DS #: 5060

APN: 138-02-713-007

PROJECT: Rancho and Jones Residential

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: November 26, 2018
TO: **Land Development Services** Department of Building & Safety			FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: **Rancho and Jones Residential**		**COPIES TO:** Actus
Cross Streets:	NWC of Rancho Drive & Jones Boulevard		Beazer Homes Las Vegas
File Number:	F:\Depot\DSMemos\DS5060A.doc		Bart Anderson, P.E., DevCo
Parcel Number:	138-02-713-007		CCRFCD
Zoning Action:	TMP-73586; ZON-73585 & GPA-73584		NDOT
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	11/6/2018	11/15/2018 & 11/26/2018	See Comments Below	$400.00	500666: $400
			TOTAL FEES (LDDRS):	**$400.00**	----

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. Provide a copy of the zoning/planning conditions associated with this site (**TMP-73586; ZON-73585 & GPA-73584**) with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the *City Council*). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.

2. Sites with a grade difference of 2 feet above or below existing grades are required to have approval from the *City of Las Vegas Planning and Development Department.* The engineer must submit copies of the grading plans and detail sheet with a letter justifying the grade difference to the *City Planning Department* (229-6301). The engineer must provide *City Planning* approval with the next submittal.

3. The site is adjacent to or crosses an existing or proposed *Clark County Regional Flood Control District* (CCRFCD) master planned facility (*Rancho Drive*). Therefore, CCRFCD concurrence is required prior to final approval of the drainage study.

4. The project proposed driveway entrance off of *Rancho Drive*. Obtain *Occupancy Permit* from the *Nevada Department of Transportation* (NDOT) for the construction of improvements in NDOT right-of-way.

5. For development in two or more phases, *City of Las Vegas* does not allow rough grading (such as rough pad and interior street grading) in the future phases in conjunction with the present phase improvements. Contour grading (to balance cut & fill) is the only grading activity allowed in the future phases. The other option is to leave the future phases in a natural and undisturbed condition.

6. The hydrology of the basin maps have some problems:

   - **Figure 8**: *Hydraulic Section (HS) J1-J1* shows Q_{100}=119cfs in Table 4. However, per the drainage map and the routing of onsite basins, *HS J1-J1* is no way close to 119cfs.
   - *HS J3-J3* is to be found nowhere in the Tables?
   - The flow from the north *Rancho* culvert (RCBC-N) will pause at the intersection of *Street G* and *Street B* (because of a high point in *Street B*), make a 90-degree turn and go south in *Street G*. Provide energy grade line calculation to evaluate the water surface at the intersection of *Street G* and *Street B*. Address the water depth and the proposed finished floor elevation of the houses in the vicinity in the next submittal.
   - At the intersection of *Street G* and *Street C*, it seems not probable that *Street C* will get the majority of the flow (15cfs/76cfs) out from **CP11** (19cfs/92cfs). Provide a split flow (Pima County) calculation for justification in the next submittal.
   - Do the same for the split flow at *Street D* and *Street E* with *Street G*.
   - It appears that some onsite streets will experience substantial flow during a major storm event. The flow depth will be above the top of curb and inundate the sidewalk. Wherever the flow tops the top of curb, a storm drain shall be provided for mitigation.

7. Review and apply the above bullet points to **Figure 9**. Address and resolve accordingly in the next submittal.

8. **Figure 7**, **Figure 8** and **Figure 9** must show clearly the existing, interim and ultimate surface flows in *Hickam Avenue* in order to verify that the interim and ultimate conditions do not impose negative impact to the downstream neighborhood.

9. The proposed condition exhibit does not consider the amount of flow being captured by the proposed inlet, and despite the discussion in the report it shows an increase of flow from 181 to 210. It is recommended that the HEC-1 and exhibit are revised to better show the proposed conditions.

10. The Interim Condition exhibit should show rough grading for undeveloped lots.

11. A notarized letter of permission from adjacent parcel owners will be required where the proposed drainage channels will be graded.

12. Confirm all slopes, flows, velocities and depths shown on the Existing, Interim, and Ultimate Drainage Conditions Maps.

13. Flow depth calculations for Street A show 78cfs entering the site, the drainage exhibit shows that this flow is entering through the drainage easement where the channel directing flow from the existing 6'x3' RCB is currently outletting onto the site. Review and revise accordingly.

14. **Sheet C3:** Label the road easement document number for Street A. If there is no easement, a notarized letter of permission for construction must be obtained from the adjacent property owner prior to the final approval of the subject drainage study.

15. **Sheet C3:** It appears that a natural swale in the adjacent parcel will impact *Street A* at the entrance. Provide some grading to re-direct the flow and obtain permission from the adjacent property owner.

16. **Sheet C4**: On the offsite side between Lot 60 and Lot 61, there appears to be a local low point at 71.39EG. Address and resolve in the next submittal.

17. **Sheet C5 & Sheet C7**: The identity of an existing storm drain in *Jones Boulevard* is mislabeled as "SS". Revise to "SD". Also provide *City of Las Vegas* recorded drawing number on the plan.

18. **Sheet C5**: Provide finished floor elevation of all adjacent houses on the plan.

19. **Sheet C6 & Sheet C8**: Are the drainage easements in the adjacent parcel existing or to be dedicated? Label recorded document number if existing.

20. Address who is going to maintain the easements in the next submittal.

21. Provide erosion control measures in both channels downstream of the *Rancho* culverts. At a minimum, provide low flow concrete U-flumes at the center of the channels.

22. Provide a barrier rail at the end of the RCB culverts and along earthen channels for pedestrian protection.

23. The *City Council* of the *City of Las Vegas* adopted an amendment to Title 20 of the Municipal Code in which Section 20.10.030 requires all public drainage easements to be concrete lined. Revise the grading plan and *Detail Sections Q/C9, R/C9 & S/C9* and all pertinent plans and construction notes accordingly.

24. The proposed wrought iron fence must utilize RTC Uniform Standard Drawing 425.S1. Revise all pertinent construction note and detail section accordingly.

25. Provide preliminary plan and profile sheets for all proposed perimeter streets. Plan and profile sheets must show existing and proposed grade at centerline, but may be preliminary in all other respects. These plans are necessary to determine the effect of the proposed development on the adjacent properties.

26. 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 the HOA".

27. All drainage easements must be public drainage easements to be privately maintained by the HOA and common lots to be labeled on the grading plans and to be dedicated as such in the final map.

28. 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.

29. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per a newly adopted USDCCA Drawing No. 421 (Stormwater Quality Management Stamp and Sign Detail).

30. The following finish floors do not meet the Regional Flood Control District minimum criteria of twice the Q_{100} depth of flow up to 18-inches above the water surface (CCRFCD Manual Section 304.4.E.1) or 6-inch minimum above the highest adjacent top of curb (CCRFCD Manual Section 1602 304.4.E.1). The following finish floors should be revised or alternate flood protection provided.

Lot	FF shown	Min FF
45	2283.00	2283.59
39	2279.10	2281.47
51	2275.30	2276.30
59	2273.60	2274.42

75.52

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
WSP/AYS

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

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Rancho and Jones Date: 11/5/2018

Location of Development: a) Descriptive (Cross Streets) North/South: N Jones Blvd

East/West: Rancho Dr

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

c) APN : 138-02-713-007

Name of Owner: Pre Rancho Craig LLC

Telephone No.: 702-802-4428 Fax No.: N/A E-Mail Address: jeff.lesnick@beazer.com

Address: 2470 Paseo Verde Parkway Suite 135, Henderson, NV 89074

Contact Person-Name: Darryl Lattimore **Telephone No.:** (702) 586-9296

* **E-Mail Address:** darryl.lattimore@actus-nv.com **Fax No.:** N/A

Firm: Actus

Address: 3283 E. Warm Springs Road Suite 300, Las Vegas, NV 89120

Type of Land Development/Land Disturbance Process:

	Rezoning	X	Subdivision Map		Clearing and Grading Only
	Parcel Map		Planned Unit Development		Other (Please specify below)
	Large Parcel Map		Building Permit		Completion of ROW

1. Total Owned Land Area: At Site: 23.13+/- Being Developed/Disturbed: 23.13+/-
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.): Single Family Residential
5. Approximate upstream land area which drains to the subject site: 14.5 +/- (Further 113 cfs flow from two culverts)
6. Has the site drainage been evaluated in the past? ■ **YES** ☐ **NO** If yes, please identify documentation: Master Drainage Study for Ranch and Jones
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: To the east into Jones Boulevard, at the intersection of Jones Boulevard and Hickam Ave
8. Briefly describe your proposed schedule for the subject project: ASAP



11/5/18

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

TECHNICAL DRAINAGE STUDY

For

Rancho & Jones

(APN: 138-02-713-007)

N. Rancho Dr and N. Jones Blvd

Las Vegas

Date: October 30, 2018

Prepared for:

Jeff Lesnick
jeff.lesnick@beazer.com
Beazer Homes Las Vegas
2470 Paseo Verde Parkway, Suite 135
Henderson, Nevada 89074
702-802-4428

Prepared by: Christian O'Quinn Jr.

Reviewed by: Darryl Lattimore, PE

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Rancho Jones	Map ID:
Firm Name: Actus	Engineer: Darryl Lattimore
Address: 3283 E. Warm Springs Road, Suite 300	
City: Las Vegas	State: NV Zip: 89120
Phone Number: (702) 586-9296	Fax Number: N/A
Property Owner: Beazer Homes Las Vegas	
Address: 2470 Paseo Verde Parkway Suite 135	
City: Henderson	State: NV Zip: 89074

Reviewed By:	Date Received:	Date Accepted for Review:

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

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

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

I. GENERAL REQUIREMENT

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

II. MAPS AND EXHIBITS

Yes	No	
x		A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.
x		A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas 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.

III. DRAINAGE PLAN

Yes	No	
x		Sheet size: 24” x 36” sealed by a registered engineer in the State of Nevada.
x		Minimum scale: 1” = 60’.
x		Project name.
x		Vicinity Map with local and major cross streets.
x		Revision box.
x		North arrow and bar scale.
x		Engineer’s/consultant’s address and phone number.
x		Elevation datum and benchmark.
x		Legend for symbols and abbreviations.
x		Cut/fill scarps, where applicable.
x		Street names, grades, widths.
x		Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street.
x		Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
x		Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
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 basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
x		Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
x		Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
x		Location and cross-section of street capacity calculations.
	N/A	Cross-sectional detail for channels, including cutoff wall locations.
x		Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
x		Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
x		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.
	N/A	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 and flood) must be shown with adjacent ground elevations. Flood walls 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 floor elevations must be a minimum of 18 inches above BFE.
x		Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the Q_{100} flows.
x		Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
	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	
	N/A	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
x		Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. Q_{100} d x v $\leq$ 8. Q_{10} d x v $\leq$ 6 and 12 foot dry lane for rights-of-way $\geq$ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
x		A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
x		Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
x		Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
x		Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever 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 the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
	N/A	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
	N/A	Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
x		The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
	N/A	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:	**STANDARD FORM 2**

CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA
STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

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

An appointment must be made to preview this checklist in conjunction with CCRFCD Standard Form 2 prior to the City accepting a new drainage study for review. The engineer must contact the Flood Control Section at (702) 229-6541 to schedule a submittal appointment.

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

I. GENERAL REQUIREMENT		
Yes	No	
	N/A	A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.)
X		Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.
X		An electronic copy of the complete submittal is required to be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output device replicating your submittal. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats. If figures are in color, they must be scanned in color and saved as a separate file. _____ by initial here, the engineer on record acknowledges that the electronic copy is an identical replicate of the original hard copy submitted to the City of Las Vegas.

II. GRADING PLAN INFORMATION		
Yes	No	
X		(1) 24" X 36" copy of the Grading Plan, (including all Detail Sheets) sealed by the engineer.
X		Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street. Note: Proposed top of curb elevations must be provided for both sides of roadways even if only half street construction is required.
X		Label existing topography at a minimum 5 foot elevation interval including adjacent developments, finished floor elevations of existing buildings and top of existing curbs extending 100 feet* around the perimeter of the site. (*Measured from the centerline of the adjacent roadway.)

II. GRADING PLAN INFORMATION		
Yes	No	
X		Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
X		All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property.
X		Street slopes for both interior and perimeter streets. Note: The minimum slope for a roadway is 0.4 percent, a minimum 18-inch storm drain must be provided where minimum slopes cannot be met.
X		Back of lot elevations and lot drainage pattern for all lots including common lots.
N/A		Sites with a grade difference two feet above or below existing ground are required to have approval from City of Las Vegas Current Planning. Current Planning approval is required prior to final approval of the drainage study.
X		On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners. (The project must pass flows through the site every 600 feet where the project is blocking flow paths.)
N/A		This project uses a solid grouted stem wall (or approved alternate) at the back of sidewalk to provide erosion protection for landscaped areas where the depth of flow in the roadway exceeds the back of walk elevation. A corresponding cross-section detail is included.
N/A		Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
X		Concrete valley gutters are required in parking lots with slopes less than 1 percent. Slopes through cul-de-sac must be at a 1 percent minimum where flow is drained through the cul-de-sac.
X		Ten-foot wide public drainage easements to be privately maintained are allowed for flow less than 20 cfs. The depth of flow entering the easement must be checked using the submerged weir calculation.
N/A		The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.
X		Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
X		Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q100 weir of submerged weir elevation, whichever is greater.

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
N/A		Lots with “B and C Type Drainage” that drain from one lot to another through a drainage easement shall be required to install an underground nuisance drainage system or a 2-foot valley gutter. 16” x 24” minimum block wall openings are required for both options.
N/A		Bubblers are required across 80 foot and greater ROW streets. When flows exceed 10 cfs, bubblers larger than 18 inches will be required up to a maximum of 36”. Inlets must be sized to match the pipe size provided.

- Contact the Flood Control Section regarding the drainage study review fee. These fees are payable at the time of submittal.
- The Drainage Study must be conditionally approved prior to submitting improvement plans to the Civil and Planning Development of the Department of Building and Safety for review.

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

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I. INTRODUCTION

A. Study Overview and Purpose

This study is intended to serve as the Technical drainage study for the 'Rancho and Jones' 23.1± acre project, located north of the intersection of N. Rancho Dr and N. Jones Blvd (see Figure 1, *Vicinity Map*). The project site is currently planned as general commercial district (C-2); however, the proposed zoning is a low-density single-family residential development. The project will be comprised of 176 single-family lots, and, will be developed in two phases. This study is a stand-alone document, and, presents the findings of the contributory watershed area's detailed hydrologic analysis. Please note that this study will provide the hydrological summations for the Existing, the Interim, and, the Ultimate conditions to meet the mandated drainage study requirements.

B. Location

The project area is a portion of the East Half (E ½) of the Southeast Quarter (SE ¼), of Section 2, Township 20 South, Range 60 East, M.D.M., Las Vegas, Nevada commonly known as APN: 138-02-713-007. See Figure 2a, and 2b, *Assessor's Map.*

C. FEMA Flood Plain Information

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Community-Panel Number 32003C 2155F, effective June 21, 2017, the site is located within Zone 'X'. Zone 'X' is described as an area outside of the 0.2% annual chance floodplain. Figure 3, *Flood Insurance Rate Map*, depicts the FEMA flood zones within proximity of the site, and, is provided in the Appendix of this study.

D. CCRFCD Master Plan Information

As shown on Figure F-20 from the *Flood Control Master Plan Update of the Las Vegas Valley* (Figures 4 and 5 of this report), the subject site is not adjacent to any existing master plan facility. On Figure H-20, *Hydrologic Subareas* (Figure 6 of this report), the site is shown to be located within regional basin PD16A3-C.

E. Reference Studies

Four (4) approved drainage studies/plans have been utilized in preparation of this study. They are as follows:

- *Master Drainage Study for Craig & Rancho (September 2016), Lochsa Engineering,* herein referred to as the *Master Study.* This study is provided as the basis for all flows impacting the project site, and, also as the basis for flows in Rancho Drive and Jones Boulevard.
- *Technical Drainage Study for Jones Hickam Residential Development (September 2017), Triton Engineering LLC,* herein referred to as the *JHRD Study.* This study is consulted to get an idea about the drainage pattern to the southeast of the project site. No flows are referenced from this study.

- *Technical Drainage Study for Craig-Jones Commercial (June 2006), DRC Inc.,* herein referred to as the *Craig-Jones study.* This study is consulted to get an idea about the drainage pattern to the northeast of the project site. No flows are referenced from this study.
- *Jones Boulevard Improvement Project, From Rancho Drive to Centennial Parkway (2000), DPW, City of Las Vegas.* These plans are referenced to show the plan and profile of the 36" HDPE and the 48" HDPE in Jones Boulevard.

The engineer has reviewed the referenced studies with addenda and concurs that the current conditions are the same as those from the referenced studies.

II. DRAINAGE BASIN DESCRIPTIONS

A. Site Description

The site consists of approximately 23.1± acres and is adjacent to existing residential and commercial properties to the northeast and the southeast, and, undeveloped properties to the North, and, the West. The project site generally slopes from Southwest to Northeast at approximately 0.9%.

B. Offsite Drainage Description

The offsite drainage description includes analysis of the properties which discharge flows into the project site or into the streets adjacent to the project site. An analysis of the offsite basins is needed to determine the increase in flow being conveyed into the project site or into the streets adjacent to the project site, due to the future development of the currently undeveloped upstream properties.

The project site for this study, has been previously analyzed as a part of the Craig and Rancho Master Study (see Figure 7, Existing Condition basins map in the Appendix). As per the *Master Study,* there are two existing 6'x3' RCBCs on the west side of the Rancho Drive (referred to as 'D5RCHO' in the *Master Study*) that discharge a combined flow of 20 cfs, and, 113 cfs of flow, for the 10-year and the 100-year rainfall event respectively, into the currently undeveloped property, just to the west of the project site. Flows from those RCBCs along with the flows from the eastern half of Rancho Drive (referred to as 'RNCH1 (4/7 cfs)' and 'RNCH2 (3/6 cfs)' in the *Master Study*), and, the flows from the currently undeveloped property to the west of the project site, in the existing condition are being conveyed easterly, through the project site, to the low point (referred to as 'LOWPNT-X*' in the *Master Study*) at the intersection of Jones Boulevard and Hickam Ave. In the existing condition, a total of 49/181 cfs of flow (combined flow from offsite as well as onsite basins, referred to as TOTL-X in the *Master Study*) is being conveyed to the low-point in Jones Boulevard, out of which, 49/79 cfs gets picked up by multiple drop inlets at the low-point in Jones Boulevard, while the rest (<1/102 cfs) continues easterly onto the Hickam Avenue. The flows picked up by the existing drop inlets in Jones Boulevard are conveyed towards north by an existing 48" HDPE in Jones Boulevard. **Note that nearly 102 cfs of flow is currently being discharged into the Hickam Avenue in the existing condition.**

As per the *Craig-Jones Study,* flows from properties to the north, and, the east of the project site are conveyed away from the project site, and, thus have no impact on the project site. Similarly, as per

the *JHRD Study,* flows from the properties to the southeast of the project site drain further towards southeast and don't affect the project site.

All pertinent information regarding the *Master Study* can be found in the References section. Please note that the entire HEC-1 analysis from the *Master Study* simulating the existing condition offsite runoff to the project site was copied and rerun to validate the results from the study. The results obtained from the validation rerun matches with the flow values provided in the *Master Study,* and, the engineer concurs with the parameters used in the existing condition HEC-1 analysis of the *Master Study*. Please also note that HEC-1 analysis in the *Master Study* takes into account DARF and lag time analysis, and so, there might be significant deviation in the flow values obtained at the low-point from HEC-1 analysis to that obtained by simple numerical summation of discharges from each offsite basin.

C. Existing Condition Drainage Description

The Existing Condition considers the currently undeveloped project site (see Figure 7, Existing Condition basins map in the Appendix). Similar to the offsite drainage description, the existing condition analysis for the project site has also been referenced from the *Master Study*. A description of the Existing Condition flows is as follows:

Flows from offsite basin *RNCH1 (4/7 cfs) combine with the flows from onsite basin *NX1 (21/48 cfs) to give a combined flow of 24/53 cfs at concentration point *CMX1.

Flows from offsite basin *RNCH2 (3/6 cfs) combine with the flows from onsite basin *NX2 (16/34 cfs) to give a combined flow of 19/39 cfs at concentration point *CMX2.

Flows from offsite street *JONES1 combine with flows in *CMX1 and *CMX2, to give a combined flow of 45/96 cfs at concentration point *LOCL-X. Flows from the two offsite 6'*3' RCBs (20/113 cfs) combine with the flows in *LOCL-X at concentration point *TOTL-X (49/181 cfs). Please note that the flow diagram showing the succession of combination points has been highlighted in the HEC-1 run from the *Master Study* and has been provided in the reference section of this study.

Please also note that the flows at concentration point *TOTL-X (49/181 cfs), is the total flow from all onsite as well as offsite basins, conveying into the low point at the intersection of Jones Boulevard and Hickam Avenue, in the existing condition. The intersection currently consists of multiple-scattered drop inlets tied to a 48" HDPE located in Jones Boulevard, and, out of the total flow conveying into the low point, 49/79 cfs of flow is getting picked up by the drop inlets and conveyed north into Jones Boulevard, while the rest (<1/102 cfs) continues easterly onto the Hickam Avenue. All the pertinent reference materials, related to the existing condition drainage description, have been provided in the References section of this study.

D. Interim Condition Drainage Description

The Interim Condition considers the project site to be developed while the considering the offsite basins to be in their existing condition (see Figure 8, *Interim Condition Basin Map* in the Appendix). As mentioned earlier in the report, the project site is being developed in two phases – Phase I, and, Phase II. During Phase I, the north-eastern half of the project site consisting of basins ION9B, DON3,

DON4, DON5, and, DON6 is fully developed while Phase II consisting of basins ION1, ION2, ION9A, ION7A, and, ION8 is rough graded with Phase I but developed later. Please note that while development of Phase II will be started only upon the completion of Phase I, the rough grading of the project site for both the phases will be carried out together. Note that Phase II, however, consists of all offsite basins along with all onsite basins to be fully developed, and, therefore has been described in the Ultimate Condition drainage description. A description of the Interim Condition flows is as flows:

Flows from the existing offsite basin IOFF1 (2/6 cfs) and the existing northern 6'*3' RCB (14/78 cfs) combine with the flows from the interim onsite basin ION1 (2/6 cfs) for a total of 19/91 cfs at concentration point CP1I. Flows at CP1I are conveyed south, and, split at the intersection of Street G and Street C, and, further down at Street D and Street E. The total combined flow at concentration point CPTOTL-I is 35/119 cfs.

Similarly, flows from the existing offsite basin IOFF2 (6/18 cfs) and the existing southern 6'*3' RCB (6/35 cfs) combine with flows from the developed onsite basins DON5 (2/3 cfs) for a total of 16/56 cfs at concentration point CP5. Flows in CP5 combine with flows from *JONES1 (4/7 cfs), Rancho Drive (7/13 cfs) (sum of *RNCH1 (4/7 cfs) and *RNCH2 (3/6 cfs) from the *Master Study*), and, flows in concentration point TOTL-I (33/123 cfs) to give a combined flow of 59/201 cfs at concentration point CPLP.

Note that the 10-year flow at each concentration point is obtained by numerically summing the 10-year flows from the upstream basins contributing the flows to the concentration point. Also note that the individual 10-year flow from the two 6'*3' RCB culverts has not been provided in the *Master Study*, but only the total combined 10-year and 100-year flow from them, and, the individual 100-year flows from them has been provided. The individual 10-year flow from each culvert is obtained by multiplying the ratio of 100-year flow from each culvert to the total combined 10-year flow from them.

Note that in our analysis flows from Rancho Drive, unlike in the *Master Study*, are not routed through the project site, but around it, though the ultimate discharge point (i.e. the low-point at the intersection of Jones Blvd and Hickam Ave) is unchanged. The engineer is of the opinion that future development of the vacant property to the west of the project site along with further improvements of the Rancho Drive will mean that flow in Rancho Drive will have to be conveyed towards the intersection of Jones Boulevard and Rancho Drive.

All pertinent reference materials along with the relevant flow-split calculations have been provided in the *Appendix* of this study.

E. Ultimate Condition Drainage Description

The Ultimate Condition considers the both the phases of the project, along with all the offsite basins impacting the project site to be fully developed (see Figure 9, *Ultimate Condition Basin Map* in the Appendix). Note that the overall drainage pattern for all the offsite and onsite basins in the ultimate condition continues to stay the same as in the interim condition with the only difference being the amount of flow into/from each basin. The flow paths through the basins and the discharge points,

however, are the same for both the interim and the ultimate condition. A description of the Ultimate Condition flows is as follows:

Flows from the developed offsite basin DOFF1 (4/9 cfs) and the existing northern 6'*3' RCB (14/78 cfs) combine with the flows from the developed onsite basin DON1 (5/10 cfs) for a total of 23/97 cfs at concentration point CP1. Flows at CP1 are conveyed south, and, split at the intersection of Street G and Street C, and, further down at Street D and Street E. The total flow at concentration point CPTOTL is 37/123 cfs.

Similarly, flows at CPTOTL combine with flows from *JONES1 (4/7 cfs), Rancho Drive (7/13 cfs) (referred to as *RNCH1 and *RNCH2 in the *Master Study*), and, CP5 (16/54 cfs) to give a combined flow of 78/210 cfs at concentration point CPLP.

Note that as per the *Master Study*, 181 cfs of total flow at the low-point in Jones Boulevard while the developed condition flow, calculated in this study, discharging into the same point, is 210 cfs, which means an increment of (210 – 181) = 29 cfs of flow. To mitigate this increment, a 15' drop inlet will be constructed at the corner of the 30' drainage easement between Lot 9 and Lot 10. The proposed 15' drop inlet will be connected to the existing 36" HDPE in Jones Boulevard and will pick up the 32 cfs of flow. The remaining 178 cfs of flow will remain of the surface and combines with the flow from DON 5. All the relevant calculations for the drop inlet and existing 36" HDPE in Jones Boulevard has been provided in the Appendix of this study.

Please note that therefore the current development of this project and future development of the offsite commercial project adjacent to Rancho Drive will NOT increase water above the existing runoff amount at the low-point in Jones Boulevard.

III. HYDROLOGIC CRITERIA

A. Method of Analysis

The U.S. Army Corps of Engineers HEC-1 flood hydrograph package is used to determine the peak runoff generated by the 100-year, 6-hour storm event. The HEC-1 computer model can simulate the surface runoff response of a given basin and smaller sub-basins to rainfall. The computed hydrographs from each sub-basin are then combined at the appropriate locations, from which a final discharge hydrograph is obtained. The HEC-1 analyses for the Existing, the Interim, and, the Ultimate Conditions are included in the Appendix of this study.

B. Precipitation

The project site is located inside of the McCarran Airport Rainfall Area. The rainfall depths for the 6-hour, 10-year and 100-year storm events are obtained per the *CCRFCD Hydrologic Criteria and Drainage Design Manual (1999), Section 500, Table 501/Figure 503/Figure 506*, and, are 1.58 inches, and 2.77 inches, respectively. Since the site encompasses less than 10 square miles, a Storm

Distribution Number three (SDN #3) is used for the HEC-1 model. HEC-1 parameters are included in the Appendix of this study.

C. Hydrologic Abstractions

The SCS curve number method is used to determine the infiltration rates for the drainage basins. The engineer has furnished a site-specific Custom Soil Resource Report from the Department of Agriculture for the project site (see Appendix). The project site lies within soils type Las Vegas-Destazo complex, 0 to 2 percent slopes (Type 305), and, Las Vegas gravelly fine sandy loam, 2 to 4 percent slope (Type 301), both of which fall within hydrological soil group D. The curve numbers used are based on Drainage Design Manual Table 602. Reference material for the soil characteristics has been provided in the Appendix of this study.

D. Basin Area

Basin areas from the referenced studies for the offsite drainage basins are utilized in this study. The elevation topography is based on a project-specific field survey in conjunction with reference studies within proximity of the site to delineate watershed tributary to the project. Note that lag times below ten minutes for the undeveloped condition and five minutes for the developed condition are revised to concur with Sections 602 and 602.1 of the *Drainage Design Manual*. The HEC-1 parameter calculations for the Existing and Interim/Ultimate Conditions has been provided in the Appendix of this study.

E. SCS Lag-Time with Time of Concentration

Lag-time, T_L, is defined as the time measured from the centroid of effective rainfall to the peak of the outflow hydrograph. Lag times for this study are estimated by calculating the drainage basins' time of concentration, T_C. The time of concentration is defined as the time required for runoff to flow from the hydraulically most distant point of a subbasin to the outlet point of the subbasin. The equation for lag-time is: $T_L=0.6T_C$. Standard Form 4 as included in the *CCRFCD Manual* is utilized to determine the lag times for sub-basins modeled and has been provided in the Appendix of this study.

IV. MODEL RESULTS

A. Peak Flows

Existing Condition

TABLE 1				
HEC-1 Summary (Existing Condition)				
BASIN ID/CONCENTRATION POINT	**DRAINAGE AREA**	**Reference**	**Q_{10}**	**Q_{100}**
	(acres)		**cfs**	**cfs**
*NX1	22.30	*Master Study*[1]	21.0	46.0
*NX2	14.07	*Master Study*[1]	16.0	34.0
*CMX1	-	*RNCH1+NX1*	24.0	53.0
*CMX2	-	*RNCH2+NX2*	19.0	39.0
*LOCL-X	-	*CMX1+CMX2+JONES1*	45.0	96.0
*TOTL-X	-	*D5RCHO+ LOCL-X*	49.0	181.0
*D5RCHO	-	*Master Study*[1]	20.0	113.0
*JONES1	2.20	*Master Study*[1]	4.0	7.0
*RNCH1	2.27	*Master Study*[1]	4.0	7.0
*RNCH2	1.94	*Master Study*[1]	3.0	6.0
[1] Referenced from Master Drainage Study for Craig and Rancho				

Interim Condition

TABLE 2				
HEC-1 Summary (Interim Condition)				
BASIN ID/CONCENTRATION POINT	**DRAINAGE AREA**	**Reference**	**Q_{10}**	**Q_{100}**
	(acres)		**cfs**	**cfs**
ION1	3.45	*HEC-1*	3.0	7.0
ION2	0.60	*HEC-1*	1.0	2.0
DON3	1.01	*HEC-1*	1.0	3.0
DON4	1.07	*HEC-1*	1.0	2.0
DON5	1.02	*HEC-1*	2.0	3.0
DON6	0.85	*HEC-1*	1.0	2.0
DON7	6.42	*HEC-1*	8.0	29.0
ION8	3.00	*HEC-1*	4.0	8.0

ION9A	2.30	*HEC-1*	3	6
ION9B	2.41	*HEC-1*	4	8
IOFF1	3.53	*HEC-1*	2.0	6.0
IOFF2	6.80	*HEC-1*	8.0	16.0
CP1	IOFF1+ION1+78 cfs	*HEC-1*	19.0	92.0
CP2	CP1+DON2	*HEC-1*	7.0	23.0
CP3	CP2+DON3	*HEC-1*	4.0	14.0
CP5	DON4+DON5+35 cfs	*HEC-1*	16.0	56.0
CP7	CP2+CP3+DON7	*HEC-1*	8.0	29.0
CP8	CP1+DON8	*HEC-1*	15.0	76.0
CPTOTL	DON9+ION8+CP7	*HEC-1*	35.0	119.0
CPLP	CPTOTL+JONES+CP5	*HEC-1*	62.0	204.0
JONES1	2.20	*Master Study*	4.0	7.0
RNCH	4.28	*Master Study*	7.0	13.0

[1] Referenced from Master Drainage Study for Craig and Rancho and HEC-1 model for this Drainage Study

Ultimate Condition

TABLE 3

HEC-1 Summary (Ultimate Condition)

BASIN ID/CONCENTRATION POINT	DRAINAGE AREA (acres)	Reference	Q_{10} cfs	Q_{100} cfs
DON1	3.45	*HEC-1*	5.0	10.0
DON2	0.80	*HEC-1*	1.0	2.0
DON3	1.01	*HEC-1*	1.0	3.0
DON4	1.07	*HEC-1*	1.0	2.0
DON5	1.02	*HEC-1*	2.0	3.0
DON6	0.85	*HEC-1*	1.0	2.0
DON7	6.42	*HEC-1*	8.0	17.0
DON8	3.00	*HEC-1*	4.0	8.0
DON9	5.71	*HEC-1*	7.0	14.0
DOFF1	3.53	*HEC-1*	4.0	9.0
DOFF2	6.80	*HEC-1*	8.0	16.0
CP1	CPN+DON1	*HEC-1*	23.0	97.0
CP2	CP1+DON2	*HEC-1*	11.0	29.0
CP3	CP2+DON3	*HEC-1*	8.0	17.0
CP5	CPSO+DON5	*HEC-1*	16.0	54.0

CP7	CP2+CP3+DON7	*HEC-1*	12.0	31.0
CP8	CP1+DON8	*HEC-1*	17.0	78.0
CPN	DOFF1+78 cfs	*HEC-1*	18.0	87.0
CPSO	DOFF2 + 35 cfs	*HEC-1*	14.0	51.0
CPTOTL	DON9+ION8+CP7	*HEC-1*	37.0	123.0
CPLP	CPTOTL+JONES+CP5	*HEC-1*	78.0	210.0
JONES1	2.20	*Master Study*	4.0	7.0
RNCH	4.28	*Master Study*	7.0	13.0
1 Referenced from Master Drainage Study for Craig and Rancho				

B. Hydraulic Calculations

Street Flow Calculations

Interim Condition

Table 4

100-year Street Flow Analysis (Interim Condition)

Street	Section	Slope (%)	Flow (100 year)	Velocity (ft/s)	Flow Depth (ft)	VxD
Street G	G1	2.50	92.0	3.12	0.66	2.06
Street G	G2	0.50	23.0	1.62	0.29	0.47
Street G	G3	0.50	17.0	2.12	0.51	1.08
Street G	G4	0.50	54.0	3.36	0.68	2.28
Street J	J1	0.61	119.0	3.66	0.73	2.67
Street J	J2	0.56	29.0	2.06	0.32	0.66
Street C	C	1.50	78.0	4.35	0.43	4.10
Street D	D	2.07	31.0	3.15	0.23	0.72
Street E	E	1	31.0	2.24	0.36	0.81

Table 5						
10-year Street Flow Analysis (Interim Condition)						
Street	**Section**	**Slope (%)**	**Flow (10 year)**	**Velocity (ft/s)**	**Flow Depth (ft)**	**VxD**
Street G	G1	2.50	19.0	2.75	0.16	0.44
Street G	G2	0.50	7.0	1.14	0.14	0.16
Street G	G3	0.50	17.0	1.62	0.24	0.39
Street G	G4	0.50	16.0	1.58	0.23	0.36
Street J	J1	0.61	35.0	2.28	0.35	0.80
Street J	J2	0.56	8.0	1.24	0.15	0.19
Street C	C	1.50	15.0	2.14	0.16	4.10
Street D	D	2.07	8.0	1.84	0.1	0.18
Street E	E	1	8.0	1.48	0.13	0.19

Ultimate Condition

Table 6						
100-year Street Flow Analysis (Ultimate Condition)						
Street	**Section**	**Slope (%)**	**Flow (100 year)**	**Velocity (ft/s)**	**Flow Depth (ft)**	**VxD**
Street G	G1	0.50	97.0	4.23	0.83	3.51
Street G	G2	0.50	29.0	2.62	0.58	1.52
Street G	G3	0.50	17.0	2.12	0.51	1.08
Street G	G4	0.50	54.0	3.36	0.68	2.28
Street J	J1	0.61	130.0	5.05	0.89	4.49
Street J	J2	0.56	78.0	4.02	0.75	3.02
Street C	C	0.73	78.0	4.35	0.72	3.13
Street D	D	1.21	31.0	3	0.48	1.44
Street E	E	1	78.0	4.79	0.69	3.31

Table 7						
10-year Street Flow Analysis (Ultimate Condition)						
Street	**Section**	**Slope (%)**	**Flow (10 year)**	**Velocity (ft/s)**	**Flow Depth (ft)**	**VxD**
Street G	G1	0.50	23.0	2.39	0.55	1.31
Street G	G2	0.50	11.0	1.86	0.47	0.87
Street G	G3	0.50	8.0	1.75	0.50	0.88
Street G	G4	0.50	16.0	2.07	0.51	1.06
Street J	J1	0.61	37.0	3.07	0.60	1.84
Street J	J2	0.56	12.0	1.98	0.47	0.93
Street C	C	0.73	17.0	2.40	0.49	1.18
Street D	D	1.21	12.0	2.71	0.43	1.17
Street E	E	1	12.0	2.51	0.44	1.10

The major storm criteria for all ROW's are as follows: VxD product shall be less than or equal to 8, and the depth of flow measured from the gutter flowline shall be less than or equal to 2'. Street's A, G, J, C, D, E, and F all meet both the criteria.

The minor storm criteria for ROW's less than 80' are as follows: depth of flow measured from the gutter flow line has to be less than or equal to 1', and the VxD product shall be less than or equal to 6. Street's A, G, J, C, D, E, and F meets these criteria.

The minor storm criteria for ROW's greater than 80' are as follows: 12' wide dry lane maintained in each direction, and the VxD product shall be less than or equal to 6. Street's A, G, J, C, D, E, and F meets both the criteria under the worst-case conditions.

Finished Floor Analysis

A finished floor analysis table depicting the proposed lot finished floor elevations, high side TCs, and correlating street flow depths has been included in the Appendix. The criteria for proposed lots is to be above 2 times the depth of flow and to be 18 inches above the centerline elevation in adjacent streets. The Ultimate Condition flow depths were used as the worst-case conditions. Both criteria have been met for all proposed lots. A copy of the relevant Finished floor calculations has been provided in the reference section of this study.

Easement Calculations

All weir calculations and normal depth calculations for all drainage easements for the ultimate 100-year flow for the worst-case scenario have been provided in the Appendix.

Storm Drain and Channel Calculations

The drop inlet calculations for section G4 are collecting the ultimate condition flow for the concentration point CPSO have been provided in the Appendix. There is 51 cfs conveyed through Common Element C in the Ultimate Condition. A proposed 15' modified type C drop inlet will face into CE C and will collect 32 cfs in the 100-year event with remaining 19 cfs spilling into the interior streets. The total project increase with development of the project is 30 cfs in the 100-year event, hence the proposed storm drain system will mitigate the existing runoff in Jones Boulevard and will not impact downstream development. As mention earlier in this study, WSPG calculations for the storm drainage system (proposed 30" RCP, as well as existing 30" & 48" mains in Jones Boulevard) and the proposed onsite drop inlet have also been provided in the Appendix section.

Please note that the existing drop inlets at the intersection of Hickam Avenue and Jones Boulevard were not re-analyzed based on not changing the total flow impacting the facilities.

The open channels from the existing 3x6 RCBs will be conveyed through the adjacent property to the south via proposed earthen channels. Please note that the bottom width of both channels have been widened to allow for non-erosive flows (less than five feet per second). WSPG calculations for both channels have been provided in the Appendix.

V. CONCLUSIONS

This Technical Drainage Study for Rancho and Jones has been developed in accordance with Criteria established in the Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual. The proposed development does not adversely impact any proposed or existing Clark County Regional Flood Control District Master Plan Update facilities.

VI. REFERENCES

1. *CCRFCD Hydrologic Criteria and Drainage Design Manual and Addenda*, WRC Engineering, 1999.

2. *2008 and 2013 CCRFCD Flood Control Master Plan Update*, P.B.S. & J, Inc. and PB, 2008 and 2013.

3. *Flood Insurance Rate Map, Community Panel Number 32003C 2155F, Clark County, Nevada*, Federal Emergency Management Agency, June 17, 2017.

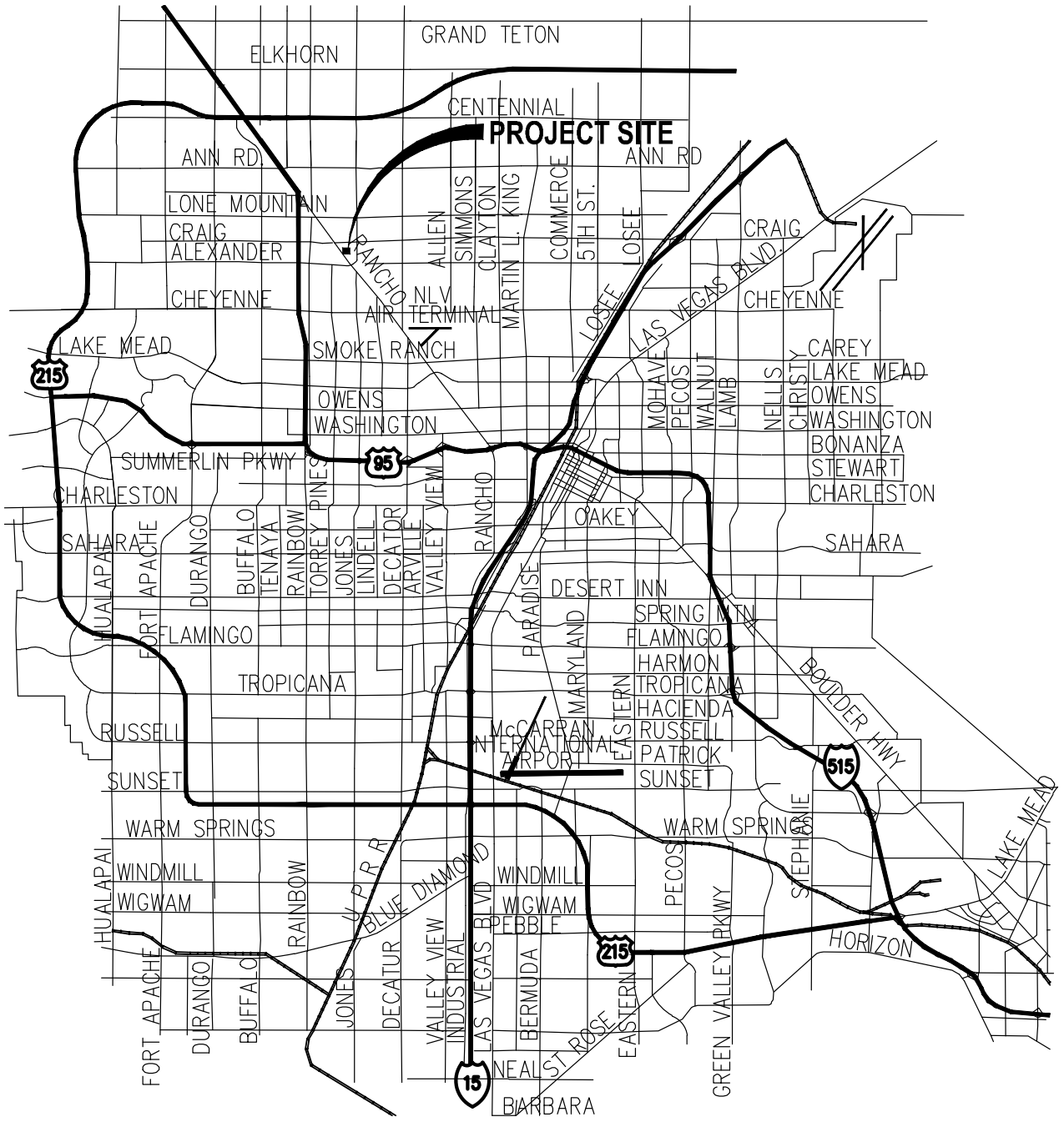
4. *Master Drainage Study for Craig & Rancho (September 2016), Lochsa Engineering,* herein referred to as the *Master Study.*

5. *Technical Drainage Study for Jones Hickam Residential Development (September 2017), Triton Engineering LLC,* herein referred to as the *JHRD Study.*

6. *Technical Drainage Study for Craig-Jones Commercial (June 2006), DRC Inc.,* herein referred to as the *Craig-Jones study.*

7. *Jones Boulevard Improvement Project, From Rancho Drive to Centennial Parkway (2000), DPW, City of Las Vegas.*

APPENDIX



VICINITY MAP

SCALE: NTS

Actus
3203 E. Warm Springs Road
Suite 400
Las Vegas, NV 89120
www. Actus-NV.com
(702) 586-9296
Consulting- Planning-
Engineering - Surveying

Rancho & Jones
VICINITY MAP

DATE	09/13/18
DRAWN	CO
DESIGNED	CO
CHECKED	DCL
PROJECT #	BZR011812
SHEET NUMBER	FIGURE 1

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

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

- 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

BOOK T20S R60E

099	100	101 10
126	125	12412
137	138	13914
164	163	16216

SEC. 2

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 N 2 SE 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

138-02-7

CLARK COUNTY ASSESSOR MAPPING DIVISION NEVADA

Scale: 1" = 200'

Rev: 5/21/2018

CRAIG RD
CRAIG AND JONES
PM 78-100
PM 88-10
NORTHBROOKE A BUSINESS CENTER
PM 78-95
PM 78-82
PM 37-33
PM 28-30
PM 40-40
PB 15-53
PB 151-100
PB 117-08
PB 20-57
PB 16-51
LAZY J RANCH ESTATES UNIT NO 2
BIG SKY RANCH ESTATES-UNIT NO 2
RANCHO TOWN & COUNTRY
AMETHYST AVE
TORREY PINES DR
HARTMAN ST
JORY TRL
BOO PL
RANCHO DR
U S HIGHWAY 95
JONES BLVD
VAC 1363-1322984
701
712
710
711
713
315
301
212
Project Site

FIGURE 2a TAX DIST 200

NOTES

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

0 100 200 400 600 800

MAP LEGEND

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

ASSESSOR'S PARCELS - CLARK CO., NV.

