DS #: 5165

APN: 125.10.404.001 & 002

PROJECT: Reed and Tenaya

SUBMITTAL: 1st

SCANNED BY/DATE: _____

CHECKED BY/DATE: _____

CITY OF LAS VEGAS NEVADA

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: 3/20/2019
TO: **Land Development Services** Department of Building & Safety				FROM: Jennifer Shinn, P.E. Flood Control, Engr. Associate Department of Public Works
SUBJECT:	Drainage Study for: **Racel and Tenaya**			**COPIES TO:** Taney Engineering
Cross Streets:	Tenaya Way and Racel Street			Andrew Acuna
File Number:	F:\Depot\DSMemos\DS5105A.doc			Bart Anderson, P.E., DevCo
Parcel Number:	125-10-010-001 & -002			CCPW
Zoning Action:	TMP-74347			
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES X	NO		

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	2/21/2019	3/20/2019	See Comments Below	$400	$400
			TOTAL FEES (LDDRS):	**$400**	**----**

REMARKS:

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

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

1. The site is adjacent to Clark County's jurisdiction. The engineer must coordinate with Clark County Department of Public Works (CCPW) and incorporate any concerns for boundary conditions along the Monte Cristo, Tenaya, and the southern border of the subject site. CCPW concurrence is required prior to final acceptance of the study.
2. Private streets must be public drainage easements. Provide a note on the grading plans "Note: All private streets are P.U.E., Public Sewer Easements, and Public Drainage Easements to be privately maintained by HOA."
3. Drainage is perpetuated through the backyards of multiple lots. Provide a "Public Drainage Easement to be Privately Maintained" and show the easement on the grading plan. Public drainage easements must be recorded by separate document prior to the final acceptance of the improvement plans unless they are to be recorded by parcel or final map.
4. The engineer must provide a table on the grading plans that shows a quantity estimate of all drainage improvements within Public Drainage Easements. All drainage improvements within Public Drainage Easements must be bonded and inspected.
5. All drainage easements must be public drainage easements to be privately maintained and common lots to be labeled on the grading plans and to be dedicated as such in the final map. The minimum width for a public drainage easement is 10' if the 100-year flow is less than 20-cfs.
6. Provide a detail of the 30' valley gutter transitioning to the 3' valley gutter.

7. Provide a hydraulic section for the 3' valley gutter to demonstrate the flows are contained and properly discharged from the site.
8. The proposed wrought iron fence must utilize RTC Uniform Standard Drawing 425.S1.

In an effort to increase administrative efficiency, for all original and re-submittal packages including updates and the addenda, the City of Las Vegas Public Works Department requires both a hardcopy and a digital copy (PDF) on CD for the drainage study.

A letter sealed and signed by a Nevada registered civil engineer must be included in every submittal certifying documents on the electronic CD matches 100% of the hardcopy submittal. The new submittal requirement is effective on May 1, 2019. If there are any questions regarding these new requirements, please contact Albert Sung in the City Flood Control Section at (702) 229-6541.

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
JKS

T/R/S: T19S/R60E/S10
AREA G-10

TECHNICAL DRAINAGE STUDY

FOR

Racel and Tenaya

Residential Development

ADV-18-110

Racel and Tenaya

City of Las Vegas

February 2019

Prepared for:

Andrew Acuna
Adaven Homes
3425 Cliff Shadows Pkwy.
Las Vegas, Nevada, 89129
(702) 365-8588



TANEY ENGINEERING

6030 S. Jones Blvd.
Las Vegas, NV 89118
Phone (702) 362-8844
Fax (702) 362-5233

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Racel & Tenaya Residential Development Date: Feb 21, 2019

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

East/West: Racel

b) Section: 10 Township: 19S Range: 60E

c) APN : 125-10-404-001 & 002

Name of Owner: Andrew Acuna

Telephone No.: (702)365-8588 Fax No.: E-Mail Address: andrewa@summithomesnv.com

Address: 3425 Cliff Shadows Pkwy, Las Vegas, NV 89129

Contact Person-Name: Lee Gong, Ph.D, P.E., CFM **Telephone No.:** (702) 362-8844

* **E-Mail Address:** LeeG@taneycorp.com **Fax No.:** (702) 362-5233

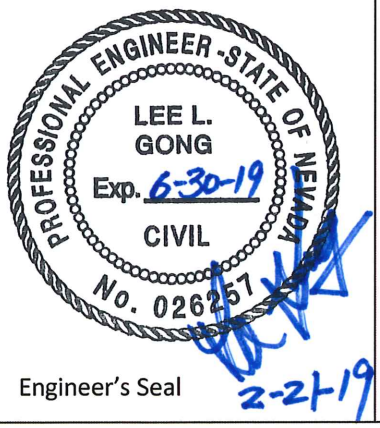
Firm: Taney Engineering

Address: 6030 S. Jones, Suite 100, Las Vegas NV. 89118

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: 4.04+/- acres Being Developed/Disturbed: 4.04+/- acres
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ **Yes**** ☒ **No**
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ **Yes**** ☒ **No**
4. Proposed type of development (Residential, Commercial, Etc.): Residential
5. Approximate upstream land area which drains to the subject site:
6. Has the site drainage been evaluated in the past? ☐ **YES** ☒ **NO** If yes, please identify documentation:
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: The site will discharge to Tenaya Way
8. Briefly describe your proposed schedule for the subject project: A.S.A.P



Engineer's Seal

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

***New Required Field**

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

Revision	Date

Local Entity File No.

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name:	Racel & Tenaya	Map ID:			
Firm Name:	TANEY ENGINEERING	Engineers:	Lee Gong, Ph.D, P.E., CFM		
Address:	6030 S. JONES BLVD				
City:	LAS VEGAS	State:	NV	Zip:	89118
Phone Number:	(702)-362-8844	Fax Number:	(702)-362-5233		
Property Owner:	Adaven Homes				
Address:	3425 Cliff Shadows Pkwy				
City:	LAS VEGAS	State:	NV	Zip:	89129

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 the 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"x36" Drainage Plan
	X	A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.

II. MAPS AND EXHIBITS

X		A copy of a current Flood Insurance Map (FIRM) with the site delineated.
X		A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental area with the site delineated.

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

Yes	No	
X		Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
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.

II. DRAINAGE PLAN

Yes	No	
X		Sheet size: 24”x36” 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/consultants’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.
X		Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where applicable.
X		Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
X		Proposed typical street sections

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
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 basin(s) 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.
		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.) starting 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 is 16” x 48”. Wrought iron gate is required for flows > 10 cfs.
X		Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
X		Perimeter retaining wall locations. All existing and proposed walls (retaining, screen & flood) must be shown with adjacent elevations. Flood wall with 8-inch concrete masonry unit.
X		Building and/or lot numbers
	N/A	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
	N/A	Limits of existing floodplain based on current FIRM or best available information, limits of proposed floodplains based on best available information

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
	N/A	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 flood elevations must be a minimum of 18 inches above BFE.
X		Appropriately elevated "humps" 6 inches above the 100 year water surface elevations 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.
	N/A	Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required)

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 stormwater flows showing basin area, Q_{10} and Q_{100} for both individual basins and combined basin flows, where applicable.
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
	N/A	Calculation for impervious area for parking lots and LIDs (if required)

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
X		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 ≤ 8. Q_{10} d x v ≤ 6 and 12 foot dry lane rights-of-way ≥ 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 fee 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 be provided with 18 inches of freeboard above Q_{100} weir height or flow depth, which ever is greater.
	N/A	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 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 calculations 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.
	N/A	The mitigation of nuisance water, both during construction and in fully developed condition, must be addressed.
	N/A	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:	STANDARD FORM 2

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1 INTRODUCTION AND GENERAL INFORMATION

1.1 Introduction

Adaven Homes is proposing to develop a new residential community on the west side of Tenaya Way and south of the Racel Street alignment. This residential development covers approximately 4.04 acres and will include 10 residential homes. This technical drainage study presents detailed hydrologic and hydraulic analyses for the existing and proposed onsite and offsite development, as required in the *Clark County Regional Flood Control District Hydrologic Criteria and Design Manual* (*HC&DDM*).

1.2 Location of Property

In general, the subject site is located west side of the Tenaya Way and south of the Racel Street in Las Vegas, Nevada. The site is located within a portion of the East Quarter (NW ¼) of the Southwest Quarter (SW ¼) of Section 10, Township 19 South, Range 60 East M.D.M., Las Vegas, Nevada. See Figure 1, *Vicinity Map*, and Figure 2, *Location Map*.

1.3 Description of Property

The project site consists of two parcels, totaling 4.04 acres. Specifically, the site includes APN 125-10-404-001, and 002. The site is bounded on the east by Tenaya Way, on the west by Monte Cristo Way, on the north by Racel Street, and on the south by residential developments. Monte Cristo Way is unimproved and Racel Street is partially improved with asphalt pavement and graded roadside ditches on one side. The site exists in a natural desert condition, having shallow alluvial streams, sloping from northwest to southeast at a slope of approximately 0.6 percent.

1.4 Floodplain Information

The Federal Emergency Management Agency (FEMA), Flood Insurance Rate Map (FIRM), Community Panel Numbers 32003C1745E, effective September 27, 2002, designates the project site as Zone 'X'. Zone 'X' is described as an area determined to be outside the 0.2% annual chance floodplain. See Figure 3 in Appendix A for the most current panel being used in this study.

1.5 Master Planning Information

1.5.1 CCRFCD 2013 Master Plan Update

As shown on Figure F-19 of the Las Vegas Valley Flood Control Master Plan Update of the Clark County Regional Flood Control District (MPU), the site is not bordered or crossed by any planned or existing regional flood control facilities. See Figures 4, 5A, 5B, 5C and 5D for reproductions of the MPU figures for the project site.

1.5.2 Northwest Neighborhood Study by City of Las Vegas, revised Sept. 1999

The project site is located on Figures E-9 and F-9 of the City of Las Vegas Northwest Neighborhood Study. An environmental basin has been built upstream of the project site

since September 1999 (see Figures 5A to 5D) that impacts flow magnitude to the project site. The effect of the environmental basin on the flow magnitude was considered to calculate flows at Racel Street and Buffalo Drive intersection, see Figures 6A and 6B. Refer to Figures 6A, 6B, 6C and 6D of this study for reproductions of these figures.

1.6 Topographic Information

Topographic information for this project was gathered from a number of sources including:

1. Field topographic survey completed by Taney Engineering and consultants at a 1-foot contour interval.
2. Two (2) foot LIDAR contour data provided by Clark County around 2016.

2 METHODOLOGY AND CRITERIA

2.1 Compliance with Regulations and Adopted Plans

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, local entity requirements and the approved zoning/planning conditions associated with this site.

2.2 Hydrologic Methodology and Criteria

Hydrologic methodologies used in this study are in accordance with Sections 500 and 600 of the HCDDM. Discussion of specific parameters, methodologies and calculations can be found in Appendix B, Hydrologic Calculations.

2.3 Hydraulic Methodology and Criteria

Hydraulic methodologies used in this study in accordance with the HCDDM. FlowMaster has been used to assist in hydraulic calculations. Excel spreadsheets have also been used for any other necessary calculations. Hydraulic calculations can be found in Appendix C.

3 DRAINAGE SUMMARY

3.1 General Description

The project site is impacted from surface runoff from Racel Street. This flow splits at the Racel/Monte Cristo intersection toward the project site. A hump will be built at the entrance of the project site to prevent the flow from entering the site. The site itself will be developed as residential homes with a minimum lot size of 14,000sf. In the existing condition, there is one onsite basin. For the interim, developed and ultimate conditions, there are two onsite basins. In the existing condition, runoff on the project site flows from northwest to southeast. In the interim, developed and ultimate conditions, runoff on the first onsite basin (ION1, DON1 or UON1) flows to Golden Rock St., then to the easement and eventually drains to Tenaya way. Runoff on the second onsite basin (ION2, DON2 or UON2) drains to the easement that is located on the south of the site and then drains to Tenaya way.

4 HYDROLOGIC ANALYSIS

4.1 Existing Condition

In the existing condition, offsite flow at the Racel/Monte Cristo intersection impacts the site. Refer to Figure 7, *Existing Basin Map*, for basin boundaries and flow paths.
Runoff from referenced concentration point REF splits at the Racel/Buffalo, Racel/Tioga and Racel/Pioneer intersections and reaches to concentration point CE3. About half of the flow at CE3 flows to the project site. Runoff from the project site flows from northwest to southeast and drains to the Tenaya Way. Hydraulic calculations for the flow splits have been provided in Appendix C.

4.2 Interim Condition

In the interim condition, the subject site becomes developed, and the offsite basins remain in the existing condition. Refer to Figure 8, *Interim Basin Map*, for basin boundaries and flow paths. The proposed onsite development includes residential homes with a minimum lot size of 14,000sf. The site includes one west-east street, Golden Rock St., and two drainage easements. The proposed onsite development includes a hump at the entrance of the site to prevent stormwater on Monte Cristo Way from entering the site.
The project site will be divided into two basins in the interim condition. The basin ION1 drains to Golden Rock St., and Tenaya Way through the drainage easement. The basin ION2 drains to the drainage easement that located at the south of the project site and drains to Tenaya Way. Hydraulic calculations for the streets and drainage easements have been provided in Appendix C.

4.3 Developed Condition

In the developed condition it is assumed the subject site and all the offsite basins are fully developed. Refer to Figure 9, *Developed Basin Map*, for basin boundaries and flow paths. In the developed condition, DOFF1, DOFF2 and all the surrounding streets are fully developed with curb and gutter. The flow splits at the related street intersections have been calculated. Hydraulic calculations for the for the developed condition have been provided in Appendix C.
All drainage patterns remain the same as in the interim condition. All existing and interim reference flows are replaced with the developed reference flows.

4.4 Ultimate Condition

In the ultimate condition it is assumed the subject site and all the offsite basins are fully developed and all the proposed drainage facilities upstream of the project site on the City of Las Vegas Northwest Neighborhood Study are built; see Figures 6A to 6D. Figure F-9 of the City of Las Vegas Northwest Neighborhood Study was used for the flow splits values in the ultimate condition. Refer to Figure 10, *Ultimate Basin Map*, for basin boundaries and flow paths. All drainage patterns remain the same as in the interim and developed conditions.

5 HYDRAULIC ANALYSIS

5.1 Street Hydraulics

Hydraulic calculations have been provided for all streets in the developed conditions. See Table 2 for a summary of results; calculations can be found in Appendix C. The location of the hydraulic cross sections can be found on Figures 7, 8, 9 and 10. All street sections meet VxD and depth requirements for the 10-year and 100-year storm events.
Golden Rock st. is being designed as a 40' public street. The street slopes from west to east at 0.85%.

5.2 Drainage Easements

The project includes two drainage easements. 30' private drainage easement is proposed at the south of lot 5. Cross section E was used to calculate the worst case scenario for the flow depth in this easement. 4' private drainage easement is proposed between lots 6 and 10. Cross section F was used to calculate the worst case scenario for the flow depth in this easement. Hydraulic calculations can be found in Appendix C.

5.3 Finished Floor Elevations

The proposed finished floor elevations have been set at a minimum vertical distance above the gutter flowline of at least twice the depth of flow in the gutter flowline up to a maximum of 18 inches above the water surface elevation in the street. The finished floor elevations are also a minimum of 18" above the top of curb elevation meeting Clark County requirements.

6 SUMMARY TABLES

Table 1: Basin Summary

Existing Condition			
Basin	Area (acres)	Q10 (cfs)	Q100 (cfs)
XON1	4.04	<1	1
XOFF1	1.25	<1	1
XOFF2	2.06	<1	1
REF*	-	207	621
CE1	-	130	354
CE2	-	90	251
CE3	-	57	161
CE4	-	26	86
CE5	-	24	81
CE6	-	25	83
ST1	0.87	2	3
ST2	0.87	2	3
ST3	0.87	2	3
ST4	0.58	1	2
ST5	0.83	2	3
ST6	0.58	1	2

Interim Condition			
Basin	Area (acres)	Q10 (cfs)	Q100 (cfs)
ION1	2.31	<1	<1
ION2	1.73	<1	<1
IOFF1	1.25	<1	1
IOFF2	2.06	<1	1
REF*	-	207	621
CI1	-	130	354
CI2	-	90	251
CI3	-	57	161
CI4	-	26	86
CI5	-	24	81
CI6	-	25	83
ST1	0.87	2	3
ST2	0.87	2	3
ST3	0.87	2	3
ST4	0.58	1	2
ST5	0.83	2	3
ST6	0.58	1	2

Table 2: Basin Summary Continued

Developed Condition			
Basin	Area (acres)	Q10 (cfs)	Q100 (cfs)
DON1	2.31	<1	<1
DON2	1.73	<1	<1
DOFF1	1.25	<1	1
DOFF2	2.06	1	3
REF*	-	207	621
CD1	-	129	361
CD2	-	88	246
CD3	-	57	158
CD4	-	31	87
CD5	-	30	81
CD6	-	31	83
ST1	0.87	2	3
ST2	0.87	2	3
ST3	0.87	2	3
ST4	0.58	1	2
ST5	0.83	2	3
ST6	0.58	1	2

Ultimate Condition			
Basin	Area (acres)	Q10 (cfs)	Q100 (cfs)
UON1	2.31	<1	<1
UON2	1.73	<1	<1
UOFF1	1.25	<1	1
UOFF2	2.06	1	3
REF*	-	0	224
CU1	-	2	152
CU2	-	4	124
CU3	-	5	77
CU4	-	3	42
CU5	-	6	45
CU6	-	7	47
ST1	0.87	2	3
ST2	0.87	2	3
ST3	0.87	2	3
ST4	0.58	1	2
ST5	0.83	2	3
ST6	0.58	1	2

Table 3: Cross Section Summary

Existing Condition						
Cross Section	**Description**	**Q (cfs)**	**Slope (%)**	**Depth (ft)**	**Velocity (ft/s)**	**DxV**
CS A EX 10YR	CE4	26	0.5	0.51	1.73	0.88
CS A EX 100YR	CE4	86	0.5	0.74	3.01	2.23
CS B EX 10YR	CE5	24	0.23	0.64	1.55	0.99
CS B EX 100YR	CE5	81	0.23	0.92	2.52	2.32
CS C EX 10YR	CE6	25	0.54	0.57	2.14	1.22
CS C EX 100YR	CE6	83	0.54	0.80	3.29	2.63

Interim Condition						
Cross Section	**Description**	**Q (cfs)**	**Slope (%)**	**Depth (ft)**	**Velocity (ft/s)**	**DxV**
CS A INT 10YR	CI4	26	0.5	0.51	1.73	0.88
CS A INT 100YR	CI4	86	0.5	0.74	3.01	2.23
CS B INT 10YR	CI5	24	0.23	0.64	1.55	0.99
CS B INT 100YR	CI5	81	0.23	0.92	2.52	2.32
CS C INT 10YR	CI6	25	0.54	0.57	2.14	1.22
CS C INT 100YR	CI6	83	0.54	0.80	3.29	2.63
CS D INT 10YR	ION1	<1	0.85	0.09	1.28	0.12
CS D INT 100YR	ION1	<1	0.85	0.17	1.30	0.22
CS E INT 10YR	Easement at ION1	<1	0.5	0.05	0.72	0.04
CS E INT 100YR	Easement at ION1	<1	0.5	0.10	1.07	0.11
CS F INT 10YR	Easement at ION2	<1	0.5	0.05	0.80	0.04
CS F INT 100YR	Easement at ION2	<1	0.5	0.10	1.51	0.15

Developed Condition						
Cross Section	**Description**	**Q (cfs)**	**Slope (%)**	**Depth (ft)**	**Velocity (ft/s)**	**DxV**
CS A DEV 10YR	CD4	31	0.5	0.62	2.43	1.51
CS A DEV 100YR	CD4	87	0.5	0.81	3.65	2.96
CS B DEV 10YR	CD5	30	0.23	0.68	1.86	1.26
CS B DEV 100YR	CD5	81	0.23	0.89	2.63	2.34
CS C DEV 10YR	CD6	31	0.54	0.62	2.49	1.54
CS C DEV 100YR	CD6	83	0.54	0.79	3.50	2.77
CS D DEV 10YR	DON1	<1	0.85	0.09	1.28	0.12
CS D DEV 100YR	DON1	<1	0.85	0.17	1.30	0.22
CS E DEV 10YR	Easement at DON1	<1	0.5	0.05	0.72	0.04
CS E DEV 100YR	Easement at DON1	<1	0.5	0.10	1.07	0.11
CS F INT 10YR	Easement at DON2	<1	0.5	0.05	0.80	0.04
CS F INT 100YR	Easement at DON2	<1	0.5	0.10	1.51	0.15

Ultimate Condition						
Cross Section	**Description**	**Q (cfs)**	**Slope (%)**	**Depth (ft)**	**Velocity (ft/s)**	**DxV**
CS A ULT 10YR	CU4	3	0.5	0.33	1.49	0.49
CS A ULT 100YR	CU4	42	0.5	0.67	2.73	1.83
CS B ULT 10YR	CU5	6	0.23	0.44	1.29	0.57
CS B ULT 100YR	CU5	45	0.23	0.75	2.14	1.61
CS C ULT 10YR	CU6	7	0.54	0.41	1.86	0.76
CS C ULT 100YR	CU6	47	0.54	0.68	2.87	1.95
CS D ULT 10YR	UON1	<1	0.85	0.09	1.28	0.12
CS D ULT 100YR	UON1	<1	0.85	0.17	1.30	0.22
CS E ULT 10YR	Easement at UON1	<1	0.5	0.05	0.72	0.04
CS E ULT 100YR	Easement at UON1	<1	0.5	0.10	1.07	0.11
CS F INT 10YR	Easement at UON2	<1	0.5	0.05	0.80	0.04
CS F INT 100YR	Easement at UON2	<1	0.5	0.10	1.51	0.15

7 CONCLUSIONS AND RECOMMENDATIONS

As detailed in this study, the Racel and Tenaya Residential Development is in compliance with the HC&DDM. No adverse effects are expected either upstream or downstream of the subject site. Street and drainage easement criteria will be met. Proposed finished floor elevations are adequately protected and are set a minimum of 18" above the adjacent top of curb elevation.

8 REFERENCES

2008 & 2013 Clark County Regional Flood Control District Flood Control Master Plan Update, PBS&J, G. C. Wallace, and Louis Berger Group.

Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual, August 1999, WRC Engineering (updated by Montgomery Watson).

FlowMaster Version V8i, Haestad Methods, Inc.

Flood Insurance Rate Map Number 32003C1745E, dated September 27, 2002, Federal Emergency Management Agency.

HEC-1 Flood Hydrograph Package Version 4.1, June 1998, U.S. Army Corps of Engineers.

APPENDIX

APPENDIX A

Figures

APPENDIX B

Hydrologic Calculations

APPENDIX C

Hydraulic Calculations

APPENDIX D

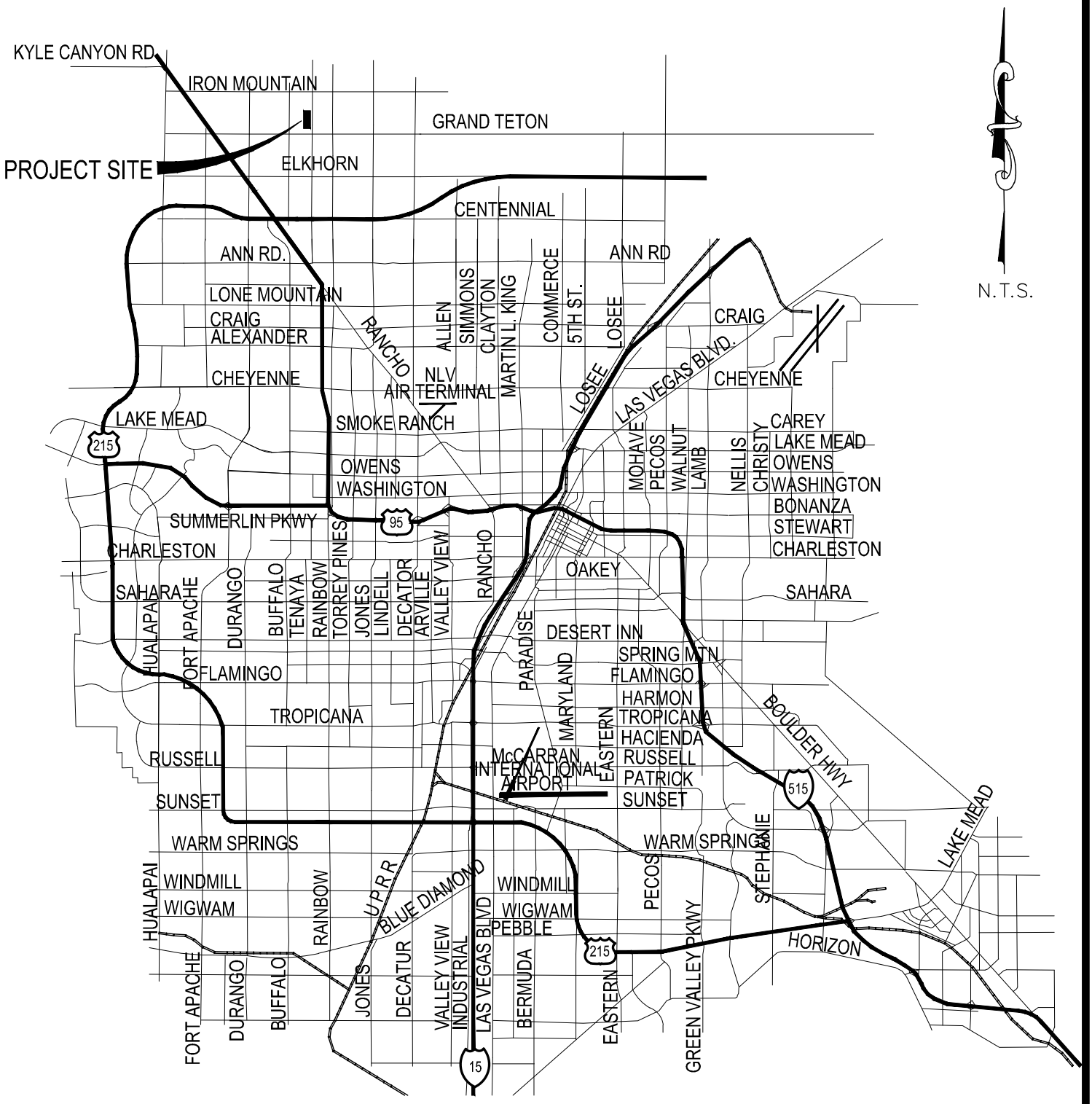
Reference Material

APPENDIX E

Improvement Plans

APPENDIX A

Figures



TANEY ENGINEERING
6030 S. JONES BLVD STE#100
LAS VEGAS, NV 89118
(702) 362-8844 FAX: (702) 362-5233

FIGURE 1
VICINITY MAP
RACEL AND TENAYA



TANEY ENGINEERING
6030 S. JONES BLVD STE#100
LAS VEGAS, NV 89118
(702) 362-8844 FAX: (702) 362-5233

FIGURE 2
LOCATION MAP
RACEL AND TENAYA

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevation** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevation (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum (NAVD). Users of this FIRM should be aware that coastal flood elevations may also be provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this community. Elevations shown in the Summary of Stillwater Elevations table should be used for construction, and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in this jurisdiction.

The **projection** used in the preparation of this map is Universal Tranverse Mercator (UTM) Zone 11. The **horizontal** datum is NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242,** or visit their website at www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by Clark County Regional Flood Control District. This information was converted using Orthophotography, dated 1999 or newer, and GBF/DIME data. Segments were digitized off of the orthophotography based on center of pavement.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

An accompanying Flood Insurance Study report, Letters of Map Revision or Letters of Map Amendment revising portions of this panel, and digital versions of this PANEL may be available. Contact the **FEMA Map Service Center** at the following phone numbers and Internet address for infomation on all related products available from FEMA;

Phone: 800-358-9616
FAX: 800-358-9620
www.fema.gov/msc

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at www.fema.gov.

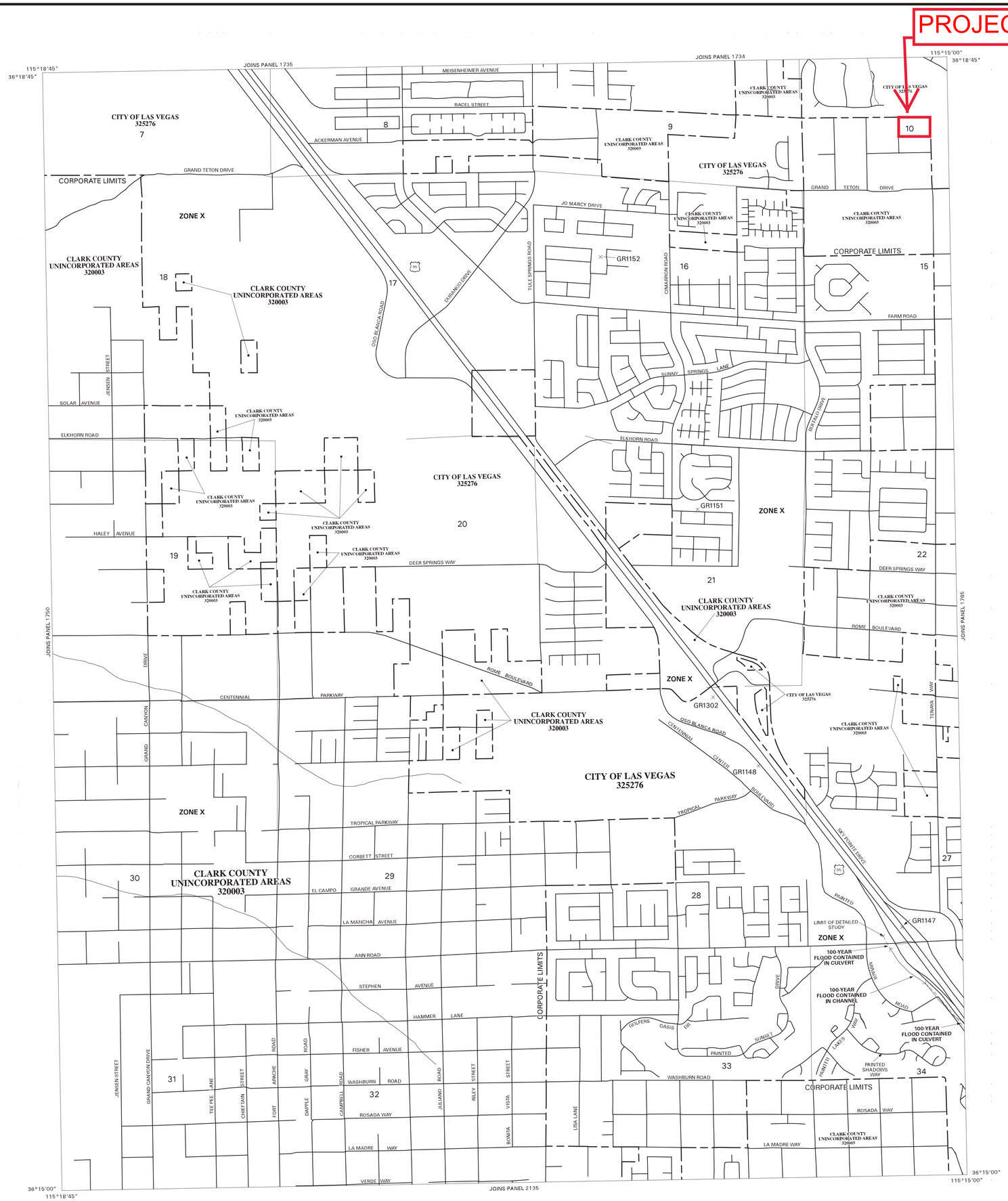
This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report may reflect stream channel distances that differ from what is shown on this map.

This Digital Flood Insurance Rate Map (DFIRM) was produced through a unique partnership between Clark County and the Federal Emergency Management Agency (FEMA). Clark County has developed a long-term approach of floodplain management to decrease the costs associated with flooding. This is demonstrated by the Clark County commitment to share and maintain floodplain layers within their Geographic Information System Management Office (GISMO).

This DFIRM reflects several innovative features. These include:
+ Southern Nevada GIS -- Cooperation among local governmental agencies throughout Clark County. The foundation of cooperation is the GIS Interlocal Agreements formed between fourteen regional participants. In part, the agreements specify that the Clark County GIS Management Office (GISMO) will be responsible for maintaining a GIS data warehouse and associated Southern Nevada GIS Metadata.

+ The GISMO's responsibilities go beyond maintaining the GIS data warehouse. GISMO also maintains the Street Centerline Database used by 911 dispatch services, This centerline database serves as the base map for this DFIRM.

DIGITAL DATA AVAILABILITY: http://www.co.clark.nv.us/ceit/gismo/gismo.htm



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

ZONE A No base flood elevations determined.

ZONE AE Base flood elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood event.

ZONE A99 Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain Boundary
Floodway Boundary
Zone D Boundary
Coastal Barrier Boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.
513 Base Flood Elevation line and value; elevation in feet*
(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A Cross Section Line
23 — 23 Transect Line
97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000M 1000-meter Universal Transverse Mercator grid values, zone 11
600000 FT 5000-foot grid ticks
DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel).
M1.5 River Mile

MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
September 27, 2002: to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to delete special flood hazard areas, to change zone designations, to add roads and road names, to incorporate previously issued letters of map revision, to incorporate previously issued letters of map amendment, and to change floodway.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1745 E

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

PANEL 1745 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LAS VEGAS, CITY OF	325276	1745	E
CLARK COUNTY, UNINCORPORATED AREAS	320003	1745	E

FIGURE 3

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 32003C1745 E

MAP REVISED: SEPTEMBER 27, 2002

Federal Emergency Management Agency

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 T19S R60E

099	100	101
126	125	124
137	138	139

SEC. 10

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

MAP S 2 SW 4

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

125-10-4

Scale: 1" = 200' Rev: 9/29/2016

CLARK COUNTY ASSESSOR MAPPING DIVISION NEVADA

RACEL ST
ACKERMAN AVE
GRAND TETON DR
BUFFALO DR
TIOGA WAY
PIONEER WAY
MONTE CRISTO WAY
TENAYA WAY
HERITAGE PINES CT
ZONAL AVE

PM 26-95 PM 57-20 PM 60-90 PM 113-21 PM 72-22 PM 35-94 PM 65-32 PM 65-31 PM 61-29 LD 13-87 PM 01-37 VERONA ESTATES PB 139-93 PB 147-82 PB 111-27 AMD

401 402 403 404 405 406 407 410 411

200 125 813

FIGURE 3

TAX DIST 125

THE ENVIRONMENTAL BASIN WAS PROPOSED ON THE 2008 MPU. IT HAS BEEN CONSTRUCTED.

PROJECT SITE

REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 13
FLOOD CONTROL FACILITIES

LEGEND

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

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

FIGURE 5A

N

0 500 1,000 2,000 3,000
Feet
Scale: 1 inch = 2,000 feet
Refer to Figure G-2 for Aerial Source(s)

US95 I-15 I-215

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

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
BCHU		**BELTWAY CHANNEL - HUALAPAI**						
0000	E	12' X 5' RCAP	853	501	CBA3-C	WEST3	0.84	1.11
0017	E	8' X 5' RCAP	1216	501	CBA3-C	WEST3	0.84	1.33
0040	E	66" RCP	60	222	DNW26-C	WEST3	0.51	1.04
0042	E	60" RCP	615	222	DNW26-C	WEST3	0.51	1.42
0054	E	54" RCP	770	222	DNW26-C	WEST3	0.51	1.23
BRDB		**BRENT DRAINAGE SYSTEM**						
0000	E	36" RCP with 18" Orifice Plate	2170	37	BRDB	WEST3	2.48	0.40
0031	E	45,080 cfs PMF Spillway		45080	CBRDB	WEST3	2.48	
0032	E	450 ac-ft South Environmental Enhancement Area		1902	CBRDB	WEST3	2.48	
0033	E	Energy Dissipator	100	957	CNW113-C	WEST3	1.58	
0043	P1	8' X 6' RCB	2920	957	CNW113-C	WEST3	1.58	2.10
0107	P1	8' X 6' RCB	2660	957	CNW113-C	WEST3	1.58	2.40
0157	P1	12' X 6' RCB	1260	741	CNW96-C	WEST3	0.95	0.25
CN95		**CENTENNIAL PKWY CHANNEL WEST / U.S 95 BRANCH**						
0000	P1	Conc Chnl 22'W 10'D 0:1 SS	2690	3340	CNWBB3-C	WEST3	3.36	2.17
0068	P1	3: 8' X 7' RCB	3380	3216	CNW103-C	WEST3	3.05	2.12
0102	P1	3: 8' X 6' RCB	1710	2888	2CNW89-C	WEST3	2.66	2.09
0167	P1	2: 10' X 6' RCB	1580	2160	2CNW71-E	WEST3	1.64	1.50
0199	E	2: 10' X 6' RCB	320	1423	2CNW72-C	WEST3	1.14	0.82
0218	E	15' X 9' RCB	1127	1423	2CNW72-C	WEST3	1.14	0.82
0257	E	Transition Structure	59	1423	2CNW72-C	WEST3	1.14	0.77
0259	E	15' X 9' RCB	290	653	CNW74-C	WEST3	0.44	0.77
0313	E	10' X 6' RCB	2680	653	CNW74-C	WEST3	0.44	2.50
0318	E	Transition Structure	60	653	CNW74-C	WEST3	0.44	1.50
0333	E	5' X 5' RCB	670	339	NW62-S	WEST3	0.22	1.50
CNGT		**CENTENNIAL PKWY CHANNEL WEST / GRAND TETON BRANCH**						
0000	E	10' X 5' RCB	2376	600	CNW71-E	WEST3	0.47	2.58
0043	P0	6' X 6' RCB	3980	600	CNW71-E	WEST3	0.47	3.00
0118	E	6' X 5' RCAP	5472	363	KYLEDET*	KYLEDB	57.73	3.72
CNKC		**CENTENNIAL PKWY CHANNEL WEST / KYLE CANYON BRANCH**						
0000	E	12' X 4' RCB	377	999	CNW72-C	WEST3	0.71	4.58
0007	E	10' X 5' RCB	874	999	CNW72-C	WEST3	0.71	3.28
0024	E	8' X 5' RCB	1385	999	CNW72-C	WEST3	0.71	2.40
0050	P0	84" RCP	2610	854	CNW72-C	WEST3	0.71	3.60
CNWE		**CENTENNIAL PKWY CHANNEL WEST**						
0150	E	Conc Chnl 40'W 9.5'D 0:1 SS	2279	4233	CNW3B3-C	WEST3	5.64	0.42
0173	E	3: 18' X 8' RCBC @ Torrey Pines	200	4233	CNW3B3-C	WEST3	5.64	0.42
0176	E	Conc Chnl 40'W 9'D 0:1 SS	150	4233	CNW3B3-C	WEST3	5.64	0.41
0189	E	Conc Chnl 36'W 10'D 0:1 SS	1200	4067	CNW2D4-C	WEST3	5.15	0.42
0200	E	Conc Chnl 36'W 9'D 0:1 SS	2470	4067	CNW2D4-C	WEST3	5.15	1.00
0226	E	2: 18' X 8.5' RCBC @ Rio Vista	100	4067	CNW2D4-C	WEST3	5.15	0.51
0241	E	Conc Chnl 36'W 9.5'D 0:1 SS	405	3951	CNW2D3-C	WEST3	4.65	0.51
0251	E	Conc Chnl 36'W 9'D 0:1 SS	575	3951	CNW2D3-C	WEST3	4.65	0.51
0271	E	Conc Chnl 32'W 10'D 0:1 SS	229	3951	CNW2D3-C	WEST3	4.65	0.51
0274	E	32' X 10' RCBC @ Tenaya	142	3951	CNW2D3-C	WEST3	4.65	0.51
0277	E	Conc Chnl 32'W 9'D 0:1 SS	579	3951	CNW2D3-C	WEST3	4.65	0.64
0287	E	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	3259	3593	CNW2B2-C	WEST3	3.84	1.79
0314	E	22' X 7' RCB	785	3593	CNW2B2-C	WEST3	3.84	1.79
0325	P1	32' X 10' RCB	2200	3593	CNW2B2-C	WEST3	3.84	1.75
EKBU		**ELKHORN SPRINGS AND BUFFALO**						
0000	E	60" RCP	1046	375	NW134-C	WEST3	0.46	1.00
EKDB		**ELKHORN SPRINGS DETENTION BASIN**						
0000	E	Grass Chnl 15'W 5.8'D 3.5:1 SS	2575	238	CNW150-C	WEST3	1.41	0.39
0025	E	4' X 3' RCB	160	120	ELKBASIN	WEST3	0.84	0.50
0026	E	48" RCP	1270	120	ELKBASIN	WEST3	0.84	1.23
0049	E	60" RCP	1095	120	ELKBASIN	WEST3	0.84	0.13
0070	E	48 ac-ft Elkhorn Springs Detention Basin		629	CNW133-C	WEST3	0.84	

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
EKHU		**ELKHORN AND HUALAPAI**						
0000	E	6' X 5' RCB Overflow Structure	48	638	CNW26-C	WEST3	0.51	0.91
0001	E	6' X 5' RCAP	72	638	CNW26-C	WEST3	0.51	0.91
0003	E	6' X 4' RCAP	980	638	CNW26-C	WEST3	0.51	3.61
0020	E	6' X 5' RCAP	150	638	CNW26-C	WEST3	0.51	3.61
0023	E	8' X 5' RCAP	1200	638	CNW26-C	WEST3	0.51	0.90
GOEC		**GOWAN NORTH - EL CAPITAN BRANCH**						
0176	P1	78" RCP	1320	363	CCPFR-C	ALLGOW3	0.46	1.15
GONO		**GOWAN NORTH SYSTEM**						
0511	P1	7' X 6' RCB	1320	546	CCPHW-C	ALLGOW3	0.60	1.14
LVMD		**LAS VEGAS WASH - MIDDLE**						
2490	E	2: 13' X 7' RCB	2555	2278	CNW168-C	CWEST3	4.69	0.40
2507	E	2: 13' X 9' RCB	2831	2278	CNW168-C	CWEST3	4.69	0.36
2525	E	24' X 8' RCB	1140	1913	CNW159-C	CWEST3	3.91	0.40
2550	E	24' X 8' RCB	1445	1664	CD161-C	CWEST3	3.41	0.40
2574	E	24' X 8' RCB	1430	1664	CD161-C	CWEST3	3.41	0.40
2599	E	Conc Chnl 24'W 7'D 2:1 SS	1577	1585	CNW162-C	CWEST3	3.08	0.50
2632	E	18' X 5' RCB	1580	968	CNW138-C	WEST3	1.16	0.46
2661	E	18' X 5' RCB	2640	968	CNW138-C	WEST3	1.16	0.46
2711	E	10' X 5' RCB	1320	968	CNW138-C	WEST3	1.16	1.54
2737	E	10' X 5' RCB	1320	818	CNW139-C	WEST3	0.93	2.22
2763	E	6' X 5' RCB	1320	818	CNW139-C	WEST3	0.93	1.79
2789	E	6' X 5' RCB	1470	818	CNW139-C	WEST3	0.93	2.17
MOHU		**MOCCASIN - HUALAPAI BRANCH**						
0000	P0	14' X 8' RCB	1920	761	2CNW45-N	LOWER3	2.10	0.50
0036	P0	10' X 8' RCB	2590	368	CNW45-N	LOWER3	1.15	0.50
0085	P0	72" RCP	790	368	CNW45-N	LOWER3	1.15	3.00
0100	P0	Natural Wash	850	65	DMODB1	LOWER3	0.81	3.00
0116	P0	60" RCPC	12	65	DMODB1	LOWER3	0.81	3.00
0118	P0	Natural Wash	3485	65	DMODB1	LOWER3	0.81	3.00
MOIR		**MOCCASIN - IRON MOUNTAIN BRANCH**						
0000	P0	66" RCP	2770	446	2CNW33-C	LOWER3	1.76	3.60
MOKC		**MOCCASIN AND KYLE CANYON**						
0000	P1	11' X 8' RCB	5450	2662	CNW35-C	LOWER3	2.69	3.40
MOSM		**MOCCASIN AND SHEEP MOUNTAIN PARKWAY**						
0000	P0	14' X 9' RCB	3370	3778	CNW64-C	LOWER3	5.32	2.40
0064	P0	14' X 8' RCB	880	3505	CNW50-C	LOWER3	4.99	3.00
0080	P0	14' X 8' RCB	710	3325	2CNW35-C	LOWER3	4.80	3.00
MSNV		**MOUNTAIN SPA/VISTA RANCH**						
0000	E	6: 12' X 5' RCBC @ Grand Teton	273	679	CNW163-C	CWEST3	1.67	0.40
0005	E	Grass Chnl 100'W 4.5'D 10:1 SS	6325	679	CNW163-C	CWEST3	1.67	0.40
0125	E	Grass Chnl 100'W 4.5'D 10:1 SS	1300	116	CNW147E	WEST3	1.54	0.40
RACO		**RACEL STREET COLLECTOR**						
0000	E	96" RCP Baffled Energy Dissipator	54	497	CNW111S	WEST3	0.55	4.20
0001	E	78" RCP	3245	497	CNW111S	WEST3	0.55	2.46
0064	E	78" RCP	2650	423	DNW111S	WEST3	0.44	2.09
RCBC		**RANCHO ROAD SYSTEM - BELTWAY CHANNEL**						
0000	E	6' X 5' RCB	1062	222	FADB	WEST3	1.60	1.04
0002	E	54" RCP Outlet with 41" Orifice	503	222	FADB	WEST3	1.60	2.38
0003	E	2,341 cfs PMF Spillway		2341	FADBIN	WEST3	1.60	
0004	E	76 ac-ft Fort Apache Detention Basin		1255	FADBIN	WEST3	1.60	
0007	E	Energy Dissipator	100	1255	FADBIN	WEST3	1.60	
0009	E	12' X 6' RCBC @ Fort Apache Detention Basin	133	1255	FADBIN	WEST3	1.60	1.79
0012	E	Conc Chnl 12'W 6'-7'D 0:1 SS	1937	1255	FADBIN	WEST3	1.60	3.15
0048	E	12' X 6' RCBC @ Grand Canyon	140	1040	CMNA1	WEST3	1.32	3.15
0051	E	Conc Chnl 12'W 6'-8'D 0:1 SS	2660	1040	CMNA1	WEST3	1.32	3.44
0096	E	1: 10' X 6' and 1: 6' X 6' RCBC @ Hualapai Way	190	1040	CMNA1	WEST3	1.32	1.93
0100	E	Conc Chnl 12'W 5.5'D 0:1 SS	2085	598	CDMNA1	WEST3	0.48	2.88
0140	E	Conc Chnl 10'W 5'D 0:1 SS	2155	598	CDMNA1	WEST3	0.48	1.65

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**						
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	CNWBC6-C	WEST3	4.17	0.30
0075	E	20' X 6' RCBC @ Beltway	428	2226	CNWBC6-C	WEST3	4.17	2.81
0083	P1	20' X 6' RCB	950	2226	CNWBC6-C	WEST3	4.17	2.49
0101	P1	Conc Chnl 20'W 7'D 0:1 SS	980	2226	CNWBC6-C	WEST3	4.17	2.38
0120	E	20' X 6' RCBC @ Grand Montecito	120	2226	CNWBC6-C	WEST3	4.17	1.00
0122	P1	Conc Chnl 16'-20'W 6'D 0:1 SS	350	2226	CNWBC6-C	WEST3	4.17	1.84
0130	P1	Conc Chnl 16'W 6'D 0:1 SS	1012	2226	CNWBC6-C	WEST3	4.17	2.67
0149	P1	Conc Chnl 16'W 6'-7'D 0:1 SS	87	1888	CNWBC3	WEST3	3.75	2.27
0151	P1	Conc Chnl 16'W 7'D 0:1 SS	1255	1888	CNWBC3	WEST3	3.75	2.65
0171	E	16' X 6' RCBC @ El Capitan Way	234	1888	CNWBC3	WEST3	3.75	1.75
0175	E	Conc Chnl 14'W 7'D 0:1 SS	1220	1888	CNWBC3	WEST3	3.75	2.93
0198	E	Conc Chnl 14'W 7'D 0:1 SS	225	1402	CNWBA6-C	WEST3	3.61	2.93
0227	E	12' X 6' RCB	1885	1402	CNWBA6-C	WEST3	3.61	1.02
0250	E	12' X 6' RCB	3200	1402	CNWBA6-C	WEST3	3.61	1.00
0275	P1	7' X 6' RCB	2650	973	CNW66-C	WEST3	1.75	3.30
0295	P1	7' X 6' RCB	2875	973	CNW66-C	WEST3	1.75	3.30
TSDB		**TULE SPRINGS DRAINAGE SYSTEM**						
0000	E	2: 10' X 4' RCBC @ Echo Grande	100	26	TULEDB	WEST3	1.35	1.04
0002	E	36" RCP with 22" Orifice Plate	320	26	TULEDB	WEST3	1.35	0.33
0010	E	14,013 cfs PMF Spillway		14013	CTULEDB	WEST3	1.35	
0011	E	117 ac-ft North Environmental Enhancement Area		804	CTULEDB	WEST3	1.35	
0012	E	Energy Dissipator	260	376	CNW148-C	WEST3	0.52	
0023	P1	84" RCP	1320	376	CNW148-C	WEST3	0.52	0.80
0059	P1	78" RCP	2640	376	CNW148-C	WEST3	0.52	1.03

** 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).

FIGURE 5B

REGIONAL FLOOD CONTROL DISTRICT

2013 LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FACILITY INVENTORY
FIGURE F - 13

LEGEND

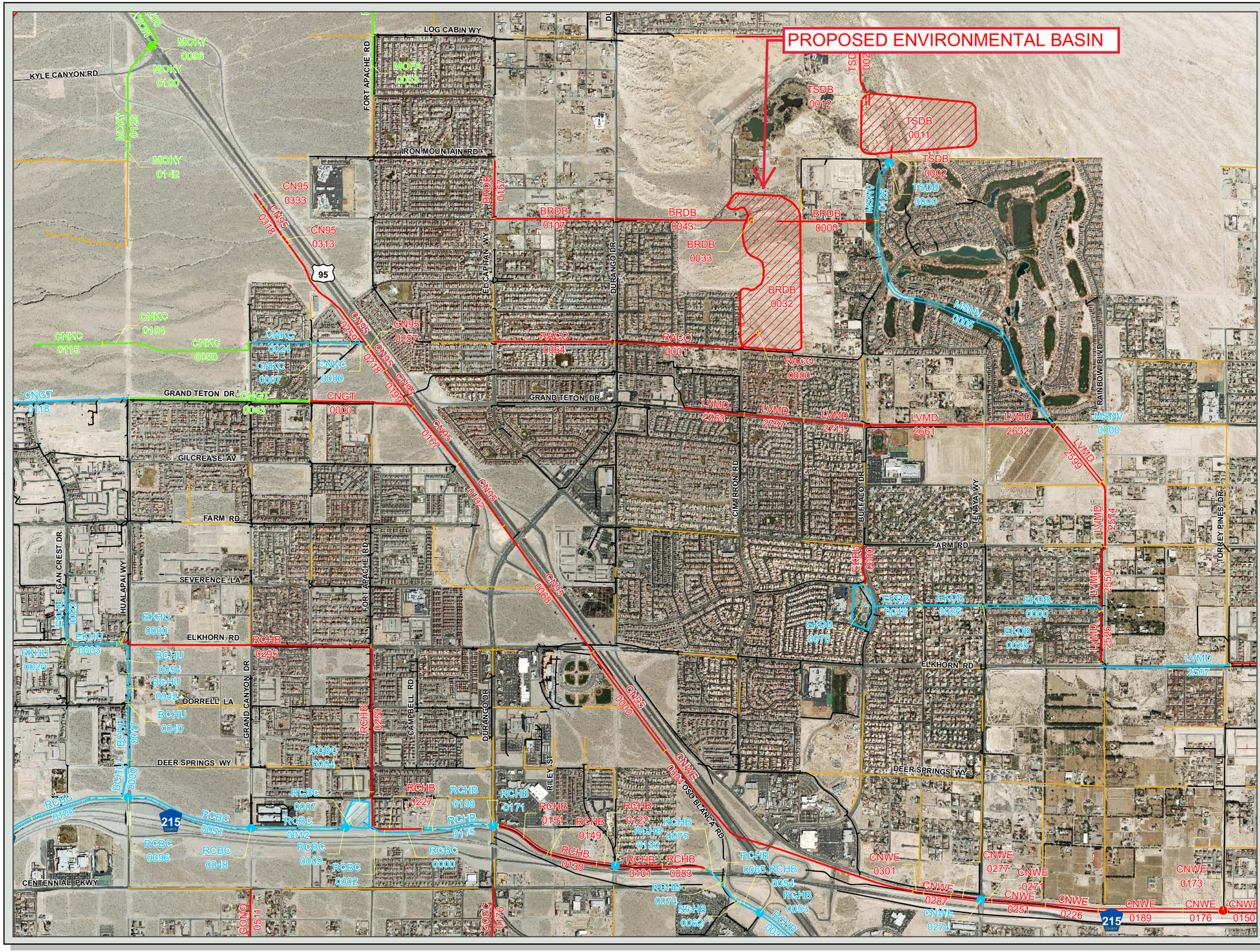
ID (Facility Identifier) AABB
Parent Stream Name
Stream Name
River Mile 0000
Distance Above Confluence with Parent Stream (Miles)
Miles in Hundredths

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



REGIONAL FLOOD CONTROL DISTRICT

2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F-13
FLOOD CONTROL FACILITIES

LEGEND

- Ultimate Development Boundary
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Local Existing Facilities
- Local Proposed Facilities
- Detention Basin
- 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

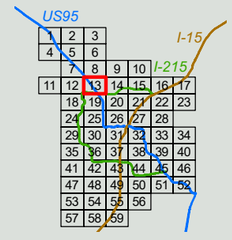
FIGURE 5C

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)



PBS&J
PB

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
BCHU		**BELTWAY CHANNEL - HUALAPAI**						
0000	E	12' X 5' RCAP	853	501	CBA3-C	WEST3	0.84	1.11
0017	E	8' X 5' RCAP	1216	501	CBA3-C	WEST3	0.84	1.33
0040	E	66" RCP	60	222	DNW26-C	WEST3	0.51	1.04
0042	E	60" RCP	615	222	DNW26-C	WEST3	0.51	1.42
0054	E	54" RCP	770	222	DNW26-C	WEST3	0.51	1.23
BRDB		**BRENT DRAINAGE SYSTEM**						
0000	P3	36" RCP with 18" Orifice Plate	2170	37	BRDB	WEST3	2.48	0.40
0031	P3	45,080 cfs PMF Spillway		45080	CBRDB	WEST3	2.48	
0032	P3	450 ac-ft South Environmental Enhancement Area		1902	CBRDB	WEST3	2.48	
0033	P3	Energy Dissipator	100	957	CNW113-C	WEST3	1.58	
0043	P1	8' X 6' RCB	2920	957	CNW113-C	WEST3	1.58	2.10
0107	P1	8' X 6' RCB	2660	957	CNW113-C	WEST3	1.58	2.40
0157	P1	12' X 6' RCB	1260	741	CNW96-C	WEST3	0.95	0.25
CN95		**CENTENNIAL PKWY CHANNEL WEST / U.S 95 BRANCH**						
0000	P2	Conc Chnl 22'W 10'D 0:1 SS	2690	3340	CNWBB3-C	WEST3	3.36	2.17
0068	P1	3: 8' X 7' RCB	3380	3216	CNW103-C	WEST3	3.05	2.12
0102	P1	3: 8' X 6' RCB	1710	2888	2CNW89-C	WEST3	2.66	2.09
0167	P1	2: 10' X 6' RCB	1580	2160	2CNW71-E	WEST3	1.64	1.50
0199	P3	Conc Chnl 15'W 11'D 0:1 SS	1015	1609	2CNW72-C	WEST3	1.17	0.82
0218	P3	16' X 8' RCB	556	1609	2CNW72-C	WEST3	1.17	0.77
0257	P3	Transition Structure	100	1609	2CNW72-C	WEST3	1.17	0.77
0259	P3	16' X 8' RCB	2848	674	CNW74-C	WEST3	0.45	2.06
0313	P3	Transition Structure	240	674	CNW74-C	WEST3	0.45	1.50
0318	P3	14' X 6' RCB	797	333	NW62-S	WEST3	0.21	1.47
0333	P3	12' X 6' RCB	300	333	NW62-S	WEST3	0.21	5.50
CNGT		**CENTENNIAL PKWY CHANNEL WEST / GRAND TETON BRANCH**						
0000	P3	10' X 5' RCB	2290	600	CNW71-E	WEST3	0.47	2.63
0043	P0	6' X 6' RCB	3980	600	CNW71-E	WEST3	0.47	3.00
0118	E	6' X 5' RCAP	5472	363	KYLEDET*	KYLEDB	57.73	3.72
CNKC		**CENTENNIAL PKWY CHANNEL WEST / KYLE CANYON BRANCH**						
0000	E	12' X 4' RCB	377	999	CNW72-C	WEST3	0.71	4.58
0007	E	10' X 5' RCB	874	999	CNW72-C	WEST3	0.71	3.28
0024	E	8' X 5' RCB	1385	999	CNW72-C	WEST3	0.71	2.40
0050	P0	6' X 6' RCB	2830	999	CNW72-C	WEST3	0.71	3.00
0104	P0	6' X 5' RCB	565	452	NW45-S	WEST3	0.27	3.00
0115	P0	72" RCP	1513	452	NW45-S	WEST3	0.27	3.00
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
EKBU		**ELKHORN SPRINGS AND BUFFALO**						
0000	P1	78" RCP	860	375	NW134-C	WEST3	0.46	1.00
EKDB		**ELKHORN SPRINGS DETENTION BASIN**						
0000	E	Grass Chnl 15'W 5.8'D 3.5:1 SS	2575	238	CNW150-C	WEST3	1.41	0.39
0025	E	4' X 3' RCB	160	120	ELKBASIN	WEST3	0.84	0.50
0026	E	48" RCP	1270	120	ELKBASIN	WEST3	0.84	1.23
0049	E	60" RCP	1095	120	ELKBASIN	WEST3	0.84	0.13
0070	E	48 ac-ft Elkhorn Springs Detention Basin		629	CNW133-C	WEST3	0.84	
EKHU		**ELKHORN AND HUALAPAI**						
0000	E	6' X 5' RCB Overflow Structure	48	638	CNW26-C	WEST3	0.51	0.91
0001	E	6' X 5' RCAP	72	638	CNW26-C	WEST3	0.51	0.91

