TECHNICAL DRAINAGE STUDY

Firestone at
Rancho & Red Coach

City of Las Vegas, Nevada

Job No.: RCI1104.000
Date: July 2011

Prepared By:
Slater Hanifan Group, Inc.
5740 S. Arville Street, Suite 216
Las Vegas, Nevada 89118
Phone: 702-284-5300 ▪ Fax: 702-284-5399

Prepared For:
Firestone (c/o Jones Lang LaSalle Americas)
515 South Flower Street, Suite 1300
Los Angeles, CA 90071
Phone: 323-395-4601 ▪ Fax: 323-733-5347

Kylie Rowbury, P.E.
NV Professional Engineer No. 21172

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Firestone at Rancho & Red Coach Date: July 2011

Location of Development: a) Descriptive (Cross Streets): North/South: Rancho Drive
East/West: Red Coach Avenue

b) Section: 2 Township: 20 S Range: 60 E

c) APN: 138-02-202-015

Name of Owner/Developer: Tass C. Hardin & Lois I. Hardin Revocable Family Trust / Firestone (c/o Jones Lang LaSalle Americas)

Telephone No.: (323) 395-4601 Fax No.: (323) 733-5347 E-mail Address: Carrie.Gillis@am.jll.com

Address: 515 South Flower Street, Suite 1300, Los Angeles, CA 90071

Contact Person – Name: Kylie Rowbury, P.E. Telephone No.: (702) 284-5300

*E-mail Address: krowbury@shg-inc.com Fax No.: (702) 284-5399

Firm: Slater Hanifan Group

Address: 5740 S. Arville St. #216, Las Vegas, NV 89118

Type of Land Development/Land Disturbance Process:

☐	Rezoning	☐	Subdivison Map	☐	Clearing and grading Only
☐	Parcel Map	☐	Planned Unit Development	☒	Other (Please specify below)
☐	Large Parcel Map	☐	Building Permit		Commercial Development

1. Total Owned Land Area: At Site: ± 1.18 acres Being Developed/Disturbed: ± 1.18 acres

2. Is a portion or all of the subject property located in a 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.): Commercial

5. Approximate upstream land area which drains to the subject site: ± 1.8 acres

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: Rancho Drive alignment

8. Briefly describe your proposed schedule for the subject project: ASAP

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.

*Newly Required Field

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

Revision	Date

Engineer's Seal

Local Entity File No.

REFERENCE: STANDARD FORM 1

Updated 05/01/2008

CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA
STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 06/06/01)

The following checklist is intended as a supplemental **guide** for the engineer preparing a Technical Drainage Study submittal to the City of Las Vegas. This supplement focuses on requirements specific to the City of Las Vegas. The requirements presented are in addition to the Clark County Regional Flood Control District Manual Standard Form 2. The listed items are the minimum information required prior to the City performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (Design Manual).

If items are not applicable for the subject site, provide N/A.

I. GENERAL REQUIREMENT		
Yes	No	
	N/A	A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.)
X		Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.

II. GRADING PLAN INFORMATION		
Yes	No	
X		(1) 24" X 36" copy of the Grading Plan, (including all Detail Sheets) sealed by the engineer.
X		Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street. Note: Proposed top of curb elevations must be provided for both sides of roadways even if only half street construction is required.
X		Label existing topography at a minimum 5 foot elevation interval including adjacent developments, finished floor elevations of existing buildings and top of existing curbs extending 100 feet* around the perimeter of the site. (*Measured from the centerline of the adjacent roadway.)
X		Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
X		All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property.
X		Street slopes for both interior and perimeter streets. Note: The minimum slope for a roadway is 0.4 percent, a minimum 18-inch storm drain must be provided where minimum slopes cannot be met.

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

II. GRADING PLAN INFORMATION		
Yes	No	
X		Back of lot elevations and lot drainage pattern for all lots including common lots.
	N/A	Sites with a grade difference two feet above or below existing ground are required to have approval from City of Las Vegas Current Planning. Current Planning approval is required prior to final approval of the drainage study.
X		On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners. (The project must pass flows through the site every 600 feet where the project is blocking flow paths.)
	N/A	This project uses a solid grouted stem wall (or approved alternate) at the back of sidewalk to provide erosion protection for landscaped areas where the depth of flow in the roadway exceeds the back of walk elevation. A corresponding cross-section detail is included.
X		Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
	N/A	Concrete valley gutters are required in parking lots with slopes less than 1 percent. Slopes through cul-de-sac must be at a 1 percent minimum where flow is drained through the cul-de-sac.
X		Ten-foot wide public drainage easements to be privately maintained are allowed for flow less than 20 cfs. The depth of flow entering the easement must be checked using the submerged weir calculation.
X		The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.
X		Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
X		Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q100 weir of submerged weir elevation, whichever is greater.
	N/A	Lots with "B and C Type Drainage" shall be required to install an underground nuisance drainage system or a 2-foot valley gutter through the lot. 16" x 24" minimum block wall openings are required for both options.
	N/A	Bubblers are required across 80 foot and greater ROW streets. When flows exceed 10 cfs, bubblers larger than 18 inches will be required up to a maximum of 36". Inlets must be sized to match the pipe size provided.

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

- An appointment must be made to preview this checklist in conjunction with Clark County Regional Flood Control District Manual Standard Form 2 prior to the City accepting a new Drainage Study for review. The engineer may contact the Flood Control Section at 229-6541.

- Following the acceptance of the Drainage Study (meeting the minimum acceptable information above), there will be a charge of $250 for each Drainage Study review submittal. These fees are payable at the time the Grading Permit is obtained.

- The Drainage Study must be accepted prior to submitting grading plans to the Land Development Section for review.

This document is intended as an **aid** in preparing Technical Drainage Studies for the City of Las Vegas. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all-inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.

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6-Jun-01

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Firestone at Rancho & Red Coach			Map ID:
Firm Name: Slater Hanifan Group (SHG)			Kylie Rowbury, P.E.
Address: 5740 S. Arville St., Suite 216			
City: Las Vegas	State: Nevada		Zip: 89118
Phone Number: 702-284-5300		Fax Number: 702-284-5399	
Property Developer: Firestone (c/o Jones Lang LaSalle Americas)			
Address: 515 South Flower Street, Suite 1300			
City: Los Angeles		State: CA	Zip: 90071
Reviewed By:		Date Received:	Date Accepted for Review:

The following checklist is intended as a guide for the engineer preparing a Technical Drainage Study to submit to the local entity and Clark County Regional Flood Control District (if necessary). The listed items are the minimum information required prior to the entity performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (MANUAL).

This document is intended as an aid in preparing Technical Drainage Studies. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.

If items are not applicable for the subject site, provide N/A.

I. GENERAL REQUIREMENT:

Yes	No	
x		Design Manual **Standard Form 1** with the engineer's seal and signature.
x		Design Manual **Standard Form 4**.
x		2 copies of the 24" x 36" Drainage Plan.
	n/a	A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.

Reference:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS

Yes	No	
x		A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.
x		A copy of the current CCRFCD Master Plan Update Figure, (F-19), for Flood Control Facilities and Environmental areas with the site delineated.
x		On-site drainage basin maps for existing and proposed conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs.
x		Vicinity Map with local and major cross streets identified and a north arrow.
x		Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.

III. DRAINAGE PLAN

Yes	No	
x		Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada.
x		Minimum scale: 1" = 60'.
x		Project name.
x		Vicinity Map with local and major cross streets.
x		Revision box.
x		North arrow and bar scale.
x		Engineer's/consultant's address and phone number.
x		Elevation datum and benchmark.
x		Legend for symbols and abbreviations.
x		Cut/fill scarps, where applicable.
x		Street names, grades, widths.
x		Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street.

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
x		Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
x		Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
	n/a	Proposed typical street sections.
	n/a	Streets with off-set crowns.
x		Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
x		Property lines.
x		Right-of-way lines and widths, existing and proposed.
x		Existing improvements and their elevations.
x		Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
x		Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
x		Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
x		Location and cross-section of street capacity calculations.
x		Cross-sectional detail for channels, including cutoff wall locations.
x		Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
x		Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
	n/a	Location and detail of existing, proposed, and future block wall openings. Minimum size is16"x48". Wrought iron gate is required for flows > 10 cfs.
	n/a	Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
x		Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood Walls with 8-inch concrete masonry unit.
	n/a	Building and/or lot numbers.
	n/a	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
x		Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.
x		For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
x		Appropriately elevated "humps" 6 inches above the 100-year water surface elevation at site accesses where the intent is to protect the site from the Q_{100} flows.
x		Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.

IV. HYDROLOGIC ANALYSIS

Yes	No	
x		Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated.
x		Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
x		Input and output information for future conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
x		Use of correct precipitation values in and around the McCarran Airport Rainfall Area.
x		A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations.
x		A summary table of storm water flows showing basin area, Q_{10} and Q_{100} for both individual basins and combined basin flows, where acceptable.
x		Copies of supporting technical information referenced from a previously approved study and a statement accepting these results.
x		On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law.

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
	n/a	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
x		Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. Q_{100} d x v $\leq$ 8. Q_{10} d x v $\leq$ 6 and 12 foot dry lane for rights-of-way $\geq$ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
x		A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
	n/a	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
x		Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
x		Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, which ever is greater.
x		A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub- and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
	n/a	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
	n/a	Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
x		The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.

REFERENCE: | **STANDARD FORM 2**

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Appendix I Reference Material
Technical Drainage Study for Draft House Barn & Casino
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1 INTRODUCTION

1.1 Project Overview & Study Purpose

Firestone is proposing commercial development of a 1.18 +/- acre parcel located southwest of the intersection of Rancho Drive and Red Coach Avenue within the City of Las Vegas, Nevada. The proposed project is identified as *Firestone at Rancho & Red Coach* (hereafter referred to as the Firestone site) and includes commercial development of the site including one (1) commercial building. Note that the parcel is currently under the ownership of Tass C. Hardin & Lois I. Hardin Revocable Family Trust; however, Firestone is under contract to purchase the property.

The purpose of this study is to provide a detailed hydrologic and hydraulic analysis for the project site in order to protect the property from onsite and offsite runoff in accordance with local stormwater criteria. This study will also provide an inventory of existing stormwater facilities in the vicinity as well as provide recommendations for site specific facilities necessary to control runoff impacting the project site.

1.2 Site Description

The Firestone site currently consists of undeveloped desert terrain with sparse desert brush and generally slopes to the east. The site is bordered by Rancho Drive to the east, Red Coach Avenue to the north, the existing Sun Valley Auto commercial development to the south, and the undeveloped land (APN 138-02-202-017) to the west. Note that the undeveloped parcel to the west is owned by the same property owner as the Firestone site (Tass C. Hardin & Lois I. Hardin Revocable Family Trust). A copy of the approved planning and zoning conditions for the Firestone site is included in Appendix K for reference. A vicinity map identified as Exhibit A is included in Appendix A for reference.

1.3 FEMA Flood Zone Designation

The project site has been identified on the current FEMA Flood Insurance Rate Map (FIRM) Panel 32003C2155E dated September 27, 2002 and revised to reflect LOMR effective December 31, 2003. The western portion of the Firestone site is located within a FEMA designated Zone X and the eastern portion is located in a FEMA designated Zone AE. A Zone X is an area determined to be outside the 0.2% annual chance flood. A Zone AE is an area determined to be within the 1% annual chance flood and is a designated a Special Flood Hazard Area (SFHA) where base flood elevations have been determined. Therefore, a Conditional Letter of Map Revision (CLOMR) and a follow-up Letter of Map Revision (LOMR) to FEMA will be required for an evaluation of the impacts of the Firestone development to the existing SFHA. A CLOMR will be submitted to FEMA upon conditional approval of this drainage study. Exhibit B identifying the project site on the FIRM Panel has been included in Appendix A for reference.

1.4 CCRFCD Facility Information

The site has been identified on the current 2008 CCRFCD MPU Figure F-19, which is included as Exhibit C in Appendix A for reference. Per the 2008 CCRFCD MPU (Reference 2), the Firestone site is not adjacent to any existing and/or proposed Regional

Facilities. However, since the site is within a FEMA SFHA, CCRFCD concurrence will be required.

1.5 Reference Studies

Four (4) approved drainage studies and improvement plans have been utilized in preparation of this study. Note that all reference material herein has been reviewed and determined acceptable for reference.

1. The study entitled, *Technical Drainage Study for Lone Mountain/Rainbow Apartments* (Lone Mountain Apartments Study, Reference 5), DS3567, prepared by VPoint, was utilized to confirm offsite drainage patterns for the Lone Mountain Apartments site, as well as for the lots adjacent to Painted Desert Drive. The corresponding approved LOMR (05-09-0073P) prepared as part of this study defined the current FEMA effective flood zone for Rancho Drive. The proposed condition HEC-RAS analysis from the LOMR was utilized to re-create Sections 93+76.00 thru 90+60.00 in the proposed Firestone HEC-RAS analysis. It was also used to for comparison purposes, as well as for tie-in locations. Relevant reference material from the Lone Mountain Apartments Study, including reference material from the approved LOMR, is included in Appendix F.

2. The plot and grading plan entitled, *Painted Desert Veterinary Clinic* (Painted Desert Vet Plans, Reference 6), DS unknown, prepared by Southwest Engineering, was utilized to confirm offsite drainage patterns for the area adjacent to the north of Red Coach Avenue. The Painted Desert Vet Plans also show the existing facilities along the north side of Red Coach Avenue. Relevant reference material from the Painted Desert Vet Plans is included in Appendix G.

3. The study entitled, *Technical Drainage Study for Sun Valley Auto* (Sun Valley Auto Study, Reference 7), DS4075, prepared by Southwest Engineering, was utilized to confirm offsite drainage patterns for the undeveloped parcel to the west. It was also utilized to show the existing grading for the Sun Valley Auto site, including the existing RCB culvert under the driveway entrance. The corresponding approved CLOMR (07-09-1025R) prepared as part of the Sun Valley Auto Study included a proposed condition HEC-RAS analysis. This analysis was utilized to re-create portions of Sections 89+50.00 thru 86+68.00 and all of Sections 86+16.00 thru 84+76.00 in the proposed Firestone HEC-RAS analysis. Note that Sections 89+50.00 thru 86+68.00 were revised to reflect proposed Firestone grading. Relevant reference material from the Sun Valley Auto Study, including reference material from the approved CLOMR, is included in Appendix H.

4. The study entitled, *Technical Drainage Study for Draft House Barn & Casino* (Draft House Study, Reference 8), DS2975, prepared by Southwest Engineering, was utilized to identify the flood zone limits determined by the project adjacent to the site.. Note that these limits do not match the current FEMA Effective boundary (see Section 4.4 for further discussion). The corresponding approved LOMA (01-09-1032A prepared as part of this study prepared a proposed condition HEC-RAS analysis which was utilized to re-create Sections 84+10.00 thru 81+55.00 in the proposed Firestone HEC-RAS analysis. Relevant reference material from the Draft House Study, including reference material from the approved LOMA, is included in Appendix I.

2 METHODOLOGY

2.1 Compliance

The methodologies utilized in the preparation of this study are in compliance with the Clark County Regional Flood Control District's Hydrologic and Drainage Design Manual (CCRFCD Manual, Reference 3).

2.2 Hydrologic Modeling

Modeling: The SCS Unit Hydrograph Method (SCS Method) was utilized to determine peak flow rates. The SCS Method utilizes precipitation, drainage area, curve number and lag time parameters to determine peak flow rates. The SCS Method routine within the U.S. Army Corp of Engineers HEC-1 Flood Hydrograph Package program was utilized to model the drainage subbasins analyzed by this study.

Precipitation: The site is located within the McCarran Rainfall Area. The precipitation values utilized in the HEC-1 model are 1.58 and 2.77 inches for the 10-year and 100-year storm events, respectively. The precipitation values have been referenced from Table 505 of the CCRFCD Manual. Additionally, since the drainage area is less than 8 square miles, the SDN 3 design storm distribution referenced from Table 503 of the CCRFCD Manual was used. Relevant tables and figures from the CCRFCD Manual have been included in Appendix B.

Curve Number: The SCS curve number loss rate methodology was utilized to approximate infiltration for the drainage subbasins. The soils information within the watershed was obtained from the SCS Soil Survey of the Las Vegas Valley Area (Soil Survey, Reference 4). Exhibit D depicts this study's project boundary on the soils map and has been included in Appendix A. The Firestone site lies within Soil Type 305 which is comprised of 60% Hydrologic Soil Group (HSG) 'D', 25% HSG 'B', 10% HSG 'C', and 5% HSG 'A'.

The undeveloped subbasins have been analyzed utilizing a composite curve number of 83.7 based on "desert shrub" cover type in poor hydrologic condition. The existing, proposed and future commercially developed subbasins have been analyzed utilizing a composite curve number of 93.9 based on commercial land use. The existing Lone Mountain Apartments have been analyzed utilizing a composite curve number of 91.0 based on Table 602A. The existing residential development along Painted Desert Drive consists of 10,000 square foot lots and has been analyzed utilizing a composite curve number 82.3 based on Table 602A. Roadways were analyzed using a curve number of 98. All soil and curve number data and computations, including CCRFCD Manual reference tables, have been included in Appendix B.

Lag Time: The lag time is defined as the time measured from the center of mass of effective rainfall to the time to peak of the outflow hydrograph. The lag time is related to the time of concentration as 0.6 times the time of concentration. The time of concentration is defined as the time required for runoff to flow from the hydraulically most distant point of a basin to the outlet point of the basin. Standard Form 4, as outlined in the CCRFCD Manual, was utilized to determine the lag times for basins modeled. The lag time computations have been included in Appendix B.

2.3 Hydraulic Modeling

Street Flow: Red Coach Avenue and interior street/parking area flows have been analyzed utilizing the Flowmaster Version 7.0 software by Haestad Methods. In accordance with the CCRFCD Manual, the velocity times depth factor (v x d) for street flow for the 10-year storm event must be less than or equal to 6, with a maximum depth of 1-ft. The velocity times depth factor (v x d) for street flow for the 100-year storm event must be less than or equal to 8, with a maximum depth of 2-ft.

Drainage Flumes & Valley Gutters: Drainage flumes and valley gutters have been analyzed utilizing the Flowmaster Version 7.0 software by Haestad Methods.

Drainage Swales: Drainage swales have been analyzed utilizing the Flowmaster Version 7.0 software by Haestad Methods.

Rancho Drive Hydraulic Analysis: The hydraulic analysis along Rancho Drive has been performed utilizing the HEC-RAS program by the U.S. Army Corps of Engineers.

3 EXISTING DRAINAGE CONDITION

3.1 Definition of Existing Condition

In the existing condition, the Firestone site is considered undeveloped. Adjacent Red Coach Avenue and Rancho Drive are considered developed with full street improvements. The parcel directly adjacent to the Firestone site to the west (APN 138-02-202-017) is considered undeveloped. The Sun Valley Automotive commercial development to the south is considered complete. Existing Lone Mountain Apartments are located northwest of the Firestone site and contribute to Red Coach Avenue. The existing residential development along Painted Desert Drive is located west of the project site and also contributes to Red Coach Avenue. A portion of the area contributing to Red Coach Avenue from the north is considered undeveloped and a portion is considered commercially developed in the existing condition.

3.2 Discussion of Existing Condition

Refer to Exhibit E located in Appendix A for a detailed illustration of the existing condition drainage patterns.

Offsite flow generated by Basins ON1D and ON2D combines in the Red Coach Avenue cul-de-sac at Concentration Point CP1. See Appendix F for relevant reference material from the Lone Mountain Apartments Study which confirms these drainage patterns. Flow from Basin OF4U drains east to an existing valley gutter within Basin OF5D to Concentration Point CP2 which discharges onto Red Coach Avenue via an existing sidewalk underdrain. See Appendix G for a relevant grading plan from the Painted Desert Vet Plans which confirms these drainage patterns. Flow generated by offsite Basin OF3U and onsite Basin ON1U drains east and north to Red Coach Avenue. Note that two (2) existing valley gutters assist in perpetuating these flow patterns. All flow contributing to Red Coach Avenue combines with the flow generated by the roadway (Basin RC1D) in a low point in Red Coach Avenue at Concentration Point CP3.

At the low point, flow from the north side of Red Coach Avenue is conveyed thru an existing 4.0-ft curb opening along north side the road. An existing valley gutter ties into the back of the curb opening and conveys flow from the roadway northeast to an existing dual elliptical 1-ft by 2-ft RCP culvert which conveys flow under Red Coach Avenue. The culvert daylights on the south side of Red Coach Avenue at the northeast corner of the Firestone site.

At the low point, flow from the south side of Red Coach is conveyed thru the existing depressed curb to an existing valley gutter along the north boundary of the Firestone site. Flow is conveyed east and combines with flow from the north side of Red Coach Avenue via the existing culvert near the northeast corner of the site. The combined flow is conveyed south in the existing valley gutter along the east boundary of the site and combines with onsite flow from Basin ON2U at Concentration Point CP4. The combined flow discharges south along the west boundary of Rancho Drive. Note an existing triple (3) 1-ft by 7-ft RCB culvert facility constructed with the Sun Valley Auto Study is located at the southern boundary of the site and is designed to convey nuisance flow, as well as 25-year flow in Rancho Drive per NDOT criteria. See Appendix H for discussion and calculations from the Sun Valley Auto Study for the existing triple (3) 1-ft by 7-ft RCB culvert.

Flow in Rancho Drive has been referenced from the Sun Valley Auto Study. The flow determined to be in the Rancho Drive alignment is 180 cfs. Note that the Northwest Neighborhood Study shows 219 cfs in Rancho Drive in the existing condition and 73 cfs in the future condition. See Exhibits E-12 and F-12 located in Appendix I for reference to the Northwest Neighborhood Study flows. However, the 180 cfs utilized by this study was accepted by FEMA with the approved Sun Valley Auto CLOMR and is consistent with the FIS study for the area and is therefore deemed acceptable for use. See relevant reference material from the Sun Valley Auto Study located in Appendix H.

3.3 Summary of Existing Condition Flows

A summary of existing condition flow rates, as determined by the HEC-1 analysis, is presented below in Table 1. Refer to Appendix C for the existing condition HEC-1 analysis.

Table 1: Summary of Existing Condition Flows

Basin / Concentration Point	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
ON1U	0.58	1	0
ON2U	0.60	1	0
OF1D	17.20	37	16
OF2D	5.53	9	3
OF3U	1.78	3	1
OF4U	0.41	1	0
OF5D	0.36	1	1
RC1D	0.79	3	1
CP1 (OF1D + OF2D)	N/A	46	20
CP2 (OF4U + OF5D)	N/A	2	1

Table 1: Summary of Existing Condition Flows			
Basin / Concentration Point	**Area (ac)**	**Q_{100} (cfs)**	**Q_{10} (cfs)**
CP3 (CP1 + CP2 + OF3U + ON1U + RC1D)	N/A	54	23
CP4 (CP3 + ON2U)	N/A	55	23

4 PROPOSED DRAINAGE CONDITION

4.1 Definition of Proposed Condition

In the proposed condition, offsite drainage patterns are the same as presented in the existing condition. However, the proposed condition considers the Firestone site commercially developed.

4.2 Discussion of Proposed Condition

Refer to Exhibit F included in Appendix A for a detailed illustration of the proposed condition drainage patterns.

Offsite drainage patterns are similar to those presented in the existing condition. However, in the existing condition, offsite flow from Basin OF3U was conveyed north to Red Coach Avenue via an existing valley gutter on the Firestone site. In the proposed condition, that valley gutter is being removed and flow from Basin OF3UB will be conveyed onsite via a proposed drainage swale within the southern landscape area to Concentration Point CP4.

Onsite drainage patterns are similar to the existing condition patterns in that a portion of the onsite area drains to Red Coach Avenue (Basin ON1D) and a portion drains to the existing onsite valley gutter (Basin ON2D). Note that all flow eventually ends up in the valley gutter at the southeast corner of the site at Concentration Point CP4.

As discussed in the existing condition, flow in Rancho Drive has been referenced from the Sun Valley Auto Study.

4.3 Summary of Proposed Condition Flows

A summary of proposed condition flow rates, as determined by the HEC-1 Analysis, is presented below in Table 2. Refer to Appendix C for the proposed condition HEC-1 analysis.

Table 2: Summary of Proposed Condition Flows			
Basin / Concentration Point	**Area (ac)**	**Q_{100} (cfs)**	**Q_{10} (cfs)**
ON1D	0.31	1	1
ON2D	0.87	3	1
OF1D	17.86	38	17

Table 2: Summary of Proposed Condition Flows			
Basin / Concentration Point	**Area (ac)**	**Q_{100} (cfs)**	**Q_{10} (cfs)**
OF2D	5.53	9	3
OF3UA	0.53	1	0
OF3UB	1.25	2	1
OF4U	0.41	1	0
OF5D	0.36	1	1
RC1D	0.79	3	1
CP1 (OF1D + OF2D)	N/A	48	20
CP2 (OF4U + OF5D)	N/A	2	1
CP3 (CP1 + CP2 + OF3UA + ON1D + RC1D)	N/A	53	23
CP4 (CP3 + OF3UB + ON2D)	N/A	57	24

The proposed condition flows for the Firestone site have been compared to the existing condition flows analyzed with this study at the downstream discharge locations. Table 3 below summarizes this comparison.

Table 3: Flowrate Comparison Proposed Condition Flows vs. Existing Condition Flows			
Location	**Proposed Condition Q_{100}/Q_{10} (cfs)**	**Location**	**Existing Condition Q_{100}/Q_{10} (cfs)**
CP4	57/24	CP4	55/23

Upon review of Table 3 above, the proposed condition flow is slightly higher than the existing condition flow at the downstream discharge location. The increase of flow is attributed to the increased curve number due to the commercial development of the Firestone site. However, per the 2008 MPU, downstream Regional Facilities have been designed based on ultimate condition flows, assuming commercial development of the proposed site. See Exhibit C (3 of 3) located in Appendix A which depicts the project site on Figure H-19 from the 2008 MPU, indicating an anticipated commercial land use for the property. Therefore, the proposed development will produce similar developed condition flows as assumed in the 2008 MPU and will not negatively impact downstream facilities. Also note that the 2 cfs increase is only approximately 1% of the total flow of 180 cfs in Rancho Drive and is therefore considered insignificant. Therefore, the proposed development is considered acceptable.

4.4 Summary of Proposed Condition Street Flows

Red Coach Avenue: Street flow hydraulics in Red Coach Avenue have been analyzed utilizing the proposed condition flows. Refer to Exhibit F for the street section location. Flowmaster calculations are included in Appendix D and street flow hydraulic characteristics are summarized in Table 4 below.

Table 4: Perimeter Street Flow Summary					
Section	**Slope (%)**	**Q_{100} (cfs)**	**Depth (ft)**	**Velocity (fps)**	**VxD**
SECTION A Red Coach Avenue *(Q = CP3)*	0.50	53	0.70	3.00	2.10

Upon review of Table 4, Red Coach Avenue adjacent to the Firestone site satisfies CCRFCD criteria as set forth in Section 2.3 of this report. Since 100-year flows meet 10-year criteria, 10-year flow characteristics have not been reported. Note that Red Coach Avenue is a 60-ft ROW and is not subject to 10-year dry lane criteria requirements.

Rancho Drive Flood Zone: Portions of the Rancho Drive alignment have been designated a FEMA Zone AE flood zone per FEMA FIRM Panel 2155, revised to reflect LOMR dated January 12, 2006. Therefore, a HEC-RAS hydraulic analysis of Rancho Drive has been performed to determine the impacts of the proposed development on the existing SFHA. Several HEC-RAS models have been performed by others to analyze the hydraulics and establish water surface elevations for the Rancho Drive flood zone. The relevant HEC-RAS models utilized in the preparation of the analysis performed as part of this study are outlined as follows:

- **FEMA Effective Model** – The FEMA Effective model which corresponds with the current FIRM Panel 2155 flood zone delineation was established with LOMR 05-09-0073P as part of the Lone Mountain Apartments Study. The HEC-RAS from the approved LOMR is referenced herein and has been utilized to compare FEMA Effective HGLs to the proposed condition HGLs and to determine tie-in locations. Furthermore, the geometry for Sections 93+76.00 thru 90+60.00 was referenced from the LOMR to create the Firestone proposed condition HEC-RAS model. Refer to Appendix F for relevant reference material.

- **Sun Valley Auto CLOMR** – The approved Sun Valley Auto CLOMR 07-09-1025R established a proposed condition HEC-RAS analysis which incorporated improvements to the Sun Valley Auto site that have yet to be incorporated into the FEMA Effective Model. Please note that the Sun Valley Auto CLOMR was approved by FEMA and the Sun Valley Auto site has since been developed; however, a LOMR has yet to be submitted and/or approved for the Sun Valley Auto site. Since the Sun Valley Auto site is developed and the CLOMR has been approved, portions of the developed condition HEC-RAS model has been deemed acceptable for use. Portions of HEC-RAS Sections 89+50.00 thru 86+68.00 and all of HEC-RAS Sections 86+16.00 thru 84+76.00 have been referenced from the CLOMR to create the proposed Firestone HEC-RAS analysis. Note that Sections 89+50.00 thru 86+68.00 were revised to reflect proposed Firestone grading. Refer to Appendix H for relevant reference material.

- **Draft House LOMA** – The approved Draft House LOMA 01-09-1032A established a proposed condition HEC-RAS analysis which incorporated improvements to the Draft House site. Note that the FEMA Effective flood zone is very narrow (less than 20-feet-wide) along the Draft House frontage (Station 84+76.00 thru 81+73.00). The grading of the Draft House site does not justify a narrowing of the flood zone in this area. Furthermore, no information/modeling could be found to

justify the the narrowing of the flood zone in this area. Therefore, HEC-RAS Sections 84+10.00 thru 81+55.00 have been referenced from the proposed Draft House HEC-RAS analysis to create the proposed Firestone HEC-RAS analysis. Refer to Appendix I for relevant reference material.

- **Proposed Condition Model** – The Firestone proposed condition HEC-RAS model is a combination of the above-referenced models with proposed commercial improvements to the Firestone site incorporated. The HEC-RAS model was ran using a mixed flow regime. Boundary conditions were set using normal depth with a slope at the upstream end of the reach of 0.22% and a slope at the downstream end of the reach of 0.30%. Manning's n values vary throughout each section based on existing and proposed ground cover. HEC-RAS sections from Station 89+50.00 to 86+68.00 have been revised to reflect the proposed Firestone grading. Please see Exhibit H located in Appendix A which shows the HEC-RAS section locations and proposed water surface elevations. Table 5 below summarizes a comparison of the proposed condition HEC-RAS analysis to the FEMA Effective analysis. Water surface elevations for the Sun Valley Auto CLOMR and Draft House LOMA have been included in the table for informational purposes.

TABLE 5: HEC-RAS Analysis Comparison

FEMA Effective vs. Proposed

HEC-RAS Station	Sun Valley Auto[2] *CLOMR 07-09-1025R* WSE (ft)	Draft House[2] *LOMA 01-09-1032A* WSE (ft)	FEMA Effective[1] *LOMR 05-09-0073P* WSE (ft)	Proposed Condition WSE (ft)	Δ WSE (ft) Proposed – FEMA Effective
94+72.00 *Tie-in Location*	--	--	**2316.66**	**TIE-IN**	**0.00**
93+76.00 *Limit of Study*	--	--	**2316.40**	**2316.42**	**0.02**
93+24.00	--	--	**2314.81**	**2314.86**	**0.05**
92+05.00	--	--	**2314.25**	**2314.5**	**0.25**
91+14.00	--	--	**2314.2**	**2314.11**	**-0.09**
90+60.00	--	--	**2314.12**	**2313.72**	**-0.40**
89+50.00 *Upstream Property Limit*	2312.84	--	**2313.74**	**2312.23**	**-1.51**
88+62.00	2312.08	--	**N/A**	**2311.85**	**N/A**
88+32.00	2311.7	--	**N/A**	**2311.9**	**N/A**
88+02.00	2311.4	--	**N/A**	**2311.7**	**N/A**
87+44.00	2311.11	--	**N/A**	**2311.19**	**N/A**
86+68.00 *Downstream Property Limit*	2311.02	--	**2311.03**	**2311.03**	**0.00**
86+16.00	2310.6	--	**N/A**	**2310.6**	**N/A**
85+86.00	2310.31	--	**N/A**	**2310.32**	**N/A**
85+66.00	2310.36	--	**N/A**	**2310.36**	**N/A**
85+33.00	2310.07	--	**N/A**	**2310.08**	**N/A**
85+06.00	2309.08	--	**N/A**	**2309.09**	**N/A**
84+76.00	2309.06	--	**2309.37**	**2309.24**	**-0.13**
84+10.00	--	2308.88	**2308.72**	**2308.89**	**0.17**
82+77.00	--	2307.78	**2307.57**	**2307.67**	**0.10**

TABLE 5: HEC-RAS Analysis Comparison FEMA Effective vs. Proposed					
HEC-RAS Station	**Sun Valley Auto[2] *CLOMR 07-09-1025R* WSE (ft)**	**Draft House[2] *LOMA 01-09-1032A* WSE (ft)**	**FEMA Effective[1] *LOMR 05-09-0073P* WSE (ft)**	**Proposed Condition WSE (ft)**	**Δ WSE (ft) Proposed – FEMA Effective**
82+21.80	--	2307.11	**N/A**	**2307.04**	**N/A**
81+73.00	--	2306.33	**N/A**	**2306.28**	**N/A**
81+55.00 *Limit of Study*	--	2306.43	**2306.61**	**2306.29**	**-0.32**
79+39.00 *Tie-in Location*	--	2304.59	**2304.14**	**TIE-IN**	**0.00**

1 - Referenced from the Lone Mountain Apartments Study and associated LOMR 05-09-0073P.

2 - For informational purposes only. Only the FEMA Effective model has been used for comparison with the proposed model.

As a result of the proposed project, the proposed condition base flood elevations (BFEs) within the Rancho Drive SFHA will increase in some areas and decrease in other areas. As a result, the width of the SFHA will also increase in some areas and decrease in other areas. In areas of increase, the computed BFE's, although different from the FEMA effective BFE's, are consistent with BFE's computed as part of the Sun Valley Auto CLOMR and the Draft House LOMA. Note that in the process of delineating the revised flood zone, there appeared to be inconsistencies in the HEC-RAS model for the approved LOMR 05-09-0073 and the mapped flood zone limits. The top widths determined with the HEC-RAS model do not incorporate areas where flow is split, and therefore, using the top width to determine the flood zone width is incorrect in areas of split flow. Therefore, even though the WSEs in the areas where the HEC-RAS sections were referenced are very similar, the delineation of the flood zone is quite different.

Note that the proposed condition flood zone limits of inundation continue to encroach on the proposed parking area but do not impact the proposed commercial building. The proposed finished floor is elevated 18-inches above the proposed condition water surface elevation at HEC-RAS Station 89+50.00. The proposed condition limits of inundation are shown on Exhibit H located in Appendix A, as well as on the improvement plans located in Appendix L.

4.5 Summary of Recommended Facilities

Onsite Facilities: The ultimate condition onsite flows have been determined to be slightly higher than the proposed condition flows. Therefore, the onsite hydraulic sections have been analyzed using the more conservative ultimate condition flow rates. See Section 5.5 of this report for further discussion.

4.6 Summary of Finished Floor Elevations

The ultimate condition flows have been determined to be slightly higher than the proposed condition flows. Therefore, the proposed finished floor elevation has been checked against local onsite flows based on the more conservative ultimate condition flow rates. See Section 5.6 of this report for further discussion.

5 ULTIMATE DRAINAGE CONDITION

5.1 Definition of Ultimate Condition

The ultimate condition considers full development of Firestone site, as well as future development of all offsite drainage areas. Red Coach Avenue and Rancho Drive are considered complete with full street improvements as presented in the proposed condition.

5.2 Discussion of Ultimate Condition

Refer to Exhibit G included in Appendix A for a detailed illustration of the ultimate condition drainage patterns.

The ultimate condition drainage patterns are considered the same as presented in the proposed condition. However, in the ultimate condition, the parcels just west of the Firestone site are considered developed with a curve number corresponding to commercial land use. Note that the ultimate condition analysis presented herein is conceptual with respect to development of the parcels to the west and future drainage studies will be required to address future development. For the purposes of this study, Basins OF3DA and OF3DB were analyzed using the same lag time as the proposed condition analysis for Basins OF3UA and OF3DUB, respectively, but the curve number has increased from 83.7 for desert shrub land cover to 93.9 for commercial development.

5.3 Summary of Ultimate Condition Flows

A summary of ultimate condition flow rates, as determined by the HEC-1 Analysis is presented below in Table 6. Refer to Appendix C for the HEC-1 Analysis.

Table 6: Summary of Ultimate Condition Flows

Basin / Concentration Point	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
ON1D	0.31	1	1
ON2D	0.87	3	1
OF1D	17.86	38	17
OF2D	5.53	9	3
OF3DA	0.53	2	1
OF3DB	1.25	4	2
OF4D	0.41	1	1
OF5D	0.36	1	1
RC1D	0.79	3	1
CP1 (OF1D + OF2D)	N/A	48	20
CP2 (OF4D + OF5D)	N/A	2	1
CP3 (CP1 + CP2 + OF3DA + ON1D + RC1D)	N/A	53	23
CP4 (CP3 + OF3DB + ON2D)	N/A	59	26

The ultimate condition flows for the Firestone site have been compared to the existing condition flows analyzed with this study. Table 7 below summarizes these comparisons.

Table 7: Flowrate Comparison
Ultimate Condition Flows vs. Existing Condition Flows

Location	Ultimate Condition Q_{100}/Q_{10} (cfs)	Location	Existing Condition Q_{100}/Q_{10} (cfs)
CP4	59/26	CP4	55/23

Similar to the proposed condition, the ultimate condition flows are slightly larger than the existing condition flows for the site. However, the proposed development is consistent with development anticipated in the 2008 MPU. Also note that the 4 cfs increase is only approximately 2% of the total flow of 180 cfs in Rancho Drive and is therefore considered insignificant. Therefore, the proposed development is considered acceptable. See Section 4.3 of this report for a more detailed discussion.

5.4 Summary of Ultimate Condition Street Flows

The ultimate condition flows in Red Coach Avenue and Rancho Drive are the same as presented in the proposed condition. See Section 4.4 of this report for further discussion of street flow hydraulics.

5.5 Summary of Recommended Facilities

Curb & Gutter: Flow generated by onsite Basin ON2D will be conveyed via proposed curb and gutter along the south boundary of the project site. Onsite hydraulic Section 1 and Section 2 have been analyzed and results are summarized in Table 8 below. See Exhibit G located in Appendix A for section locations and Appendix D for Flowmaster calculations.

Curb Opening: A curb opening has been designed to allow flow from Basin ON2D to convey east thru the site (Section 3). A Flowmaster calculation for the curb opening is included in Appendix D and results are summarized in Table 8 below.

Earthen Swale/Drainage Easement: A proposed earthen swale along the south boundary of the site will convey offsite flow from Basin ON3DB east to the existing valley gutter along Rancho Drive. The swale has been dedicated as a 10-foot wide public drainage easement to be privately maintained. A Flowmaster calculation for the proposed swale (Section 4) is included in Appendix D and results are summarized in Table 8 below. Note that the velocity in the channel is less than 5 fps and is therefore considered non-erosive. Also note that the adjacent existing wall constructed with the Sun Valley Auto Study is solid grouted one course and therefore adequately protected to a height of twice the depth of flow in the adjacent swale.

Riprap Swale: A 5-foot-wide drainage swale is proposed at the low point along the east boundary of the proposed parking lot to the existing valley gutter along Rancho Drive. The swale is lined with 6-inch riprap to minimize erosion. A Flowmaster calculation (Section 5) is included in Appendix D and results are summarized in Table 8 below.

Table 8: Summary of Onsite Hydraulic Sections							
Section	**Slope (%)**	**Q (cfs)**	**Flow Depth (ft)**	**Facility Depth (ft)**	**Top Width (ft)**	**Velocity (fps)**	**Section Description**
Section 1 *(Q = ½ON2D)*	0.56	1.5	0.3	0.50	14.13	1.31	L-Curb
Section 2 *(Q = ½ON2D)*	0.56	1.5	0.35	0.50	5.88	1.87	L-Curb
Section 3 *(Q = ½ON2D)*	0.56	1.5	0.38	0.50	1.50	3.14	Curb Opening
Section 4 *(Q = OF3DB)*	1.00	4	0.77	2.00	3.10	3.33	Drainage Swale (10-ft Drainage Easement)
Section 5 *(Q = ON2D)*	9.70	3	0.18	0.20	8.98	3.72	Riprap Drainage Swale

Valley Gutter: The existing valley gutter east boundary of the site is designed for nuisance flow and has not been analyzed as part of this study.

Storm Drain: The existing culverts, both the one that crosses Red Coach Avenue and the one at the downstream end of the site which crosses under the Sun Valley Auto driveway entrance, have not been analyzed with this study since the flow in the Rancho Drive SFHA was referenced and the proposed development does not significantly increase flow to these facilities.

Driveway Humps: The proposed driveway entrances from Red Coach Avenue have been humped to a minimum elevation of 6 inches above the flow depth in Red Coach Avenue to prevent flows from the roadway from entering the site.

5.6 Summary of Finished Floor Elevations

CCRFCD criteria requires that all non-residential finished floors (new construction) proposed within a SFHA be elevated at least 18-inches above the water surface elevation in the street. Since the Firestone site is adjacent to a FEMA designated Zone AE, the proposed finished floor is required to be elevated a minimum of 18-inches above the adjacent water surface elevation at HEC-RAS Section 89+50.00. Furthermore, City of Las Vegas Criteria requires the proposed finished floor elevation be elevated to minimum of 6-inches above the highest adjacent top of. The finished floor for the Firestone building meets finished floor criteria as set forth in the CCRFCD Manual and CLV local criteria.

6 CONCLUSIONS & RECOMMENDATIONS

1. The Firestone site is partially located within a FEMA designated Zone AE; therefore, a Conditional Letter of Map Revision (CLOMR) and a follow-up Letter of Map Revision (LOMR) to FEMA will be required. The CLOMR will be submitted to FEMA upon conditional approval of this study by CLV.

2. The Firestone site is not adjacent to any existing and/or proposed CCRFCD Regional Facilities. However, since a portion of the site is located in a FEMA SFHA, CCRFCD concurrence will be required.

3. Although proposed and ultimate condition flows are greater than existing condition flows for the proposed site, the proposed development is in accordance with the land use anticipated with the 2008 MPU and downstream facilities have been designed for the more conservative developed condition flows. Also note that the increase is only approximately 2% of the total flow of 180 cfs in Rancho Drive and is therefore considered insignificant. Development of the Firestone site is considered acceptable and does not result in negative impacts downstream.

4. The proposed finished floor elevation for the Firestone building has been set a minimum of 18-inches above the 100-year water surface elevation in the adjacent Rancho Drive as set for by CCRFCD criteria. Furthermore, the proposed finished floor is elevated a minimum of 6-inches above highest adjacent top of curb per City of Las Vegas criteria. In addition, proposed driveway entrances have been humped a minimum of 6-inches above depth of flow in the adjacent roadway to prevent offsite flow from entering the site.

5. Planning and zoning conditions (NOFA) for the proposed site have been approved and a copy of the conditions is included in Appendix K.

6. Grading plan, profile and detail sheets included in Appendix L of this study support the drainage patterns and conclusions detailed in this study.

7 REFERENCES

1. *U.S. 95 and Rancho Flood Insurance ReStudy, by PBS&J.*

2. *Las Vegas Valley Flood Control Master Plan Update.* PBS&J, Louis Berger Group and Parsons Brinckerhoff, October 2008.

3. *Hydrologic Criteria and Drainage Design Manual.* Clark County Regional Flood Control District, 1990.

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

5. *Technical Drainage Study for Lone Mountain/Rainbow Apartments*, by VPoint, December 2004.

6. *Plot and Grading Plan for Painted Desert Veterinary Clinic,* by Southwest Engineering, date unknown.

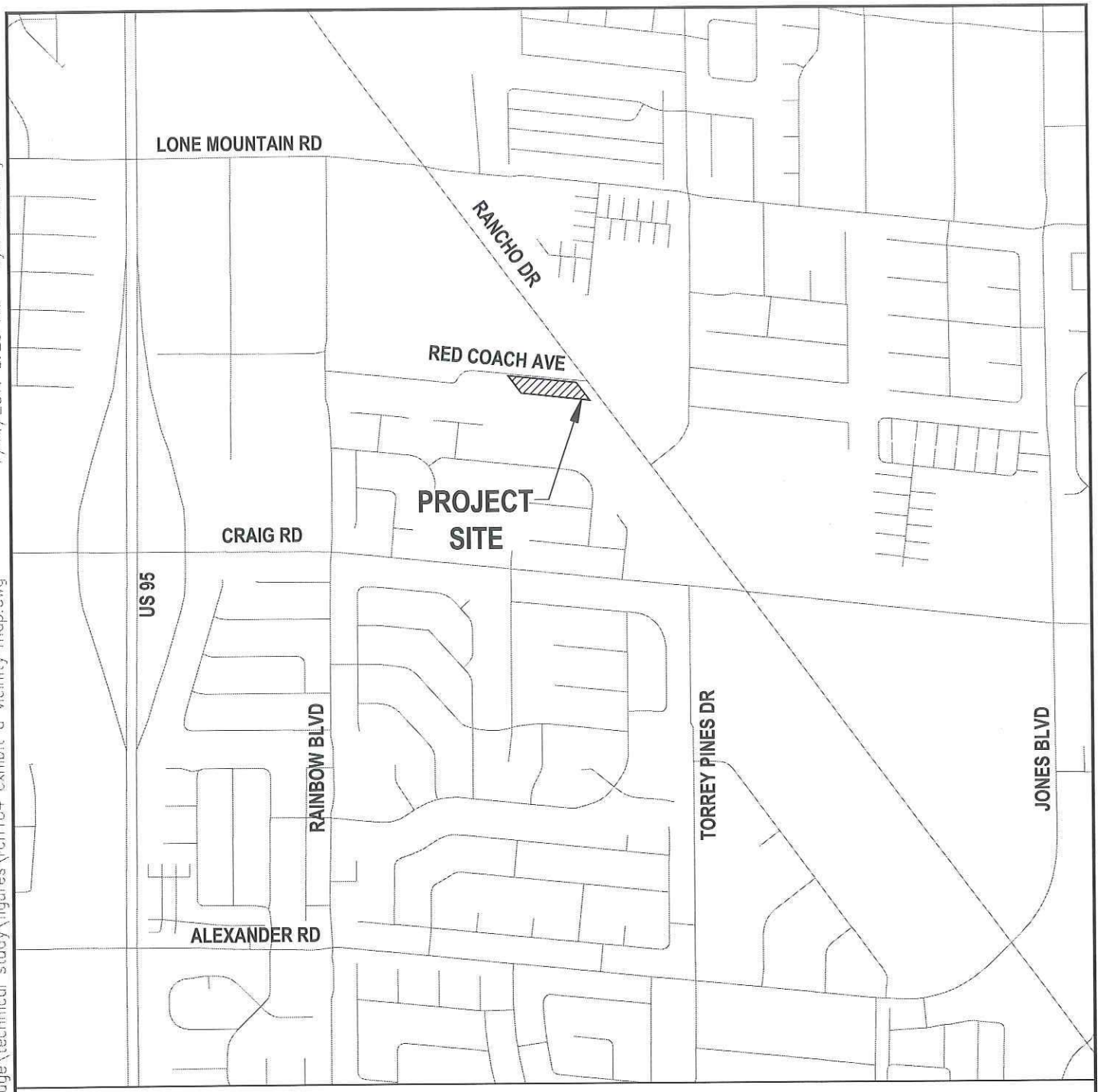
7. *Technical Drainage Study for Sun Valley Auto,* by Stantec Consulting, April 2007.

8. *Technical Drainage Study for Draft House Barn & Casino,* by Southwest Engineering, December 2002.

9. *The City of Las Vegas Northwest Neighborhood Study,* by PBS&J.

APPENDIX A

Drainage Exhibits



0 1000 2000

SCALE – 1" = 1000' FEET

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j:\rci1104.000 firestone rancho-red coach\drainage\technical study\figures\rci1104 exhibit a vicinity map.dwg 7/14/2011 8:26 AM Kyle Rowbury

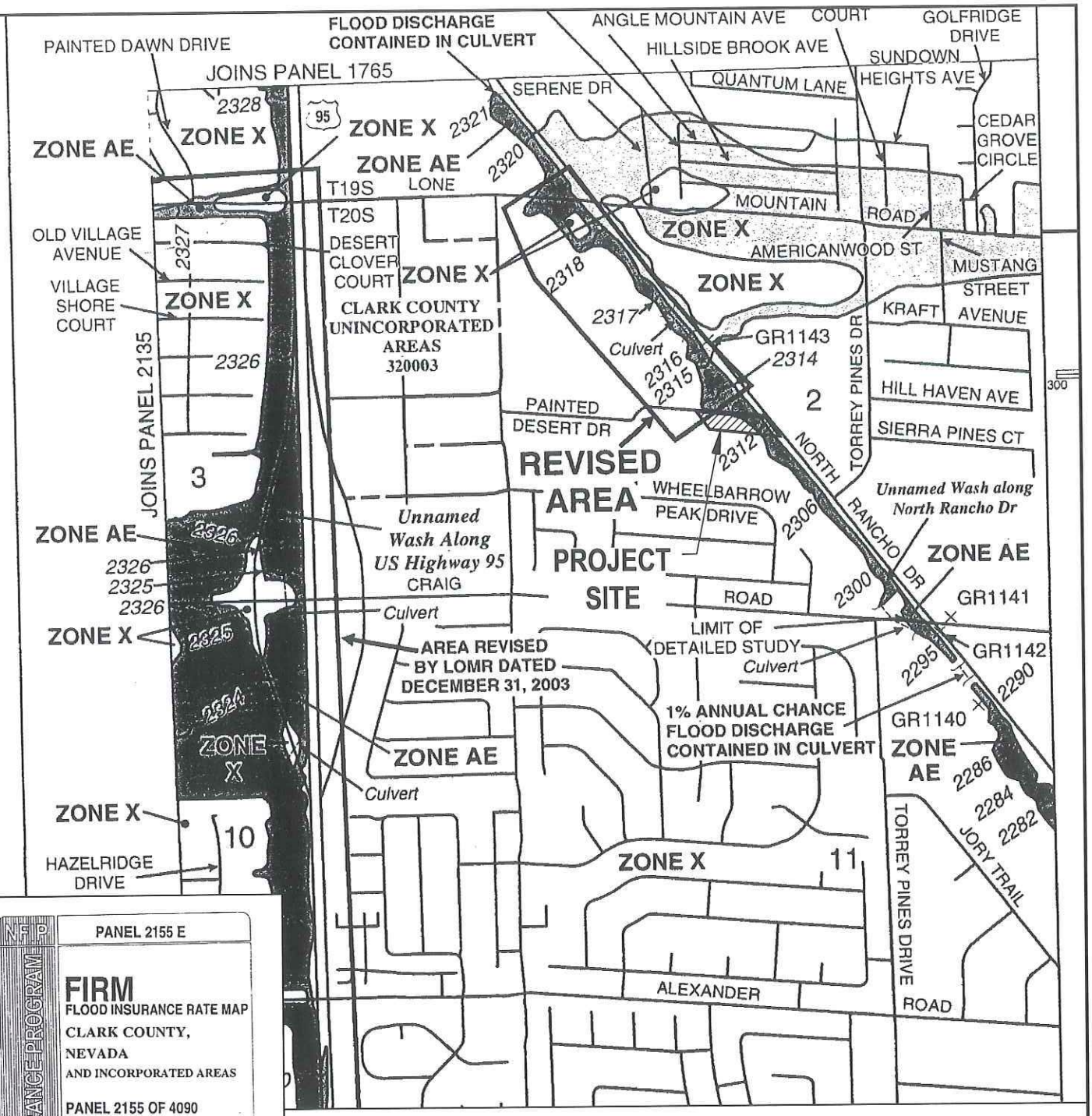
SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

FIRESTONE

FIRESTONE AT RANCHO & RED COACH

VICINITY MAP

DATE: 06/20/11	PROJECT NO. RCI1104.000
DRAFTER: KCR	
DESIGNER: KCR	**EXHIBIT A**
CHECKED: MJF	TDS



PANEL 2155 E

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA
AND INCORPORATED AREAS

PANEL 2155 OF 4090

REVISED TO REFLECT LOMR DATED JAN 12 2006

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

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

MAP NUMBER
32003C2155 E

MAP REVISED:
SEPTEMBER 27, 2002

Federal Emergency Management Agency

0 1000 2000
SCALE – 1" = 1000' FEET

N

S-H-G

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

FIRESTONE

FIRESTONE AT RANCHO & RED COACH
FEMA FIRM MAP

DATE: 06/20/11	PROJECT NO. RCI1104.000
DRAFTER: KCR	
DESIGNER: KCR	**EXHIBIT B**
CHECKED: MJF	TDS

j:\rci1104.000 firestone rancho-red coach\drainage\technical study\figures\rci1104 exhibit b fema firm map.dwg 7/14/2011 8:28 AM Kylie Rowbury

REGIONAL FLOOD CONTROL DISTRICT

2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F-19
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

EXHIBIT C
(1 OF 3)

N

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

Scale: 1 inch = 2,000 feet

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

US95 I-15 I-215

1	2	3				
4	5	6				
	7	8	9	10		
11	12	13	14	15	16	17
	18	19	20	21	22	23
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	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			

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ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
ANRB		ANN ROAD CHANNEL WEST - RAINBOW						
0000	P1	10' X 7' RCB	1320	721	CNW2B5-C	WEST3	0.99	0.40
ANWE		ANN ROAD CHANNEL WEST						
0245	E	10' X 9' RCB	1721	993	CNW2D1-C	WEST3	6.84	0.80
0279	E	10' X 9' RCB	553	743	2CNW2B5C	WEST3	6.37	0.80
0290	E	8' X 8' RCB	2050	743	2CNW2B5C	WEST3	6.37	0.70
0327	E	6' X 6' RCB	2360	161	RCHOOT	WEST3	5.38	0.87
0371	E	6' X 6' RCB	760	161	RCHOOT	WEST3	5.38	0.34
0385	E	54" RCP	1950	161	RCHOOT	WEST3	5.38	1.17
CNWE		CENTENNIAL PKWY CHANNEL WEST						
0150	P2	Conc Chnl 42'W 10'D 0:1 SS	720	4233	CNW3B3-C	WEST3	5.64	0.40
0173	P2	42' X 10' RCBC @ Torrey Pines	190	4233	CNW3B3-C	WEST3	5.64	0.40
0176	P2	Conc Chnl 32'W 12'D 0:1 SS	795	4233	CNW3B3-C	WEST3	5.64	0.40
0189	P2	Conc Chnl 32'W 10'D 0:1 SS	1845	4067	CNW2D4-C	WEST3	5.15	0.54
0226	P2	Conc Chnl 12'W 12'D 2:1 SS	1165	4067	CNW2D4-C	WEST3	5.15	1.00
0251	P2	Conc Chnl 12'W 12'D 2:1 SS	1135	3951	CNW2D3-C	WEST3	4.65	0.59
0271	P2	Conc Chnl 32'W 10'D 0:1 SS	185	3951	CNW2D3-C	WEST3	4.65	0.59
0274	E	32' X 10' RCBC @ Tenaya	130	3951	CNW2D3-C	WEST3	4.65	0.45
0277	P2	Conc Chnl 13'W 10'D 2:1 SS	590	3951	CNW2D3-C	WEST3	4.65	0.45
0287	P2	Conc Chnl 13'W 10'D 2:1 SS	605	3593	CNW2B2-C	WEST3	3.84	1.19
0301	P2	Conc Chnl 32'W 10'D 0:1 SS	235	3593	CNW2B2-C	WEST3	3.84	1.19
0304	P2	32' X 10' RCB	6510	3593	CNW2B2-C	WEST3	3.84	1.75
GO95		GOWAN OUTFALL - U.S. 95 CHANNEL						
0000	P1	Conc Chnl 12'W 4'D 2:1 SS	2640	299	GD17BG-C	ALLGOW3	0.36	0.30
0050	P1	Conc Chnl 12'W 4'D 2:1 SS	2450	299	GD17BG-C	ALLGOW3	0.36	0.30
GOA2		GOWAN OUTFALL - ALEXANDER BRANCH						
0000	P1	8' X 5' RCB	2281	523	CPT41-C	ALLGOW3	0.61	0.90
GOAL		GOWAN OUTFALL - ALEXANDER ROAD FACILITIES						
0111	P1	10' X 8' RCB	3000	880	CPT2B2	ALLGOW3	2.28	0.83
0168	P1	10' X 8' RCB	4200	880	CPT2B2	ALLGOW3	2.28	0.50
0247	P1	Conc Chnl 12'W 5.5'D 2:1 SS	2640	757	CGD20BMC	ALLGOW3	1.98	0.30
GOBU		GOWAN NORTH - BUFFALO BRANCH						
0000	E	2: 12' X 6' RCB	1705	961	CGD14CBC	ALLGOW3	2.53	0.20
0032	E	2: 12' X 5' RCB	1248	850	CGD14AAC	ALLGOW3	2.30	0.25
0058	E	2: 11' X 4' RCB	1398	745	CGD17AAC	ALLGOW3	1.90	0.25
0085	E	11' X 5' RCB	1266	614	CGD17ABC	ALLGOW3	1.52	0.25
0112	P1	8' X 6' RCB	1535	484	CGD20ABC	ALLGOW3	1.15	0.54
0136	P1	7' X 6' RCB	1400	344	CGD20AAC	ALLGOW3	0.76	0.36
GOBW		GOWAN BELTWAY WEST						
0000	E	48" RCP	2527	116	LMBWDB	ALLGOW4	10.68	4.37
0048	E	72" RCP	131	116	LMBWDB	ALLGOW4	10.68	2.21
0051	P2	72" RCP Outlet	1508	116	LMBWDB	ALLGOW4	10.68	0.30
0052	P2	589 ac-ft Lone Mountain-Beltway Detention Basin		5140	CLMBW1	GW3SC	3.50	
0082	P2	51,400 cfs PMF Spillway		51400	CLMBW1	GW3SC	3.50	
0096	P1	8' X 8' RCB Connector Pipe Under Beltway	839	5140	CLMBW1	GW3SC	3.50	0.30
0097	P2	54" RCP	394	525	UVB1-2	ALLGOW3	0.34	8.09
0108	P2	8' X 8' RCB Connector Pipe Under Lone Mountain	697	5140	CLMBW1	GW3SC	3.50	0.30
0128	P2	Conc Chnl 20'W 10'D 0:1 SS	190	3429	CWRBW1	ALLGOW3	6.06	25.00
0132	P2	Conc Chnl 14'W 10'D 0:1 SS	1286	2869	CHLBW1-C	GW3SC	1.84	5.00
0156	P2	Conc Chnl 16'W 10'D 0:1 SS	221	2869	CHLBW1-C	GW3SC	1.84	1.05
0160	P2	16' X 8' RCB	1230	2869	CHLBW1-C	GW3SC	1.84	1.05
GOBX		GOWAN BOX CANYON						
0000	P2	66" RCP	794	753	LWBW1	ALLGOW3	0.48	9.45
GODU		GOWAN NORTH - DURANGO BRANCH						
0000	E	12' X 6' RCB	2629	1150	CLV14-C	ALLGOW3	1.40	0.91
0050	E	9' X 6' RCB	865	835	CLV20-C	ALLGOW3	0.97	1.50
GOEC		GOWAN NORTH - EL CAPITAN BRANCH						
0000	P1	10' X 7' RCB	1445	1233	CLWFR-C	ALLGOW3	2.20	1.36
0026	P1	10' X 8' RCB	1320	1162	CWRJS-C	ALLGOW3	1.95	0.91
0051	P1	10' X 7' RCB	1320	1027	CHLFR-C	ALLGOW3	1.69	1.06
0076	P1	10' X 6' RCB	1320	894	CARFR-C	ALLGOW3	1.45	1.06

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
GOEC		GOWAN NORTH - EL CAPITAN BRANCH						
0100	P1	10' X 6' RCB	1320	745	CEAFR-C	ALLGOW3	1.21	0.76
0126	P1	10' X 7' RCB	1320	635	CTRFR-C	ALLGOW3	0.96	0.38
0152	P1	7' X 6' RCB	1320	485	CARFP-C	ALLGOW3	0.70	0.77
0176	P1	78" RCP	1320	363	CCPFR-C	ALLGOW3	0.46	1.15
GOL2		GOWAN LONE MOUNTAIN SYSTEM-BRANCH 2						
0000	E	5' X 4' RCB	150	461	CRBW	ALLGOW3	0.44	14.60
0003	E	66" RCP	607	461	CRBW	ALLGOW3	0.44	1.97
0014	E	84" RCPC @ Alexander	125	461	CRBW	ALLGOW3	0.44	4.00
GOLM		GOWAN LONE MOUNTAIN SYSTEM						
0000	E	78" RCP	2590	345	CLV15-C	ALLGOW4	11.88	1.80
0049	E	6' X 5' RCB	585	345	CLV15-C	ALLGOW4	11.88	1.87
0060	E	66" RCP	817	345	CLV15-C	ALLGOW4	11.88	2.40
0075	E	60" RCP	1385	345	CLV15-C	ALLGOW4	11.88	2.55
0101	E	54" RCP	701	190	LMTNDB	ALLGOW4	11.52	1.74
0115	E	48" RCP	1799	190	LMTNDB	ALLGOW4	11.52	3.08
0140	E	42" RCP	439	190	LMTNDB	ALLGOW4	11.52	1.60
0142	E	48" RCP	348	190	LMTNDB	ALLGOW4	11.52	2.14
0144	E	66" RCP	196	190	LMTNDB	ALLGOW4	11.52	5.44
0145	E	66" RCP Outlet	378	190	LMTNDB	ALLGOW4	11.52	0.90
0146	E	888 ac-ft Lone Mountain Detention Basin		7252	LMTNIN	GW3SC	6.13	
0147	E	36,000 cfs PMF Spillway		36000	LMTNIN	GW3SC	6.13	
0150	E	Drop Structure	481	6323	CGABW	GW3SC	5.12	
0162	E	28' X 8' RCBC @ Hualapai	625	6323	CGABW	GW3SC	5.12	1.86
0174	E	Conc Chnl 28'W 8'D 0:1 SS	2715	6173	CCLMT5	GW3SC	4.92	3.20
GOLO		GOWAN OUTFALL - LONE MTN. ROAD BRANCH						
0275	P1	8' X 6' RCB	3000	590	CPT3AA2	ALLGOW3	1.16	0.77
GONO		GOWAN NORTH SYSTEM						
0000	E	8' X 8' RCB Outlet	184	558	GWNNDB	ALLGOW5	68.49	0.51
0001	E	8' X 8' RCB Outlet	156	558	GWNNDB	ALLGOW5	68.49	0.63
0008	E	30,780 cfs PMF Spillway		30780	GWNNDB	ALLGOW5	68.49	
0008	E	921 ac-ft Gowan North Detention Basin		4937	CCLV43-C*	GW4SC	11.93	
0009	E	3: 13' X 8' RCB	1662	4937	CCLV43-C	GW4SC	11.93	0.62
0012	E	Conc Chnl 30'W 8'-9.5'D 0:1 SS	2665	4117	CCLV36-C	GW4SC	8.54	1.18
0062	E	Bridge 30'W 8.5'D @ Cimarron	80	3844	CCLV15-C	GW4SC	8.03	0.30
0063	E	Conc Chnl 30'W 8.5'-10'D 0:1 SS	2302	3844	CCLV15-C	GW4SC	8.03	1.00
0110	E	2: 12' X 8' RCAC @ Alexander	547	3352	CCRSFR-C*	GW3SC	6.10	1.00
0117	E	2: 12' X 8' RCAP	424	3352	CCRSFR-C*	GW3SC	6.10	1.10
0124	E	Conc Chnl 24'W 9'D 0:1 SS	887	3352	CCRSFR-C*	GW3SC	6.10	1.36
0141	E	Conc Chnl 24'W 9'-10.5'D 0:1 SS	2064	3352	CCRSFR-C	GW3SC	6.10	0.59
0181	E	Bridge 30'W 7'D @ Craig	142	2846	CRSFR-C	GW3SC	5.20	0.65
0183	E	Conc Chnl 22'W 8'-10.6'D 0:1 SS	2193	2846	CRSFR-C	GW3SC	5.20	0.72
0225	E	Conc Chnl Width Varies Depth Varies 0:1 SS	508	2605	CCLWFR-C	GW3SC	4.54	1.05
0230	E	13' X 5' RCB	256	1486	CCWRHW-C	GW3SC	2.34	2.78
0234	E	12' X 6' RCB	2010	1486	CCWRHW-C	GW3SC	2.34	1.67
0272	E	10' X 6' RCB	2797	1486	CCWRHW-C	GW3SC	2.34	3.15
0325	E	15' X 7' RCB	291	1486	CCWRHW-C	GW3SC	2.34	1.79
0335	E	15' X 7' RCB	529	1486	CWRHW-C	ALLGOW3	2.34	1.79
0350	P1	10' X 9' RCB	3473	1486	CWRHW-C	ALLGOW3	2.34	0.88
0411	P1	10' X 9' RCB	1320	1404	CARHW-C	ALLGOW3	1.89	0.76
0436	P1	10' X 7' RCB	1320	1173	CEAHW-C	ALLGOW3	1.53	1.14
0461	P1	10' X 9' RCB	1320	959	CTRHW-C	ALLGOW3	1.22	0.38
0486	P1	8' X 7' RCB	1320	747	CADHW-C	ALLGOW3	0.90	0.76
0511	P1	7' X 6' RCB	1320	546	CCPHW-C	ALLGOW3	0.60	1.14
GOOF		GOWAN OUTFALL FACILITIES						
0511	E	8' X 5' RCB	8390	699	CPT6B-C	GW3SC	1.08	0.50
0531	E	8' X 5' RCB	1300	558	GWNNDB	ALLGOW5	68.49	0.50
0551	E	72" RCP	524	558	GWNNDB	ALLGOW5	68.49	0.62
0773	E	60" RCP	803	286	LV30-C	ALLGOW3	0.42	1.40
0775	E	60" RCP	1300	286	LV30-C	ALLGOW3	0.42	1.00

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
RCHB		RANCHO ROAD SYSTEM - BELTWAY						
0000	E	2: 12' X 8.5' RCAP	1700	2631	CNW1C-W	WEST3	4.68	0.63
0034	E	Conc Chnl 21'W 8'D 0:1 SS	1000	2631	CNW1C-W	WEST3	4.68	1.19
0053	E	2: 12' X 8' RCBC @ South Ramp Connector	85	2304	CDW1C1	WEST3	4.31	1.40
0054	E	Conc Chnl 21'W 8'D 0:1 SS	432	2304	CDW1C1	WEST3	4.31	1.51
0062	E	Transition Structure	130	2304	CDW1C1	WEST3	4.31	1.51
0065	E	24' X 7' RCB	480	2304	CDW1C1	WEST3	4.31	0.30
0074	E	24' X 6' RCB	50	2226	CNWBC8-C	WEST3	4.17	0.30
0075	E	20' X 6' RCBC @ Beltway	428	2226	CNWBC8-C	WEST3	4.17	2.81
0083	P2	20' X 6' RCB	950	2226	CNWBC8-C	WEST3	4.17	2.49
0101	P2	Conc Chnl 20'W 7'D 0:1 SS	980	2226	CNWBC8-C	WEST3	4.17	2.38
0120	E	20' X 6' RCBC @ Grand Montecito	120	2226	CNWBC8-C	WEST3	4.17	1.00
0122	P2	Conc Chnl 16'-20'W 6'D 0:1 SS	350	2226	CNWBC8-C	WEST3	4.17	1.84
0130	P2	Conc Chnl 16'W 6'D 0:1 SS	1012	2226	CNWBC8-C	WEST3	4.17	2.67
RCHO		RANCHO ROAD SYSTEM						
0000	E	60" RCP with 36" Orifice Plate	1183	161	RCHODB	WEST3	5.38	0.74
0025	E	321 ac-ft Rancho Road Detention Basin		3115	RCHOIN	WEST3	5.38	
0027	E	18,000 cfs PMF Spillway		18000	RCHOIN	WEST3	5.38	
0050	E	Energy Dissipator	90	402	CNW1A4-C	WEST3	0.51	
0052	E	Conc Chnl 10'W 10'D 0:1 SS	115	402	CNW1A4-C	WEST3	0.51	11.43
0054	E	10' X 5' RCB	128	402	CNW1A4-C	WEST3	0.51	0.50
0056	E	10' X 5' RCB	815	402	CNW1A4-C	WEST3	0.51	0.47
0071	E	72" RCP	3140	402	CNW1A4-C	WEST3	0.51	1.80

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

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

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

EXHIBIT C
(2 OF 3)

REGIONAL FLOOD CONTROL DISTRICT

2008 LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FACILITY INVENTORY
FIGURE F - 19

LEGEND

ID (Facility Identifier) AABB
Parent Stream Name
Stream Name
River Mile 0000
Distance Above Confluence with Parent Stream (Miles)
Miles in Hundredths

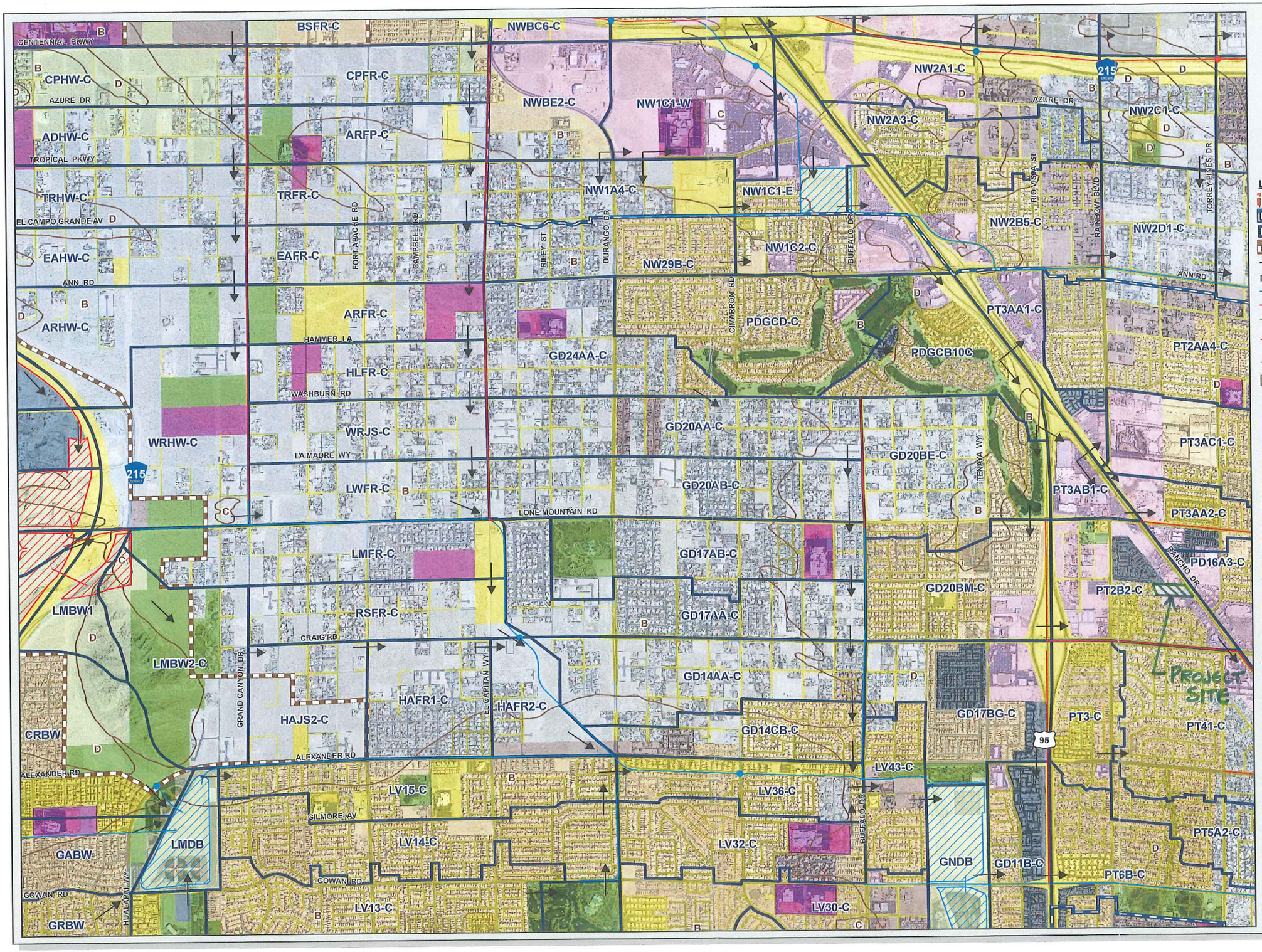
Existing Facility..... E
Proposed or Modified Facility..... P
Contingency Level
Category B..... P0
Master Plan..... P1
Preliminary Design..... P2
Design..... P3