Michele W. Shafe - Assessor

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

BOOK T20S R60E

099	100	101	10
126	125	124	12
137	138	139	14
164	163	162	16

SEC. 2

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 SE 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

138-02-8

CLARK COUNTY ASSESSOR MAPPING DIVISION NEVADA

Scale: 1" = 200'

Rev: 5/21/2018

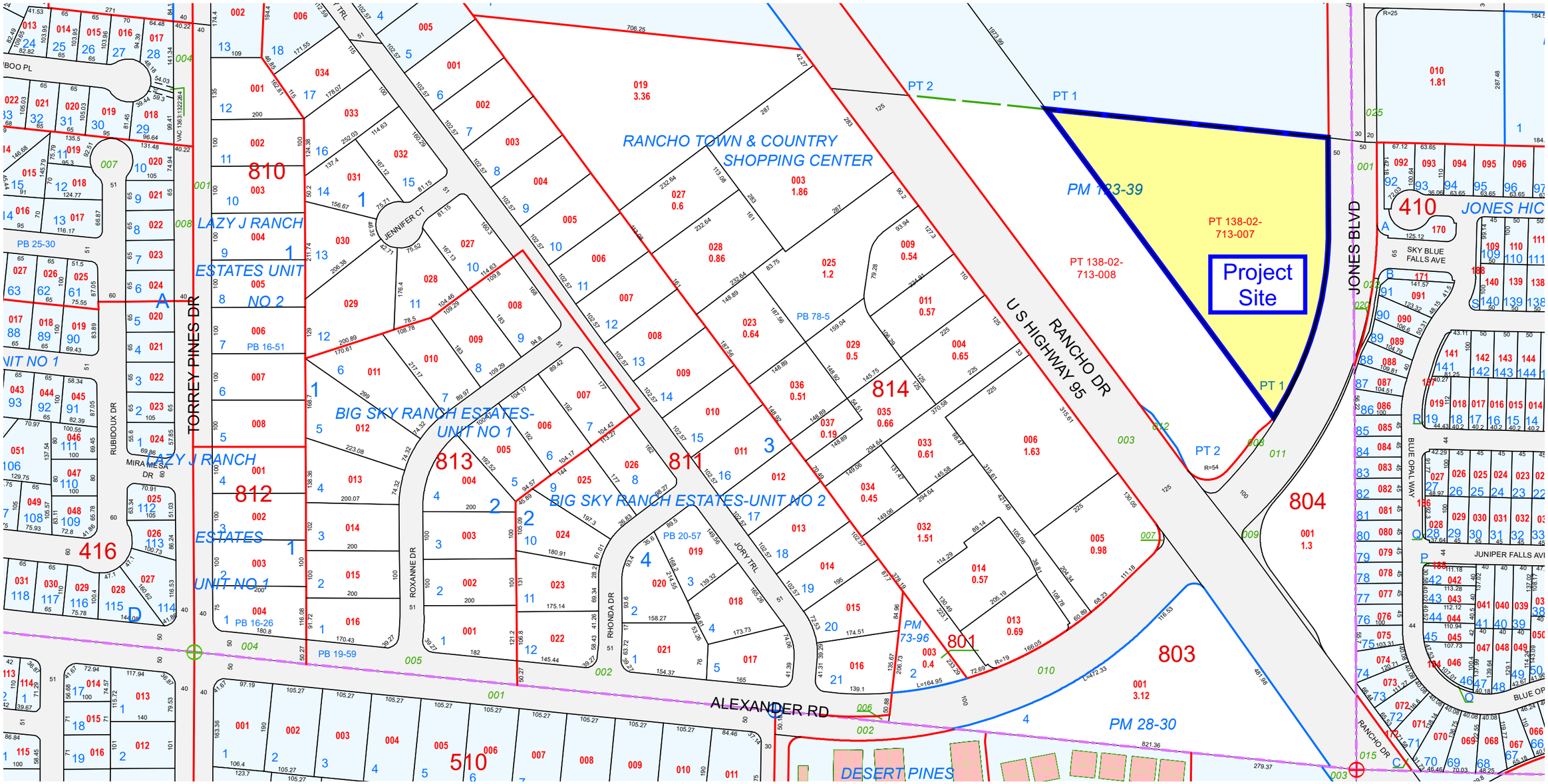


FIGURE 2b

TAX DIST 200

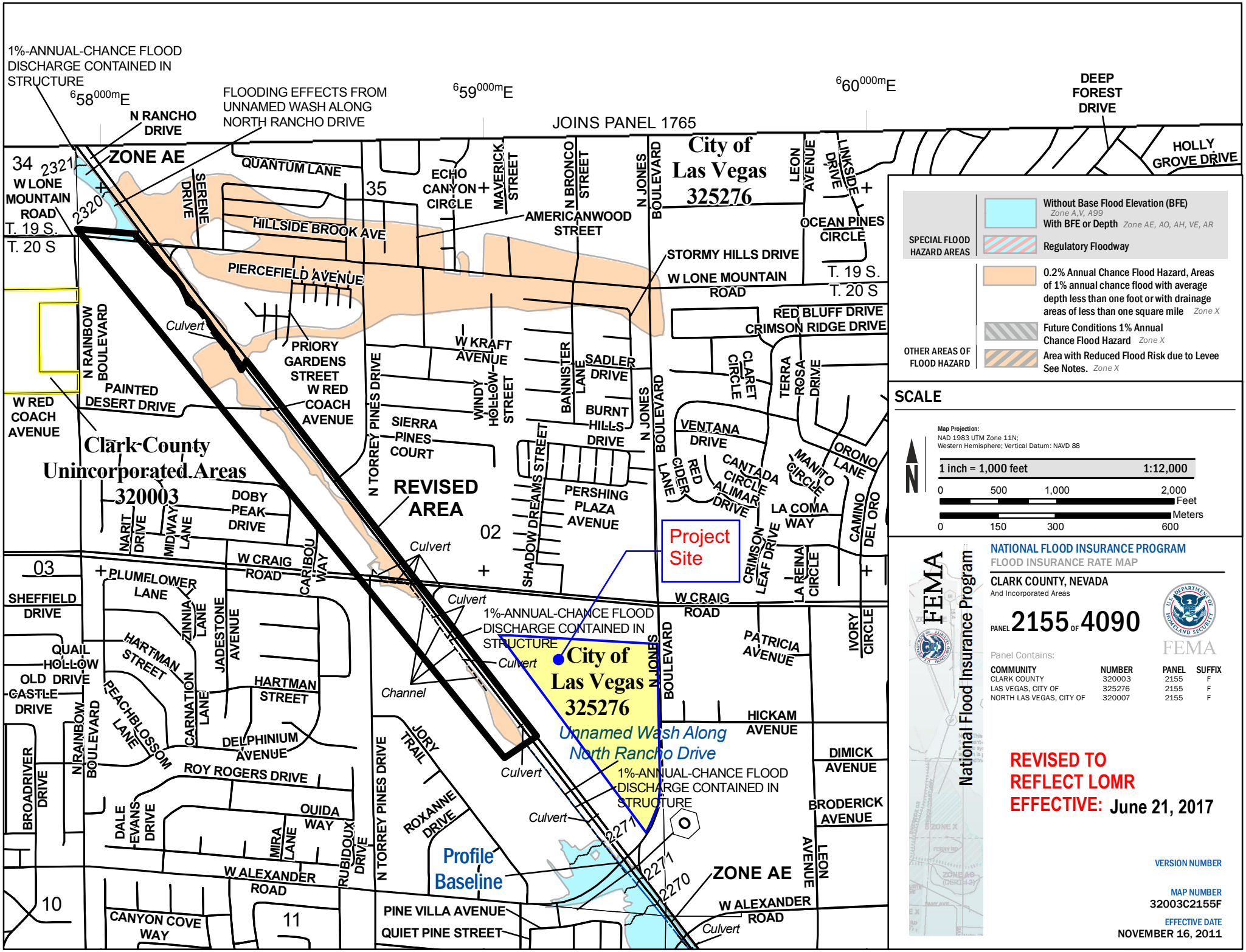

1%-ANNUAL-CHANCE FLOOD DISCHARGE CONTAINED IN STRUCTURE
6580000mE
FLOODING EFFECTS FROM UNNAMED WASH ALONG NORTH RANCHO DRIVE
6590000mE
JOINS PANEL 1765
6600000mE
DEEP FOREST DRIVE
N RANCHO DRIVE
ZONE AE
34
2321
2320
W LONE MOUNTAIN ROAD
T. 19 S.
T. 20 S
QUANTUM LANE
SERENE DRIVE
HILLSIDE BROOK AVE
35
ECHO CANYON CIRCLE
MAVERICK STREET
N BRONCO STREET
AMERICANWOOD STREET
N JONES BOULEVARD
City of Las Vegas 325276
LEON AVENUE
LINKSIDE DRIVE
HOLLY GROVE DRIVE
OCEAN PINES CIRCLE
STORMY HILLS DRIVE
PIERCEFIELD AVENUE
W LONE MOUNTAIN ROAD
T. 19 S.
T. 20 S
RED BLUFF DRIVE
CRIMSON RIDGE DRIVE
Culvert
N RAINBOW BOULEVARD
PRIORY GARDENS STREET
W KRAFT AVENUE
BANNISTER LANE
SADLER DRIVE
CLARET CIRCLE
TERRA ROSA DRIVE
PAINTED DESERT DRIVE
W RED COACH AVENUE
N TORREY PINES DRIVE
WINDY HOLLOW STREET
BURNT HILLS DRIVE
SIERRA PINES COURT
VENTANA DRIVE
Clark County Unincorporated Areas 320003
REVISED AREA
SHADOW DREAMS STREET
PERSHING PLAZA AVENUE
RED CIDER LANE
CANTADA CIRCLE
ALIMAR DRIVE
MANITO CIRCLE
ORONO LANE
LA COMA WAY
CAMINO DEL ORO
NARIT DRIVE
MIDWAY LANE
DOBY PEAK DRIVE
02
03
W CRAIG ROAD
CARIBOU WAY
Culvert
Project Site
CRIMSON LEAF DRIVE
LA REINA CIRCLE
PLUMELOWER LANE
SHEFFIELD DRIVE
ZINNIA LANE
JADESTONE AVENUE
1%-ANNUAL-CHANCE FLOOD DISCHARGE CONTAINED IN STRUCTURE
City of Las Vegas 325276
PATRICIA AVENUE
IVORY CIRCLE
QUAIL HOLLOW DRIVE
HARTMAN STREET
OLD CASTLE DRIVE
PEACHBLOSSOM LANE
CARNATION LANE
HARTMAN STREET
Channel
Unnamed Wash Along North Rancho Drive
HICKAM AVENUE
BROADRIVER DRIVE
N RAINBOW BOULEVARD
DELPHINIUM AVENUE
JORY TRAIL
DIMICK AVENUE
ROY ROGERS DRIVE
1%-ANNUAL-CHANCE FLOOD DISCHARGE CONTAINED IN STRUCTURE
DALE EVANS DRIVE
OUIDA WAY
MIRA LANE
RUBIDOUX DRIVE
ROXANNE DRIVE
BRODERICK AVENUE
2271
2271
2270
Profile Baseline
ZONE AE
LEON AVENUE
W ALEXANDER ROAD
10
CANYON COVE WAY
11
PINE VILLA AVENUE
QUIET PINE STREET
W ALEXANDER ROAD
Culvert
SPECIAL FLOOD HAZARD AREAS
Without Base Flood Elevation (BFE) Zone A,V, A99
With BFE or Depth Zone AE, AO, AH, VE, AR
Regulatory Floodway
0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
Future Conditions 1% Annual Chance Flood Hazard Zone X
OTHER AREAS OF FLOOD HAZARD
Area with Reduced Flood Risk due to Levee See Notes. Zone X
SCALE
Map Projection:
NAD 1983 UTM Zone 11N;
Western Hemisphere; Vertical Datum: NAVD 88
1 inch = 1,000 feet 1:12,000
0 500 1,000 2,000 Feet
0 150 300 600 Meters
FEMA
National Flood Insurance Program
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA
And Incorporated Areas
PANEL 2155 OF 4090
Panel Contains:
COMMUNITY NUMBER PANEL SUFFIX
CLARK COUNTY 320003 2155 F
LAS VEGAS, CITY OF 325276 2155 F
NORTH LAS VEGAS, CITY OF 320007 2155 F
REVISED TO REFLECT LOMR EFFECTIVE: June 21, 2017
VERSION NUMBER
MAP NUMBER
32003C2155F
EFFECTIVE DATE
NOVEMBER 16, 2011

FIGURE 3

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
ANWE		**ANN ROAD CHANNEL WEST**						
0000	E	12' X 12' RCB	1400	2214	CNN043-C	CWEST3	3.41	0.66
0027	E	14' X 9' RCB	203	2214	CNN043-C	CWEST3	3.41	0.77
0031	E	12' X 10' RCB	2362	2214	CNN043-C	CWEST3	3.41	1.40
0076	E	16' X 8' RCB	350	2214	CNN043-C	CWEST3	3.41	0.93
0082	E	12' X 11' RCB	2217	1947	CNW3B2-C	CWEST3	2.99	0.71
0122	E	12' X 10' RCB	260	1947	CNW3B2-C	CWEST3	2.99	0.71
0127	E	10' X 8' RCB	1450	1947	CNW3B2-C	CWEST3	2.99	2.55
0157	E	10' X 9' RCB	1112	1257	CNW2D2-C	CWEST3	1.95	1.13
0177	E	12' X 10' RCB	2797	1257	CNW2D2-C	CWEST3	1.95	0.39
0232	E	12 'X 8' RCB	714	1257	CNW2D2-C	CWEST3	1.95	0.43
0245	E	10' X 9' RCB	1721	993	CNW2D1-C	WEST3	6.84	0.80
0279	E	10' X 9' RCB	553	743	2CNW2B5C	WEST3	6.37	0.80
0290	E	8' X 8' RCB	2050	743	2CNW2B5C	WEST3	6.37	0.70
CNEA		**CENTENNIAL PKWY CHANNEL EAST**						
0123	E	14' X 6' RCB	1585	1457	CNN093-C	WEST3	1.67	0.92
0153	E	14' X 6' RCB	1125	1457	CNN093-C	WEST3	1.67	1.34
0175	E	15' X 6' RCB	125	1174	CNN078-C	WEST3	1.35	5.66
0176	E	Conc Chnl 15'W 6.5'D 0:1 SS	540	1174	CNN078-C	WEST3	1.35	0.70
CNWE		**CENTENNIAL PKWY CHANNEL WEST**						
0000	E	2: 27' X 10' RCB	309	4465	CNW3D3-C	WEST3	6.41	1.38
0005	E	4: 13.5' X 10' RCB	762	4465	CNW3D3-C	WEST3	6.41	1.10
0020	E	4: 13' X 10' RCB	310	4465	CNW3D3-C	WEST3	6.41	2.57
0026	E	4: 13.5' X 9' RCB	750	4465	CNW3D3-C	WEST3	6.41	0.61
0045	E	Conc Chnl 56'W 8'D 0:1 SS	1575	4465	CNW3D3-C	WEST3	6.41	0.61
0071	E	3: 18' X 8' RCBC @ Bradley	300	4465	CNW3D3-C	WEST3	6.41	0.61
0075	E	Conc Chnl 54'W 8'D 0:1 SS	775	4465	CNW3D3-C	WEST3	6.41	0.42
0110	E	Conc Chnl 54'W 9'D 0:1 SS	620	4382	2CW3B4-C	WEST3	6.15	0.42
0129	E	3: 18' X 8' RCB	2451	4382	2CW3B4-C	WEST3	6.15	0.40
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
GOA2		**GOWAN OUTFALL - ALEXANDER BRANCH**						
0000	P1	8' X 5' RCB	2281	523	CPT41-C	ALLGOW3	0.61	0.90
GOAL		**GOWAN OUTFALL - ALEXANDER ROAD FACILITIES**						
0000	P1	10' X 9' RCB	5280	1461	CPT5A2-C	ALLGOW3	3.23	1.00
0100	P1	10' X 8' RCB	540	1297	CCPT41-C	ALLGOW3	2.89	1.00
0111	P1	10' X 8' RCB	3000	880	CPT2B2	ALLGOW3	2.28	0.83
0168	P1	10' X 8' RCB	4200	880	CPT2B2	ALLGOW3	2.28	0.50
GOCL		**GOWAN OUTFALL - CLAYTON BRANCH**						
0000	P1	9' X 8' RCB	6785	814	CPT2B-1	ALLGOW3	1.11	0.61
GOCR		**GOWAN OUTFALL - CRAIG ROAD**						
0000	E	Conc Chnl 20'W 7'D 2:1 SS	1380	3101	CPT3D-3	ALLGOW3	5.78	1.06
0022	E	2: 8' X 8' RCB	3000	1120	CPT4C-2	ALLGOW3	1.75	0.50
0080	E	120" RCP	5850	995	CPT4C-1	ALLGOW3	1.50	0.50
0180	E	114" RCP	350	238	PT4B3-C	ALLGOW3	0.28	0.30
0201	E	96" RCP	1090	238	PT4B3-C	ALLGOW3	0.28	0.35
GOLO		**GOWAN OUTFALL - LONE MTN. ROAD BRANCH**						
0000	E	72" RCP	1370	308^	CPT2AD-1^	ALLGOW3	3.28	0.53
0001	E	13' X 8' RCB	1370	1433^	CPT2AD-1^	ALLGOW3	3.28	0.45
0025	E	16' X 8' RCB	1464	1741	CPT2AD-1	ALLGOW3	3.28	0.39
0052	E	16' X 8' RCB	2564	1741	CPT2AD-1	ALLGOW3	3.28	0.42
0100	E	16' X 8' RCB	2732	1605	C2AC2-C	ALLGOW3	2.96	0.37
0152	E	10' X 10' RCB	700	1605	C2AC2-C	ALLGOW3	2.96	0.71
0165	E	10' X 8' RCB	3300	1415	CPT2AB2	ALLGOW3	2.59	1.21
0228	E	10' X 8' RCB	1300	1244	C2AB1C	ALLGOW3	2.31	1.00
0253	E	10' X 6' RCB	1200	986	CPT3AC1	ALLGOW3	2.10	1.25
0275	E	8' X 6' RCB	3000	590	CPT3AA2	ALLGOW3	1.16	0.77

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
GOOF		**GOWAN OUTFALL FACILITIES**						
0000	E	Conc Chnl 20'W 7'D 2:1 SS	2500	5233	CPT-2B-3	GW5SC	14.66	1.25
0040	E	Conc Chnl 20'W 7'D 2:1 SS	1900	5058	CCPT2C1*	GW4SC	11.84	0.60
0074	E	2: 16' X 7' RCBC @ Camino Al Norte	131	5058	CCPT2C1*	GW4SC	11.84	1.30
0077	E	Conc Chnl 20'W 7'D 2:1 SS	3157	5058	CCPT2C1*	GW4SC	11.84	1.40
0146	E	3: 12' X 5' RCBC @ Clayton	150	4014^	CCPT2C1*^	GW4SC	11.84	1.33
0147	P1	Add 1: 12' X 7' RCBC @ Clayton	150	1044^	CCPT2C1*^	GW4SC	11.84	1.33
0149	E	Conc Chnl 20'W 7'D 2:1 SS	1228	5058	CCPT2C1	GW4SC	11.84	1.13
0150	E	Conc Chnl 20'W 7'D 2:1 SS	612	4772	CCPT3D-3	GW4SC	10.86	1.13
0162	E	Confluence Structure	678	4772	CCPT3D-3	GW4SC	10.86	0.90
0196	E	37.66' X 5.66' Bridge @ Simmons	112	3101	CPT3D-3	ALLGOW3	5.78	0.90
0198	E	14' X 6' RCB	1344	1164^	CPT4C-3^	GW3SC	5.85	0.41
0199	P1	Add 1: 24' X 6' RCB	1171	1581^	CPT4C-3^	GW3SC	5.85	0.40
0200	E	24' X 6' RCB	173	1581^	CPT4C-3^	GW3SC	5.85	0.89
0224	P1	1: 20' X 6' RCB and 1: 14' X 6' RCB	2700	2745	CPT4C-3	GW3SC	5.85	0.40
0275	P1	1: 16' X 8' RCB and 1: 14' X 6' RCB	515	2582	CPT5C-3	GW3SC	5.59	0.40
0285	P1	2: 14' X 8' RCB	2650	2582	CPT5C-3	GW3SC	5.59	0.45
0325	P1	2: 14' X 8' RCB	2650	2458	CPT5C-2	GW3SC	5.36	0.37
0375	P1	2: 12' X 8' RCB	2700	2375	CPT5C-1	GW3SC	5.17	0.56
0427	E	96" RCP	1510	630	DGOW2A	GW3SC	1.38	0.47
0485	E	90" RCP	1080	630	DGOW2A	GW3SC	1.38	0.47
0486	E	8' X 5' RCB	3300	630	DGOW2A	GW3SC	1.38	0.60
0511	E	8' X 5' RCB	8390	699	CPT6B-C	GW3SC	1.08	0.50
LV03		**CLAYTON STREET CHANNEL**						
0000	E	33' X 16' RCBC @ Hammer	400	1044	CNN057-C	WEST3	1.22	0.42
0006	E	Conc Chnl 9'W 9.4'D 1.5:1 SS	1300	1044	CNN057-C	WEST3	1.22	0.42
0030	E	2: 9' X 7' RCBC @ Ann	120	1044	CNN057-C	WEST3	1.22	0.42
0031	E	Conc Chnl 8'W 8.1'D 1.5:1 SS	2600	757	CNN054-C	WEST3	0.81	0.40
0081	E	2: 10' X 7' RCBC @ Tropical	100	757	CNN054-C	WEST3	0.81	0.42
0082	E	Conc Chnl 7'W 7.1'D 1.5:1 SS	2444	757	CNN054-C	WEST3	0.81	2.80
0128	E	Conc Chnl 7'W 7.1'D 1.5:1 SS	167	257	1/2NN052-C	WEST3	0.55	2.80
0129	E	2: 10' X 6' RCB	801	257	1/2NN052-C	WEST3	0.55	1.60
0131	E	10' X 6' RCB	665	257	1/2NN052-C	WEST3	0.55	1.28
LV05		**WESTERN TRIBUTARY AT ALEXANDER RD**						
0131	E	Conc Chnl 28'W 3'D 3:1 SS	1300	567	CLV99B-3	WEST3	0.64	0.76
LV06		**WESTERN TRIBUTARY AT CRAIG RD**						
0053	E	16' X 6' RCAP	782	1080	CLV99A-3	WEST3	1.31	1.56
0063	E	14' X 6' RCAP	526	1080	CLV99A-3	WEST3	1.31	1.88
0075	E	12' X 6' RCB	1608	1080	CLV99A-3	WEST3	1.31	0.72
0105	E	2: 8' X 6' RCBC @ Revere	158	1080	CLV99A-3	WEST3	1.31	1.71
0107	E	Conc Chnl 17.3'W 6'D 0:1 SS	140	1080	CLV99A-3	WEST3	1.31	3.79
0110	E	Conc Chnl 12'W 5.5'D 2:1 SS	2451	1080	CLV99A-3	WEST3	1.31	0.87
0147	E	12' X 6' RCBC @ Alexander	150	629	CLV99A-2	WEST3	0.74	1.16
LVMD		**LAS VEGAS WASH - MIDDLE**						
1877	E	Conc Chnl 30'W 10'D 1:1 SS	1570	6423	CNN104-C	WEST5	44.33	1.10
1905	E	Conc Chnl 12'W 10'D 1.65:1 SS	2440	3245	CNN086-C	WEST5	29.30	1.00
1953	E	2: 24' X 10' RCBC @ Camino Al Norte	145	3245	CNN086-C	WEST5	29.30	0.94
1954	E	Conc Chnl 32'W 7'D 2:1 SS	1587	3245	CNN086-C	WEST5	29.30	0.99
1984	E	Transition Structure	550	3221	LOWERDB	CWEST5	19.67	0.99
2048	E	68,000 cfs PMF Spillway		68000	LOWERIN	CWEST5	19.67	
2049	E	4: 7' X 7' RCB Outlet	200	3221	LOWERDB	CWEST5	19.67	
2050	E	700 ac-ft Lower Las Vegas Wash Detention Basin		6729	LOWERIN	CWEST5	19.67	
2052	P1	Conc Chnl 50'W 6'D 0:1 SS	240	6636	2C057-C	CWEST5	19.28	3.11
2053	P1	Conc Chnl 60'W 12'D 0:1 SS	690	6636	2C057-C	CWEST5	19.28	0.15
2054	P1	Conc Chnl 60'W 12'D 0:1 SS	260	6636	2C057-C	CWEST5	19.28	3.80
2055	P1	Conc Chnl 60'W 12'D 0:1 SS	165	6636	2C057-C	CWEST5	19.28	9.10
2060	E	4: 12.75' X 16' RCBC @ Clayton	144	6171	2C044-C	CWEST5	18.06	0.15
2061	E	Conc Chnl 54'W 16'D 0:1 SS	425	6171	2C044-C	CWEST5	18.06	0.15
2062	E	Conc Chnl 54'W 9'D 0:1 SS	1200	6171	2C044-C	CWEST5	18.06	1.35
2089	E	Conc Chnl 54'W 9'-9.5'D 0:1 SS	908	6171	2C044-C	CWEST5	18.06	0.50
2124	E	2: 26.5' X 10' RCBC @ Simmons	110	6046	2C043-C	CLVMD5	15.94	0.50

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVMD		**LAS VEGAS WASH - MIDDLE**						
2125	E	Conc Chnl 54'W 9'D 0:1 SS	1571	6046	2C043-C	CLVMD5	15.94	0.77
2170	E	4: 12' X 10' RCBC @ Ann Road	500	6046	2C043-C	CLVMD5	15.94	1.42
2172	E	Conc Chnl 50'W 10'D 0:1 SS	1289	5734	2C3D4-C*	CLVMD4	11.98	1.15
2192	E	2: 24.5' X 10' RCBC @ Allen	110	5734	2C3D4-C*	CLVMD4	11.98	1.15
2197	E	Conc Chnl 50'W 10'D 0:1 SS	1385	5734	2C3D4-C*	CLVMD4	11.98	1.37
2223	E	50' X 10' RCBC @ El Campo Grande	275	5734	2C3D4-C*	CLVMD4	11.98	1.60
2228	E	Conc Chnl 50'W 10'D 0:1 SS	1600	5734	2C3D4-C*	CLVMD4	11.98	1.83
2266	E	2: 24.5' X 10' RCBC @ Tropical	575	5734	2C3D4-C*	CLVMD4	11.98	0.80
2276	E	Conc Chnl 50'D 10'D 0:1 SS	985	5734	2C3D4-C*	CLVMD4	11.98	0.80
2294	E	2: 24.5' X 10' RCBC @ Ranchhouse	292	5734	2C3D4-C	CLVMD4	11.98	1.04
2300	E	Transition Structure	200	5734	2C3D4-C	CLVMD4	11.98	1.50
2304	E	Conc Chnl 70'W 10'D 0:1 SS	220	5734	2C3D4-C	CLVMD4	11.98	1.50
2308	E	Confluence Structure	480	5734	2C3D4-C	CLVMD4	11.98	0.90
2322	E	2: 15' X 9' RCB	1200	3317	CNW3D4-C	CWEST3	6.88	1.50
2324	E	2: 14' X 8' RCB	5485	3317	CNW3D4-C	CWEST3	6.88	0.40
LVSM		**LAS VEGAS WASH-SIMMONS**						
0000	E	12' X 8' RCB	195	790	CNN044-C	WEST3	0.81	0.63
0006	E	11' X 6' RCB	1005	790	CNN044-C	WEST3	0.81	0.30
0025	E	10' X 6' RCB	1310	790	CNN044-C	WEST3	0.81	0.44
0050	E	9' X 6' RCB	387	530	CNN040-C	WEST3	0.53	0.50
0057	E	8' X 6' RCB	1113	530	CNN040-C	WEST3	0.53	0.54
0084	E	72" RCP	252	530	CNN040-C	WEST3	0.53	1.49
0089	E	60" RCP	1068	235	NN038-C	WEST3	0.24	2.04
0109	E	48" RCP	2003	235	NN038-C	WEST3	0.24	1.91
TREA		**TROPICAL ROAD CHANNEL EAST**						
0134	E	66" RCP	2700	447	CNN095-C	WEST3	0.57	2.10

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

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

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

REGIONAL FLOOD CONTROL DISTRICT

2013 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

FACILITY INVENTORY FIGURE F - 20

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

FIGURE 4

REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 20
FLOOD CONTROL FACILITIES

LEGEND

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

- Stormdrain
- Lined Channel
- Unlined Channel
- Levee/Dike
- Natural Wash/Floodway
- ID-Mile Separator

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

N

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

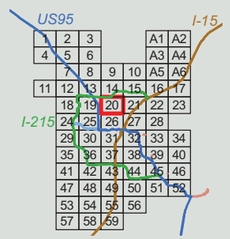


FIGURE 5

REGIONAL FLOOD CONTROL DISTRICT

2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE H-20
HYDROLOGIC SUMMARY

LEGEND

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

Flood Control Facilities

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

Type Hydrologic Soil Groups

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

Typical Land Use

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

* Drought Ordinance Applied

N

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

Scale: 1 inch = 2,000 feet

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

US95 I-15 I-215

PBS&J

FIGURE 6

CITY OF LAS VEGAS NEVADA

NORTHWEST NEIGHBORHOOD STUDY

LEGEND

SUB-BASIN BOUNDARY

FLOW ARROW

250	10-YEAR STREET FLOW
500	100-YEAR STREET FLOW
300	10-YEAR FACILITY FLOW
800	100-YEAR FACILITY FLOW

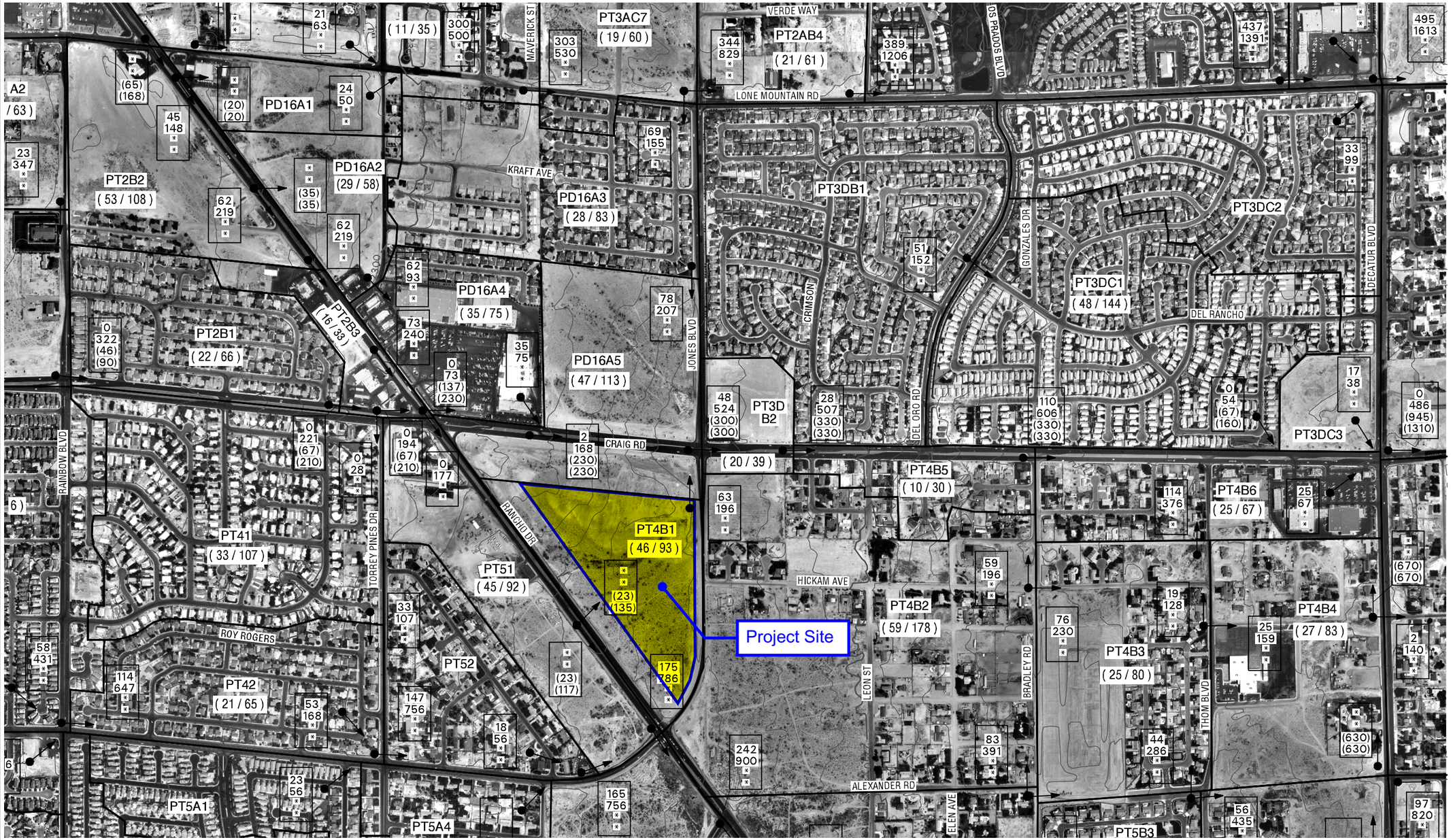
(FLOWS IN CFS)

BWJS ←→ Basin-ID

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

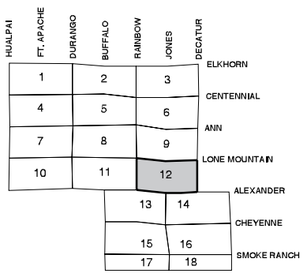
PHOTO DATE: APRIL 1996

FIGURE E-12



EXISTING DRAINAGE CONDITIONS

PBS&J
POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERING PLANNING SURVEYING GIS
901, N. Green Valley Pkwy, Ste 100, Henderson NV 89014
Phone: (702) 263-7275 Fax: (702) 263-7200



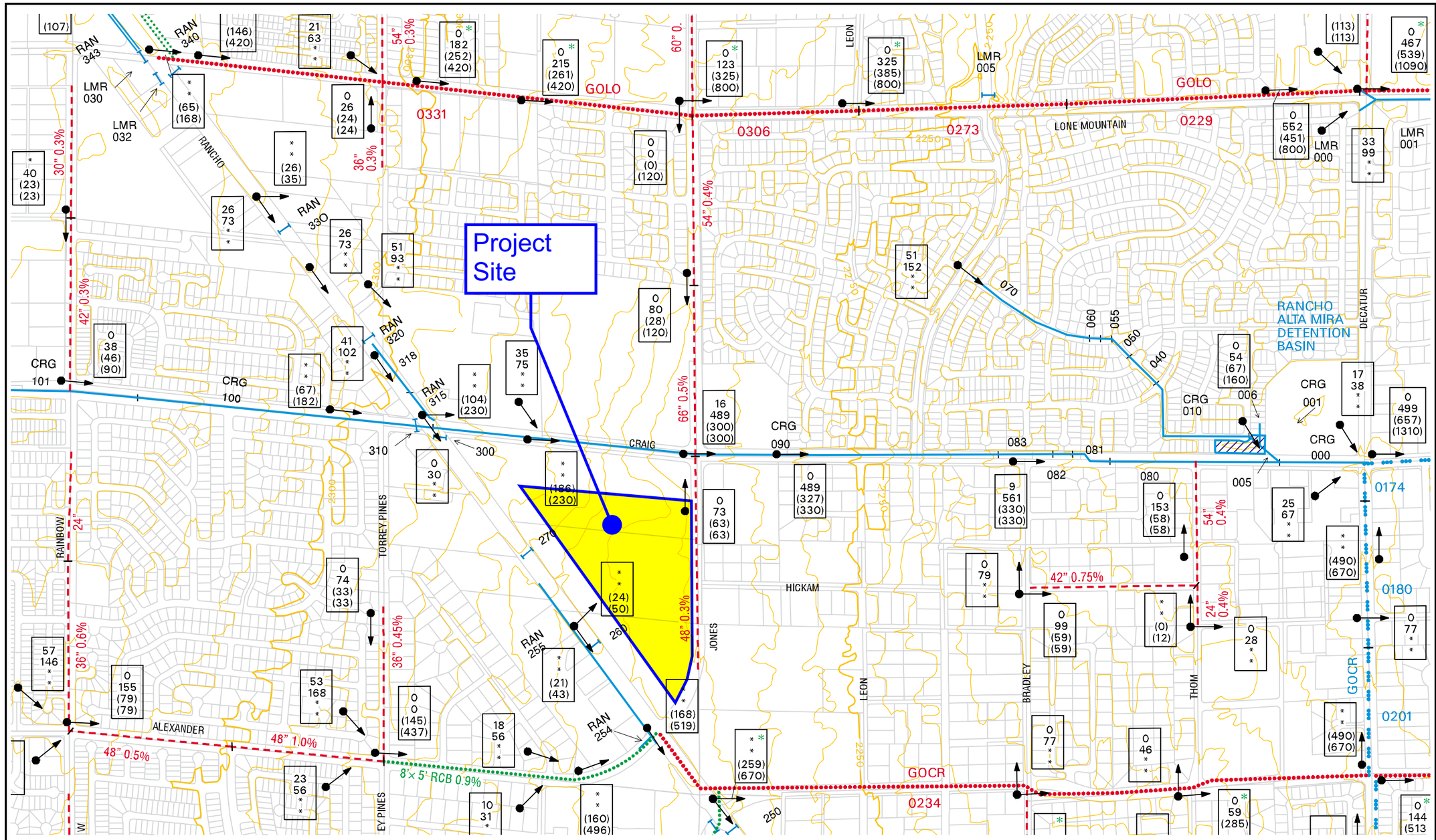
NOTE:
Existing conditions are based on future CN values with only existinig local and CCRFCD facilities in place



800 600 400 200 0 400 800

(IN FEET)

SCALE: 1 INCH = 800 FEET



NORTHWEST NEIGHBORHOOD STUDY

LEGEND

- EXISTING REGIONAL DETENTION BASINS
- PROPOSED REGIONAL DETENTION BASINS
- EXISTING LOCAL DETENTION BASINS
- EXISTING REGIONAL BRIDGES
- PROPOSED REGIONAL BRIDGES
- EXISTING LOCAL BRIDGES
- EXISTING REGIONAL CULVERT
- PROPOSED REGIONAL CULVERT
- EXISTING LOCAL CULVERT
- EXISTING REGIONAL PIPELINE
- PROPOSED REGIONAL PIPELINE
- EXISTING LOCAL PIPELINE
- PROPOSED LOCAL PIPLINE
- EXISTING REGIONAL CHANNEL
- PROPOSED REGIONAL CHANNEL
- EXISTING LOCAL CHANNEL
- PROPOSED REGIONAL PIPELINE (Not Induded In 1996 MPU)
- PROPOSED REGIONAL CHANNEL (Not Induded In 1996 MPU)
- EXISTING REGIONAL DIKE/LEVEE
- PROPOSED REGIONAL DIKE/LEVEE
- EXISTING LOCAL DIKE/LEVEE
- EXISTING STORM WATER PUMPING STATION
- PROPOSED BELTWAY ALIGNMENT

FIGURE F-12

N W E S

800 600 400 200 0 400 800

(IN FEET)

SCALE: 1 INCH = 800 FEET

FLOW ARROW

250	10-YEAR STREET FLOW
500	100-YEAR STREET FLOW
(300)	10-YEAR FACILITY FLOW
(800)	100-YEAR FACILITY FLOW

(FLOWS IN CFS)

NOTE:

Ultimate drainage conditions are based on future CN values with all flood control facilities in place

* The capacity of the proposed regional facility is based on the "1996 Clark County Regional Flood Control Master Plan Update for the Las Vegas Valley." The facility may need to be enlarged in final design.

HUALAPAI	FT. APACHE	DURANGO	BUFFALO	RAINBOW	JONES	DECATUR	
1		2		3			ELKHORN
4		5		6			CENTENNIAL
7		8		9			ANN
10		11		12			LONE MOUNTAIN
			13	14			ALEXANDER
			15	16			CHEYENNE
			17	18			SMOKE RANCH

FUTURE DRAINAGE CONDITIONS

POST, BUCKLEY, SCHUH & JERNIGAN, INC.

ENGINEERING PLANNING SURVEYING GIS

901, N. Green Valley Pkwy, Ste 100, Henderson NV 89014

Phone: (702) 263-7275 Fax: (702) 263-7200

* Includes referenced flows from the 2009 " Rancho/US 95 LOMR"

Peak Flow Summary
Existing Condition

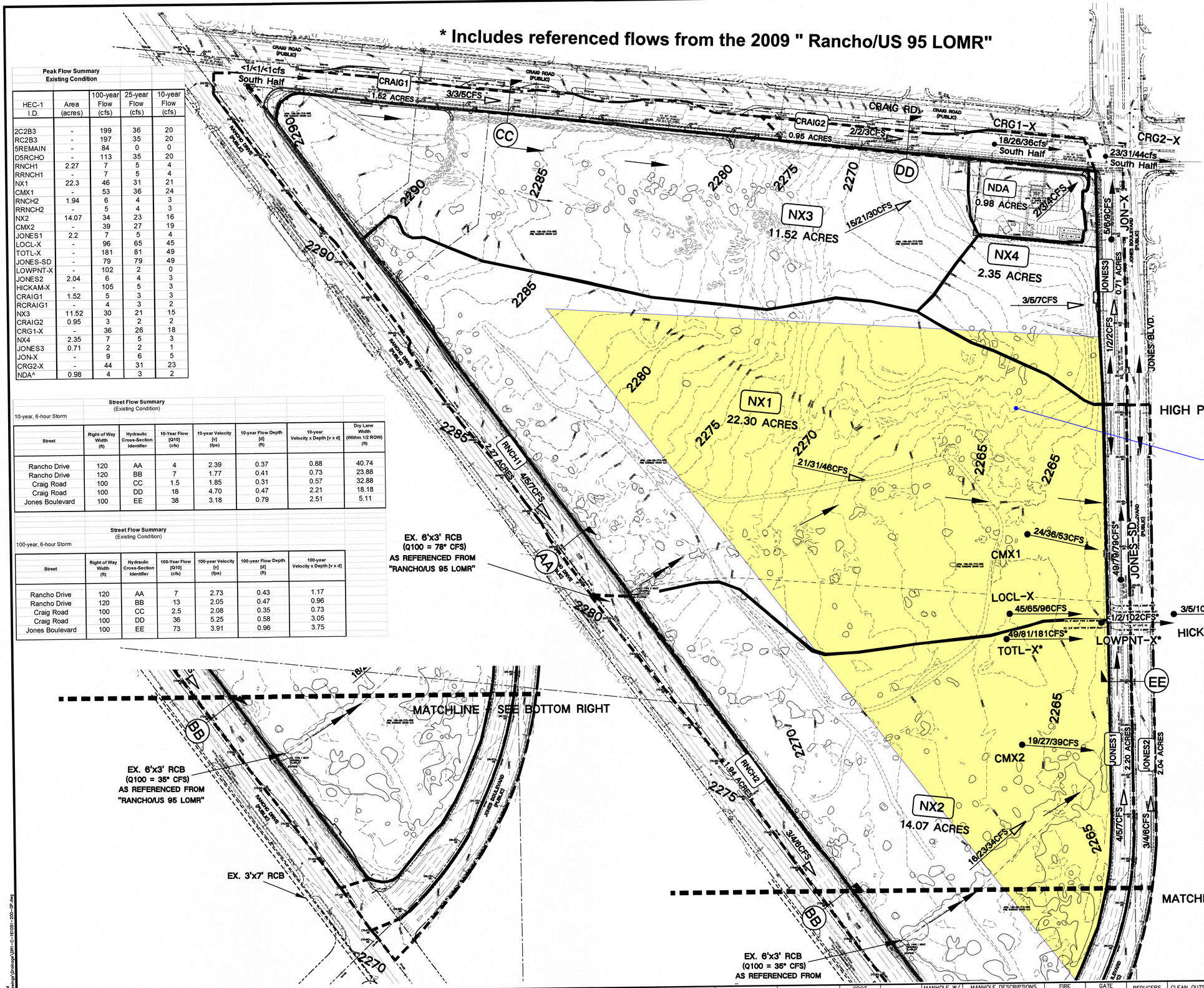
HEC-1 I.D.	Area (acres)	100-year Flow (cfs)	25-year Flow (cfs)	10-year Flow (cfs)
2C2B3	-	199	36	20
RC2B3	-	197	35	20
5REMAIN	-	84	0	0
D5RCHO	-	113	35	20
RNCH1	2.27	7	5	4
RRNCH1	-	7	5	4
NX1	22.3	46	31	21
CMX1	-	53	36	24
RNCH2	1.94	6	4	3
RRNCH2	-	5	4	3
NX2	14.07	34	23	16
CMX2	-	39	27	19
JONES1	2.2	7	5	4
LOCL-X	-	96	65	45
TOTL-X	-	181	81	49
JONES-SD	-	79	79	49
LOWPNT-X	-	102	2	0
JONES2	2.04	6	4	3
HICKAM-X	-	105	5	3
CRAIG1	1.52	5	3	3
RCRAIG1	-	4	3	2
NX3	11.52	30	21	15
CRAIG2	0.95	3	2	2
CRG1-X	-	36	26	18
NX4	2.35	7	5	3
JONES3	0.71	2	2	1
JON-X	-	9	6	5
CRG2-X	-	44	31	23
NDA^	0.98	4	3	2

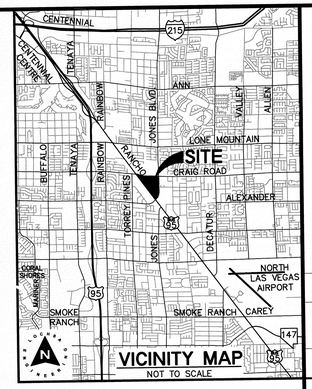
Street Flow Summary
(Existing Condition)
10-year, 6-hour Storm

Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	10-Year Flow [Q10] (cfs)	10-year Velocity [v] (fps)	10-year Flow Depth [d] (ft)	10-year Velocity x Depth [v x d]	Dry Lane Width (Within 1/2 ROW) (ft)
Rancho Drive	120	AA	4	2.39	0.37	0.88	40.74
Rancho Drive	120	BB	7	1.77	0.41	0.73	23.88
Craig Road	100	CC	1.5	1.85	0.31	0.57	32.88
Craig Road	100	DD	18	4.70	0.47	2.21	18.18
Jones Boulevard	100	EE	38	3.18	0.79	2.51	5.11

Street Flow Summary
(Existing Condition)
100-year, 6-hour Storm

Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	100-Year Flow [Q10] (cfs)	100-year Velocity [v] (fps)	100-year Flow Depth [d] (ft)	100-year Velocity x Depth [v x d]
Rancho Drive	120	AA	7	2.73	0.43	1.17
Rancho Drive	120	BB	13	2.05	0.47	0.96
Craig Road	100	CC	2.5	2.08	0.35	0.73
Craig Road	100	DD	36	5.25	0.58	3.05
Jones Boulevard	100	EE	73	3.91	0.96	3.75





GRAPHIC SCALE
100 0 50 100 200
(IN FEET)
1 inch = 100 ft.

DRAINAGE LEGEND

ND1	DRAINAGE BASIN LABEL
•	CONCENTRATION POINT
CMD1	COMBINATION POINT
▬▬	BASIN BOUNDARY LINE
- - - - -	OFFSITE BASIN BOUNDARY
2 / 3 / 5	Q10/Q25/Q100 FLOW IN CFS
1 (1.0)(1.2) / 1 (1.0)(1.2)	Q10 (V10)(D10) / Q100 (V100)(D100)
→	BASIN FLOW DIRECTION
→	COMBINED FLOW DIRECTION
1D	HYDRAULIC CROSS-SECTION
2 / 3	[Q10]N / [Q100]N STORM DRAIN FLOWS IN CFS

Lochsa engineering
6345 South Jones Blvd
Suite 100
Las Vegas, NV 89118
Phone (702) 365-6312
Fax (702) 365-9317
www.lochsa.com

ONSITE BASIN MAP
(EXISTING CONDIITON)

CRAIG & RANCHO
MASTER DRAINAGE STUDY

PROJECT No.:	161051
DATE:	08/26/16
SCALE:	1"=100'
DRAWN BY:	HMN
DESIGNED BY:	HMN
CHECKED BY:	HMN
SHEET No.	DR1
SHEET	1 2
CLV No.	--

FIGURE 7

LEGEND

CL OR SURVEY LINE PROPERTY LINE ROW LINE	EASEMENT LINE SAWCUT LINE SCARP LINE	DESCRIPTION: EXISTING: PROPOSED:	CONTOUR LINES (2210) 2122	EDGE OF PAVEMENT	"A" TYPE CURBS	"L" TYPE CURBS	WALLS	FENCES	AC PAVEMENT	CONCRETE	SPOT ELEVATIONS (12.34) BC 12.34 BC	SIGNS	MANHOLE W/ DESCRIPTION Ⓢ Ⓢ	MANHOLE DESCRIPTIONS Ⓢ = SANITARY SEWER Ⓢ = STORM DRAIN Ⓔ = ELECTRICAL Ⓣ = TELEPHONE	FIRE HYDRANTS	GATE VALVES	REDUCERS	CLEAN OUTS	UTILITY BOX OR VAULT	BACKWATER VALVES BWV BWV	100w HPS STREETLIGHTS	150w HPS STREETLIGHTS	200w HPS STREETLIGHTS	250w HPS STREETLIGHTS

9/1/2016 10:38 AM
K:\CAD\161051\Drainage\Drainage\Shft-C-161051-2025-DP.dwg

TABLE 2				
HEC-1 Summary (Interim Condition)				
BASIN ID/CONCENTRATION POINT	**DRAINAGE AREA (acres)**	**Reference**	**Q_{10} cfs**	**Q_{100} cfs**
ION1	3.45	*HEC-1*	3.0	7.0
ION2	0.60	*HEC-1*	1.0	2.0
DON3	1.01	*HEC-1*	1.0	3.0
DON4	1.07	*HEC-1*	1.0	2.0
DON5	1.02	*HEC-1*	2.0	3.0
DON6	0.85	*HEC-1*	1.0	2.0
DON7	6.42	*HEC-1*	8.0	29.0
ION8	3.00	*HEC-1*	4.0	8.0
ION9A	2.30	*HEC-1*	3.0	6.0
ION9B	2.41	*HEC-1*	4.0	8.0
IOFF1	3.53	*HEC-1*	2.0	6.0
IOFF2	6.80	*HEC-1*	8.0	16.0
CP1	IOFF1+ION1+78 cfs	*HEC-1*	19.0	92.0
CP2	CP1+DON2	*HEC-1*	7.0	23.0
CP3	CP2+DON3	*HEC-1*	4.0	14.0
CP5	DON4+DON5+35 cfs	*HEC-1*	16.0	56.0
CP7	CP2+CP3+DON7	*HEC-1*	8.0	29.0
CP8	CP1+DON8	*HEC-1*	15.0	76.0
CPTOTL	DON9+ION8+CP7	*HEC-1*	35.0	119.0
CPLP	CPTOTL+JONES+CP5	*HEC-1*	62.0	204.0
JONES1	2.20	*Master Study*	4.0	7.0
RNCH	4.28	*Master Study*	7.0	13.0

1 Referenced from Master Drainage Study for Craig and Rancho and HEC-1 model for this Drainage Study

Table 4

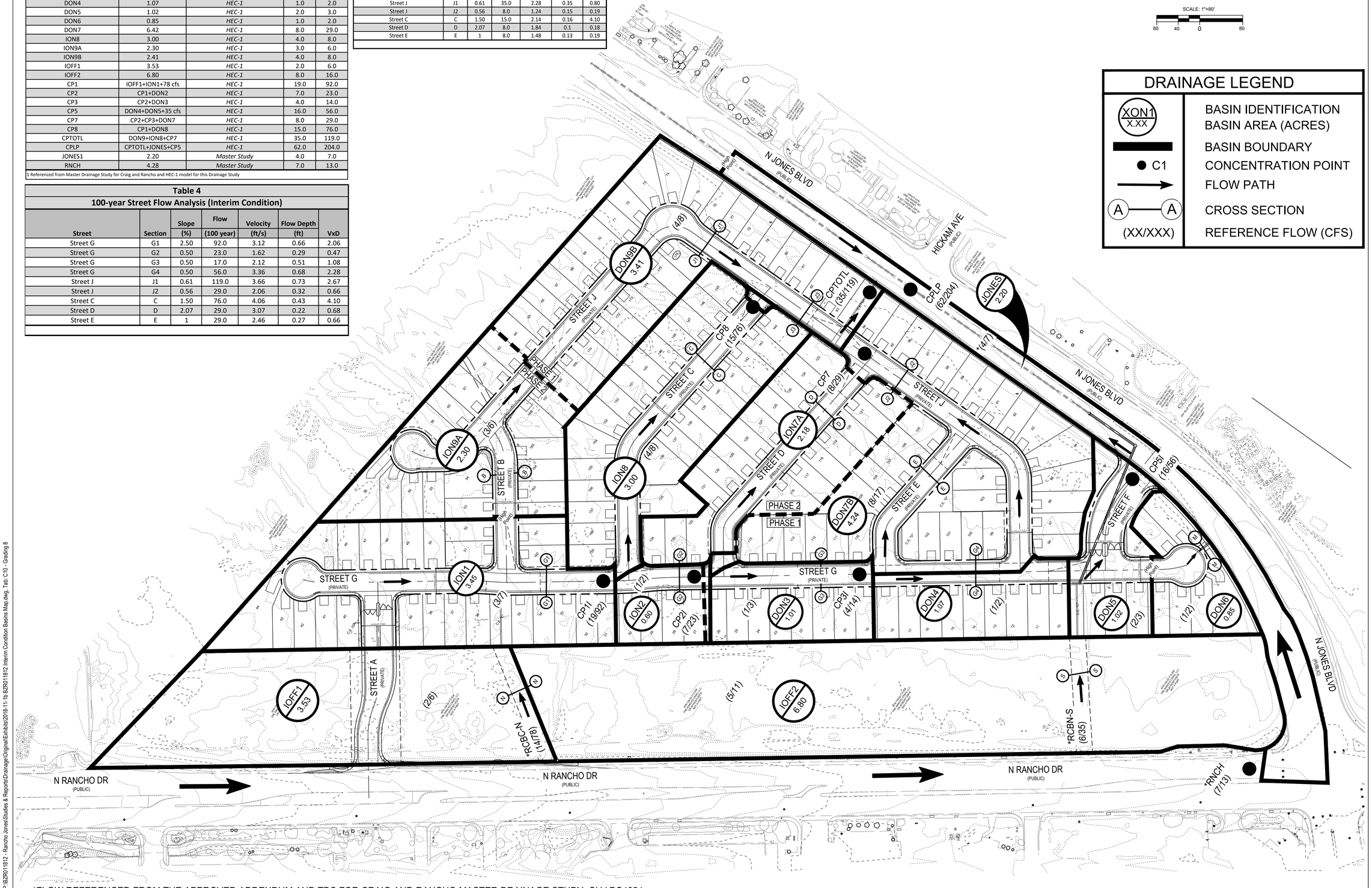
100-year Street Flow Analysis (Interim Condition)

Street	Section	Slope (%)	Flow (100 year)	Velocity (ft/s)	Flow Depth (ft)	VxD
Street G	G1	2.50	92.0	3.12	0.66	2.06
Street G	G2	0.50	23.0	1.62	0.29	0.47
Street G	G3	0.50	17.0	2.12	0.51	1.08
Street G	G4	0.50	56.0	3.36	0.68	2.28
Street J	J1	0.61	119.0	3.66	0.73	2.67
Street J	J2	0.56	29.0	2.06	0.32	0.66
Street C	C	1.50	76.0	4.06	0.43	4.10
Street D	D	2.07	29.0	3.07	0.22	0.68
Street E	E	1	29.0	2.46	0.27	0.66

Table 5

10-year Street Flow Analysis (Interim Condition)

Street	Section	Slope (%)	Flow (10 year)	Velocity (ft/s)	Flow Depth (ft)	VxD
Street G	G1	2.50	19.0	2.75	0.16	0.44
Street G	G2	0.50	7.0	1.14	0.14	0.16
Street G	G3	0.50	17.0	1.62	0.24	0.39
Street G	G4	0.50	16.0	1.58	0.23	0.36
Street J	J1	0.61	35.0	2.28	0.35	0.80
Street J	J2	0.56	8.0	1.24	0.15	0.19
Street C	C	1.50	15.0	2.14	0.16	4.10
Street D	D	2.07	8.0	1.84	0.1	0.18
Street E	E	1	8.0	1.48	0.13	0.19



*FLOW REFERENCED FROM THE APPROVED ADDENDUM AND TDS FOR CRAIG AND RANCHO MASTER DRAINAGE STUDY, CLV DS4824.