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
EKHU		**ELKHORN AND HUALAPAI**						
0003	E	6' X 4' RCAP	980	638	CNW26-C	WEST3	0.51	3.61
0020	E	6' X 5' RCAP	150	638	CNW26-C	WEST3	0.51	3.61
0023	E	8' X 5' RCAP	1200	638	CNW26-C	WEST3	0.51	0.90
GOEC		**GOWAN NORTH - EL CAPITAN BRANCH**						
0176	P1	78" RCP	1320	363	CCPFR-C	ALLGOW3	0.46	1.15
GONO		**GOWAN NORTH SYSTEM**						
0511	P1	7' X 6' RCB	1320	546	CCPHW-C	ALLGOW3	0.60	1.14
LVMD		**LAS VEGAS WASH - MIDDLE**						
2490	P2	2: 13' X 7' RCB	2555	2278	CNW168-C	CWEST3	4.69	0.40
2507	E	2: 13' X 9' RCB	2831	2278	CNW168-C	CWEST3	4.69	0.36
2525	P1	21' X 6' RCB	1140	1913	CNW159-C	CWEST3	3.91	0.40
2550	P1	21' X 6' RCB	1445	1664	CD161-C	CWEST3	3.41	0.40
2574	P1	21' X 6' RCB	1430	1664	CD161-C	CWEST3	3.41	0.60
2599	P1	Conc Chnl 30'W 5'D 2:1 SS	1577	1585	CNW162-C	CWEST3	3.08	0.40
2632	P1	13' X 5' RCB	1580	968	CNW138-C	WEST3	1.16	0.59
2661	P1	11' X 5' RCB	2640	968	CNW138-C	WEST3	1.16	1.00
2711	P1	8' X 5' RCB	1320	968	CNW138-C	WEST3	1.16	1.80
2737	P1	8' X 5' RCB	1320	818	CNW139-C	WEST3	0.93	1.81
2763	P1	78" RCP	1320	818	CNW139-C	WEST3	0.93	2.40
MOFA		**MOCCASIN - FORT APACHE**						
0024	P0	12' X 6' RCB	1520	394	DNW100-W	LOWER3	0.46	0.25
0053	P0	10' X 6' RCB	1345	258	DNW78-C	LOWER3	0.24	0.25
MOKY		**MOCCASIN - KYLE CANYON BRANCH**						
0078	P0	2: 13' X 7' RCB	965	1205	CNW50-E	LOWER3	1.06	0.40
0096	P0	2: 13' X 7' RCBC @ US 95	210	1066	CNW35-C	LOWER3	0.89	1.70
0100	P0	2: 13' X 7' RCB	1515	1066	CNW35-C	LOWER3	0.89	0.40
0129	P0	2: 11' X 7' RCB	675	779	CNW33-C	LOWER3	0.64	0.40
0142	P0	2: 9' X 7' RCB	430	779	CNW33-C	LOWER3	0.64	0.40
MSNV		**MOUNTAIN SPA/VISTA RANCH**						
0000	E	6: 12' X 5' RCBC @ Grand Teton	273	679	CNW163-C	CWEST3	1.67	0.40
0005	E	Grass Chnl 100'W 4.5'D 10:1 SS	6325	679	CNW163-C	CWEST3	1.67	0.40
0125	E	Grass Chnl 100'W 4.5'D 10:1 SS	1300	116	CNW147E	WEST3	1.54	0.40
RACO		**RACEL STREET COLLECTOR**						
0000	P3	96" RCP Baffled Energy Dissipator	54	497	CNW111S	WEST3	0.55	4.20
0001	P3	78" RCP	3245	497	CNW111S	WEST3	0.55	2.46
0064	P3	78" RCP	2650	423	DNW111S	WEST3	0.44	2.09
RCBC		**RANCHO ROAD SYSTEM - BELTWAY CHANNEL**						
0000	E	6' X 5' RCB	1062	222	FADB	WEST3	1.60	1.04
0002	E	54" RCP Outlet with 41" Orifice	503	222	FADB	WEST3	1.60	2.38
0003	E	2,341 cfs PMF Spillway		2341	FADBIN	WEST3	1.60	
0004	E	76 ac-ft Fort Apache Detention Basin		1255	FADBIN	WEST3	1.60	
0007	E	Energy Dissipator	100	1255	FADBIN	WEST3	1.60	
0009	E	12' X 6' RCBC @ Fort Apache Detention Basin	133	1255	FADBIN	WEST3	1.60	1.79
0012	E	Conc Chnl 12'W 6'-7'D 0:1 SS	1937	1255	FADBIN	WEST3	1.60	3.15
0048	E	12' X 6' RCBC @ Grand Canyon	140	1040	CMNA1	WEST3	1.32	3.15
0051	E	Conc Chnl 12'W 6'-8'D 0:1 SS	2660	1040	CMNA1	WEST3	1.32	3.44
0096	E	1: 10' X 6' and 1: 6' X 6' RCBC @ Hualapai Way	190	1040	CMNA1	WEST3	1.32	1.93
0100	E	Conc Chnl 12'W 5.5'D 0:1 SS	2085	598	CDMNA1	WEST3	0.48	2.88
0140	E	Conc Chnl 10'W 5'D 0:1 SS	2155	598	CDMNA1	WEST3	0.48	1.65
RCHB		**RANCHO ROAD SYSTEM - BELTWAY**						
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	CNWBC6-C	WEST3	4.17	0.30
0075	E	20' X 6' RCBC @ Beltway	428	2226	CNWBC6-C	WEST3	4.17	2.81
0083	P2	20' X 6' RCB	950	2226	CNWBC6-C	WEST3	4.17	2.49
0101	P2	Conc Chnl 20'W 7'D 0:1 SS	980	2226	CNWBC6-C	WEST3	4.17	2.38
0120	E	20' X 6' RCBC @ Grand Montecito	120	2226	CNWBC6-C	WEST3	4.17	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**						
0122	P2	Conc Chnl 16'-20'W 6'D 0:1 SS	350	2226	CNWBC6-C	WEST3	4.17	1.84
0130	P2	Conc Chnl 16'W 6'D 0:1 SS	1012	2226	CNWBC6-C	WEST3	4.17	2.67
0149	P2	Conc Chnl 16'W 6'-7'D 0:1 SS	87	1888	CNWBC3	WEST3	3.75	2.27
0151	P2	Conc Chnl 16'W 7'D 0:1 SS	1255	1888	CNWBC3	WEST3	3.75	2.65
0171	E	16' X 6' RCBC @ El Capitan Way	234	1888	CNWBC3	WEST3	3.75	1.75
0175	E	Conc Chnl 14'W 7'D 0:1 SS	1220	1888	CNWBC3	WEST3	3.75	2.93
0198	E	Conc Chnl 14'W 7'D 0:1 SS	225	1402	CNWBA6-C	WEST3	3.61	2.93
0227	P1	11' X 8' RCB	1885	1402	CNWBA6-C	WEST3	3.61	2.17
0250	P1	11' X 8' RCB	3200	1402	CNWBA6-C	WEST3	3.61	1.06
0295	P1	7' X 6' RCB	5525	973	CNW66-C	WEST3	1.75	3.30
TSDB		**TULE SPRINGS DRAINAGE SYSTEM**						
0000	E	2: 10' X 4' RCBC @ Echo Grande	100	26	TULEDB	WEST3	1.35	1.04
0002	P3	36" RCP with 22" Orifice Plate	320	26	TULEDB	WEST3	1.35	0.33
0010	P3	14,013 cfs PMF Spillway		14013	CTULEDB	WEST3	1.35	
0011	P3	117 ac-ft North Environmental Enhancement Area		804	CTULEDB	WEST3	1.35	
0012	P3	Energy Dissipator	260	376	CNW148-C	WEST3	0.52	
0023	P1	84" RCP	1320	376	CNW148-C	WEST3	0.52	0.80
0059	P1	78" RCP	2640	376	CNW148-C	WEST3	0.52	1.03

** 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).

FIGURE 5D

REGIONAL FLOOD CONTROL DISTRICT

2008 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

FACILITY INVENTORY FIGURE F - 13

LEGEND

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

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

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

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

Construction Features

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

PBS&J PB

CITY OF LAS VEGAS NEVADA

NORTHWEST NEIGHBORHOOD STUDY PHASE 2

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

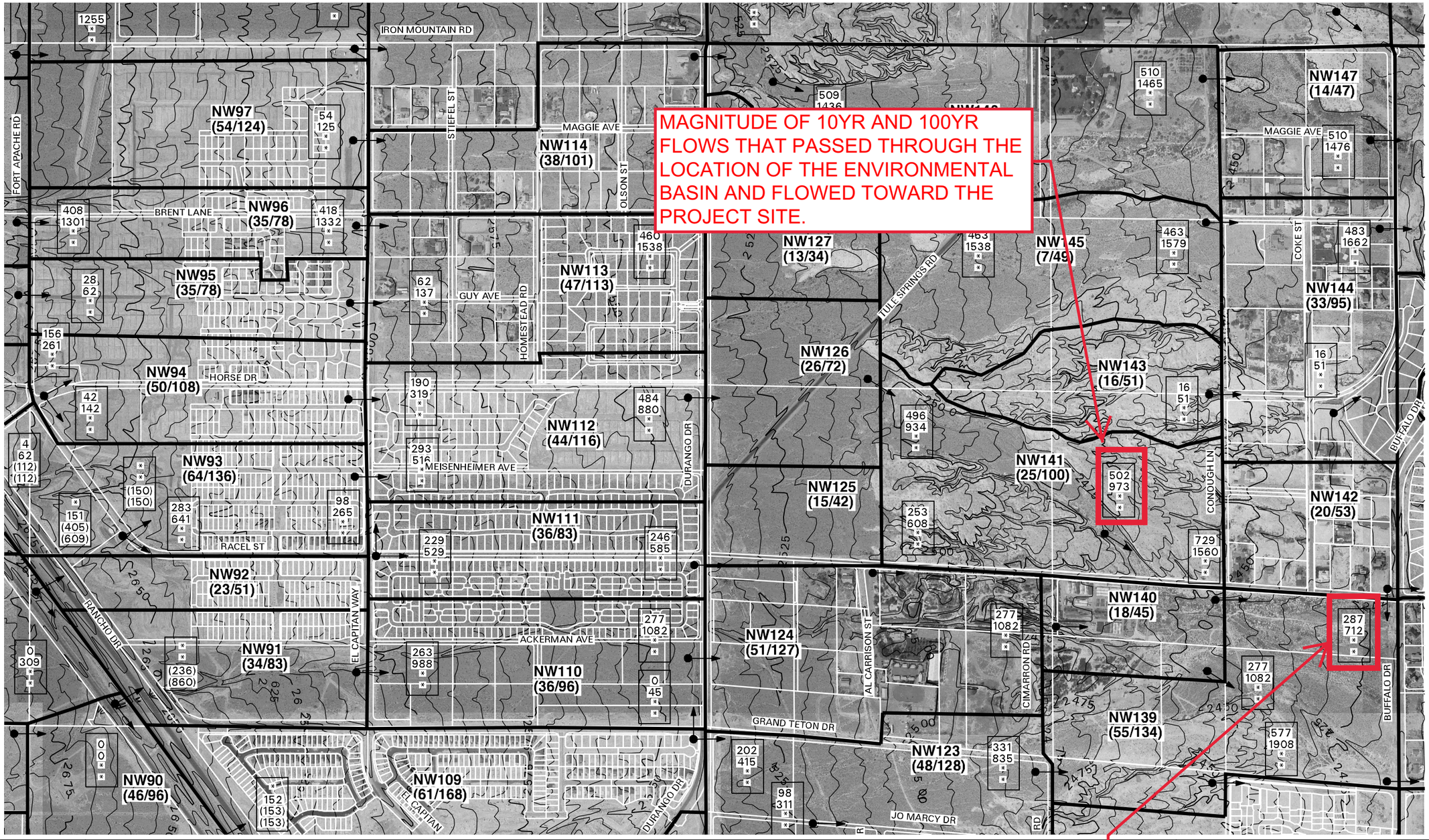
(FLOWS IN CFS)

BWJS Basin-ID

(13 / 59) Contributing flow (10-Year / 100-Year) from the basin (cfs)

PHOTO DATE: SEPTEMBER 1998

FIGURE E-8



EXISTING DRAINAGE CONDITIONS

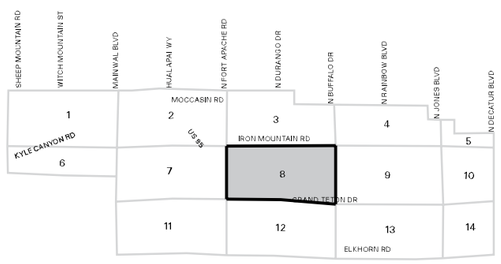


FIGURE 6A

NOTE:

Existing conditions are based on future CN values with only existing local and CCRFCD facilities in place

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N W E S

800 600 400 200 0 400 800

(IN FEET)
SCALE: 1 INCH = 800 FEET

/FILES8/NWTEMP/E8.MAP

CITY OF LAS VEGAS NEVADA

NORTHWEST NEIGHBORHOOD STUDY PHASE 2

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: SEPTEMBER 1998

FIGURE E-9

TOTAL 10YR FLOW AT THE RACEL/BUFFALO INTERSECTION = 287 CFS* + 422 CFS** - 502 CFS*** = 207 CFS****
TOTAL 100YR FLOW AT THE RACEL/BUFFALO INTERSECTION = 712 CFS* + 882 CFS** - 973 CFS*** = 621 CFS****

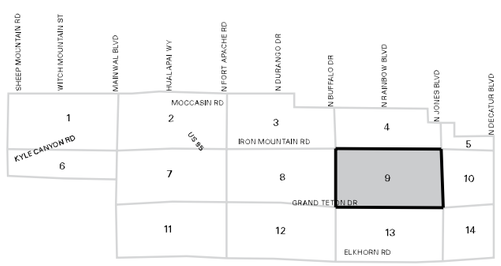
* FLOW SPLIT TO BUFFALO
** FLOW SPLIT TO RACEL
*** FLOW THAT PASSES THROUGH THE ENVIRONMENTAL BASIN THAT DID NOT EXIST AT THE TIME OF PREPARING NORTHWEST NEIGHBORHOOD STUDY PHASE II
**** FLOW VALUES USED FOR THE EXISTING, INTERIM AND DEVELOPED CONDITIONS AT THE RACEL/BUFFALO INTERSECTION THAT ACCOUNTS FOR FLOW BYPASS BY THE ENVIRONMENTAL BASIN. THIS FLOW IS INDICATED AS "REF" IN THIS STUDY.

FLOW SPLIT TO RACEL

NW156 (94/244)
NW155 (66/172)
NW154 (29/100)
NW163 (94/240)
NW162 (45/119)
NW172 (33/104)
NW173 (34/105)
NW184 (37/108)
NW183 (37/108)
NW182 (43/125)

IRON MOUNTAIN RD
BUFFALO DR
RACEL ST
ACKERMAN AVE
BRENT LN
HORSE DR
MEISENHEIMER AVE
GRAND TETON DR
RAINBOW BLVD
MUSTANG ST
MAVERICK ST
BRONCO ST
GILBERT LANE
GAREHIME ST
KISSEL ST
TORREY PINES DR
JONES BLVD
PIONEER WAY
MONTE CRISTO WAY
TENAYA WAY
TIOGA WAY
MAG

89 327
495 1502
1085 3726
816 2500
8 75
5 53
12 60
11 58
20 93
23 106
21 101
21 111
4 14
34 108
43 140
43 157
32 96
56 196
185 297
142 140
126 307
1140 3898
1181 4040
422 882
660 1916
1197 4099
406 1316
589 1492
189 647
216 669
212 749



EXISTING DRAINAGE CONDITIONS

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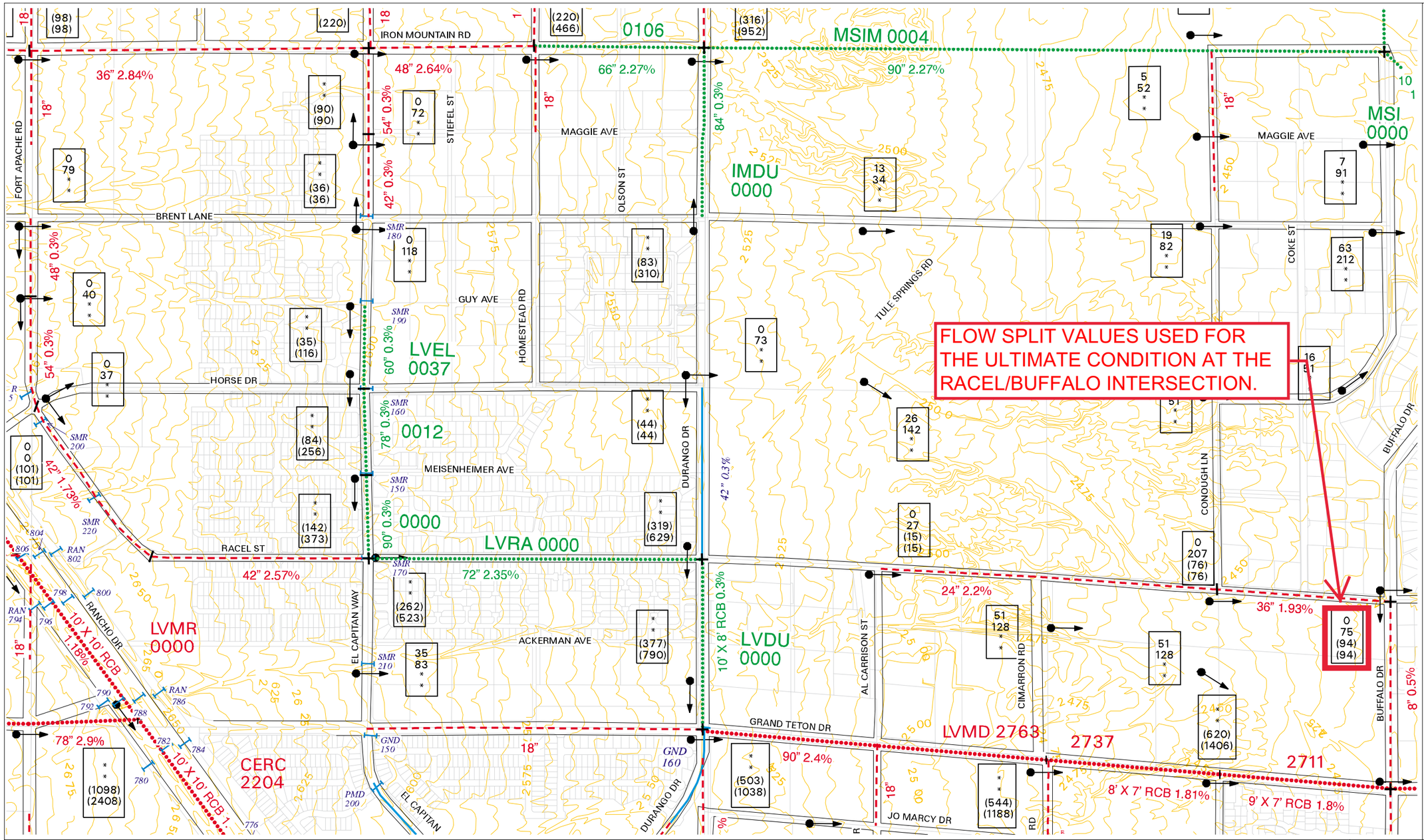
FIGURE 6B

NOTE:
Existing conditions are based on future CN values with only existing local and CCRFCD facilities in place

N W E S

800 600 400 200 0 400 800
(IN FEET)
SCALE: 1 INCH = 800 FEET

/FILES8/NWTEMP/E9.MAP



NORTHWEST NEIGHBORHOOD STUDY PHASE 2

LEGEND

- EXISTING REGIONAL DETENTION BASINS
- PROPOSED REGIONAL DETENTION BASINS (Not Included in 1996 MPU)
- EXISTING REGIONAL BRIDGES
- PROPOSED REGIONAL BRIDGES
- PROPOSED REGIONAL BRIDGES (Not Included In 1996 MPU)
- EXISTING LOCAL BRIDGES
- PROPOSED REGIONAL CULVERT
- EXISTING REGIONAL CULVERT
- EXISTING LOCAL CULVERT
- EXISTING REGIONAL PIPELINE
- PROPOSED REGIONAL PIPELINE
- PROPOSED REGIONAL PIPELINE (Not Included in 1996 MPU)
- EXISTING LOCAL PIPELINE
- PROPOSED LOCAL PIPELINE
- EXISTING REGIONAL CHANNEL
- PROPOSED REGIONAL CHANNEL
- EXISTING LOCAL CHANNEL
- PROPOSED LOCAL CHANNEL
- PROPOSED REGIONAL CHANNEL (Not Included In 1996 MPU)
- EXISTING REGIONAL DIKE/LEVEE
- PROPOSED REGIONAL DIKE/LEVEE
- PROPOSED REGIONAL DIKE/LEVEE (Not Included In 1996 MPU)
- PROPOSED LOCAL DIKE/LEVEE

FIGURE F-8

FUTURE DRAINAGE CONDITIONS

N S E W

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)

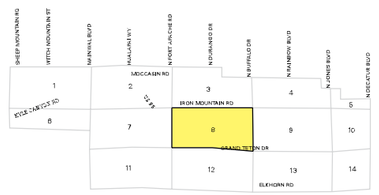
NOTE:

Ultimate drainage conditions are based on future CN values with all flood control facilities in place.
Regional facility identifiers were established based on the methodology used in the "1996 Clark County Regional Flood Control Master Plan Update for the Las Vegas Valley."

NOTE:

All regional facilities proposed in the "1996 Clark County Regional Flood Control Master Plan Update for the Las Vegas Valley" have been resized based on the flows developed in this study. In addition, many of these facilities have been changed from channels to reinforced concrete box culverts.

FIGURE 6C



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/F7/NW/F8.MAP

FIGURE 6D

4 FT EARTH DIVERSION BERM

10 X 9' RCB
1.14%

MSIM
0000

NVMS 0000
GOLF COURSE
CHANNEL (APPROXIMATE)
100' BW, 6' D 10:1 S.S.

GOLF COURSE
CHANNEL (APPROXIMATE)
50' BW, 3' D, 5:1 S.S.

FLOW SPLIT VALUES USED FOR THE ULTIMATE CONDITION AT THE RACEL/BUFFALO INTERSECTION.

PROJECT SITE

NVMS
0000
GOLF COURSE
CHANNEL (APPROXIMATE)
100' BW, 6' D 10:1 S.S.

CONCRETE
CHANNEL
20'W, 11'D

LVMD
2661

LVMD
2632

9' X 9' RCB 1.0%

11' X 10' RCB 0.59%

48" 0.5%

30" 0.54%

36" 0.8%

IRON MOUNTAIN RD
MAGGIE AVE
BRENT LN
GUY AVE
HORSE DR
MEISENHEIMER AVE
ACKERMAN AVE
GRAND TETON DR
RACEL ST
BUFFALO DR
PIONEER WAY
TENAYA WAY
MONTE CRISTO WAY
TIOGA WAY
RAINBOW BLVD
GILBERT LANE
GAREHIME ST
KISSEL ST
TORREY PINES DR
MUSTANG ST
MAVERICK ST
BRONCO ST
JONES BLVD

15 98 * *
483 1805 * *
532 1887 *
8 71 * *
5 32 * *
11 55 * *
12 58 * *
0 69 (46) (46)
0 79 * *
5 26 * *
6 31 * *
19 97 * *
34 108 * *
19 90 * *
2 11 * *
130 306 * *
587 1961 *
43 140 * *
28 93 * *
30 123 (23) (23)
0 149 * *
619 2263 * *
37 135 (8) (8)
41 60 (33) (33)
* * (711) (1552)
* * (724) (1754)
0 171 (65)

2425
2400
2375
18"

NORTHWEST NEIGHBORHOOD STUDY PHASE 2

LEGEND

- EXISTING REGIONAL DETENTION BASINS
- PROPOSED REGIONAL DETENTION BASINS (Not Included in 1996 MPU)
- EXISTING REGIONAL BRIDGES
- PROPOSED REGIONAL BRIDGES
- PROPOSED REGIONAL BRIDGES (Not Included In 1996 MPU)
- EXISTING LOCAL BRIDGES
- PROPOSED REGIONAL CULVERT
- EXISTING REGIONAL CULVERT
- EXISTING LOCAL CULVERT
- EXISTING REGIONAL PIPELINE
- PROPOSED REGIONAL PIPELINE
- PROPOSED REGIONAL PIPELINE (Not Included in 1996 MPU)
- EXISTING LOCAL PIPELINE
- PROPOSED LOCAL PIPELINE
- EXISTING REGIONAL CHANNEL
- PROPOSED REGIONAL CHANNEL
- EXISTING LOCAL CHANNEL
- PROPOSED LOCAL CHANNEL
- PROPOSED REGIONAL CHANNEL (Not Included In 1996 MPU)
- EXISTING REGIONAL DIKE/LEVEE
- PROPOSED REGIONAL DIKE/LEVEE
- PROPOSED REGIONAL DIKE/LEVEE (Not Included In 1996 MPU)
- PROPOSED LOCAL DIKE/LEVEE

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.
Regional facility identifiers were established based on the methodology used in the "1996 Clark County Regional Flood Control Master Plan Update for the Las Vegas Valley."

NOTE:
All regional facilities proposed in the "1996 Clark County Regional Flood Control Master Plan Update for the Las Vegas Valley" have been resized based on the flows developed in this study. In addition, many of these facilities have been changed from channels to reinforced concrete box culverts.

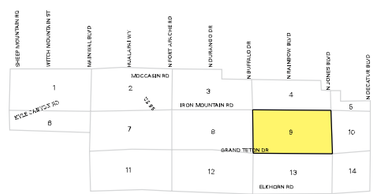
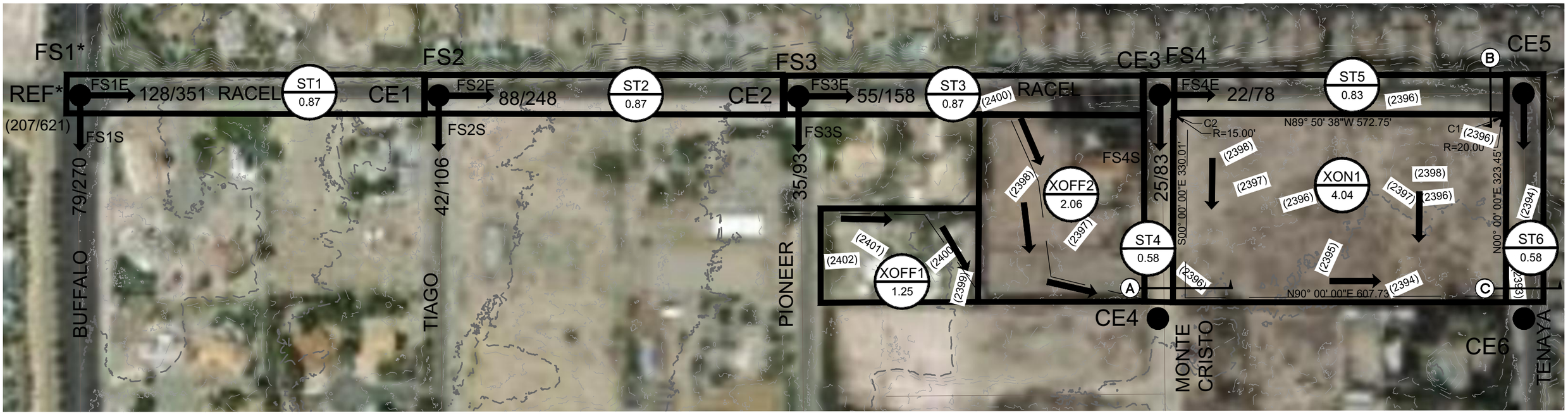


FIGURE F-9

FUTURE DRAINAGE CONDITIONS

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Existing Condition			
Basin	Area (acres)	Q10 (cfs)	Q100 (cfs)
XON1	4.04	<1	1
XOFF1	1.25	<1	1
XOFF2	2.06	<1	1
REF*	-	207	621
CE1	-	130	354
CE2	-	90	251
CE3	-	57	161
CE4	-	26	86
CE5	-	24	81
CE6	-	25	83
ST1	0.87	2	3
ST2	0.87	2	3
ST3	0.87	2	3
ST4	0.58	1	2
ST5	0.83	2	3
ST6	0.58	1	2

Existing Condition						
Cross Section	Description	Q (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)	DxV
CS A EX 10YR	CE4	26	0.5	0.51	1.73	0.88
CS A EX 100YR	CE4	86	0.5	0.74	3.01	2.23
CS B EX 10YR	CE5	24	0.23	0.64	1.55	0.99
CS B EX 100YR	CE5	81	0.23	0.92	2.52	2.32
CS C EX 10YR	CE6	25	0.54	0.57	2.14	1.22
CS C EX 100YR	CE6	83	0.54	0.80	3.29	2.63

* REFERENCED AND CALCULATED FROM CITY OF LAS VEGAS NORTHWEST NEIGHBORHOOD STUDY PHASE 2.

SEE FLOW SPLIT CALCULATIONS IN APPENDIX C.

175 0 87.5 175 350

(IN FEET)
1 inch = 175 ft.

DRAINAGE LEGEND

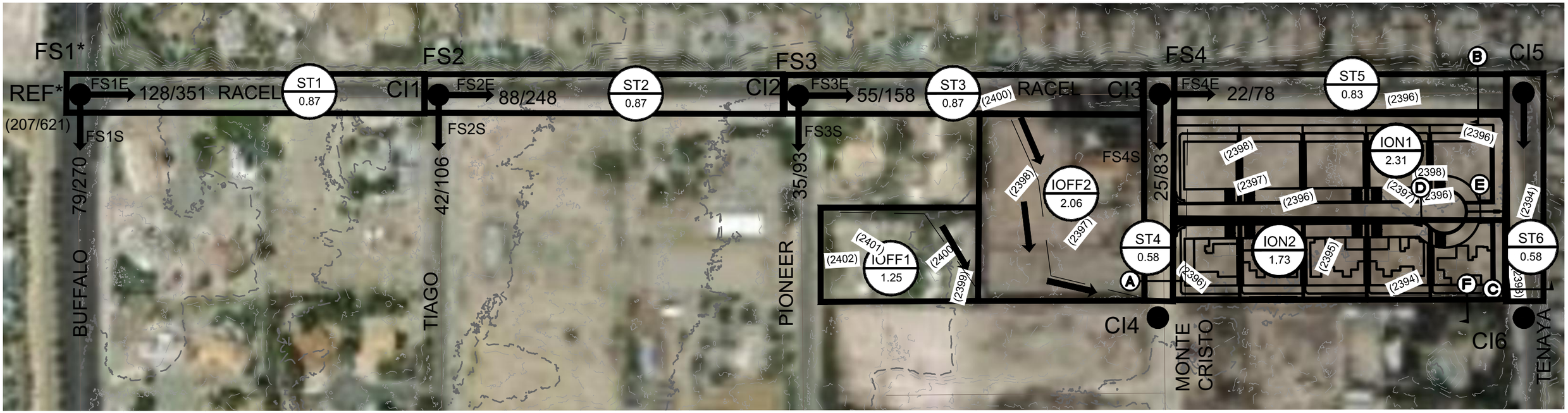
XOFF1 / XXX	BASIN IDENTIFICATION / BASIN AREA (ACRES)
C1	BASIN BOUNDARY CONCENTRATION POINT
	FLOW PATH
	PROJECT SITE
A	CROSS SECTION
XX/XXX (XX/XXX)	10-YR/100-YR FLOW (CFS) REFERENCE FLOW (CFS)

TANEY ENGINEERING
6030 S. JONES BOULEVARD
LAS VEGAS, NV 89118
(702) 362-8844 FAX: (702) 362-5233
EST. 2000

DATE: 2.21.2019
JOBNO: ADV-18-110

EXISTING CONDITION; RACEL AND TENAYA

FIGURE 7



Interim Condition			
Basin	Area (acres)	Q10 (cfs)	Q100 (cfs)
ION1	2.31	<1	<1
ION2	1.73	<1	<1
IOFF1	1.25	<1	1
IOFF2	2.06	<1	1
REF*	-	207	621
CI1	-	130	354
CI2	-	90	251
CI3	-	57	161
CI4	-	26	86
CI5	-	24	81
CI6	-	25	83
ST1	0.87	2	3
ST2	0.87	2	3
ST3	0.87	2	3
ST4	0.58	1	2
ST5	0.83	2	3
ST6	0.58	1	2

Interim Condition						
Cross Section	Description	Q (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)	DxV
CS A INT 10YR	CI4	26	0.5	0.51	1.73	0.88
CS A INT 100YR	CI4	86	0.5	0.74	3.01	2.23
CS B INT 10YR	CI5	24	0.23	0.64	1.55	0.99
CS B INT 100YR	CI5	81	0.23	0.92	2.52	2.32
CS C INT 10YR	CI6	25	0.54	0.57	2.14	1.22
CS C INT 100YR	CI6	83	0.54	0.80	3.29	2.63
CS D INT 10YR	ION1	<1	0.85	0.09	1.28	0.12
CS D INT 100YR	ION1	<1	0.85	0.17	1.30	0.22
CS E INT 10YR	Easement at ION1	<1	0.5	0.05	0.72	0.04
CS E INT 100YR	Easement at ION1	<1	0.5	0.10	1.07	0.11
CS F INT 10YR	Easement at ION2	<1	0.5	0.05	0.80	0.04
CS F INT 100YR	Easement at ION2	<1	0.5	0.10	1.51	0.15

* REFERENCED AND CALCULATED FROM CITY OF LAS VEGAS NORTHWEST NEIGHBORHOOD STUDY PHASE 2.

SEE FLOW SPLIT CALCULATIONS IN APPENDIX C.

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EST. 2000

175 0 87.5 175 350

(IN FEET)
1 inch = 175 ft.

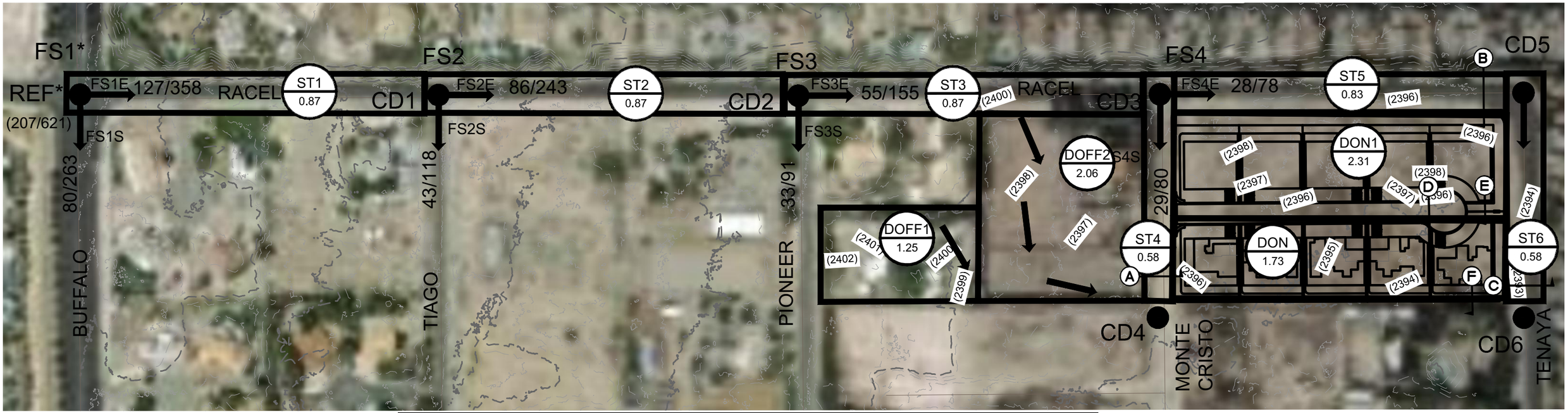
DRAINAGE LEGEND

XOFI / xxx	BASIN IDENTIFICATION
	BASIN AREA (ACRES)
	BASIN BOUNDARY
● C1	CONCENTRATION POINT
	FLOW PATH
	PROJECT SITE
A	CROSS SECTION
XX/XXX	10-YR/100-YR FLOW (CFS)
(XX/XXX)	REFERENCE FLOW (CFS)

DATE: 2.21.2019
JOBNO: ADV-18-110

INTERIM CONDITION; RACEL AND TENAYA

FIGURE 8



DEVELOPED Condition			
Basin	Area (acres)	Q10 (cfs)	Q100 (cfs)
DON1	2.31	<1	<1
DON2	1.73	<1	<1
DOFF1	1.25	<1	1
DOFF2	2.06	1	3
REF*	-	207	621
CD1	-	129	361
CD2	-	88	246
CD3	-	57	158
CD4	-	31	87
CD5	-	30	81
CD6	-	31	83
ST1	0.87	2	3
ST2	0.87	2	3
ST3	0.87	2	3
ST4	0.58	1	2
ST5	0.83	2	3
ST6	0.58	1	2

Developed Condition						
Cross Section	Description	Q (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)	DxV
CS A DEV 10YR	CD4	31	0.5	0.62	2.43	1.51
CS A DEV 100YR	CD4	87	0.5	0.81	3.65	2.96
CS B DEV 10YR	CD5	30	0.23	0.68	1.86	1.26
CS B DEV 100YR	CD5	81	0.23	0.89	2.63	2.34
CS C DEV 10YR	CD6	31	0.54	0.62	2.49	1.54
CS C DEV 100YR	CD6	83	0.54	0.79	3.50	2.77
CS D DEV 10YR	DON1	<1	0.85	0.09	1.28	0.12
CS D DEV 100YR	DON1	<1	0.85	0.17	1.30	0.22
CS E DEV 10YR	Easement at DON1	<1	0.5	0.05	0.72	0.04
CS E DEV 100YR	Easement at DON1	<1	0.5	0.10	1.07	0.11
CS F INT 10YR	Easement at DON2	<1	0.5	0.05	0.80	0.04
CS F INT 100YR	Easement at DON2	<1	0.5	0.10	1.51	0.15

* REFERENCED AND CALCULATED FROM CITY OF LAS VEGAS NORTHWEST NEIGHBORHOOD STUDY PHASE 2.

SEE FLOW SPLIT CALCULATIONS IN APPENDIX C.

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EST. 2000

175 0 87.5 175 350

(IN FEET)
1 inch = 175ft.

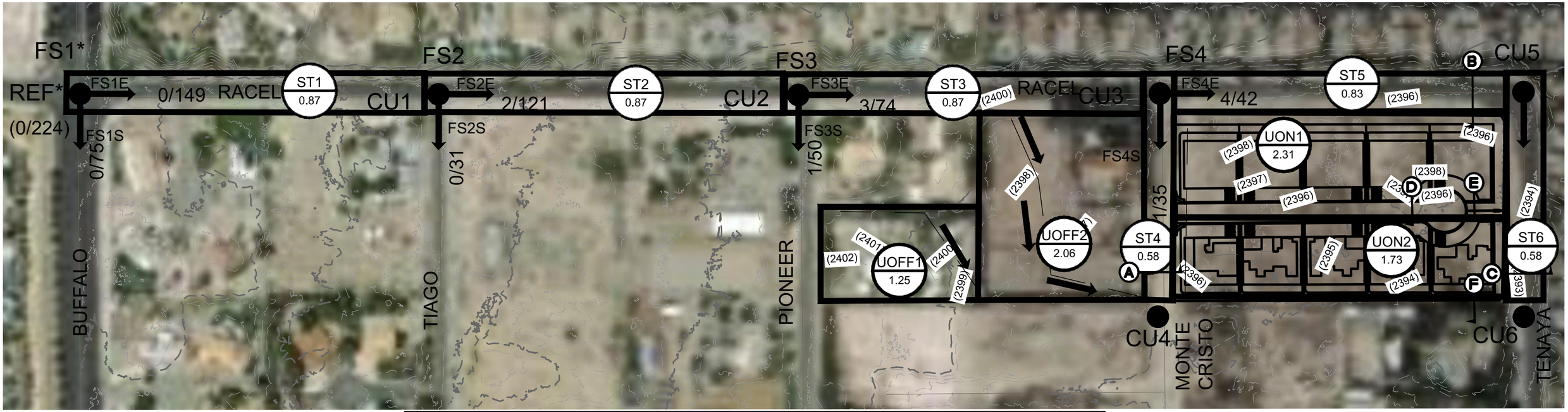
DRAINAGE LEGEND

XOF1 / xxx	BASIN IDENTIFICATION / BASIN AREA (ACRES)
C1	BASIN BOUNDARY CONCENTRATION POINT
	FLOW PATH
	PROJECT SITE
A	CROSS SECTION
XX/XXX (XX/XXX)	10-YR/100-YR FLOW (CFS) REFERENCE FLOW (CFS)

DATE: 2.21.2019
JOBNO: ADV-18-110

DEVELOPED CONDITION; RACEL AND TENAYA

FIGURE 9



Ultimate Condition			
Basin	Area (acres)	Q10 (cfs)	Q100 (cfs)
UON1	2.31	<1	<1
UON2	1.73	<1	<1
UOFF1	1.25	<1	1
UOFF2	2.06	1	3
REF*	-	0	224
CU1	-	2	152
CU2	-	4	124
CU3	-	5	77
CU4	-	3	42
CU5	-	6	45
CU6	-	7	47
ST1	0.87	2	3
ST2	0.87	2	3
ST3	0.87	2	3
ST4	0.58	1	2
ST5	0.83	2	3
ST6	0.58	1	2

Ultimate Condition						
Cross Section	Description	Q (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)	DxV
CS A ULT 10YR	CU4	3	0.5	0.33	1.49	0.49
CS A ULT 100YR	CU4	42	0.5	0.67	2.73	1.83
CS B ULT 10YR	CU5	6	0.23	0.44	1.29	0.57
CS B ULT 100YR	CU5	45	0.23	0.75	2.14	1.61
CS C ULT 10YR	CU6	7	0.54	0.41	1.86	0.76
CS C ULT 100YR	CU6	47	0.54	0.68	2.87	1.95
CS D ULT 10YR	UON1	<1	0.85	0.09	1.28	0.12
CS D ULT 100YR	UON1	<1	0.85	0.17	1.30	0.22
CS E ULT 10YR	Easement at UON1	<1	0.5	0.05	0.72	0.04
CS E ULT 100YR	Easement at UON1	<1	0.5	0.10	1.07	0.11
CS F INT 10YR	Easement at UON2	<1	0.5	0.05	0.80	0.04
CS F INT 100YR	Easement at UON2	<1	0.5	0.10	1.51	0.15

* REFERENCED FROM CITY OF LAS VEGAS NORTHWEST NEIGHBORHOOD STUDY PHASE 2.

SEE FLOW SPLIT CALCULATIONS IN APPENDIX C.

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175 0 87.5 175 350

(IN FEET)
1 inch = 175 ft.

DRAINAGE LEGEND

XOF1 / xxx	BASIN IDENTIFICATION / BASIN AREA (ACRES)
C1	BASIN BOUNDARY CONCENTRATION POINT
	FLOW PATH
	PROJECT SITE
A	CROSS SECTION
XX/XXX (XX/XXX)	10-YR/100-YR FLOW (CFS) REFERENCE FLOW (CFS)

DATE: 2.21.2019
JOBNO: ADV-18-110

ULTIMATE CONDITION; RACEL AND TENAYA

FIGURE 10

APPENDIX B

Hydrologic Calculations

HYDROLOGIC METHODOLOGY AND CRITERIA

The U.S. Army Corps of Engineers *HEC-1 Flood Hydrograph Package* was used to determine the peak runoff values generated by the 100-year, 6-hour storm event. The HEC-1 computer model has the ability to simulate the surface runoff response of a drainage basin to precipitation. The HEC-1 Program represents the basin as an interconnected system of hydraulic components. Each component models an aspect of the rainfall runoff process within a portion of the entire basin. This basin portion is referred to as a sub-basin. The computed hydrographs of each sub-basin are then combined at the appropriate locations and a final discharge hydrograph is obtained.

Hydrologic Parameters

Basin Area

The offsite drainage basins were determined from available topographic maps, aerial photographs and field investigation. The proposed onsite areas were determined from the onsite improvement plans in AutoCAD format. The drainage basins are shown on Figures 7 through 10.

Precipitation

The project site is located inside of the limits for McCarran Airport Rainfall. Precipitation values have been referenced from Table 505 of the HCDDM. The site encompasses less than 8 square miles, therefore the Storm Distribution Number Three (SDN No. 3) was used for the HEC-1 Model.

Depth-Area Reduction Factor

A Depth-Area Reduction Factor or DARF was not used in this analysis as the drainage basins were too small.

Hydrologic Abstractions
Interception, infiltration, surface storage, evaporation, and evapotranspiration are regarded as hydrologic abstractions. The primary rainfall loss component in hydrologic models is infiltration.

The SCS curve number method was used to approximate the infiltration rates for the onsite watershed. Curve numbers are a function of the hydrologic soil group, vegetative cover and its hydrologic condition, land use, and the soil's antecedent soil moisture condition. Curve numbers are referenced from the CCRFCD's Hydrologic Criteria and Drainage Design Manual, Tables 602 and 602A.

Hydrologic soil group information was determined from the Web Soil Survey website (http://websoilsurvey.nrcs.usda.gov). The project site is located within a Hydrologic Soil Group A which has a low runoff potential. Composite SCS curve number calculations were calculated using a spreadsheet.

Lag Time
Lag time (TLAG) is described as the time measured between the centroid of rainfall to the peak of the outflow hydrograph. It is a measure of the watershed's response time and is associated to basin length, slope, roughness characteristics, and land use.

Lag-times have been estimated by calculating the drainage basins' time of concentration, T_c. The time of concentration consists of two component times; the initial overland flow time, t_i, and the travel time for the flow within the gutter, swale, or channel, t_t. The equation for the time of concentration is as follows:

$$T_c = t_i + t_t$$

Where, $t_i = 1.8(1.1-K)L_O^{1/2}/S^{1/3}$

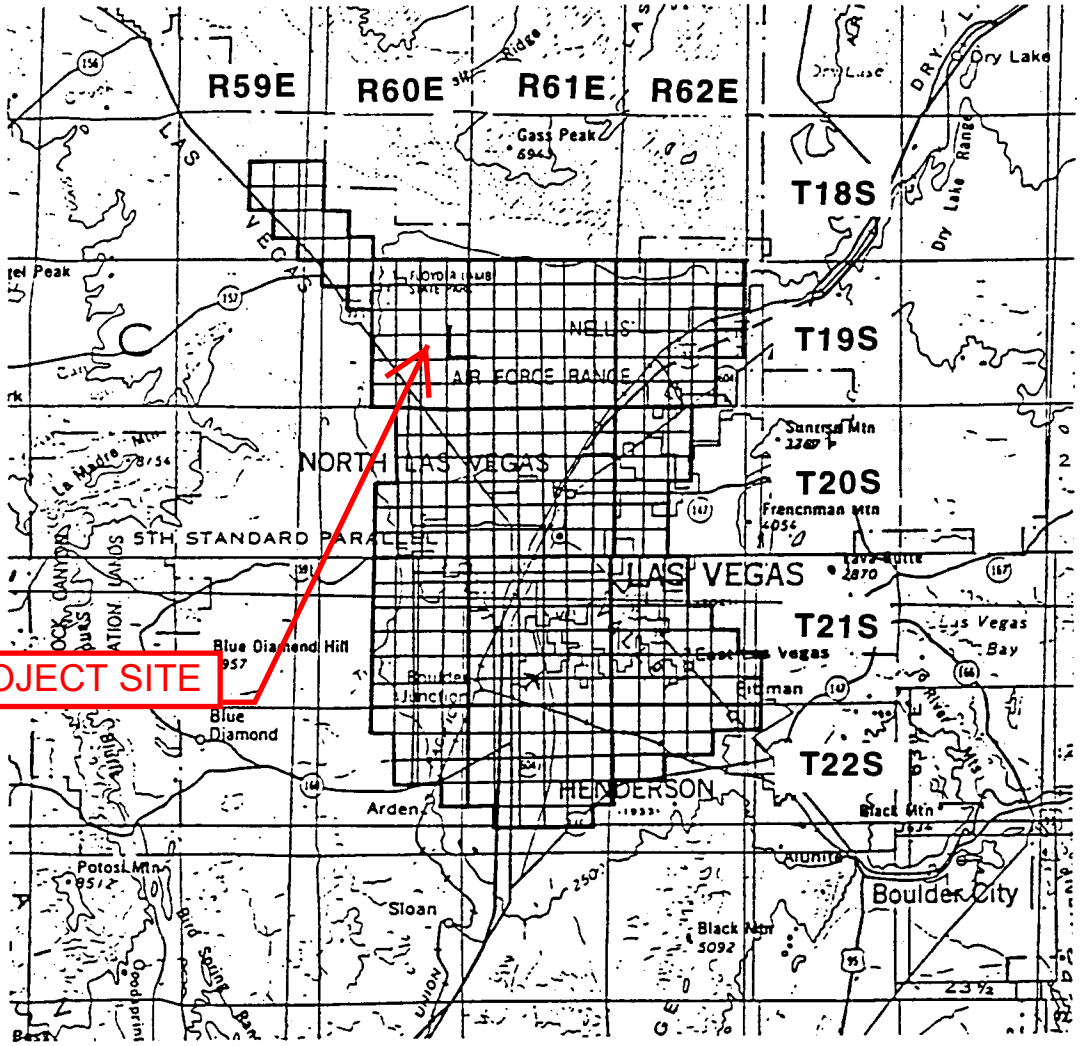
K = Flow Resistance Coefficient (K = 0.0132CN-0.39)
CN = Curve Number
L_O = Length of the Overland Flow
S = Average Basin Slope

And, $t_t = L/(60V)$

L = Length of Gutter/Channel (ft)
V = Flow Velocity (ft/s) – Velocity is calculated from the Manning's Equation with $Q = 0.6Q_T$, where Q_T = Total Discharge

Lag-times are estimated with the following equation: $TLAG = 0.6T_c$.

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.

Revision	Date

SIX HOUR DEPTH-AREA REDUCTION FACTORS

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

NOTES: 1. A graphical representation of these factors is presented in Figure 514.

2. Consult with the local entity and/or the CCRFCD for guidance in using the Depth-Area Reduction Factors for drainage areas greater than 200 square miles.

Revision	Date

SIX-HOUR STORM DISTRIBUTIONS

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

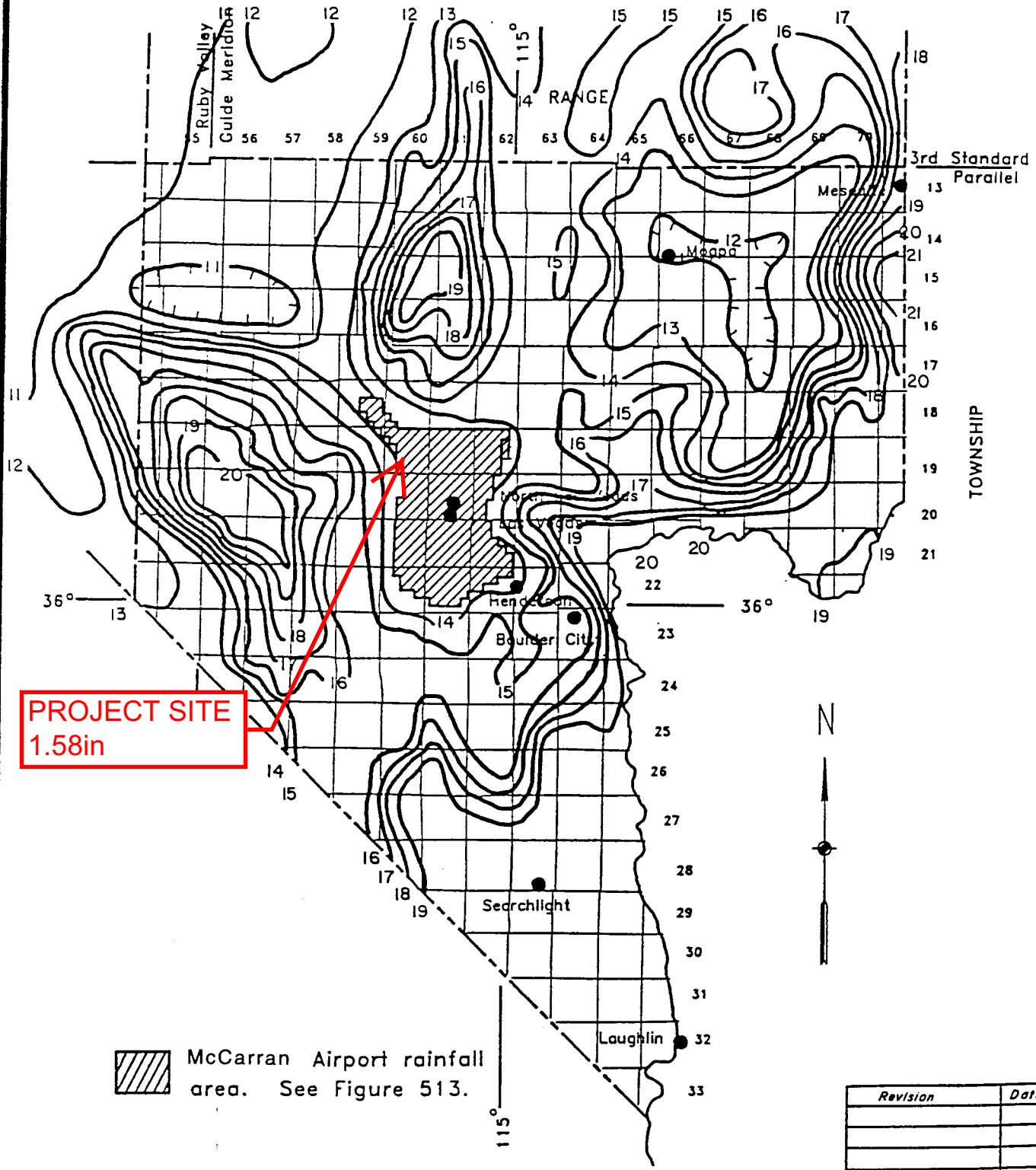
Notes:
1. For drainage areas less than 8 square miles in size, use SDN 3.
2. For drainage areas greater than or equal to 8 square miles and less than 12 square miles in size, use SDN 4.
3. For drainage areas greater than or equal to 12 square miles, use SDN 5.
4. A graphical representation of these values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

Revision	Date

REFERENCE:

TABLE 503

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



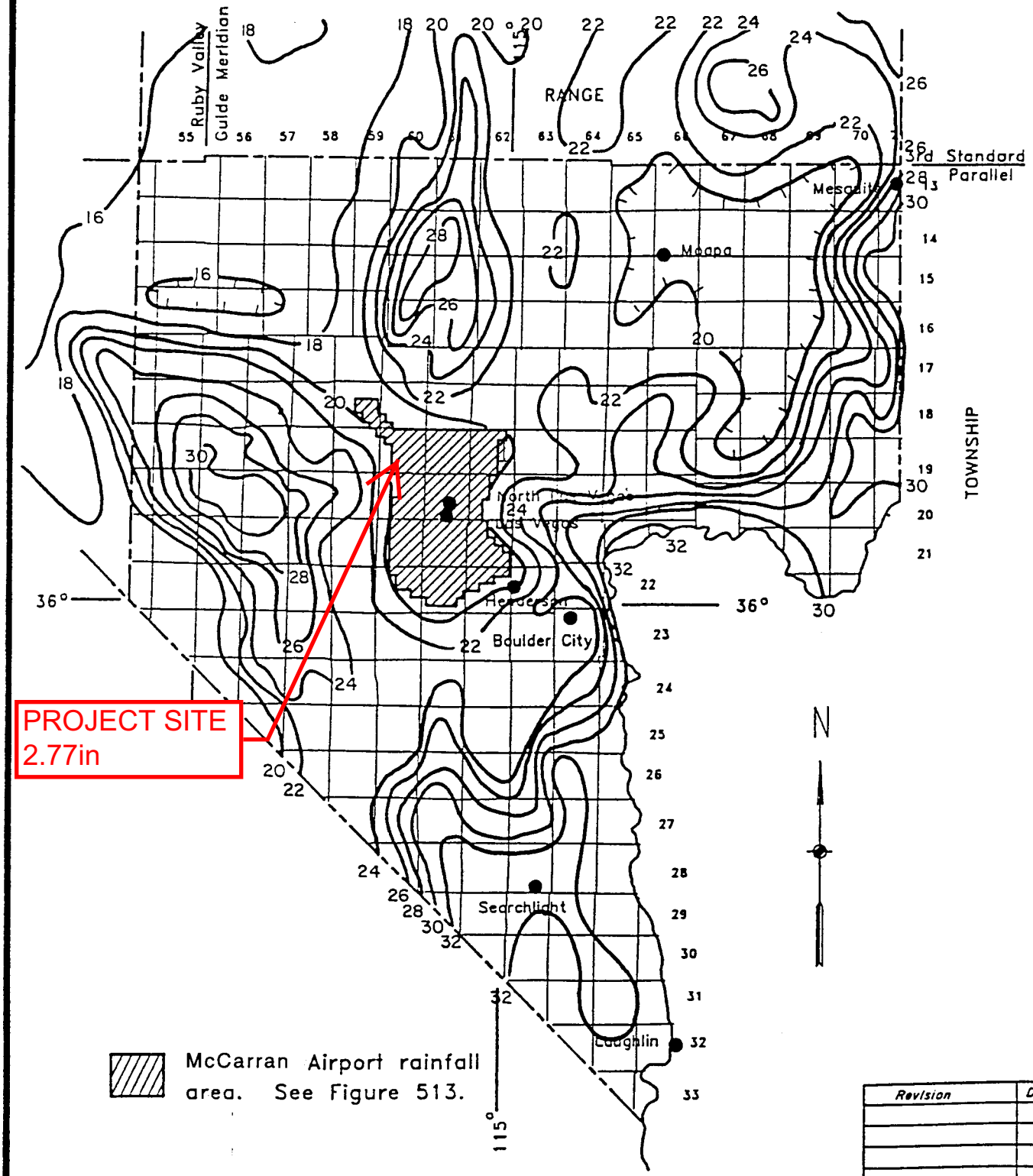
Revision	Date

WRC ENGINEERING

REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 503

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



Revision	Date

WRC ENGINEERING

REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 506

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
(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 - 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.

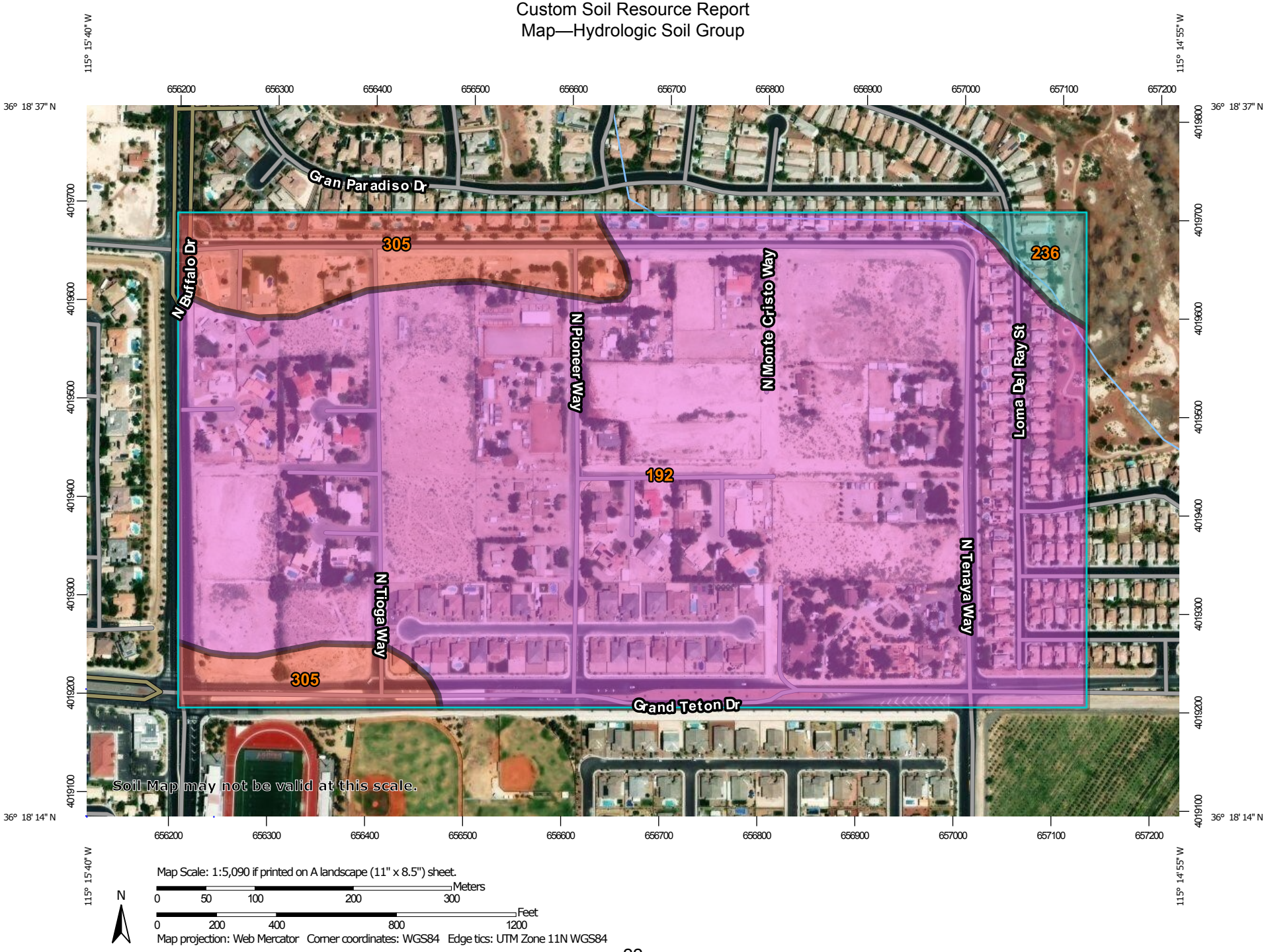
2 Actual percent impervious value should be compared to selected land use type.

