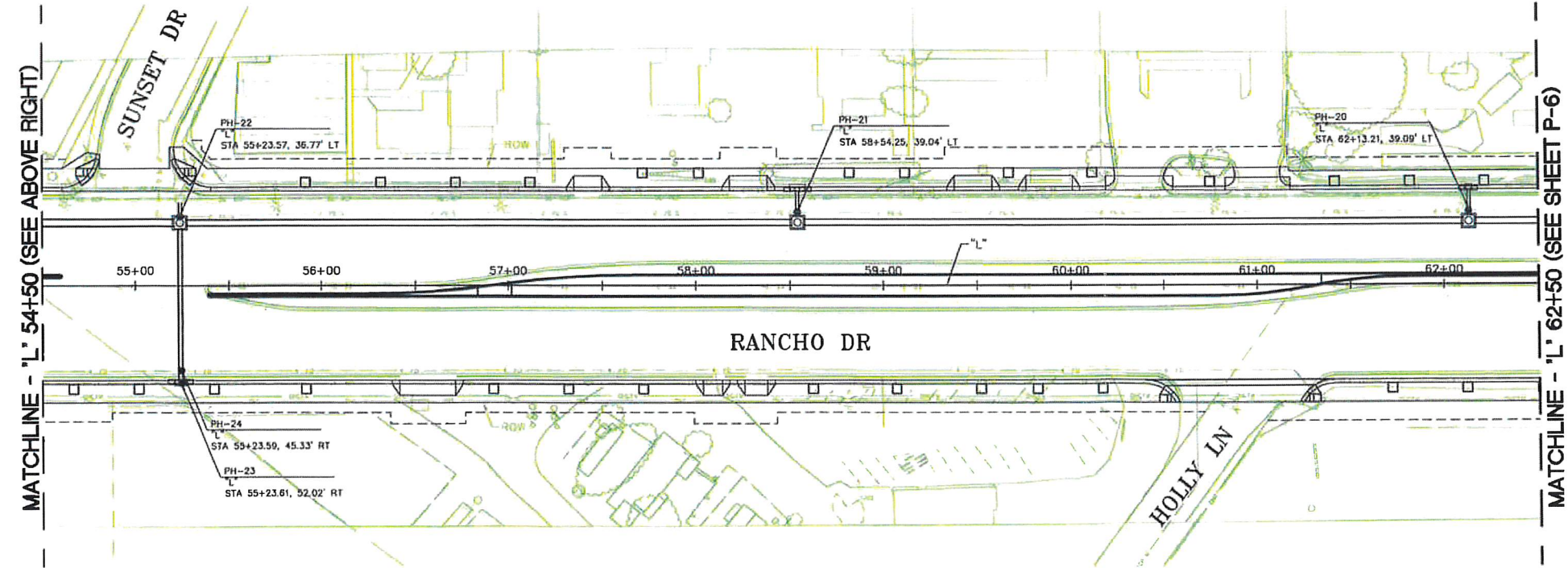
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TITLE: RANCHO DRIVE CAPACITY IMPROVEMENTS
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SHEET: POTHOLE EXHIBIT
"L" 15+00 TO "L" 71+00

Sheet
P-3

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CAPITAL PROJECT MANAGEMENT



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Las Vegas, NV 89169
Phone: 702.587.3100

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DRAWN BY: NM
CHECKED BY: JAM
DATE: XXXX 2014