SCALE: 1"=80'

80 40 0 80

DRAINAGE LEGEND

XON1 / X.XX	BASIN IDENTIFICATION BASIN AREA (ACRES)
	BASIN BOUNDARY
C1	CONCENTRATION POINT
	FLOW PATH
A — A	CROSS SECTION
(XX/XXX)	REFERENCE FLOW (CFS)

Actus
3283 E. Warm Springs Rd., Suite 300
Las Vegas, NV 89120
www.Actus-NV.com
(702) 586-9296
Engineering - Surveying - Consulting - Planning

FIGURE 8 INTERIM CONDITION BASINS MAP

RANCHO JONES

BEAZER HOMES

CITY OF LAS VEGAS, NEVADA

BY	DESCRIPTION	DATE

DATE	10/17/2018
DRAWN	RP
DESIGNED	ALW
CHECKED	DCL
PROJECT #	BZR011812

SHEET TITLE: FIGURE 8

SHEET NUMBER: 1

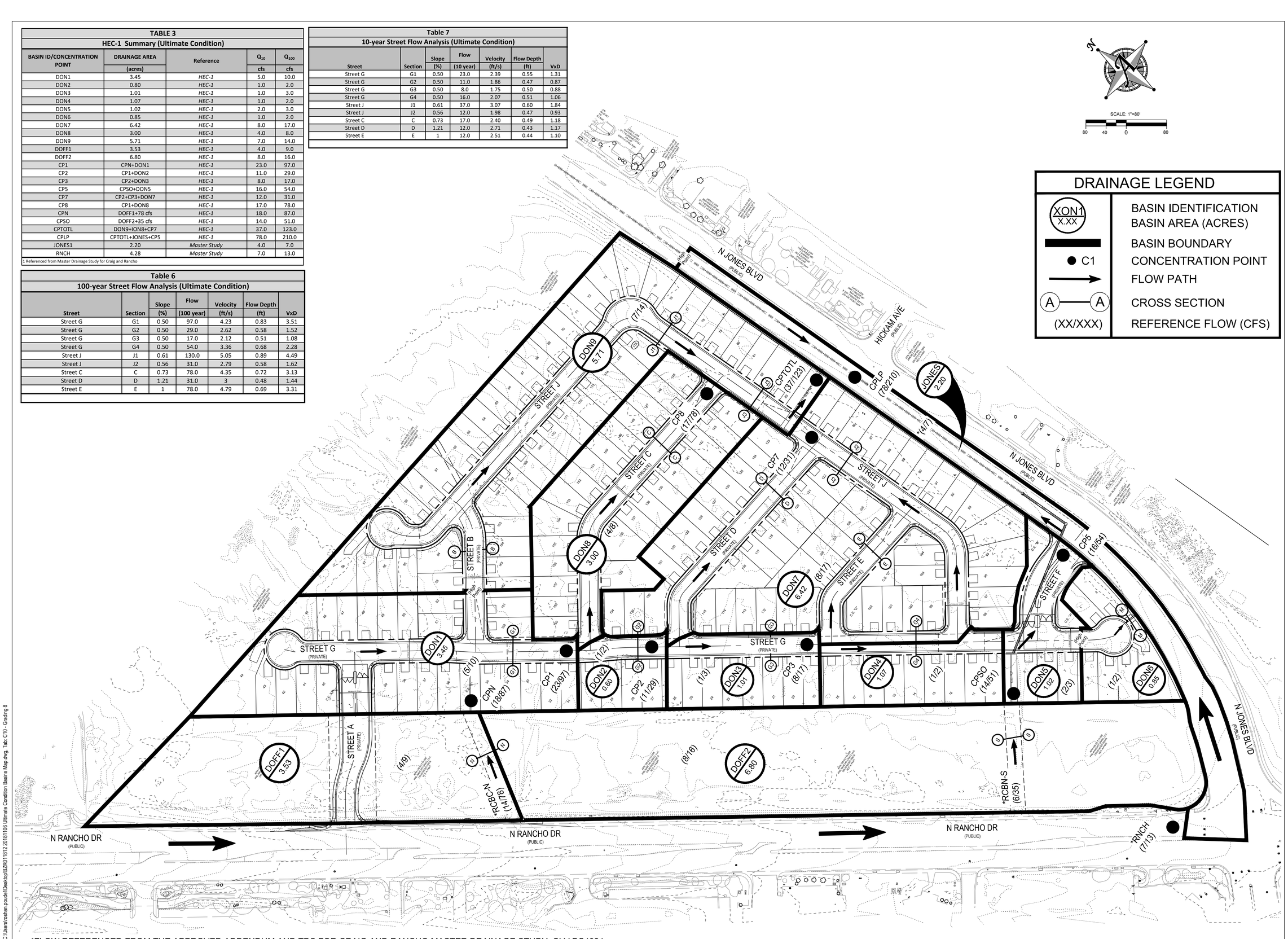
Plot Stamp: 11/6/2018 1:27:40 PM - Roshan Poudel
File: P:\BZR011812 - Rancho Jones\Studies & Reports\Drainage\Original\Exhibits\2018-11-1b BZR011812 Interim Condition Basins Map.dwg, Tab: C10 - Grading 8

TABLE 3				
HEC-1 Summary (Ultimate Condition)				
BASIN ID/CONCENTRATION POINT	DRAINAGE AREA (acres)	Reference	Q_{10} cfs	Q_{100} cfs
DON1	3.45	*HEC-1*	5.0	10.0
DON2	0.80	*HEC-1*	1.0	2.0
DON3	1.01	*HEC-1*	1.0	3.0
DON4	1.07	*HEC-1*	1.0	2.0
DON5	1.02	*HEC-1*	2.0	3.0
DON6	0.85	*HEC-1*	1.0	2.0
DON7	6.42	*HEC-1*	8.0	17.0
DON8	3.00	*HEC-1*	4.0	8.0
DON9	5.71	*HEC-1*	7.0	14.0
DOFF1	3.53	*HEC-1*	4.0	9.0
DOFF2	6.80	*HEC-1*	8.0	16.0
CP1	CPN+DON1	*HEC-1*	23.0	97.0
CP2	CP1+DON2	*HEC-1*	11.0	29.0
CP3	CP2+DON3	*HEC-1*	8.0	17.0
CP5	CPSO+DON5	*HEC-1*	16.0	54.0
CP7	CP2+CP3+DON7	*HEC-1*	12.0	31.0
CP8	CP1+DON8	*HEC-1*	17.0	78.0
CPN	DOFF1+78 cfs	*HEC-1*	18.0	87.0
CPSO	DOFF2+35 cfs	*HEC-1*	14.0	51.0
CPTOTL	DON9+ION8+CP7	*HEC-1*	37.0	123.0
CPLP	CPTOTL+JONES+CP5	*HEC-1*	78.0	210.0
JONES1	2.20	*Master Study*	4.0	7.0
RNCH	4.28	*Master Study*	7.0	13.0

1 Referenced from Master Drainage Study for Craig and Rancho

Table 6						
100-year Street Flow Analysis (Ultimate Condition)						
Street	Section	Slope (%)	Flow (100 year)	Velocity (ft/s)	Flow Depth (ft)	VxD
Street G	G1	0.50	97.0	4.23	0.83	3.51
Street G	G2	0.50	29.0	2.62	0.58	1.52
Street G	G3	0.50	17.0	2.12	0.51	1.08
Street G	G4	0.50	54.0	3.36	0.68	2.28
Street J	J1	0.61	130.0	5.05	0.89	4.49
Street J	J2	0.56	31.0	2.79	0.58	1.62
Street C	C	0.73	78.0	4.35	0.72	3.13
Street D	D	1.21	31.0	3	0.48	1.44
Street E	E	1	78.0	4.79	0.69	3.31

Table 7						
10-year Street Flow Analysis (Ultimate Condition)						
Street	Section	Slope (%)	Flow (10 year)	Velocity (ft/s)	Flow Depth (ft)	VxD
Street G	G1	0.50	23.0	2.39	0.55	1.31
Street G	G2	0.50	11.0	1.86	0.47	0.87
Street G	G3	0.50	8.0	1.75	0.50	0.88
Street G	G4	0.50	16.0	2.07	0.51	1.06
Street J	J1	0.61	37.0	3.07	0.60	1.84
Street J	J2	0.56	12.0	1.98	0.47	0.93
Street C	C	0.73	17.0	2.40	0.49	1.18
Street D	D	1.21	12.0	2.71	0.43	1.17
Street E	E	1	12.0	2.51	0.44	1.10



*FLOW REFERENCED FROM THE APPROVED ADDENDUM AND TDS FOR CRAIG AND RANCHO MASTER DRAINAGE STUDY, CLV DS4824.

Actus
3283 E. Warm Springs Rd., Suite 300
Las Vegas, NV 89120
www.Actus-NV.com
(702) 586-9296
Engineering - Surveying - Consulting - Planning

FIGURE 9 ULTIMATE CONDITION BASINS MAP

RANCHO JONES

BEAZER HOMES

CITY OF LAS VEGAS, NEVADA

BY	DESCRIPTION	DATE

DATE	10/17/2018
DRAWN	RP
DESIGNED	ALW
CHECKED	DCL
PROJECT #	BZR011812

SHEET TITLE: FIGURE 9

SHEET NUMBER: 1

Plot Stamp: 11/6/2018 1:49:10 PM - Roshan Poudel
File: C:\Users\roshan.poudel\Desktop\BZR011812 20181106 Ultimate Condition Basins Map.dwg, Tab: C10 - Grading 8

HYDROLOGIC PARAMETERS



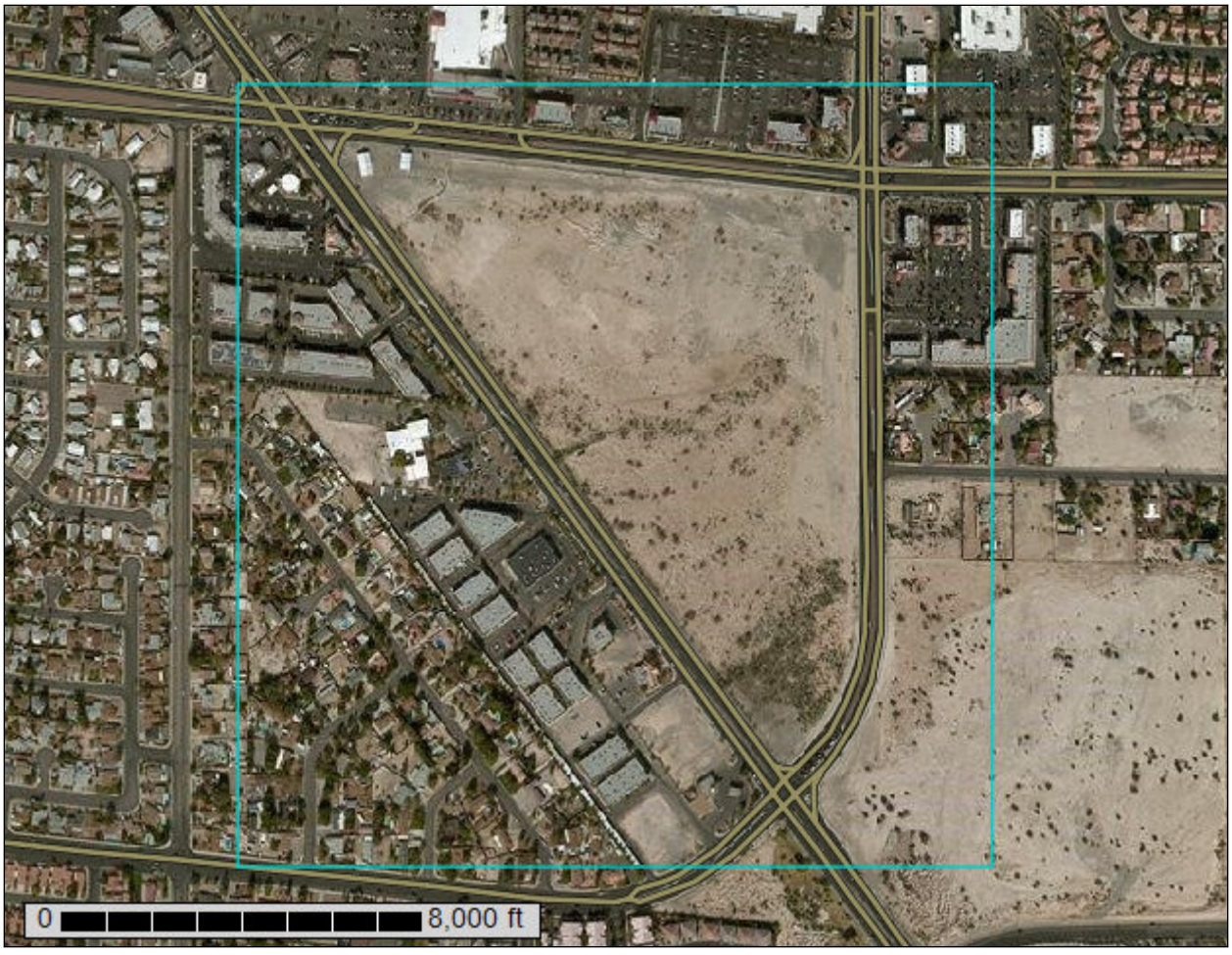
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Las Vegas Valley Area, Nevada, Part of Clark County



September 4, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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301—Las Vegas gravelly fine sandy loam, 2 to 4 percent slopes.....14
305—Las Vegas-DeStazo complex, 0 to 2 percent slopes.....15
Soil Information for All Uses.....18
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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

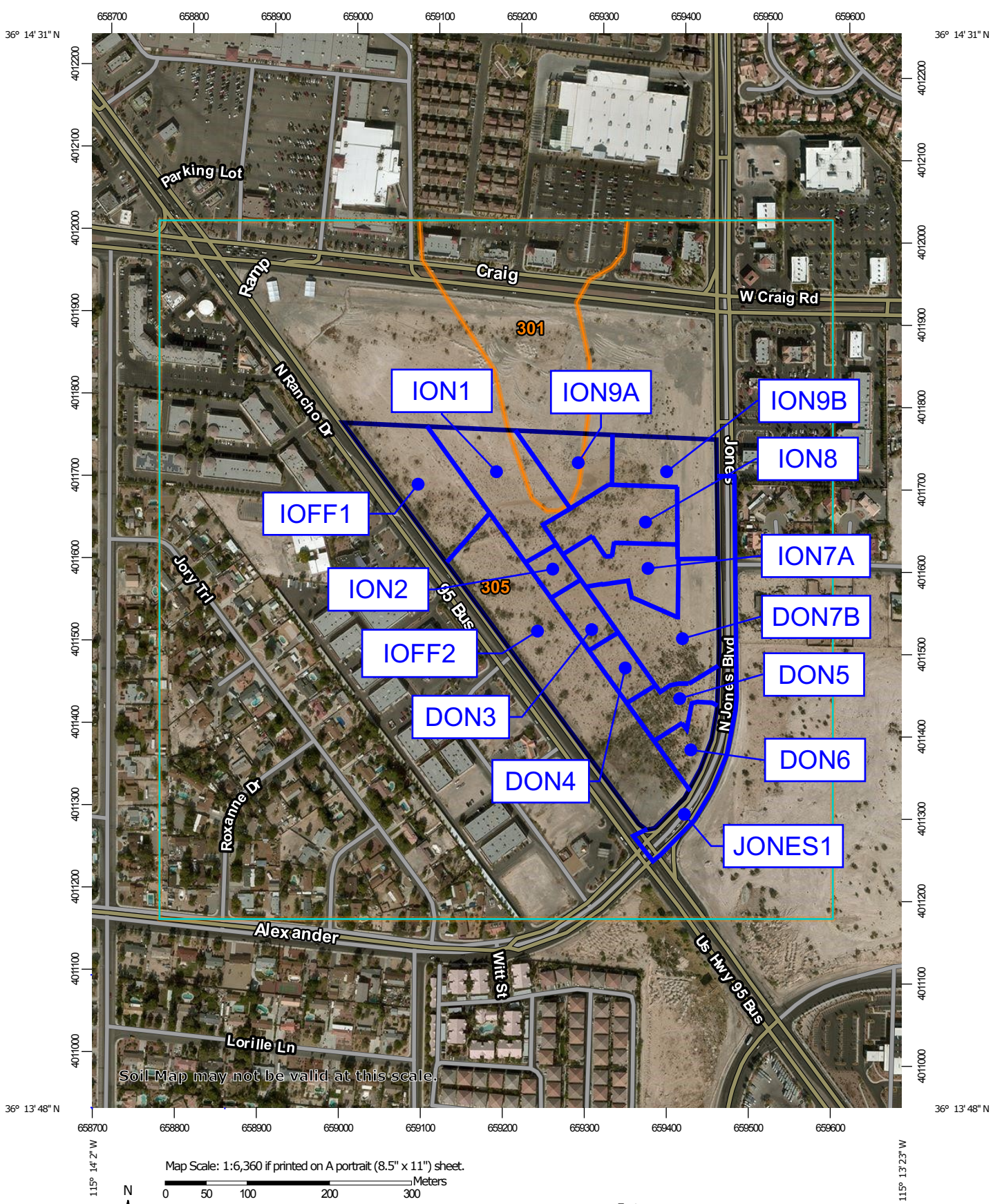
identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

INTERIM CONDITION

Custom Soil Resource Report
Soil Map



Map Scale: 1:6,360 if printed on A portrait (8.5" x 11") sheet.

N

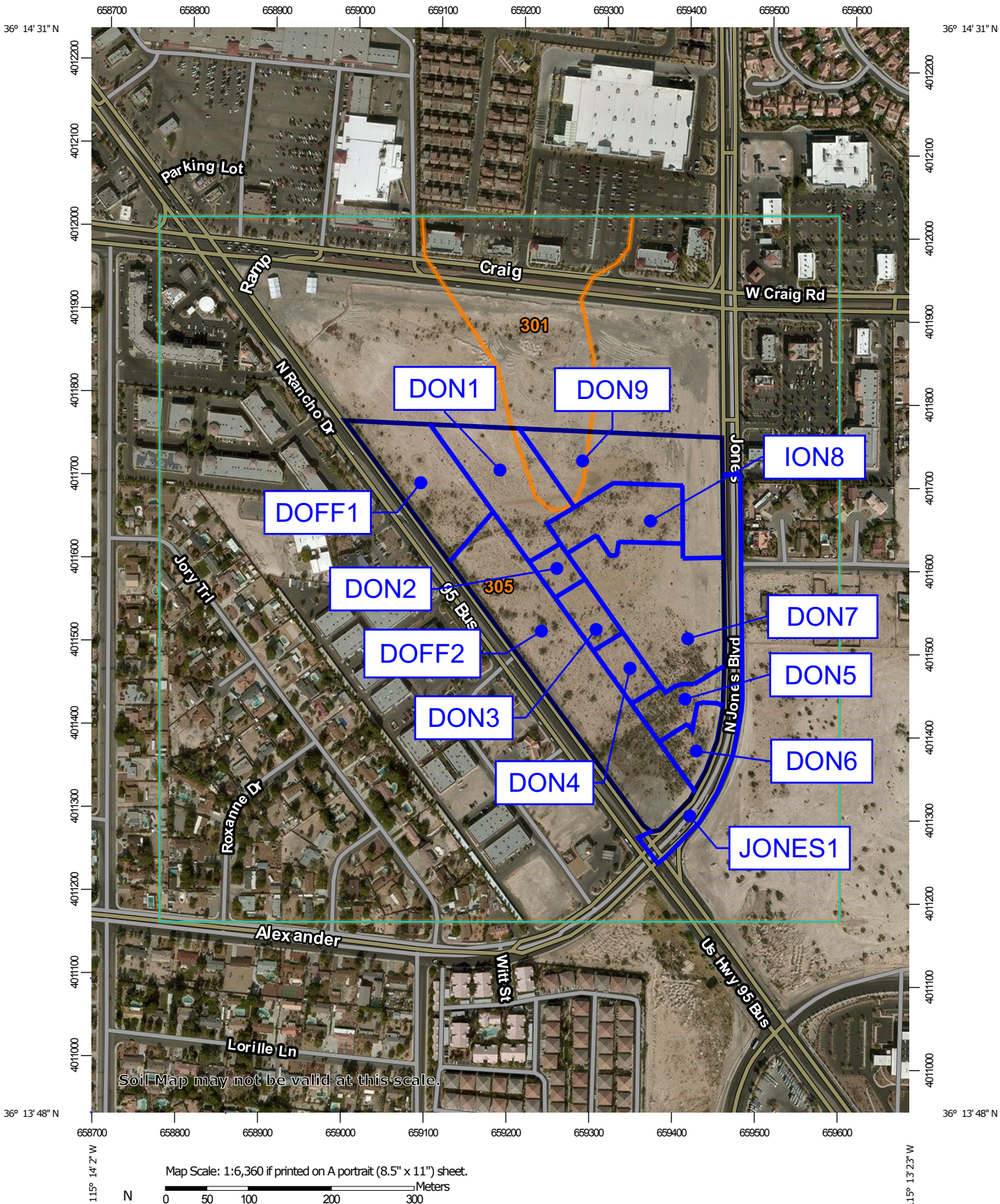
Meters: 0 50 100 200 300

Feet: 0 300 600 1200 1800

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

INTERIM CONDITION

Custom Soil Resource Report
Soil Map



Map Scale: 1:6,360 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 300 600 1200 1800

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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 12, Sep 15, 2017

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

Date(s) aerial images were photographed: May 7, 2011—Feb 25, 2014

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
301	Las Vegas gravelly fine sandy loam, 2 to 4 percent slopes	11.8	6.8%
305	Las Vegas-DeStazo complex, 0 to 2 percent slopes	161.1	93.2%
Totals for Area of Interest		**172.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Las Vegas Valley Area, Nevada, Part of Clark County

301—Las Vegas gravelly fine sandy loam, 2 to 4 percent slopes

Map Unit Setting

National map unit symbol: hrbq
Elevation: 1,800 to 2,600 feet
Mean annual precipitation: 4 to 6 inches
Mean annual air temperature: 63 to 68 degrees F
Frost-free period: 220 to 260 days
Farmland classification: Not prime farmland

Map Unit Composition

Las vegas and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Las Vegas

Setting

Landform: Basin-floor remnants
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from limestone

Typical profile

H1 - 0 to 1 inches: gravelly fine sandy loam
H2 - 1 to 7 inches: fine sandy loam
H3 - 7 to 11 inches: gravelly sandy clay loam
H4 - 11 to 15 inches: indurated

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: 3 to 14 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 85 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

305—Las Vegas-DeStazo complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hrbs
Elevation: 1,400 to 5,200 feet
Mean annual precipitation: 3 to 10 inches
Mean annual air temperature: 55 to 70 degrees F
Frost-free period: 180 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Las vegas and similar soils: 60 percent
Destazo and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Las Vegas

Setting

Landform: Alluvial flats
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from limestone

Typical profile

H1 - 0 to 2 inches: gravelly fine sandy loam
H2 - 2 to 8 inches: fine sandy loam
H3 - 8 to 12 inches: gravelly sandy clay loam
H4 - 12 to 16 inches: indurated

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 3 to 14 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 85 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

Description of Destazo

Setting

Landform: Alluvial flats
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 11 inches: fine sandy loam
H2 - 11 to 51 inches: very gravelly sandy clay loam
H3 - 51 to 62 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

Minor Components

Glencarb

Percent of map unit: 5 percent
Landform: Alluvial flats
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: LOAMY BOTTOM (030XB020NV)
Hydric soil rating: No

Bluepoint

Percent of map unit: 5 percent
Landform: Fan piedmonts, sand sheets
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Other vegetative classification: LIMY SAND 5-7" P.Z. (030XB037NV_2)
Hydric soil rating: No

Skyhaven

Percent of map unit: 5 percent
Landform: Alluvial flats
Down-slope shape: Linear

Across-slope shape: Linear
Other vegetative classification: SHALLOW LIMESTONE SLOPE 5-8 P.Z. (030XB030NV_2)
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

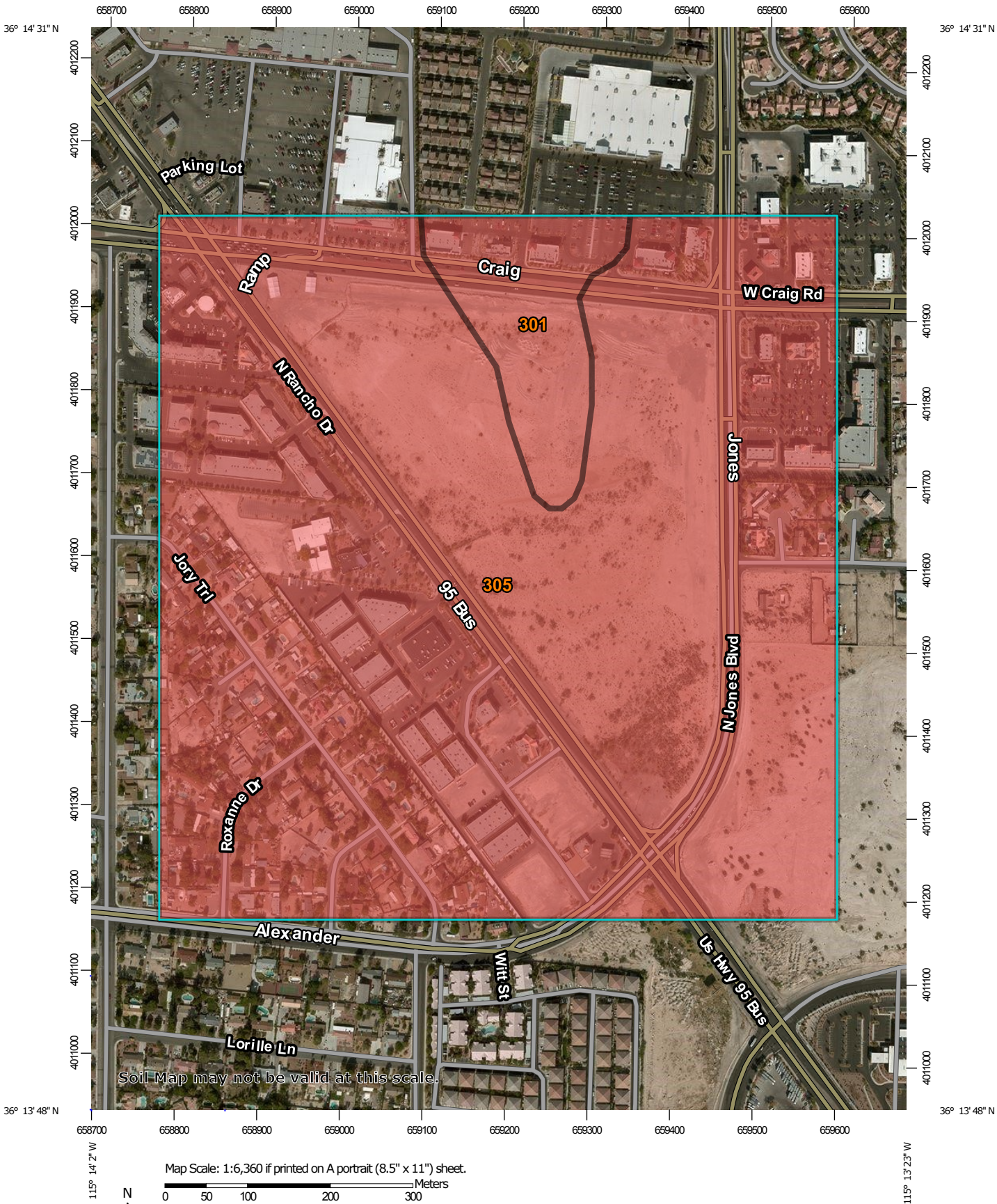
Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.



Map Scale: 1:6,360 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 300 600 1200 1800

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 12, Sep 15, 2017

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

Date(s) aerial images were photographed: May 7, 2011—Feb 25, 2014

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
301	Las Vegas gravelly fine sandy loam, 2 to 4 percent slopes	D	11.8	6.8%
305	Las Vegas-DeStazo complex, 0 to 2 percent slopes	D	161.1	93.2%
Totals for Area of Interest			**172.9**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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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				

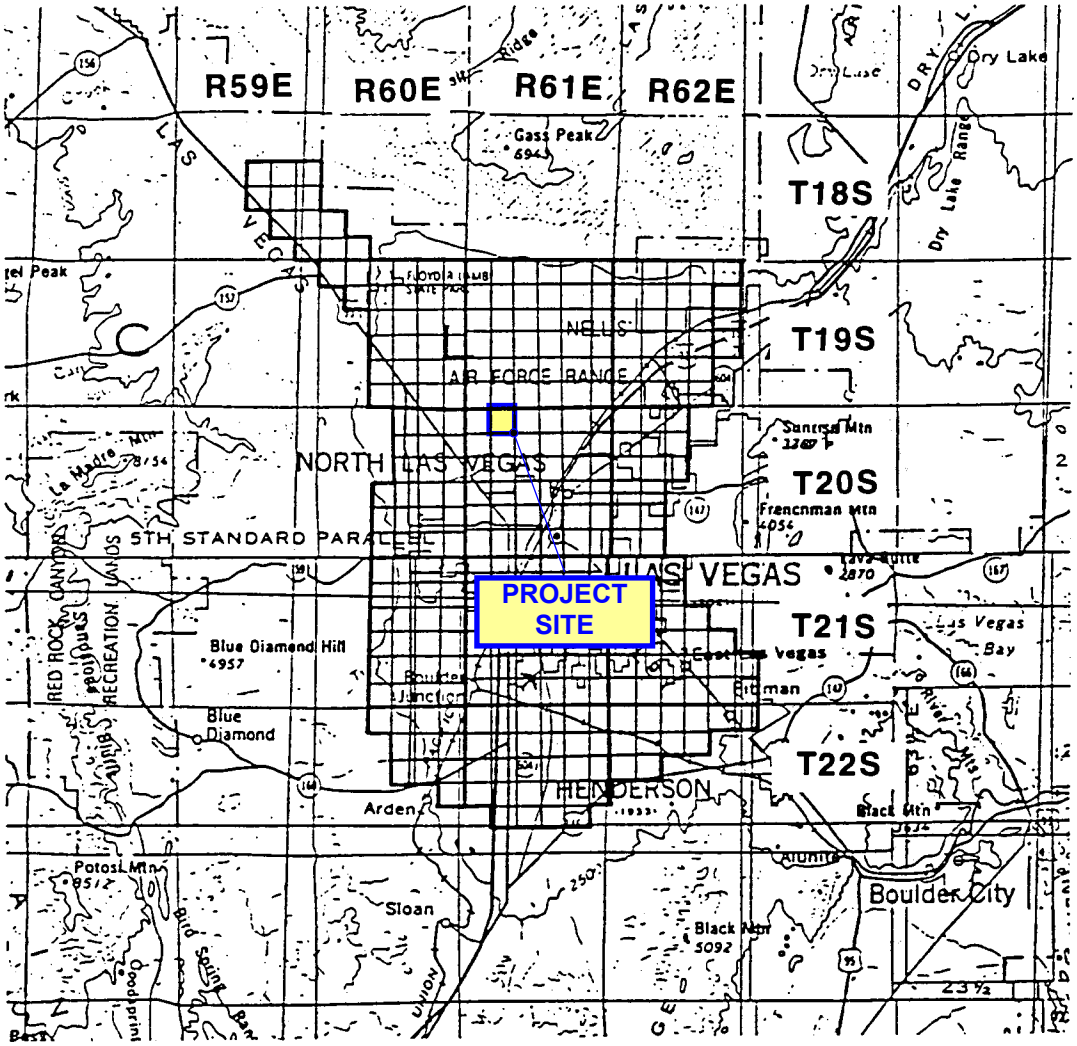
Notes:
1. For drainage areas less than 8 square miles in size, use SDN 3.
2. For drainage areas greater than or equal to 8 square miles and less than 12 square miles in size, use SDN 4.
3. For drainage areas greater than or equal to 12 square miles, use SDN 5.
4. A graphical representation of these values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

Revision	Date

REFERENCE:

TABLE 503

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

RUNOFF CURVE NUMBERS
(SEMIARID RANGELANDS[1])

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

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

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

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

Revision	Date

RUNOFF CURVE NUMBERS - RESIDENTIAL DISTRICTS

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

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

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

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

Revision	Date

REFERENCE:

TABLE 602A

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

Curve Number Calculator

Company:	Actus
By:	Christian O'Quinn
Date:	10/30/2018
Project Name:	Rancho Jones

Soil # 305 - Las Vegas-DeStazo complex, 0 to 2 percent slopes						
Soil Composition	%	Group	Existing CN -	Desert Shrub	Developed CN -	Residential <6,000sf
Las Vegas	60	D	88		95	
Destazo	25	C	85		94	
Minor Comp	15	D	88		95	
--	0	--	0		0	
Composite CN	**100**	**--**	**87.25**		**94.75**	

Soil # 301 - Las Vegas gravelly fine sandy loam, 2 to 4 percent slopes						
Soil Composition	%	Group	Existing CN -	Desert Shrub	Developed CN -	Residential <6,000sf
Las Vegas	100	D	88		95	
--	0	--	0		0	
--	0	--	0		0	
--	0	--	0		0	
Composite CN	**100**	**--**	**88.00**		**95.00**	

Soil # -- - --						
Soil Composition	%	Group	Existing CN -	--	Developed CN -	--
--	--	--	0		0	
--	--	--	0		0	
--	--	--	0		0	
--	--	--	0		0	
Composite CN	**100**	**--**	**0**		**0**	

Soil # -- - --						
Soil Composition	%	Group	Existing CN -	--	Developed CN -	--
--	--	--	0		0	
--	--	--	0		0	
--	--	--	0		0	
--	--	--	0		0	
Composite CN	**100**	**--**	**0**		**0**	

Soil # -- - --						
Soil Composition	%	Group	Existing CN -	--	Developed CN -	--
--	--	--	0		0	
--	--	--	0		0	
--	--	--	0		0	
--	--	--	0		0	
Composite CN	**100**	**--**	**0**		**0**	

Curve Number Calculator

Company:	Actus
By:	Christian O'Quinn
Date:	10/30/2018
Project Name:	Rancho Jones

EXISTING BASINS

BASIN	Percentage of Basin (%)						Composite CN
	Existing Soil # 305 CN 87.25	Existing Soil # 301 CN 88.00	Existing Soil # -- CN 0	Existing Soil # -- CN 0	Existing Soil # -- CN 0	Public Street Improvments CN 98.00	
EON1	91%	9%					87.32
EOF1	100%						87.25
RNCH1						100%	98.00
RNCH2						100%	98.00
JONES1						100%	98.00
JONES2						100%	98.00

DEVELOPED BASINS

BASIN	Percentage of Basin (%)						Composite CN
	Developed Soil # 305 CN 94.75	Developed Soil # 301 CN 95.00	Developed Soil # -- CN 0	Developed Soil # -- CN 0	Developed Soil # -- CN 0	Public Street Improvments CN 98.00	
DON1	90%	10%					94.78
DON2	90%	10%					94.78
DON3	90%	10%					94.78
DON4	90%	10%					94.78
DON5	90%	10%					94.78
DON6	90%	10%					94.78
DON7	90%	10%					94.78
DON8	90%	10%					94.78
DON9	90%	10%					94.78
DON10	90%	10%					94.78
DON11	90%	10%					94.78
DON12	90%	10%					94.78
DOFF1	100%						94.75
DOFF2	100%						94.75
JONES1						100%	98.00
JONES2						100%	98.00

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
TIME OF CONCENTRATION

Company: Actus | Project Name: Rancho Jones
By: Christian O'Quinn | Description: Existing and Developed Basins
Date: 10/30/18 | File Name:

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check Urbanized Basins		Tlag
DESIG:	DEV./EX. (D or E)	CN	K [1]	AREA Ac	AREA Mi^2 [2]	INITIAL LENGTH Feet	SLOPE %	Ti Min [3]	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS [4]	V2 VELOCITY FPS [5]	Tt Min [6]	Tc Calc. [7]	Total Length Feet [8]	Tc Check [9]	Tlag Hours [10]
Existing Basins																	
EON1	E	87.32	0.7626	23.13	**0.0361**	560	1.10	13.92	1960	0.90	1.40	2.79	14.66	28.58			**0.286**
EOF1	E	87.25	0.7617	11.00	**0.0172**	210	0.95	8.98	2200	0.90	1.40	2.79	16.09	25.07			**0.251**
RNCH1	E	98.00	0.9036	2.27	**0.0035**	50	2.00	1.98	1490	0.94	1.43	2.85	11.60	13.58			**0.136**
RNCH2	E	98.00	0.9036	1.94	**0.0030**	50	2.00	1.98	1405	0.64	1.18	2.35	13.45	15.44			**0.154**
JONES1	E	98.00	0.9036	2.20	**0.0034**	37.5	2.00	1.72	1215	0.66	1.20	2.39	11.92	13.64			**0.136**
JONES2	E	98.00	0.9036	2.04	**0.0032**	37.5	2.00	1.72	1215	0.66	1.20	2.39	11.92	13.64			**0.136**
Developed Basins																	
DON1	D	94.78	0.8610	3.43	**0.0054**	100	1.00	4.30	580.26	1.90	2.78	4.22	3.31	7.61	680.26	13.779	**0.076**
DON2	D	94.78	0.8610	0.58	**0.0009**	100	1.00	4.30	179.59	0.56	1.51	2.29	1.98	6.28	279.59	11.553	**0.063**
DON3	D	94.78	0.8610	1.01	**0.0016**	100	1.00	4.30	276	0.36	1.21	1.84	3.80	8.10	376	12.089	**0.081**
DON4	D	94.78	0.8610	0.82	**0.0013**	100	1.00	4.30	250.2	0.40	1.28	1.94	3.26	7.57	350.2	11.946	**0.076**
DON5	D	94.78	0.8610	1.29	**0.0020**	100	1.00	4.30	246.93	0.20	0.90	1.37	4.56	8.86	346.93	11.927	**0.089**
DON6	D	94.78	0.8610	0.83	**0.0013**	100	1.00	4.30	130.44	0.38	1.25	1.89	1.75	6.05	230.44	11.280	**0.060**
DON7	D	94.78	0.8610	1.57	**0.0025**	100	1.00	4.30	424.15	0.47	1.38	2.10	5.10	9.41	524.15	12.912	**0.094**
DON8	D	94.78	0.8610	1.67	**0.0026**	100	1.00	4.30	573.98	0.17	0.83	1.26	10.98	13.74	673.98	13.744	**0.137**
DON9	D	94.78	0.8610	2.31	**0.0036**	100	1.00	4.30	516.6	0.39	1.26	1.91	6.75	11.05	616.6	13.426	**0.111**
DON10	D	94.78	0.8610	3.00	**0.0047**	100	1.00	4.30	545.65	0.92	1.94	2.94	4.56	8.86	645.65	13.587	**0.089**
DON11	D	94.78	0.8610	5.65	**0.0088**	100	1.00	4.30	948.64	0.53	1.47	2.23	9.02	13.32	1048.64	15.826	**0.133**
DON12	D	94.78	0.8610	1.30	**0.0020**	100	1.00	4.30	398.19	0.50	1.43	2.16	4.65	8.95	498.19	12.768	**0.089**
DOFF1	D	94.75	0.8607	3.53	**0.0055**	680	1.62	9.56	218.32	1.83	2.73	4.14	1.33	10.90	898.32	14.991	**0.109**
DOFF2	D	94.75	0.8607	6.80	**0.0106**	1030	0.58	16.58	216.83	0.92	1.94	2.94	1.87	16.93	1246.83	16.927	**0.169**
JONES1	D	98.00	0.9036	2.20	**0.0034**	37.5	2.00	1.72	1215	0.66	1.64	2.49	9.87	11.59	1252.5	16.958	**0.116**
JONES2	D	98.00	0.9036	2.04	**0.0032**	37.5	2.00	1.72	1215	0.66	1.64	2.49	9.87	11.59	1252.5	16.958	**0.116**

[1] K = 0.0132 (CN) - 0.39
[2] A = Area/640
[3] Ti = (1.8 (1.1-K) L^0.5)/S^0.33
[4] For Existing Conditions: V1 = 14.8 * (S/100)^0.5
For Developed Conditions: V1 = 20.2 * (S/100)^0.5
[5] For Existing Conditions: V2 = 29.4 * (S/100)^0.5
For Developed Conditions: V2 = 30.6 * (S/100)^0.5
[6] Tt = L/(60*V)
[7] Tc = Ti + Tt
[8] Total L = Initial L + Travel L
[9] Tc = (L/180) + 10
[10] Tlag = (0.6*Tc)/60
[11] Min Tlag =0.05
Note: For Travel Time Calcs: V1 applies to first 500 feet and V2 applies to remaining distance.

REFERENCE :

STANDARD FORM 4

MANNING'S ROUGHNESS COEFFICIENTS FOR CHANNEL LINING TYPES

Channel Material	Roughness Coefficient (n)	
	Normal	Maximum
Corrugated Metal	0.025	0.030
Concrete**		
1) Trowel finish	0.013	0.015
2) Float finish	0.015	0.016
3) Unfinished	0.017	0.020
4) Shotcrete, Good section	0.019	0.023
5) Shotcrete, wavy section	0.122	0.025
Asphalt (use maximum value when cars are present)	0.016	0.020
Soil-Cement	0.020	0.025
Constructed channels with earth or sand bottom, sides of		
1) Clean earth; straight	0.022	0.025
2) Earth with grass and weeds	0.025	0.030
3) Earth with trees and shrubs	0.032	0.040
4) Shotcrete	0.022	0.025
5) Soil-cement	0.025	0.028
6) Concrete	0.020	0.024
7) Dry rubble or riprap	0.033	0.036
Natural channels with sand bottom, sides of		
1) Trees and shrubs	0.035	0.045
2) Rock	0.032	0.040
Natural channel with rock bottom	0.060	0.090
Overbank floodplains		
1) Desert brush, normal density	0.060	0.080
2) Dense vegetation	0.100	0.160

- Adapted from Chow (1959) and Aldridge and Garrett (1973).

** Manning's Coefficients for Clear Water Only

__ City of Tucson Standards Manual for Drainage Design

Revision	Date

REFERENCE:

TABLE 702

Interim Condition - 10 yr

```
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   26OCT18  TIME  17:05:42   *                 *           (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

            1           ID    PREPARED FOR
            2           ID    RANCHO JONES
            3           ID    10-Y & 100-Y,6 Hour Storm
            4           ID    INTERIM/ULTIMATE CONDITION
            5           ID    @@@@
```

```
   54          KK   CP1D
   55          KM   COMBINATION POINT CP1D
   56          HC       4
               *

   57          KK   REMAIN1
   58          DT      D8
   59          DI       0      28
   60          DQ       0      19
               *

   61          KK   ION2
   62          KM   DEVELOPED ONSITE BASIN DON2
   63          BA  0.0009
   64          LS       0   87.32
   65          UD   0.063
               *

   66          KK   CP2D
   67          KM   COMBINATION POINT CP2D
   68          HC       2
               *

   69          KK   REMAIN2
   70          DT      D7
   71          DI       0      10
   72          DQ       0       6
               *

   73          KK   DON3
   74          KM   DEVELOPED ONSITE BASIN DON3
   75          BA  0.0016
   76          LS       0   94.78
   77          UD   0.081
               *

   78          KK   CP3D
   79          KM   COMBINATION POINT CP3D
   80          HC       2
               *

   81          KK   RTDN7
   82          KM   RETRIVE FLOW
   83          DR      D7
               *
1                                       HEC-1 INPUT                                          PAGE  3

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

   84          KK   DON7
   85          KM   DEVELOPED ONSITE BASIN DON7
   86          BA  0.0100
   87          LS       0   94.78
   88          UD   0.095
               *

   89          KK   CP7D
   90          KM   COMBINATION POINT CP7D
   91          HC       2
               *

   92          KK   RTDN8
   93          KM   RETRIVE FLOW
   94          DR      D8
               *

   95          KK   ION8
   96          KM   DEVELOPED ONSITE BASIN DON7
   97          BA  0.0047
   98          LS       0   87.32
   99          UD   0.089
               *

  100          KK   CP8D
  101          KM   COMBINATION POINT CP8D
  102          HC       2
               *

  103          KK   DON9
  104          KM   DEVELOPED ONSITE BASIN DON9
  105          BA  0.0089
  106          LS       0   94.78
  107          UD   0.111
               *

  108          KK   CPTOTALD
  109          KM   COMBINATION POINT CPTOTALD
  110          HC       3
               *

  111          KK   DOFF2
  112          KM   DEVELOPED OFFSITE BASIN DOFF2
  113          BA  0.0106
  114          LS       0   94.75
  115          UD   0.169
               *

  116          KK   DON4
  117          KM   DEVELOPED ONSITE BASIN DON4
  118          BA  0.0013
  119          LS       0   94.78
  120          UD   0.076
               *
1                                       HEC-1 INPUT                                          PAGE  4
```

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

            121         KK   DON5
            122         KM   DEVELOPED ONSITE BASIN DON5
            123         BA  0.0020
            124         LS       0   94.78
            125         UD   0.089
                        *

            126         KK    CPFS
            127         KM   DEVELOPED OFFSITE BASIN
            128         BA   .0001
            129         BF       6
            130         LS       0      98
            131         UD   0.100
                        *

            132         KK   DREF1
            133         BA   .0001
            134         BF       0
            135         LS       0      98
            136         UD   0.100
                        *

            137         KK   CP5D
            138         KM   COMBINATION POINT CP5D
            139         HC       5
                        *

            140         KK    CPFS
            141         KM   DEVELOPED OFFSITE BASIN
            142         BA   .0001
            143         BF      13
            144         LS       0      98
            145         UD   0.100
                        *

            146         KK   DREF1
            147         BA   .0001
            148         BF       0
            149         LS       0      98
            150         UD   0.100
                        *

            151         KK    DON6
            152         KM   DEVELOPED ONSITE BASIN DON6
            153         BA  0.0013
            154         LS       0   94.78
            155         UD   0.060
                        *
1                                                HEC-1 INPUT                                                PAGE  5

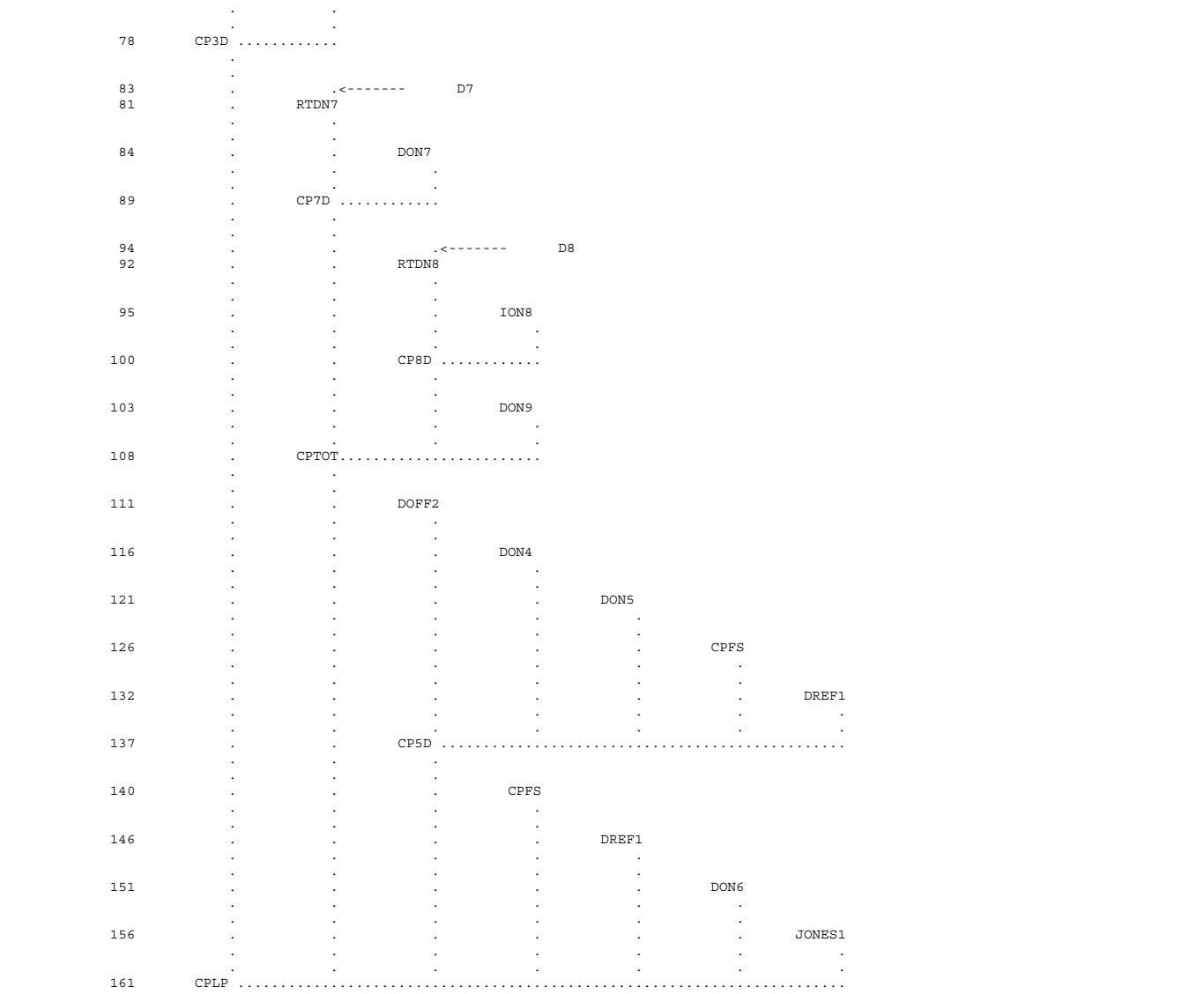
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            156         KK  JONES1
            157         KM   DEVELOPED OFFSITE BASIN JONES1
            158         BA  0.0034
            159         LS       0   98.00
            160         UD   0.116
                        *

            161         KK   CPLP
            162         KM   COMBINATION POINT CPLP
            163         HC       7
            164         ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (---->) DIVERSION OR PUMP FLOW

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

    24       ION1
                 .
                 .
    38           .       IOFF1
                 .           .
                 .           .
    43           .           .        CPFS
                 .           .           .
                 .           .           .
    49           .           .           .       DREF1
                 .           .           .           .
                 .           .           .           .
    54       CP1D ..................................
                 .
                 .
    58           .-------->      D8
    57       REMAI
                 .
                 .
    61           .       ION2
                 .           .
                 .           .
    66       CP2D ............
                 .
                 .
    70           .-------->      D7
    69       REMAI
                 .
                 .
    73           .       DON3
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   26OCT18  TIME  17:05:42   *
*                                       *
*****************************************
```

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

PREPARED FOR
RANCHO JONES
10-Y & 100-Y,6 Hour Storm
INTERIM/ULTIMATE CONDITION
@@@

```
                     IDATE      1    0  STARTING DATE
                     ITIME         0000  STARTING TIME
                        NQ          101  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1    0  ENDING DATE
                     NDTIME        0820  ENDING TIME
                     ICENT           19  CENTURY MARK

                  COMPUTATION INTERVAL     .08 HOURS
                      TOTAL TIME BASE    8.33 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       .74       .57       .90       .67       .51
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  RATIO 2  RATIO 3  RATIO 4  RATIO 5  RATIO 6
                                                           1.00      .74      .57      .90      .67      .51

 HYDROGRAPH AT
+                  ION1        .01     1   FLOW             8.       5.       3.       7.       5.       3.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
+                 IOFF1        .01     1   FLOW             7.       5.       3.       6.       4.       2.
                                             TIME          3.58     3.58     3.58     3.58     3.58     3.58

 HYDROGRAPH AT
+                  CPFS        .00     1   FLOW            14.      14.      14.      14.      14.      14.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
+                 DREF1        .00     1   FLOW             0.       0.       0.       0.       0.       0.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

  4 COMBINED AT
+                  CP1D        .01     1   FLOW            30.      24.      21.      28.      23.      19.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

 DIVERSION TO
+                    D8        .01     1   FLOW            21.      16.      14.      19.      15.      13.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
+                 REMAI        .01     1   FLOW            10.       8.       7.       9.       7.       6.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
+                 ION2         .00     1   FLOW             1.       1.       1.       1.       1.       0.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

  2 COMBINED AT
+                  CP2D        .01     1   FLOW            11.       9.       7.      10.       8.       7.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

 DIVERSION TO
+                    D7        .01     1   FLOW             7.       5.       4.       6.       5.       4.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
+                 REMAI        .01     1   FLOW             4.       3.       3.       4.       3.       3.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
+                 DON3         .00     1   FLOW             3.       2.       2.       3.       2.       1.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

  2 COMBINED AT
+                  CP3D        .01     1   FLOW             8.       6.       4.       7.       5.       4.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
+                 RTDN7        .00     1   FLOW             7.       5.       4.       6.       5.       4.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
+                 DON7         .01     1   FLOW            19.      13.      10.      17.      12.       8.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

  2 COMBINED AT
+                  CP7D        .01     1   FLOW            26.      18.      14.      23.      17.      12.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
+                 RTDN8        .00     1   FLOW            21.      16.      14.      19.      15.      13.
                                             TIME          3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
```

+	ION8	.00	1	FLOW	7.	4.	3.	6.	4.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CP8D	.00	1	FLOW	28.	21.	17.	25.	19.	15.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	DON9	.01	1	FLOW	16.	11.	8.	14.	10.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT										
+	CPTOT	.02	1	FLOW	69.	50.	39.	62.	46.	35.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	DOFF2	.01	1	FLOW	18.	12.	9.	16.	11.	8.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	DON4	.00	1	FLOW	3.	2.	1.	2.	2.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	DON5	.00	1	FLOW	4.	3.	2.	3.	2.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	CPFS	.00	1	FLOW	6.	6.	6.	6.	6.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	DREF1	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
5 COMBINED AT										
+	CP5D	.01	1	FLOW	29.	22.	18.	27.	21.	16.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT										
+	CPFS	.00	1	FLOW	13.	13.	13.	13.	13.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	DREF1	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	DON6	.00	1	FLOW	3.	2.	1.	2.	2.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	JONES1	.00	1	FLOW	6.	5.	4.	6.	4.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
7 COMBINED AT										
+	CPLP	.06	1	FLOW	127.	98.	78.	116.	90.	72.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50

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

Interim Condition -100 yr

```
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   26OCT18  TIME  16:26:37  *                                                  *          (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.