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



Map Scale: 1:5,090 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County
Survey Area Data: Version 13, Sep 14, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 3, 2016—Oct 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
192	Dalian-McCullough complex, 0 to 4 percent slopes	A	100.4	86.9%
236	Glencarb very fine sandy loam, saline	C	2.0	1.7%
305	Las Vegas-DeStazo complex, 0 to 2 percent slopes	D	13.2	11.4%
Totals for Area of Interest			**115.6**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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Composite Curve Number Calculations

Proj. No: ADV-18-110 **Project Name:** RACEL AND TENAYA
Date: 2/19/2019 **Designed By:** MS

Basin	Basin Area (ac)	Sub-region Cover Type	Sub-region Soil Type	Sub-region CN	Sub-region Area (ac)	Percent of Basin	Cumulative Percent	Areal Weighted CN	Cumulative CN	Composite CN
EXISTING CONDITION										
XON1	4.04	Desert Shrub, Poor	A	63	4.04	100.0%	100.0%	63.0	63.0	**63**
XOFF1	2.06	Desert Shrub, Poor	A	63	2.06	100.0%	100.0%	63.0	63.0	**63**
XOFF2	1.25	Desert Shrub, Poor	A	63	1.25	100.0%	100.0%	63.0	63.0	**63**
ST1	0.87	Impervious	A	98	0.87	100.0%	100.0%	98.0	98.0	**98**
ST2	0.87	Impervious	A	98	0.87	100.0%	100.0%	98.0	98.0	**98**
ST3	0.87	Impervious	A	98	0.87	100.0%	100.0%	98.0	98.0	**98**
ST4	0.58	Impervious	A	98	0.58	100.0%	100.0%	98.0	98.0	**98**
ST5	0.83	Impervious	A	98	0.83	100.0%	100.0%	98.0	98.0	**98**
ST6	0.58	Impervious	A	98	0.58	100.0%	100.0%	98.0	98.0	**98**
INTERIM CONDITION										
ION1	2.31	Residential, 14000sf, 30% Imp	A	57	2.31	100.0%	100.0%	57.0	57.0	**57**
ION2	1.73	Residential, 14000sf, 30% Imp	A	57	1.73	100.0%	100.0%	57.0	57.0	**57**
IOFF1	2.06	Desert Shrub, Poor	A	63	2.06	100.0%	100.0%	63.0	63.0	**63**
IOFF2	1.25	Desert Shrub, Poor	A	63	1.25	100.0%	100.0%	63.0	63.0	**63**
ST1	0.87	Impervious	A	98	0.87	100.0%	100.0%	98.0	98.0	**98**
ST2	0.87	Impervious	A	98	0.87	100.0%	100.0%	98.0	98.0	**98**
ST3	0.87	Impervious	A	98	0.87	100.0%	100.0%	98.0	98.0	**98**
ST4	0.58	Impervious	A	98	0.58	100.0%	100.0%	98.0	98.0	**98**
ST5	0.83	Impervious	A	98	0.83	100.0%	100.0%	98.0	98.0	**98**
ST6	0.58	Impervious	A	98	0.58	100.0%	100.0%	98.0	98.0	**98**
DEVELOPED CONDITION										
DON1	2.31	Residential, 14000sf, 30% Imp	A	57	2.31	100.0%	100.0%	57.0	57.0	**57**
DON2	1.73	Residential, 14000sf, 30% Imp	A	57	1.73	100.0%	100.0%	57.0	57.0	**57**
DOFF1	2.06	Residential, 8000sf, 58% Imp	A	73	2.06	100.0%	100.0%	73.0	73.0	**73**
DOFF2	1.25	Residential, 6000sf, 69% Imp	A	80	1.25	100.0%	100.0%	80.0	80.0	**80**
ST1	0.87	Impervious	A	98	0.87	100.0%	100.0%	98.0	98.0	**98**
ST2	0.87	Impervious	A	98	0.87	100.0%	100.0%	98.0	98.0	**98**
ST3	0.87	Impervious	A	98	0.87	100.0%	100.0%	98.0	98.0	**98**
ST4	0.58	Impervious	A	98	0.58	100.0%	100.0%	98.0	98.0	**98**
ST5	0.83	Impervious	A	98	0.83	100.0%	100.0%	98.0	98.0	**98**
ST6	0.58	Impervious	A	98	0.58	100.0%	100.0%	98.0	98.0	**98**
ULTIMATE CONDITION										
UON1	2.31	Residential, 14000sf, 30% Imp	A	57	2.31	100.0%	100.0%	57.0	57.0	**57**
UON2	1.73	Residential, 14000sf, 30% Imp	A	57	1.73	100.0%	100.0%	57.0	57.0	**57**
UOFF1	2.06	Residential, 8000sf, 58% Imp	A	73	2.06	100.0%	100.0%	73.0	73.0	**73**
UOFF2	1.25	Residential, 6000sf, 69% Imp	A	80	1.25	100.0%	100.0%	80.0	80.0	**80**
ST1	0.87	Impervious	A	98	0.87	100.0%	100.0%	98.0	98.0	**98**
ST2	0.87	Impervious	A	98	0.87	100.0%	100.0%	98.0	98.0	**98**
ST3	0.87	Impervious	A	98	0.87	100.0%	100.0%	98.0	98.0	**98**
ST4	0.58	Impervious	A	98	0.58	100.0%	100.0%	98.0	98.0	**98**
ST5	0.83	Impervious	A	98	0.83	100.0%	100.0%	98.0	98.0	**98**
ST6	0.58	Impervious	A	98	0.58	100.0%	100.0%	98.0	98.0	**98**

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL - STANDARD FORM 4

Taney Engineering
6030 S. Jones, Suite #100
Las Vegas, NV 89118

PROJECT NO. : ADV-18-110 **PROJECT: RACEL AND TENAYA**

FILE : STD_FRM4 **CALCULATED BY: MS** **DATE : 02/19/19**

Sub-Basin Data					Initial/Overland Time (T_i)			Travel Time (T_t)					T_c	T_c Check (Urbanized Basins)		Final T_c	T_{lag}	Remarks
DESIG	CN	K	AREA (acres)	AREA (mi^2)	LENGTH (ft)	SLOPE (%)	T_i (min)	LENGTH (ft)	SLOPE (%)	V_1 (fps)	V_2 (fps)	T_t (min)	$T_c=T_i+T_t$ (min)	TOTAL (ft)	T_c (min)	T_c (min)	T_{lag} (hrs)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
EXISTING CONDITION																		
XON1	63	0.442	4.04	0.0063	32.9	0.1	17.4	890.1	0.6	1.15	2.28	10.1	27.5	N/A	N/A	27.49	0.275	
XOFF1	63	0.442	2.06	0.0032	36.2	1.0	7.1	321.5	1.0	1.48	N/A	3.6	10.8	N/A	N/A	10.75	0.108	
XOFF2	63	0.442	1.25	0.0020	57.4	2.2	6.9	468.3	0.6	1.56	N/A	5.0	11.9	N/A	N/A	11.89	0.119	
ST1	98	0.904	0.87	0.0014	7.5	3.3	0.7	627.4	1.1	2.16	3.27	4.5	5.2	635	13.5	5.16	0.052	
ST2	98	0.904	0.87	0.0014	7.5	3.3	0.7	627.4	1.1	2.16	3.27	4.5	5.2	635	13.5	5.16	0.052	
ST3	98	0.904	0.87	0.0014	7.5	3.3	0.7	627.4	1.1	2.16	3.27	4.5	5.2	635	13.5	5.16	0.052	
ST4	98	0.904	0.58	0.0009	7.5	3.3	0.7	413.7	0.4	1.28	N/A	5.4	6.0	421	12.3	6.05	0.060	
ST5	98	0.904	0.83	0.0013	7.5	3.3	0.7	605.4	0.4	1.25	1.89	7.6	8.3	613	13.4	8.27	0.083	
ST6	98	0.904	0.58	0.0009	7.5	3.3	0.7	413.7	0.5	1.47	N/A	4.7	5.3	421	12.3	5.34	0.053	
INTERIM CONDITION																		
ION1	57	0.362	2.31	0.0036	140.3	1.1	15.5	758.04	0.5	1.41	2.14	7.9	23.4	898	15.0	14.99	0.150	
ION2	57	0.362	1.73	0.0027	237	0.4	27.7	471.23	0.4	1.26	N/A	6.2	34.0	708	13.9	13.93	0.139	
IOFF1	63	0.442	2.06	0.0032	36.2	1.0	7.1	321.5	1.0	1.48	N/A	3.6	10.8	N/A	N/A	10.75	0.108	
IOFF2	63	0.442	1.25	0.0020	57.4	2.2	6.9	468.3	0.6	1.15	N/A	6.8	13.7	N/A	N/A	13.71	0.137	
ST1	98	0.904	0.87	0.0014	7.5	3.3	0.7	627.4	1.1	2.16	3.27	4.5	5.2	635	13.5	5.16	0.052	
ST2	98	0.904	0.87	0.0014	7.5	3.3	0.7	627.4	1.1	2.16	3.27	4.5	5.2	635	13.5	5.16	0.052	
ST3	98	0.904	0.87	0.0014	7.5	3.3	0.7	627.4	1.1	2.16	3.27	4.5	5.2	635	13.5	5.16	0.052	
ST4	98	0.904	0.58	0.0009	7.5	3.3	0.7	413.7	0.4	1.28	N/A	5.4	6.0	421	12.3	6.05	0.060	
ST5	98	0.904	0.83	0.0013	7.5	3.3	0.7	605.4	0.4	1.25	1.89	7.6	8.3	613	13.4	8.27	0.083	
ST6	98	0.904	0.58	0.0009	7.5	3.3	0.7	413.7	0.5	1.47	N/A	4.7	5.3	421	12.3	5.34	0.053	
DEVELOPED CONDITION																		
DON1	57	0.362	2.31	0.0036	140.3	1.1	15.5	758.04	0.5	1.41	2.14	7.9	23.4	898	15.0	14.99	0.150	
DON2	57	0.362	1.73	0.0027	237	0.4	27.7	471.23	0.4	1.26	N/A	6.2	34.0	708	13.9	13.93	0.139	
DOFF1	73	0.574	2.06	0.0032	36.2	1.0	5.7	321.5	1.0	2.02	N/A	2.7	8.4	358	12.0	8.35	0.084	
DOFF2	80	0.666	1.25	0.0020	57.4	2.2	4.6	468.3	0.6	1.56	N/A	5.0	9.5	526	12.9	9.54	0.095	
ST1	98	0.904	0.87	0.0014	7.5	3.3	0.7	627.4	1.1	2.16	3.27	4.5	5.2	635	13.5	5.16	0.052	
ST2	98	0.904	0.87	0.0014	7.5	3.3	0.7	627.4	1.1	2.16	3.27	4.5	5.2	635	13.5	5.16	0.052	
ST3	98	0.904	0.87	0.0014	7.5	3.3	0.7	627.4	1.1	2.16	3.27	4.5	5.2	635	13.5	5.16	0.052	
ST4	98	0.904	0.58	0.0009	7.5	3.3	0.7	413.7	0.4	1.28	N/A	5.4	6.0	421	12.3	6.05	0.060	
ST5	98	0.904	0.83	0.0013	7.5	3.3	0.7	605.4	0.4	1.25	1.89	7.6	8.3	613	13.4	8.27	0.083	
ST6	98	0.904	0.58	0.0009	7.5	3.3	0.7	413.7	0.5	1.47	N/A	4.7	5.3	421	12.3	5.34	0.053	
ULTIMATE CONDITION																		
UON1	57	0.362	2.31	0.0036	140.3	1.1	15.5	758.04	0.5	1.41	2.14	7.9	23.4	898	15.0	14.99	0.150	
UON2	57	0.362	1.73	0.0027	237	0.4	27.7	471.23	0.4	1.26	N/A	6.2	34.0	708	13.9	13.93	0.139	
UOFF1	73	0.574	2.06	0.0032	36.2	1.0	5.7	321.5	1.0	2.02	N/A	2.7	8.4	358	12.0	8.35	0.084	
UOFF2	80	0.666	1.25	0.0020	57.4	2.2	4.6	468.3	0.6	1.56	N/A	5.0	9.5	526	12.9	9.54	0.095	
ST1	98	0.904	0.87	0.0014	7.5	3.3	0.7	627.4	1.1	2.16	3.27	4.5	5.2	635	13.5	5.16	0.052	
ST2	98	0.904	0.87	0.0014	7.5	3.3	0.7	627.4	1.1	2.16	3.27	4.5	5.2	635	13.5	5.16	0.052	
ST3	98	0.904	0.87	0.0014	7.5	3.3	0.7	627.4	1.1	2.16	3.27	4.5	5.2	635	13.5	5.16	0.052	
ST4	98	0.904	0.58	0.0009	7.5	3.3	0.7	413.7	0.4	1.28	N/A	5.4	6.0	421	12.3	6.05	0.060	
ST5	98	0.904	0.83	0.0013	7.5	3.3	0.7	605.4	0.4	1.25	1.89	7.6	8.3	613	13.4	8.27	0.083	
ST6	98	0.904	0.58	0.0009	7.5	3.3	0.7	413.7	0.5	1.47	N/A	4.7	5.3	421	12.3	5.34	0.053	

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

$T_c=T_i+T_t$

$K=0.0132(CN)-.39$

$T_{lag} = 0.6T_c$

For the travel time (T_t) calculations,
V_1 applies to the first 500 feet of travel distance;
V_2 applies to the remaining travel distance.

Travel Time Velocity Formulas

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

All basins over one square mile are calculated by the equation $T_{lag}=20Kn(L*L_c/S^{0.5})^{0.33}$ and denoted by shaded gray (See Worksheet).

REFERENCE: **CCRFCD HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL**

STANDARD FORM 4

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   19FEB19  TIME  13:18:26  *                    *         (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
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

1 HEC-1 INPUT PAGE 1

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

                    *DIAGRAM
              1     ID
              2     ID      <><><><><><><><><><><><><><><><><><><><>
              3     ID        RACEL/TENAYA
              4     ID        HYDROLOGIC MODEL
              5     ID        ----------------------------
              6     ID
              7     ID        10-YR STORM EVENT
              8     ID        ----------------------------
              9     ID        TANEY ENGINEERING
             10     ID        EXISTING CONDITION
             11     ID        FILE: EX_10YR.DAT
             12     ID        PROJECT No: ADV-18-110
             13     ID        DATE:  FEB 2019
             14     ID      <><><><><><><><><><><><><><><><><><><><>
             15     ID
             16     ID       ---> 6-HOUR / SDN 3 <---
             17     ID
             18     IT       5       0       0     300
             19     IO       5
             20     IN       5
             21     JR    PREC    1.00
                    *

             22     KK   ST1
             23     BA   .0014
             24     PB    1.58
             25     PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
             26     PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
             27     PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
             28     PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
             29     PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
             30     PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
             31     PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
             32     PC    .998    .999   1.00
             33     LS       0      98
             34     UD    .052
                    *

             35     KK   FS1E
             36     KM   FLOW AT RACEL/BUFFALO INTERSECTION THAT FLOWS EAST (RACEL)
             37     BA   .0001
             38     BF     128
             39     LS       0      98
             40     UD    .052
                    *

             41     KK    CE1
             42     KM   COMBINE FS1E, ST1
             43     HC       2
                    *
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1 HEC-1 INPUT PAGE 2

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

  44          KK   ST2
  45          BA   .0014
  46          BF       0
  47          LS       0      98
  48          UD    .052
              *

  49          KK   FS2E
  50          KM   FLOW AT RACEL/TIAGO INTERSECTION THAT FLOWS EAST (RACEL)
  51          BA   .0001
  52          BF      88
  53          LS       0      98
  54          UD    .052
              *

  55          KK    CE2
  56          KM   COMBINE FS2E, ST2
  57          HC       2
              *

  58          KK   ST3
  59          BA   .0014
  60          BF       0
  61          LS       0      98
  62          UD    .052
              *

  63          KK   FS3E
  64          KM   FLOW AT RACEL/PIONEER INTERSECTION THAT FLOWS EAST (RACEL)
  65          BA   .0001
  66          BF      55
  67          LS       0      98
  68          UD    .052
              *

  69          KK    CE3
  70          KM   COMBINE FS2E, ST2
  71          HC       2
              *

  72          KK   FS4S
  73          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS SOUTH (MONTE CRISTO)
  74          BA   .0001
  75          BF      25
  76          LS       0      98
  77          UD    .056
              *

  78          KK   ST4
  79          BA   .0009
  80          BF       0
  81          LS       0      98
  82          UD    .060
              *
1                                        HEC-1 INPUT                                          PAGE  3

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

  83          KK   XOFF1
  84          BA   .0019
  85          BF       0
  86          LS       0      63
  87          UD    .108
              *

  88          KK   XOFF2
  89          BA   .0032
  90          BF       0
  91          LS       0      63
  92          UD    .119
              *

  93          KK    CE4
  94          KM   COMBINE FS4S, ST4, XOFF1, XOFF2
  95          HC       4
              *

  96          KK   FS4E
  97          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS EAST (RACEL)
  98          BA   .0001
  99          BF      22
 100          LS       0      98
 101          UD    .051
              *
```

```
            102           KK   ST5
            103           BA   .0013
            104           BF       0
            105           LS       0      98
            106           UD    .083
                          *

            107           KK    CE5
            108           KM   COMBINE FS4E, ST5
            109           HC       2
                          *

            110           KK   ST6
            111           BA   .0009
            112           BF       0
            113           LS       0      98
            114           UD    .053
                          *

            115           KK   XON1
            116           BA   .0063
            117           BF       0
            118           LS       0      63
            119           UD    .275
                          *
```



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

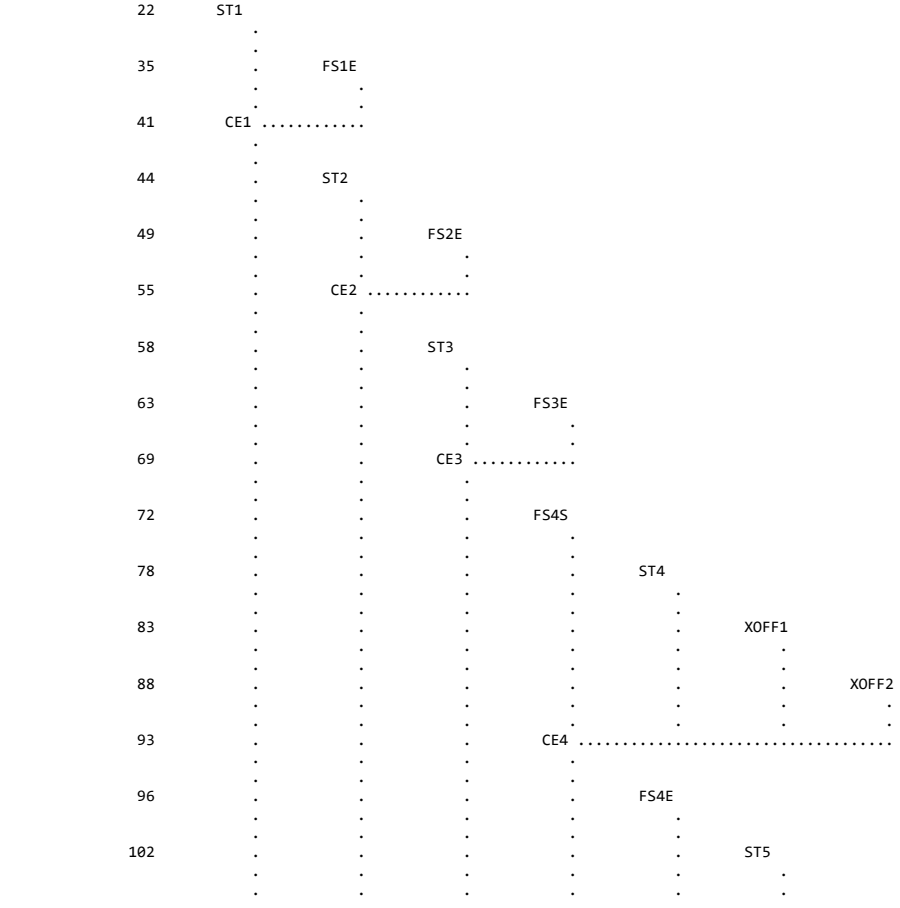

            120           KK    CE6
            121           KM   COMBINE CE5, ST6, XON1
            122           HC       3
                          *
            123           ZZ
```

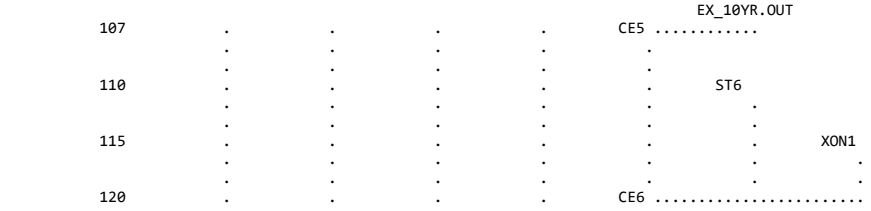
1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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





(***) 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   19FEB19  TIME  13:18:26  *                                  *          (916) 756-1104              *
 *                                      *                                  *                                      *
 ****************************************                                  ****************************************
```

<><><><><><><><><><><><><><><><><><><><>
RACEL/TENAYA
HYDROLOGIC MODEL

10-YR STORM EVENT

TANEY ENGINEERING
EXISTING CONDITION
FILE: EX_10YR.DAT
PROJECT No: ADV-18-110
DATE: FEB 2019
<><><><><><><><><><><><><><><><><><><><>

---> 6-HOUR / SDN 3 <---

```
   19 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
1

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


                                                                RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN            RATIO 1
                                                        1.00

 HYDROGRAPH AT
+                 ST1         .00     1   FLOW           2.
                                           TIME         3.50
```

```
 HYDROGRAPH AT
+                 FS1E        .00     1   FLOW         128.
                                           TIME        3.50

  2 COMBINED AT
+                  CE1        .00     1   FLOW         130.
                                           TIME        3.50

 HYDROGRAPH AT
+                 ST2         .00     1   FLOW           2.
                                           TIME        3.50

 HYDROGRAPH AT
+                 FS2E        .00     1   FLOW          88.
                                           TIME        3.50

  2 COMBINED AT
+                  CE2        .00     1   FLOW          90.
                                           TIME        3.50

 HYDROGRAPH AT
+                 ST3         .00     1   FLOW           2.
                                           TIME        3.50

 HYDROGRAPH AT
+                 FS3E        .00     1   FLOW          55.
                                           TIME        3.50

  2 COMBINED AT
+                  CE3        .00     1   FLOW          57.
                                           TIME        3.50

 HYDROGRAPH AT
+                 FS4S        .00     1   FLOW          25.
                                           TIME        3.50

 HYDROGRAPH AT
+                 ST4         .00     1   FLOW           1.
                                           TIME        3.50

 HYDROGRAPH AT
+                 XOFF1       .00     1   FLOW           0.
                                           TIME        4.83

 HYDROGRAPH AT
+                 XOFF2       .00     1   FLOW           0.
                                           TIME        4.92

  4 COMBINED AT
+                  CE4        .01     1   FLOW          26.
                                           TIME        3.50

 HYDROGRAPH AT
+                 FS4E        .00     1   FLOW          22.
                                           TIME        3.50

 HYDROGRAPH AT
+                 ST5         .00     1   FLOW           2.
                                           TIME        3.50

  2 COMBINED AT
+                  CE5        .00     1   FLOW          24.
                                           TIME        3.50

 HYDROGRAPH AT
+                 ST6         .00     1   FLOW           1.
                                           TIME        3.50

 HYDROGRAPH AT
+                 XON1        .01     1   FLOW           0.
                                           TIME        5.00

  3 COMBINED AT
+                  CE6        .01     1   FLOW          25.
                                           TIME        3.50


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

```
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   20FEB19  TIME  17:06:59  *                                  *          (916) 756-1104              *
 *                                      *                                  *                                      *
 ****************************************                                  ****************************************

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

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

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

1 HEC-1 INPUT PAGE 1

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

                        *DIAGRAM
            1           ID
            2           ID      <><><><><><><><><><><><><><><><><><><><>
            3           ID        RACEL/TENAYA
            4           ID        HYDROLOGIC MODEL
            5           ID        ----------------------------
            6           ID
            7           ID        100-YR STORM EVENT
            8           ID        ----------------------------
            9           ID        TANEY ENGINEERING
           10           ID        EXISTING CONDITION
           11           ID        FILE: EX_100YR.DAT
           12           ID        PROJECT No: ADV-18-110
           13           ID        DATE:  FEB 2019
           14           ID      <><><><><><><><><><><><><><><><><><><><>
           15           ID
           16           ID       ---> 6-HOUR / SDN 3 <---
           17           ID
           18           IT       5       0       0     300
           19           IO       5
           20           IN       5
           21           JR    PREC    1.00
                        *

           22           KK   ST1
           23           BA   .0014
           24           PB    2.77
           25           PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
           26           PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
           27           PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
           28           PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
           29           PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
           30           PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
           31           PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
           32           PC    .998    .999   1.00
           33           LS       0      98
           34           UD    .052
                        *

           35           KK   FS1E
           36           KM   FLOW AT RACEL/BUFFALO INTERSECTION THAT FLOWS EAST (RACEL)
           37           BA   .0001
           38           BF     351
           39           LS       0      98
           40           UD    .052
                        *

           41           KK    CE1
           42           KM   COMBINE FS1E, ST1
           43           HC       2
                        *
```

1 HEC-1 INPUT PAGE 2

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

  44          KK   ST2
  45          BA   .0014
  46          BF       0
  47          LS       0      98
  48          UD    .052
              *

  49          KK   FS2E
  50          KM   FLOW AT RACEL/TIAGO INTERSECTION THAT FLOWS EAST (RACEL)
  51          BA   .0001
  52          BF     248
  53          LS       0      98
  54          UD    .052
              *

  55          KK    CE2
  56          KM   COMBINE FS2E, ST2
  57          HC       2
              *

  58          KK   ST3
  59          BA   .0014
  60          BF       0
  61          LS       0      98
  62          UD    .052
              *

  63          KK   FS3E
  64          KM   FLOW AT RACEL/PIONEER INTERSECTION THAT FLOWS EAST (RACEL)
  65          BA   .0001
  66          BF     158
  67          LS       0      98
  68          UD    .052
              *

  69          KK    CE3
  70          KM   COMBINE FS2E, ST2
  71          HC       2
              *

  72          KK   FS4S
  73          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS SOUTH (MONTE CRISTO)
  74          BA   .0001
  75          BF      83
  76          LS       0      98
  77          UD    .056
              *

  78          KK   ST4
  79          BA   .0009
  80          BF       0
  81          LS       0      98
  82          UD    .060
              *
1                                        HEC-1 INPUT                                          PAGE  3

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

  83          KK   XOFF1
  84          BA   .0019
  85          BF       0
  86          LS       0      63
  87          UD    .108
              *

  88          KK   XOFF2
  89          BA   .0032
  90          BF       0
  91          LS       0      63
  92          UD    .119
              *

  93          KK    CE4
  94          KM   COMBINE FS4S, ST4, XOFF1, XOFF2
  95          HC       4
              *

  96          KK   FS4E
  97          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS EAST (RACEL)
  98          BA   .0001
  99          BF      78
 100          LS       0      98
 101          UD    .051
              *
```

```
            102           KK   ST5
            103           BA   .0013
            104           BF       0
            105           LS       0      98
            106           UD    .083
                          *

            107           KK    CE5
            108           KM   COMBINE FS4E, ST5
            109           HC       2
                          *

            110           KK   ST6
            111           BA   .0009
            112           BF       0
            113           LS       0      98
            114           UD    .053
                          *

            115           KK   XON1
            116           BA   .0063
            117           BF       0
            118           LS       0      63
            119           UD    .275
                          *
```



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

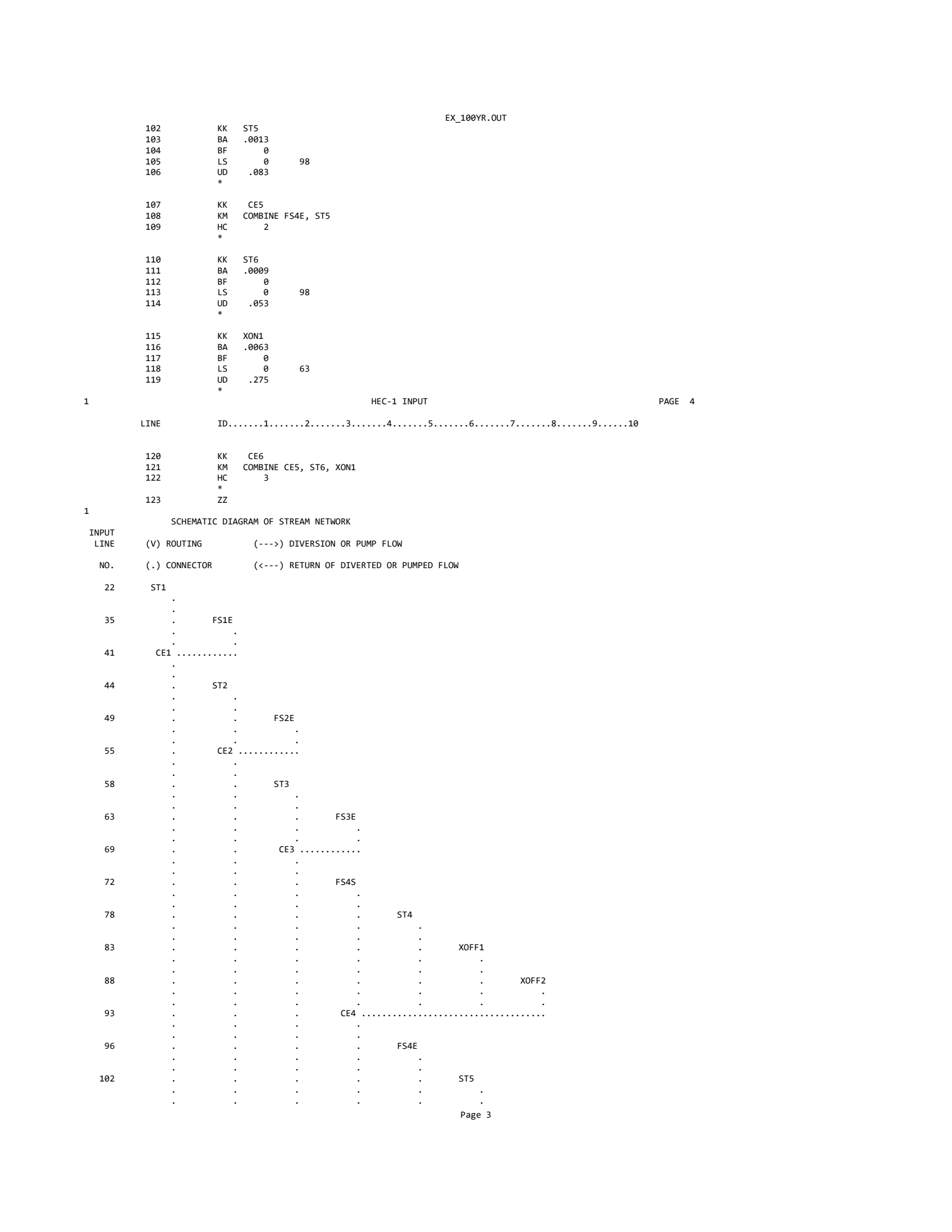

            120           KK    CE6
            121           KM   COMBINE CE5, ST6, XON1
            122           HC       3
                          *
            123           ZZ
```

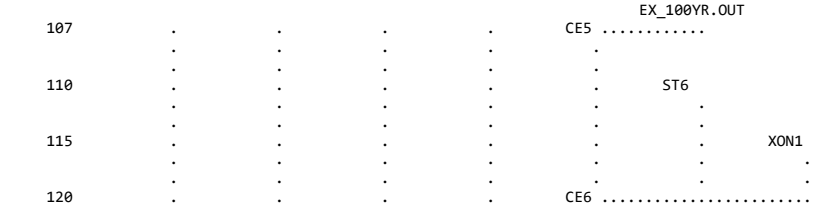
1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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





(***) 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   20FEB19  TIME  17:06:59   *                                  *          (916) 756-1104               *
 *                                       *                                  *                                       *
 *****************************************                                  *****************************************
```

```
                            <><><><><><><><><><><><><><><><><><><><>
                              RACEL/TENAYA
                              HYDROLOGIC MODEL
                              ----------------------------

                              100-YR STORM EVENT
                              ----------------------------
                              TANEY ENGINEERING
                              EXISTING CONDITION
                              FILE: EX_100YR.DAT
                              PROJECT No: ADV-18-110
                              DATE:  FEB 2019
                            <><><><><><><><><><><><><><><><><><><><>

                             ---> 6-HOUR / SDN 3 <---


   19 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
1

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


                                                                RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN            RATIO 1
                                                        1.00

 HYDROGRAPH AT
+                  ST1         .00     1   FLOW           3.
                                           TIME         3.50
```

```
 HYDROGRAPH AT
+                 FS1E        .00     1   FLOW         351.
                                           TIME        3.50

  2 COMBINED AT
+                  CE1        .00     1   FLOW         354.
                                           TIME        3.50

 HYDROGRAPH AT
+                 ST2         .00     1   FLOW           3.
                                           TIME        3.50

 HYDROGRAPH AT
+                 FS2E        .00     1   FLOW         248.
                                           TIME        3.50

  2 COMBINED AT
+                  CE2        .00     1   FLOW         251.
                                           TIME        3.50

 HYDROGRAPH AT
+                 ST3         .00     1   FLOW           3.
                                           TIME        3.50

 HYDROGRAPH AT
+                 FS3E        .00     1   FLOW         158.
                                           TIME        3.50

  2 COMBINED AT
+                  CE3        .00     1   FLOW         161.
                                           TIME        3.50

 HYDROGRAPH AT
+                 FS4S        .00     1   FLOW          83.
                                           TIME        3.50

 HYDROGRAPH AT
+                 ST4         .00     1   FLOW           2.
                                           TIME        3.50

 HYDROGRAPH AT
+                 XOFF1       .00     1   FLOW           1.
                                           TIME        3.58

 HYDROGRAPH AT
+                 XOFF2       .00     1   FLOW           1.
                                           TIME        3.58

  4 COMBINED AT
+                  CE4        .01     1   FLOW          86.
                                           TIME        3.50

 HYDROGRAPH AT
+                 FS4E        .00     1   FLOW          78.
                                           TIME        3.50

 HYDROGRAPH AT
+                 ST5         .00     1   FLOW           3.
                                           TIME        3.50

  2 COMBINED AT
+                  CE5        .00     1   FLOW          81.
                                           TIME        3.50

 HYDROGRAPH AT
+                 ST6         .00     1   FLOW           2.
                                           TIME        3.50

 HYDROGRAPH AT
+                 XON1        .01     1   FLOW           1.
                                           TIME        3.83

  3 COMBINED AT
+                  CE6        .01     1   FLOW          83.
                                           TIME        3.50


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

INTERIM 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   19FEB19  TIME  13:18:52  *                 *          (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
            2           ID      <><><><><><><><><><><><><><><><><><><><>
            3           ID        RACEL/TENAYA
            4           ID        HYDROLOGIC MODEL
            5           ID        ----------------------------
            6           ID
            7           ID        10-YR STORM EVENT
            8           ID        ----------------------------
            9           ID        TANEY ENGINEERING
           10           ID        INTERIM CONDITION
           11           ID        FILE: INT_10YR.DAT
           12           ID        PROJECT No: ADV-18-110
           13           ID        DATE:  FEB 2019
           14           ID      <><><><><><><><><><><><><><><><><><><><>
           15           ID
           16           ID       ---> 6-HOUR / SDN 3 <---
           17           ID
           18           IT       5       0       0     300
           19           IO       5
           20           IN       5
           21           JR    PREC    1.00
                        *
           22           KK   ST1
           23           BA   .0014
           24           PB    1.58
           25           PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
           26           PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
           27           PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
           28           PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
           29           PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
           30           PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
           31           PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
           32           PC    .998    .999   1.00
           33           LS       0      98
           34           UD    .052
                        *
           35           KK   FS1E
           36           KM   FLOW AT RACEL/BUFFALO INTERSECTION THAT FLOWS EAST (RACEL)
           37           BA   .0001
           38           BF     128
           39           LS       0      98
           40           UD    .052
                        *
           41           KK    CI1
           42           KM   COMBINE FS1E, ST1
           43           HC       2
                        *
```

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

  44          KK   ST2
  45          BA   .0014
  46          BF       0
  47          LS       0      98
  48          UD    .052
              *

  49          KK   FS2E
  50          KM   FLOW AT RACEL/TIAGO INTERSECTION THAT FLOWS EAST (RACEL)
  51          BA   .0001
  52          BF      88
  53          LS       0      98
  54          UD    .052
              *

  55          KK    CI2
  56          KM   COMBINE FS2E, ST2
  57          HC       2
              *

  58          KK   ST3
  59          BA   .0014
  60          BF       0
  61          LS       0      98
  62          UD    .052
              *

  63          KK   FS3E
  64          KM   FLOW AT RACEL/PIONEER INTERSECTION THAT FLOWS EAST (RACEL)
  65          BA   .0001
  66          BF      55
  67          LS       0      98
  68          UD    .052
              *

  69          KK    CI3
  70          KM   COMBINE FS2E, ST2
  71          HC       2
              *

  72          KK   FS4S
  73          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS SOUTH (MONTE CRISTO)
  74          BA   .0001
  75          BF      25
  76          LS       0      98
  77          UD    .056
              *

  78          KK   ST4
  79          BA   .0009
  80          BF       0
  81          LS       0      98
  82          UD    .060
              *
1                                        HEC-1 INPUT                                          PAGE  3

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

  83          KK   IOFF1
  84          BA   .0019
  85          BF       0
  86          LS       0      63
  87          UD    .108
              *

  88          KK   IOFF2
  89          BA   .0032
  90          BF       0
  91          LS       0      63
  92          UD    .119
              *

  93          KK    CI4
  94          KM   COMBINE FS4S, ST4, IOFF1, IOFF2
  95          HC       4
              *

  96          KK   FS4E
  97          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS EAST (RACEL)
  98          BA   .0001
  99          BF      22
 100          LS       0      98
 101          UD    .051
              *
```

```
            102          KK   ST5
            103          BA   .0013
            104          BF       0
            105          LS       0      98
            106          UD    .083
                         *

            107          KK    CI5
            108          KM   COMBINE FS4E, ST5
            109          HC       2
                         *

            110          KK   ST6
            111          BA   .0009
            112          BF       0
            113          LS       0      98
            114          UD    .053
                         *

            115          KK   ION1
            116          BA   .0036
            117          BF       0
            118          LS       0      57
            119          UD    .150
                         *
```



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

            120          KK   ION2
            121          BA   .0027
            122          BF       0
            123          LS       0      57
            124          UD    .139
                         *

            125          KK    CI6
            126          KM   COMBINE CI5, ST6, ION1, ION2
            127          HC       4
                         *
            128          ZZ
```

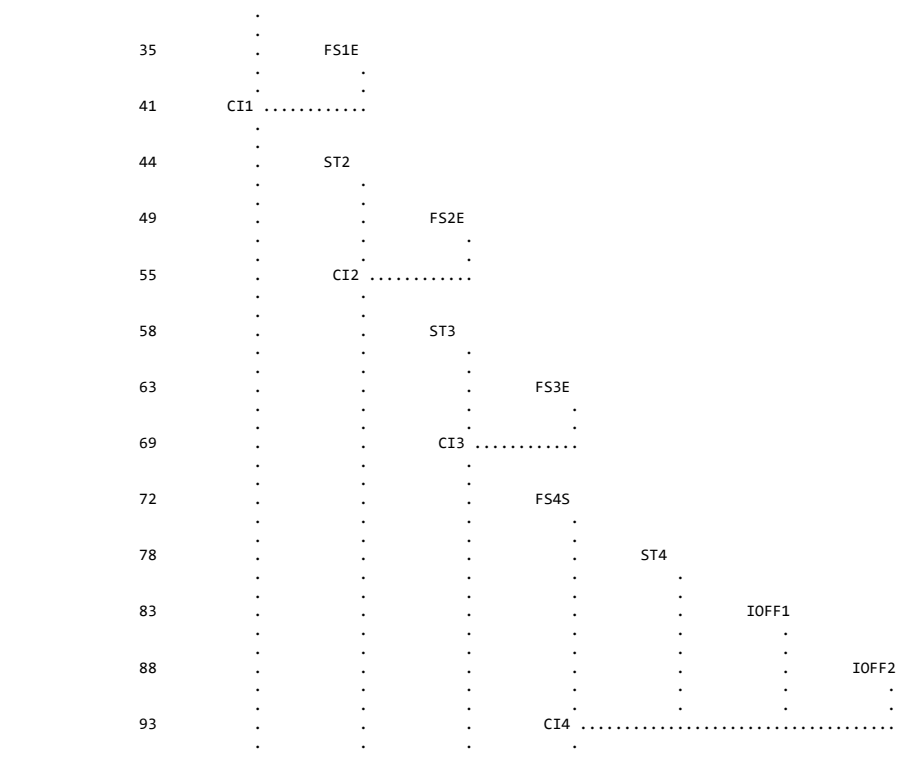
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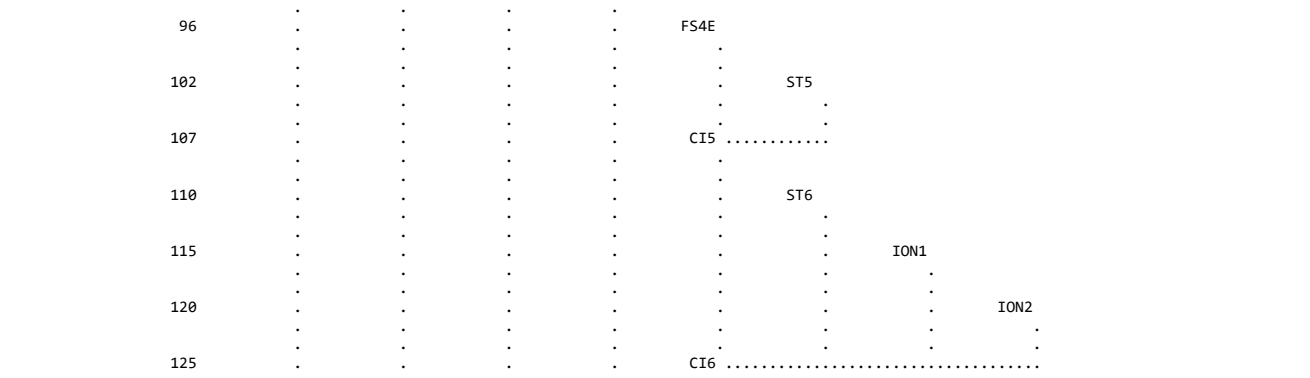
SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

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

(.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW





(***) 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   19FEB19  TIME  13:18:52   *                                    *           (916) 756-1104              *
 *                                       *                                    *                                       *
 *****************************************                                    *****************************************
```

```
                          <><><><><><><><><><><><><><><><><><><><>
                            RACEL/TENAYA
                            HYDROLOGIC MODEL
                            ----------------------------

                            10-YR STORM EVENT
                            ----------------------------
                            TANEY ENGINEERING
                            INTERIM CONDITION
                            FILE: INT_10YR.DAT
                            PROJECT No: ADV-18-110
                            DATE:  FEB 2019
                          <><><><><><><><><><><><><><><><><><><><>

                           ---> 6-HOUR / SDN 3 <---


   19 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
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
HYDROGRAPH AT					
+	ST1	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	FS1E	.00	1	FLOW	128.
				TIME	3.50
2 COMBINED AT					
+	CI1	.00	1	FLOW	130.
				TIME	3.50
HYDROGRAPH AT					
+	ST2	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	FS2E	.00	1	FLOW	88.
				TIME	3.50
2 COMBINED AT					
+	CI2	.00	1	FLOW	90.
				TIME	3.50
HYDROGRAPH AT					
+	ST3	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	FS3E	.00	1	FLOW	55.
				TIME	3.50
2 COMBINED AT					
+	CI3	.00	1	FLOW	57.
				TIME	3.50
HYDROGRAPH AT					
+	FS4S	.00	1	FLOW	25.
				TIME	3.50
HYDROGRAPH AT					
+	ST4	.00	1	FLOW	1.
				TIME	3.50
HYDROGRAPH AT					
+	IOFF1	.00	1	FLOW	0.
				TIME	4.83
HYDROGRAPH AT					
+	IOFF2	.00	1	FLOW	0.
				TIME	4.92
4 COMBINED AT					
+	CI4	.01	1	FLOW	26.
				TIME	3.50
HYDROGRAPH AT					
+	FS4E	.00	1	FLOW	22.
				TIME	3.50
HYDROGRAPH AT					
+	ST5	.00	1	FLOW	2.
				TIME	3.50
2 COMBINED AT					
+	CI5	.00	1	FLOW	24.
				TIME	3.50
HYDROGRAPH AT					
+	ST6	.00	1	FLOW	1.
				TIME	3.50
HYDROGRAPH AT					
+	ION1	.00	1	FLOW	0.
				TIME	5.00
HYDROGRAPH AT					
+	ION2	.00	1	FLOW	0.
				TIME	5.00
4 COMBINED AT					
+	CI6	.01	1	FLOW	25.
				TIME	3.50

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

```
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   20FEB19  TIME  17:07:29  *                    *         (916) 756-1104               *
 *                                      *                    *                                      *
 ****************************************                    ****************************************

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

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

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

1 HEC-1 INPUT PAGE 1

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

                        *DIAGRAM
            1           ID
            2           ID      <><><><><><><><><><><><><><><><><><><><>
            3           ID        RACEL/TENAYA
            4           ID        HYDROLOGIC MODEL
            5           ID        ----------------------------
            6           ID
            7           ID        100-YR STORM EVENT
            8           ID        ----------------------------
            9           ID        TANEY ENGINEERING
           10           ID        INTERIM CONDITION
           11           ID        FILE: INT_100YR.DAT
           12           ID        PROJECT No: ADV-18-110
           13           ID        DATE:  FEB 2019
           14           ID      <><><><><><><><><><><><><><><><><><><><>
           15           ID
           16           ID       ---> 6-HOUR / SDN 3 <---
           17           ID
           18           IT       5       0       0     300
           19           IO       5
           20           IN       5
           21           JR    PREC    1.00
                        *
           22           KK   ST1
           23           BA   .0014
           24           PB    2.77
           25           PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
           26           PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
           27           PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
           28           PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
           29           PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
           30           PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
           31           PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
           32           PC    .998    .999   1.00
           33           LS       0      98
           34           UD    .052
                        *
           35           KK   FS1E
           36           KM   FLOW AT RACEL/BUFFALO INTERSECTION THAT FLOWS EAST (RACEL)
           37           BA   .0001
           38           BF     351
           39           LS       0      98
           40           UD    .052
                        *
           41           KK    CI1
           42           KM   COMBINE FS1E, ST1
           43           HC       2
                        *
```

1 HEC-1 INPUT PAGE 2

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

  44          KK   ST2
  45          BA   .0014
  46          BF       0
  47          LS       0      98
  48          UD    .052
              *

  49          KK   FS2E
  50          KM   FLOW AT RACEL/TIAGO INTERSECTION THAT FLOWS EAST (RACEL)
  51          BA   .0001
  52          BF     248
  53          LS       0      98
  54          UD    .052
              *

  55          KK    CI2
  56          KM   COMBINE FS2E, ST2
  57          HC       2
              *

  58          KK   ST3
  59          BA   .0014
  60          BF       0
  61          LS       0      98
  62          UD    .052
              *

  63          KK   FS3E
  64          KM   FLOW AT RACEL/PIONEER INTERSECTION THAT FLOWS EAST (RACEL)
  65          BA   .0001
  66          BF     158
  67          LS       0      98
  68          UD    .052
              *

  69          KK    CI3
  70          KM   COMBINE FS2E, ST2
  71          HC       2
              *

  72          KK   FS4S
  73          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS SOUTH (MONTE CRISTO)
  74          BA   .0001
  75          BF      83
  76          LS       0      98
  77          UD    .056
              *

  78          KK   ST4
  79          BA   .0009
  80          BF       0
  81          LS       0      98
  82          UD    .060
              *
1                                        HEC-1 INPUT                                          PAGE  3

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

  83          KK   IOFF1
  84          BA   .0019
  85          BF       0
  86          LS       0      63
  87          UD    .108
              *

  88          KK   IOFF2
  89          BA   .0032
  90          BF       0
  91          LS       0      63
  92          UD    .119
              *

  93          KK    CI4
  94          KM   COMBINE FS4S, ST4, IOFF1, IOFF2
  95          HC       4
              *

  96          KK   FS4E
  97          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS EAST (RACEL)
  98          BA   .0001
  99          BF      78
 100          LS       0      98
 101          UD    .051
              *
```

```
            102          KK   ST5
            103          BA   .0013
            104          BF       0
            105          LS       0      98
            106          UD    .083
                         *

            107          KK    CI5
            108          KM   COMBINE FS4E, ST5
            109          HC       2
                         *

            110          KK   ST6
            111          BA   .0009
            112          BF       0
            113          LS       0      98
            114          UD    .053
                         *

            115          KK   ION1
            116          BA   .0036
            117          BF       0
            118          LS       0      57
            119          UD    .150
                         *
1                                              HEC-1 INPUT                                          PAGE  4

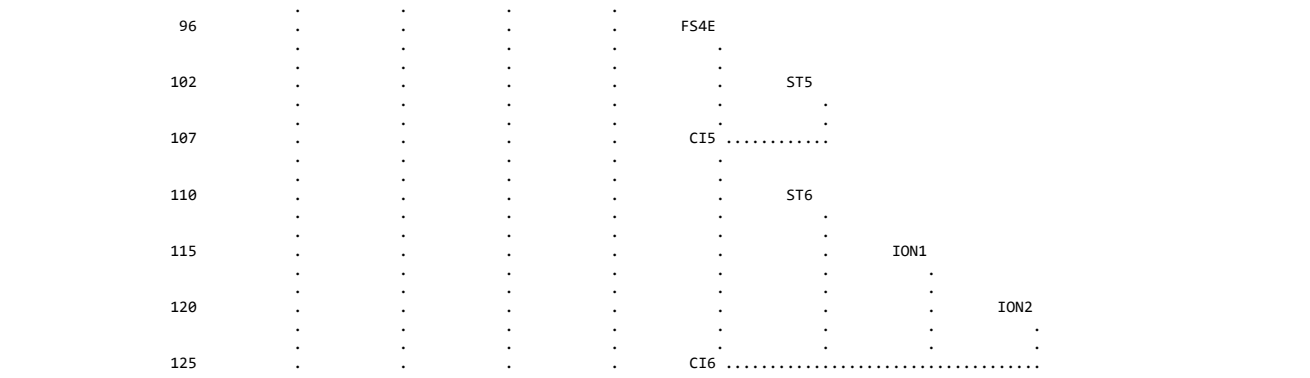
          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


            120          KK   ION2
            121          BA   .0027
            122          BF       0
            123          LS       0      57
            124          UD    .139
                         *

            125          KK    CI6
            126          KM   COMBINE CI5, ST6, ION1, ION2
            127          HC       4
                         *
            128          ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    22       ST1
                .
                .
    35          .       FS1E
                .          .
                .          .
    41        CI1 ............
                .
                .
    44          .       ST2
                .          .
                .          .
    49          .          .       FS2E
                .          .          .
                .          .          .
    55          .        CI2 ............
                .          .
                .          .
    58          .          .       ST3
                .          .          .
                .          .          .
    63          .          .          .       FS3E
                .          .          .          .
                .          .          .          .
    69          .          .        CI3 ............
                .          .          .
                .          .          .
    72          .          .          .       FS4S
                .          .          .          .
                .          .          .          .
    78          .          .          .          .       ST4
                .          .          .          .          .
                .          .          .          .          .
    83          .          .          .          .          .       IOFF1
                .          .          .          .          .          .
                .          .          .          .          .          .
    88          .          .          .          .          .          .       IOFF2
                .          .          .          .          .          .          .
                .          .          .          .          .          .          .
    93          .          .          .        CI4 ..................................
                .          .          .          .
```



(***) 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   20FEB19  TIME  17:07:29   *                                   *           (916) 756-1104            *
 *                                       *                                   *                                   *
 *****************************************                                    *************************************
```

```
                            <><><><><><><><><><><><><><><><><><><><>
                              RACEL/TENAYA
                              HYDROLOGIC MODEL
                              ----------------------------

                              100-YR STORM EVENT
                              ----------------------------
                              TANEY ENGINEERING
                              INTERIM CONDITION
                              FILE: INT_100YR.DAT
                              PROJECT No: ADV-18-110
                              DATE:  FEB 2019
                            <><><><><><><><><><><><><><><><><><><><>

                             ---> 6-HOUR / SDN 3 <---


   19 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
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
HYDROGRAPH AT					
+	ST1	.00	1	FLOW	3.
				TIME	3.50
HYDROGRAPH AT					
+	FS1E	.00	1	FLOW	351.
				TIME	3.50
2 COMBINED AT					
+	CI1	.00	1	FLOW	354.
				TIME	3.50
HYDROGRAPH AT					
+	ST2	.00	1	FLOW	3.
				TIME	3.50
HYDROGRAPH AT					
+	FS2E	.00	1	FLOW	248.
				TIME	3.50
2 COMBINED AT					
+	CI2	.00	1	FLOW	251.
				TIME	3.50
HYDROGRAPH AT					
+	ST3	.00	1	FLOW	3.
				TIME	3.50
HYDROGRAPH AT					
+	FS3E	.00	1	FLOW	158.
				TIME	3.50
2 COMBINED AT					
+	CI3	.00	1	FLOW	161.
				TIME	3.50
HYDROGRAPH AT					
+	FS4S	.00	1	FLOW	83.
				TIME	3.50
HYDROGRAPH AT					
+	ST4	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	IOFF1	.00	1	FLOW	1.
				TIME	3.58
HYDROGRAPH AT					
+	IOFF2	.00	1	FLOW	1.
				TIME	3.58
4 COMBINED AT					
+	CI4	.01	1	FLOW	86.
				TIME	3.50
HYDROGRAPH AT					
+	FS4E	.00	1	FLOW	78.
				TIME	3.50
HYDROGRAPH AT					
+	ST5	.00	1	FLOW	3.
				TIME	3.50
2 COMBINED AT					
+	CI5	.00	1	FLOW	81.
				TIME	3.50
HYDROGRAPH AT					
+	ST6	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	ION1	.00	1	FLOW	0.
				TIME	3.75
HYDROGRAPH AT					
+	ION2	.00	1	FLOW	0.
				TIME	3.75
4 COMBINED AT					
+	CI6	.01	1	FLOW	83.
				TIME	3.50

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

DEVELOPED 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   20FEB19  TIME  17:07:51  *                                  *         (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
            2           ID      <><><><><><><><><><><><><><><><><><><><>
            3           ID        RACEL/TENAYA
            4           ID        HYDROLOGIC MODEL
            5           ID        ----------------------------
            6           ID
            7           ID        10-YR STORM EVENT
            8           ID        ----------------------------
            9           ID        TANEY ENGINEERING
           10           ID        DEVELOPED CONDITION
           11           ID        FILE: DEV_10YR.DAT
           12           ID        PROJECT No: ADV-18-110
           13           ID        DATE:  FEB 2019
           14           ID      <><><><><><><><><><><><><><><><><><><><>
           15           ID
           16           ID       ---> 6-HOUR / SDN 3 <---
           17           ID
           18           IT       5       0       0     300
           19           IO       5
           20           IN       5
           21           JR    PREC    1.00
                        *
           22           KK   ST1
           23           BA   .0014
           24           PB    1.58
           25           PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
           26           PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
           27           PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
           28           PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
           29           PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
           30           PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
           31           PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
           32           PC    .998    .999   1.00
           33           LS       0      98
           34           UD    .052
                        *
           35           KK   FS1E
           36           KM   FLOW AT RACEL/BUFFALO INTERSECTION THAT FLOWS EAST (RACEL)
           37           BA   .0001
           38           BF     127
           39           LS       0      98
           40           UD    .052
                        *
           41           KK    CD1
           42           KM   COMBINE FS1E, ST1
           43           HC       2
                        *
```

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

  44          KK   ST2
  45          BA   .0014
  46          BF       0
  47          LS       0      98
  48          UD    .052
              *

  49          KK   FS2E
  50          KM   FLOW AT RACEL/TIAGO INTERSECTION THAT FLOWS EAST (RACEL)
  51          BA   .0001
  52          BF      86
  53          LS       0      98
  54          UD    .052
              *

  55          KK    CD2
  56          KM   COMBINE FS2E, ST2
  57          HC       2
              *

  58          KK   ST3
  59          BA   .0014
  60          BF       0
  61          LS       0      98
  62          UD    .052
              *

  63          KK   FS3E
  64          KM   FLOW AT RACEL/PIONEER INTERSECTION THAT FLOWS EAST (RACEL)
  65          BA   .0001
  66          BF      55
  67          LS       0      98
  68          UD    .052
              *

  69          KK    CD3
  70          KM   COMBINE FS2E, ST2
  71          HC       2
              *

  72          KK   FS4S
  73          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS SOUTH (MONTE CRISTO)
  74          BA   .0001
  75          BF      29
  76          LS       0      98
  77          UD    .056
              *

  78          KK   ST4
  79          BA   .0009
  80          BF       0
  81          LS       0      98
  82          UD    .060
              *
1                                        HEC-1 INPUT                                          PAGE  3

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

  83          KK   DOFF1
  84          BA   .0019
  85          BF       0
  86          LS       0      73
  87          UD    .084
              *

  88          KK   DOFF2
  89          BA   .0032
  90          BF       0
  91          LS       0      80
  92          UD    .095
              *

  93          KK    CD4
  94          KM   COMBINE FS4S, ST4, DOFF1, DOFF2
  95          HC       4
              *

  96          KK   FS4E
  97          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS EAST (RACEL)
  98          BA   .0001
  99          BF      28
 100          LS       0      98
 101          UD    .051
              *
```

```
            102           KK   ST5
            103           BA   .0013
            104           BF       0
            105           LS       0      98
            106           UD    .083
                          *

            107           KK    CD5
            108           KM   COMBINE FS4E, ST5
            109           HC       2
                          *

            110           KK   ST6
            111           BA   .0009
            112           BF       0
            113           LS       0      98
            114           UD    .053
                          *

            115           KK   DON1
            116           BA   .0036
            117           BF       0
            118           LS       0      57
            119           UD    .150
                          *
```



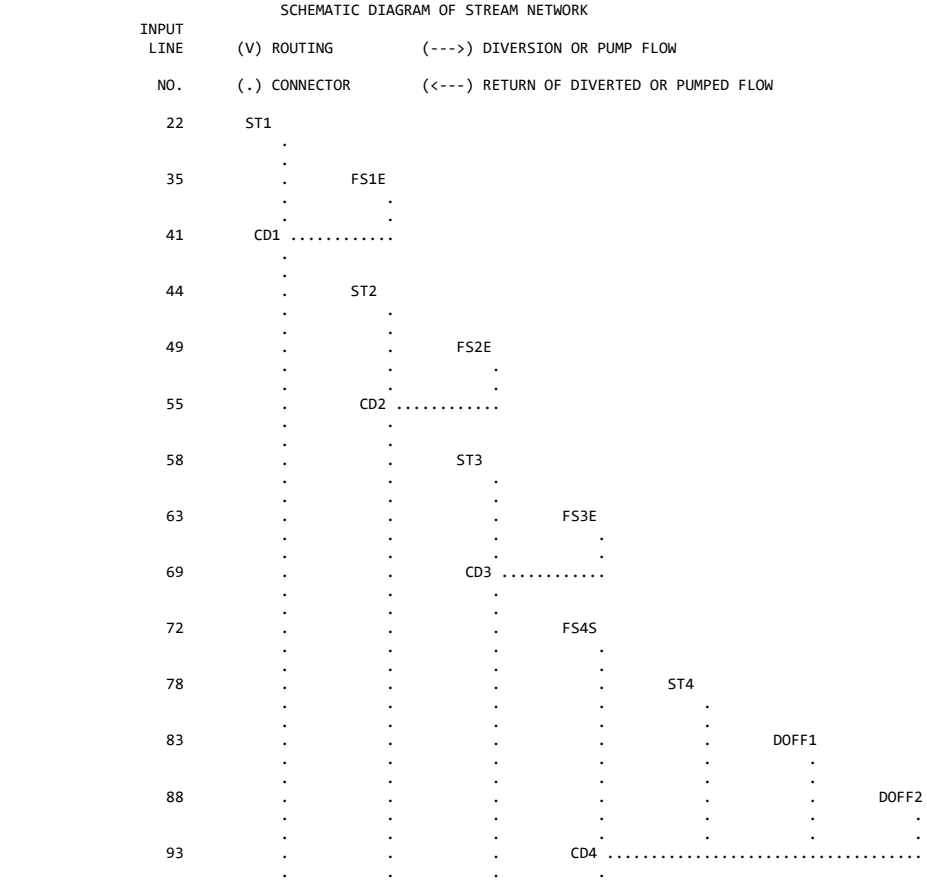
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          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

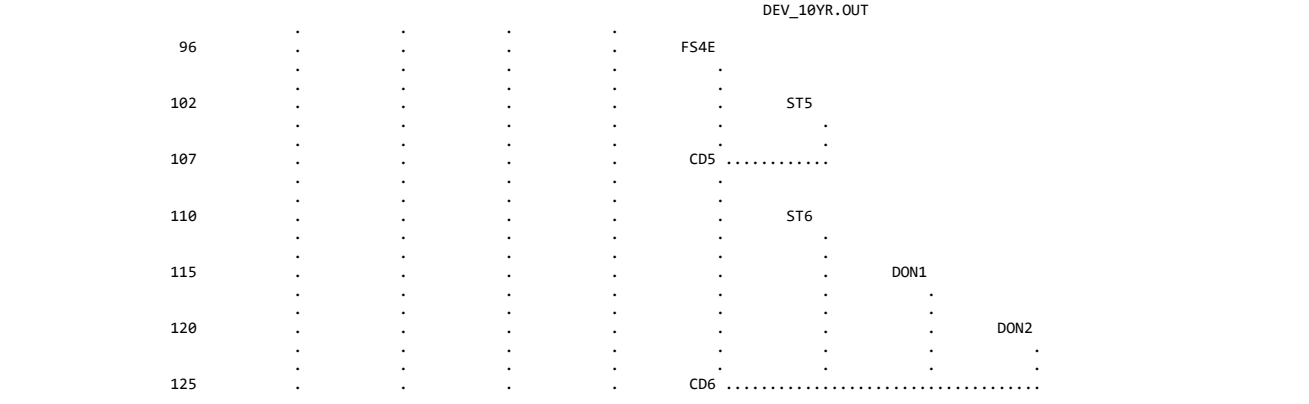
            120           KK   DON2
            121           BA   .0027
            122           BF       0
            123           LS       0      57
            124           UD    .139
                          *

            125           KK    CD6
            126           KM   COMBINE CD5, ST6, DON1, DON2
            127           HC       4
                          *
            128           ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK





(***) 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   20FEB19  TIME  17:07:51   *                                  *          (916) 756-1104               *
 *                                       *                                  *                                       *
 *****************************************                                  *****************************************
```

```
                          <><><><><><><><><><><><><><><><><><><><>
                            RACEL/TENAYA
                            HYDROLOGIC MODEL
                            ----------------------------

                            10-YR STORM EVENT
                            ----------------------------
                            TANEY ENGINEERING
                            DEVELOPED CONDITION
                            FILE: DEV_10YR.DAT
                            PROJECT No: ADV-18-110
                            DATE:  FEB 2019
                          <><><><><><><><><><><><><><><><><><><><>

                           ---> 6-HOUR / SDN 3 <---


   19 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
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
HYDROGRAPH AT					
+	ST1	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	FS1E	.00	1	FLOW	127.
				TIME	3.50
2 COMBINED AT					
+	CD1	.00	1	FLOW	129.
				TIME	3.50
HYDROGRAPH AT					
+	ST2	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	FS2E	.00	1	FLOW	86.
				TIME	3.50
2 COMBINED AT					
+	CD2	.00	1	FLOW	88.
				TIME	3.50
HYDROGRAPH AT					
+	ST3	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	FS3E	.00	1	FLOW	55.
				TIME	3.50
2 COMBINED AT					
+	CD3	.00	1	FLOW	57.
				TIME	3.50
HYDROGRAPH AT					
+	FS4S	.00	1	FLOW	29.
				TIME	3.50
HYDROGRAPH AT					
+	ST4	.00	1	FLOW	1.
				TIME	3.50
HYDROGRAPH AT					
+	DOFF1	.00	1	FLOW	0.
				TIME	3.58
HYDROGRAPH AT					
+	DOFF2	.00	1	FLOW	1.
				TIME	3.58
4 COMBINED AT					
+	CD4	.01	1	FLOW	31.
				TIME	3.50
HYDROGRAPH AT					
+	FS4E	.00	1	FLOW	28.
				TIME	3.50
HYDROGRAPH AT					
+	ST5	.00	1	FLOW	2.
				TIME	3.50
2 COMBINED AT					
+	CD5	.00	1	FLOW	30.
				TIME	3.50
HYDROGRAPH AT					
+	ST6	.00	1	FLOW	1.
				TIME	3.50
HYDROGRAPH AT					
+	DON1	.00	1	FLOW	0.
				TIME	5.00
HYDROGRAPH AT					
+	DON2	.00	1	FLOW	0.
				TIME	5.00
4 COMBINED AT					
+	CD6	.01	1	FLOW	31.
				TIME	3.50