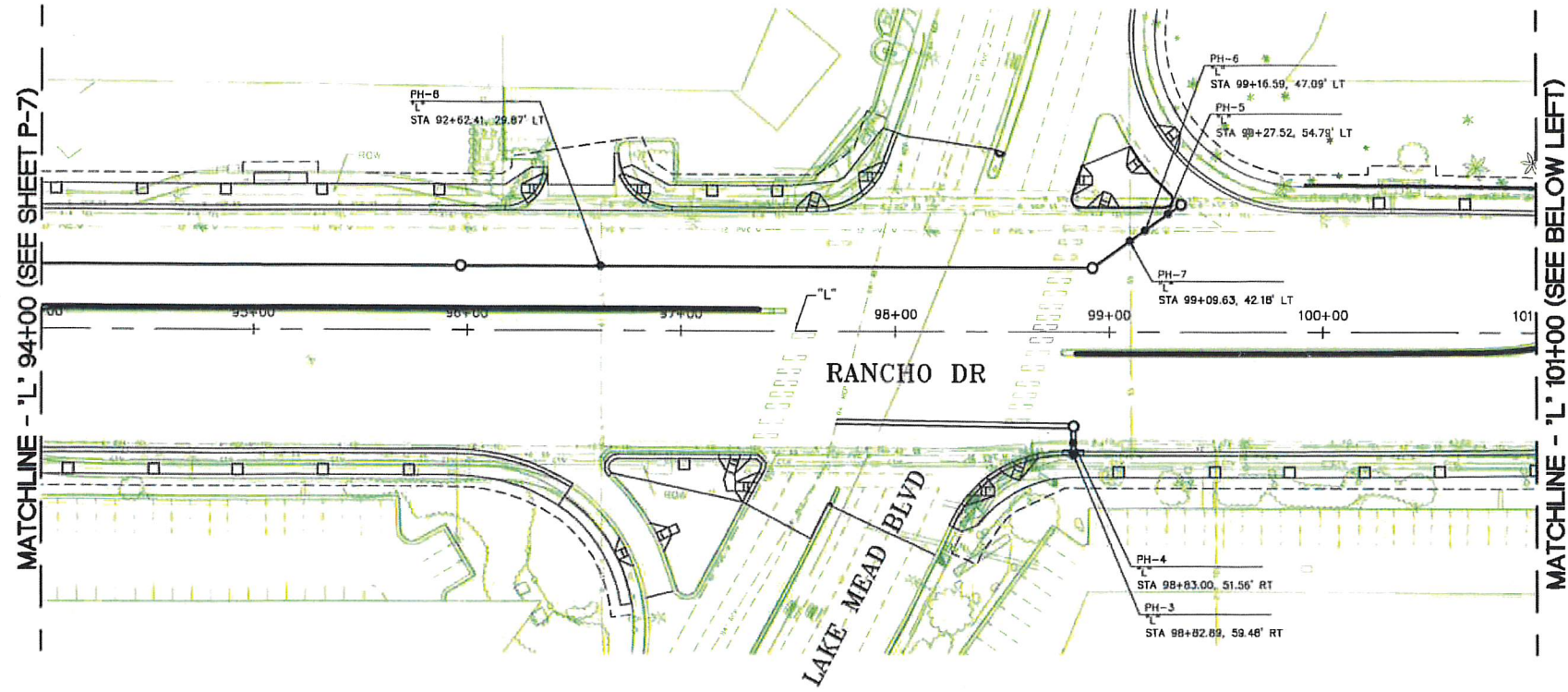
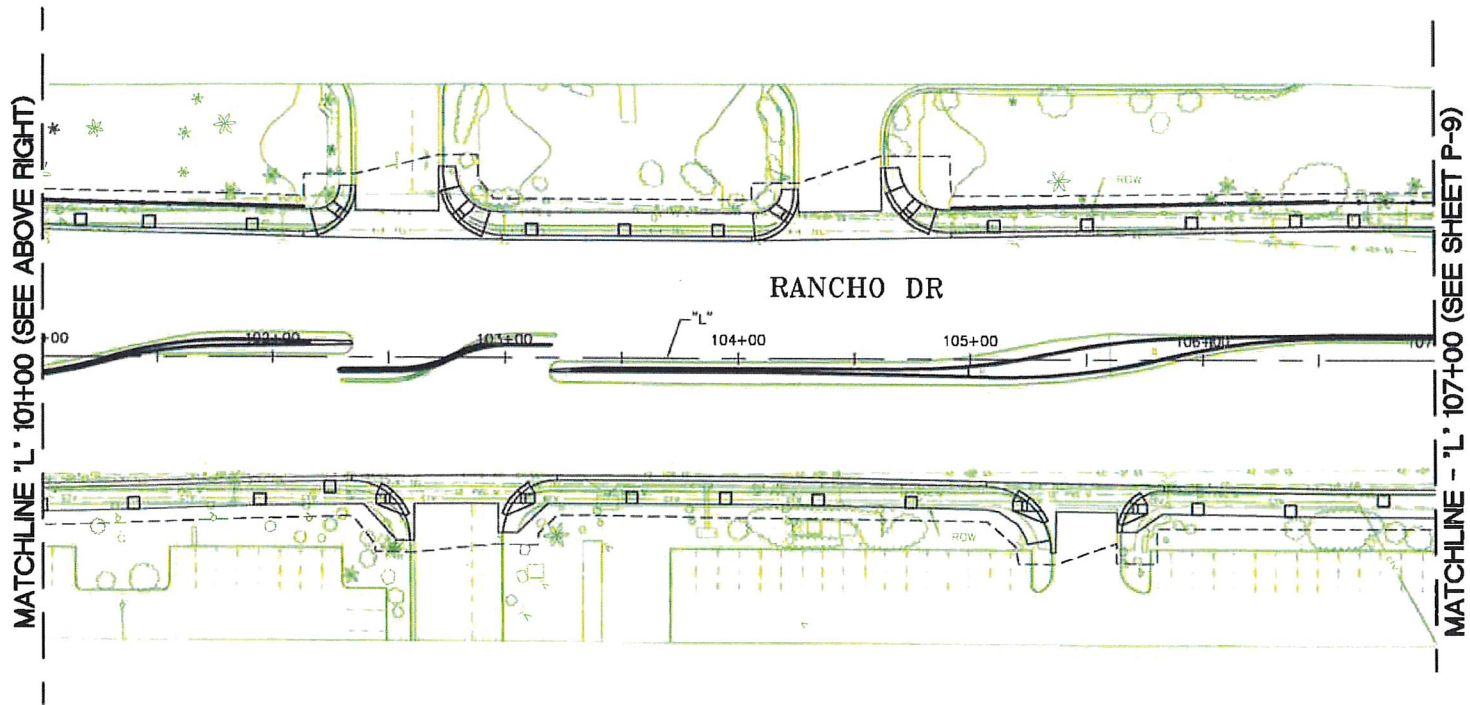
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SHEET: POTHOLE EXHIBIT
"L" 47+00 TO "L" 62+50