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 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

            1           ID    PREPARED FOR
            2           ID    RANCHO JONES
            3           ID    10-Y & 100-Y,6 Hour Storm
            4           ID    INTERIM/ULTIMATE CONDITION
            5           ID    @@@@
```

```
   54          KK   CP1D
   55          KM   COMBINATION POINT CP1D
   56          HC       4
               *

   57          KK   REMAIN1
   58          DT      D8
   59          DI       0      92
   60          DQ       0      70
               *

   61          KK   ION2
   62          KM   DEVELOPED ONSITE BASIN ION2
   63          BA  0.0009
   64          LS       0   87.32
   65          UD   0.063
               *

   66          KK   CP2D
   67          KM   COMBINATION POINT CP2D
   68          HC       2
               *

   69          KK   REMAIN2
   70          DT      D7
   71          DI       0      29
   72          DQ       0      15
               *

   73          KK   DON3
   74          KM   DEVELOPED ONSITE BASIN DON3
   75          BA  0.0016
   76          LS       0   94.78
   77          UD   0.081
               *

   78          KK   CP3D
   79          KM   COMBINATION POINT CP3D
   80          HC       2
               *

   81          KK   REMAIN3
   82          DT      D7
   83          DI       0      17
   84          DQ       0       6
               *
1                                      HEC-1 INPUT                                      PAGE  3

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

   85          KK   RTDN7
   86          KM   RETRIVE FLOW
   87          DR      D7
               *

   88          KK   DON7
   89          KM   DEVELOPED ONSITE BASIN DON7
   90          BA  0.0100
   91          LS       0   94.78
   92          UD   0.095
               *

   93          KK   CP7D
   94          KM   COMBINATION POINT CP7D
   95          HC       2
               *

   96          KK   RTDN8
   97          KM   RETRIVE FLOW
   98          DR      D8
               *

   99          KK   ION8
  100          KM   DEVELOPED ONSITE BASIN DON7
  101          BA  0.0047
  102          LS       0   87.32
  103          UD   0.089
               *

  104          KK   CP8D
  105          KM   COMBINATION POINT CP8D
  106          HC       2
               *

  107          KK   DON9
  108          KM   DEVELOPED ONSITE BASIN DON9
  109          BA  0.0089
  110          LS       0   94.78
  111          UD   0.111
               *

  112          KK   CPTOTALD
  113          KM   COMBINATION POINT CPTOTALD
  114          HC       3
               *

  115          KK   DOFF2
  116          KM   DEVELOPED OFFSITE BASIN DOFF2
  117          BA  0.0106
  118          LS       0   94.75
  119          UD   0.169
               *
1                                      HEC-1 INPUT                                      PAGE  4
```

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

           120          KK   DON4
           121          KM   DEVELOPED ONSITE BASIN DON4
           122          BA  0.0013
           123          LS       0   94.78
           124          UD   0.076
                        *

           125          KK   DON5
           126          KM   DEVELOPED ONSITE BASIN DON5
           127          BA  0.0020
           128          LS       0   94.78
           129          UD   0.089
                        *

           130          KK    CPFS
           131          KM   DEVELOPED OFFSITE BASIN
           132          BA   .0001
           133          BF      35
           134          LS       0      98
           135          UD   0.100
                        *

           136          KK   DREF1
           137          BA   .0001
           138          BF       0
           139          LS       0      98
           140          UD   0.100
                        *

           141          KK   CP5D
           142          KM   COMBINATION POINT CP5D
           143          HC       5
                        *

           144          KK    CPFS
           145          KM   DEVELOPED OFFSITE BASIN
           146          BA   .0001
           147          BF      13
           148          LS       0      98
           149          UD   0.100
                        *

           150          KK   DREF1
           151          BA   .0001
           152          BF       0
           153          LS       0      98
           154          UD   0.100
                        *
1                                                HEC-1 INPUT                                                PAGE  5

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

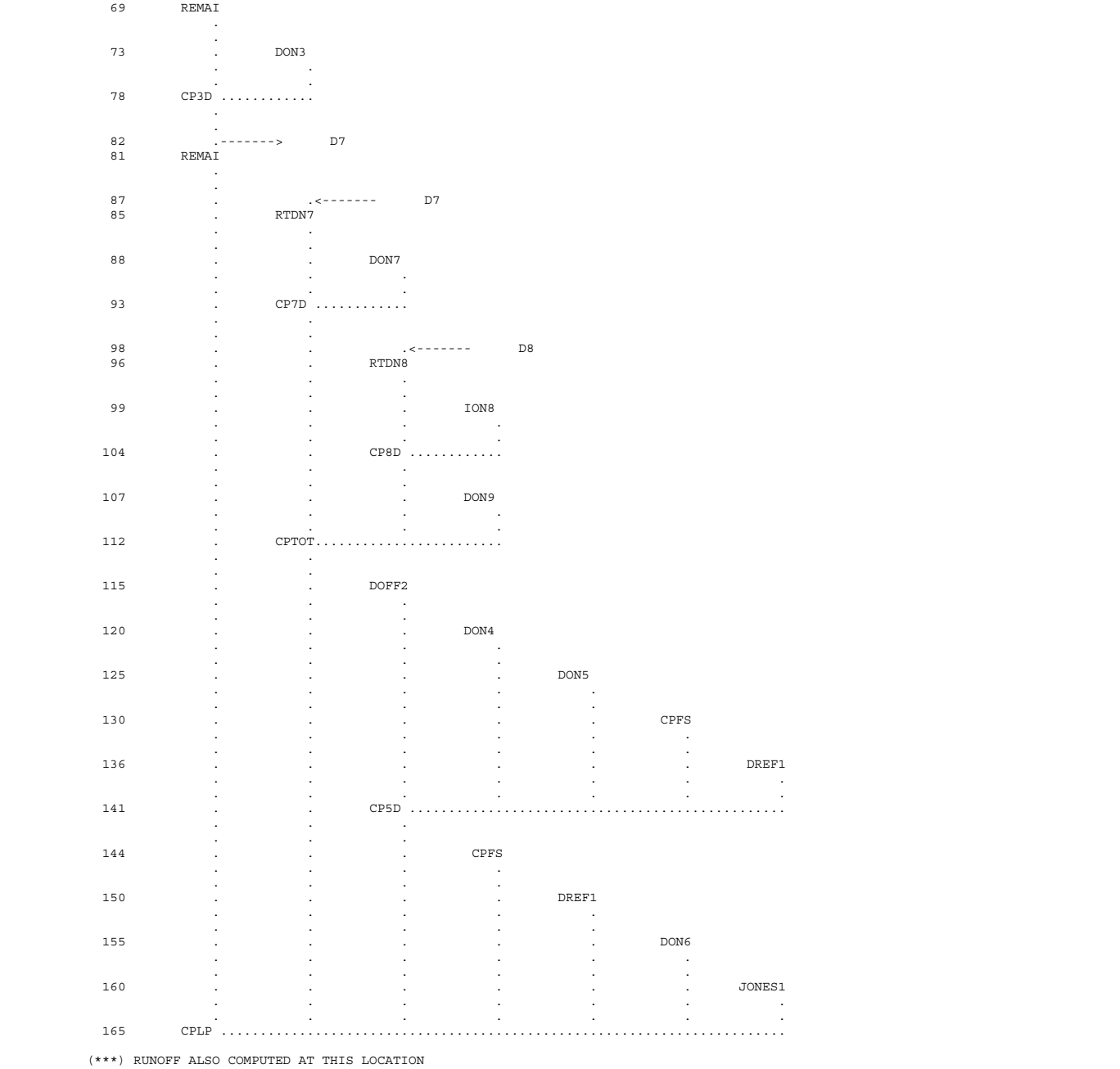
           155          KK    DON6
           156          KM   DEVELOPED ONSITE BASIN DON6
           157          BA  0.0013
           158          LS       0   94.78
           159          UD   0.060
                        *

           160          KK  JONES1
           161          KM   DEVELOPED OFFSITE BASIN JONES1
           162          BA  0.0034
           163          LS       0   98.00
           164          UD   0.116
                        *

           165          KK   CPLP
           166          KM   COMBINATION POINT CPLP
           167          HC       7
           168          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    24       ION1
                .
                .
    38          .       IOFF1
                .          .
                .          .
    43          .          .        CPFS
                .          .          .
                .          .          .
    49          .          .          .       DREF1
                .          .          .          .
                .          .          .          .
    54       CP1D ..................................
                .
                .
    58          .------->      D8
    57       REMAI
                .
                .
    61          .       ION2
                .          .
                .          .
    66       CP2D ............
                .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   26OCT18  TIME  16:26:37   *
*                                       *
*****************************************
```

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

PREPARED FOR
RANCHO JONES
10-Y & 100-Y,6 Hour Storm
INTERIM/ULTIMATE CONDITION
@@@

```
   22 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        101  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      1   0  ENDING DATE
                       NDTIME       0820  ENDING TIME
                        ICENT         19  CENTURY MARK

                    COMPUTATION INTERVAL     .08 HOURS
                         TOTAL TIME BASE    8.33 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       .74       .57       .90       .67       .51
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  RATIO 2  RATIO 3  RATIO 4  RATIO 5  RATIO 6
                                                             1.00      .74      .57      .90      .67      .51

 HYDROGRAPH AT
+                  ION1        .01     1   FLOW              8.       5.       3.       7.       5.       3.
                                           TIME            3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
+                 IOFF1        .01     1   FLOW              7.       5.       3.       6.       4.       2.
                                           TIME            3.58     3.58     3.58     3.58     3.58     3.58

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

 HYDROGRAPH AT
+                 DREF1        .00     1   FLOW              0.       0.       0.       0.       0.       0.
                                           TIME            3.50     3.50     3.50     3.50     3.50     3.50

  4 COMBINED AT
+                  CP1D        .01     1   FLOW             94.      88.      85.      92.      87.      83.
                                           TIME            3.50     3.50     3.50     3.50     3.50     3.50

 DIVERSION TO
+                    D8        .01     1   FLOW             72.      67.      64.      70.      66.      63.
                                           TIME            3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
+                 REMAI        .01     1   FLOW             23.      21.      20.      22.      21.      20.
                                           TIME            3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
+                  ION2        .00     1   FLOW              1.       1.       1.       1.       1.       0.
                                           TIME            3.50     3.50     3.50     3.50     3.50     3.50

  2 COMBINED AT
+                  CP2D        .01     1   FLOW             24.      22.      21.      23.      22.      20.
                                           TIME            3.50     3.50     3.50     3.50     3.50     3.50

 DIVERSION TO
+                    D7        .01     1   FLOW             12.      11.      11.      12.      11.      11.
                                           TIME            3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
+                 REMAI        .01     1   FLOW             12.      11.      10.      11.      10.      10.
                                           TIME            3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
+                  DON3        .00     1   FLOW              3.       2.       2.       3.       2.       1.
                                           TIME            3.50     3.50     3.50     3.50     3.50     3.50

  2 COMBINED AT
+                  CP3D        .01     1   FLOW             15.      13.      12.      14.      12.      11.
                                           TIME            3.50     3.50     3.50     3.50     3.50     3.50

 DIVERSION TO
+                    D7        .01     1   FLOW              5.       5.       4.       5.       4.       4.
                                           TIME            3.50     3.50     3.50     3.50     3.50     3.50

 HYDROGRAPH AT
+                 REMAI        .01     1   FLOW             10.       8.       8.       9.       8.       7.
                                           TIME            3.50     3.50     3.50     3.50     3.50     3.50
```

HYDROGRAPH AT											
+	RTDN7	.00	1	FLOW	12.	11.	11.	12.	11.	11.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DON7	.01	1	FLOW	19.	13.	10.	17.	12.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP7D	.01	1	FLOW	31.	25.	20.	29.	23.	19.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RTDN8	.00	1	FLOW	72.	67.	64.	70.	66.	63.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	ION8	.00	1	FLOW	7.	4.	3.	6.	4.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP8D	.00	1	FLOW	79.	72.	67.	76.	70.	66.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DON9	.01	1	FLOW	16.	11.	8.	14.	10.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CPTOT	.02	1	FLOW	126.	107.	95.	119.	102.	91.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DOFF2	.01	1	FLOW	18.	12.	9.	16.	11.	8.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	DON4	.00	1	FLOW	3.	2.	1.	2.	2.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DON5	.00	1	FLOW	4.	3.	2.	3.	2.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	CPFS	.00	1	FLOW	35.	35.	35.	35.	35.	35.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DREF1	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
5 COMBINED AT											
+	CP5D	.01	1	FLOW	58.	51.	47.	56.	50.	45.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	CPFS	.00	1	FLOW	13.	13.	13.	13.	13.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DREF1	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DON6	.00	1	FLOW	3.	2.	1.	2.	2.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	JONES1	.00	1	FLOW	6.	5.	4.	6.	4.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
7 COMBINED AT											
+	CPLP	.06	1	FLOW	215.	186.	167.	204.	178.	161.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50

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

Developed Condition - 10 yr

```
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   30OCT18  TIME  13:58:37   *                 *           (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

             1          ID    PREPARED FOR
             2          ID    RANCHO JONES
             3          ID    10-Y & 100-Y,6 Hour Storm
             4          ID    INTERIM/ULTIMATE CONDITION
             5          ID    @@@@
```

```
   54          BA  0.0054
   55          LS       0   94.78
   56          UD   0.076
               *

   57          KK   CP1
   58          KM   COMBINATION POINT CP1
   59          HC       2
               *

   60          KK   REMAIN1
   61          DT      D8
   62          DI       0      33
   63          DQ       0      19
               *

   64          KK   DON2
   65          KM   DEVELOPED ONSITE BASIN DON2
   66          BA  0.0009
   67          LS       0   94.78
   68          UD   0.063
               *

   69          KK   CP2D
   70          KM   COMBINATION POINT CP2D
   71          HC       2
               *

   72          KK   REMAIN2
   73          DT      D7
   74          DI       0      16
   75          DQ       0       6
               *

   76          KK   DON3
   77          KM   DEVELOPED ONSITE BASIN DON3
   78          BA  0.0016
   79          LS       0   94.78
   80          UD   0.081
               *

   81          KK   CP3D
   82          KM   COMBINATION POINT CP3D
   83          HC       2
               *
1                                        HEC-1 INPUT                                                PAGE  3

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

   84          KK   RTDN7
   85          KM   RETRIVE FLOW
   86          DR      D7
               *

   87          KK   DON7
   88          KM   DEVELOPED ONSITE BASIN DON7
   89          BA  0.0100
   90          LS       0   94.78
   91          UD   0.095
               *

   92          KK   CP7D
   93          KM   COMBINATION POINT CP7D
   94          HC       2
               *

   95          KK   RTDN8
   96          KM   RETRIVE FLOW
   97          DR      D8
               *

   98          KK   DON8
   99          KM   DEVELOPED ONSITE BASIN DON7
  100          BA  0.0047
  101          LS       0   94.78
  102          UD   0.089
               *

  103          KK   CP8D
  104          KM   COMBINATION POINT CP8D
  105          HC       2
               *

  106          KK   DON9
  107          KM   DEVELOPED ONSITE BASIN DON9
  108          BA  0.0089
  109          LS       0   94.78
  110          UD   0.111
               *

  111          KK   CPTOTALD
  112          KM   COMBINATION POINT CPTOTALD
  113          HC       3
               *

  114          KK   DOFF2
  115          KM   DEVELOPED OFFSITE BASIN DOFF2
  116          BA  0.0106
  117          LS       0   94.75
  118          UD   0.169
               *
1                                        HEC-1 INPUT                                                PAGE  4

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

```
            119           KK    CPFS
            120           KM   DEVELOPED OFFSITE BASIN
            121           BA   .0001
            122           BF       6
            123           LS       0      98
            124           UD   0.100
                          *

            125           KK   DREF1
            126           BA   .0001
            127           BF       0
            128           LS       0      98
            129           UD   0.100
                          *

            130           KK   CPSO
            131           KM   COMBINATION POINT CPSO
            132           HC       3

            133           KK   DON4
            134           KM   DEVELOPED ONSITE BASIN DON4
            135           BA  0.0013
            136           LS       0   94.78
            137           UD   0.076
                          *

            138           KK   DON5
            139           KM   DEVELOPED ONSITE BASIN DON5
            140           BA  0.0020
            141           LS       0   94.78
            142           UD   0.089
                          *

            143           KK   CP5D
            144           KM   COMBINATION POINT CP5D
            145           HC       3
                          *

            146           KK    CPFS
            147           KM   DEVELOPED OFFSITE BASIN
            148           BA   .0001
            149           BF      13
            150           LS       0      98
            151           UD   0.100
                          *

            152           KK   DREF1
            153           BA   .0001
            154           BF       0
            155           LS       0      98
            156           UD   0.100
                          *
1                                                HEC-1 INPUT                                                PAGE  5

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

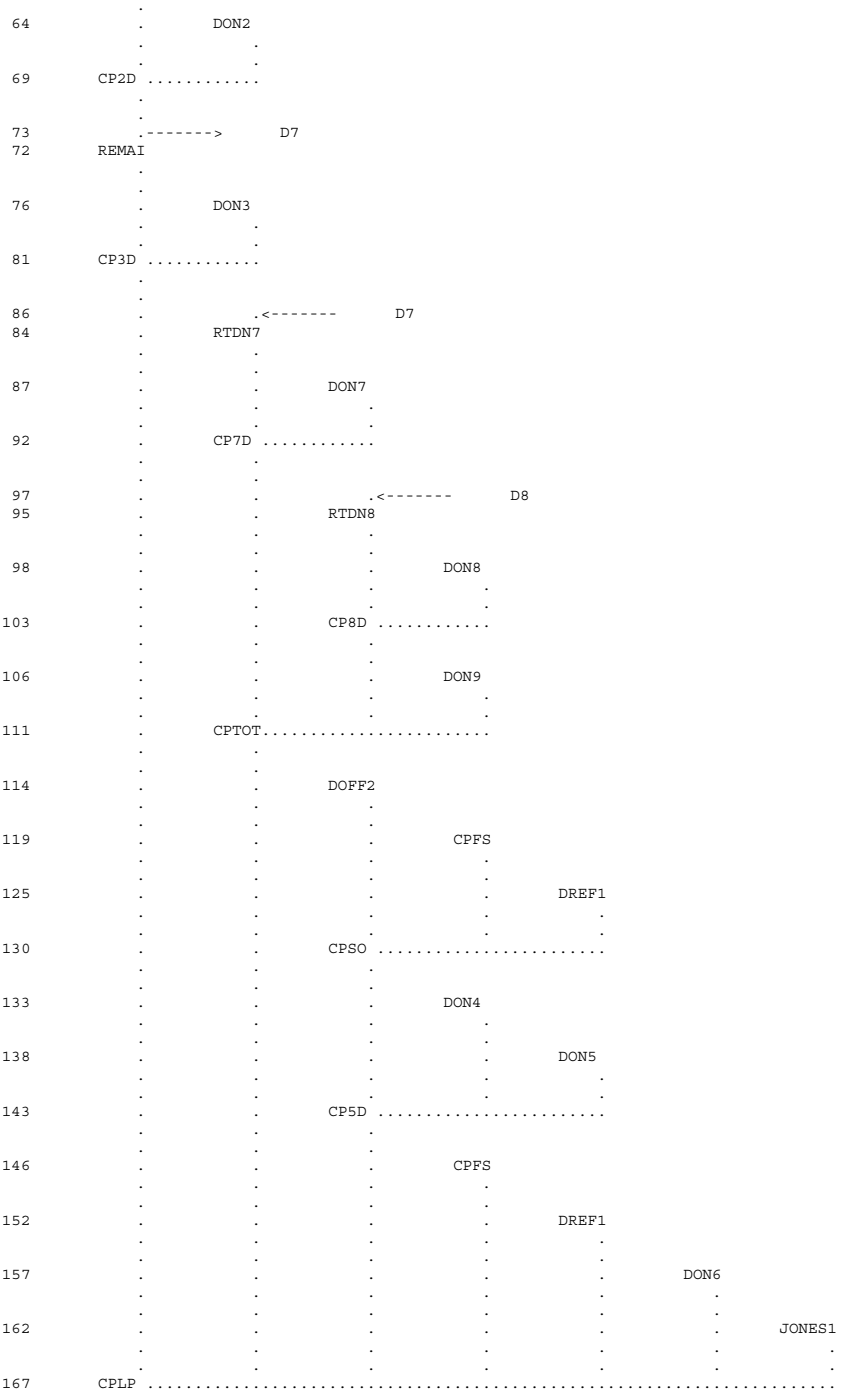

            157           KK    DON6
            158           KM   DEVELOPED ONSITE BASIN DON6
            159           BA  0.0013
            160           LS       0   94.78
            161           UD   0.060
                          *

            162           KK  JONES1
            163           KM   DEVELOPED OFFSITE BASIN JONES1
            164           BA  0.0034
            165           LS       0   98.00
            166           UD   0.116
                          *

            167           KK   CPLP
            168           KM   COMBINATION POINT CPLP
            169           HC       7
            170           ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    24       DOFF1
                 .
                 .
    38           .        CPFS
                 .           .
                 .           .
    44           .           .       DREF1
                 .           .           .
                 .           .           .
    49         CPN.......................
                 .
                 .
    52           .       DON1
                 .           .
                 .           .
    57       CP1  ............
                 .
                 .
    61           .-------->      D8
    60       REMAI
                 .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   30OCT18  TIME  13:58:37   *
*                                       *
*****************************************
```

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

PREPARED FOR
RANCHO JONES
10-Y & 100-Y,6 Hour Storm
INTERIM/ULTIMATE CONDITION
@@@

****
* SDN 3 VALUES *
****

22 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 101 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 1 0 ENDING DATE
NDTIME 0820 ENDING TIME
ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 8.33 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 .74 .57 .90 .67 .51
1

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .74	RATIO 3 .57	RATIO 4 .90	RATIO 5 .67	RATIO 6 .51
HYDROGRAPH AT										
+	DOFF1	.01	1	FLOW	10.	7.	5.	9.	6.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	CPFS	.00	1	FLOW	14.	14.	14.	14.	14.	14.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	DREF1	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT										
+	CPN	.01	1	FLOW	24.	21.	19.	23.	20.	18.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	DON1	.01	1	FLOW	11.	8.	6.	10.	7.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CP1	.01	1	FLOW	35.	29.	25.	33.	27.	23.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO										
+	D8	.01	1	FLOW	20.	17.	14.	19.	16.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	REMAI	.01	1	FLOW	15.	12.	11.	14.	12.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	DON2	.00	1	FLOW	2.	1.	1.	2.	1.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CP2D	.01	1	FLOW	17.	14.	11.	16.	13.	11.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO										
+	D7	.01	1	FLOW	6.	5.	4.	6.	5.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	REMAI	.01	1	FLOW	10.	8.	7.	10.	8.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	DON3	.00	1	FLOW	3.	2.	2.	3.	2.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CP3D	.01	1	FLOW	14.	11.	9.	13.	10.	8.

				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RTDN7	.00	1	FLOW	6.	5.	4.	6.	5.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DON7	.01	1	FLOW	19.	13.	10.	17.	12.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP7D	.01	1	FLOW	25.	18.	14.	23.	17.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RTDN8	.00	1	FLOW	20.	17.	14.	19.	16.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DON8	.00	1	FLOW	9.	6.	5.	8.	6.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP8D	.00	1	FLOW	29.	23.	19.	27.	21.	17.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DON9	.01	1	FLOW	16.	11.	8.	14.	10.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CPTOT	.02	1	FLOW	70.	52.	41.	63.	48.	37.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DOFF2	.01	1	FLOW	18.	12.	9.	16.	11.	8.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	CPFS	.00	1	FLOW	6.	6.	6.	6.	6.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DREF1	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CPSO	.01	1	FLOW	24.	19.	15.	22.	17.	14.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	DON4	.00	1	FLOW	3.	2.	1.	2.	2.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DON5	.00	1	FLOW	4.	3.	2.	3.	2.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CP5D	.01	1	FLOW	29.	22.	18.	27.	21.	16.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	CPFS	.00	1	FLOW	13.	13.	13.	13.	13.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DREF1	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DON6	.00	1	FLOW	3.	2.	1.	2.	2.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	JONES1	.00	1	FLOW	6.	5.	4.	6.	4.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
7 COMBINED AT											
+	CPLP	.06	1	FLOW	135.	105.	85.	123.	96.	78.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50

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

Developed Condition - 100 yr

```
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   30OCT18  TIME  13:48:35   *                 *           (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

            1       ID    PREPARED FOR
            2       ID    RANCHO JONES
            3       ID    10-Y & 100-Y,6 Hour Storm
            4       ID    INTERIM/ULTIMATE CONDITION
            5       ID    @@@@
```

```
   54          BA  0.0054
   55          LS       0   94.78
   56          UD   0.076
               *

   57          KK   CP1
   58          KM   COMBINATION POINT CP1D
   59          HC       2
               *

   60          KK   REMAIN1
   61          DT      D8
   62          DI       0      97
   63          DQ       0      70
               *

   64          KK   DON2
   65          KM   DEVELOPED ONSITE BASIN DON2
   66          BA  0.0009
   67          LS       0   94.78
   68          UD   0.063
               *

   69          KK   CP2
   70          KM   COMBINATION POINT CP2D
   71          HC       2
               *

   72          KK   REMAIN2
   73          DT      D7
   74          DI       0      29
   75          DQ       0      15
               *

   76          KK   DON3
   77          KM   DEVELOPED ONSITE BASIN DON3
   78          BA  0.0016
   79          LS       0   94.78
   80          UD   0.081
               *

   81          KK   CP3
   82          KM   COMBINATION POINT CP3D
   83          HC       2
               *
1                                       HEC-1 INPUT                                                 PAGE  3

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


   84          KK   REMAIN3
   85          DT      D7
   86          DI       0      17
   87          DQ       0       6
               *

   88          KK   RTDN7
   89          KM   RETRIVE FLOW
   90          DR      D7
               *

   91          KK   DON7
   92          KM   DEVELOPED ONSITE BASIN DON7
   93          BA  0.0100
   94          LS       0   94.78
   95          UD   0.095
               *

   96          KK   CP7
   97          KM   COMBINATION POINT CP7D
   98          HC       2
               *

   99          KK   RTDN8
  100          KM   RETRIVE FLOW
  101          DR      D8
               *

  102          KK   DON8
  103          KM   DEVELOPED ONSITE BASIN DON7
  104          BA  0.0047
  105          LS       0   94.78
  106          UD   0.089
               *

  107          KK   CP8
  108          KM   COMBINATION POINT CP8D
  109          HC       2
               *

  110          KK   DON9
  111          KM   DEVELOPED ONSITE BASIN DON9
  112          BA  0.0089
  113          LS       0   94.78
  114          UD   0.111
               *

  115          KK   CPTOTAL
  116          KM   COMBINATION POINT CPTOTALD
  117          HC       3
               *
1                                       HEC-1 INPUT                                                 PAGE  4

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

```
            118           KK   DOFF2
            119           KM   DEVELOPED OFFSITE BASIN DOFF2
            120           BA  0.0106
            121           LS       0   94.75
            122           UD   0.169
                          *

            123           KK    CPFS
            124           KM   DEVELOPED OFFSITE BASIN
            125           BA   .0001
            126           BF      35
            127           LS       0      98
            128           UD   0.100
                          *

            129           KK   DREF1
            130           BA   .0001
            131           BF       0
            132           LS       0      98
            133           UD   0.100
                          *

            134           KK   CPSO
            135           KM   COMBINATION POINT CPSO
            136           HC       3
                          *

            137           KK   DON4
            138           KM   DEVELOPED ONSITE BASIN DON4
            139           BA  0.0013
            140           LS       0   94.78
            141           UD   0.076
                          *

            142           KK   DON5
            143           KM   DEVELOPED ONSITE BASIN DON5
            144           BA  0.0020
            145           LS       0   94.78
            146           UD   0.089
                          *

            147           KK   CP5
            148           KM   COMBINATION POINT CP5D
            149           HC       3
                          *

            150           KK    CPFS
            151           KM   DEVELOPED OFFSITE BASIN
            152           BA   .0001
            153           BF      13
            154           LS       0      98
            155           UD   0.100
                          *
1                                                HEC-1 INPUT                                                PAGE  5

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


            156           KK   DREF1
            157           BA   .0001
            158           BF       0
            159           LS       0      98
            160           UD   0.100
                          *

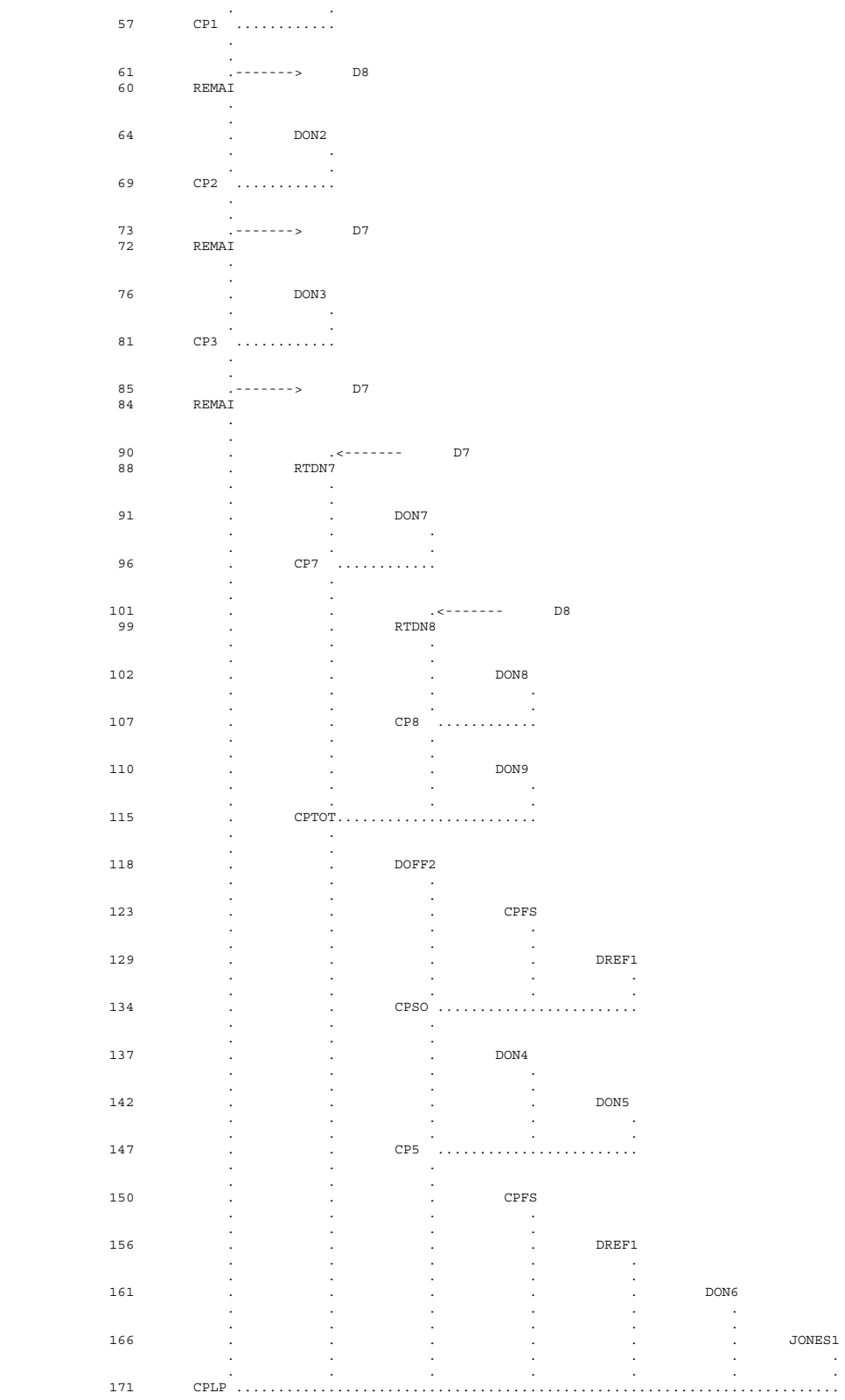
            161           KK    DON6
            162           KM   DEVELOPED ONSITE BASIN DON6
            163           BA  0.0013
            164           LS       0   94.78
            165           UD   0.060
                          *

            166           KK  JONES1
            167           KM   DEVELOPED OFFSITE BASIN JONES1
            168           BA  0.0034
            169           LS       0   98.00
            170           UD   0.116
                          *

            171           KK   CPLP
            172           KM   COMBINATION POINT CPLP
            173           HC       7
            174           ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    24       DOFF1
                .
                .
    38          .        CPFS
                .          .
                .          .
    44          .          .       DREF1
                .          .         .
                .          .         .
    49        CPN.....................
                .
                .
    52          .       DON1
                .          .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********

* *

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *

* JUN 1998 *

* VERSION 4.1 *

* *

* RUN DATE 30OCT18 TIME 13:48:35 *

* *

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* *

* U.S. ARMY CORPS OF ENGINEERS *

* HYDROLOGIC ENGINEERING CENTER *

* 609 SECOND STREET *

* DAVIS, CALIFORNIA 95616 *

* (916) 756-1104 *

* *

****

PREPARED FOR

RANCHO JONES
10-Y & 100-Y,6 Hour Storm
INTERIM/ULTIMATE CONDITION
@@@

HYDROGRAPH AT											
+	REMAI	.01	1	FLOW	14.	13.	12.	14.	13.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DON3	.00	1	FLOW	3.	2.	2.	3.	2.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP3	.01	1	FLOW	17.	15.	14.	17.	15.	14.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
DIVERSION TO											
+	D7	.01	1	FLOW	6.	5.	5.	6.	5.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	REMAI	.01	1	FLOW	11.	10.	9.	11.	10.	9.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RTDN7	.00	1	FLOW	15.	14.	13.	15.	14.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DON7	.01	1	FLOW	19.	13.	10.	17.	12.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP7	.01	1	FLOW	34.	27.	23.	31.	25.	21.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	RTDN8	.00	1	FLOW	71.	67.	64.	70.	66.	63.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DON8	.00	1	FLOW	9.	6.	5.	8.	6.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CP8	.00	1	FLOW	81.	73.	69.	78.	71.	67.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DON9	.01	1	FLOW	16.	11.	8.	14.	10.	7.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CPTOT	.02	1	FLOW	130.	112.	100.	123.	107.	95.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DOFF2	.01	1	FLOW	18.	12.	9.	16.	11.	8.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	CPFS	.00	1	FLOW	35.	35.	35.	35.	35.	35.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DREF1	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CPSO	.01	1	FLOW	53.	48.	44.	51.	46.	43.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	DON4	.00	1	FLOW	3.	2.	1.	2.	2.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DON5	.00	1	FLOW	4.	3.	2.	3.	2.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CP5	.01	1	FLOW	58.	51.	47.	56.	50.	45.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	CPFS	.00	1	FLOW	13.	13.	13.	13.	13.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DREF1	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	DON6	.00	1	FLOW	3.	2.	1.	2.	2.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	JONES1	.00	1	FLOW	6.	5.	4.	6.	4.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
7 COMBINED AT											
+	CPLP	.06	1	FLOW	221.	192.	173.	210.	184.	166.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50

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

HYDRAULIC CALCULATIONS

HYDRAULIC CALCULATIONS

Weir, Easement, and, Block Wall Opening Calculations (Ultimate Condition)

Worksheet for Section G1 - Street G - 40' Easement

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.51	%
Discharge	87.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	2.00
0+00.00	0.25
0+20.00	0.00
0+40.00	0.25
0+40.00	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 2.00)	(0+40.00, 2.00)	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 2.00 ft	
Flow Area	27.07	ft²
Wetted Perimeter	41.11	ft
Hydraulic Radius	0.66	ft
Top Width	40.00	ft
Normal Depth	0.80	ft
Critical Depth	0.65	ft

Worksheet for Section G1 - Street G - 40' Easement

Results

Critical Slope		0.01157	ft/ft
Velocity		3.21	ft/s
Velocity Head		0.16	ft
Specific Energy		0.96	ft
Froude Number		0.69	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.80	ft
Critical Depth	0.65	ft
Channel Slope	0.51	%
Critical Slope	0.01157	ft/ft

Weir Depth Calculator

Company:	Actus
By:	Christian O'Quinn
Date:	10/31/2018
Project Name:	Rancho Jones
Description	Northern 6'x3' RCBC 100YR
Location	Northwest of Project

Q	87	cfs
C	3.0	
L	40.0	ft

Weir Flow = Q = C*L*H^(3/2)

$$H = \left(\frac{Q}{C * L}\right)^{(2/3)}$$

H = 0.807 ft

[1] Q = Flow (cfs) (Q100 @ DON1)
[2] C = Weir Coefficient
[3] L = Weir Length (ft)
[4] H = Weir Height (ft)

Worksheet for Section G4 - Street G - 24' Easement

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.52	%
Discharge	51.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	2.00
0+00.00	0.25
0+12.00	0.00
0+24.00	0.25
0+24.00	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 2.00)	(0+24.00, 2.00)	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	0.00 to 2.00 ft	
Flow Area	16.03	ft²
Wetted Perimeter	25.09	ft
Hydraulic Radius	0.64	ft
Top Width	24.00	ft
Normal Depth	0.79	ft
Critical Depth	0.64	ft

Worksheet for Section G4 - Street G - 24' Easement

Results

Critical Slope		0.01183	ft/ft
Velocity		3.18	ft/s
Velocity Head		0.16	ft
Specific Energy		0.95	ft
Froude Number		0.69	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.79	ft
Critical Depth	0.64	ft
Channel Slope	0.52	%
Critical Slope	0.01183	ft/ft

Worksheet for Street M - 15' Easement

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	2.50	%
Bottom Width	15.00	ft
Discharge	2.00	cfs

Results

Normal Depth	0.05	ft
Flow Area	0.79	ft²
Wetted Perimeter	15.11	ft
Hydraulic Radius	0.05	ft
Top Width	15.00	ft
Critical Depth	0.08	ft
Critical Slope	0.00575	ft/ft
Velocity	2.53	ft/s
Velocity Head	0.10	ft
Specific Energy	0.15	ft
Froude Number	1.94	
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	0.05	ft
Critical Depth	0.08	ft
Channel Slope	2.50	%
Critical Slope	0.00575	ft/ft

Weir Depth Calculator

Company:	Actus
By:	Christian O'Quinn
Date:	10/31/2018
Project Name:	Rancho Jones
Description	DON6
Location	Southeast

Q	2	cfs
C	3.0	
L	15.0	ft

Weir Flow = Q = C*L*H^(3/2)

$$H = \left(\frac{Q}{C * L}\right)^{(2/3)}$$

H = 0.125 ft

[1] Q = Flow (cfs) (Q100 @ DON1)
[2] C = Weir Coefficient
[3] L = Weir Length (ft)
[4] H = Weir Height (ft)

Worksheet for Section J1 - Street J - 40' Easement

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.51	%
Discharge	123.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	2.00
0+00.00	0.25
0+20.00	0.00
0+40.00	0.25
0+40.00	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 2.00)	(0+40.00, 2.00)	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	0.96	ft
Elevation Range	0.00 to 2.00 ft	
Flow Area	33.42	ft²
Wetted Perimeter	41.42	ft
Hydraulic Radius	0.81	ft
Top Width	40.00	ft
Normal Depth	0.96	ft
Critical Depth	0.79	ft

Worksheet for Section J1 - Street J - 40' Easement

Results

Critical Slope		0.01081	ft/ft
Velocity		3.68	ft/s
Velocity Head		0.21	ft
Specific Energy		1.17	ft
Froude Number		0.71	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.96	ft
Critical Depth	0.79	ft
Channel Slope	0.51	%
Critical Slope	0.01081	ft/ft

Weir Depth Calculator

Company:	Actus
By:	Christian O'Quinn
Date:	10/31/2018
Project Name:	Rancho Jones
Description	CPTOTL
Location	Northeast

Q	123	cfs
C	3.0	
L	40.0	ft

Weir Flow = Q = C*L*H^(3/2)

$$H = \left(\frac{Q}{C * L}\right)^{(2/3)}$$

H = 1.017 ft

[1] Q = Flow (cfs) (Q100 @ DON1)
[2] C = Weir Coefficient
[3] L = Weir Length (ft)
[4] H = Weir Height (ft)

HYDRAULIC CALCULATIONS

Storm Drain System (Ultimate Condition)



Section B_Interim - Street B - 47' ROW - 100 YR

GVF Output Data

Critical Slope	0.02084	ft/ft

Worksheet for Section G4 - Street G - 15' Drop Inlet

Project Description

Solve For	Spread

Input Data

Discharge		32.00	cfs
Gutter Width		1.50	ft
Gutter Cross Slope		8.75	%
Road Cross Slope		0.50	%
Local Depression		2.00	in
Local Depression Width		1.50	ft
Grate Width		1.50	ft
Grate Length		7.50	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		0.00	%
Curb Opening Length		7.50	ft
Opening Height		0.50	ft
Curb Throat Type	Horizontal		
Throat Incline Angle		90.00	degrees

Options

Calculation Option	Use Both

Results

Spread		158.23	ft
Depth		0.91	ft
Gutter Depression		0.12	ft
Total Depression		0.29	ft
Open Grate Area		10.13	ft²
Active Grate Weir Length		10.50	ft

Weir Depth Calculator

Company:	Actus
By:	Christian O'Quinn
Date:	10/31/2018
Project Name:	Rancho Jones
Description	Southern 6'x3' RCBC 100YR
Location	Southwest of Project

Q	19	cfs
C	3.0	
L	24.0	ft

Weir Flow = Q = C*L*H^(3/2)

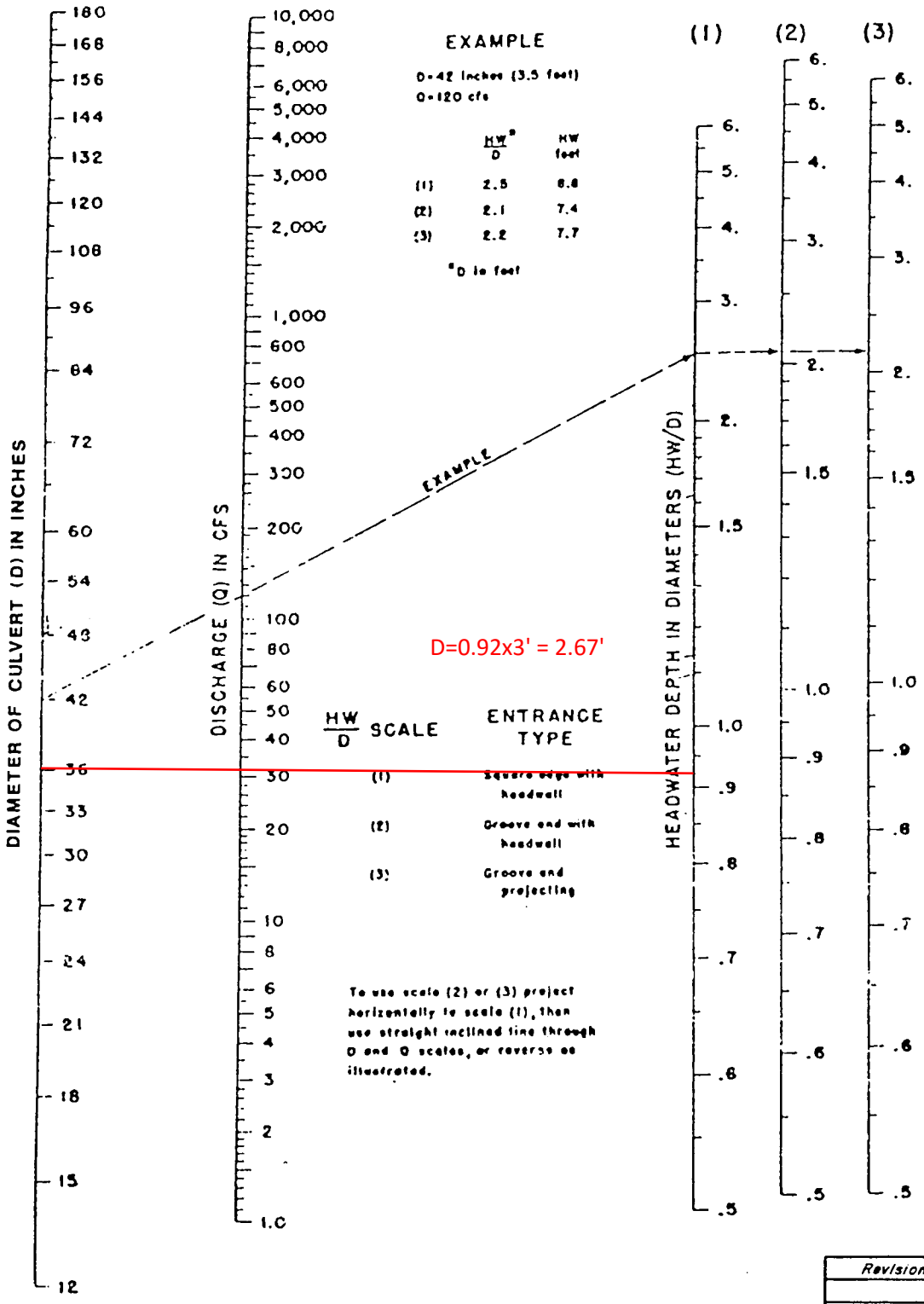
$$H = \left(\frac{Q}{C * L}\right)^{(2/3)}$$

H = 0.411 ft

[1] Q = Flow (cfs) (Q100 @ DON1)
[2] C = Weir Coefficient
[3] L = Weir Length (ft)
[4] H = Weir Height (ft)

NOMOGRAPH – INLET CONTROL RCP

@ 15' Drop inlet



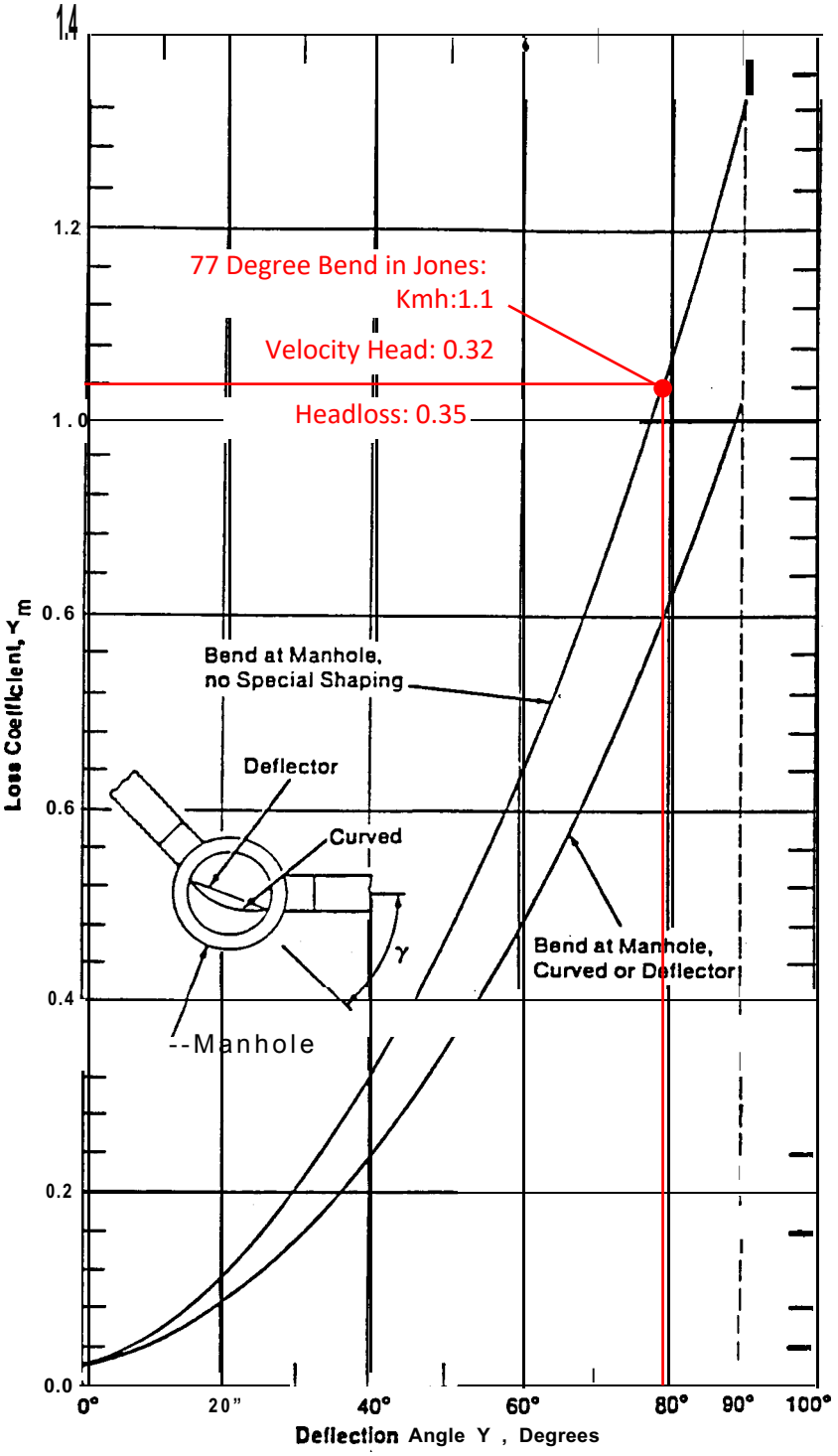
Revision	Date

WRC ENGINEERING

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

FIGURE 1005

ENERGY LOSS COEFFICIENT IN STRAIGHT THROUGH MANHOLE



NOTE: Head loss applied at outlet of manhole.

Revision	Date

WRC ENGINEERING

REFERENCE:
Modern Sewer Design, AISI, Washington D. C., 1980

FIGURE 815