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

```
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   20FEB19  TIME  17:08:09  *                                  *          (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
            2           ID      <><><><><><><><><><><><><><><><><><><><>
            3           ID        RACEL/TENAYA
            4           ID        HYDROLOGIC MODEL
            5           ID        ----------------------------
            6           ID
            7           ID        100-YR STORM EVENT
            8           ID        ----------------------------
            9           ID        TANEY ENGINEERING
           10           ID        DEVELOPED CONDITION
           11           ID        FILE: DEV_100YR.DAT
           12           ID        PROJECT No: ADV-18-110
           13           ID        DATE:  FEB 2019
           14           ID      <><><><><><><><><><><><><><><><><><><><>
           15           ID
           16           ID       ---> 6-HOUR / SDN 3 <---
           17           ID
           18           IT       5       0       0     300
           19           IO       5
           20           IN       5
           21           JR    PREC    1.00
                        *

           22           KK   ST1
           23           BA   .0014
           24           PB    2.77
           25           PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
           26           PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
           27           PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
           28           PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
           29           PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
           30           PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
           31           PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
           32           PC    .998    .999   1.00
           33           LS       0      98
           34           UD    .052
                        *

           35           KK   FS1E
           36           KM   FLOW AT RACEL/BUFFALO INTERSECTION THAT FLOWS EAST (RACEL)
           37           BA   .0001
           38           BF     358
           39           LS       0      98
           40           UD    .052
                        *

           41           KK    CD1
           42           KM   COMBINE FS1E, ST1
           43           HC       2
                        *
```

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

  44          KK   ST2
  45          BA   .0014
  46          BF       0
  47          LS       0      98
  48          UD    .052
              *

  49          KK   FS2E
  50          KM   FLOW AT RACEL/TIAGO INTERSECTION THAT FLOWS EAST (RACEL)
  51          BA   .0001
  52          BF     243
  53          LS       0      98
  54          UD    .052
              *

  55          KK    CD2
  56          KM   COMBINE FS2E, ST2
  57          HC       2
              *

  58          KK   ST3
  59          BA   .0014
  60          BF       0
  61          LS       0      98
  62          UD    .052
              *

  63          KK   FS3E
  64          KM   FLOW AT RACEL/PIONEER INTERSECTION THAT FLOWS EAST (RACEL)
  65          BA   .0001
  66          BF     155
  67          LS       0      98
  68          UD    .052
              *

  69          KK    CD3
  70          KM   COMBINE FS2E, ST2
  71          HC       2
              *

  72          KK   FS4S
  73          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS SOUTH (MONTE CRISTO)
  74          BA   .0001
  75          BF      80
  76          LS       0      98
  77          UD    .056
              *

  78          KK   ST4
  79          BA   .0009
  80          BF       0
  81          LS       0      98
  82          UD    .060
              *
1                                        HEC-1 INPUT                                        PAGE  3

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

  83          KK   DOFF1
  84          BA   .0019
  85          BF       0
  86          LS       0      73
  87          UD    .084
              *

  88          KK   DOFF2
  89          BA   .0032
  90          BF       0
  91          LS       0      80
  92          UD    .095
              *

  93          KK    CD4
  94          KM   COMBINE FS4S, ST4, DOFF1, DOFF2
  95          HC       4
              *

  96          KK   FS4E
  97          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS EAST (RACEL)
  98          BA   .0001
  99          BF      78
 100          LS       0      98
 101          UD    .051
              *
```

```
            102           KK   ST5
            103           BA   .0013
            104           BF       0
            105           LS       0      98
            106           UD    .083
                          *

            107           KK    CD5
            108           KM   COMBINE FS4E, ST5
            109           HC       2
                          *

            110           KK   ST6
            111           BA   .0009
            112           BF       0
            113           LS       0      98
            114           UD    .053
                          *

            115           KK   DON1
            116           BA   .0036
            117           BF       0
            118           LS       0      57
            119           UD    .150
                          *
1                                              HEC-1 INPUT                                              PAGE  4

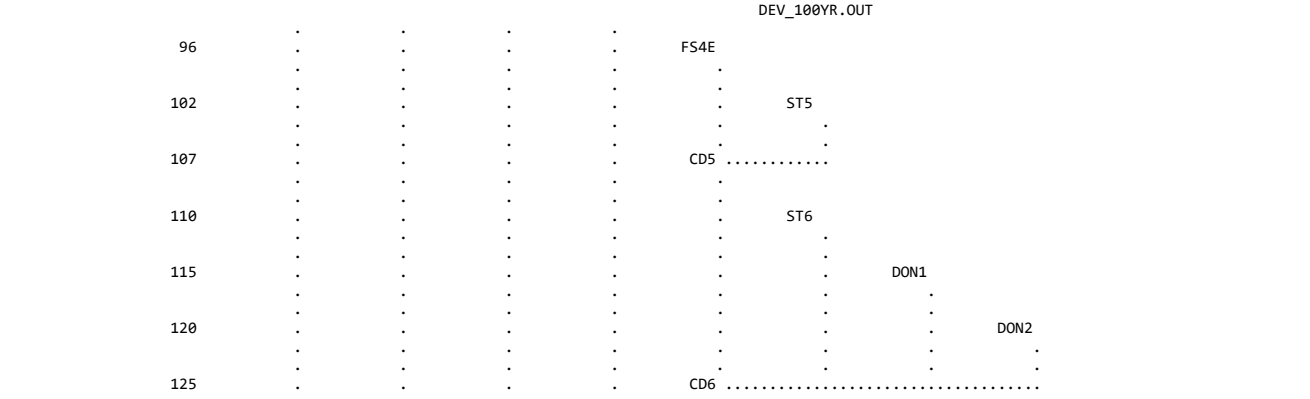
          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


            120           KK   DON2
            121           BA   .0027
            122           BF       0
            123           LS       0      57
            124           UD    .139
                          *

            125           KK    CD6
            126           KM   COMBINE CD5, ST6, DON1, DON2
            127           HC       4
                          *
            128           ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    22       ST1
                .
                .
    35          .       FS1E
                .          .
                .          .
    41        CD1 ............
                .
                .
    44          .       ST2
                .          .
                .          .
    49          .          .       FS2E
                .          .          .
                .          .          .
    55          .        CD2 ............
                .          .
                .          .
    58          .          .       ST3
                .          .          .
                .          .          .
    63          .          .          .       FS3E
                .          .          .          .
                .          .          .          .
    69          .          .        CD3 ............
                .          .          .
                .          .          .
    72          .          .          .       FS4S
                .          .          .          .
                .          .          .          .
    78          .          .          .          .       ST4
                .          .          .          .          .
                .          .          .          .          .
    83          .          .          .          .          .       DOFF1
                .          .          .          .          .          .
                .          .          .          .          .          .
    88          .          .          .          .          .          .       DOFF2
                .          .          .          .          .          .          .
                .          .          .          .          .          .          .
    93          .          .          .        CD4 ..................................
                .          .          .          .
```



(***) 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   20FEB19  TIME  17:08:09   *                                  *           (916) 756-1104            *
 *                                       *                                  *                                   *
 *****************************************                                  *************************************
```

```
                            <><><><><><><><><><><><><><><><><><><><>
                              RACEL/TENAYA
                              HYDROLOGIC MODEL
                              ----------------------------

                              100-YR STORM EVENT
                              ----------------------------
                              TANEY ENGINEERING
                              DEVELOPED CONDITION
                              FILE: DEV_100YR.DAT
                              PROJECT No: ADV-18-110
                              DATE:  FEB 2019
                            <><><><><><><><><><><><><><><><><><><><>

                             ---> 6-HOUR / SDN 3 <---


   19 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
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
HYDROGRAPH AT					
+	ST1	.00	1	FLOW	3.
				TIME	3.50
HYDROGRAPH AT					
+	FS1E	.00	1	FLOW	358.
				TIME	3.50
2 COMBINED AT					
+	CD1	.00	1	FLOW	361.
				TIME	3.50
HYDROGRAPH AT					
+	ST2	.00	1	FLOW	3.
				TIME	3.50
HYDROGRAPH AT					
+	FS2E	.00	1	FLOW	243.
				TIME	3.50
2 COMBINED AT					
+	CD2	.00	1	FLOW	246.
				TIME	3.50
HYDROGRAPH AT					
+	ST3	.00	1	FLOW	3.
				TIME	3.50
HYDROGRAPH AT					
+	FS3E	.00	1	FLOW	155.
				TIME	3.50
2 COMBINED AT					
+	CD3	.00	1	FLOW	158.
				TIME	3.50
HYDROGRAPH AT					
+	FS4S	.00	1	FLOW	80.
				TIME	3.50
HYDROGRAPH AT					
+	ST4	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	DOFF1	.00	1	FLOW	1.
				TIME	3.50
HYDROGRAPH AT					
+	DOFF2	.00	1	FLOW	3.
				TIME	3.50
4 COMBINED AT					
+	CD4	.01	1	FLOW	87.
				TIME	3.50
HYDROGRAPH AT					
+	FS4E	.00	1	FLOW	78.
				TIME	3.50
HYDROGRAPH AT					
+	ST5	.00	1	FLOW	3.
				TIME	3.50
2 COMBINED AT					
+	CD5	.00	1	FLOW	81.
				TIME	3.50
HYDROGRAPH AT					
+	ST6	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	DON1	.00	1	FLOW	0.
				TIME	3.75
HYDROGRAPH AT					
+	DON2	.00	1	FLOW	0.
				TIME	3.75
4 COMBINED AT					
+	CD6	.01	1	FLOW	83.
				TIME	3.50

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

ULTIMATE 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   19FEB19  TIME  13:20:06  *                                  *         (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
            2           ID      <><><><><><><><><><><><><><><><><><><><>
            3           ID        RACEL/TENAYA
            4           ID        HYDROLOGIC MODEL
            5           ID        ----------------------------
            6           ID
            7           ID        10-YR STORM EVENT
            8           ID        ----------------------------
            9           ID        TANEY ENGINEERING
           10           ID        ULTIMATE CONDITION
           11           ID        FILE: ULT_10YR.DAT
           12           ID        PROJECT No: ADV-18-110
           13           ID        DATE:  FEB 2019
           14           ID      <><><><><><><><><><><><><><><><><><><><>
           15           ID
           16           ID       ---> 6-HOUR / SDN 3 <---
           17           ID
           18           IT       5       0       0     300
           19           IO       5
           20           IN       5
           21           JR    PREC    1.00
                        *

           22           KK   ST1
           23           BA   .0014
           24           PB    1.58
           25           PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
           26           PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
           27           PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
           28           PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
           29           PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
           30           PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
           31           PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
           32           PC    .998    .999   1.00
           33           LS       0      98
           34           UD    .052
                        *

           35           KK   FS1E
           36           KM   FLOW AT RACEL/BUFFALO INTERSECTION THAT FLOWS EAST (RACEL)
           37           BA   .0001
           38           BF       0
           39           LS       0      98
           40           UD    .052
                        *

           41           KK    CU1
           42           KM   COMBINE FS1E, ST1
           43           HC       2
                        *
```

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

  44          KK   ST2
  45          BA   .0014
  46          BF       0
  47          LS       0      98
  48          UD    .052
              *

  49          KK   FS2E
  50          KM   FLOW AT RACEL/TIAGO INTERSECTION THAT FLOWS EAST (RACEL)
  51          BA   .0001
  52          BF       2
  53          LS       0      98
  54          UD    .052
              *

  55          KK    CU2
  56          KM   COMBINE FS2E, ST2
  57          HC       2
              *

  58          KK   ST3
  59          BA   .0014
  60          BF       0
  61          LS       0      98
  62          UD    .052
              *

  63          KK   FS3E
  64          KM   FLOW AT RACEL/PIONEER INTERSECTION THAT FLOWS EAST (RACEL)
  65          BA   .0001
  66          BF       3
  67          LS       0      98
  68          UD    .052
              *

  69          KK    CU3
  70          KM   COMBINE FS2E, ST2
  71          HC       2
              *

  72          KK   FS4S
  73          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS SOUTH (MONTE CRISTO)
  74          BA   .0001
  75          BF       1
  76          LS       0      98
  77          UD    .056
              *

  78          KK   ST4
  79          BA   .0009
  80          BF       0
  81          LS       0      98
  82          UD    .060
              *
1                                        HEC-1 INPUT                                          PAGE  3

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

  83          KK   UOFF1
  84          BA   .0019
  85          BF       0
  86          LS       0      73
  87          UD    .084
              *

  88          KK   UOFF2
  89          BA   .0032
  90          BF       0
  91          LS       0      80
  92          UD    .095
              *

  93          KK    CU4
  94          KM   COMBINE FS4S, ST4, UOFF1, UOFF2
  95          HC       4
              *

  96          KK   FS4E
  97          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS EAST (RACEL)
  98          BA   .0001
  99          BF       4
 100          LS       0      98
 101          UD    .051
              *
```

```
            102           KK   ST5
            103           BA   .0013
            104           BF       0
            105           LS       0      98
            106           UD    .083
                          *

            107           KK    CU5
            108           KM   COMBINE FS4E, ST5
            109           HC       2
                          *

            110           KK   ST6
            111           BA   .0009
            112           BF       0
            113           LS       0      98
            114           UD    .053
                          *

            115           KK   UON1
            116           BA   .0036
            117           BF       0
            118           LS       0      57
            119           UD    .150
                          *
```



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

            120           KK   UON2
            121           BA   .0027
            122           BF       0
            123           LS       0      57
            124           UD    .139
                          *

            125           KK    CU6
            126           KM   COMBINE CU5, ST6, UON1, UON2
            127           HC       4
                          *
            128           ZZ
```

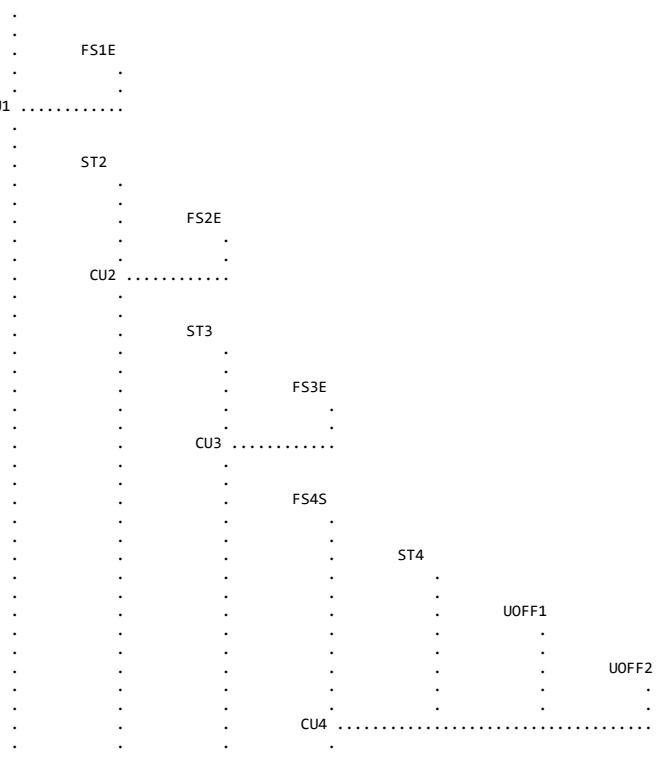
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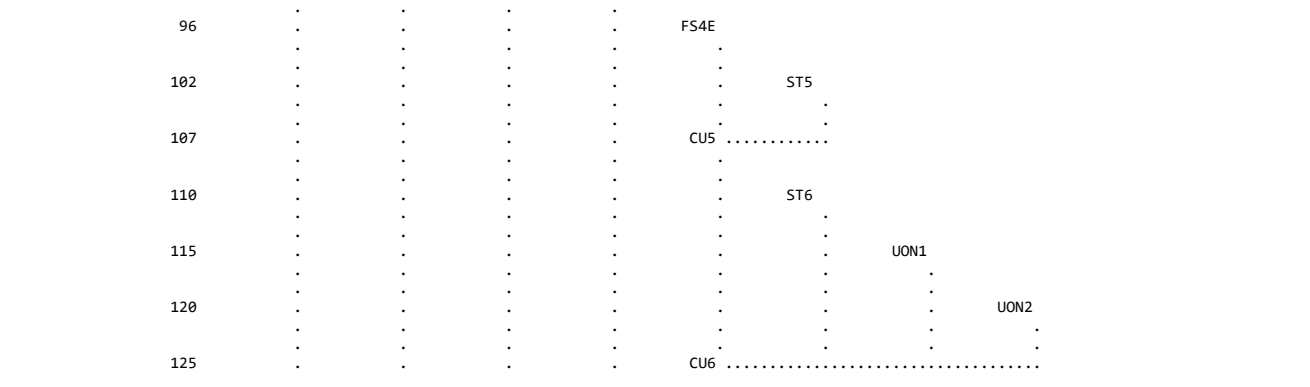
SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

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

(.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW





(***) 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   19FEB19  TIME  13:20:06   *                                   *           (916) 756-1104              *
 *                                       *                                   *                                       *
 *****************************************                                   *****************************************
```

```
                          <><><><><><><><><><><><><><><><><><><><>
                            RACEL/TENAYA
                            HYDROLOGIC MODEL
                            ----------------------------

                            10-YR STORM EVENT
                            ----------------------------
                            TANEY ENGINEERING
                            ULTIMATE CONDITION
                            FILE: ULT_10YR.DAT
                            PROJECT No: ADV-18-110
                            DATE:  FEB 2019
                          <><><><><><><><><><><><><><><><><><><><>

                           ---> 6-HOUR / SDN 3 <---


   19 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
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
HYDROGRAPH AT					
+	ST1	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	FS1E	.00	1	FLOW	0.
				TIME	3.50
2 COMBINED AT					
+	CU1	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	ST2	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	FS2E	.00	1	FLOW	2.
				TIME	3.50
2 COMBINED AT					
+	CU2	.00	1	FLOW	4.
				TIME	3.50
HYDROGRAPH AT					
+	ST3	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	FS3E	.00	1	FLOW	3.
				TIME	3.50
2 COMBINED AT					
+	CU3	.00	1	FLOW	5.
				TIME	3.50
HYDROGRAPH AT					
+	FS4S	.00	1	FLOW	1.
				TIME	3.50
HYDROGRAPH AT					
+	ST4	.00	1	FLOW	1.
				TIME	3.50
HYDROGRAPH AT					
+	UOFF1	.00	1	FLOW	0.
				TIME	3.58
HYDROGRAPH AT					
+	UOFF2	.00	1	FLOW	1.
				TIME	3.58
4 COMBINED AT					
+	CU4	.01	1	FLOW	3.
				TIME	3.50
HYDROGRAPH AT					
+	FS4E	.00	1	FLOW	4.
				TIME	3.50
HYDROGRAPH AT					
+	ST5	.00	1	FLOW	2.
				TIME	3.50
2 COMBINED AT					
+	CU5	.00	1	FLOW	6.
				TIME	3.50
HYDROGRAPH AT					
+	ST6	.00	1	FLOW	1.
				TIME	3.50
HYDROGRAPH AT					
+	UON1	.00	1	FLOW	0.
				TIME	5.00
HYDROGRAPH AT					
+	UON2	.00	1	FLOW	0.
				TIME	5.00
4 COMBINED AT					
+	CU6	.01	1	FLOW	7.
				TIME	3.50

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

```
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   19FEB19  TIME  13:20:25  *                                  *         (916) 756-1104               *
 *                                      *                                  *                                      *
 ****************************************                                  ****************************************

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

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

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

1 HEC-1 INPUT PAGE 1

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

                        *DIAGRAM
                          1     ID
                          2     ID      <><><><><><><><><><><><><><><><><><><><>
                          3     ID        RACEL/TENAYA
                          4     ID        HYDROLOGIC MODEL
                          5     ID        ----------------------------
                          6     ID
                          7     ID        100-YR STORM EVENT
                          8     ID        ----------------------------
                          9     ID        TANEY ENGINEERING
                         10     ID        ULTIMATE CONDITION
                         11     ID        FILE: ULT_100YR.DAT
                         12     ID        PROJECT No: ADV-18-110
                         13     ID        DATE:  FEB 2019
                         14     ID      <><><><><><><><><><><><><><><><><><><><>
                         15     ID
                         16     ID       ---> 6-HOUR / SDN 3 <---
                         17     ID
                         18     IT       5       0       0     300
                         19     IO       5
                         20     IN       5
                         21     JR    PREC    1.00
                                *

                         22     KK   ST1
                         23     BA   .0014
                         24     PB    2.77
                         25     PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
                         26     PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
                         27     PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
                         28     PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
                         29     PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
                         30     PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
                         31     PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
                         32     PC    .998    .999   1.00
                         33     LS       0      98
                         34     UD    .052
                                *

                         35     KK   FS1E
                         36     KM   FLOW AT RACEL/BUFFALO INTERSECTION THAT FLOWS EAST (RACEL)
                         37     BA   .0001
                         38     BF     149
                         39     LS       0      98
                         40     UD    .052
                                *

                         41     KK    CU1
                         42     KM   COMBINE FS1E, ST1
                         43     HC       2
                                *
```

1 HEC-1 INPUT PAGE 2

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

  44          KK   ST2
  45          BA   .0014
  46          BF       0
  47          LS       0      98
  48          UD    .052
              *

  49          KK   FS2E
  50          KM   FLOW AT RACEL/TIAGO INTERSECTION THAT FLOWS EAST (RACEL)
  51          BA   .0001
  52          BF     121
  53          LS       0      98
  54          UD    .052
              *

  55          KK    CU2
  56          KM   COMBINE FS2E, ST2
  57          HC       2
              *

  58          KK   ST3
  59          BA   .0014
  60          BF       0
  61          LS       0      98
  62          UD    .052
              *

  63          KK   FS3E
  64          KM   FLOW AT RACEL/PIONEER INTERSECTION THAT FLOWS EAST (RACEL)
  65          BA   .0001
  66          BF      74
  67          LS       0      98
  68          UD    .052
              *

  69          KK    CU3
  70          KM   COMBINE FS2E, ST2
  71          HC       2
              *

  72          KK   FS4S
  73          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS SOUTH (MONTE CRISTO)
  74          BA   .0001
  75          BF      35
  76          LS       0      98
  77          UD    .056
              *

  78          KK   ST4
  79          BA   .0009
  80          BF       0
  81          LS       0      98
  82          UD    .060
              *
1                                        HEC-1 INPUT                                        PAGE  3

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

  83          KK   UOFF1
  84          BA   .0019
  85          BF       0
  86          LS       0      73
  87          UD    .084
              *

  88          KK   UOFF2
  89          BA   .0032
  90          BF       0
  91          LS       0      80
  92          UD    .095
              *

  93          KK    CU4
  94          KM   COMBINE FS4S, ST4, UOFF1, UOFF2
  95          HC       4
              *

  96          KK   FS4E
  97          KM   FLOW AT RACEL/MONTE CRISTO INTERSECTION THAT FLOWS EAST (RACEL)
  98          BA   .0001
  99          BF      42
 100          LS       0      98
 101          UD    .051
              *
```

```
            102           KK   ST5
            103           BA   .0013
            104           BF       0
            105           LS       0      98
            106           UD    .083
                          *

            107           KK    CU5
            108           KM   COMBINE FS4E, ST5
            109           HC       2
                          *

            110           KK   ST6
            111           BA   .0009
            112           BF       0
            113           LS       0      98
            114           UD    .053
                          *