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

Construction Features

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

PBS&J
PB



REGIONAL FLOOD CONTROL DISTRICT

2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE H-19

HYDROLOGIC SUMMARY

LEGEND

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

Flood Control Facilities

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

Type Hydrologic Soil Groups

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

Typical Land Use

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

* Drought Ordinance Applied

N

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

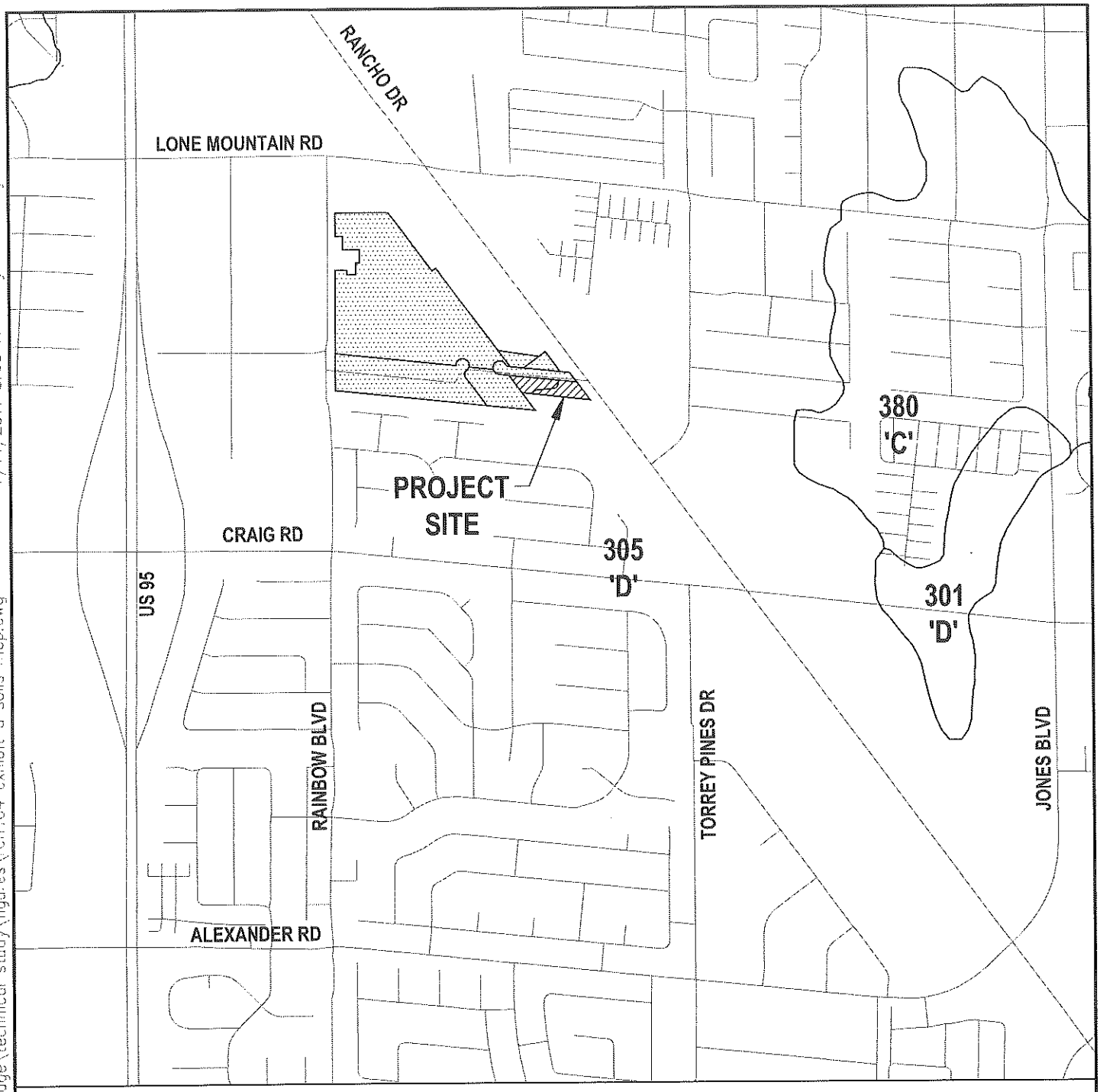
Scale: 1 inch = 2,000 feet

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

1	2	3							
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						

PBS&J PB

EXHIBIT C
(3 OF 3)



LEGEND

- PROJECT SITE
- OFFSITE DRAINAGE BASINS

0 1000 2000

SCALE – 1" = 1000' FEET

N

S-IG

J:\rci1104.000 firestone rancho-red coach\drainage\technical study\figures\rci1104 exhibit d soils map.dwg 7/14/2011 8:55 AM Kyle Rowbury

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

FIRESTONE

FIRESTONE AT RANCHO & RED COACH

SOILS MAP

DATE: 06/20/11	PROJECT NO. RCI1104.000
DRAFTER: KCR	
DESIGNER: KCR	EXHIBIT D
CHECKED: MJF	TDS

j:\rci1104.000 firestone rancho-red coach\drainage\technical study\figures\rci1104 exhibit e existing condition.dwg 7/20/2011 9:11 AM Kylie Rowbury

Flow Summary
Existing Condition

Subbasin ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
ON1U	0.58	1	0
ON2U	0.60	1	0
OF1D	17.20	37	16
OF2D	5.53	9	3
OF3U	1.78	3	1
OF4U	0.41	1	0
OF5D	0.36	1	1
RC1D	0.79	3	1
CP1 (OF1D + OF2D)	N/A	46	20
CP2 (OF4U + OF5D)	N/A	2	1
CP3 (CP1 + CP2 + OF3U + ON1U + RC1D)	N/A	54	23
CP4 (CP3 + ON2U)	N/A	55	23

N

0 150 300

SCALE – 1"=150' FEET

LEGEND

- BASIN BOUNDARY
- ON-D1 — BASIN ID
- FLOW DIRECTION
- PT1 — CONCENTRATION POINT

RAINBOW BLVD

OF1D

LONE MOUNTAIN APARTMENTS

OF2D

PAINTED DESERT DR

CP1

OF4U

OF5D

CP2

RED COACH AVE

RC1D

CP3

OF3U

EX. VALLEY GUTTERS

ON1U

ON2U

RANCHO DR

CP4

SUN VALLEY AUTOMOTIVE

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

FIRESTONE

FIRESTONE AT RANCHO & RED COACH
EXISTING CONDITION DRAINAGE MAP

DATE: 07/13/11
DRAFTER: KCR
DESIGNER: KCR
CHECKED: MJF
PROJECT NO. RCI1104.000

EXHIBIT E
SHEET 1 OF 1

j:\rci1104.000 firestone rancho-red coach\drainage\technical study\figures\rci1104 exhibit f proposed condition.dwg 7/20/2011 9:37 AM Kylie Rowbury

Perimeter Street Flow Summary Proposed/Ultimate Condition					
Section	Slope (%)	Q_{100} (cfs)	Depth (ft)	Velocity (fps)	VxD
SECTION A Red Coach Avenue Full Street *(Q = CP3)*	0.50	53.0	0.70	3.00	2.1

Flow Summary Proposed Condition			
Subbasin ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
ON1D	0.31	1	1
ON2D	0.87	3	1
OF1D	17.86	38	17
OF2D	5.53	9	3
OF3UA	0.53	1	0
OF3UB	1.25	2	1
OF4U	0.41	1	0
OF5D	0.36	1	1
RC1D	0.79	3	1
CP1 (OF1D + OF2D)	N/A	48	20
CP2 (OF4U + OF5D)	N/A	2	1
CP3 (CP1 + CP2 + OF3UA + ON1D + RC1D)	N/A	53	23
CP4 (CP3 + OF3UB + ON2D)	N/A	57	24

N

0 80 160

SCALE – 1"=80' FEET

LEGEND

- BASIN BOUNDARY
- ON-D1 — BASIN ID
- FLOW DIRECTION
- PT1 — CONCENTRATION POINT
- A — FLOWMASTER SECTION

OF1D
OF4U
OF5D
CP1
CP2
RED COACH AVE
RC1D
CP3
OF3UA
OF2D
ON1D
Firestone COMPLETE AUTO CARE
FF=2314.5
OF3UB
ON2D
CP4
RANCHO DR
SUN VALLEY AUTOMOTIVE
(3) 6.5'X1' RCB CULVERTS
2315
2314
2312
2310

*SEE EXHIBIT E FOR EXTENTS OF OFFSITE DRAINAGE BASINS

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

FIRESTONE

FIRESTONE AT RANCHO & RED COACH
PROPOSED CONDITION DRAINAGE MAP

DATE:	07/13/11
DRAFTER:	KCR
DESIGNER:	KCR
CHECKED:	MJF
PROJECT NO.	RCI1104.000

EXHIBIT F

SHEET 1 OF 1

Summary of Onsite Hydraulic Sections
Ultimate Condition

Section	Slope (%)	Q (cfs)	Flow Depth (ft)	Facility Depth (ft)	Top Width (ft)	Velocity (fps)	Section Description
Section 1 (Q = ½ON2D)	0.56	1.5	0.3	0.50	14.13	1.31	L-Curb
Section 2 (Q = ½ON2D)	0.56	1.5	0.35	0.50	5.88	1.87	L-Curb
Section 3 (Q = ½ON2D)	0.56	1.5	0.38	0.50	1.50	3.14	Curb Opening
Section 4 (Q = OF3DB)	1.00	4	0.77	2.00	3.10	3.33	Drainage Swale (10-ft Drainage Easement)
Section 5 (Q = ON2D)	12.00	3	0.18	0.20	8.98	3.72	Drainage Swale

Perimeter Street Flow Summary
Proposed/Ultimate Condition

Section	Slope (%)	Q_{100} (cfs)	Depth (ft)	Velocity (fps)	VxD
SECTION A Red Coach Avenue Full Street (Q = CP3)	0.50	53.0	0.70	3.00	2.1

Flow Summary
Ultimate Condition

Subbasin ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
ON1D	0.31	1	1
ON2D	0.87	3	1
OF1D	17.86	38	17
OF2D	5.53	9	3
OF3DA	0.53	2	1
OF3DB	1.25	4	2
OF4D	0.41	1	1
OF5D	0.36	1	1
RC1D	0.79	3	1
CP1 (OF1D + OF2D)	N/A	48	20
CP2 (OF4D + OF5D)	N/A	2	1
CP3 (CP1 + CP2 + OF3DA + ON1D + RC1D)	N/A	53	23
CP4 (CP3 + OF3DB + ON2D)	N/A	59	26

N

0 80 160
SCALE – 1"=80' FEET

LEGEND
- BASIN BOUNDARY
- ON-D1 — BASIN ID
- FLOW DIRECTION
- PT1 — CONCENTRATION POINT
- A — FLOWMASTER SECTION

OF1D*
OF4D
OF5D
CP1
CP2
RED COACH AVE
RC1D
CP3
OF3DA
OF2D*
ON1D
Firestone COMPLETE AUTO CARE
FF=2314.5
OF3DB
ON2D
RANCHO DR
CP4
SUN VALLEY AUTOMOTIVE
(3) 6.5'x1' RCB CULVERTS
*SEE EXHIBIT E FOR EXTENTS OF OFFSITE DRAINAGE BASINS

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

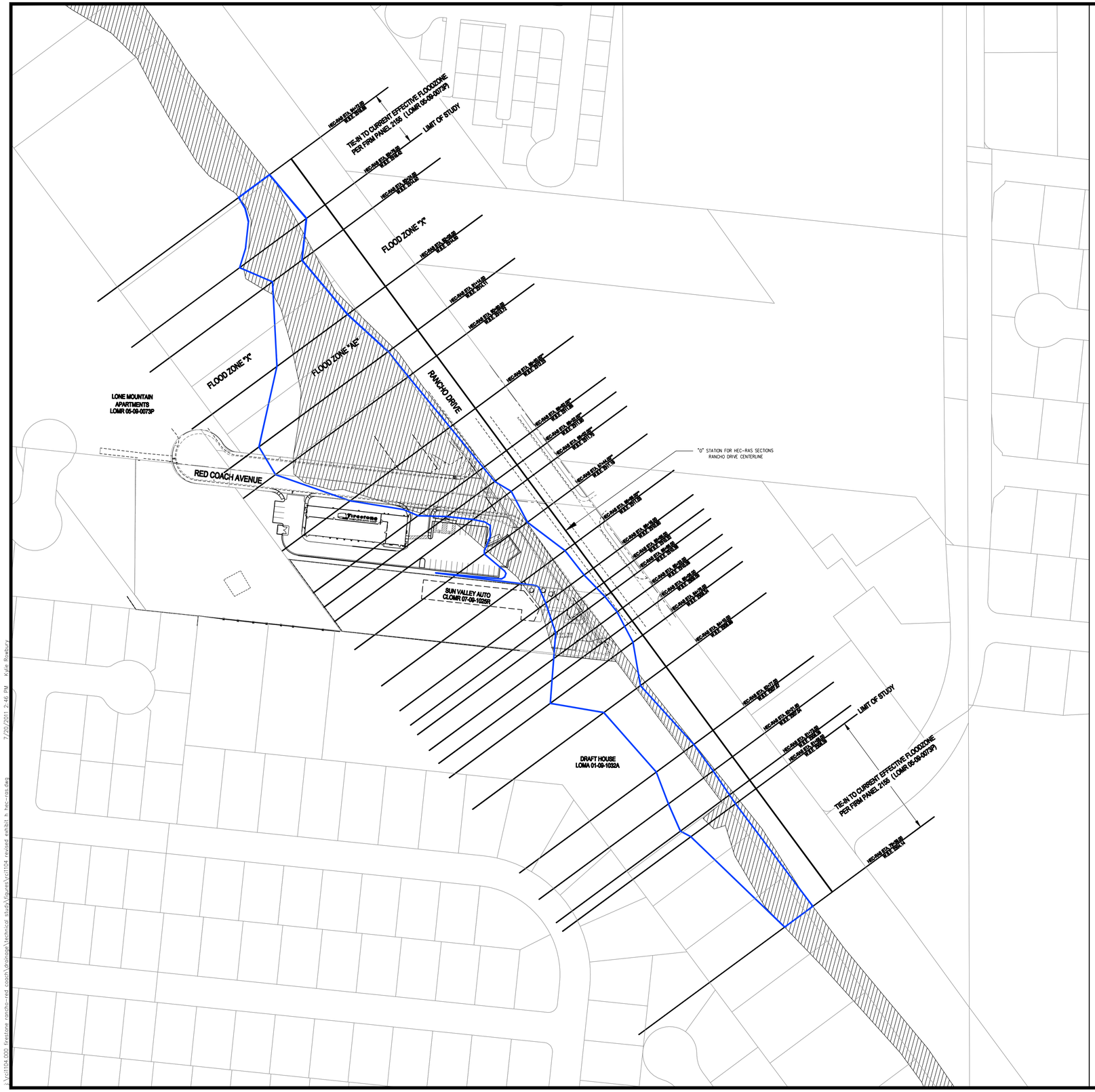
FIRESTONE

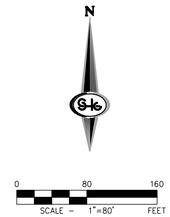
FIRESTONE AT RANCHO & RED COACH
ULTIMATE CONDITION DRAINAGE MAP

DATE:	07/13/11
DRAFTER:	KCR
DESIGNER:	KCR
CHECKED:	MJF
PROJECT NO.	RCI1104.000

EXHIBIT G
SHEET 1 OF 1

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LEGEND

HEC-RAS STA. 87+44.00 W.S.E. 2310.72	HEC-RAS SECTION
••	SECTION GEOMETRY PER FIRESTONE PROPOSED GRADING
	PROPOSED FLOODZONE
	CURRENT EFFECTIVE FLOODZONE

HEC-RAS Analysis Comparison
FEMA Effective vs. Proposed

HEC-RAS Station	Sun Valley Auto[2] *CLOMR 07-09-1025R* WSE (ft)	Draft House[2] *LOMA 01-09-1032A* WSE (ft)	FEMA Effective[1] *LOMR 05-09-0073P* WSE (ft)	Proposed Condition WSE (ft)	Δ WSE (ft) Proposed - FEMA Effective
94+72.00	–	–	2316.66	TIE-IN	0.00
93+76.00	–	–	2316.40	2316.42	0.02
93+24.00	–	–	2314.81	2314.86	0.05
92+05.00	–	–	2314.25	2314.50	0.25
91+14.00	–	–	2314.20	2314.11	-0.09
90+60.00	–	–	2314.12	2313.72	-0.40
89+50.00	2312.84	–	2313.74	2312.23	-1.51
88+62.00	2312.08	–	N/A	2311.85	N/A
88+32.00	2311.70	–	N/A	2311.90	N/A
88+02.00	2311.40	–	N/A	2311.70	N/A
87+44.00	2311.11	–	N/A	2311.19	N/A
86+68.00	2311.02	–	2311.03	2311.03	0.00
86+16.00	2310.60	–	N/A	2310.60	N/A
85+86.00	2310.31	–	N/A	2310.32	N/A
85+66.00	2310.36	–	N/A	2310.36	N/A
85+33.00	2310.07	–	N/A	2310.08	N/A
85+06.00	2309.08	–	N/A	2309.09	N/A
84+76.00	2309.06	–	2309.37	2309.24	-0.13
84+10.00	–	2308.88	2308.72	2308.89	0.17
82+77.00	–	2307.78	2307.57	2307.67	0.10
82+21.80	–	2307.11	N/A	2307.04	N/A
81+73.00	–	2306.33	N/A	2306.28	N/A
81+55.00	–	2306.43	2306.61	2306.29	-0.32
79+39.00	–	2304.59	2304.14	TIE-IN	0.00

1 - Referenced from the Lone Mountain Apartments Study and associated LOMR 05-09-0073P.
2 - For informational purposes only. Only the FEMA Effective model has been used for comparison with the proposed model.

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

FIRESTONE

FIRESTONE AT RANCHO & RED COACH
HEC-RAS EXHIBIT

DATE: 07/20/11
DRAFTER: KCR
DESIGNER: KCR
CHECKED: MJF

PROJECT NO.
RCI1104.000

EXHBIT H
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APPENDIX B

Precipitation, Curve Number and Lag Time Data

Precipitation Data

NOTES

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

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

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

USE THIS SCALE(FEET) WHEN MAP REDUCED FROM 11X17 ORIGINAL

0 100 200 400 600 800

MAP LEGEND

- PARCEL BOUNDARY
- SUB BOUNDARY
- PM/LD BOUNDARY
- ROAD EASEMENT
- MATCH / LEADER LINE
- HISTORIC LOT LINE
- HISTORIC SUB BOUNDARY
- HISTORIC PM/LD BOUNDARY
- SECTION LINE
- CONDOMINIUM UNIT
- AIR SPACE PCL
- RIGHT OF WAY PCL
- SUB-SURFACE PCL
- 001 ROAD PARCEL NUMBER
- 001 PARCEL NUMER
- 1.00 ACREAGE
- 202 PARCEL SUB/SEQ NUMBER
- PB 24-45 PLAT RECORDING NUMBER
- 5 BLOCK NUMBER
- 5 LOT NUMBER
- GL5 GOV. LOT NUMBER

ASSESSOR'S PARCELS - CLARK CO., NV.
Michele W. Shafe - Assessor

BOOK T20S R60E | SEC. 2 | MAP S 2 NW 4 | 138-02-2

099	100	101	102
126	125	124	123
137	138	139	140
164	163	162	161

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

8	4	8	4
5	1	5	1
6	2	6	2
7	3	7	3
8	4	8	4
5	1	5	1

Scale: 1" = 200' | Rev: 03/31/2011

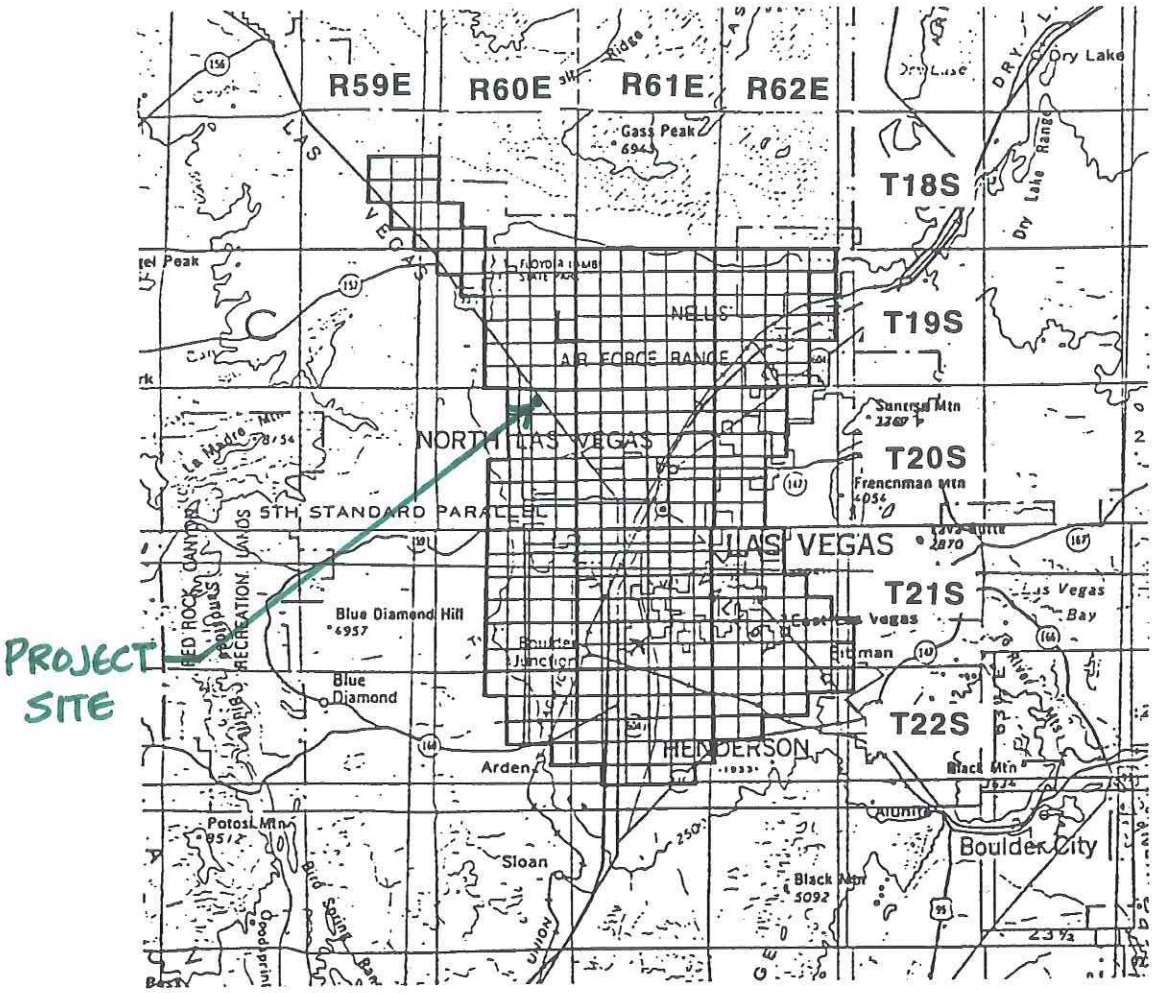
CLARK COUNTY ASSESSOR'S OFFICE NEVADA

PROJECT SITE

PAINTED DESERT DR
MESSENGER CT
PB 31-83
ROMANCE CIR
PM 36-36
PM 111-12
RANCHO PINES
PB 105-58
TORREY PINES DR
RAINBOW BLVD
BEDFORD VILLAGE WEST UNIT NO 2
STUCKER DR
WHEELBARROW PEAK DR
PM 28-64
PM 63-88
U S HIGHWAY NO 95
RANCHO DR
RHINELANDER DR
MCBRIDE DR
NARIT DR
MIDWAY LN
PB 29-81
LONE MOUNTAIN ESTATES-UNIT NO 1
DOBY PEAK DR
LOOKOUT PEAK WAY
CRAIG ROAD
BEDFORD VILLAGE WEST UNIT NO 1
PB 25-90
FAITH PEAK DR
JADESTONE AVE
CARIBOU WAY
RANCHO DRIVE CENTER
PB 54-24
CRAIG RD
JADE PARK UNIT NO 1

TAX DIST 200

McCARRAN AIRPORT RAINFALL AREA



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

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

Revision	Date

WRC ENGINEERING

REFERENCE:
USACE, Los Angeles District, 1988

FIGURE 513

DEPTH-DURATION-FREQUENCY VALUES FOR McCARRAN AIRPORT RAINFALL AREA

(IN INCHES)

	RECURRENCE INTERVAL					
TIME	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.

HEC-1 RATIO = $\frac{1.58}{2.77} = 0.57$

Revision	Date

WRC ENGINEERING

REFERENCE: USACE, Los Angeles District, 1988

TABLE 505

SIX-HOUR STORM DISTRIBUTIONS

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

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

Curve Number Data

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

Soil & Curve Number Computation

Project Name: Firestone at Rancho & Red Coach
Date: 6/20/2011
File Name: RCI1104 H&H Forms.xls
By: KCR

Data:

Reference:

Project is located in the following soil types:

		Soil Group:
305	Las Vegas-Destazo complex, 0 to 2 percent	
60%	Las Vegas	D
25%	Destazo	B
5%	Bluepoint	A
5%	Glencarb	C
5%	Skyhaven	C

Exhibit G
SCS Soil Data

Hydrologic Soil Group	Desert Shrub (Poor Condition)	Commercial & Business & High Density Residential	Apartments Condos	Residential (10,000 sq ft lots)	Streets & Roads (w/curb & gutter)
A	63	89	81	61	98
B	77	92	88	75	98
C	85	94	91	83	98
D	88	95	93	87	98
Composite	**83.7**	**93.9**	**91.0**	**82.3**	**98.0**

Onsite

Subbasin	Soil Type	% Area	Land Use	CN	Area (Acres)	Composite CN
ON1U	305	100.0%	Desert Shrub	83.7	0.58	83.7
ON1D	305	100.0%	Commercial	93.9	0.31	93.9
ON2U	305	100.0%	Desert Shrub	83.7	0.60	83.7
ON2D	305	100.0%	Commercial	93.9	0.87	93.9

Offsite

Subbasin	Soil Type	% Area	Land Use	CN	Area (Acres)	Composite CN
OF1D	305	100.0%	Apartments	91.0	17.20	91.0
OF2D	305	100.0%	Residential	82.3	5.53	82.3
OF3U	305	100.0%	Desert Shrub	83.7	1.78	83.7
OF3UA	305	100.0%	Desert Shrub	83.7	0.53	83.7
OF3UB	305	100.0%	Desert Shrub	83.7	1.25	83.7
OF3DA	305	100.0%	Commercial	93.9	0.53	93.9
OF3DB	305	100.0%	Commercial	93.9	1.25	93.9
OF4U	305	100.0%	Desert Shrub	83.7	0.41	83.7
OF4D	305	100.0%	Commercial	93.9	0.41	93.9
OF5D	305	100.0%	Commercial	93.9	0.36	93.9
RC1D	305	100.0%	Streets & Roads	98.0	0.79	98.0

5740 S. Arville St., Suite 216 - Las Vegas, NV 89118
Ph. 702-284-5300 - Fx. 702-284-5399

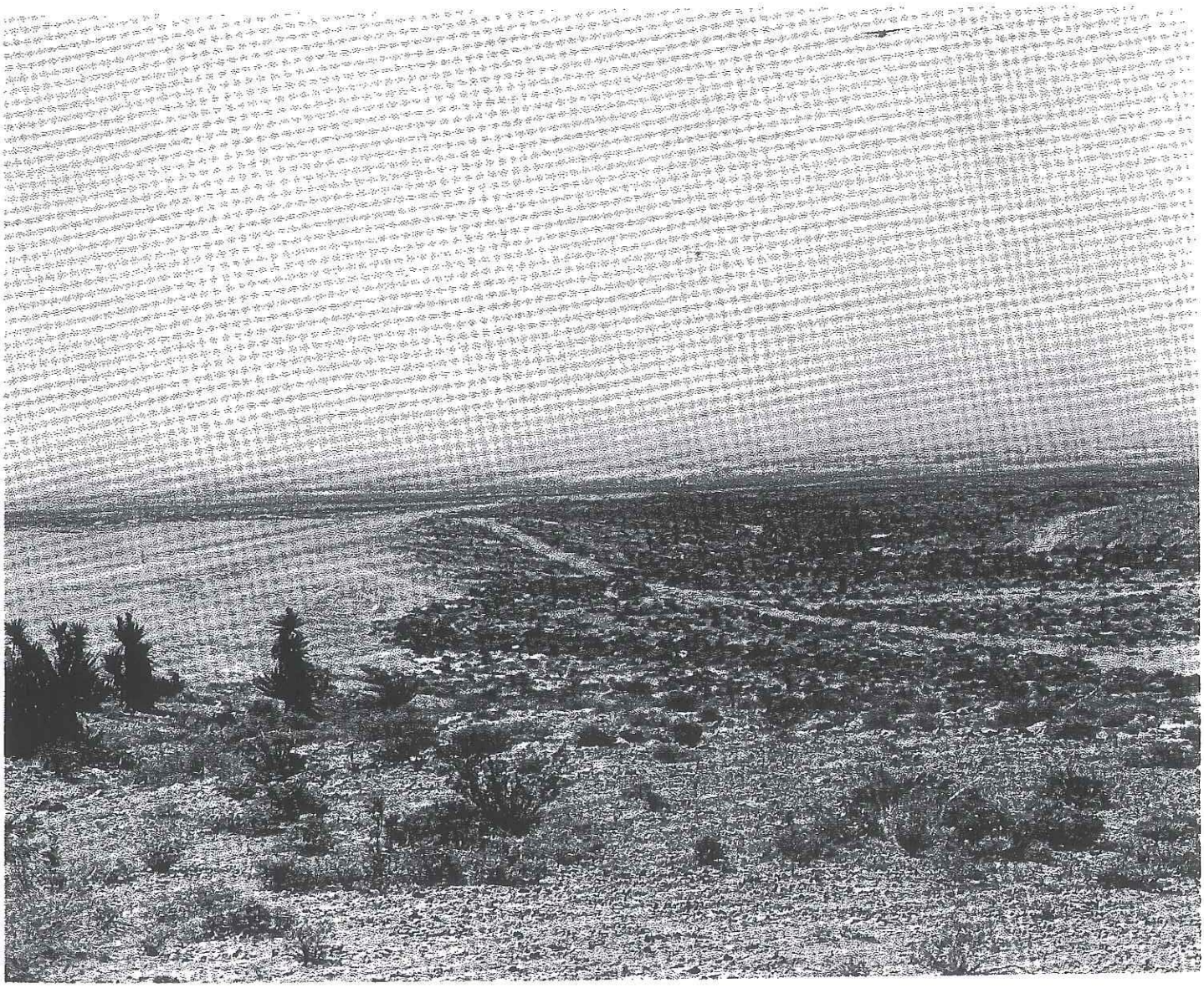
United States Department of Agriculture

Soil Conservation Service

In cooperation with United States Department of the Interior, Bureau of Land Management, and University of Nevada Agricultural Experiment Station

Soil Survey of Las Vegas Valley Area Nevada

Part of Clark County



plants. Because of the content of gypsum and other salts in the soil, salt-tolerant plants should be selected. Excessive irrigation can dissolve gypsum in the soil and cause subsidence. Lawn grasses, shrubs, and trees that are not sensitive to lime-induced chlorosis are well suited to use in landscaping. Annual applications of iron chelates reduce the effects of chlorosis.

This map unit is in capability subclass VIIs, nonirrigated. The Las Vegas soil is in horticultural group 6, the McCarran soil is in horticultural group 4, and the Grapevine soil is in horticultural group 2.

305—Las Vegas-Destazo complex, 0 to 2 percent slopes. This map unit is on relict alluvial flats.

This unit is 60 percent Las Vegas gravelly fine sandy loam, 0 to 2 percent slopes, and 25 percent Destazo fine sandy loam, 0 to 2 percent slopes. These soils are in a random pattern on a relict surface and are topographically indistinguishable. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 5 percent Bluepoint soils on small sand sheets, 5 percent Glencarb soils on recent alluvial flats, and 5 percent Skyhaven soils on the relict alluvial flats. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Las Vegas soil is shallow and well drained. It formed in alluvium derived dominantly from limestone, dolomite, and some lacustrine sediment that has a high content of lime. Typically, about 25 percent of the surface is covered with a desert pavement of hardpan fragments and pebbles. The surface layer is very pale brown gravelly fine sandy loam about 2 inches thick. The upper 6 inches of the underlying material is very pale brown fine sandy loam, and the next 4 inches is very pale brown gravelly sandy clay loam and gravelly loam. An indurated, lime-cemented hardpan is at a depth of about 12 inches. Depth to the hardpan ranges from 3 to 14 inches.

Permeability of the Las Vegas soil is moderately slow above the hardpan. Available water capacity is very low. Effective rooting depth is 3 to 14 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is subject to rare periods of flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

The Destazo soil is very deep and well drained. It formed in alluvium derived dominantly from limestone, dolomite, and sediment that has a high content of lime. Typically, about 25 percent of the surface is covered with a desert pavement of pebbles and lime nodules. The surface layer is very pale brown fine sandy loam about 11 inches thick. The upper 40 inches of the underlying material is stratified very pale brown to white very gravelly to extremely gravelly sandy clay loam, averaging very gravelly sandy clay loam, and the lower part to a depth of 62 inches is light brown sandy loam.

Permeability of the Destazo soil is moderately slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is subject to rare periods of flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

This unit is used mainly as habitat for desert wildlife and for recreation. It is also used for urban development.

The main limitations for construction of dwellings are the hazard of flooding and the limited depth to the hardpan in the Las Vegas soil. Dikes and channels that have outlets for floodwater can be used to protect buildings from flooding. Excavation for building sites is limited by the hardpan. Heavy equipment is needed for excavation.

The main limitations for septic tank absorption fields are the limited depth to the hardpan in the Las Vegas soil and the restricted permeability of the Destazo soil. Special design of septic tank absorption fields is needed. Heavy equipment is needed for excavation. Using long absorption lines and backfilling the trench with sandy material help to compensate for the restricted permeability.

This unit is limited for roads because of the limited depth to the hardpan in the Las Vegas soil. Roads should be designed to minimize cuts. Heavy equipment is needed for excavation.

The main limitations for lawns and landscaping are the limited depth to the hardpan in the Las Vegas soil and the moderate available water capacity of the Destazo soil. It is difficult to establish plants in areas where the pan is exposed. Mulching and fertilizing cut areas help to establish plants. Frequent irrigation of lawns, gardens, and most other plantings is needed because of the limited available water capacity of the soil. Lawn grasses, shrubs, and trees that are not sensitive to lime-induced chlorosis are well suited to use in landscaping. Annual applications of iron chelates reduce the effects of chlorosis.

This map unit is in capability subclass VIIs, nonirrigated. The Las Vegas soil is in horticultural group 6, and the Destazo soil is in horticultural group 2.

307—Las Vegas-Skyhaven complex, 0 to 4 percent slopes. This map unit is on relict alluvial flats.

This unit is 60 percent Las Vegas gravelly fine sandy loam, 0 to 4 percent slopes, and 30 percent Skyhaven very fine sandy loam, 0 to 4 percent slopes. The Las Vegas and Skyhaven soils are in a random pattern on relict alluvial flats and are topographically indistinguishable. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding		High water table		Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Months	Depth	Months	Depth	Thickness	Depth	Hardness	Uncoated steel	Concrete
				Ft		In		In			
270---------- Land	B	Rare--------	---	3.5-6.0	Mar-Sep	>60	---	---	---	High------	High.
278---------- Land	D	Rare--------	---	1.5-3.0	Jan-Dec	>60	---	---	---	High------	High.
282---------- Land	C	Rare--------	---	3.0-3.5	Jan-Dec	>60	---	---	---	High------	High.
300, 301---------- Las Vegas	D	Rare--------	---	>6.0	---	>60	---	3-14	Thick	High------	High.
302*:											
Las Vegas--------	D	Rare--------	---	>6.0	---	>60	---	3-14	Thick	High------	High.
McCarran---------	B	Rare--------	---	>6.0	---	>60	---	---	---	High------	High.
Grapevine--------	B	Rare--------	---	>6.0	---	>60	---	---	---	High------	High.
305*:											
Las Vegas--------	D	Rare--------	---	>6.0	---	>60	---	3-14	Thick	High------	High.
Destazo----------	B	Rare--------	---	>6.0	---	>60	---	---	---	High------	High.
307*:											
Las Vegas--------	D	Rare--------	---	>6.0	---	>60	---	3-14	Thick	High------	High.
Skyhaven---------	C	Rare--------	---	>6.0	---	>60	---	24-40	Thick	High------	High.
325, 326---------- McCarran	B	Rare--------	---	>6.0	---	>60	---	---	---	High------	High.
341---------- Paradise	C	Rare--------	---	3.0-5.0	Dec-Mar	>60	---	---	---	High------	Low.
360*:											
Rock outcrop.											
St. Thomas-------	D	None--------	---	>6.0	---	4-20	Hard	---	---	High------	Low.
380---------- Skyhaven	C	Rare--------	---	>6.0	---	>60	---	24-40	Thick	High------	High.
390---------- Spring	C	Rare--------	---	>6.0	---	>60	---	---	---	High------	High.
400---------- Tencee	D	None--------	---	>6.0	---	>60	---	7-20	Thick	High------	Low.
415---------- Aztec	B	None--------	---	>6.0	---	>60	---	---	---	High------	High.
417*:											
Aztec----------	B	None--------	---	>6.0	---	>60	---	---	---	High------	High.
Rock outcrop.											
418*:											
Aztec----------	B	None--------	---	>6.0	---	>60	---	---	---	High------	High.
Nickel----------	B	None--------	---	>6.0	---	40-60	Hard	---	---	High------	Low.
Knob Hill--------	B	None--------	---	>6.0	---	>60	---	---	---	High------	Low.

See footnote at end of table.

RUNOFF CURVE NUMBERS
(URBAN AREAS[1])

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					

See Table 602A

Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)[5]		77	86	91	94

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system. Impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using Figure 603.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using Figure 603 based on the impervious area percentage (CN #98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using Figure 603 based on the degree of development impervious area percentage) and the CN's for the newly graded pervious areas.

Revision	Date

RUNOFF CURVE NUMBERS
(SEMIARID RANGELANDS[1])

Cover description		Curve numbers for hydrologic soil group—			
Cover type	Hydrologic condition[2]	A[3]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
* Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

[1]Average runoff condition, and I_a = 0.2S.

[2]*Poor:* <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: >70% ground cover.

[3]Curve numbers for group A have been developed only for desert shrub.

Revision	Date

RUNOFF CURVE NUMBERS - RESIDENTIAL DISTRICTS

Average Lot Size or Usage[1]	Percent Impervious[2]	Curve Number for Hydrologic Soil Groups			
		A	B	C	D
Apartments/Condos	72	81	88	91	93
Townhouses/6,000 sq ft lots or less[3]	69	80	87	90	92
7,000 sq ft lots	63	76	84	89	91
8,000 sq ft lots	58	73	82	88	90
10,000 sq ft lots	38	61	75	83	87
14,000 sq ft lots	30	57	72	81	86
20,000 sq ft lots	25	54	70	80	85
40,000 sq ft lots	20	51	68	79	84
80,000 sq ft lots	12	46	65	77	82

1 Lot size should represent the size of the average lot and not the gross acreage divided by the number of lots.

2 Actual percent impervious value should be compared to selected land use type.

3 In cases where average residential lots are smaller than 6,000 sq ft, commercial/business/industrial land use should be used.

Revision	Date

REFERENCE:

TABLE 602A

Lag Time Data

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
TIME OF CONCENTRATION

Project Name: Firestone at Rancho & Red Coach
Description: Hydrologic Conditions
File Name: RCI1104 H&H Forms.xls
By: KCR
Date: 6/20/2011

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check Urbanized Basins		Tlag
DESIG:	DEV./EX. (D or E)	CN	K [1]	AREA Ac	AREA Mi^2 [2]	INITIAL LENGTH Feet	SLOPE %	Ti Min [3]	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS [4]	V2 VELOCITY FPS [5]	Tt Min [6]	Tc Calc. [7]	Total Length Feet [8]	Tc Check [9]	Tlag Hours [10]
ON1U	E	83.7	0.715	0.58	0.0009	100	1.00	6.93	230	0.50	1.05	2.08	3.66	10.60			0.106
ON1D	D	93.9	0.849	0.31	0.0005	40	1.00	2.85	335	0.50	1.43	2.16	3.91	6.76	375	12.083	0.068
ON2U	E	83.7	0.715	0.60	0.0009	100	1.00	6.93	390	0.50	1.05	2.08	6.21	13.14			0.131
ON2D	D	93.9	0.849	0.87	0.0014	60	1.00	3.49	460	1.30	2.30	3.49	3.33	6.82	520	12.889	0.068
OF1D	D	91.0	0.811	17.20	0.0269	100	1.00	5.20	1630	0.50	1.43	2.16	14.54	19.74	1730	19.611	0.196
OF2D	D	82.3	0.696	5.53	0.0086	20	2.00	2.58	1030	0.50	1.43	2.16	9.92	12.50	1050	15.833	0.125
OF3U	E	83.7	0.715	1.78	0.0028	100	1.00	6.93	420	0.50	1.05	2.08	6.69	13.62			0.136
OF3UA	E	83.7	0.715	0.53	0.0008	100	1.00	6.93	270	0.50	1.05	2.08	4.30	11.23			0.112
OF3UB	E	83.7	0.715	1.25	0.0020	100	1.00	6.93	340	0.50	1.05	2.08	5.41	12.35			0.123
OF3DA	D	93.9	0.849	0.53	0.0008	100	1.00	4.51	270	0.50	1.43	2.16	3.15	7.66	370	12.056	0.077
OF3DB	D	93.9	0.849	1.25	0.0020	100	1.00	4.51	340	0.50	1.43	2.16	3.97	8.48	440	12.444	0.085
OF4U	E	83.7	0.715	0.41	0.0006	100	1.00	6.93	280	0.50	1.05	2.08	4.46	11.39			0.114
OF4D	D	93.9	0.849	0.41	0.0006	100	1.00	4.51	280	0.50	1.43	2.16	3.27	7.78	380	12.111	0.078
OF5D	D	93.9	0.849	0.36	0.0006	100	1.00	4.51	120	0.50	1.43	2.16	1.40	5.91	220	11.222	0.059
RC1D	D	98.0	0.904	0.79	0.0012	25	2.00	1.40	590	0.50	1.43	2.16	6.53	7.93	615	13.417	0.079

[1] K = 0.0132 (CN) - 0.39
[2] A = Area/640
[3] Ti = (1.8 (1.1-K) L^0.5)/S^0.33
[4] For Existing Conditions: V1 = 14.8 * (S/100)^0.5
For Developed Conditions: V1 = 20.2 * (S/100)^0.5
[5] For Existing Conditions: V2 = 29.4 * (S/100)^0.5
For Developed Conditions: V2 = 30.6 * (S/100)^0.5
[6] Tt = L/(60*V)
[7] Tc = Ti + Tt
[8] Total L = Initial L + Travel L
[9] Tc = (L/180) + 10
[10] Tlag = (0.6*Tc)/60
[11] Min Tlag =0.05

Note: For Travel Time Calcs: V1 applies to first 500 feet and V2 applies to remaining distance.

REFERENCE :

STANDARD FORM 4

APPENDIX C

HEC-1 Analyses

Existing Condition

```
1****************************************
****************************************
 *                                      *                                      *
 *                                      *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                      *    U.S. ARMY CORPS OF ENGINEERS
 *                                      *                                      *
 *              JUN   1998              *                                      *    HYDROLOGIC ENGINEERING CENTER
 *                                      *                                      *
 *           VERSION 4.1                *                                      *          609 SECOND STREET
 *                                      *                                      *
 *                                      *                                      *       DAVIS, CALIFORNIA 95616
 *                                      *                                      *
 *  RUN DATE   13JUL11  TIME  15:33:12  *                                      *          (916) 756-1104
 *                                      *                                      *
 *                                      *                                      *
 ****************************************
****************************************
```

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

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

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


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

              *DIAGRAM
    1         ID     SLATER HANIFAN GROUP
    2         ID     FIRESTONE
    3         ID     FIRESTONE AT RANCHO & RED COACH
    4         ID     TECHNICAL DRAINAGE STUDY
    5         ID     EXISTING DRAINAGE CONDITIONS
    6         ID
    7         ID     RETURN PERIOD ------- 100 & 10-YEAR
    8         ID     DISTRIBUTION -------- 6-HOUR SDN3
    9         ID     PROJECT NO. --------- RCI1104.000
   10         ID     FILENAME ------------ RRC_EX.H1
   11         ID     DATE ---------------- 06/22/11
   12         ID     MODELED BY ---------- KCR
   13         ID
   14         ID        SIX HOUR DEPTH-AREA REDUCTION FACTORS
   15         ID        DRAINAGE AREA (MI^2)    DARF
   16         ID        100-YR                  1.00
   17         ID        10-YR                   0.57
   18         ID
   19         IT       5       0       0     300
   20         IO       5       0       0
   21         IN       5       0       0
   22         JR    PREC    1.00    0.57
              *
   23         KK    OF1D
   24         KM    OFFSITE DEVELOPED SUBBASIN OF1D (LONE MOUNTAIN APARTMENTS)
   25         KM    DISCHARGES AS SURFACE FLOW INTO RED COACH AVENUE
   26         BA    .0269
   27         PB    2.77
   28         PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   29         PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   30         PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   31         PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   32         PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   33         PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   34         PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   35         PC   0.998   0.999       1
   36         LS       0    91.0
   37         UD   0.196
              *
   38         KK    OF2D
   39         KM    OFFSITE DEVELOPED SUBBASIN OF2D (ALONG PAINTED DESERT DR)
   40         KM    DISCHARGES AS SURFACE FLOW INTO RED COACH AVENUE
   41         BA    .0086
   42         LS       0    82.3
   43         UD   0.125
```

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

  44      KK    CP1
  45      KM   COMBINE OF1D AND OF2D
  46      KM   TOTAL FLOW IN RED COACH AVE AT CUL-DE-SAC
  47      HC       2
          *
  48      KK    OF4U
  49      KM   OFFSITE UNDEVELOPED SUBBASIN OF4U
  50      KM   DISCHARGES THRU SUBBASIN OF5D TO RED COACH AVE
  51      BA   .0006
  52      LS       0    83.7
  53      UD   0.114
          *
  54      KK    OF5D
  55      KM   OFFSITE DEVELOPED SUBBASIN OF5D (PAINTED DESERT ANIMAL HOSPITAL)
  56      KM   DISCHARGES AS SURFACE FLOW INTO RED COACH AVENUE
  57      BA   .0006
  58      LS       0    93.9
  59      UD   0.059
          *
  60      KK    CP2
  61      KM   COMBINE OF4U AND OF5D
  62      KM   SURFACE FLOW TO RED COACH FROM NORTH
  63      HC       2
          *
  64      KK    OF3U
  65      KM   OFFSITE UNDEVELOPED SUBBASIN OF3U
  66      KM   DISCHARGES TO RED COACH AVENUE
  67      BA   .0028
  68      LS       0    83.7
  69      UD   0.136
          *
  70      KK    ON1U
  71      KM   ONSITE UNDEVELOPED SUBBASIN ON1U
  72      KM   DISCHARGES AS SURFACE FLOW TO RED COACH AVE
  73      BA   .0009
  74      LS       0    83.7
  75      UD   0.106
          *
  76      KK    RC1D
  77      KM   RED COACH AVENUE DEVELOPED SUBBASIN RC1D
  78      KM   FLOW GENERATED BY RED COACH AVE
  79      BA   .0012
  80      LS       0    98.0
  81      UD   0.079
          *
```



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

  82      KK     CP3
  83      KM   COMBINE CP1, CP2, OF3U, ON1U AND RC1D
  84      KM   TOTAL FLOW IN RED COACH AVE AT LOW POINT
  85      HC       5
          *
  86      KK    ON2U
  87      KM   ONSITE UNDEVELOPED SUBBASIN ON2U
  88      KM   DISCHARGES AS SURFACE FLOW TO EXISTING VALLEY GUTTER
  89      BA   .0009
  90      LS       0    83.7
  91      UD   0.131
          *
  92      KK     CP4
  93      KM   COMBINE CP3 AND ON2U
  94      KM   TOTAL FLOW IN EXISTING VALLEY GUTTER
  95      HC       2
          *
  96      ZZ
```

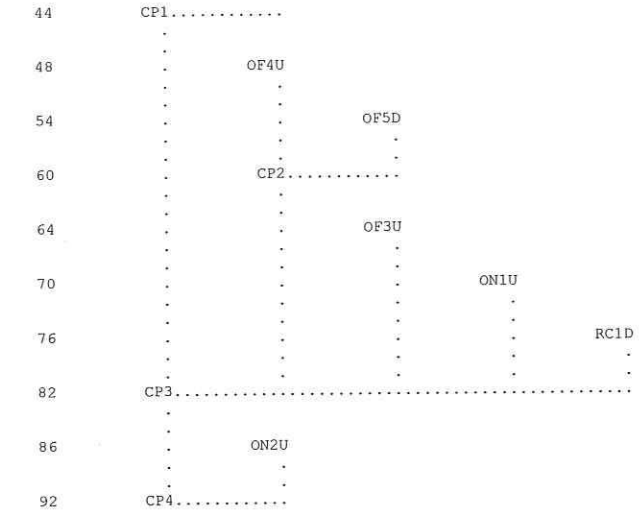
1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

 23        OF1D
             .
             .
 38          .        OF2D
             .           .
             .           .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*****************************************
 *                                       *                                       *
 *                                       *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *    U.S. ARMY CORPS OF ENGINEERS       *
 *                                       *                                       *
 *               JUN   1998              *    HYDROLOGIC ENGINEERING CENTER      *
 *                                       *                                       *
 *            VERSION 4.1                *         609 SECOND STREET             *
 *                                       *                                       *
 *                                       *       DAVIS, CALIFORNIA 95616         *
 *                                       *                                       *
 *  RUN DATE   13JUL11  TIME  15:33:12   *           (916) 756-1104              *
 *                                       *                                       *
 *                                       *                                       *
 *****************************************
*****************************************
```

```
SLATER HANIFAN GROUP
FIRESTONE
FIRESTONE AT RANCHO & RED COACH
TECHNICAL DRAINAGE STUDY
EXISTING DRAINAGE CONDITIONS

RETURN PERIOD ------- 100 & 10-YEAR
DISTRIBUTION -------- 6-HOUR SDN3
PROJECT NO. --------- RCI1104.000
FILENAME ------------ RRC_EX.H1
DATE ---------------- 06/22/11
MODELED BY ---------- KCR

   SIX HOUR DEPTH-AREA REDUCTION FACTORS
   DRAINAGE AREA (MI^2)     DARF
   100-YR                   1.00
   10-YR                    0.57
```

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

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

                COMPUTATION INTERVAL      .08 HOURS
                    TOTAL TIME BASE   24.92 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
```

SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
1.00 .57

1

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .57
HYDROGRAPH AT						
+	OF1D	.03	1	FLOW	37.	16.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	OF2D	.01	1	FLOW	9.	3.
				TIME	3.58	3.58
2 COMBINED AT						
+	CP1	.04	1	FLOW	46.	20.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	OF4U	.00	1	FLOW	1.	0.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	OF5D	.00	1	FLOW	1.	1.
				TIME	3.50	3.50
2 COMBINED AT						
+	CP2	.00	1	FLOW	2.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	OF3U	.00	1	FLOW	3.	1.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	ON1U	.00	1	FLOW	1.	0.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	RC1D	.00	1	FLOW	3.	1.
				TIME	3.50	3.50
5 COMBINED AT						
+	CP3	.04	1	FLOW	54.	23.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	ON2U	.00	1	FLOW	1.	0.
				TIME	3.58	3.58
2 COMBINED AT						
+	CP4	.04	1	FLOW	55.	23.
				TIME	3.58	3.58

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

Proposed Condition

```
1*****************************************
*****************************************
 *                                       *
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *                                       *
 *               JUN   1998              *
 *                                       *
 *            VERSION 4.1                *
 *                                       *
 *                                       *
 *                                       *
 *  RUN DATE   13JUL11  TIME  15:40:27   *
 *                                       *
 *                                       *
 *                                       *
 *****************************************
*****************************************
```

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

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

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

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

1 HEC-1 INPUT

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

              *DIAGRAM
    1         ID     SLATER HANIFAN GROUP
    2         ID     FIRESTONE
    3         ID     FIRESTONE AT RANCHO & RED COACH
    4         ID     TECHNICAL DRAINAGE STUDY
    5         ID     PROPOSED DRAINAGE CONDITIONS
    6         ID
    7         ID     RETURN PERIOD ------- 100 & 10-YEAR
    8         ID     DISTRIBUTION -------- 6-HOUR SDN3
    9         ID     PROJECT NO. --------- RCI1104.000
   10         ID     FILENAME ------------ RRC_PROP.H1
   11         ID     DATE ---------------- 06/22/11
   12         ID     MODELED BY ---------- KCR
   13         ID
   14         ID        SIX HOUR DEPTH-AREA REDUCTION FACTORS
   15         ID        DRAINAGE AREA (MI^2)     DARF
   16         ID        100-YR                   1.00
   17         ID        10-YR                    0.57
   18         ID
   19         IT       5       0       0     300
   20         IO       5       0       0
   21         IN       5       0       0
   22         JR    PREC    1.00    0.57
              *
   23         KK    OF1D
   24         KM    OFFSITE DEVELOPED SUBBASIN OF1D (LONE MOUNTAIN APARTMENTS)
   25         KM    DISCHARGES AS SURFACE FLOW INTO RED COACH AVENUE
   26         BA    .0279
   27         PB     2.77
   28         PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   29         PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   30         PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   31         PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   32         PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   33         PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   34         PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   35         PC   0.998   0.999       1
   36         LS       0    91.0
   37         UD   0.196
              *
   38         KK    OF2D
   39         KM    OFFSITE DEVELOPED SUBBASIN OF2D (ALONG PAINTED DESERT DR)
   40         KM    DISCHARGES AS SURFACE FLOW INTO RED COACH AVENUE
   41         BA    .0086
   42         LS       0    82.3
   43         UD   0.125
```

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

  44      KK     CP1
  45      KM   COMBINE OF1D AND OF2D
  46      KM   TOTAL FLOW IN RED COACH AVE AT CUL-DE-SAC
  47      HC       2
          *
  48      KK    OF4U
  49      KM   OFFSITE UNDEVELOPED SUBBASIN OF4U
  50      KM   DISCHARGES THRU SUBBASIN OF5D TO RED COACH AVE
  51      BA   .0006
  52      LS       0    83.7
  53      UD   0.114
          *
  54      KK    OF5D
  55      KM   OFFSITE DEVELOPED SUBBASIN OF5D (PAINTED DESERT ANIMAL HOSPITAL)
  56      KM   DISCHARGES AS SURFACE FLOW INTO RED COACH AVENUE
  57      BA   .0006
  58      LS       0    93.9
  59      UD   0.059
          *
  60      KK     CP2
  61      KM   COMBINE OF4U AND OF5D
  62      KM   SURFACE FLOW TO RED COACH FROM NORTH
  63      HC       2
          *
  64      KK   OF3UA
  65      KM   OFFSITE UNDEVELOPED SUBBASIN OF3UA
  66      KM   DISCHARGES THRU SUBBASIN ON1D
  67      BA   .0008
  68      LS       0    83.7
  69      UD   0.112
          *
  70      KK    ON1D
  71      KM   ONSITE DEVELOPED SUBBASIN ON1D
  72      KM   DISCHARGES AS SURFACE FLOW TO RED COACH AVE
  73      BA   .0005
  74      LS       0    93.9
  75      UD   0.068
          *
  76      KK    RC1D
  77      KM   RED COACH AVENUE DEVELOPED SUBBASIN RC1D
  78      KM   FLOW GENERATED BY RED COACH AVE
  79      BA   .0012
  80      LS       0    98.0
  81      UD   0.079
          *
```



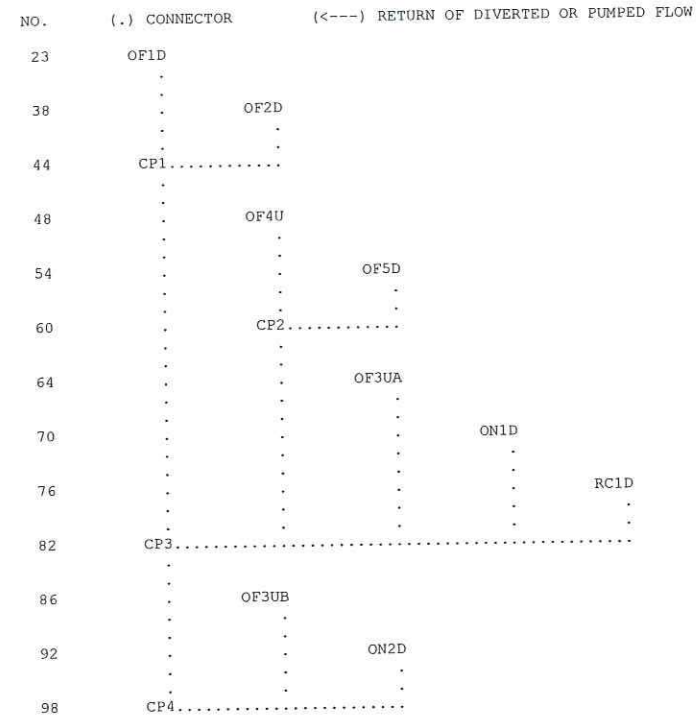
```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  82      KK     CP3
  83      KM   COMBINE CP1, CP2, OF3UA, ON1D AND RC1D
  84      KM   TOTAL FLOW IN RED COACH AVE AND EXISTING VALLEY GUTTER
  85      HC       5
          *
  86      KK   OF3UB
  87      KM   OFFSITE UNDEVELOPED SUBBASIN OF3UB
  88      KM   DISCHARGES THRU SUBBASIN ON2D
  89      BA   .0020
  90      LS       0    83.7
  91      UD   0.123
          *
  92      KK    ON2D
  93      KM   ONSITE DEVELOPED SUBBASIN ON2D
  94      KM   DISCHARGES AS SURFACE FLOW TO ONSITE VALLEY GUTTER
  95      BA   .0014
  96      LS       0    93.9
  97      UD   0.068
          *
  98      KK     CP4
  99      KM   COMBINE CP3, OF3UB, AND ON2D
 100      KM   TOTAL FLOW IN EXISTING VALLEY GUTTER
 101      HC       3
          *
 102      ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
**************************************
 *                                    *
*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*
 *               JUN   1998             *
*
 *            VERSION 4.1               *
*
 *                                      *
*
 *  RUN DATE   13JUL11  TIME  15:40:27   *
*
 *                                      *
*
 ****************************************
**************************************
```

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

SLATER HANIFAN GROUP
FIRESTONE
FIRESTONE AT RANCHO & RED COACH
TECHNICAL DRAINAGE STUDY
PROPOSED DRAINAGE CONDITIONS

RETURN PERIOD ------- 100 & 10-YEAR
DISTRIBUTION -------- 6-HOUR SDN3
PROJECT NO. --------- RCI1104.000
FILENAME ------------ RRC_PROP.H1
DATE ---------------- 06/22/11
MODELED BY ---------- KCR

SIX HOUR DEPTH-AREA REDUCTION FACTORS

DRAINAGE AREA (MI^2)	DARF
100-YR	1.00
10-YR	0.57

20 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

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

ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

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

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
1.00 .57

1

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .57
HYDROGRAPH AT						
+	OF1D	.03	1	FLOW	38.	17.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	OF2D	.01	1	FLOW	9.	3.
				TIME	3.58	3.58
2 COMBINED AT						
+	CP1	.04	1	FLOW	48.	20.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	OF4U	.00	1	FLOW	1.	0.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	OF5D	.00	1	FLOW	1.	1.
				TIME	3.50	3.50
2 COMBINED AT						
+	CP2	.00	1	FLOW	2.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	OF3UA	.00	1	FLOW	1.	0.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	ON1D	.00	1	FLOW	1.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	RC1D	.00	1	FLOW	3.	1.
				TIME	3.50	3.50
5 COMBINED AT						
+	CP3	.04	1	FLOW	53.	23.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	OF3UB	.00	1	FLOW	2.	1.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	ON2D	.00	1	FLOW	3.	1.
				TIME	3.50	3.50
3 COMBINED AT						
+	CP4	.04	1	FLOW	57.	24.
				TIME	3.58	3.58

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

Ultimate Condition

```
1****************************************
****************************************
 *                                      *
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *                                      *
 *               JUN   1998             *
 *                                      *
 *            VERSION 4.1               *
 *                                      *
 *                                      *
 *                                      *
 *  RUN DATE   13JUL11  TIME  15:51:07  *
 *                                      *
 *                                      *
 *                                      *
 ****************************************
****************************************
```

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

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

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

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


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

              *DIAGRAM
    1         ID     SLATER HANIFAN GROUP
    2         ID     FIRESTONE
    3         ID     FIRESTONE AT RANCHO & RED COACH
    4         ID     TECHNICAL DRAINAGE STUDY
    5         ID     ULTIMATE DRAINAGE CONDITIONS
    6         ID
    7         ID     RETURN PERIOD ------- 100 & 10-YEAR
    8         ID     DISTRIBUTION -------- 6-HOUR SDN3
    9         ID     PROJECT NO. --------- RCI1104.000
   10         ID     FILENAME ------------ RRC_ULT.H1
   11         ID     DATE ---------------- 06/22/11
   12         ID     MODELED BY ---------- KCR
   13         ID
   14         ID        SIX HOUR DEPTH-AREA REDUCTION FACTORS
   15         ID        DRAINAGE AREA (MI^2)     DARF
   16         ID        100-YR                   1.00
   17         ID        10-YR                    0.57
   18         ID
   19         IT       5       0       0     300
   20         IO       5       0       0
   21         IN       5       0       0
   22         JR    PREC    1.00    0.57
              *
   23         KK    OF1D
   24         KM    OFFSITE DEVELOPED SUBBASIN OF1D (LONE MOUNTAIN APARTMENTS)
   25         KM    DISCHARGES AS SURFACE FLOW INTO RED COACH AVENUE
   26         BA    .0279
   27         PB     2.77
   28         PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   29         PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   30         PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   31         PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   32         PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   33         PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   34         PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   35         PC   0.998   0.999       1
   36         LS       0    91.0
   37         UD   0.196
              *
   38         KK    OF2D
   39         KM    OFFSITE DEVELOPED SUBBASIN OF2D (ALONG PAINTED DESERT DR)
   40         KM    DISCHARGES AS SURFACE FLOW INTO RED COACH AVENUE
   41         BA    .0086
   42         LS       0    82.3
   43         UD   0.125
```