```
                                                                  sdsouth.WSW
T1 Rancho Jones Storm Drain                                                   0

T2       1         2         3         4         5         6         7         8         9
T3 456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
SO    100.0002242.380  1                          2250.000
R     105.0002242.390  1      .013                                .000         0
R     560.0002251.810  1      .013                                .000         0
R    1110.0002252.980  1      .013                                .000         0
JX   1115.0002253.980  1  2   .013   79.000    0.0002253.980         00.0        0.000
R    1485.0002255.100  2      .013                                .000         0
JX   1490.0002255.300  2  3   .013   12.000    0.0002256.600         00.0        0.000
R    1589.3002256.170  2      .013                                .000         0
WX   1589.3002256.170  2
R    1594.3002256.370  2      .013                                .000 77.000  0
WE   1594.3002256.370  2       .20
R    1863.5002257.740  2      .013                                .000         0
WE   1863.5002257.740  2       .20
SH   1863.5002257.740  2                          2260.410
CD   1  4   0    .000   4.000     .000  .000  .000   .00
CD   2  4   0    .000   3.000     .000  .000  .000   .00
CD   3  4   0    .000   1.500     .000  .000  .000   .00
Q            32.000   .0
```

Program Package Serial Number: 7156

WATER SURFACE PROFILE LISTING Date:11- 6-2018 Time: 7:17:51

Rancho Jones Storm Drain

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
100.000	2242.380	7.620	2250.000	123.00	9.79	1.49	2251.49	.00	3.33	.00	4.000	.000	.00	0 .0
5.000	.0020					.0073	.04	7.62	.00	4.00	.013	.00	.00	PIPE
105.000	2242.390	7.647	2250.037	123.00	9.79	1.49	2251.52	.00	3.33	.00	4.000	.000	.00	0 .0
228.117	.0207					.0073	1.67	7.65	.00	2.22	.013	.00	.00	PIPE
333.117	2247.113	4.595	2251.708	123.00	9.79	1.49	2253.20	.00	3.33	.00	4.000	.000	.00	0 .0
HYDRAULIC JUMP														
333.117	2247.113	2.306	2249.419	123.00	16.40	4.17	2253.59	.00	3.33	3.95	4.000	.000	.00	0 .0
54.455	.0207					.0180	.98	2.31	2.10	2.22	.013	.00	.00	PIPE
387.572	2248.240	2.341	2250.581	123.00	16.10	4.02	2254.61	.00	3.33	3.94	4.000	.000	.00	0 .0
64.975	.0207					.0165	1.07	2.34	2.04	2.22	.013	.00	.00	PIPE
452.547	2249.585	2.436	2252.021	123.00	15.35	3.66	2255.68	.00	3.33	3.90	4.000	.000	.00	0 .0
38.244	.0207					.0146	.56	2.44	1.89	2.22	.013	.00	.00	PIPE
490.790	2250.377	2.537	2252.914	123.00	14.64	3.33	2256.24	.00	3.33	3.85	4.000	.000	.00	0 .0
25.273	.0207					.0130	.33	2.54	1.75	2.22	.013	.00	.00	PIPE
516.064	2250.900	2.644	2253.544	123.00	13.95	3.02	2256.57	.00	3.33	3.79	4.000	.000	.00	0 .0
17.472	.0207					.0115	.20	2.64	1.61	2.22	.013	.00	.00	PIPE
533.536	2251.262	2.759	2254.021	123.00	13.30	2.75	2256.77	.00	3.33	3.70	4.000	.000	.00	0 .0
12.121	.0207					.0103	.12	2.76	1.48	2.22	.013	.00	.00	PIPE

Program Package Serial Number: 7156

WATER SURFACE PROFILE LISTING Date:11- 6-2018 Time: 7:17:51

Rancho Jones Storm Drain

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
545.656	2251.513	2.883	2254.396	123.00	12.69	2.50	2256.89	.00	3.33	3.59	4.000	.000	.00	0 .0
8.060	.0207					.0092	.07	2.88	1.36	2.22	.013	.00	.00	PIPE
553.716	2251.680	3.017	2254.697	123.00	12.10	2.27	2256.97	.00	3.33	3.44	4.000	.000	.00	0 .0
4.699	.0207					.0083	.04	3.02	1.24	2.22	.013	.00	.00	PIPE
558.415	2251.777	3.165	2254.943	123.00	11.53	2.07	2257.01	.00	3.33	3.25	4.000	.000	.00	0 .0
1.585	.0207					.0075	.01	3.17	1.12	2.22	.013	.00	.00	PIPE
560.000	2251.810	3.333	2255.143	123.00	10.99	1.88	2257.02	.00	3.33	2.98	4.000	.000	.00	0 .0
5.315	.0021					.0069	.04	3.33	1.00	4.00	.013	.00	.00	PIPE
565.315	2251.821	3.529	2255.350	123.00	10.48	1.71	2257.06	.00	3.33	2.58	4.000	.000	.00	0 .0
23.722	.0021					.0065	.15	3.53	.87	4.00	.013	.00	.00	PIPE
589.037	2251.872	3.787	2255.658	123.00	9.99	1.55	2257.21	.00	3.33	1.80	4.000	.000	.00	0 .0
32.959	.0021					.0067	.22	3.79	.67	4.00	.013	.00	.00	PIPE
621.997	2251.942	4.000	2255.942	123.00	9.79	1.49	2257.43	.00	3.33	.00	4.000	.000	.00	0 .0
488.003	.0021					.0072	3.50	4.00	.00	4.00	.013	.00	.00	PIPE
1110.000	2252.980	6.540	2259.520	123.00	9.79	1.49	2261.01	.00	3.33	.00	4.000	.000	.00	0 .0
JUNCT STR	.2000					.0041	.02	6.54	.00		.013	.00	.00	PIPE
1115.000	2253.980	6.858	2260.838	44.00	6.22	.60	2261.44	.00	2.16	.00	3.000	.000	.00	0 .0
370.000	.0030					.0044	1.61	6.86	.00	3.00	.013	.00	.00	PIPE

Program Package Serial Number: 7156

WATER SURFACE PROFILE LISTING Date:11- 6-2018 Time: 7:17:51

Rancho Jones Storm Drain

1 2 3 4 5 6 7

4567890123456789012345678901234567890123456789012345678901234567890123

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1485.000	2255.100	7.348	2262.448	44.00	6.22	.60	2263.05	.00	2.16	.00	3.000	.000	.00	0 .0
JUNCT STR	.0400					.0033	.02	7.35	.00		.013	.00	.00	PIPE
1490.000	2255.300	7.448	2262.748	32.00	4.53	.32	2263.07	.00	1.83	.00	3.000	.000	.00	0 .0

```
       -|-       -|-       -|-       -|-       -|-      -|-      -|-       -|-      -|-       -|-       -|-      -|-      -|-      -|-      -|-      -|-      -|-      -|-      -|-      |-
  99.300    .0088                                                .0023      .23     7.45     .00    1.52     .013       .00   .00  PIPE
       |         |         |         |         |                   |         |        |        |       |        |         |        |        |
1589.300  2256.170    6.807  2262.977     32.00    4.53     .32  2263.30     .00    1.83      .00    3.000     .000   .00   0    .0
       -|-       -|-       -|-       -|-       -|-      -|-      -|-       -|-      -|-       -|-       -|-      -|-      -|-      -|-      -|-      -|-      -|-      -|-      -|-      |-
WALL  EXIT
       |         |         |         |         |                   |         |        |        |       |        |         |        |        |
1589.300  2256.170    6.808  2262.978     32.00    4.53     .32  2263.30     .00    1.83      .00    3.000     .000   .00   0    .0
       -|-       -|-       -|-       -|-       -|-      -|-      -|-       -|-      -|-       -|-       -|-      -|-      -|-      -|-      -|-      -|-      -|-      -|-      -|-      |-
   5.000    .0400                                                .0023      .01     6.81     .00    1.00     .013       .00   .00  PIPE
WALL  ENTRANCE
       |         |         |         |         |                   |         |        |        |       |        |         |        |        |
1594.300  2256.370    6.700  2263.070     32.00    4.53     .32  2263.39     .00    1.83      .00    3.000     .000   .00   0    .0
       -|-       -|-       -|-       -|-       -|-      -|-      -|-       -|-      -|-       -|-       -|-      -|-      -|-      -|-      -|-      -|-      -|-      -|-      -|-      |-
 269.200    .0051                                                .0023      .62     6.70     .00    1.80     .013       .00   .00  PIPE
WALL  ENTRANCE
       |         |         |         |         |                   |         |        |        |       |        |         |        |        |
1863.500  2257.740    5.950  2263.690     32.00    4.53     .32  2264.01     .00    1.83      .00    3.000     .000   .00   0    .0
       -|-       -|-       -|-       -|-       -|-      -|-      -|-       -|-      -|-       -|-       -|-      -|-      -|-      -|-      -|-      -|-      -|-      -|-      -|-      |-
```

2263.42'

2264.01'

Increase HGL 0.35' based on 77 degree manhole loss

Rancho Jones Storm Drain

```
                    1         2         3         4         5         6         7

456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123


   100.00    .I             C  H               W      E                                                .    R

   135.99    .I             C  H               W      E                                                .    R

   171.98    .                                                                                         .

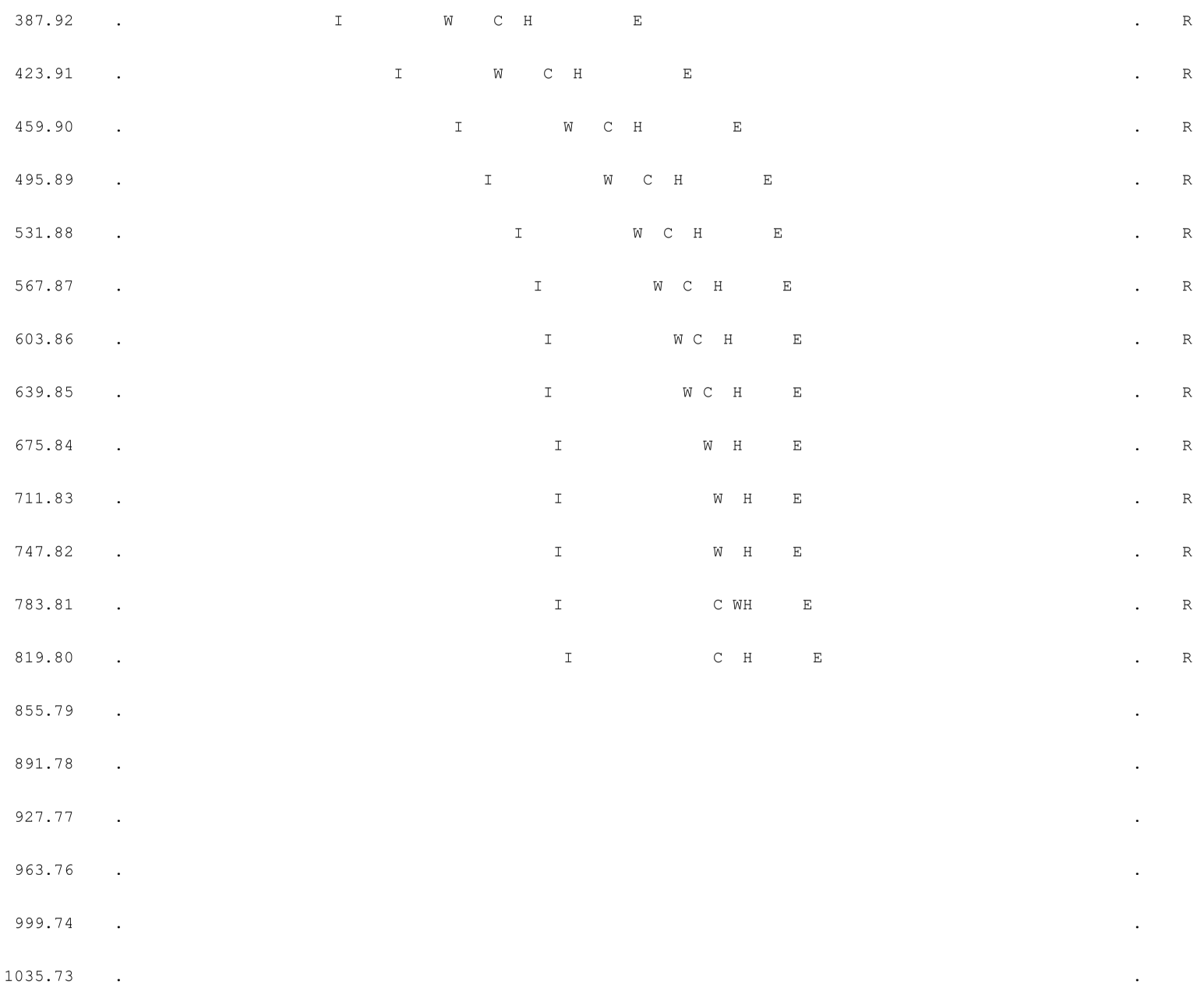
   207.97    .                                                                                         .

   243.96    .                                                                                         .

   279.95    .                                                                                         .

   315.94    .                                                                                         .

   351.93    .                    I             C  H  W      E                                           .    R
```


387.92 . I W C H E . R
423.91 . I W C H E . R
459.90 . I W C H E . R
495.89 . I W C H E . R
531.88 . I W C H E . R
567.87 . I W C H E . R
603.86 . I W C H E . R
639.85 . I W C H E . R
675.84 . I W H E . R
711.83 . I W H E . R
747.82 . I W H E . R
783.81 . I C WH E . R
819.80 . I C H E . R
855.79 . .
891.78 . .
927.77 . .
963.76 . .
999.74 . .
1035.73 . .

```
1071.72    .                                                                .
1107.71    .                                                                .
1143.70    .                I             C  H          W      E            .    JX
1179.69    .                    I         C   H              W  E           .    R
1215.68    .                                                                .
1251.67    .                                                                .
1287.66    .                                                                .
1323.65    .                                                                .
1359.64    .                                                                .
1395.63    .                                                                .
1431.62    .                                                                .
1467.61    .                                                                .
1503.60    .                         I         C   H                W  E    .    JX
1539.59    .                          I        C    H                  WE    .    R
1575.58    .                                                                .
1611.57    .                              IYYYYYYYYCYYYYH                WE    .    WX
1647.56    .                              I        C    H                WE    .    R
1683.55    .                               I        C    H              W E   .    R
1719.54    .
```

HYDRAULIC CALCULATIONS

HYDRAULIC CALCULATIONS

Northern Channel WSPG



```
T1 RANCHO JONES                                                                0
T2 NORTHERN OPEN CHANNEL RUN
T3 456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
SO    100.0002272.680  1                              2273.48
R     100.0002272.680  1      .025                                  45.000
JX    120.0002272.780  1  2   .025    9.000         2266.11          .000          0.000
R     120.0002272.780  1      .025                                  .000
TS    150.0002272.930  2      .025
R     348.0302273.960  2      .025                                  .000
SH    348.0302273.960  2                               .000
CD   1  2   0    .000   6.000   40.000               -.40
CD   2  1   0    .000   2.000   15.000 2.000 2.000   -.15
Q            78.000   .0
```

WATER SURFACE PROFILE LISTING Date:11- 6-2018 Time:10:46:10

RANCHO JONES
NORTHERN OPEN CHANNEL RUN

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El. / SE Dpth	Super Elev / Froude N	Critical Depth / Norm Dp	Flow Top Width / "N"	Height/Dia.-FT / X-Fall	Base Wt or I.D. / ZR	ZL	No Wth Prs/Pip / Type Ch
100.000	2272.680	.720	2273.400	87.00	3.09	.15	2273.55	.00	.54	40.00	6.000	40.000	.00	0 .0
JUNCT STR	.0050				.0038	.08	.72	.65		.025	-.40	.00		RECTANG
120.000	2272.780	.763	2273.543	78.00	2.61	.11	2273.65	.00	.51	40.00	6.000	40.000	.00	0 .0
TRANS STR	.0050							.76	.53		.025	-.15	.00	RECTANG
150.000	2272.930	.912	2273.842	78.00	4.95	.38	2274.22	.00	.91	18.60	2.000	15.000	2.00	0 .0
.626	.0052				.0094	.01	.91	1.00	1.10	.025	-.15	2.00		TRAP
150.626	2272.933	.952	2273.885	78.00	4.89	.37	2274.26	.00	.91	18.76	2.000	15.000	2.00	0 .0
2.624	.0052				.0081	.02	.95	.93	1.10	.025	-.15	2.00		TRAP
153.249	2272.947	.993	2273.940	78.00	4.66	.34	2274.28	.00	.91	18.92	2.000	15.000	2.00	0 .0
6.876	.0052				.0070	.05	.99	.87	1.10	.025	-.15	2.00		TRAP
160.126	2272.983	1.036	2274.019	78.00	4.45	.31	2274.33	.00	.91	19.09	2.000	15.000	2.00	0 .0
20.000	.0052				.0060	.12	1.04	.82	1.10	.025	-.15	2.00		TRAP
180.125	2273.087	1.081	2274.167	78.00	4.24	.28	2274.45	.00	.91	19.27	2.000	15.000	2.00	0 .0
53.096	.0052				.0054	.29	1.08	.76	1.10	.025	-.15	2.00		TRAP
233.221	2273.363	1.104	2274.467	78.00	4.14	.27	2274.73	.00	.91	19.37	2.000	15.000	2.00	0 .0
114.809	.0052				.0052	.60	1.10	.74	1.10	.025	-.15	2.00		TRAP
348.030	2273.960	1.104	2275.064	78.00	4.14	.27	2275.33	.00	.91	19.37	2.000	15.000	2.00	0 .0

All flows are non-erosive (less than 5 fps)

NORTHERN OPEN CHANNEL RUN

```
                  4567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123
100.00    .I       C  W  E                                                                    H  .    JX
105.06    .                                                                                      .
110.12    .                                                                                      .
115.19    .                                                                                      .
120.25    . I       C    WE                                                                    H .    TX
125.31    .                                                                                      .
130.37    .                                                                                      .
135.43    .                                                                                      .
140.49    .                                                                                      .
145.56    .                                                                                      .
150.62    .    I             W     E          H                                                .    R
155.68    .    I             W     E          H                                                .    R
160.74    .    I             CW     E          H                                              .    R
165.80    .    I             C W    E          H                                              .    R
170.87    .                                                                                      .
175.93    .                                                                                      .
```

```
180.99    .      I              C  W   E          H                                                .    R
186.05    .                                                                                        .
191.11    .                                                                                        .
196.17    .                                                                                        .
201.24    .                                                                                        .
206.30    .                                                                                        .
211.36    .                                                                                        .
216.42    .                                                                                        .
221.48    .                                                                                        .
226.55    .                                                                                        .
231.61    .                                                                                        .
236.67    .           I              C  W   E          H                                           .    R
241.73    .                                                                                        .
246.79    .                                                                                        .
251.86    .                                                                                        .
256.92    .                                                                                        .
261.98    .                                                                                        .
267.04    .                                                                                        .
```

272.10 . .

277.16 . .

282.23 . .

287.29 . .

292.35 . .

297.41 . .

302.47 . .

307.54 . .

312.60 . .

317.66 . .

322.72 . .

327.78 . .

332.84 .

HYDRAULIC CALCULATIONS

HYDRAULIC CALCULATIONS

Southern Channel WSPG



```
T1 RANCHO JONES                                                                0
T2 SOUTHERN OPEN CHANNEL RUN
T3 456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
SO    100.0002266.110  1                           2266.900
R     100.0002266.110  1      .025                                .000
JX    120.0002266.210  1  2   .025   11.000         2266.11       .000         0.000
R     120.0002266.210  1      .025                                .000
TS    150.0002266.360  2      .025
R     334.0302267.280  2      .025                                .000
SH    334.0302267.280  2                             .000
CD   1  2   0    .000   6.000   24.000               -.24
CD   2  1   0    .000   2.000   15.000 2.000 2.000   -.15
Q            35.000   .0
```

WATER SURFACE PROFILE LISTING Date:11- 6-2018 Time:10:40:13

RANCHO JONES
SOUTHERN OPEN CHANNEL RUN

4567890123456789012345678901234567890123456789012345678901234567890123

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El.	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
100.000	2266.110	.790	2266.900	46.00	2.46	.09	2266.99	.00	.50	24.00	6.000	24.000	.00	0 .0
JUNCT STR	.0050				.0020	.04	.79	.49		.025	-.24	.00		RECTANG
120.000	2266.210	.796	2267.006	35.00	1.86	.05	2267.06	.00	.41	24.00	6.000	24.000	.00	0 .0
TRANS STR	.0050				.0035	.10	.80	.37		.025	-.15	.00		RECTANG
150.000	2266.360	.682	2267.042	35.00	3.17	.16	2267.20	.00	.55	17.68	2.000	15.000	2.00	0 .0
41.692	.0050				.0052	.22	.68	.71	.70	.025	-.15	2.00		TRAP
191.692	2266.569	.700	2267.269	35.00	3.08	.15	2267.42	.00	.55	17.75	2.000	15.000	2.00	0 .0
142.338	.0050				.0050	.71	.70	.68	.70	.025	-.15	2.00		TRAP
334.030	2267.280	.700	2267.980	35.00	3.08	.15	2268.13	.00	.55	17.75	2.000	15.000	2.00	0 .0

All flows are non-erosive (less than 5 fps)

RANCHO JONES
SOUTHERN OPEN CHANNEL RUN
4567890123456789012345678901234567890123456789012345678901234567890123

```
100.00    .I       C   W E                                                    H  .    JX
104.78    .                                                                     .
109.55    .                                                                     .
```