            115           KK   UON1
            116           BA   .0036
            117           BF       0
            118           LS       0      57
            119           UD    .150
                          *
```



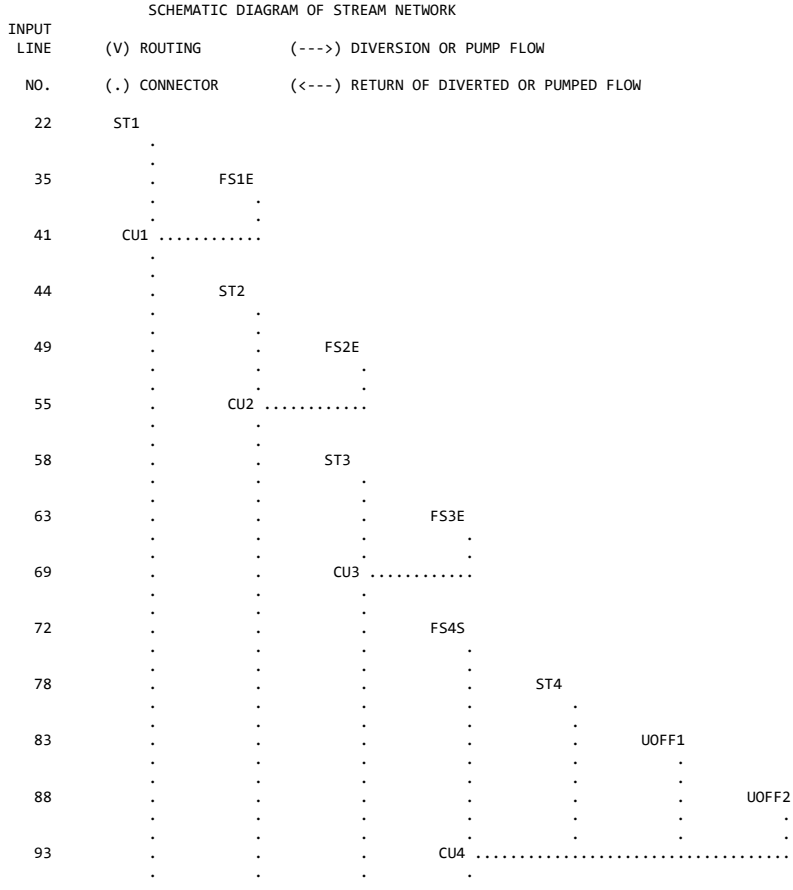
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          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

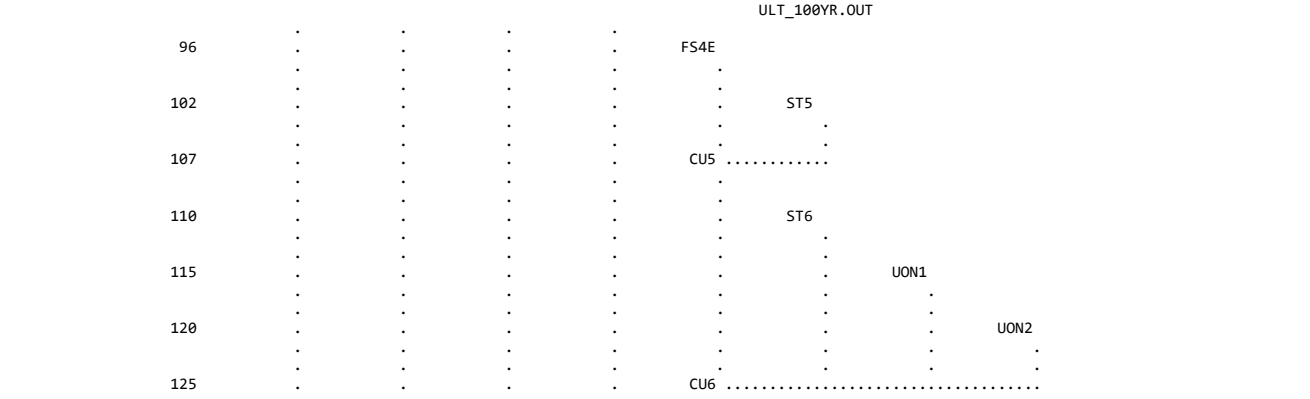
            120           KK   UON2
            121           BA   .0027
            122           BF       0
            123           LS       0      57
            124           UD    .139
                          *

            125           KK    CU6
            126           KM   COMBINE CU5, ST6, UON1, UON2
            127           HC       4
                          *
            128           ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK





(***) 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   19FEB19  TIME  13:20:25   *                                  *          (916) 756-1104          *
 *                                       *                                  *                                  *
 *****************************************                                  ************************************
```

```
                          <><><><><><><><><><><><><><><><><><><><>
                            RACEL/TENAYA
                            HYDROLOGIC MODEL
                            ----------------------------

                            100-YR STORM EVENT
                            ----------------------------
                            TANEY ENGINEERING
                            ULTIMATE CONDITION
                            FILE: ULT_100YR.DAT
                            PROJECT No: ADV-18-110
                            DATE:  FEB 2019
                          <><><><><><><><><><><><><><><><><><><><>

                           ---> 6-HOUR / SDN 3 <---


   19 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
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
HYDROGRAPH AT					
+	ST1	.00	1	FLOW	3.
				TIME	3.50
HYDROGRAPH AT					
+	FS1E	.00	1	FLOW	149.
				TIME	3.50
2 COMBINED AT					
+	CU1	.00	1	FLOW	152.
				TIME	3.50
HYDROGRAPH AT					
+	ST2	.00	1	FLOW	3.
				TIME	3.50
HYDROGRAPH AT					
+	FS2E	.00	1	FLOW	121.
				TIME	3.50
2 COMBINED AT					
+	CU2	.00	1	FLOW	124.
				TIME	3.50
HYDROGRAPH AT					
+	ST3	.00	1	FLOW	3.
				TIME	3.50
HYDROGRAPH AT					
+	FS3E	.00	1	FLOW	74.
				TIME	3.50
2 COMBINED AT					
+	CU3	.00	1	FLOW	77.
				TIME	3.50
HYDROGRAPH AT					
+	FS4S	.00	1	FLOW	35.
				TIME	3.50
HYDROGRAPH AT					
+	ST4	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	UOFF1	.00	1	FLOW	1.
				TIME	3.50
HYDROGRAPH AT					
+	UOFF2	.00	1	FLOW	3.
				TIME	3.50
4 COMBINED AT					
+	CU4	.01	1	FLOW	42.
				TIME	3.50
HYDROGRAPH AT					
+	FS4E	.00	1	FLOW	42.
				TIME	3.50
HYDROGRAPH AT					
+	ST5	.00	1	FLOW	3.
				TIME	3.50
2 COMBINED AT					
+	CU5	.00	1	FLOW	45.
				TIME	3.50
HYDROGRAPH AT					
+	ST6	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	UON1	.00	1	FLOW	0.
				TIME	3.75
HYDROGRAPH AT					
+	UON2	.00	1	FLOW	0.
				TIME	3.75
4 COMBINED AT					
+	CU6	.01	1	FLOW	47.
				TIME	3.50

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

APPENDIX C

Hydraulic Calculations

TANEY ENGINEERING
6030 S. JONES BOULEVARD, SUITE #100
LAS VEGAS, NV 89118
TELEPHONE: 702-362-8844
FAX: 702-362-5233

Proj. No: ADV-18-110 **Project Name:** RACEL & TENAYA
Date: 2/21/2019 **Designed By:** MS

ULTIMATE CONDITION

FF Criteria Check

Bldg #	FF Elev.	Depth	TC Elev.	Freeboard	Criteria Met
1	2400.57	0.17	2398.55	2.06	YES
2	2400.67	0.17	2398.55	2.16	YES
3	2399.57	0.17	2397.62	1.99	YES
4	2398.47	0.17	2396.49	2.02	YES
5	2398.27	0.17	2395.39	2.92	YES
6	2396.97	0.17	2395.39	1.62	YES
7	2398.07	0.17	2396.49	1.62	YES
8	2399.17	0.17	2397.62	1.59	YES
9	2400.07	0.17	2398.55	1.56	YES
10	2400.07	0.17	2398.55	1.56	YES
Freeboard = FF - (TC + (2*D) - 0.38')					

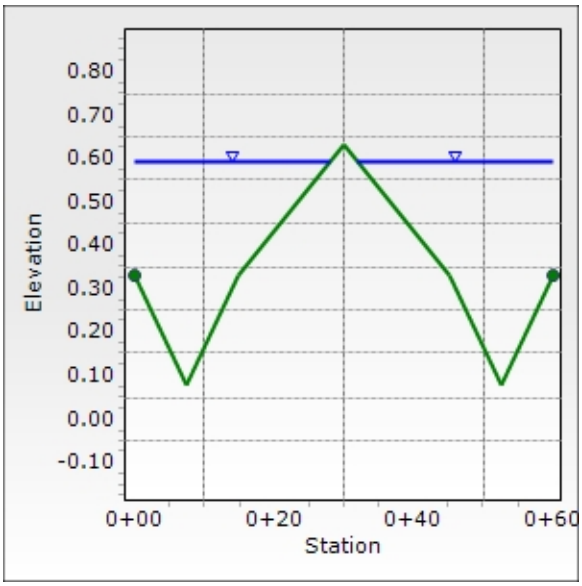
EXISTING CONDITION

CROSS SECTIONS

Cross Section for CROSS SECTION A 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.51 ft
Discharge	26.000 cfs



Worksheet for CROSS SECTION A 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	26.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.33
0+07.5	0.08
0+15.0	0.33
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.51	ft
Elevation Range	0.08 to 0.63	ft
Flow Area	15.0	ft^2
Wetted Perimeter	56.67	ft
Hydraulic Radius	0.26	ft
Top Width	56.13	ft
Normal Depth	0.51	ft
Critical Depth	0.41	ft
Critical Slope	1.536	%
Velocity	1.73	ft/s
Velocity Head	0.05	ft
Specific Energy	0.56	ft
Froude Number	0.591	
Flow Type	Subcritical	

Worksheet for CROSS SECTION A 10YR

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

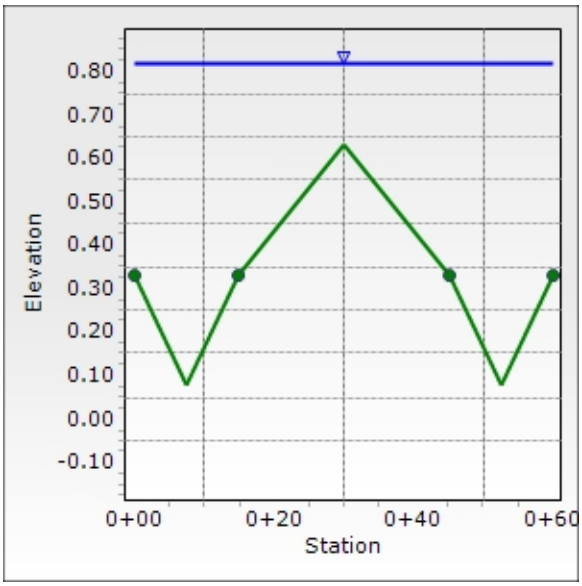
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.51 ft
Critical Depth	0.41 ft
Channel Slope	0.500 %
Critical Slope	1.536 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.261262365238105ft. Flow is divided.

Cross Section for CROSS SECTION A 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.74 ft
Discharge	86.000 cfs



Worksheet for CROSS SECTION A 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	86.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.33
0+07.5	0.08
0+15.0	0.33
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.33)	(0+15.0, 0.33)	0.025
(0+15.0, 0.33)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.74	ft
Elevation Range	0.08 to 0.63	ft
Flow Area	28.6	ft²
Wetted Perimeter	61.00	ft
Hydraulic Radius	0.47	ft
Top Width	60.00	ft
Normal Depth	0.74	ft
Critical Depth	0.66	ft
Critical Slope	0.894	%
Velocity	3.01	ft/s
Velocity Head	0.14	ft
Specific Energy	0.88	ft

Worksheet for CROSS SECTION A 100YR

Results	
Froude Number	0.769
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

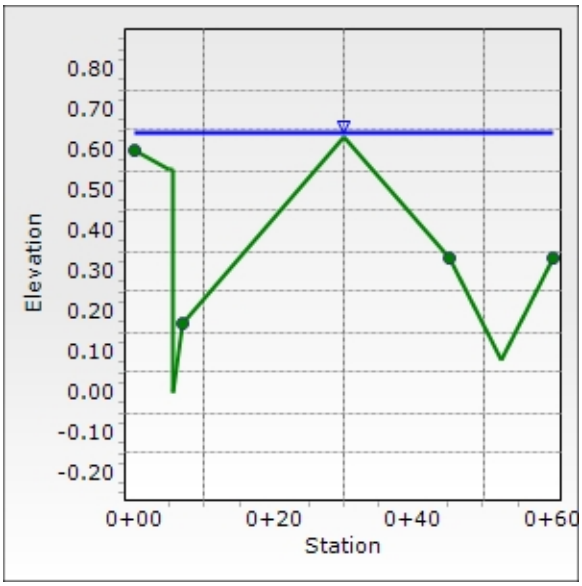
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.74 ft
Critical Depth	0.66 ft
Channel Slope	0.500 %
Critical Slope	0.894 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.488693519434986ft.

Cross Section for CROSS SECTION B 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.230 %
Normal Depth	0.64 ft
Discharge	24.000 cfs



Worksheet for CROSS SECTION B 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.230	%
Discharge	24.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.64	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	15.5	ft²
Wetted Perimeter	60.92	ft
Hydraulic Radius	0.25	ft
Top Width	60.00	ft
Normal Depth	0.64	ft
Critical Depth	0.52	ft
Critical Slope	0.843	%
Velocity	1.55	ft/s

Worksheet for CROSS SECTION B 10YR

Results	
Velocity Head	0.04 ft
Specific Energy	0.67 ft
Froude Number	0.540
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

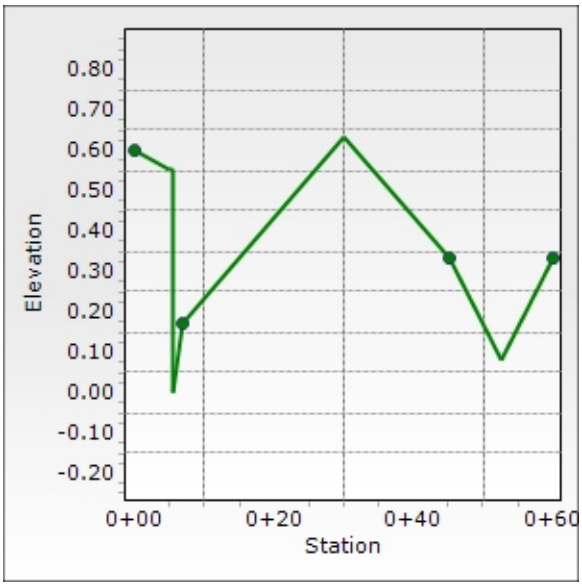
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.64 ft
Critical Depth	0.52 ft
Channel Slope	0.230 %
Critical Slope	0.843 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.306720456227401ft.

Cross Section for CROSS SECTION B 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.230 %
Normal Depth	0.92 ft
Discharge	81.000 cfs



Worksheet for CROSS SECTION B 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.230	%
Discharge	81.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.92	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	32.2	ft²
Wetted Perimeter	61.48	ft
Hydraulic Radius	0.52	ft
Top Width	60.00	ft
Normal Depth	0.92	ft
Critical Depth	0.76	ft
Critical Slope	0.696	%
Velocity	2.52	ft/s

Worksheet for CROSS SECTION B 100YR

Results	
Velocity Head	0.10 ft
Specific Energy	1.01 ft
Froude Number	0.606
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

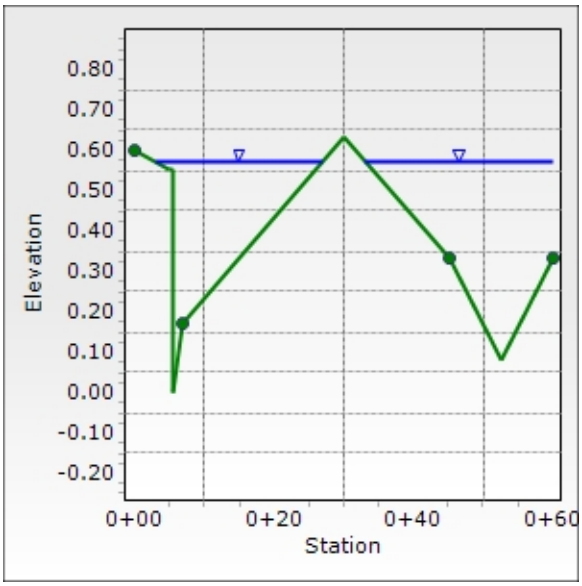
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.92 ft
Critical Depth	0.76 ft
Channel Slope	0.230 %
Critical Slope	0.696 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.585696526452336ft.

Cross Section for CROSS SECTION C 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Normal Depth	0.57 ft
Discharge	25.000 cfs



Worksheet for CROSS SECTION C 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.540	%
Discharge	25.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.57	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	11.7	ft²
Wetted Perimeter	51.81	ft
Hydraulic Radius	0.23	ft
Top Width	50.99	ft
Normal Depth	0.57	ft
Critical Depth	0.52	ft
Critical Slope	0.886	%
Velocity	2.14	ft/s

Worksheet for CROSS SECTION C 10YR

Results	
Velocity Head	0.07 ft
Specific Energy	0.64 ft
Froude Number	0.789
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

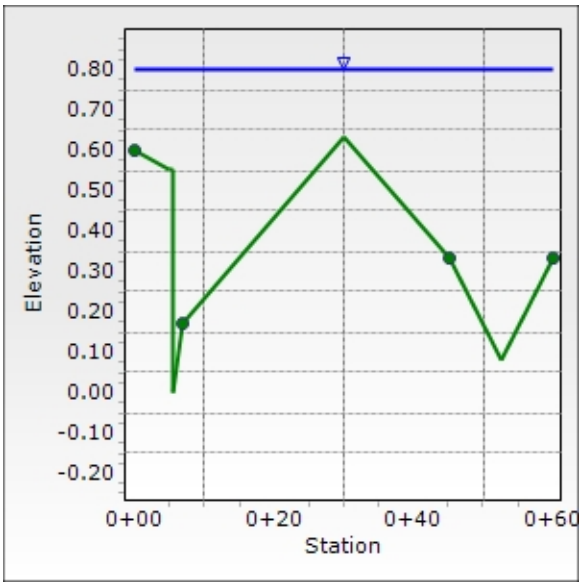
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.57 ft
Critical Depth	0.52 ft
Channel Slope	0.540 %
Critical Slope	0.886 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.239974750 117707ft. Flow is divided.

Cross Section for CROSS SECTION C 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Normal Depth	0.80 ft
Discharge	83.000 cfs



Worksheet for CROSS SECTION C 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.540	%
Discharge	83.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.80	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	25.2	ft²
Wetted Perimeter	61.25	ft
Hydraulic Radius	0.41	ft
Top Width	60.00	ft
Normal Depth	0.80	ft
Critical Depth	0.77	ft
Critical Slope	0.692	%
Velocity	3.29	ft/s

Worksheet for CROSS SECTION C 100YR

Results	
Velocity Head	0.17 ft
Specific Energy	0.97 ft
Froude Number	0.894
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.80 ft
Critical Depth	0.77 ft
Channel Slope	0.540 %
Critical Slope	0.692 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.469821757317848ft.

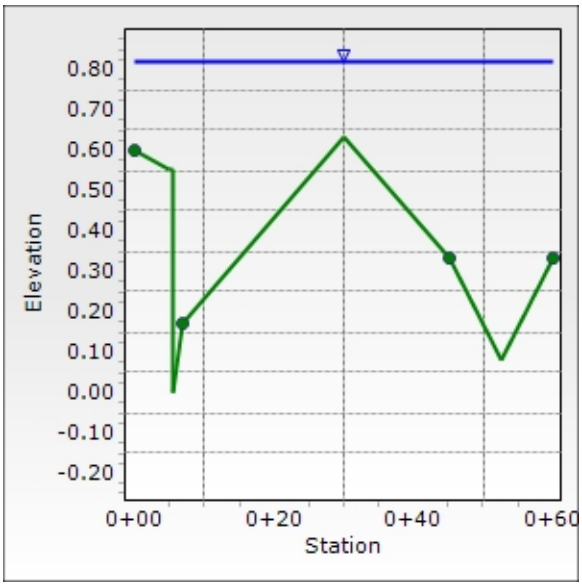
FLOW SPLIT CALCULATIONS

FLOW SPLIT AT RACEL & BUFFALO
REF* = FS1E + FS1S

Cross Section for FS1E_RACEL&BUFFALO_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.82 ft
Discharge	128.000 cfs



Worksheet for FS1E_RACEL&BUFFALO_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	1.140	%
Discharge	128.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.82	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	26.2	ft²
Wetted Perimeter	61.28	ft
Hydraulic Radius	0.43	ft
Top Width	60.00	ft
Normal Depth	0.82	ft
Critical Depth	0.90	ft
Critical Slope	0.632	%
Velocity	4.89	ft/s

Worksheet for FS1E_RACEL&BUFFALO_RACEL 10YR

Results	
Velocity Head	0.37 ft
Specific Energy	1.19 ft
Froude Number	1.306
Flow Type	Supercritical

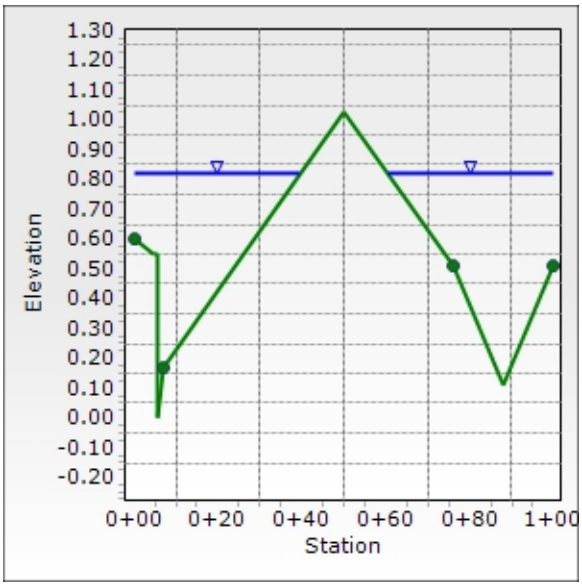
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.82 ft
Critical Depth	0.90 ft
Channel Slope	1.140 %
Critical Slope	0.632 %

Cross Section for FS1S_RACEL&BUFFALO_BUFFALO 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Normal Depth	0.82 ft
Discharge	79.000 cfs



Worksheet for FS1S_RACEL&BUFFALO_BUFFALO 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.540	%
Discharge	79.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+50.0	1.03
0+76.0	0.51
0+88.0	0.11
1+00.0	0.51

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+76.0, 0.51)	0.016
(0+76.0, 0.51)	(1+00.0, 0.51)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.82	ft
Elevation Range	0.00 to 1.03	ft
Flow Area	27.8	ft²
Wetted Perimeter	80.30	ft
Hydraulic Radius	0.35	ft
Top Width	79.18	ft
Normal Depth	0.82	ft
Critical Depth	0.78	ft
Critical Slope	0.775	%
Velocity	2.84	ft/s

Worksheet for FS1S_RACEL&BUFFALO_BUFFALO 10YR

Results	
Velocity Head	0.13 ft
Specific Energy	0.95 ft
Froude Number	0.845
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

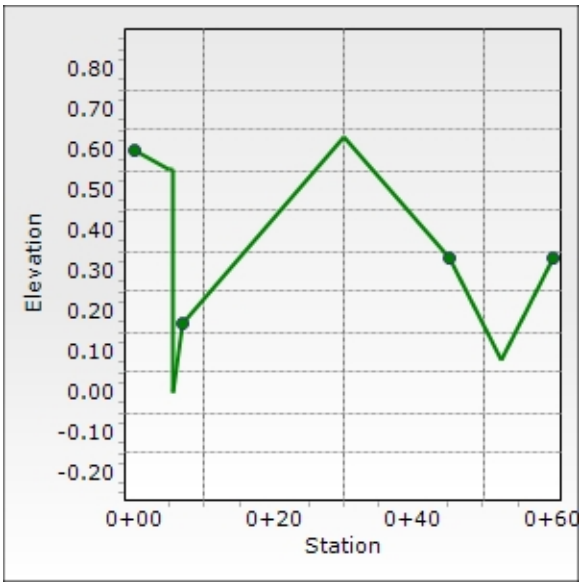
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.82 ft
Critical Depth	0.78 ft
Channel Slope	0.540 %
Critical Slope	0.775 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.311798160512914ft. Flow is divided.

Cross Section for FS1E_RACEL&BUFFALO_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	1.18 ft
Discharge	351.000 cfs



Worksheet for FS1E_RACEL&BUFFALO_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	1.140	%
Discharge	351.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	1.18	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	48.2	ft²
Wetted Perimeter	62.01	ft
Hydraulic Radius	0.78	ft
Top Width	60.00	ft
Normal Depth	1.18	ft
Critical Depth	1.40	ft
Critical Slope	0.517	%
Velocity	7.28	ft/s

Worksheet for FS1E_RACEL&BUFFALO_RACEL 100YR

Results	
Velocity Head	0.82 ft
Specific Energy	2.01 ft
Froude Number	1.433
Flow Type	Supercritical

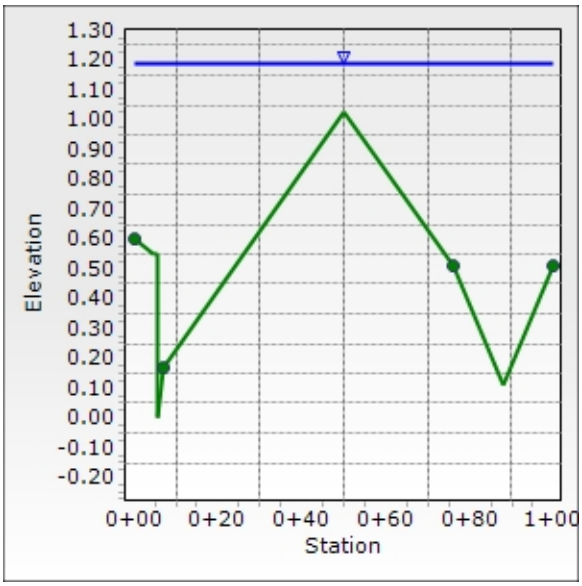
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.18 ft
Critical Depth	1.40 ft
Channel Slope	1.140 %
Critical Slope	0.517 %

Cross Section for FS1S_RACEL&BUFFALO_BUFFALO 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Normal Depth	1.19 ft
Discharge	270.000 cfs



Worksheet for FS1S_RACEL&BUFFALO_BUFFALO 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.540	%
Discharge	270.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+50.0	1.03
0+76.0	0.51
0+88.0	0.11
1+00.0	0.51

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+76.0, 0.51)	0.016
(0+76.0, 0.51)	(1+00.0, 0.51)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	1.19	ft
Elevation Range	0.00 to 1.03	ft
Flow Area	62.8	ft²
Wetted Perimeter	101.86	ft
Hydraulic Radius	0.62	ft
Top Width	100.00	ft
Normal Depth	1.19	ft
Critical Depth	1.17	ft
Critical Slope	0.596	%
Velocity	4.30	ft/s

Worksheet for FS1S_RACEL&BUFFALO_BUFFALO 100YR

Results	
Velocity Head	0.29 ft
Specific Energy	1.48 ft
Froude Number	0.957
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.19 ft
Critical Depth	1.17 ft
Channel Slope	0.540 %
Critical Slope	0.596 %

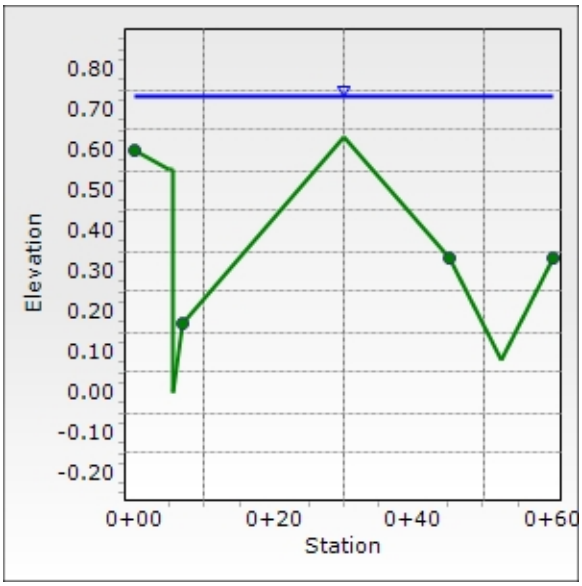
Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.683183571115612ft.

FLOW SPLIT AT RACEL & TIAGO
CE1 = FS2E + FS2S

Cross Section for FS2E_RACEL&TIAGO_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.73 ft
Discharge	88.000 cfs



Worksheet for FS2E_RACEL&TIAGO_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	1.140	%
Discharge	88.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.73	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	20.9	ft²
Wetted Perimeter	61.10	ft
Hydraulic Radius	0.34	ft
Top Width	60.00	ft
Normal Depth	0.73	ft
Critical Depth	0.79	ft
Critical Slope	0.683	%
Velocity	4.22	ft/s

Worksheet for FS2E_RACEL&TIAGO_RACEL 10YR

Results	
Velocity Head	0.28 ft
Specific Energy	1.00 ft
Froude Number	1.261
Flow Type	Supercritical

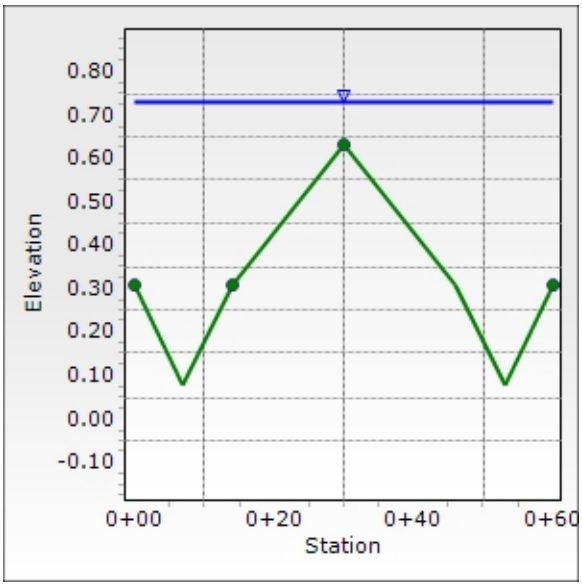
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.73 ft
Critical Depth	0.79 ft
Channel Slope	1.140 %
Critical Slope	0.683 %

Cross Section for FS2S_RACEL&TIAGO_TIAGO 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.270 %
Normal Depth	0.65 ft
Discharge	42.000 cfs



Worksheet for FS2S_RACEL&TIAGO_TIAGO 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.270 %
Discharge	42.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.31
0+07.0	0.08
0+14.0	0.31
0+30.0	0.63
0+46.0	0.31
0+53.0	0.08
0+60.0	0.31

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.31)	(0+14.0, 0.31)	0.025
(0+14.0, 0.31)	(0+30.0, 0.63)	0.016
(0+30.0, 0.63)	(0+60.0, 0.31)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.65 ft
Elevation Range	0.08 to 0.63 ft
Flow Area	23.5 ft²
Wetted Perimeter	60.87 ft
Hydraulic Radius	0.39 ft
Top Width	60.00 ft
Normal Depth	0.65 ft
Critical Depth	0.50 ft
Critical Slope	1.218 %
Velocity	1.78 ft/s
Velocity Head	0.05 ft
Specific Energy	0.70 ft

Worksheet for FS2S_RACEL&TIAGO_TIAGO 10YR

Results	
Froude Number	0.502
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

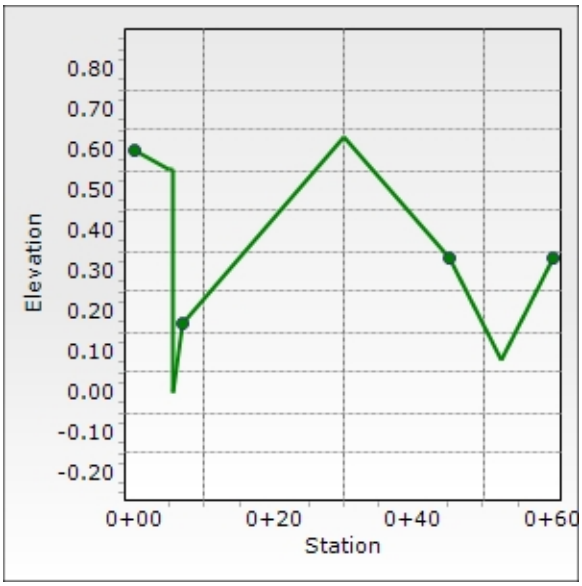
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.65 ft
Critical Depth	0.50 ft
Channel Slope	0.270 %
Critical Slope	1.218 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.423978706749391ft.

Cross Section for FS2E_RACEL&TIAGO_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	1.03 ft
Discharge	248.000 cfs



Worksheet for FS2E_RACEL&TIAGO_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	1.140	%
Discharge	248.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	1.03	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	39.0	ft²
Wetted Perimeter	61.71	ft
Hydraulic Radius	0.63	ft
Top Width	60.00	ft
Normal Depth	1.03	ft
Critical Depth	1.19	ft
Critical Slope	0.553	%
Velocity	6.35	ft/s

Worksheet for FS2E_RACEL&TIAGO_RACEL 100YR

Results	
Velocity Head	0.63 ft
Specific Energy	1.66 ft
Froude Number	1.388
Flow Type	Supercritical

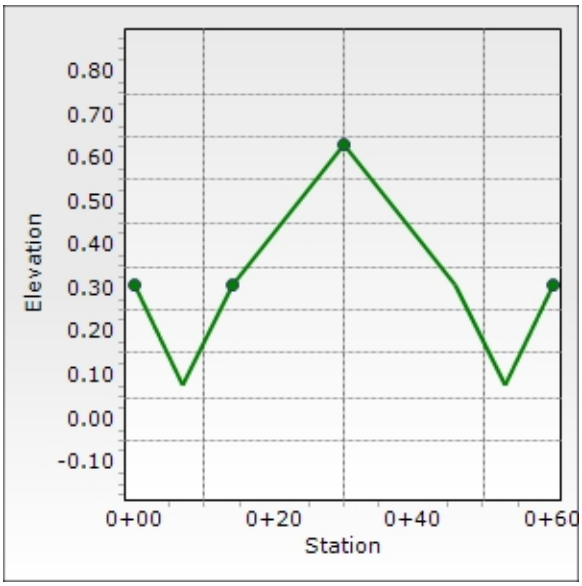
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.03 ft
Critical Depth	1.19 ft
Channel Slope	1.140 %
Critical Slope	0.553 %

Cross Section for FS2S_RACEL&TIAGO_TIAGO 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.270 %
Normal Depth	0.95 ft
Discharge	106.000 cfs



Worksheet for FS2S_RACEL&TIAGO_TIAGO 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.270 %
Discharge	106.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.31
0+07.0	0.08
0+14.0	0.31
0+30.0	0.63
0+46.0	0.31
0+53.0	0.08
0+60.0	0.31

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.31)	(0+14.0, 0.31)	0.025
(0+14.0, 0.31)	(0+30.0, 0.63)	0.016
(0+30.0, 0.63)	(0+60.0, 0.31)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.95 ft
Elevation Range	0.08 to 0.63 ft
Flow Area	41.2 ft²
Wetted Perimeter	61.46 ft
Hydraulic Radius	0.67 ft
Top Width	60.00 ft
Normal Depth	0.95 ft
Critical Depth	0.72 ft
Critical Slope	1.021 %
Velocity	2.57 ft/s
Velocity Head	0.10 ft
Specific Energy	1.05 ft

Worksheet for FS2S_RACEL&TIAGO_TIAGO 100YR

Results	
Froude Number	0.547
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.95 ft
Critical Depth	0.72 ft
Channel Slope	0.270 %
Critical Slope	1.021 %

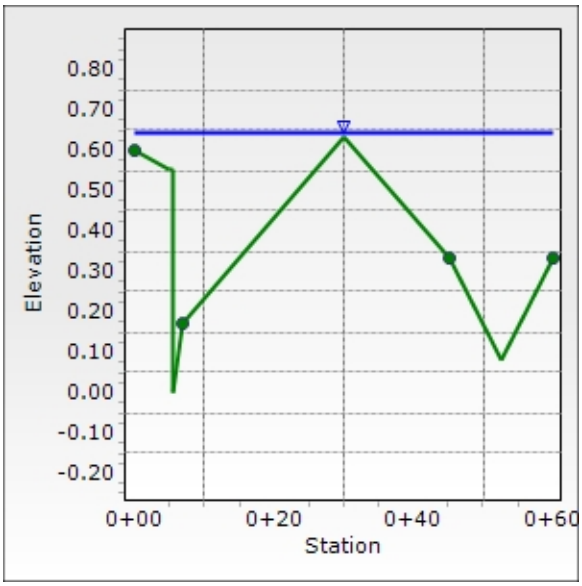
Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.718703663 39896ft.

FLOW SPLIT AT RACEL & PIONEER
CE2 = FS3E + FS3S

Cross Section for FS3E_RACEL&PIONEER_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.64 ft
Discharge	55.000 cfs



Worksheet for FS3E_RACEL&PIONEER_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	1.140	%
Discharge	55.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.64	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	15.7	ft²
Wetted Perimeter	60.93	ft
Hydraulic Radius	0.26	ft
Top Width	60.00	ft
Normal Depth	0.64	ft
Critical Depth	0.68	ft
Critical Slope	0.755	%
Velocity	3.50	ft/s

Worksheet for FS3E_RACEL&PIONEER_RACEL 10YR

Results	
Velocity Head	0.19 ft
Specific Energy	0.83 ft
Froude Number	1.206
Flow Type	Supercritical

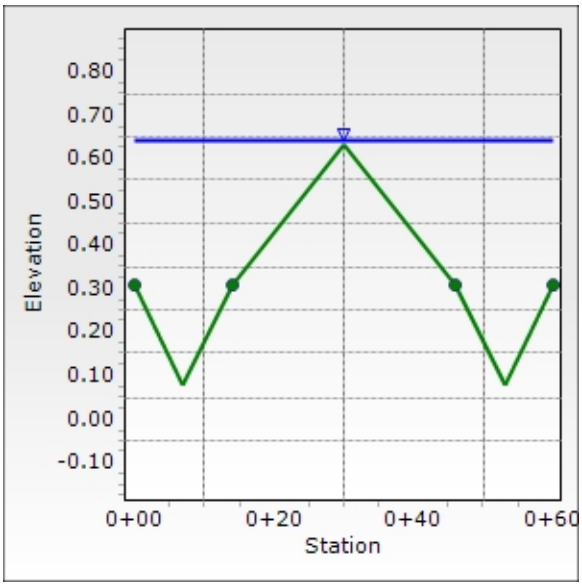
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.64 ft
Critical Depth	0.68 ft
Channel Slope	1.140 %
Critical Slope	0.755 %

Cross Section for FS3S_RACEL&PIONEER_PIONEER 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.400 %
Normal Depth	0.56 ft
Discharge	35.000 cfs



Worksheet for FS3S_RACEL&PIONEER_PIONEER 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.400 %
Discharge	35.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.31
0+07.0	0.08
0+14.0	0.31
0+30.0	0.63
0+46.0	0.31
0+53.0	0.08
0+60.0	0.31

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.31)	(0+14.0, 0.31)	0.025
(0+14.0, 0.31)	(0+46.0, 0.31)	0.016
(0+46.0, 0.31)	(0+60.0, 0.31)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.56 ft
Elevation Range	0.08 to 0.63 ft
Flow Area	17.6 ft²
Wetted Perimeter	60.67 ft
Hydraulic Radius	0.29 ft
Top Width	60.00 ft
Normal Depth	0.56 ft
Critical Depth	0.46 ft
Critical Slope	1.017 %
Velocity	1.99 ft/s
Velocity Head	0.06 ft
Specific Energy	0.62 ft

Worksheet for FS3S_RACEL&PIONEER_PIONEER 10YR

Results	
Froude Number	0.646
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

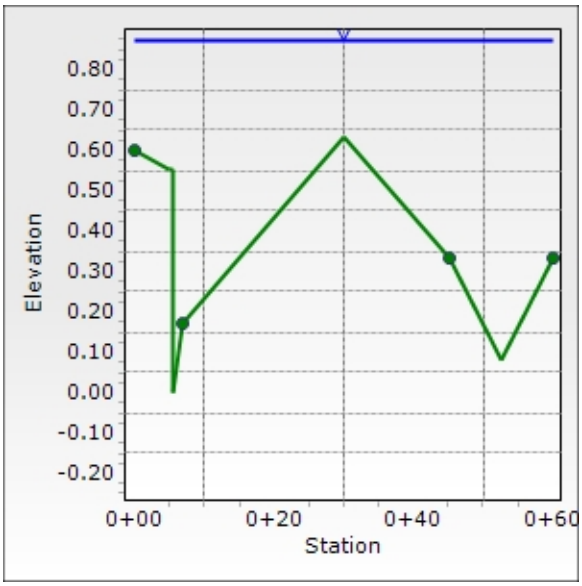
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.56 ft
Critical Depth	0.46 ft
Channel Slope	0.400 %
Critical Slope	1.017 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.325256696785104ft.

Cross Section for FS3E_RACEL&PIONEER_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.87 ft
Discharge	158.000 cfs



Worksheet for FS3E_RACEL&PIONEER_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Discharge	158.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.87 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	29.7 ft²
Wetted Perimeter	61.39 ft
Hydraulic Radius	0.48 ft
Top Width	60.00 ft
Normal Depth	0.87 ft
Critical Depth	0.98 ft
Critical Slope	0.606 %
Velocity	5.32 ft/s

Worksheet for FS3E_RACEL&PIONEER_RACEL 100YR

Results	
Velocity Head	0.44 ft
Specific Energy	1.31 ft
Froude Number	1.331
Flow Type	Supercritical

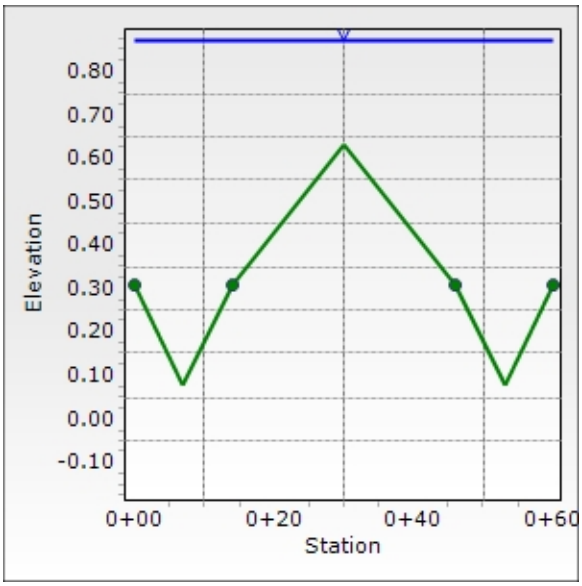
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.87 ft
Critical Depth	0.98 ft
Channel Slope	1.140 %
Critical Slope	0.606 %

Cross Section for FS3S_RACEL&PIONEER_PIONEER 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.400 %
Normal Depth	0.79 ft
Discharge	93.000 cfs



Worksheet for FS3S_RACEL&PIONEER_PIONEER 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.400 %
Discharge	93.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.31
0+07.0	0.08
0+14.0	0.31
0+30.0	0.63
0+46.0	0.31
0+53.0	0.08
0+60.0	0.31

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.31)	(0+14.0, 0.31)	0.025
(0+14.0, 0.31)	(0+46.0, 0.31)	0.016
(0+46.0, 0.31)	(0+60.0, 0.31)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.79 ft
Elevation Range	0.08 to 0.63 ft
Flow Area	31.8 ft²
Wetted Perimeter	61.14 ft
Hydraulic Radius	0.52 ft
Top Width	60.00 ft
Normal Depth	0.79 ft
Critical Depth	0.68 ft
Critical Slope	0.857 %
Velocity	2.92 ft/s
Velocity Head	0.13 ft
Specific Energy	0.92 ft

Worksheet for FS3S_RACEL&PIONEER_PIONEER 100YR

Results	
Froude Number	0.708
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.79 ft
Critical Depth	0.68 ft
Channel Slope	0.400 %
Critical Slope	0.857 %

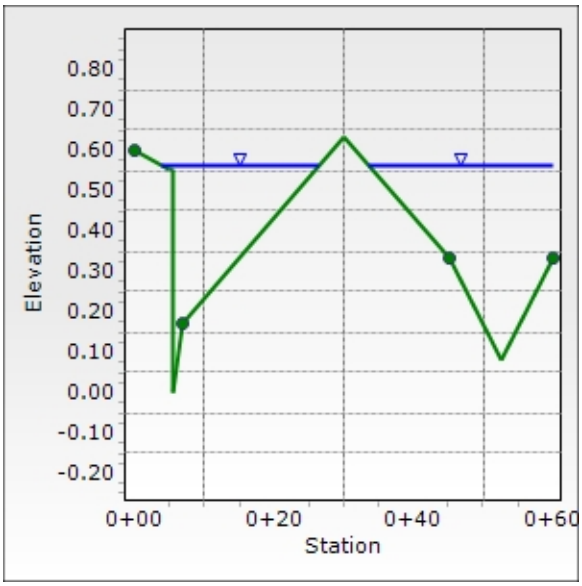
Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.561616314 92112ft.

FLOW SPLIT AT RACEL & MONTE CRISTO
CE3 = FS4E + FS4S

Cross Section for FS4E_RACEL&MONTE_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.460 %
Normal Depth	0.56 ft
Discharge	22.000 cfs



Worksheet for FS4E_RACEL&MONTE_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.460	%
Discharge	22.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.56	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	11.2	ft²
Wetted Perimeter	50.05	ft
Hydraulic Radius	0.22	ft
Top Width	49.24	ft
Normal Depth	0.56	ft
Critical Depth	0.50	ft
Critical Slope	0.914	%
Velocity	1.96	ft/s

Worksheet for FS4E_RACEL&MONTE_RACEL 10YR

Results	
Velocity Head	0.06 ft
Specific Energy	0.62 ft
Froude Number	0.723
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

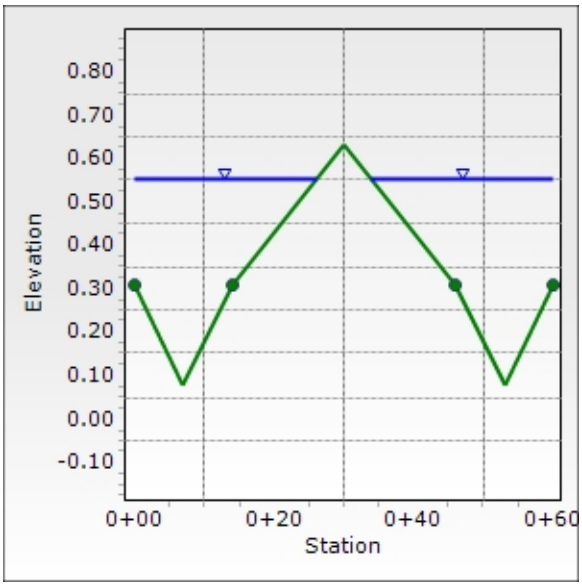
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.56 ft
Critical Depth	0.50 ft
Channel Slope	0.460 %
Critical Slope	0.914 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.231200152335273ft. Flow is divided.

Cross Section for FS4S_RACEL&MONTE_MONTE 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.47 ft
Discharge	25.000 cfs



Worksheet for FS4S_RACEL&MONTE_MONTE 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	25.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.31
0+07.0	0.08
0+14.0	0.31
0+30.0	0.63
0+46.0	0.31
0+53.0	0.08
0+60.0	0.31

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.31)	(0+14.0, 0.31)	0.025
(0+14.0, 0.31)	(0+46.0, 0.31)	0.016
(0+46.0, 0.31)	(0+60.0, 0.31)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.47	ft
Elevation Range	0.08 to 0.63	ft
Flow Area	12.9	ft^2
Wetted Perimeter	52.74	ft
Hydraulic Radius	0.25	ft
Top Width	52.23	ft
Normal Depth	0.47	ft
Critical Depth	0.40	ft
Critical Slope	1.126	%
Velocity	1.93	ft/s
Velocity Head	0.06	ft
Specific Energy	0.53	ft

Worksheet for FS4S_RACEL&MONTE_MONTE 10YR

Results	
Froude Number	0.684
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

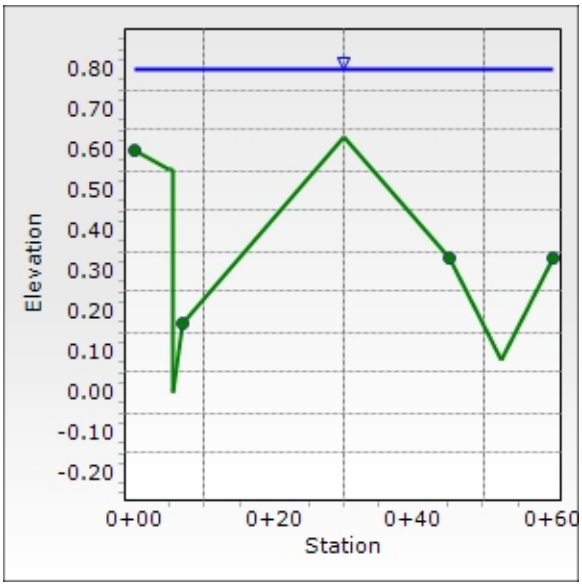
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.47 ft
Critical Depth	0.40 ft
Channel Slope	0.500 %
Critical Slope	1.126 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.242307615902806ft. Flow is divided.

Cross Section for FS4E_RACEL&MONTE_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.460 %
Normal Depth	0.80 ft
Discharge	78.000 cfs



Worksheet for FS4E_RACEL&MONTE_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.460	%
Discharge	78.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.80	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	25.5	ft²
Wetted Perimeter	61.25	ft
Hydraulic Radius	0.42	ft
Top Width	60.00	ft
Normal Depth	0.80	ft
Critical Depth	0.75	ft
Critical Slope	0.701	%
Velocity	3.06	ft/s

Worksheet for FS4E_RACEL&MONTE_RACEL 100YR

Results	
Velocity Head	0.15 ft
Specific Energy	0.95 ft
Froude Number	0.827
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

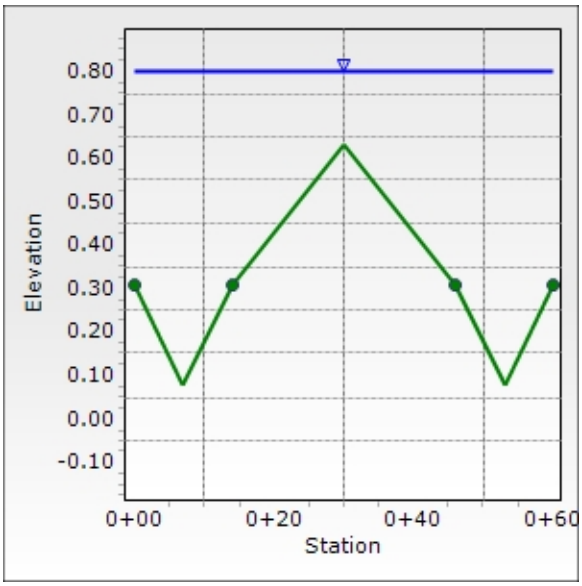
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.80 ft
Critical Depth	0.75 ft
Channel Slope	0.460 %
Critical Slope	0.701 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.474399747361555ft.

Cross Section for FS4S_RACEL&MONTE_MONTE 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.72 ft
Discharge	83.000 cfs



Worksheet for FS4S_RACEL&MONTE_MONTE 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Discharge	83.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.31
0+07.0	0.08
0+14.0	0.31
0+30.0	0.63
0+46.0	0.31
0+53.0	0.08
0+60.0	0.31

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.31)	(0+14.0, 0.31)	0.025
(0+14.0, 0.31)	(0+46.0, 0.31)	0.016
(0+46.0, 0.31)	(0+60.0, 0.31)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.72 ft
Elevation Range	0.08 to 0.63 ft
Flow Area	27.7 ft²
Wetted Perimeter	61.01 ft
Hydraulic Radius	0.45 ft
Top Width	60.00 ft
Normal Depth	0.72 ft
Critical Depth	0.65 ft
Critical Slope	0.877 %
Velocity	2.99 ft/s
Velocity Head	0.14 ft
Specific Energy	0.86 ft

Worksheet for FS4S_RACEL&MONTE_MONTE 100YR

Results	
Froude Number	0.776
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.72 ft
Critical Depth	0.65 ft
Channel Slope	0.500 %
Critical Slope	0.877 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.494027365226163ft.

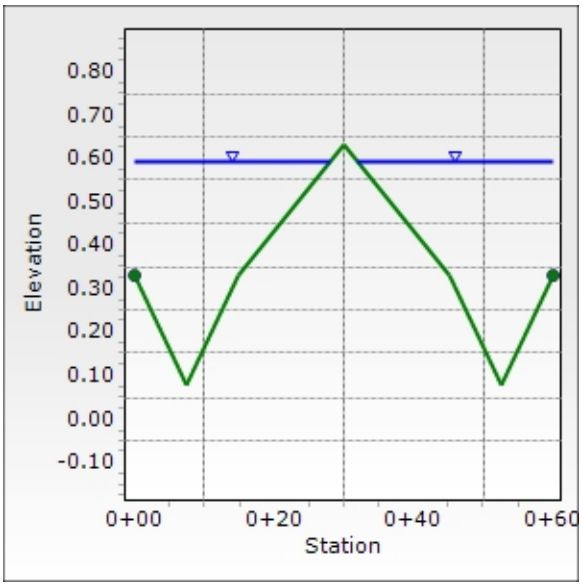
INTERIM CONDITION

CROSS SECTIONS

Cross Section for CROSS SECTION A 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.51 ft
Discharge	26.000 cfs



Worksheet for CROSS SECTION A 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	26.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.33
0+07.5	0.08
0+15.0	0.33
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.51	ft
Elevation Range	0.08 to 0.63	ft
Flow Area	15.0	ft^2
Wetted Perimeter	56.67	ft
Hydraulic Radius	0.26	ft
Top Width	56.13	ft
Normal Depth	0.51	ft
Critical Depth	0.41	ft
Critical Slope	1.536	%
Velocity	1.73	ft/s
Velocity Head	0.05	ft
Specific Energy	0.56	ft
Froude Number	0.591	
Flow Type	Subcritical	

Worksheet for CROSS SECTION A 10YR

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

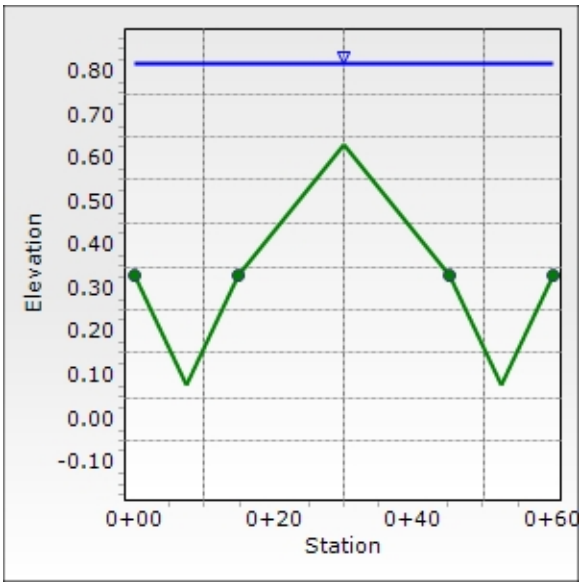
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.51 ft
Critical Depth	0.41 ft
Channel Slope	0.500 %
Critical Slope	1.536 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.261262365238105ft. Flow is divided.

Cross Section for CROSS SECTION A 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.74 ft
Discharge	86.000 cfs



Worksheet for CROSS SECTION A 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	86.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.33
0+07.5	0.08
0+15.0	0.33
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.33)	(0+15.0, 0.33)	0.025
(0+15.0, 0.33)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.74	ft
Elevation Range	0.08 to 0.63	ft
Flow Area	28.6	ft²
Wetted Perimeter	61.00	ft
Hydraulic Radius	0.47	ft
Top Width	60.00	ft
Normal Depth	0.74	ft
Critical Depth	0.66	ft
Critical Slope	0.894	%
Velocity	3.01	ft/s
Velocity Head	0.14	ft
Specific Energy	0.88	ft

Worksheet for CROSS SECTION A 100YR

Results	
Froude Number	0.769
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

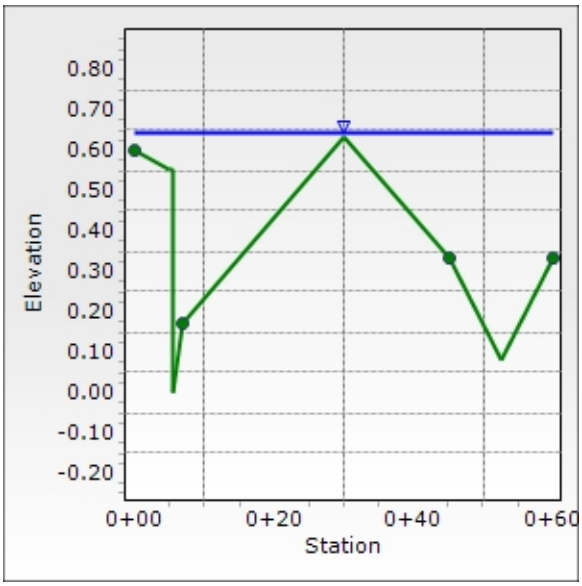
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.74 ft
Critical Depth	0.66 ft
Channel Slope	0.500 %
Critical Slope	0.894 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.488693519434986ft.

Cross Section for CROSS SECTION B 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.230 %
Normal Depth	0.64 ft
Discharge	24.000 cfs



Worksheet for CROSS SECTION B 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.230	%
Discharge	24.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.64	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	15.5	ft²
Wetted Perimeter	60.92	ft
Hydraulic Radius	0.25	ft
Top Width	60.00	ft
Normal Depth	0.64	ft
Critical Depth	0.52	ft
Critical Slope	0.843	%
Velocity	1.55	ft/s

Worksheet for CROSS SECTION B 10YR

Results	
Velocity Head	0.04 ft
Specific Energy	0.67 ft
Froude Number	0.540
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

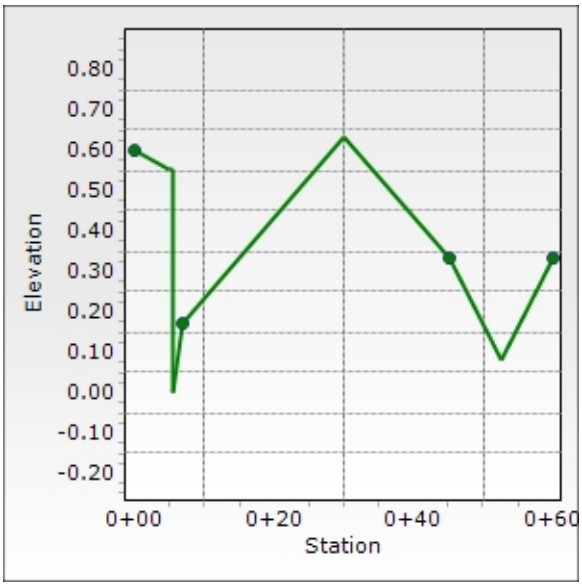
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.64 ft
Critical Depth	0.52 ft
Channel Slope	0.230 %
Critical Slope	0.843 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.306720456227401ft.

Cross Section for CROSS SECTION B 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.230 %
Normal Depth	0.92 ft
Discharge	81.000 cfs



Worksheet for CROSS SECTION B 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.230	%
Discharge	81.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.92	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	32.2	ft²
Wetted Perimeter	61.48	ft
Hydraulic Radius	0.52	ft
Top Width	60.00	ft
Normal Depth	0.92	ft
Critical Depth	0.76	ft
Critical Slope	0.696	%
Velocity	2.52	ft/s

Worksheet for CROSS SECTION B 100YR

Results	
Velocity Head	0.10 ft
Specific Energy	1.01 ft
Froude Number	0.606
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

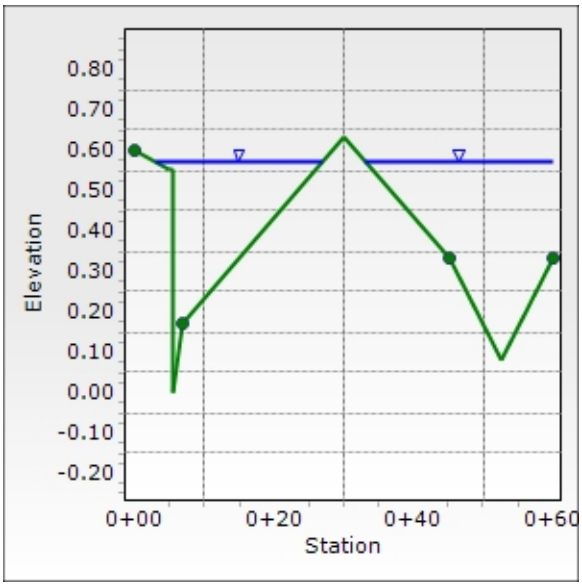
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.92 ft
Critical Depth	0.76 ft
Channel Slope	0.230 %
Critical Slope	0.696 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.585696526452336ft.

Cross Section for CROSS SECTION C 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Normal Depth	0.57 ft
Discharge	25.000 cfs



Worksheet for CROSS SECTION C 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.540	%
Discharge	25.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.57	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	11.7	ft²
Wetted Perimeter	51.81	ft
Hydraulic Radius	0.23	ft
Top Width	50.99	ft
Normal Depth	0.57	ft
Critical Depth	0.52	ft
Critical Slope	0.886	%
Velocity	2.14	ft/s

Worksheet for CROSS SECTION C 10YR

Results	
Velocity Head	0.07 ft
Specific Energy	0.64 ft
Froude Number	0.789
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

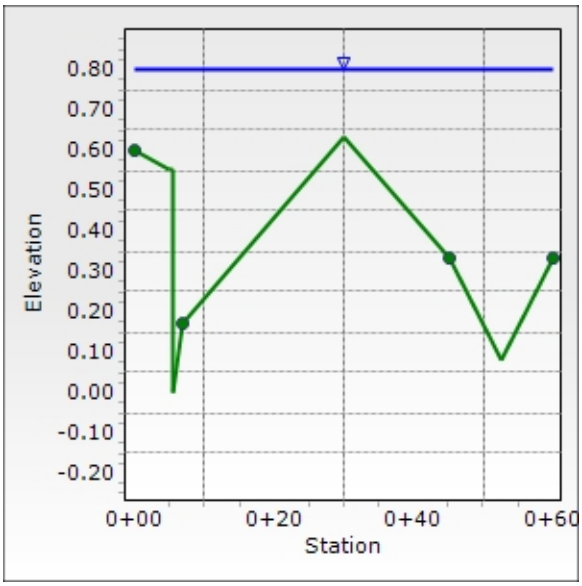
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.57 ft
Critical Depth	0.52 ft
Channel Slope	0.540 %
Critical Slope	0.886 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.239974750 117707ft. Flow is divided.

Cross Section for CROSS SECTION C 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Normal Depth	0.80 ft
Discharge	83.000 cfs



Worksheet for CROSS SECTION C 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.540	%
Discharge	83.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.80	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	25.2	ft²
Wetted Perimeter	61.25	ft
Hydraulic Radius	0.41	ft
Top Width	60.00	ft
Normal Depth	0.80	ft
Critical Depth	0.77	ft
Critical Slope	0.692	%
Velocity	3.29	ft/s

Worksheet for CROSS SECTION C 100YR

Results	
Velocity Head	0.17 ft
Specific Energy	0.97 ft
Froude Number	0.894
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

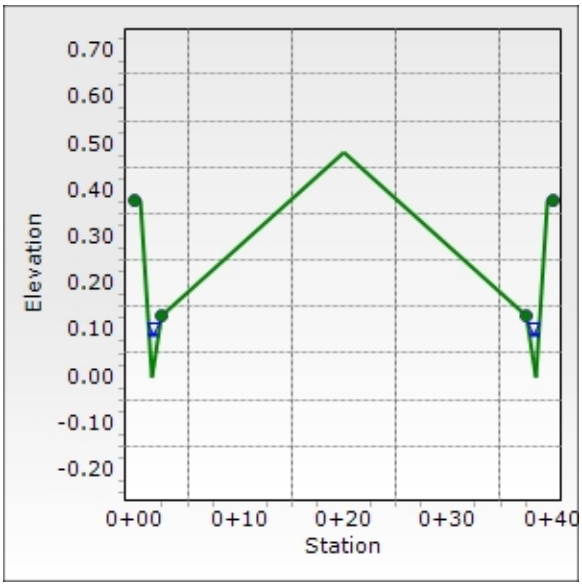
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.80 ft
Critical Depth	0.77 ft
Channel Slope	0.540 %
Critical Slope	0.692 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.469821757317848ft.

Cross Section for CROSS SECTION D 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.850 %
Normal Depth	0.09 ft
Discharge	0.100 cfs



Worksheet for CROSS SECTION D 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.850	%
Discharge	0.100	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.38
0+00.4	0.38
0+01.5	0.00
0+02.5	0.13
0+20.0	0.48
0+37.5	0.13
0+38.5	0.00
0+39.6	0.38
0+40.0	0.38

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.38)	(0+02.5, 0.13)	0.013
(0+02.5, 0.13)	(0+37.5, 0.13)	0.016
(0+37.5, 0.13)	(0+40.0, 0.38)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.09	ft
Elevation Range	0.00 to 0.48	ft
Flow Area	0.1	ft²
Wetted Perimeter	1.86	ft
Hydraulic Radius	0.04	ft
Top Width	1.82	ft
Normal Depth	0.09	ft
Critical Depth	0.09	ft
Critical Slope	0.716	%
Velocity	1.28	ft/s

Worksheet for CROSS SECTION D 10YR

Results	
Velocity Head	0.03 ft
Specific Energy	0.11 ft
Froude Number	1.090
Flow Type	Supercritical

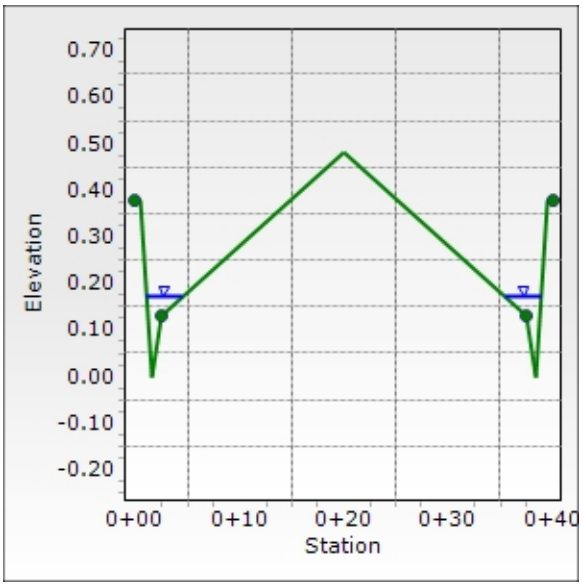
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.09 ft
Critical Depth	0.09 ft
Channel Slope	0.850 %
Critical Slope	0.716 %

Cross Section for CROSS SECTION D 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.850 %
Normal Depth	0.17 ft
Discharge	0.500 cfs



Worksheet for CROSS SECTION D 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.850	%
Discharge	0.500	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.38
0+00.4	0.38
0+01.5	0.00
0+02.5	0.13
0+20.0	0.48
0+37.5	0.13
0+38.5	0.00
0+39.6	0.38
0+40.0	0.38

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.38)	(0+02.5, 0.13)	0.013
(0+02.5, 0.13)	(0+37.5, 0.13)	0.016
(0+37.5, 0.13)	(0+40.0, 0.38)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.17	ft
Elevation Range	0.00 to 0.48	ft
Flow Area	0.4	ft²
Wetted Perimeter	7.20	ft
Hydraulic Radius	0.05	ft
Top Width	7.13	ft
Normal Depth	0.17	ft
Critical Depth	0.17	ft
Critical Slope	0.858	%
Velocity	1.30	ft/s

Worksheet for CROSS SECTION D 100YR

Results	
Velocity Head	0.03 ft
Specific Energy	0.20 ft
Froude Number	0.992
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

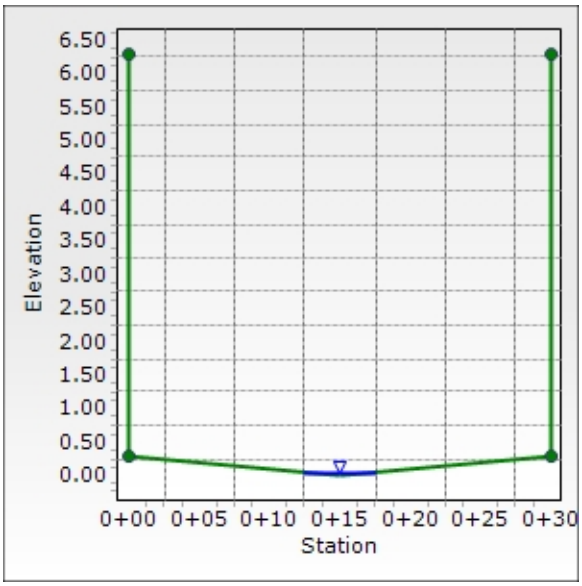
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.17 ft
Critical Depth	0.17 ft
Channel Slope	0.850 %
Critical Slope	0.858 %

Messages	
Messages	Flow is divided.

Cross Section for CROSS SECTION E 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.05 ft
Discharge	0.100 cfs



Worksheet for CROSS SECTION E 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	0.100	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	6.30
0+00.0	0.30
0+15.0	0.00
0+30.0	0.30
0+30.0	6.30

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 6.30)	(0+00.0, 0.30)	0.003
(0+00.0, 0.30)	(0+30.0, 0.30)	0.013
(0+30.0, 0.30)	(0+30.0, 6.30)	0.003

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.05	ft
Elevation Range	0.00 to 6.30	ft
Flow Area	0.1	ft^2
Wetted Perimeter	5.27	ft
Hydraulic Radius	0.03	ft
Top Width	5.27	ft
Normal Depth	0.05	ft
Critical Depth	0.05	ft
Critical Slope	0.857	%
Velocity	0.72	ft/s
Velocity Head	0.01	ft
Specific Energy	0.06	ft
Froude Number	0.782	
Flow Type	Subcritical	

Worksheet for CROSS SECTION E 10YR

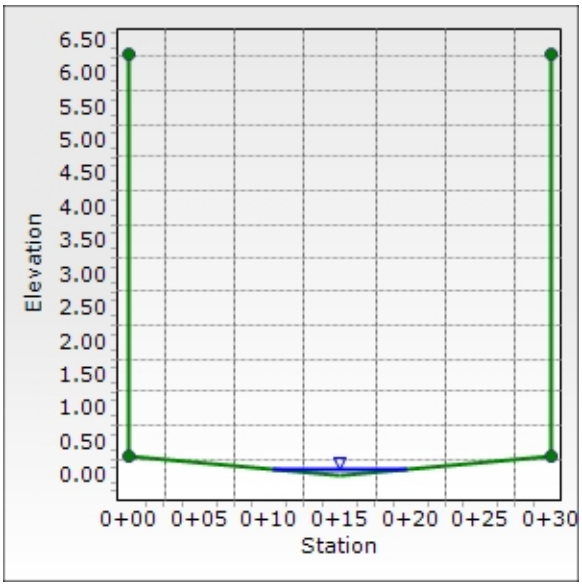
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.05 ft
Critical Depth	0.05 ft
Channel Slope	0.500 %
Critical Slope	0.857 %

Cross Section for CROSS SECTION E 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.10 ft
Discharge	0.500 cfs



Worksheet for CROSS SECTION E 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	0.500	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	6.30
0+00.0	0.30
0+15.0	0.00
0+30.0	0.30
0+30.0	6.30

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 6.30)	(0+00.0, 0.30)	0.003
(0+00.0, 0.30)	(0+30.0, 0.30)	0.013
(0+30.0, 0.30)	(0+30.0, 6.30)	0.003

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.10	ft
Elevation Range	0.00 to 6.30	ft
Flow Area	0.5	ft²
Wetted Perimeter	9.65	ft
Hydraulic Radius	0.05	ft
Top Width	9.65	ft
Normal Depth	0.10	ft
Critical Depth	0.09	ft
Critical Slope	0.690	%
Velocity	1.07	ft/s
Velocity Head	0.02	ft
Specific Energy	0.11	ft
Froude Number	0.861	
Flow Type	Subcritical	

Worksheet for CROSS SECTION E 100YR

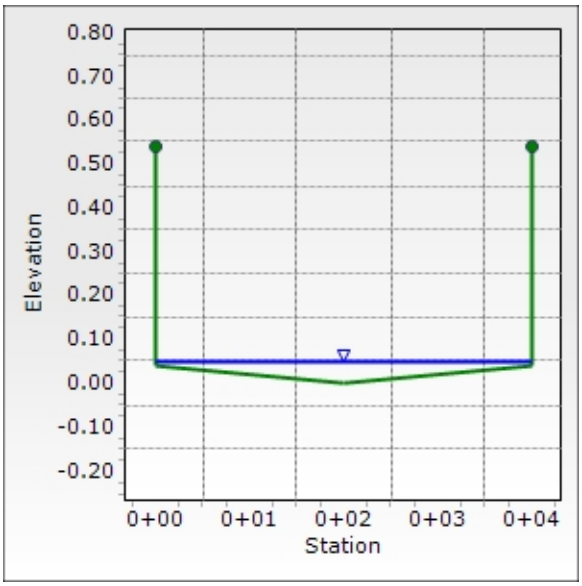
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.10 ft
Critical Depth	0.09 ft
Channel Slope	0.500 %
Critical Slope	0.690 %

Cross Section for CROSS SECTION F 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.05 ft
Discharge	0.100 cfs



Worksheet for CROSS SECTION F 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	0.100	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.54
0+00.0	0.04
0+02.0	0.00
0+04.0	0.04
0+04.0	0.54

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.54)	(0+04.0, 0.54)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.05	ft