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

  44      KK     CP1
  45      KM   COMBINE OF1D AND OF2D
  46      KM   TOTAL FLOW IN RED COACH AVE AT CUL-DE-SAC
  47      HC       2
          *
  48      KK    OF4D
  49      KM   OFFSITE DEVELOPED SUBBASIN OF4U
  50      KM   DISCHARGES THRU SUBBASIN OF5D TO RED COACH AVE
  51      BA   .0006
  52      LS       0    93.9
  53      UD   0.078
          *
  54      KK    OF5D
  55      KM   OFFSITE DEVELOPED SUBBASIN OF5D (PAINTED DESERT ANIMAL HOSPITAL)
  56      KM   DISCHARGES AS SURFACE FLOW INTO RED COACH AVENUE
  57      BA   .0006
  58      LS       0    93.9
  59      UD   0.059
          *
  60      KK     CP2
  61      KM   COMBINE OF4D AND OF5D
  62      KM   SURFACE FLOW TO RED COACH FROM NORTH
  63      HC       2
          *
  64      KK   OF3DA
  65      KM   OFFSITE DEVELOPED SUBBASIN OF3DA
  66      KM   DISCHARGES THRU SUBBASIN ON1D
  67      BA   .0008
  68      LS       0    93.9
  69      UD   0.077
          *
  70      KK    ON1D
  71      KM   ONSITE DEVELOPED SUBBASIN ON1D
  72      KM   DISCHARGES AS SURFACE FLOW TO RED COACH AVE
  73      BA   .0005
  74      LS       0    93.9
  75      UD   0.068
          *
  76      KK    RC1D
  77      KM   RED COACH AVENUE DEVELOPED SUBBASIN RC1D
  78      KM   FLOW GENERATED BY RED COACH AVE
  79      BA   .0012
  80      LS       0    98.0
  81      UD   0.079
          *
```



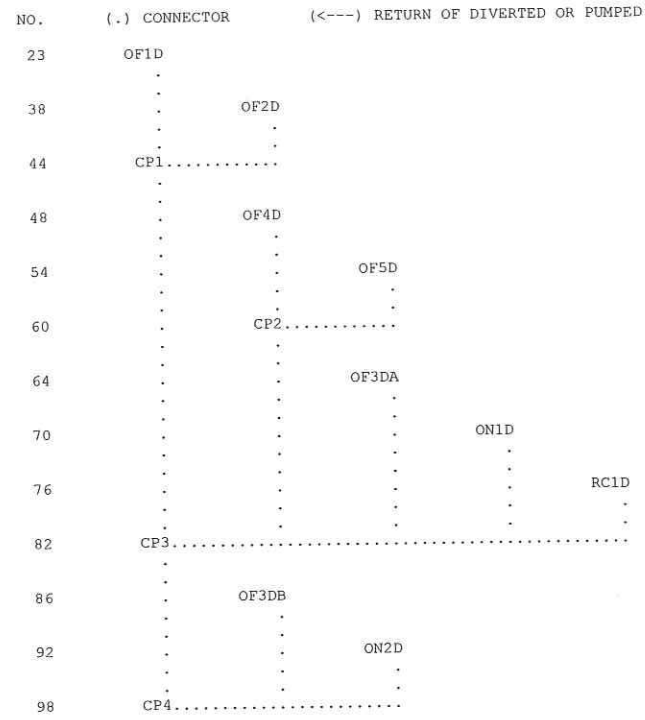
```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  82      KK     CP3
  83      KM   COMBINE CP1, CP2, OF3DA, ON1D AND RC1D
  84      KM   TOTAL FLOW IN RED COACH AVE AND EXISTING VALLEY GUTTER
  85      HC       5
          *
  86      KK   OF3DB
  87      KM   OFFSITE DEVELOPED SUBBASIN OF3DB
  88      KM   DISCHARGES THRU SUBBASIN ON2D
  89      BA   .0020
  90      LS       0    93.9
  91      UD   0.085
          *
  92      KK    ON2D
  93      KM   ONSITE DEVELOPED SUBBASIN ON2D
  94      KM   DISCHARGES AS SURFACE FLOW TO ONSITE VALLEY GUTTER
  95      BA   .0014
  96      LS       0    93.9
  97      UD   0.068
          *
  98      KK     CP4
  99      KM   COMBINE CP3, OF3DB, AND ON2D
 100      KM   TOTAL FLOW IN EXISTING VALLEY GUTTER
 101      HC       3
          *
 102      ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*****************************************
 *                                       *
*                                        *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*                                        *
 *               JUN   1998              *
*                                        *
 *            VERSION 4.1                *
*                                        *
 *                                       *
*                                        *
 *  RUN DATE   13JUL11  TIME  15:51:07   *
*                                        *
 *                                       *
*                                        *
 *****************************************
*****************************************
```

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

SLATER HANIFAN GROUP
FIRESTONE
FIRESTONE AT RANCHO & RED COACH
TECHNICAL DRAINAGE STUDY
ULTIMATE DRAINAGE CONDITIONS

RETURN PERIOD ------- 100 & 10-YEAR
DISTRIBUTION -------- 6-HOUR SDN3
PROJECT NO. --------- RCI1104.000
FILENAME ------------ RRC_ULT.H1
DATE ---------------- 06/22/11
MODELED BY ---------- KCR

SIX HOUR DEPTH-AREA REDUCTION FACTORS

DRAINAGE AREA (MI^2)	DARF
100-YR	1.00
10-YR	0.57

20 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

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

ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

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

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
1.00 .57

1

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .57
HYDROGRAPH AT	OF1D	.03	1	FLOW	38.	17.
+				TIME	3.58	3.58
HYDROGRAPH AT	OF2D	.01	1	FLOW	9.	3.
+				TIME	3.58	3.58
2 COMBINED AT	CP1	.04	1	FLOW	48.	20.
+				TIME	3.58	3.58
HYDROGRAPH AT	OF4D	.00	1	FLOW	1.	1.
+				TIME	3.50	3.50
HYDROGRAPH AT	OF5D	.00	1	FLOW	1.	1.
+				TIME	3.50	3.50
2 COMBINED AT	CP2	.00	1	FLOW	2.	1.
+				TIME	3.50	3.50
HYDROGRAPH AT	OF3DA	.00	1	FLOW	2.	1.
+				TIME	3.50	3.50
HYDROGRAPH AT	ON1D	.00	1	FLOW	1.	1.
+				TIME	3.50	3.50
HYDROGRAPH AT	RC1D	.00	1	FLOW	3.	1.
+				TIME	3.50	3.50
5 COMBINED AT	CP3	.04	1	FLOW	53.	23.
+				TIME	3.58	3.58
HYDROGRAPH AT	OF3DB	.00	1	FLOW	4.	2.
+				TIME	3.50	3.50
HYDROGRAPH AT	ON2D	.00	1	FLOW	3.	1.
+				TIME	3.50	3.50
3 COMBINED AT	CP4	.04	1	FLOW	59.	26.
+				TIME	3.58	3.58

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

APPENDIX D

Flowmaster Hydraulic Computations

Perimeter Street Sections

SECTION A - Red Coach Avenue (100-YR)
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION A - Red Coach Avenue (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	0.50	%
Discharge	53.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.70	ft
Elevation Range	0.00 to 0.63	
Flow Area	17.7	ft²
Wetted Perimeter	61.27	ft
Top Width	60.00	ft
Actual Depth	0.70	ft
Critical Elevation	0.70	ft
Critical Slope	0.53	%
Velocity	3.00	ft/s
Velocity Head	0.14	ft
Specific Energy	0.84	ft
Froude Number	0.98	
Flow Type	Subcritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.1040389 ft.

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.00	0+07.00	0.013
0+07.00	0+53.00	0.016
0+53.00	0+60.00	0.013

Natural Channel Points

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17

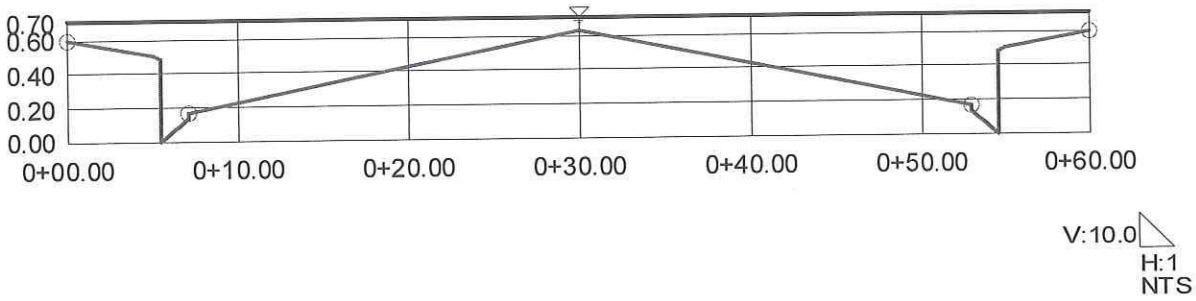
SECTION A - Red Coach Avenue (100-YR)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+53.00	0.13
0+54.50	0.00
0+54.50	0.48
0+55.00	0.50
0+60.00	0.60

SECTION A - Red Coach Avenue (100-YR)
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION A - Red Coach Avenue (100-YR)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Channel Slope	0.50 %
Water Surface Elevation	0.70 ft
Elevation Range	0.00 to 0.63
Discharge	53.00 cfs



Onsite Hydraulic Sections

SECTION 1
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	0.56	%
Discharge	1.50	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.016	
Water Surface Elevation	0.30	ft
Elevation Range	0.00 to 0.60	
Flow Area	1.1	ft²
Wetted Perimeter	14.47	ft
Top Width	14.13	ft
Actual Depth	0.30	ft
Critical Elevation	0.28	ft
Critical Slope	0.87	%
Velocity	1.31	ft/s
Velocity Head	0.03	ft
Specific Energy	0.32	ft
Froude Number	0.81	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.00	0+02.00	0.013
0+02.00	0+25.00	0.016
0+25.00	0+35.00	0.013

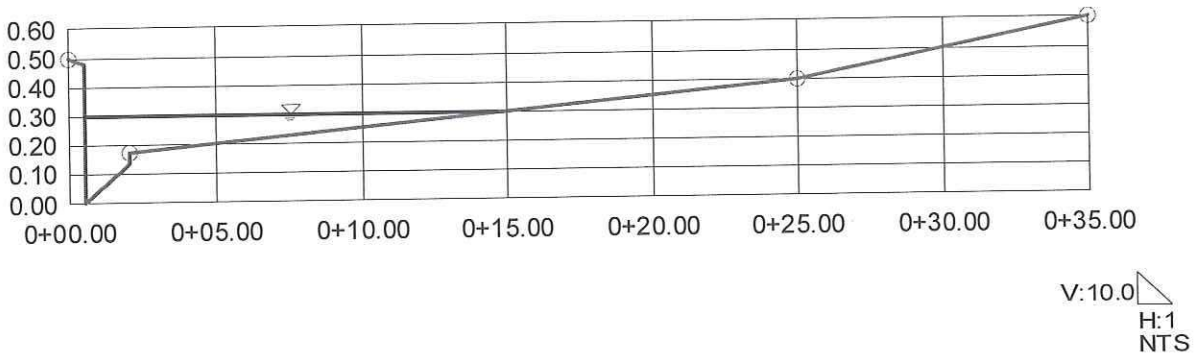
Natural Channel Points

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+25.00	0.40
0+35.00	0.60

SECTION 1
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	0.56 %
Water Surface Elevation	0.30 ft
Elevation Range	0.00 to 0.60
Discharge	1.50 cfs



SECTION 2
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	0.56	%
Discharge	1.50	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.35	ft
Elevation Range	0.00 to 1.29	
Flow Area	0.8	ft²
Wetted Perimeter	6.27	ft
Top Width	5.88	ft
Actual Depth	0.35	ft
Critical Elevation	0.33	ft
Critical Slope	0.72	%
Velocity	1.87	ft/s
Velocity Head	0.05	ft
Specific Energy	0.40	ft
Froude Number	0.89	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.00	0+02.00	0.013
0+02.00	0+25.00	0.016
0+25.00	0+35.00	0.013

Natural Channel Points

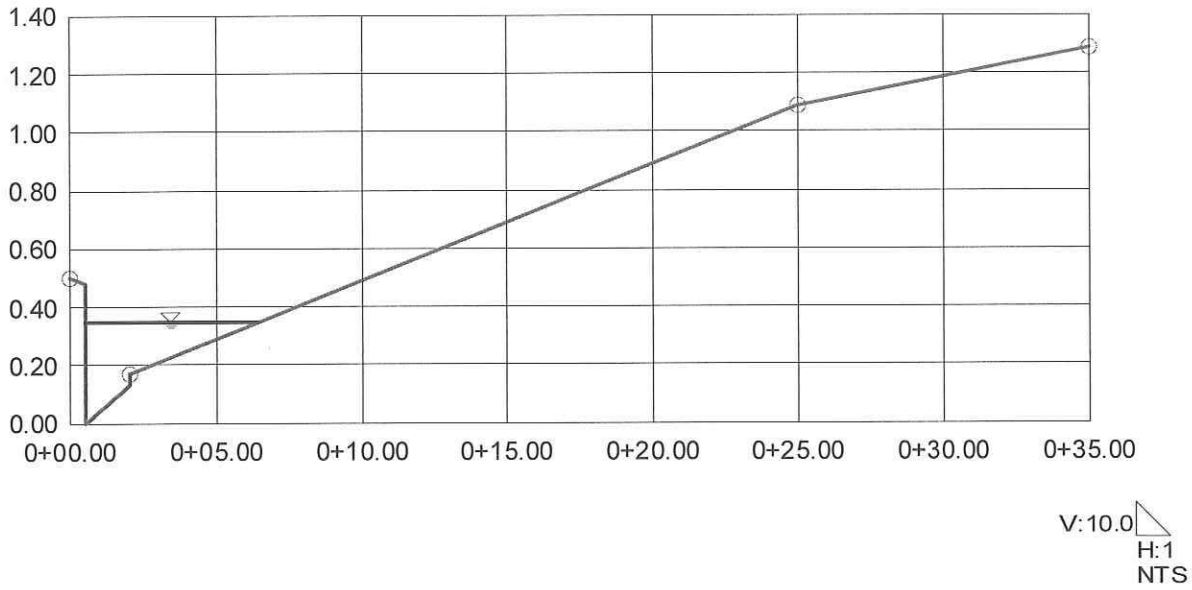
Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+25.00	1.09
0+35.00	1.29

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SECTION 2
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	0.56	%
Water Surface Elevation	0.35	ft
Elevation Range	0.00 to 1.29	
Discharge	1.50	cfs



SECTION 3
Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION 3
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	0.56	%
Discharge	1.50	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.013	
Water Surface Elevation	0.38	ft
Elevation Range	0.00 to 0.67	
Flow Area	0.5	ft²
Wetted Perimeter	2.14	ft
Top Width	1.50	ft
Actual Depth	0.38	ft
Critical Elevation	0.38	ft
Critical Slope	0.58	%
Velocity	3.14	ft/s
Velocity Head	0.15	ft
Specific Energy	0.54	ft
Froude Number	0.98	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.00	0+02.00	0.013

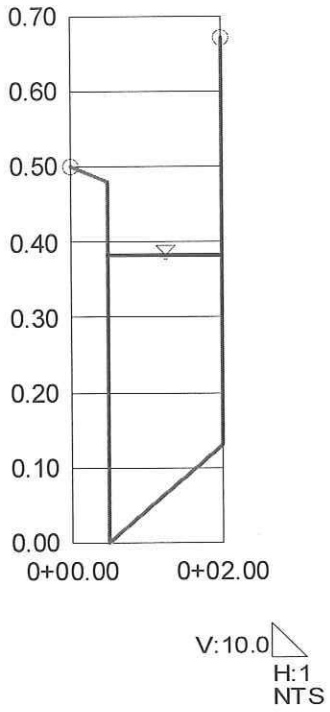
Natural Channel Points

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+02.00	0.67

SECTION 3
Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION 3
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.013	
Channel Slope	0.56	%
Water Surface Elevation	0.38	ft
Elevation Range	0.00 to 0.67	
Discharge	1.50	cfs



SECTION 4
Worksheet for Triangular Channel

Project Description	
Worksheet	SECTION 4
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.022
Channel Slope	1.00 %
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Discharge	4.00 cfs

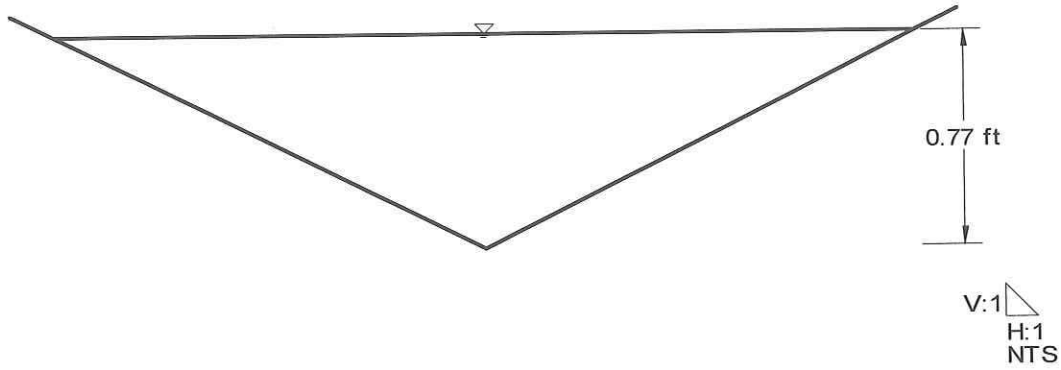
Results	
Depth	0.77 ft
Flow Area	1.2 ft²
Wetted Perimeter	3.46 ft
Top Width	3.10 ft
Critical Depth	0.76 ft
Critical Slope	1.13 %
Velocity	3.33 ft/s
Velocity Head	0.17 ft
Specific Energy	0.95 ft
Froude Number	0.94
Flow Type	Subcritical

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SECTION 4
Cross Section for Triangular Channel

Project Description	
Worksheet	SECTION 4
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.022
Channel Slope	1.00 %
Depth	0.77 ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Discharge	4.00 cfs



SECTION 5
Worksheet for Triangular Channel

Project Description	
Worksheet	SECTION 5
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Channel Slope	9.70	%
Left Side Slope	25.00	H : V
Right Side Slope	25.00	H : V
Discharge	3.00	cfs

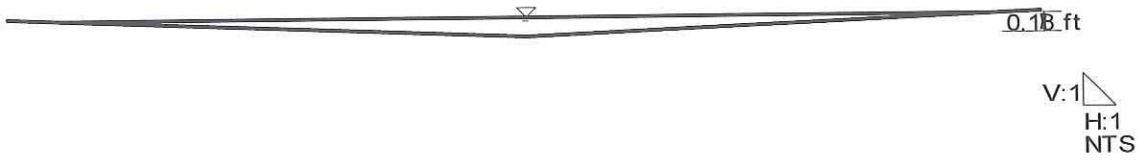
Results		
Depth	0.18	ft
Flow Area	0.8	ft²
Wetted Perimeter	8.99	ft
Top Width	8.98	ft
Critical Depth	0.25	ft
Critical Slope	1.84	%
Velocity	3.72	ft/s
Velocity Head	0.21	ft
Specific Energy	0.39	ft
Froude Number	2.19	
Flow Type	Supercritical	

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SECTION 5
Cross Section for Triangular Channel

Project Description	
Worksheet	SECTION 5
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.025	
Channel Slope	9.70	%
Depth	0.18	ft
Left Side Slope	25.00	H : V
Right Side Slope	25.00	H : V
Discharge	3.00	cfs

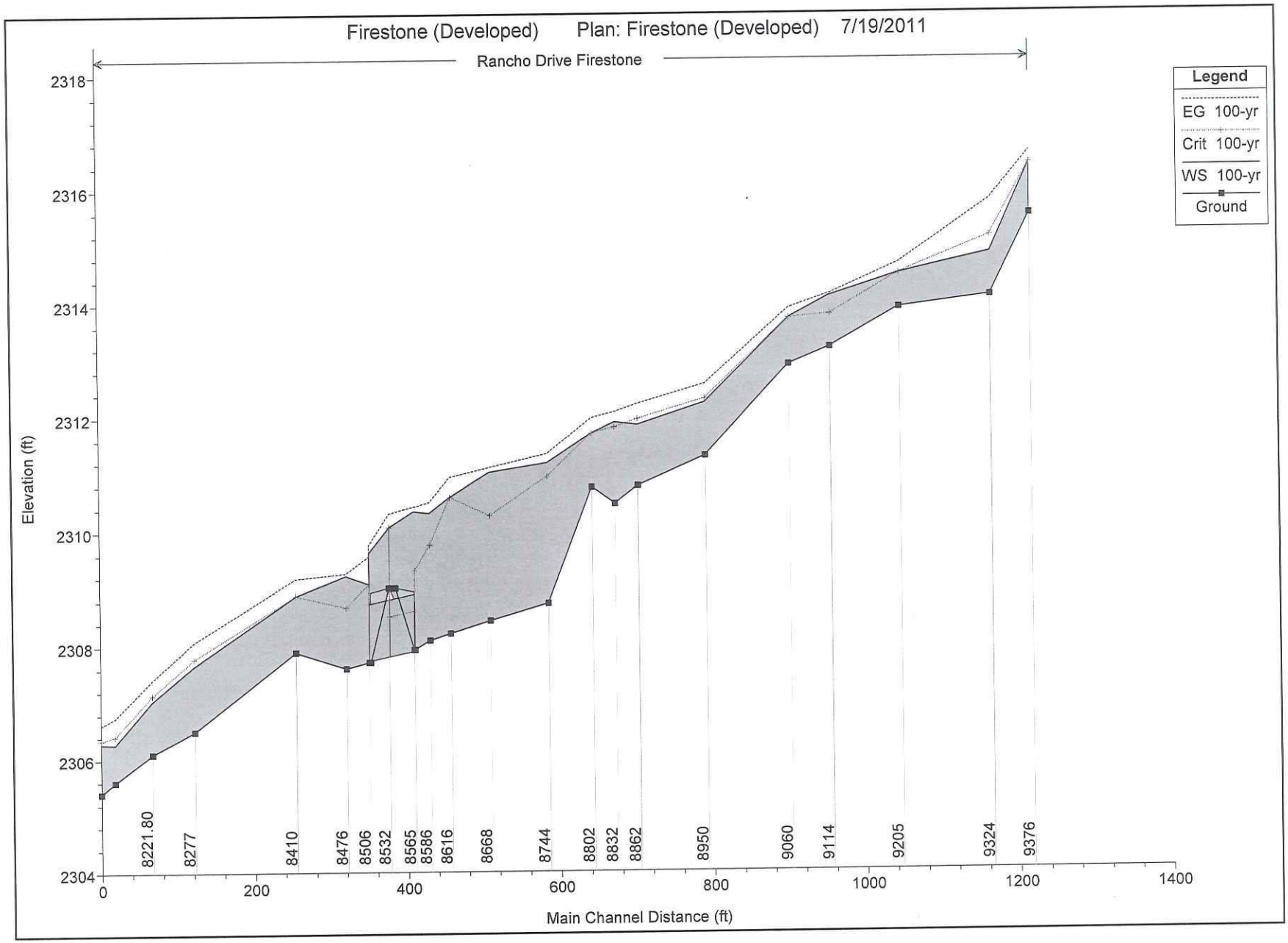


APPENDIX E

Rancho Drive Hydraulic Analysis

HEC-RAS Plan: Rancho River: Rancho Drive Reach: Firestone Profile: 100-yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Sta W.S. Lft	Sta W.S. Rgt
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)
Firestone	9376	100-yr	180.00	2315.53	2316.42	2316.42	2316.62	0.004337	3.62	49.72	119.52	0.99	39.05	178.57
Firestone	9324	100-yr	180.00	2314.10	2314.86	2315.15	2315.79	0.025175	7.72	23.31	61.42	2.21	86.82	148.24
Firestone	9205	100-yr	180.00	2313.90	2314.50	2314.50	2314.68	0.005625	3.40	52.89	147.64	1.00	79.19	226.83
Firestone	9114	100-yr	180.00	2313.20	2314.11	2313.79	2314.15	0.002492	1.46	122.98	270.03	0.38	61.38	331.41
Firestone	9060	100-yr	180.00	2312.90	2313.72	2313.72	2313.90	0.018935	3.33	54.01	156.76	1.00	59.54	277.30
Firestone	8950	100-yr	180.00	2311.30	2312.23	2312.30	2312.56	0.007699	4.57	39.42	97.87	1.27	164.00	261.87
Firestone	8862	100-yr	180.00	2310.78	2311.85	2311.95	2312.21	0.005729	4.84	37.22	86.32	1.30	98.57	184.89
Firestone	8832	100-yr	180.00	2310.47	2311.90	2311.81	2312.07	0.002297	3.35	53.73	99.71	0.80	46.98	146.69
Firestone	8802	100-yr	180.00	2310.76	2311.70	2311.70	2311.97	0.004971	4.17	43.18	79.90	1.00	34.34	114.23
Firestone	8744	100-yr	180.00	2308.74	2311.19	2310.96	2311.35	0.003942	3.20	56.21	81.84	0.68	43.34	133.28
Firestone	8668	100-yr	180.00	2308.44	2311.03	2310.28	2311.11	0.001652	2.30	78.37	85.69	0.42	20.81	106.50
Firestone	8616	100-yr	180.00	2308.22	2310.60	2310.60	2310.95	0.007086	4.74	37.99	53.42	0.99	19.40	72.81
Firestone	8586	100-yr	180.00	2308.10	2310.32	2309.77	2310.51	0.003555	3.49	52.09	68.21	0.65	24.36	95.38
Firestone	8566	100-yr	180.00	2307.94	2310.36	2309.32	2310.43	0.001088	2.25	83.57	102.86	0.39	12.75	115.62
Firestone	8565		Culvert											
Firestone	8533	100-yr	180.00	2309.02	2310.08	2310.08	2310.32	0.003324	3.92	45.87	95.61	1.00	11.58	107.20
Firestone	8532		Culvert											
Firestone	8506	100-yr	180.00	2307.72	2309.09	2309.09	2309.57	0.009885	5.55	32.43	33.69	1.00	41.21	84.90
Firestone	8476	100-yr	180.00	2307.61	2309.24	2308.68	2309.27	0.000538	1.55	116.37	172.93	0.33	20.34	193.27
Firestone	8410	100-yr	180.00	2307.90	2308.89	2308.89	2309.18	0.005130	4.37	41.16	71.11	1.01	53.56	130.00
Firestone	8277	100-yr	180.00	2306.50	2307.67	2307.79	2308.08	0.011272	5.17	34.80	78.41	1.37	40.03	118.43
Firestone	8221.80	100-yr	180.00	2306.10	2307.04	2307.14	2307.42	0.012331	4.92	36.62	93.54	1.38	40.30	133.85
Firestone	8173	100-yr	180.00	2305.60	2306.28	2306.42	2306.75	0.014486	5.52	32.61	93.47	1.65	51.34	144.81
Firestone	8155	100-yr	180.00	2305.40	2306.29	2306.35	2306.62	0.007091	4.59	39.21	93.40	1.25	42.86	136.26


Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
Rancho Drive Firestone
Legend
EG 100-yr
Crit 100-yr
WS 100-yr
Ground
Elevation (ft)
2318
2316
2314
2312
2310
2308
2306
2304
8221.80
8277
8410
8476
8506
8532
8565
8586
8616
8668
8744
8802
8832
8862
8950
9060
9114
9205
9324
9376
0
200
400
600
800
1000
1200
1400
Main Channel Distance (ft)

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

PROJECT DATA
Project Title: Firestone (Developed)
Project File : firedev.prj
Run Date and Time: 7/19/2011 6:52:08 PM

Project in English units

Project Description:
Slater Hanifan Group - July 19, 2011 - Job#RCI1104.000
Firestone at Rancho/Red
Coach
Rancho Drive Conveyance - 100-Year Storm Event

PLAN DATA

Plan Title: Firestone (Developed)
Plan File : j:\RCI1104.000 Firestone Rancho-Red Coach\Drainage\Technical Study\HEC-RAS\firedev.p01

Geometry Title: Firestone (Developed)
Geometry File : j:\RCI1104.000 Firestone Rancho-Red Coach\Drainage\Technical Study\HEC-RAS\firedev.g01

Flow Title : Firestone (Developed)
Flow File : j:\RCI1104.000 Firestone Rancho-Red Coach\Drainage\Technical Study\HEC-RAS\firedev.f01

Plan Summary Information:
Number of: Cross Sections = 22 Multiple Openings = 0
Culverts = 2 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Program Selects Appropriate method
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: Firestone (Developed)
Flow File : j:\RCI1104.000 Firestone Rancho-Red Coach\Drainage\Technical Study\HEC-RAS\firedev.f01

Flow Data (cfs)

River	Reach	RS	100-yr
Rancho Drive	Firestone	9376	180

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Rancho Drive	Firestone	100-yr	Normal S = 0.0022	Normal S = 0.003

GEOMETRY DATA

Geometry Title: Firestone (Developed)
Geometry File : j:\RCI1104.000 Firestone Rancho-Red Coach\Drainage\Technical Study\HEC-RAS\firedev.g01

CROSS SECTION

RIVER: Rancho Drive
REACH: Firestone RS: 9376

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2317.2	50	2316.2	50.01	2316.7	55	2316.8	70	2316.6
70.01	2316.1	90	2315.6	91	2315.53	92	2315.6	240	2317

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	50	.013	55	.03	70	.016	90	.013
92	.016								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	240	52	52	.1	.3

CROSS SECTION

RIVER: Rancho Drive
REACH: Firestone RS: 9324

INPUT
Description: Referenced from Lone Mountain Apts Study (LOMR 05-09-0073P)
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2316.3	42	2315.4	66	2315.3	76	2315.4	102	2314.1
169	2315.2								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.016	42	.03	76	.016

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	169	119	119	.1	.3

CROSS SECTION

RIVER: Rancho Drive
REACH: Firestone RS: 9205

INPUT
Description: Referenced from Lone Mountain Apts Study (LOMR 05-09-0073P)
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2316.2	41	2315.3	54	2315.6	93	2313.9	210	2314.3
235	2314.6	309	2314.6						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.016	41	.03	93	.016

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	309	91	91	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
231	279	2318

CROSS SECTION

RIVER: Rancho Drive
REACH: Firestone RS: 9114

INPUT
Description: Referenced from Lone Mountain Apts Study (LOMR 05-09-0073P)
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2316	47	2315.1	63	2314	77	2313.2	150	2313.4
272	2314	326	2314	360	2314.7				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	47	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	360	54	54	.1	.3

CROSS SECTION

RIVER: Rancho Drive
REACH: Firestone RS: 9060

INPUT
Description: Referenced from Lone Mountain Apts Study (LOMR 05-09-0073P)
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2315.6	44	2314.8	54	2314	76	2312.9	345	2314
384	2314	556	2315.2	600	2316				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	44	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	345	110	110	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
442	600	2316	F

Blocked Obstructions num= 1

Sta L	Sta R	Elev
104	165	2316

CROSS SECTION

RIVER: Rancho Drive
REACH: Firestone RS: 8950

INPUT
Description: Firestone Proposed
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2314.5	48	2313	52	2312.5	59	2313	172	2311.9
179	2311.8	179.5	2311.8	179.5	2311.3	181	2311.5	216.5	2312
250.5	2311.7	252	2311.5	252	2312	252.5	2312	260.5	2312.1
285	2314.5	357.5	2314.5	362	2314.4	395	2313.35	396.5	2313.15
396.5	2313.65	397	2313.65	404	2313.249	404.51	2313.22		

Manning's n Values num= 10

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	48	.03	59	.016	172	.013	181	.016
260.5	.035	285	.013	362	.016	395	.013	397	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	404.51	88	88	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
114	164	2313.52	285	357.5	2320

CROSS SECTION

RIVER: Rancho Drive
REACH: Firestone RS: 8862

INPUT
Description: Firestone Proposed
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2313.31	10	2313	83	2312	121	2311.63	155	2311.06
159.5	2310.78	166	2311.06	200.5	2312.5	202	2312.3	202	2312.8
202.5	2312.8	207.5	2312.9	207.5	2314.5	262	2314.5	277.8	2314.3
312.5	2313.1	314	2312.9	314	2313.4	314.5	2313.4	328.22	2313.31

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	155	.013	166	.016	200.5	.013	277.8	.016
312.5	.013	314.5	.035						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	328.22	30	30	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
207.5	262	2320

CROSS SECTION

RIVER: Rancho Drive
REACH: Firestone RS: 8832

INPUT
Description: Firestone Proposed
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2313.04	9	2313	39	2312	61	2311.72	88	2311.43
122	2311.18	125	2310.91	130	2310.56	133	2310.49	134	2310.47
135	2310.49	155	2312.9	162	2312.8	173	2313	178	2312
178	2312.5	185	2313.1	185.5	2313.1	185.5	2312.6	187	2312.8
227.5	2314.1	229	2313.9	229	2314.4	229.5	2314.4	243	2314.35
281.5	2312.8	283	2312.6	283	2313.1	283.5	2313.1	295.65	2312.75

Manning's n Values num= 11

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	122	.013	135	.035	173	.013	178	.035
185	.013	187	.016	227.5	.013	243	.016	281.5	.013
283.5	.035								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	295.65	30	30	.1	.3

CROSS SECTION

RIVER: Rancho Drive

REACH: Firestone RS: 8802

INPUT
Description: Firestone Proposed
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2312.8	23	2312	61	2311	93	2310.9	93	2311.4
100	2311.47	100	2310.79	101.5	2310.76	103	2310.79	129	2312.9
129.5	2312.9	129.5	2312.4	131	2312.6	248.8	2312.5	250.3	2312.3
250.3	2312.8	250.8	2312.8	263.08	2312.61				

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	93	.013	103	.035	129	.013	131	.016
248.8	.013	250.8	.035						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	263.08	58	58	.1	.3

CROSS SECTION

RIVER: Rancho Drive
REACH: Firestone RS: 8744

INPUT
Description: Firestone Proposed
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2312.24	10	2313	45	2311.1	47	2310.93	47	2311.43
54	2311.53	63	2308.76	64	2308.74	65	2308.76	82	2310.96
82.5	2310.96	82.5	2310.46	84	2310.48	186	2311.95	187.5	2311.75
187.5	2312.25	188	2312.25	200.12	2312.33				

Manning's n Values num= 9

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	45	.013	54	.035	63	.013	65	.035
82	.013	84	.016	186	.013	188	.035		

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	200.12	76	76	.1	.3

CROSS SECTION

RIVER: Rancho Drive
REACH: Firestone RS: 8668

INPUT
Description: Firestone Proposed
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2311.6	45	2310.37	46.5	2310.2	46.5	2310.7	47	2310.7
53	2310.82	54	2310.82	63	2308.47	64	2308.44	65	2308.47
87	2310	106	2311	117.62	2311.73				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	45	.013	53	.03	63	.013	65	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	117.62	52	52	.1	.3

CROSS SECTION

RIVER: Rancho Drive
REACH: Firestone RS: 8616

INPUT
Description: Referenced from Sun Valley Auto Study (CLOMR 07-09-1025R)
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2311.09	45	2309.95	46.5	2309.78	46.5	2310.28	53	2310.38
63	2308.24	64	2308.22	65	2308.24	76	2311.56	76.5	2311.56
76.5	2311.06	78	2311.23	107	2312.27	107	2312.77	116	2313.2

Manning's n Values num= 8

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	45	.013	53	.03	63	.013	65	.03
76	.013	78	.016	107	.013				

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	76	27	27	.1	.3

CROSS SECTION

RIVER: Rancho Drive
REACH: Firestone RS: 8586

INPUT
Description: Referenced from Sun Valley Auto Study (CLOMR 07-09-1025R)
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

```
      0 2310.81      45 2309.91    46.5 2309.74    46.5 2310.24      53 2310.34
     63 2308.12      64  2308.1      65 2308.12      79 2308.69      85 2310.69
   85.5 2310.69    85.5 2310.19     174 2311.38     176 2311.21     176 2311.71
    177 2311.71     186  2311.5

Manning's n Values        num=        8
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
       0    .016       45    .013       53     .03       63    .013       65     .03
      85    .013     85.5    .016      174    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
             0      85                 20      20      20              .1      .3

CROSS SECTION


RIVER: Rancho Drive
REACH: Firestone          RS: 8566

INPUT
Description: Referenced from Sun Valley Auto Study (CLOMR 07-09-1025R)
Station Elevation Data    num=      18
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0 2310.61       45 2309.71     46.5 2309.54     46.5 2310.04      54 2310.14
      59 2308.18       60 2307.96       61 2307.94       62 2307.96      82 2308.32
      85 2310.23     85.5 2310.23     85.5 2309.73      152 2311.11     154 2310.94
     154 2311.44    154.5 2311.44    168.5 2311.14

Manning's n Values        num=        9
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
       0    .016       45    .013       54     .03       60    .013       62     .03
      85    .013     85.5    .016      152    .013    154.5     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
             0      85                 33      33      33              .1      .3

CULVERT


RIVER: Rancho Drive
REACH: Firestone          RS: 8565

INPUT
Description: RCB Culvert
Distance from Upstream XS =        1
Deck/Roadway Width        =       24
Weir Coefficient          =      2.6
Upstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
      56 2309.58               83 2309.59

Upstream Bridge Cross Section Data
Station Elevation Data    num=      18
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0 2310.61       45 2309.71     46.5 2309.54     46.5 2310.04      54 2310.14
      59 2308.18       60 2307.96       61 2307.94       62 2307.96      82 2308.32
      85 2310.23     85.5 2310.23     85.5 2309.73      152 2311.11     154 2310.94
     154 2311.44    154.5 2311.44    168.5 2311.14

Manning's n Values        num=        9
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
       0    .016       45    .013       54     .03       60    .013       62     .03
      85    .013     85.5    .016      152    .013    154.5     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
             0      85              .1      .3

Downstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
      59 2309.41               81 2309.41

Downstream Bridge Cross Section Data
Station Elevation Data    num=      12
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0 2310.31       45 2309.41       46 2309.02       52 2309.22       59  2309.5
      81  2309.5       86  2309.4      116 2310.36    117.5 2310.19    117.5 2310.69
     118 2310.69      133 2310.53

Manning's n Values        num=        7
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
       0    .016       45    .013       52    .016       59    .013       81    .016
     116    .013      118     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
             0     118              .1      .3

Upstream Embankment side slope             =       3 horiz. to 1.0 vertical
Downstream Embankment side slope           =       3 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =      .95
Elevation at which weir flow begins        =
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested
```

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Box	1	7

FHWA Chart # 58- Rectangular concrete
FHWA Scale # 2 - Side tapered; More favorable edges
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	1	32	.013	.013	0	.2	1

Number of Barrels = 3
Upstream Elevation = 2307.91
Centerline Stations

Sta.	Sta.	Sta.
63	71	79

Downstream Elevation = 2307.82
Centerline Stations

Sta.	Sta.	Sta.
63	71	79

CULVERT OUTPUT Profile #100-yr Culv Group: Culvert #1

Q Culv Group (cfs)	70.44	Culv Full Len (ft)	32.00
# Barrels	3	Culv Vel US (ft/s)	3.35
Q Barrel (cfs)	23.48	Culv Vel DS (ft/s)	3.35
E.G. US. (ft)	2310.44	Culv Inv El Up (ft)	2307.91
W.S. US. (ft)	2310.36	Culv Inv El Dn (ft)	2307.82
E.G. DS (ft)	2310.32	Culv Frctn Ls (ft)	0.08
W.S. DS (ft)	2310.08	Culv Exit Loss (ft)	
Delta EG (ft)	0.12	Culv Entr Loss (ft)	0.03
Delta WS (ft)	0.28	Q Weir (cfs)	109.56
E.G. IC (ft)	2310.32	Weir Sta Lft (ft)	8.46
E.G. OC (ft)	2310.44	Weir Sta Rgt (ft)	119.76
Culvert Control	Outlet	Weir Submerg	0.34
Culv WS Inlet (ft)	2308.91	Weir Max Depth (ft)	1.48
Culv WS Outlet (ft)	2308.82	Weir Avg Depth (ft)	0.50
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	55.68
Culv Crt Depth (ft)	0.70	Min El Weir Flow (ft)	2309.03

Warning: During the culvert inlet computations, the program could not balance the culvert/weir flow.
The reported inlet energy grade answer may not be valid.

CROSS SECTION

RIVER: Rancho Drive
REACH: Firestone RS: 8533

INPUT
Description: Referenced from Sun Valley Auto Study (CLOMR 07-09-1025R)
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2310.31	45	2309.41	46	2309.02	52	2309.22	59	2309.5
81	2309.5	86	2309.4	116	2310.36	117.5	2310.19	117.5	2310.69
118	2310.69	133	2310.53						

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	45	.013	52	.016	59	.013	81	.016
116	.013	118	.03						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	118	27	27	.1	.3

CULVERT

RIVER: Rancho Drive
REACH: Firestone RS: 8532

INPUT
Description: RCB Culvert
Distance from Upstream XS = 1
Deck/Roadway Width = 24
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
59	2309.58		81	2309.58	

Upstream Bridge Cross Section Data
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2310.31	45	2309.41	46	2309.02	52	2309.22	59	2309.5
81	2309.5	86	2309.4	116	2310.36	117.5	2310.19	117.5	2310.69
118	2310.69	133	2310.53						

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	45	.013	52	.016	59	.013	81	.016
116	.013	118	.03						

Bank Sta: Left	Right	Coeff Contr.	Expan.
0	118	.1	.3

```
Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
      59 2309.41               85 2309.41

Downstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 2310.06      45    2309      50 2308.94      50 2309.44      51 2309.44
    57.5 2309.54      60 2309.41      60 2307.74      61 2307.72      62 2307.74
      82 2307.74      86  2309.6     104 2310.05

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .016      45    .013    57.5     .03      60    .013      62     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
             0     104             .1       .3

Upstream Embankment side slope                =       3 horiz. to 1.0 vertical
Downstream Embankment side slope              =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =      .95
Elevation at which weir flow begins           =
Energy head used in spillway design           =
Spillway height used in design                =
Weir crest shape                              = Broad Crested

Number of Culverts =  1

Culvert Name      Shape      Rise    Span
Culvert #1          Box         1       7
FHWA Chart # 58- Rectangular concrete
FHWA Scale # 1 - Side tapered; Less favorable edges
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  0      27     .013     .013        0                  .2               1
Number of Barrels =  3
Upstream   Elevation =  2307.82
Centerline Stations
    Sta.    Sta.    Sta.
      63      71      79
Downstream Elevation =  2307.74
Centerline Stations
    Sta.    Sta.    Sta.
      63      71      79

CULVERT OUTPUT  Profile #100-yr  Culv Group:  Culvert #1

  Q Culv Group (cfs)        123.88    Culv Full Len (ft)         27.00
  # Barrels                      3    Culv Vel US (ft/s)          5.90
  Q Barrel (cfs)             41.29    Culv Vel DS (ft/s)          5.90
  E.G. US. (ft)            2309.95    Culv Inv El Up (ft)      2307.82
  W.S. US. (ft)            2310.08    Culv Inv El Dn (ft)      2307.74
  E.G. DS (ft)             2309.57    Culv Frctn Ls (ft)          0.22
  W.S. DS (ft)             2309.09    Culv Exit Loss (ft)         0.06
  Delta EG (ft)               0.39    Culv Entr Loss (ft)         0.11
  Delta WS (ft)               0.99    Q Weir (cfs)               56.12
  E.G. IC (ft)             2310.02    Weir Sta Lft (ft)          17.82
  E.G. OC (ft)             2309.95    Weir Sta Rgt (ft)         103.30
  Culvert Control            Inlet    Weir Submerg                0.00
  Culv WS Inlet (ft)       2308.82    Weir Max Depth (ft)         0.93
  Culv WS Outlet (ft)      2308.74    Weir Avg Depth (ft)         0.38
  Culv Nml Depth (ft)         1.00    Weir Flow Area (sq ft)     32.81
  Culv Crt Depth (ft)         1.00    Min El Weir Flow (ft)    2309.03


Warning: During subcritical analysis, the water surface upstream of culvert went to critical depth.
Note:    The normal depth exceeds the height of the culvert.  The program assumes that the normal
         depth is equal to the height of the culvert.
Note:    Culvert critical depth exceeds the height of the culvert.
Note:    During the supercritical calculations a hydraulic jump occurred inside of the culvert.
Note:    The culvert inlet is submerged and the culvert flows full over part or all of its length.  Therefore,
         the culvert inlet equations are not valid and the supercritical result has been discarded.  The
         outlet answer will be used.

CROSS SECTION


RIVER: Rancho Drive
REACH: Firestone          RS: 8506

INPUT
Description: Referenced from Sun Valley Auto Study (CLOMR 07-09-1025R)
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 2310.06      45    2309      50 2308.94      50 2309.44      51 2309.44
    57.5 2309.54      60 2309.41      60 2307.74      61 2307.72      62 2307.74
      82 2307.74      86  2309.6     104 2310.05

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .016      45    .013    57.5     .03      60    .013      62     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
```

```
            0     104                30      30      30              .1       .3

CROSS SECTION


RIVER: Rancho Drive
REACH: Firestone          RS: 8476

INPUT
Description: Referenced from Sun Valley Auto Study (CLOMR 07-09-1025R)
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 2309.8      45 2308.55    46.5 2308.38    46.5 2308.88      47 2308.88
      52    2309      53    2309      68 2307.64      69 2307.61      70 2307.64
      79    2308     100    2308     162    2309     295    2310

Manning's n Values        num=      6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .016      45    .013      52     .03      68    .013      70     .03
      79    .016

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            0     295               66      66      66             .1       .3

CROSS SECTION


RIVER: Rancho Drive
REACH: Firestone          RS: 8410

INPUT
Description: Referenced from Draft House Study (LOMA 01-09-1032A)
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 2309.18   27.49 2309.18   40.95 2309.01   50.02 2308.99      67 2308.49
   83.94    2308      85    2308      90  2307.9  101.49    2308  136.89 2308.85
  198.31 2308.85  222.58 2309.07     285 2309.98

Manning's n Values        num=      3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .016      67    .037      85    .016

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            0     285               133     133     133             .1       .3
Blocked Obstructions      num=      2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
     130     235    2312      78   83.33    2310

CROSS SECTION


RIVER: Rancho Drive
REACH: Firestone          RS: 8277

INPUT
Description: Referenced from Draft House Study (LOMA 01-09-1032A)
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 2307.99   22.16    2308      67 2307.16   75.46    2307      86    2307
   86.01  2306.5   94.98    2307     126 2307.88     147  2308.1  147.01 2309.52
     204 2309.52  204.01 2308.33

Manning's n Values        num=      4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .016      67    .025      86    .016     126    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            0  204.01              55.2    55.2    55.2             .1       .3

CROSS SECTION


RIVER: Rancho Drive
REACH: Firestone          RS: 8221.80

INPUT
Description: Referenced from Draft House Study (LOMA 01-09-1032A)
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 2307.28   27.28 2307.31   42.86 2306.99   47.82 2306.99      71 2306.57
   83.95 2306.35      86 2306.34   86.01  2306.1   97.14 2306.35  119.24 2306.81
     133    2307     147  2307.7  147.01 2309.52     203 2309.52

Manning's n Values        num=      5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .016      71    .037      86    .016     133    .025     147    .016

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            0     203               48.8    48.8    48.8             .1       .3
Blocked Obstructions      num=      1
   Sta L   Sta R    Elev
     147     203    2310

CROSS SECTION
```

RIVER: Rancho Drive
REACH: Firestone RS: 8173

INPUT
Description: Referenced from Draft House Study (LOMA 01-09-1032A)
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2306.93	2.24	2307	22.12	2307	62.5	2306	68	2306
85	2306	110	2305.6	132.05	2306	139.74	2306.06	161.54	2306.99
205.13	2306.99	217.31	2307.13	252.56	2308	256.09	2307.99	260	2308.33

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.016	68	.025	85	.016

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	260	18	18	.1	.3

CROSS SECTION

RIVER: Rancho Drive
REACH: Firestone RS: 8155

INPUT
Description: Referenced from Draft House Study (LOMA 01-09-1032A)
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2306.99	7.33	2306.99	16.23	2306.99	53.41	2306.01	68	2306.01
78	2306.01	110	2305.4	129.35	2306.01	153.7	2306.99	195.59	2306.99
252.62	2307.99	260	2308.48						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.016	68	.025	78	.016

Bank Sta: Left	Right	Coeff Contr.	Expan.
0	260	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
157	190	2311

SUMMARY OF MANNING'S N VALUES

River:Rancho Drive

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7	n8	n9	n10	n11
Firestone	9376	.016	.013	.03	.016	.013	.016					
Firestone	9324	.016	.03	.016								
Firestone	9205	.016	.03	.016								
Firestone	9114	.016	.03									
Firestone	9060	.016	.03									
Firestone	8950	.016	.03	.016	.013	.016	.035	.013	.016	.013	.035	
Firestone	8862	.016	.013	.016	.013	.016	.013	.035				
Firestone	8832	.016	.013	.035	.013	.035	.013	.016	.013	.016	.013	.035
Firestone	8802	.016	.013	.035	.013	.016	.013	.035				
Firestone	8744	.016	.013	.035	.013	.035	.013	.016	.013	.035		
Firestone	8668	.016	.013	.03	.013	.03						
Firestone	8616	.016	.013	.03	.013	.03	.013	.016	.013			
Firestone	8586	.016	.013	.03	.013	.03	.013	.016	.013			
Firestone	8566	.016	.013	.03	.013	.03	.013	.016	.013	.03		
Firestone	8565	Culvert										
Firestone	8533	.016	.013	.016	.013	.016	.013	.03				
Firestone	8532	Culvert										
Firestone	8506	.016	.013	.03	.013	.03						
Firestone	8476	.016	.013	.03	.013	.03	.016					
Firestone	8410	.016	.037	.016								
Firestone	8277	.016	.025	.016	.025							
Firestone	8221.80	.016	.037	.016	.025	.016						
Firestone	8173	.016	.025	.016								
Firestone	8155	.016	.025	.016								

SUMMARY OF REACH LENGTHS

River: Rancho Drive

Reach	River Sta.	Left	Channel	Right
Firestone	9376	52	52	52
Firestone	9324	119	119	119
Firestone	9205	91	91	91
Firestone	9114	54	54	54
Firestone	9060	110	110	110
Firestone	8950	88	88	88
Firestone	8862	30	30	30

Firestone	8832	30	30	30
Firestone	8802	58	58	58
Firestone	8744	76	76	76
Firestone	8668	52	52	52
Firestone	8616	27	27	27
Firestone	8586	20	20	20
Firestone	8566	33	33	33
Firestone	8565	Culvert		
Firestone	8533	27	27	27
Firestone	8532	Culvert		
Firestone	8506	30	30	30
Firestone	8476	66	66	66
Firestone	8410	133	133	133
Firestone	8277	55.2	55.2	55.2
Firestone	8221.80	48.8	48.8	48.8
Firestone	8173	18	18	18
Firestone	8155			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Rancho Drive

Reach	River Sta.	Contr.	Expan.
Firestone	9376	.1	.3
Firestone	9324	.1	.3
Firestone	9205	.1	.3
Firestone	9114	.1	.3
Firestone	9060	.1	.3
Firestone	8950	.1	.3
Firestone	8862	.1	.3
Firestone	8832	.1	.3
Firestone	8802	.1	.3
Firestone	8744	.1	.3
Firestone	8668	.1	.3
Firestone	8616	.1	.3
Firestone	8586	.1	.3
Firestone	8566	.1	.3
Firestone	8565	Culvert	
Firestone	8533	.1	.3
Firestone	8532	Culvert	
Firestone	8506	.1	.3
Firestone	8476	.1	.3
Firestone	8410	.1	.3
Firestone	8277	.1	.3
Firestone	8221.80	.1	.3
Firestone	8173	.1	.3
Firestone	8155	.1	.3

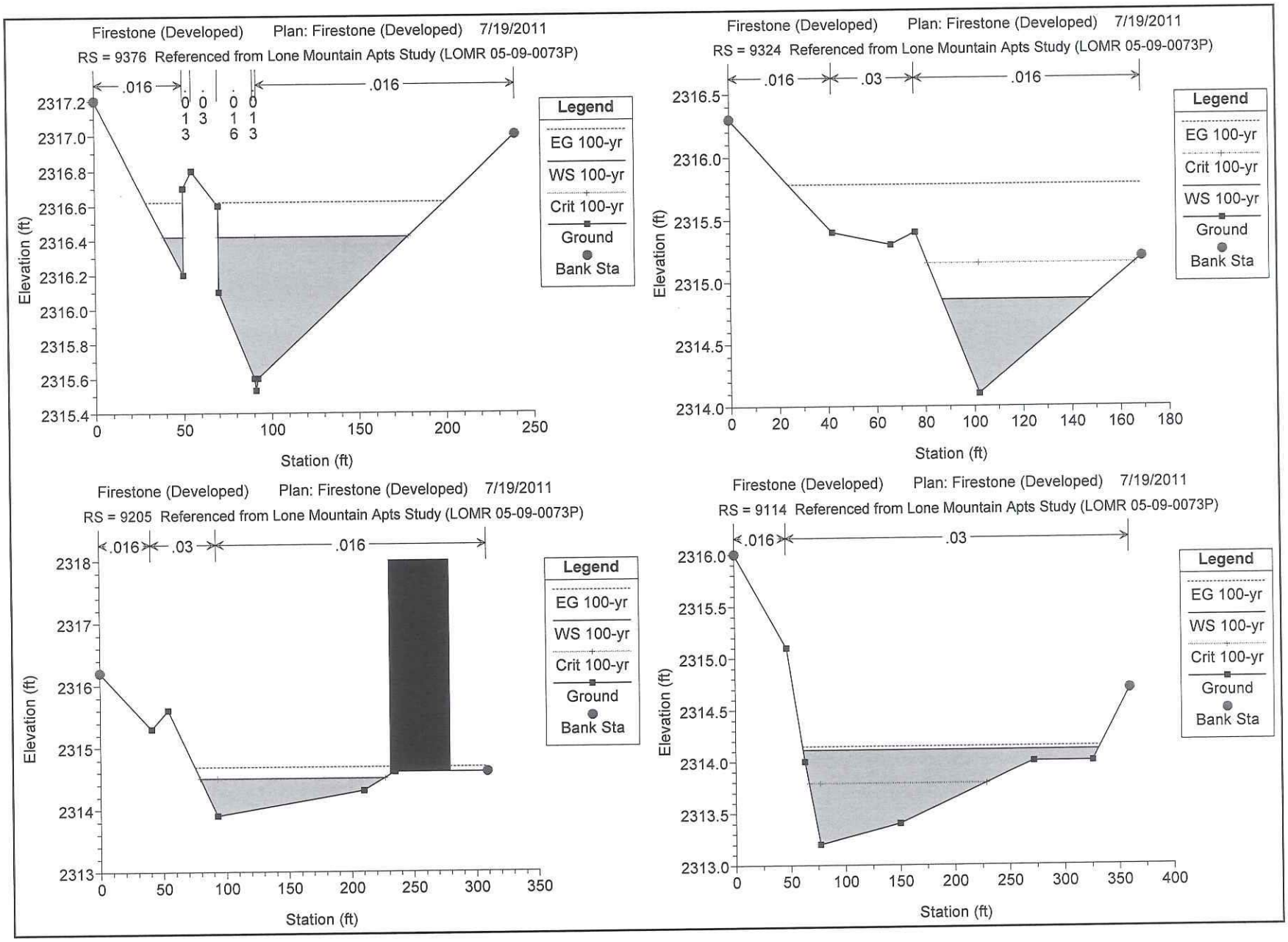
ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Rancho

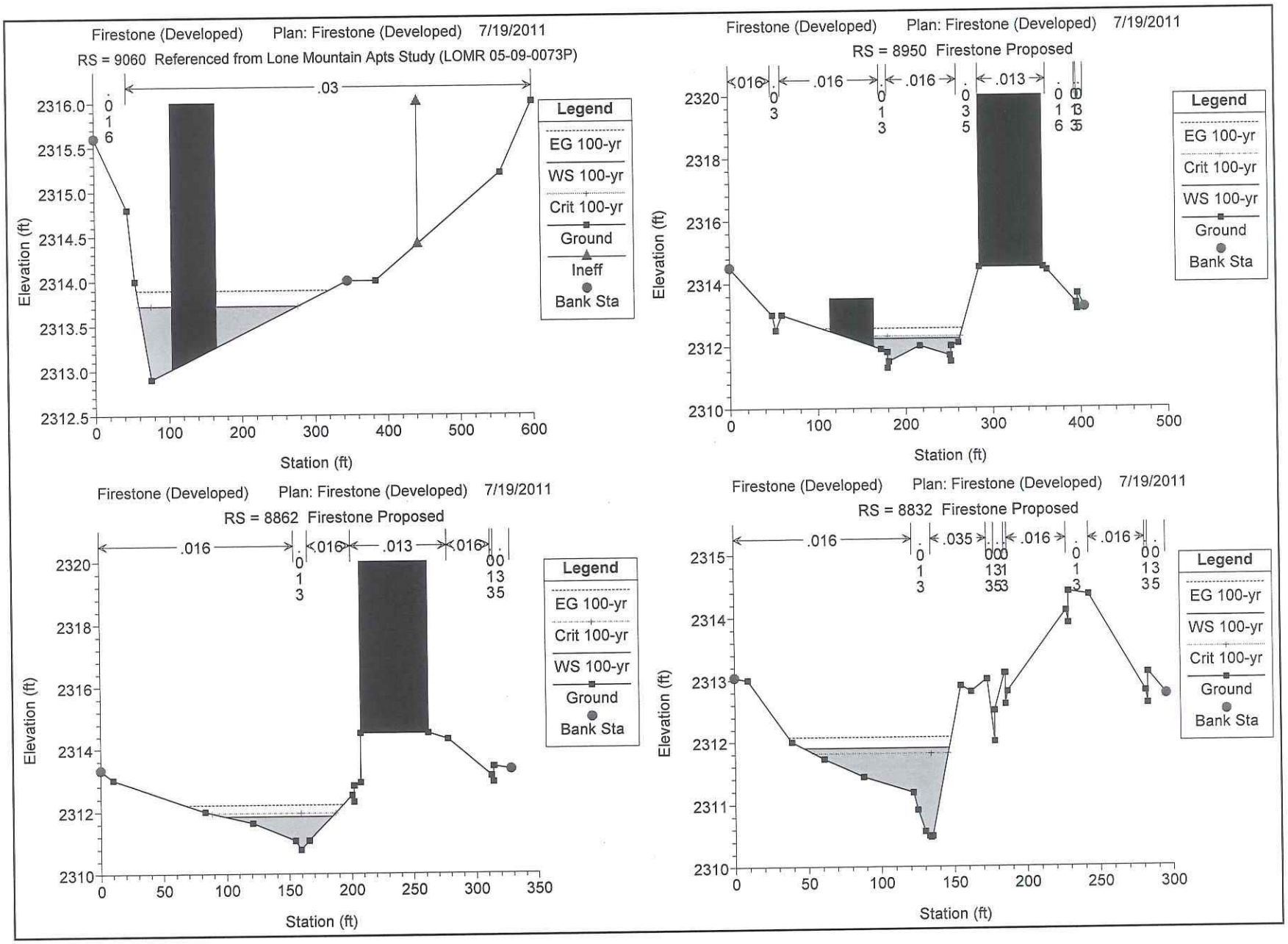
River: Rancho Drive Reach: Firestone RS: 9376 Profile: 100-yr
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: Rancho Drive Reach: Firestone RS: 9324 Profile: 100-yr
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Rancho Drive Reach: Firestone RS: 9205 Profile: 100-yr
Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: Rancho Drive Reach: Firestone RS: 9114 Profile: 100-yr
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: Rancho Drive Reach: Firestone RS: 9060 Profile: 100-yr
Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

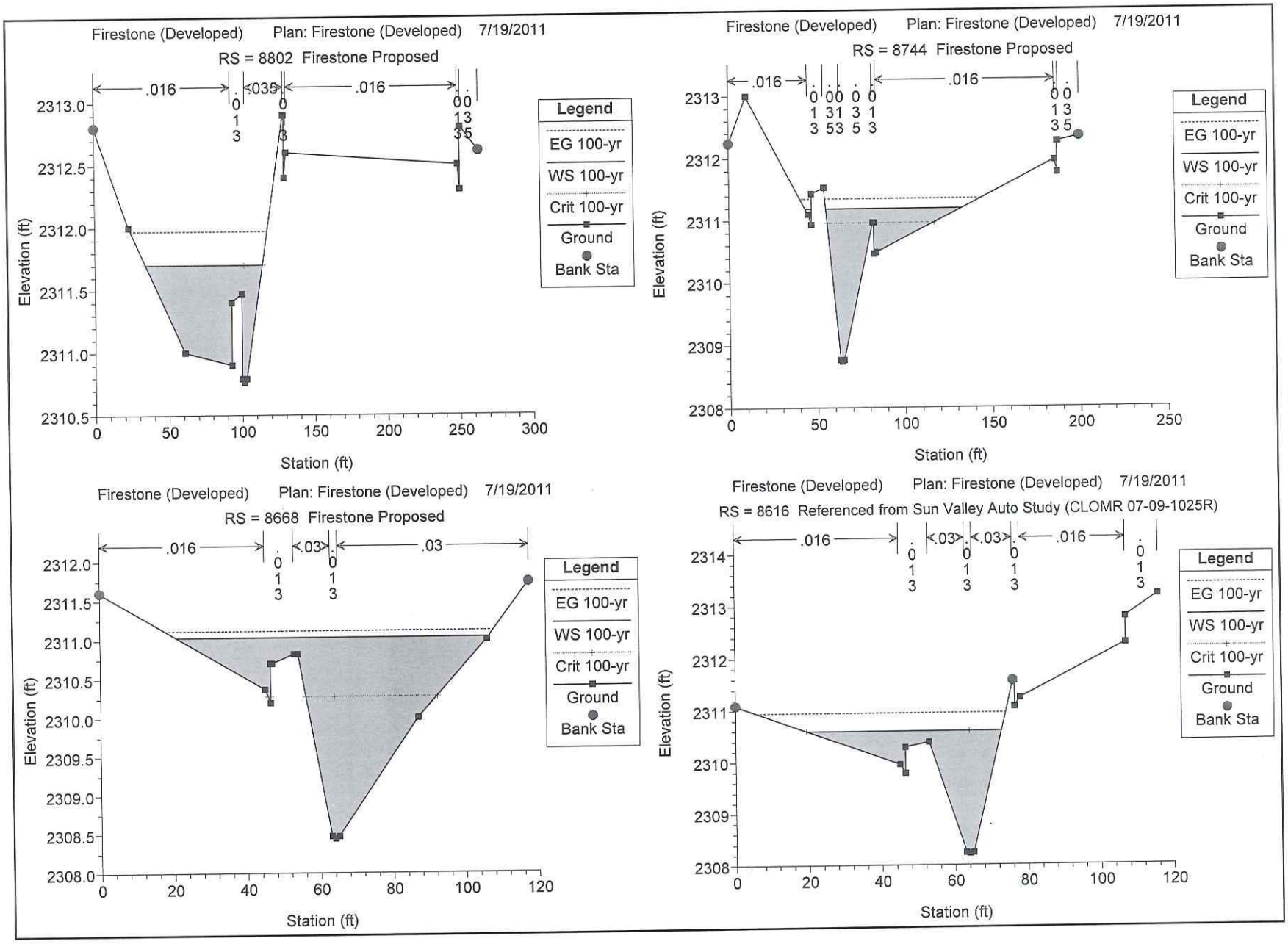
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     Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
             water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
             program defaulted to critical depth.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Rancho Drive  Reach: Firestone     RS: 8950     Profile: 100-yr
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Program found supercritical flow starting at this cross section.
River: Rancho Drive  Reach: Firestone     RS: 8862     Profile: 100-yr
     Warning:The energy equation could not be balanced within the specified number of iterations.  The program selected the
water
             surface that had the least amount of error between computed and assumed values.
River: Rancho Drive  Reach: Firestone     RS: 8832     Profile: 100-yr
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: Rancho Drive  Reach: Firestone     RS: 8802     Profile: 100-yr
     Warning:The energy equation could not be balanced within the specified number of iterations.  The program used critical
depth
             for the water surface and continued on with the calculations.
     Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
             water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
             program defaulted to critical depth.
River: Rancho Drive  Reach: Firestone     RS: 8744     Profile: 100-yr
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Manning's n values were composited to a single value in the main channel.
River: Rancho Drive  Reach: Firestone     RS: 8668     Profile: 100-yr
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Manning's n values were composited to a single value in the main channel.
River: Rancho Drive  Reach: Firestone     RS: 8616     Profile: 100-yr
     Warning:The energy equation could not be balanced within the specified number of iterations.  The program selected the
water
             surface that had the least amount of error between computed and assumed values.
     Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
             water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
             program defaulted to critical depth.
     Note:   Manning's n values were composited to a single value in the main channel.
River: Rancho Drive  Reach: Firestone     RS: 8586     Profile: 100-yr
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Manning's n values were composited to a single value in the main channel.
River: Rancho Drive  Reach: Firestone     RS: 8565     Profile: 100-yr     Culv: Culvert #1
     Warning:During the culvert inlet computations, the program could not balance the culvert/weir flow.  The reported inlet
             energy grade answer may not be valid.
River: Rancho Drive  Reach: Firestone     RS: 8533     Profile: 100-yr
     Warning:During subcritical analysis, the water surface upstream of culvert went to critical depth.
River: Rancho Drive  Reach: Firestone     RS: 8532     Profile: 100-yr
     Warning:During subcritical analysis, the water surface upstream of culvert went to critical depth.
River: Rancho Drive  Reach: Firestone     RS: 8532     Profile: 100-yr     Culv: Culvert #1
     Note:   The normal depth exceeds the height of the culvert.  The program assumes that the normal depth is equal to the
height
             of the culvert.
     Note:   Culvert critical depth exceeds the height of the culvert.
     Note:   During the supercritical calculations a hydraulic jump occurred inside of the culvert.
     Note:   The culvert inlet is submerged and the culvert flows full over part or all of its length.  Therefore, the culvert
             inlet equations are not valid and the supercritical result has been discarded.  The outlet answer will be used.
River: Rancho Drive  Reach: Firestone     RS: 8506     Profile: 100-yr
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
             water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
             program defaulted to critical depth.
     Note:   Manning's n values were composited to a single value in the main channel.
River: Rancho Drive  Reach: Firestone     RS: 8476     Profile: 100-yr
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: Rancho Drive  Reach: Firestone     RS: 8410     Profile: 100-yr
     Warning:The energy equation could not be balanced within the specified number of iterations.  The program used critical
depth
             for the water surface and continued on with the calculations.
     Warning:Divided flow computed for this cross-section.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
             water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
             program defaulted to critical depth.
River: Rancho Drive  Reach: Firestone     RS: 8277     Profile: 100-yr
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Program found supercritical flow starting at this cross section.
River: Rancho Drive  Reach: Firestone     RS: 8155     Profile: 100-yr
```

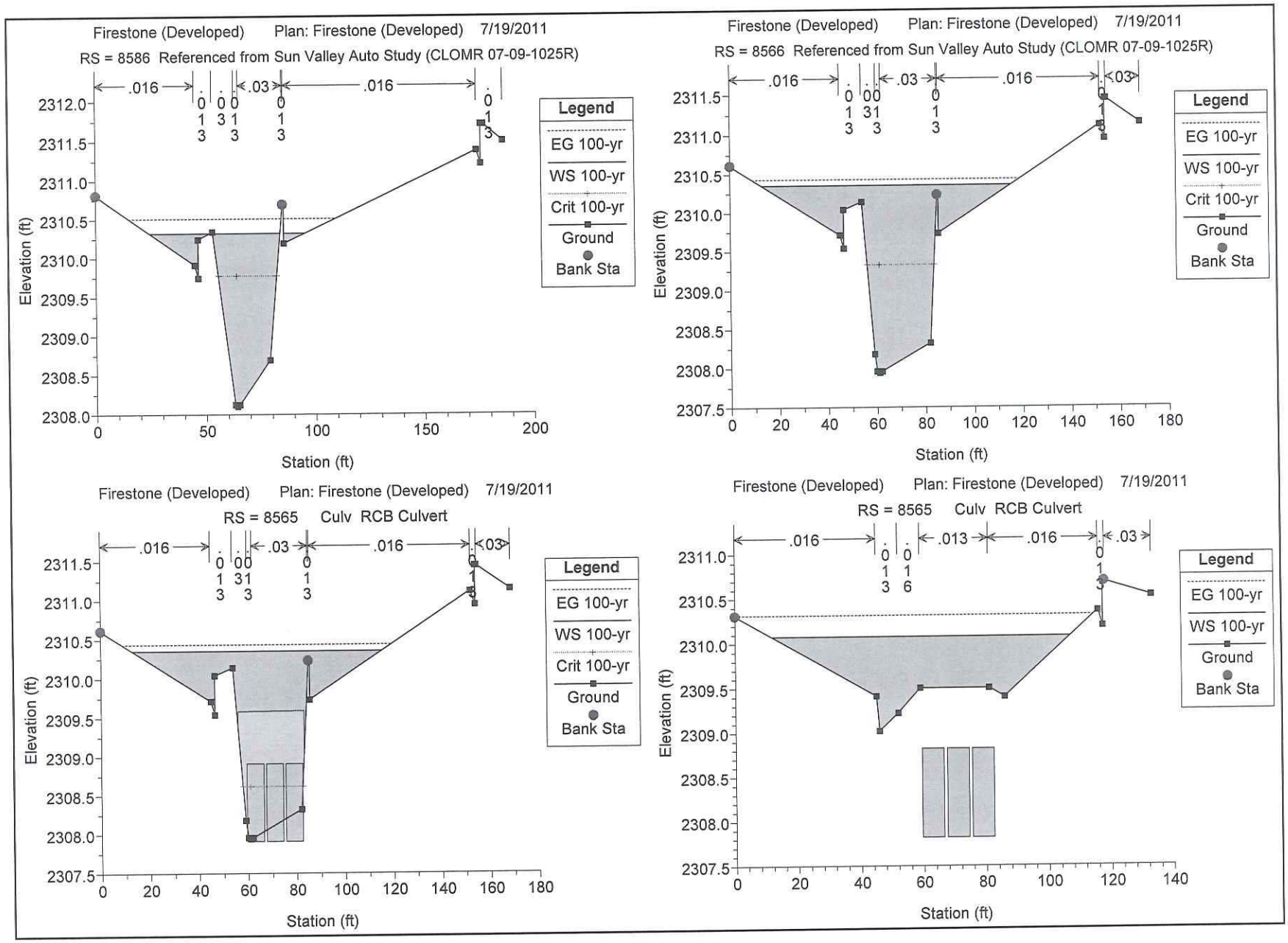
Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

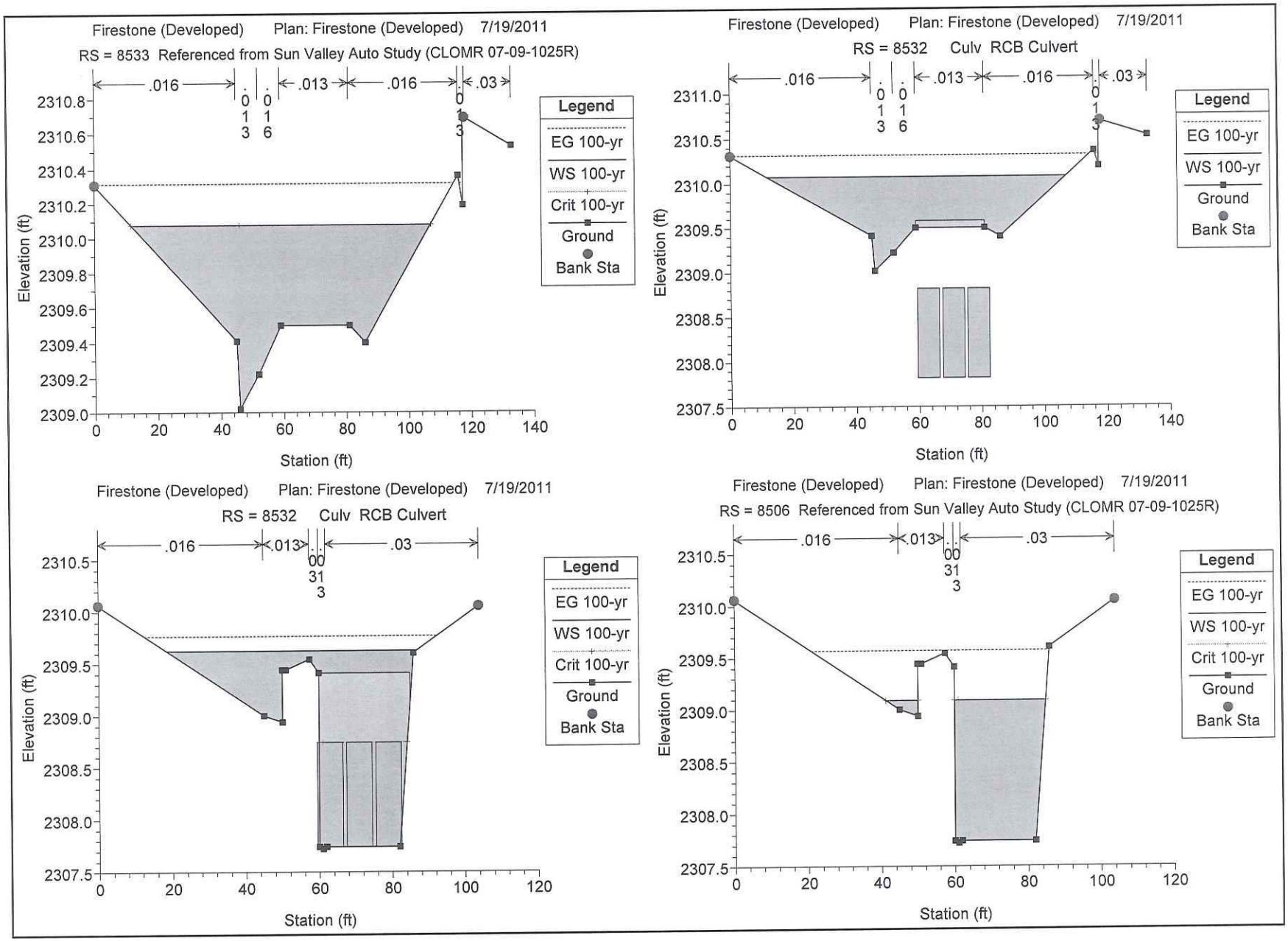
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

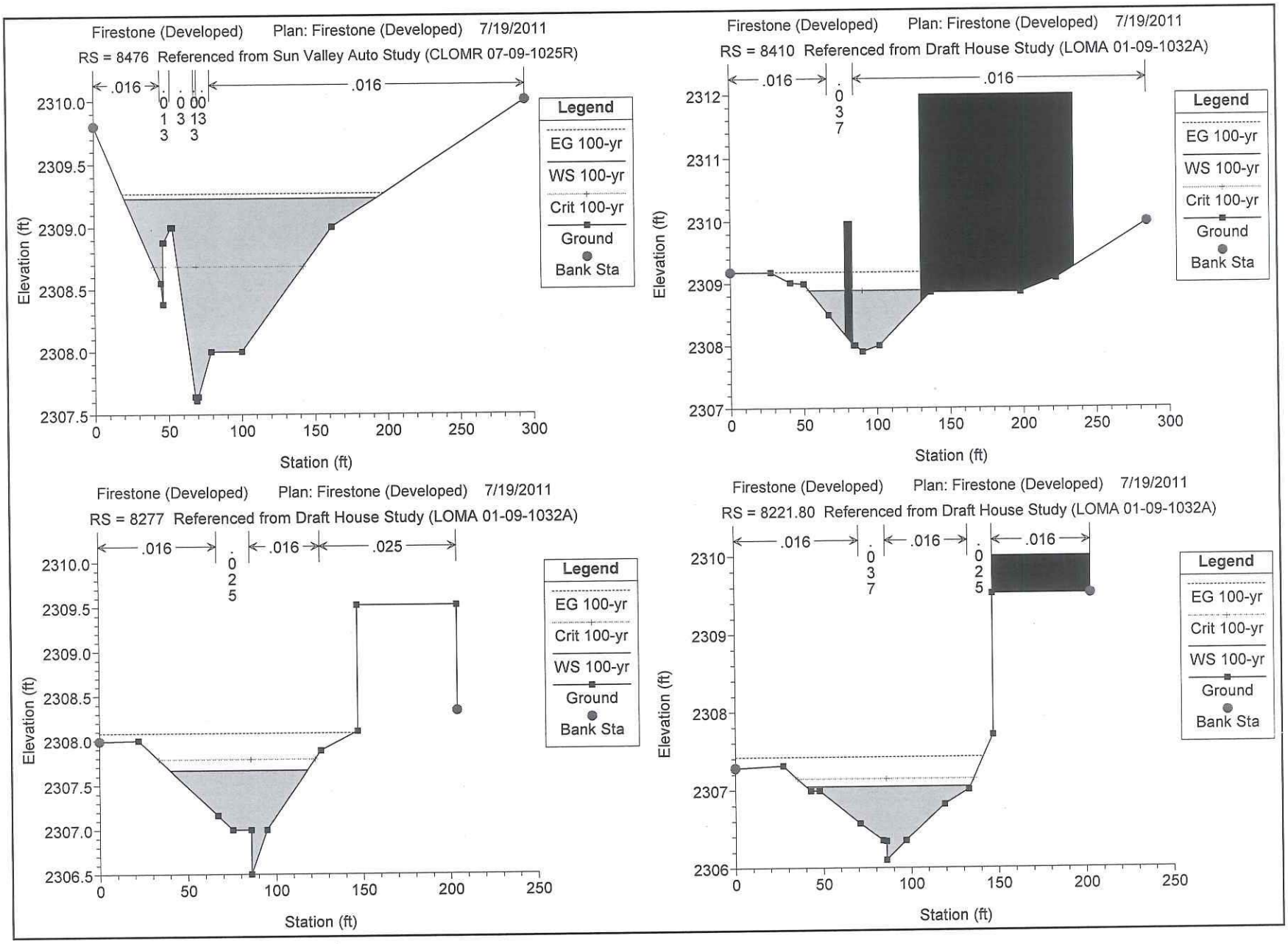

Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 9376 Referenced from Lone Mountain Apts Study (LOMR 05-09-0073P)
.016
.013
.03
.016
.013
.016
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 9324 Referenced from Lone Mountain Apts Study (LOMR 05-09-0073P)
.016
.03
.016
Legend
EG 100-yr
Crit 100-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 9205 Referenced from Lone Mountain Apts Study (LOMR 05-09-0073P)
.016
.03
.016
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 9114 Referenced from Lone Mountain Apts Study (LOMR 05-09-0073P)
.016
.03
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

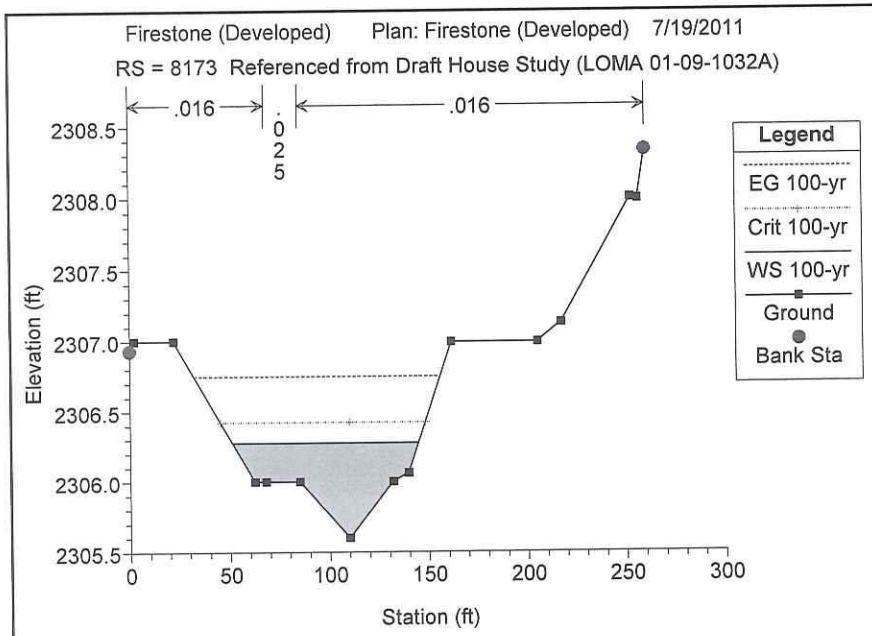

Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 9060 Referenced from Lone Mountain Apts Study (LOMR 05-09-0073P)
.016
.03
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Ineff
Bank Sta
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8950 Firestone Proposed
.016
.016
.016
.013
Elevation (ft)
Station (ft)
Legend
EG 100-yr
Crit 100-yr
WS 100-yr
Ground
Bank Sta
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8862 Firestone Proposed
.016
.016
.013
.016
Elevation (ft)
Station (ft)
Legend
EG 100-yr
Crit 100-yr
WS 100-yr
Ground
Bank Sta
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8832 Firestone Proposed
.016
.035
.016
.016
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Bank Sta

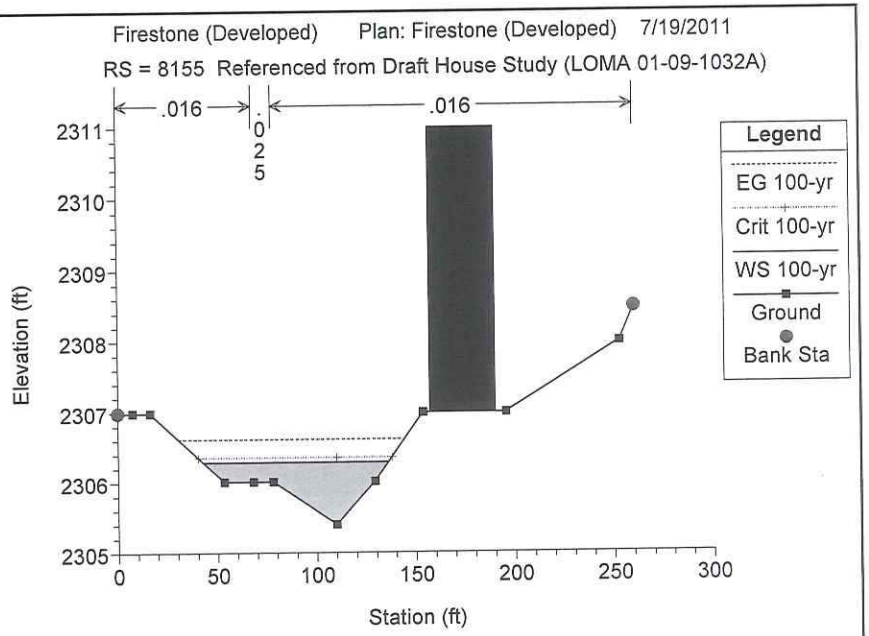

Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8802 Firestone Proposed
.016
.035
.016
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8744 Firestone Proposed
.016
.016
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8668 Firestone Proposed
.016
.03
.03
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8616 Referenced from Sun Valley Auto Study (CLOMR 07-09-1025R)
.016
.03
.03
.016
Elevation (ft)
Station (ft)
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Bank Sta


Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8586 Referenced from Sun Valley Auto Study (CLOMR 07-09-1025R)
.016 .03 .016
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8566 Referenced from Sun Valley Auto Study (CLOMR 07-09-1025R)
.016 .03 .016 .03
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8565 Culv RCB Culvert
.016 .03 .016 .03
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8565 Culv RCB Culvert
.016 .013 .016 .03
Legend
EG 100-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8533 Referenced from Sun Valley Auto Study (CLOMR 07-09-1025R)
.016
.013
.016
.03
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8532 Culv RCB Culvert
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8532 Culv RCB Culvert
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8506 Referenced from Sun Valley Auto Study (CLOMR 07-09-1025R)


Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8476 Referenced from Sun Valley Auto Study (CLOMR 07-09-1025R)
.016
.016
.013
.013
.013
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8410 Referenced from Draft House Study (LOMA 01-09-1032A)
.016
.016
.037
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8277 Referenced from Draft House Study (LOMA 01-09-1032A)
.016
.016
.025
.025
Legend
EG 100-yr
Crit 100-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8221.80 Referenced from Draft House Study (LOMA 01-09-1032A)
.016
.016
.016
.037
.025
Legend
EG 100-yr
Crit 100-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8173 Referenced from Draft House Study (LOMA 01-09-1032A)
.016
.025
.016
Legend
EG 100-yr
Crit 100-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
2308.5
2308.0
2307.5
2307.0
2306.5
2306.0
2305.5
0
50
100
150
200
250
300


Firestone (Developed) Plan: Firestone (Developed) 7/19/2011
RS = 8155 Referenced from Draft House Study (LOMA 01-09-1032A)
.016
.025
.016
Legend
EG 100-yr
Crit 100-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
2311
2310
2309
2308
2307
2306
2305
0
50
100
150
200
250
300

APPENDIX F

Reference Material

Technical Drainage Study for Lone Mountain/Rainbow Apartments
by VPoint (DS3567)

Approval Letter

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: December 9, 2004
TO: **Land Development Services** Department of Public Works				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Technical Drainage Study for: ***Lone Mountain / Rainbow Apartments***			**COPIES TO:** V Point
Cross Streets:	SEC of Lone Mountain Rd. & Rainbow Blvd.			Ovation Development
File Number:	F:\Depot\DSMEMOS\DS3567C.doc			Bart Anderson, P.E., DevCo
Parcel Number:	138-02-101-001 & -013			B&H
Zoning Action:	ZON 3486, SDR 3490			Leni Skaar, Ward 6
FEMA Flood Zone	YES	X	NO	
Proposed Storm Drain	YES	X	NO	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID G.R. No.
1st Submittal	4/27/2004	5/11/2004	See Comments Below	$400.00	123930: $400
2nd Submittal & Supplemental	6/08/2004 & 7/29/2004	8/12/2004	See Comments Below	$400.00	Trn6285: $400
3rd Submittal	11/24/2004	12/08/2004	CCRFCD Concurrence	0.0	N/A
			TOTAL FEES (LDDRS):	**$800.00**	----

REMARKS: CCRFCD Concurrence received with supplemental information.