Sheet
P-5

1 of
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GRAPHIC SCALE

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1 inch = 40 ft.

40 0 20 40 80

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1-702-229-6611

Avoid cutting overhead utility lines. It's costly.
Call before you do Overhead
1-702-593-6111
OVERHEAD SERVICE ALERT

Call before you Under Ground
1-702-455-7511
1-702-229-6611

NO.	DATE	DESCRIPTION	APPD

DEPARTMENT OF PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT



PARSONS BRINCKERHOFF
3735 Howard Hughes Parkway, Suite 135
Las Vegas, NV 89169
Phone: 702.597.4100

TITLE: RANCHO DRIVE CAPACITY IMPROVEMENTS
BONANZA TO DECATUR

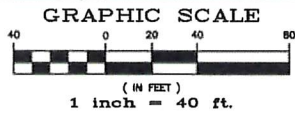
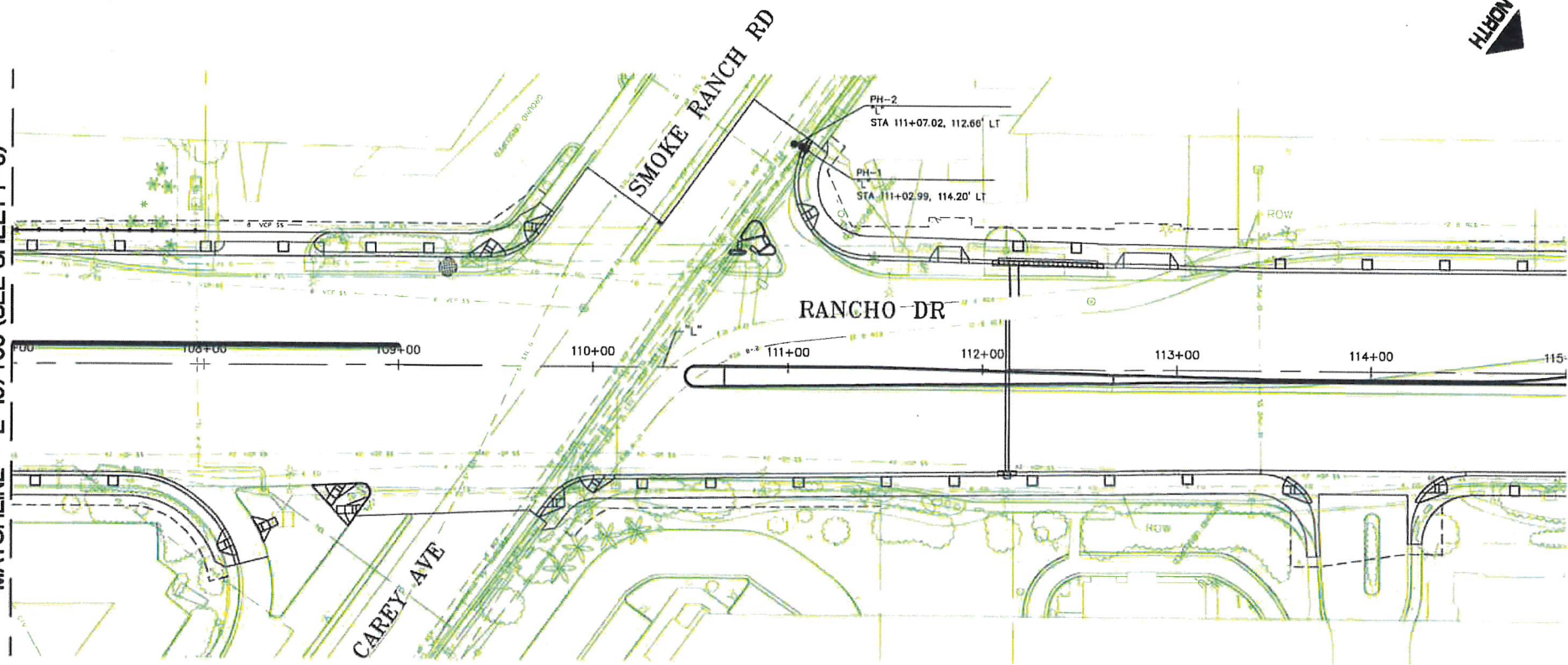
SHEET: POTHOLE EXHIBIT
"L" 94+00 TO "L" 107+00