Elevation Range	0.00 to 0.54	ft
Flow Area	0.1	ft²
Wetted Perimeter	4.02	ft
Hydraulic Radius	0.03	ft
Top Width	4.00	ft
Normal Depth	0.05	ft
Critical Depth	0.05	ft
Critical Slope	0.825	%
Velocity	0.80	ft/s
Velocity Head	0.01	ft
Specific Energy	0.06	ft
Froude Number	0.791	
Flow Type	Subcritical	

GVF Input Data

Worksheet for CROSS SECTION F 10YR

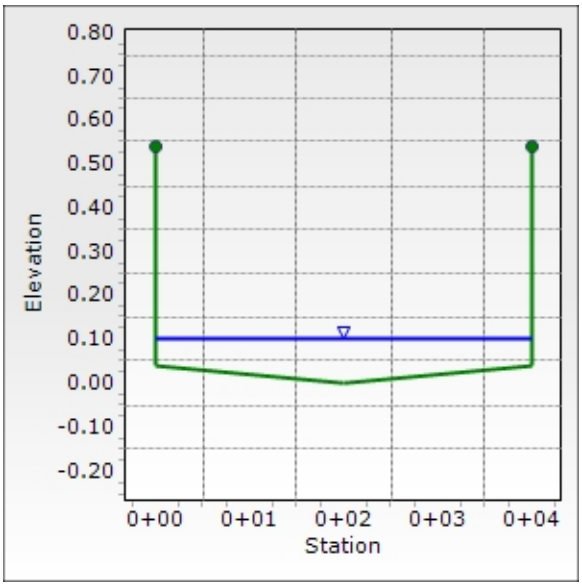
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Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.05 ft
Critical Depth	0.05 ft
Channel Slope	0.500 %
Critical Slope	0.825 %

Cross Section for CROSS SECTION F 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.10 ft
Discharge	0.500 cfs



Worksheet for CROSS SECTION F 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	0.500	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.54
0+00.0	0.04
0+02.0	0.00
0+04.0	0.04
0+04.0	0.54

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.54)	(0+04.0, 0.54)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.10	ft
Elevation Range	0.00 to 0.54	ft
Flow Area	0.3	ft²
Wetted Perimeter	4.13	ft
Hydraulic Radius	0.08	ft
Top Width	4.00	ft
Normal Depth	0.10	ft
Critical Depth	0.10	ft
Critical Slope	0.597	%
Velocity	1.51	ft/s
Velocity Head	0.04	ft
Specific Energy	0.14	ft
Froude Number	0.924	
Flow Type	Subcritical	

GVF Input Data

Worksheet for CROSS SECTION F 100YR

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.10 ft
Critical Depth	0.10 ft
Channel Slope	0.500 %
Critical Slope	0.597 %

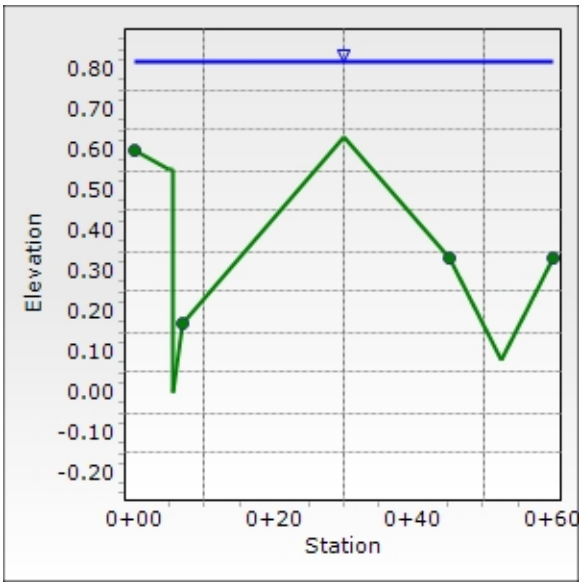
FLOW SPLIT CALCULATIONS

FLOW SPLIT AT RACEL & BUFFALO
REF* = FS1E + FS1S

Cross Section for FS1E_RACEL&BUFFALO_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.82 ft
Discharge	128.000 cfs



Worksheet for FS1E_RACEL&BUFFALO_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	1.140	%
Discharge	128.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.82	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	26.2	ft²
Wetted Perimeter	61.28	ft
Hydraulic Radius	0.43	ft
Top Width	60.00	ft
Normal Depth	0.82	ft
Critical Depth	0.90	ft
Critical Slope	0.632	%
Velocity	4.89	ft/s

Worksheet for FS1E_RACEL&BUFFALO_RACEL 10YR

Results	
Velocity Head	0.37 ft
Specific Energy	1.19 ft
Froude Number	1.306
Flow Type	Supercritical

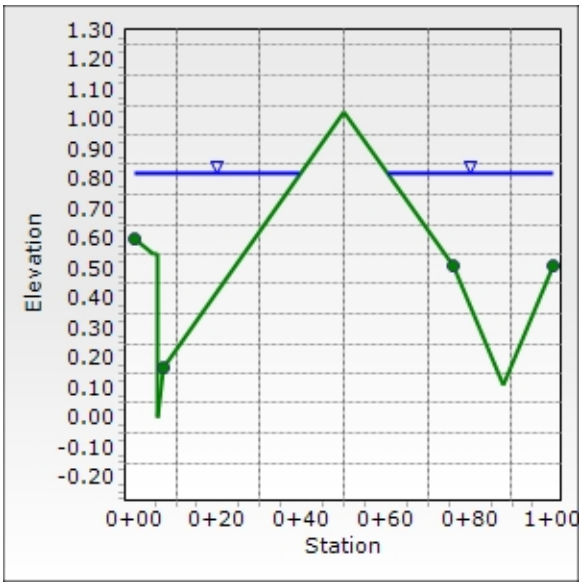
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.82 ft
Critical Depth	0.90 ft
Channel Slope	1.140 %
Critical Slope	0.632 %

Cross Section for FS1S_RACEL&BUFFALO_BUFFALO 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Normal Depth	0.82 ft
Discharge	79.000 cfs



Worksheet for FS1S_RACEL&BUFFALO_BUFFALO 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.540	%
Discharge	79.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+50.0	1.03
0+76.0	0.51
0+88.0	0.11
1+00.0	0.51

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+76.0, 0.51)	0.016
(0+76.0, 0.51)	(1+00.0, 0.51)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.82	ft
Elevation Range	0.00 to 1.03	ft
Flow Area	27.8	ft²
Wetted Perimeter	80.30	ft
Hydraulic Radius	0.35	ft
Top Width	79.18	ft
Normal Depth	0.82	ft
Critical Depth	0.78	ft
Critical Slope	0.775	%
Velocity	2.84	ft/s

Worksheet for FS1S_RACEL&BUFFALO_BUFFALO 10YR

Results	
Velocity Head	0.13 ft
Specific Energy	0.95 ft
Froude Number	0.845
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

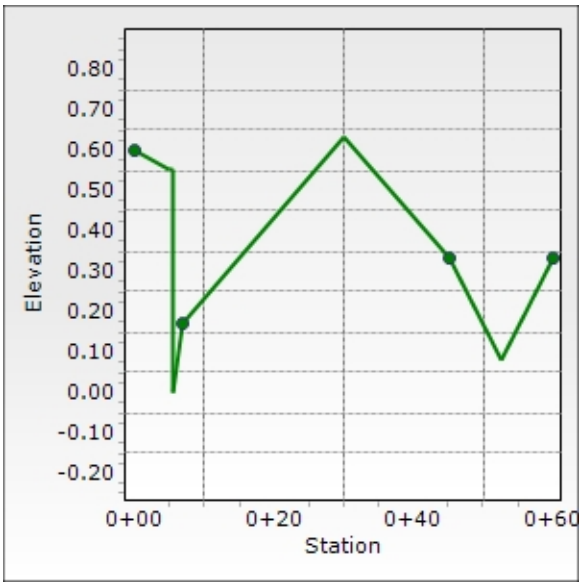
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.82 ft
Critical Depth	0.78 ft
Channel Slope	0.540 %
Critical Slope	0.775 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.311798160512914ft. Flow is divided.

Cross Section for FS1E_RACEL&BUFFALO_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	1.18 ft
Discharge	351.000 cfs



Worksheet for FS1E_RACEL&BUFFALO_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	1.140	%
Discharge	351.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	1.18	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	48.2	ft²
Wetted Perimeter	62.01	ft
Hydraulic Radius	0.78	ft
Top Width	60.00	ft
Normal Depth	1.18	ft
Critical Depth	1.40	ft
Critical Slope	0.517	%
Velocity	7.28	ft/s

Worksheet for FS1E_RACEL&BUFFALO_RACEL 100YR

Results	
Velocity Head	0.82 ft
Specific Energy	2.01 ft
Froude Number	1.433
Flow Type	Supercritical

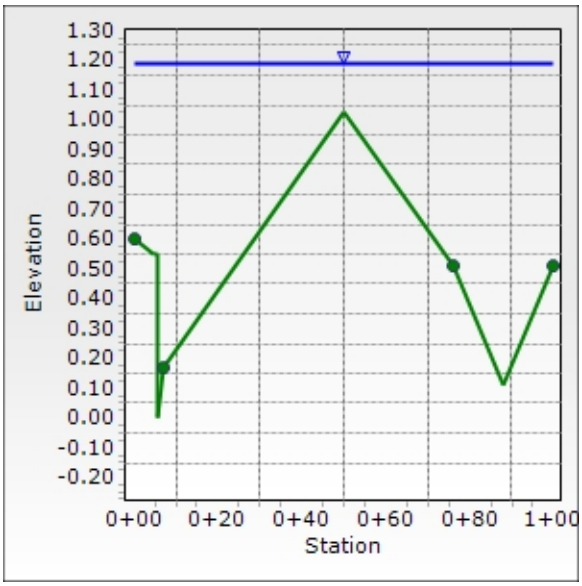
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.18 ft
Critical Depth	1.40 ft
Channel Slope	1.140 %
Critical Slope	0.517 %

Cross Section for FS1S_RACEL&BUFFALO_BUFFALO 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Normal Depth	1.19 ft
Discharge	270.000 cfs



Worksheet for FS1S_RACEL&BUFFALO_BUFFALO 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.540	%
Discharge	270.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+50.0	1.03
0+76.0	0.51
0+88.0	0.11
1+00.0	0.51

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+76.0, 0.51)	0.016
(0+76.0, 0.51)	(1+00.0, 0.51)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	1.19	ft
Elevation Range	0.00 to 1.03	ft
Flow Area	62.8	ft²
Wetted Perimeter	101.86	ft
Hydraulic Radius	0.62	ft
Top Width	100.00	ft
Normal Depth	1.19	ft
Critical Depth	1.17	ft
Critical Slope	0.596	%
Velocity	4.30	ft/s

Worksheet for FS1S_RACEL&BUFFALO_BUFFALO 100YR

Results	
Velocity Head	0.29 ft
Specific Energy	1.48 ft
Froude Number	0.957
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.19 ft
Critical Depth	1.17 ft
Channel Slope	0.540 %
Critical Slope	0.596 %

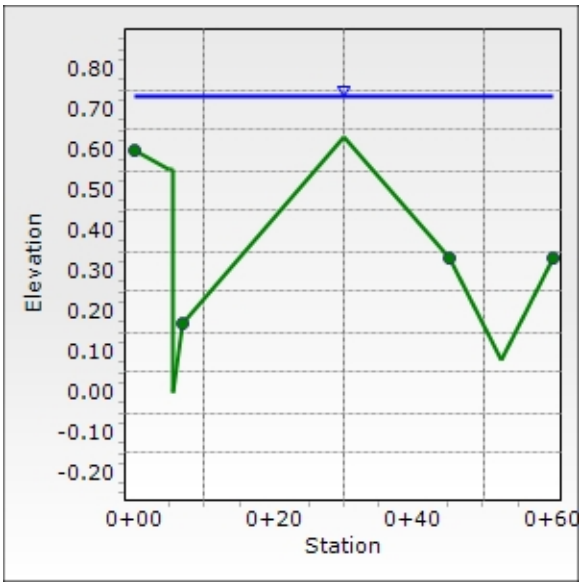
Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.683183571115612ft.

FLOW SPLIT AT RACEL & TIAGO
CI1 = FS2E + FS2S

Cross Section for FS2E_RACEL&TIAGO_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.73 ft
Discharge	88.000 cfs



Worksheet for FS2E_RACEL&TIAGO_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	1.140	%
Discharge	88.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.73	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	20.9	ft²
Wetted Perimeter	61.10	ft
Hydraulic Radius	0.34	ft
Top Width	60.00	ft
Normal Depth	0.73	ft
Critical Depth	0.79	ft
Critical Slope	0.683	%
Velocity	4.22	ft/s

Worksheet for FS2E_RACEL&TIAGO_RACEL 10YR

Results	
Velocity Head	0.28 ft
Specific Energy	1.00 ft
Froude Number	1.261
Flow Type	Supercritical

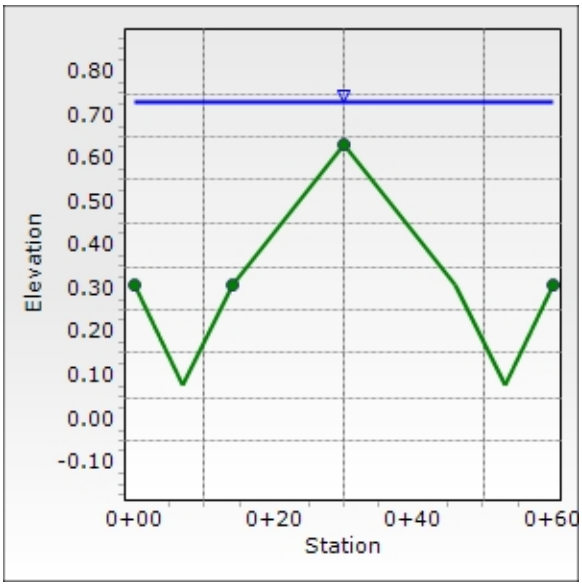
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.73 ft
Critical Depth	0.79 ft
Channel Slope	1.140 %
Critical Slope	0.683 %

Cross Section for FS2S_RACEL&TIAGO_TIAGO 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.270 %
Normal Depth	0.65 ft
Discharge	42.000 cfs



Worksheet for FS2S_RACEL&TIAGO_TIAGO 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.270 %
Discharge	42.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.31
0+07.0	0.08
0+14.0	0.31
0+30.0	0.63
0+46.0	0.31
0+53.0	0.08
0+60.0	0.31

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.31)	(0+14.0, 0.31)	0.025
(0+14.0, 0.31)	(0+30.0, 0.63)	0.016
(0+30.0, 0.63)	(0+60.0, 0.31)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.65 ft
Elevation Range	0.08 to 0.63 ft
Flow Area	23.5 ft²
Wetted Perimeter	60.87 ft
Hydraulic Radius	0.39 ft
Top Width	60.00 ft
Normal Depth	0.65 ft
Critical Depth	0.50 ft
Critical Slope	1.218 %
Velocity	1.78 ft/s
Velocity Head	0.05 ft
Specific Energy	0.70 ft

Worksheet for FS2S_RACEL&TIAGO_TIAGO 10YR

Results	
Froude Number	0.502
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

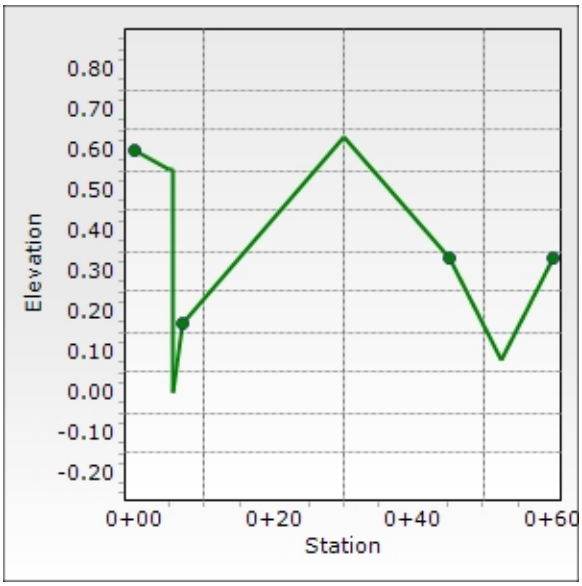
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.65 ft
Critical Depth	0.50 ft
Channel Slope	0.270 %
Critical Slope	1.218 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.423978706749391ft.

Cross Section for FS2E_RACEL&TIAGO_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	1.03 ft
Discharge	248.000 cfs



Worksheet for FS2E_RACEL&TIAGO_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	1.140	%
Discharge	248.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	1.03	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	39.0	ft²
Wetted Perimeter	61.71	ft
Hydraulic Radius	0.63	ft
Top Width	60.00	ft
Normal Depth	1.03	ft
Critical Depth	1.19	ft
Critical Slope	0.553	%
Velocity	6.35	ft/s

Worksheet for FS2E_RACEL&TIAGO_RACEL 100YR

Results	
Velocity Head	0.63 ft
Specific Energy	1.66 ft
Froude Number	1.388
Flow Type	Supercritical

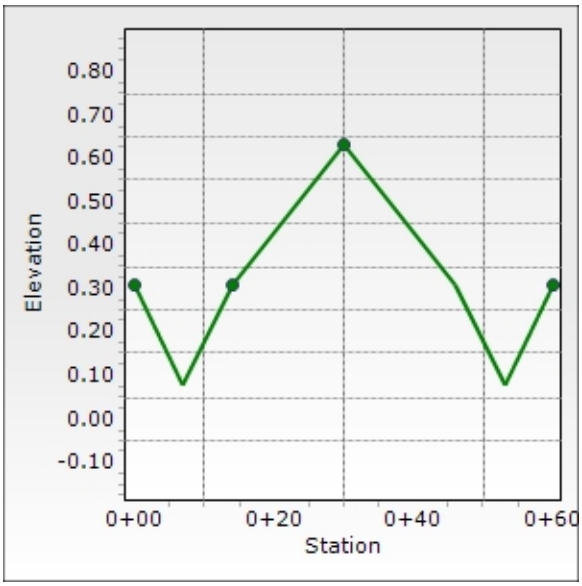
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.03 ft
Critical Depth	1.19 ft
Channel Slope	1.140 %
Critical Slope	0.553 %

Cross Section for FS2S_RACEL&TIAGO_TIAGO 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.270 %
Normal Depth	0.95 ft
Discharge	106.000 cfs



Worksheet for FS2S_RACEL&TIAGO_TIAGO 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.270 %
Discharge	106.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.31
0+07.0	0.08
0+14.0	0.31
0+30.0	0.63
0+46.0	0.31
0+53.0	0.08
0+60.0	0.31

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.31)	(0+14.0, 0.31)	0.025
(0+14.0, 0.31)	(0+30.0, 0.63)	0.016
(0+30.0, 0.63)	(0+60.0, 0.31)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.95 ft
Elevation Range	0.08 to 0.63 ft
Flow Area	41.2 ft²
Wetted Perimeter	61.46 ft
Hydraulic Radius	0.67 ft
Top Width	60.00 ft
Normal Depth	0.95 ft
Critical Depth	0.72 ft
Critical Slope	1.021 %
Velocity	2.57 ft/s
Velocity Head	0.10 ft
Specific Energy	1.05 ft

Worksheet for FS2S_RACEL&TIAGO_TIAGO 100YR

Results	
Froude Number	0.547
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.95 ft
Critical Depth	0.72 ft
Channel Slope	0.270 %
Critical Slope	1.021 %

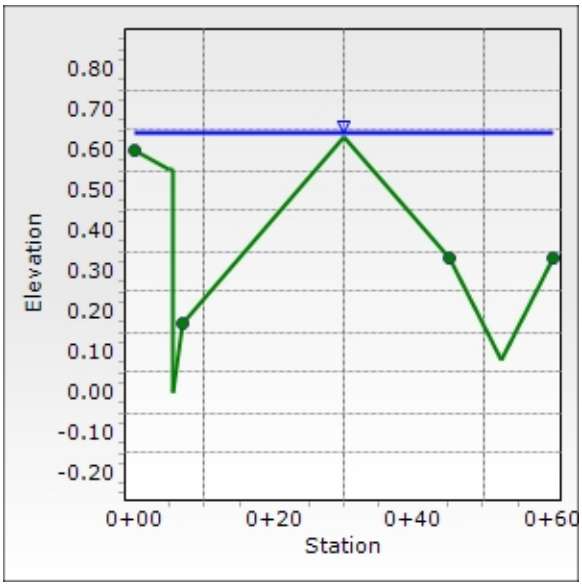
Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.718703663 39896ft.

FLOW SPLIT AT RACEL & PIONEER
CI2 = FS3E + FS3S

Cross Section for FS3E_RACEL&PIONEER_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.64 ft
Discharge	55.000 cfs



Worksheet for FS3E_RACEL&PIONEER_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	1.140	%
Discharge	55.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.64	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	15.7	ft²
Wetted Perimeter	60.93	ft
Hydraulic Radius	0.26	ft
Top Width	60.00	ft
Normal Depth	0.64	ft
Critical Depth	0.68	ft
Critical Slope	0.755	%
Velocity	3.50	ft/s

Worksheet for FS3E_RACEL&PIONEER_RACEL 10YR

Results	
Velocity Head	0.19 ft
Specific Energy	0.83 ft
Froude Number	1.206
Flow Type	Supercritical

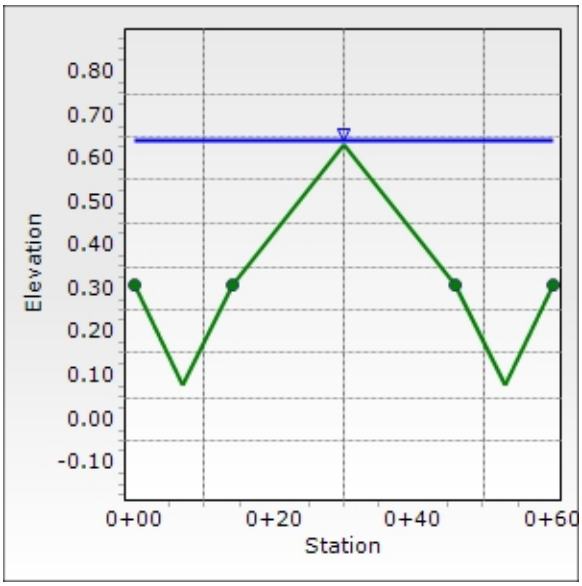
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.64 ft
Critical Depth	0.68 ft
Channel Slope	1.140 %
Critical Slope	0.755 %

Cross Section for FS3S_RACEL&PIONEER_PIONEER 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.400 %
Normal Depth	0.56 ft
Discharge	35.000 cfs



Worksheet for FS3S_RACEL&PIONEER_PIONEER 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.400 %
Discharge	35.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.31
0+07.0	0.08
0+14.0	0.31
0+30.0	0.63
0+46.0	0.31
0+53.0	0.08
0+60.0	0.31

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.31)	(0+14.0, 0.31)	0.025
(0+14.0, 0.31)	(0+46.0, 0.31)	0.016
(0+46.0, 0.31)	(0+60.0, 0.31)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.56 ft
Elevation Range	0.08 to 0.63 ft
Flow Area	17.6 ft²
Wetted Perimeter	60.67 ft
Hydraulic Radius	0.29 ft
Top Width	60.00 ft
Normal Depth	0.56 ft
Critical Depth	0.46 ft
Critical Slope	1.017 %
Velocity	1.99 ft/s
Velocity Head	0.06 ft
Specific Energy	0.62 ft

Worksheet for FS3S_RACEL&PIONEER_PIONEER 10YR

Results	
Froude Number	0.646
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

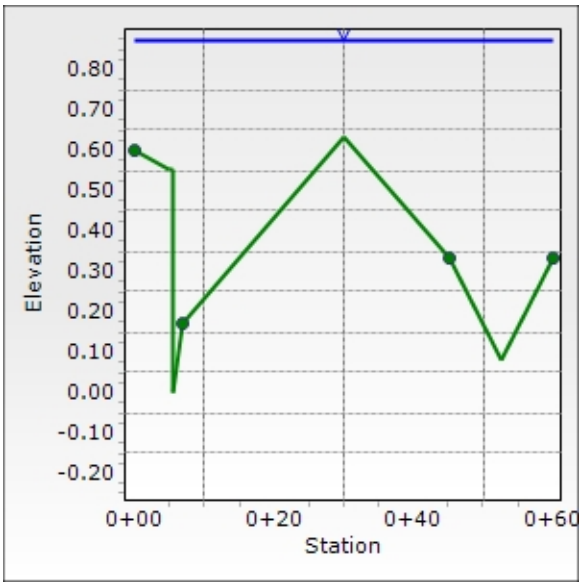
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.56 ft
Critical Depth	0.46 ft
Channel Slope	0.400 %
Critical Slope	1.017 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.325256696785104ft.

Cross Section for FS3E_RACEL&PIONEER_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.87 ft
Discharge	158.000 cfs



Worksheet for FS3E_RACEL&PIONEER_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Discharge	158.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.87 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	29.7 ft²
Wetted Perimeter	61.39 ft
Hydraulic Radius	0.48 ft
Top Width	60.00 ft
Normal Depth	0.87 ft
Critical Depth	0.98 ft
Critical Slope	0.606 %
Velocity	5.32 ft/s

Worksheet for FS3E_RACEL&PIONEER_RACEL 100YR

Results	
Velocity Head	0.44 ft
Specific Energy	1.31 ft
Froude Number	1.331
Flow Type	Supercritical

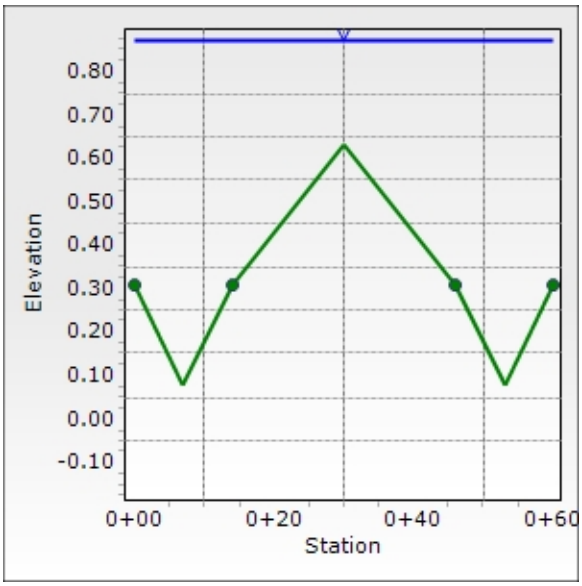
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.87 ft
Critical Depth	0.98 ft
Channel Slope	1.140 %
Critical Slope	0.606 %

Cross Section for FS3S_RACEL&PIONEER_PIONEER 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.400 %
Normal Depth	0.79 ft
Discharge	93.000 cfs



Worksheet for FS3S_RACEL&PIONEER_PIONEER 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.400 %
Discharge	93.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.31
0+07.0	0.08
0+14.0	0.31
0+30.0	0.63
0+46.0	0.31
0+53.0	0.08
0+60.0	0.31

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.31)	(0+14.0, 0.31)	0.025
(0+14.0, 0.31)	(0+46.0, 0.31)	0.016
(0+46.0, 0.31)	(0+60.0, 0.31)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.79 ft
Elevation Range	0.08 to 0.63 ft
Flow Area	31.8 ft²
Wetted Perimeter	61.14 ft
Hydraulic Radius	0.52 ft
Top Width	60.00 ft
Normal Depth	0.79 ft
Critical Depth	0.68 ft
Critical Slope	0.857 %
Velocity	2.92 ft/s
Velocity Head	0.13 ft
Specific Energy	0.92 ft

Worksheet for FS3S_RACEL&PIONEER_PIONEER 100YR

Results	
Froude Number	0.708
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.79 ft
Critical Depth	0.68 ft
Channel Slope	0.400 %
Critical Slope	0.857 %

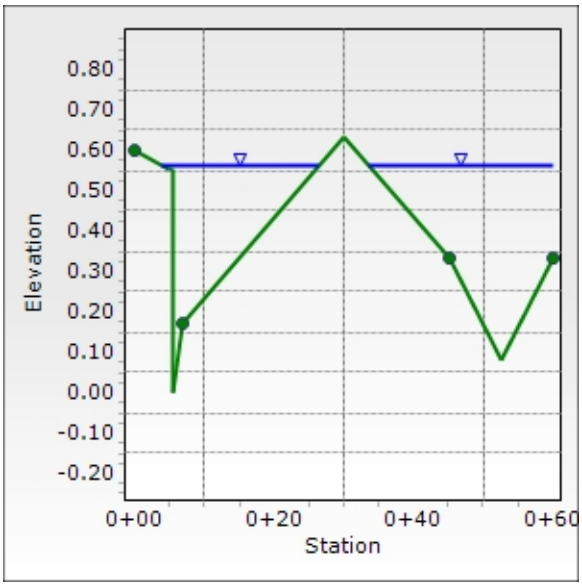
Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.561616314 92112ft.

FLOW SPLIT AT RACEL & MONTE CRISTO
CI3 = FS4E + FS4S

Cross Section for FS4E_RACEL&MONTE_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.460 %
Normal Depth	0.56 ft
Discharge	22.000 cfs



Worksheet for FS4E_RACEL&MONTE_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.460	%
Discharge	22.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.56	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	11.2	ft²
Wetted Perimeter	50.05	ft
Hydraulic Radius	0.22	ft
Top Width	49.24	ft
Normal Depth	0.56	ft
Critical Depth	0.50	ft
Critical Slope	0.914	%
Velocity	1.96	ft/s

Worksheet for FS4E_RACEL&MONTE_RACEL 10YR

Results	
Velocity Head	0.06 ft
Specific Energy	0.62 ft
Froude Number	0.723
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

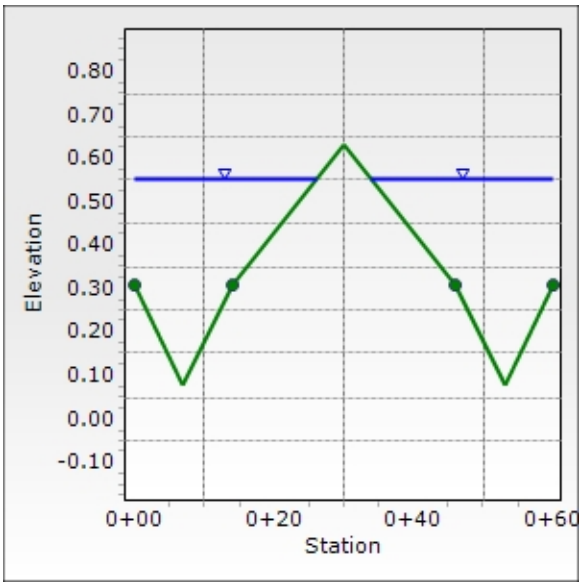
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.56 ft
Critical Depth	0.50 ft
Channel Slope	0.460 %
Critical Slope	0.914 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.231200152335273ft. Flow is divided.

Cross Section for FS4S_RACEL&MONTE_MONTE 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.47 ft
Discharge	25.000 cfs



Worksheet for FS4S_RACEL&MONTE_MONTE 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	25.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.31
0+07.0	0.08
0+14.0	0.31
0+30.0	0.63
0+46.0	0.31
0+53.0	0.08
0+60.0	0.31

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.31)	(0+14.0, 0.31)	0.025
(0+14.0, 0.31)	(0+46.0, 0.31)	0.016
(0+46.0, 0.31)	(0+60.0, 0.31)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.47	ft
Elevation Range	0.08 to 0.63	ft
Flow Area	12.9	ft^2
Wetted Perimeter	52.74	ft
Hydraulic Radius	0.25	ft
Top Width	52.23	ft
Normal Depth	0.47	ft
Critical Depth	0.40	ft
Critical Slope	1.126	%
Velocity	1.93	ft/s
Velocity Head	0.06	ft
Specific Energy	0.53	ft

Worksheet for FS4S_RACEL&MONTE_MONTE 10YR

Results	
Froude Number	0.684
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

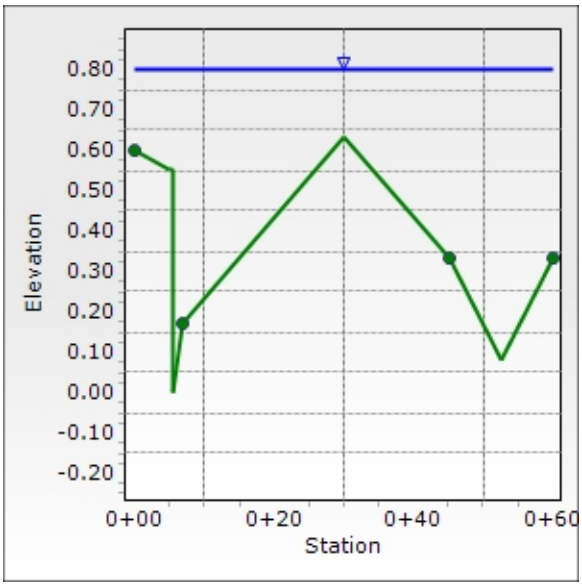
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.47 ft
Critical Depth	0.40 ft
Channel Slope	0.500 %
Critical Slope	1.126 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.242307615902806ft. Flow is divided.

Cross Section for FS4E_RACEL&MONTE_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.460 %
Normal Depth	0.80 ft
Discharge	78.000 cfs



Worksheet for FS4E_RACEL&MONTE_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.460	%
Discharge	78.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.55
0+05.5	0.55
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+45.0	0.33
0+52.5	0.08
0+60.0	0.33

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+45.0, 0.33)	0.016
(0+45.0, 0.33)	(0+60.0, 0.33)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.80	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	25.5	ft²
Wetted Perimeter	61.25	ft
Hydraulic Radius	0.42	ft
Top Width	60.00	ft
Normal Depth	0.80	ft
Critical Depth	0.75	ft
Critical Slope	0.701	%
Velocity	3.06	ft/s

Worksheet for FS4E_RACEL&MONTE_RACEL 100YR

Results	
Velocity Head	0.15 ft
Specific Energy	0.95 ft
Froude Number	0.827
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

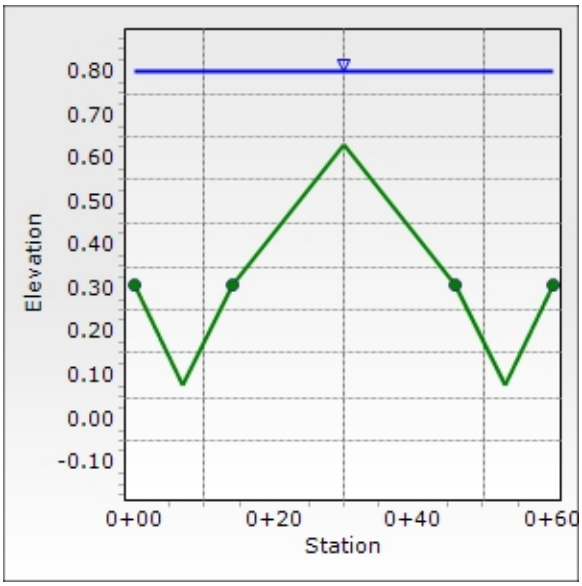
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.80 ft
Critical Depth	0.75 ft
Channel Slope	0.460 %
Critical Slope	0.701 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.474399747361555ft.

Cross Section for FS4S_RACEL&MONTE_MONTE 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.72 ft
Discharge	83.000 cfs



Worksheet for FS4S_RACEL&MONTE_MONTE 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Discharge	83.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.31
0+07.0	0.08
0+14.0	0.31
0+30.0	0.63
0+46.0	0.31
0+53.0	0.08
0+60.0	0.31

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.31)	(0+14.0, 0.31)	0.025
(0+14.0, 0.31)	(0+46.0, 0.31)	0.016
(0+46.0, 0.31)	(0+60.0, 0.31)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.72 ft
Elevation Range	0.08 to 0.63 ft
Flow Area	27.7 ft²
Wetted Perimeter	61.01 ft
Hydraulic Radius	0.45 ft
Top Width	60.00 ft
Normal Depth	0.72 ft
Critical Depth	0.65 ft
Critical Slope	0.877 %
Velocity	2.99 ft/s
Velocity Head	0.14 ft
Specific Energy	0.86 ft

Worksheet for FS4S_RACEL&MONTE_MONTE 100YR

Results	
Froude Number	0.776
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.72 ft
Critical Depth	0.65 ft
Channel Slope	0.500 %
Critical Slope	0.877 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.494027365226163ft.

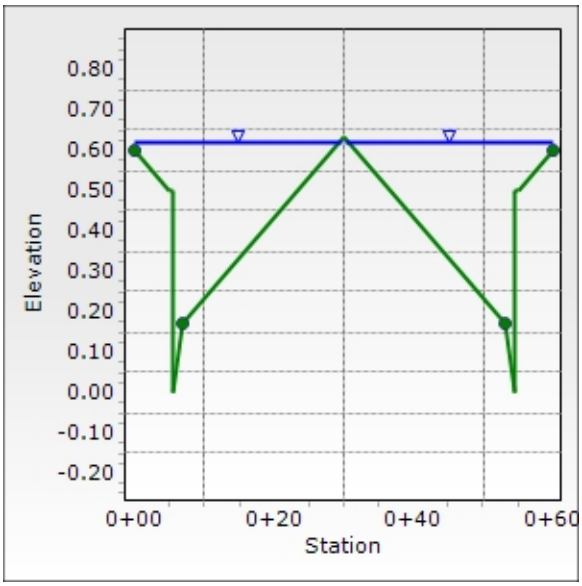
DEVELOPED CONDITION

CROSS SECTIONS

Cross Section for CROSS SECTION A 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.62 ft
Discharge	31.000 cfs



Worksheet for CROSS SECTION A 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	31.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.62	ft
Elevation Range	0.00 to 0.63	ft
Flow Area	12.7	ft^2
Wetted Perimeter	60.40	ft
Hydraulic Radius	0.21	ft
Top Width	59.33	ft
Normal Depth	0.62	ft
Critical Depth	0.61	ft

Worksheet for CROSS SECTION A 10YR

Results	
Critical Slope	0.591 %
Velocity	2.43 ft/s
Velocity Head	0.09 ft
Specific Energy	0.72 ft
Froude Number	0.925
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

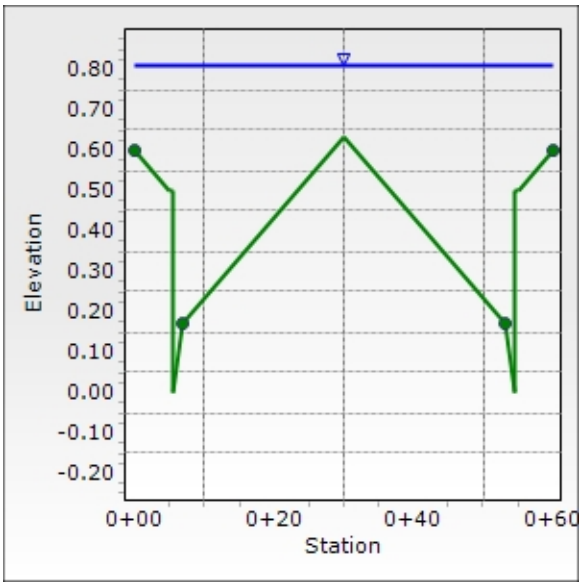
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.62 ft
Critical Depth	0.61 ft
Channel Slope	0.500 %
Critical Slope	0.591 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.023255907 1632766ft. Flow is divided.

Cross Section for CROSS SECTION A 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.81 ft
Discharge	87.000 cfs



Worksheet for CROSS SECTION A 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Discharge	87.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.81 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	23.8 ft²
Wetted Perimeter	61.45 ft
Hydraulic Radius	0.39 ft
Top Width	60.00 ft
Normal Depth	0.81 ft
Critical Depth	0.81 ft

Worksheet for CROSS SECTION A 100YR

Results	
Critical Slope	0.477 %
Velocity	3.65 ft/s
Velocity Head	0.21 ft
Specific Energy	1.02 ft
Froude Number	1.022
Flow Type	Supercritical

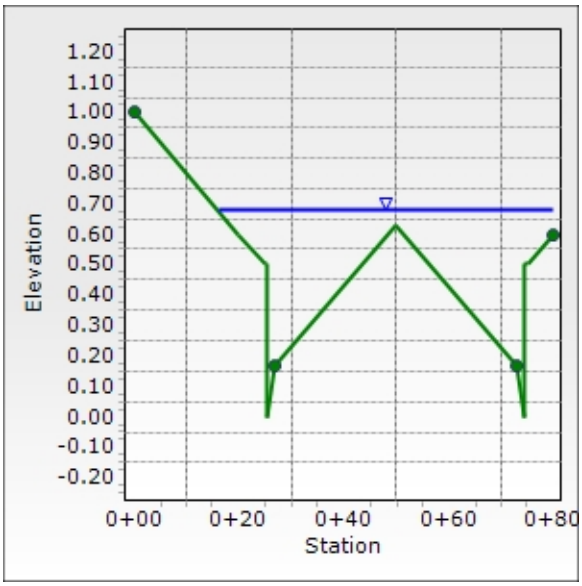
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.81 ft
Critical Depth	0.81 ft
Channel Slope	0.500 %
Critical Slope	0.477 %

Cross Section for CROSS SECTION B 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.230 %
Normal Depth	0.68 ft
Discharge	30.000 cfs



Worksheet for CROSS SECTION B 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.230	%
Discharge	30.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	1.00
0+20.0	0.60
0+25.0	0.50
0+25.5	0.50
0+25.5	0.00
0+27.0	0.17
0+50.0	0.63
0+73.0	0.17
0+74.5	0.00
0+74.5	0.50
0+75.0	0.50
0+80.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 1.00)	(0+27.0, 0.17)	0.013
(0+27.0, 0.17)	(0+73.0, 0.17)	0.016
(0+73.0, 0.17)	(0+80.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.68	ft
Elevation Range	0.00 to 1.00	ft
Flow Area	16.2	ft²
Wetted Perimeter	65.00	ft
Hydraulic Radius	0.25	ft
Top Width	63.89	ft
Normal Depth	0.68	ft

Worksheet for CROSS SECTION B 10YR

Results	
Critical Depth	0.61 ft
Critical Slope	0.586 %
Velocity	1.86 ft/s
Velocity Head	0.05 ft
Specific Energy	0.73 ft
Froude Number	0.650
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

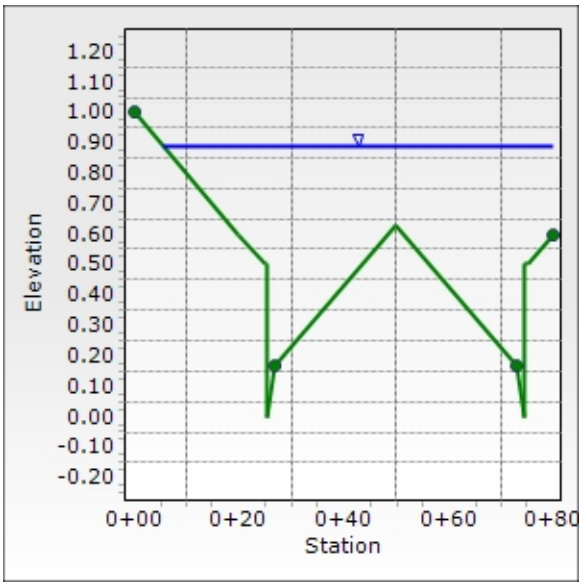
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.68 ft
Critical Depth	0.61 ft
Channel Slope	0.230 %
Critical Slope	0.586 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.077807344000006ft.

Cross Section for CROSS SECTION B 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.230 %
Normal Depth	0.89 ft
Discharge	81.000 cfs



Worksheet for CROSS SECTION B 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.230 %
Discharge	81.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	1.00
0+20.0	0.60
0+25.0	0.50
0+25.5	0.50
0+25.5	0.00
0+27.0	0.17
0+50.0	0.63
0+73.0	0.17
0+74.5	0.00
0+74.5	0.50
0+75.0	0.50
0+80.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 1.00)	(0+27.0, 0.17)	0.013
(0+27.0, 0.17)	(0+73.0, 0.17)	0.016
(0+73.0, 0.17)	(0+80.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.89 ft
Elevation Range	0.00 to 1.00 ft
Flow Area	30.9 ft²
Wetted Perimeter	75.83 ft
Hydraulic Radius	0.41 ft
Top Width	74.50 ft
Normal Depth	0.89 ft

Worksheet for CROSS SECTION B 100YR

Results	
Critical Depth	0.80 ft
Critical Slope	0.471 %
Velocity	2.63 ft/s
Velocity Head	0.11 ft
Specific Energy	1.00 ft
Froude Number	0.719
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

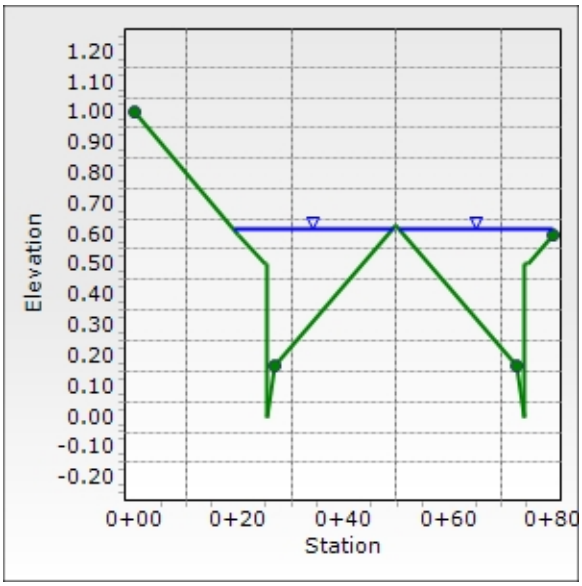
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.89 ft
Critical Depth	0.80 ft
Channel Slope	0.230 %
Critical Slope	0.471 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.290076798112718ft.

Cross Section for CROSS SECTION C 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Normal Depth	0.62 ft
Discharge	31.000 cfs



Worksheet for CROSS SECTION C 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.540	%
Discharge	31.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	1.00
0+20.0	0.60
0+25.0	0.50
0+25.5	0.50
0+25.5	0.00
0+27.0	0.17
0+50.0	0.63
0+73.0	0.17
0+74.5	0.00
0+74.5	0.50
0+75.0	0.50
0+80.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 1.00)	(0+27.0, 0.17)	0.013
(0+27.0, 0.17)	(0+73.0, 0.17)	0.016
(0+73.0, 0.17)	(0+80.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.62	ft
Elevation Range	0.00 to 1.00	ft
Flow Area	12.5	ft^2
Wetted Perimeter	60.79	ft
Hydraulic Radius	0.20	ft
Top Width	59.74	ft
Normal Depth	0.62	ft

Worksheet for CROSS SECTION C 10YR

Results	
Critical Depth	0.61 ft
Critical Slope	0.590 %
Velocity	2.49 ft/s
Velocity Head	0.10 ft
Specific Energy	0.71 ft
Froude Number	0.961
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

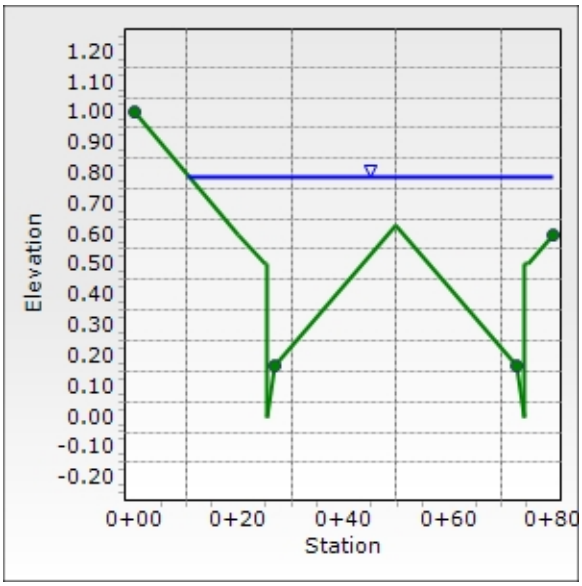
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.62 ft
Critical Depth	0.61 ft
Channel Slope	0.540 %
Critical Slope	0.590 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.018283744 7656481ft. Flow is divided.

Cross Section for CROSS SECTION C 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Normal Depth	0.79 ft
Discharge	83.000 cfs



Worksheet for CROSS SECTION C 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Discharge	83.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	1.00
0+20.0	0.60
0+25.0	0.50
0+25.5	0.50
0+25.5	0.00
0+27.0	0.17
0+50.0	0.63
0+73.0	0.17
0+74.5	0.00
0+74.5	0.50
0+75.0	0.50
0+80.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 1.00)	(0+27.0, 0.17)	0.013
(0+27.0, 0.17)	(0+73.0, 0.17)	0.016
(0+73.0, 0.17)	(0+80.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.79 ft
Elevation Range	0.00 to 1.00 ft
Flow Area	23.7 ft²
Wetted Perimeter	70.76 ft
Hydraulic Radius	0.33 ft
Top Width	69.53 ft
Normal Depth	0.79 ft

Worksheet for CROSS SECTION C 100YR

Results	
Critical Depth	0.80 ft
Critical Slope	0.477 %
Velocity	3.50 ft/s
Velocity Head	0.19 ft
Specific Energy	0.98 ft
Froude Number	1.058
Flow Type	Supercritical

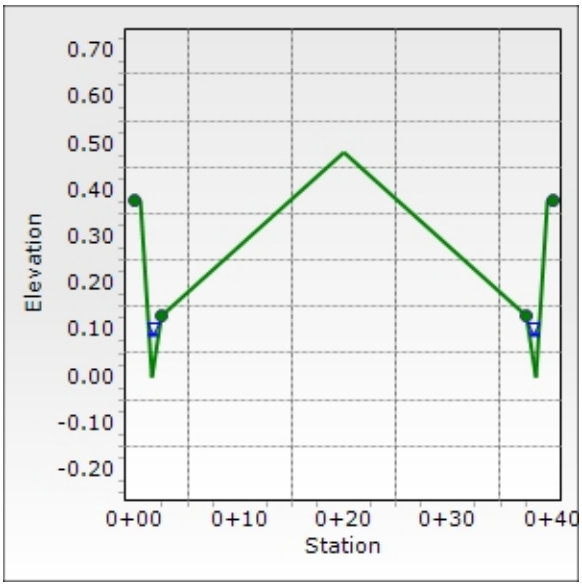
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Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.79 ft
Critical Depth	0.80 ft
Channel Slope	0.540 %
Critical Slope	0.477 %

Cross Section for CROSS SECTION D 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.850 %
Normal Depth	0.09 ft
Discharge	0.100 cfs



Worksheet for CROSS SECTION D 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.850	%
Discharge	0.100	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.38
0+00.4	0.38
0+01.5	0.00
0+02.5	0.13
0+20.0	0.48
0+37.5	0.13
0+38.5	0.00
0+39.6	0.38
0+40.0	0.38

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.38)	(0+02.5, 0.13)	0.013
(0+02.5, 0.13)	(0+37.5, 0.13)	0.016
(0+37.5, 0.13)	(0+40.0, 0.38)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.09	ft
Elevation Range	0.00 to 0.48	ft
Flow Area	0.1	ft²
Wetted Perimeter	1.86	ft
Hydraulic Radius	0.04	ft
Top Width	1.82	ft
Normal Depth	0.09	ft
Critical Depth	0.09	ft
Critical Slope	0.716	%
Velocity	1.28	ft/s

Worksheet for CROSS SECTION D 10YR

Results	
Velocity Head	0.03 ft
Specific Energy	0.11 ft
Froude Number	1.090
Flow Type	Supercritical

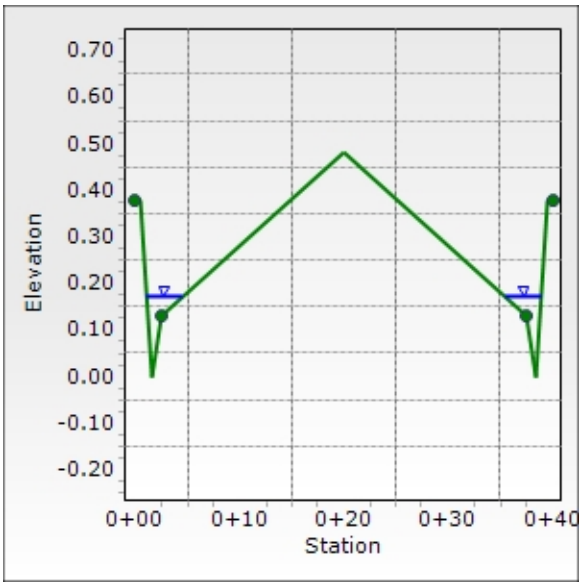
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Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.09 ft
Critical Depth	0.09 ft
Channel Slope	0.850 %
Critical Slope	0.716 %

Cross Section for CROSS SECTION D 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.850 %
Normal Depth	0.17 ft
Discharge	0.500 cfs



Worksheet for CROSS SECTION D 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.850	%
Discharge	0.500	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.38
0+00.4	0.38
0+01.5	0.00
0+02.5	0.13
0+20.0	0.48
0+37.5	0.13
0+38.5	0.00
0+39.6	0.38
0+40.0	0.38

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.38)	(0+02.5, 0.13)	0.013
(0+02.5, 0.13)	(0+37.5, 0.13)	0.016
(0+37.5, 0.13)	(0+40.0, 0.38)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.17	ft
Elevation Range	0.00 to 0.48	ft
Flow Area	0.4	ft²
Wetted Perimeter	7.20	ft
Hydraulic Radius	0.05	ft
Top Width	7.13	ft
Normal Depth	0.17	ft
Critical Depth	0.17	ft
Critical Slope	0.858	%
Velocity	1.30	ft/s

Worksheet for CROSS SECTION D 100YR

Results	
Velocity Head	0.03 ft
Specific Energy	0.20 ft
Froude Number	0.992
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

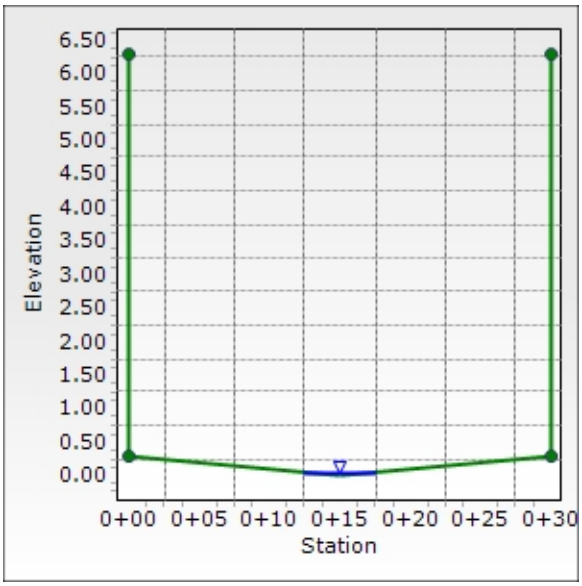
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.17 ft
Critical Depth	0.17 ft
Channel Slope	0.850 %
Critical Slope	0.858 %

Messages	
Messages	Flow is divided.

Cross Section for CROSS SECTION E 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.05 ft
Discharge	0.100 cfs



Worksheet for CROSS SECTION E 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	0.100	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	6.30
0+00.0	0.30
0+15.0	0.00
0+30.0	0.30
0+30.0	6.30

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 6.30)	(0+00.0, 0.30)	0.003
(0+00.0, 0.30)	(0+30.0, 0.30)	0.013
(0+30.0, 0.30)	(0+30.0, 6.30)	0.003

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.05	ft
Elevation Range	0.00 to 6.30	ft
Flow Area	0.1	ft^2
Wetted Perimeter	5.27	ft
Hydraulic Radius	0.03	ft
Top Width	5.27	ft
Normal Depth	0.05	ft
Critical Depth	0.05	ft
Critical Slope	0.857	%
Velocity	0.72	ft/s
Velocity Head	0.01	ft
Specific Energy	0.06	ft
Froude Number	0.782	
Flow Type	Subcritical	

Worksheet for CROSS SECTION E 10YR

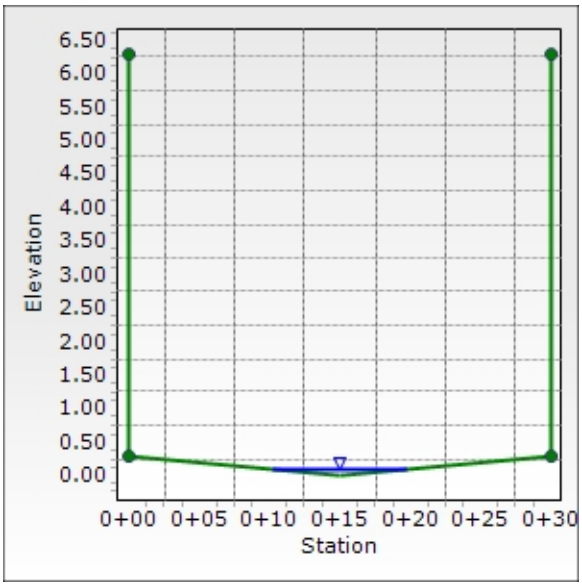
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Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.05 ft
Critical Depth	0.05 ft
Channel Slope	0.500 %
Critical Slope	0.857 %

Cross Section for CROSS SECTION E 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.10 ft
Discharge	0.500 cfs



Worksheet for CROSS SECTION E 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	0.500	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	6.30
0+00.0	0.30
0+15.0	0.00
0+30.0	0.30
0+30.0	6.30

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 6.30)	(0+00.0, 0.30)	0.003
(0+00.0, 0.30)	(0+30.0, 0.30)	0.013
(0+30.0, 0.30)	(0+30.0, 6.30)	0.003

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.10	ft
Elevation Range	0.00 to 6.30	ft
Flow Area	0.5	ft²
Wetted Perimeter	9.65	ft
Hydraulic Radius	0.05	ft
Top Width	9.65	ft
Normal Depth	0.10	ft
Critical Depth	0.09	ft
Critical Slope	0.690	%
Velocity	1.07	ft/s
Velocity Head	0.02	ft
Specific Energy	0.11	ft
Froude Number	0.861	
Flow Type	Subcritical	

Worksheet for CROSS SECTION E 100YR

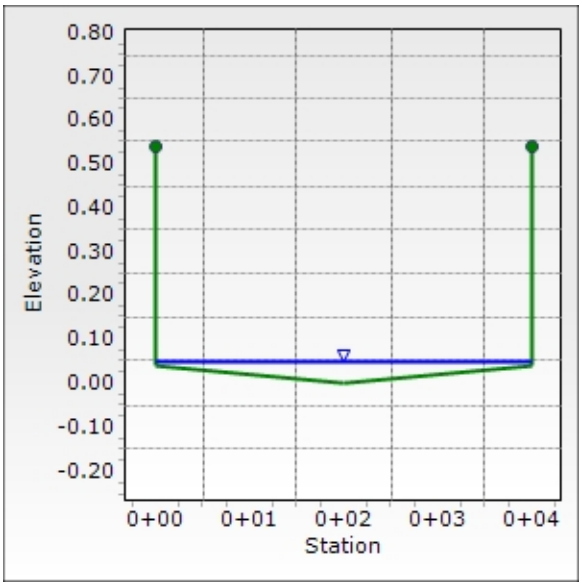
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.10 ft
Critical Depth	0.09 ft
Channel Slope	0.500 %
Critical Slope	0.690 %

Cross Section for CROSS SECTION F 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.05 ft
Discharge	0.100 cfs



Worksheet for CROSS SECTION F 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	0.100	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.54
0+00.0	0.04
0+02.0	0.00
0+04.0	0.04
0+04.0	0.54

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.54)	(0+04.0, 0.54)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.05	ft
Elevation Range	0.00 to 0.54	ft
Flow Area	0.1	ft²
Wetted Perimeter	4.02	ft
Hydraulic Radius	0.03	ft
Top Width	4.00	ft
Normal Depth	0.05	ft
Critical Depth	0.05	ft
Critical Slope	0.825	%
Velocity	0.80	ft/s
Velocity Head	0.01	ft
Specific Energy	0.06	ft
Froude Number	0.791	
Flow Type	Subcritical	

GVF Input Data

Worksheet for CROSS SECTION F 10YR

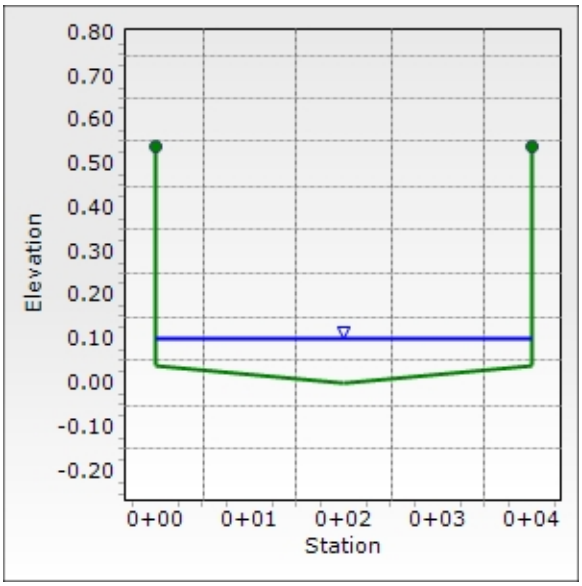
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Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.05 ft
Critical Depth	0.05 ft
Channel Slope	0.500 %
Critical Slope	0.825 %

Cross Section for CROSS SECTION F 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.10 ft
Discharge	0.500 cfs



Worksheet for CROSS SECTION F 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	0.500	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.54
0+00.0	0.04
0+02.0	0.00
0+04.0	0.04
0+04.0	0.54

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.54)	(0+04.0, 0.54)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.10	ft
Elevation Range	0.00 to 0.54	ft
Flow Area	0.3	ft²
Wetted Perimeter	4.13	ft
Hydraulic Radius	0.08	ft
Top Width	4.00	ft
Normal Depth	0.10	ft
Critical Depth	0.10	ft
Critical Slope	0.597	%
Velocity	1.51	ft/s
Velocity Head	0.04	ft
Specific Energy	0.14	ft
Froude Number	0.924	
Flow Type	Subcritical	

GVF Input Data

Worksheet for CROSS SECTION F 100YR

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.10 ft
Critical Depth	0.10 ft
Channel Slope	0.500 %
Critical Slope	0.597 %

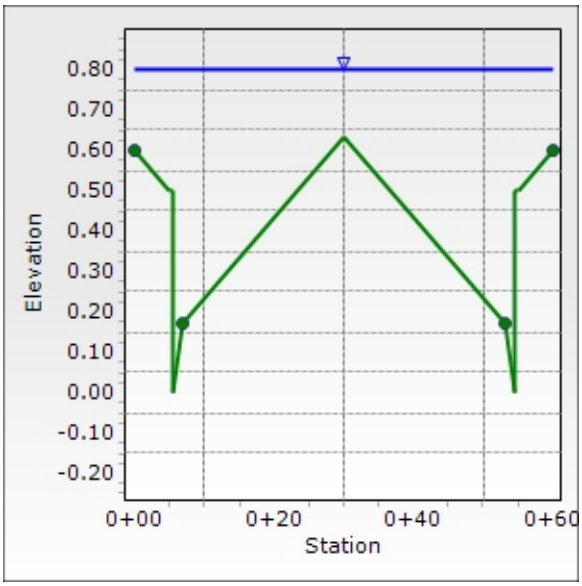
FLOW SPLIT CALCULATIONS

FLOW SPLIT AT RACEL & BUFFALO
REF* = FS1E + FS1S

Cross Section for FS1E_RACEL&BUFFALO_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.80 ft
Discharge	127.000 cfs



Worksheet for FS1E_RACEL&BUFFALO_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Discharge	127.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.80 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	23.3 ft²
Wetted Perimeter	61.43 ft
Hydraulic Radius	0.38 ft
Top Width	60.00 ft
Normal Depth	0.80 ft
Critical Depth	0.93 ft

Worksheet for FS1E_RACEL&BUFFALO_RACEL 10YR

Results	
Critical Slope	0.441 %
Velocity	5.44 ft/s
Velocity Head	0.46 ft
Specific Energy	1.26 ft
Froude Number	1.538
Flow Type	Supercritical

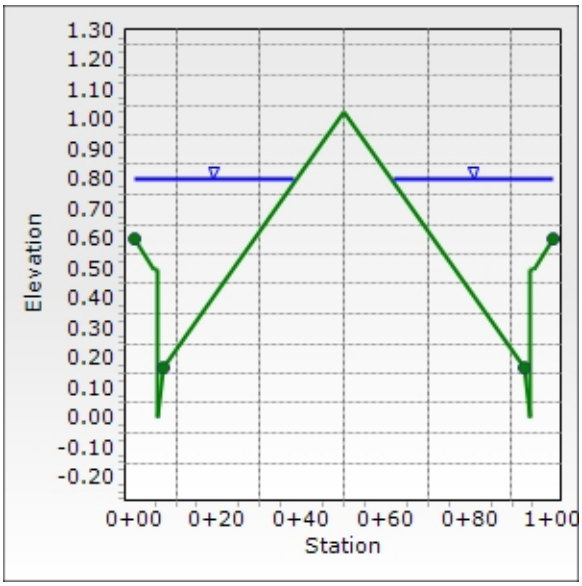
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.80 ft
Critical Depth	0.93 ft
Channel Slope	1.140 %
Critical Slope	0.441 %

Cross Section for FS1S_RACEL&BUFFALO_BUFFALO 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Normal Depth	0.80 ft
Discharge	80.000 cfs



Worksheet for FS1S_RACEL&BUFFALO_BUFFALO 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Discharge	80.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+50.0	1.03
0+93.0	0.17
0+94.5	0.00
0+94.5	0.50
0+95.0	0.50
1+00.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+93.0, 0.17)	0.016
(0+93.0, 0.17)	(1+00.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.80 ft
Elevation Range	0.00 to 1.03 ft
Flow Area	24.5 ft²
Wetted Perimeter	78.08 ft
Hydraulic Radius	0.31 ft
Top Width	76.66 ft
Normal Depth	0.80 ft
Critical Depth	0.80 ft

Worksheet for FS1S_RACEL&BUFFALO_BUFFALO 10YR

Results	
Critical Slope	0.520 %
Velocity	3.26 ft/s
Velocity Head	0.17 ft
Specific Energy	0.96 ft
Froude Number	1.017
Flow Type	Supercritical

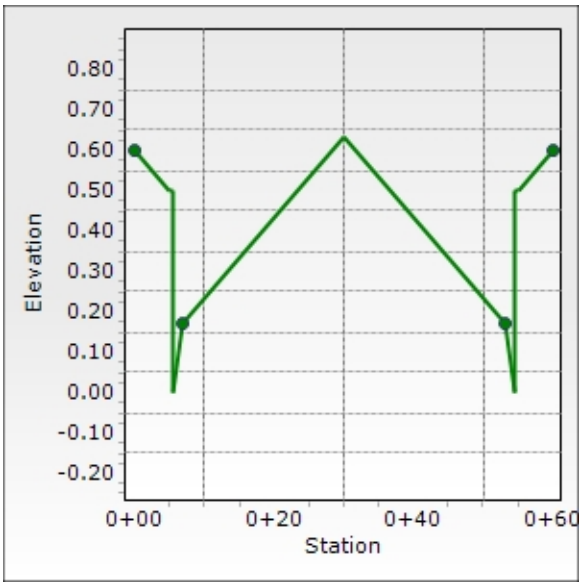
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.80 ft
Critical Depth	0.80 ft
Channel Slope	0.540 %
Critical Slope	0.520 %

Cross Section for FS1E_RACEL&BUFFALO_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	1.14 ft
Discharge	358.000 cfs



Worksheet for FS1E_RACEL&BUFFALO_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Discharge	358.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	1.14 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	43.6 ft²
Wetted Perimeter	62.11 ft
Hydraulic Radius	0.70 ft
Top Width	60.00 ft
Normal Depth	1.14 ft
Critical Depth	1.45 ft

Worksheet for FS1E_RACEL&BUFFALO_RACEL 100YR

Results	
Critical Slope	0.357 %
Velocity	8.21 ft/s
Velocity Head	1.05 ft
Specific Energy	2.18 ft
Froude Number	1.697
Flow Type	Supercritical

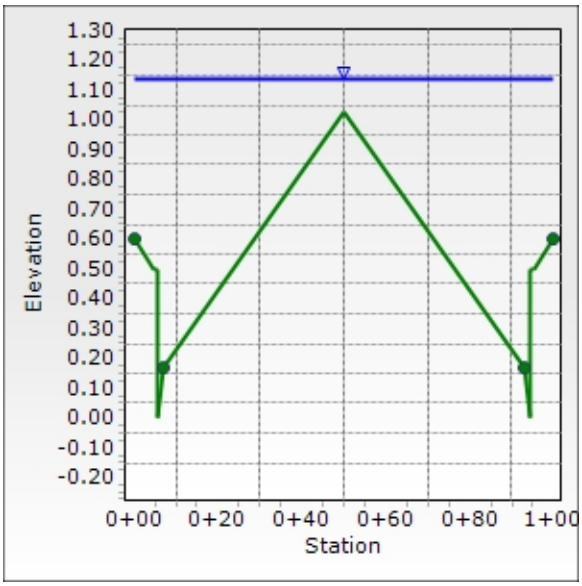
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.14 ft
Critical Depth	1.45 ft
Channel Slope	1.140 %
Critical Slope	0.357 %

Cross Section for FS1S_RACEL&BUFFALO_BUFFALO 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Normal Depth	1.14 ft
Discharge	263.000 cfs



Worksheet for FS1S_RACEL&BUFFALO_BUFFALO 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Discharge	263.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+50.0	1.03
0+93.0	0.17
0+94.5	0.00
0+94.5	0.50
0+95.0	0.50
1+00.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+93.0, 0.17)	0.016
(0+93.0, 0.17)	(1+00.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	1.14 ft
Elevation Range	0.00 to 1.03 ft
Flow Area	56.0 ft²
Wetted Perimeter	102.11 ft
Hydraulic Radius	0.55 ft
Top Width	100.00 ft
Normal Depth	1.14 ft
Critical Depth	1.18 ft

Worksheet for FS1S_RACEL&BUFFALO_BUFFALO 100YR

Results	
Critical Slope	0.431 %
Velocity	4.70 ft/s
Velocity Head	0.34 ft
Specific Energy	1.48 ft
Froude Number	1.107
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

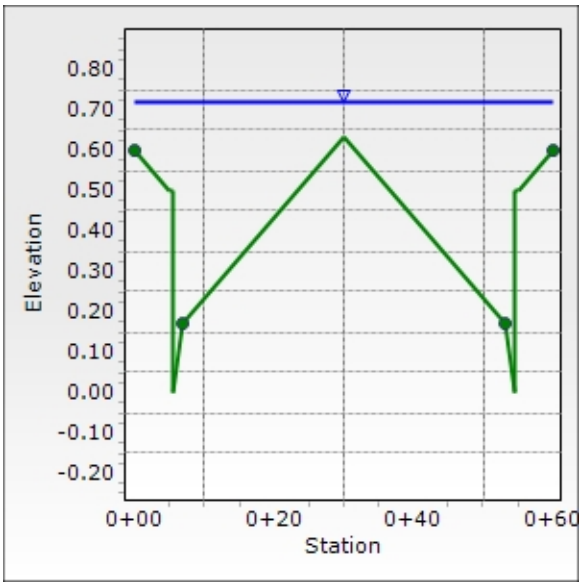
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.14 ft
Critical Depth	1.18 ft
Channel Slope	0.540 %
Critical Slope	0.431 %

FLOW SPLIT AT RACEL & TIAGO
CD1 = FS2E + FS2S

Cross Section for FS2E_RACEL&TIAGO_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.72 ft
Discharge	86.000 cfs



Worksheet for FS2E_RACEL&TIAGO_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Discharge	86.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.72 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	18.5 ft²
Wetted Perimeter	61.27 ft
Hydraulic Radius	0.30 ft
Top Width	60.00 ft
Normal Depth	0.72 ft
Critical Depth	0.81 ft

Worksheet for FS2E_RACEL&TIAGO_RACEL 10YR

Results	
Critical Slope	0.479 %
Velocity	4.66 ft/s
Velocity Head	0.34 ft
Specific Energy	1.06 ft
Froude Number	1.480
Flow Type	Supercritical

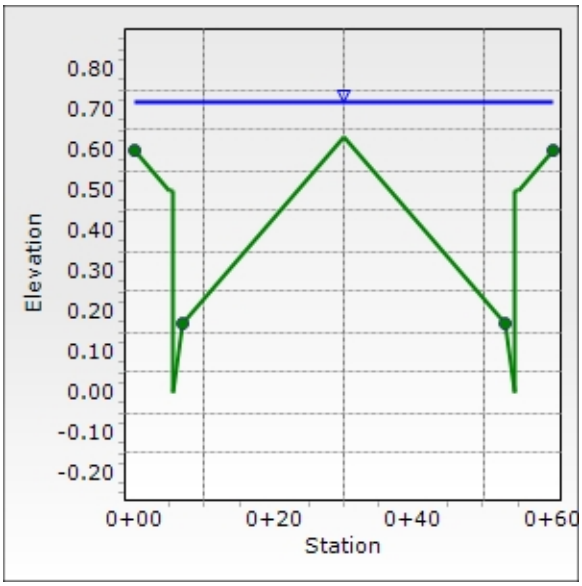
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Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.72 ft
Critical Depth	0.81 ft
Channel Slope	1.140 %
Critical Slope	0.479 %

Cross Section for FS2S_RACEL&TIAGO_TIAGO 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.270 %
Normal Depth	0.72 ft
Discharge	43.000 cfs



Worksheet for FS2S_RACEL&TIAGO_TIAGO 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.270 %
Discharge	43.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.72 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	18.8 ft²
Wetted Perimeter	61.28 ft
Hydraulic Radius	0.31 ft
Top Width	60.00 ft
Normal Depth	0.72 ft
Critical Depth	0.66 ft

Worksheet for FS2S_RACEL&TIAGO_TIAGO 10YR

Results		
Critical Slope	0.555	%
Velocity	2.29	ft/s
Velocity Head	0.08	ft
Specific Energy	0.81	ft
Froude Number	0.723	