The Drainage Study for the subject project has been reviewed and:

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.

1. The drainage easements along the south side of the site are being dedicated by separate document. A 20-foot drainage easement must be shown between Rainbow and the Painted Desert cul-de-sac and a 10-foot drainage easement must be shown between the Painted Desert and Red Coach cul-de-sacs. These easements are to be labeled as "Public Drainage Easement to be Privately Maintained". Additionally, the two cul-de-sac dedications must be shown on the Parcel Map or dedicated by a separate document.

2. A *Letter of Map Revision* (LOMR) must be obtained from FEMA for any project within a FEMA "A" flood zone. The bonded flood control improvements will not be released until the LOMR is obtained and filed with the City of Las Vegas.

3. Sheet PP1 & PP2: Add the storm drain pipe flow to the profile sheets of Rainbow Boulevard.

4. The engineer has provided a table on the grading plans that shows a quantity estimate of all on-site and off-site flood control improvements such as solid grouted stem wall, drainage easements, protection berm, riprap, etc. All drainage improvements must be bonded and inspected.

5. Show the limits of the proposed right-of-way for Red Coach Avenue on the plans.

6. Detail I, DT1: Provide the headwall details prior to approval of the improvement plans.

7. This drainage study assumes that the project will be constructed in one phase. If improvement plans are submitted to break the project into separate phases, a drainage study update will be required for each phase addressing the interim condition.

NOTE: This site is located in a **FEMA Zone AE**. Clark County Regional Flood Control District (CCRFCD) review and approval is required prior to recordation of final map or issuance of building/grading permits. The Engineer must send a copy of the report to the CCRFCD for review. **The developer/engineer must also obtain a Letter of Map Revision (LOMR) using the approved drainage study as technical support to inform FEMA of the modifications within the flood zone. The approved LOMR must be submitted to the City of Las Vegas prior to the release of the bond.** FEMA Elevation Certificates, showing as-built finish floor elevations, must be completed for each building in the FEMA AE Zone. The certificate must be submitted to the City of Las Vegas Flood Control Section prior to scheduling a framing inspection.

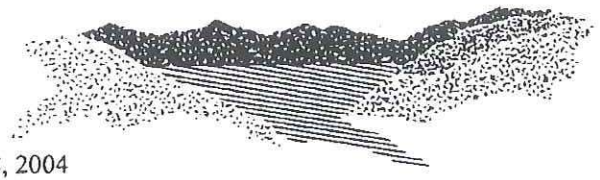
Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the Nevada Division of Environmental Protection a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see <http://ndep.nv.gov/bwpc/storm01.htm> or call (775) 687-9429.

END OF REMARKS
PBJ

T/R/S: T20S/R60E/02
AREA L-02

662-E169(c)

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



RECEIVED
SEP 29 2004
VPOINT

Gale Wm. Fraser, II, P.E.
General Manager/Chief Engineer

BOARD OF DIRECTORS

Larry Brown
Chairman
City of Las Vegas

Chip Maxfield
Vice-Chairman
Clark County

Shari Buck
City of North Las Vegas

Andy Hafen
City of Henderson

Michael Mack
City of Las Vegas

Mayor Bill Nicholes
City of Mesquite

Roger Tobler
City of Boulder City

Bruce L. Woodbury
Clark County

September 28, 2004

Mr. Randy Fultz, P.E.
City of Las Vegas Public Works
731 S. Fourth Street
Las Vegas, NV 89101

DISTRICT CONCURRENCE: LONE MOUNTAIN APARTMENTS (A.K.A. LONE MOUNTAIN/RAINBOW) (DS3567) (RFCD NO. 04-5954)

Dear Mr. Fultz:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated April 23, 2004, Addendum No. 1 dated June 2, 2004, and the Supplement dated July 28, 2004, for the above-mentioned project as submitted by VPoint. In addition, District is in receipt of the Conditional Letter of Acceptance from the City of Las Vegas Public Works dated August 12, 2004.

District concurs with acceptance of this Technical Drainage Study by the City of Las Vegas Public Works.

District's review of this project was limited to issues of Regional Flood Control Significance as defined in *Uniform Regulations for the Control of Drainage*. As noted in study, the site resides in a Special Flood Hazard Area (SFHA) designated as "Zone AE" per the effective Flood Insurance Rate Map (FIRM). Therefore, the consultant should be advised that this acceptance does not serve to amend the FIRM or remove the SFHA designation.

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, information submitted by VPoint may be superseded. Compliance with regulatory elements and design standards specified in *Uniform Regulations for the Control of Drainage* does not imply a guarantee that properties will be free from flooding of flood damage. The District, its officials, or employees assume no liability for information, data, or conclusions presented by consulting engineers. We, therefore, make no warranties, either expressed or implied, in conducting this review.

GALE WM. FRASER, II, P.E.
General Manager/Chief Engineer

BY: _____
Andrew R. Trelease, P.E.
Senior Civil Engineer

ART:jb

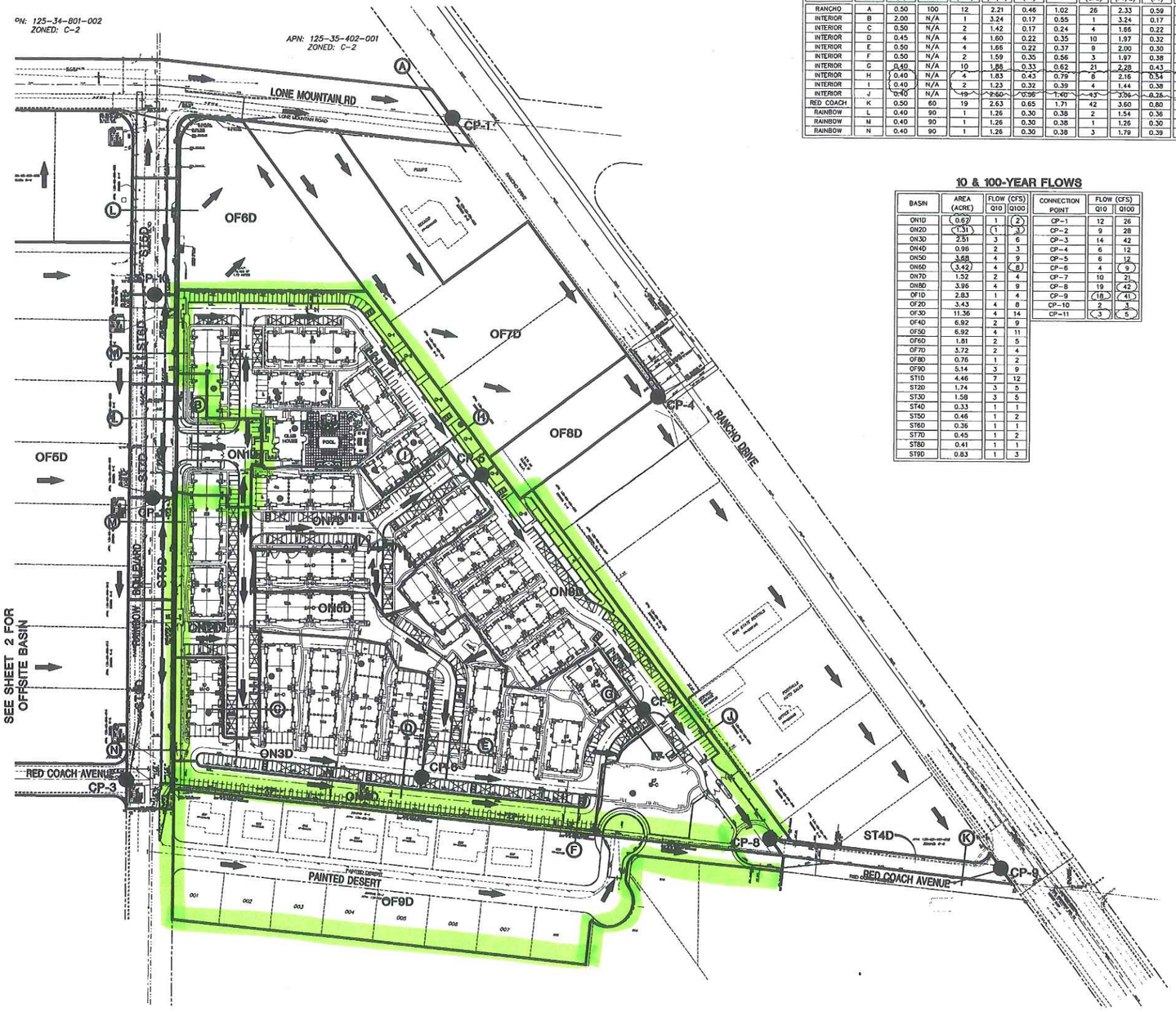
c: Randy McConnell, P.E., VPoint

File: 20-60-2

600 S. Grand Central Parkway, Suite 300 • Las Vegas, Nevada 89106-4511
(702) 455-3139 • FAX: (702) 455-3870
Website: http://www.ccrfcd.org

Drainage Map

Revised Developed HEC-1 Map (Onsite Flows)



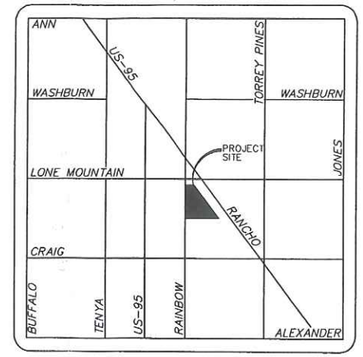
* UTILIZED TO CONFIRM OFFSITE DRAINAGE PATTERNS

STREET FLOW				10-YEAR FLOW				100-YEAR FLOW				
STREET NAME	CROSS SECTION	SLOPE (%)	R.O.W. WIDTH	Q10 (CFS)	V10 (FT/S)	D10 (FT)	V x D	Q100 (CFS)	V100 (FT/S)	D100 (FT)	V x D	DRY LANE
RANCHO	A	0.50	100	12	2.21	0.46	1.02	26	2.33	0.59	1.37	28.5
INTERIOR	B	2.00	N/A	1	3.24	0.17	0.55	1	3.24	0.17	0.55	N/A
INTERIOR	C	0.50	N/A	2	1.42	0.17	0.24	4	1.66	0.22	0.37	N/A
INTERIOR	D	0.45	N/A	4	1.60	0.22	0.35	10	1.97	0.32	0.36	N/A
INTERIOR	E	0.50	N/A	4	1.66	0.22	0.37	9	2.00	0.30	0.60	N/A
INTERIOR	F	0.50	N/A	2	1.59	0.35	0.56	3	1.97	0.38	0.75	N/A
INTERIOR	G	0.40	N/A	10	1.88	0.33	0.62	21	2.28	0.43	0.98	N/A
INTERIOR	H	0.40	N/A	4	1.83	0.43	0.79	8	2.16	0.54	1.67	N/A
INTERIOR	I	0.40	N/A	2	1.23	0.32	0.39	4	1.44	0.38	0.55	N/A
INTERIOR	J	0.40	N/A	19	2.60	0.36	1.40	43	3.06	0.75	2.30	N/A
RED COACH	K	0.50	60	19	2.63	0.65	1.71	42	3.60	0.80	2.88	N/A
RAINBOW	L	0.40	90	1	1.26	0.30	0.38	2	1.54	0.36	0.55	31.5
RAINBOW	M	0.40	90	1	1.26	0.30	0.38	1	1.26	0.30	0.38	31.5
RAINBOW	N	0.40	90	1	1.26	0.30	0.38	3	1.79	0.39	0.70	31.5

10 & 100-YEAR FLOWS

BASIN	AREA (ACRE)	FLOW (CFS) Q10	FLOW (CFS) Q100
ON1D	0.67	1	2
ON2D	1.31	1	3
ON3D	2.51	3	6
ON4D	0.98	2	3
ON5D	3.68	4	9
ON6D	3.42	4	8
ON7D	1.52	2	4
ON8D	3.96	4	9
OF1D	2.83	1	4
OF2D	3.43	4	8
OF3D	11.36	4	14
OF4D	6.92	2	9
OF5D	6.92	4	11
OF6D	1.81	2	5
OF7D	3.72	2	4
OF8D	0.76	1	2
OF9D	5.14	3	9
ST1D	4.46	7	12
ST2D	1.74	3	5
ST3D	1.58	3	5
ST4D	0.33	1	1
ST5D	0.46	1	2
ST6D	0.36	1	1
ST7D	0.45	1	2
ST8D	0.41	1	1
ST9D	0.83	1	3

CONNECTION POINT	FLOW (CFS) Q10	FLOW (CFS) Q100
CP-1	12	26
CP-2	9	28
CP-3	14	42
CP-4	6	12
CP-5	6	12
CP-6	4	9
CP-7	10	21
CP-8	19	42
CP-9	18	41
CP-10	2	3
CP-11	3	5



VICINITY MAP
N.T.S.

BASIS OF BEARING
THE BASIS OF BEARING FOR THIS SURVEY IS THE WESTERLY LINE OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 2, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, COUNTY OF CLARK, STATE OF NEVADA, WHICH BEARS NORTH 00°31'01" EAST, AS PER MAP RECORDED IN BOOK 105, PAGE 58 OF PLATS IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

BENCHMARK
CITY OF LAS VEGAS BENCH MARK 1LV00 3NEE6

CITY OF LAS VEGAS PIN AND PLATE IN THE TOP OF CURB, SOUTHWEST CORNER OF RAINBOW BOULEVARD AND RED COACH AVENUE NEAR THE PT OF RED COACH AVENUE

NAVD '88 DATUM

ELEVATION = 2319.021 U.S. SURVEY FEET
ELEVATION = 706.839 METERS

OWNER/DEVELOPER
OVATIONS DEVELOPMENT
1095 EAST TWAIN AVENUE
LAS VEGAS, NEVADA 89109

LEGEND
- BASIN BOUNDRY
- FLOW DIRECTION
- COMBINATION POINT
- 10 / 100 — 10-YEAR FLOW SPLIT / 100-YEAR FLOW SPLIT
- 68/270* — 10/100 YEAR FLOWS (CFS)
- (X) — CROSS SECTION LOCATION

*DENOTE FLOW VALUES TAKEN FROM THE "CITY OF LAS VEGAS CONTROL FACILITIES AND CITY WIDE HYDROLOGY ANALYSIS." (VOLUME II ~ 1999, PERFORMED BY PBS&J.)

GRAPHIC SCALE
1" = 100'

This grading plan is a part of drainage study #3567 which was received on 4/10/05 and approved on 4/17/05. Page 5 of 5.

REVISION	BY	DATE	APPRVL REV

TITLE: REVISED DEVELOPED HEC-1 MAP (ONSITE FLOWS)

PROJECT: LONE MOUNTAIN / RAINBOW

VPOINT
DESIGNING FOR THE FUTURE
PLANNERS · CONSULTING ENGINEERS · SURVEYORS
1020 ANTHEM RANCH DRIVE · HENDERSON, NEVADA 89014 · (702) 248-8415

SHEET	OF	SHEETS
1		1

W.O. # : 662-0169
BY : PJL
DATE : APRIL 2005
SCALE : 1"=100'

I:\Engineering\DWG\0662EZE 69\HYDROLOGY\DWG\BASIN-REV.dwg, 04/18/2005 09:04:48 PM, XEROX 8830.pc3

Letter of Map Revision (LOMR)

Federal Emergency Management Agency

Washington, D.C. 20472

SEP 15 2005

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Oscar B. Goodman
Mayor, City of Las Vegas
400 Stewart Avenue
Las Vegas, NV 89101

IN REPLY REFER TO:
Case No.: 05-09-0073P
Community Name: City of Las Vegas, NV
Community No.: 325276
Effective Date of This Revision: JAN 12 2006

Dear Mayor Goodman:

The Flood Insurance Study report and Flood Insurance Rate Map for your community have been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel(s) revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Federal Insurance and Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Oakland, California, at (510) 627-7175, or the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Sincerely,

Lloyd A. Hake

Lloyd A. Hake, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

For: Doug Bellomo, P.E., Chief
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

List of Enclosures:
Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map
Annotated Flood Insurance Study Report

cc: Mr. Randy L. Fultz, P.E.
Assistant City Engineer
City of Las Vegas

Mr. Randy McConnell, P.E.
Project Manager
VPoint

Mr. Kevin Eubanks, P.E., CFM
Assistant General Manager
Clark County Regional Flood Control District

2005 SEP 22 PM 3:36

RFCD

 | Issue Date: SEP 15 2005 | Effective Date: JAN 12 2006 | Case No.: 05-09-0073P | LOMR-APP

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Las Vegas Clark County Nevada	CHANNELIZATION CULVERT	NEW TOPOGRAPHIC DATA HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS
	COMMUNITY NO.: 325276		
IDENTIFIER	Lone Mountain Apartments	APPROXIMATE LATITUDE & LONGITUDE: 36.2436°,-115.2361° SOURCE: USGS QUADRANGLE DATUM: NAD 83	
FLOODING SOURCE(S) & REVISED REACH(ES)	Unnamed Wash Along North Rancho Drive – from approximately 250 feet downstream of Lone Mountain Road to approximately 200 feet upstream of Painted Desert Drive		

SUMMARY OF REVISIONS

Effective Flooding:	Zone AE	BFEs*
Revised Flooding:	Zone AE	BFEs
Increases:	NONE	YES
Decreases:	YES	YES

* BFEs – Base Flood Elevations

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 32003C2155 E Date: September 27, 2002	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: September 27, 2002 PROFILE: 91P

* FIRM – Flood Insurance Rate Map; ** FBFM – Flood Boundary and Floodway Map; *** FHBM – Flood Hazard Boundary Map

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Lloyd A. Hake

Lloyd A. Hake, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness and Response Directorate 105634 103105090073 102IAC

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the modified channel and culvert rests with your community. We may request that your community submit a description and schedule of channel and culvert activities.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Lloyd A. Hake

Lloyd A. Hake, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness and Response Directorate 105634 103105090073 102IAC

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Sally M. Ziolkowski
Director, Federal Insurance and Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway Street, Suite 1200
Oakland, CA 94607-4052
(510) 627-7175

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Lloyd A. Hake

Lloyd A. Hake, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness and Response Directorate 105634 103105090073 102IAC

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised BFEs presented in this LOMR may be changed.

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below.

LOCAL NEWSPAPER Name: *Las Vegas Review-Journal*
Dates: 10/06/2005 10/13/2005

PUBLIC NOTIFICATION

FLOODING SOURCE	LOCATION OF REFERENCED ELEVATION	BFE (FEET NAVD)		MAP PANEL NUMBER(S)
		EFFECTIVE	REVISED	
Unnamed Wash Along North Rancho Drive	Approximately 250 feet downstream of Lone Mountain Road	2,317	2,318	32003C2155 E
	Approximately 500 feet upstream of Painted Desert Drive	2,315	2,316	32003C2155 E

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Lloyd A. Hake

Lloyd A. Hake, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness and Response Directorate 105634 103105090073 102IAC

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE CITY OF LAS VEGAS, CLARK COUNTY, NEVADA UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On September 27, 2002, the Department of Homeland Security's Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the City of Las Vegas, Clark County, Nevada, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Division has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in this community is appropriate. The modified Base Flood Elevations (BFEs) revise the FIRM for the community.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

A hydraulic analysis was performed to incorporate updated topographic information and the effects of culvert construction and channelization along an unnamed wash along North Rancho Drive from approximately 250 feet downstream of Lone Mountain Road to approximately 200 feet upstream of Painted Desert Drive. This has resulted in a decrease in SFHA width and increased and decreased BFEs throughout the revised reach of the unnamed wash. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)*	Modified BFE (feet)*
Approximately 250 feet downstream of Lone Mountain Road	2,317	2,318
Approximately 500 feet upstream of Painted Desert Drive	2,315	2,316

*North American Vertical Datum, rounded to nearest whole foot

Under the above-mentioned Acts of 1968 and 1973, the Mitigation Division must develop criteria for floodplain management. To participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Division reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested parties are on notice that until the 90-day period elapses, the Mitigation Division's determination to modify the BFEs may itself be changed.

Any person having knowledge or wishing to comment on these changes should immediately notify:

The Honorable Oscar B. Goodman
Mayor, City of Las Vegas
400 Stewart Avenue
Las Vegas, NV 89101

REVISED TO REFLECT LOMR DATED JAN 12 2006

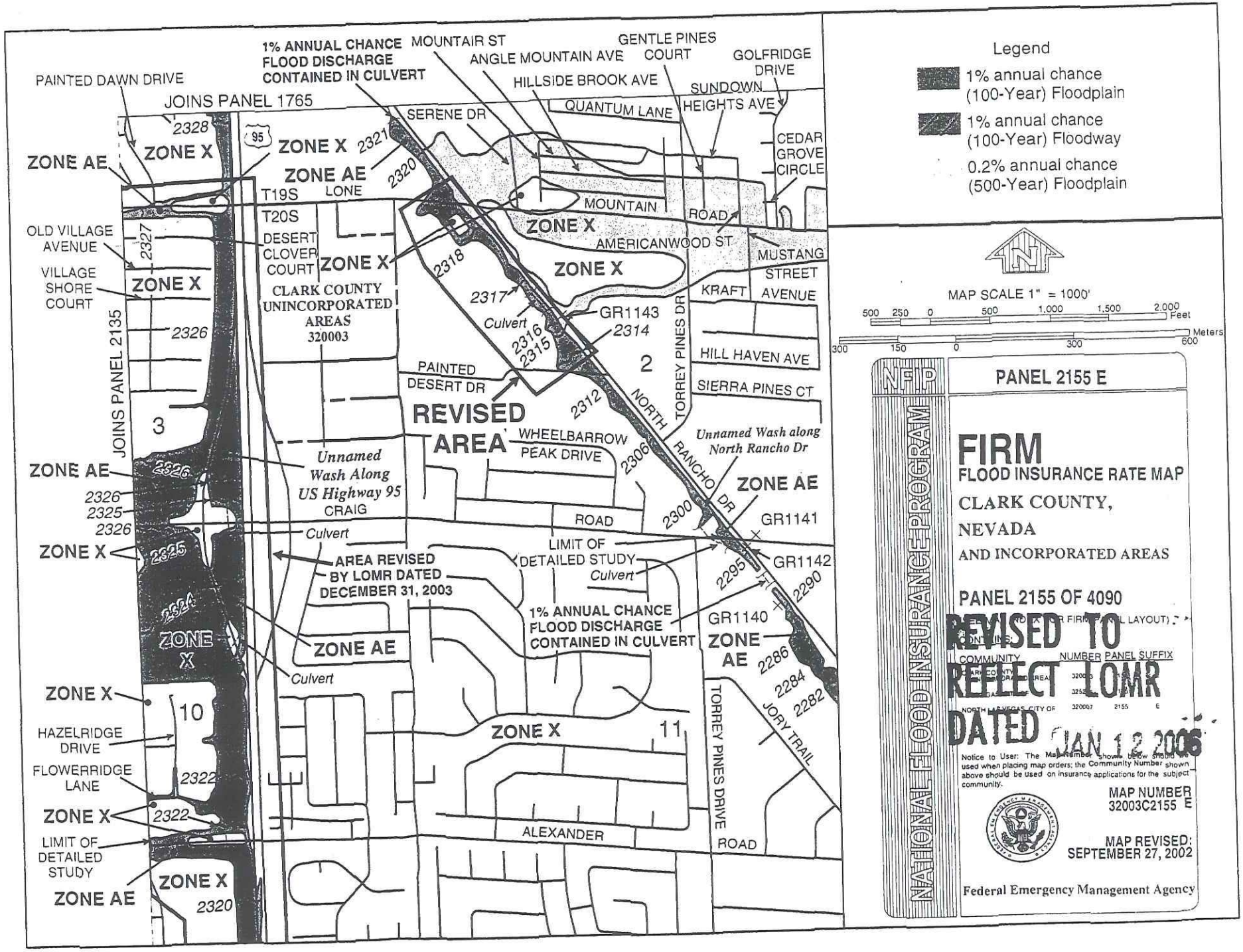
FEDERAL EMERGENCY MANAGEMENT AGENCY

CLARK COUNTY, NV
AND INCORPORATED AREAS

FLOOD PROFILES

UNNAMED WASH - ALONG NORTH RANCHO DRIVE

91P



Legend

- 1% annual chance (100-Year) Floodplain
- 1% annual chance (100-Year) Floodway
- 0.2% annual chance (500-Year) Floodplain

MAP SCALE 1" = 1000'

500 250 0 500 1,000 1,500 2,000 Feet

300 150 0 300 600 Meters

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2155 E

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	E
LAS VEGAS, CITY OF	320028	2155	E
NORTH LAS VEGAS, CITY OF	320007	2155	E

REVISED TO REFLECT LOMR DATED JAN 12 2006

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 32003C2155 E

MAP REVISED: SEPTEMBER 27, 2002

Federal Emergency Management Agency

Federal Emergency Management Agency

RECD
1:53

JAN 25 2006

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 05-09-0073P

The Honorable Oscar B. Goodman
Mayor, City of Las Vegas
400 Stewart Avenue
Las Vegas, NV 89101

Community: City of Las Vegas, NV
Community No.: 325276
FIRM Panel Affected: 32003C2155 E

116

Dear Mayor Goodman:

In a Letter of Map Revision (LOMR) dated September 15, 2005, you were notified of proposed modified flood elevation determinations affecting the Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for City of Las Vegas, Clark County, Nevada. These determinations were for Unnamed Wash Along North Rancho Drive from approximately 250 feet downstream of Lone Mountain Road to approximately 500 feet upstream of Painted Desert Drive. The 90-day appeal period that was initiated on October 13, 2005, when the Department of Homeland Security's Federal Emergency Management Agency (FEMA) published a notice of proposed Base Flood Elevations (BFEs) in the *Las Vegas Review-Journal*, has elapsed.

FEMA received no valid requests for changes to the modified BFEs. Therefore, the modified BFEs that became effective on January 12, 2006, remain valid and revise the FIRM and FIS report that were in effect prior to that date.

The modifications are pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. The community number(s) and suffix code(s) are unaffected by this revision. The community number and appropriate suffix code as shown above will be used by the National Flood Insurance Program (NFIP) for all flood insurance policies and renewals issued for your community.

FEMA has developed criteria for floodplain management as required under the above-mentioned Acts of 1968 and 1973. To continue participation in the NFIP, your community must use the modified BFEs to carry out the floodplain management regulations for the NFIP. The modified BFEs will also be used to calculate the appropriate flood insurance premium rates for all new buildings and their contents and for the second layer of insurance on existing buildings and their contents.

If you have any questions regarding the necessary floodplain management measures for your community or the NFIP in general, please call the Director, Federal Insurance and Mitigation Division of FEMA in Oakland, California at (510) 627-7103.

If you have any questions regarding the LOMR, the proposed modified BFEs, or mapping issues in general, please call the FEMA Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,

Doug Bellomo, P.E., CFM, Chief
Hazard Identification Section
Mitigation Division

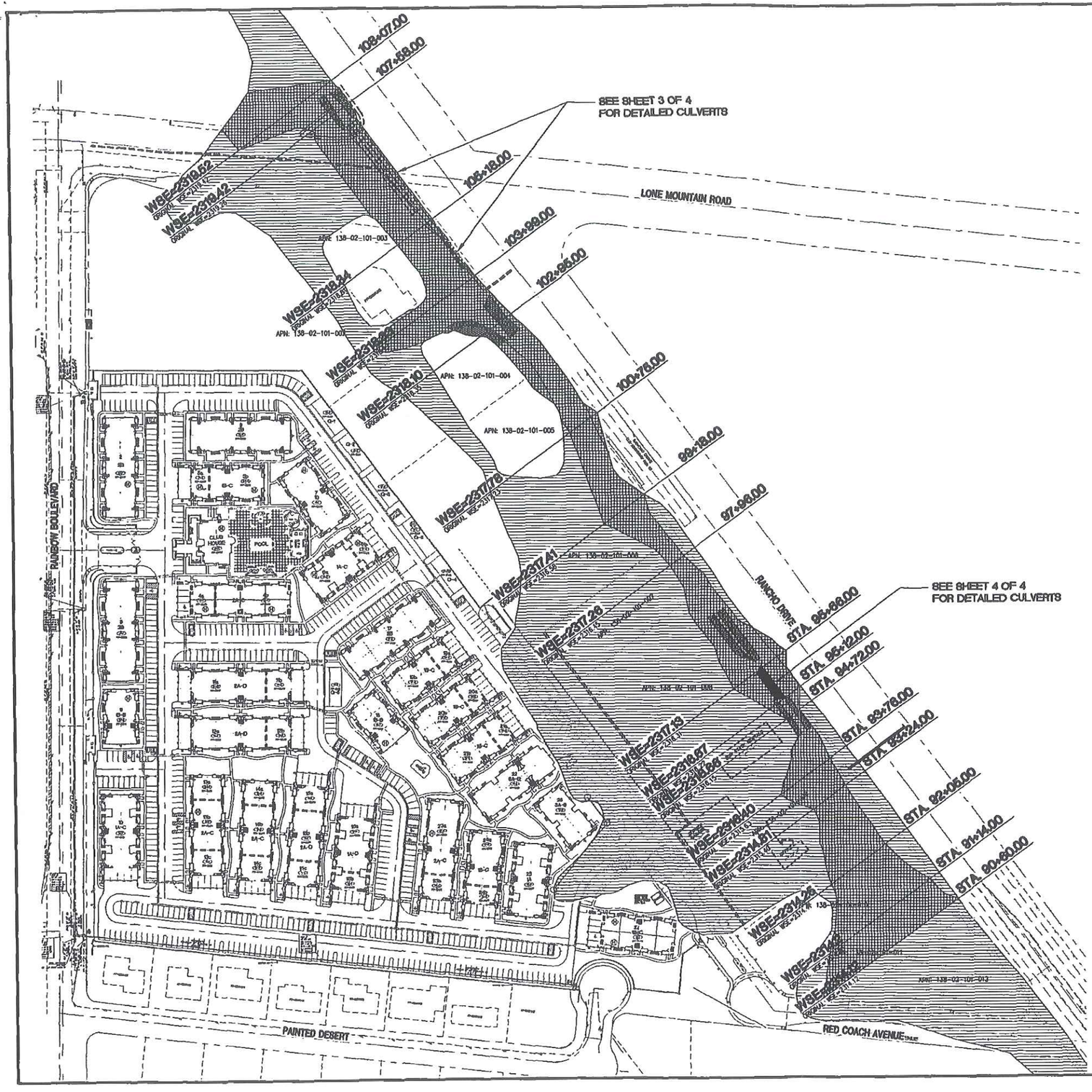
cc: Mr. Randy McConnell, P.E.
Project Manager
VPoint

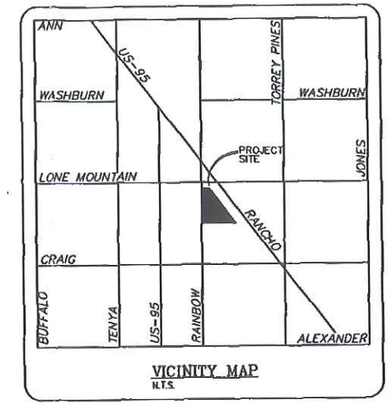
Mr. Randy Fultz, P.E.
Assistant City Engineer
City of Las Vegas

Mr. Kevin Eubanks, P.E., CFM
Assistant General Manager
Clark County Regional Flood Control District

HEC-RAS Exhibit

Revised Zone A





VICINITY MAP
N.T.S.

BASIS OF BEARING

THE BASIS OF BEARING FOR THIS SURVEY IS THE WESTERLY LINE OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 2, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, COUNTY OF CLARK, STATE OF NEVADA, WHICH BEARS NORTH 00°31'01" EAST, AS PER MAP RECORDED IN BOOK 103, PAGE 58 OF PLATS IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

BENCHMARK

CITY OF LAS VEGAS BENCH MARK 1LV00 3NE68

CITY OF LAS VEGAS PIN AND PLATE IN THE TOP OF CURB, SOUTHWEST CORNER OF RAINBOW BOULEVARD AND RED COACH AVENUE NEAR THE PT OF RED COACH AVENUE

NAVD '88 DATUM

ELEVATION = 2310.021 U.S. SURVEY FEET
ELEVATION = 708.838 METERS

OWNER/DEVELOPER

GVATIONS DEVELOPMENT
1095 EAST TWAIN AVENUE
LAS VEGAS, NEVADA 89109

LEGEND

EXISTING ZONE A

PROPOSED ZONE A

GRAPHIC SCALE

(IN FEET)
1 inch = 60 ft.

APPR'L REQ'D	DATE	BY	REVISION

TITLE: REVISED ZONE A

PROJECT: LONE MOUNTAIN APARTMENTS

VPOINT
DESIGNING FOR THE FUTURE
CIVIL • CONSULTING ENGINEERS • SURVEYORS
1095 TWAIN AVENUE • LAS VEGAS, NEVADA 89109 • (702) 240-5413

W.O. # :	662-E169
BY :	RMM
DATE :	01/20/05
SCALE :	1"=80'

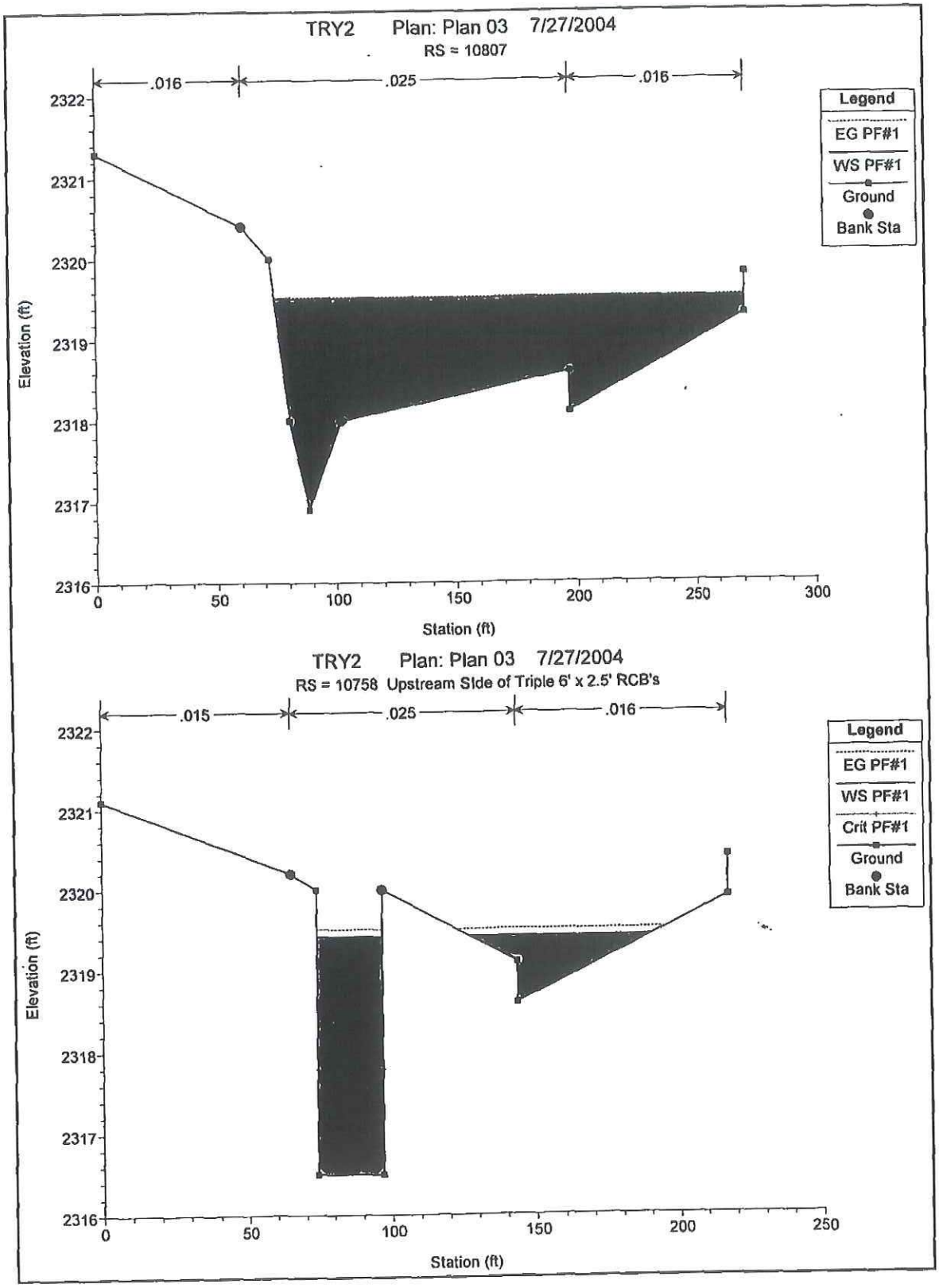
SHEET 1 OF 4 SHEETS

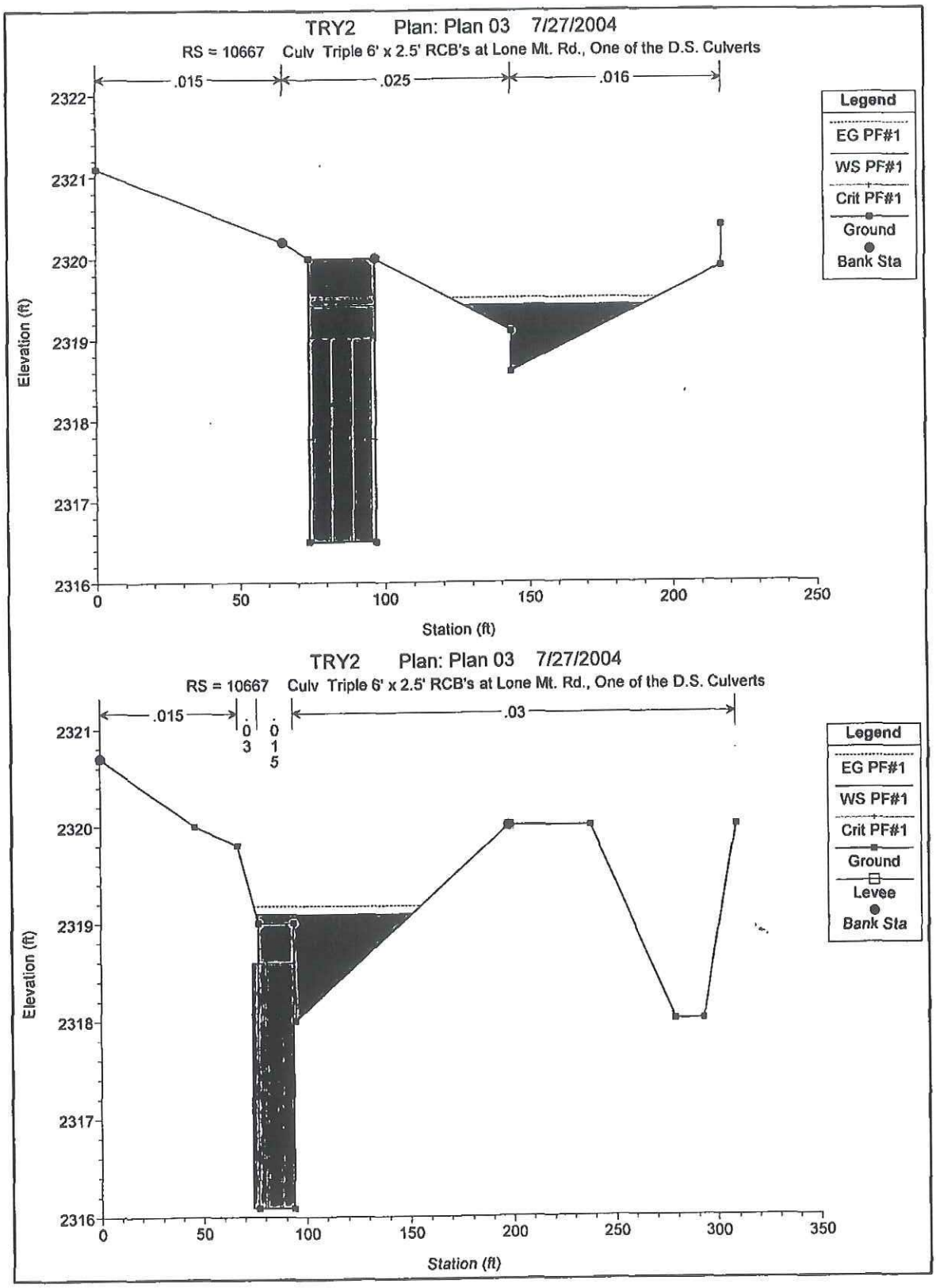
HEC-RAS Analysis

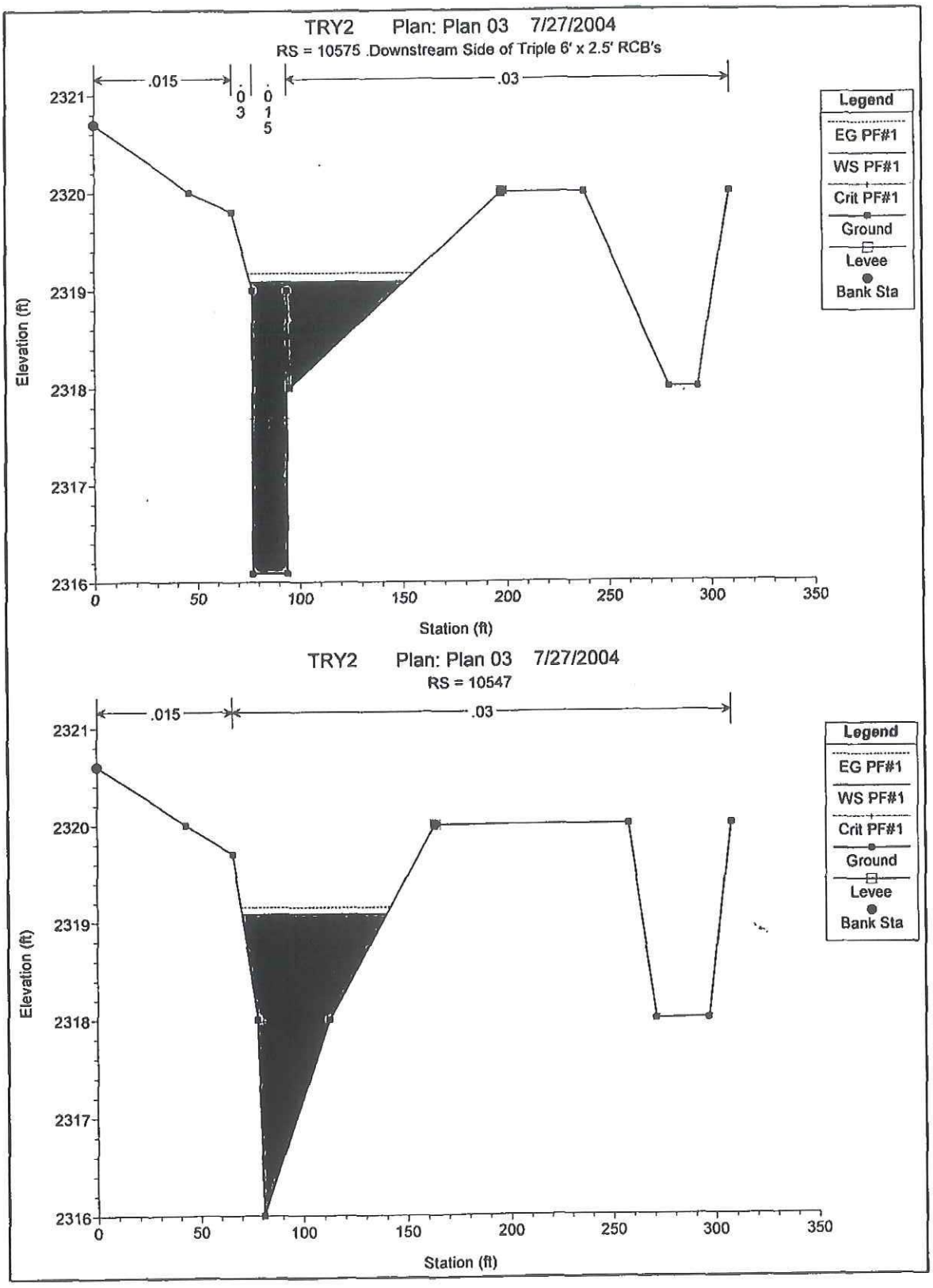
FEMA Effective

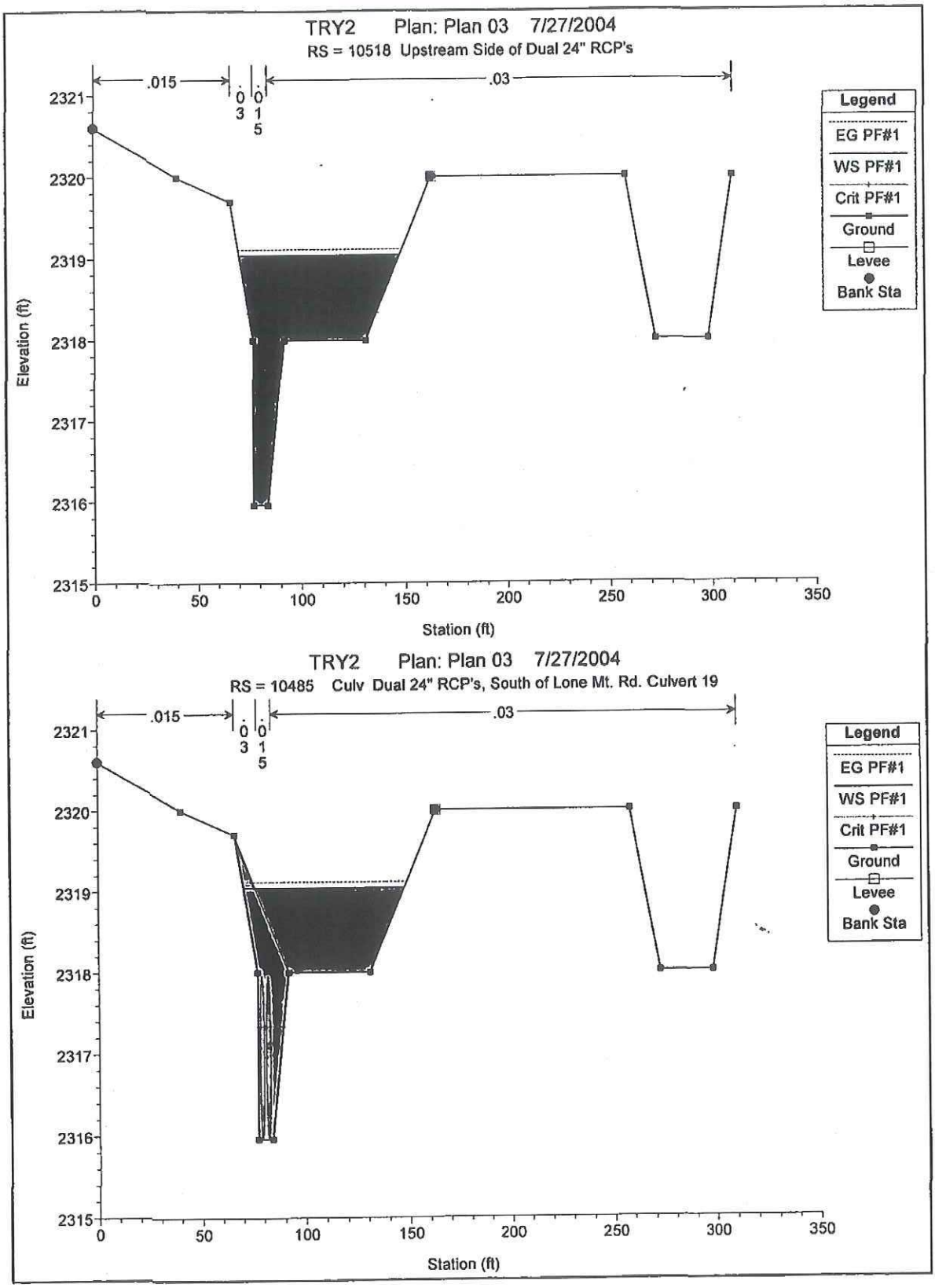
HEC-RAS Plan: Plan 02 River: RANCHO ROAD Reach: 95 TO GOWAN Profile: PF#1

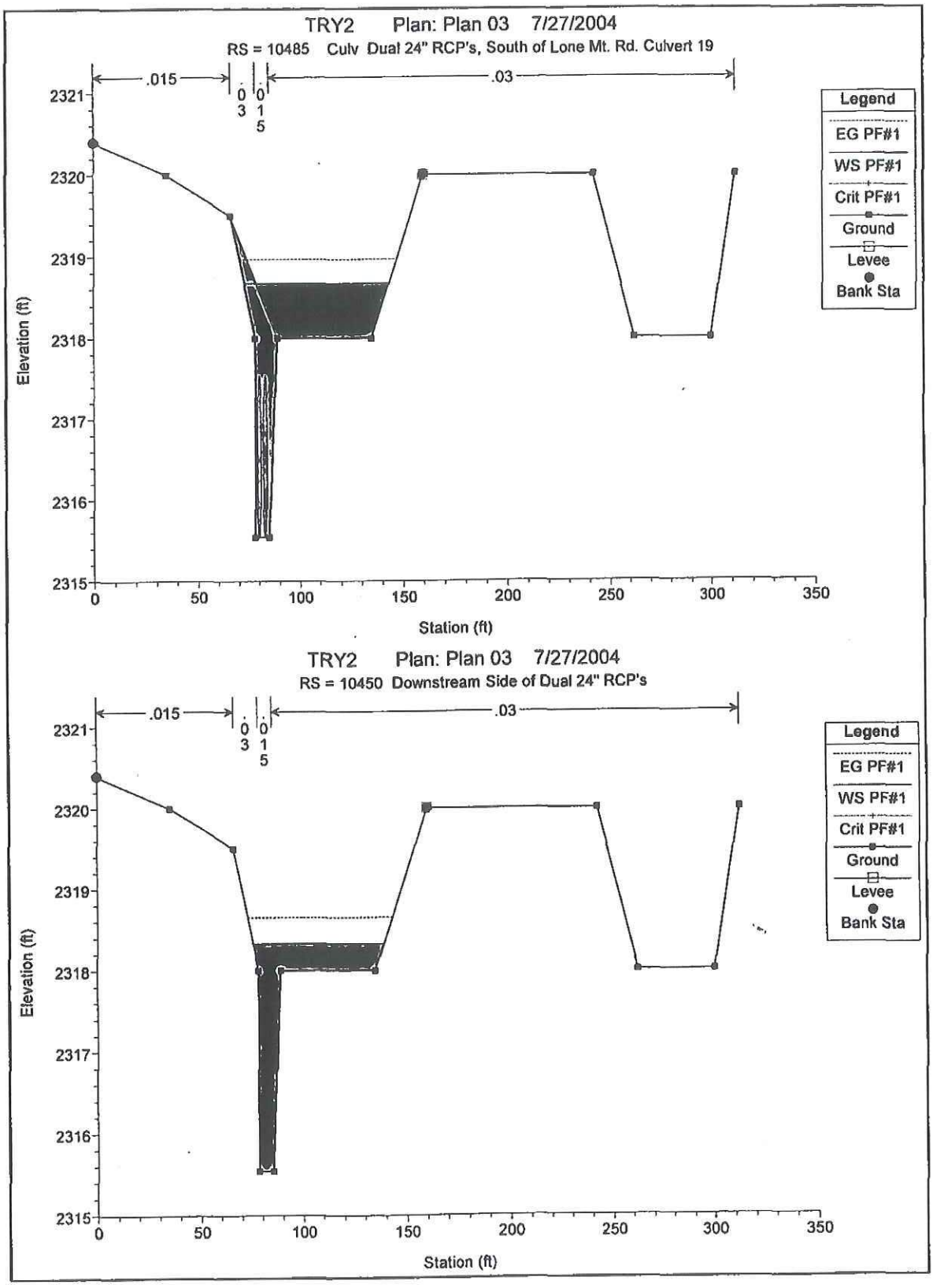
Reach	River Sta	Profile	Q Total	Min Ch El.	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl.
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
95 TO GOWAN	13266	PF#1	192.00	2324.00	2324.78	2324.70	2324.89	0.006439	2.85	74.89	209.13	0.63
95 TO GOWAN	13036	PF#1	192.00	2323.20	2324.68		2324.70	0.000481	1.09	166.31	261.28	0.19
95 TO GOWAN	12852	PF#1	192.00	2322.60	2324.57		2324.63	0.001184	2.20	102.35	182.17	0.37
95 TO GOWAN	12677	PF#1	192.00	2322.00	2323.70	2323.70	2324.14	0.009989	5.32	36.11	42.49	1.02
95 TO GOWAN	12430	PF#1	192.00	2322.00	2323.33	2322.76	2323.37	0.000823	1.63	121.67	161.76	0.27
95 TO GOWAN	12355	PF#1	192.00	2322.00	2323.32		2323.33	0.000256	1.08	201.74	347.83	0.17
95 TO GOWAN	12295	PF#1	155.00	2320.35	2323.31		2323.32	0.000082	0.79	227.08	267.79	0.10
95 TO GOWAN	12260	PF#1	155.00	2322.68	2323.30		2323.32	0.000301	0.51	147.60	245.50	0.13
95 TO GOWAN	12264	PF#1	155.00	2321.80	2323.30		2323.31	0.000153	0.85	179.26	226.97	0.13
95 TO GOWAN	12145	PF#1	190.00	2320.30	2323.28		2323.30	0.000117	1.02	206.30	182.38	0.13
95 TO GOWAN	12111	PF#1	190.00	2319.81	2322.91	2321.69	2323.25	0.002352	4.72	40.24	13.00	0.47
95 TO GOWAN	12036		Culvert									
95 TO GOWAN	11981	PF#1	161.00	2319.46	2322.12		2322.46	0.002630	4.66	34.58	13.00	0.50
95 TO GOWAN	11897	PF#1	161.00	2320.00	2322.02		2322.22	0.003560	3.58	45.00	45.96	0.62
95 TO GOWAN	11748	PF#1	161.00	2319.30	2321.96		2322.02	0.000518	1.87	86.10	52.49	0.26
95 TO GOWAN	11683	PF#1	161.00	2319.00	2321.94		2321.98	0.000373	1.64	98.20	57.17	0.22
95 TO GOWAN	11653	PF#1	161.00	2318.84	2321.63	2320.52	2321.94	0.002288	4.44	36.26	13.00	0.47
95 TO GOWAN	11621		Culvert									
95 TO GOWAN	11590	PF#1	161.00	2318.66	2320.75		2321.42	0.007340	6.66	24.54	13.00	0.84
95 TO GOWAN	11538	PF#1	161.00	2318.00	2321.10		2321.15	0.000691	1.85	91.28	97.75	0.29
95 TO GOWAN	11438	PF#1	161.00	2318.70	2321.01		2321.07	0.000871	2.17	82.06	105.11	0.33
95 TO GOWAN	11167	PF#1	161.00	2318.30	2320.05	2320.05	2320.48	0.009349	5.27	30.60	37.32	0.99
95 TO GOWAN	10946	PF#1	161.00	2318.00	2319.47	2319.20	2319.60	0.001020	3.22	59.84	83.13	0.56
95 TO GOWAN	10807	PF#1	192.00	2318.90	2319.52		2319.53	0.000128	0.98	225.17	196.34	0.13
95 TO GOWAN	10758	PF#1	192.00	2318.50	2319.42	2317.79	2319.51	0.000570	2.49	89.01	86.23	0.26
95 TO GOWAN	10667		Culvert									
95 TO GOWAN	10575	PF#1	192.00	2316.09	2319.09	2317.69	2319.18	0.000394	2.33	82.35	75.36	0.39
95 TO GOWAN	10547	PF#1	192.00	2316.00	2319.09	2317.98	2319.15	0.001251	2.08	92.17	70.34	0.32
95 TO GOWAN	10518	PF#1	192.00	2315.96	2319.05	2318.34	2319.12	0.001368	2.11	91.21	77.50	0.34
95 TO GOWAN	10485		Culvert									
95 TO GOWAN	10450	PF#1	192.00	2315.54	2318.33	2318.33	2318.65	0.013806	4.56	42.15	63.79	0.99
95 TO GOWAN	10399	PF#1	169.00	2316.00	2318.33	2316.54	2318.34	0.000112	0.89	190.82	233.22	0.11
95 TO GOWAN	10295	PF#1	169.00	2316.00	2318.10	2317.41	2318.29	0.003025	3.62	46.67	32.19	0.51
95 TO GOWAN	10075	PF#1	169.00	2314.10	2317.78	2316.13	2317.82	0.001384	1.60	105.38	127.56	0.31
95 TO GOWAN	9918	PF#1	169.00	2316.00	2317.41	2316.96	2317.50	0.002998	2.50	67.48	75.94	0.47
95 TO GOWAN	9796	PF#1	169.00	2313.67	2317.26	2315.35	2317.35	0.000692	2.33	72.53	28.88	0.26
95 TO GOWAN	9566	PF#1	215.00	2312.98	2317.13	2314.91	2317.19	0.000596	2.05	104.77	95.94	0.35
95 TO GOWAN	9539		Culvert									
95 TO GOWAN	9512	PF#1	215.00	2312.50	2316.67	2314.44	2316.76	0.000675	2.43	88.52	54.58	0.34
95 TO GOWAN	9472	PF#1	215.00	2312.20	2316.66	2314.16	2316.73	0.000535	2.17	99.10	70.58	0.32
95 TO GOWAN	9376	PF#1	180.00	2315.53	2316.40	2316.40	2316.61	0.004397	3.73	48.25	114.18	1.01
95 TO GOWAN	9324	PF#1	180.00	2314.10	2314.81	2315.14	2316.01	0.035628	8.80	20.46	57.55	2.60
95 TO GOWAN	9205	PF#1	180.00	2313.90	2314.25	2314.50	2315.53	0.102260	9.06	19.87	112.12	3.79
95 TO GOWAN	9114	PF#1	180.00	2313.20	2314.20	2313.79	2314.22	0.001427	1.22	147.05	277.81	0.30
95 TO GOWAN	9060	PF#1	180.00	2312.90	2314.12	2313.72	2314.14	0.001494	1.32	139.72	267.03	0.31
95 TO GOWAN	8950	PF#1	180.00	2312.40	2313.74		2313.85	0.005768	2.58	69.81	121.23	0.60
95 TO GOWAN	8668	PF#1	180.00	2310.00	2311.03	2311.03	2311.28	0.016040	4.07	44.23	88.10	1.01
95 TO GOWAN	8476	PF#1	180.00	2308.30	2309.37	2309.18	2309.47	0.005759	2.55	70.48	131.40	0.61
95 TO GOWAN	8410	PF#1	180.00	2307.70	2308.72	2308.67	2308.94	0.011374	3.79	47.53	85.01	0.89
95 TO GOWAN	8277	PF#1	180.00	2306.50	2307.57	2307.43	2307.74	0.007234	3.28	54.86	67.63	0.73
95 TO GOWAN	8155	PF#1	180.00	2305.40	2306.61	2306.52	2306.79	0.008324	3.39	53.13	99.40	0.82
95 TO GOWAN	7939	PF#1	180.00	2302.20	2304.14	2304.12	2304.42	0.014898	4.26	42.28	73.54	0.99
95 TO GOWAN	7578	PF#1	198.00	2299.90	2301.14		2301.29	0.005749	3.12	63.55	102.93	0.70
95 TO GOWAN	7478	PF#1	198.00	2298.90	2300.20	2300.20	2300.42	0.014444	3.77	52.45	112.43	0.97
95 TO GOWAN	7373	PF#1	198.00	2298.00	2299.25	2298.99	2299.37	0.004295	2.78	71.15	103.86	0.59
95 TO GOWAN	7280	PF#1	198.00	2297.90	2298.52	2298.52	2298.74	0.011789	3.75	52.77	120.95	1.00
95 TO GOWAN	7016	PF#1	158.00	2295.50	2295.87	2295.91	2296.06	0.008495	3.52	44.91	170.48	1.21
95 TO GOWAN	6934	PF#1	158.00	2294.60	2295.18	2295.23	2295.41	0.007499	3.84	41.10	124.36	1.18
95 TO GOWAN	6815	PF#1	158.00	2293.60	2294.44	2294.57	2294.86	0.010180	5.33	29.67	69.23	1.43
95 TO GOWAN	6763	PF#1	230.00	2286.87	2292.19	2290.60	2292.52	0.002786	4.61	50.00	16.70	0.45
95 TO GOWAN	6691	PF#1	230.00	2286.40	2291.24	2291.23	2292.10	0.012266	7.44	30.91	17.73	0.99
95 TO GOWAN	6609	PF#1	230.00	2287.91	2291.14	2289.84	2291.49	0.003102	4.75	48.45	15.00	0.47
95 TO GOWAN	6572		Culvert									
95 TO GOWAN	6535	PF#1	230.00	2287.21	2290.88	2289.17	2290.98	0.002283	4.39	53.37	18.96	0.42
95 TO GOWAN	6468	PF#1	230.00	2286.70	2290.58		2290.82	0.001990	3.95	59.34	26.16	0.42
95 TO GOWAN	6404	PF#1	230.00	2286.17	2290.52	2288.11	2290.70	0.001211	3.49	68.76	31.97	0.29
95 TO GOWAN	6362		Culvert									
95 TO GOWAN	6321	PF#1	230.00	2285.53	2290.12	2287.47	2290.25	0.000735	3.07	84.01	49.92	0.25
95 TO GOWAN	6260	PF#1	230.00	2288.00	2289.78	2289.78	2290.13	0.007758	4.71	48.87	72.49	1.01
95 TO GOWAN	6181	PF#1	230.00	2287.30	2288.27	2288.41	2288.79	0.028069	5.85	40.76	82.40	1.34
95 TO GOWAN	6012	PF#1	230.00	2286.00	2286.88	2286.88	2287.19	0.014781	4.47	51.48	170.60	1.01
95 TO GOWAN	5808	PF#1	230.00	2282.20	2283.67	2283.33	2283.92	0.001924	1.92	119.57	143.50	0.37
95 TO GOWAN	5518	PF#1	230.00	2282.00	2282.48	2282.48	2282.67	0.016576	3.51	65.62	167.49	0.99
95 TO GOWAN	5382	PF#1	146.00	2278.00	2278.19	2278.33	2278.68	0.122527	5.65	25.85	138.96	2.31
95 TO GOWAN	5264	PF#1	146.00	2273.01	2277.11	2274.30	2277.12	0.000060	0.64	229.00	104.74	0.08
95 TO GOWAN	4560		Culvert									
95 TO GOWAN	3836	PF#1	146.00	2264.48	2270.40		2270.44	0.000814	1.52	96.36	82.18	0.25
95 TO GOWAN	3756	PF#1	146.00	2268.00	2270.37		2270.39	0.000377	1.11	131.03	104.92	0.18
95 TO GOWAN	3666	PF#1	146.00	2269.50	2270.14	2270.10	2270.28	0.013292	2.99	48.85	129.01	0.86
95 TO GOWAN	3479	PF#1	146.00	2268.00	2269.15	2268.76	2269.22	0.003000	2.18	66.93	92.77	0.45

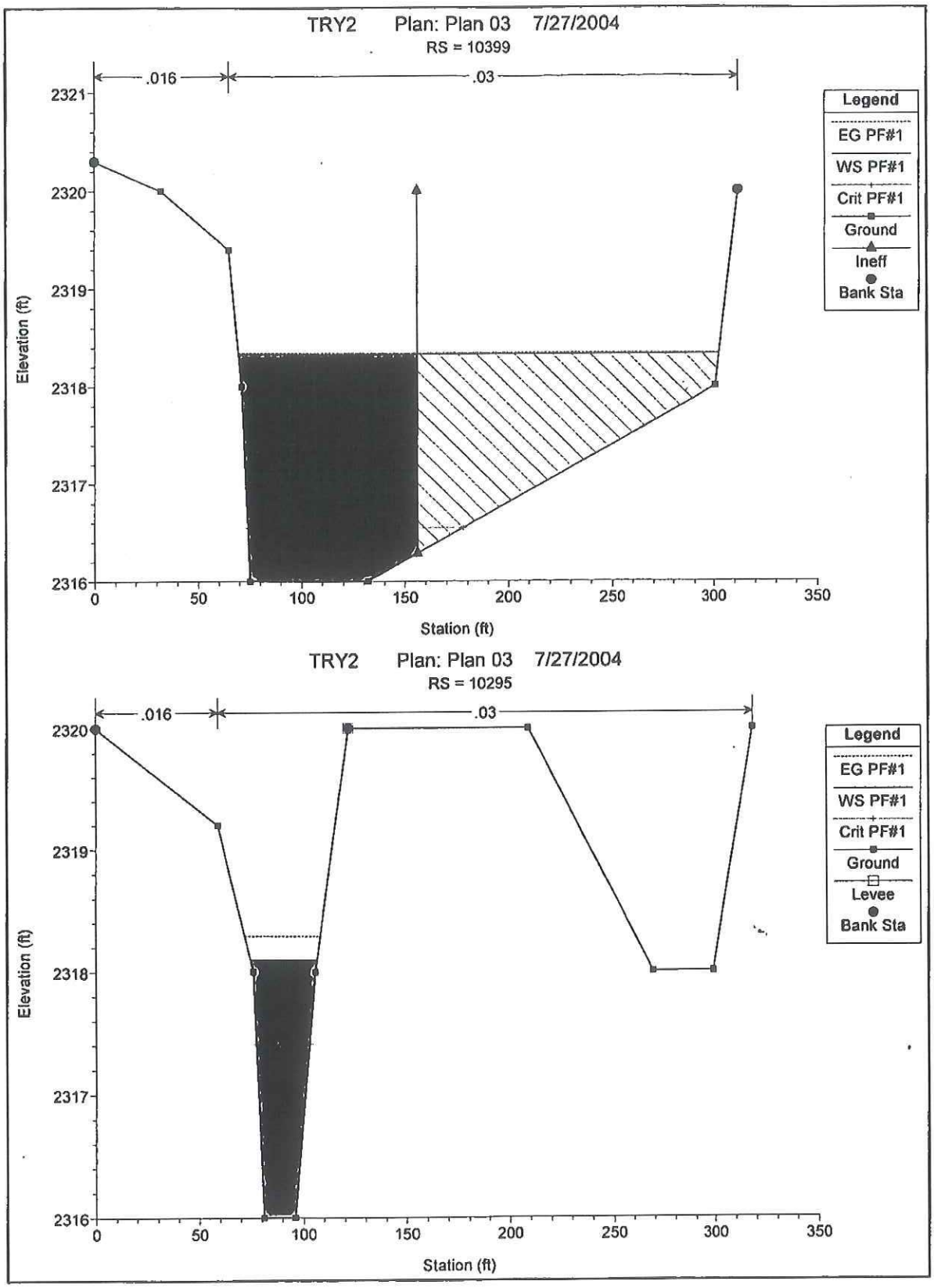

TRY2 Plan: Plan 03 7/27/2004
RS = 10807
.016
.025
.016
Legend
EG PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
2322
2321
2320
2319
2318
2317
2316
0
50
100
150
200
250
300
Station (ft)
TRY2 Plan: Plan 03 7/27/2004
RS = 10758 Upstream Side of Triple 6' x 2.5' RCB's
.015
.025
.016
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
2322
2321
2320
2319
2318
2317
2316
0
50
100
150
200
250
Station (ft)