DESIGNED BY: KS
DRAWN BY: NM
CHECKED BY: JAM
DATE: XXXX 2014

Sheet
P-8
1 of
DRAWING NO.

70% SUBMITTAL
NOT FOR CONSTRUCTION

MATCHLINE - "L" 107+00 (SEE SHEET P-8)



REVISIONS			
NO	DATE	DESCRIPTION	APPD

DESIGNED BY: KS
DRAWN BY: NM
CHECKED BY: JAM
DATE: XXXX 2014



DEPARTMENT OF PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT



**PARSONS
BRINCKERHOFF**
2000 Las Vegas Blvd. S., Suite 1100
Las Vegas, NV 89109
Phone: 702-697-4100

TITLE: RANCHO DRIVE CAPACITY IMPROVEMENTS
BONANZA TO DECATUR

SHEET: POTHOLE EXHIBIT
"L" 107+00 TO "L" 115+00

Sheet
P-9
1 of
DRAWING NO

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RANCHO DRIVE CAPACITY IMPROVEMENTS- BONANZA TO DECATUR UTILITY MATRIX

TITLE	FIRST NAME	LAST NAME	COMPANY	ADDRESS	CITY,STATE	ZIP	PHONE
Mr Ms.	Bob Linda	Middag Pistone	Southwest Gas Corporation	6355 Shatz Street	North Las Vegas, NV	89115	(702) 365-2071 702-365-2165
Ms.	Lisa Debbie Don	Harvey Lamm Jackson	Nevada Energy Transmission Nevada Energy Distribution	7155 Lindell Road	Las Vegas, NV	89118	(702) 402-5327 702-402-6811 (702) 402-6815
Mr.	Steven Jason	Jackson Ghadery	Las Vegas Valley Water District	1001 S. Valley View Blvd.	Las Vegas, NV	89153	
Mr.	Doney Dan	Villareal Defiesta	Cox Communications	1700 Vegas Drive	Las Vegas, NV	89106	(702) 210-5985 702-384-8084; Ext 8276
Mr.	Tim	Parks	CLV Collection Systems Planning (Sanitary Sewer)	333 N. Rancho Dr	Las Vegas, NV	89106	(702) 229-2178
Ms.	Kathleen	Minert	Clark County Water Reclamation District	5857 East Flamingo Road	Las Vegas, NV	89122	(702) 434-6600
Mr.	Peter	Jackson	City of Las Vegas, Flood Control	333 N. Rancho Dr	Las Vegas, NV	89106	(702) 229-1815
Mrs.	Steven	Turner	Centurylink	6700 Via Austi Pkwy	Las Vegas, NV	89119	(702) 244-7883
Ms.	Eric	Haught	Southern Nevada Water Authority	100 City Pkwy	Las Vegas, NV	89101	702-862-3459 702-822-3372
Mr.	Gwen	Matsuo	City of North Las Vegas	1263 South Stewart Street, Room 013,			
Ms.	Sara	Martel	NDOT		Carson City, NV	89712	775-888-7115