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

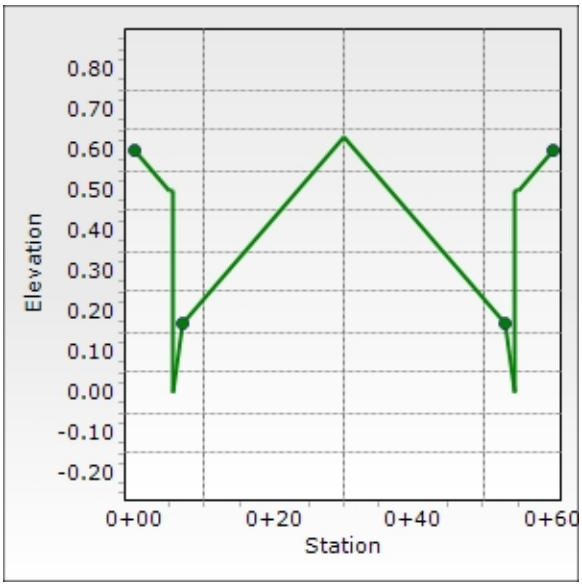
GVF Output Data		
Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.72	ft
Critical Depth	0.66	ft
Channel Slope	0.270	%
Critical Slope	0.555	%

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.123549340110017ft.

Cross Section for FS2E_RACEL&TIAGO_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.99 ft
Discharge	243.000 cfs



Worksheet for FS2E_RACEL&TIAGO_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Discharge	243.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.99 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	34.5 ft²
Wetted Perimeter	61.80 ft
Hydraulic Radius	0.56 ft
Top Width	60.00 ft
Normal Depth	0.99 ft
Critical Depth	1.21 ft

Worksheet for FS2E_RACEL&TIAGO_RACEL 100YR

Results	
Critical Slope	0.386 %
Velocity	7.04 ft/s
Velocity Head	0.77 ft
Specific Energy	1.76 ft
Froude Number	1.636
Flow Type	Supercritical

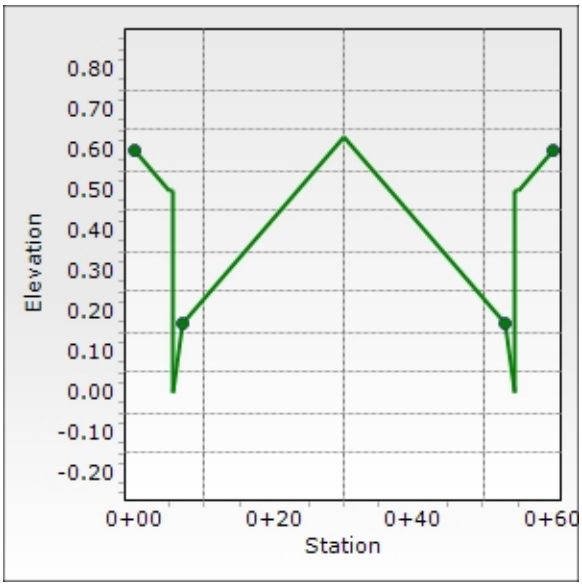
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.99 ft
Critical Depth	1.21 ft
Channel Slope	1.140 %
Critical Slope	0.386 %

Cross Section for FS2S_RACEL&TIAGO_TIAGO 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.270 %
Normal Depth	0.99 ft
Discharge	118.000 cfs



Worksheet for FS2S_RACEL&TIAGO_TIAGO 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.270 %
Discharge	118.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.99 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	34.5 ft²
Wetted Perimeter	61.80 ft
Hydraulic Radius	0.56 ft
Top Width	60.00 ft
Normal Depth	0.99 ft
Critical Depth	0.90 ft

Worksheet for FS2S_RACEL&TIAGO_TIAGO 100YR

Results	
Critical Slope	0.447 %
Velocity	3.42 ft/s
Velocity Head	0.18 ft
Specific Energy	1.17 ft
Froude Number	0.796
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.99 ft
Critical Depth	0.90 ft
Channel Slope	0.270 %
Critical Slope	0.447 %

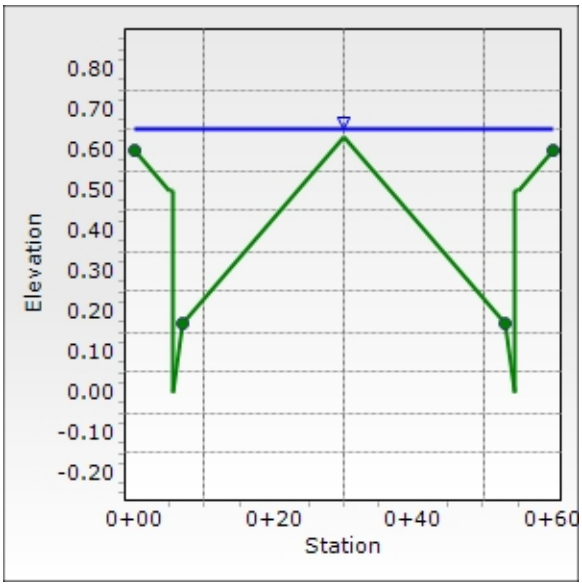
Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.385561799603841ft.

FLOW SPLIT AT RACEL & PIONEER
CD2 = FS3E + FS3S

Cross Section for FS3E_RACEL&PIONEER_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.65 ft
Discharge	55.000 cfs



Worksheet for FS3E_RACEL&PIONEER_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Discharge	55.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.65 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	14.1 ft²
Wetted Perimeter	61.12 ft
Hydraulic Radius	0.23 ft
Top Width	60.00 ft
Normal Depth	0.65 ft
Critical Depth	0.71 ft

Worksheet for FS3E_RACEL&PIONEER_RACEL 10YR

Results	
Critical Slope	0.527 %
Velocity	3.90 ft/s
Velocity Head	0.24 ft
Specific Energy	0.88 ft
Froude Number	1.418
Flow Type	Supercritical

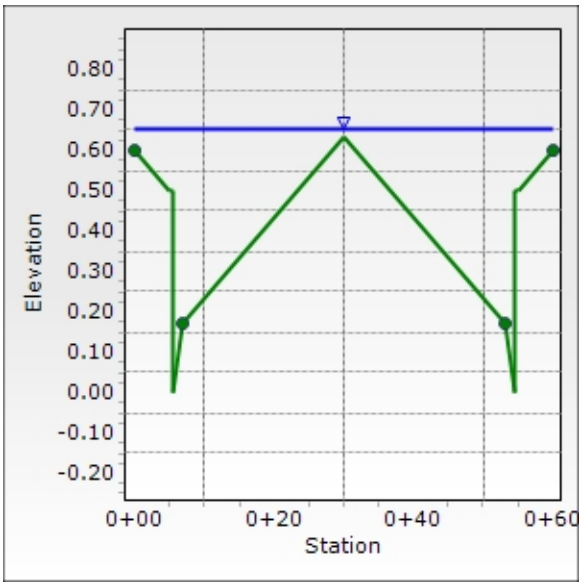
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.65 ft
Critical Depth	0.71 ft
Channel Slope	1.140 %
Critical Slope	0.527 %

Cross Section for FS3S_RACEL&PIONEER_PIONEER 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.400 %
Normal Depth	0.65 ft
Discharge	33.000 cfs



Worksheet for FS3S_RACEL&PIONEER_PIONEER 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.400 %
Discharge	33.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.65 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	14.2 ft²
Wetted Perimeter	61.13 ft
Hydraulic Radius	0.23 ft
Top Width	60.00 ft
Normal Depth	0.65 ft
Critical Depth	0.62 ft

Worksheet for FS3S_RACEL&PIONEER_PIONEER 10YR

Results		
Critical Slope	0.586	%
Velocity	2.32	ft/s
Velocity Head	0.08	ft
Specific Energy	0.73	ft
Froude Number	0.841	
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

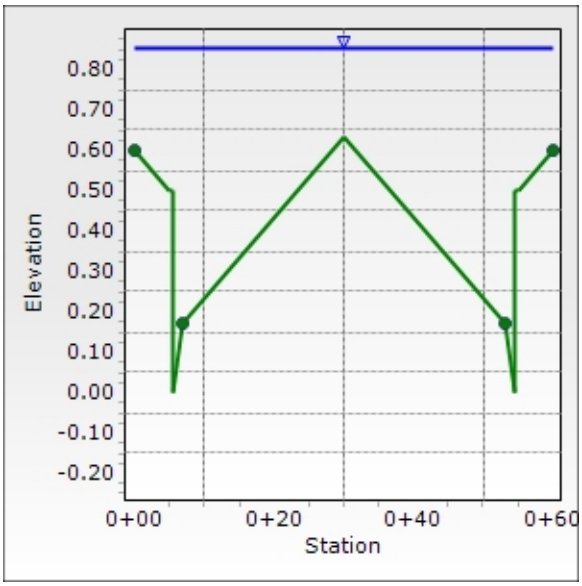
GVF Output Data		
Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.65	ft
Critical Depth	0.62	ft
Channel Slope	0.400	%
Critical Slope	0.586	%

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.047729806 2359611ft.

Cross Section for FS3E_RACEL&PIONEER_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.85 ft
Discharge	155.000 cfs



Worksheet for FS3E_RACEL&PIONEER_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Discharge	155.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.85 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	26.3 ft²
Wetted Perimeter	61.53 ft
Hydraulic Radius	0.43 ft
Top Width	60.00 ft
Normal Depth	0.85 ft
Critical Depth	1.00 ft

Worksheet for FS3E_RACEL&PIONEER_RACEL 100YR

Results	
Critical Slope	0.423 %
Velocity	5.89 ft/s
Velocity Head	0.54 ft
Specific Energy	1.39 ft
Froude Number	1.567
Flow Type	Supercritical

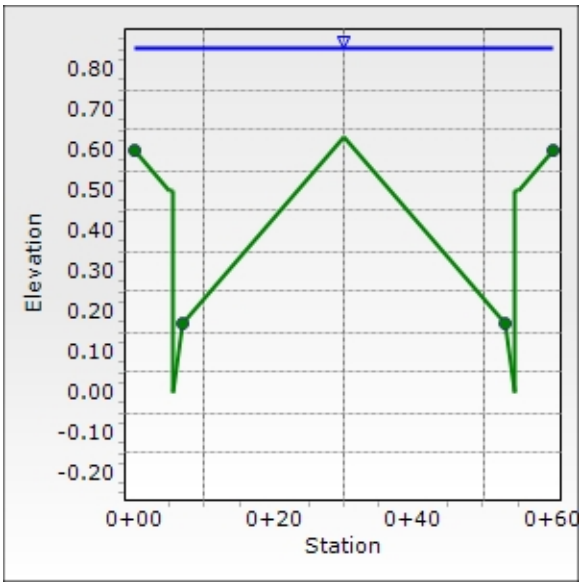
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Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.85 ft
Critical Depth	1.00 ft
Channel Slope	1.140 %
Critical Slope	0.423 %

Cross Section for FS3S_RACEL&PIONEER_PIONEER 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.400 %
Normal Depth	0.85 ft
Discharge	91.000 cfs



Worksheet for FS3S_RACEL&PIONEER_PIONEER 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.400 %
Discharge	91.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.85 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	26.2 ft²
Wetted Perimeter	61.53 ft
Hydraulic Radius	0.43 ft
Top Width	60.00 ft
Normal Depth	0.85 ft
Critical Depth	0.83 ft

Worksheet for FS3S_RACEL&PIONEER_PIONEER 100YR

Results	
Critical Slope	0.472 %
Velocity	3.48 ft/s
Velocity Head	0.19 ft
Specific Energy	1.04 ft
Froude Number	0.928
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.85 ft
Critical Depth	0.83 ft
Channel Slope	0.400 %
Critical Slope	0.472 %

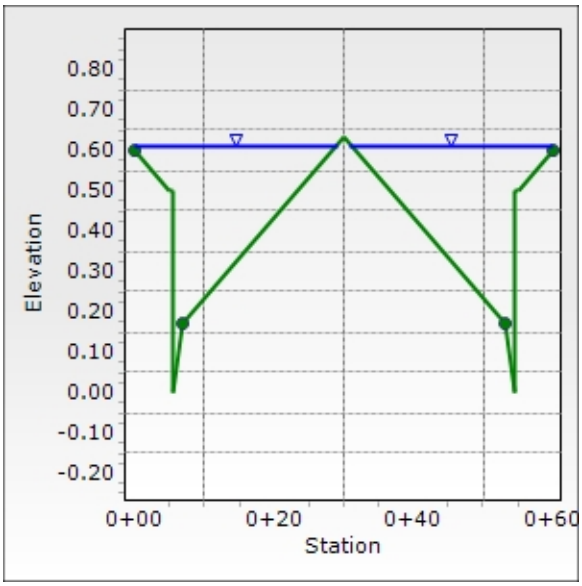
Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.247310195690259ft.

FLOW SPLIT AT RACEL & MONTE CRISTO
CD3 = FS4E + FS4S

Cross Section for FS4E_RACEL&MONTE_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.460 %
Normal Depth	0.61 ft
Discharge	28.000 cfs



Worksheet for FS4E_RACEL&MONTE_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.460 %
Discharge	28.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.61 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	12.2 ft²
Wetted Perimeter	59.51 ft
Hydraulic Radius	0.21 ft
Top Width	58.45 ft
Normal Depth	0.61 ft
Critical Depth	0.59 ft

Worksheet for FS4E_RACEL&MONTE_RACEL 10YR

Results		
Critical Slope	0.599	%
Velocity	2.29	ft/s
Velocity Head	0.08	ft
Specific Energy	0.70	ft
Froude Number	0.883	
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

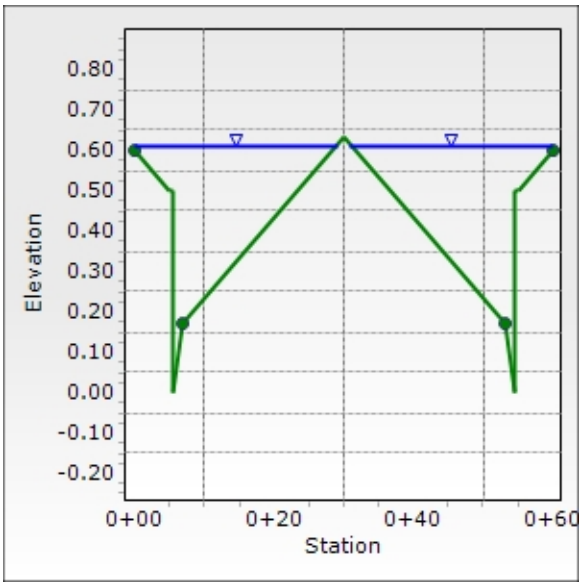
GVF Output Data		
Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.61	ft
Critical Depth	0.59	ft
Channel Slope	0.460	%
Critical Slope	0.599	%

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.014483475 9021364ft. Flow is divided.

Cross Section for FS4S_RACEL&MONTE_MONTE 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.61 ft
Discharge	29.000 cfs



Worksheet for FS4S_RACEL&MONTE_MONTE 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Discharge	29.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.61 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	12.2 ft²
Wetted Perimeter	59.40 ft
Hydraulic Radius	0.20 ft
Top Width	58.34 ft
Normal Depth	0.61 ft
Critical Depth	0.60 ft

Worksheet for FS4S_RACEL&MONTE_MONTE 10YR

Results	
Critical Slope	0.597 %
Velocity	2.38 ft/s
Velocity Head	0.09 ft
Specific Energy	0.70 ft
Froude Number	0.920
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

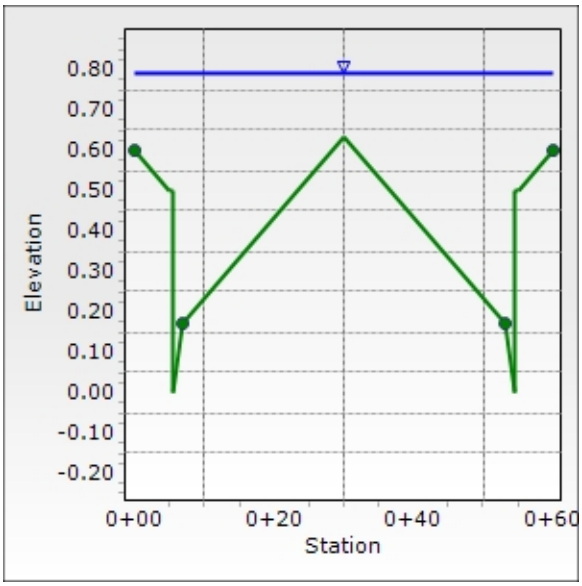
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.61 ft
Critical Depth	0.60 ft
Channel Slope	0.500 %
Critical Slope	0.597 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.013435748 3448866ft. Flow is divided.

Cross Section for FS4E_RACEL&MONTE_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.460 %
Normal Depth	0.79 ft
Discharge	78.000 cfs



Worksheet for FS4E_RACEL&MONTE_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.460 %
Discharge	78.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.79 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	22.9 ft²
Wetted Perimeter	61.41 ft
Hydraulic Radius	0.37 ft
Top Width	60.00 ft
Normal Depth	0.79 ft
Critical Depth	0.79 ft

Worksheet for FS4E_RACEL&MONTE_RACEL 100YR

Results	
Critical Slope	0.488 %
Velocity	3.41 ft/s
Velocity Head	0.18 ft
Specific Energy	0.97 ft
Froude Number	0.974
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

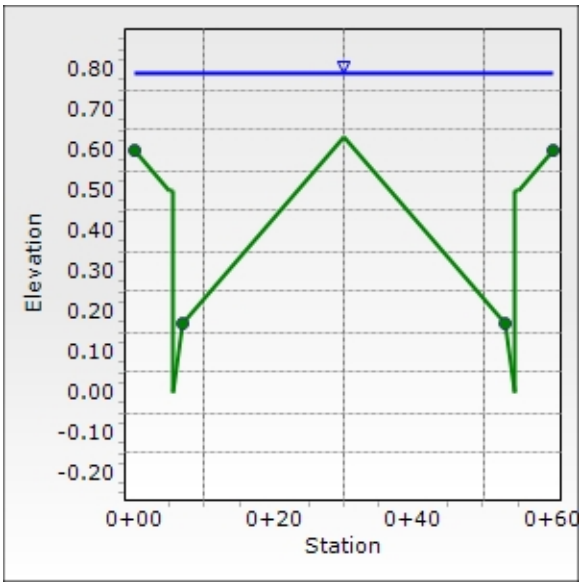
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.79 ft
Critical Depth	0.79 ft
Channel Slope	0.460 %
Critical Slope	0.488 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.192171551189408ft.

Cross Section for FS4S_RACEL&MONTE_MONTE 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.79 ft
Discharge	80.000 cfs



Worksheet for FS4S_RACEL&MONTE_MONTE 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Discharge	80.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.79 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	22.6 ft²
Wetted Perimeter	61.41 ft
Hydraulic Radius	0.37 ft
Top Width	60.00 ft
Normal Depth	0.79 ft
Critical Depth	0.79 ft

Worksheet for FS4S_RACEL&MONTE_MONTE 100YR

Results	
Critical Slope	0.486 %
Velocity	3.53 ft/s
Velocity Head	0.19 ft
Specific Energy	0.98 ft
Froude Number	1.014
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.79 ft
Critical Depth	0.79 ft
Channel Slope	0.500 %
Critical Slope	0.486 %

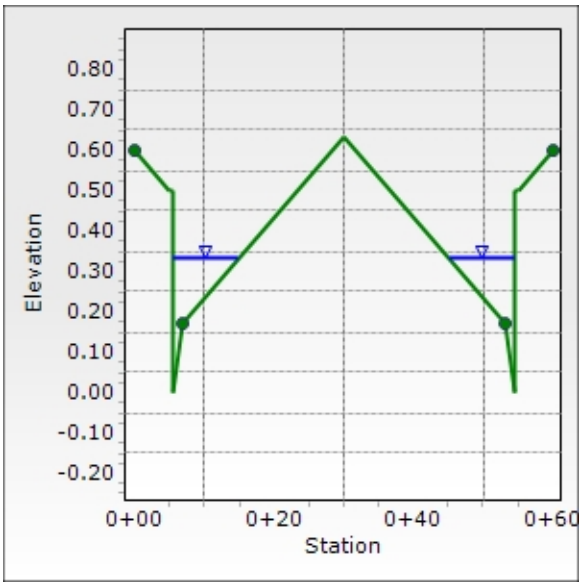
ULTIMATE CONDITION

CROSS SECTIONS

Cross Section for CROSS SECTION A 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.33 ft
Discharge	3.000 cfs



Worksheet for CROSS SECTION A 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Discharge	3.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.33 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	2.0 ft²
Wetted Perimeter	19.70 ft
Hydraulic Radius	0.10 ft
Top Width	19.02 ft
Normal Depth	0.33 ft
Critical Depth	0.31 ft

Worksheet for CROSS SECTION A 10YR

Results	
Critical Slope	0.796 %
Velocity	1.49 ft/s
Velocity Head	0.03 ft
Specific Energy	0.36 ft
Froude Number	0.804
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

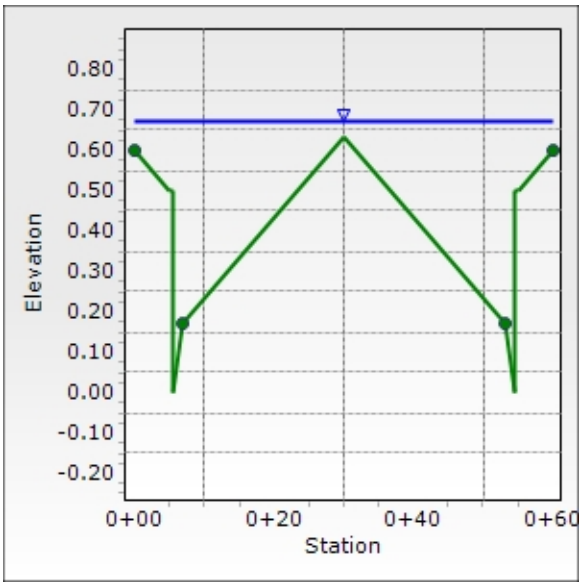
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.33 ft
Critical Depth	0.31 ft
Channel Slope	0.500 %
Critical Slope	0.796 %

Messages	
Messages	Flow is divided.

Cross Section for CROSS SECTION A 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.67 ft
Discharge	42.000 cfs



Worksheet for CROSS SECTION A 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Discharge	42.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.67 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	15.4 ft²
Wetted Perimeter	61.16 ft
Hydraulic Radius	0.25 ft
Top Width	60.00 ft
Normal Depth	0.67 ft
Critical Depth	0.66 ft

Worksheet for CROSS SECTION A 100YR

Results	
Critical Slope	0.558 %
Velocity	2.73 ft/s
Velocity Head	0.12 ft
Specific Energy	0.78 ft
Froude Number	0.952
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

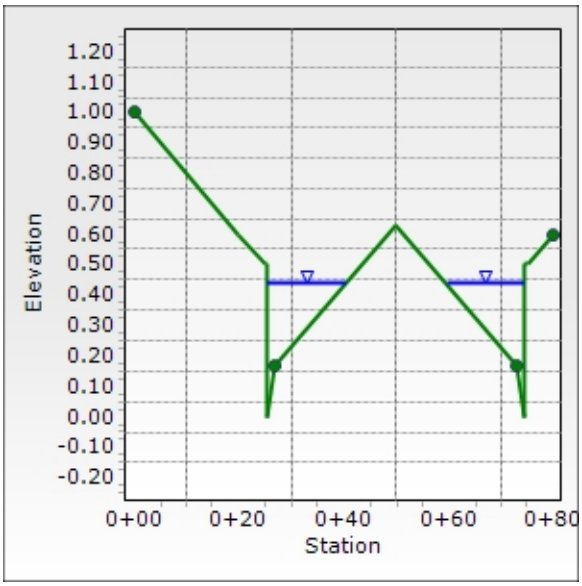
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.67 ft
Critical Depth	0.66 ft
Channel Slope	0.500 %
Critical Slope	0.558 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.067059054 6901105ft.

Cross Section for CROSS SECTION B 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.230 %
Normal Depth	0.44 ft
Discharge	6.000 cfs



Worksheet for CROSS SECTION B 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.230 %
Discharge	6.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	1.00
0+20.0	0.60
0+25.0	0.50
0+25.5	0.50
0+25.5	0.00
0+27.0	0.17
0+50.0	0.63
0+73.0	0.17
0+74.5	0.00
0+74.5	0.50
0+75.0	0.50
0+80.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 1.00)	(0+27.0, 0.17)	0.013
(0+27.0, 0.17)	(0+73.0, 0.17)	0.016
(0+73.0, 0.17)	(0+80.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.44 ft
Elevation Range	0.00 to 1.00 ft
Flow Area	4.6 ft²
Wetted Perimeter	30.68 ft
Hydraulic Radius	0.15 ft
Top Width	29.78 ft
Normal Depth	0.44 ft

Worksheet for CROSS SECTION B 10YR

Results	
Critical Depth	0.38 ft
Critical Slope	0.742 %
Velocity	1.29 ft/s
Velocity Head	0.03 ft
Specific Energy	0.46 ft
Froude Number	0.577
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

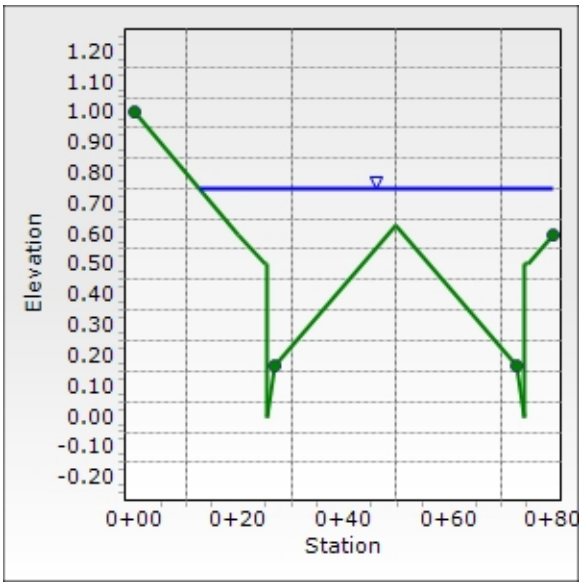
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.44 ft
Critical Depth	0.38 ft
Channel Slope	0.230 %
Critical Slope	0.742 %

Messages	
Messages	Flow is divided.

Cross Section for CROSS SECTION B 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.230 %
Normal Depth	0.75 ft
Discharge	45.000 cfs



Worksheet for CROSS SECTION B 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.230 %
Discharge	45.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	1.00
0+20.0	0.60
0+25.0	0.50
0+25.5	0.50
0+25.5	0.00
0+27.0	0.17
0+50.0	0.63
0+73.0	0.17
0+74.5	0.00
0+74.5	0.50
0+75.0	0.50
0+80.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 1.00)	(0+27.0, 0.17)	0.013
(0+27.0, 0.17)	(0+73.0, 0.17)	0.016
(0+73.0, 0.17)	(0+80.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.75 ft
Elevation Range	0.00 to 1.00 ft
Flow Area	21.0 ft²
Wetted Perimeter	68.75 ft
Hydraulic Radius	0.31 ft
Top Width	67.57 ft
Normal Depth	0.75 ft

Worksheet for CROSS SECTION B 100YR

Results	
Critical Depth	0.67 ft
Critical Slope	0.538 %
Velocity	2.14 ft/s
Velocity Head	0.07 ft
Specific Energy	0.82 ft
Froude Number	0.678
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

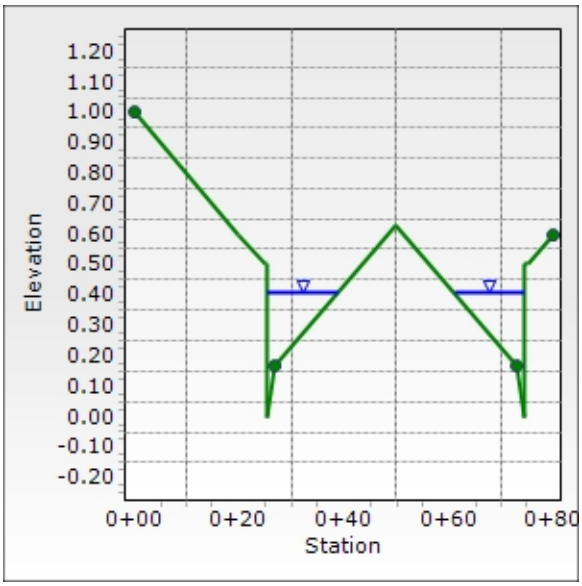
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.75 ft
Critical Depth	0.67 ft
Channel Slope	0.230 %
Critical Slope	0.538 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.151376449496611ft.

Cross Section for CROSS SECTION C 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Normal Depth	0.41 ft
Discharge	7.000 cfs



Worksheet for CROSS SECTION C 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.540	%
Discharge	7.000	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	1.00
0+20.0	0.60
0+25.0	0.50
0+25.5	0.50
0+25.5	0.00
0+27.0	0.17
0+50.0	0.63
0+73.0	0.17
0+74.5	0.00
0+74.5	0.50
0+75.0	0.50
0+80.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 1.00)	(0+27.0, 0.17)	0.013
(0+27.0, 0.17)	(0+73.0, 0.17)	0.016
(0+73.0, 0.17)	(0+80.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.41 ft
Elevation Range	0.00 to 1.00 ft
Flow Area	3.8 ft²
Wetted Perimeter	27.53 ft
Hydraulic Radius	0.14 ft
Top Width	26.69 ft
Normal Depth	0.41 ft

Worksheet for CROSS SECTION C 10YR

Results	
Critical Depth	0.39 ft
Critical Slope	0.724 %
Velocity	1.86 ft/s
Velocity Head	0.05 ft
Specific Energy	0.46 ft
Froude Number	0.870
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

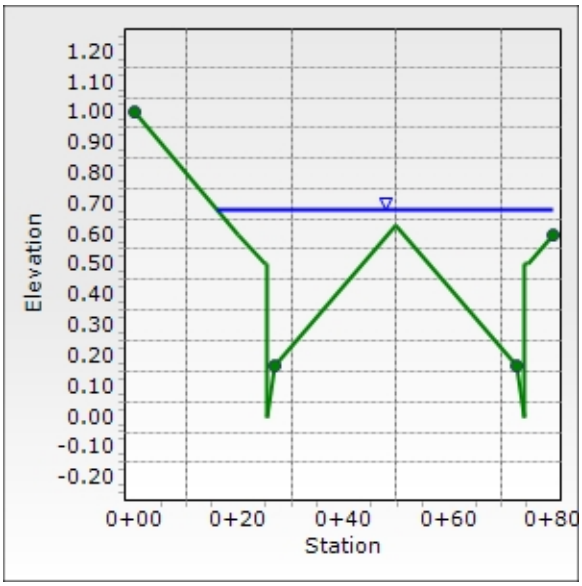
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.41 ft
Critical Depth	0.39 ft
Channel Slope	0.540 %
Critical Slope	0.724 %

Messages	
Messages	Flow is divided.

Cross Section for CROSS SECTION C 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Normal Depth	0.68 ft
Discharge	47.000 cfs



Worksheet for CROSS SECTION C 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.540 %
Discharge	47.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	1.00
0+20.0	0.60
0+25.0	0.50
0+25.5	0.50
0+25.5	0.00
0+27.0	0.17
0+50.0	0.63
0+73.0	0.17
0+74.5	0.00
0+74.5	0.50
0+75.0	0.50
0+80.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 1.00)	(0+27.0, 0.17)	0.013
(0+27.0, 0.17)	(0+73.0, 0.17)	0.016
(0+73.0, 0.17)	(0+80.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.68 ft
Elevation Range	0.00 to 1.00 ft
Flow Area	16.4 ft²
Wetted Perimeter	65.18 ft
Hydraulic Radius	0.25 ft
Top Width	64.07 ft
Normal Depth	0.68 ft

Worksheet for CROSS SECTION C 100YR

Results	
Critical Depth	0.68 ft
Critical Slope	0.541 %
Velocity	2.87 ft/s
Velocity Head	0.13 ft
Specific Energy	0.81 ft
Froude Number	0.999
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

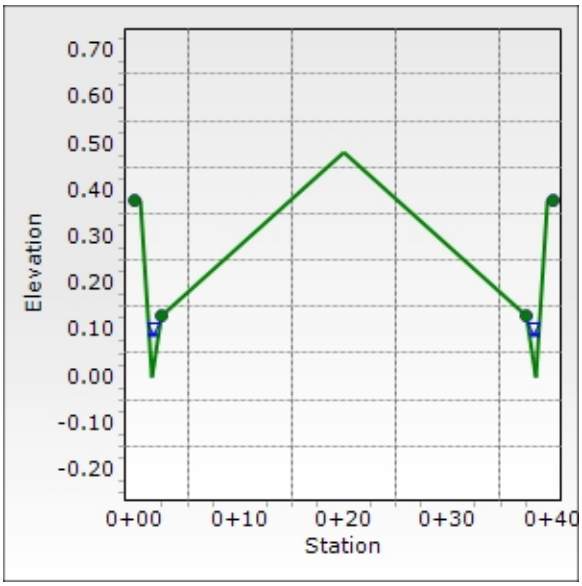
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.68 ft
Critical Depth	0.68 ft
Channel Slope	0.540 %
Critical Slope	0.541 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.081413506 7958035ft.

Cross Section for CROSS SECTION D 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.850 %
Normal Depth	0.09 ft
Discharge	0.100 cfs



Worksheet for CROSS SECTION D 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.850	%
Discharge	0.100	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.38
0+00.4	0.38
0+01.5	0.00
0+02.5	0.13
0+20.0	0.48
0+37.5	0.13
0+38.5	0.00
0+39.6	0.38
0+40.0	0.38

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.38)	(0+02.5, 0.13)	0.013
(0+02.5, 0.13)	(0+37.5, 0.13)	0.016
(0+37.5, 0.13)	(0+40.0, 0.38)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.09	ft
Elevation Range	0.00 to 0.48	ft
Flow Area	0.1	ft²
Wetted Perimeter	1.86	ft
Hydraulic Radius	0.04	ft
Top Width	1.82	ft
Normal Depth	0.09	ft
Critical Depth	0.09	ft
Critical Slope	0.716	%
Velocity	1.28	ft/s

Worksheet for CROSS SECTION D 10YR

Results	
Velocity Head	0.03 ft
Specific Energy	0.11 ft
Froude Number	1.090
Flow Type	Supercritical

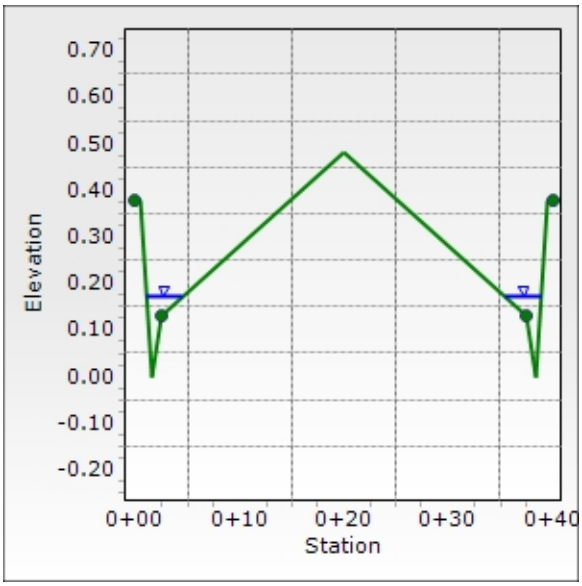
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.09 ft
Critical Depth	0.09 ft
Channel Slope	0.850 %
Critical Slope	0.716 %

Cross Section for CROSS SECTION D 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.850 %
Normal Depth	0.17 ft
Discharge	0.500 cfs



Worksheet for CROSS SECTION D 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.850	%
Discharge	0.500	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.38
0+00.4	0.38
0+01.5	0.00
0+02.5	0.13
0+20.0	0.48
0+37.5	0.13
0+38.5	0.00
0+39.6	0.38
0+40.0	0.38

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.38)	(0+02.5, 0.13)	0.013
(0+02.5, 0.13)	(0+37.5, 0.13)	0.016
(0+37.5, 0.13)	(0+40.0, 0.38)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.17	ft
Elevation Range	0.00 to 0.48	ft
Flow Area	0.4	ft²
Wetted Perimeter	7.20	ft
Hydraulic Radius	0.05	ft
Top Width	7.13	ft
Normal Depth	0.17	ft
Critical Depth	0.17	ft
Critical Slope	0.858	%
Velocity	1.30	ft/s

Worksheet for CROSS SECTION D 100YR

Results	
Velocity Head	0.03 ft
Specific Energy	0.20 ft
Froude Number	0.992
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

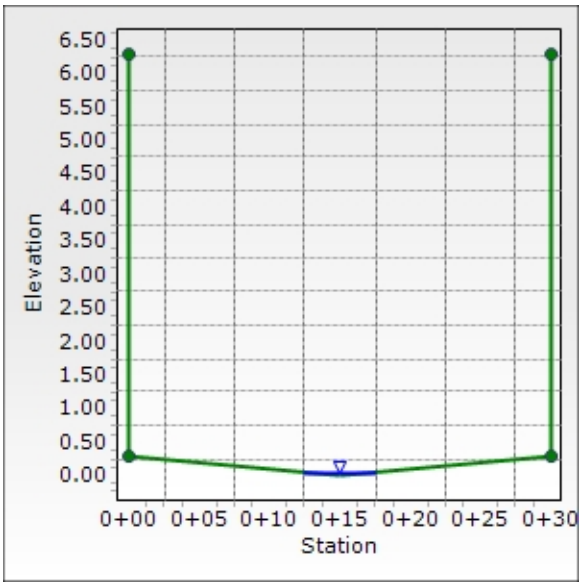
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.17 ft
Critical Depth	0.17 ft
Channel Slope	0.850 %
Critical Slope	0.858 %

Messages	
Messages	Flow is divided.

Cross Section for CROSS SECTION E 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.05 ft
Discharge	0.100 cfs



Worksheet for CROSS SECTION E 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	0.100	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	6.30
0+00.0	0.30
0+15.0	0.00
0+30.0	0.30
0+30.0	6.30

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 6.30)	(0+00.0, 0.30)	0.003
(0+00.0, 0.30)	(0+30.0, 0.30)	0.013
(0+30.0, 0.30)	(0+30.0, 6.30)	0.003

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.05	ft
Elevation Range	0.00 to 6.30	ft
Flow Area	0.1	ft^2
Wetted Perimeter	5.27	ft
Hydraulic Radius	0.03	ft
Top Width	5.27	ft
Normal Depth	0.05	ft
Critical Depth	0.05	ft
Critical Slope	0.857	%
Velocity	0.72	ft/s
Velocity Head	0.01	ft
Specific Energy	0.06	ft
Froude Number	0.782	
Flow Type	Subcritical	

Worksheet for CROSS SECTION E 10YR

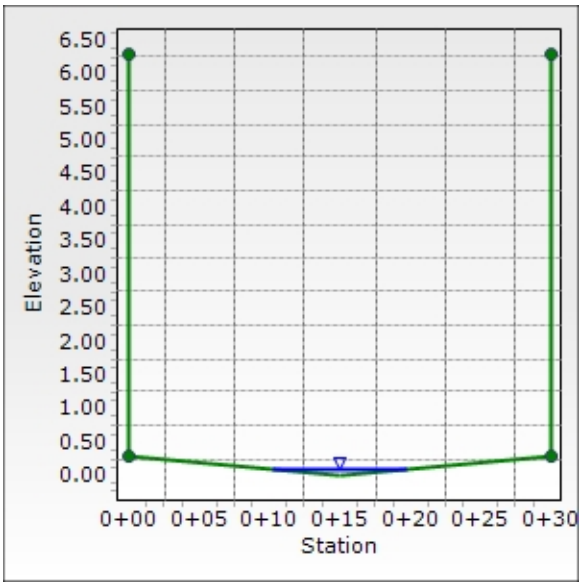
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.05 ft
Critical Depth	0.05 ft
Channel Slope	0.500 %
Critical Slope	0.857 %

Cross Section for CROSS SECTION E 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.10 ft
Discharge	0.500 cfs



Worksheet for CROSS SECTION E 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	0.500	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	6.30
0+00.0	0.30
0+15.0	0.00
0+30.0	0.30
0+30.0	6.30

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 6.30)	(0+00.0, 0.30)	0.003
(0+00.0, 0.30)	(0+30.0, 0.30)	0.013
(0+30.0, 0.30)	(0+30.0, 6.30)	0.003

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.10	ft
Elevation Range	0.00 to 6.30	ft
Flow Area	0.5	ft²
Wetted Perimeter	9.65	ft
Hydraulic Radius	0.05	ft
Top Width	9.65	ft
Normal Depth	0.10	ft
Critical Depth	0.09	ft
Critical Slope	0.690	%
Velocity	1.07	ft/s
Velocity Head	0.02	ft
Specific Energy	0.11	ft
Froude Number	0.861	
Flow Type	Subcritical	

Worksheet for CROSS SECTION E 100YR

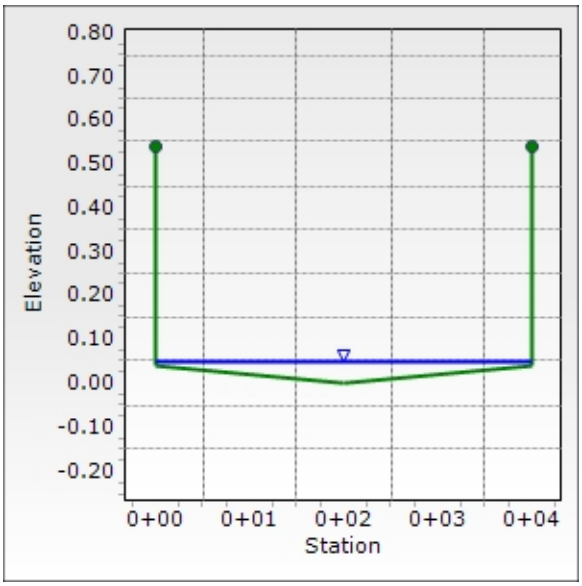
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.10 ft
Critical Depth	0.09 ft
Channel Slope	0.500 %
Critical Slope	0.690 %

Cross Section for CROSS SECTION F 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.05 ft
Discharge	0.100 cfs



Worksheet for CROSS SECTION F 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	0.100	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.54
0+00.0	0.04
0+02.0	0.00
0+04.0	0.04
0+04.0	0.54

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.54)	(0+04.0, 0.54)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.05	ft
Elevation Range	0.00 to 0.54	ft
Flow Area	0.1	ft²
Wetted Perimeter	4.02	ft
Hydraulic Radius	0.03	ft
Top Width	4.00	ft
Normal Depth	0.05	ft
Critical Depth	0.05	ft
Critical Slope	0.825	%
Velocity	0.80	ft/s
Velocity Head	0.01	ft
Specific Energy	0.06	ft
Froude Number	0.791	
Flow Type	Subcritical	

GVF Input Data

Worksheet for CROSS SECTION F 10YR

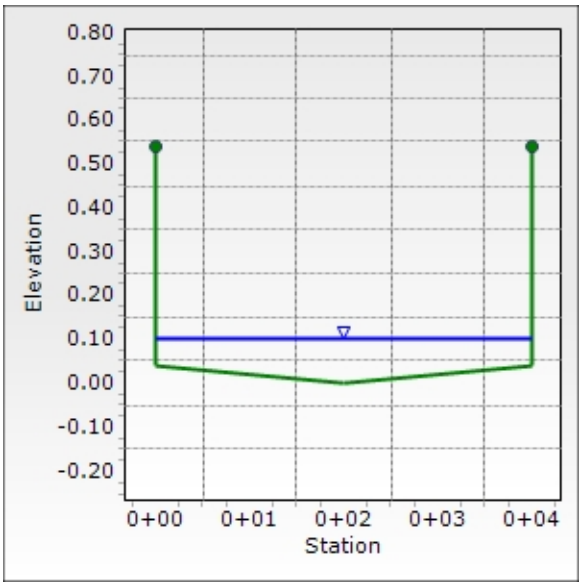
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.05 ft
Critical Depth	0.05 ft
Channel Slope	0.500 %
Critical Slope	0.825 %

Cross Section for CROSS SECTION F 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.500 %
Normal Depth	0.10 ft
Discharge	0.500 cfs



Worksheet for CROSS SECTION F 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.500	%
Discharge	0.500	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.54
0+00.0	0.04
0+02.0	0.00
0+04.0	0.04
0+04.0	0.54

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.54)	(0+04.0, 0.54)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.10	ft
Elevation Range	0.00 to 0.54	ft
Flow Area	0.3	ft²
Wetted Perimeter	4.13	ft
Hydraulic Radius	0.08	ft
Top Width	4.00	ft
Normal Depth	0.10	ft
Critical Depth	0.10	ft
Critical Slope	0.597	%
Velocity	1.51	ft/s
Velocity Head	0.04	ft
Specific Energy	0.14	ft
Froude Number	0.924	
Flow Type	Subcritical	

GVF Input Data

Worksheet for CROSS SECTION F 100YR

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.10 ft
Critical Depth	0.10 ft
Channel Slope	0.500 %
Critical Slope	0.597 %

FLOW SPLIT CALCULATIONS

Flow Split Calculation

Description: Flow split at the intersection of Racel and Tiago - 10 YR
Project: RACEL AND TENAYA
Reference: From the Pima County Drainage Manual (Tuscon, Arizona)
Date: 2/12/2019

Main Road: Racel
Side Road: Tiago

10-yr Flow in Main Street (Q_T) = 2 cfs

Depth of Flow in Main Street (d_{10}) = 0.27 ft
Main Street 10-yr Flow between Curb Face ($\mathbf{Q_M}$) = 2.0 cfs
Ave. Depth of Flow to Side Street, d_{10} - 0.5', ($\mathbf{y_o}$)= 0.00 ft
Estimated Left Overbank Flow (Q_{LOB})= 0.00 cfs
Estimated Right Overbank Flow (Q_{ROB})= 0.00 cfs

(Refer to FlowMaster Calculations Section B 10YR)

$$Q_L = 0.042*[(Q_M^{0.93} * W_{SS}^{0.85})/(S_M^{0.41} * W_M^{0.79})]$$ (Equation 12.3)

Solving for Q_L, where:

$\mathbf{S_M}$ = 0.011 ft/ft [Main street slope]
$\mathbf{W_M}$ = 60 ft [Main street width between face-of-curbs]
$\mathbf{W_{SS}}$ = 60 ft [Side street width between face-of-curbs]

Q_L = 0.6 cfs [Lateral flow into the side street]

Equation 12.4 is used to calculated the maximum amount of "overbank" flow which will also turn and flow down the side street. Note that if Q_0 from Equation 12.4 is positive and is greater than the actual overbank flow, it should be assumed that all of the actual overbank flow turns and flows down the side street. Also, if Q_0 calculated from Equation 12.4 is negative, it should be assumed that no overbank flow turns and flows down the side street.

$$Q_0 = 46.8(y_o * W_{SS} * S_{SS}^{0.5})-Q_L$$ (Equation 12.4)

Solving for Q_O, where:

S_{SS} = 0.0027 ft/ft [Side street Slope]

Q_O = -0.6 cfs [Overbank flow intercepted by the side street]

If $Q_o > Q_{OB}$, assume HALF of the actual overbank flow goes to side street

$$Q_{OB} = Q_{LOB} + Q_{ROB}$$

Q_{OB} = -0.64 cfs

$$Q_{SS} = Q_{OB} + Q_L$$

TIAGO **Q_{SS} = +/- 0 cfs** [Total Developed 10-yr flow entering the side street]

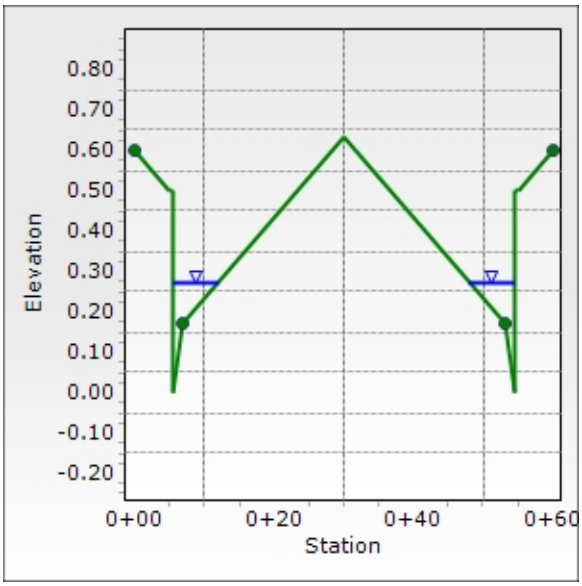
$$Q_{MS} = Q_T - Q_{SS}$$

RACEL **Q_{MS} = +/- 2 cfs** [Total Developed 10-yr flow remaining in main street]

Cross Section for FS2_RACEL&TIAGO_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.27 ft
Discharge	2.000 cfs



Worksheet for FS2_RACEL&TIAGO_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Discharge	2.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.27 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	1.1 ft²
Wetted Perimeter	13.55 ft
Hydraulic Radius	0.08 ft
Top Width	12.99 ft
Normal Depth	0.27 ft
Critical Depth	0.28 ft

Worksheet for FS2_RACEL&TIAGO_RACEL 10YR

Results	
Critical Slope	0.814 %
Velocity	1.90 ft/s
Velocity Head	0.06 ft
Specific Energy	0.33 ft
Froude Number	1.175
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.27 ft
Critical Depth	0.28 ft
Channel Slope	1.140 %
Critical Slope	0.814 %

Flow Split Calculation

Description: Flow split at the intersection of Racel and Tiago - 100 YR
Project: RACEL AND TENAYA
Reference: From the Pima County Drainage Manual (Tuscon, Arizona)
Date: 2/12/2019

Main Road: Racel
Side Road: Tiago

100-yr Flow in Main Street (Q_T) = 152 cfs

Depth of Flow in Main Street (d_{100}) =	0.84 ft
Main Street 100-yr Flow between Curb Face ($\mathbf{Q_M}$) =	50.0 cfs
Ave. Depth of Flow to Side Street, d_{100} - 0.5', ($\mathbf{y_o}$)=	0.34 ft
Estimated Left Overbank Flow (Q_{LOB})=	51.00 cfs
Estimated Right Overbank Flow (Q_{ROB})=	51.00 cfs

(Refer to FlowMaster Calculations Section B 100YR)

$$Q_L = 0.042*[(Q_M^{0.93} * W_{SS}^{0.85})/(S_M^{0.41} * W_M^{0.79})]$$ (Equation 12.3)

Solving for Q_L, where:

$\mathbf{S_M}$ = 0.011 ft/ft [Main street slope]
$\mathbf{W_M}$ = 60 ft [Main street width between face-of-curbs]
$\mathbf{W_{SS}}$ = 60 ft [Side street width between face-of-curbs]

Q_L = 12.8 cfs [Lateral flow into the side street]

Equation 12.4 is used to calculated the maximum amount of "overbank" flow which will also turn and flow down the side street. Note that if Q_0 from Equation 12.4 is positive and is greater than the actual overbank flow, it should be assumed that all of the actual overbank flow turns and flows down the side street. Also, if Q_0 calculated from Equation 12.4 is negative, it should be assumed that no overbank flow turns and flows down the side street.

$$Q_0 = 46.8(y_o * W_{SS} * S_{SS}^{0.5})-Q_L$$ (Equation 12.4)

Solving for Q_O, where:

S_{SS} = 0.0027 ft/ft [Side street Slope]

Q_O = 36.8 cfs [Overbank flow intercepted by the side street]

If $Q_o > Q_{OB}$, assume HALF of the actual overbank flow goes to side street

$$Q_{OB} = Q_{LOB} + Q_{ROB}$$

Q_{OB} = 36.83 cfs

$$Q_{SS} = Q_{OB} + Q_L$$

TIAGO **Q_{SS} = +/- 31 cfs** [Total Developed 100-yr flow entering the side street]

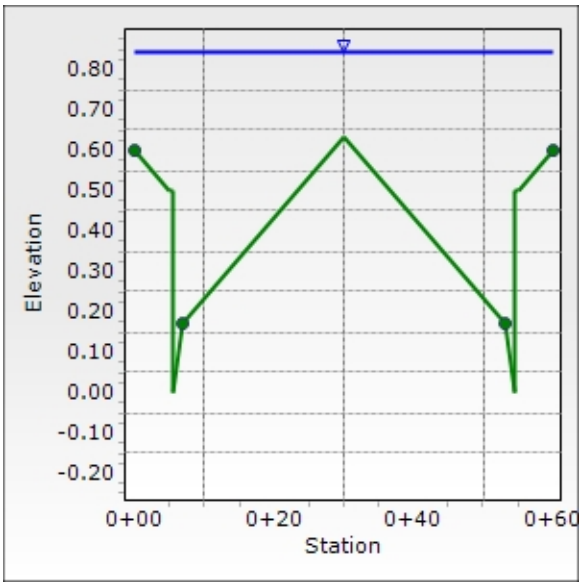
$$Q_{MS} = Q_T - Q_{SS}$$

RACEL **Q_{MS} = +/- 121 cfs** [Total Developed 100-yr flow remaining in main street]

Cross Section for FS2_RACEL&TIAGO_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.84 ft
Discharge	152.000 cfs



Worksheet for FS2_RACEL&TIAGO_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Discharge	152.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.84 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	26.0 ft²
Wetted Perimeter	61.52 ft
Hydraulic Radius	0.42 ft
Top Width	60.00 ft
Normal Depth	0.84 ft
Critical Depth	1.00 ft

Worksheet for FS2_RACEL&TIAGO_RACEL 100YR

Results	
Critical Slope	0.425 %
Velocity	5.84 ft/s
Velocity Head	0.53 ft
Specific Energy	1.37 ft
Froude Number	1.564
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.84 ft
Critical Depth	1.00 ft
Channel Slope	1.140 %
Critical Slope	0.425 %

Flow Split Calculation

Description: Flow split at the intersection of Racel and Pioneer - 10 YR
Project: RACEL AND TENAYA
Reference: From the Pima County Drainage Manual (Tuscon, Arizona)
Date: 2/12/2019

Main Road: Racel
Side Road: Pioneer

10-yr Flow in Main Street (Q_T) = 4 cfs

Depth of Flow in Main Street (d_{10}) = 0.32 ft
Main Street 10-yr Flow between Curb Face (**Q_M**) = 4.0 cfs
Ave. Depth of Flow to Side Street, d_{10} - 0.5', (**y_o**)= 0.00 ft
Estimated Left Overbank Flow (Q_{LOB})= 0.00 cfs
Estimated Right Overbank Flow (Q_{ROB})= 0.00 cfs

(Refer to FlowMaster Calculations Section B 10YR)

$$Q_L = 0.042*[(Q_M^{0.93} * W_{SS}^{0.85})/(S_M^{0.41} * W_M^{0.79})]$$ (Equation 12.3)

Solving for Q_L, where:

S_M = 0.011 ft/ft [Main street slope]
W_M = 60 ft [Main street width between face-of-curbs]
W_{SS} = 60 ft [Side street width between face-of-curbs]

Q_L = 1.2 cfs [Lateral flow into the side street]

Equation 12.4 is used to calculated the maximum amount of "overbank" flow which will also turn and flow down the side street. Note that if Q_0 from Equation 12.4 is positive and is greater than the actual overbank flow, it should be assumed that all of the actual overbank flow turns and flows down the side street. Also, if Q_0 calculated from Equation 12.4 is negative, it should be assumed that no overbank flow turns and flows down the side street.

$$Q_0 = 46.8(y_o * W_{SS} * S_{SS}^{0.5})-Q_L$$ (Equation 12.4)

Solving for Q_O, where:

S_{SS} = 0.0040 ft/ft [Side street Slope]

Q_O = -1.2 cfs [Overbank flow intercepted by the side street]

If $Q_o > Q_{OB}$, assume HALF of the actual overbank flow goes to side street

$$Q_{OB} = Q_{LOB} + Q_{ROB}$$

Q_{OB} = -1.22 cfs

$$Q_{SS} = Q_{OB} + Q_L$$

PIONEER **Q_{SS} = +/- 1 cfs** [Total Developed 10-yr flow entering the side street]

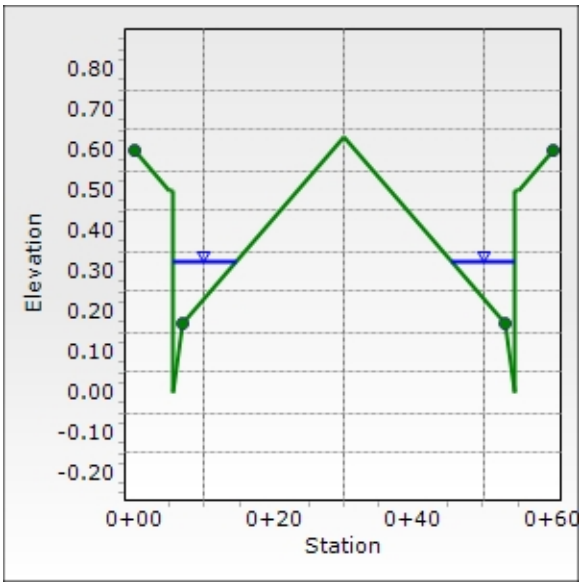
$$Q_{MS} = Q_T - Q_{SS}$$

RACEL **Q_{MS} = +/- 3 cfs** [Total Developed 10-yr flow remaining in main street]

Cross Section for FS3_RACEL&PIONEER_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.32 ft
Discharge	4.000 cfs



Worksheet for FS3_RACEL&PIONEER_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Discharge	4.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.32 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	1.8 ft²
Wetted Perimeter	18.68 ft
Hydraulic Radius	0.10 ft
Top Width	18.02 ft
Normal Depth	0.32 ft
Critical Depth	0.34 ft

Worksheet for FS3_RACEL&PIONEER_RACEL 10YR

Results	
Critical Slope	0.764 %
Velocity	2.18 ft/s
Velocity Head	0.07 ft
Specific Energy	0.39 ft
Froude Number	1.206
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.32 ft
Critical Depth	0.34 ft
Channel Slope	1.140 %
Critical Slope	0.764 %

Flow Split Calculation

Description: Flow split at the intersection of Racel and Pioneer - 100 YR
Project: RACEL AND TENAYA
Reference: From the Pima County Drainage Manual (Tuscon, Arizona)
Date: 2/12/2019

Main Road: Racel
Side Road: Pioneer

100-yr Flow in Main Street (Q_T) = 124 cfs

Depth of Flow in Main Street (d_{100}) =	0.79 ft
Main Street 100-yr Flow between Curb Face ($\mathbf{Q_M}$) =	50.0 cfs
Ave. Depth of Flow to Side Street, d_{100} - 0.5', ($\mathbf{y_o}$)=	0.29 ft
Estimated Left Overbank Flow (Q_{LOB})=	37.00 cfs
Estimated Right Overbank Flow (Q_{ROB})=	37.00 cfs

(Refer to FlowMaster Calculations Section B 100YR)

$$Q_L = 0.042*[(Q_M^{0.93} * W_{SS}^{0.85})/(S_M^{0.41} * W_M^{0.79})]$$ (Equation 12.3)

Solving for Q_L, where:

$\mathbf{S_M}$ = 0.011 ft/ft [Main street slope]
$\mathbf{W_M}$ = 60 ft [Main street width between face-of-curbs]
$\mathbf{W_{SS}}$ = 60 ft [Side street width between face-of-curbs]

Q_L = 12.8 cfs [Lateral flow into the side street]

Equation 12.4 is used to calculated the maximum amount of "overbank" flow which will also turn and flow down the side street. Note that if Q_0 from Equation 12.4 is positive and is greater than the actual overbank flow, it should be assumed that all of the actual overbank flow turns and flows down the side street. Also, if Q_0 calculated from Equation 12.4 is negative, it should be assumed that no overbank flow turns and flows down the side street.

$$Q_0 = 46.8(y_o * W_{SS} * S_{SS}^{0.5})-Q_L$$ (Equation 12.4)

Solving for Q_O, where:

S_{SS} = 0.0040 ft/ft [Side street Slope]

Q_O = 38.7 cfs [Overbank flow intercepted by the side street]

If $Q_o > Q_{OB}$, assume HALF of the actual overbank flow goes to side street

$$Q_{OB} = Q_{LOB} + Q_{ROB}$$

Q_{OB} = 74.00 cfs

$$Q_{SS} = Q_{OB} + Q_L$$

PIONEER **Q_{SS} = +/- 50 cfs** [Total Developed 100-yr flow entering the side street]

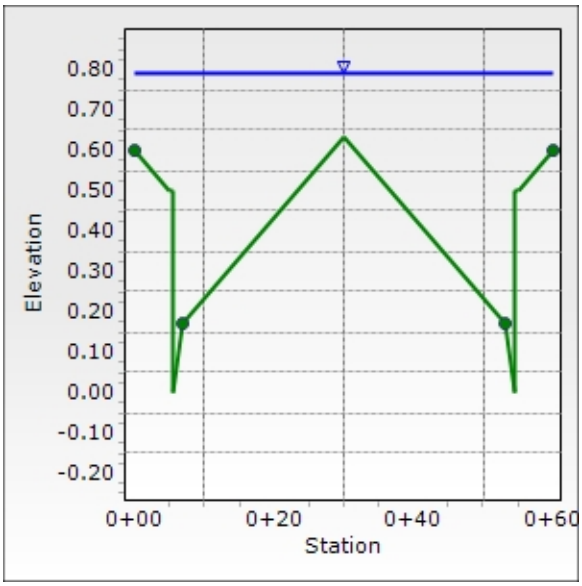
$$Q_{MS} = Q_T - Q_{SS}$$

RACEL **Q_{MS} = +/- 74 cfs** [Total Developed 100-yr flow remaining in main street]

Cross Section for FS3_RACEL&PIONEER_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Normal Depth	0.79 ft
Discharge	124.000 cfs



Worksheet for FS3_RACEL&PIONEER_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.140 %
Discharge	124.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.79 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	23.0 ft²
Wetted Perimeter	61.42 ft
Hydraulic Radius	0.37 ft
Top Width	60.00 ft
Normal Depth	0.79 ft
Critical Depth	0.92 ft

Worksheet for FS3_RACEL&PIONEER_RACEL 100YR

Results	
Critical Slope	0.443 %
Velocity	5.39 ft/s
Velocity Head	0.45 ft
Specific Energy	1.25 ft
Froude Number	1.534
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.79 ft
Critical Depth	0.92 ft
Channel Slope	1.140 %
Critical Slope	0.443 %

Flow Split Calculation

Description: Flow split at the intersection of Racel and Monte Cristo - 10 YR
Project: RACEL AND TENAYA
Reference: From the Pima County Drainage Manual (Tuscon, Arizona)
Date: 2/20/2019

Main Road: Racel
Side Road: Monte Cristo

10-yr Flow in Main Street (Q_T) = 5 cfs

Depth of Flow in Main Street (d_{10}) = 0.38 ft
Main Street 10-yr Flow between Curb Face ($\mathbf{Q_M}$) = 5.0 cfs
Ave. Depth of Flow to Side Street, d_{10} - 0.5', ($\mathbf{y_o}$)= 0.00 ft
Estimated Left Overbank Flow (Q_{LOB})= 0.00 cfs
Estimated Right Overbank Flow (Q_{ROB})= 0.00 cfs

(Refer to FlowMaster Calculations Section B 10YR)

$$Q_L = 0.042*[(Q_M^{0.93} * W_{SS}^{0.85})/(S_M^{0.41} * W_M^{0.79})]$$ (Equation 12.3)

Solving for Q_L, where:

$\mathbf{S_M}$ = 0.005 ft/ft [Main street slope]
$\mathbf{W_M}$ = 60 ft [Main street width between face-of-curbs]
$\mathbf{W_{SS}}$ = 60 ft [Side street width between face-of-curbs]

Q_L = 2.2 cfs [Lateral flow into the side street]

Equation 12.4 is used to calculated the maximum amount of "overbank" flow which will also turn and flow down the side street. Note that if Q_0 from Equation 12.4 is positive and is greater than the actual overbank flow, it should be assumed that all of the actual overbank flow turns and flows down the side street. Also, if Q_0 calculated from Equation 12.4 is negative, it should be assumed that no overbank flow turns and flows down the side street.

$$Q_0 = 46.8(y_o * W_{SS} * S_{SS}^{0.5})-Q_L$$ (Equation 12.4)

Solving for Q_O, where:

S_{SS} = 0.0050 ft/ft [Side street Slope]

Q_O = -2.2 cfs [Overbank flow intercepted by the side street]

If $Q_o > Q_{OB}$, assume HALF of the actual overbank flow goes to side street

$$Q_{OB} = Q_{LOB} + Q_{ROB}$$

Q_{OB} = -2.18 cfs

$$Q_{SS} = Q_{OB} + Q_L$$

Monte Cristo **Q_{SS} = +/- 1 cfs** [Total Developed 10-yr flow entering the side street]

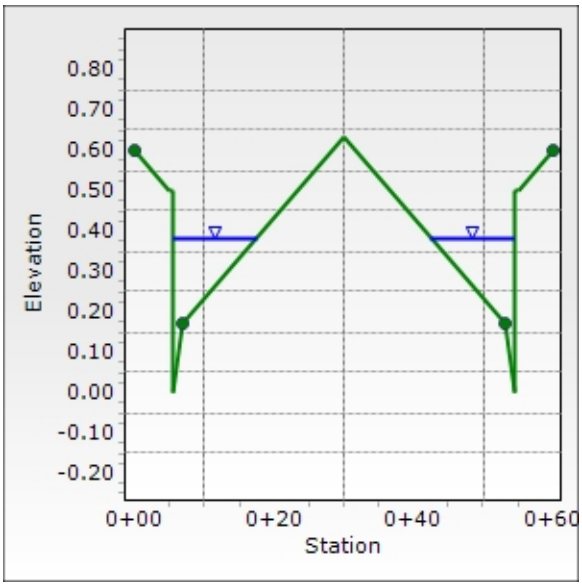
$$Q_{MS} = Q_T - Q_{SS}$$

RACEL **Q_{MS} = +/- 4 cfs** [Total Developed 10-yr flow remaining in main street]

Cross Section for FS4_RACEL&MONTE_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.460 %
Normal Depth	0.38 ft
Discharge	5.000 cfs



Worksheet for FS4_RACEL&MONTE_RACEL 10YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.460 %
Discharge	5.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.38 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	3.1 ft²
Wetted Perimeter	24.80 ft
Hydraulic Radius	0.12 ft
Top Width	24.02 ft
Normal Depth	0.38 ft
Critical Depth	0.36 ft

Worksheet for FS4_RACEL&MONTE_RACEL 10YR

Results	
Critical Slope	0.754 %
Velocity	1.62 ft/s
Velocity Head	0.04 ft
Specific Energy	0.42 ft
Froude Number	0.793
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.38 ft
Critical Depth	0.36 ft
Channel Slope	0.460 %
Critical Slope	0.754 %

Messages	
Messages	Flow is divided.

Flow Split Calculation

Description: Flow split at the intersection of Racel and Monte Cristo - 100 YR
Project: RACEL AND TENAYA
Reference: From the Pima County Drainage Manual (Tuscon, Arizona)
Date: 2/20/2019

Main Road: Racel
Side Road: Monte Cristo

100-yr Flow in Main Street (Q_T) = 77 cfs

Depth of Flow in Main Street (d_{100}) =	0.79 ft
Main Street 100-yr Flow between Curb Face ($\mathbf{Q_M}$) =	32.0 cfs
Ave. Depth of Flow to Side Street, d_{100} - 0.5', ($\mathbf{y_o}$)=	0.29 ft
Estimated Left Overbank Flow (Q_{LOB})=	22.50 cfs