```
114.33    .                                                                .
119.10    .                                                                .
123.88    . I      C     WE                                                H.    TX
128.66    .                                                                .
133.43    .                                                                .
138.21    .                                                                .
142.99    .                                                                .
147.76    .                                                                .
152.54    .    I        C W E                H                             .    R
157.31    .                                                                .
162.09    .                                                                .
166.87    .                                                                .
171.64    .                                                                .
176.42    .                                                                .
181.19    .                                                                .
185.97    .                                                                .
190.75    .                                                                .
195.52    .       I        C W  E               H                          .    R
```

200.30 . .

205.07 . .

209.85 . .

214.63 . .

219.40 . .

224.18 . .

228.96 . .

233.73 . .

238.51 . .

243.28 . .

248.06 . .

252.84 . .

257.61 . .

262.39 . .

267.16 . .

271.94 . .

276.72 . .

281.49 . .

286.27 .

291.04 .

295.82 .

300.60 .

305.37 .

310.15 .

314.93 .

319.70 .

324.48 .

HYDRAULIC CALCULATIONS

Street Flow Calculations 100-year (Interim Condition)

Section B_Interim - Street B - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	2.58	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	6.00	cfs

Results

Normal Depth	0.08	ft
Flow Area	3.41	ft²
Wetted Perimeter	43.50	ft
Hydraulic Radius	0.08	ft
Top Width	43.47	ft
Critical Depth	0.08	ft
Critical Slope	0.02084	ft/ft
Velocity	1.76	ft/s
Velocity Head	0.05	ft
Specific Energy	0.13	ft
Froude Number	1.11	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.08	ft
Critical Depth	0.08	ft
Channel Slope	2.58	%

Section B_Interim - Street B - 47' ROW - 100 YR

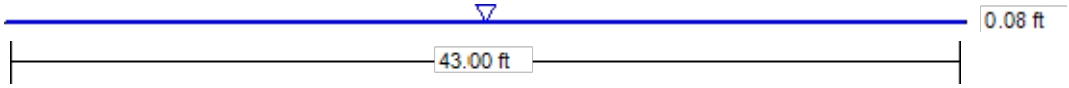
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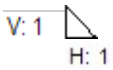
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	2.58	%
Normal Depth	0.08	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	6.00	cfs

Cross Section Image





Section C_Interim - Street C - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	1.50	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	78.00	cfs

Results

Normal Depth	0.43	ft
Flow Area	19.15	ft²
Wetted Perimeter	45.73	ft
Hydraulic Radius	0.42	ft
Top Width	45.59	ft
Critical Depth	0.46	ft
Critical Slope	0.01195	ft/ft
Velocity	4.07	ft/s
Velocity Head	0.26	ft
Specific Energy	0.69	ft
Froude Number	1.11	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.43	ft
Critical Depth	0.46	ft
Channel Slope	1.50	%

Section C_Interim - Street C - 47' ROW - 100 YR

GVF Output Data

Critical Slope	0.01195	ft/ft

Section C_Interim - Street C - 47' ROW - 100 YR

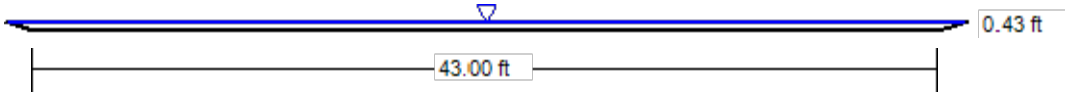
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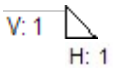
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	1.50	%
Normal Depth	0.43	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	78.00	cfs

Cross Section Image





Section D_Interim - Street D - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	2.07	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	29.00	cfs

Results

Normal Depth	0.22	ft
Flow Area	9.49	ft²
Wetted Perimeter	44.37	ft
Hydraulic Radius	0.21	ft
Top Width	44.30	ft
Critical Depth	0.24	ft
Critical Slope	0.01476	ft/ft
Velocity	3.06	ft/s
Velocity Head	0.15	ft
Specific Energy	0.36	ft
Froude Number	1.16	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.22	ft
Critical Depth	0.24	ft
Channel Slope	2.07	%

Section D_Interim - Street D - 47' ROW - 100 YR

GVF Output Data

Critical Slope	0.01476	ft/ft

Section D_Interim - Street D - 47' ROW - 100 YR

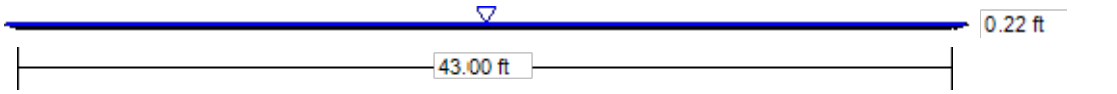
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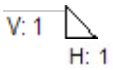
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	2.07	%
Normal Depth	0.22	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	29.00	cfs

Cross Section Image





Section E_Interim - Street E - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	1.00	%
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	29.00	cfs

Results

Normal Depth	0.27	ft
Flow Area	11.78	ft²
Wetted Perimeter	44.21	ft
Hydraulic Radius	0.27	ft
Top Width	44.08	ft
Critical Depth	0.24	ft
Critical Slope	0.01475	ft/ft
Velocity	2.46	ft/s
Velocity Head	0.09	ft
Specific Energy	0.36	ft
Froude Number	0.84	
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	0.27	ft
Critical Depth	0.24	ft
Channel Slope	1.00	%

Section E_Interim - Street E - 47' ROW - 100 YR

GVF Output Data

Critical Slope	0.01475	ft/ft

Section E_Interim - Street E - 47' ROW - 100 YR

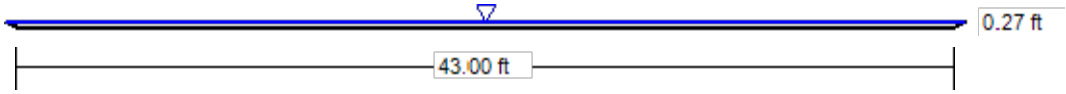
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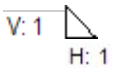
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	1.00	%
Normal Depth	0.27	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	29.00	cfs

Cross Section Image





Section G1_Interim - Street G - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.50	%
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	92.00	cfs

Results

Normal Depth	0.66	ft
Flow Area	29.47	ft²
Wetted Perimeter	45.97	ft
Hydraulic Radius	0.64	ft
Top Width	45.66	ft
Critical Depth	0.52	ft
Critical Slope	0.01151	ft/ft
Velocity	3.12	ft/s
Velocity Head	0.15	ft
Specific Energy	0.82	ft
Froude Number	0.69	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.66	ft
Critical Depth	0.52	ft
Channel Slope	0.50	%

Section G1_Interim - Street G - 47' ROW - 100 YR

GVF Output Data

Critical Slope	0.01151	ft/ft

Section G1_Interim - Street G - 47' ROW - 100 YR

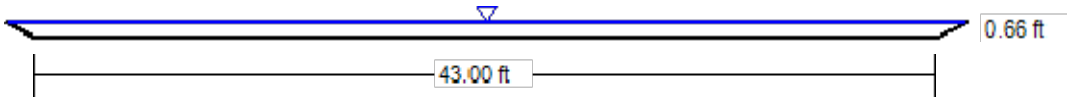
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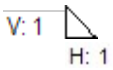
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.50	%
Normal Depth	0.66	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	92.00	cfs

Cross Section Image





Section G2_Interim - Street G - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.50	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	23.00	cfs

Results

Normal Depth	0.29	ft
Flow Area	12.69	ft²
Wetted Perimeter	44.83	ft
Hydraulic Radius	0.28	ft
Top Width	44.74	ft
Critical Depth	0.21	ft
Critical Slope	0.01552	ft/ft
Velocity	1.81	ft/s
Velocity Head	0.05	ft
Specific Energy	0.34	ft
Froude Number	0.60	
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	0.29	ft
Critical Depth	0.21	ft
Channel Slope	0.50	%

Section G2_Interim - Street G - 47' ROW - 100 YR

GVF Output Data

Critical Slope	0.01552	ft/ft

Section G2_Interim - Street G - 47' ROW - 100 YR

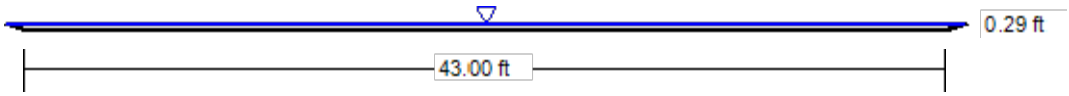
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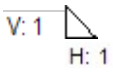
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.50	%
Normal Depth	0.29	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	23.00	cfs

Cross Section Image





Section J1_Interim - Street J - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.61	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	119.00	cfs

Results

Normal Depth	0.73	ft
Flow Area	32.84	ft²
Wetted Perimeter	47.60	ft
Hydraulic Radius	0.69	ft
Top Width	47.36	ft
Critical Depth	0.61	ft
Critical Slope	0.01094	ft/ft
Velocity	3.62	ft/s
Velocity Head	0.20	ft
Specific Energy	0.93	ft
Froude Number	0.77	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.73	ft
Critical Depth	0.61	ft
Channel Slope	0.61	%

Section J1_Interim - Street J - 47' ROW - 100 YR

GVF Output Data

Critical Slope	0.01094	ft/ft

Section J1_Interim - Street J - 47' ROW - 100 YR

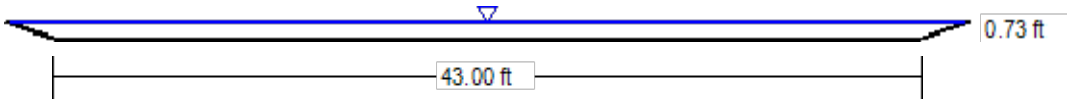
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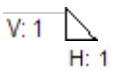
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.61	%
Normal Depth	0.73	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	119.00	cfs

Cross Section Image





Section J2_Interim - Street J - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.56	%
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	29.00	cfs

Results

Normal Depth	0.32	ft
Flow Area	14.12	ft²
Wetted Perimeter	45.03	ft
Hydraulic Radius	0.31	ft
Top Width	44.93	ft
Critical Depth	0.24	ft
Critical Slope	0.01476	ft/ft
Velocity	2.05	ft/s
Velocity Head	0.07	ft
Specific Energy	0.39	ft
Froude Number	0.65	
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	0.32	ft
Critical Depth	0.24	ft
Channel Slope	0.56	%

Section J2_Interim - Street J - 47' ROW - 100 YR

GVF Output Data

Critical Slope	0.01476	ft/ft

Section J2_Interim - Street J - 47' ROW - 100 YR

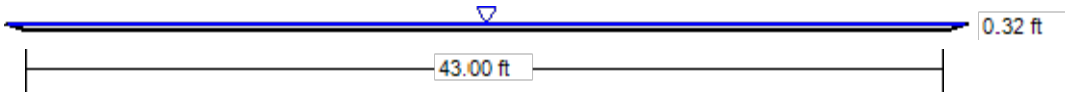
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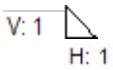
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.56	%
Normal Depth	0.32	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	43.00	ft
Discharge	29.00	cfs

Cross Section Image





HYDRAULIC CALCULATIONS

Street Flow Calculations 100-year (Ultimate Condition)

Section A - Street A - 64' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.00	%
Discharge	78.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+29.00	0.61
0+29.00	0.62
0+35.00	0.62
0+35.00	0.61
0+57.00	0.17
0+57.00	0.13
0+58.50	0.00
0+58.50	0.50
0+59.00	0.50
0+64.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+29.00, 0.61)	0.016
(0+29.00, 0.61)	(0+35.00, 0.61)	0.013
(0+35.00, 0.61)	(0+57.00, 0.17)	0.016
(0+57.00, 0.17)	(0+64.00, 0.60)	0.013

Section A - Street A - 64' ROW - 100 YR

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		0.71	ft
Elevation Range	0.00 to 0.62 ft		
Flow Area		18.41	ft²
Wetted Perimeter		65.34	ft
Hydraulic Radius		0.28	ft
Top Width		64.00	ft
Normal Depth		0.71	ft
Critical Depth		0.78	ft
Critical Slope		0.00481	ft/ft
Velocity		4.24	ft/s
Velocity Head		0.28	ft
Specific Energy		0.99	ft
Froude Number		1.39	
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	0.71	ft
Critical Depth	0.78	ft
Channel Slope	1.00	%
Critical Slope	0.00481	ft/ft

Section A - Street A - 64' ROW - 100 YR

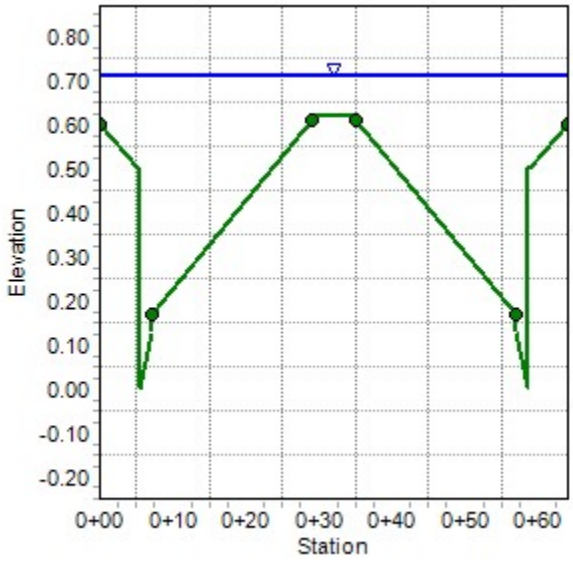
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.00	%
Normal Depth	0.71	ft
Discharge	78.00	cfs

Cross Section Image



Section B - Street B - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.98	%
Discharge	99.30	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.15	0.38
0+05.15	0.36
0+06.00	0.13
0+06.00	0.00
0+07.00	0.13
0+07.00	0.17
0+23.50	0.50
0+40.00	0.17
0+40.00	0.13
0+41.00	0.00
0+41.00	0.13
0+41.85	0.36
0+42.00	0.38
0+47.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+40.00, 0.17)	0.016
(0+40.00, 0.17)	(0+47.00, 0.48)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method

Section B - Street B - 47' ROW - 100 YR

Options

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 0.50 ft		
Flow Area		15.34	ft²
Wetted Perimeter		47.82	ft
Hydraulic Radius		0.32	ft
Top Width		47.00	ft
Normal Depth		0.67	ft
Critical Depth		0.86	ft
Critical Slope		0.00430	ft/ft
Velocity		6.47	ft/s
Velocity Head		0.65	ft
Specific Energy		1.32	ft
Froude Number		2.00	
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	0.67	ft
Critical Depth	0.86	ft
Channel Slope	1.98	%
Critical Slope	0.00430	ft/ft

Section B - Street B - 47' ROW - 100 YR

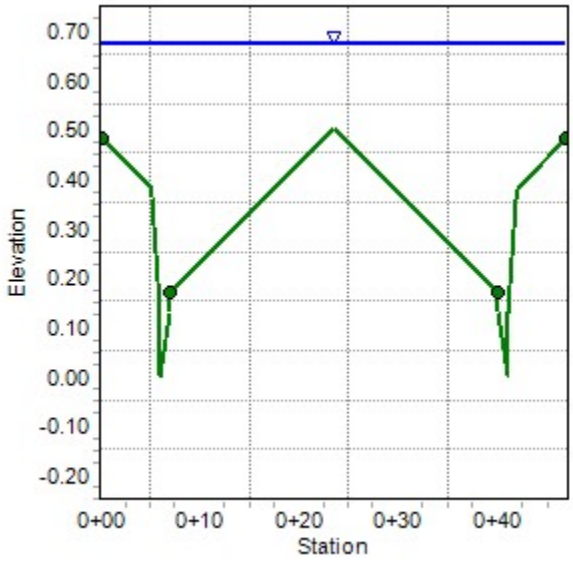
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.98	%
Normal Depth	0.67	ft
Discharge	99.30	cfs

Cross Section Image



Section C - Street C - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.73	%
Discharge	78.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.15	0.38
0+05.15	0.36
0+06.00	0.13
0+06.00	0.00
0+07.00	0.13
0+07.00	0.17
0+23.50	0.50
0+40.00	0.17
0+40.00	0.13
0+41.00	0.00
0+41.00	0.13
0+41.85	0.36
0+42.00	0.38
0+47.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+40.00, 0.17)	0.016
(0+40.00, 0.17)	(0+47.00, 0.48)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method

Section C - Street C - 47' ROW - 100 YR

Options

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 0.50 ft		
Flow Area		17.91	ft²
Wetted Perimeter		47.93	ft
Hydraulic Radius		0.37	ft
Top Width		47.00	ft
Normal Depth		0.72	ft
Critical Depth		0.78	ft
Critical Slope		0.00451	ft/ft
Velocity		4.35	ft/s
Velocity Head		0.29	ft
Specific Energy		1.02	ft
Froude Number		1.24	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.72	ft
Critical Depth	0.78	ft
Channel Slope	0.73	%
Critical Slope	0.00451	ft/ft

Section C - Street C - 47' ROW - 100 YR

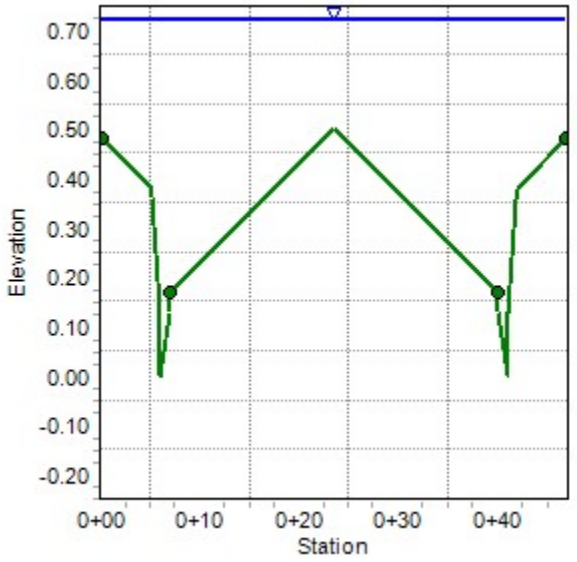
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.73	%
Normal Depth	0.72	ft
Discharge	78.00	cfs

Cross Section Image



Section D - Street D - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.21	%
Discharge	20.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.15	0.38
0+05.15	0.36
0+06.00	0.13
0+06.00	0.00
0+07.00	0.13
0+07.00	0.17
0+23.50	0.50
0+40.00	0.17
0+40.00	0.13
0+41.00	0.00
0+41.00	0.13
0+41.85	0.36
0+42.00	0.38
0+47.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+40.00, 0.17)	0.016
(0+40.00, 0.17)	(0+47.00, 0.48)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method

Section D - Street D - 47' ROW - 100 YR

Options

Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.48	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		6.67	ft²
Wetted Perimeter		45.70	ft
Hydraulic Radius		0.15	ft
Top Width		45.25	ft
Normal Depth		0.48	ft
Critical Depth		0.52	ft
Critical Slope		0.00601	ft/ft
Velocity		3.00	ft/s
Velocity Head		0.14	ft
Specific Energy		0.62	ft
Froude Number		1.38	
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	0.48	ft
Critical Depth	0.52	ft
Channel Slope	1.21	%
Critical Slope	0.00601	ft/ft

Section D - Street D - 47' ROW - 100 YR

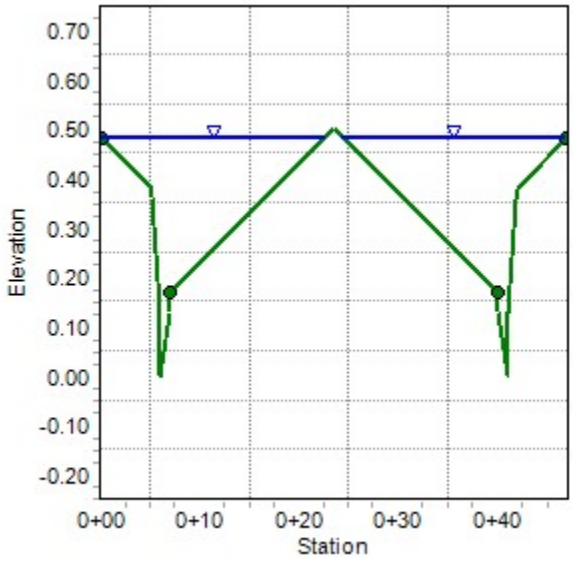
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.21	%
Normal Depth	0.48	ft
Discharge	20.00	cfs

Cross Section Image



Section E - Street E - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.00	%
Discharge	78.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.15	0.38
0+05.15	0.36
0+06.00	0.13
0+06.00	0.00
0+07.00	0.13
0+07.00	0.17
0+23.50	0.50
0+40.00	0.17
0+40.00	0.13
0+41.00	0.00
0+41.00	0.13
0+41.85	0.36
0+42.00	0.38
0+47.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+40.00, 0.17)	0.016
(0+40.00, 0.17)	(0+47.00, 0.48)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method

Section E - Street E - 47' ROW - 100 YR

Options

Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.69	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		16.29	ft²
Wetted Perimeter		47.86	ft
Hydraulic Radius		0.34	ft
Top Width		47.00	ft
Normal Depth		0.69	ft
Critical Depth		0.78	ft
Critical Slope		0.00452	ft/ft
Velocity		4.79	ft/s
Velocity Head		0.36	ft
Specific Energy		1.04	ft
Froude Number		1.43	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.69	ft
Critical Depth	0.78	ft
Channel Slope	1.00	%
Critical Slope	0.00452	ft/ft

Section E - Street E - 47' ROW - 100 YR

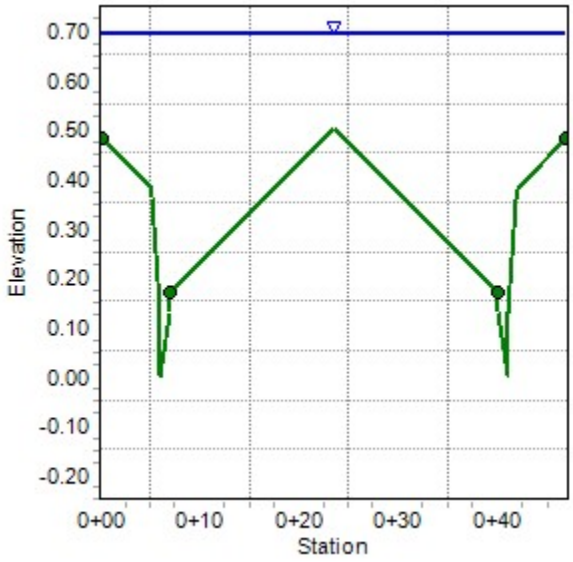
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.00	%
Normal Depth	0.69	ft
Discharge	78.00	cfs

Cross Section Image



Section F - Street F - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.00	%
Discharge	99.30	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.15	0.38
0+05.15	0.36
0+06.00	0.13
0+06.00	0.00
0+07.00	0.13
0+07.00	0.17
0+23.50	0.50
0+40.00	0.17
0+40.00	0.13
0+41.00	0.00
0+41.00	0.13
0+41.85	0.36
0+42.00	0.38
0+47.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+40.00, 0.17)	0.016
(0+40.00, 0.17)	(0+47.00, 0.48)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method

Section F - Street F - 47' ROW - 100 YR

Options

Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.74	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		18.85	ft²
Wetted Perimeter		47.97	ft
Hydraulic Radius		0.39	ft
Top Width		47.00	ft
Normal Depth		0.74	ft
Critical Depth		0.86	ft
Critical Slope		0.00430	ft/ft
Velocity		5.27	ft/s
Velocity Head		0.43	ft
Specific Energy		1.17	ft
Froude Number		1.47	
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	0.74	ft
Critical Depth	0.86	ft
Channel Slope	1.00	%
Critical Slope	0.00430	ft/ft

Section F - Street F - 47' ROW - 100 YR

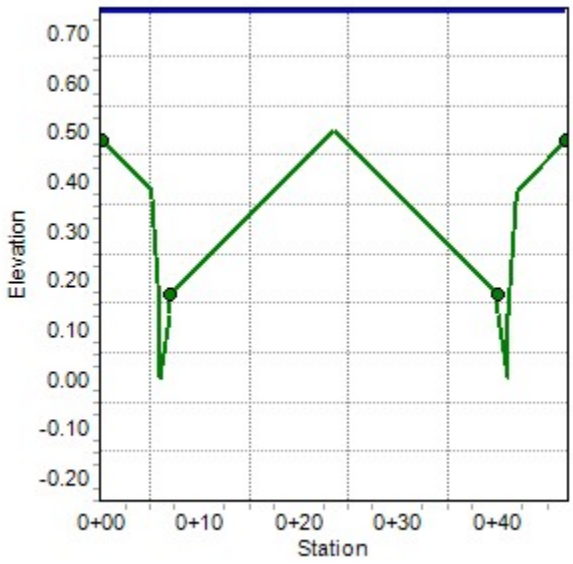
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.00	%
Normal Depth	0.74	ft
Discharge	99.30	cfs

Cross Section Image



Section G1 - Street G - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50	%
Discharge	97.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.15	0.38
0+05.15	0.36
0+06.00	0.13
0+06.00	0.00
0+07.00	0.13
0+07.00	0.17
0+23.50	0.50
0+40.00	0.17
0+40.00	0.13
0+41.00	0.00
0+41.00	0.13
0+41.85	0.36
0+42.00	0.38
0+47.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+40.00, 0.17)	0.016
(0+40.00, 0.17)	(0+47.00, 0.48)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method

Section G1 - Street G - 47' ROW - 100 YR

Options

Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.83	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		22.91	ft²
Wetted Perimeter		48.14	ft
Hydraulic Radius		0.48	ft
Top Width		47.00	ft
Normal Depth		0.83	ft
Critical Depth		0.85	ft
Critical Slope		0.00431	ft/ft
Velocity		4.23	ft/s
Velocity Head		0.28	ft
Specific Energy		1.11	ft
Froude Number		1.07	
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	0.83	ft
Critical Depth	0.85	ft
Channel Slope	0.50	%
Critical Slope	0.00431	ft/ft

Section G1 - Street G - 47' ROW - 100 YR

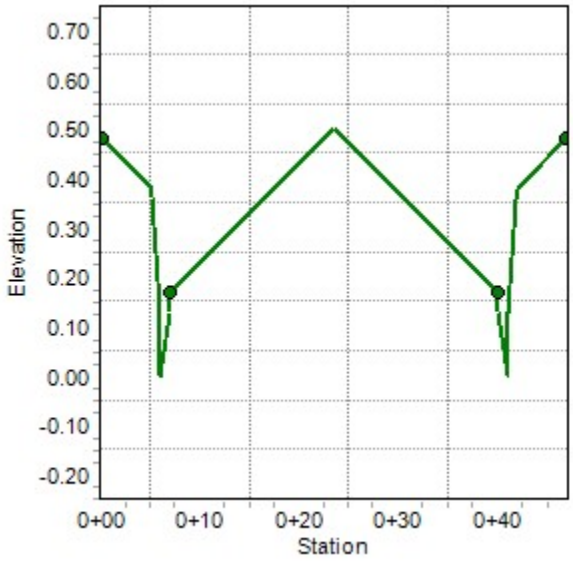
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50	%
Normal Depth	0.83	ft
Discharge	97.00	cfs

Cross Section Image



Section G2 - Street G - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50	%
Discharge	29.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.15	0.38
0+05.15	0.36
0+06.00	0.13
0+06.00	0.00
0+07.00	0.13
0+07.00	0.17
0+23.50	0.50
0+40.00	0.17
0+40.00	0.13
0+41.00	0.00
0+41.00	0.13
0+41.85	0.36
0+42.00	0.38
0+47.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+40.00, 0.17)	0.016
(0+40.00, 0.17)	(0+47.00, 0.48)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method

Section G2 - Street G - 47' ROW - 100 YR

Options

Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.58	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		11.06	ft²
Wetted Perimeter		47.64	ft
Hydraulic Radius		0.23	ft
Top Width		47.00	ft
Normal Depth		0.58	ft
Critical Depth		0.57	ft
Critical Slope		0.00557	ft/ft
Velocity		2.62	ft/s
Velocity Head		0.11	ft
Specific Energy		0.68	ft
Froude Number		0.95	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.58	ft
Critical Depth	0.57	ft
Channel Slope	0.50	%
Critical Slope	0.00557	ft/ft

Section G2 - Street G - 47' ROW - 100 YR

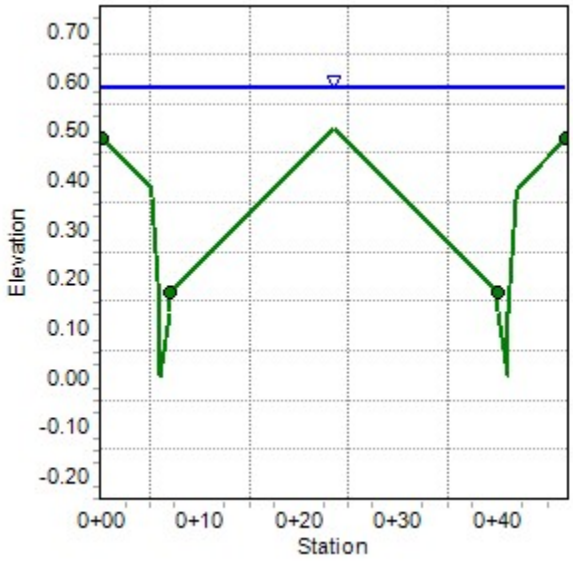
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50	%
Normal Depth	0.58	ft
Discharge	29.00	cfs

Cross Section Image



Section G3 - Street G - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50	%
Discharge	17.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.15	0.38
0+05.15	0.36
0+06.00	0.13
0+06.00	0.00
0+07.00	0.13
0+07.00	0.17
0+23.50	0.50
0+40.00	0.17
0+40.00	0.13
0+41.00	0.00
0+41.00	0.13
0+41.85	0.36
0+42.00	0.38
0+47.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+40.00, 0.17)	0.016
(0+40.00, 0.17)	(0+47.00, 0.48)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method

Section G3 - Street G - 47' ROW - 100 YR

Options

Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.51	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		8.02	ft²
Wetted Perimeter		47.51	ft
Hydraulic Radius		0.17	ft
Top Width		47.00	ft
Normal Depth		0.51	ft
Critical Depth		0.50	ft
Critical Slope		0.00625	ft/ft
Velocity		2.12	ft/s
Velocity Head		0.07	ft
Specific Energy		0.58	ft
Froude Number		0.90	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.51	ft
Critical Depth	0.50	ft
Channel Slope	0.50	%
Critical Slope	0.00625	ft/ft

Section G3 - Street G - 47' ROW - 100 YR

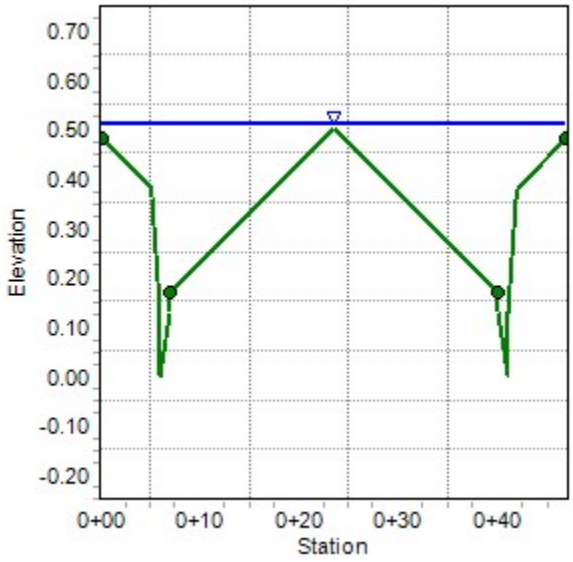
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50	%
Normal Depth	0.51	ft
Discharge	17.00	cfs

Cross Section Image



Section G4 - Street G - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50	%
Discharge	54.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.15	0.38
0+05.15	0.36
0+06.00	0.13
0+06.00	0.00
0+07.00	0.13
0+07.00	0.17
0+23.50	0.50
0+40.00	0.17
0+40.00	0.13
0+41.00	0.00
0+41.00	0.13
0+41.85	0.36
0+42.00	0.38
0+47.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+40.00, 0.17)	0.016
(0+40.00, 0.17)	(0+47.00, 0.48)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method

Section G4 - Street G - 47' ROW - 100 YR

Options

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 0.50 ft		
Flow Area		16.09	ft²
Wetted Perimeter		47.85	ft
Hydraulic Radius		0.34	ft
Top Width		47.00	ft
Normal Depth		0.68	ft
Critical Depth		0.69	ft
Critical Slope		0.00487	ft/ft
Velocity		3.36	ft/s
Velocity Head		0.18	ft
Specific Energy		0.86	ft
Froude Number		1.01	
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	0.68	ft
Critical Depth	0.69	ft
Channel Slope	0.50	%
Critical Slope	0.00487	ft/ft

Section G4 - Street G - 47' ROW - 100 YR

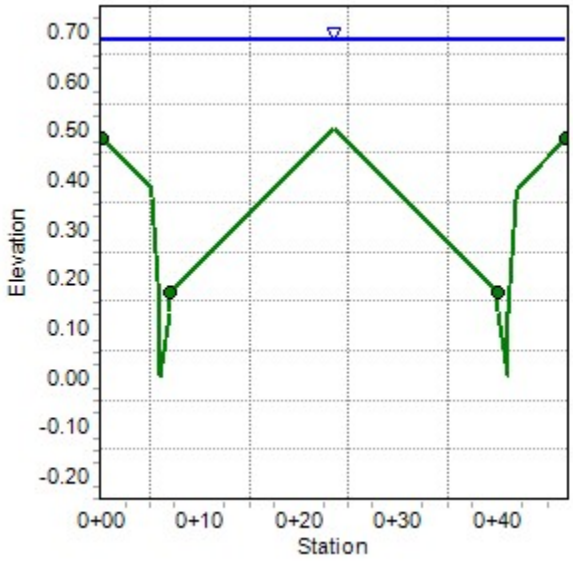
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50	%
Normal Depth	0.68	ft
Discharge	54.00	cfs

Cross Section Image



Section J1 - Street J - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.61	%
Discharge	130.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.15	0.38
0+05.15	0.36
0+06.00	0.13
0+06.00	0.00
0+07.00	0.13
0+07.00	0.17
0+23.50	0.50
0+40.00	0.17
0+40.00	0.13
0+41.00	0.00
0+41.00	0.13
0+41.85	0.36
0+42.00	0.38
0+47.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+40.00, 0.17)	0.016
(0+40.00, 0.17)	(0+47.00, 0.48)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method

Section J1 - Street J - 47' ROW - 100 YR

Options

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 0.50 ft		
Flow Area		25.75	ft²
Wetted Perimeter		48.27	ft
Hydraulic Radius		0.53	ft
Top Width		47.00	ft
Normal Depth		0.89	ft
Critical Depth		0.96	ft
Critical Slope		0.00406	ft/ft
Velocity		5.05	ft/s
Velocity Head		0.40	ft
Specific Energy		1.28	ft
Froude Number		1.20	
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	0.89	ft
Critical Depth	0.96	ft
Channel Slope	0.61	%
Critical Slope	0.00406	ft/ft

Section J1 - Street J - 47' ROW - 100 YR

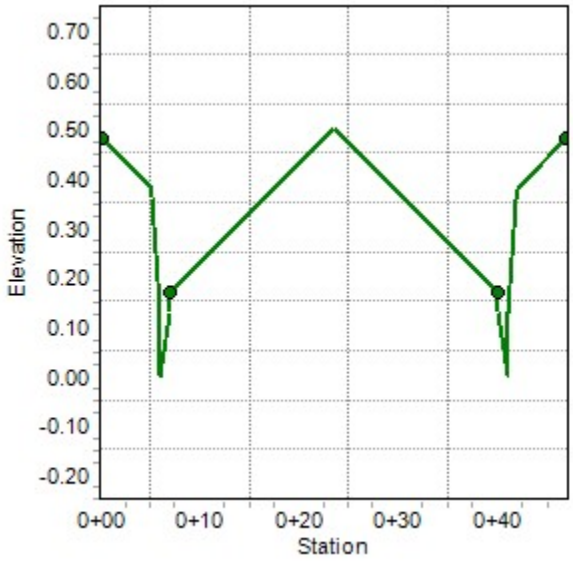
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.61	%
Normal Depth	0.89	ft
Discharge	130.00	cfs

Cross Section Image



Section J2 - Street J - 47' ROW - 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.56	%
Discharge	31.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.15	0.38
0+05.15	0.36
0+06.00	0.13
0+06.00	0.00
0+07.00	0.13
0+07.00	0.17
0+23.50	0.50
0+40.00	0.17
0+40.00	0.13
0+41.00	0.00
0+41.00	0.13
0+41.85	0.36
0+42.00	0.38
0+47.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+40.00, 0.17)	0.016
(0+40.00, 0.17)	(0+47.00, 0.48)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method

Section J2 - Street J - 47' ROW - 100 YR

Options

Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.58	ft
Elevation Range	0.00 to 0.50 ft		
Flow Area		11.12	ft²
Wetted Perimeter		47.64	ft
Hydraulic Radius		0.23	ft
Top Width		47.00	ft
Normal Depth		0.58	ft
Critical Depth		0.58	ft
Critical Slope		0.00549	ft/ft
Velocity		2.79	ft/s
Velocity Head		0.12	ft
Specific Energy		0.70	ft
Froude Number		1.01	
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	0.58	ft
Critical Depth	0.58	ft
Channel Slope	0.56	%
Critical Slope	0.00549	ft/ft

Section J2 - Street J - 47' ROW - 100 YR

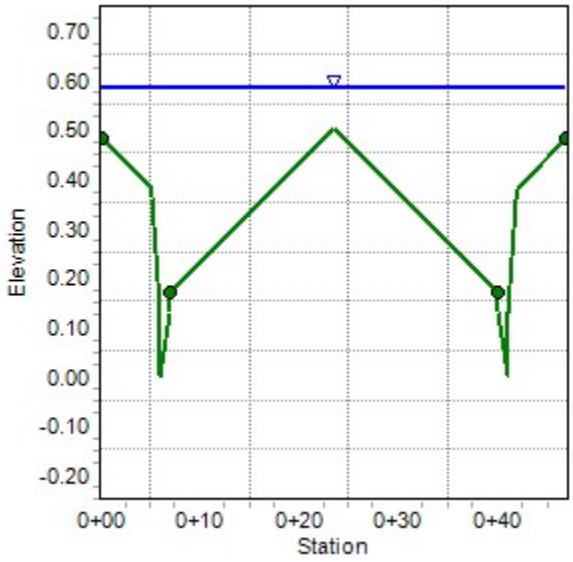
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.56	%
Normal Depth	0.58	ft
Discharge	31.00	cfs

Cross Section Image



HYDRAULIC CALCULATIONS

Flow Split Calculations - 100 Year



Flow Split Calculator

Company:	Actus	Project Name:	Rancho Jones
By:	Christian O'Quinn	Intersection	Street G/ Street C
Date:	10/30/2018	Flow Direction	Southeast

Q_M	16.27	cfs	W_{SS}	37	ft	$Q_L = 0.42\left[\frac{Q_M^{0.93} W_{SS}^{0.85}}{S_M^{0.41} W_M^{0.79}}\right]$ =	6.1 cfs
S_M	0.005	ft/ft	y_O	0.33	ft	$Q_O = 46.8 * y_O * W_{SS} * S_S^{0.5} - Q_L$ =	63.9 cfs
W_M	37	ft	S_S	0.015	ft/ft	Q_T =	70.0 cfs

[1] Q_L=Lateral flow into side street, (cfs)
[2] Q_M=Main street flow measured at top of curb, (cfs)
[3] S_M=Longitudinal slop at main street, (ft/ft)
[4] W_M=Width of the main street at curb, (ft)
[5] W_{SS}=Width of side street at curb, (ft)
[6] Q_O=Overbank flow intercepted by side street, (cfs)
[7] y_O=Average depth of overbank flow intercepted by side street, (ft)
[8] S_S=Longitudinal slope of side street, (ft/ft)
[9] Q_T=Total Flow entering side street, cfs

Flow Split Calculator

Company:	Actus	Project Name:	Rancho Jones
By:	Christian O'Quinn	Intersection	Street G/ Street D
Date:	10/30/2018	Flow Direction	Southeast

Q_M	16.27	cfs	W_{SS}	37	ft	$Q_L = 0.42\left[\frac{Q_M^{0.93} W_{SS}^{0.85}}{S_M^{0.41} W_M^{0.79}}\right]$ =	6.1 cfs
S_M	0.005	ft/ft	y_O	0.08	ft	$Q_O = 46.8 * y_O * W_{SS} * S_S^{0.5} - Q_L$ =	9.1 cfs
W_M	37	ft	S_S	0.0121	ft/ft	Q_T =	15.2 cfs

[1] Q_L=Lateral flow into side street, (cfs)
[2] Q_M=Main street flow measured at top of curb, (cfs)
[3] S_M=Longitudinal slop at main street, (ft/ft)
[4] W_M=Width of the main street at curb, (ft)
[5] W_{SS}=Width of side street at curb, (ft)
[6] Q_O=Overbank flow intercepted by side street, (cfs)
[7] y_O=Average depth of overbank flow intercepted by side street, (ft)
[8] S_S=Longitudinal slope of side street, (ft/ft)
[9] Q_T=Total Flow entering side street, cfs

Flow Split Calculator

Company:	Actus	Project Name:	Racnho Jones
By:	Christian O'Quinn	Intersection	Street G/ Street E
Date:	10/30/2018	Flow Direction	Southeast

Q_M	16.27	cfs	W_{SS}	37	ft	$Q_L = 0.42\left[\frac{Q_M^{0.93} W_{SS}^{0.85}}{S_M^{0.41} W_M^{0.79}}\right]$ =	6.1 cfs
S_M	0.005	ft/ft	y_O	0.01	ft	$Q_O = 46.8 * y_O * W_{SS} * S_S^{0.5} - Q_L$ =	-4.4 cfs
W_M	37	ft	S_S	0.01	ft/ft	Q_T =	6.1 cfs

[1] Q_L=Lateral flow into side street, (cfs)
[2] Q_M=Main street flow measured at top of curb, (cfs)
[3] S_M=Longitudinal slop at main street, (ft/ft)
[4] W_M=Width of the main street at curb, (ft)
[5] W_{SS}=Width of side street at curb, (ft)
[6] Q_O=Overbank flow intercepted by side street, (cfs)
[7] y_O=Average depth of overbank flow intercepted by side street, (ft)
[8] S_S=Longitudinal slope of side street, (ft/ft)
[9] Q_T=Total Flow entering side street, cfs

HYDRAULIC CALCULATIONS

Flow Split Calculations - 10 year



Flow Split Calculator

Company:	Actus	Project Name:	Rancho Jones
By:	Christian O'Quinn	Intersection	Street G/ Street C
Date:	10/30/2018	Flow Direction	Southeast

Q_M	16.27	cfs	W_{SS}	37	ft	$Q_L = 0.42\left[\frac{Q_M^{0.93} W_{SS}^{0.85}}{S_M^{0.41} W_M^{0.79}}\right]$ =	6.1 cfs
S_M	0.005	ft/ft	y_O	0.09	ft	$Q_O = 46.8 * y_O * W_{SS} * S_S^{0.5} - Q_L$ =	13.0 cfs
W_M	37	ft	S_S	0.015	ft/ft	Q_T =	19.1 cfs

[1] Q_L=Lateral flow into side street, (cfs)
[2] Q_M=Main street flow measured at top of curb, (cfs)
[3] S_M=Longitudinal slop at main street, (ft/ft)
[4] W_M=Width of the main street at curb, (ft)
[5] W_{SS}=Width of side street at curb, (ft)
[6] Q_O=Overbank flow intercepted by side street, (cfs)
[7] y_O=Average depth of overbank flow intercepted by side street, (ft)
[8] S_S=Longitudinal slope of side street, (ft/ft)
[9] Q_T=Total Flow entering side street, cfs

Flow Split Calculator

Company:	Actus	Project Name:	Rancho Jones
By:	Christian O'Quinn	Intersection	Street G/ Street D
Date:	10/30/2018	Flow Direction	Southeast

Q_M	16.27	cfs	W_{SS}	37	ft	$Q_L = 0.42\left[\frac{Q_M^{0.93} W_{SS}^{0.85}}{S_M^{0.41} W_M^{0.79}}\right]$ =	6.1 cfs
S_M	0.005	ft/ft	y_O	0.01	ft	$Q_O = 46.8 * y_O * W_{SS} * S_S^{0.5} - Q_L$ =	-4.2 cfs
W_M	37	ft	S_S	0.0121	ft/ft	Q_T =	6.1 cfs

[1] Q_L=Lateral flow into side street, (cfs)
[2] Q_M=Main street flow measured at top of curb, (cfs)
[3] S_M=Longitudinal slop at main street, (ft/ft)
[4] W_M=Width of the main street at curb, (ft)
[5] W_{SS}=Width of side street at curb, (ft)
[6] Q_O=Overbank flow intercepted by side street, (cfs)
[7] y_O=Average depth of overbank flow intercepted by side street, (ft)
[8] S_S=Longitudinal slope of side street, (ft/ft)
[9] Q_T=Total Flow entering side street, cfs

Flow Split Calculator

Company:	Actus	Project Name:	Rancho Jones
By:	Christian O'Quinn	Intersection	Street G/ Street E
Date:	10/30/2018	Flow Direction	East

Q_M	16.27	cfs	W_{SS}	37	ft	$Q_L = 0.42\left[\frac{Q_M^{0.93} W_{SS}^{0.85}}{S_M^{0.41} W_M^{0.79}}\right]$ =	6.1 cfs
S_M	0.005	ft/ft	y_O	0.01	ft	$Q_O = 46.8 * y_O * W_{SS} * S_S^{0.5} - Q_L$ =	-4.4 cfs
W_M	37	ft	S_S	0.01	ft/ft	Q_T =	6.1 cfs

[1] Q_L=Lateral flow into side street, (cfs)
[2] Q_M=Main street flow measured at top of curb, (cfs)
[3] S_M=Longitudinal slop at main street, (ft/ft)
[4] W_M=Width of the main street at curb, (ft)
[5] W_{SS}=Width of side street at curb, (ft)
[6] Q_O=Overbank flow intercepted by side street, (cfs)
[7] y_O=Average depth of overbank flow intercepted by side street, (ft)
[8] S_S=Longitudinal slope of side street, (ft/ft)
[9] Q_T=Total Flow entering side street, cfs

HYDRAULIC CALCULATIONS

HYDRAULIC CALCULATIONS

Finished Floor Elevation Check

Actus

RANCHO & JONES														
FINISH FLOOR ANALYSIS (OVERALL)														
INPUT INFORMATION							FINISHED FLOORS							NOTES
Lot Number	Hydraulic Section Utilized	Centerline Elevation	T/C[1]	Mod Roll, Roll, or L Curb?	F/L[2]	D_{100}	Flowline FF min[3]	Centerline (of TC) FF min[4]	Pad	Section	FF Design	Flowline Check	Centerline Check	See References on Last Sheet
		(ft)	(ft)	Type	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
1	G4	2266.48	2266.48	Roll	2266.10	0.68	2267.46	2267.98	2267.5	1.00	2268.50	OK	OK	
2	G4	2266.17	2266.17	Roll	2265.79	0.68	2267.15	2267.67	2267.5	1.00	2268.50	OK	OK	
3	G4	2266.17	2266.17	Roll	2265.79	0.68	2267.15	2267.67	2267.5	1.00	2268.50	OK	OK	
4	G4	2266.33	2266.33	Roll	2265.95	0.68	2267.31	2267.83	2267.6	1.00	2268.60	OK	OK	
5	G4	2266.54	2266.54	Roll	2266.16	0.68	2267.52	2268.04	2267.7	1.00	2268.70	OK	OK	
6	G4	2266.54	2266.54	Roll	2266.16	0.68	2267.52	2268.04	2267.9	1.00	2268.90	OK	OK	
7	G4	2266.51	2266.51	Roll	2266.13	0.68	2267.49	2268.01	2267.7	1.00	2268.70	OK	OK	
8	G4	2266.31	2266.31	Roll	2265.93	0.68	2267.29	2267.81	2267.5	1.00	2268.50	OK	OK	
9	G4	2266.11	2266.11	Roll	2265.73	0.68	2267.09	2267.61	2267.3	1.00	2268.30	OK	OK	
10	G4	2266.45	2266.45	Roll	2266.07	0.68	2267.43	2267.95	2267.5	1.00	2268.50	OK	OK	
11	G4	2266.85	2266.85	Roll	2266.47	0.68	2267.83	2268.35	2267.9	1.00	2268.90	OK	OK	
12	G4	2267.24	2267.24	Roll	2266.86	0.68	2268.22	2268.74	2268.3	1.00	2269.30	OK	OK	
13	G4	2267.49	2267.49	Roll	2267.11	0.68	2268.47	2268.99	2268.5	1.00	2269.50	OK	OK	
14	G4	2267.69	2267.69	Roll	2267.31	0.68	2268.67	2269.19	2268.7	1.00	2269.70	OK	OK	
15	G4	2267.89	2267.89	Roll	2267.51	0.68	2268.87	2269.39	2268.9	1.00	2269.90	OK	OK	
16	G4	2268.09	2268.09	Roll	2267.71	0.68	2269.07	2269.59	2269.1	1.00	2270.10	OK	OK	
17	G4	2268.29	2268.29	Roll	2267.91	0.68	2269.27	2269.79	2269.3	1.00	2270.30	OK	OK	
18	G4	2268.49	2268.49	Roll	2268.11	0.68	2269.47	2269.99	2269.5	1.00	2270.50	OK	OK	
19	G3	2268.69	2268.69	Roll	2268.31	0.51	2269.33	2270.19	2269.7	1.00	2270.70	OK	OK	
20	G3	2268.89	2268.89	Roll	2268.51	0.51	2269.53	2270.39	2269.9	1.00	2270.90	OK	OK	
21	G3	2269.09	2269.09	Roll	2268.71	0.51	2269.73	2270.59	2270.1	1.00	2271.10	OK	OK	
22	G3	2269.29	2269.29	Roll	2268.91	0.51	2269.93	2270.79	2270.3	1.00	2271.30	OK	OK	
23	G3	2269.49	2269.49	Roll	2269.11	0.51	2270.13	2270.99	2270.5	1.00	2271.50	OK	OK	
24	G3	2269.69	2269.69	Roll	2269.31	0.51	2270.33	2271.19	2270.7	1.00	2271.70	OK	OK	
25	G3	2269.89	2269.89	Roll	2269.51	0.51	2270.53	2271.39	2270.9	1.00	2271.90	OK	OK	
26	G3	2270.09	2270.09	Roll	2269.71	0.51	2270.73	2271.59	2271.1	1.00	2272.10	OK	OK	
27	G2	2270.29	2270.29	Roll	2269.91	0.58	2271.07	2271.79	2271.3	1.00	2272.30	OK	OK	
28	G2	2270.50	2270.50	Roll	2270.12	0.58	2271.28	2272.00	2271.5	1.00	2272.50	OK	OK	
29	G2	2270.70	2270.70	Roll	2270.32	0.58	2271.48	2272.20	2271.7	1.00	2272.70	OK	OK	
30	G2	2270.89	2270.89	Roll	2270.51	0.58	2271.67	2272.39	2271.9	1.00	2272.90	OK	OK	
31	G1	2271.09	2271.09	Roll	2270.71	0.83	2272.37	2272.59	2272.1	1.00	2273.10	OK	OK	
32	G1	2271.29	2271.29	Roll	2270.91	0.83	2272.57	2272.79	2272.3	1.00	2273.30	OK	OK	
33	G1	2271.49	2271.49	Roll	2271.11	0.83	2272.77	2272.99	2272.5	1.00	2273.50	OK	OK	
34	G1	2271.72	2271.72	Roll	2271.34	0.83	2273.00	2273.22	2272.7	1.00	2273.70	OK	OK	
35	G1	2272.18	2272.18	Roll	2271.80	0.83	2273.46	2273.68	2273.2	1.00	2274.20	OK	OK	
36	G1	2274.10	2274.10	Roll	2273.72	0.83	2275.38	2275.60	2274.6	1.80	2276.40	OK	OK	
37	G1	2275.11	2275.11	Roll	2274.73	0.83	2276.39	2276.61	2275.6	1.80	2277.40	OK	OK	
38	G1	2276.11	2276.11	Roll	2275.73	0.83	2277.39	2277.61	2276.6	1.80	2278.40	OK	OK	
39	G1	2277.13	2277.13	Roll	2276.75	0.83	2278.41	2278.63	2277.5	1.80	2279.30	OK	OK	

RANCHO & JONES														
FINISH FLOOR ANALYSIS (OVERALL)														
INPUT INFORMATION							FINISHED FLOORS							NOTES
Lot Number	Hydraulic Section Utilized	Centerline Elevation	T/C[1]	Mod Roll, Roll, or L Curb?	F/L[2]	D_{100}	Flowline FF min[3]	Centerline (of TC) FF min[4]	Pad	Section	FF Design	Flowline Check	Centerline Check	See References on Last Sheet
		(ft)	(ft)	Type	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
40	G1	2280.11	2280.11	Roll	2279.73	0.83	2281.39	2281.61	2280.6	1.80	2282.40	OK	OK	
41	G1	2281.01	2281.01	Roll	2280.63	0.83	2282.29	2282.51	2281.6	1.80	2283.40	OK	OK	
42	G1	2281.83	2281.83	Roll	2281.45	0.83	2283.11	2283.33	2282.4	1.80	2284.20	OK	OK	
43	G1	2282.47	2282.47	Roll	2282.09	0.83	2283.75	2283.97	2282.9	1.80	2284.70	OK	OK	
44	G1	2282.82	2282.82	Roll	2282.44	0.83	2284.10	2284.32	2282.9	1.80	2284.70	OK	OK	
45	G1	2280.02	2280.02	Roll	2279.64	0.83	2281.30	2281.52	2282.4	1.80	2284.20	OK	OK	
46	G1	2280.02	2280.02	Roll	2279.64	0.83	2281.30	2281.52	2280.4	1.80	2282.20	OK	OK	
47	G1	2279.02	2279.02	Roll	2278.64	0.83	2280.30	2280.52	2279.4	1.80	2281.20	OK	OK	
48	G1	2278.02	2278.02	Roll	2277.64	0.83	2279.30	2279.52	2278.4	1.80	2280.20	OK	OK	
49	G1	2277.02	2277.02	Roll	2276.64	0.83	2278.30	2278.52	2277.4	1.80	2279.20	OK	OK	
50	G1	2276.02	2276.02	Roll	2275.64	0.83	2277.30	2277.52	2276.4	1.80	2278.20	OK	OK	
51	G1	2273.36	2273.36	Roll	2272.98	0.83	2274.64	2274.86	2274.3	1.00	2275.30	OK	OK	
52	G1	2273.30	2273.30	Roll	2272.92	0.83	2274.58	2274.80	2274.4	1.00	2275.40	OK	OK	
53	J1	2273.32	2273.32	Roll	2272.94	0.89	2274.72	2274.82	2274.4	1.00	2275.40	OK	OK	
54	J1	2273.11	2273.11	Roll	2272.73	0.89	2274.51	2274.61	2274.1	1.00	2275.10	OK	OK	
55	J1	2272.99	2272.99	Roll	2272.61	0.89	2274.39	2274.49	2273.9	1.00	2274.90	OK	OK	
56	J1	2273.57	2273.57	Roll	2273.19	0.89	2274.97	2275.07	2274.5	1.00	2275.50	OK	OK	
57	J1	2273.99	2273.99	Roll	2273.61	0.89	2275.39	2275.49	2275.1	1.00	2276.10	OK	OK	
58	J1	2274.68	2274.68	Roll	2274.30	0.89	2276.08	2276.18	2275.9	1.00	2276.90	OK	OK	
59	J1	2272.10	2272.10	Roll	2271.72	0.89	2273.50	2273.60	2272.6	1.00	2273.60	OK	OK	
60	J1	2271.08	2271.08	Roll	2270.70	0.89	2272.48	2272.58	2272.1	1.00	2273.10	OK	OK	
61	J1	2270.64	2270.64	Roll	2270.26	0.89	2272.04	2272.14	2271.7	1.00	2272.70	OK	OK	
62	J1	2270.24	2270.24	Roll	2269.86	0.89	2271.64	2271.74	2271.2	1.00	2272.20	OK	OK	
63	J1	2269.84	2269.84	Roll	2269.46	0.89	2271.24	2271.34	2270.9	1.00	2271.90	OK	OK	
64	J1	2269.54	2269.54	Roll	2269.16	0.89	2270.94	2271.04	2270.6	1.00	2271.60	OK	OK	
65	J1	2269.24	2269.24	Roll	2268.86	0.89	2270.64	2270.74	2270.3	1.00	2271.30	OK	OK	
66	J1	2268.94	2268.94	Roll	2268.56	0.89	2270.34	2270.44	2270.0	1.00	2271.00	OK	OK	
67	J1	2268.64	2268.64	Roll	2268.26	0.89	2270.04	2270.14	2269.7	1.00	2270.70	OK	OK	
68	J1	2268.34	2268.34	Roll	2267.96	0.89	2269.74	2269.84	2269.4	1.00	2270.40	OK	OK	
69	J1	2268.04	2268.04	Roll	2267.66	0.89	2269.44	2269.54	2269.1	1.00	2270.10	OK	OK	
70	J1	2267.74	2267.74	Roll	2267.36	0.89	2269.14	2269.24	2268.8	1.00	2269.80	OK	OK	
71	J1	2267.44	2267.44	Roll	2267.06	0.89	2268.84	2268.94	2268.5	1.00	2269.50	OK	OK	
72	J1	2267.12	2267.12	Roll	2266.74	0.89	2268.52	2268.62	2268.1	1.00	2269.10	OK	OK	
73	J1	2266.83	2266.83	Roll	2266.45	0.89	2268.23	2268.33	2267.9	1.00	2268.90	OK	OK	
74	J1	2266.62	2266.62	Roll	2266.24	0.89	2268.02	2268.12	2267.9	1.00	2268.90	OK	OK	
75	J1	2266.41	2266.41	Roll	2266.03	0.89	2267.81	2267.91	2267.4	1.00	2268.40	OK	OK	
76	J1	2266.12	2266.12	Roll	2265.74	0.89	2267.52	2267.62	2267.0	1.00	2268.00	OK	OK	
77	J1	2265.70	2265.70	Roll	2265.32	0.89	2267.10	2267.20	2266.7	1.00	2267.70	OK	OK	
78	J1	2265.40	2265.40	Roll	2265.02	0.89	2266.80	2266.90	2266.5	1.00	2267.50	OK	OK	

RANCHO & JONES														
FINISH FLOOR ANALYSIS (OVERALL)														
INPUT INFORMATION							FINISHED FLOORS							NOTES
Lot Number	Hydraulic Section Utilized	Centerline Elevation	T/C[1]	Mod Roll, Roll, or L Curb?	F/L[2]	D_{100}	Flowline FF min[3]	Centerline (of TC) FF min[4]	Pad	Section	FF Design	Flowline Check	Centerline Check	See References on Last Sheet
		(ft)	(ft)	Type	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
79	J1	2265.15	2265.15	Roll	2264.77	0.89	2266.55	2266.65	2266.2	1.00	2267.20	OK	OK	
80	J1	2264.91	2264.91	Roll	2264.53	0.89	2266.31	2266.41	2266.0	1.00	2267.00	OK	OK	
81	J1	2264.66	2264.66	Roll	2264.28	0.89	2266.06	2266.16	2265.7	1.00	2266.70	OK	OK	
82	J1	2264.42	2264.42	Roll	2264.04	0.89	2265.82	2265.92	2265.5	1.00	2266.50	OK	OK	
83	J2	2264.17	2264.17	Roll	2263.79	0.58	2264.95	2265.67	2265.1	1.00	2266.10	OK	OK	
84	J2	2263.65	2263.65	Roll	2263.27	0.58	2264.43	2265.15	2264.7	1.00	2265.70	OK	OK	
85	J2	2263.88	2263.88	Roll	2263.50	0.58	2264.66	2265.38	2265.0	1.00	2266.00	OK	OK	
86	J2	2264.11	2264.11	Roll	2263.73	0.58	2264.89	2265.61	2265.2	1.00	2266.20	OK	OK	
87	J2	2264.33	2264.33	Roll	2263.95	0.58	2265.11	2265.83	2265.4	1.00	2266.40	OK	OK	
88	J2	2264.55	2264.55	Roll	2264.17	0.58	2265.33	2266.05	2265.6	1.00	2266.60	OK	OK	
89	J2	2264.78	2264.78	Roll	2264.40	0.58	2265.56	2266.28	2265.8	1.00	2266.80	OK	OK	
90	J2	2265.00	2265.00	Roll	2264.62	0.58	2265.78	2266.50	2266.1	1.00	2267.10	OK	OK	
91	J2	2265.23	2265.23	Roll	2264.85	0.58	2266.01	2266.73	2266.3	1.00	2267.30	OK	OK	
92	J2	2265.44	2265.44	Roll	2265.06	0.58	2266.22	2266.94	2266.5	1.00	2267.50	OK	OK	
93	J2	2265.58	2265.58	Roll	2265.20	0.58	2266.36	2267.08	2266.7	1.00	2267.70	OK	OK	
94	J2	2265.72	2265.72	Roll	2265.34	0.58	2266.50	2267.22	2266.9	1.00	2267.90	OK	OK	
95	J2	2265.90	2265.90	Roll	2265.52	0.58	2266.68	2267.40	2267.1	1.00	2268.10	OK	OK	
96	J2	2266.12	2266.12	Roll	2265.74	0.58	2266.90	2267.62	2267.3	1.00	2268.30	OK	OK	
97	J2	2266.35	2266.35	Roll	2265.97	0.58	2267.13	2267.85	2267.5	1.00	2268.50	OK	OK	
98	J2	2266.70	2266.70	Roll	2266.32	0.58	2267.48	2268.20	2267.7	1.00	2268.70	OK	OK	
99	G4	2267.50	2267.50	Roll	2267.12	0.68	2268.48	2269.00	2268.7	1.00	2269.70	OK	OK	
100	G4	2267.70	2267.70	Roll	2267.32	0.68	2268.68	2269.20	2268.8	1.00	2269.80	OK	OK	
101	G4	2267.90	2267.90	Roll	2267.52	0.68	2268.88	2269.40	2269.0	1.00	2270.00	OK	OK	
102	G4	2268.10	2268.10	Roll	2267.72	0.68	2269.08	2269.60	2269.2	1.00	2270.20	OK	OK	
103	J2	2266.10	2266.10	Roll	2265.72	0.58	2266.88	2267.60	2267.2	1.00	2268.20	OK	OK	
104	J2	2265.87	2265.87	Roll	2265.49	0.58	2266.65	2267.37	2266.9	1.00	2267.90	OK	OK	
105	E	2265.81	2265.81	Roll	2265.43	0.69	2266.81	2267.31	2266.8	1.00	2267.80	OK	OK	
106	E	2266.21	2266.21	Roll	2265.83	0.69	2267.21	2267.71	2267.2	1.00	2268.20	OK	OK	
107	E	2266.61	2266.61	Roll	2266.23	0.69	2267.61	2268.11	2267.6	1.00	2268.60	OK	OK	
108	E	2267.01	2267.01	Roll	2266.63	0.69	2268.01	2268.51	2268.0	1.00	2269.00	OK	OK	
109	E	2267.28	2267.28	Roll	2266.90	0.69	2268.28	2268.78	2268.3	1.00	2269.30	OK	OK	
110	G3	2268.78	2268.78	Roll	2268.40	0.51	2269.42	2270.28	2269.9	1.00	2270.90	OK	OK	
111	G3	2269.01	2269.01	Roll	2268.63	0.51	2269.65	2270.51	2270.1	1.00	2271.10	OK	OK	
112	G3	2269.23	2269.23	Roll	2268.85	0.51	2269.87	2270.73	2270.3	1.00	2271.30	OK	OK	
113	G3	2269.45	2269.45	Roll	2269.07	0.51	2270.09	2270.95	2270.5	1.00	2271.50	OK	OK	
114	G3	2269.67	2269.67	Roll	2269.29	0.51	2270.31	2271.17	2270.7	1.00	2271.70	OK	OK	
115	G3	2269.88	2269.88	Roll	2269.50	0.51	2270.52	2271.38	2270.9	1.00	2271.90	OK	OK	
116	D	2266.81	2266.81	Roll	2266.43	0.48	2267.39	2268.31	2268.1	1.00	2269.10	OK	OK	
117	D	2266.81	2266.81	Roll	2266.43	0.48	2267.39	2268.31	2267.8	1.00	2268.80	OK	OK	

RANCHO & JONES														
FINISH FLOOR ANALYSIS (OVERALL)														
INPUT INFORMATION							FINISHED FLOORS							NOTES
Lot Number	Hydraulic Section Utilized	Centerline Elevation (ft)	T/C[1] (ft)	Mod Roll, Roll, or L Curb? Type	F/L[2] (ft)	D_{100} (ft)	Flowline FF min[3] (ft)	Centerline (of TC) FF min[4] (ft)	Pad (ft)	Section (ft)	FF Design (ft)	Flowline Check (ft)	Centerline Check (ft)	See References on Last Sheet (ft)
118	D	2266.33	2266.33	Roll	2265.95	0.48	2266.91	2267.83	2267.3	1.00	2268.30	OK	OK	
119	D	2265.84	2265.84	Roll	2265.46	0.48	2266.42	2267.34	2266.8	1.00	2267.80	OK	OK	
120	D	2265.36	2265.36	Roll	2264.98	0.48	2265.94	2266.86	2266.3	1.00	2267.30	OK	OK	
121	D	2264.87	2264.87	Roll	2264.49	0.48	2265.45	2266.37	2265.8	1.00	2266.80	OK	OK	
122	D	2264.41	2264.41	Roll	2264.03	0.48	2264.99	2265.91	2265.5	1.00	2266.50	OK	OK	
123	D	2264.66	2264.66	Roll	2264.28	0.48	2265.24	2266.16	2265.6	1.00	2266.60	OK	OK	
124	D	2265.14	2265.14	Roll	2264.76	0.48	2265.72	2266.64	2266.1	1.00	2267.10	OK	OK	
125	D	2265.63	2265.63	Roll	2265.25	0.48	2266.21	2267.13	2266.6	1.00	2267.60	OK	OK	
126	D	2266.11	2266.11	Roll	2265.73	0.48	2266.69	2267.61	2267.1	1.00	2268.10	OK	OK	
127	D	2266.59	2266.59	Roll	2266.21	0.48	2267.17	2268.09	2267.6	1.00	2268.60	OK	OK	
128	D	2267.08	2267.08	Roll	2266.70	0.48	2267.66	2268.58	2268.0	1.00	2269.00	OK	OK	
129	D	2267.56	2267.56	Roll	2267.18	0.48	2268.14	2269.06	2268.5	1.00	2269.50	OK	OK	
130	D	2268.05	2268.05	Roll	2267.67	0.48	2268.63	2269.55	2269.0	1.00	2270.00	OK	OK	
131	D	2268.49	2268.49	Roll	2268.11	0.48	2269.07	2269.99	2269.5	1.00	2270.50	OK	OK	
132	G2	2270.26	2270.26	Roll	2269.88	0.58	2271.04	2271.76	2271.3	1.00	2272.30	OK	OK	
133	G2	2270.45	2270.45	Roll	2270.07	0.58	2271.23	2271.95	2271.6	1.00	2272.60	OK	OK	
134	G2	2270.61	2270.61	Roll	2270.23	0.58	2271.39	2272.11	2271.8	1.00	2272.80	OK	OK	
135	C	2268.87	2268.87	Roll	2268.49	0.72	2269.93	2270.37	2269.9	1.00	2270.90	OK	OK	
136	C	2267.90	2267.90	Roll	2267.52	0.72	2268.96	2269.40	2268.4	1.00	2269.40	OK	OK	
137	C	2267.13	2267.13	Roll	2266.75	0.72	2268.19	2268.63	2268.1	1.00	2269.10	OK	OK	
138	C	2266.83	2266.83	Roll	2266.45	0.72	2267.89	2268.33	2267.8	1.00	2268.80	OK	OK	
139	C	2266.54	2266.54	Roll	2266.16	0.72	2267.60	2268.04	2267.5	1.00	2268.50	OK	OK	
140	C	2266.25	2266.25	Roll	2265.87	0.72	2267.31	2267.75	2267.2	1.00	2268.20	OK	OK	
141	C	2265.96	2265.96	Roll	2265.58	0.72	2267.02	2267.46	2266.9	1.00	2267.90	OK	OK	
142	C	2265.67	2265.67	Roll	2265.29	0.72	2266.73	2267.17	2266.7	1.00	2267.70	OK	OK	
143	C	2265.38	2265.38	Roll	2265.00	0.72	2266.44	2266.88	2266.4	1.00	2267.40	OK	OK	
144	C	2265.07	2265.07	Roll	2264.69	0.72	2266.13	2266.57	2266.1	1.00	2267.10	OK	OK	
145	C	2265.20	2265.20	Roll	2264.82	0.72	2266.26	2266.70	2266.3	1.00	2267.30	OK	OK	
146	C	2265.49	2265.49	Roll	2265.11	0.72	2266.55	2266.99	2266.5	1.00	2267.50	OK	OK	
147	C	2265.78	2265.78	Roll	2265.40	0.72	2266.84	2267.28	2266.8	1.00	2267.80	OK	OK	
148	C	2266.08	2266.08	Roll	2265.70	0.72	2267.14	2267.58	2267.0	1.00	2268.00	OK	OK	
149	C	2266.37	2266.37	Roll	2265.99	0.72	2267.43	2267.87	2267.3	1.00	2268.30	OK	OK	
150	C	2266.66	2266.66	Roll	2266.28	0.72	2267.72	2268.16	2267.6	1.00	2268.60	OK	OK	
151	C	2266.95	2266.95	Roll	2266.57	0.72	2268.01	2268.45	2267.9	1.00	2268.90	OK	OK	
152	C	2267.24	2267.24	Roll	2266.86	0.72	2268.30	2268.74	2268.2	1.00	2269.20	OK	OK	
153	C	2267.44	2267.44	Roll	2267.06	0.72	2268.50	2268.94	2268.6	1.00	2269.60	OK	OK	
154	C	2267.63	2267.63	Roll	2267.25	0.72	2268.69	2269.13	2268.7	1.00	2269.70	OK	OK	
155	C	2267.90	2267.90	Roll	2267.52	0.72	2268.96	2269.40	2268.9	1.00	2269.90	OK	OK	
156	C	2268.46	2268.46	Roll	2268.08	0.72	2269.52	2269.96	2269.4	1.00	2270.40	OK	OK	

RANCHO & JONES														
FINISH FLOOR ANALYSIS (OVERALL)														
INPUT INFORMATION							FINISHED FLOORS							NOTES
Lot Number	Hydraulic Section Utilized	Centerline Elevation (ft)	T/C[1] (ft)	Mod Roll, Roll, or L Curb? Type	F/L[2] (ft)	D_{100} (ft)	Flowline FF min[3] (ft)	Centerline (of TC) FF min[4] (ft)	Pad (ft)	Section (ft)	FF Design (ft)	Flowline Check (ft)	Centerline Check (ft)	See References on Last Sheet (ft)
157	C	2269.02	2269.02	Roll	2268.64	0.72	2270.08	2270.52	2270.0	1.00	2271.00	OK	OK	
158	C	2269.59	2269.59	Roll	2269.21	0.72	2270.65	2271.09	2270.6	1.00	2271.60	OK	OK	
159	C	2270.19	2270.19	Roll	2269.81	0.72	2271.25	2271.69	2271.0	1.00	2272.00	OK	OK	
160	G1	2272.70	2272.70	Roll	2272.32	0.83	2273.98	2274.20	2273.8	1.00	2274.80	OK	OK	
161	G1	2273.16	2273.16	Roll	2272.78	0.83	2274.44	2274.66	2274.1	1.00	2275.10	OK	OK	
162	J1	2273.32	2273.32	Roll	2272.94	0.89	2274.72	2274.82	2274.6	1.00	2275.60	OK	OK	
163	J1	2273.21	2273.21	Roll	2272.83	0.89	2274.61	2274.71	2274.2	1.00	2275.20	OK	OK	
164	J1	2272.64	2272.64	Roll	2272.26	0.89	2274.04	2274.14	2273.4	1.00	2274.40	OK	OK	
165	J1	2271.74	2271.74	Roll	2271.36	0.89	2273.14	2273.24	2272.7	1.00	2273.70	OK	OK	
166	J1	2270.22	2270.22	Roll	2269.84	0.89	2271.62	2271.72	2271.3	1.00	2272.30	OK	OK	
167	J1	2269.92	2269.92	Roll	2269.54	0.89	2271.32	2271.42	2271.0	1.00	2272.00	OK	OK	
168	J1	2269.62	2269.62	Roll	2269.24	0.89	2271.02	2271.12	2270.7	1.00	2271.70	OK	OK	
169	J1	2269.32	2269.32	Roll	2268.94	0.89	2270.72	2270.82	2270.4	1.00	2271.40	OK	OK	
170	J1	2269.02	2269.02	Roll	2268.64	0.89	2270.42	2270.52	2270.1	1.00	2271.10	OK	OK	
171	J1	2268.72	2268.72	Roll	2268.34	0.89	2270.12	2270.22	2269.8	1.00	2270.80	OK	OK	
172	J1	2268.42	2268.42	Roll	2268.04	0.89	2269.82	2269.92	2269.5	1.00	2270.50	OK	OK	
173	J1	2268.12	2268.12	Roll	2267.74	0.89	2269.52	2269.62	2269.2	1.00	2270.20	OK	OK	
174	J1	2267.82	2267.82	Roll	2267.44	0.89	2269.22	2269.32	2268.9	1.00	2269.90	OK	OK	
175	J1	2267.52	2267.52	Roll	2267.14	0.89	2268.92	2269.02	2268.6	1.00	2269.60	OK	OK	
176	J1	2267.22	2267.22	Roll	2266.84	0.89	2268.62	2268.72	2268.3	1.00	2269.30	OK	OK	

Where

1: Top of Curb at High Side of Lot

2: Flowline = TC - 0.38 feet (for Mod Roll)

3: Minimum Allowable Finished Floor Elevation above flowline @ high side of lot = $(2 \times D_{100}) + F/L$

4: Minimum Allowable Finished Floor Elevation above centerline (or TC whicher is higher) elevation = Centerline elevation (or Center TC) + 1.5 feet

REFERENCES

Master Study for Craig and Rancho



CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: October 27, 2016
TO: **Land Development Services** Department of Building & Safety				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: **Craig & Rancho Master Drainage Study**			**COPIES TO:** Lochsa Engineering
Cross Streets:	SEC of Craig Road & Rancho Drive			Pre Rancho Craig LLC
File Number:	F:\Depot\DSMemos\DS4824B.doc			Bart Anderson, P.E., DevCo
Parcel Number:	138-02-713-002			CCRFCD
Zoning Action:	N/A			NDOT
FEMA Flood Zone	YES	NO	**X**	
Proposed Storm Drain	YES	NO	**X**	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	9/7/2016	9/27/2016	Not Approved	$400.00	457513: $400
2nd Submittal	10/17/2016	10/27/2016	See Comments Below	$400.00	461974: $400
			TOTAL FEES (LDDRS):	**$800.00**	**----**

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

1. The final approval of this master study is for conceptual drainage pattern only. No onsite improvements are being proposed with this master drainage study. No detail site plan had been submitted for site specific drainage analysis. Technical drainage study/studies will be required upon future site specific developments and when final site plans become available.

2. **This drainage study is acceptable in concept**; however, *City of Las Vegas* will not formally accept the study until the *Clark County Regional Flood Control District* (CCRFCD) has issued a letter of concurrence. The engineer should contact the CCRFCD to confirm that they have begun their review.

3. The project proposes to construct facilities and/or increase flows within *Nevada Department of Transportation* (NDOT) right-of-way. The engineer must contact NDOT for encroachment permit for the proposed project.

4. **Sheet C3.01**: Upsize the proposed 18"-lateral to 24"-diameter at the relocated drop inlet near Station 111+00 in *Craig Road*.

As shown in Figure E-12, the Northwest Neighborhood Study determined the flows continuing easterly at Rancho/Craig intersection into Craig Road to be 0/73cfs. As discussed previously, the more detailed and more current hydrologic and hydraulic analysis in Rancho/US95 LOMR determined no flows will continue easterly within Craig Road. However, as discussed in Reference 5, any flows continue easterly will be contained within Craig Road north half (with a flow capacity more than 324cfs). Thus, only local flows will be travelling along the south half of Craig Road along the project site.

Existing 6'x3'RCBCs across Rancho Drive

The LOMR study also provided the most current and detailed analysis for the flows through existing 6'x3'RCBCs across Rancho Drive. The existing RCBC crossing Rancho Drive at Station 21+64 is constructed within the existing UMC Quick Care Center, and will be referred to as the **Northern 6'x3' RCBC**. As shown in the attached copy of the approved plans for the "UMC Quick Care Center", the existing 6'x3' RCBC will divert (easterly) portion of the flows travelling southerly along the west side of Rancho Drive. Within the UMC, these Rancho Drive southerly flows are conveyed through an existing open channel within 90ft public drainage easement. As shown in referenced Exhibit C7R from the LOMR study, the HEC-RAS model along Rancho Drive determined the 100-year water surface elevation (WSE) near the entrance of the Northern 6'x3' RCBC to be 2278.18ft (at HEC-RAS Sta: 53+82).

As shown in the approved UMC Plans and the current topographic information for Rancho Drive, the upstream invert for the Northern 6'x3' RCB is approximately 2275.0ft. Thus, the

available 100-year headwater upstream the entrance of the 6'x3' RCB is approximately 3.0ft. The Rancho/US95 LOMR determined the 100-year flows diverted easterly through the 6'x3'RCB to be 78cfs, utilizing the available 100-year headwater and inlet control nomograph. Since the referenced nomogrph information from the Rancho/US95 LOMR was not available, Reference 5 provided the inlet control nomograph to confirm the diverted 78cfs through the Northern 6'x3' RCB.

The existing 6'x3' RCBC at Station 31+63 crosses Rancho Drive within the existing Pep Boys Auto Center, and will be referred to as **the Southern 6'x3' RCBC.** As shown in the attached copy of the approved plans for the "Rancho Town & Country Shopping Center", the existing 6'x3' RCBC will divert (easterly) portion of the flows travelling southerly along the west side of Rancho Drive. Within the Pep Boys development, these Rancho Drive southerly flows are conveyed through an existing 7' x 3' RCB storm drain. As shown in the attached relevant excerpts from the Rancho/US95 LOMR, the 100-year flows bypassing the existing Northern 6'x3' RCBC towards the existing 7'x3' RCB storm drain is determined to be approximately 121cfs. The Rancho/US95 LOMR determined the 100-year flows diverted easterly through the Southern 6'x3' RCBC to be 35cfs, utilizing the available 100-year headwater through the 7'x3' RCB and inlet control nomograph. Since the referenced nomogrph information from the Rancho/US95 LOMR was not available, Reference 5 provided inlet control nomograph to confirm the diverted 35cfs through the Southern 6'x3'RCBC. Reference 5 also provided a normal depth calculation for the 7'x3' RCB storm drain, to determine the available headwater the existing storm drain near the entrance of the Southern 6'x3' RCBC.

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   31AUG16  TIME  20:24:28   *
*                                       *
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*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
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X     X  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

            1       ID        CRAIG/RANCHO MASTER DRAINAGE STUDY
            2       ID        EXISTING CONDITION
            3       ID        USING SCS METHODS AND KINEMATIC WAVE ROUTING
            4       ID        MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION
            5       ID
            6       ID        LOCHSA JOB# 161051
            7       ID
            8       ID
            9       ID        INPUT FILE NAME:  XLOMR.DAT
           10       ID
           11       ID        AUGUST 2016
           12       ID
           13       ID        ************************************************************************
           14       ID        ************************************************************************
           15       ID             INSIDE McCARRAN AIRPORT RAINFALL AREA
           16       ID
           17       ID             10, 25 & 100 YEAR - 6 HOUR STORM EVENT
           18       ID             PRECIPITATION BASED ON FIGURES 503 AND 506 OF THE HCDDM
           19       ID
           20       ID
           21       ID             10-YEAR RAINFALL DEPTH  = 1.58 INCHES
           22       ID             25-YEAR RAINFALL DEPTH  = 2.05 INCHES
           23       ID             100-YEAR RAINFALL DEPTH = 2.77 INCHES
           24       ID
           25       ID             10-YEAR RAINFALL DEPTH RATIO (JR CARD) = 1.58/2.77 = 0.57
           26       ID             25-YEAR RAINFALL DEPTH RATIO (JR CARD) = 2.05/2.77 = 0.74
           27       ID        ************************************************************************
           28       ID
           29       ID
           30       ID   DARF RATIOS FOR AREAS OF 5.20 SQUARE MILES FOR
           31       ID   RANCHO AND JONES BLVD. FLOWS = 0.90
           32       ID
           33       ID             10-YEAR RAINFALL DEPTH RATIO (JR CARD) = (1.58/2.77) X 0.90 = 0.51
           34       ID             25-YEAR RAINFALL DEPTH RATIO (JR CARD) = (2.05/2.77) X 0.90 = 0.67
           35       ID
           36       ID
           37       ID        ************************************************************************
           38       ID
           39       ID        ************************************************************************
                    *
                    *        ******************** AUGUST 2016 ****************************
                    *
                    *                 ----------------------------------------
                    * (1) ***************** BGEGINNING OF REFERENCED HEC-1 MODEL ******************
                    *                 ----------------------------------------
                    *
                    *   ***************** FROM THE "RANCHO/US 95 LOMR **************
                    *        **************ISSUED ON NOVEMBER 30, 2009 ******************
                    *
                    *        ******************** AUSUST 2016 ****************************
                    *
                    *                   **************************
                    *              ********************************************
                    *DIAGRAM
```