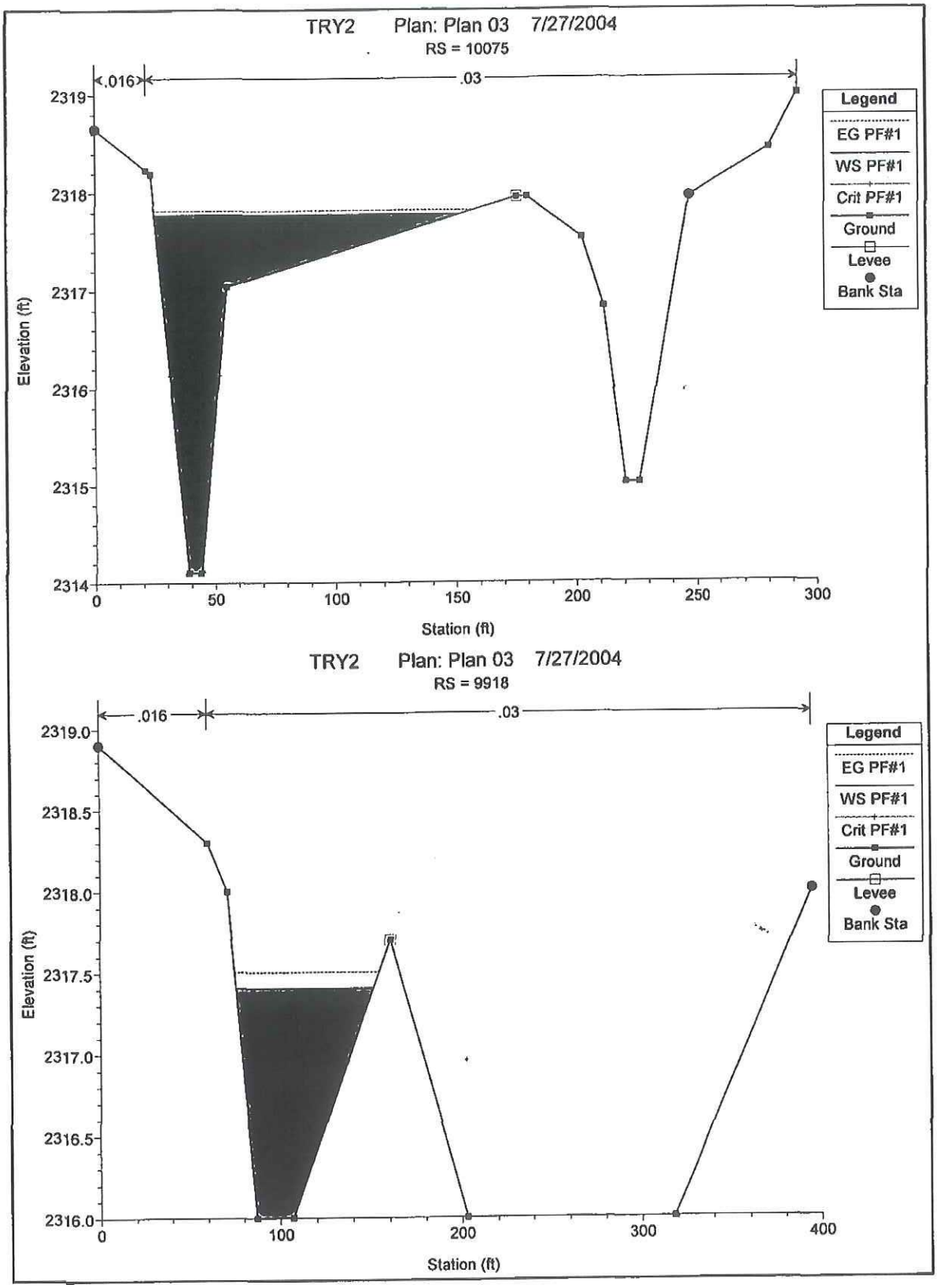

TRY2 Plan: Plan 03 7/27/2004
RS = 10667 Culv Triple 6' x 2.5' RCB's at Lone Mt. Rd., One of the D.S. Culverts
.015
.025
.016
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
TRY2 Plan: Plan 03 7/27/2004
RS = 10667 Culv Triple 6' x 2.5' RCB's at Lone Mt. Rd., One of the D.S. Culverts
.015
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

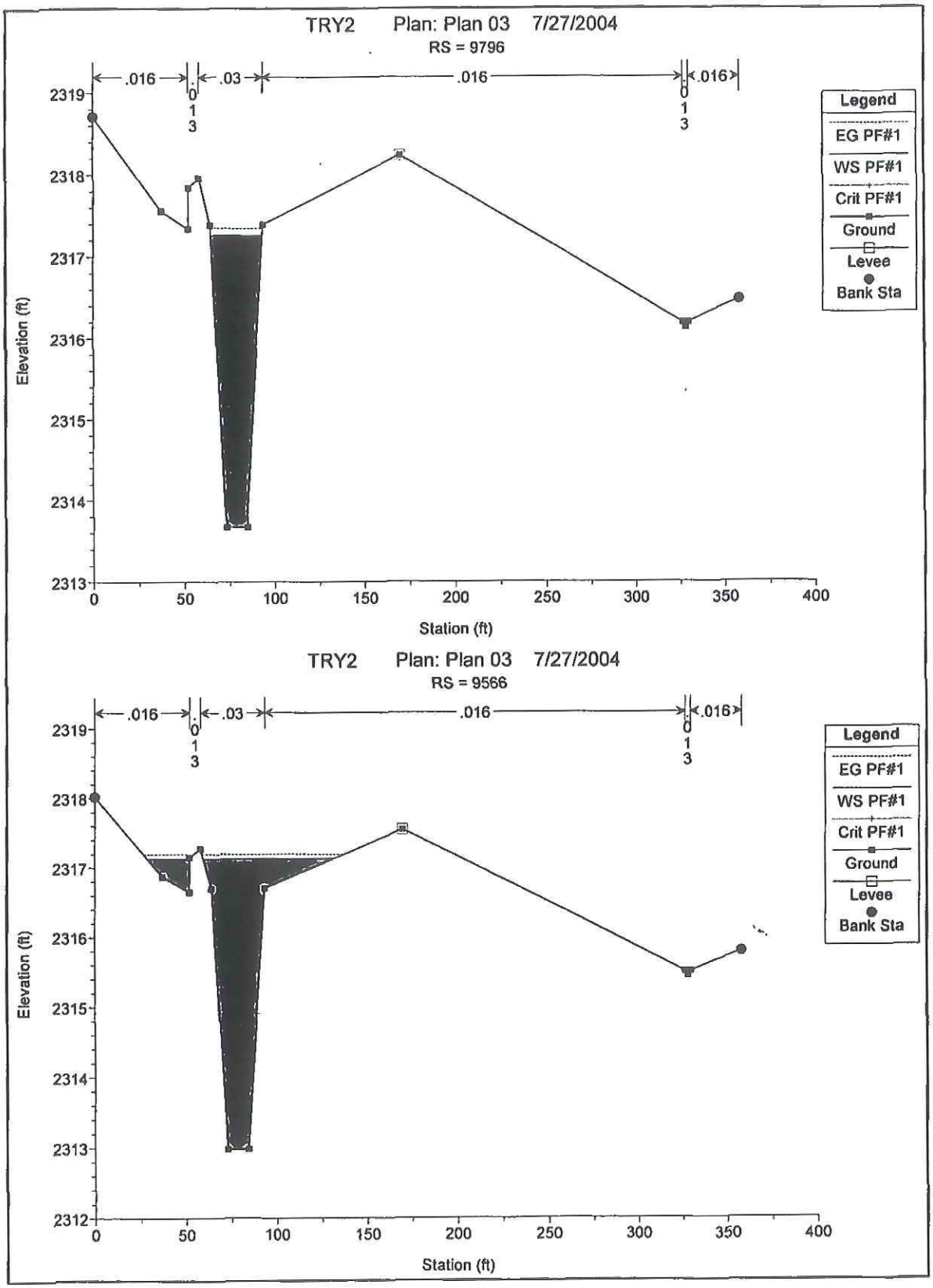

TRY2 Plan: Plan 03 7/27/2004
RS = 10575 .Downstream Side of Triple 6' x 2.5' RCB's
.015
.03
.03
.015
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
2321
2320
2319
2318
2317
2316
0
50
100
150
200
250
300
350
TRY2 Plan: Plan 03 7/27/2004
RS = 10547
.015
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

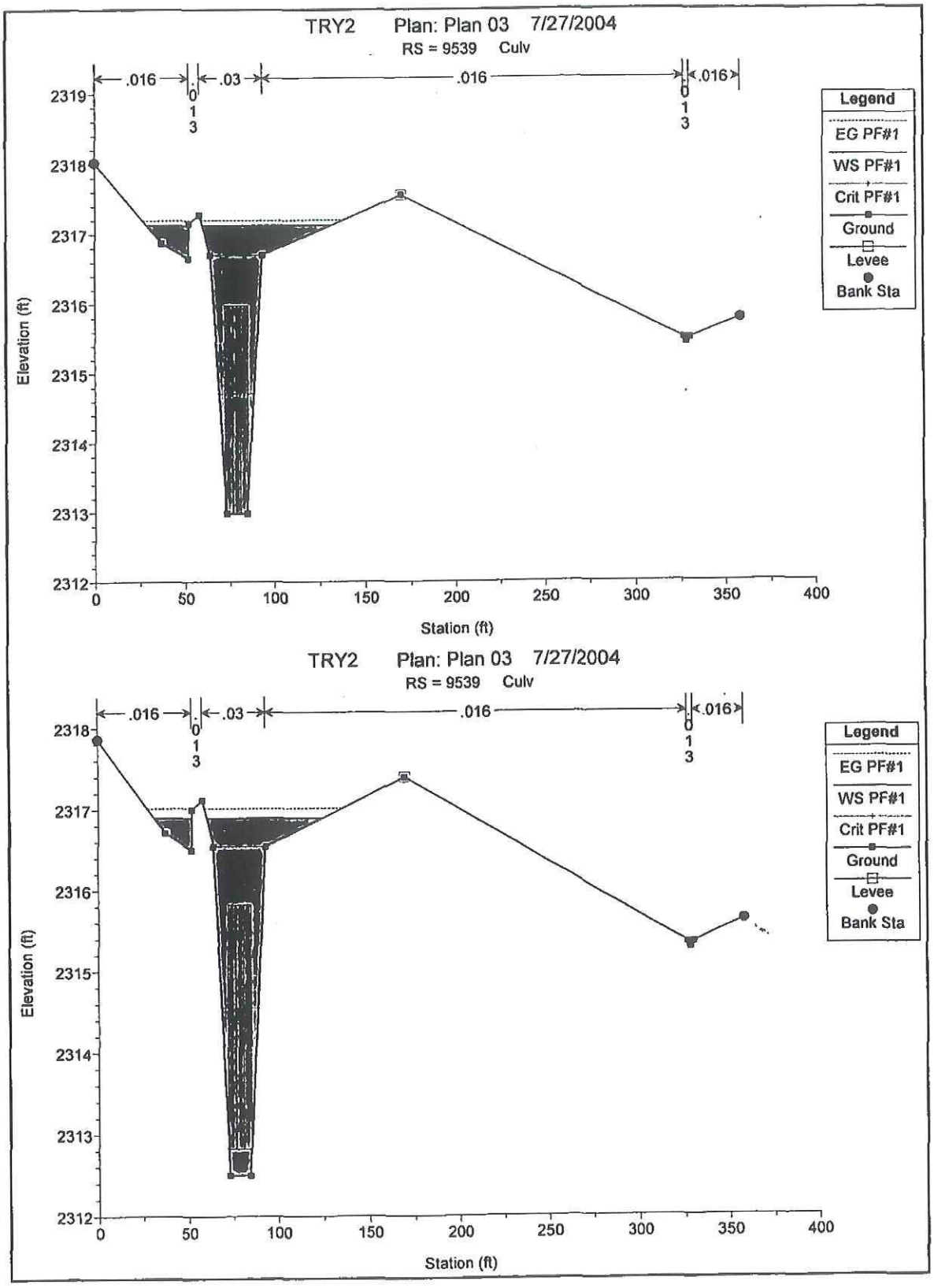

TRY2 Plan: Plan 03 7/27/2004
RS = 10518 Upstream Side of Dual 24" RCP's
.015
.03
.03
.015
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
2321
2320
2319
2318
2317
2316
2315
0
50
100
150
200
250
300
350
TRY2 Plan: Plan 03 7/27/2004
RS = 10485 Culv Dual 24" RCP's, South of Lone Mt. Rd. Culvert 19
.015
.03
.03
.015
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
2321
2320
2319
2318
2317
2316
2315
0
50
100
150
200
250
300
350

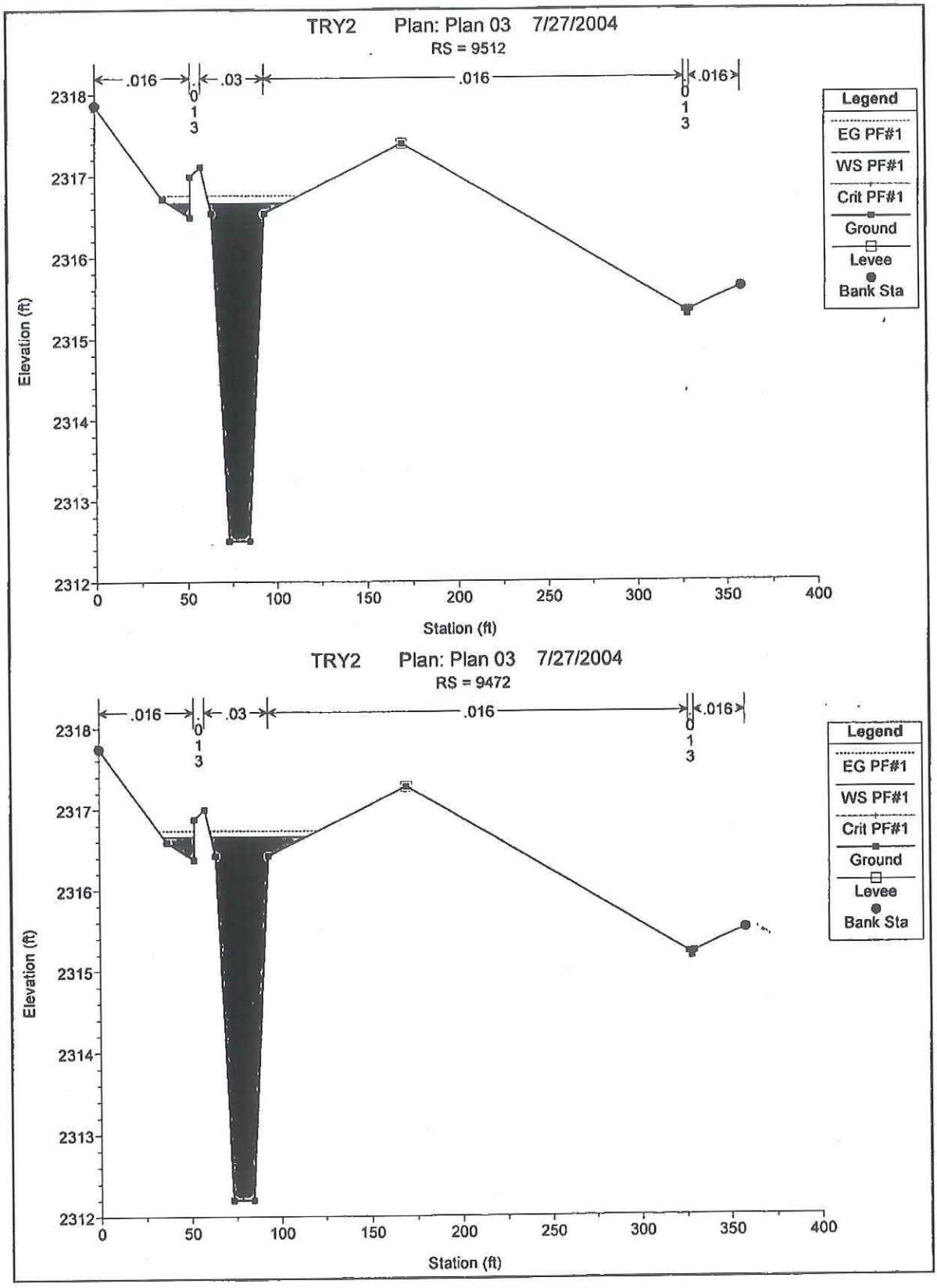

TRY2 Plan: Plan 03 7/27/2004
RS = 10485 Culv Dual 24" RCP's, South of Lone Mt. Rd. Culvert 19
.015
.03
.03
.015
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
2321
2320
2319
2318
2317
2316
2315
0
50
100
150
200
250
300
350
TRY2 Plan: Plan 03 7/27/2004
RS = 10450 Downstream Side of Dual 24" RCP's
.015
.03
.03
.015
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
2321
2320
2319
2318
2317
2316
2315
0
50
100
150
200
250
300
350

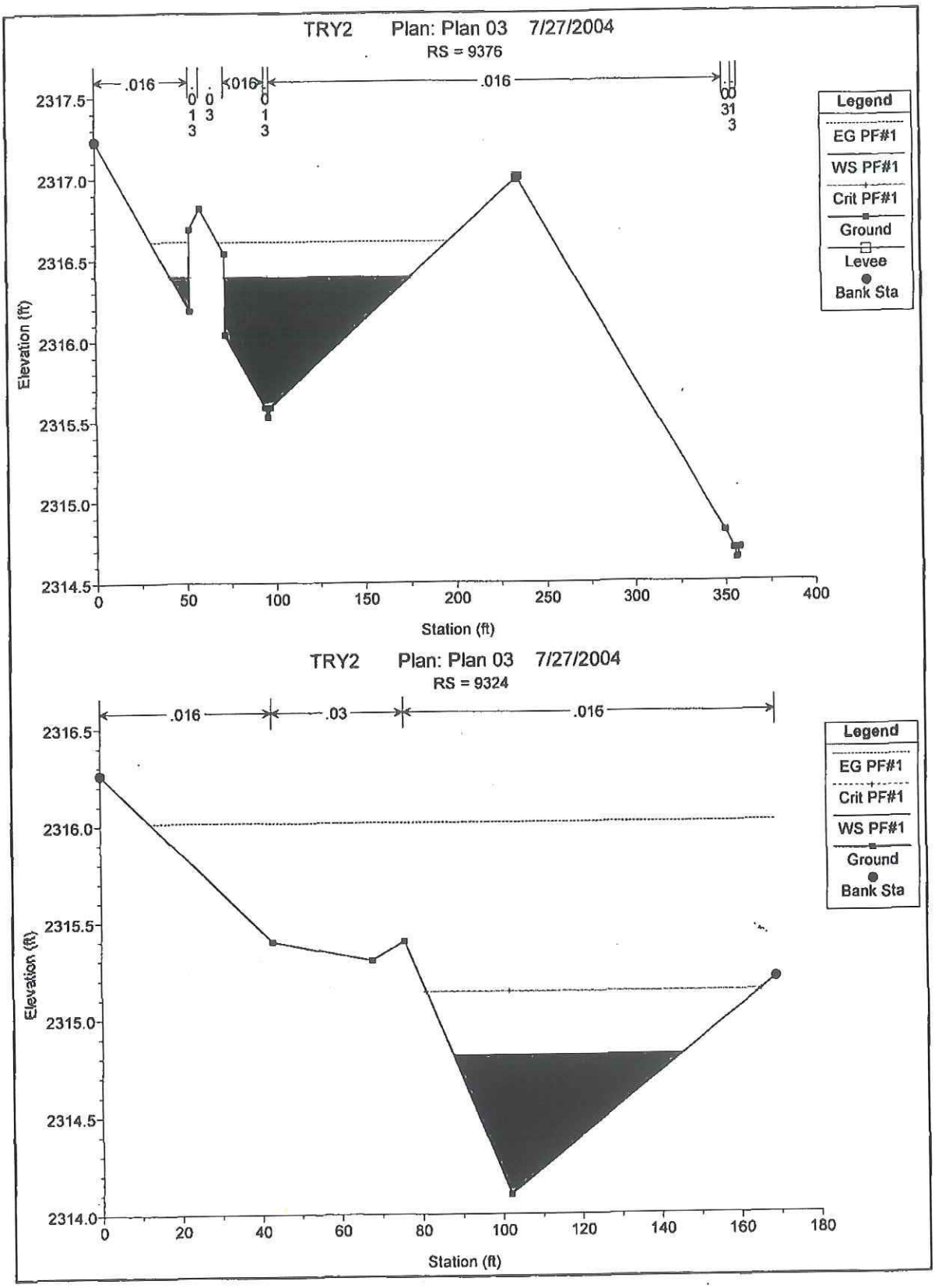

TRY2 Plan: Plan 03 7/27/2004
RS = 10399
.016
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
TRY2 Plan: Plan 03 7/27/2004
RS = 10295
.016
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

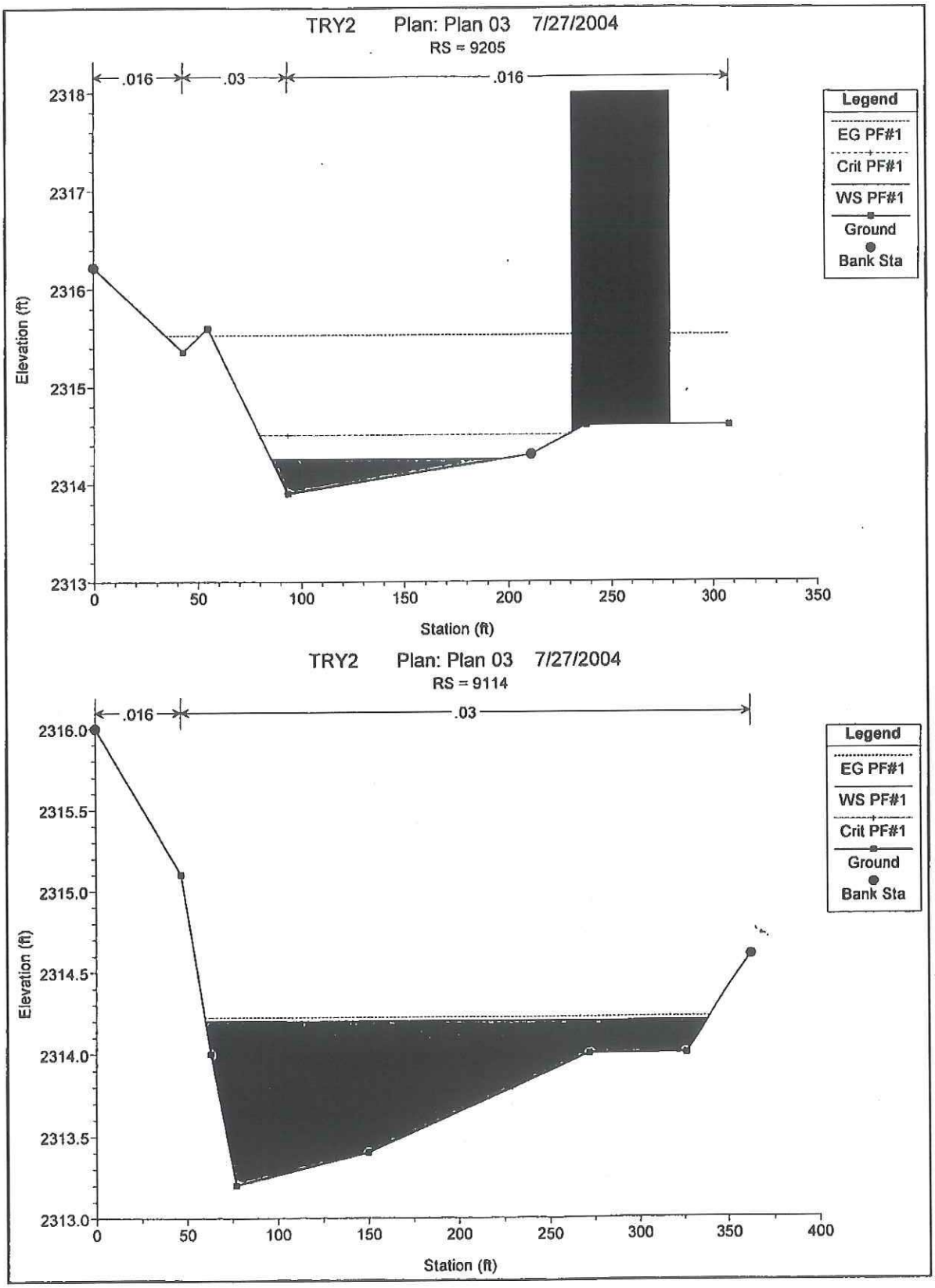

TRY2 Plan: Plan 03 7/27/2004
RS = 10075
.016
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
TRY2 Plan: Plan 03 7/27/2004
RS = 9918
.016
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

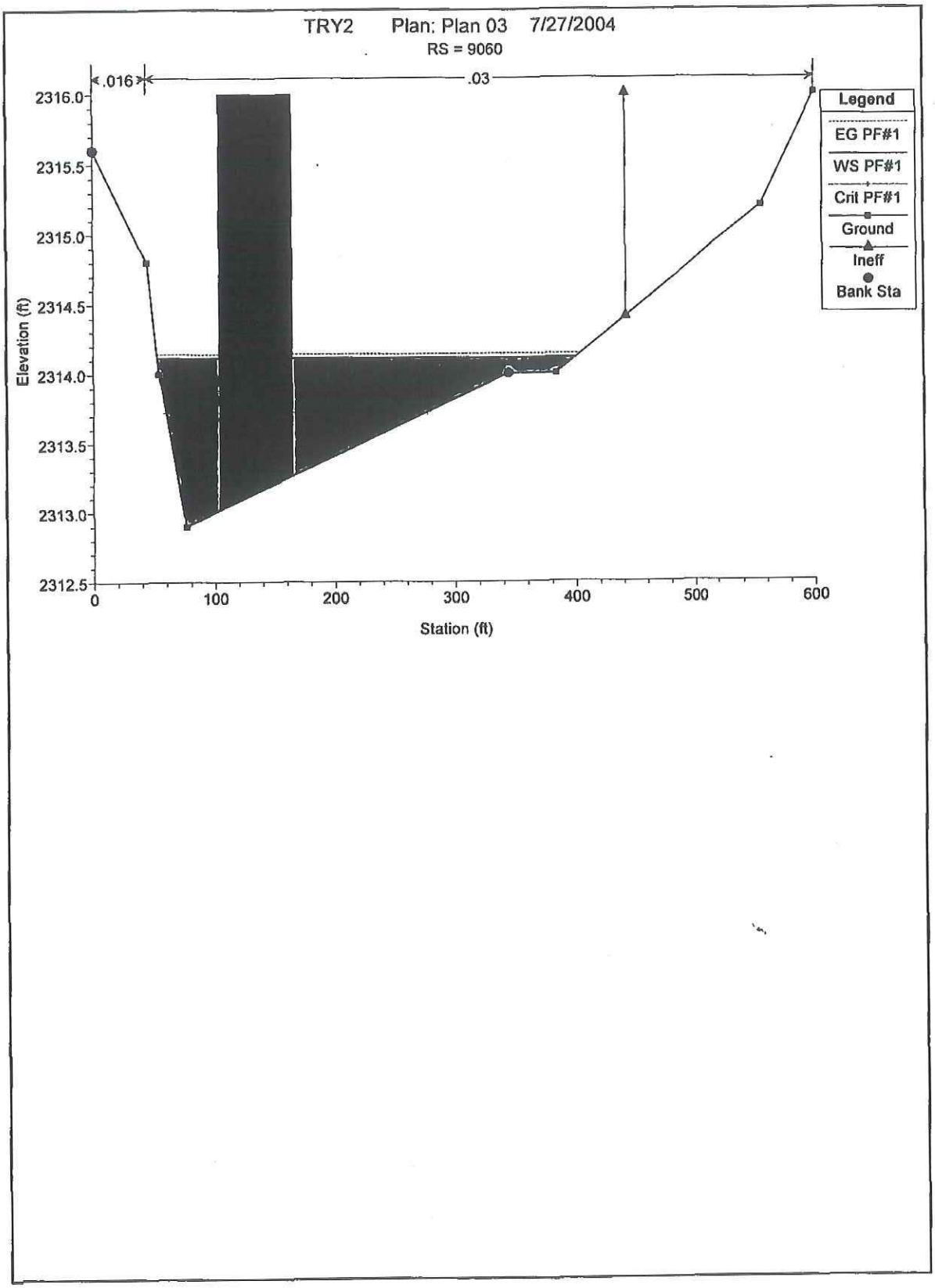

TRY2 Plan: Plan 03 7/27/2004
RS = 9796
.016
.03
.016
.016
0
1
3
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
Elevation (ft)
2319
2318
2317
2316
2315
2314
2313
0
50
100
150
200
250
300
350
400
Station (ft)
TRY2 Plan: Plan 03 7/27/2004
RS = 9566
.016
.03
.016
.016
0
1
3
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
Elevation (ft)
2319
2318
2317
2316
2315
2314
2313
2312
0
50
100
150
200
250
300
350
400
Station (ft)


TRY2 Plan: Plan 03 7/27/2004
RS = 9539 Culv
.016
.03
.016
.016
0
1
3
Elevation (ft)
Station (ft)
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
TRY2 Plan: Plan 03 7/27/2004
RS = 9539 Culv
Elevation (ft)
Station (ft)
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta


TRY2 Plan: Plan 03 7/27/2004
RS = 9512
.016
.03
.016
.016
0
1
3
0
1
3
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
Elevation (ft)
2318
2317
2316
2315
2314
2313
2312
0
50
100
150
200
250
300
350
400
Station (ft)
TRY2 Plan: Plan 03 7/27/2004
RS = 9472
.016
.03
.016
.016
0
1
3
0
1
3
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
Elevation (ft)
2318
2317
2316
2315
2314
2313
2312
0
50
100
150
200
250
300
350
400
Station (ft)


TRY2 Plan: Plan 03 7/27/2004
RS = 9376
.016
.016
.016
.013
.03
.013
.033
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Levee
Bank Sta
Elevation (ft)
2317.5
2317.0
2316.5
2316.0
2315.5
2315.0
2314.5
0
50
100
150
200
250
300
350
400
Station (ft)
TRY2 Plan: Plan 03 7/27/2004
RS = 9324
.016
.03
.016
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
2316.5
2316.0
2315.5
2315.0
2314.5
2314.0
0
20
40
60
80
100
120
140
160
180
Station (ft)


TRY2 Plan: Plan 03 7/27/2004
RS = 9205
.016
.03
.016
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
TRY2 Plan: Plan 03 7/27/2004
RS = 9114
.016
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)


TRY2 Plan: Plan 03 7/27/2004
RS = 9060
.016
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
2316.0
2315.5
2315.0
2314.5
2314.0
2313.5
2313.0
2312.5
0
100
200
300
400
500
600
Station (ft)

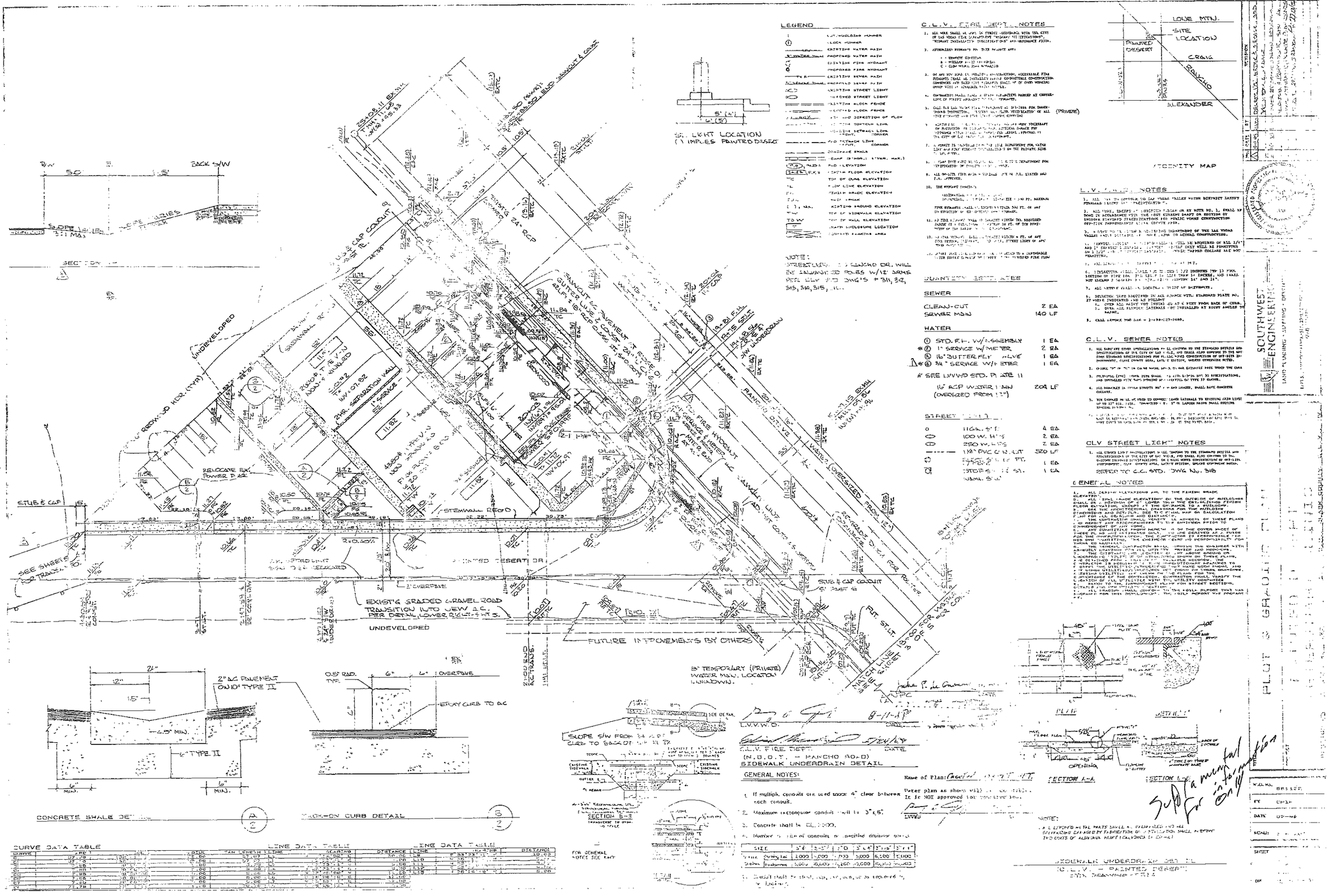
APPENDIX G

Reference Material

Painted Desert Veterinary Clinic

by Southwest Engineering

Plot & Grading Plan



CURVE DATA TABLE

CURVE	RADIUS	DELTA	TAN LENGTH	ARC LENGTH
C1	37.00	12°00'00"	3.90	7.75
C2	37.00	12°00'00"	3.90	7.75
C3	7.00	90°00'00"	7.00	11.00
C4	7.00	90°00'00"	7.00	11.00
C5	7.00	90°00'00"	7.00	11.00

APPENDIX H

Reference Material

Technical Drainage Study for Sun Valley Auto
by Stantec Consulting (DS4075)

Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM					DATE: April 16, 2007
TO: **Land Development Services** Department of Public Works					FROM: Oh Sang Kwon, P.E. Flood Control Civil Engineer Department of Public Works
SUBJECT:	Technical Drainage Study for:				**COPIES TO:**
Sun Valley Auto					Stantec Consulting, Inc.
Cross Streets:	SWC of Painted Desert Rd. & Rancho Drive				Rancho Reflection, LLC
File Number:	F:\Depot\DSMemos\DS4075C.ZNA.doc				Bart Anderson, P.E., DevCo
Parcel Number:	138-02-202-016				CCRFCD
Zoning Action:	SDR-12365				NDOT
FEMA Flood Zone	YES	X	NO		
Proposed Storm Drain	YES	X	NO		

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Trn. No.
1st Submittal	9/18/2006	10/2/2006	Not Approved	$400.00	54063: $400
2nd Submittal	12/4/2006, 1/5/2007 & 1/29/2007	2/12/2007	Conditional Approval	$400.00	58809: $400
CCRFCD	3/30/2007	4/13/2007	Concurrence	N/C	N/C
			TOTAL FEES (LDDRS):	**$800.00**	----

REMARKS:

This site development is within a FEMA Special Flood Hazard Area, Zone AE. No Permits will be issued until a Conditional Letter of Map Revision (CLOMR) is received from FEMA.

The Drainage Study for the subject project has been reviewed and:

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.

1. The project proposes to construct facilities and/or increase flows within *Nevada Department of Transportation (NDOT)* right-of-way. The engineer must contact NDOT for encroachment permit for the proposed project.
2. Provide a soils report, structural calculations and specifications, two wet stamped structural sets, and a grading plan to the *Building Department* for processing. The engineer must obtain *Building Department* approval of the structures prior to final approval of improvement plans.

The Engineer is to provide addresses for each lot in a FEMA Flood Hazard Zone prior to obtaining a grading permit. This information is necessary to insure that the elevation certificates are provided for each address prior to completion of construction.

NOTE: The engineer must submit the drainage study to FEMA for a Conditional Letter of Map Revision (CLOMR). A favorable CLOMR must be obtained prior to the issuance of any permits. This site is located in a **FEMA Zone A**. *Clark County Regional Flood Control District* (CCRFCD) review and approval is required prior to recordation of final map or issuance of building/grading permits. The Engineer must send a copy of the report to the CCRFCD for review. **The developer/engineer must also obtain a Letter of Map Revision (LOMR) using the approved drainage study as technical support to inform FEMA of the modifications within the flood zone. The approved LOMR must be submitted to the *City of Las Vegas* prior to the release of the bond.** FEMA Elevation Certificates, showing as-built finish floor elevations, must be completed for each building in the FEMA A Zone. The certificate must be submitted to the *City of Las Vegas Flood Control Section* prior to scheduling a framing inspection.

NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Amendment and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the Nevada Division of Environmental Protection a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm or call (775) 687-9429.

END OF REMARKS
OSK/ays

T/R/S: T20S/R60E/02
AREA L-02

REGIONAL FLOOD CONTROL DISTRICT

MAR 28 2007

Rec'd: 3/30/07
DS 4075
L-02
N/C

Gale Wm. Fraser, II, P.E.
General Manager/Chief Engineer

BOARD OF DIRECTORS

Larry Brown
Chairman
City of Las Vegas

Chip Maxfield
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Robert L. Eliason
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Andy Hafen
City of Henderson

Mayor Bill Nicholes
City of Mesquite

Roger Tobler
City of Boulder City

Bruce L. Woodbury
Clark County

March 27, 2007

Mr. Randy Fultz, P.E.
City of Las Vegas Public Works
731 S. 4th Street
Las Vegas, NV 89101

DISTRICT CONCURRENCE: **SUN VALLEY AUTO**
(DS4075) (RFCD No. 06-7062)

Dear Mr. Fultz:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated September 13, 2006, Addendum No. 1 dated November 28, 2006, and Supplement No. 1 dated February 12, 2007, for above-mentioned project as submitted by STANTEC CONSULTING, INC. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Public Works dated February 12, 2007.

District concurs with acceptance of this Technical Drainage Study by City of Las Vegas Public Works.

District's review of this project was limited to issues of Regional Flood Control Significance as defined in *Uniform Regulations for the Control of Drainage*. As noted in study, site resides in a Special Flood Hazard Area (SFHA) designated as "Zone AE" per the effective Flood Insurance Rate Map (FIRM). Therefore, consultant should be advised that this acceptance does not serve to amend the FIRM or remove the SFHA.

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, information submitted by STANTEC CONSULTING, INC., may be superseded. Compliance with regulatory elements and design standards specified in *Uniform Regulations for the Control of Drainage* does not imply a guarantee that properties will be free from flooding or flood damage. The District, its officials, or employees assume no liability for information, data, or conclusions presented by consulting engineers. We, therefore, make no warranties, either expressed or implied, in conducting this review.

GALE WM. FRASER, II, P.E.
General Manager/Chief Engineer

BY:

Abigail Mayrena, P.E.
Associate Engineer

Andrew R. Trelease, P.E., CFM
Principal Civil Engineer

AM:ART:jb

c: Matthew T. Haskin, P.E., STANTEC CONSULTING, INC.

\\Soliton\OfficeFiles\Letters and Memos\Local Drainage\Land Development & Drainage\Concurrence Letters\2007\Mar07\20-60-2.STA.doc

600 S. Grand Central Parkway, Suite 300 • Las Vegas, Nevada 89106-4511
(702) 455-3139 • FAX: (702) 455-3870
Website: *http://www.regionalflood.org*

Drainage Exhibit

Developed Condition Basin Map (Figure 8B)

NORTH
60 0 30 60 120
(IN FEET)
1 inch = 60 ft.

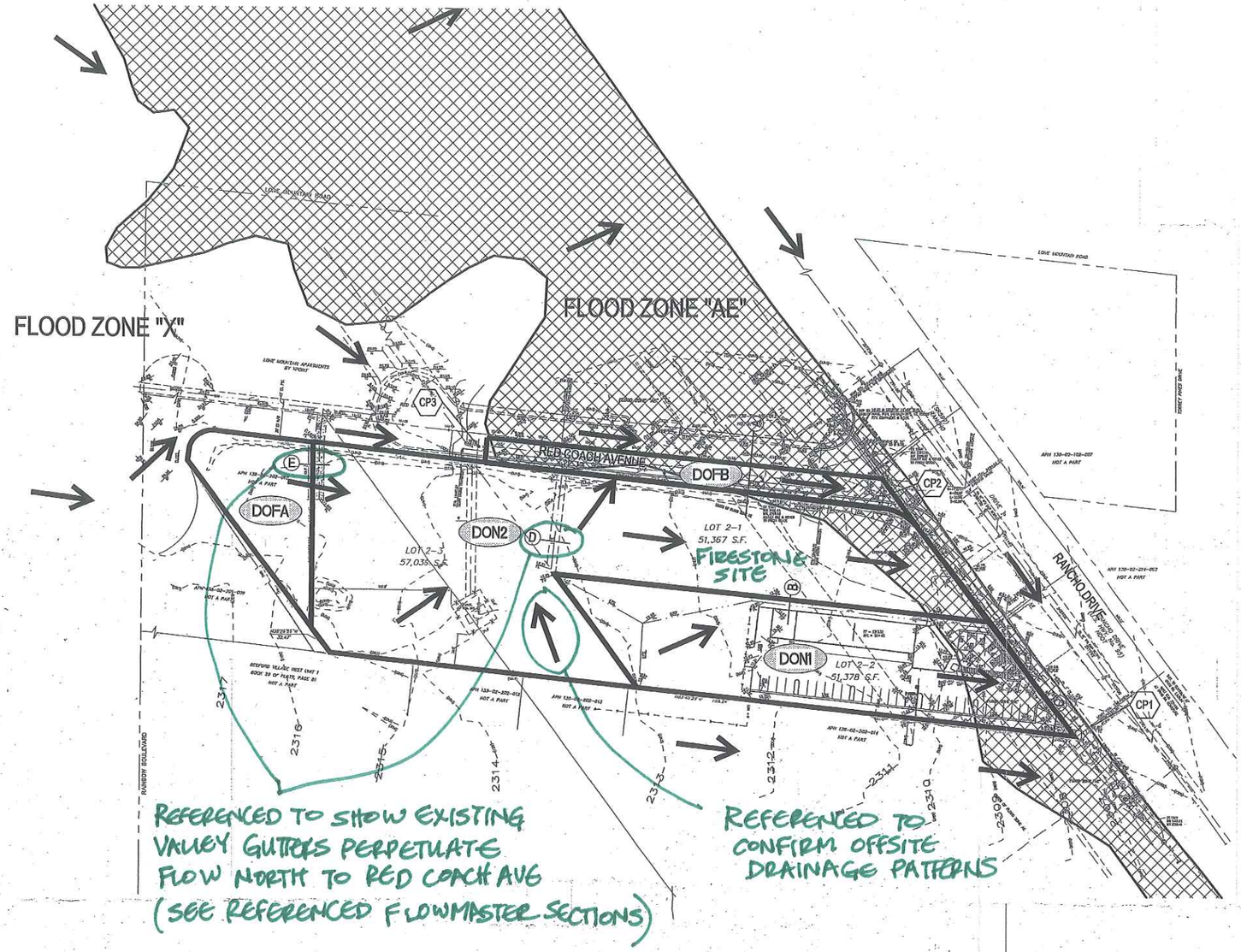
LEGEND

- BASIN BOUNDARY
- SB8A — DRAINAGE BASIN IDENTIFICATION
- CP8 — CONCENTRATION POINT
- ← DIRECTION OF FLOW
- SOIL TYPE BOUNDARY
- 10/100 — FLOW, Q10/Q100 (CFS)
- (A) — FLOW MASTER SECTION
- EXISTING CONTOURS
- FEMA FLOOD ZONE

NOTE: ENTIRE SITE AND VICINITY SHOWN CONSISTS OF TYPE "C" SOILS.

BASIN NAME / CONCENTRATION POINT	AREA (ACRES)	Q_{10} (cfs)	Q_{100} (cfs)
DON1	1.18	2	4
DON2	2.47	3	7
DOFA	0.35	1	1
DOFB	0.33	1	1
CP1*	----	62	219
CP2*	----	19	42
CP3*	----	3	9

* – REFERENCED FROM THE CONCEPTUAL DRAINAGE STUDY FOR RANCHO/RED COACH (BY STANTEC CONSULTING, INC.)



VICINITY MAP



W:\active\185100290\land_development\drainage\Technical Drainage Study\Figures\DEVELOPED CONDITION BM TDS.dwg que Tue, 28 Nov 2006 – 3:08pm

NO.	DESCRIPTION	DATE	APP'D

DATE : 11/28/2006
PM : M. HASKIN
DRAWN BY : CAQ
DESIGNED BY :
CHECKED BY :
JOB NO. : 185100290
SCALE : AS NOTED

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Stantec Consulting, Inc.
7251 W. Charleston Blvd.
Las Vegas, Nevada, U.S.A.
89117
Tel. (702) 258-0115
Fax. (702) 258-4956
www.stantec.com

Stantec

SUN VALLEY AUTOMOTIVE
SUN VALLEY AUTO
DEVELOPED CONDITION BASIN MAP

TDS
NOVEMBER
2006

SHEET
FIG 8B
OF

Flowmaster Hydraulic Sections

Section D: 10' wide Drainage Easement
Worksheet for Irregular Channel

Project Description	
Worksheet	Section D: 10' wide Drainage Easement
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	0.010100	ft/ft
Discharge	4.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Metho	Horton's Method

Results		
Mannings Coefficient	0.035	
Water Surface Elevation	0.30	ft
Elevation Range	0.00 to 0.10	
Flow Area	2.5	ft²
Wetted Perimeter	10.393	ft
Top Width	10.000	ft
Actual Depth	0.30	ft
Critical Elevation	0.22	ft
Critical Slope	0.033260	ft/ft
Velocity	1.63	ft/s
Velocity Head	0.04	ft
Specific Energy	0.34	ft
Froude Number	0.58	
Flow Type	Subcritical	

$d \times V = 0.30 \times 1.63 = 0.5 < 6$ OK

Calculation Messages:
Water elevation exceeds lowest end station by 0.1954012 ft.

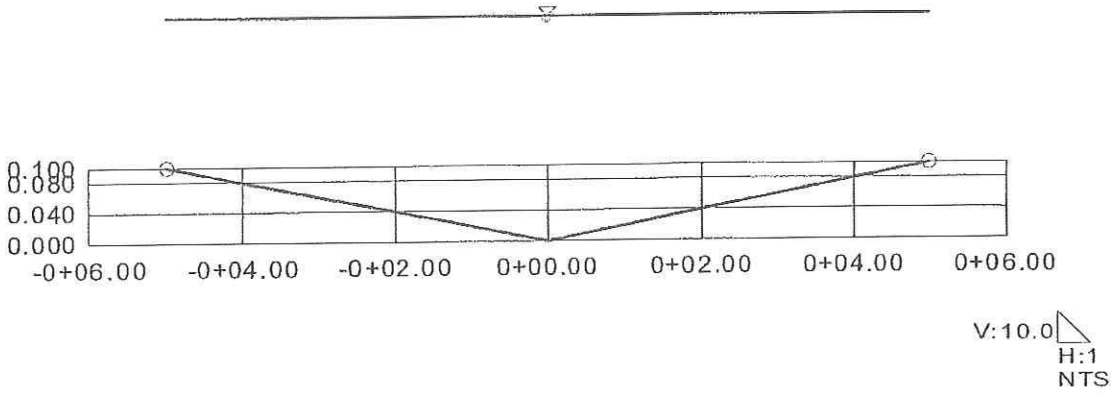
Roughness Segments		
Start Station	End Station	Mannings Coefficient
-0+05.00	0+05.00	0.035

Natural Channel Points	
Station (ft)	Elevation (ft)
-0+05.00	0.100
0+00.00	0.000
0+05.00	0.100

Section D: Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	Section D: 10' wide Concrete Drainage Easement
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.035	
Channel Slope	0.010100	ft/ft
Water Surface Elevation	0.30	ft
Elevation Range	0.00 to 0.10	
Discharge	4.00	cfs



Section E: 10' wide Concrete Drainage Easement
Worksheet for Irregular Channel

Project Description	
Worksheet	Section E: 10' wide Concrete Drainage Easement
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	0.008800	ft/ft
Discharge	1.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Metho	Horton's Method

Results		
Mannings Coefficient	0.013	
Water Surface Elevation	0.21	ft
Elevation Range	0.00 to 0.21	
Flow Area	0.6	ft²
Wetted Perimeter	10.018	ft
Top Width	10.000	ft
Actual Depth	0.21	ft
Critical Elevation	0.21	ft
Critical Slope	0.006087	ft/ft
Velocity	1.64	ft/s
Velocity Head	0.04	ft
Specific Energy	0.25	ft
Froude Number	1.17	
Flow Type	Supercritical	

$d \times v = 0.21 \times 1.64 = 0.3 < 6$ OK

Calculation Messages:
Water elevation exceeds lowest end station by 0.44968929e-3 ft.

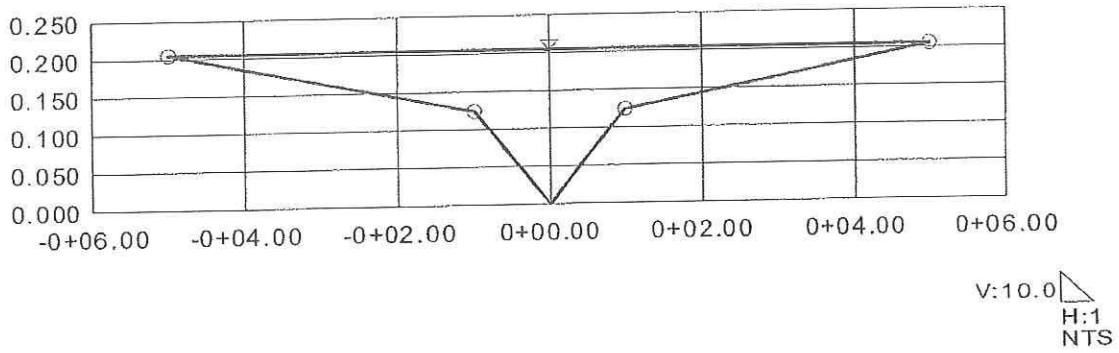
Roughness Segments		
Start Station	End Station	Mannings Coefficient
-0+05.00	-0+01.00	0.030
-0+01.00	0+01.00	0.013
0+01.00	0+05.00	0.030

Natural Channel Points	
Station (ft)	Elevation (ft)
-0+05.00	0.205
-0+01.00	0.125
0+00.00	0.000
0+01.00	0.125
0+05.00	0.205

Section E: 10' wide Concrete Drainage Easement
Cross Section for Irregular Channel

Project Description	
Worksheet	Section E: 10' wide Concrete Drainage Easement
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.013	
Channel Slope	0.008800	ft/ft
Water Surface Elevation	0.21	ft
Elevation Range	0.00 to 0.21	
Discharge	1.00	cfs

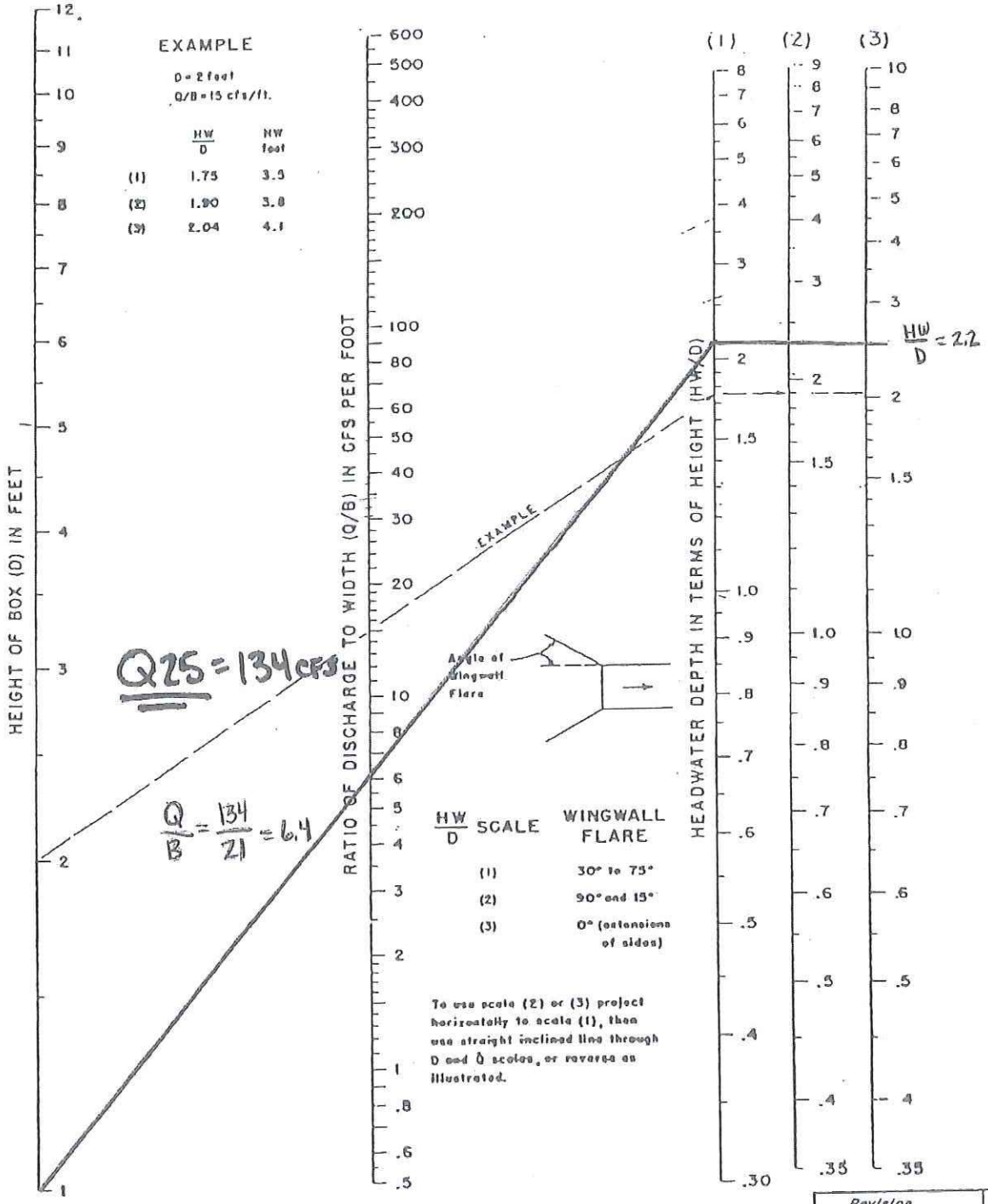


Storm Drain Hydraulic Calculations

Existing Triple (3) 1'x7' RCB

NOMOGRAPH – INLET CONTROL CALCULATION
(25 YR)

NOMOGRAPH – INLET CONTROL BOX CULVERT



Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS No.5, 1985

FIGURE 1004

HYDRAULIC CALCULATION
(25 YR)

3-RCB's (1' x 7') - 25YR
Worksheet for Rectangular Channel

Project Description	
Worksheet	RCB's (1' x 7')
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

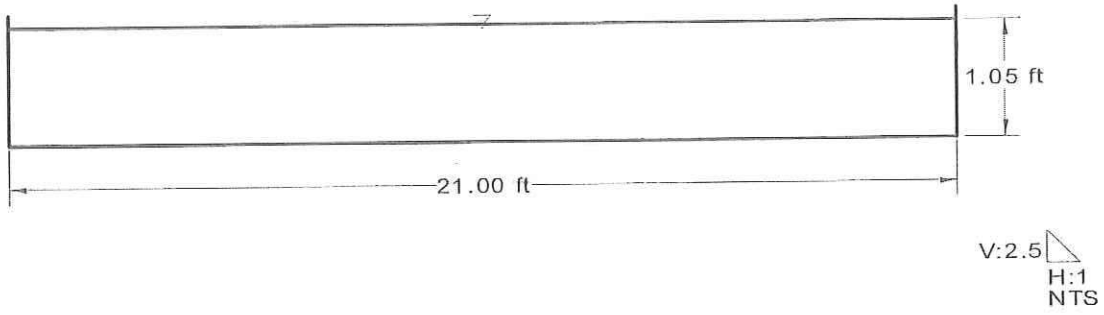
Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.003000	ft/ft
Bottom Width	21.00	ft
Discharge	134.00	cfs

Results		
Depth	1.05	ft
Flow Area	22.1	ft²
Wetted Perimeter	23.10	ft
Top Width	21.00	ft
Critical Depth	1.08	ft
Critical Slope	0.002734	ft/ft
Velocity	6.07	ft/s
Velocity Head	0.57	ft
Specific Energy	1.62	ft
Froude Number	1.04	
Flow Type	Supercritical	

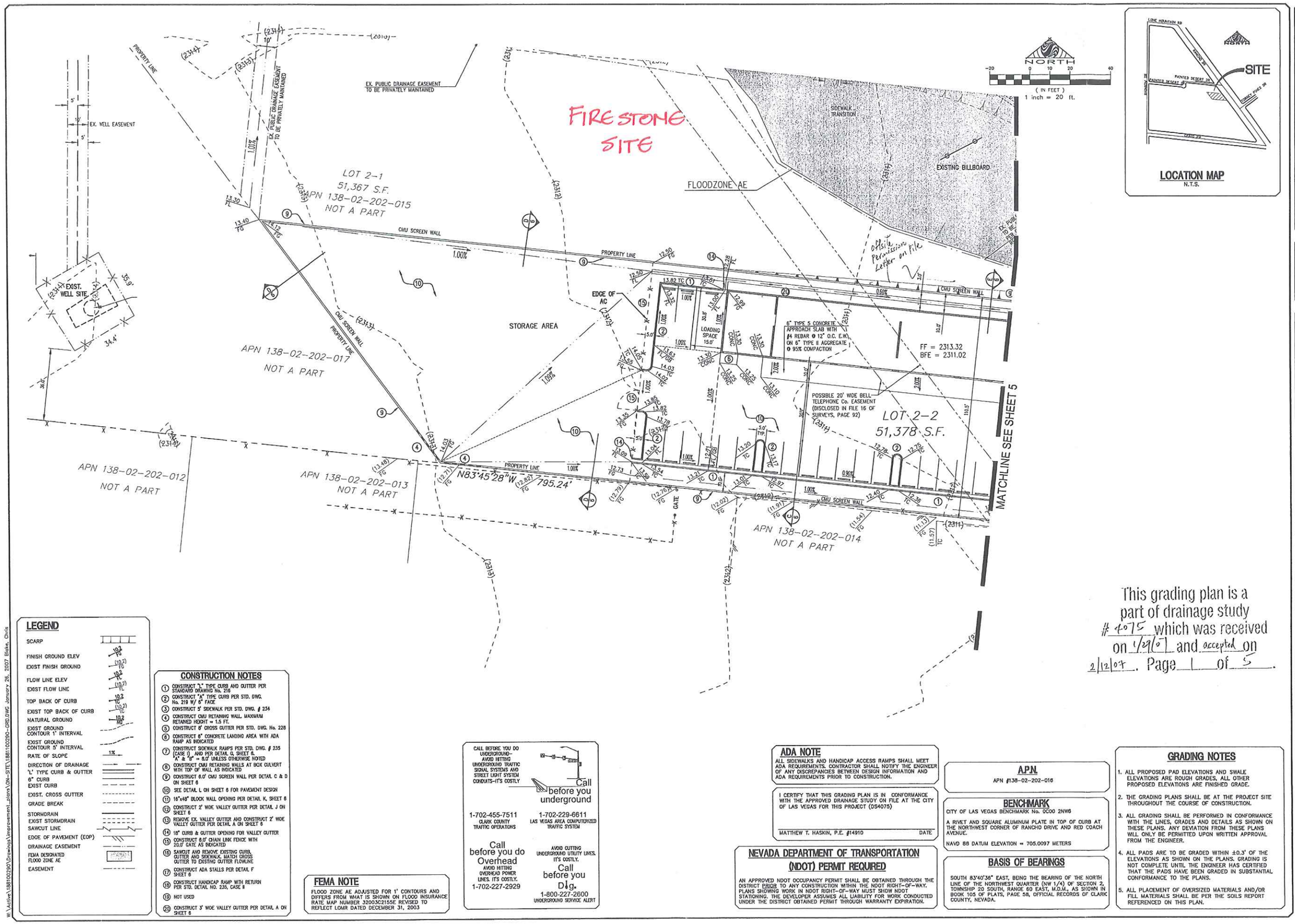
3-RCB's (1' x 7') - 25YR
Cross Section for Rectangular Channel

Project Description	
Worksheet	RCB's (1' x 7')
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.013	
Channel Slope	0.003000	ft/ft
Depth	1.05	ft
Bottom Width	21.00	ft
Discharge	134.00	cfs



Relevant Plan, Profile and Detail Sheets



LOCATION MAP
N.T.S.

ZONE: -20 0 10 20 40 (IN FEET) 1 inch = 20 ft.

LEGEND

- SCARP
- FINISH GROUND ELEV — 10.2 FG
- EXIST FINISH GROUND — (10.2) FG
- FLOW LINE ELEV — 10.2 FL
- EXIST FLOW LINE — (10.2) FL
- TOP BACK OF CURB — 10.2 TC
- EXIST TOP BACK OF CURB — (10.2) TC
- NATURAL GROUND — 10.2 NG
- EXIST GROUND CONTOUR 1' INTERVAL
- EXIST GROUND CONTOUR 5' INTERVAL
- RATE OF SLOPE — 1%
- DIRECTION OF DRAINAGE
- 'L' TYPE CURB & GUTTER
- 6" CURB EXIST CURB
- EXIST. CROSS GUTTER
- GRADE BREAK
- STORMDRAIN
- EXIST STORMDRAIN
- SAWCUT LINE
- EDGE OF PAVEMENT (EOP)
- DRAINAGE EASEMENT
- FEMA DESIGNATED FLOOD ZONE AE
- EASEMENT

CONSTRUCTION NOTES

1. CONSTRUCT 'L' TYPE CURB AND GUTTER PER STANDARD DRAWING No. 216
2. CONSTRUCT "A" TYPE CURB PER STD. DWG. No. 219 W/ 6" FACE
3. CONSTRUCT 5' SIDEWALK PER STD. DWG. # 234
4. CONSTRUCT CMU RETAINING WALL, MAXIMUM RETAINED HEIGHT = 1.5 FT.
5. CONSTRUCT 6' CROSS GUTTER PER STD. DWG. No. 228
6. CONSTRUCT 6" CONCRETE LANDING AREA WITH ADA RAMP AS INDICATED
7. CONSTRUCT SIDEWALK RAMPS PER STD. DWG. # 235 (CASE I) AND PER DETAIL G, SHEET 6. 'A' & 'B' = 8.0' UNLESS OTHERWISE NOTED
8. CONSTRUCT CMU RETAINING WALLS AT BOX CULVERT WITH TOP OF WALL AS INDICATED
9. CONSTRUCT 6.0' CMU SCREEN WALL PER DETAIL C & D ON SHEET 6
10. SEE DETAIL L ON SHEET 6 FOR PAVEMENT DESIGN
11. 16'x48' BLOCK WALL OPENING PER DETAIL K, SHEET 6
12. CONSTRUCT 2' WIDE VALLEY GUTTER PER DETAIL J ON SHEET 6
13. REMOVE EX. VALLEY GUTTER AND CONSTRUCT 2' WIDE VALLEY GUTTER PER DETAIL A ON SHEET 6
14. 18" CURB & GUTTER OPENING FOR VALLEY GUTTER
15. CONSTRUCT 8.0' CHAIN LINK FENCE WITH 20.0' GATE AS INDICATED
16. SAWCUT AND REMOVE EXISTING CURB, GUTTER AND SIDEWALK. MATCH CROSS GUTTER TO EXISTING GUTTER FLOWLINE
17. CONSTRUCT ADA STALLS PER DETAIL F SHEET 6
18. CONSTRUCT HANDICAP RAMP WITH RETURN PER STD. DETAIL NO. 235, CASE II
19. NOT USED
20. CONSTRUCT 3' WIDE VALLEY GUTTER PER DETAIL A ON SHEET 6

FEMA NOTE
FLOOD ZONE AE ADJUSTED FOR 1' CONTOURS AND DIFFERS FROM WHAT IS SHOWN ON FLOOD INSURANCE RATE MAP NUMBER 32003C2155E REVISED TO REFLECT LOMR DATED DECEMBER 31, 2003

CALL BEFORE YOU DO UNDERGROUND– AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS AND STREET LIGHT SYSTEM CONDUITS–IT'S COSTLY

Call before you underground

1-702-455-7511 CLARK COUNTY TRAFFIC OPERATIONS

1-702-229-6611 LAS VEGAS AREA COMPUTERIZED TRAFFIC SYSTEM

Call before you do Overhead

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.

1-702-227-2929

AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.

Call before you Dig.

1-800-227-2600 UNDERGROUND SERVICE ALERT

ADA NOTE
ALL SIDEWALKS AND HANDICAP ACCESS RAMPS SHALL MEET ADA REQUIREMENTS. CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES BETWEEN DESIGN INFORMATION AND ADA REQUIREMENTS PRIOR TO CONSTRUCTION.

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT (DS4075)

MATTHEW T. HASKIN, P.E. #14910 DATE

NEVADA DEPARTMENT OF TRANSPORTATION (NDOT) PERMIT REQUIRED
AN APPROVED NDOT OCCUPANCY PERMIT SHALL BE OBTAINED THROUGH THE DISTRICT PRIOR TO ANY CONSTRUCTION WITHIN THE NDOT RIGHT-OF-WAY. PLANS SHOWING WORK IN NDOT RIGHT-OF-WAY MUST SHOW NDOT STATIONING. THE DEVELOPER ASSUMES ALL LIABILITY FOR WORK CONDUCTED UNDER THE DISTRICT OBTAINED PERMIT THROUGH WARRANTY EXPIRATION.

A.P.N.
APN #138-02-202-016

BENCHMARK
CITY OF LAS VEGAS BENCHMARK No. 0C00 2NW6

A RIVET AND SQUARE ALUMINUM PLATE IN TOP OF CURB AT THE NORTHWEST CORNER OF RANCHO DRIVE AND RED COACH AVENUE.

NAVD 88 DATUM ELEVATION = 705.0097 METERS

BASIS OF BEARINGS
SOUTH 83°40'36" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 2, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., AS SHOWN IN BOOK 105 OF PLATS, PAGE 58, OFFICIAL RECORDS OF CLARK COUNTY, NEVADA.

GRADING NOTES

1. ALL PROPOSED PAD ELEVATIONS AND SWALE ELEVATIONS ARE ROUGH GRADES. ALL OTHER PROPOSED ELEVATIONS ARE FINISHED GRADE.
2. THE GRADING PLANS SHALL BE AT THE PROJECT SITE THROUGHOUT THE COURSE OF CONSTRUCTION.
3. ALL GRADING SHALL BE PERFORMED IN CONFORMANCE WITH THE LINES, GRADES AND DETAILS AS SHOWN ON THESE PLANS. ANY DEVIATION FROM THESE PLANS WILL ONLY BE PERMITTED UPON WRITTEN APPROVAL FROM THE ENGINEER.
4. ALL PADS ARE TO BE GRADED WITHIN ±0.3' OF THE ELEVATIONS AS SHOWN ON THE PLANS. GRADING IS NOT COMPLETE UNTIL THE ENGINEER HAS CERTIFIED THAT THE PADS HAVE BEEN GRADED IN SUBSTANTIAL CONFORMANCE TO THE PLANS.
5. ALL PLACEMENT OF OVERSIZED MATERIALS AND/OR FILL MATERIALS SHALL BE PER THE SOILS REPORT REFERENCED ON THIS PLAN.

This grading plan is a part of drainage study #4075 which was received on 1/29/07 and accepted on 2/12/07. Page 1 of 5.

NO.	DESCRIPTION	DATE	APP'D

DATE: 10/04/06
PM: SBC
DRAWN: JRP
DESIGNED: SBC
CHECKED: BPL
JOB NO: 1881002901
SCALE: AS SHOWN

The Contractor shall verify the information for all dimensions. DO NOT scale this drawing. any errors or omissions shall be reported to the Engineer immediately. Copyright Reserved property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is prohibited.