DRAINAGE POTHOLE LOCATIONS							
Pothole #	Alignment	Station	Offset (feet)	L/R	Utility Being Potholed	Purpose	Notes
						Horizontal Location Only	
SMOKE RANCH RD							
1	L	111+02.99	114.20	L	Fiber Optic (FAST) , Traffic Signal		Unknown depth on Fiber Optic and TS
2	L	111+07.02	112.66	L	4-4" Telephone, 8' x8' RCB	Need North side edge of 8' x 8' RCB, to tie in; Confirm horizontal location of RCB. Too close to proposed DI	as-built provided
LAKE MEAD DR							
3	L	98+82.89	57.48	R	12" PVC Water		Unknown depth
4	L	98+83.00	51.56	R	2-4" Telephone		Unknown depth
PROPOSED SEWER							
5	L	99+27.52	54.79	L	4-4" Telephone		Unknown depth
6	L	99+16.59	47.09	L	12" PVC Water		Unknown depth
7	L	99+09.63	42.18	L	Sewer lateral?		Unknown depth
8	L	96+62.41	29.87	L	8" Stl Gas		Unknown depth
9	L	92+84.13	30.04	L	6' X3' RCB		Unknown depth; as-built provided
10	L	83+84.55	30.38	L	6' X3' RCB		Unknown depth; as-built provided
11	L	78+38.42	30.42	L	45" X 29" RCB		Unknown depth;
12	L	77+85.64	41.83	L	12" PVC Water		Unknown depth
EXS. (2) 6' X3' CROSS CULVERTS							
13	L	92+85.34	53.54	L	4-4" Telephone		Unknown depth
14	L	92+85.15	47.72	L	12" PVC Water	Confirm Horizontal location if within 10 ft from existing DI; then Pothole;	
15	L	83+95.82	47.93	L	12" PVC Water	Confirm Horizontal location if within 15 ft from existing DI; then Pothole;	
CORAN LN. TO VEGAS DR							
16	L	77+58.21	52.61	R	4" Fiber optic (FAST), 2-4" Telephone		Unknown depth
17	L	77+45.04	34.46	L	24" Water		Unknown depth at crossing
18	L	77+22.80	34.28	L	2-4", 6-3.5", 1-1" Telephone (3 LINES)		Unknown depth
19	L	64+97.77	49.92	R	4" Fiber optic (FAST)		Unknown depth
20	L	62+13.21	39.09	L	2" PE Gas		Unknown depth
21	L	58+54.25	39.04	L	2" PE Gas		Unknown depth
22	L	55+23.57	36.77	L	2" PE Gas		Unknown depth
23	L	55+23.61	52.02	R	14" ACP Water	Confirm Horizontal location only;Find upto 15 ft on west side from back of curb.	
24	L	55+23.59	45.33	R	4" Fiber optic (FAST)		Unknown depth
25		49+94.09	34.81	L	Existing 18" RCP Lateral		Unknown depth at connection to proposed Manhole
26	L	49+92.69	46.18	R	4" Fiber optic (FAST)		Unknown depth