*** FREE ***


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

           40       ID   RANCHO/US95 CLOMR
           41       ID   FOR:  CITY OF LAS VEGAS, NV AND THE CLARK COUNTY REGIONAL FLOOD CONTROL DISTR
           42       ID   THIS IS THE PROPOSED HEC1 MODEL FOR UPPER RANCHO DRIVE (NORTH OF GOWAN ROAD)
           43       ID    FILENAME:UPPRSDN3.DAT
           44       ID
           45       ID    CAM10 DETENTION BASIN AND THE WESTERN BELTWAY CHANNEL ARE INCLUDED IN THE EN
           46       ID    NOT IN THE SDN3 WATERSHED.
           47       ID
           48       ID
           49       ID   MODIFIED BY LBG SEPT 2005
           50       ID   SDN3 CREATED BY REDUCING THE SIZE OF CRAIG SUBBASIN TO 1.434 SQUARE MILES
           51       ID   ADD INTERIM BELTWAY AND GOWAN NORTH PHASE III
```

```
835          KK    C2B1
836          HC       2
             *
837          KK    R2B1
838          KM  ROUTE TO C2B3
839          RK     300   0.007   0.015       0    TRAP      80       2
             *
```



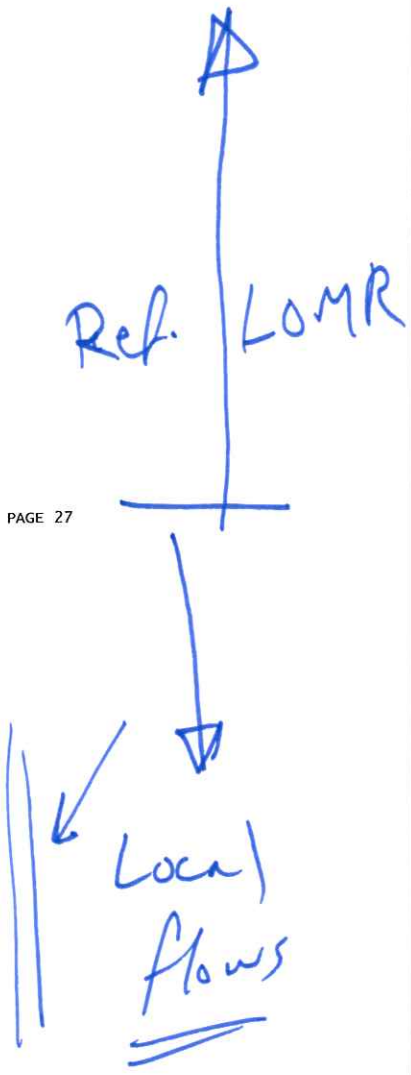
```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

840          KK   2C2B3
841          HC       2
             *
842          KK   RC2B3
843          KM  ROUTE TO 5REMAIN (UPPER RANCHO HECRAS STA 53+82)
844          RK    1600  0.0076    0.03       0    TRAP      80       2
             *
             *
             *      ***************** BEGINNING AUGUST 2016 REVISION ********************
             *
             * JUST SWITCHING 5REMAIN AND D5RCHO, SO THAT RUNOFF FROM THE RANCHO CULVERTS
             * (CULVERT 27 AND CULVERT 26) CAN BE ROUTED AND COMBINED WITH THE LOCAL
             * FLOWS WITHIN THE STUDY
             *
             *                  ***************************
             *            ********************************************
             *
845          KK  D5RCHO
846          KM   DIVERT FLOW EAST ACROSS RANCHO IN TWO 6' X 3' RCB's. THE FIRST RCB IS JUST
847          KM   UPSTREAM OF THE 7' X 3' RCB (CULVERT 27) THAT PARALLELS RANCHO ON THE WEST
848          KM   SIDE.  DIVERT 78 CFS OF 185 CFS TO THE FIRST 6' X 3' RCB (CULVERT 26). THE
849          KM   REMAINING 107 CFS ENTERS THE 7' X 3' RCB.  THE SECOND 6' X 3' RCB
850          KM   CULVERT 28) IS CONNECTED INTO THE SIDE OF THE 7' X 3' RCB. DIVERT 35 CFS OF
851          KM   THE 107 CFS TO THE SECOND 6' X 3' RCB.  THE REMAINING 72 CFS CONTINUES
852          KM   TO THE SOUTH SIDE OF ALEXANDER IN THE 7' X 3' RCB. UPPER RANCHO HECRAS
853          KM   HAS CULVERT 27 IN IT BETWEEN STA. 52+64 AND 38+36.
854          DT 5REMAIN
855          DI       0     113     155     197     308
856          DQ       0       0      42      84     195
             *
             *     ********************END AUSUST 2016 REVISION*****************************
             *
             *
             *        ********************* AUGUST 2016 *****************************
             *
             *                  ----------------------------------------
             * (1) ***************** END OF REFERENCED HEC-1 MODEL ******************* (1)
             *                  ----------------------------------------
             *
             *    ***************** FROM THE "RANCHO/US 95 LOMR **************
             *         **************ISSUED ON NOVEMBER 30, 2009 *******************
             *
             *        ********************* AUSUST 2016 *****************************
             *
             *                  ***************************
             *            ********************************************
             *
```



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

857          KK   RNCH1
858          KM   NORTHERN PORTION OF EXISTING RANCHO DRIVE ALONG THE PROJECT SITE
859          PB    2.77
860          BA  .00355
861          LS       0    98.0
862          UD    .125
             *
863          KK  RRNCH1
864          KM   ROUTE RUNOFF FROM RNCHO1 THROUGH NX1 TO JONES LOW POINT
865          RK    1660   0.013   0.035       0    TRAP      10       50
             *
866          KK     NX1
867          KM   EXISTING ONSITE BASIN NX1 DRAINING SOUTHEASTERLY TOWARD JONES BLVD LOW POINT
868          BA  .03484
869          LS       0    91.6
870          UD    .220
             *
871          KK    CMX1
872          KM   COMBINE RRNCH1 AND NX1
873          HC       2
             *
874          KK   RNCH2
875          KM   SOUTHERN PORTION OF EXISTING RANCHO DRIVE ALONG THE PROJECT SITE
876          BA  .00304
877          LS       0    98.0
878          UD    .137
             *
879          KK  RRNCH2
880          KM   ROUTE RUNOFF FROM RNCHO1 THROUGH NX2 TO JONES LOW POINT
881          RK     600   0.011   0.035       0    TRAP      10       50
             *
882          KK     NX2
883          KM   EXISTING ONSITE BASIN NX2 DRAINING EASTERLY AND SOUTHEASTERLY TOWARDS
884          KM   JONES BLVD LOW POINT
885          BA  .02198
886          LS       0    91.6
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887          UD    .155
             *

888          KK    CMX2
889          KM    COMBINE RRNCH2 AND NX2
890          HC       2
             *
             *
```



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

891          KK  JONES1
892          KM   WESTERN HALF OF JONES BOULEVARD DRAINING DIRECTLY TOWARDS EXISTING DROP INLET
893          KM   AT THE LAS VEGAS BOULEVARD LOW POINT
894          BA  .00344
895          LS       0    98.0
896          UD    .109
             *

897          KK  LOCL-X
898          KM   COMBINE CMX1, CMX2 AND JONES1
899          KM   LOCAL FLOWS DRAINING ONTO THE EXISTING DROP INLETS AT
900          KM   JONES BLVD. LOW POINT
901          HC       3
             *
             *

902          KK  TOTL-X
903          KM   COMBINE LOCL-X AND D5RCHO
904          KM   TOTAL FLOWS DRAINING ONTO THE EXISTING DROP INLETS AT
905          KM   JONES BLVD. LOW POINT
906          HC       2
             *

907          KKLOWPNT-X
908          KM   DIVERT FLOWS INTO EXISTING JONES BOULEVARD STORM DRAIN
909          KM   REMAINING FLOWS WILL CONTINUE EASTERLY INTO HICKAM AVENUE
910          DTJONES-SD
911          DI       0      79     100     200     300
912          DQ       0      79      79      79      79
             *

913          KK  JONES2
914          KM   EASTERN HALF OF JONES BOULEVARD TOWARDS HICKAM AVE. AT THE INTERSECTION
915          BA  .00319
916          LS       0    98.0
917          UD    .123
             *
             *

918          KKHICKAM-X
919          KM   COMBINE HICKAM-X AND JONES2
920          KM   TOTAL FLOWS CONTINUING INTO HICKAM AVENUE
921          KM   AT INTERSECTION WITH JONES BLVD. LOW POINT
922          HC       2
             *
             * KKR5REMN
             * KMROUTE TO CPT51 (UPPER RANCHO HECRAS STA 38+36)
             * RK1428     0.006    0.03       0   TRAP        7       0
             *
             * KKPT51
             * PB2.77
             * BA0.070
             * LS0          90.4
             * UD0.262
             *
             * KKCPT51
             * HC2
             *
             * KKD95Fa
             * KMRETRIEVE FLOW FROM WIER DIVERSION AT US95 AND ALEXANDER
             * DRD95Fa
             *
             * THESE TWO DIVERSIONS CARRY A TOTAL TRIBUTARY AREA OF 18.68.
             * THIS IS NOT IN ADDITION TO THE 1.49 SQUARE MILES AND 2.35
             * SQUARE MILES BROUGHT IN BY D95B AND D95E RESPECTIVELY, SO THE TOTAL
             * TRIBUTARY AREA AT THE ALEXANDER/RANCHO INTERSECTION IS 19.69 SQUARE MILES.
             * (18.68 + 1.01)
             *
             * KKDCSD2
             * KM RETRIEVE FLOWS CONVEYED THROUGH THE CRAIG ROAD STORM DRAIN
             * DRDCSD2
             *
             *
             * KKDCSD1
             * KM RETRIEVE FLOWS CONVEYED THROUGH THE CRAIG ROAD STORM DRAIN
             * DRDCSD1
             *
             * KK CRGSD
             * HC     2
             *
             *
             *
```



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

923          KK  CRAIG1
924          KM   WESTERN PORTION OF EXISTING SOUTH-HALF OF CRAIG ROAD ALONG THE PROJECT SITE
925          BA  .00237
926          LS       0    98.0
927          UD    .098
             *

928          KK RCRAIG1
929          KM   ROUTE RUNOFF FROM CRAIG1 TO INTERSECTION WITH JONES BLVD.
```

```
                                                                XLOMR
930          RK     700   0.020   0.015       0    TRAP       2      50
             *
931          KK     NX3
932          KM   EXISTING ONSITE BASIN NX3 DRAINING EASTERLY AND NORTHEASTERLY TOWARDS
933          KM   CRAIG ROAD
934          BA  .01801
935          LS       0    94.0
936          UD    .161
             *
             *
937          KK  CRAIG2
938          KM   EASTERN PORTION OF EXISTING SOUTH-HALF OF CRAIG ROAD ALONG THE PROJECT SITE
939          BA  .00148
940          LS       0    98.0
941          UD    .065
             *
             *
942          KK  CRG1-X
943          KM   COMBINE RCRAIG1, NX3 AMD CRAIG2
944          KM   TOTAL SURFACE FLOWS CONVEYED WITHIN CRAIG ROAD SOUTH HALF
945          KM   JUST UPSTREAM THE INTERSECTION WITH JONES BLVD.
946          HC       3
             *
947          KK     NX4
948          KM   EXISTING ONSITE BASIN NX4 DRAINING EASTERLY AND NORTHEASTERLY TOWARDS
949          KM   JONES BOULEVARD, NORTH OF THE HIGHPOINT
950          BA  .00366
951          LS       0    94.0
952          UD    .100
             *
             *
953          KK  JONES3
954          KM   WESTERN HALF OF JONES BOULEVARD, NORTH OF THE HIGHPOINT
955          KM   DRAINING NORTHERLY TOWARDS CRIAG ROAD
956          BA  .00111
957          LS       0    98.0
958          UD    .087
             *
             *
1                                        HEC-1 INPUT                                    PAGE 30

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

959          KK   JON-X
960          KM   COMBINE NX4 AND JONES3
961          KM   TOTAL NORTHERLY FLOWS WITHIN WEST HALF OF JONES BOULEVARD
962          KM   AT INTERSECTION WITH CRAIG ROAD
963          HC       2
             *
             *
964          KK  CRG2-X
965          KM   COMBINE CRG1-X AND JON-X
966          KM   TOTAL FLOWS CONVEYED WITHIN CRAIG ROAD SOUTH HALF,
967          KM   AT THE INTERSECTION WITH JONES BLVD.
968          HC       2
             *
             *
969          KK    NDA^
970          KM   REFERENCED ONSITE BASIN NDA FOR THE PORTION OF THE MURPHY EXPRESS DRAINING IN
971          KM   EXISTING CRAIG ROAD STORM DRAIN, AS REFERENCED FROM
972          KM   "TDS FOR MURPHY EXPRESS (CRAIG RD & JONES BLVD.)", DS 4771
973          BA  .00153
974          LS       0    98.0
975          UD    .050
             *
976          ZZ
```