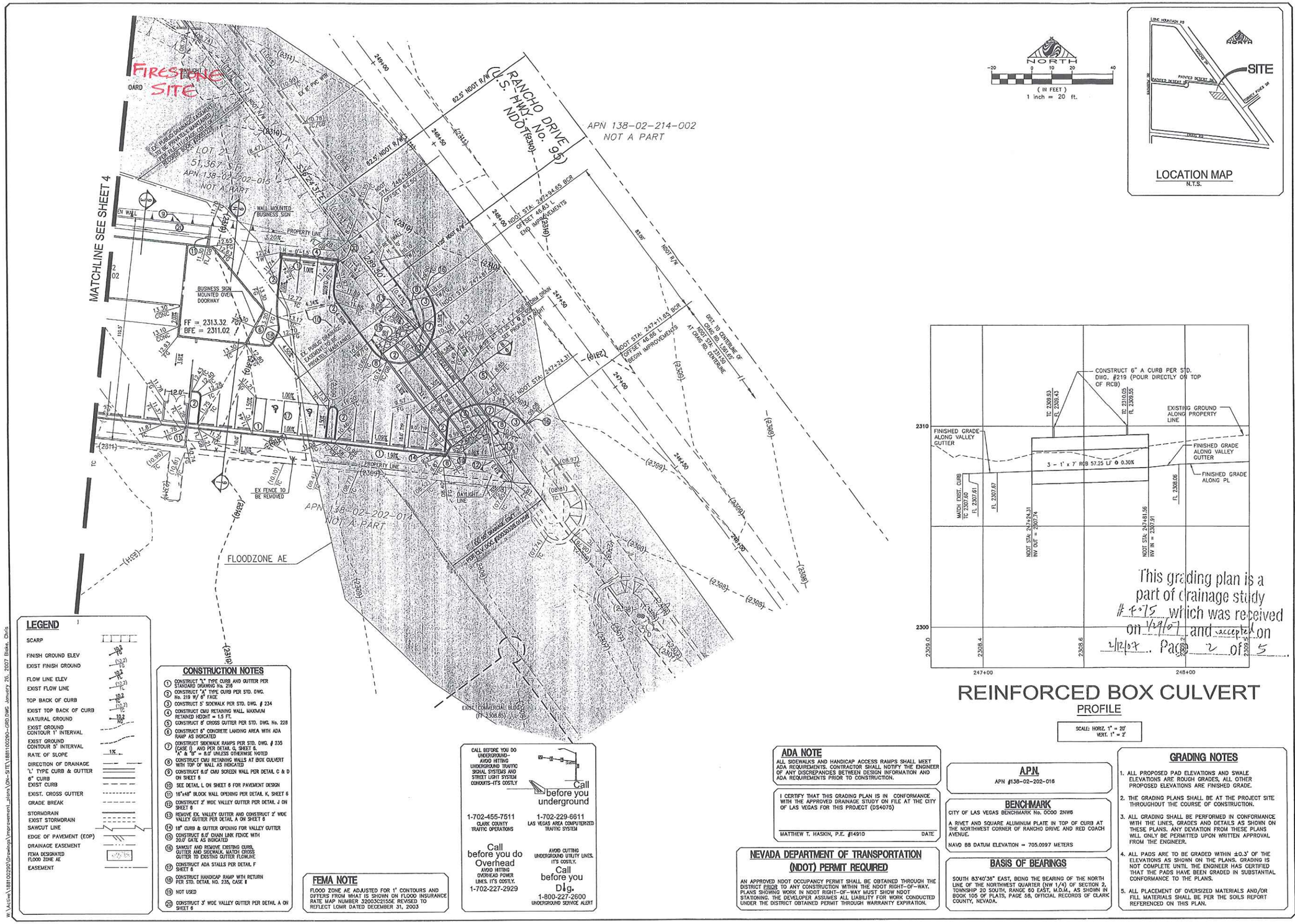
Stantec Consulting, Inc.
7251 W. Charleston Blvd.
Las Vegas, Nevada 89117
Tel. (702) 258-0115
Fax. (702) 258-4956
www.stantec.com
Stantec

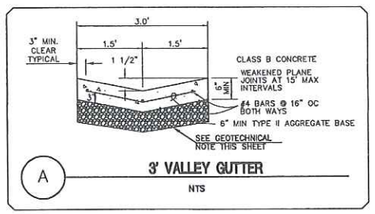
SUN VALLEY AUTOMOTIVE
SUN VALLEY AUTO
GRADING PLAN

PROFESSIONAL ENGINEER STATE OF NEVADA
MATTHEW T. HASKIN
Exp. 06-30-07
CIVIL
No. 14910
1/26/07

SHEET 4 OF 7
C.L.V. DWG.#

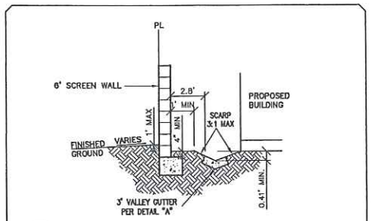
W:\Active\1881002901\Drawings\Improvement_plans\GN-SITE\1881002901-GRD.DWG January 26, 2007 Blake, Chris


FIRESTONE SITE
MATCHLINE SEE SHEET 4
RANCHO DRIVE (U.S. HWY. No. 95) NDOT
APN 138-02-214-002
NOT A PART
LOT 2
51,367 S.F.
APN 138-02-202-015
NOT A PART
APN 138-02-202-011
NOT A PART
FLOODZONE AE
EXIST. COMMERCIAL BLDG (FF=2308.85)
WALL MOUNTED BUSINESS SIGN
BUSINESS SIGN MOUNTED OVER DOORWAY
FF = 2313.32
BFE = 2311.02
PROPERTY LINE
DAYLIGHT LINE
EX FENCE TO BE REMOVED
EX. PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED
EX. 66" RCP STORM DRAIN
TOP BACK OF DRAINAGE DITCH
EX. 42" RCP STORM DRAIN
EX. 24" PVC WTR
EX. 8" PVC WTR
EX. 6" PVC WTR
EX. 12" PVC WTR
EX. 8" PVC SAN SWR
EX. 6" PVC SAN SWR
EX. 12" PVC SAN SW



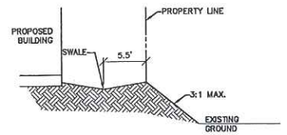
A — 3' VALLEY GUTTER

NTS



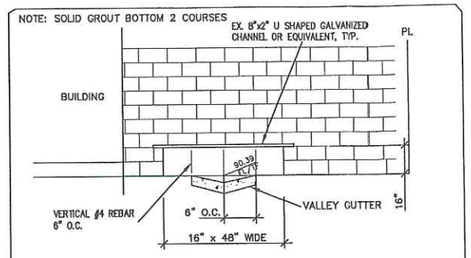
E — PERIMETER WALL SECTION

NTS



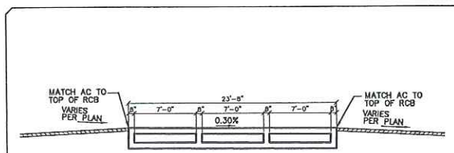
H — PERIMETER SECTION

NTS



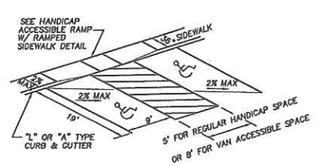
K — 48"x16" BLOCK WALL OPENING W/ VALLEY GUTTER

NTS



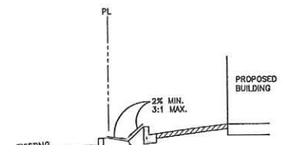
B — REINFORCED CULVERT BOXES

NTS



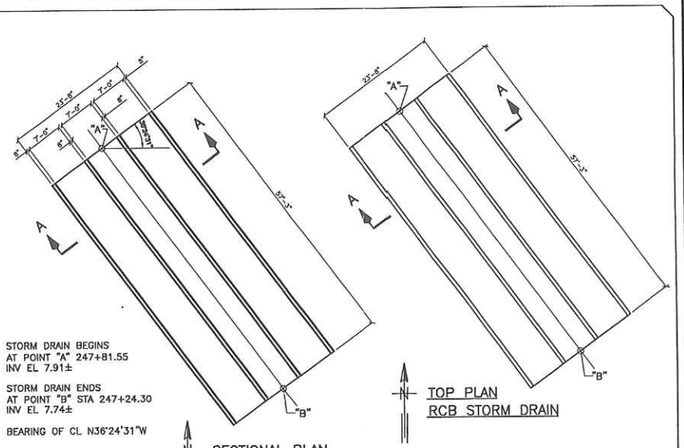
F — HANDICAP LOADING ZONE (ON-SITE)

NTS



I — PERIMETER WALL SECTION

NTS



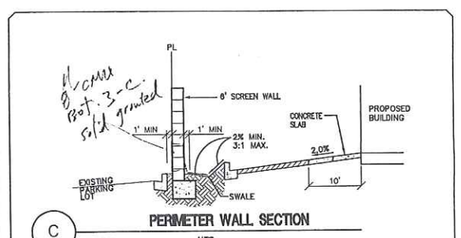
STORM DRAIN BEGINS AT POINT "A" 247+81.55 INV EL 7.91±

STORM DRAIN ENDS AT POINT "B" STA 247+24.30 INV EL 7.74±

BEARING OF CL N36°24'31"W

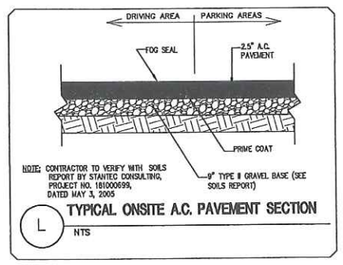
SECTIONAL PLAN RCB STORM DRAIN

TOP PLAN RCB STORM DRAIN



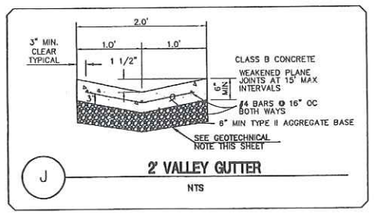
C — PERIMETER WALL SECTION

NTS



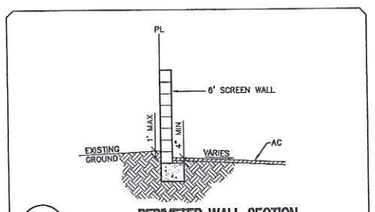
L — TYPICAL ONSITE A.C. PAVEMENT SECTION

NTS



J — 2' VALLEY GUTTER

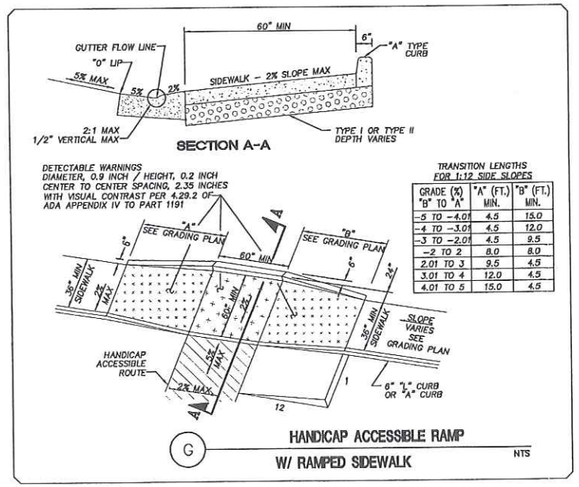
NTS



D — PERIMETER WALL SECTION

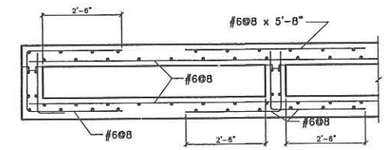
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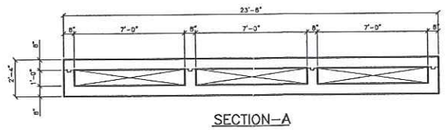
G — HANDICAP ACCESSIBLE RAMP W/ RAMPED SIDEWALK

NTS



**ALL REINF. ARE #5@8 UNO

ENLARGE SECTION–A TYPICAL REINFORCING



SECTION–A

NOTES:
1. DESIGNED SOIL BEARING PRESSURE = 2000 PSF
2. DESIGNED LIVE LOAD = HS20 TRUCK
3. REFER TO GEOTECHNICAL REPORT FOR SUBSRFACE PREPARATIONS
4. CLEAR COVER TO REINFORCING = 2" UNO
5. f'c=4500 psi, fy=60 ksi
6. PROVIDE INSPECTION FOR PLACEMENT OF REBAR

STRUCTURAL DETAILS
NTS

This grading plan is a part of drainage study #4075 which was received on 1/29/07 and accepted on 2/12/07. Page 3 of

NO.	DESCRIPTION	DATE	APP'D

DATE: 10/04/05
PM: SBC
DRAWN: JRP
DESIGNED: SBC
CHECKED: BVL
JOB NO: 181100290
SCALE: AS SHOWN

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Stantec Consulting, Inc.
7251 W. Charleston Blvd.
Las Vegas, Nevada USA 89117
Tel. (702) 258-0115
Fax. (702) 258-4956
www.stantec.com
Stantec

SUN VALLEY AUTOMOTIVE
SUN VALLEY AUTO
DETAIL SHEET

MATTHEW T. HASKIN
Exp. 06-30-07
CIVIL
No. 14910
STATE OF NEVADA
PROFESSIONAL ENGINEER
1/26/07

SHEET 6 OF 7

C.L.V. DWG.#

w:\Active\181001290\Drawings\Improvement plans\ON-SITE\181100290-GRD.DWG January 26, 2007 Blake, Chris

Conditional Letter of Map Revision (CLOMR)

Federal Emergency Management Agency

Washington, D.C. 20472

JUN 28 2007

JUL 2

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 07-09-1025R

The Honorable Oscar B. Goodman
Mayor, City of Las Vegas
400 Stewart Avenue
Las Vegas, NV 89101

Community: City of Las Vegas, NV
Community No.: 325276

104

Dear Mayor Goodman:

This responds to a request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) comment on the effects that a proposed project would have on the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Clark County, Nevada and Incorporated Areas (the effective FIRM and FIS report for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated February 8, 2007, Mr. Matthew Haskin, P.E., previously with Stantec Consulting, requested that FEMA evaluate the effects that updated topographic information, proposed grading, and proposed installation of culverts along an unnamed wash along North Rancho Drive (unnamed wash) from approximately 400 feet downstream to approximately 200 feet upstream of Painted Desert Drive would have on the flood hazard information shown on the effective FIRM and FIS report.

All data required to complete our review of this request for a Conditional Letter of Map Revision (CLOMR) were submitted with letters from Mr. Haskin.

We reviewed the submitted data and the data used to prepare the effective FIRM for your community and determined that the proposed project meets the minimum floodplain management criteria of the NFIP. The submitted existing conditions HEC-RAS hydraulic computer model, dated March 18, 2005, based on updated topographic information, was used as the base conditions model in our review of the proposed conditions model for this CLOMR request. We believe that, if the proposed project is constructed as shown on the plans entitled "Sun Valley Automotive, Sun Valley Auto, Grading Plan," prepared by Stantec Consulting, dated January 26, 2007, and the data listed below are received, a revision to the FIRM would be warranted.

As a result of the updated topographic information, the Base (1-percent-annual-chance) Flood Elevations (BFEs) for the unnamed wash decreased compared to the effective BFEs from approximately 400 feet downstream to approximately 200 feet upstream of Painted Desert Drive. The maximum decrease in BFE, 0.7 foot, occurred approximately 100 feet upstream of Painted Desert Drive.

As a result of the proposed project, the proposed conditions BFEs for the unnamed wash will increase in some areas and decrease in other areas compared to the existing conditions BFEs from approximately 400 feet downstream to approximately 200 feet upstream of Painted Desert Drive. The maximum increase in BFE, 0.4 foot, will occur approximately 100 feet downstream of Painted Desert Drive. The maximum decrease in BFE, 0.2 foot, will occur approximately 100 feet upstream of Painted Desert Drive.

As a result of the proposed project and updated topographic information, the BFEs for the unnamed wash will decrease compared to the effective BFEs from approximately 400 feet downstream to approximately 200 feet upstream of Painted Desert Drive. The maximum decrease in BFE, 0.9 foot, will occur approximately 100 feet upstream of Painted Desert Drive.

As a result of the proposed project and updated topographic information, the width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, along the unnamed wash will increase in some areas and decrease in other areas compared to the effective SFHA width from approximately 400 feet downstream to approximately 200 feet upstream of Painted Desert Drive. The maximum increase in SFHA width, approximately 50 feet, will occur approximately 300 feet downstream of Painted Desert Drive. The maximum decrease in SFHA width, approximately 50 feet, will occur approximately 100 feet downstream of Painted Desert Drive.

Upon completion of the project, your community may submit the data listed below and request that we make a final determination on revising the effective FIRM and FIS report.

- Detailed application and certification forms must be used for requesting final revisions to the maps. Therefore, when the map revision request for the area covered by this letter is submitted, Form 1, entitled "Overview & Concurrence Form," must be included. (A copy of this form is enclosed.)

- The detailed application and certification forms listed below may be required if as-built conditions differ from the preliminary plans. If required, please submit new forms (copies of which are enclosed) or annotated copies of the previously submitted forms showing the revised information.

  Form 2, entitled "Riverine Hydrology & Hydraulics Form"

  Form 3, entitled "Riverine Structures Form"

  Hydraulic analyses, for as-built conditions, of the base flood, together with a topographic work map showing the revised floodplain boundaries, must be submitted with Form 2.

- Effective October 30, 2005, FEMA revised the fee schedule for reviewing and processing requests for conditional and final modifications to published flood information and maps. In accordance with this schedule, the current fee for this map revision request is $4,000 and must be received before we can begin processing the request. Please note, however, that the fee schedule is subject to change, and requesters are required to submit the fee in effect at the time of the submittal. Payment of this fee shall be made in the form of a check or money order, made payable in U.S. funds to the National Flood Insurance Program, or by credit card (Visa or MasterCard only). The payment, along with the revision application, must be forwarded to the following address:

  FEMA National Service Provider
  3601 Eisenhower Avenue
  Alexandria, VA 22304-6425

- As-built plans, certified by a registered professional engineer, of all proposed project elements

- Community acknowledgment of the map revision request

After receiving appropriate documentation to show that the project has been completed, FEMA will initiate a revision to the FIRM and FIS report. Because the BFEs would change as a result of the project, a 90-day appeal period would be initiated, during which community officials and interested persons may appeal the revised BFEs based on scientific or technical data.

The basis of this CLOMR is, in whole or in part, a culvert project. NFIP regulations, as cited in Paragraph 60.3(b)(7), require that communities assure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management regulations. Consequently, the ultimate responsibility for maintenance of the culverts rests with your community.

This CLOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the Consultation Coordination Officer (CCO) for your community. Information on the CCO for your community may be obtained by calling the Director, Federal Insurance and Mitigation Division of FEMA in Oakland, California, at (510) 627-7175. If you have any questions regarding this CLOMR, please call our Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,

Max H. Yuan, P.E., Project Engineer
Engineering Management Section
Mitigation Division

For: William R. Blanton Jr., CFM, Chief
Engineering Management Section
Mitigation Division

Enclosures

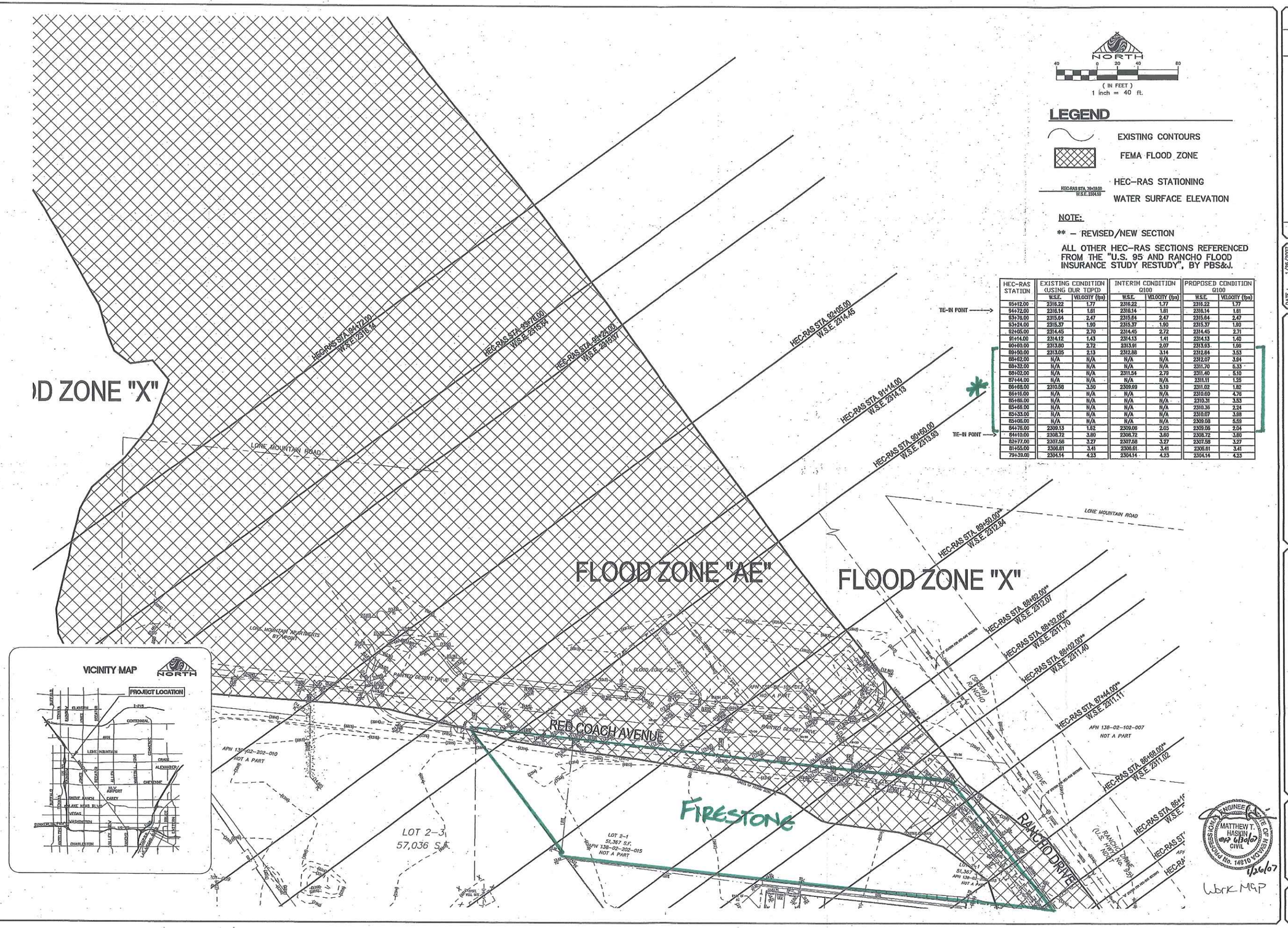
cc: Mr. Randy Fultz, P.E., CFM
Assistant City Engineer
City of Las Vegas

Mr. Kevin Eubanks, P.E., CFM
Assistant General Manager
Clark County Regional Flood Control District

Mr. Michael H. Yates, E.I.T.
Project Manager
Stantec Consulting

HEC-RAS Exhibit

Proposed Condition HEC-RAS Exhibit (Figure 9B)



HEC-RAS STATION	EXISTING CONDITION (USING OUR TOPO)		INTERIM CONDITION Q100		PROPOSED CONDITION Q100	
	W.S.E.	VELOCITY (fps)	W.S.E.	VELOCITY (fps)	W.S.E.	VELOCITY (fps)
95+12.00	2316.22	1.77	2316.22	1.77	2316.22	1.77
94+72.00	2316.14	1.61	2316.14	1.61	2316.14	1.61
93+76.00	2315.64	2.47	2315.64	2.47	2315.64	2.47
93+24.00	2315.37	1.90	2315.37	1.90	2315.37	1.90
92+05.00	2314.45	2.70	2314.45	2.72	2314.45	2.71
91+14.00	2314.12	1.43	2314.13	1.41	2314.13	1.40
90+60.00	2313.80	2.72	2313.91	2.07	2313.93	1.98
89+50.00	2313.05	2.13	2312.88	3.14	2312.84	3.53
88+62.00	N/A	N/A	N/A	N/A	2312.07	3.84
88+32.00	N/A	N/A	N/A	N/A	2311.70	5.33
88+02.00	N/A	N/A	2311.54	2.79	2311.40	5.10
87+44.00	N/A	N/A	N/A	N/A	2311.11	1.25
86+68.00	2310.58	3.50	2309.09	5.10	2311.02	1.82
86+16.00	N/A	N/A	N/A	N/A	2310.60	4.76
85+86.00	N/A	N/A	N/A	N/A	2310.31	3.53
85+68.00	N/A	N/A	N/A	N/A	2310.36	2.24
85+33.00	N/A	N/A	N/A	N/A	2310.07	3.68
85+08.00	N/A	N/A	N/A	N/A	2309.08	5.59
84+76.00	2309.13	1.62	2309.06	2.05	2309.06	2.04
84+10.00	2308.72	3.80	2308.72	3.80	2308.72	3.80
82+77.00	2307.58	3.27	2307.58	3.27	2307.58	3.27
81+55.00	2306.61	3.41	2306.61	3.41	2306.61	3.41
79+39.00	2304.14	4.23	2304.14	4.23	2304.14	4.23

NO.	DESCRIPTION	DATE	APP'D

DATE : 1/26/2007
PM : B. COOK
DRAWN BY : CHQ
DESIGNED BY :
CHECKED BY :
JOB NO. : 188100290
SCALE : AS NOTED

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7251 W. Charleston Blvd.
Las Vegas, Nevada, U.S.A.
89117
Tel. (702) 258-0115
Fax. (702) 258-4956
www.stantec.com

Stantec

SUN VALLEY AUTOMOTIVE
RANCHO / RED COACH
PROPOSED CONDITION HEC-RAS EXHIBIT

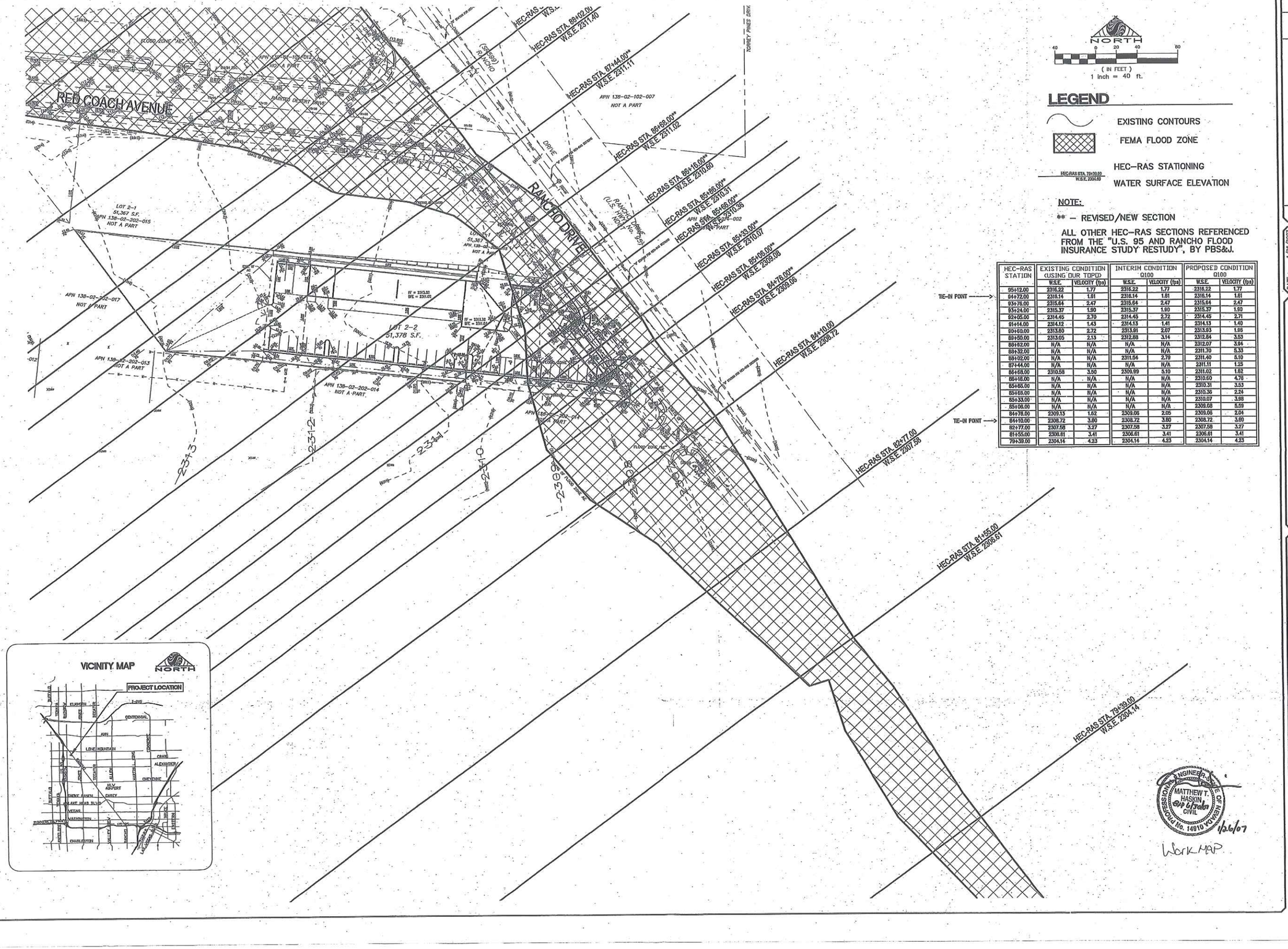
PROFESSIONAL ENGINEER STATE OF NEVADA MATTHEW T. HASKIN No. 14810 CIVIL
4/26/07

Work Map

TDS
NOVEMBER
2006

SHEET
FIG 9B
OF

W:\Active\188100290\land_development\drainage\Technical Drainage Study\Figures\DEVELOPED CONDITION HEC-RAS EXHIBIT FOR NDOT.dwg ablake Fri, 26 Jan 2007 - 9:59am



HEC-RAS STATION	EXISTING CONDITION (USING OUR TOPO)		INTERIM CONDITION Q100		PROPOSED CONDITION Q100	
	W.S.E.	VELOCITY (fps)	W.S.E.	VELOCITY (fps)	W.S.E.	VELOCITY (fps)
95+12.00	2316.22	1.77	2316.22	1.77	2316.22	1.77
94+72.00	2316.14	1.61	2316.14	1.61	2316.14	1.61
93+76.00	2315.64	2.47	2315.64	2.47	2315.64	2.47
93+24.00	2315.37	1.90	2315.37	1.90	2315.37	1.90
92+05.00	2314.45	2.70	2314.45	2.72	2314.45	2.71
91+14.00	2314.12	1.43	2314.13	1.41	2314.13	1.40
90+60.00	2313.90	2.72	2313.91	2.07	2313.93	1.98
89+50.00	2313.05	2.13	2312.85	3.14	2312.84	3.53
88+62.00	N/A	N/A	N/A	N/A	2312.07	3.64
88+32.00	N/A	N/A	N/A	N/A	2311.70	5.33
88+02.00	N/A	N/A	2311.54	2.79	2311.40	5.19
87+44.00	N/A	N/A	N/A	N/A	2311.11	1.25
86+68.00	2310.58	3.50	2309.99	5.10	2311.02	1.82
86+16.00	N/A	N/A	N/A	N/A	2310.60	4.78
85+98.00	N/A	N/A	N/A	N/A	2310.31	3.53
85+68.00	N/A	N/A	N/A	N/A	2310.36	2.24
85+33.00	N/A	N/A	N/A	N/A	2310.07	3.98
85+06.00	N/A	N/A	N/A	N/A	2309.08	5.59
84+76.00	2309.13	1.62	2309.06	2.05	2309.06	2.04
84+10.00	2308.72	3.80	2308.72	3.80	2308.72	3.80
82+77.00	2307.58	3.27	2307.58	3.27	2307.58	3.27
81+55.00	2306.61	3.41	2306.61	3.41	2306.61	3.41
79+39.00	2304.14	4.33	2304.14	4.23	2304.14	4.23

NO.	DESCRIPTION	DATE	APP'D

DATE : 1/26/2007
PM : B. COOK
DRAWN BY : CAQ
DESIGNED BY :
CHECKED BY :
JOB NO. : 189100290
SCALE : AS NOTED

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Stantec Consulting, Inc.
7251 W. Charleston Blvd.
Las Vegas, Nevada, U.S.A.
89117
Tel. (702) 258-0115
Fax. (702) 258-4956
www.stantec.com

Stantec

SUN VALLEY AUTOMOTIVE
RANCHO / RED COACH
PROPOSED CONDITION HEC-RAS EXHIBIT

TDS
NOVEMBER
2006

SHEET
FIG 9B
OF

W:\Active\189100290\land_development\drawings\Technical Drawings Study\Figures\DEVELOPED CONDITION HEC-RAS EXHIBIT FOR NDOT.dwg cblake Fri, 26 Jan 2007 - 9:58am

HEC-RAS Analysis

Proposed Condition HEC-RAS Analysis

HEC-RAS Plan: Plan 1 River: RANCHO ROAD Reach: 95 TO GOWAN Profile: PF#1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
95 TO GOWAN	10075	PF#1	169.00	2316.00	2317.23	2317.17	2317.61	0.011868	4.96	34.06	38.49	0.93
95 TO GOWAN	9918	PF#1	169.00	2316.00	2316.58		2316.63	0.003253	1.76	95.97	194.91	0.44
95 TO GOWAN	9796	PF#1	169.00	2314.00	2316.46		2316.47	0.000646	0.85	199.56	361.36	0.20
95 TO GOWAN	9566	PF#1	215.00	2314.00	2316.31		2316.33	0.000570	1.05	220.58	344.48	0.20
95 TO GOWAN	9512	PF#1	215.00	2314.00	2316.22		2316.27	0.002320	1.77	125.70	238.81	0.39
95 TO GOWAN	9472	PF#1	215.00	2314.00	2316.14		2316.18	0.001929	1.61	153.85	422.74	0.35
95 TO GOWAN	9376	PF#1	180.00	2314.00	2315.64		2315.73	0.005930	2.47	72.97	139.86	0.60
95 TO GOWAN	9324	PF#1	180.00	2314.00	2315.37	2315.21	2315.43	0.005356	1.90	94.64	248.81	0.54
95 TO GOWAN	9205	PF#1	180.00	2313.70	2314.45		2314.57	0.010338	2.71	66.44	168.31	0.76
95 TO GOWAN	9114	PF#1	180.00	2313.20	2314.13	2313.80	2314.16	0.002184	1.40	128.41	272.45	0.36
95 TO GOWAN	9060	PF#1	180.00	2312.90	2313.93	2313.72	2313.99	0.004837	1.97	91.57	210.82	0.53
95 TO GOWAN	8950	PF#1	180.00	2312.00	2312.84	2312.84	2313.03	0.018869	3.52	51.16	136.53	1.01
95 TO GOWAN	8862	PF#1	180.00	2310.93	2312.08	2312.08	2312.31	0.004534	3.92	45.88	101.28	1.03
95 TO GOWAN	8832	PF#1	180.00	2310.47	2311.70	2311.82	2312.14	0.006472	5.32	33.85	79.23	1.43
95 TO GOWAN	8802	PF#1	180.00	2310.76	2311.40	2311.52	2311.80	0.020108	5.09	35.33	103.33	1.54
95 TO GOWAN	8744	PF#1	180.00	2308.74	2311.11	2309.97	2311.13	0.000660	1.25	144.09	120.41	0.20
95 TO GOWAN	8668	PF#1	180.00	2308.44	2311.02		2311.07	0.000826	1.82	99.17	90.08	0.30
95 TO GOWAN	8616	PF#1	180.00	2308.22	2310.60	2310.60	2310.95	0.007195	4.76	37.78	53.25	1.00
95 TO GOWAN	8586	PF#1	180.00	2308.10	2310.31	2309.75	2310.51	0.003639	3.53	51.41	66.24	0.66
95 TO GOWAN	8566	PF#1	180.00	2307.94	2310.36	2309.32	2310.43	0.001076	2.24	83.87	103.15	0.39
95 TO GOWAN	8565		Culvert									
95 TO GOWAN	8533	PF#1	180.00	2309.02	2310.07	2310.07	2310.32	0.003465	3.98	45.17	95.02	1.02
95 TO GOWAN	8532		Culvert									
95 TO GOWAN	8506	PF#1	180.00	2307.72	2309.08	2309.08	2309.57	0.010061	5.59	32.19	33.38	1.00
95 TO GOWAN	8476	PF#1	180.00	2307.61	2309.06	2308.68	2309.12	0.001037	2.04	88.12	142.69	0.46
95 TO GOWAN	8410	PF#1	180.00	2307.70	2308.72	2308.67	2308.94	0.011531	3.80	47.33	84.90	0.90
95 TO GOWAN	8277	PF#1	180.00	2306.50	2307.58	2307.43	2307.74	0.007147	3.27	55.08	87.78	0.73
95 TO GOWAN	8155	PF#1	180.00	2305.40	2306.61	2306.52	2306.79	0.008457	3.41	52.84	99.13	0.82
95 TO GOWAN	7939	PF#1	180.00	2302.20	2304.14	2304.12	2304.42	0.014647	4.23	42.51	73.80	0.98
95 TO GOWAN	7578	PF#1	198.00	2299.90	2301.14		2301.29	0.005820	3.13	63.27	102.66	0.70
95 TO GOWAN	7478	PF#1	198.00	2298.90	2300.20	2300.20	2300.42	0.014444	3.77	52.45	112.43	0.97
95 TO GOWAN	7373	PF#1	198.00	2298.00	2299.11	2298.99	2299.29	0.008014	3.45	57.34	93.80	0.78
95 TO GOWAN	7280	PF#1	198.00	2297.90	2298.75	2298.52	2298.84	0.003003	2.41	82.11	136.41	0.55

HEC-RAS Version 3.1.1 May 2003
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X     X
X     X  X        X            X   X     X    X   X
XXXXXXX  XXXX     X       XXX  XXXX      XXXXXX    XXXX
X     X  X        X            X  X      X     X        X
X     X  X        X    X       X   X     X     X        X
X     X  XXXXXX    XXXX        X    X    X     X   XXXXX
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(100-YR)

PROJECT DATA
Project Title: Sun Valley Auto (Developed)
Project File : svadevb.prj
Run Date and Time: 1/26/2007 11:28:07 AM

Project in English units

PLAN DATA

Plan Title: Critical
Plan File : w:\Active\188100290\land_development\drainage\Technical Drainage Study\Calculations\HEC-RAS\svadevb.p01

Geometry Title: Cross-sections
Geometry File : w:\Active\188100290\land_development\drainage\Technical Drainage Study\Calculations\HEC-RAS\svadevb.g01

Flow Title : flow 1
Flow File : w:\Active\188100290\land_development\drainage\Technical Drainage Study\Calculations\HEC-RAS\svadevb.f01

Plan Summary Information:
Number of: Cross Sections = 31 Mulitple Openings = 0
Culverts = 2 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculaton tolerance = 0.01
Maximum number of interations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: flow 1
Flow File : w:\Active\188100290\land_development\drainage\Technical Drainage Study\Calculations\HEC-RAS\svadevb.f01

Flow Data (cfs)

River	Reach	RS	PF#1
RANCHO ROAD	95 TO GOWAN	10075	169
RANCHO ROAD	95 TO GOWAN	9566	215
RANCHO ROAD	95 TO GOWAN	9376	180
RANCHO ROAD	95 TO GOWAN	7578	198

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
RANCHO ROAD	95 TO GOWAN	PF#1	Normal S = 0.0022	Normal S = 0.003

GEOMETRY DATA

Geometry Title: Cross-sections
Geometry File : w:\Active\188100290\land_development\drainage\Technical Drainage Study\Calculations\HEC-RAS\svadevb.g01

CROSS SECTION

RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 10075

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2319.3	63	2318.7	103	2318	117	2316	134	2316
155	2318	237	2318.9	284	2318	320	2318	379	2320

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	63	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	237	164	157	148	.1	.3

CROSS SECTION

RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 9918

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2318.9	60	2318.3	71	2318	87	2316	107	2316
161	2317.7	203	2316	318	2316	395	2318		

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	60	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	395	78	122	169	.1	.3

CROSS SECTION

RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 9796

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2318.7	56	2318	74	2316	80	2314	95	2314
105	2316	278	2316	385	2316	466	2316.8	658	2318

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	56	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	466	175	230	355	.1	.3

CROSS SECTION

RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 9566

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2318.3	22	2318	47	2317.2	66	2316	73	2314
89	2314	105	2316	126	2316	145	2318	150	2320
153	2318	211	2316	292	2315.1	364	2316	430	2316
618	2317.2	670	2318						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	47	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	364	54	54	54	.1	.3

CROSS SECTION

RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 9512

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2318.1	18	2318	46	2317	66	2316	72	2314
90	2314	96	2316	293	2316	309	2315.1	362	2316
664	2317.3	839	2318						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	46	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	362	40	40	40	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
114	227	2320

CROSS SECTION

RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 9472

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2318	11	2318	45	2316.8	61	2316	68	2314
91	2314	96	2316	279	2316	321	2315.1	360	2316
576	2316	824	2318						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	45	.03

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
             0     360             148     148     148            .1        .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     114     227    2320

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN         RS: 9376

INPUT
Description:
Station Elevation Data    num=      14
      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
        0  2317.5       45  2316.5       47    2316       51    2314       61    2314
       94    2316      190    2316      236  2315.9      273    2316      318    2316
      352    2315      474    2316      588    2316      693    2318

Manning's n Values        num=       2
      Sta   n Val      Sta   n Val
        0    .016       45    .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
             0     474              52      52      52            .1        .3

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN         RS: 9324

INPUT
Description:
Station Elevation Data    num=      10
      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
        0  2317.2       45  2316.2       60    2316       70    2314       93    2316
      179    2316      255  2314.8      367    2315      436  2315.3      521    2316

Manning's n Values        num=       2
      Sta   n Val      Sta   n Val
        0    .016       45    .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
             0     521             119     119     119            .1        .3

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN         RS: 9205

INPUT
Description:
Station Elevation Data    num=       9
      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
        0  2316.5       28    2316       48  2315.7       68    2314       73  2313.7
      100  2313.8      130    2314      402    2315      477    2316

Manning's n Values        num=       2
      Sta   n Val      Sta   n Val
        0    .016       48    .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
             0     477              91      91      91            .1        .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     231     279    2318

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN         RS: 9114

INPUT
Description:
Station Elevation Data    num=      10
      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
        0    2316       47  2315.1       63    2314       77  2313.2      150  2313.4
      272    2314      326    2314      441    2316      568  2315.4      614    2316

Manning's n Values        num=       2
      Sta   n Val      Sta   n Val
        0    .016       47    .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
             0     441              54      54      54            .1        .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
     441     614    2316          F

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN         RS: 9060

INPUT
Description:
Station Elevation Data    num=       8
      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
        0  2315.6       44  2314.8       54    2314       76  2312.9      345    2314
      384    2314      556  2315.2      600    2316
```

```
Manning's n Values          num=        2
     Sta   n Val      Sta   n Val
       0    .016       44    .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0     345                110     110     110            .1      .3
Ineffective Flow     num=        1
   Sta L   Sta R    Elev  Permanent
     442     600    2316          F
Blocked Obstructions      num=        1
   Sta L   Sta R    Elev
     104     165    2316

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN          RS: 8950

INPUT
Description:
Station Elevation Data     num=        6
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
       0  2314.5       48     2313       52  2312.5       59     2313      179     2312
     272     2313

Manning's n Values          num=        2
     Sta   n Val      Sta   n Val
       0    .016       48    .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0     272                 88      88      88            .1      .3
Blocked Obstructions      num=        1
   Sta L   Sta R    Elev
     114     164 2313.52

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN          RS: 8862

INPUT
Description:
Station Elevation Data     num=       10
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
       0 2313.31       10     2313       83     2312      121 2311.63      155 2311.06
     158 2310.93      158 2311.43      166 2311.53      175     2312      180  2312.1

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
       0    .016      155    .013      166    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0     180                 30      30      30            .1      .3

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN          RS: 8832

INPUT
Description:
Station Elevation Data     num=       13
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
       0 2313.04        9     2313       39     2312       61 2311.72       88 2311.43
     122 2311.18      125 2310.91      130 2310.56      133 2310.49      134 2310.47
     135 2310.49      144     2312  295.65 2312.75

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
       0    .016      122    .013      135    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  295.65                 30      30      44            .1      .3

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN          RS: 8802

INPUT
Description:
Station Elevation Data     num=       11
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
       0  2312.8       23     2312       61     2311       93  2310.9       93  2311.4
     100 2311.47      100 2310.79   101.5 2310.76      103 2310.79      121     2311
  263.08 2312.61

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
       0    .016       93    .013      103    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  263.08                 58      58      86            .1      .3

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN          RS: 8744

INPUT
```

```
Description:
Station Elevation Data    num=      11
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0 2312.24       10    2312       45 2311.1       47 2310.93       47 2311.43
      54 2311.53       63 2308.76       64 2308.74       65 2308.76      171    2311
  200.12 2312.25

Manning's n Values        num=       5
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
       0    .016       45    .013       54    .035       63    .013       65    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
             0  200.12                 76      76     112             .1       .3

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN        RS: 8668

INPUT
Description:
Station Elevation Data    num=      12
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0  2311.6       45 2310.37     46.5  2310.2     46.5  2310.7       47  2310.7
      53 2310.82       54 2310.82       63 2308.47       64 2308.44       65 2308.47
     102    2310   117.62 2311.73

Manning's n Values        num=       5
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
       0    .016       45    .013       53     .03       63    .013       65     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
             0  117.62                 52      52      52             .1       .3

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN        RS: 8616

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0 2311.09       45 2309.95     46.5 2309.78     46.5 2310.28       53 2310.38
      63 2308.24       64 2308.22       65 2308.24       76 2311.56     76.5 2311.56
    76.5 2311.06       78 2311.23      107 2312.27      107 2312.77      116  2313.2

Manning's n Values        num=       8
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
       0    .016       45    .013       53     .03       63    .013       65     .03
      76    .013       78    .016      107    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
             0      76                 30      30      31             .1       .3

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN        RS: 8586

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0 2310.81       45 2309.91     46.5 2309.74     46.5 2310.24       53 2310.34
      63 2308.12       64  2308.1       65 2308.12       79 2308.69       85 2310.69
    85.5 2310.69     85.5 2310.19      174 2311.38      176 2311.21      176 2311.71
     177 2311.71      186  2311.5

Manning's n Values        num=       8
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
       0    .016       45    .013       53     .03       63    .013       65     .03
      85    .013     85.5    .016      174    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
             0      85                 20      20      20             .1       .3

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN        RS: 8566

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0 2310.61       45 2309.71     46.5 2309.54     46.5 2310.04       54 2310.14
      59 2308.18       60 2307.96       61 2307.94       62 2307.96       82 2308.32
      85 2310.23     85.5 2310.23     85.5 2309.73      152 2311.11      154 2310.94
     154 2311.44    154.5 2311.44    168.5 2311.14

Manning's n Values        num=       9
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
       0    .016       45    .013       54     .03       60    .013       62     .03
      85    .013     85.5    .016      152    .013    154.5     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
             0      85                 33      33      33             .1       .3

CULVERT
```

RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 8565

INPUT
Description: RCB Culvert
Distance from Upstream XS = 1
Deck/Roadway Width = 24
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
56	2309.58	83	2309.59

Upstream Bridge Cross Section Data
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2310.61	45	2309.71	46.5	2309.54	46.5	2310.04	54	2310.14
59	2308.18	60	2307.96	61	2307.94	62	2307.96	82	2308.32
85	2310.23	85.5	2310.23	85.5	2309.73	152	2311.11	154	2310.94
154	2311.44	154.5	2311.44	168.5	2311.14				

Manning's n Values num= 9

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	45	.013	54	.03	60	.013	62	.03
85	.013	85.5	.016	152	.013	154.5	.03		

Bank Sta: Left Right Coeff Contr. Expan.
0 85 .1 .3

Downstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
59	2309.41	81	2309.41

Downstream Bridge Cross Section Data
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2310.31	45	2309.41	46	2309.02	52	2309.22	59	2309.5
81	2309.5	86	2309.4	116	2310.36	117.5	2310.19	117.5	2310.69
118	2310.69	133	2310.53						

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	45	.013	52	.016	59	.013	81	.016
116	.013	118	.03						

Bank Sta: Left Right Coeff Contr. Expan.
0 118 .1 .3

Upstream Embankment side slope = 3 horiz. to 1.0 vertical
Downstream Embankment side slope = 3 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Box	1	7

FHWA Chart # 58- Rectangular concrete
FHWA Scale # 2 - Side tapered; More favorable edges
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	1	32	.013	.013	0	.2	1

Number of Barrels = 3
Upstream Elevation = 2307.91
Centerline Stations

Sta.	Sta.	Sta.
63	71	79

Downstream Elevation = 2307.82
Centerline Stations

Sta.	Sta.	Sta.
63	71	79

CROSS SECTION

RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 8533

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2310.31	45	2309.41	46	2309.02	52	2309.22	59	2309.5
81	2309.5	86	2309.4	116	2310.36	117.5	2310.19	117.5	2310.69
118	2310.69	133	2310.53						

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	45	.013	52	.016	59	.013	81	.016
116	.013	118	.03						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	118	27	49	.1	.3

CULVERT

RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 8532

INPUT
Description: RCB Culvert

```
Distance from Upstream XS =       1
Deck/Roadway Width        =      24
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
      59 2309.58               81 2309.58

Upstream Bridge Cross Section Data
Station Elevation Data    num=      12
      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
        0 2310.31        45 2309.41        46 2309.02        52 2309.22        59  2309.5
       81  2309.5        86  2309.4       116 2310.36    117.5 2310.19    117.5 2310.69
      118 2310.69       133 2310.53

Manning's n Values        num=       7
      Sta   n Val       Sta   n Val       Sta   n Val       Sta   n Val       Sta   n Val
        0    .016        45    .013        52    .016        59    .013        81    .016
      116    .013       118    .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
             0     118             .1       .3

Downstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
      59 2309.41               85 2309.41

Downstream Bridge Cross Section Data
Station Elevation Data    num=      13
      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
        0 2310.06        45     2309        50 2308.94        50 2309.44        51 2309.44
     57.5 2309.54        60 2309.41        60 2307.74        61 2307.72        62 2307.74
       82 2307.74        86  2309.6       104 2310.05

Manning's n Values        num=       5
      Sta   n Val       Sta   n Val       Sta   n Val       Sta   n Val       Sta   n Val
        0    .016        45    .013      57.5    .03        60    .013        62    .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
             0     104             .1       .3

Upstream Embankment side slope                =       3 horiz. to 1.0 vertical
Downstream Embankment side slope              =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow   =     .95
Elevation at which weir flow begins           =
Energy head used in spillway design           =
Spillway height used in design                =
Weir crest shape                              = Broad Crested

Number of Culverts =  1

Culvert Name      Shape      Rise    Span
Culvert #1          Box         1       7
FHWA Chart # 58- Rectangular concrete
FHWA Scale # 1 - Side tapered; Less favorable edges
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  0      27     .013      .013              0                  .2                1
Number of Barrels =  3
Upstream   Elevation =  2307.82
Centerline Stations
    Sta.     Sta.     Sta.
      63       71       79
Downstream Elevation =  2307.74
Centerline Stations
    Sta.     Sta.     Sta.
      63       71       79

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN         RS: 8506

INPUT
Description:
Station Elevation Data    num=      13
      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
        0 2310.06        45     2309        50 2308.94        50 2309.44        51 2309.44
     57.5 2309.54        60 2309.41        60 2307.74        61 2307.72        62 2307.74
       82 2307.74        86  2309.6       104 2310.05

Manning's n Values        num=       5
      Sta   n Val       Sta   n Val       Sta   n Val       Sta   n Val       Sta   n Val
        0    .016        45    .013      57.5    .03        60    .013        62    .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0     104                30      30      45              .1       .3

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN         RS: 8476

INPUT
Description:
Station Elevation Data    num=      14
      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
        0  2309.8        45 2308.55      46.5 2308.38      46.5 2308.88        47 2308.88
       52     2309        53     2309        68 2307.64        69 2307.61        70 2307.64
       79     2308       100     2308       162     2309       295     2310

Manning's n Values        num=       6
      Sta   n Val       Sta   n Val       Sta   n Val       Sta   n Val       Sta   n Val
```

```
      0    .016       45    .013       52    .03        68    .013       70    .03
     79    .016

Bank Sta: Left   Right     Lengths: Left Channel   Right     Coeff Contr.    Expan.
            0     295                66      66      66            .1        .3

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN          RS: 8410

INPUT
Description:
Station Elevation Data     num=       6
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0  2309.6       50  2308.5       74    2308       80  2307.7       95    2308
     285    2310

Manning's n Values         num=       2
     Sta   n Val      Sta   n Val
       0    .016       50     .03

Bank Sta: Left   Right     Lengths: Left Channel   Right     Coeff Contr.    Expan.
            0     285                133     133     133            .1        .3
Blocked Obstructions       num=       1
   Sta L   Sta R    Elev
     125     217    2312

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN          RS: 8277

INPUT
Description:
Station Elevation Data     num=       7
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0  2308.2       13    2308       50  2307.4       79  2306.5      190    2308
     238    2308      262    2310

Manning's n Values         num=       2
     Sta   n Val      Sta   n Val
       0    .016       50     .03

Bank Sta: Left   Right     Lengths: Left Channel   Right     Coeff Contr.    Expan.
            0     262                122     122     122            .1        .3
Blocked Obstructions       num=       1
   Sta L   Sta R    Elev
     127     213    2311

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN          RS: 8155

INPUT
Description:
Station Elevation Data     num=       9
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0  2306.9       48  2306.2       72    2306       83  2305.4      106    2306
     149    2308      187    2308      239    2308      260    2310

Manning's n Values         num=       2
     Sta   n Val      Sta   n Val
       0    .016       48     .03

Bank Sta: Left   Right     Lengths: Left Channel   Right     Coeff Contr.    Expan.
            0     260                216     216     216            .1        .3
Blocked Obstructions       num=       1
   Sta L   Sta R    Elev
     157     179    2311

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN          RS: 7939

INPUT
Description:
Station Elevation Data     num=       7
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0  2304.8       45  2304.1       76    2304       93  2302.2      114    2304
     146    2306      255  2306.7

Manning's n Values         num=       2
     Sta   n Val      Sta   n Val
       0    .016       45     .03

Bank Sta: Left   Right     Lengths: Left Channel   Right     Coeff Contr.    Expan.
            0     255                361     361     361            .1        .3
Blocked Obstructions       num=       1
   Sta L   Sta R    Elev
     148     236    2308