DRAINAGE POTHOLE LOCATIONS							
Pothole #	Alignment	Station	Offset (feet)	L/R	Utility Being Potholed	Purpose	Notes
						Horizontal Location Only	
27	L	49+92.55	52.12	R	14" ACP Water	Confirm Horizontal location only;Find upto 15 ft on west side from back of curb.	
28	L	46+69.92	42.34	R	4" Fiber optic (FAST)		Unknown depth
29	L	46+69.76	51.44	R	14" ACP Water	Confirm Horizontal location only;Find upto 15 ft on west side from back of curb.	
30	L	46+04.05	49.75	L	2" Fiber optic (FAST)		Unknown depth
31	L	46+03.75	46.24	L	2" Fiber optic (FAST)		Unknown depth
32	L	45+99.13	39.54	R	4" Fiber optic (FAST)		Unknown depth
33	L	45+98.77	46.46	R	14" ACP Water	Confirm Horizontal location only;Find upto 15 ft on west side from back of curb.	
34	L	45+80.60	39.91	L	2" Fiber optic (FAST)		Unknown depth
35	L	45+75.14	42.52	L	2" Fiber optic(FAST)		Unknown depth
36	L	45+73.46	43.82	L	2" Fiber optic (FAST)		unknown depth
VEGAS DR							
37	L	46+20.53	98.14	L	2" Fiber optic (FAST)		Unknown depth
38	L	39+76.96	23.37	L	16" DIP Water		Unknown depth at crossing; Watch for Abandoned CIP Water
39	L	39+77.04	40.06	R	Gas, 4" Fiber Optic(FAST)		Unknown depth
40	L	36+78.71	23.31	L	16" DIP Water		
41	L	35+02.41	23.31	L	16" DIP Water	Confirm Horizontal location only (from existing curb); Find if within 25ft ;Watch for Abandoned CIP Water	Unknown depth at crossing; Watch for Abandoned CIP Water
42	L	35+02.43	40.06	R	4" Fiber Optic		Unknown depth
43	L	32+76.96	23.49	L	16" DIP Water	Confirm Horizontal location only (from existing curb); Find if within 25ft ;Watch for Abandoned CIP Water	
44	L	30+55.20	23.30	L	16" DIP Water		Unknown depth at crossing; Watch for Abandoned CIP Water
45	L	30+55.29	40.32	R	4" Fiber Optic (FAST)		Unknown depth
46	L	26+70.14	23.18	L	16" DIP Water	Confirm Horizontal location only (from existing curb); Find if within 25ft ;Watch for Abandoned CIP Water	
47		24+98.82	27.59	L	Existing 18" RCP Lateral		Unknown depth at connection to proposed Manhole
48	L	24+98.53	23.12	L	16" DIP Water		Unknown depth at crossing; Watch for Abandoned CIP Water
49	L	24+97.16	40.30	R	4" Fiber Optic (FAST)		Unknown depth
50	L	21+85.18	22.95	L	16" DIP Water	Confirm Horizontal location only (from existing curb); Find if within 25ft ; Watch for Abandoned CIP Water	
51	L	20+58.00	23.12	L	16" DIP Water	Confirm Horizontal location only (from existing curb); Find if within 25ft;Watch for Abandoned CIP Water	

DRAINAGE POTHOLE LOCATIONS							
Pothole #	Alignment	Station	Offset (feet)	L/R	Utility Being Potholed	Purpose	Notes
						Horizontal Location Only	
52	L	19+75.85	22.88	L	16" DIP Water	Unknown depth at crossing; Watch for Abandoned CIP Water	
53	L	19+75.82	25.03	R	4" Stl Gas	Unknown depth	
54	L	19+71.43	39.66	R	4" Fiber Optic (FAST)	Unknown depth	
55	L	16+07.83	44.26	R	Lighting	Unknown depth	
56	L	16+07.68	38.18	R	4" Fiber Optic (FAST)	Unknown depth	
57	L	16+07.83	22.96	L	16" DIP Water	Unknown depth at crossing; Watch for Abandoned CIP Water	
58	L	13+32.19	22.81	L	16" DIP Water	Confirm Horizontal location only (from existing curb); Find if within 25ft ; Watch for Abandoned CIP Water	
59	L	12+75.21	22.89	L	16" DIP Water	Confirm Horizontal location only (from existing curb); Find if within 25ft ;	
60	L	12+09.12	39.37	L	8" Water	Unknown depth at crossing	
WASHINGTON AVE							
61	L	11+63.68	72.50	L	60" SNWA MLCP	Unknown depth at crossing	
62	L	12+57.40	193.55	L	60" SNWA MLCP	Unknown depth at crossing	
63	L	12+63.74	187.67	L	42" RCP SDMH	Need Horizontal Location . W.r. to proposed DI	
64	L	11+28.61	13.13	L	8'x6' RCB	Need South side edge of 8' x 6' RCB, to tie in; Confirm horizontal location of RCB. Too close to proposed DI	
SOUTH OF WASHINGTON							
65	L	11+24.02	22.76	L	16" DIP Water	Unknown depth at crossing	
66	L	11+17.04	39.00	L	2-4", 4-4", 16-4" Telephone (3 conduits)	Unknown depth	
67	L	10+08.97	45.40	L	2-4", 4-4", 16-4" Telephone (3 conduits)	Unknown depth	
68	L	10+22.02	51.26	L	36" RCP	Confirm Invert on the 36" RCP connecting the two inlets. Proposed inlet connects to the pipe between the two inlets. See as-builts provided	as-built provided
69	4	16+02.65	25.07	R	4" Fiber Optic (FAST) & Lighting	Unknown depth	
70	4	16+02.91	8.21	R	4" Stl Gas	Horizontal location from existing curb	
71	4	15+51.61	62.97	L	54" RCP	Need to identify centerline of Existing 54" RCP and invert	
72	4	15+51.69	60.83	L	6-4" TELEPHONE	Unknown depth	
73	4	15+19.37	66.64	L	Lighting	Need to identify centerline of Existing 54" RCP and invert	
74	4	15+15.79	63.13	L	54" RCP	Unknown depth	
75		15+15.89	60.85	L	6-4" TELEPHONE	Unknown depth	
76	4	14+93.10	10.92	R	4" Fiber Optic (FAST)	Unknown depth	
77	4	14+78.61	29.00	R	Gas	Unknown depth	
78		14+00.27	65.95	L	Lighting	Unknown depth	
79	4	14+00.49	60.91	L	6-4" TELEPHONE	Horizontal location from existing curb; Find if within 10ft	
80	4	13+63.56	13.80	R	4" Stl Gas	Horizontal location from existing curb	
81	4	11+74.44	63.33	L	54" RCP	Confirm Invert at proposed connection	
82	4	11+74.43	60.98	L	6-4" Telephone	Horizontal location from existing curb; Find if within 10ft	