Estimated Right Overbank Flow (Q_{ROB})=	22.50 cfs

(Refer to FlowMaster Calculations Section B 100YR)

$$Q_L = 0.042*[(Q_M^{0.93} * W_{SS}^{0.85})/(S_M^{0.41} * W_M^{0.79})]$$ (Equation 12.3)

Solving for Q_L, where:

$\mathbf{S_M}$ = 0.005 ft/ft [Main street slope]
$\mathbf{W_M}$ = 60 ft [Main street width between face-of-curbs]
$\mathbf{W_{SS}}$ = 60 ft [Side street width between face-of-curbs]

Q_L = 12.2 cfs [Lateral flow into the side street]

Equation 12.4 is used to calculated the maximum amount of "overbank" flow which will also turn and flow down the side street. Note that if Q_0 from Equation 12.4 is positive and is greater than the actual overbank flow, it should be assumed that all of the actual overbank flow turns and flows down the side street. Also, if Q_0 calculated from Equation 12.4 is negative, it should be assumed that no overbank flow turns and flows down the side street.

$$Q_0 = 46.8(y_o * W_{SS} * S_{SS}^{0.5})-Q_L$$ (Equation 12.4)

Solving for Q_O, where:

S_{SS} = 0.0050 ft/ft [Side street Slope]

Q_O = 45.3 cfs [Overbank flow intercepted by the side street]

If $Q_o > Q_{OB}$, assume HALF of the actual overbank flow goes to side street

$$Q_{OB} = Q_{LOB} + Q_{ROB}$$

Q_{OB} = 45.00 cfs

$$Q_{SS} = Q_{OB} + Q_L$$

Monte Cristo **Q_{SS} = +/- 35 cfs** [Total Developed 100-yr flow entering the side street]

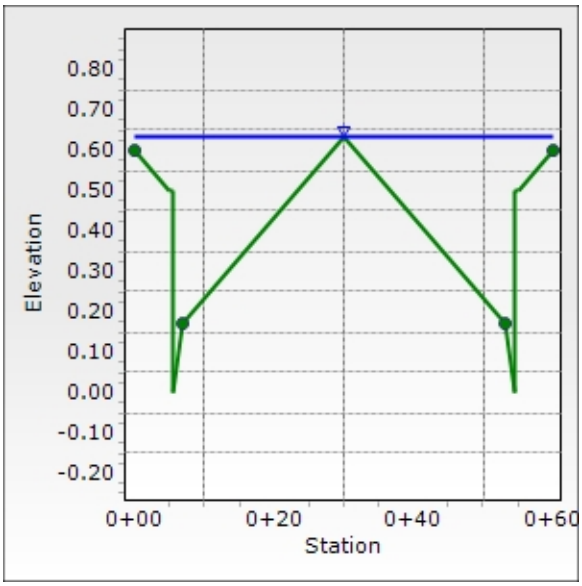
$$Q_{MS} = Q_T - Q_{SS}$$

RACEL **Q_{MS} = +/- 42 cfs** [Total Developed 100-yr flow remaining in main street]

Cross Section for FS4_RACEL&MONTE_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.460 %
Normal Depth	0.63 ft
Discharge	32.000 cfs



Worksheet for FS4_RACEL&MONTE_RACEL 100YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.460 %
Discharge	32.000 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.63 ft
Elevation Range	0.00 to 0.63 ft
Flow Area	13.4 ft²
Wetted Perimeter	61.10 ft
Hydraulic Radius	0.22 ft
Top Width	60.00 ft
Normal Depth	0.63 ft
Critical Depth	0.62 ft

Worksheet for FS4_RACEL&MONTE_RACEL 100YR

Results	
Critical Slope	0.589 %
Velocity	2.39 ft/s
Velocity Head	0.09 ft
Specific Energy	0.72 ft
Froude Number	0.893
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.63 ft
Critical Depth	0.62 ft
Channel Slope	0.460 %
Critical Slope	0.589 %

Messages	
Messages	Water Surface Elevation exceeds lowest end station by 0.033941620 3152819ft.

APPENDIX D

Reference Material

APPENDIX E

Improvement Plans

IMPROVEMENT PLANS
FOR
RACEL & TENAYA
RESIDENTIAL SUBDIVISION
CITY OF LAS VEGAS, NEVADA
APN: 125-10-404-001 & 002
5.00 ACRES
10 LOTS

Avoid overhead power line contact. it's costly.
Call before you Overhead
1-702-227-2929

Call before you Dig
Avoid cutting underground utility lines. it's costly.
CALL 811
OR
1-800-227-2600

LEGEND

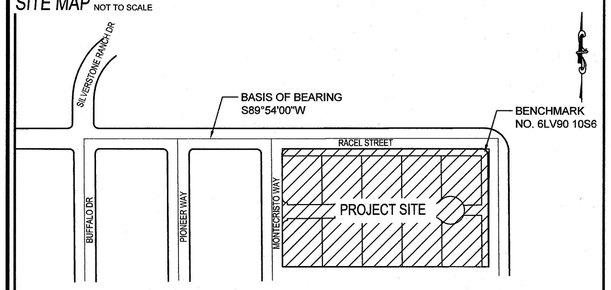
	EXISTING	PROPOSED
PROJECT BOUNDARY		
RIGHT-OF-WAY		
CENTERLINE		
PROPERTY LINE		
EDGE OF PAVEMENT		
SIDEWALK		
CURB AND GUTTER		
FENCE		
CONTOUR (1' INTERVAL)		
CONTOUR (5' INTERVAL)		
DIRECTION OF FLOW		
CUT LINE-ASPHALT		
SCARP (SLOPE VARIES)		
DESIGN ELEVATION	(10.00)	10.00
FUTURE ELEVATION		[10.00]
NUMBER OF RETAINING COURSES		10
RETAINING WALL		
CMU WALL		
SOLID GROUTED WALL - NO RETAINING		
CUT-OFF WALL		
POWER POLE		
SIDEWALK RAMP		
CURB DROP INLET		
STORM DRAIN W/MANHOLE		
CUT-FILL LINE		
SIGHT VISIBILITY ZONE		
CAP & 2" BLOW OFF VALVE		
WATERLINE FITTINGS		
GATE VALVE		
FIRE HYDRANT		
SEWER LINE W/MANHOLE		
SEWER LATERAL		
WATER LINE		
WATER LATERAL W/METER		
PRESSURE REDUCING VALVE		PRV
BACKWATER VALVE		BWV
200A SERVICE PEDESTAL		
STREET LIGHT CONDUIT		
F.A.S.T. CONDUIT		
TRAFFIC SIGN		
STOP SIGN W/STREET NAME SIGN		
100W HPS LUMINAIRE W/11 GA. POLE		
250W HPS LUMINAIRE W/11 GA. POLE		
400W HPS LUMINAIRE W/11 GA. POLE		

SHEET INDEX		
Sheet Number	Sheet Title	Sheet Description
01	C1	COVER SHEET
02	C2	CLV - GENERAL NOTES AND QUANTITIES
03	G1	GRADING PLAN 1
04	GD 1	GRADING DETAILS
05	PP 1	PLAN AND PROFILE: RACEL ST.
06	PP2	PLAN AND PROFILE: TENAYA WAY
07	PP3	PLAN AND PROFILE: MONTE CRISTO WAY
08	PP4	PLAN AND PROFILE: GOLDEN ROCK ST

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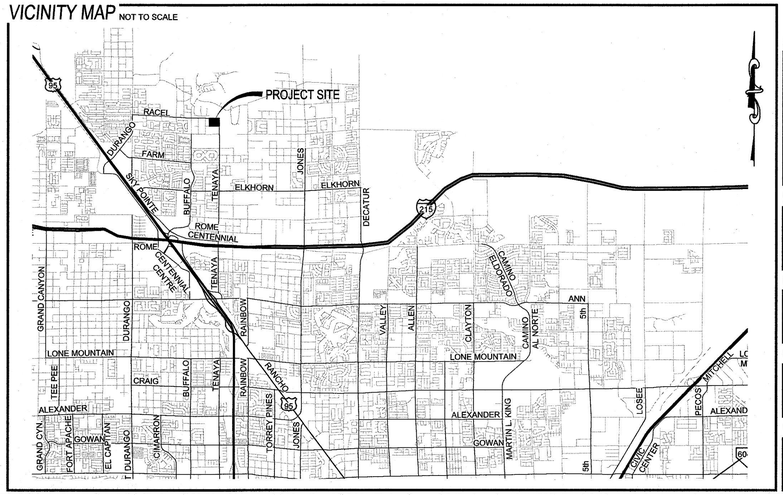
SITE MAP
NOT TO SCALE



ABBREVIATIONS

AC	ASPHALTIC CONCRETE	EX	EXISTING	PT	POINT OF TANGENCY
ACP	ASBESTOS CEMENT PIPE	FF	FINISH FLOOR ELEVATION	PVC	POLYVINYL CHLORIDE
AVE	AVENUE	FG	FINISH GRADE	R	RADIUS
BC	BACK OF CURB	FH	FIRE HYDRANT	RCB	REINFORCED CONCRETE BOX
BCR	BACK OF CURB RADIUS	FL	FLOW LINE	RCP	REINFORCED CONCRETE PIPE
BFE	BASE FLOOD ELEVATION	FT	FEET	R/W	RIGHT-OF-WAY
BFP	BACK FLOW PREVENTOR	G	GRADING	RT	RIGHT
BLM	BUREAU OF LAND MANAGEMENT	GB	GRADE BREAK	SD	STORM DRAIN
BM	BENCH MARK	GFF	GARAGE FINISH FLOOR	SHT	SHEET
BO	BOUNDARY	HP	HIGH POINT	ST/LT	STREETLIGHT
BRPM	BLUE RAISED PAVEMENT MARKER	HPG	HIGH PRESSURE GAS	SNWA	SOUTHERN NEVADA WATER AUTHORITY
BVC	BEGIN VERTICAL CURVE	INV	INVERT	SS	SANITARY SEWER
BW	BOTTOM OF WALL	LF	LINEAR FEET	ST	STREET
CATV	CABLE TELEVISION	LN	LANE	STA	STATION
CC	CLARK COUNTY	LS	LANDSCAPE	STD	STANDARD
CCFD	CLARK COUNTY FIRE DEPARTMENT	LT	LEFT	SVZ	SIGHT VISIBILITY ZONE
CCWRD	CLARK COUNTY WATER RECLAMATION DISTRICT	LVWD	LAS VEGAS VALLEY WATER DISTRICT	SW	SIDEWALK
CL	CENTERLINE	MAX	MAXIMUM	SY	SQUARE YARD
CLSM	CONTROLLED LOW STRENGTH MATERIAL	MH	MANHOLE	TC	TOP OF CURB
CLV	CITY OF LAS VEGAS	MIN	MINIMUM	TELE	TELEPHONE
CMP	CORRUGATED METAL PIPE	NO	NUMBER	TF	TOP OF FOOTING
CNLV	CITY OF NORTH LAS VEGAS	NTS	NOT TO SCALE	T.O.P.	TOP OF PIPE
CO	CLEAN OUT, SEWER	OC	ON CENTER	TR	TOP OF RETAINING
COH	CITY OF HENDERSON	PB	PULL BOX	TW	TOP OF WALL
CY	CUBIC YARD	PC	POINT OF CURVE	TYP	TYPICAL
DCSWCS	DESIGN AND CONSTRUCTION STANDARDS FOR WASTE WATER COLLECTION SYSTEMS	PCC	POINT OF COMPOUND CURVE	UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS
DG	DECOMPOSED GRANITE	PE	POLYETHYLENE	UT	UTILITY
DI	DROP INLET	PI	POINT OF INTERSECTION	USD	UNIFORM STANDARD DRAWING
DIP	DUCTILE IRON PIPE	PL	PROPERTY LINE	VC	VERTICAL CURVE
DR	DRIVE	PLT	PLATE	VCP	VITRIFIED CLAY PIPE
EC	END OF CURVE	POC	POINT OF CONNECTION	VG	VALLEY GUTTER
EG	EXISTING GRADE	PP	POWER POLE	W	WATER
ELEC	ELECTRICAL	P&P	PLAN AND PROFILE	ZC	ZERO LIP CURB
EP	EDGE OF PAVEMENT	PRC	POINT OF REVERSE CURVE		
EVC	END VERTICAL CURVE	PROJ	PROJECT		
		PRV	PRESSURE REDUCING VALVE		

VICINITY MAP
NOT TO SCALE



SUBDIVISION INFORMATION

ACRES:	4.04 AC
AREA DISTURBED:	5.00 AC
LOTS:	10
LOT SIZE:	16213 SF
ZONING:	R-D
FMP:	XX
TMP:	XX
SETBACKS:	
FRONT:	20 FT
REAR:	30 FT
SIDE:	10 FT
CORNER:	15 FT

UTILITY DISCLAIMER
EXISTING UTILITY LOCATIONS SHOWN HEREIN ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR EXISTING LOCATIONS.

BASIS OF BEARING
SOUTH 89°54'00" WEST, BEING THE BEARING OF THE NORTH LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 10, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., COUNTY OF CLARK, STATE OF NEVADA, AS SHOWN ON BOOK 139, PAGE 93 OF PLATS, ON FILE AT THE CLARK COUNTY, NEVADA, RECORDER'S OFFICE.

BENCHMARK
CLARK COUNTY VERTICAL CONTROL STATION: 6LV90 10S6
BEING A 2CITY OF LAS VEGAS RIVET AND ROUND PLATE IN CONCRETECYLINDER, SOUTHWEST CORNER OF RACEL STREET AND TENAYA WAY, +-100' SOUTH OF RACEL STREET. ELEVATION: 2395.01 FEET (NAVD88)
730,000 METERS (NAVD88)

LEGAL DESCRIPTION
BEING THOSE CERTAIN PARCELS OF LAND AS DESCRIBED ON THAT "QUITCLAIM DEED" RECORDED ON MAY 29, 2009AS BOOK 20090529, INSTRUMENT NO. 04426, ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE, LYING WITHIN THE NORTHEAST QUARTER (NE 1/4) OF THE SOUTHEAST QUARTER (SE 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 10, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.B. & M., CLARK COUNTY, NEVADA.

APPROVAL SIGNATURES
APPROVED FOR CONSTRUCTION

COX COMMUNICATIONS LAS VEGAS, INC. DATE

SOUTHWEST GAS CORPORATION DATE

CENTRAL TELEPHONE COMPANY dba CENTURYLINK DATE
"THE AFFIXED CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS"

NV ENERGY DATE
NV ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.

LAS VEGAS FIRE AND RESCUE DATE

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT# 122XXX FIRST APPROVED DATE
LVVWD APPROVED FIRE FLOW: XXXX GPM AT 20 PSI RESIDUAL
MAXIMUM AVAILABLE FIRE SPRINKLER FLOW XXXX GPM
SHEETS: XXXXXX

CITY ENGINEER – ALLEN PAVELKA, PE #9029 DATE
APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHT-OF-WAY, AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS EXCEPT THOSE SPECIFICALLY LISTED UNDER DEVIATIONS FROM STANDARDS. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARD IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS, CLARK COUNTY AREA, NEVADA.

CITY OF LAS VEGAS, PLANNING DEPARTMENT DATE
THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.

NO.	DESCRIPTION	BY	SHTS.	APPR.	DATE
REVISIONS					

ADAVEN HOMES
3425 CLIFF SHADOWS PKWY
LAS VEGAS, NV 89129
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LAS VEGAS, NEVADA 89118
(702) 362-8844 FAX: (702) 362-5233

EST. 2000

RACEL & TENAYA
A RESIDENTIAL SUBDIVISION
COVER SHEET

BRIAN E. MYERS Exp. 12-31-19 CIVIL No. 23550 — PROFESSIONAL ENGINEER — STATE OF NEVADA
2/21/19

DATE: 2/25/2019
SCALE: NA
JOB NO: ADV-18-110
DESIGNED BY: BP CHECKED BY: BM
SHEET NAME: C1
SHEET NUMBER: 01 OF 8
CITY 0000000

LAST PLOT: Mohit Khokha
FILE NAME: S:\ACTIVE\ADAVEN HOMES\ADV-18-110 - RACEL & TENAYA\ENGR\PS\DWGS\SHEET DWGS\ADV18110_SHT_C.DWG

CLV GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY, NEVADA AREA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA, NEVADA" LATEST REVISED EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".

2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCES WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.

3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES, AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.

4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS. ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.

5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGN TO BE APPROVED BY THE CITY, PRIOR TO USE ON THE PROJECT.

6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.

7. EXPANSION JOINTS REQUIRED, MAXIMUM OF EVERY 300' IN EXTRUDED-TYPE CURB.

8. AC PAVEMENT TO BE ONE-HALF INCH (1/2") ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.

9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.

10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.

11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF TRANSITIONS TO BE AS SHOWN ON PLANS.

12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY THE (COMPANY_REPORT#, DATE) APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.

13. EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.

14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.R.S. STATUTE No. 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.

15. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC. SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER.

WALL NOTES:

16. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS, FLOOD CONTROL, AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.

17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.

18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEANOUTS, ETC. TO FINISH GRADE AS APPLICABLE, WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.

19. MATERIALS, HANDLING, AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF NDOT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.

20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC. THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.

21. SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE CITY AND APPROVED PRIOR TO ACCEPTANCE OF FACILITY VIDEO INSPECTION. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT-OF-WAY, AND STORM DRAIN MAIN ALIGNMENT, INCLUDING DEFLECTION POINTS. THE LOCATION SHALL BE DESCRIBED BY COORDINATES WHICH SHALL BE BASED ON THE OFFICIAL HORIZONTAL AND VERTICAL CONTROL NETWORKS OF THE CITY OF LAS VEGAS. FINAL LOCATION MAPS MUST BE SEALED AND CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTAINTIES OF ± 0.09 METERS (± 0.3 FEET) HORIZONTALLY AND VERTICALLY. A SEPARATE ELECTRONIC COMMA DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S).

22. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST EDITION.

23. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

CLV STREETLIGHT NOTES

1. ALL STREET LIGHTING INSTALLATION SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY, NEVADA AREA", LATEST REVISION, AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY, NEVADA AREA", LATEST REVISION.

2. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS, ETC., LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF THE TRAFFIC/ELECTRICAL FIELD OPERATIONS DIVISION AND THE CONSTRUCTION PROJECT REPRESENTATIVE. ANY DEVIATION FROM THE PLAN LOCATION WILL REQUIRE COMPLIANCE WITH SECTION 623.10.03 (E) OF THE SPECIFICATIONS.

3. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION.

4. ALL EMPTY CONDUIT SHALL HAVE PULL STRINGS INSTALLED PRIOR TO FINAL INSPECTION.

5. ANY STRUCTURE, SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, ETC., SHALL LEAVE A MINIMUM OF SEVENTEEN INCHES (18") TO THE FACE OF STREET LIGHTING POLE ON ALL SIDES WHEN STREET LIGHT IS INSTALLED BEHIND SIDEWALK, AND SHALL AT NO TIME COMPLETELY ENCLOSE THE STREET LIGHTING POLE.

6. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE ELECTRICAL SERVICES SECTION PRIOR TO ANY PRE-FINAL INSPECTION. THE AS-BUILT DRAWINGS SHALL BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.

7. SERVICE POINTS SHALL BE COORDINATED WITH NEVADA POWER COMPANY, AND WHEREVER POSSIBLE, SHALL BE LOCATED NEAR THE CENTER OF THE CIRCUIT. SERVICE POINTS SHALL BE SHOWN ON THE PLANS.

8. IT SHALL BE ASSUMED THAT IN THE ABSENCE OF AN EXISTING, WORKABLE CIRCUIT TO ATTACH TO, ALL INSTALLATIONS SHALL REQUIRE A NEW SERVICE FOR OPERATION OF THE CIRUCIT.

9. WHEREVER THERE IS AN OVERHEAD UTILITY THAT MAY CONFLICT WITH THE INSTALLATION OF STREET LIGHTING CIRCUITS AND/OR POLES, THESE CONFLICTS MUST BE RESOLVED BETWEEN THE DEVELOPER AND THE UTILITIES INVOLVED BEFORE STREET LIGHT BASES ARE INSTALLED AT NO EXPENSE TO THE CITY OF LAS VEGAS.

10. THE CONTRACTOR SHALL FURNISH COMPLETE SERVICE TO TRANSFORMERS AND CONTROL SYSTEMS IF REQUIRED ON THE PLANS.

LEGAL DESCRIPTION

BEING THOSE CERTAIN PARCELS OF LAND AS DESCRIBED ON THAT "QUITCLAIM DEED" RECORDED ON MAY 20, 2009AS BOOK 20090529, INSTRUMENT NO. 04428, ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE, LYING WITHIN THE NORTHEAST QUARTER (NE 1/4) OF THE SOUTHEAST QUARTER (SE 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 10, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.B. & M., CLARK COUNTY, NEVADA.

EARTHWORK

TOTAL FOR OVERALL DEVELOPMENT: XX, XXX CY CUT / XX,XXX CY FILL / XX,XXX CY NET

NOTE: THIS OPINION OF THE CUT AND FILL QUANTITIES IS PROVIDED AS REQUIRED BY THE GOVERNING ENTITY. THIS INFORMATION SHOULD NOT BE USED FOR BIDDING PURPOSES. ALL CONTRACTORS ARE RESPONSIBLE FOR THEIR OWN QUANTITIES. THESE TOTALS ARE RAW AND DO NOT ACCOUNT FOR SHRINKAGE AND SUBSIDENCE.

CLV TRAFFIC NOTES

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.

2. THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.

3. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONES. THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCROACHMENT INTO EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.

4. WHEN A DESIGNATED "SAFE ROUTE TO SCHOOL" IS ENCROACHED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD". THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.

5. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL, OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.

6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PERMANENT SIGNS SHOWN ON THE PLANS. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.

7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE FEET (5') OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGN POST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGN POST SHALL BE ELIMINATED.

8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HEREUNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.

9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.

10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO EQUIPMENT AND FLAG PERSONS AS NECESSARY TO ENSURE THE SAFETY OF THE PUBLIC IN AND AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR IMSA WORK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHTS-OF-WAY.

11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.

12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING CITIZEN AREA TRANSIT (C.A.T.) IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET AND SHALL ARRANGE FOR TEMPORARY RELOCATION OF THE STOP.

13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE NO. 229-3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THESE OFFICERS SHALL BE SET BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.

14. ALL WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.

15. CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT'S OFFSITE INSPECTOR PRIOR TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNAGE, WHICH MAY INCLUDE OMITTING, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

CLV GRADING NOTES

1. IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.

2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.

3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION. ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF EXCAVATION.

4. THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY THE INTENT OF THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED OR LEFTOVER MATERIAL FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.

5. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.

6. THE CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION IN THE AREAS INDICATED:

	HORIZONTAL	VERTICAL	COMPACTION	
A.	PAVEMENT AREA SUBGRADE	0.1'+	+0.0' TO -0.1'	SEE SOILS REPORT
B.	ENGINEERED FILL	0.0'+	+0.1' TO -0.1'	SEE SOILS REPORT

COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE.

7. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.

8. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.

9. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS, AND ALL OTHER PUBLIC RIGHT-OF-WAY IN A CLEAN, SAFE, AND USABLE CONDITION. ALL SPILLS OF SOIL, ROCK, OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE, AND USABLE CONDITION.

10. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, THE OWNER AGREES TO PROVIDE AND INSTALL SUCH ITEM AT HIS OWN EXPENSE AND AT THE DIRECTION OF THE CITY ENGINEER. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS, BARRICADES, ETC.

STORMWATER RUNOFF MANAGEMENT NOTES

1. THE OWNER, SITE DEVELOPER, CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATE IN, THE PUBLIC RIGHTS OF WAY OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.

2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BEST MANAGEMENT PRACTICES MANUAL.

3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION IIIA.5.

4. AT A MINIMUM, THE CONTRACTOR R HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER AND ACTUAL RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECCESSARY. SOME EXCEPTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION IIIA.12.

5. ACCUMULATED SEDIMENT IN BMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

SOUTHERN NEVADA SOUTHWEST GAS CORP. GENERAL NOTES

1. IN THE EVENT OF NATURAL GAS EMERGENCIES CALL 911 AND 1-877-860-6020.
2. MINIMUM HORIZONTAL AND VERTICAL CLEARANCES BETWEEN NATURAL GAS FACILITIES AND ANY UNDERGROUND UTILITIES AND/OR STRUCTURES, INCLUDING BUT NOT LIMITED TO WATER, SEWER, STORM DRAIN, COMMUNICATIONS, AND ELECTRIC SHALL BE AT LEAST 12-INCHES OR GREATER AS DICTATED BY LOCAL CODES AND STANDARDS.
   A) ANY DEVIATION FROM SPECIFIED MINIMUM CLEARANCES MUST BE APPROVED BY ALL AFFECTED UTILITIES AND/OR MUNICIPALITIES.
3. FOR VALVE ADJUSTMENT CONTACT 702-668-6107 48 HOURS PRIOR TO CONSTRUCTION.
4. IN THE EVENT OF A NATURAL GAS CONFLICT WITH PROPOSED UTILITIES AND/OR STRUCTURES CONTACT 702-365-2099.
5. SWG STANDBY CONTACT NUMBER: (702-400-1789)

SOUTHWEST GAS CORPORATION — DATE

CLV FIRE DEPARTMENT NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE # 6325 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.

2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICT'S APPROVED PRODUCTS LIST ARE ALLOWED TO BE INSTALLED.

3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK. [IFC § 105.7.12]

4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. [IFC § 3310, § 3312]

5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. [IFC § 507.5.7.3]

6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. [IFC § 106.3]

7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.W.A APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. [IFC § 507.2.1, NFPA 24]

8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. [IFC § 507]

9. PRIVATE HYDRANTS SHALL BE PAINTED RED. [IFC § 507.5.7.1]

10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. [IFC § 507]

11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: [IFC § C102]
• RESIDENTIAL – 500 FT UNSPRINKLERED; 600 FT SPRINKLERED.
• COMMERCIAL – 300 FT UNSPRINKLERED; 400 FT SPRINKLERED.

12. WHERE THE WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATING BASIS. [IFC § C102.8]

13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FT OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.

14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. [IFC § C102.12]

15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY ANAPPROVED ROUTE. [IFC § C102.4]

16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. [IFC § C102.7]

17. THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. [IFC § C102.6]

18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE IS 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS ARE INSTALLED ON A SINGLE SYSTEM. SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN. [IFC § C104]

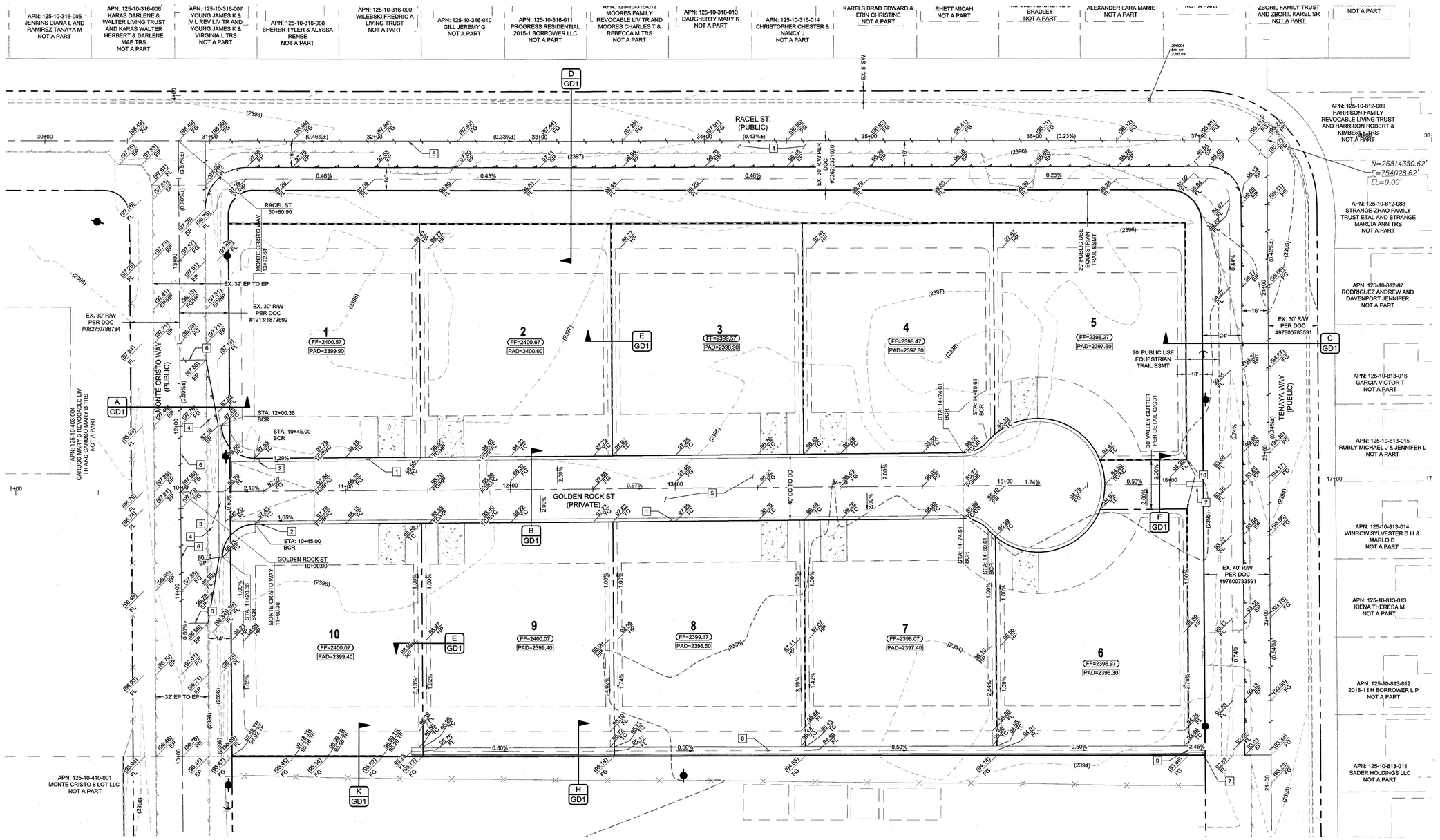
19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. [IFC § 503.2.3]

20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12%. ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FT PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. [IFC § 503.2.7, § 503.2.8]

21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FT OUTSIDE AND 28 FT INSIDE TURNING RADIUS. [IFC § 503.2.4]

22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13FT 6 INS. [IFC § 503.2.1]

23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 40 FT FLOW LINE TO FLOW LINE WITH PARALLEL PARKING PERMITTED ON BOTH SIDES. NOT LESS THAN 32 FT WIDE, FLOW-LINE TO FLOW-LINE, WHERE PARKING IS PERMITTED ONLY ON ONE SIDE OF THE FIRE APPARATUS ACCESS ROAD. NOT LESS THAN 24 FT WIDE, FLOW-LINE TO FLOW-LINE, WHERE NO PARKING IS PERMITTED ON EITHER SIDE. F



CONSTRUCTION NOTES

1 -----24" R-TYPE CURB & GUTTER (USD #217.3.S1)
2 ---3.0' L-CURB TO R-CURB TRANSITION (SEE CCAUSD# 223)
3 -----8.0' CROSS GUTTER (USD #228)
4 ---3.5" AC PAVEMENT OVER 5" TYPE II PER SOILS REPORT (XXXX)
5 -----2.5" AC PAVEMENT OVER 4.5" TYPE II PER SOILS REPORT (XXXX)
6 ---SAWCUT & MATCH EXISTING AC PAVEMENT (USD #500.3, 500.4, 500.5, & 503)
7 -----INSTALL 3.0' VALLEY GUTTER (SEE DETAIL I/GD1)
8 ---INSTALL 4.0' CONCRETE FLUME (SEE DETAIL I/GD1)
9 -----INSTALL 48" X 16" BLOCK WALL OPENING (SEE DETAIL L/GD1)
10 ---INSTALL 6' HIGH WROUGHT IRON FENCING

SCALE: 1" = 30'
30' 15' 30' 60' 90'

GEOTECHNICAL

FIRM NAME
FIRM ADDRESS
LAS VEGAS, NV 89XXX
(702) XXX-XXXX

REPORT NO: XXXXX
DATE: XX/XX/XX

Avoid overhead power line contact. It's costly.
Call before you Overhead
1-702-227-2929

Call before you Dig
Avoid cutting underground utility lines. It's costly.
CALL 811
OR 1-800-227-2600

FLOOD ZONE

THIS PROJECT IS LOCATED IN FLOOD ZONE "X", AN AREA DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOOD PLAIN PER FIRM PANEL 32003C1745E, REVISED 09/27/2002.

GRADING NOTES

COMPLETION OF SECTION II OF DRAINAGE COMPLIANCE REPORT REQUIRED.

ADD 2300 FEET TO ALL GRADE TAGS TO GET ACTUAL ELEVATION.

THE ELEVATION DIFFERENCE BETWEEN THE PAD AND FINISH FLOOR IS DETERMINED FROM THE MINIMUM THICKNESS REQUIRED PER THE GEOTECHNICAL REPORT. FINISH FLOORS MAY INCREASE DEPENDING ON THE TYPE OF SOIL AND FOUNDATION PLAN USED. NOTE THAT THE STRUCTURAL PLANS & GEOTECHNICAL REPORT SHALL SUPERSEDE THE CIVIL IMPROVEMENT PLANS.

ALL PRIVATE STREETS AND DRAINAGE EASEMENTS ARE TO BE PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNERS ASSOCIATION (H.O.A.).

ALL WORK TO BE PERFORMED OUTSIDE OF THE PROJECT BOUNDARY AND ON PRIVATE PROPERTY SHALL NOT BE PERFORMED UNTIL WRITTEN PERMISSION AND EASEMENTS HAVE BEEN OBTAINED FROM THE OFFSITE OWNER AND GIVEN TO THE GOVERNING ENTITY.

CONTRACTOR SHALL VERIFY HORIZONTAL AND VERTICAL LOCATION OF EXISTING UTILITIES AND NOTIFY THE DESIGN ENGINEER IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.

EARTHWORK

TOTAL FOR OVERALL DEVELOPMENT: XX, XXX CY CUT / XX,XXX CY FILL / XX,XXX CY NET

NOTE: THIS OPINION OF THE CUT AND FILL QUANTITIES IS PROVIDED AS REQUIRED BY THE GOVERNING ENTITY. THIS INFORMATION SHOULD NOT BE USED FOR BIDDING PURPOSES. ALL CONTRACTORS ARE RESPONSIBLE FOR THEIR OWN QUANTITIES. THESE TOTALS ARE RAW AND DO NOT ACCOUNT FOR SHRINKAGE AND SUBSIDENCE.

UTILITY DISCLAIMER

EXISTING UTILITY LOCATIONS SHOWN HEREIN ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR EXISTING LOCATIONS.

BENCHMARK

CLARK COUNTY VERTICAL CONTROL STATION: 6LV90 10S6
BEING A 2CITY OF LAS VEGAS RIVET AND ROUND PLATE IN CONCRETE CYLINDER, SOUTHWEST CORNER OF RACEL STREET AND TENAYA WAY, +-100' SOUTH OF RACEL STREET.
ELEVATION: 2395.01 FEET (NAVD88)
730.000 METERS (NAVD88)

GRADING CERTIFICATION

I CERTIFY THIS GRADING PLAN COMPLIES WITH THE APPROVED DRAINAGE STUDY, HTE# XX-XXXXX, ON FILE WITH CLARK COUNTY FOR THIS PROJECT.

BRIAN E. MYERS, PE DATE

ACCEPTANCE OF PLANS FOR FILING

BY:_____
DEVELOPMENT AND FLOOD CONTROL DATE

NO.	DESCRIPTION	BY	SHTS.	APPR.	DATE
REVISIONS					

ADAVEN HOMES
3425 CLIFF SHADOWS PKWY
LAS VEGAS, NV 89129
(720) 365-5588 FAX:

TANEY ENGINEERING
6030 S. JONES BOULEVARD
LAS VEGAS, NV 89118
(702) 362-2844 FAX: (702) 362-5333

EST. 2000

RACEL & TENAYA
A RESIDENTIAL SUBDIVISION

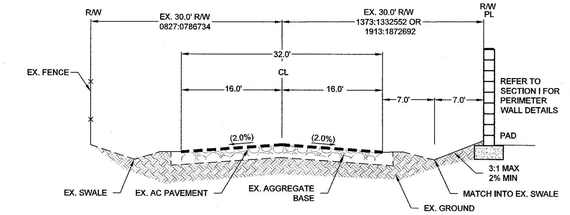
GRADING PLAN 1

PROFESSIONAL ENGINEER
BRIAN E. MYERS
Exp. 12-31-19
CIVIL
No. 23550
2/21/19

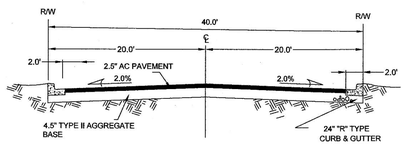
DATE:	2/25/2019
SCALE:	1"=30'
JOB NO:	ADV-18-110
DESIGNED BY:	BP
CHECKED BY:	BM
SHEET NAME:	G1
SHEET NUMBER:	03 OF 8
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CITY	0000000

LAST PLOT: Mohit Khullar
FILE NAME: S:\ACTIVE\ADAVEN HOMES\ADV-18-110 - RACEL & TENAYA\ENGR\SD\WGS\SHEET DWGS\ADV18110_SHT_G.DWG

NOTE:
ALL AGGREGATE BASES SHALL BE COMPACTED PER GEOTECHNICAL REPORT xxxx. PRELIMINARY PAVEMENT SECTIONS SHALL BE VERIFIED WITH THE FINAL PAVEMENT SECTION RECOMMENDATION REPORT PRIOR TO CONSTRUCTION. IF FINAL PAVEMENT SECTIONS ARE DIFFERENT, A REVISION TO THE IMPROVEMENT PLANS WILL BE REQUIRED.

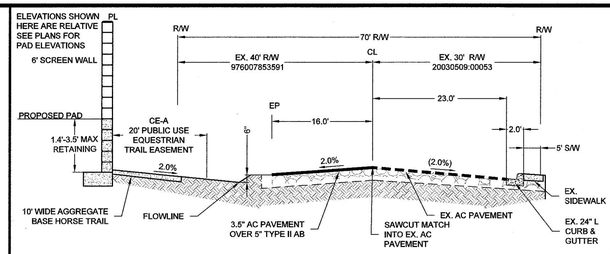


SECTION A - MONTE CRISTO WAY (PUBLIC)
NTS



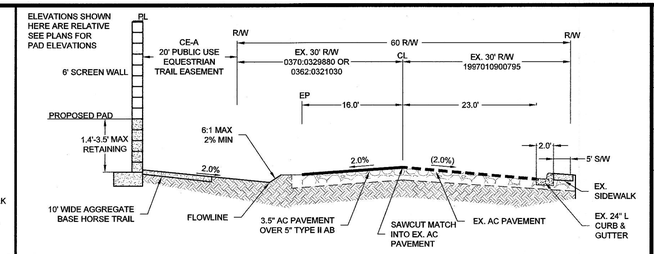
SECTION B
INTERIOR STREET SECTION (PRIVATE)
NTS

NOTE:
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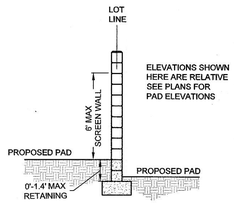
SECTION C - TENAYA WAY STREET SECTION (PUBLIC)
NTS

NOTE:
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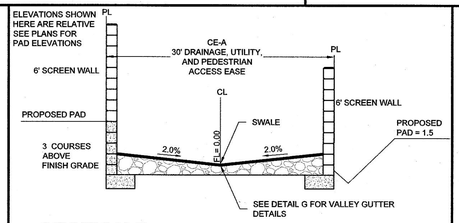


SECTION D - RACEL STREET SECTION (PUBLIC)
NTS

NOTE:
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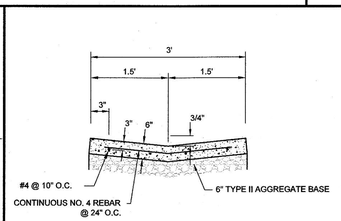


SECTION E
SIDE/SIDE YARDS
NTS

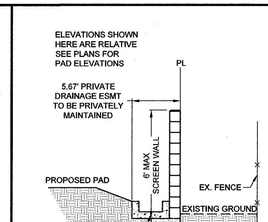


SECTION F -
PEDESTRIAN ACCESS WALKWAY
NTS

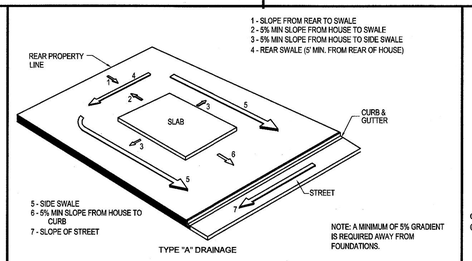
NOTE:
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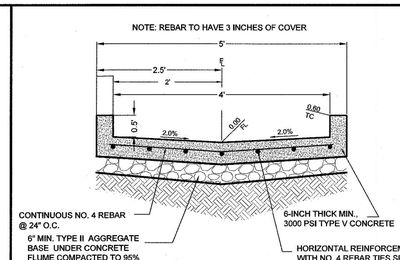
DETAIL G - 3' WIDE VALLEY GUTTER
NTS



SECTION H
SOUTH BOUNDARY
NTS



TYPICAL GRADING DETAIL
TYPE A



DETAIL I
4' CONCRETE FLUME
NTS

DETAIL J
3' VALLEY GUTTER
NTS

SECTION K
SOUTH BOUNDARY
NTS

TYPICAL GRADING DETAIL - TYPE-B
(LOTS 6-10 ONLY)

DETAIL L
48" X 16" BLOCK WALL OPENING
NTS

NO.	DESCRIPTION	BY	SH'TS.	APPR.	DATE
	REVISIONS				

ADAVEN HOMES
3425 CLIFF SHADOWS PKWY
LAS VEGAS, NV 89129
(720) 365-8588 FAX:

TANEY ENGINEERING
8330 S. JONES BOULEVARD
LAS VEGAS, NEVADA 89139
(702) 362-8844 FAX: (702) 362-5233

EST. 2000

RACEL & TENAYA
A RESIDENTIAL SUBDIVISION
GRADING DETAILS

PROFESSIONAL ENGINEER STATE OF NEVADA
BRIAN E. MYERS
Exp. 12-31-19
CIVIL
No. 23550
2/21/19

DATE:	2/25/2019
SCALE:	NTS
JOB NO:	ADV-18-110
DESIGNED BY: BP	CHECKED BY: BM
SHEET NAME:	GD 1
SHEET NUMBER:	04 OF 8
---	---
CITY	0000000

Avoid overhead power line contact, it's costly.
Call before you Overhead
1-702-227-2929

Call before you Dig
Avoid cutting underground utility lines, it's costly.
CALL 811 OR 1-800-227-2600

LAST PLOT: Mohit Khadka
FILE NAME: S:\ACTIVE\ADAVEN HOMES\ADV-18-110 - RACEL & TENAYA\ENGI\PS\DWGS\SHEET DWGS\ADV18110_SHT_GD.DWG

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MAINTAIN MINIMUM TWENTY-FOUR (24) INCH COVER PER UDACS SECTION 2.08.04. GRADING MUST BE COMPLETED PRIOR TO WATERLINE INSTALLATION.

WATER MAIN JOINT DEFLECTION NOTE (PVC 4"-24")
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BENCHMARK
CLARK COUNTY VERTICAL CONTROL STATION: 6LV90 1088.
BEING A 2CITY OF LAS VEGAS RIVET AND ROUND PLATE IN CONCRETECYLINDER, SOUTHWEST CORNER OF RACEL STREET AND TENAYA WAY, +-100' SOUTH OF RACEL STREET. ELEVATION: 2395.01 FEET (NAVD88)
730.000 METERS (NAVD88)

PROFILE NOTES
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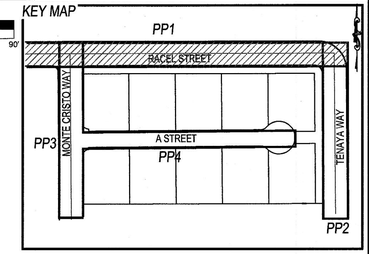
LINE AND CURVE DATA
FOR LINE AND CURVE DATA TABLES, SEE THE GRADING PLAN SHEETS FOR THIS PROJECT.

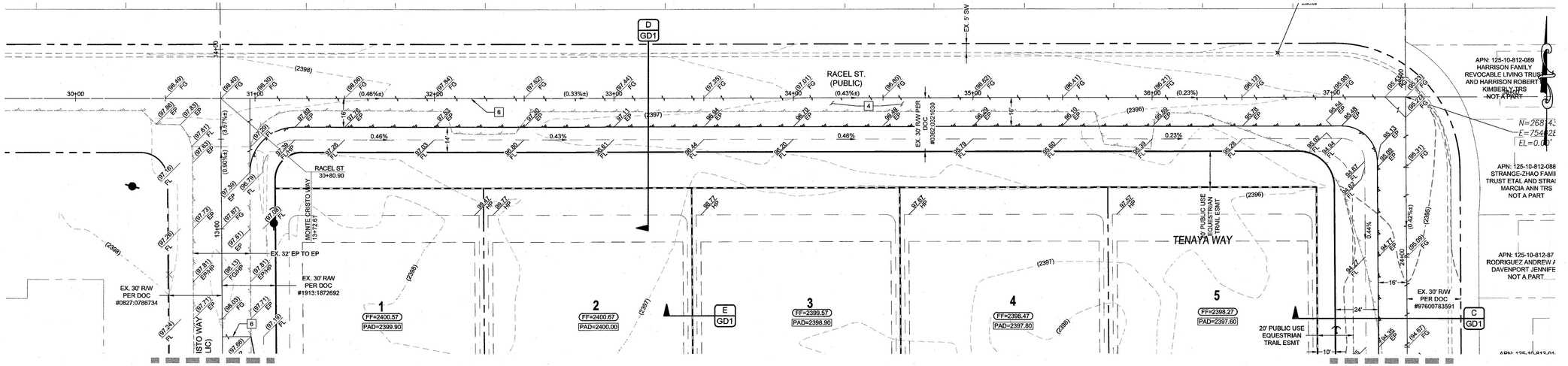
GEOTECHNICAL
FIRM NAME
FIRM ADDRESS
LAS VEGAS, NV 89XXX
(702) XXX-XXXX

REPORT NO: XXXXX
DATE: XX/XX/XX

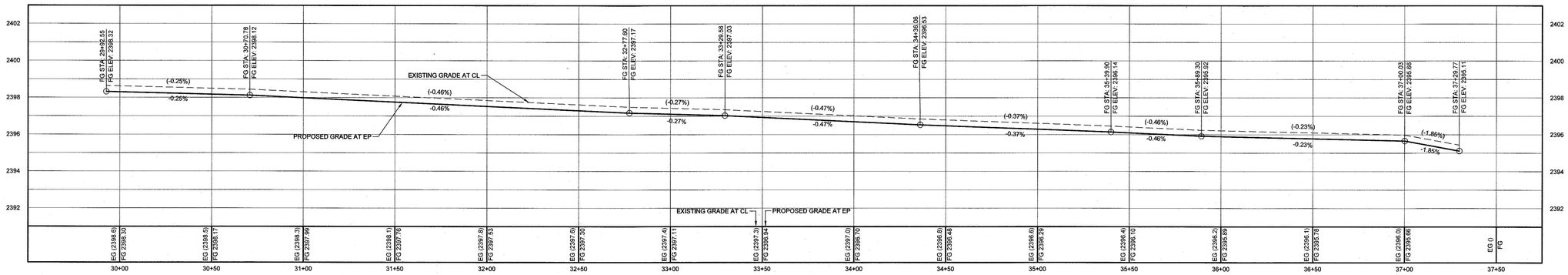
SCALE: 1" = 30'
30' 15' 30' 60' 90'

KEY MAP





RACEL ST. (PUBLIC) - PLAN



RACEL ST. (PUBLIC) - PROFILE
SCALE: 1"=30' HORIZONTAL; 1"=3' VERTICAL

CONSTRUCTION NOTES
1 — 24" R-TYPE CURB & GUTTER (USD #217.3.S1)
2 — 3.0' L-CURB TO R-CURB TRANSITION (SEE CCAUSD# 223)
3 — 8.0' CROSS GUTTER (USD #228)
4 — 3.5" AC PAVEMENT OVER 5" TYPE II PER SOILS REPORT (XXXX)
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6 — SAWCUT & MATCH EXISTING AC PAVEMENT (USD #500.3, 500.4, 500.5, & 503)
7 — INSTALL 3.0' VALLEY GUTTER (SEE DETAIL J/GD1)
8 — INSTALL 4.0' CONCRETE FLUME (SEE DETAIL I/GD1)
9 — INSTALL 48" X 16" BLOCK WALL OPENING (SEE DETAIL L/GD1)
10 — INSTALL 6' HIGH WROUGHT IRON FENCING

APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT# 122XXX FIRST APPROVED DATE
LVVWD APPROVED FIRE FLOW: XXXX GPM AT 20 PSI RESIDUAL
MAXIMUM AVAILABLE FIRE SPRINKLER FLOW XXXX GPM

ACCEPTANCE OF PLANS
SOUTHWEST GAS CORPORATION DATE

ACCEPTANCE OF PLANS FOR FILING
BY:
DEVELOPMENT AND FLOOD CONTROL DATE

CITY 0000000

NO.	DESCRIPTION	BY	SHTS	APPR.	DATE
	REVISIONS				

ADAVEN HOMES
3425 CLIFF SHADOWS PKWY
LAS VEGAS, NV 89129
(720) 385-8588 FAX:

TANEY ENGINEERING
6030 S. JONES BOULEVARD
LAS VEGAS, NEVADA 89118
(702) 362-8844 FAX: (702) 362-8333

EST. 2000

RACEL & TENAYA
A RESIDENTIAL SUBDIVISION
PLAN AND PROFILE
RACEL ST.

PROFESSIONAL ENGINEER — BRIAN E. MYERS Exp. 12-31-19 CIVIL No. 23550 — STATE OF NEVADA
2/21/19

DATE: 2/25/2019
SCALE: 1"=30'
JOB NO: ADV-18-110
DESIGNED BY: BP CHECKED BY: BM
SHEET NAME: PP 1
SHEET NUMBER: 05 OF 8

LAST PLOT: Mark Rhodia
FILE NAME: S:\ACTIVE\ADAVEN HOMES\ADV-18-110 - RACEL & TENAYA\ENG\PS\DWGS\SHEET DWGS\ADV18110_SHT_PP.DWG

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BENCHMARK
CLARK COUNTY VERTICAL CONTROL STATION: SLV99 10S8
BEING A 2CITY OF LAS VEGAS RIVET AND ROUND PLATE IN CONCRETECYLINDER, SOUTHWEST CORNER OF RACEL STREET AND TENAYA WAY, +-100' SOUTH OF RACEL STREET. ELEVATION: 2395.01 FEET (NAVD88)
730.000 METERS (NAVD88)

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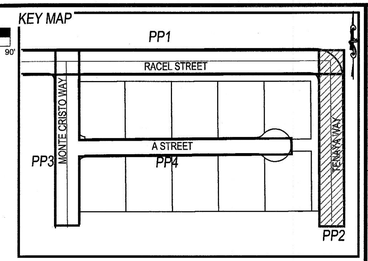
LINE AND CURVE DATA
FOR LINE AND CURVE DATA TABLES, SEE THE GRADING PLAN SHEETS FOR THIS PROJECT.

GEOTECHNICAL
FIRM NAME
FIRM ADDRESS
LAS VEGAS, NV 89XXX
(XXX) XXX-XXXX

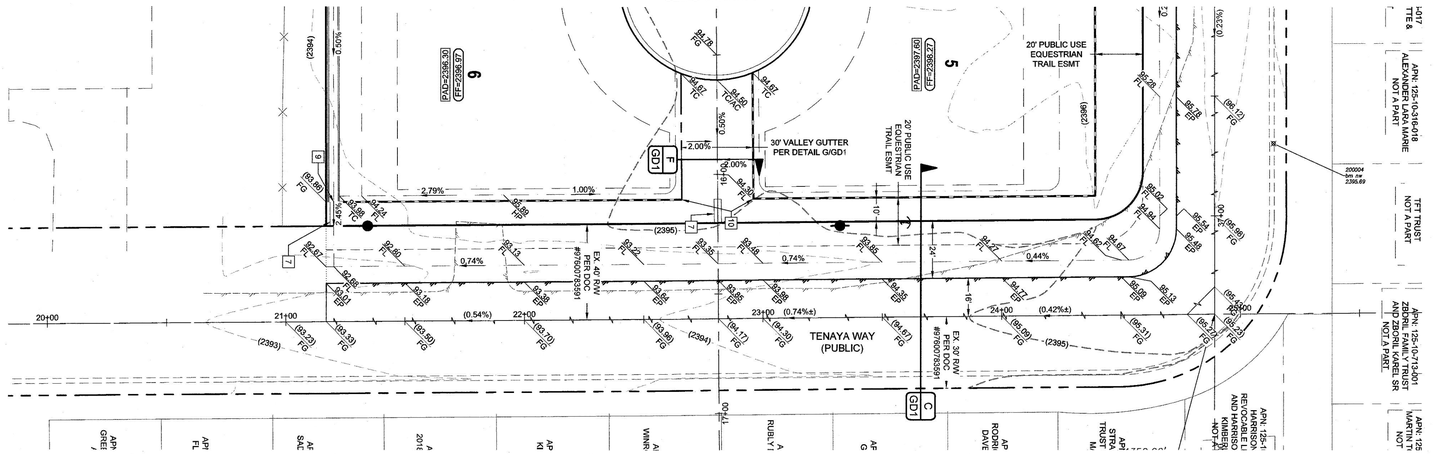
REPORT NO: XXXXX
DATE: XX/XX/XX

SCALE: 1" = 30'
30' 15' 0' 30' 60' 90'

KEY MAP

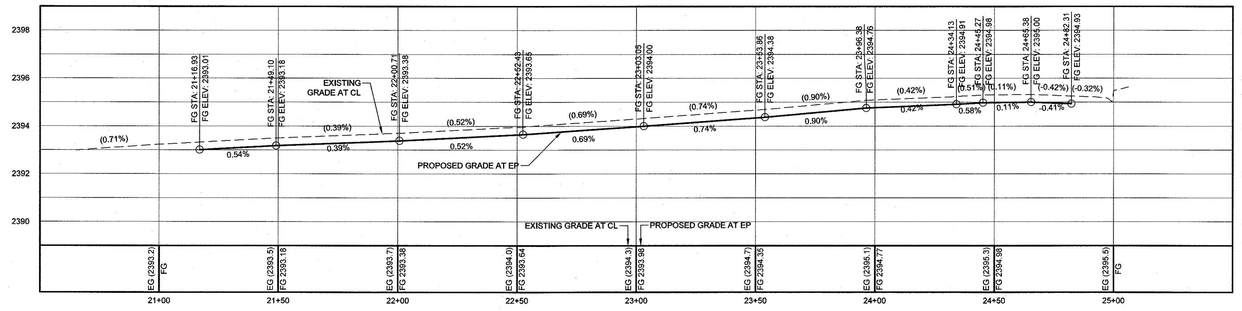


GOLDEN ROCK ST.
SEE SHEET PP4



TENAYA WAY (PUBLIC) - PLAN

CONSTRUCTION NOTES
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2. 3.0' L-CURB TO R-CURB TRANSITION (SEE CCAUSD# 223)
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10. INSTALL 6' HIGH WROUGHT IRON FENCING



TENAYA WAY (PUBLIC) - PROFILE
SCALE: 1"=30' HORIZONTAL; 1"=3' VERTICAL

APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT# 122XXX FIRST APPROVED DATE
LVVWD APPROVED FIRE FLOW: XXXX GPM AT 20 PSI RESIDUAL
MAXIMUM AVAILABLE FIRE SPRINKLER FLOW XXXX GPM

ACCEPTANCE OF PLANS
SOUTHWEST GAS CORPORATION DATE

ACCEPTANCE OF PLANS FOR FILING
BY:
DEVELOPMENT AND FLOOD CONTROL DATE

NO.	DESCRIPTION	BY	APPR.	DATE
	REVISIONS			

ADAVEN HOMES
3425 CLIFF SHADOWS PKWY
LAS VEGAS, NV 89129
(720) 365-8588 FAX:

TANEY ENGINEERING
6030 S. JONES BOULEVARD
LAS VEGAS, NEVADA 89118
(702) 362-8844 FAX: (702) 362-8233

EST. 2000

RACEL & TENAYA
A RESIDENTIAL SUBDIVISION

PLAN AND PROFILE: TENAYA WAY

BRIAN E. MYERS
Exp. 12-31-19
CIVIL
No. 23550
2/21/19

DATE: 2/25/2019
SCALE: 1"=30'
JOB NO: ADV-18-110
DESIGNED BY: BP
CHECKED BY: BM
SHEET NAME: PP2
SHEET NUMBER: 06 OF 8
CITY 0000000

LAST PLOT: Mohit Khullar
FILE NAME: S:\ACTIVE\ADAVEN HOMES\ADV-18-110 - RACEL & TENAYA\ENGR\PS\DWGS\SHEET DWGS\ADV18110_SHT_PP.DWG

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730.000 METERS (NAVD88)

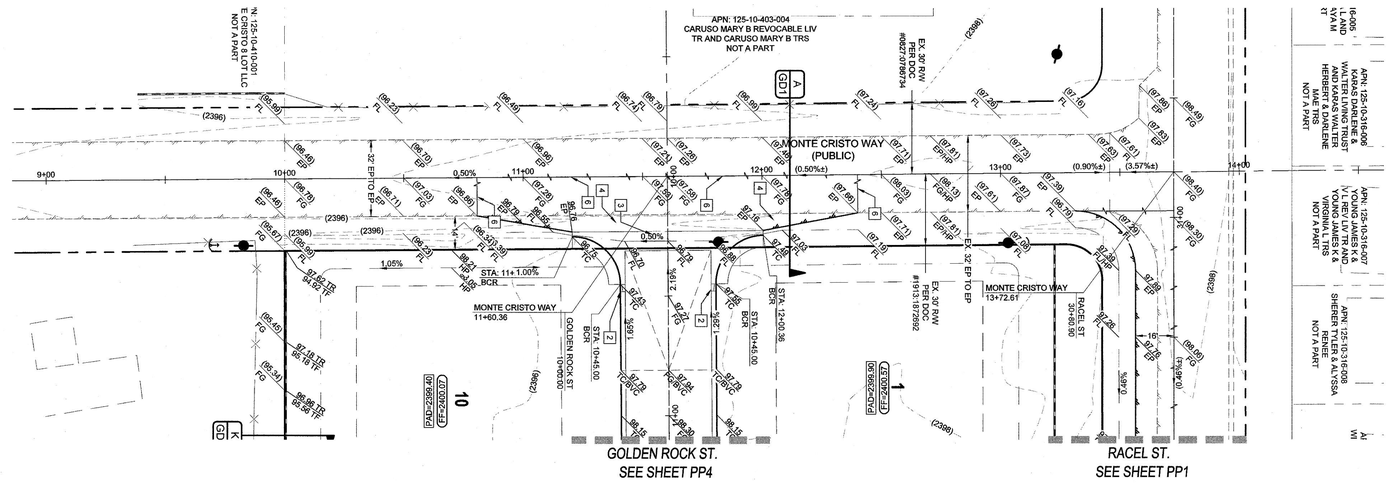
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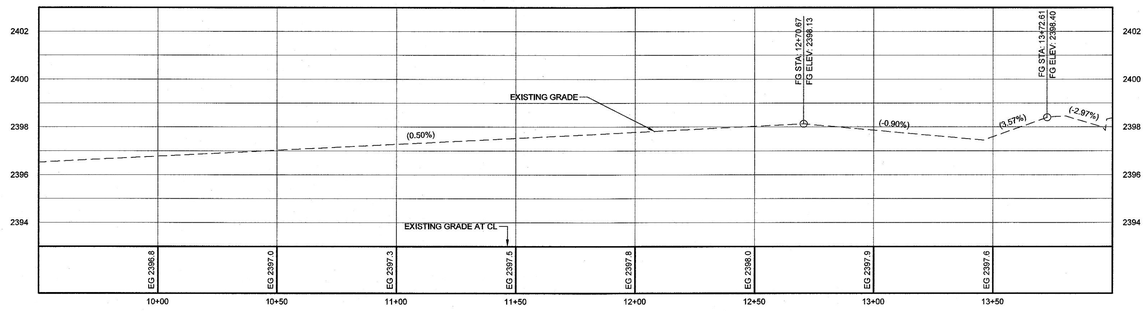
LINE AND CURVE DATA
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GEOTECHNICAL
FIRM NAME
FIRM ADDRESS
LAS VEGAS, NV 89XXX
(702) XXX-XXXX

REPORT NO: XXXXX
DATE: XX/XX/XX



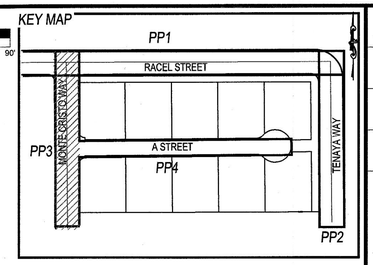
MONTE CRISTO WAY (PUBLIC) - PLAN



MONTE CRISTO WAY (PUBLIC) - PROFILE
SCALE: 1"=30' HORIZONTAL; 1"=3' VERTICAL

SCALE: 1" = 30'
30' 15' 0' 30' 60' 90'

KEY MAP



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APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT# 122XXX FIRST APPROVED DATE
LVVWD APPROVED FIRE FLOW: XXXX GPM AT 20 PSI RESIDUAL
MAXIMUM AVAILABLE FIRE SPRINKLER FLOW XXXX GPM

ACCEPTANCE OF PLANS
SOUTHWEST GAS CORPORATION DATE

ACCEPTANCE OF PLANS FOR FILING
BY:
DEVELOPMENT AND FLOOD CONTROL DATE

NO.	DESCRIPTION	BY	SH'S.	APPR.	DATE
	REVISIONS				

ADAVEN HOMES
3425 CLIFF SHADOWS PKWY
LAS VEGAS, NV 89129
(720) 365-5588 FAX:

TANEY ENGINEERING
6030 S. JONES BOULEVARD
LAS VEGAS, NEVADA 89118
(702) 362-8844 FAX: (702) 362-5233

EST. 2000

RACEL & TENAYA
A RESIDENTIAL SUBDIVISION
PLAN AND PROFILE:
MONTE CRISTO WAY

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA
BRIAN E. MYERS
Exp. 12-31-19
CIVIL
No. 23550
2/21/19

DATE:	2/25/2019
SCALE:	1"=30'
JOB NO:	ADV-18-110
DESIGNED BY: BP	CHECKED BY: BM
SHEET NAME:	PP3
SHEET NUMBER:	07 OF 8
CITY	0000000

LAST PLOT: Mark Khudia
FILE NAME: S:\ACTIVE\ADAVEN HOMES\ADV-18-110 - RACEL & TENAYA\ENG\PS\DWGS\SHEET DWGS\ADV18110_SHT_PP.DWG

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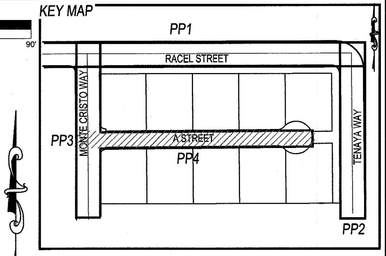
GEOTECHNICAL

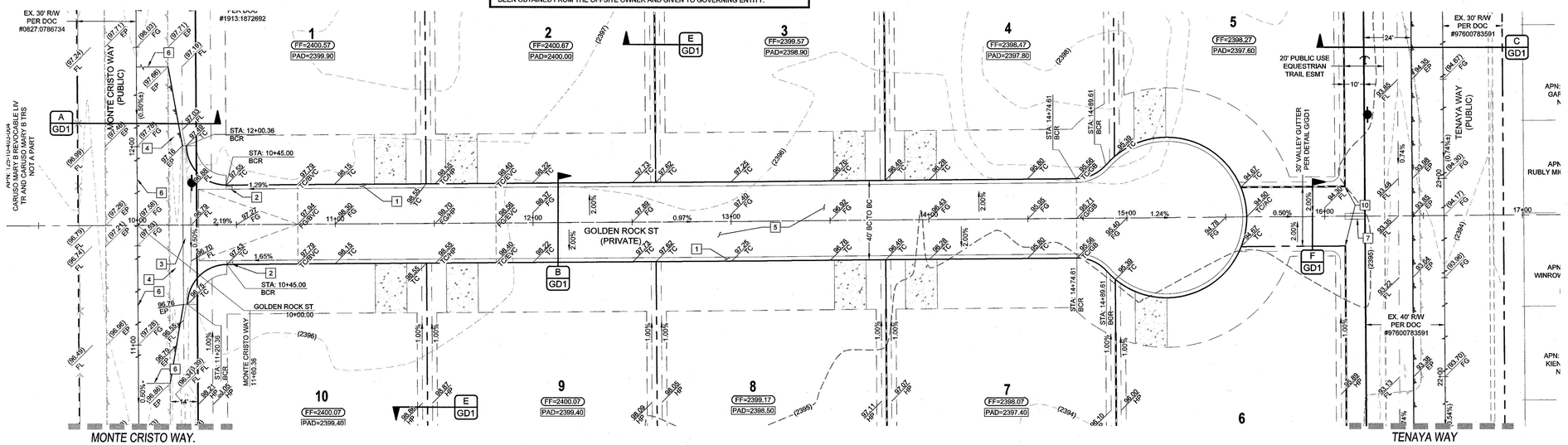
FIRM NAME
FIRM ADDRESS
LAS VEGAS, NV 89XXX
(702) XXX-XXXX

REPORT NO: XXXXX
DATE: XX/XX/XX

SCALE: 1" = 30'
30' 15' 30' 60' 90'

KEY MAP

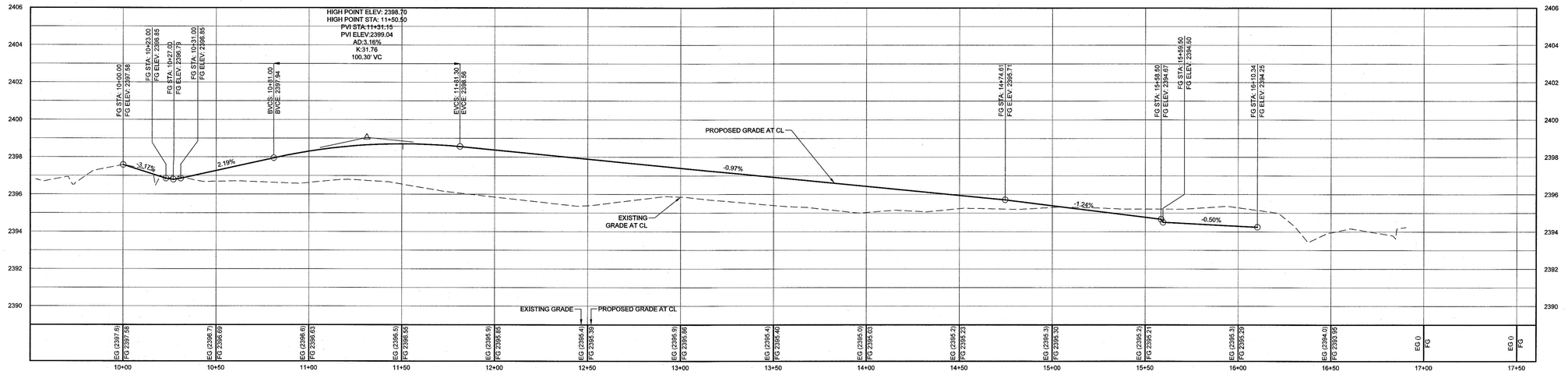




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GOLDEN ROCK ST. (PUBLIC) - PLAN



GOLDEN ROCK ST. (PUBLIC) - PROFILE

SCALE: 1"=30' HORIZONTAL; 1"=3' VERTICAL

APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT# 122XXX FIRST APPROVED DATE
LVVWD APPROVED FIRE FLOW XXXX GPM AT 20 PSI RESIDUAL
MAXIMUM AVAILABLE FIRE SPRINKLER FLOW XXXX GPM

ACCEPTANCE OF PLANS
SOUTHWEST GAS CORPORATION DATE

ACCEPTANCE OF PLANS FOR FILING
BY:
DEVELOPMENT AND FLOOD CONTROL DATE

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	REVISIONS				

ADAVEN HOMES
3425 CLIFF SHADOWS PKWY
LAS VEGAS, NV 89129
(720) 365-8588 FAX:

TANEY ENGINEERING
6030 S. JONES BOULEVARD
LAS VEGAS, NV 89118
(702) 362-8844 FAX: (702) 362-8233

EST. 2000

RACEL & TENAYA
A RESIDENTIAL SUBDIVISION

PLAN AND PROFILE: GOLDEN ROCK ST

BRIAN E. MYERS Exp. 12-31-19 CIVIL No. 23550 — 2/21/19

DATE:	2/25/2019
SCALE:	1"=30'
JOB NO:	ADV-18-110
DESIGNED BY: BP	CHECKED BY: BM
SHEET NAME:	PP4
SHEET NUMBER:	08 OF 8
CITY	0000000

LAST PLOT: Mohit Khatke
FILE NAME: S:\ACTIVE\ADAVEN HOMES\ADV-18-110 - RACEL & TENAYA\ENGR\PS\DWGS\SHEET DWGS\ADV18110_SHT_PP.DWG