CROSS SECTION


RIVER: RANCHO ROAD
REACH: 95 TO GOWAN          RS: 7578

INPUT
Description:
```

Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2301.4	49	2300.8	91	2300	99	2299.9	105	2300
138	2302	350	2304						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	49	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	350	100	100	100	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
146	287	2304

CROSS SECTION

RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 7478

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2300.6	38	2300	45	2299.9	48	2300	57	2300
95	2298.9	116	2300	474	2302				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	38	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	474	105	105	105	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
138	370	2303

CROSS SECTION

RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 7373

INPUT
Description:
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2299.7	45	2298.8	91	2298	99	2298	143	2300
186	2300.3								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	45	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	186	93	93	93	.1	.3

CROSS SECTION

RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 7280

INPUT
Description:
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2298.7	44	2298	54	2297.9	62	2298	123	2298
159	2300								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	54	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	159	7279	7279	7279	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
160	220	2308

SUMMARY OF MANNING'S N VALUES

River:RANCHO ROAD

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7	n8	n9
95 TO GOWAN	10075	.016	.03							
95 TO GOWAN	9918	.016	.03							
95 TO GOWAN	9796	.016	.03							
95 TO GOWAN	9566	.016	.03							
95 TO GOWAN	9512	.016	.03							
95 TO GOWAN	9472	.016	.03							
95 TO GOWAN	9376	.016	.03							
95 TO GOWAN	9324	.016	.03							
95 TO GOWAN	9205	.016	.03							
95 TO GOWAN	9114	.016	.03							
95 TO GOWAN	9060	.016	.03							
95 TO GOWAN	8950	.016	.03							
95 TO GOWAN	8862	.016	.013	.035						
95 TO GOWAN	8832	.016	.013	.035						
95 TO GOWAN	8802	.016	.013	.035						
95 TO GOWAN	8744	.016	.013	.035	.013	.035				
95 TO GOWAN	8668	.016	.013	.03	.013	.03				

95 TO GOWAN	8616	.016	.013	.03	.013	.03	.013	.016	.013
95 TO GOWAN	8586	.016	.013	.03	.013	.03	.013	.016	.013
95 TO GOWAN	8566	.016	.013	.03	.013	.03	.013	.016	.013	.03
95 TO GOWAN	8565	Culvert							
95 TO GOWAN	8533	.016	.013	.016	.013	.016	.013	.03	
95 TO GOWAN	8532	Culvert							
95 TO GOWAN	8506	.016	.013	.03	.013	.03			
95 TO GOWAN	8476	.016	.013	.03	.013	.03	.016		
95 TO GOWAN	8410	.016	.03						
95 TO GOWAN	8277	.016	.03						
95 TO GOWAN	8155	.016	.03						
95 TO GOWAN	7939	.016	.03						
95 TO GOWAN	7578	.016	.03						
95 TO GOWAN	7478	.016	.03						
95 TO GOWAN	7373	.016	.03						
95 TO GOWAN	7280	.016	.03						

SUMMARY OF REACH LENGTHS

River: RANCHO ROAD

Reach	River Sta.	Left	Channel	Right
95 TO GOWAN	10075	164	157	148
95 TO GOWAN	9918	78	122	169
95 TO GOWAN	9796	175	230	355
95 TO GOWAN	9566	54	54	54
95 TO GOWAN	9512	40	40	40
95 TO GOWAN	9472	148	148	148
95 TO GOWAN	9376	52	52	52
95 TO GOWAN	9324	119	119	119
95 TO GOWAN	9205	91	91	91
95 TO GOWAN	9114	54	54	54
95 TO GOWAN	9060	110	110	110
95 TO GOWAN	8950	88	88	88
95 TO GOWAN	8862	30	30	30
95 TO GOWAN	8832	30	30	44
95 TO GOWAN	8802	58	58	86
95 TO GOWAN	8744	76	76	112
95 TO GOWAN	8668	52	52	52
95 TO GOWAN	8616	30	30	31
95 TO GOWAN	8586	20	20	20
95 TO GOWAN	8566	33	33	33
95 TO GOWAN	8565	Culvert		
95 TO GOWAN	8533	27	27	49
95 TO GOWAN	8532	Culvert		
95 TO GOWAN	8506	30	30	45
95 TO GOWAN	8476	66	66	66
95 TO GOWAN	8410	133	133	133
95 TO GOWAN	8277	122	122	122
95 TO GOWAN	8155	216	216	216
95 TO GOWAN	7939	361	361	361
95 TO GOWAN	7578	100	100	100
95 TO GOWAN	7478	105	105	105
95 TO GOWAN	7373	93	93	93
95 TO GOWAN	7280	7279	7279	7279

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: RANCHO ROAD

Reach	River Sta.	Contr.	Expan.
95 TO GOWAN	10075	.1	.3
95 TO GOWAN	9918	.1	.3
95 TO GOWAN	9796	.1	.3
95 TO GOWAN	9566	.1	.3
95 TO GOWAN	9512	.1	.3
95 TO GOWAN	9472	.1	.3
95 TO GOWAN	9376	.1	.3
95 TO GOWAN	9324	.1	.3
95 TO GOWAN	9205	.1	.3
95 TO GOWAN	9114	.1	.3
95 TO GOWAN	9060	.1	.3
95 TO GOWAN	8950	.1	.3
95 TO GOWAN	8862	.1	.3
95 TO GOWAN	8832	.1	.3
95 TO GOWAN	8802	.1	.3
95 TO GOWAN	8744	.1	.3
95 TO GOWAN	8668	.1	.3
95 TO GOWAN	8616	.1	.3
95 TO GOWAN	8586	.1	.3
95 TO GOWAN	8566	.1	.3
95 TO GOWAN	8565	Culvert	
95 TO GOWAN	8533	.1	.3
95 TO GOWAN	8532	Culvert	
95 TO GOWAN	8506	.1	.3
95 TO GOWAN	8476	.1	.3
95 TO GOWAN	8410	.1	.3
95 TO GOWAN	8277	.1	.3
95 TO GOWAN	8155	.1	.3
95 TO GOWAN	7939	.1	.3
95 TO GOWAN	7578	.1	.3
95 TO GOWAN	7478	.1	.3
95 TO GOWAN	7373	.1	.3
95 TO GOWAN	7280	.1	.3

Errors Warnings and Notes for Plan : Plan 1

Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 10075 Profile: PF#1
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 9918 Profile: PF#1
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 9566 Profile: PF#1
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 9512 Profile: PF#1
Warning:	Divided flow computed for this cross-section.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 9472 Profile: PF#1
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 9376 Profile: PF#1
Warning:	Divided flow computed for this cross-section.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 9324 Profile: PF#1
Warning:	Divided flow computed for this cross-section.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 9205 Profile: PF#1
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 9114 Profile: PF#1
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 9060 Profile: PF#1
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water
	surface was used.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 8950 Profile: PF#1
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7

Errors Warnings and Notes for Plan : Plan 1 (Continued)

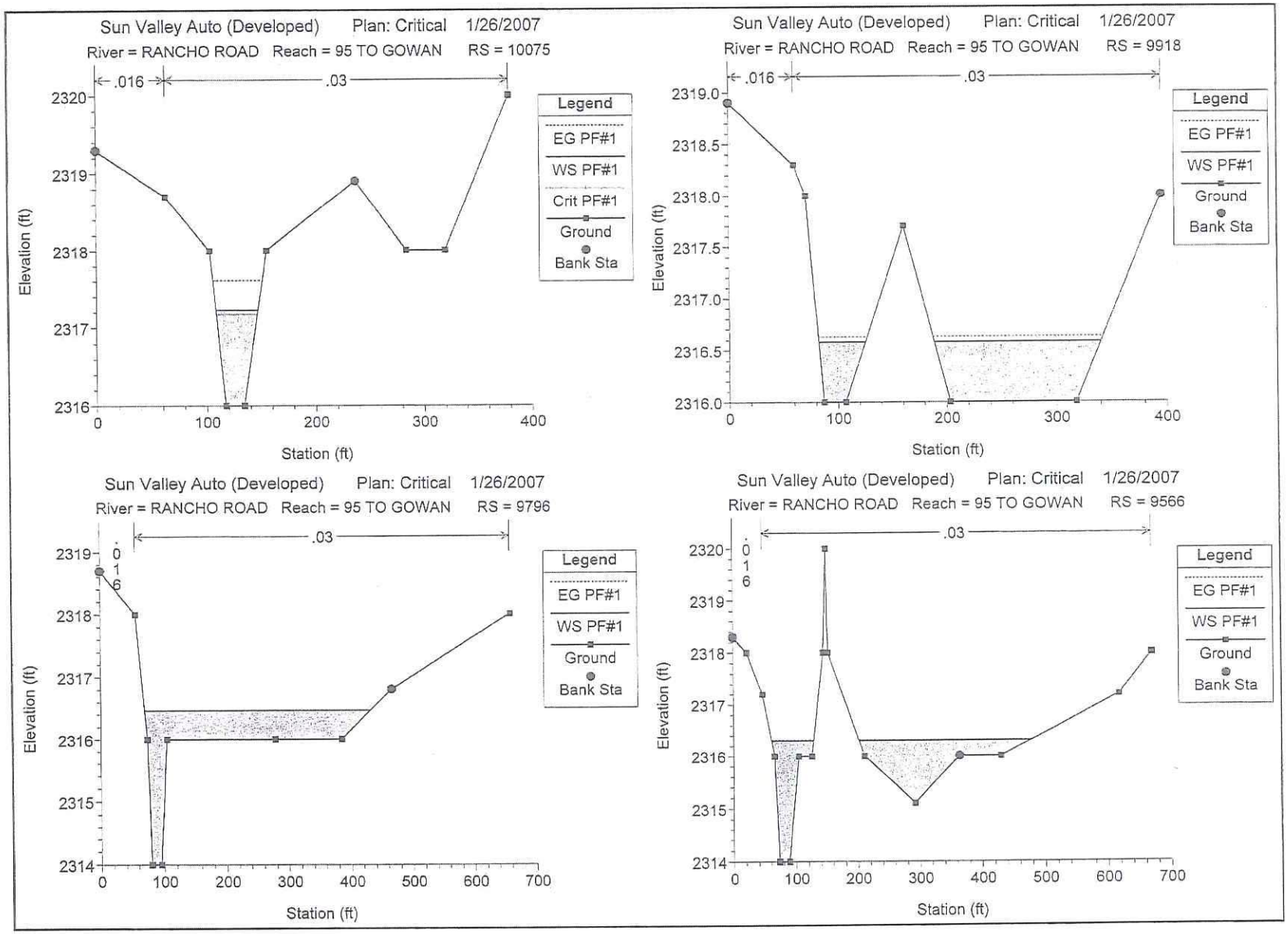
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth,
	the calculated water surface came back below critical depth. This indicates that there is not a valid
	subcritical answer. The program defaulted to critical depth.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 8862 Profile: PF#1
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Program found supercritical flow starting at this cross section.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 8802 Profile: PF#1
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 8744 Profile: PF#1
Warning:	Divided flow computed for this cross-section.
Note:	Manning's n values were composited to a single value in the main channel.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 8668 Profile: PF#1
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Manning's n values were composited to a single value in the main channel.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 8616 Profile: PF#1
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	selected the water surface that had the least amount of error between computed and assumed
	values.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth,
	the calculated water surface came back below critical depth. This indicates that there is not a valid
	subcritical answer. The program defaulted to critical depth.
Note:	Manning's n values were composited to a single value in the main channel.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 8586 Profile: PF#1
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Manning's n values were composited to a single value in the main channel.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 8533 Profile: PF#1
Warning:	During subcritical analysis, the water surface upstream of culvert went to critical depth.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 8532 Profile: PF#1
Warning:	During subcritical analysis, the water surface upstream of culvert went to critical depth.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 8532 Profile: PF#1 Culv: Culvert #1

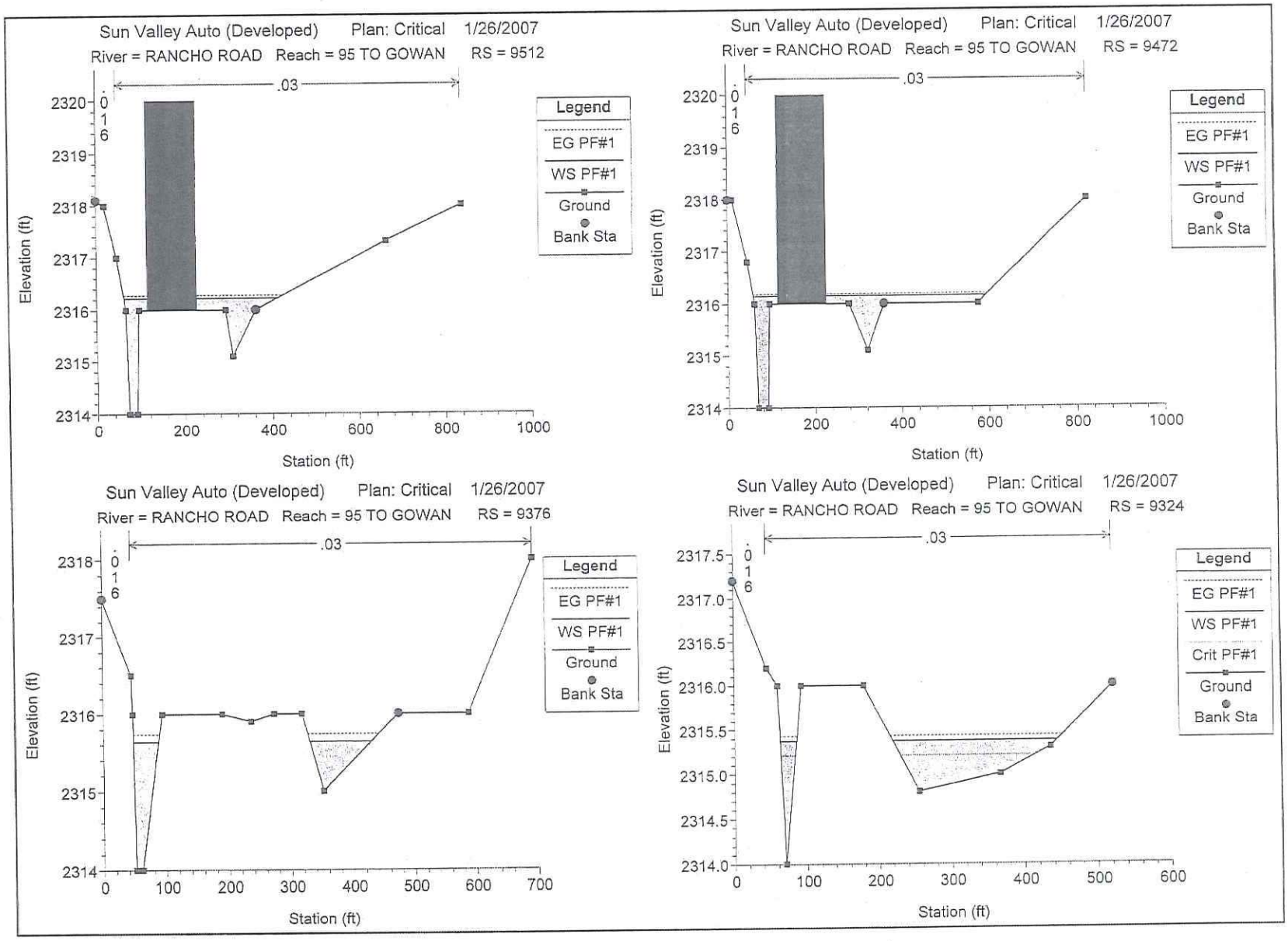
Errors Warnings and Notes for Plan : Plan 1 (Continued)

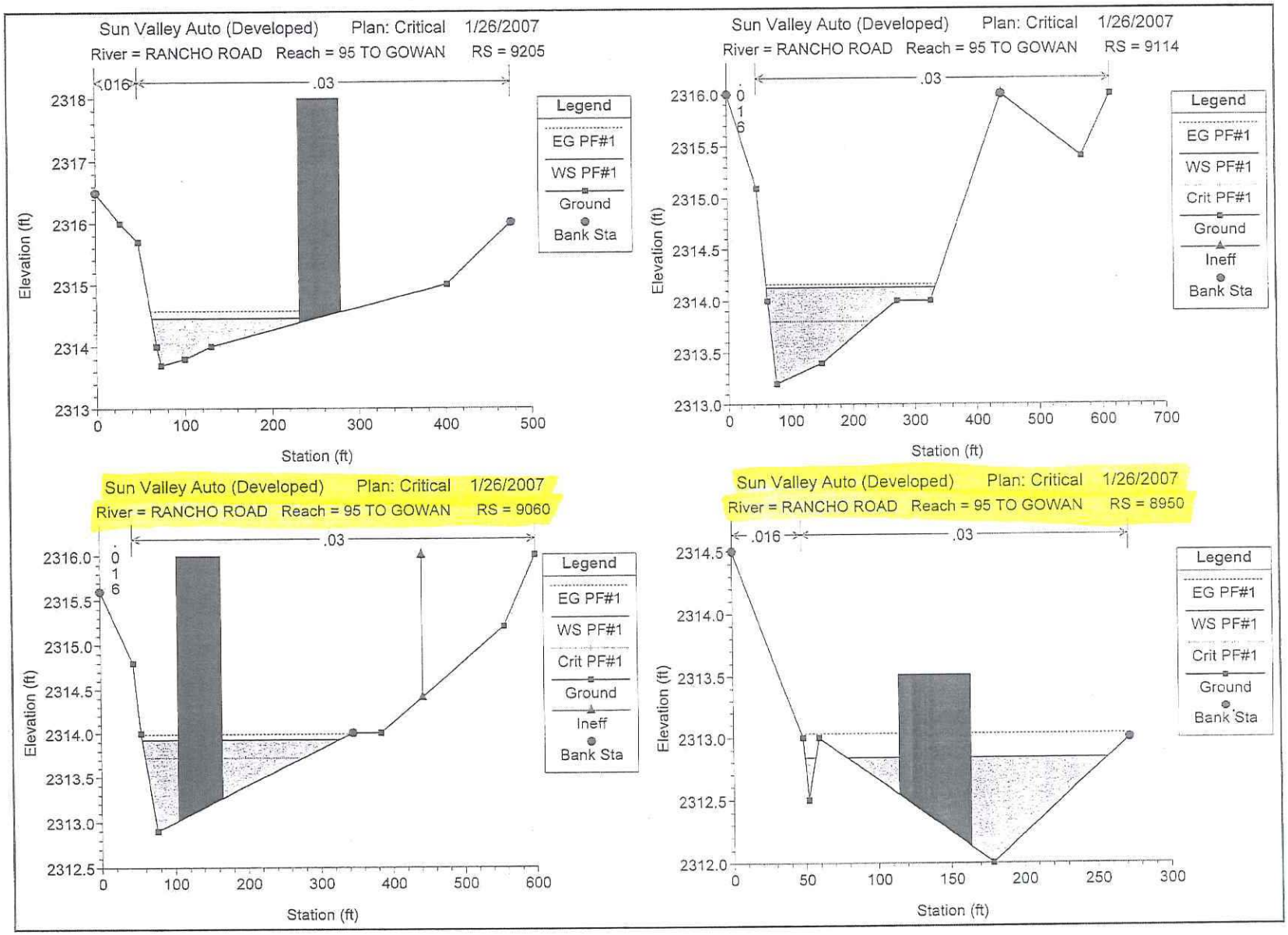
Note:	Culvert critical depth exceeds the height of the culvert.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 8506 Profile: PF#1
Warning:	The energy equation could not be balanced within the specified number of iterations. The program
	selected the water surface that had the least amount of error between computed and assumed
	values.
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth,
	the calculated water surface came back below critical depth. This indicates that there is not a valid
	subcritical answer. The program defaulted to critical depth.
Note:	Manning's n values were composited to a single value in the main channel.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 8476 Profile: PF#1
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 8410 Profile: PF#1
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 8155 Profile: PF#1
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 7939 Profile: PF#1
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 7578 Profile: PF#1
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7
	or greater than 1.4. This may indicate the need for additional cross sections.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 7478 Profile: PF#1
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
	This may indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth,
	the calculated water surface came back below critical depth. This indicates that there is not a valid
	subcritical answer. The program defaulted to critical depth.
Location:	River: RANCHO ROAD Reach: 95 TO GOWAN RS: 7373 Profile: PF#1
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7

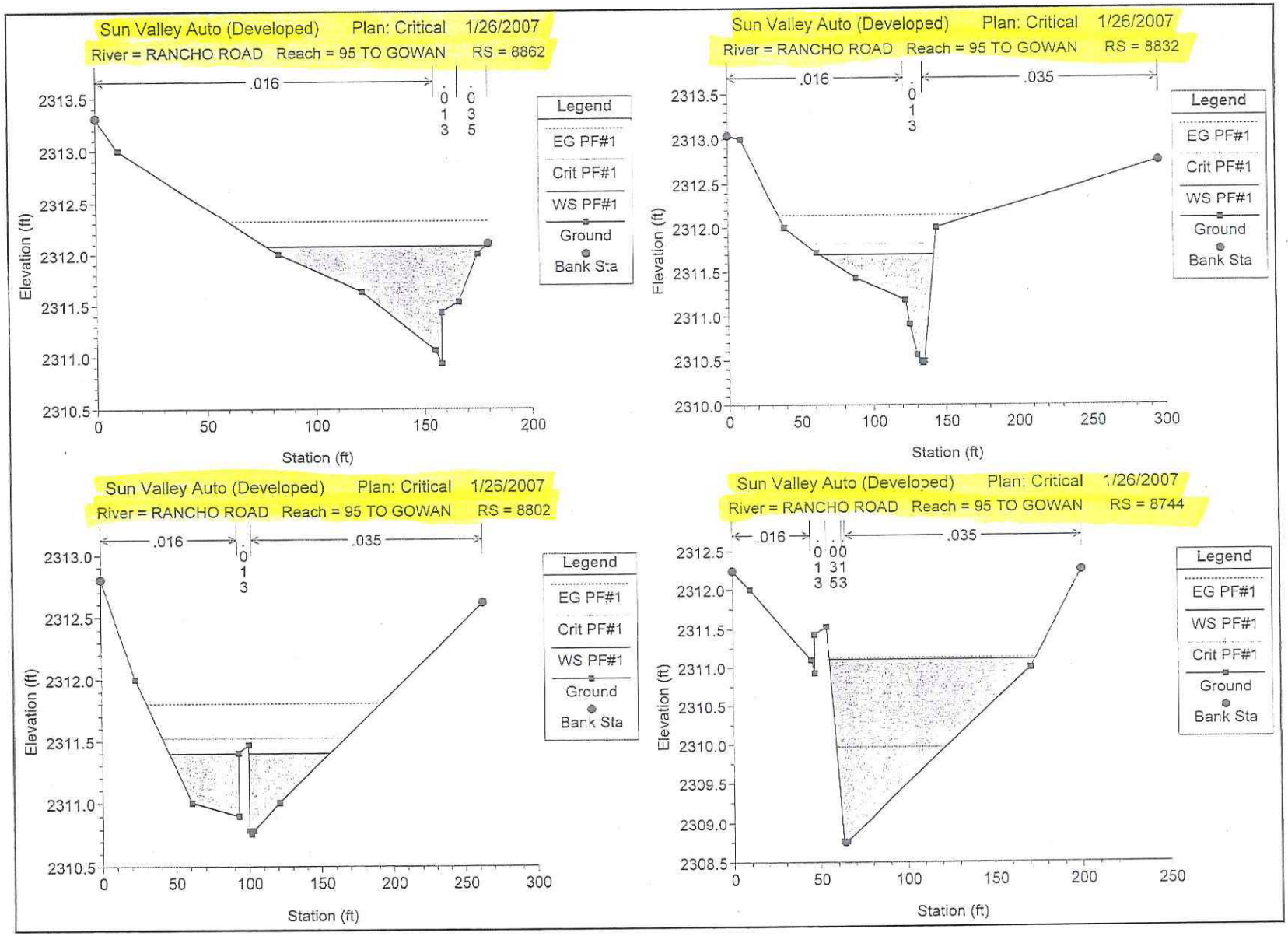
Errors Warnings and Notes for Plan : Plan 1 (Continued)

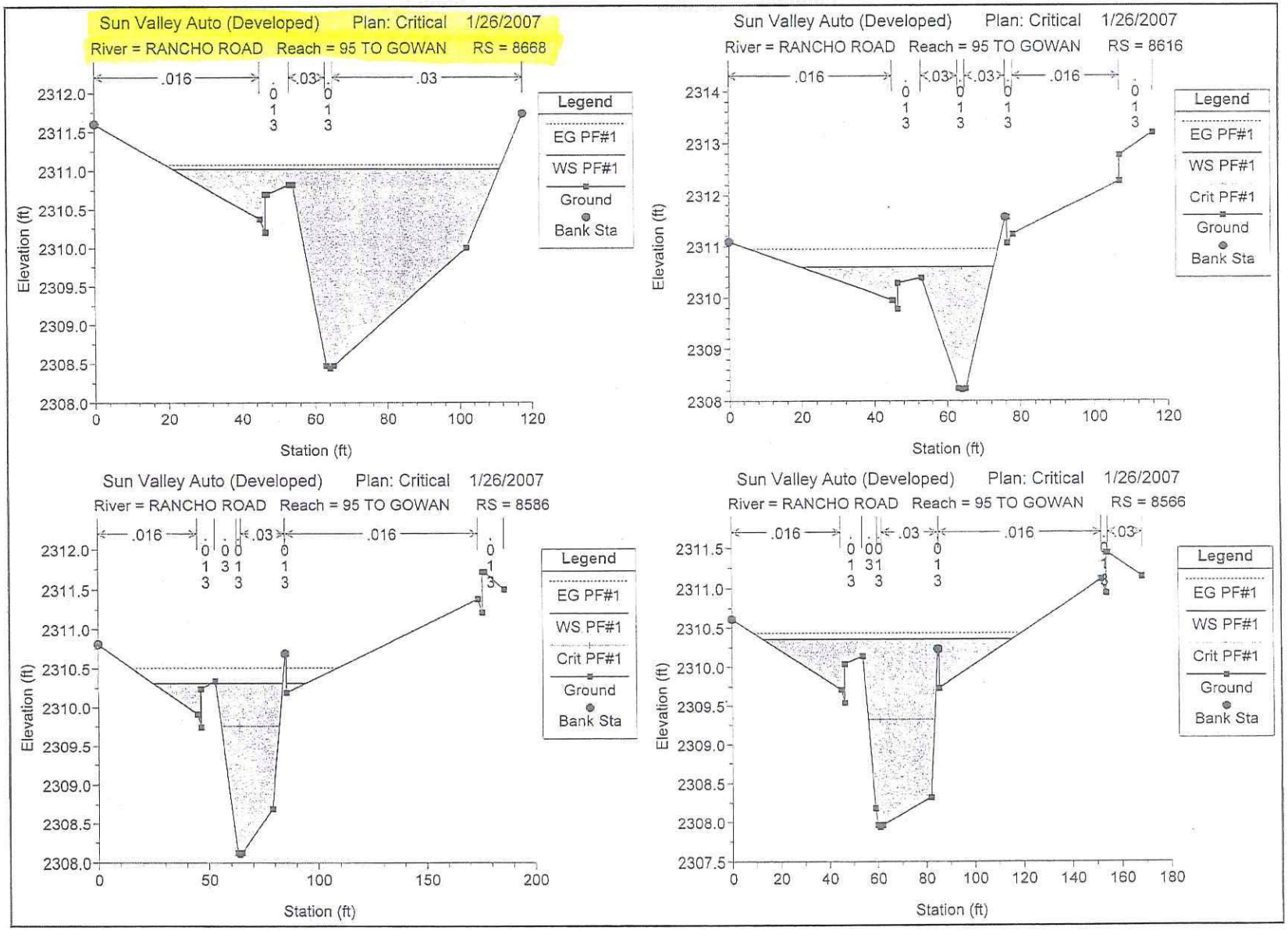
	or greater than 1.4. This may indicate the need for additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.

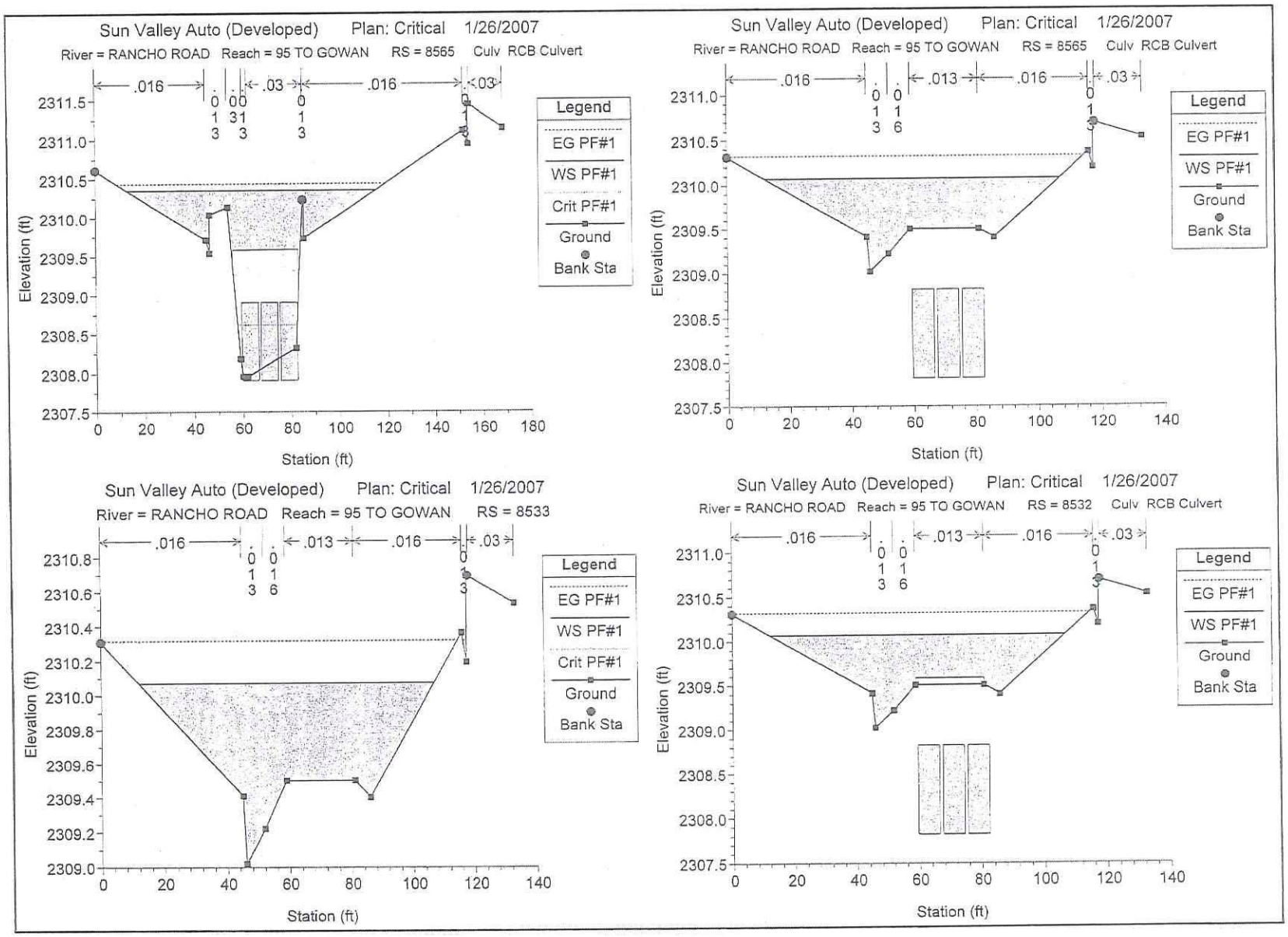

Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 10075
.016
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 9918
.016
.03
Legend
EG PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 9796
.016
.03
Legend
EG PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 9566
.016
.03
Legend
EG PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)

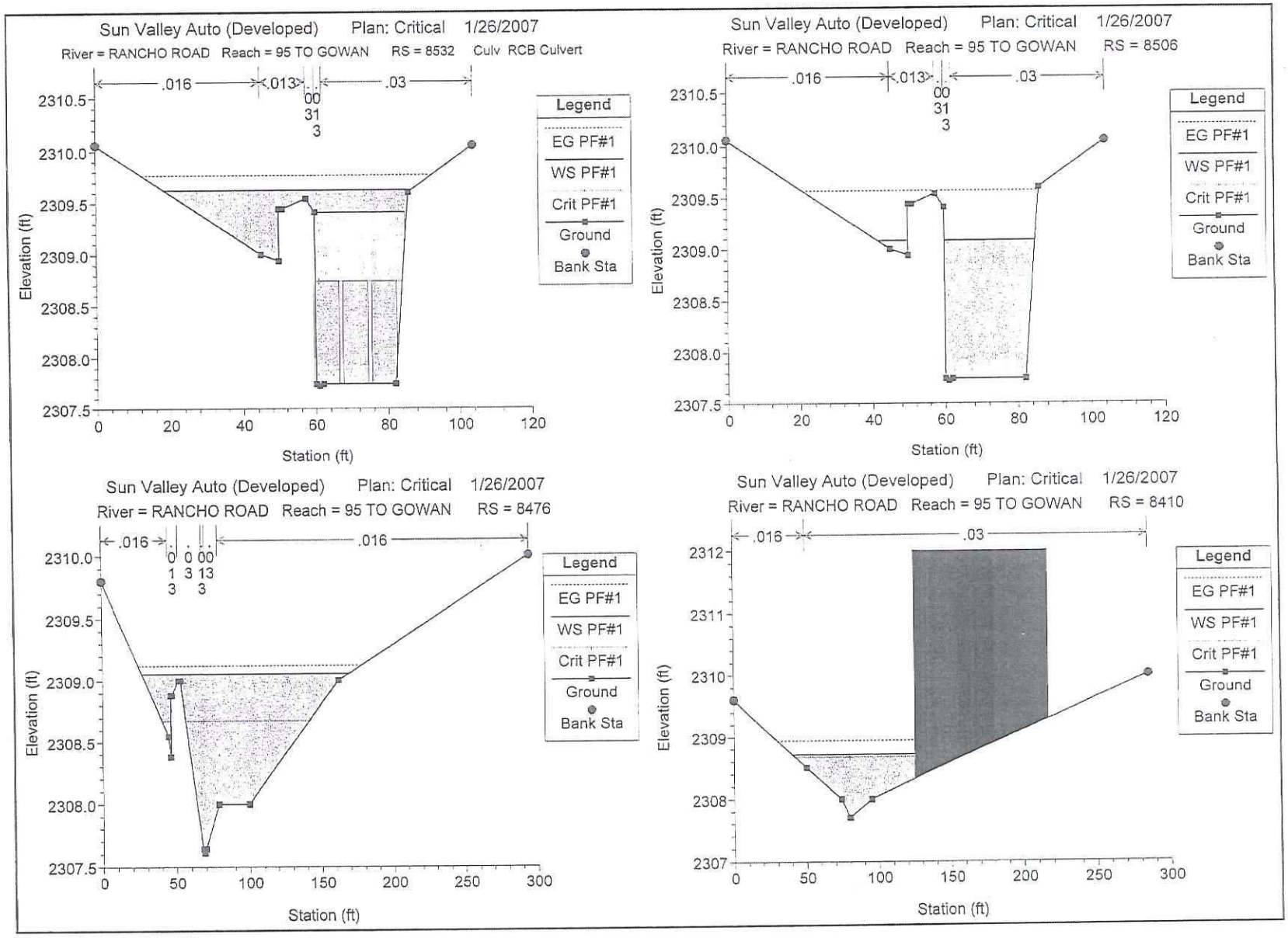

Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 9512
.03
.016
Legend
EG PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 9472
.03
.016
Legend
EG PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 9376
.03
.016
Legend
EG PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 9324
.03
.016
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)

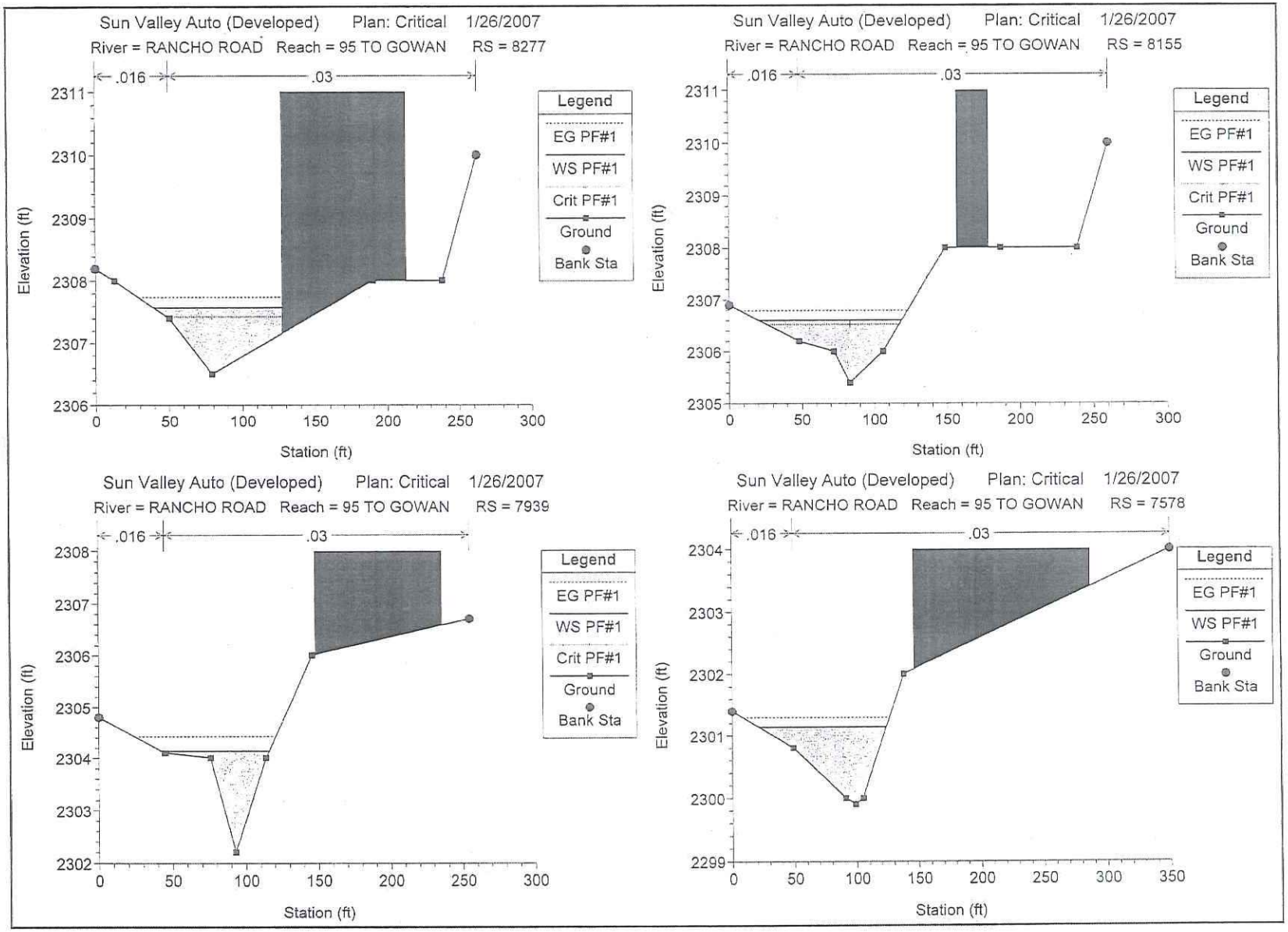

Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 9205
.016
.03
Legend
EG PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 9114
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 9060
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8950
.016
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)

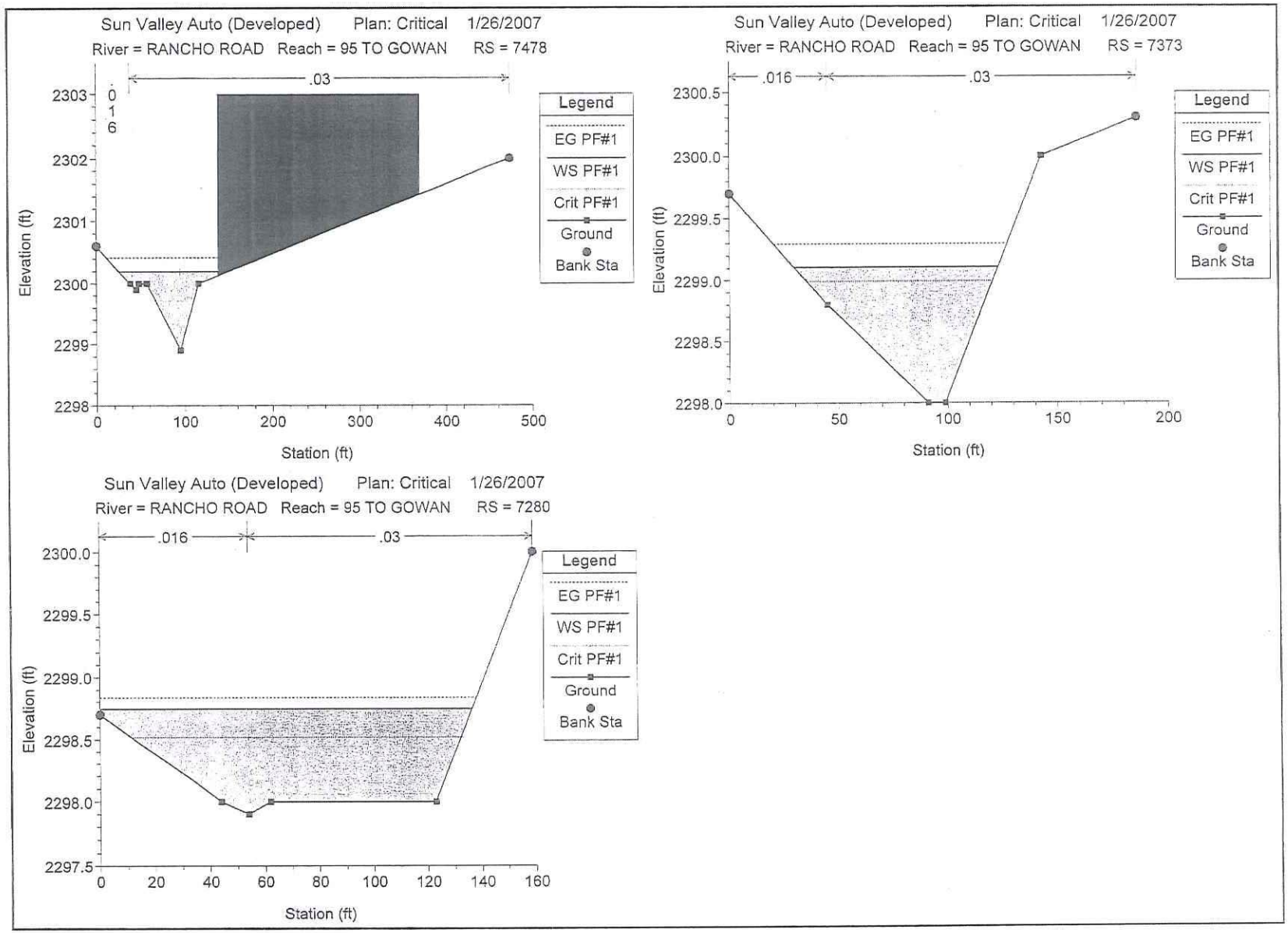

Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8862
.016
.013
.035
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8832
.016
.013
.035
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8802
.016
.013
.035
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8744
.016
.013
.031
.053
.035
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8668
.016
.03
.03
Legend
EG PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8616
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8586
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8566
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8565 Culv RCB Culvert
.016
.03
.016
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8565 Culv RCB Culvert
.016
.013
.016
.03
Legend
EG PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8533
.016
.013
.016
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8532 Culv RCB Culvert
.016
.013
.016
.03
Legend
EG PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8532 Culv RCB Culvert
.016
.013
.03
00
31
3
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8506
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8476
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8410


Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8277
.016
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8155
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 7939
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 7578


Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 7478
.03
0
1
6
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 7373
.016
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Sun Valley Auto (Developed) Plan: Critical 1/26/2007
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 7280
.016
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)

APPENDIX I

Reference Material

Technical Drainage Study for Draft House Barn & Casino
by Southwest Engineering (DS2975)

Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: December 16, 2002
TO: **Land Development Services** Department of Public Works			FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: **Draft House Barn & Casino**		**COPIES TO:** Southwest Engineering
Cross Streets:	Rancho Drive north of Craig Road		Sherman Architecture
File Number:	F:\Depot\DSMemos\DS2975D.doc		Bart Anderson, P.E., DEVCO
Parcel Number:	138-02-202-014, 013, 012		
Zoning Action:	SD-0045-00(1)		
FEMA Flood Zone	YES X	NO	
Proposed Storm Drain	YES	NO X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID G.R. No.
1st Submittal	09/06/01	09/18/01	Not Accepted	$250.00	51541: $250.0
2nd Submittal	09/18/02	09/23/02	Pending concurrences	$250.00	91853: $250.0
CCRFCD	10/29& 12/2/2002	12/3/2002	Concurrence	N/C	N/A
			TOTAL FEES (LDDRS):	**$500.00**	**Paid in full**

REMARKS:

The Drainage Study for the subject project has been reviewed and:

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	must have Clark County Regional Flood Control District concurrence and the followings:

NOTE: This site is located within a **FEMA Zone AE** and a required Clark County Regional Flood Control District (CCRFCD) concurrence has already been received. Since the proposed addition to the existing building, located at 4543 N. Rancho Drive, is clearly shown outside Zone AE (per LOMR annotated FIRM) and a FEMA Elevation Certificate shall therefore not be required.

Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Amendment and accepted by the CLV Flood Control Section. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the City of Las Vegas reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

END OF REMARKS
Wld/jwb/ays

T/R/S: T20S/R60E/S02
AREA L-02

010318
TDS
Adden. 2

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

Gale Wm. Fraser, II, P.E.
General Manager/Chief Engineer

BOARD OF DIRECTORS

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October 28, 2002

Mr. Randy Fultz, P.E.
City of Las Vegas Public Works
731 S. Fourth St
Las Vegas, NV 89101

DISTRICT CONCURRENCE: DRAFT HOUSE BARN & CASINO (DS2975)

Dear Mr. Fultz:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated September 4, 2002, and Addendum No. 2 dated August 27, 2002, for the above-mentioned project as submitted by Southwest Engineering, Inc. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Public Works dated September 23, 2002.

District concurs with acceptance of this Technical Drainage Study by City of Las Vegas Public Works.

District's review of this project was limited to issues of Regional Flood Control Significance as defined in *Uniform Regulations for the Control of Drainage*. As noted in study, the site resides in a Special Flood Hazard Area (SFHA) designated as "Zone AE" per the effective Flood Insurance Rate Map (FIRM). Therefore, the consultant should be advised that this acceptance does not serve to amend the FIRM or remove the SFHA designation.

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, information submitted by Southwest Engineering, Inc. may be superseded. Compliance with regulatory elements and design standards specified in *Uniform Regulations for the Control of Drainage* does not imply a guarantee that properties will be free from flooding of flood damage. The District, its officials, or employees assume no liability for information, data, or conclusions presented by consulting engineers. We, therefore, make no warranties, either expressed or implied, in conducting this review.

GALE WM. FRASER, II, P.E.
General Manager/Chief Engineer

BY: A R T
Andrew R. Trelease, P.E.
Senior Civil Engineer

ART:css

c: Mark E. Jones, P.E., Southwest Engineering, Inc.

File: 20-60-2.SOU

600 S. Grand Central Parkway, Suite 300 • Las Vegas, Nevada 89106-4511
(702) 455-3139 • FAX: (702) 455-3870
Website: http://www.ccrfcd.org

Letter of Map Amendment (LOMA)

SEP 10 2001

Case No.: 01-09-1032A LOMA

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP AMENDMENT
DETERMINATION DOCUMENT (REMOVAL)

COMMUNITY AND MAP PANEL INFORMATION		LEGAL PROPERTY DESCRIPTION
COMMUNITY	CITY OF LAS VEGAS, CLARK COUNTY, NEVADA	A portion of Section 2, Township 20 South, Range 60 East, Mount Diablo Base and Meridian, as described in the Grant, Bargain, Sale Deed recorded as Instrument No. 53 in Book 910405, in the Office of the Recorder, Clark County, Nevada The legal description of the portion mentioned above is as follows: COMMENCING at the center quarter corner of Section 2; thence N 00°04'06" E, 359.78 feet; thence N 36°26'22" W, 745.25 feet along the westerly right of way line of Rancho Drive; thence S 53°33'38" W, 61.00 feet to the POINT OF BEGINNING; thence S 53°33'38" W, 89.86 feet; thence N 36°26'22" W, 60.31 feet; thence N 53°33'38" E, 5.66 feet; thence N 36°26'22" W, 43.50 feet; thence S 53°33'38" W, 7.92 feet; thence N 36°26'22" W, 66.62 feet; thence S 53°33'38" W, 8.62 feet; thence
	COMMUNITY NO: 325276	
MAP PANEL AFFECTED	NUMBER: 32003C2155D	
	NAME: CLARK COUNTY, NEVADA AND INCORPORATED AREAS	
	DATE: 08/16/1995	
FLOODING SOURCE: RANCHO DRIVE		APPROXIMATE LATITUDE & LONGITUDE: 36.2420, -115.2353 SOURCE OF LAT & LONG: PRECISION MAPPING STREETS 4.0 DATUM: NAD 83

DETERMINATION

LOT	BLOCK/ SECTION	SUBDIVISION	STREET ADDRESS	OUTCOME WHAT IS REMOVED FROM THE SFHA	NEW FLOOD ZONE	1% ANNUAL CHANCE FLOOD ELEVATION (NGVD)	LOWEST ADJACENT GRADE ELEVATION (NGVD)	LOWEST LOT ELEVATION (NGVD 29)
			4543 North Rancho Drive	Portion of Property	X (unshaded)	2304.8 to 2306.6 feet		2304.8 to 2306.6 feet

Special Flood Hazard Area (SFHA) – The SFHA is an area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood).

ADDITIONAL CONSIDERATIONS (If the appropriate box is checked, please refer to the appropriate section on Attachment 1)

☒ 1. PROPERTY DESCRIPTION (CONTINUED)
☒ 2. STUDY UNDERWAY
☒ 3. PORTIONS REMAIN IN THE SFHA
☒ 4. REVISED BY LETTER OF MAP REVISION

This document provides the Federal Emergency Management Agency's determination regarding a request for a Letter of Map Amendment for the property described above. Using the information submitted and the effective National Flood Insurance Program (NFIP) map, we determined the [structure(s) on the] property is/are not located in the SFHA, an area inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood). This document amends the effective NFIP map to remove the [structure / property] from the SFHA; therefore, the federal mandatory flood insurance requirement does not apply. However, the lender has the option to continue the flood insurance requirement to protect its financial risk on the loan. A Preferred Risk Policy (PRP) is available for buildings located outside the SFHA. Information about the PRP and how one can apply is enclosed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (FEMA MAP) or by letter addressed to the FEMA LOMA DEPOT, 3601 Eisenhower Avenue, Suite 600, Alexandria, VA 22304-6439.

Matthew B. Miller

Matthew B. Miller, P.E., Chief
Hazards Study Branch
Federal Insurance and Mitigation Administration

SEP 10 2001 | Case No.: 01-09-1032A | LOMA

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP AMENDMENT
DETERMINATION DOCUMENT (REMOVAL)
ATTACHMENT 1 (ADDITIONAL CONSIDERATIONS)

1. PROPERTY DESCRIPTION (CONTINUED)

N 36°26'22" W, 17.50 feet; thence S 53°33'38" W, 9.58 feet; thence N 36°26'22" W, 62.75 feet; thence N 53°33'38" E, 92.62 feet; thence S 36°26'22" E, 32.37 feet; thence N 53°33'38" E, 11.92 feet; thence S 36°26'22" E, 20.00 feet; thence 26.32 feet northeasterly along a curve to the right having a radius of 7.50 feet; thence S 36°26'22" E, 26.10 feet; thence S 53°33'38" W, 13.37 feet, thence S 36°26'22" E, 64.25 feet; thence N 53°33'38" E, 10.74 feet; thence S 36°26'22" E, 47.26 feet; thence N 53°33'38" E, 1.92 feet; thence S 36°26'22" E, 47.47 feet to POINT OF BEGINNING

2. STUDY UNDERWAY

This determination is based on the flood data presently available. However, the Federal Emergency Management Agency is currently revising the National Flood Insurance Program (NFIP) map for the community. New flood data could be generated that may affect this property. When the new NFIP map is issued it will supersede this determination. The Federal requirement for the purchase of flood insurance will then be based on the new effective NFIP map.

3. PORTIONS OF THE PROPERTY REMAIN IN THE SFHA

The Determination Document has removed the subject of the determination from the Special Flood Hazard Area (SFHA). However, portions of the property may remain in the SFHA. Therefore, any future construction or substantial improvement on the property remains subject to Federal, State, and local regulations for floodplain management.

4. REVISED BY LETTER OF MAP REVISION

The effective National Flood Insurance Program map for the subject property has since been revised by a Letter of Map Revision (LOMR) dated 11/02/1999. The 11/02/1999 LOMR has been used in making the determination/comment for the subject property.

This attachment provides additional information regarding this request. If you have any questions about this attachment, please contact the Federal Emergency Management Agency Map Assistance Center toll free at 1-877-336-2627 (FEMA MAP) or by letter addressed to the FEMA LOMA DEPOT, 3601 Eisenhower Avenue, Suite 600, Alexandria, VA 22304-6439.

Matthew B. Miller

Matthew B. Miller, P.E., Chief
Hazards Study Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

SEP 10 2001

Mr. Grant Tokumi
Southwest Engineering
3610 North Rancho Drive
Las Vegas, NV 89130

Case No.: 01-09-1032A
Community: City of Las Vegas, NV
Community No.: 325276

Dear Mr. Tokumi:

This is in reference to a request that the Federal Emergency Management Agency (FEMA) determine if the property described in the enclosed document is located within an identified Special Flood Hazard Area, the area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood), on the effective National Flood Insurance Program (NFIP) map. Using the information submitted and the effective NFIP map, our determination is shown on the attached Letter of Map Amendment (LOMA) Determination Document. This determination document provides additional information regarding the effective NFIP map, the legal description of the property, and our determination.

Additional documents are enclosed which provide information regarding the subject property and LOMAs. Please see the List of Enclosures below to determine which documents are enclosed. If you have any questions about this letter or any of the enclosures, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (FEMA MAP) or by letter addressed to the FEMA LOMA DEPOT, 3601 Eisenhower Avenue, Suite 600, Alexandria, VA 22304-6439.

Sincerely,

Matthew B. Miller

Matthew B. Miller, P.E., Chief
Hazards Study Branch
Federal Insurance and Mitigation Administration

List of Enclosures
- LOMA Determination Letter; Pages 1 & 2

cc: Community Map Repository
State NFIP Coordinator
Regional Director R9-MT

Mr. Tom Wiesner
Mr. Kevin Eubanks

DATE: 9/18/01
COPIES: Grant
Ron

Federal Emergency Management Agency
Washington, D.C. 20472

ADDITIONAL INFORMATION REGARDING LETTERS OF MAP AMENDMENT

When making determinations on requests for Letters of Map Amendment (LOMAs), the Federal Emergency Management Agency (FEMA) bases its determination on the flood hazard information available at the time of the determination. Requesters should be aware that flood conditions may change or new information may be generated that would supersede FEMA's determination. In such cases, the community will be informed by letter.

Requesters also should be aware that removal of a property (parcel of land or structure) from the Special Flood Hazard Area (SFHA) means FEMA has determined the property is not subject to inundation by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood). This does not mean the property is not subject to other flood hazards. The property could be inundated by a flood with a magnitude greater than the base flood or by localized flooding not shown on the effective National Flood Insurance Program (NFIP) map.

The effect of a LOMA is it removes the Federal requirement for the lender to require flood insurance coverage for the property described. The LOMA *is not* a waiver of the condition that the property owner maintain flood insurance coverage for the property. *Only* the lender can waive the flood insurance purchase requirement because the lender imposed the requirement. ***The property owner must request and receive a written waiver from the lender before canceling the policy.*** The lender may determine, on its own as a business decision, that it wishes to continue the flood insurance requirement to protect its financial risk on the loan.

The LOMA provides FEMA's comment on the mandatory flood insurance requirements of the NFIP as they apply to a particular property. A LOMA is not a building permit, nor should it be construed as such. Any development, new construction, or substantial improvement of a property impacted by a LOMA must comply with all applicable State and local criteria and other Federal criteria.

If a lender releases a property owner from the flood insurance requirement, and the property owner decides to cancel the policy and seek a refund, the NFIP will refund the premium paid for the current policy year, provided that no claim is pending or has been paid on the policy during the current policy year. The property owner must provide a written waiver of the insurance requirement from the lender to the property insurance agent or company servicing his or her policy. The agent or company will then process the refund request.

Even though structures are not located in an SFHA, as mentioned above, they could be flooded by a flooding event with a greater magnitude than the base flood. In fact, more than 25 percent of all claims paid by the NFIP are for policies for structures located outside the SFHA in Zones B, C, X (shaded), or X (unshaded). More than one-fourth of all policies purchased under the NFIP protect structures located in these zones. The risk to structures located outside SFHAs is just not as great as the risk to structures located in SFHAs. Finally, approximately 90 percent of all federally declared disasters are caused by flooding, and homeowners insurance does not provide financial protection from this flooding. Therefore, FEMA encourages the widest possible coverage under the NFIP.

The NFIP offers two types of flood insurance policies to property owners: the low-cost Preferred Risk Policy (PRP) and the Standard Flood Insurance Policy (SFIP). The PRP is available for 1- to 4-family residential structures located outside the SFHA with little or no loss history. The PRP is available for townhouse/rowhouse-type structures, but is not available for other types of condominium units. The SFIP is available for all other structures. Additional information on the PRP and how a property owner can qualify for this type of policy may be obtained by calling the Flood Insurance Information Hotline, toll free, at 1-800-427-4661. Before making a final decision about flood insurance coverage, FEMA strongly encourages property owners to discuss their individual flood risk situations and insurance needs with an insurance agent or company.

FEMA makes flood insurance available in participating communities; in addition, we encourage communities to develop their own loss reduction and prevention programs. Through the *Project Impact: Building Disaster Resistant Communities* initiative, launched by FEMA Director James Lee Witt in 1997, we seek to focus the energy of businesses, citizens, and communities in the United States on the importance of reducing their susceptibility to the impact of all natural disasters, including floods, hurricanes, severe storms, earthquakes, and wildfires. Natural hazard mitigation is most effective when it is planned for and implemented at the local level, by the entities who are most knowledgeable of local conditions and whose economic stability and safety are at stake. For your information, we are enclosing a copy of a pamphlet describing this nationwide initiative. For additional information on *Project Impact*, please visit our website at www.fema.gov/impact.

FEMA has established "Grandfather" rules to benefit flood insurance policyholders who have maintained continuous coverage. Property owners may wish to note also that, if they live outside but on the fringe of the SFHA shown on an effective NFIP map and the map is revised to expand the SFHA to include their structure(s), their flood insurance policy rates will not increase as long as the coverage for the affected structure(s) has been continuous. Property owners would continue to receive the lower insurance policy rates.

LOMAs are based on minimum criteria established by the NFIP. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If a State, county, or community has adopted more restrictive and comprehensive floodplain management criteria, these criteria take precedence over the minimum Federal criteria.

In accordance with regulations adopted by the community when it made application to join the NFIP, letters issued to amend an NFIP map must be attached to the community's official record copy of the map. That map is available for public inspection at the community's official map repository. Therefore, FEMA sends copies of all such letters to the affected community's official map repository.

When a restudy is undertaken, or when a sufficient number of revisions or amendments occur on particular map panels, FEMA initiates the printing and distribution process for the affected panels. FEMA notifies community officials in writing when affected map panels are being physically revised and distributed. In such cases, FEMA attempts to reflect the results of the LOMA on the new map panel. If the results of particular LOMAs cannot be reflected on the new map panel because of scale limitations, FEMA notifies the community in writing and revalidates the LOMAs in that letter. LOMAs revalidated in this way usually will become effective 1 day after the effective date of the revised map.

Federal Emergency Management Agency

Washington, D.C. 20472

The Honorable Oscar Goodman
Mayor, City of Las Vegas
400 East Stewart Avenue
10th Floor
Las Vegas, NV 89101

Case No.: 00-09-981V
Community: City of Las Vegas, NV
Community No.: 325276
Effective Date: September 28, 2002
LOMC-VALID

Dear Mayor Goodman:

This letter revalidates the determinations for properties and/or structures in the referenced community as described in the Letters of Map Revision Based on Fill (LOMR-Fs) and Letters of Map Amendment (LOMAs) previously issued by the Federal Emergency Management Agency (FEMA) on the dates listed on the enclosed table. As of the effective date shown above, these LOMR-Fs and LOMAs will revise the effective National Flood Insurance Program (NFIP) map dated September 27, 2002, for the referenced community, and will remain in effect until superseded by a revision to the NFIP map panel on which the property is located. The FEMA case number, property identifier, NFIP map panel number, and current flood insurance zone for the revalidated LOMR-Fs and LOMAs are listed on the enclosed table.

Because these revalidated LOMR-Fs and LOMAs will not be printed or distributed to primary map users, such as local insurance agents and mortgage lenders, your community will serve as a repository for this new data. We encourage you to disseminate the information reflected by this letter throughout your community so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information.

For information relating to LOMR-Fs or LOMAs not listed on the enclosed table or to obtain copies of previously issued LOMR-Fs and LOMAs, if needed, please contact our Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,

Matthew B. Miller

Matthew B. Miller, P.E., Chief
Hazards Study Branch
Federal Insurance and
Mitigation Administration

Enclosure

cc: Community Map Repository

Mr. Greg Mc Dermott
Flood Control Project Manager
City of Las Vegas

REVALIDATED LETTERS OF MAP CHANGE FOR LAS VEGAS, NEVADA

COMMUNITY NO. :325276 **CASE NO. : 00-09-981V** **EFFECTIVE DATE : September 28, 2002**

Case No.	Date Issued	Identifier	Map Panel No.	New Zone
95-09-716A	08/17/95	PARADISO AT PAINTED DESERT, LOTS 54-123	32003C1765E	X
95-09-824A	10/11/95	ROSEWALK UNIT 2, BLOCK 3, LOTS 33-35 & 40-- ROSEWALK UNIT 5, BLOCK 1, LOTS 1-11-- BLOCK 4, LOTS 1-16 & 25-40-- BLOCK 5, LOTS 6 & 7-- ROSEWALK UNIT 6, BLOCK 5, LOTS 1-5 & 8-19-- ROSEWALK UNIT 3, BLOCK 3, LOT 54	32003C2187E	X
95-09-844A	10/11/95	HIGH COUNTRY ESTATES, BLK. 1, LOTS 78-82-- HIGH COUNTRY ESTATES, BLK. 3 LOTS 1-5 AND 26,27-- HIGH COUNTRY ESTATES, BLK. 4, LOTS 4-15.	32003C2155E	X
95-09-845A	10/11/95	MOUNTAIN VIEW APTS., PHASE 2, LOT 2	32003C2155E	X
95-09-846A	10/11/95	MARION VIEW SUBDIVISION, LOTS 50-66.	32003C2187E	X
95-09-847A	10/11/95	PARCEL 1, 8301 LONE MOUNTAIN RD.	32003C2155E	X
95-09-849A	10/11/95	CEDAR CREEK PARK-UNIT 1, BLK. 2, LOTS 1-7 AND 14-21.	32003C2187E	MULTIPLE
95-09-850A	10/11/95	BROKEN SOUND CONDOMINIUMS A PORTION OF THE EAST 1/2 OF THE NORTHEAST 1/4 OF THE SOUTHEAST 1/4 OF SECTION 28,TOWNSHIP 20 SOUTH,RANGE 62 EAST. BUILDINGS 1-27.	32003C2195E	X
95-09-851A	10/11/95	BREEZEWOOD SUBDIV. PHASE 1, LOTS 1-42	32003C2187E	X
95-09-852A	10/11/95	BOULDER HEIGHTS ADDITION TRACT NO. 2, LOTS 28-37	32003C2187E	X
95-09-853A	10/11/95	LEWIS HOMES LAS VEGAS #9A, BLK. 1, LOT 11, 4728 LAKESTREAM AVE.	32003C2187E	X
95-09-855A	10/11/95	TONOPAH TERRACE, BLK. 2, LOTS 7 & 9-- 5650 DUNCAN DR. AND 3800 NORTH RANCHO DR.	32003C2155E	X
95-09-858A	10/11/95	VEGAS GREEN TOWNHOUSES, UNITS 1-16.	32003C2187E	MULTIPLE
95-09-859A	10/11/95	VILLAGE AT WASHINGTON, BLOCK 1, LOTS 1-26; BLOCK 2, LOTS 1-26	32003C2187E	X
95-09-856A	10/12/95	WINDCHIME PHASE 5, BLK. 4, LOTS 1-5,56,57-- WINDCHIME PHASE 5, BLK. 5, LOT 1-9.	32003C2160E	X
95-09-837A	10/18/95	PORTRAITS @ PAINTED DESERT PHASE II, LOTS 12-27, 37-39, 44, 45, AND 51-53	32003C1765E	X
95-09-838A	10/18/95	PAINTED DESERT PARCEL 6, LOTS 35-47	32003C1765E	X