DRAINAGE POTHOLE LOCATIONS							
Pothole #	Alignment	Station	Offset (feet)	L/R	Utility Being Potholed	Purpose	Notes
						Horizontal Location Only	
83	4	11+80.71	15.47	R	4" Stl Gas	Horizontal location from existing curb; Watch for Abandoned Telephone.	
84	4	11+81.54	24.12	R	4" Fiber Optic (FAST) & Lighting		Unknown depth
85	4	7+25.68	72.46	L	54" RCP	Need to identify centerline of Existing 54" RCP and invert at both points;	
86	4	6+96.35	73.41	L	54" RCP		
87	4	6+74.13	22.54	R	2-4" Telephone	Need Horizontal location; If detected running under proposed lateral connection, then need pothole. Watch for Abandoned Telephone.	
88	4	6+74.25	24.57	R	2-4" Telephone	Need Horizontal location; If detected running under proposed lateral connection, then need pothole.	
89	4	6+74.22	40.18	R	4" Fiber Optic (FAST) & Lighting	Need Horizontal location; If detected running under proposed DI, then need pothole.	
90	C	0+98.03	76.31	R	54" RCP	Need to identify centerline of Existing 54" RCP and invert;	
91	C	1+37.08	68.80	R	4" PE Gas		Unknown depth at crossing
92	C	2+86.54	68.99	R	4" PE Gas	Need Horizontal location of 4" PE Gas; Need to confirm, if it is under the proposed lateral or, proposed mainline at this location	
93	C	3+30.37	68.86	R	4" PE Gas		Unknown depth at crossing
94	C	3+41.75	67.95	R	4" PE Gas	Need to identify centerline of Existing 54" RCP and invert;	
95	C	3+67.05	79.39	R	54" RCP		
96	C	3+59.12	23.47	L	12' X6' RCB	Need East side edge of 12' x 6' RCB, to tie in; Confirm horizontal location of RCB. Too close to proposed DI	as-built provided
97	C	3+56.00	118.11	R	2" PVC Gas	Identify Horizontal location, if within 10-feet from the existing curb	
SOUTH OF BONANZA							
98	C	6+88.68	79.69	R	Locate Existing SDMH	Existing SDMH got paved over; Confirm existence and location of the Manhole, that connects to the Existing DI	as-built provided
99	C	6+97.79	79.97	R	18" RCP	Confirm Invert at proposed connection	
100	C	7+09.71	77.72	R	4" Fiber Optic (FAST)		Unknown depth
101	C	8+34.23	92.37	R	4" Fiber Optic (FAST)	Horizontal location & Unknown depth	
102	C	8+29.49	92.42	R	Lighting	Unknown depth	

Appendix G - 70% Plans and Cost Estimate

- A. Design Plans
- B. Quantity and Cost Estimate

Appendix H-FlowMaster Calculations (CD)