96-09-541A	04/11/96	MARION VIEW ESTATES LOTS 33-49	32003C2187E	MULTIPLE
96-09-555A	04/19/96	REFLECTIONS AT THE LAKE UNIT 2, BLK. 1, LOTS 20-28,37,39 AND 71-77; BLK. 3, LOTS 11-15 & 19-49.	32003C2145E	X
96-09-794A	07/31/96	GREATER LAS VEGAS ADDT'N. NO 3, UNIT 5-B, BLK 3, LOT 84-- 1117 NORTH 22ND ST.	32003C2186E	X

REVALIDATED LETTERS OF MAP CHANGE FOR LAS VEGAS, NEVADA

COMMUNITY NO. :325276 **CASE NO. : 00-09-981V** **EFFECTIVE DATE : September 28, 2002**

Case No.	Date Issued	Identifier	Map Panel No.	New Zone
96-09-592A	09/13/96	RANCHO SAN MIGUEL UNIT 2, BLK 2, LOTS 5-17, 44, 45; BLK 1, LOTS 1-28; & UNIT 3, BLK 2, LOTS 29-46	32003C2155E	MULTIPLE
97-09-017A	10/18/96	RANCHO SAN MIGUEL UNIT 2, BLK 1, LOTS 44-45, AND BLK 2, LOTS 5-17; UNIT 3, BLK 1, LOTS 1-28, BLK 2, LOTS 29-46	32003C2155E	MULTIPLE
97-09-267A	12/23/96	RANCHO SAN MIGUEL UNIT 3, BLK. 1, LOTS 10-12, 14-16	32003C2155E	X
97-09-396A	01/27/97	RANCHO SAN MIGUEL UNIT 2, BLOCK 1, LOTS 44-45, BLOCK 2, LOTS 5-17; UNIT 3, BLOCK 1, LOTS 1-9, 13, 17-30, BLOCK 2, 31-46	32003C2155E	X
97-09-547A	03/25/97	GREATER LAS VEGAS ADDITION 3, UNIT NO. 4, BLOCK 7, LOT 130 – 2317 CONSTANTINE AVENUE	32003C2186E	X
97-09-248A	06/03/97	A PORTION OF N 1/2 OF SECTION 19, T20S, R61E, M.D.M. – 2151 N. RANCHO ROAD	32003C2155E	X
97-09-445A	06/10/97	HOMESTEAD ESTATES UNITS 1, 2, & 3, LOTS 18, 61, 62, 66-69; PARCEL MAP CURTIS, LOTS 1-3; SHADOW ACRES UNIT 1, LOT 3 – 3711 THOM BLVD, 5125, 5133, 5217, 5225, 5233, 5241 GILMORE AVE, 3808, 3804, 3800, & 3824 THOM BLVD	32003C2155E	X
97-09-1135A	09/10/97	ROSEWALK UNIT 2, BLOCK 2, LOTS 1-4, BLOCK 3, LOTS 31-40; UNIT 3, BLOCK 3, LOTS 41-55; UNIT 5, BLOCK 1, LOTS 1-11, BLOCK4, LOTS 1-16, & 25-40, BLOCK 5, LOTS 6-7; UNIT 6, BLOCK 5, LOTS 1-5, & 8-19	32003C2187E	X
98-09-788A	07/14/98	DESERT PINES CONDOS, PARCEL 1, PARCEL MAP 1747	32003C2155E	X
98-09-729A	07/17/98	SUNSET DRIVE APTS, EASTLAND HEIGHTS, BLOCK 14, LOTS 4-5 – 1701 NORTH RANCHO DRIVE	32003C2160E	X
01-09-1032A	09/10/01	4543 NORTH RANCHO DRIVE – PORTION OF SECTION 2, T20S, R60E, M.D.M.	32003C2155E	X
02-09-684A	04/10/02	GREATER LAS VEGAS ADDITION 3 UNIT 3, BLOCK 5, LOT 113 – 1901 EAST THERESA STREET	32003C2186E	X
02-09-963P	07/09/02	GOWAN BRADLEY FLOOD INSURANCE STUDY	32003C2155E	X
02-09-1070A	08/26/02	DESERT PINES CONDOMINIUMS UNIT 1, PHASES XIV, XV, XVII – 6161 WEST ALEXANDER ROAD	32003C2155E	X

Grading Plan

Showing Proposed Flood Zone Boundary

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

BENCH MARK

CITY OF LAS VEGAS VERTICAL CONTROL
RIVET AND PLATE IN TOP OF CURB, SW RETURN OF RAINBOW BLVD. AND RED COACH AVE.

STATION 1LV00
3MEE6
ELEVATION= 706.9818 METERS (NAVD88)
2319.49 FEET

UNDEVELOPED
APN 138-02-202-011
PM FILE 36 PAGE 36

APN 138-02-203-002-003

APN 138-02-213-010

CRAIG ROAD RANCHO DRIVE CENTER
APN 138-02-213-011

RANCHO DRIVE (PUBLIC STREET)

EXISTING LONE MOUNTAIN ESTATES - UNIT 1
PLATS BOOK 25 PAGE 90

EXISTING BUILDING
FF=2312.85

BUILDING ADDITION
FF = 2308.52

EXISTING BUILDING
Ex FF = 2308.85

LIMITS OF CONSTRUCTION

100-YEAR STORM INUNDATION LIMITS Q(100)=219 CFS

ZONE X
ZONE AE

REMOVE & RELOCATE EXISTING OVERHEAD POWER POLE (BY OTHERS)

REMOVE EXISTING AREA LIGHTS

REMOVE & RELOCATE EXISTING AREA LIGHT

NEW STRIPING

EXISTING AREA LIGHT

REPLACE EXISTING STRIPING

REPLACE EXISTING PARKING BUMPER BLOCKS TO NEW LOCATION

EAST TRASH ENCLOSURE

SAWCUT AND STRIP EDGE LINE

EXTRA DEPTH FOOTING

CONST. CONC. RAMP

PLANTER

SIDE WALK

10'x15' LVVWD EASEMENT PER BOOK 920617 DOC. #01009

EX. 16" WTR

EX. 8" PVC SAN SWR

EX. 6" PVC WTR

EX. 12" PVC SAN SWR

EX. 8" PVC WTR

EX. 2" PVC WTR

EX. 6" PVC WTR

EX. 16" ACP WTR

EX. 8" PVC WTR

EX. 2" PVC WTR

EX. 6" PVC WTR

EX. 21" RCP SWR @ 0.29%

EX. 12" PVC SWR @ 1.26%

EX. 8" PVC SWR @ 0.52%

EX. SCMH RIM EL.=(95.54) INV. THRU =(94.71)

EX. 6" PVC WTR

EX. 6" PVC WTR

EX. 6" PVC WTR

HEC-RAS Analysis

Proposed Condition HEC-RAS Analysis

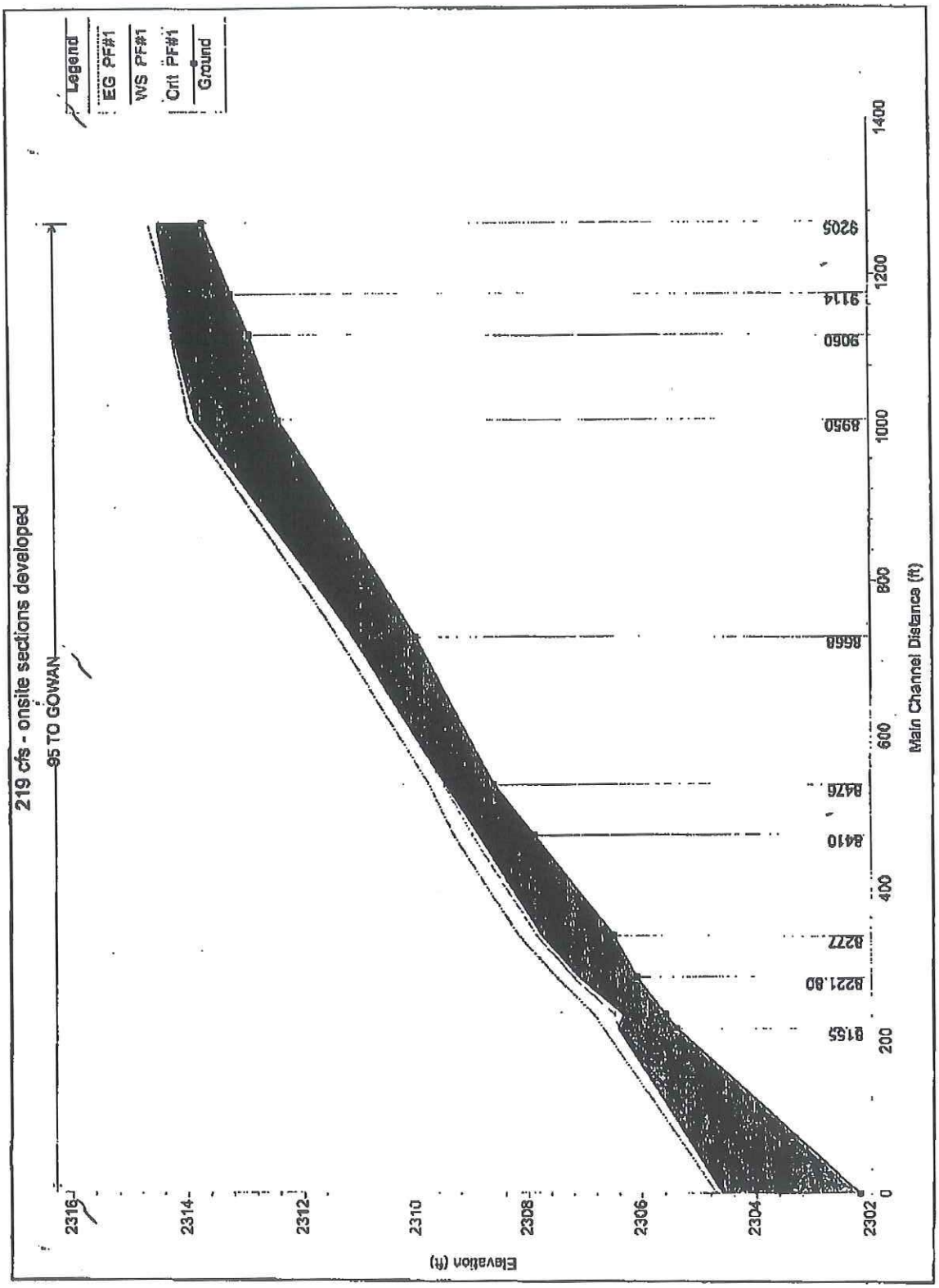
HEC-RAS Plan: Critical River: RANCHO ROAD Reach: 95 TO GOWAN Profile: PF#1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Sta W.S. Lft	Sta W.S. Rgt
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)
95 TO GOWAN	9205	219.00	2313.70	2314.47	2314.43	2314.62	0.013335	3.18	69.28	166.50	0.67	62.50	231.00
95 TO GOWAN	9114	219.00	2313.20	2314.28	2313.85	2314.30	0.001361	1.30	169.02	282.98	0.30	58.97	341.95
95 TO GOWAN	9050	219.00	2312.90	2314.20	2313.78	2314.23	0.001358	1.33	165.26	300.58	0.30	51.47	413.06
96 TO GOWAN	8950	219.00	2312.40	2313.83	2313.59	2313.85	0.005909	2.71	80.92	193.09	0.61	51.06	245.15
96 TO GOWAN	8658	219.00	2310.00	2311.11	2311.11	2311.39	0.015420	4.22	51.89	95.51	1.01	31.58	128.07
95 TO GOWAN	8476	219.00	2308.60	2309.46	2309.49	2309.78	0.005348	4.35	50.32	101.71	1.09	50.85	152.55
95 TO GOWAN	8410	219.00	2307.90	2308.88	2309.00	2309.33	0.007396	5.42	40.43	70.76	1.28	53.91	130.00
95 TO GOWAN	8277	219.00	2306.50	2307.76	2307.85	2308.17	0.010210	5.13	42.67	88.85	1.28	34.94	121.79
95 TO GOWAN	8221.80	219.00	2306.10	2307.11	2307.21	2307.51	0.014214	5.09	43.05	98.16	1.35	37.04	135.19
95 TO GOWAN	8173.00	219.00	2305.60	2306.33	2306.48	2306.85	0.012535	5.76	38.01	97.09	1.62	49.05	146.14
95 TO GOWAN	8156	219.00	2305.40	2306.43	2306.43	2306.69	0.004153	4.15	52.74	102.06	1.02	37.61	139.70
96 TO GOWAN	7939	219.00	2302.20	2304.69	2304.22	2304.70	0.003001	2.80	84.25	110.22	0.62	13.28	123.50

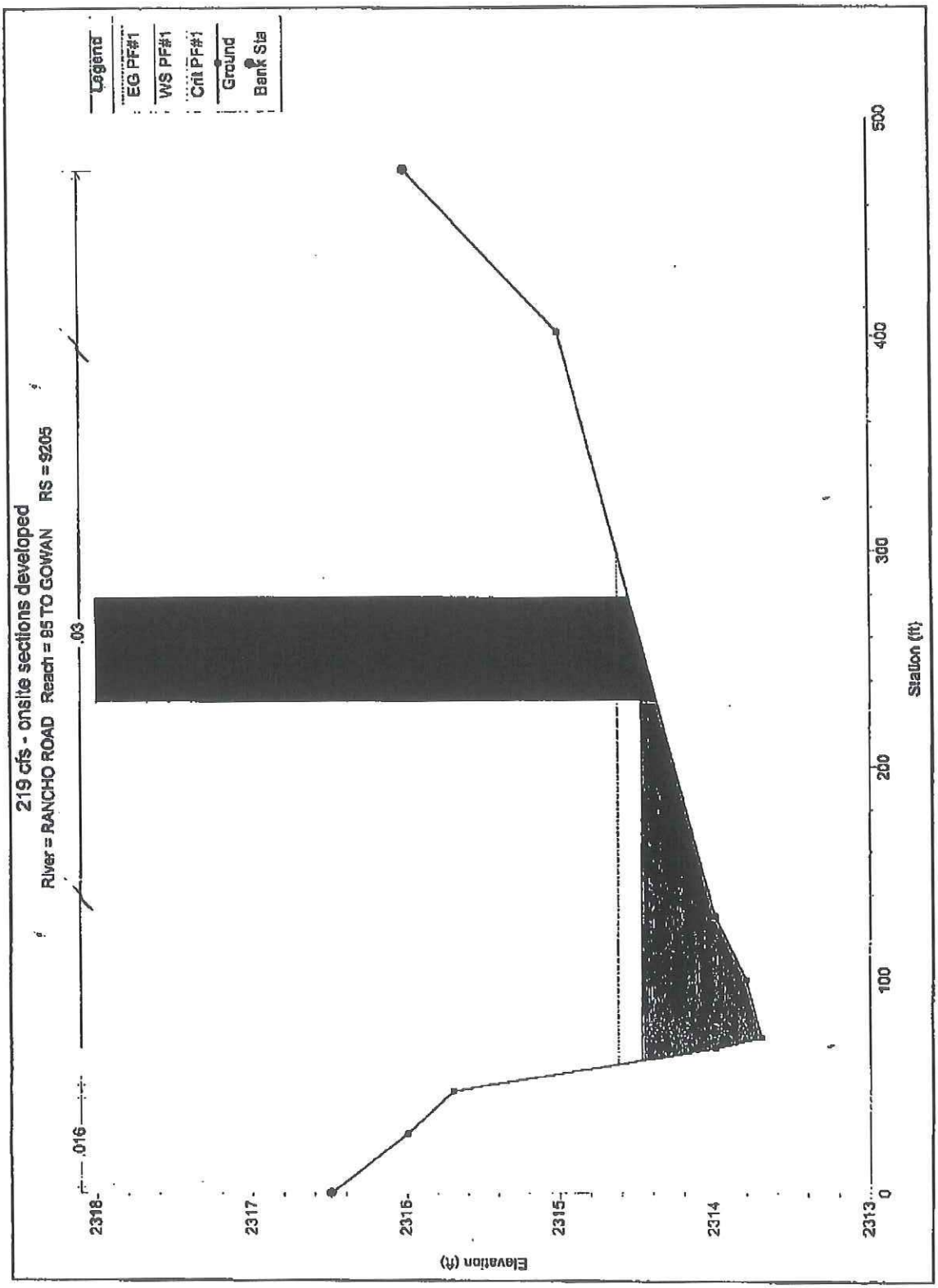
DEVELOPED CONDITION HEC-RAS TABLE

WITH ADDED DCDA @ RIVER STATION 8410.

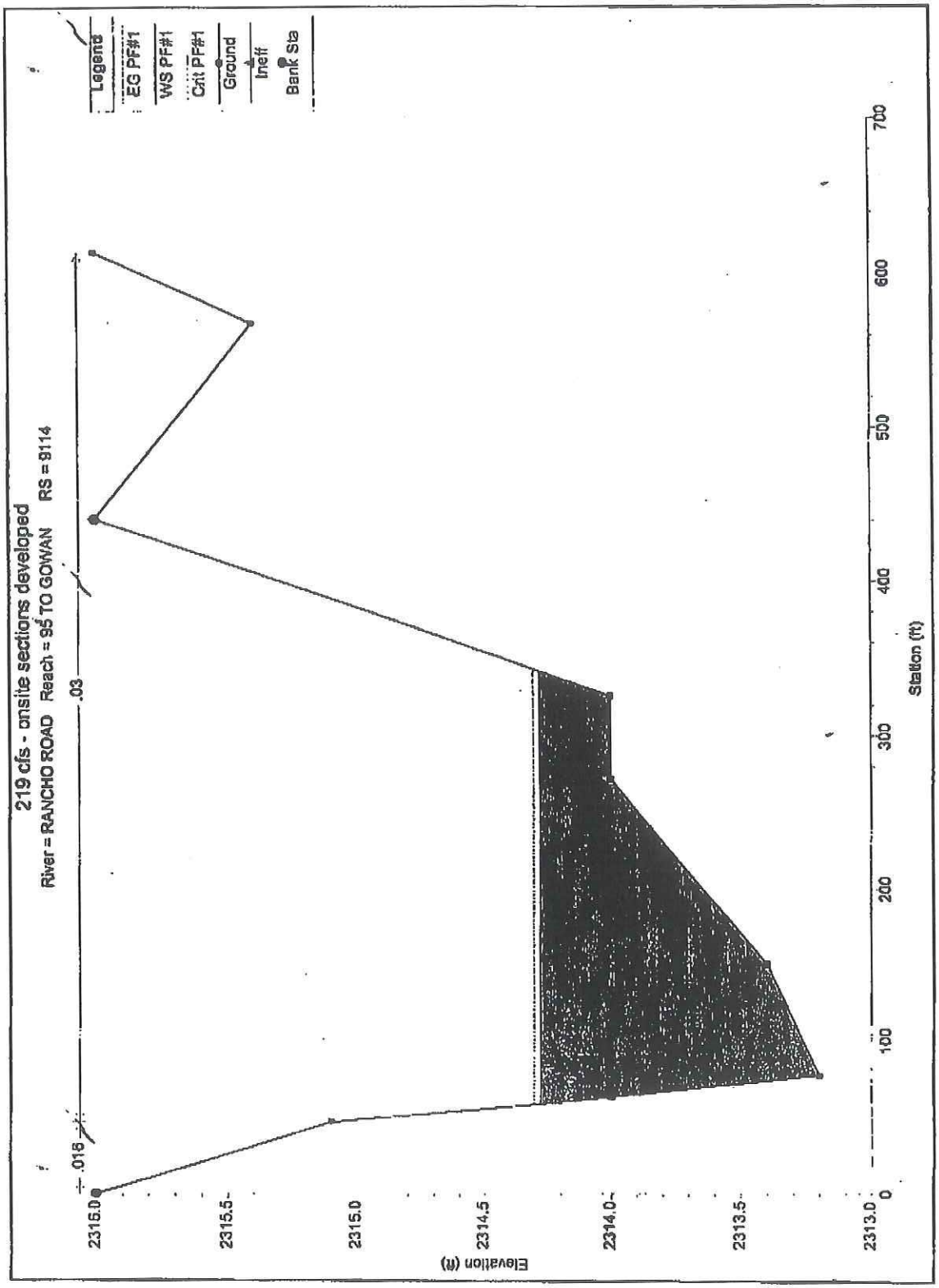
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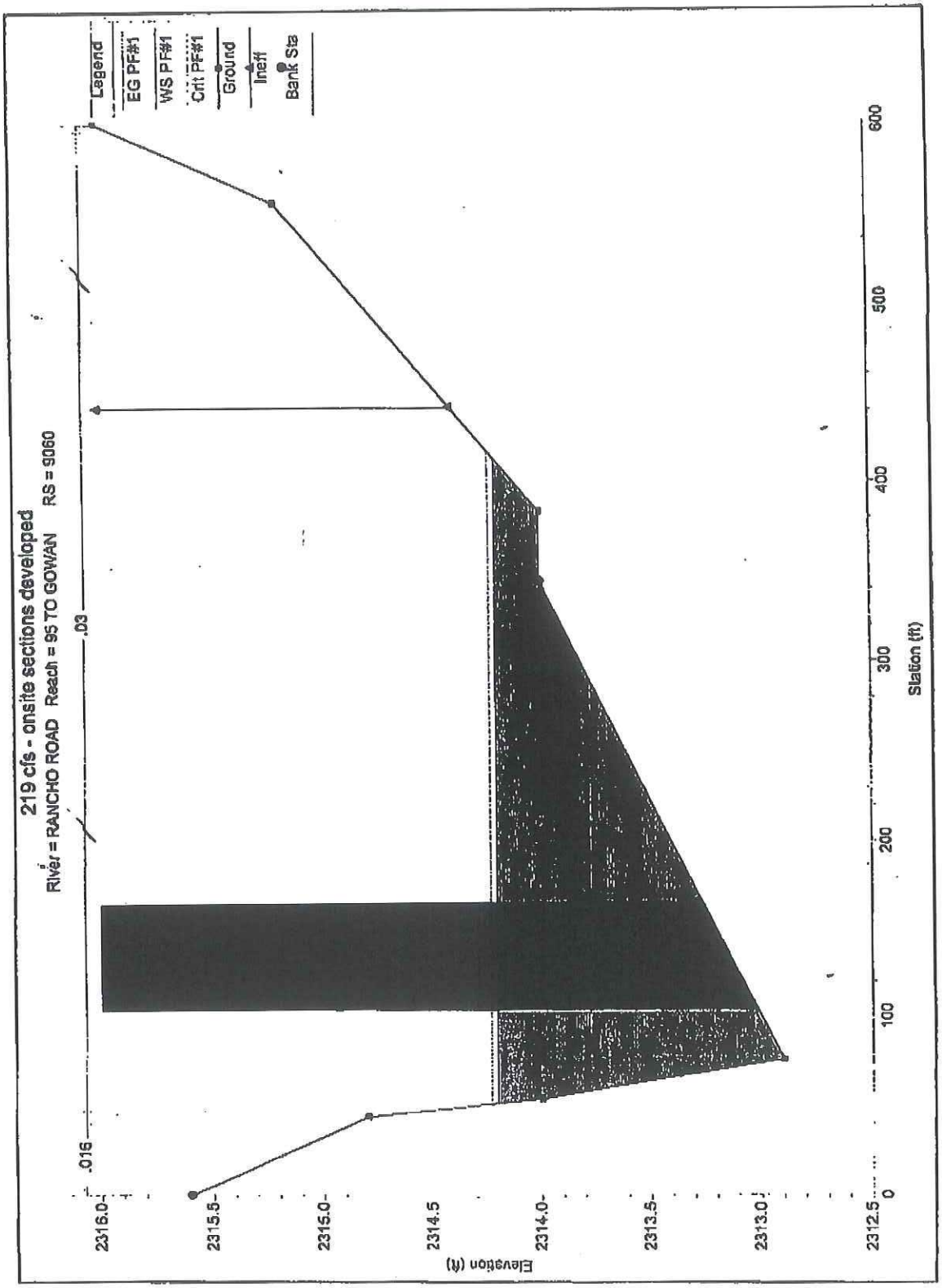

219 cfs - onsite sections developed
95 TO GOWAN
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Elevation (ft)
Main Channel Distance (ft)
2316
2314
2312
2310
2308
2306
2304
2302
0
200
400
600
800
1000
1200
1400
8155
8221.80
8277
8410
8476
8660
8950
9060
9114
9205

5

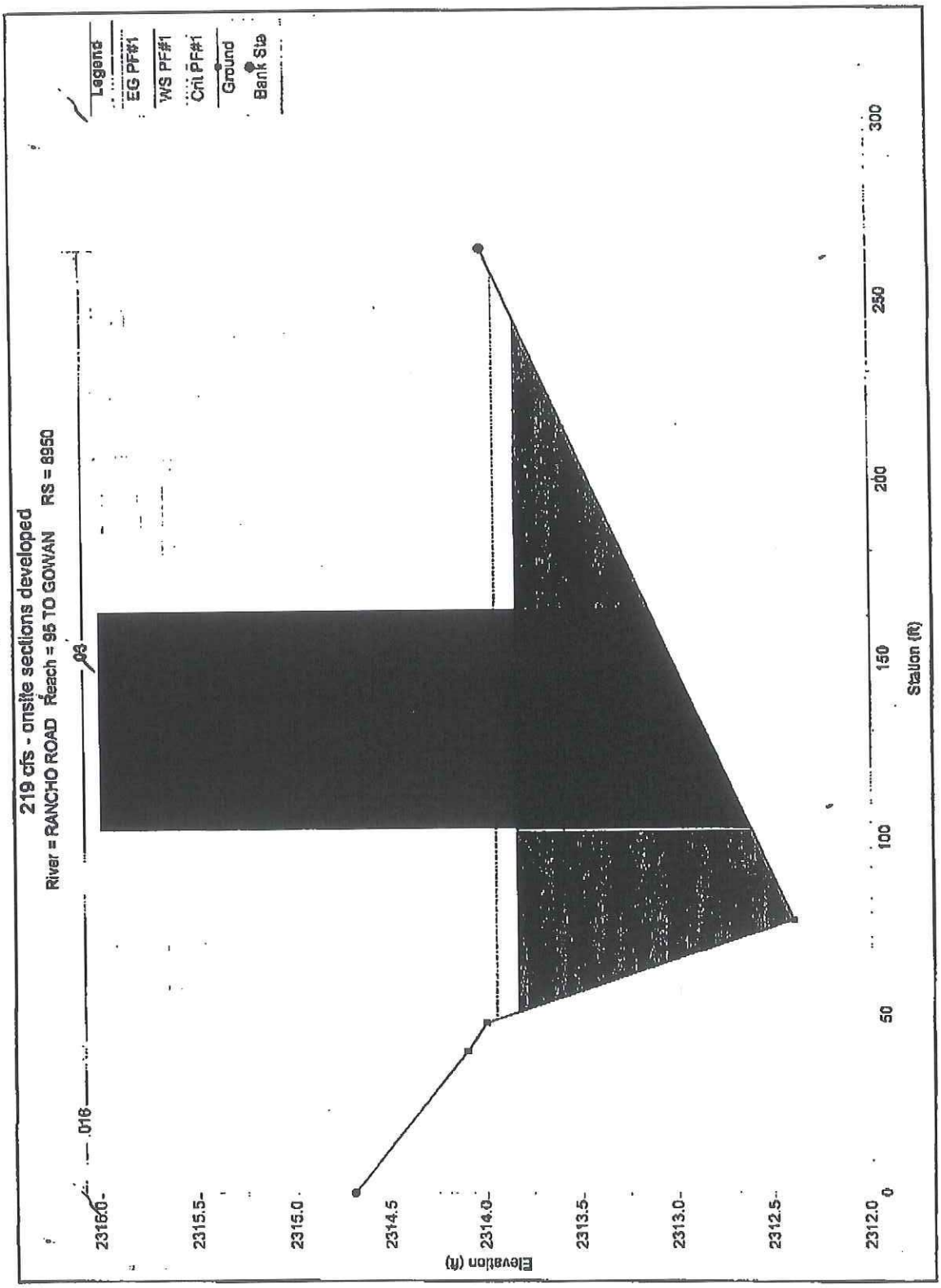

219 cfs - onsite sections developed
River = RANCHO ROAD Reach = 85 TO GOWAN RS = 9205
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
.016
.03
Elevation (ft)
Station (ft)
2318
2317
2316
2315
2314
2313
0
100
200
300
400
500

6

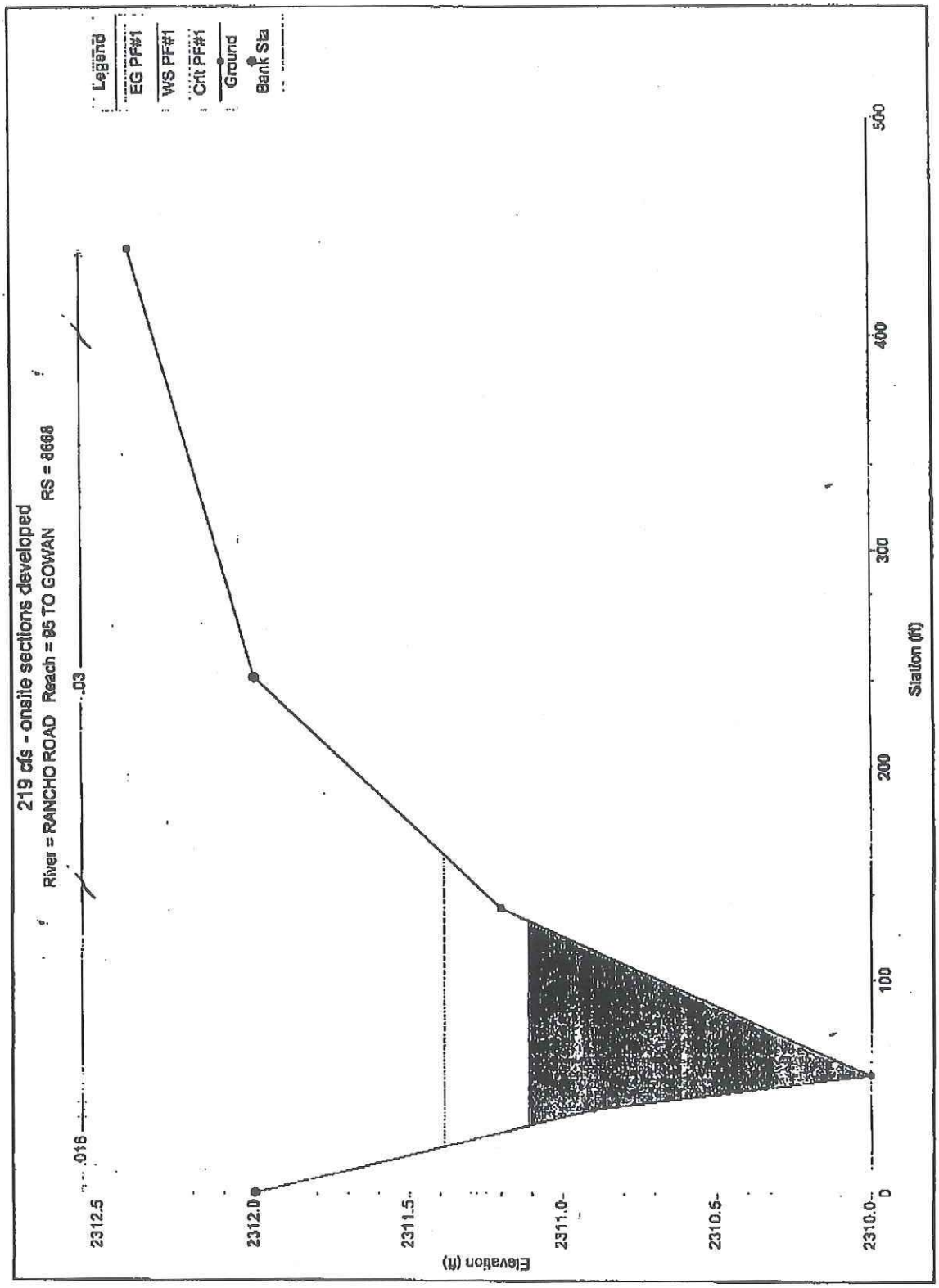

219 cfs - onsite sections developed
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 9114
.018
.03
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
2316.0
2315.5
2315.0
2314.5
2314.0
2313.5
2313.0
0
100
200
300
400
500
600
700
Station (ft)


219 cfs - onsite sections developed
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 9060
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Ineff
Bank Sta
.016
.03
Elevation (ft)
Station (ft)
2316.0
2315.5
2315.0
2314.5
2314.0
2313.5
2313.0
2312.5
0
100
200
300
400
500
600

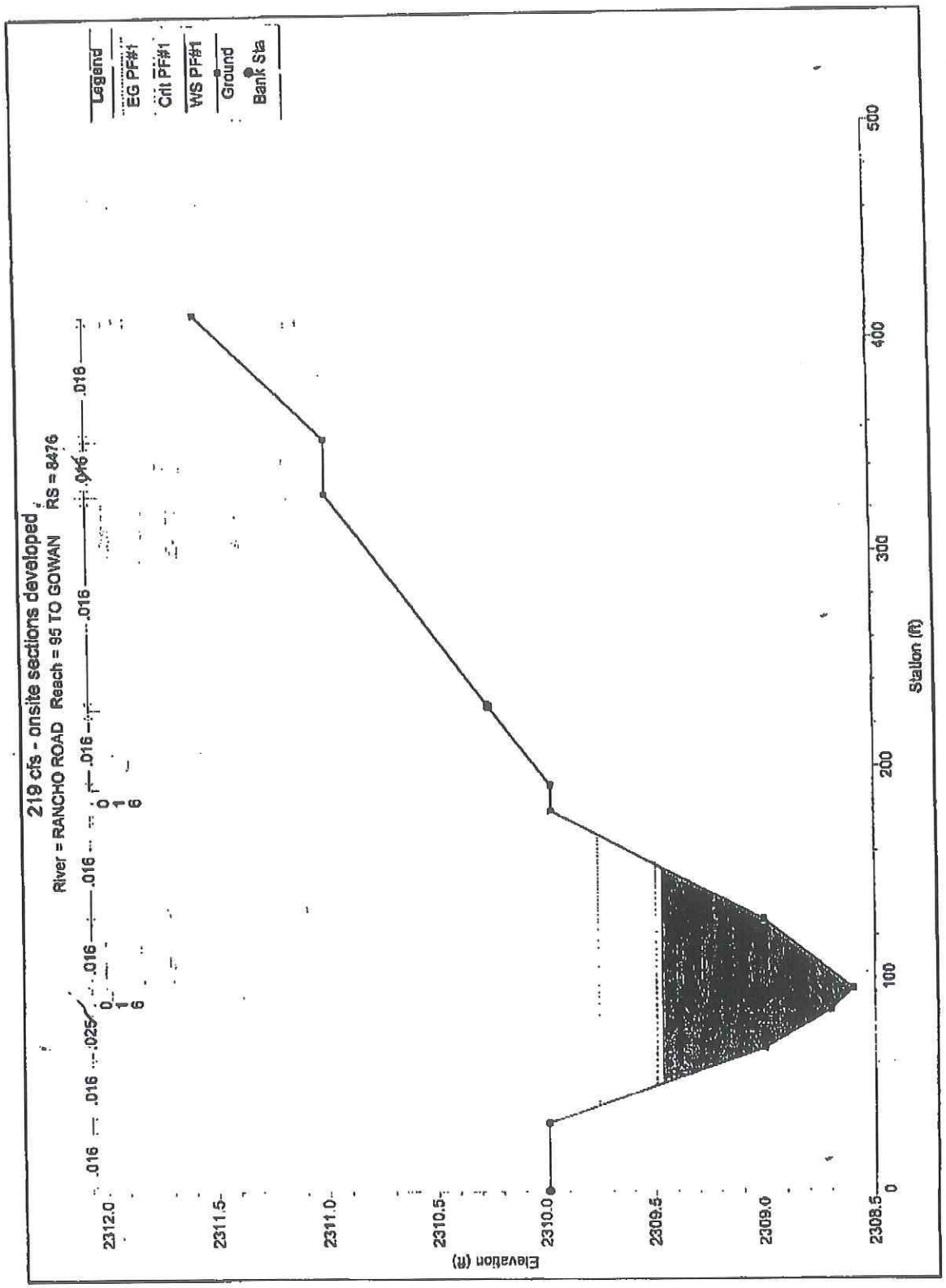
8


219 cfs - onsite sections developed
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8950
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2316.0
2315.5
2315.0
2314.5
2314.0
2313.5
2313.0
2312.5
2312.0
0
50
100
150
200
250
300

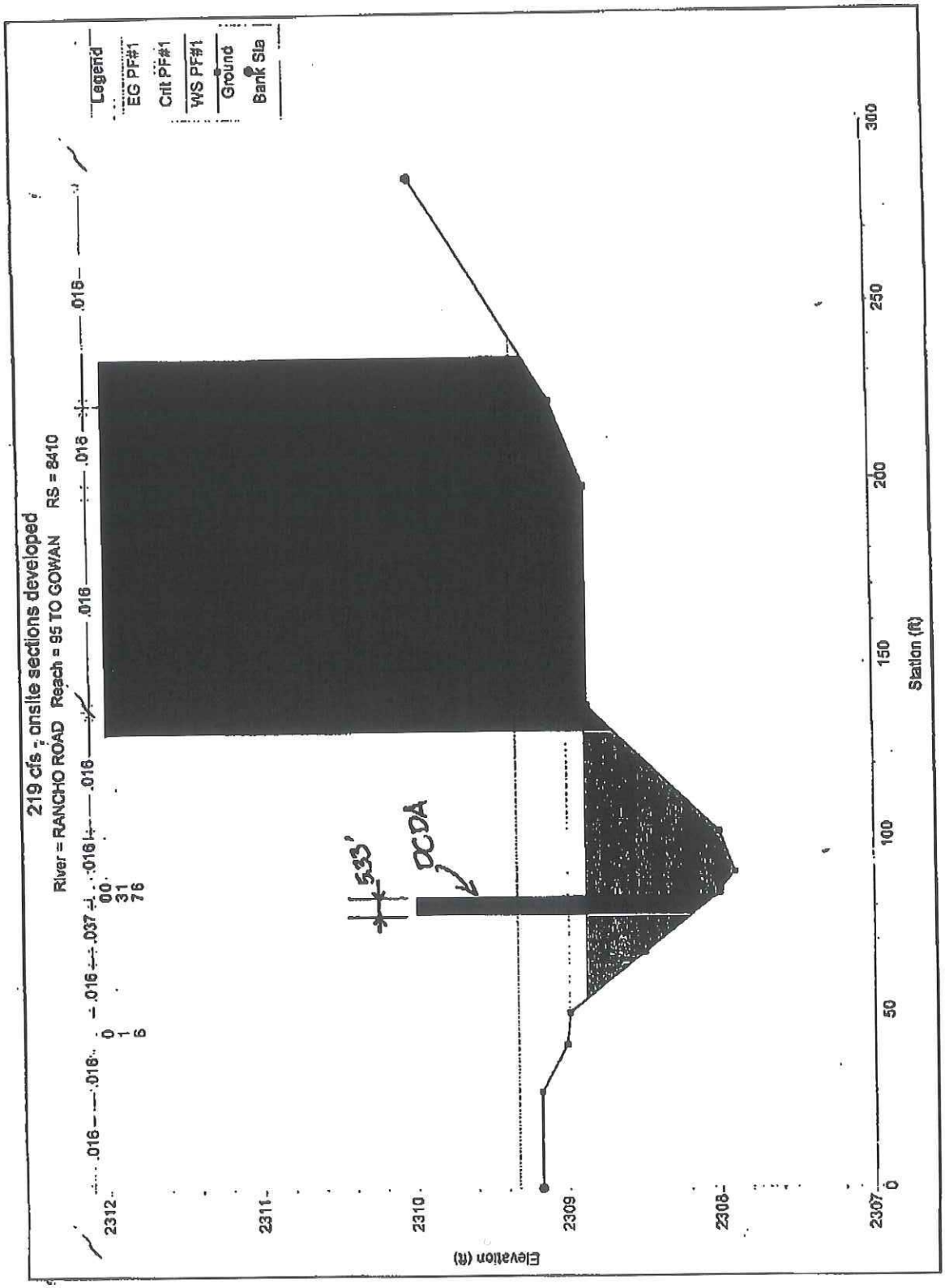
9


219 cfs - onsite sections developed
River = RANCHO ROAD Reach = 85 TO GOWAN RS = 8668
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
.016
.03
2312.5
2312.0
2311.5
2311.0
2310.5
2310.0
Elevation (ft)
0
100
200
300
400
500
Station (ft)

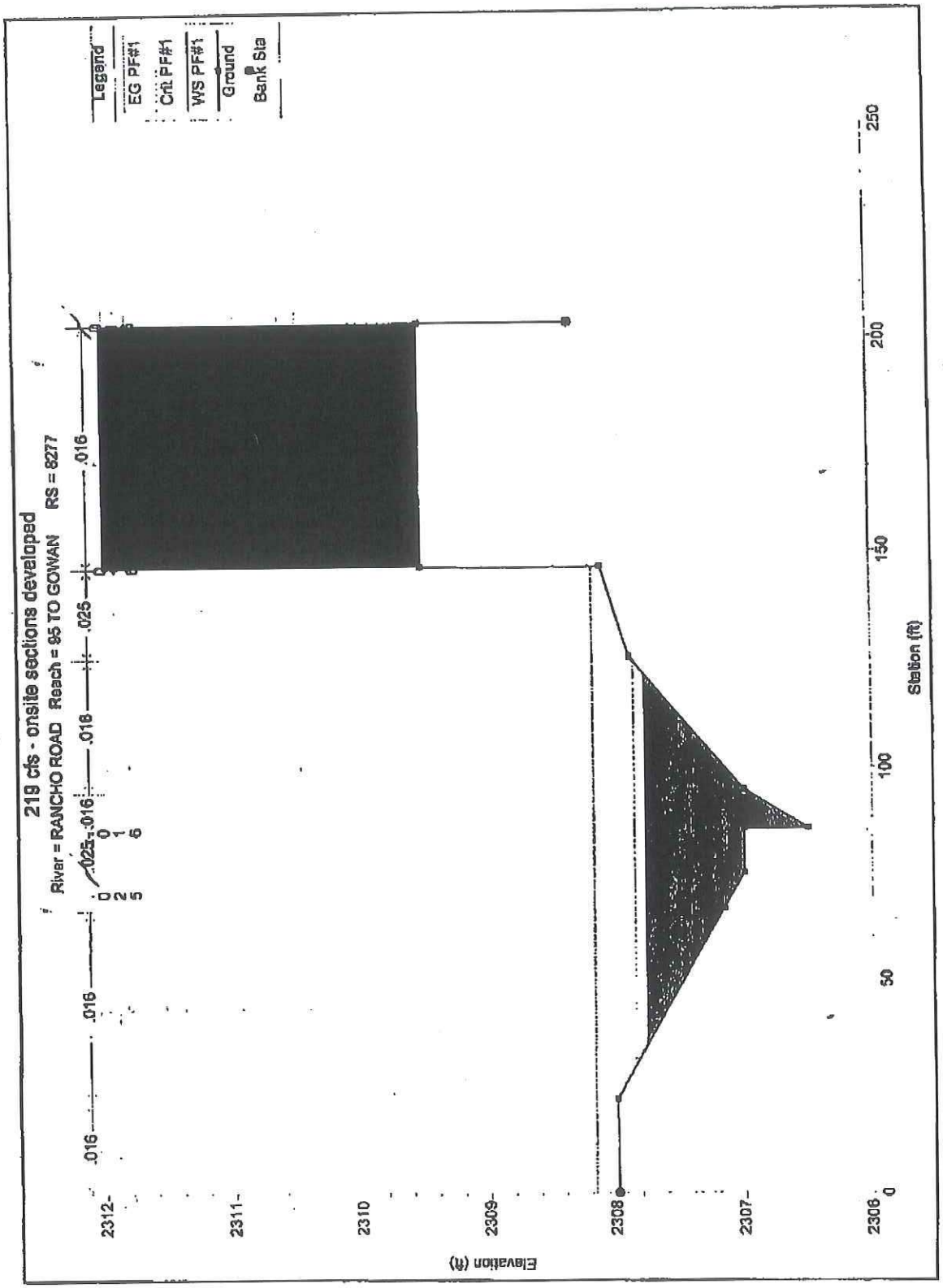
10


219 cfs - onsite sections developed
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8476
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2312.0
2311.5
2311.0
2310.5
2310.0
2309.5
2309.0
2308.5
0
100
200
300
400
500
.016
.025
.018

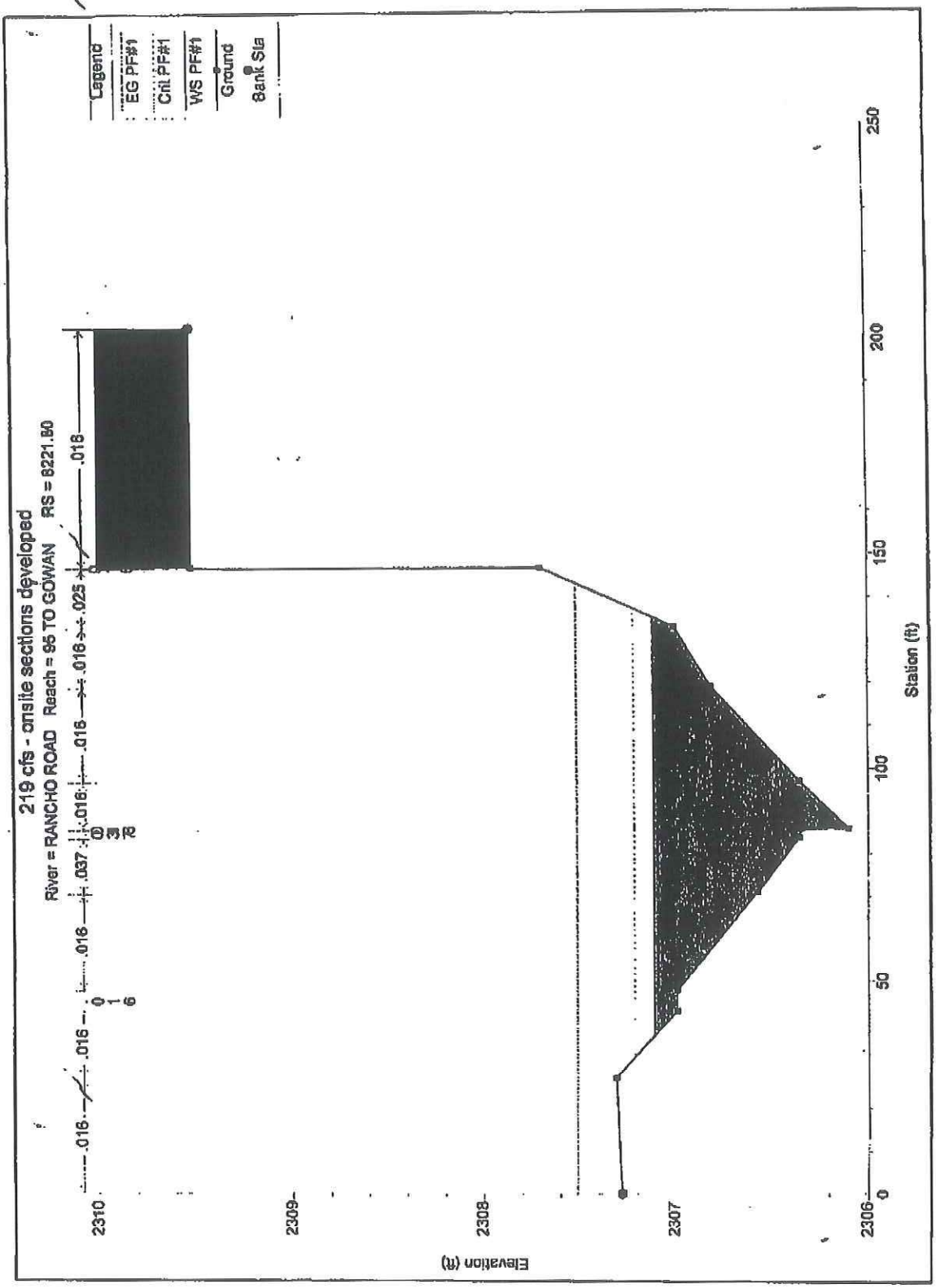
11


219 cfs - onsite sections developed
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8410
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
.016
.018
.037
.016
.016
.016
.016
.018
.016
.016
.016
.016

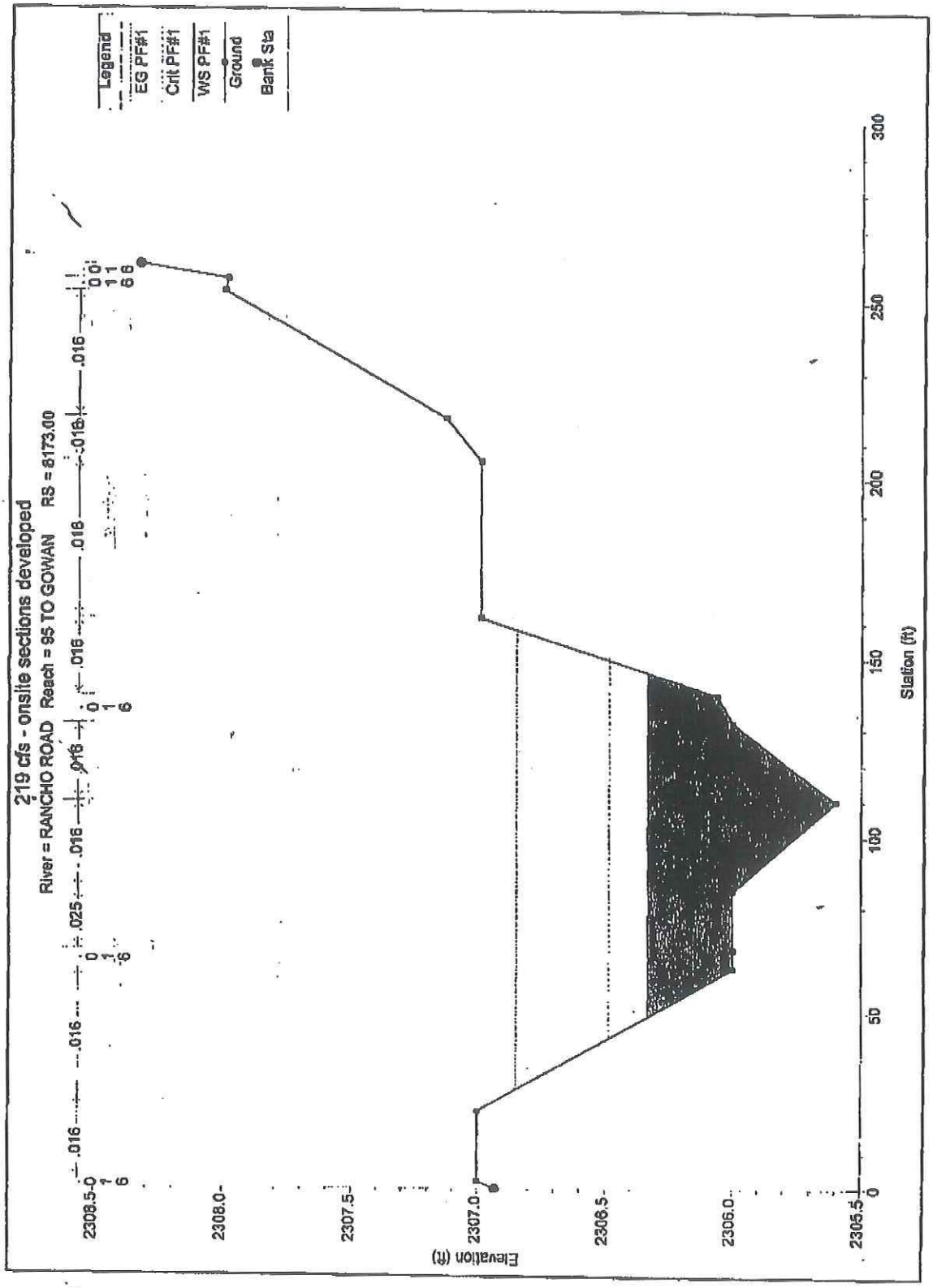
12


219 cfs - onsite sections developed
River = RANCHO ROAD Reach = 85 TO GOWAN RS = 8277
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2312
2311
2310
2309
2308
2307
2306
0
50
100
150
200
250
.016
.025
.018

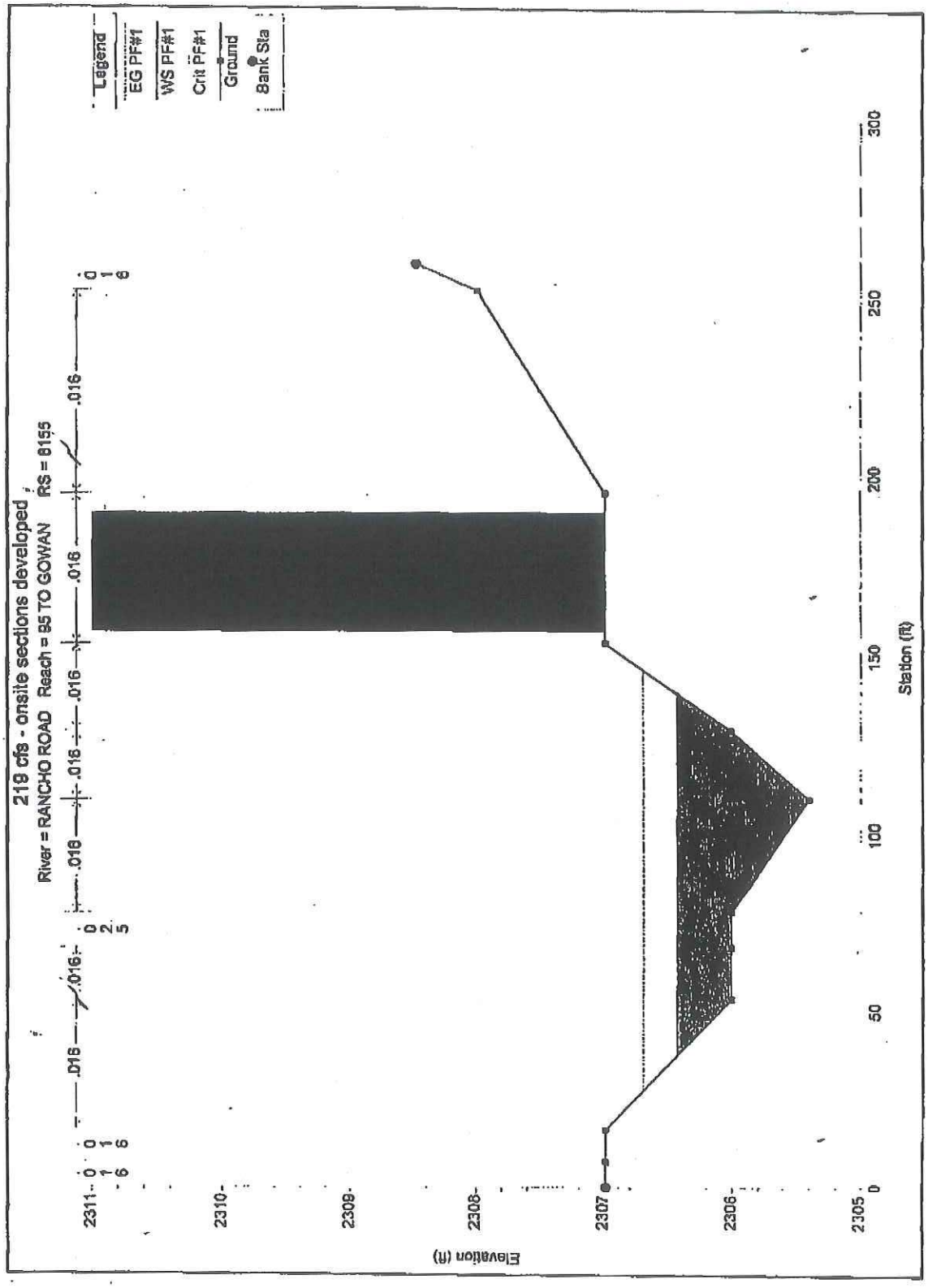
13


219 cfs - onsite sections developed
River = RANCHO ROAD Reach = 85 TO GOWAN RS = 8221.80
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2310
2309
2308
2307
2306
0
50
100
150
200
250
.018
.016
.037
.025

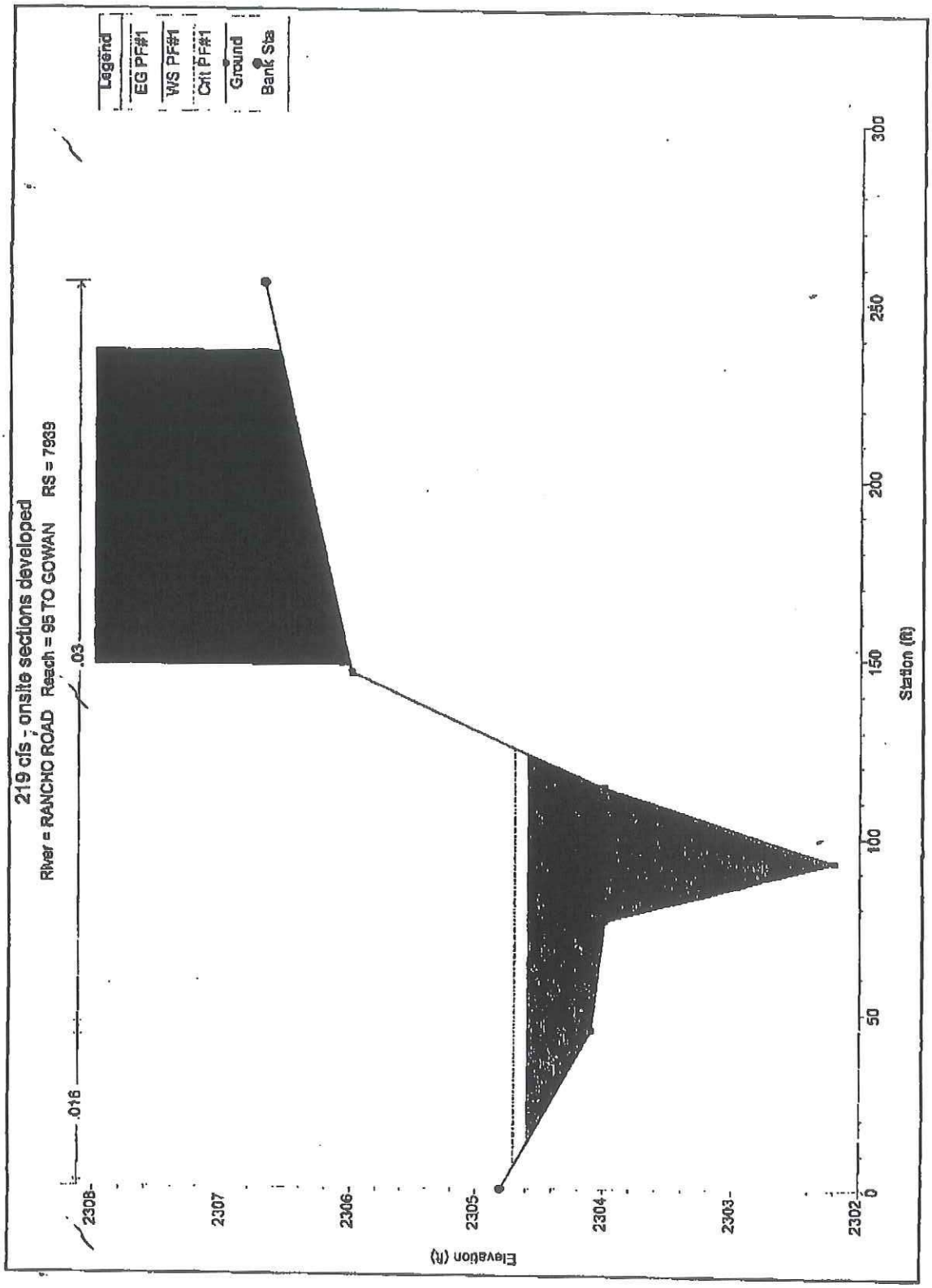
14


219 cfs - onsite sections developed
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8173.00
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2308.5
2308.0
2307.5
2307.0
2306.5
2306.0
2305.5
0
50
100
150
200
250
300
.016
.025
.018

15


219 cfs - onsite sections developed
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 8155
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2311
2310
2309
2308
2307
2306
2305
0
50
100
150
200
250
300
.018
.016

16


219 cfs - onsite sections developed
River = RANCHO ROAD Reach = 95 TO GOWAN RS = 7939
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
.016
.03
Elevation (ft)
2308
2307
2306
2305
2304
2303
2302
0
50
100
150
200
250
300
Station (ft)

17

HEC-RAS Version 3.0.1 Mar 2001
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

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

PROJECT DATA
Project Title: 219 cfs - onsite sections developed
Project File : tempdev.prj
Run Date and Time: 3/6/03 8:11:20 AM

Project in English units

PLAN DATA

Plan Title: Critical
Plan File : h:\JOBS\010318\Drainage\truncated\tempdev.p01

Geometry Title: Cross-sections
Geometry File : h:\JOBS\010318\Drainage\truncated\tempdev.g01

Flow Title : flow 1
Flow File : h:\JOBS\010318\Drainage\truncated\tempdev.f01

Plan Summary Information:
Number of: Cross Sections = 12 Mulitple Openings = 0
Culverts = 0 Inline Weirs = 0
Bridges = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculaton tolerance = 0.01
Maximum number of interations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

18

GEOMETRY DATA

Geometry Title: Cross-sections
Geometry File : h:\JOBS\010318\Drainage\truncated\tempdev.g01

CROSS SECTION RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 9205

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2316.5	28	2316	48	2315.7	68	2314	73	2313.7
100	2313.8	130	2314	402	2315	477	2316		

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	48	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	477	91	91	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
281	279	2318

CROSS SECTION RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 9114

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2316	47	2315.1	63	2314	77	2313.2	150	2313.4
272	2314	326	2314	441	2316	568	2315.4	614	2316

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	47	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	441	54	54	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
888	F		

CROSS SECTION RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 9060

INPUT
Description:
Station Elevation Data num= 8

19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2315.6	44	2314.8	54	2314	76	2312.9	345	2314
384	2314	556	2315.2	600	2316				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	44	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	345	110	110	110	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
888	F		

Blocked Obstructions num= 1

Sta L	Sta R	Elev
104	165	2316

CROSS SECTION RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 8950

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2314.7	40	2314.1	48	2314	77	2312.4	265	2314

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	40	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	265	282	282	282	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
103	164	2316

CROSS SECTION RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 8668

INPUT
Description:
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2312	39	2310.9	55	2310	134	2311.2	242	2312
440	2312.4								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	49	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	242	192	192	192	.1	.3

CROSS SECTION RIVER: RANCHO ROAD

20

REACH: 95 TO GOWAN RS: 8476

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2309.99	32.38	2309.99	67.11	2309	85	2308.7	95	2308.6
127.65	2309	179.75	2309.97	191.95	2309.97	229	2310.25	328.52	2310.99
354.34	2310.99	413	2311.57						

Manning's n Values num= 11

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	32.38	.016	67.11	.025	85	.016	95	.016
127.65	.016	179.75	.016	191.95	.016	229	.016	328.52	.016
354.34	.016								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.	
0	229	66	66	66	.1 .3

CROSS SECTION RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 8410

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2309.18	27.49	2309.18	40.95	2309.01	50.02	2308.99	67	2308.49
83.94	2308	85	2308	90	2307.9	101.49	2308	136.89	2308.85
198.31	2308.85	222.58	2309.07	285	2309.98				

Manning's n Values num= 12

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	27.49	.016	40.95	.016	50.02	.016	67	.037
83.94	.037	85	.016	90	.016	101.49	.016	136.89	.016
198.31	.016	222.58	.016						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.	
0	285	133	133	133	.1 .3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
130	235	2312	78	83.33	2310

← DCDA

CROSS SECTION RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 8277

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2307.99	22.16	2308	67	2307.16	75.46	2307	86	2307
86.01	2306.5	94.98	2307	126	2307.88	147	2308.1	147.01	2309.52
204	2309.52	204.01	2308.33						

Manning's n Values num= 11

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val

21

0	.016	22.16	.016	67	.025	75.46	.025	86	.016
86.01	.016	94.98	.016	126	.025	147	.016	147.01	.016
204	.016								

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr.
Expan.

0	204.01	55.2	55.2	55.2	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
147	204	2312

CROSS SECTION RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 8221.80

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2307.28	27.28	2307.31	42.86	2306.99	47.82	2306.99	71	2306.57
83.95	2306.35	86	2306.34	86.01	2306.1	97.14	2306.35	119.24	2306.81
133	2307	147	2307.7	147.01	2309.52	203	2309.52		

Manning's n Values num= 13

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	27.28	.016	42.86	.016	47.82	.016	71	.037
83.95	.037	86	.016	86.01	.016	97.14	.016	119.24	.016
133	.025	147	.016	147.01	.016				

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr.
Expan.

0	203	48.8	48.8	48.8	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
147	203	2310

CROSS SECTION RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 8173.00

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2306.93	2.24	2307	22.12	2307	62.5	2306	68	2306
85	2306	110	2305.6	132.05	2306	139.74	2306.06	161.54	2306.99
205.13	2306.99	217.31	2307.13	252.56	2308	256.09	2307.99	260	2308.33

Manning's n Values num= 14

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	2.24	.016	22.12	.016	62.5	.016	68	.025
85	.016	110	.016	132.05	.016	139.74	.016	161.54	.016
205.13	.016	217.31	.016	252.56	.016	256.09	.016		

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr.
Expan.

0	260	18	18	18	.1	.3

CROSS SECTION RIVER: RANCHO ROAD

22

REACH: 95 TO GOWAN RS: 8155

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2306.99	7.33	2306.99	16.23	2306.99	53.41	2306.01	68	2306.01
78	2306.01	110	2305.4	129.35	2306.01	153.7	2306.99	195.59	2306.99
252.62	2307.99	260	2308.48						

Manning's n Values num= 12

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.016	7.33	.016	16.23	.016	53.41	.016	68	.025
78	.016	110	.016	129.35	.016	153.7	.016	195.59	.016
252.62	.016	260	.016						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.	
0	260	216	216	216	.1 .3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
157	190	2311

CROSS SECTION RIVER: RANCHO ROAD
REACH: 95 TO GOWAN RS: 7939

INPUT
Description:
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2304.8	45	2304.1	76	2304	93	2302.2	114	2304
146	2306	255	2306.7						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.016	45	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.	
0	255	361	361	361	.1 .3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
148	236	2308

SUMMARY OF MANNING'S N VALUES

River:RANCHO ROAD

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7	n8	n9	n10	n11	n12	n13	n14
95 TO GOWAN	9205	.016	.03												
95 TO GOWAN	9114	.016	.03												
95 TO GOWAN	9060	.016	.03												

23

95 TO GOWAN	8950			.016	.03		
95 TO GOWAN	8668			.016	.03		
95 TO GOWAN	8476			.016	.016	.025	.016
.016	.016	.016	.016	.016	.016	.016	
95 TO GOWAN	8410			.016	.016	.016	.016
.037	.037	.016	.016	.016	.016	.016	.016
95 TO GOWAN	8277			.016	.016	.025	.025
.016	.016	.016	.025	.016	.016	.016	
95 TO GOWAN	8221.80			.016	.016	.016	.016
.037	.037	.016	.016	.016	.016	.025	.016
.016							
95 TO GOWAN	8173.00			.016	.016	.016	.016
.025	.016	.016	.016	.016	.016	.016	.016
.016	.016						
95 TO GOWAN	8155			.016	.016	.016	.016
.025	.016	.016	.016	.016	.016	.016	.016
95 TO GOWAN	7939			.016	.03		

SUMMARY OF REACH LENGTHS.

River: RANCHO ROAD

Reach	River Sta.	Left	Channel	Right
95 TO GOWAN	9205	91	91	91
95 TO GOWAN	9114	54	54	54
95 TO GOWAN	9060	110	110	110
95 TO GOWAN	8950	282	282	282
95 TO GOWAN	8668	192	192	192
95 TO GOWAN	8476	66	66	66
95 TO GOWAN	8410	133	133	133
95 TO GOWAN	8277	55.2	55.2	55.2
95 TO GOWAN	8221.80	48.8	48.8	48.8
95 TO GOWAN	8173.00	18	18	18
95 TO GOWAN	8155	216	216	216
95 TO GOWAN	7939	361	361	361

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: RANCHO ROAD

Reach	River Sta.	Contr.	Expan.
95 TO GOWAN	9205	.1	.3
95 TO GOWAN	9114	.1	.3
95 TO GOWAN	9060	.1	.3
95 TO GOWAN	8950	.1	.3
95 TO GOWAN	8668	.1	.3
95 TO GOWAN	8476	.1	.3
95 TO GOWAN	8410	.1	.3
95 TO GOWAN	8277	.1	.3

24

95 TO GOWAN	8221.80	.1	.3
95 TO GOWAN	8173.00	.1	.3
95 TO GOWAN	8155	.1	.3
95 TO GOWAN	7939	.1	.3

APPENDIX J

Northwest Neighborhood Study

Figure E-12 & Figure F-12

CITY OF LAS VEGAS NEVADA

NORTHWEST NEIGHBORHOOD STUDY

LEGEND

SUB-BASIN BOUNDARY

FLOW ARROW

250	10-YEAR STREET FLOW
500	100-YEAR STREET FLOW
300	10-YEAR FACILITY FLOW
800	100-YEAR FACILITY FLOW

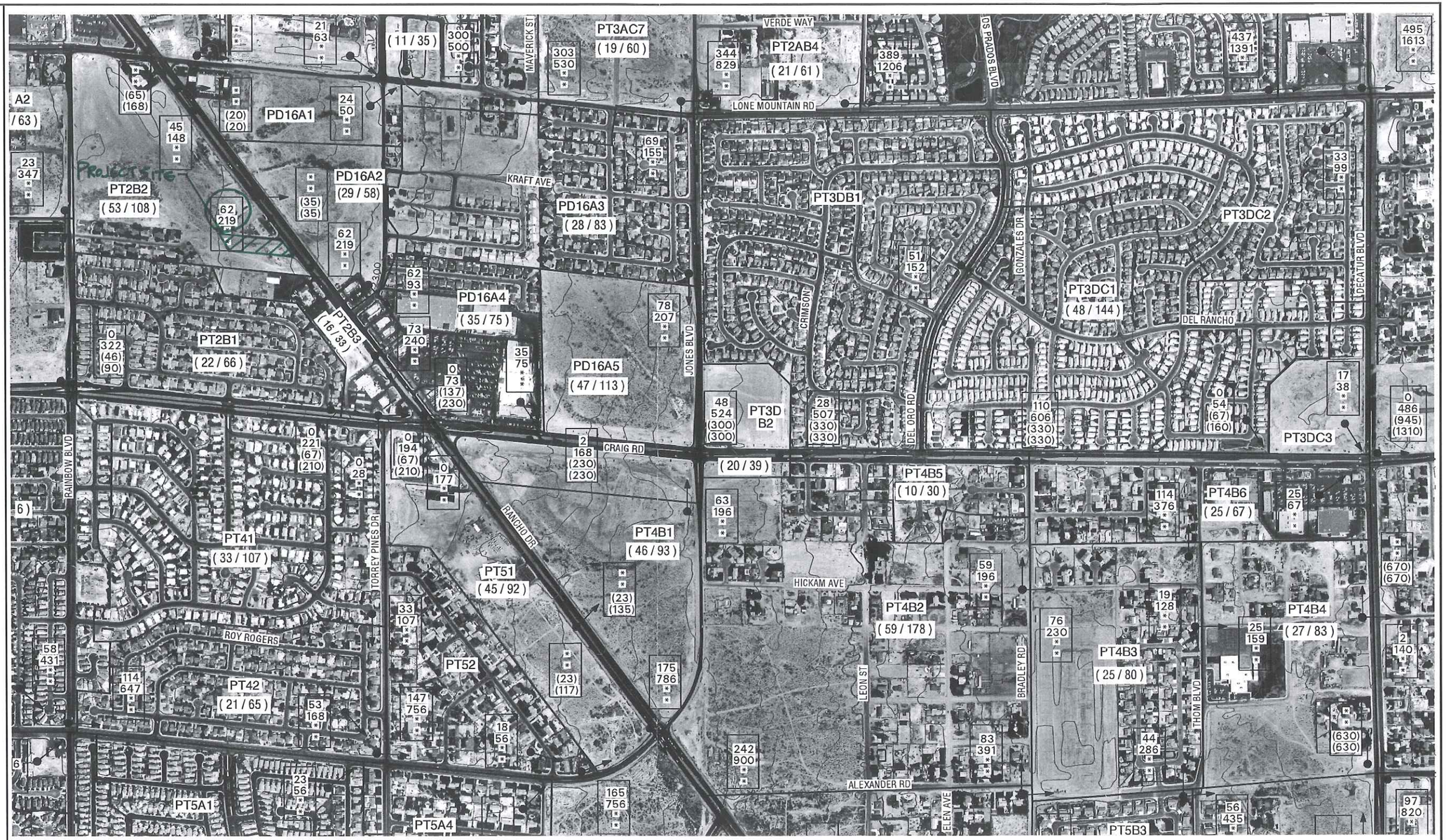
(FLOWS IN CFS)

BWJS ←→ Basin-ID

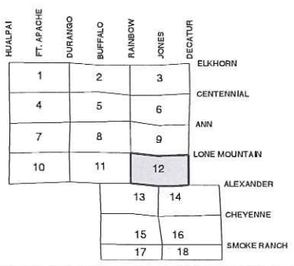
(13 / 59) ←→ Contributing flow (10-Year / 100-Year) from the basin (cfs)

PHOTO DATE: APRIL 1996

FIGURE E-12



EXISTING DRAINAGE CONDITIONS



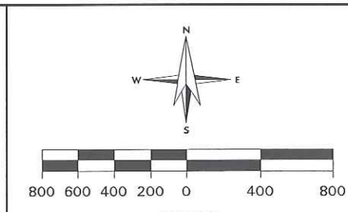
POST, BUCKLEY, SCHUH & JERNIGAN, INC.

ENGINEERING PLANNING SURVEYING GIS

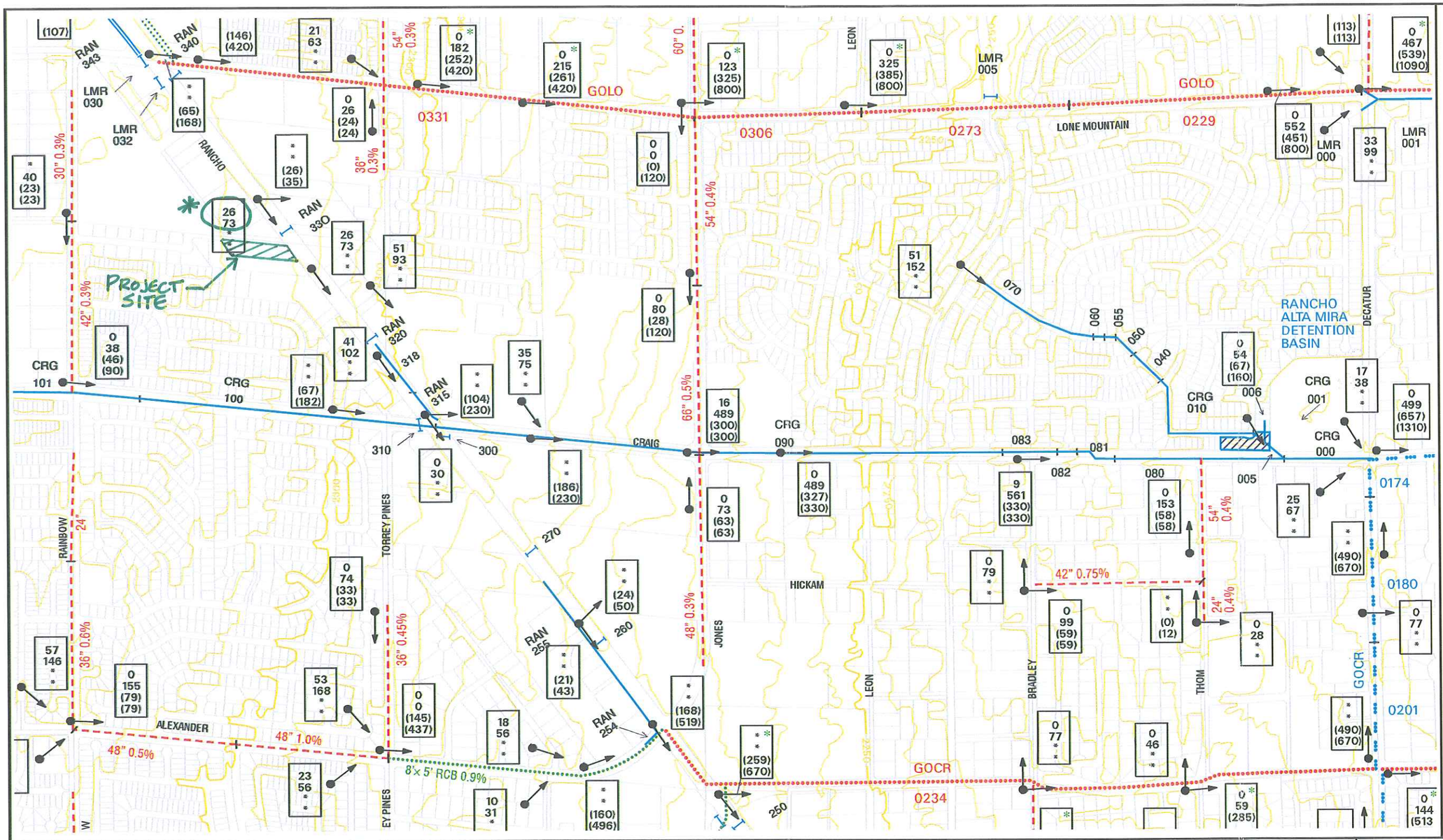
901, N. Green Valley Pkwy, Ste 100, Henderson NV 89014
Phone: (702) 263-7275 Fax: (702) 263-7200

NOTE:

Existing conditions are based on future CN values with only existinig local and CCRFCD facilities in place



SCALE: 1 INCH = 800 FEET



NORTHWEST NEIGHBORHOOD STUDY

LEGEND

- EXISTING REGIONAL DETENTION BASINS
- PROPOSED REGIONAL DETENTION BASINS
- EXISTING LOCAL DETENTION BASINS
- EXISTING REGIONAL BRIDGES
- PROPOSED REGIONAL BRIDGES
- EXISTING LOCAL BRIDGES
- EXISTING REGIONAL CULVERT
- PROPOSED REGIONAL CULVERT
- EXISTING LOCAL CULVERT
- EXISTING REGIONAL PIPELINE
- PROPOSED REGIONAL PIPELINE
- EXISTING LOCAL PIPELINE
- PROPOSED LOCAL PIPLINE
- EXISTING REGIONAL CHANNEL
- PROPOSED REGIONAL CHANNEL
- EXISTING LOCAL CHANNEL
- PROPOSED REGIONAL PIPELINE (Not included in 1996 MPU)
- PROPOSED REGIONAL CHANNEL (Not included in 1996 MPU)
- EXISTING REGIONAL DIKE/LEVEE
- PROPOSED REGIONAL DIKE/LEVEE
- EXISTING LOCAL DIKE/LEVEE
- EXISTING STORM WATER PUMPING STATION
- PROPOSED BELTWAY ALIGNMENT

FIGURE F-12

N W E S

800 600 400 200 0 400 800

(IN FEET)

SCALE: 1 INCH = 800 FEET

→ FLOW ARROW

250	10-YEAR STREET FLOW
500	100-YEAR STREET FLOW
(300)	10-YEAR FACILITY FLOW
(800)	100-YEAR FACILITY FLOW

(FLOWS IN CFS)

NOTE:

Ultimate drainage conditions are based on future CN values with all flood control facilities in place

* The capacity of the proposed regional facility is based on the "1996 Clark County Regional Flood Control Master Plan Update for the Las Vegas Valley." The facility may need to be enlarged in final design.

HUALPAI	FT. APACHE	DURANGO	BUFFALO	RAINBOW	JONES	DECATUR	
1		2		3			ELKHORN
4		5		6			CENTENNIAL
7		8		9			ANN
10		11		12			LONE MOUNTAIN
				13	14		ALEXANDER
				15	16		CHEYENNE
				17	18		SMOKE RANCH

FUTURE DRAINAGE CONDITIONS

POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERING PLANNING SURVEYING GIS
901, N. Green Valley Pkwy, Ste 100, Henderson NV 89014
Phone: (702) 263-7275 Fax: (702) 263-7200

APPENDIX K

Planning and Zoning Conditions

SDR-41578 & VAR-41579

LAS VEGAS CITY COUNCIL

OSCAR B. GOODMAN
MAYOR

GARY REESE
MAYOR PRO TEM

STEVE WOLFSON
LOIS TARKANIAN
STEVEN D. ROSS
RICKI Y. BARLOW
STAVROS S. ANTHONY

ELIZABETH N. FRETWELL
CITY MANAGER

June 15, 2011

The Tass C. Hardin & Lois I. Hardin Revocable Family Trust
4095 North Chieftain Street
Las Vegas, Nevada 89129

RE: VAR-41579 - VARIANCE RELATED TO SDR-41578
PLANNING COMMISSION MEETING OF JUNE 14, 2011

Dear Applicant:

Your request for a Variance TO ALLOW 30 PARKING SPACES WHERE 47 ARE REQUIRED on 1.18 acres at the southwest corner of Red Coach Avenue and Rancho Drive (APN 138-02-202-015), C-2 (General Commercial) Zone, Ward 6 (Ross), was considered by the Planning Commission on June 14, 2011.

The Planning Commission voted to ***APPROVE*** your request, subject to the following:

Planning

1. Approval of and conformance to the Conditions of Approval Site Development Plan Review (SDR-41578) date stamped 5/23/11 shall be required, if approved.

2. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.18. An Extension of Time may be filed for consideration by the City of Las Vegas.

3. Prior to occupancy, all necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

4. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.

5. All City Code requirements and design standards of all City departments must be satisfied, except as modified herein.

CITY OF LAS VEGAS
DEPARTMENT OF PLANNING
DEVELOPMENT SERVICES CENTER
333 NORTH RANCHO DRIVE
3RD FLOOR
LAS VEGAS, NEVADA 89106

VOICE 702.229.6301
FAX 702.474.0352
TTY 702.386.9108
www.lasvegasnevada.gov

This action by the Planning Commission on **June 14, 2011** is final unless a written appeal is filed with the City Clerk within ten days of the date of the Planning Commission's decision as allowed by code or there is a review action filed by the City Council within the same time period. For additional information on appeals or review requests please access http://www.lasvegasnevada.gov/CheckStatus/DevelopmentApp.htm, or contact the Department of Planning and Development at 702.229.6301 after ***June 27, 2011***. No building permits or business licenses related to these items shall be issued prior to the expiration of the required ten day waiting period, or until any filed appeal is resolved pursuant to LVMC Title 19.18.

Sincerely,

Steve Gebeke, AICP
Planning Supervisor
Case Planning Division

SG:clb

cc: Ms. Carrie Gillis
Jones Lang LaSalle
515 South Flower Street, Suite #1300
Los Angeles, California 90071

Mr. Bob Gronauer
Kaempfer Crowell Renshaw Gronauer & Fiorentino
8345 West Sunset Road, Suite #250
Las Vegas, Nevada 89113

LAS VEGAS CITY COUNCIL

OSCAR B. GOODMAN
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RICKI Y. BARLOW
STAVROS S. ANTHONY

ELIZABETH N. FRETWELL
CITY MANAGER

June 15, 2011

The Tass C. Hardin & Lois I. Hardin Revocable Family Trust
4095 North Chieftain Street
Las Vegas, Nevada 89129

RE: SDR-41578 - SITE DEVELOPMENT PLAN REVIEW RELATED TO VAR-41579
PLANNING COMMISSION MEETING OF JUNE 14, 2011

Dear Applicant:

Your request for a Site Development Plan Review FOR AN 8,500 SQUARE-FOOT AUTO REPAIR GARAGE, MINOR on 1.18 acres at the southwest corner of Red Coach Avenue and Rancho Drive (APN 138-02-202-015), C-2 (General Commercial) Zone, Ward 6 (Ross), was considered by the Planning Commission on June 14, 2011.

The Planning Commission voted to ***APPROVE*** your request, subject to the following:

Planning

1. Approval of and conformance to the Conditions of Approval for Variance (VAR-41579) shall be required, if approved.

2. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.18. An Extension of Time may be filed for consideration by the City of Las Vegas.

3. All development shall be in conformance with the building elevations and floor plans date stamped 04/27/11 and the site and landscape plans date stamped 05/23/11, except as amended by conditions herein.

4. An Exception from Title 19.10 is hereby approved, to allow no parking lot landscape fingers where three are required.

CITY OF LAS VEGAS
DEPARTMENT OF PLANNING
DEVELOPMENT SERVICES CENTER
333 NORTH RANCHO DRIVE
3RD FLOOR
LAS VEGAS, NEVADA 89106

VOICE 702.229.6301
FAX 702.474.0352
TTY 702.386.9108
www.lasvegasnevada.gov

5. Any changes based upon right-of-way, traffic or drainage studies or street improvements required by the city or public utilities shall not reduce the widths of perimeter landscape buffers, height of walls or quantities of plant materials from that on submitted landscape plans date stamped 05/23/11. Any changes based upon subsequently submitted studies must be accommodated elsewhere on the site.

6. Prior to occupancy, all necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

7. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.

8. A technical landscape plan, signed and sealed by a Registered Architect, Landscape Architect, Residential Designer or Civil Engineer, must be submitted prior to or at the same time application is made for a building permit. The technical landscape plan shall be revised to provide one 24-inch box size tree for every 20 lineal feet along the north perimeter (17 trees) and one 24-inch box size tree for every 30 lineal feet along the south perimeter (16 trees). Four, five-gallon shrubs shall be provided for every required tree. A permanent underground sprinkler system is required, and shall be permanently maintained in a satisfactory manner; the landscape plan shall include irrigation specifications. Installed landscaping shall not impede visibility of any traffic control device.

9. Reflective glazing at the pedestrian level is prohibited. Glazing above the pedestrian level shall be limited to a maximum reflectance rating of 22% (as defined by the National Institute of Standards and Technology).

10. All mechanical equipment, air conditioners and trash areas shall be fully screened in views from the abutting streets.

11. All utility boxes exceeding 27 cubic feet in size shall meet the standards of LVMC Title 19.12.040.

12. Parking lot lighting standards shall be no more than 30 feet in height and shall utilize downward-directed lights with full cut-off luminaries. Lighting on the exterior of buildings shall be shielded and shall be downward-directed. Non-residential property lighting shall be directed away from residential property or screened, and shall not create fugitive lighting on adjacent properties.

13. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.

14. All City Code requirements and design standards of all City Departments must be satisfied, except as modified herein.

Public Works

15. Remove all substandard improvements adjacent to this site, if any, and replace with new improvements meeting current City Standards concurrent with development of this site. All existing paving damaged or removed by this development shall be restored at its original location and to its original width concurrent with development of this site.

16. Unless otherwise allowed by the City Engineer, construct sidewalk on at least one side of all access drives connecting this site to the adjacent public streets concurrent with development of this site. The connecting sidewalk shall extend from the sidewalk on the public street to the first intersection of the on-site roadway network and shall be terminated on-site with a handicap ramp.

17. As appropriate obtain an Encroachment Agreement from the City of Las Vegas or obtain an Occupancy Permit from the Nevada Department of Transportation (NDOT) for all landscaping or other private improvements in the Rancho Drive public right-of-way adjacent to this site prior to constructing any improvements within NDOT jurisdiction.

18. All landscaping and private improvements installed with this project shall be situated and maintained so as to not create sight visibility obstructions for vehicular traffic at all development access drives and abutting street intersections.

19. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits or submittal of any construction drawings, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage plan/study. The developer of this site shall be responsible to construct such neighborhood or local drainage facility improvements as are recommended by the City of Las Vegas Neighborhood Drainage Studies and approved Drainage Plan/Study concurrent with development of this site.

This action by the Planning Commission on **June 14, 2011** is final unless a written appeal is filed with the City Clerk within ten days of the date of the Planning Commission's decision as allowed by code or there is a review action filed by the City Council within the same time period. For additional information on appeals or review requests please access http://www.lasvegasnevada.gov/CheckStatus/DevelopmentApp.htm, or contact the Department of Planning and Development at 702.229.6301 after ***June 27, 2011***. No building permits or business licenses related to these items shall be issued prior to the expiration of the required ten day waiting period, or until any filed appeal is resolved pursuant to LVMC Title 19.18.

Sincerely,

Steve Gebeke, AICP
Planning Supervisor
Case Planning Division

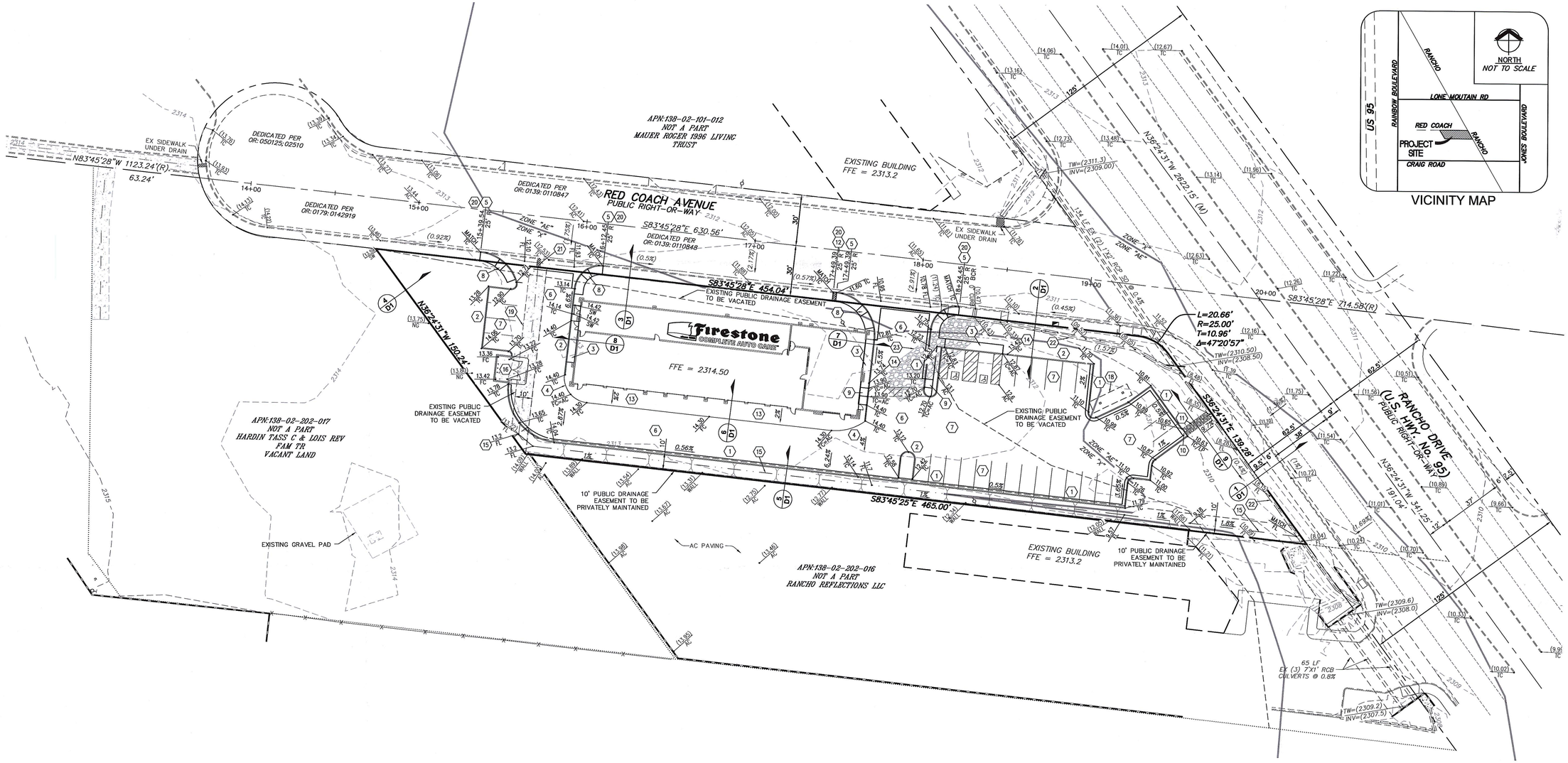
SG:clb

cc: Ms. Carrie Gillis
Jones Lang LaSalle
515 South Flower Street, Suite #1300
Los Angeles, California 90071

Mr. Bob Gronauer
Kaempfer Crowell Renshaw Gronauer & Fiorentino
8345 West Sunset Road, Suite #250
Las Vegas, Nevada 89113

APPENDIX L

Plan, Profile and Detail Sheets



FLOOD ZONE

A PORTION OF THIS SITE IS LOCATED IN ZONE "AE", AREAS WHERE BASE FLOOD ELEVATIONS HAVE BEEN DETERMINED, PER THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL 32003C2155 E. CLARK COUNTY, NEVADA DATED SEPTEMBER 27, 2002, REVISED TO REFLECT LOMAR DATED JANUARY 12, 2006.

FLOOD ZONE "AE" DEPICTED ON PLAN REFLECTS PROPOSED CONDITION AND WILL BE SUBMITTED AS PART OF A CLOMAR TO FEMA FOR THIS PROJECT.

BASIS OF BEARING

NORTH 83°40'36" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 2, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN FILE 111, PAGE 12 OF OFFICIAL RECORDS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

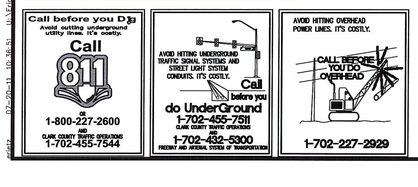
BENCHMARK

BENCHMARK STATION: BLVOD 2C4N

RIVET AND ROUND ALUMINUM PLATE IN THE TOP OF CURB, 4521 N RANCHO DR AND 100' SW OF P.I. OF TORREY PINES DR AND RANCHO DR.

ELEVATION = 2303.01 FEET, 701.959 METERS
N.A.V.D. 88 DATUM

PER THE CITY OF LAS VEGAS VERTICAL CONTROL V.2008 UPDATED 2010



NOTES

1. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING STRUCTURES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.
2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
3. OWNER RESPONSIBLE TO PROVIDE SURVEY MONUMENTATION AS SHOWN AND TO REPLACE ALL SURVEY MONUMENTATION DAMAGED, DISTURBED, DESTROYED OR OBSCURED DURING CONSTRUCTION.

GRADING

1. CONSTRUCT "L" CURB AND GUTTER PER CCAUSD #216
2. CONSTRUCT "A" CURB AND GUTTER PER CCAUSD #219
3. CONSTRUCT SIDEWALK PER CCAUSD #234
4. 6"-0" AC TRANSITION
5. CONSTRUCT 32' (FACE TO FACE) WIDE COMMERCIAL DRIVEWAY PER CCAUSD #222A AND #222B
6. MAIN CORRIDOR (TRUCK ACCESS) INSTALL 4" AC OVER 5" TYPE II AGGREGATE BASE PER GEOTECH REPORT PREPARED BY TERRACON MAY 12, 2011
7. AUTOMOBILE ROUTE / PARKING. INSTALL 3" AC OVER 5" TYPE II AGGREGATE BASE PER GEOTECH REPORT PREPARED BY TERRACON MAY 12, 2011
8. CONSTRUCT HANDICAP RAMPS PER CCAUSD #235 CASE III A AND B = 8' UNLESS OTHERWISE NOTED
9. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIV. PER LATEST ADA GUIDE LINE
10. CONSTRUCT 5' CURB CUT
11. INSTALL RIP-RAP PAD D_{50}=6", 12" DEEP (PAD SIZE PER PLAN) SEE DETAIL 9 SHEET D1
12. INSTALL SIDEWALK UNDER DRAIN PER CCAUSD # 236
13. CONCRETE APRON. INSTALL 5" CONCRETE OVER 4" TYPE II AGGREGATE BASE PER GEOTECH REPORT PREPARED BY TERRACON MAY 12, 2011
14. CONSTRUCT 3' CURB TRANSITION PER DETAIL 10 ON SHEET D1
15. CONSTRUCT EARTH SWAIL AT MIN 1% SLOPE
16. INSTALL TRASH ENCLOSURE, SEE ARCHITECTURAL PLANS FOR DETAILS
17. SAWCUT (CLEAN), REMOVE CURB, GUTTER, & SIDEWALK
18. EXISTING BILLBOARD SIGN TO REMAIN IN PLACE
19. REMOVE EXISTING CONCRETE VALLEY GUTTER
20. REMOVE EXISTING CURB, GUTTER, AND SIDEWALK
21. REMOVE EXISTING SIDEWALK UNERDRAIN
22. EXISTING VALLEY GUTTER TO REMAIN IN PLACE
23. REMOVE EXISTING RIP-RAP TRACK OUT PAD

LEGEND

- 2500 — INDEX CONTOUR (5' INTERVAL)
- INTERMEDIATE CONTOUR (1' INTERVAL)
- CENTERLINE
- RIGHT-OF-WAY
- PROPERTY LINE
- EASEMENT
- EXISTING CMU WALL
- EXISTING EDGE OF PAVEMENT
- PROPOSED FLOW LINE
- EXISTING CHAIN LINK FENCE
- EXISTING UTILITY POLE
- EXISTING SIDEWALK UNDER DRAIN

PROPOSED		EXISTING	
00.00 TC	TOP BACK CURB	(00.00) TC	TOP BACK CURB
00.00 FG	FINISH GRADE	(00.00) FG	FINISH GRADE
00.00 EP	EDGE OF PAVEMENT	(00.00) EP	EDGE OF PAVEMENT
00.00 FL	FLOW LINE	(00.00) FL	FLOW LINE
00.00 AC	ASPHALT CONCRETE	(00.00) AC	ASPHALT CONCRETE

APN # 138-02-202-015

DATUM

ADD 2300.00 TO PLAN GRADES, EXCEPT FOR CONTOURS.
TOPOGRAPHY BY AERIAL FLIGHT PROVIDED BY OTHERS
CONTOUR INTERVAL = 1'

GEOTECHNICAL REPORT

PROJECT No. 64115013
DATED: MAY 12, 2011
AS PREPARED BY: TERRACON

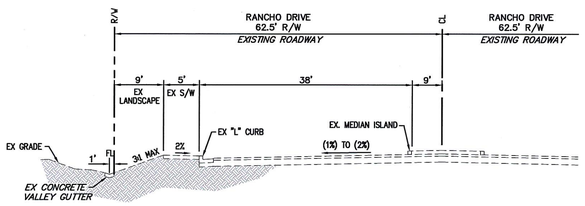
I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY CLV # XXX FOR THIS SITE ON FILE AT CITY OF LAS VEGAS FOR THIS PROJECT.

ERIC J. RIETZ, P.E. No. 16350 — DATE 7/20/11

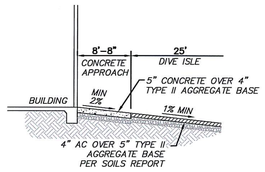
DRAINAGE QUANTITIES

ITEM	
1 EA	SIDEWALK UNDER DRAIN
1 EA	RIP-RAP PAD D_{50}=6", 12" DEEP, 5'x17.5'

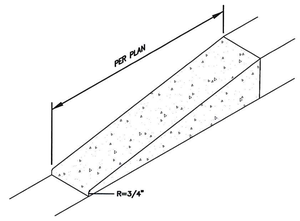
SCALE: 1"=30'
30 15 0 30



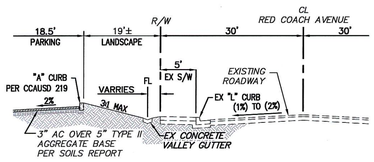
① RANCHO DRIVE (PUBLIC)
NTS



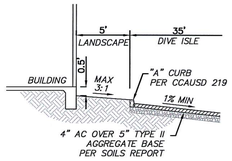
⑥ SECTION (PUBLIC)
NTS



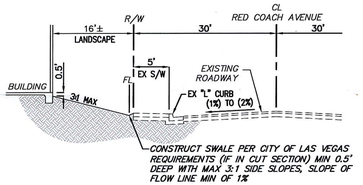
⑩ DEPRESSED CURB
NTS



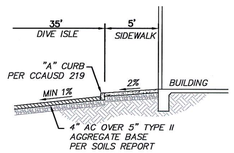
② RED COACH AVENUE (PUBLIC)
NTS



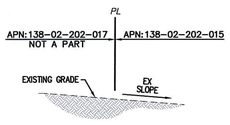
⑦ SECTION (PUBLIC)
NTS



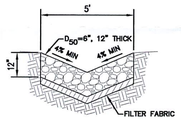
③ RED COACH AVENUE (PUBLIC)
NTS



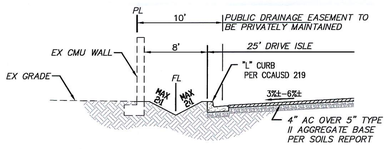
⑧ SECTION (PUBLIC)
NTS



④ SECTION (PRIVATE)
NTS



⑨ SECTION (PUBLIC)
NTS



⑤ SECTION (PRIVATE)
NTS

GEOTECHNICAL REPORT

PROJECT No. 64115013
DATED: MAY 12, 2011
AS PREPARED BY: TERRACON

REV:	DATE:	DESCRIPTION:

CLIENT: Firestone COMPLETE AUTO CARE

PREPARED:
RIETZ CONSULTING INC.
5740 SOUTH ARVILLE STREET, #206
LAS VEGAS, NEVADA 89118
PH:702.521.3355 FX:702.212.3963

SHEET: DETAIL SHEET

PROJECT:
FIRESTONE
RANCHO DRIVE/RED COACH AVENUE
CITY OF LAS VEGAS
APN 138-02-202-015

DATE:	DRAFTER:	CHECKED:	SCALE
7/20/2011	RES	EJR	NTS

PROFESSIONAL ENGINEER - STATE OF NEVADA
ERIC J. RIETZ
Exp: 12/31/11
CIVIL
No. 16350
7/20/11

SHEET
C4
SHEET 4 OF X SHEETS

CLV DWG #
XXXXXXXX