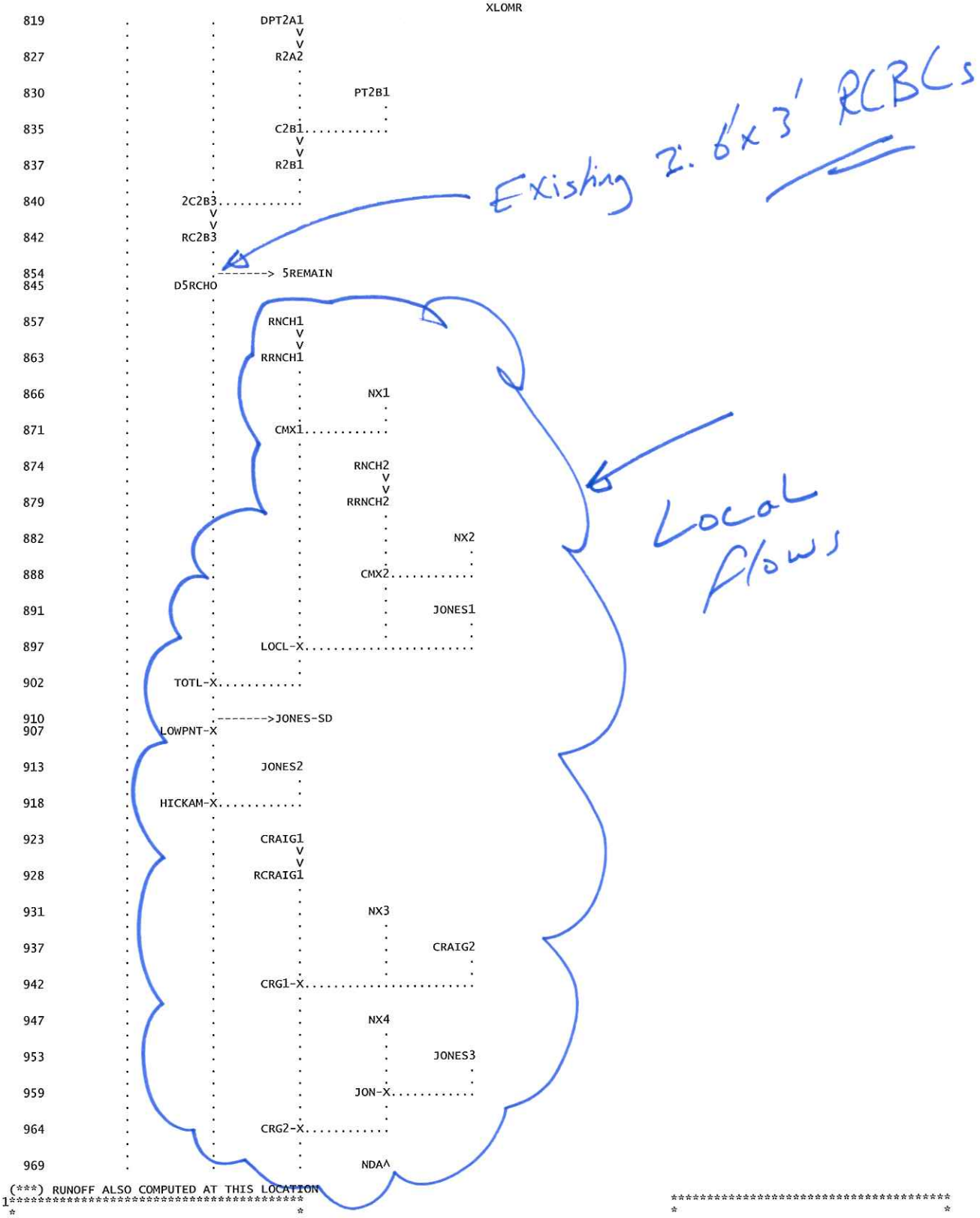
|| ← Ref. 5

```
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

 68          ANN
               V
               V
 81          RANN
               .
               .
 84            .       GD29B
               .           .
               .           .
 89       CGD29B............
               V
               V
 91       RGD29B
               .
               .
 94            .       ANN1B
               .           .
               .           .
 99       CANN1B............
               V
               V
101       RANN1B
               .
               .
104            .      ANN1C2
               .           .
               .           .
109      CANN1C2............
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********

* *
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* *
* RUN DATE 31AUG16 TIME 20:24:28 *
* *

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* *
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
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*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .74	RATIO 3 .57	RATIO 4 .90	RATIO 5 .67	RATIO 6 .51
HYDROGRAPH AT										
+	ANN	.26	1	FLOW	123.	62.	30.	99.	48.	21.
				TIME	4.00	4.00	4.08	4.00	4.00	4.08
ROUTED TO										
+	RANN	.26	1	FLOW	122.	62.	30.	98.	48.	20.
				TIME	4.08	4.08	4.17	4.08	4.08	4.17
HYDROGRAPH AT										
+	GD29B	.14	1	FLOW	69.	32.	14.	54.	24.	9.
				TIME	3.75	3.83	3.83	3.75	3.83	3.92
2 COMBINED AT										
+	CGD29B	.40	1	FLOW	174.	85.	39.	137.	64.	27.
				TIME	3.92	4.00	4.08	3.92	4.00	4.17
ROUTED TO										
+	RGD29B	.40	1	FLOW	173.	84.	39.	137.	64.	26.
				TIME	4.00	4.08	4.17	4.00	4.08	4.25
HYDROGRAPH AT										
+	ANN1B	.14	1	FLOW	108.	62.	35.	90.	51.	27.
				TIME	3.75	3.75	3.75	3.75	3.75	3.83
2 COMBINED AT										
+	CANN1B	.53	1	FLOW	258.	128.	59.	206.	98.	40.
				TIME	3.92	3.92	4.08	3.92	4.00	4.17

DARF = 0.9

HYDROGRAPH AT	D2B3	.20	1	FLOW	128.	14.	1.	74.	1.	1.
+				TIME	3.83	3.83	3.83	3.83	3.83	3.83
HYDROGRAPH AT	PT2A2	.06	1	FLOW	63.	37.	22.	53.	31.	18.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO	R2A2	.06	1	FLOW	61.	37.	22.	51.	31.	17.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT	PT2A1	.06	1	FLOW	63.	39.	24.	53.	33.	19.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT	D95E	.00	1	FLOW	184.	83.	21.	148.	55.	14.
+				TIME	4.00	4.17	4.33	4.08	4.25	4.08
ROUTED TO	RD95E	.00	1	FLOW	184.	82.	21.	147.	55.	14.
+				TIME	4.08	4.25	4.42	4.17	4.25	4.17
3 COMBINED AT	C2A2	.13	1	FLOW	255.	113.	53.	202.	83.	41.
+				TIME	4.00	4.17	3.83	4.00	3.92	3.83
DIVERSION TO	DCSD1	.13	1	FLOW	90.	90.	52.	90.	82.	40.
+				TIME	3.58	3.75	3.83	3.58	3.92	3.83
HYDROGRAPH AT	DPT2A1	.13	1	FLOW	165.	23.	1.	112.	1.	1.
+				TIME	4.00	4.17	3.58	4.00	3.50	3.58
ROUTED TO	R2A2	.13	1	FLOW	164.	22.	1.	111.	1.	1.
+				TIME	4.00	4.25	4.17	4.08	4.00	4.17
HYDROGRAPH AT	PT2B1	.07	1	FLOW	72.	43.	26.	61.	36.	20.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT	C2B1	.20	1	FLOW	197.	43.	26.	133.	36.	20.
+				TIME	4.00	3.67	3.67	4.08	3.67	3.67
ROUTED TO	R2B1	.20	1	FLOW	197.	43.	25.	133.	35.	19.
+				TIME	4.00	3.67	3.67	4.08	3.67	3.67
2 COMBINED AT	2C2B3	.40	1	FLOW	312.	54.	26.	199.	36.	20.
+				TIME	3.92	3.75	3.67	3.92	3.67	3.67
ROUTED TO	RC2B3	.40	1	FLOW	308.	52.	25.	197.	35.	20.
+				TIME	3.92	3.83	3.83	4.00	3.83	3.83
DIVERSION TO	5REMAIN	.40	1	FLOW	195.	0.	0.	84.	0.	0.
+				TIME	3.92	.00	.00	4.00	.00	.00
HYDROGRAPH AT	D5RCHO	.40	1	FLOW	113.	52.	25.	113.	35.	20.
+				TIME	3.75	3.83	3.83	3.75	3.83	3.83
HYDROGRAPH AT	RNCH1	.00	1	FLOW	7.	5.	4.	6.	4.	3.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO	RRNCH1	.00	1	FLOW	7.	5.	4.	6.	4.	3.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT	NX1	.03	1	FLOW	46.	31.	21.	41.	27.	18.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT	CMX1	.04	1	FLOW	53.	36.	24.	46.	31.	20.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT	RNCH2	.00	1	FLOW	6.	4.	3.	5.	4.	3.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO	RRNCH2	.00	1	FLOW	5.	4.	3.	5.	4.	3.
+				TIME	3.58	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT	NX2	.02	1	FLOW	34.	23.	16.	30.	20.	13.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT	CMX2	.03	1	FLOW	39.	27.	19.	34.	23.	16.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	JONES1	.00	1	FLOW	7.	5.	4.	6.	4.	3.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT	LOCL-X	.07	1	FLOW	96.	65.	45.	84.	56.	37.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58

Ref. LOMR

59. miles + 4.79 miles from D95E ≃ 5.19 59. Miles

Local flows

XLOMB

2 COMBINED AT											
+	TOTL-X	.47	1	FLOW	203.	97.	61.	181.	81.	49.
				TIME	3.67	3.67	3.75	3.75	3.75	3.75
DIVERSION TO											
+	JONES-SD	.47	1	FLOW	79.	79.	61.	79.	79.	49.
				TIME	3.50	3.58	3.75	3.50	3.67	3.75
HYDROGRAPH AT											
+	LOWPNT-X	.47	1	FLOW	124.	18.	0.	102.	2.	0.
				TIME	3.67	3.67	.00	3.75	3.75	.00
HYDROGRAPH AT											
+	JONES2	.00	1	FLOW	6.	4.	3.	5.	4.	3.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	HICKAM-X	.47	1	FLOW	129.	22.	3.	105.	5.	3.
				TIME	3.67	3.67	3.58	3.75	3.67	3.58
HYDROGRAPH AT											
+	CRAIG1	.00	1	FLOW	5.	3.	3.	4.	3.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO											
+	RCRAIG1	.00	1	FLOW	4.	3.	2.	4.	3.	2.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	NX3	.02	1	FLOW	30.	21.	15.	26.	18.	13.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	CRAIG2	.00	1	FLOW	3.	2.	2.	3.	2.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT											
+	CRG1-X	.02	1	FLOW	36.	26.	18.	32.	23.	16.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	NX4	.00	1	FLOW	7.	5.	3.	6.	4.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	JONES3	.00	1	FLOW	2.	2.	1.	2.	2.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	JON-X	.00	1	FLOW	9.	6.	5.	8.	6.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	CRG2-X	.03	1	FLOW	44.	31.	23.	39.	28.	20.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	NDA^	.00	1	FLOW	4.	3.	2.	3.	2.	2.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= 1.00									
	RANN MANE	1.82	122.44	242.51	.96	5.00	121.58	245.00	.96
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1323E+02 EXCESS= .0000E+00 OUTFLOW= .1322E+02 BASIN STORAGE= .1053E-01 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .74									
	RANN MANE	2.49	61.90	246.24	.50	5.00	61.81	245.00	.50
CONTINUITY SUMMARY (AC-FT) - INFLOW= .6912E+01 EXCESS= .0000E+00 OUTFLOW= .6899E+01 BASIN STORAGE= .9157E-02 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .57									
	RANN MANE	3.17	29.76	249.97	.26	5.00	29.76	250.00	.26
CONTINUITY SUMMARY (AC-FT) - INFLOW= .3559E+01 EXCESS= .0000E+00 OUTFLOW= .3553E+01 BASIN STORAGE= .7950E-02 PERCENT ERROR= -.1									
FOR PLAN = 1 RATIO= .90									
	RANN MANE	2.03	98.09	244.58	.77	5.00	97.80	245.00	.77
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1066E+02 EXCESS= .0000E+00 OUTFLOW= .1065E+02 BASIN STORAGE= .9697E-02 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .67									
	RANN MANE	2.62	47.85	246.09	.39	5.00	47.53	245.00	.39
CONTINUITY SUMMARY (AC-FT) - INFLOW= .5440E+01 EXCESS= .0000E+00 OUTFLOW= .5432E+01 BASIN STORAGE= .1171E-01 PERCENT ERROR= -.1									
FOR PLAN = 1 RATIO= .51									
	RANN MANE	3.73	20.50	250.72	.19	5.00	20.41	250.00	.19
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2575E+01 EXCESS= .0000E+00 OUTFLOW= .2571E+01 BASIN STORAGE= .7596E-02 PERCENT ERROR= -.2									

HYDROGRAPH AT									
+	4REMAIN	.18	1	FLOW	229.	119.	74.	176.	100.	60.
				TIME	3.83	3.75	3.75	3.83	3.75	3.75
ROUTED TO										
+	R4MAIN	.18	1	FLOW	224.	118.	74.	175.	99.	60.
				TIME	3.83	3.83	3.83	3.92	3.83	3.83
HYDROGRAPH AT										
+	PT2B3	.02	1	FLOW	32.	22.	15.	28.	19.	13.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT										
+	C2B3	.20	1	FLOW	248.	134.	86.	194.	114.	70.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83
DIVERSION TO										
+	DCSD2	.20	1	FLOW	120.	120.	85.	120.	113.	69.
				TIME	3.58	3.75	3.83	3.58	3.83	3.83
HYDROGRAPH AT										
+	D2B3	.20	1	FLOW	128.	14.	1.	74.	1.	1.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83
HYDROGRAPH AT										
+	PT2A2	.06	1	FLOW	63.	37.	22.	53.	31.	18.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO										
+	R2A2	.06	1	FLOW	61.	37.	22.	51.	31.	17.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT										
+	PT2A1	.06	1	FLOW	63.	39.	24.	53.	33.	19.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT										
+	D95E	.00	1	FLOW	184.	83.	21.	148.	55.	14.
				TIME	4.00	4.17	4.33	4.08	4.25	4.08
ROUTED TO										
+	RD95E	.00	1	FLOW	184.	82.	21.	147.	55.	14.
				TIME	4.08	4.25	4.42	4.17	4.25	4.17
3 COMBINED AT										
+	C2A2	.13	1	FLOW	255.	113.	53.	202.	83.	41.
				TIME	4.00	4.17	3.83	4.00	3.92	3.83
DIVERSION TO										
+	DCSD1	.13	1	FLOW	90.	90.	52.	90.	82.	40.
				TIME	3.58	3.75	3.83	3.58	3.92	3.83
HYDROGRAPH AT										
+	DPT2A1	.13	1	FLOW	165.	23.	1.	112.	1.	1.
				TIME	4.00	4.17	3.58	4.00	3.50	3.58
ROUTED TO										
+	R2A2	.13	1	FLOW	164.	22.	1.	111.	1.	1.
				TIME	4.00	4.25	4.17	4.08	4.00	4.17
HYDROGRAPH AT										
+	PT2B1	.07	1	FLOW	72.	43.	26.	61.	36.	20.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT										
+	C2B1	.20	1	FLOW	197.	43.	26.	133.	36.	20.
				TIME	4.00	3.67	3.67	4.08	3.67	3.67
ROUTED TO										
+	R2B1	.20	1	FLOW	197.	43.	25.	133.	35.	19.
				TIME	4.00	3.67	3.67	4.08	3.67	3.67
2 COMBINED AT										
+	2C2B3	.40	1	FLOW	312.	54.	26.	199.	36.	20.
				TIME	3.92	3.75	3.67	3.92	3.67	3.67
ROUTED TO										
+	RC2B3	.40	1	FLOW	308.	52.	25.	197.	35.	20.
				TIME	3.92	3.83	3.83	4.00	3.83	3.83
DIVERSION TO										
+	5REMAIN	.40	1	FLOW	195.	0.	0.	84.	0.	0.
				TIME	3.92	.00	.00	4.00	.00	.00
HYDROGRAPH AT										
+	D5RCHO	.40	1	FLOW	113.	52.	25.	113.	35.	20.
				TIME	3.75	3.83	3.83	3.75	3.83	3.83
HYDROGRAPH AT										
+	RNCH1	.00	1	FLOW	7.	5.	4.	6.	4.	3.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO										
+	RRNCH1	.00	1	FLOW	7.	5.	4.	6.	4.	3.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT										
+	ND1	.04	1	FLOW	81.	60.	45.	73.	54.	40.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT										
+	CMD1	.05	1	FLOW	86.	63.	48.	77.	57.	42.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT										
+	RNCH2	.00	1	FLOW	6.	4.	3.	5.	4.	3.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58

DLOMR

ROUTED TO	RRNCH2	.00	1	FLOW	6.	4.	3.	5.	4.	3.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT	ND2	.02	1	FLOW	46.	34.	26.	41.	31.	23.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CMD2	.03	1	FLOW	51.	37.	28.	46.	34.	25.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	JONES1	.00	1	FLOW	7.	5.	4.	6.	4.	3.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT	LOCL-D	.07	1	FLOW	144.	105.	80.	129.	95.	71.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	TOTL-D	.47	1	FLOW	203.	116.	81.	175.	100.	71.
+				TIME	3.67	3.58	3.50	3.75	3.58	3.50
DIVERSION TO	JONES-SD	.47	1	FLOW	79.	79.	79.	79.	79.	71.
+				TIME	3.33	3.42	3.50	3.33	3.50	3.50
HYDROGRAPH AT	LOWPNT-D	.47	1	FLOW	124.	37.	2.	96.	21.	0.
+				TIME	3.67	3.58	3.50	3.75	3.58	.00
HYDROGRAPH AT	JONES2	.00	1	FLOW	6.	4.	3.	5.	4.	3.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT	HICKAM-D	.48	1	FLOW	128.	41.	5.	99.	24.	3.
+				TIME	3.67	3.58	3.50	3.75	3.58	3.58
HYDROGRAPH AT	CRAIG1	.00	1	FLOW	5.	3.	3.	4.	3.	2.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	ND3-1	.01	1	FLOW	17.	13.	10.	16.	11.	9.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CRG0-D	.01	1	FLOW	22.	16.	12.	20.	15.	11.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO	RCRG0-D	.01	1	FLOW	21.	15.	11.	19.	14.	10.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	CRAIG2	.00	1	FLOW	3.	2.	2.	3.	2.	2.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	ND3-2	.00	1	FLOW	8.	6.	5.	8.	6.	4.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT	CRG1-D	.02	1	FLOW	33.	24.	18.	29.	21.	16.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	ND4	.00	1	FLOW	8.	6.	4.	7.	5.	4.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	JONES3	.00	1	FLOW	2.	2.	1.	2.	2.	1.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	JON-D	.00	1	FLOW	10.	7.	6.	9.	7.	5.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT	CRG2-D	.02	1	FLOW	43.	31.	24.	38.	28.	21.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT	NDA^	.00	1	FLOW	4.	3.	2.	3.	2.	2.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50

1

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	INTERPOLATED TO COMPUTATION INTERVAL PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= 1.00									
	RANN MANE	1.82	122.44	242.51	.96	5.00	121.58	245.00	.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1323E+02 EXCESS= .0000E+00 OUTFLOW= .1322E+02 BASIN STORAGE= .1053E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .74									
	RANN MANE	2.49	61.90	246.24	.50	5.00	61.81	245.00	.50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6912E+01 EXCESS= .0000E+00 OUTFLOW= .6899E+01 BASIN STORAGE= .9157E-02 PERCENT ERROR= .0

* Includes referenced flows from the 2009 " Rancho/US 95 LOMR"

Peak Flow Summary
Existing Condition

HEC-1 I.D.	Area (acres)	100-year Flow (cfs)	25-year Flow (cfs)	10-year Flow (cfs)
2C2B3	-	199	36	20
RC2B3	-	197	35	20
5REMAIN	-	84	0	0
D5RCHO	-	113	35	20
RNCH1	2.27	7	5	4
RRNCH1	-	7	5	4
NX1	22.3	46	31	21
CMX1	-	53	36	24
RNCH2	1.94	6	4	3
RRNCH2	-	5	4	3
NX2	14.07	34	23	16
CMX2	-	39	27	19
JONES1	2.2	7	5	4
LOCL-X	-	96	65	45
TOTL-X	-	181	81	49
JONES-SD	-	79	79	49
LOWPNT-X	-	102	2	0
JONES2	2.04	6	4	3
HICKAM-X	-	105	5	3
CRAIG1	1.52	5	3	3
RCRAIG1	-	4	3	2
NX3	11.52	30	21	15
CRAIG2	0.95	3	2	2
CRG1-X	-	36	26	18
NX4	2.35	7	5	3
JONES3	0.71	2	2	1
JON-X	-	9	6	5
CRG2-X	-	44	31	23
NDA^	0.98	4	3	2

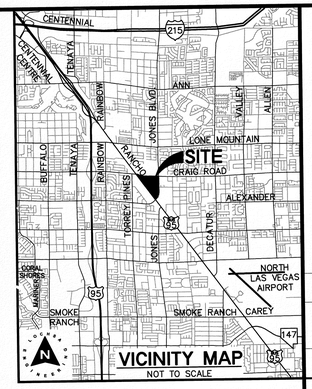
Street Flow Summary
(Existing Condition)
10-year, 6-hour Storm

Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	10-Year Flow [Q10] (cfs)	10-year Velocity [v] (fps)	10-year Flow Depth [d] (ft)	10-year Velocity x Depth [v x d]	Dry Lane Width (Within 1/2 ROW) (ft)
Rancho Drive	120	AA	4	2.39	0.37	0.88	40.74
Rancho Drive	120	BB	7	1.77	0.41	0.73	23.88
Craig Road	100	CC	1.5	1.85	0.31	0.57	32.88
Craig Road	100	DD	18	4.70	0.47	2.21	18.18
Jones Boulevard	100	EE	38	3.18	0.79	2.51	5.11

Street Flow Summary
(Existing Condition)
100-year, 6-hour Storm

Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	100-Year Flow [Q10] (cfs)	100-year Velocity [v] (fps)	100-year Flow Depth [d] (ft)	100-year Velocity x Depth [v x d]
Rancho Drive	120	AA	7	2.73	0.43	1.17
Rancho Drive	120	BB	13	2.05	0.47	0.96
Craig Road	100	CC	2.5	2.08	0.35	0.73
Craig Road	100	DD	36	5.25	0.58	3.05
Jones Boulevard	100	EE	73	3.91	0.96	3.75

CRAIG ROAD (PUBLIC)
<1/<1/<1cfs
South Half
CRAIG1
1.52 ACRES
3/3/5CFS
CRAIG2
0.95 ACRES
2/2/3CFS
CRG1-X
18/26/36cfs*
South Half
CRG2-X
23/31/44cfs
South Half
CC
DD
NDA
0.98 ACRES
2/3/4CFS
NX3
11.52 ACRES
15/21/30CFS
NX4
2.35 ACRES
3/5/7CFS
JON-X
5/6/8CFS
JONES3
0.71 ACRES
1/2/2CFS
JONES BLVD.
HIGH POINT
RANCHO DRIVE (PUBLIC)
NX1
22.30 ACRES
21/31/46CFS
RNCH1
2.27 ACRES
4/6/7CFS
24/36/53CFS
CMX1
JONES-SD
49/79/79CFS*
JONES BOULEVARD (PUBLIC)
EX. 6'x3' RCB
(Q100 = 78* CFS)
AS REFERENCED FROM
"RANCHO/US 95 LOMR"
AA
LOCL-X
45/65/96CFS
1/2/102CFS*
3/5/105CFS*
HICKAM-X*
49/81/181CFS*
TOTL-X*
LOWPNT-X*
EE
MATCHLINE - SEE BOTTOM RIGHT
BB
EX. 6'x3' RCB
(Q100 = 35* CFS)
AS REFERENCED FROM
"RANCHO/US 95 LOMR"
EX. 3'x7' RCB
RNCH2
1.94 ACRES
3/4/6CFS
19/27/39CFS
CMX2
JONES1
2.20 ACRES
JONES2
2.04 ACRES
NX2
14.07 ACRES
16/23/34CFS
4/5/7CFS
3/4/6CFS
MATCHLINE - SEE BOTTOM LEFT
EX. 6'x3' RCB
(Q100 = 35* CFS)
AS REFERENCED FROM



GRAPHIC SCALE
100 0 50 100 200
(IN FEET)
1 inch = 100 ft.

DRAINAGE LEGEND

ND1	DRAINAGE BASIN LABEL
•	CONCENTRATION POINT
CMD1	COMBINATION POINT
▬▬	BASIN BOUNDARY LINE
- - - -	OFFSITE BASIN BOUNDARY
2 / 3 / 5	Q10/Q25/Q100 FLOW IN CFS
1 (1.0)(1.2) / 1 (1.0)(1.2)	Q10 (V10)(D10) / Q100 (V100)(D100)
→	BASIN FLOW DIRECTION
→	COMBINED FLOW DIRECTION
1D	HYDRAULIC CROSS-SECTION
2 / 3	[Q10]N / [Q100]N STORM DRAIN FLOWS IN CFS

LEGEND

CL OR SURVEY LINE	EASEMENT LINE	DESCRIPTION:	CONTOUR LINES	EDGE OF PAVEMENT	"A" TYPE CURBS	"L" TYPE CURBS	WALLS	FENCES	AC PAVEMENT	CONCRETE	SPOT ELEVATIONS	SIGNS	MANHOLE W/ DESCRIPTION	MANHOLE DESCRIPTIONS	FIRE HYDRANTS	GATE VALVES	REDUCERS	CLEAN OUTS	UTILITY BOX OR VAULT	BACKWATER VALVES	100w HPS STREETLIGHTS	150w HPS STREETLIGHTS	200w HPS STREETLIGHTS	250w HPS STREETLIGHTS
PROPERTY LINE	SAWCUT LINE	EXISTING:	(2210)								(12.34) BC 12.34 BC		(S)	(S) = SANITARY SEWER						BWV				
ROW LINE	SCARP LINE	PROPOSED:	2122										(D)	(D) = STORM DRAIN (E) = ELECTRICAL (T) = TELEPHONE						BWV				

Lochsa engineering
6345 South Jones Blvd
Suite 100
Las Vegas, NV 89118
Phone (702) 365-6312
Fax (702) 365-9317
www.lochsa.com

ONSITE BASIN MAP
(EXISTING CONDITION)

CRAIG & RANCHO
MASTER DRAINAGE STUDY

PROJECT No.:	161051
DATE:	08/26/16
SCALE:	1"=100'
DRAWN BY:	HMN
DESIGNED BY:	HMN
CHECKED BY:	HMN

SHEET No.
DR1
SHEET 1 2
CLV No.

REV.: DATE: BY: DESCRIPTION:

9/1/2016, 10:38 AM
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* Includes referenced flows from the " Rancho/US 95 LOMR"

Peak Flow Summary
Future Condition

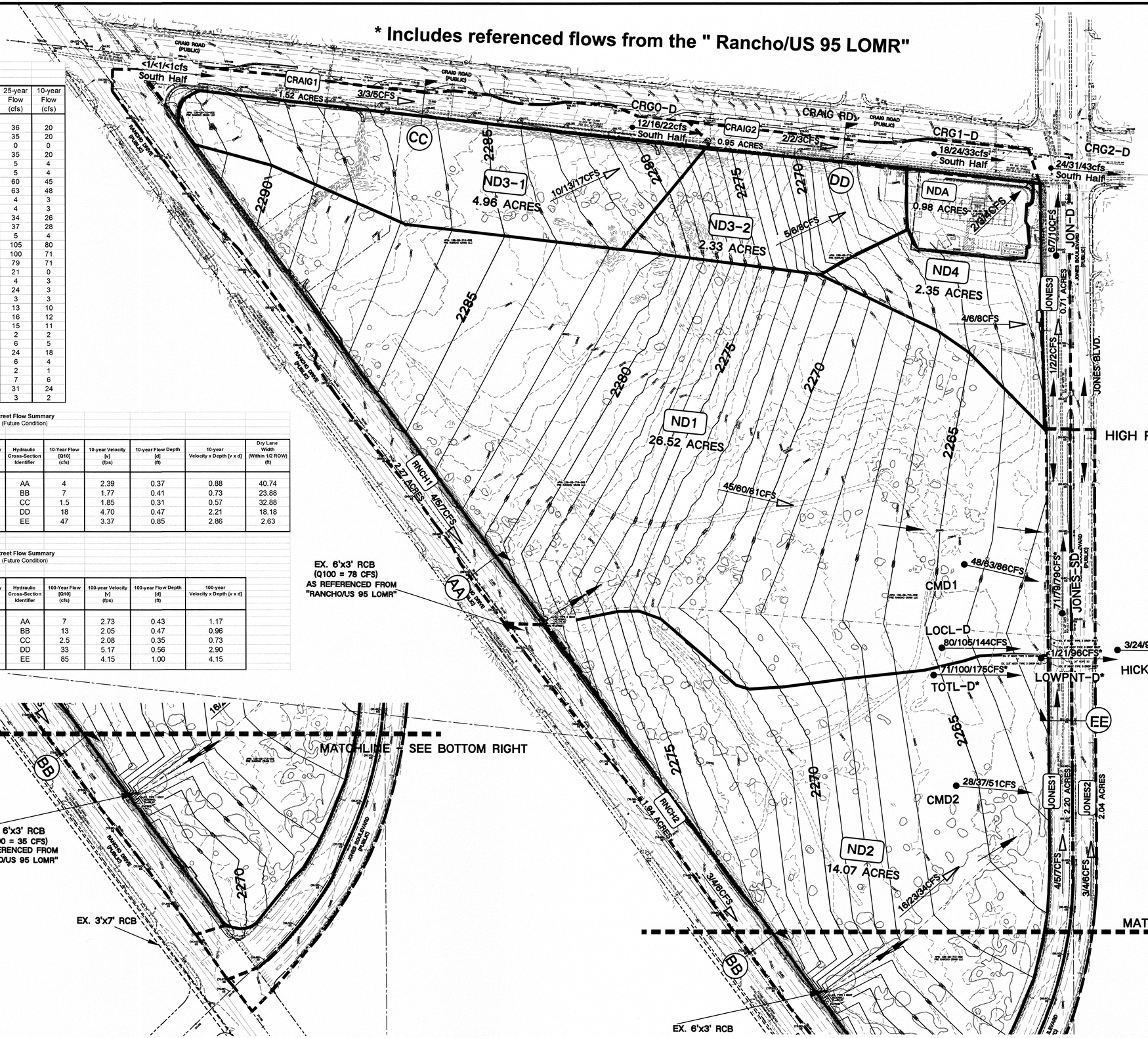
HEC-1 I.D.	Area (acres)	100-year Flow (cfs)	25-year Flow (cfs)	10-year Flow (cfs)
2C2B3	-	199	36	20
RC2B3	-	197	35	20
5REMAIN	-	84	0	0
D5RCHO	-	113	35	20
RNCH1	2.27	7	5	4
RRNCH1	-	7	5	4
ND1	26.52	81	60	45
CMD1	-	86	63	48
RNCH2	1.94	6	4	3
RRNCH2	-	5	4	3
ND2	14.07	46	34	26
CMD2	-	51	37	28
JONES1	2.2	7	5	4
LOCL-D	-	144	105	80
TOTL-D	-	175	100	71
JONES-SD	-	79	79	71
LOWPNT-D	-	96	21	0
JONES2	2.04	6	4	3
HICKAM-D	-	99	24	3
CRAIG1	1.52	5	3	3
ND3-1	4.96	17	13	10
CRG0-D	-	22	16	12
RCRG0-D	-	21	15	11
CRAIG2	0.95	3	2	2
ND3-2	2.33	8	6	5
CRG1-D	-	33	24	18
ND4	2.35	8	6	4
JONES3	0.71	2	2	1
JON-D	-	10	7	6
CRG2-D	-	43	31	24
NDA^	0.98	4	3	2

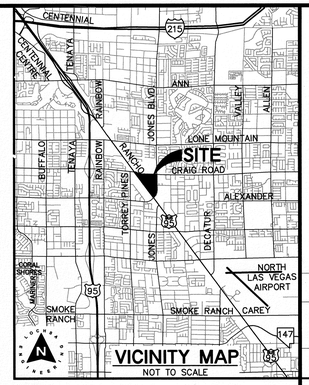
Street Flow Summary
(Future Condition)
10-year, 6-hour Storm

Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	10-Year Flow [Q10] (cfs)	10-year Velocity [v] (fps)	10-year Flow Depth [d] (ft)	10-year Velocity x Depth [v x d]	Dry Lane Width (Within 1/2 ROW) (ft)
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Rancho Drive	120	BB	7	1.77	0.41	0.73	23.88
Craig Road	100	CC	1.5	1.85	0.31	0.57	32.88
Craig Road	100	DD	18	4.70	0.47	2.21	18.18
Jones Boulevard	100	EE	47	3.37	0.85	2.86	2.63

Street Flow Summary
(Future Condition)
100-year, 6-hour Storm

Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	100-Year Flow [Q10] (cfs)	100-year Velocity [v] (fps)	100-year Flow Depth [d] (ft)	100-year Velocity x Depth [v x d]
Rancho Drive	120	AA	7	2.73	0.43	1.17
Rancho Drive	120	BB	13	2.05	0.47	0.96
Craig Road	100	CC	2.5	2.08	0.35	0.73
Craig Road	100	DD	33	5.17	0.56	2.90
Jones Boulevard	100	EE	85	4.15	1.00	4.15





GRAPHIC SCALE
100 0 50 100 200
(IN FEET)
1 Inch = 100 ft.

DRAINAGE LEGEND

ND1	DRAINAGE BASIN LABEL
•	CONCENTRATION POINT
CMD1	COMBINATION POINT
	BASIN BOUNDARY LINE
	OFFSITE BASIN BOUNDARY
2 / 3 / 5	Q10/Q25/Q100 FLOW IN CFS
1 (1.0)(1.2) / 1 (1.0)(1.2)	Q10 (V10)(D10) / Q100 (V100)(D100)
	BASIN FLOW DIRECTION
	COMBINED FLOW DIRECTION
1D	HYDRAULIC CROSS-SECTION
2 / 3	[Q10]N / [Q100]N STORM DRAIN FLOWS IN CFS

LEGEND

CL OR SURVEY LINE	EASEMENT LINE	DESCRIPTION:	CONTOUR LINES	EDGE OF PAVEMENT	"A" TYPE CURBS	"L" TYPE CURBS	WALLS	FENCES	AC PAVEMENT	CONCRETE	SPOT ELEVATIONS	SIGNS	MANHOLE W/ DESCRIPTION	MANHOLE DESCRIPTIONS (S) = SANITARY SEWER (D) = STORM DRAIN (E) = ELECTRICAL (T) = TELEPHONE	FIRE HYDRANTS	GATE VALVES	REDUCERS	CLEAN OUTS	UTILITY BOX OR VAULT	BACKWATER VALVES	100yr HPS STREETLIGHTS	150w HPS STREETLIGHTS	200w HPS STREETLIGHTS	250w HPS STREETLIGHTS
PROPERTY LINE	SAWCUT LINE	EXISTING:	(2210)								(12.34) BC		S							BWV				
ROW LINE	SCARP LINE	PROPOSED:	2122								12.34 BC		S							BWV				

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Fax (702) 365-9317
www.lochsa.com

ONSITE BASIN MAP
(FUTURE CONDITON)

CRAIG & RANCHO
MASTER DRAINAGE STUDY

SHEET	TITLE
PROJECT No.:	161051
DATE:	08/26/16
SCALE:	1"=100'
DRAWN BY:	HMN
DESIGNED BY:	HMN
CHECKED BY:	HMN
SHEET No.	DR2
SHEET	2 2
CLV No.	--

DESCRIPTION: | BY: | DATE: | REV.:

9/1/2016 10:30 AM
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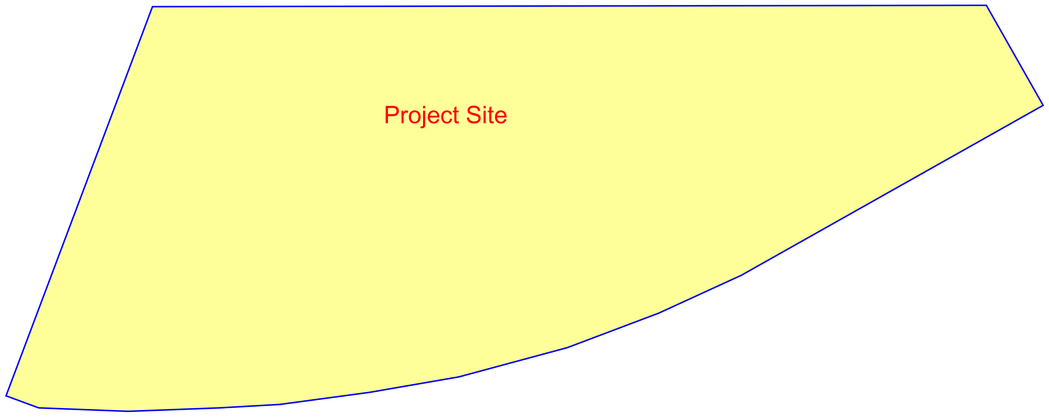
REFERENCES

Jones Boulevard Improvement Plans




Starting HGL: 2250 ft


Project Site


Project Site

MATCHLINE SEE SHEET C6

NORTH TORREY PINES DR

LAZY J RANCH ESTATES

JORY TRAIL

BIG SKY RANCH ESTATES

DESERT PINES CONDOMINIUMS

ALEXANDER RD

NORTH JONES BLVD

RANCHO DR

R2C2B3

R5A1

5REMAIN

5REMN

D5RCHO

CULVERT #26

CULVERT #27

CULVERT #28

CPT52

CPT51

RPT52

2271.27 BFE

STA 60+12.00
2286.79

STA 58+08.00
2283.80

STA 55+18.00
2282.44

STA 53+82.00
2278.18

STA 52+64.00
2275.89

78*
90*

400*
1256

458*
1281

84*
1*

35*
41*

Project Site

LIMIT OF STUDY

MATCHLINE SEE SHEET C8

NOTE:
CONTOUR INTERVAL = 2 FEET.
ALL ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988.

NOTE:
BUILDING FOOTPRINT AND PARCEL DATA SHOWN WAS OBTAINED FROM CLARK COUNTY GIS COVERAGE. THESE DATA ARE APPROXIMATE AND PROVIDED FOR INFORMATION ONLY.

0 100 200 400
SCALE: (IN FEET)

CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

RANCHO/US 95 LOMR
FLOODPLAIN DELINEATION

THE Louis Berger Group, INC.
500 E. Amigo Court, Suite 100 Volce: 702-736-6632
Las Vegas, Nevada 89119 Fax: 702-736-0704

LEGEND

- PROPOSED FLOOD ZONE AE
- EFFECTIVE FLOOD ZONE A OR FLOOD ZONE AE
- EFFECTIVE FLOOD ZONE X (SHADED)
- PROPOSED FLOOD ZONE X (SHADED)
- EXISTING CULVERT
- STA 0+00.00 / 2323.22 — HEC-RAS CROSS-SECTION MARKER, STATION AND 100-YEAR BFE
- STA 0+00.00 / WSPG — WSPG STATION MARKER
- 1037 / 1037* — PROPOSED SDN5 / PROPOSED SDN3
- 1037 / 1037* — 100-YEAR FLOW INDICATOR
- 1037 / 1037* — EFFECTIVE US95 FISR SDN5 / EFFECTIVE US95 FISR SDN3
- (1037) — EFFECTIVE NLV FIS
- (FF=24.24) — FINISH FLOOR ELEVATION
- 20.8 — AERIAL TOPOGRAPHY SPOT ELEVATION AND MARKER
- 2250 — 2 FOOT CONTOUR LINES
- HEC-1 NODE
- LIMITS OF RANCHO/US 95 LOMR STUDY

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

KEY MAP
NTS

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

Drafted by: ARB/FKR	Scale: AS NOTED	Job Number: CB881
Checked by: FKR	File Name: 881-C7.DWG	Sheet Number: C7R
Date: 07/10/09		

REFERENCES

Grading and Drainage Easements to adjacent Parcel

Inst #: 20181018-0001672
Fees: $40.00
10/18/2018 01:46:47 PM
Receipt #: 3541737
Requestor:
FIRST AMERICAN TITLE NCS LA
Recorded By: CDE Pgs: 15
DEBBIE CONWAY
CLARK COUNTY RECORDER
Src: ERECORD
Ofc: ERECORD

APN: 138-02-713-008
NCS-892917 (ad)
When recorded return to:

JEN Nevada 2 LLC, a Nevada limited liability company
Attn: Michael Jesberger
2222 West Pinnacle Peak Road
Suite 140
Phoenix, Arizona 85027

ACCESS EASEMENT AGREEMENT

This Access Easement Agreement ("**Easement Agreement**") is entered into as of this 18 day of October, 2018 by PRE RANCHO CRAIG, LLC, a Nevada limited liability company, together with its successors and assigns (collectively, "**Grantor**"), in favor and for the benefit of JEN NEVADA 2 LLC, a Nevada limited liability company, together with its successors and assigns (collectively, the "**Grantee**").

RECITALS

A. Grantor is the owner of that certain real property located in the City of Las Vegas, Clark County, Nevada (the "**City**") known as Assessor Parcel Number 138-02-713-008 ("**Burdened Property**").

B. Grantor and Beazer Homes Holdings, LLC, a Nevada limited liability company ("**Builder**"), entered into that certain Real Estate Purchase and Sale Agreement dated February 21, 2018, as amended from time to time ("**Purchase Agreement**"), wherein the Grantor agreed to sell, and Builder agreed to purchase, a parcel adjacent to the Burdened Property known as Assessor Parcel Number 138-02-713-007 ("**Benefited Property**").

C. Pursuant to Purchase Agreement, Builder and Grantor identified the need for various easements in order for Builder to develop the Benefited Property, including, but not limited to, the easements identified herein.

D. Pursuant to a separate agreement, Builder and Grantee have entered into a land banking transaction whereby Grantee shall acquire Builder's rights, title and interested in the Benefited Property under the Purchase Agreement which include rights to the easements contemplated herein (the "**Option Agreement**").

E. In order for Builder to develop the Benefited Property, upon the consummation of the transaction contemplated by the Purchase Agreement, the Builder and Grantor have coordinated with the City regarding the City's requirements for development of the Benefited Property. The City has required that the Burdened Property grant a perpetual irrevocable access easement across a portion of the Burdened Property in favor of the Benefited Parcel. Such

access easement will require the realignment of drainage across the easement area and the installation of various improvements including, but not limited to, a shared entrance for entry upon the Burdened Parcel and Benefited Parcel and landscaping and irrigation within the easement area, collectively, the "**Shared Entrance**", in a manner generally depicted on **Exhibit A** attached herein. Grantor desires to allow Grantee and Builder the ability to access the Burdened Property for such construction upon the Burdened Property for the mutual benefit of the Grantor, Grantee and Builder, in the location as depicted and described on **Exhibit B** attached hereto (the "**Shared Entrance Easement Area**") and to maintain and operate such Shared Entrance and easement area.

F. The Shared Entrance and grading across the Easement Area, once completed by the Builder, will be mutually beneficial for Grantor, Grantee and Builder. All Parties hereto agree to reasonably cooperate in connection with the other party's efforts to obtain the necessary approvals of such plans and specifications for construction and grading across the Easement Area, which cooperation shall include, but shall not be limited to, executing any necessary or appropriate applications, documents or instruments as may be required by the City and/or any other applicable governmental authority having jurisdiction over the Easement Area (each a "**Governing Authority**" and collectively, the "**Governing Authorities**")

G. The Grantor and Grantee acknowledge and agree that the Grantee's rights and obligations contemplated herein will, at a later date, be transferred to the Builder, or its assignee, pursuant to the Option Agreement. For purposes of this Agreement the term **"Benefited Property Owner"**) means the Grantee, and following the transfer to the Builder, will automatically include the Builder, together with their successors and assigns (including, without limitation, any homeowners association formed with respect to the Benefited Property (or any portion thereof) and to which any of the rights and easements of the Benefited Property Owner hereunder have been assigned and/or any duties and obligations of Benefited Property Owner hereunder have been delegated pursuant to a separate written instrument in accordance with the applicable provisions of Section 13 hereof).

AGREEMENT

NOW, THEREFORE, for good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, the parties agree as follows:

1. Incorporation. The recitals set forth above are incorporated into and made a part of this Easement Agreement.

2. Grant of Temporary Construction Easement. Grantor hereby grants to the Benefited Property Owner the following non-exclusive, temporary construction easement (the "**Construction Easements**"). Grantor agrees that the rights granted by the Construction Easements includes the right of the Benefited Property Owner to authorize any and all employees, agents, engineers, design consultants, contractors and suppliers engaged by the Benefited Property Owner (collectively the "Construction Personnel") to enter upon and utilize the Easement Areas described herein for purposes of performing the work authorized by the granted Construction Easements.

(a) **Shared Entrance Construction Easement**. Benefited Property Owner is hereby granted the right and easement in, over, under, upon and across the Easement Area and the fifty (50) feet of real property located immediately contiguous to and running immediately adjacent to the exterior boundary lines of the Shared Entrance Easement Area (collectively, the "**Construction Easement Area**"), for the purpose of the design, construction and installation of the Shared Entrance and related facilities and purposes incidental thereto.

(b) **Drainage Construction Easement**. Benefited property Owner is hereby granted the right and easement in, over, under, upon and across the Shared Entrance Easement Area for the purpose of the alteration and re-alignment of the natural grading and drainage upon and across the land within the Construction Easement Area to manage the drainage flow across the Burdened Property and the Benefited Property, in order to allowing for Builder's intended development and operation of the Benefited Property and the Grantor's intended development of the Burdened Property. For purposes of this Agreement, the Construction Easement Area and the Shared Entrance Easement Area are each referred to herein as the "**Easement Area**" or collectively as the "**Easement Areas**".

3. Grant of Permanent Easements. Subject to the terms of this Agreement, Grantor hereby grants to the Benefited Property Owner, together with its successors and assigns, which shall specifically include any owners of lots or other interests within the Benefited Property (collectively "**Lot Owners**") together with any Construction Personnel and any tenants, family members, residents, guests or other invitees of the Lot Owners a perpetual, irrevocable, non-exclusive right and easement in and to all portions of the Shared Access Easement Area and any all improvements now or hereafter located therein for (a) pedestrian and vehicular access over and across the Shared Entrance and for the maintenance, repair, replacement, and use of all improvements comprising the Shared Entrance (the "**Access Easement**"), and (b) maintenance, repair and replacement of any and all grading and drainage work performed in connection with the Drainage Construction Easement above to provide for the continuing flow of drainage across the Burdened Property and the Benefited Property, in order to allowing for Builder's intended development and operation of the Benefited Property and the Grantor's intended development and operation of the Burdened Property (the "**Drainage Maintenance Easement**" and, together with the Access Easement, the "**Permanent Easements**") .

4. Use of Easement Areas by Grantor. Upon completion of any work by or on behalf of the Benefited Property Owner within an Easement Area, Benefited Property Owner, shall operate, maintain, and repair the Easement Area and any improvement or structures therein in good operational order and in a manner free of any obstructions that may impede or otherwise limit the flow of vehicular and pedestrian traffic and drainage across the Easement Area. Grantor reserves to itself and its successors and assigns (including any owners of lots or their contractors, tenants, guests or other invitees), the right to utilize the Easement Areas, provided that none of the uses unreasonably interferes with the exercise of Benefited Property Owner's rights hereunder. Notwithstanding the foregoing, Grantor shall have the right to alter, improve and repair curb cuts or other improvements within the Easement Areas which operate for the benefit of the Burdened Property.

5. Self-Help Rights. In the event that the acts of Grantor creates any obstructions that impede or limit the flow of vehicular and pedestrian traffic or water across the Easement Areas (other than temporary obstructions needed for repairs of curb cuts or other improvements), Benefited Owner shall have the right, after providing Grantor not less than thirty (30) days prior written notice and opportunity to cure, to take corrective action, at Grantor's sole cost and expense, to repair or remove any such obstruction. Grantor shall promptly remit any amounts expended by Benefited Property Owner in exercising such rights within thirty (30) days of receipt of notice of such costs.

6. Term of Easements. The term of Permanent Easements granted under Section 3 above, together with the self-help rights related thereto under Section 5 above, shall commence upon the date of recordation of this Easement Agreement in the official records of Clark County, Nevada, and shall be perpetual to allow for controlled vehicular and pedestrian access and drainage across the Burdened Property and upon the Benefited Property. The term of the Construction Easements granted under Section 2 above shall commence upon the date of recordation of this Easement Agreement in the official records of Clark County, Nevada and shall terminate automatically upon the completion of the installation of the Shared Entrance and acceptance thereof for operation by the City or other applicable Governing Authorities. Prior to termination of the Construction Easement, the Benefited Property Owner shall repair any damage to the Burdened Property caused by the construction of the shared Entrance and shall return the Construction Easement Area to a substantially similar condition as the same existed prior to any such construction except for the existing of the shared Entrance and drainage improvements.

7. Performance of the Work/ Indemnification. Benefited Property Owner agrees that all work performed hereunder shall be subject to the terms and conditions set forth in that certain Development and Maintenance Agreement by and between Grantor and Benefited Property Owner, dated as of the date hereof and recorded with the Official Records of the Clark County all work or activities performed by or on behalf of Benefited Property Owner in any Easement Area shall be performed in a good and safe workmanlike manner and in compliance with all applicable laws, codes, permits and regulations. Benefited Property Owner shall indemnify and hold Grantor harmless from and against any and all liabilities, damages, expenses, liens, causes of action, suits, claims or judgments (including reasonable attorneys' fees) arising from (i) the acts or omissions of Benefited Property Owner on the Burdened Property, (ii) the exercise of any of its rights under this Agreement, or (iii) any default or breach by Benefited Property Owner under this Agreement.

8. Coordination. Benefited Property Owner shall provide Grantor with not less than ten (10) business days' written notice prior to commencing any work in the Easement Area. To the extent the Burdened Property is occupied or improved, Benefited Property Owner will coordinate its work activities so as not to disturb the occupancy of the Burdened Property or to damage the improvements thereon, and neither Grantor nor its agents, contractors, subcontractors, engineers or employees shall unreasonably interfere with Benefited Property Owner in connection with the performance of the work.

9. Insurance. As a condition to entry upon the Easement Area or performance of any work therein, Benefited Property Owner shall take out and keep in force, at its sole cost and expense (i) comprehensive public liability insurance, written on an occurrence basis including contractual liability coverage to cover any contractual indemnifications provided under this Agreement and insuring against all claims for injury or damage to any person to the economic interest of Grantor, injury or death of persons, damage to property on or about the Burdened Property, the limit of such public liability coverage being not less than $2,000,000 for each occurrence Benefited Property Owner shall cause Grantor to be named as additional insured on such insurance and shall provide reasonable evidence thereof to Grantor upon request. Notwithstanding anything to the contrary contained herein, so long as the Benefited Property Owner (including, without limitation, any homeowners' association formed with respect to the Benefited Property (or any portion thereof)) is maintaining the insurance required under this Section 9, this section shall not be deemed to impose an obligation on any individual Lot Owner to maintain the insurance required hereunder.

10. No Public Dedication. Nothing contained in this Easement Agreement shall be deemed to be a gift or dedication of any portion of the Easement Area to or for the general public or for any public purpose whatsoever, and this Easement Agreement shall be strictly limited to and for the purposes expressed herein. However, the Parties acknowledge that portions of the Burdened Property may be required to be dedicated at later date by the City or other Governing Authorities.

11. Relocation and Amendment to Drainage Flow. The parties acknowledge and agree that the Easement Areas may only be relocated by written agreement between the parties hereto or their successors. Any amendment to the intended flow of vehicular or pedestrian traffic or drainage across the Easement Areas by Grantor, or its successors, subsequent to the initial construction of the same by the Benefited Property Owner or its assignee, shall be in accordance with a traffic study and drainage study approved by any relevant Governing Authorities and a grading permit issued by such Governing Authority.

12. Covenants Running With Land. All provisions of this Easement Agreement shall run with the land and shall be binding upon and inure to the benefit of Grantor and Benefited Property Owner and their respective successors and assigns. The dominant estate shall be the Benefited Property and the servient estate shall be those portions of Burdened Property identified as the Easement Area.

13. Assignability. Successor owners of the Benefited Property shall have the benefit of this Easement. In addition, the rights and easements granted hereunder to the Benefited Property Owner may be exercised by tenants, residents, family members, agents, affiliates, guests and invitees of other persons claiming an interest in the Benefited Property through the Benefited Property Owner or any successor owner of the Benefited Property, provided that all such persons will be subject to enforcement of the terms of this Agreement against them. Notwithstanding anything to the contrary contained in this Easement Agreement, the Benefited Property Owner shall have the right to assign all or any portion of its rights and easements hereunder, and to delegate all or any portion of its obligations hereunder (including, without limitation, any of its maintenance, indemnity and/or insurance obligations hereunder), to a

homeowners' association formed with respect to the Benefited Property (or any portion thereof) pursuant to a separate written instrument.

14. Cooperation. Each of the parties hereto (including, without limitation, Grantor) agrees to execute and acknowledge (as applicable) any applications, maps, easements or other similar instruments reasonably required by the City or any other applicable Governing Authority in connection with the City's or other Governing Authorities' approval of any maps, plans or other entitlements with respect to the Benefited Property or Burdened Property.

15. Applicable Law. This Easement Agreement shall be construed and enforced in accordance with the laws of the State of Nevada, without giving effect to the principles of the conflicts of law.

16. Enforcement and Attorneys' Fees. Enforcement of this Agreement may be by proceedings at law or in equity against any person or persons violating or attempting or threatening to violate any covenant herein, either to restrain or prevent such violation or proposed violation by an injunction, either prohibitive or mandatory, or to obtain any other relief. In the event of any litigation, mediation or arbitration arising out of or related to enforcement of this Easement Agreement, the prevailing party shall be entitled to recover from the other party its costs and reasonable attorneys' fees, costs and professional fees incurred in connection with such action, including all trial, appellate, bankruptcy and post-judgment proceedings, from the non-prevailing party.

17. Severability. If any terms, provisions or covenants contained in this Easement Agreement shall be invalid or unenforceable, the remainder of this Easement Agreement shall not be affected thereby, and each term, provision and condition hereof shall be valid and enforceable to the fullest extent permitted by law.

18. Counterparts. This Easement Agreement may be executed in one or more counterparts, each of which shall be deemed to be an original and all of which together shall constitute one and the same agreement.

[SIGNATURES ON FOLLOWING PAGE]

IN WITNESS WHEREOF, the undersigned have executed this Easement Agreement as of the date first written above.

GRANTOR:

PRE RANCHO CRAIG, LLC,
a Nevada limited liability company

By: _____
Raymond M. Murphy

Its: Authorized Signer

STATE OF ~~NEVADA~~ Massachusetts)
) ss.
County of ~~Clark~~ Middlesex)

This instrument was acknowledged before me on October 17, 2018, by Raymond M. Murphy the Authorized Siger of the PRE Rancho Craig LLC, on behalf thereof.

_____
(Signature of Notarial Officer)
(My Commission Expires 4)
Expires April 23, 2021

[Signature pages continue]

JEAN M. O'BRIEN
Notary Public
Commonwealth of Massachusetts
My Commission Expires April 23, 2021

GRANTEE:

JEN NEVADA 2 LLC, a Nevada limited liability company

By: _____

Its: Authorized Signatory

Diann E. Curley

STATE OF ARIZONA)
) ss.
County of Maricopa)

This instrument was acknowledged before me on October 17th, 2018, by Diann E. Curley the Authorized Signatory of the limited liability company, on behalf thereof.

ADAM MATTSON
Notary Public - Arizona
Maricopa County
Commission # 545346
My Comm. Expires Jun 30, 2022

#545346

_____
(Signature of Notarial Officer)
(My Commission Expires 06/30/2022

Adam Mattson

[Signature pages continue]

BUILDER:

BEAZER HOMES HOLDINGS, LLC, a Delaware limited liability company

By: _____

Its: Steve Cervino
Division President
Beazer Homes-Las Vegas

STATE OF Nevada)
) ss.
County of Clark)

This instrument was acknowledged before me on October 17, 2018, by Steve Cervino the Division President of the Beazer Homes Holdings, LLC on behalf thereof.

_____
(Signature of Notarial Officer)
(My Commission Expires 4-23-22)

TAMMY R. BARNES
Notary Public State of Nevada
No. 01-67852-1
My Appt. Exp. April 23, 2022

Tammy R. Barnes

#01.67852.1

Exhibit A
Shared Entrance General Depiction of Shared Entrance

The Parties have agreed that the Seller shall grant a perpetual irrevocable access easement across the Seller's Parcel in favor of Grantee and its assignees (the "**Access Easement**") in the form attached hereto as **Exhibit A**. JEN may assign or delegate any portion of its rights or obligations pursuant to the Access Easement to the Buyer or a to-be formed homeowner's association established by the Buyer. The Parties have agreed that Grantee shall construct and maintain at its sole cost and expense a shared access road upon the Access Easement allowing access to the Property and the Seller's Parcel (the "**Shared Entrance**").

Grantee shall construct such improvements for the Shared Entrance including the curb cut, the paved roadway, entrance, related landscaping and irrigation, drive aisle, curb cuts into Sellers Parcel from the access road, and drainage improvements; additionally, outside of the Shared Entrance and Access Easement area, the Grantee shall also construct a right turn lane, deceleration lane, and taper along Rancho Drive. Seller shall grant to Grantees the permission to grade within twenty-five feet (25') of the right-of-way along Rancho Drive. The construction and maintenance of the Shared Entrance and all improvements related thereto whether within the Easement Area or offsite, shall be governed by and subject to the terms of a Development and Maintenance Agreement in the form attached hereto as **Exhibit B** (the "**Development Agreement**").

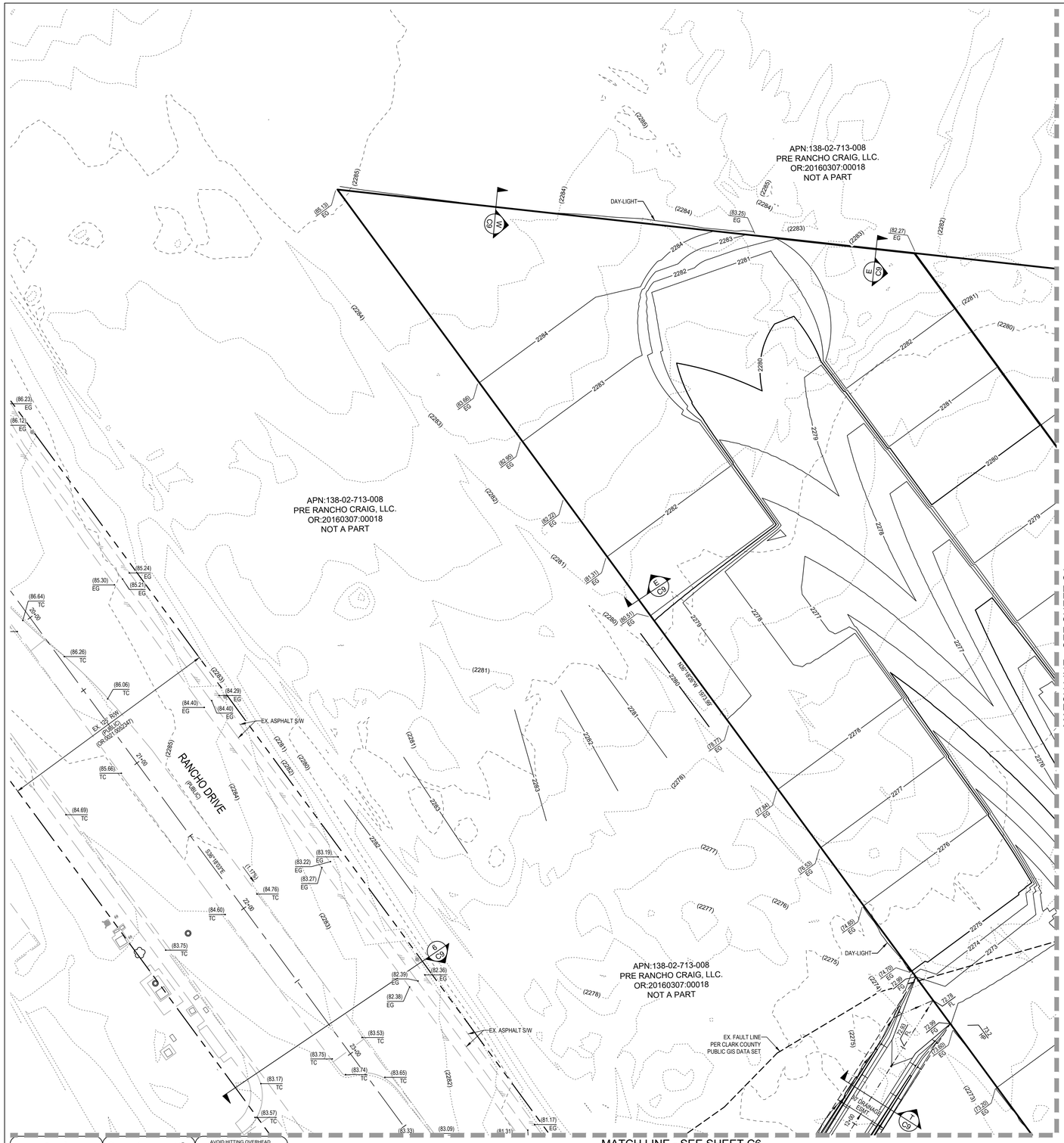
If the deceleration lane and other improvements required within or along Rancho Drive are projected to exceed 500 feet, Grantee and Seller shall work together to obtain a waiver from NDOT to require no more than approximately five hundred feet (500') of improvements south of the Shared Entrance. Currently, the Parties acknowledge and agree that the location of such Shared Entrance will likely require the placement of fill to accommodate access to the Property and the Seller's Parcel which Grantee will provide at its sole cost and expense. Further, the Parties acknowledge and agree that such Shared Entrance may require the Seller to dedicate a portion of its parcel to the City or NDOT for right-of-way or sidewalk purposes. Upon request from Buyer, Seller shall execute and acknowledge any applications, maps, easements or other written instruments reasonably required by the City or any other applicable governing authority in connection with the Shared Entrance, Access Easement area and improvements along Rancho Drive required from Seller for Buyer's intended development of the Property. Seller's obligations pursuant to this Section 1 shall survive closing and remain an obligation of Seller. Seller shall remain obligated and bound by the terms herein in the event of the sale of Seller's Parcel unless and until such subsequent purchaser fully assumes Seller's obligations herein.

2. Execution and Delivery of Access Easement and Development Agreement. On or before the Closing Date, Seller and Grantee shall deliver or cause to be delivered to Escrow Agent the fully executed and acknowledged Access Easement and the Development Agreement. Each of the Access Easement and Development Agreement shall be deemed a Closing Document pursuant to paragraph 10 of the Purchase Agreement and shall be recorded at Closing. Further, the execution and delivery of the Access Easement and Development Agreement are deemed Closing Conditions pursuant to 9(a)(viii) of the Purchase Agreement.

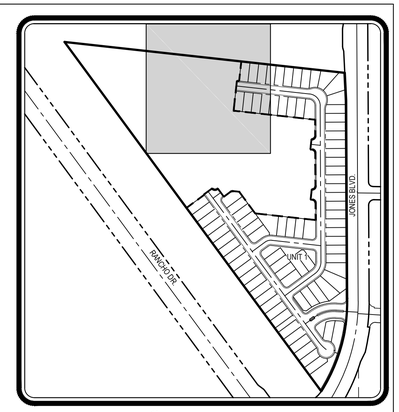
3. Rescission of Prior Easement. The Parties previously executed that certain Drainage Channel Grading Easement Agreement dated May 16, 2018 (the "**Drainage and Grading Easement**"). Currently, the Drainage and Grading Easement is being held by the Escrow Agent. The Parties acknowledge and agree that the purpose of the Drainage and Grading Easement was to provide for the ability of Grantee to grade the Property and portions of Seller's Parcel to direct drainage from the Property to certain locations on Seller's Parcel which have been agreed upon by Seller. Based on input from City of Las Vegas Public Works Department, it has been

REFERENCES

Grading and Drainage Plans (Interim Plans)


APN:138-02-713-008
PRE RANCHO CRAIG, LLC.
OR:20160307:00018
NOT A PART
APN:138-02-713-008
PRE RANCHO CRAIG, LLC.
OR:20160307:00018
NOT A PART
APN:138-02-713-008
PRE RANCHO CRAIG, LLC.
OR:20160307:00018
NOT A PART
SEE SHEET C4
MATCH LINE - SEE SHEET C6
RANCHO DRIVE
(PUBLIC)
EX. CL 40' R/W
(BK 20071, PG 0047)
EX. ASPHALT S/W
EX. FAULT LINE
PER CLARK COUNTY
PUBLIC GIS DATA SET
DAY-LIGHT
DAY-LIGHT
DAY-LIGHT
105' BRDWK
105' BRDWK
N 89°44'40" E
1,320.00'
S 89°44'40" W
1,320.00'
S 89°44'40" W
1,320.00'
N 89°44'40" E
1,320.00'
S 89°44'40" W
1,320.00'
S 89°44'40" W
1,320.00'
S 89°44'40" W





KEY MAP
SCALE: NTS

SCALE: 1"=30'
30 15 0 30

GRADING CONSTRUCTION NOTES

1. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
2. CONSTRUCT "ROLL" TYPE CURB AND GUTTER PER CCAUSD #217.2.S1
3. CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD #234
4. CONSTRUCT 8' WIDE CROSS GUTTER PER CCAUSD #228
5. CONSTRUCT ENTRY GATES PER LANDSCAPE PLANS AND DETAILS
6. MATCH EXISTING ASPHALT, CURB, SIDEWALK, GUTTER, OR VALLEY GUTTER. SAWCUT CLEAN EDGE FOR CONNECTION
7. CONSTRUCT SIDEWALK RAMP PER CCAUSD #235 CASE I. "A" & "B" = 8' UNLESS OTHERWISE NOTED
8. CONSTRUCT PAD PER TYPICAL PAD SECTION DETAIL "5" ON SHEET C9
9. INSTALL 2.5" AC OVER 6.5" TYPE II AGGREGATE BASE
10. CONSTRUCT SIDEWALK DRAIN PER CCAUSD #236
11. 5' TRANSITION "L" CURB TO "R" CURB PER DETAIL "7" ON SHEET C9
12. CONSTRUCT 2' WIDE CONCRETE VALLEY GUTTER PER DETAIL "8" ON SHEET C9
13. EXISTING POWER/UTILITY POLE TO BE REMOVED, RESET OR RELOCATED AS SHOWN PER NV ENERGY PLANS
14. EXISTING POWER/UTILITY POLE TO BE PROTECTED IN PLACE
15. EXISTING UTILITY TO BE ADJUSTED TO GRADE
16. INSTALL 5.5" AC OVER 13" TYPE II AGGREGATE BASE
17. CONSTRUCT WROUGHT IRON FENCE PER DETAIL "10", SHEET C9
18. CONSTRUCT 2' WIDE CONCRETE FLUME PER DETAIL "9" ON SHEET C9

STORM DRAIN CONSTRUCTION NOTES

1. CONSTRUCT 48" TYPE I STORM DRAIN MANHOLE PER CCAUSD #403
2. CONSTRUCT 15' TYPE "CM" DROP INLET PER CCAUSD #422 & 421
3. INSTALL 36" CLASS III RCP (PUBLIC)

LEGEND

PROPOSED	EXISTING	
		PUBLIC ROW LINE
		PRVT STREET/PROPERTY LINE
		BOUNDARY/PROPERTY LINE
		EASEMENT LINE
		CENTER LINE
		EDGE OF ASPHALT
		CURB & GUTTER
		RETAINING WALL
		SAWCUT LINE
		FLOW LINE
		GRADE BREAK
2500	(2500)	MAJOR 5' CONTOUR
2501	(2501)	MINOR 1' CONTOUR
		SCARP (3:1 MAX)
		CONCRETE SURFACE PER PLAN
		PROPOSED ASPHALT
		REMOVE AND REPLACE EX. ASPHALT
		MATCH LINE
[98.72] XX	(98.72) XX	FUTURE GRADE TAG
		EXISTING GRADE TAG
98.72 XX		PROPOSED GRADE TAG
FF		FINISHED FLOOR
RC		TOP OF "ROLL" CURB
TC		TOP OF CURB
AC		TOP OF PAVEMENT
FL		FLOW LINE GRADE
EP		EDGE OF PAVEMENT
TB		TOP OF BERM
TW		TOP OF RETAINING WALL
TF		TOP OF WALL FOOTING
PRIV. ST.		PRIVATE STREET
TYP.		TYPICAL
1.00%		GRADE SLOPE
1 C9		SECTION MARKER- DETAIL NUMBER ABOVE SHEET NUMBER
		SIGHT VISIBILITY ZONE
FILL CUT		CUT / FILL LINE

GRADING NOTES

1. ACTUS SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES IN THE PLANS OR CONDITIONS IN THE FILED.
2. FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS, THE CONTRACTOR SHALL VERIFY CROSS SLOPES FROM EXISTING PAVEMENT SAWCUT LINE TO PROPOSED EDGE OF PAVEMENT OR PROJECTED LIP OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM OR MAXIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER.
3. WALL DETAILS ARE FOR REFERENCE ONLY AND DO NOT CONSTITUTE A STRUCTURAL DESIGN.
4. CONSTRUCTION OF BLOCK WALLS REQUIRE A SEPARATE BUILDING PERMIT AND APPROVAL BY THE BUILDING DEPARTMENT.

SIGHT VISIBILITY ZONE NOTE

NO WALLS, FENCES SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAT TRAFFIC CONTROL DEVICES, FIRE HYDRANTS, TREES, AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM TOP OF CURB, OR WHERE NO CURB EXISTS. A HEIGHT OF 27 INCHES MEASURED FROM THE TOP OF ADJACENT ASPHALT, GRAVEL OR PAVEMENT. STREET SURFACE. THIS RESTRICTION EXTENDS ALONG THE SIGHT VISIBILITY LINE THROUGH LANDSCAPED MEDIANS.

PLEASE REFER TO TRAFFIC SHEET ? FOR SIGHT VISIBILITY ZONE DIMENSIONS.

SOILS NOTE

ALL GRADING SHALL CONFORM TO GEOTECHNICAL REPORT
BY: SOUTHWEST GEOTECHNICAL
ORIGINAL PROJECT NUMBER: 182158
DATED: APRIL 17, 2018

STORM DRAIN CONNECTIONS NOTE

WHEN CONNECTING TO EXISTING RCP, CONTRACTOR SHALL REMOVE THE EXISTING RCP TO THE NEAREST BELL CONNECTION, CONNECT NEW RCP TO EXISTING RCP AND MATCH EXISTING PIPE SLOPE.

FLOOD ZONE DESCRIPTION

THIS SITE IS LOCATED IN ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN, PER THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL 32003C2155F CLARK COUNTY, NEVADA DATED NOVEMBER 16, 2011.

FLOOD DESIGNATION PROVIDED BY FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

ESTIMATED QUANTITIES

NOTE: QUANTITIES SHOWN ARE RAW QUANTITIES AND APPROXIMATE. CONTRACTOR TO DETERMINE HIS OWN QUANTITIES FOR GRADING PURPOSES.

WORK UNDER THIS PLAN CONSTITUTES GRADING IN ACCORDANCE WITH 2012 IBC; ENGINEERING REPORTS AND CERTIFICATIONS IN CONFORMANCE WITH IBC SHALL BE FILED WITH THE CITY OF LAS VEGAS PRIOR TO CITY OF LAS VEGAS APPROVAL AT FINAL INSPECTION.

CUT: 28,295 CY
FILL: 30,880 CY
BALANCE: 2,585 CY (FILL)

DISCLAIMER NOTE

THE UNDERGROUND UTILITIES AS SHOWN HEREON HAVE BEEN LOCATED FROM OBSERVED FIELD SURVEY EVIDENCE AND EXISTING DRAWINGS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING; PLANS PROVIDED BY THE CLIENT, UTILITY COMPANIES, AND MUNICIPAL AGENCIES. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

PRIVATE STREET NOTE

ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS, AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY THE HOA.

ENGINEER'S CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED UPDATED DRAINAGE STUDY CLV# N/A ON FILE WITH THE CITY OF LAS VEGAS.

DARRYL LATTIMORE, P.E. — 11/06/2018 DATE

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS STREET LIGHTING AND ITS CONDUIT. IT'S COSTLY
CALL BEFORE YOU DIG UNDERGROUND
Call before you
Underground
1-702-432-5300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (FAST)

Call before you Dig
Avoid cutting underground utility lines. It's costly.
CALL
OR
1-800-227-2600

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

BASIS OF BEARING

SOUTH 00°17'09" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 2, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS PER MAP RECORDED IN FILE 123, PAGE 39 OF PARCEL MAPS IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDERS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK

MONUMENT ID: 5LV002E4

RIVET & PLATE IN TOP OF CURB @ NW CORNER OF CRAIG & JONES

ELEVATION: 2,261.88 (FEET)
689.423 (METERS)

CITY OF LAS VEGAS VERTICAL CONTROL BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

Actus
3283 E. Warm Springs Rd., Suite 300
Las Vegas, NV 89120
www.Actus-NV.com
(702) 586-9266
Engineering - Surveying - Consulting - Planning

GRADING PLAN 2
RANCHO JONES - UNIT 1
BEAZER HOMES
CITY OF LAS VEGAS, NEVADA

NO.	DATE	DESCRIPTION	BY
A			

PROFESSIONAL ENGINEER — DARRYL C. LATTIMORE — STATE OF NEVADA — No. 17516 — EXP: 12/31/19 CIVIL — PROFESSIONAL ENGINEER
11/6/2018

DATE	11/06/2018
DRAWN	RLS
DESIGNED	ALW
CHECKED	DCL
PROJECT #	BZR011812

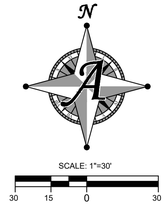
SHEET TITLE
GRADING

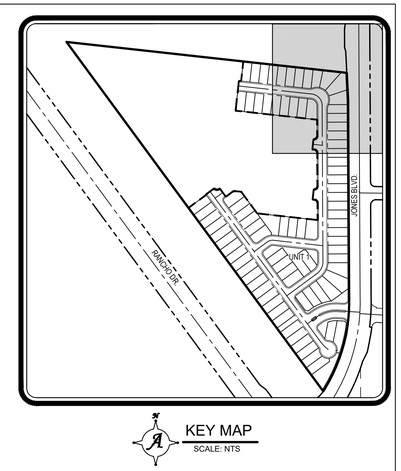
SHEET NUMBER
C4

CLV# N/A — SHEET# 4 OF ###

Plot Stamp: 11/6/2018 1:38:56 PM - Ryan Sconer
File: P:\BZR011812 - Rancho Jones\Civil_CD\Unit 1\BZR011812-CD-UTIL-GRAD.dwg, Tab: C4 - Grading 2







KEY MAP
SCALE: NTS

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12. CONSTRUCT 2' WIDE CONCRETE VALLEY GUTTER PER DETAIL "8" ON SHEET C9
13. EXISTING POWER/UTILITY POLE TO BE REMOVED, RESET OR RELOCATED AS SHOWN PER NV ENERGY PLANS
14. EXISTING POWER/UTILITY POLE TO BE PROTECTED IN PLACE
15. EXISTING UTILITY TO BE ADJUSTED TO GRADE
16. INSTALL 5.5" AC OVER 13" TYPE II AGGREGATE BASE
17. CONSTRUCT WROUGHT IRON FENCE PER DETAIL# "10", SHEET C9
18. CONSTRUCT 2' WIDE CONCRETE FLUME PER DETAIL "9" ON SHEET C9

STORM DRAIN CONSTRUCTION NOTES

1. CONSTRUCT 48" TYPE I STORM DRAIN MANHOLE PER CCAUSD #403
2. CONSTRUCT 15' TYPE "CM" DROP INLET PER CCAUSD #422 & 421
3. INSTALL 36" CLASS III RCP (PUBLIC)

LEGEND

PROPOSED	EXISTING	
		PUBLIC ROW LINE
		PRVT STREET/PROPERTY LINE
		BOUNDARY/PROPERTY LINE
		EASEMENT LINE
		CENTER LINE
		EDGE OF ASPHALT
		CURB & GUTTER
		RETAINING WALL
		SAWCUT LINE
		FLOW LINE
		GRADE BREAK
2500	(2500)	MAJOR 5' CONTOUR
2501	(2501)	MINOR 1' CONTOUR
		SCARP (3:1 MAX)
		CONCRETE SURFACE PER PLAN
		PROPOSED ASPHALT
		REMOVE AND REPLACE EX. ASPHALT
		MATCH LINE
[98.72] XX		FUTURE GRADE TAG
(98.72) XX		EXISTING GRADE TAG
98.72 XX		PROPOSED GRADE TAG
FF		FINISHED FLOOR
RC		TOP OF "ROLL" CURB
TC		TOP OF CURB
AC		TOP OF PAVEMENT
FL		FLOW LINE GRADE
EP		EDGE OF PAVEMENT
TB		TOP OF BERM
TW		TOP OF RETAINING WALL
TF		TOP OF WALL FOOTING
PRIV. ST.		PRIVATE STREET
TYP.		TYPICAL
1.00%		GRADE SLOPE
1 C9		SECTION MARKER- DETAIL NUMBER ABOVE SHEET NUMBER
		SIGHT VISIBILITY ZONE
FILL CUT		CUT / FILL LINE

GRADING NOTES

1. ACTUS SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES IN THE PLANS OR CONDITIONS IN THE FILED.
2. FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS, THE CONTRACTOR SHALL VERIFY CROSS SLOPES FROM EXISTING PAVEMENT SAWCUT LINE TO PROPOSED EDGE OF PAVEMENT OR PROJECTED LIP OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM OR MAXIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER.
3. WALL DETAILS ARE FOR REFERENCE ONLY AND DO NOT CONSTITUTE A STRUCTURAL DESIGN.
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SIGHT VISIBILITY ZONE NOTE

NO WALLS, FENCES SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAT TRAFFIC CONTROL DEVICES, FIRE HYDRANTS, TREES, AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM TOP OF CURB, OR WHERE NO CURB EXISTS, A HEIGHT OF 27 INCHES MEASURED FROM THE TOP OF ADJACENT ASPHALT, GRAVEL OR PAVEMENT STREET SURFACE. THIS RESTRICTION EXTENDS ALONG THE SIGHT VISIBILITY LINE THROUGH LANDSCAPED MEDIANS.

PLEASE REFER TO TRAFFIC SHEET ? FOR SIGHT VISIBILITY ZONE DIMENSIONS.

SOILS NOTE

ALL GRADING SHALL CONFORM TO GEOTECHNICAL REPORT
BY: SOUTHWEST GEOTECHNICAL
ORIGINAL PROJECT NUMBER: 182158
DATED: APRIL 17, 2018

STORM DRAIN CONNECTIONS NOTE

WHEN CONNECTING TO EXISTING RCP, CONTRACTOR SHALL REMOVE THE EXISTING RCP TO THE NEAREST BELL CONNECTION, CONNECT NEW RCP TO EXISTING RCP AND MATCH EXISTING PIPE SLOPE.

FLOOD ZONE DESCRIPTION

THIS SITE IS LOCATED IN ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN, PER THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL 32003C2155F CLARK COUNTY, NEVADA DATED NOVEMBER 16, 2011.

FLOOD DESIGNATION PROVIDED BY FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

ESTIMATED QUANTITIES

NOTE: QUANTITIES SHOWN ARE RAW QUANTITIES AND APPROXIMATE. CONTRACTOR TO DETERMINE HIS OWN QUANTITIES FOR GRADING PURPOSES.

WORK UNDER THIS PLAN CONSTITUTES GRADING IN ACCORDANCE WITH 2012 IBC; ENGINEERING REPORTS AND CERTIFICATIONS IN CONFORMANCE WITH IBC SHALL BE FILED WITH THE CITY OF LAS VEGAS PRIOR TO CITY OF LAS VEGAS APPROVAL AT FINAL INSPECTION.

CUT:	28,295 CY
FILL:	30,880 CY
BALANCE:	2,585 CY (FILL)

DISCLAIMER NOTE

THE UNDERGROUND UTILITIES AS SHOWN HEREON HAVE BEEN LOCATED FROM OBSERVED FIELD SURVEY EVIDENCE AND EXISTING DRAWINGS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING; PLANS PROVIDED BY THE CLIENT, UTILITY COMPANIES, AND MUNICIPAL AGENCIES. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

PRIVATE STREET NOTE

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ENGINEER'S CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED UPDATED DRAINAGE STUDY CLV# N/A ON FILE WITH THE CITY OF LAS VEGAS.

DARRYL LATTIMORE, P.E. — 11/06/2018 — DATE



BASIS OF BEARING

SOUTH 00°17'09" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 2, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS PER MAP RECORDED IN FILE 123, PAGE 39 OF PARCEL MAPS IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDERS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK

MONUMENT ID: 5LV002E4

RIVET & PLATE IN TOP OF CURB @ NW CORNER OF CRAIG & JONES

ELEVATION: 2,261.88 (FEET)
689.423 (METERS)

CITY OF LAS VEGAS VERTICAL CONTROL BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

Actus
3283 E. Warm Springs Rd., Suite 300
Las Vegas, NV 89120
www.Actus-NV.com
(702) 586-9266
Engineering - Surveying - Consulting - Planning

GRADING PLAN 3
RANCHO JONES - UNIT 1
BEAZER HOMES
CITY OF LAS VEGAS, NEVADA

BY	DESCRIPTION	DATE
A.1		

PROFESSIONAL ENGINEER — STATE OF NEVADA — DARRYL C. LATTIMORE — EXP: 12/31/19 — CIVIL — No. 17516
11/6/2018

DATE	11/06/2018
DRAWN	RLS
DESIGNED	ALW
CHECKED	DCL
PROJECT #	BZR011812

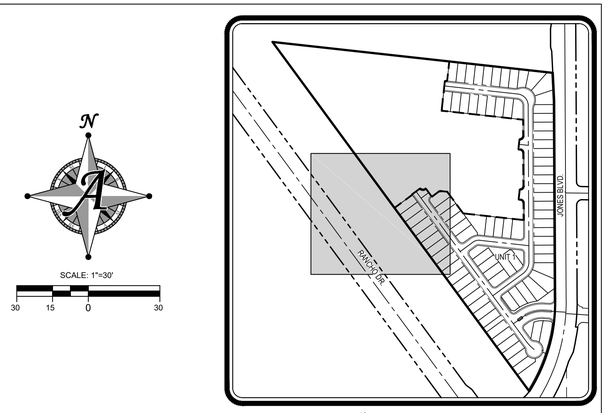
SHEET TITLE
GRADING

SHEET NUMBER
C5

CLV# N/A — SHEET# 5 OF ###

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File: P:\BZR011812 - Rancho Jones\Civil_CD\Unit 1\BZR011812-CD-UTIL-1-GRAD.dwg, Tab: C5 - Grading 3





KEY MAP
SCALE: NTS

SCALE: 1"=30'
30 15 0 30

GRADING CONSTRUCTION NOTES

1. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
2. CONSTRUCT "ROLL" TYPE CURB AND GUTTER PER CCAUSD #217.2.S1
3. CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD #234
4. CONSTRUCT 8' WIDE CROSS GUTTER PER CCAUSD #228
5. CONSTRUCT ENTRY GATES PER LANDSCAPE PLANS AND DETAILS
6. MATCH EXISTING ASPHALT, CURB, SIDEWALK, GUTTER, OR VALLEY GUTTER. SAWCUT CLEAN EDGE FOR CONNECTION
7. CONSTRUCT SIDEWALK RAMP PER CCAUSD #235 CASE I. "A" & "B" = 8' UNLESS OTHERWISE NOTED
8. CONSTRUCT PAD PER TYPICAL PAD SECTION DETAIL "5" ON SHEET C9
9. INSTALL 2.5" AC OVER 6.5" TYPE II AGGREGATE BASE
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1. CONSTRUCT 48" TYPE I STORM DRAIN MANHOLE PER CCAUSD #403
2. CONSTRUCT 15" TYPE "CM" DROP INLET PER CCAUSD #422 & 421
3. INSTALL 36" CLASS III RCP (PUBLIC)

LEGEND

PROPOSED	EXISTING	
		PUBLIC ROW LINE
		PRVT STREET/PROPERTY LINE
		BOUNDARY/PROPERTY LINE
		EASEMENT LINE
		CENTER LINE
		EDGE OF ASPHALT
		CURB & GUTTER
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		SAWCUT LINE
		FLOW LINE
		GRADE BREAK
2500	(2500)	MAJOR 5' CONTOUR
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		SCARP (3:1 MAX)
		CONCRETE SURFACE PER PLAN
		PROPOSED ASPHALT
		REMOVE AND REPLACE EX. ASPHALT
		MATCH LINE
[98.72] XX		FUTURE GRADE TAG
(98.72) XX		EXISTING GRADE TAG
98.72 XX		PROPOSED GRADE TAG
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AC		TOP OF PAVEMENT
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TW		TOP OF RETAINING WALL
TF		TOP OF WALL FOOTING
PRIV. ST.		PRIVATE STREET
TYP.		TYPICAL
1.00%		GRADE SLOPE
1 C9		SECTION MARKER- DETAIL NUMBER ABOVE SHEET NUMBER
		SIGHT VISIBILITY ZONE
FILL / CUT		CUT / FILL LINE

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SOILS NOTE

ALL GRADING SHALL CONFORM TO GEOTECHNICAL REPORT BY: SOUTHWEST GEOTECHNICAL
ORIGINAL PROJECT NUMBER: 182158
DATED: APRIL 17, 2018

STORM DRAIN CONNECTIONS NOTE

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FLOOD ZONE DESCRIPTION

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FLOOD DESIGNATION PROVIDED BY FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

ESTIMATED QUANTITIES

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CUT: 28,295 CY
FILL: 30,880 CY
BALANCE: 2,585 CY (FILL)

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ENGINEER'S CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED UPDATED DRAINAGE STUDY CLV# N/A ON FILE WITH THE CITY OF LAS VEGAS.

11/06/2018
DARRYL LATTIMORE, P.E. — DATE

Call before you Dig
Avoid cutting underground utility lines. It's costly.
CALL 811 OR 1-800-227-2600

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS AND STREET LIGHT SYSTEM CONDUIT. IT'S COSTLY
Call before you Underground
1-702-432-5300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (FAST)

BASIS OF BEARING

SOUTH 00°17'09" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 2, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS PER MAP RECORDED IN FILE 123, PAGE 39 OF PARCEL MAPS IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDERS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK

MONUMENT ID: 5LV002E4

RIVET & PLATE IN TOP OF CURB @ NW CORNER OF CRAIG & JONES

ELEVATION: 2,261.88 (FEET)
689.423 (METERS)

CITY OF LAS VEGAS VERTICAL CONTROL BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

Actus
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Engineering - Surveying - Consulting - Planning

GRADING PLAN 4
RANCHO JONES - UNIT 1
BEAZER HOMES
CITY OF LAS VEGAS, NEVADA

#	DATE	DESCRIPTION	BY
A			

PROFESSIONAL ENGINEER — STATE OF NEVADA
DARRYL C. LATTIMORE
EXP: 12/31/19
CIVIL
No. 17516
11/6/2018

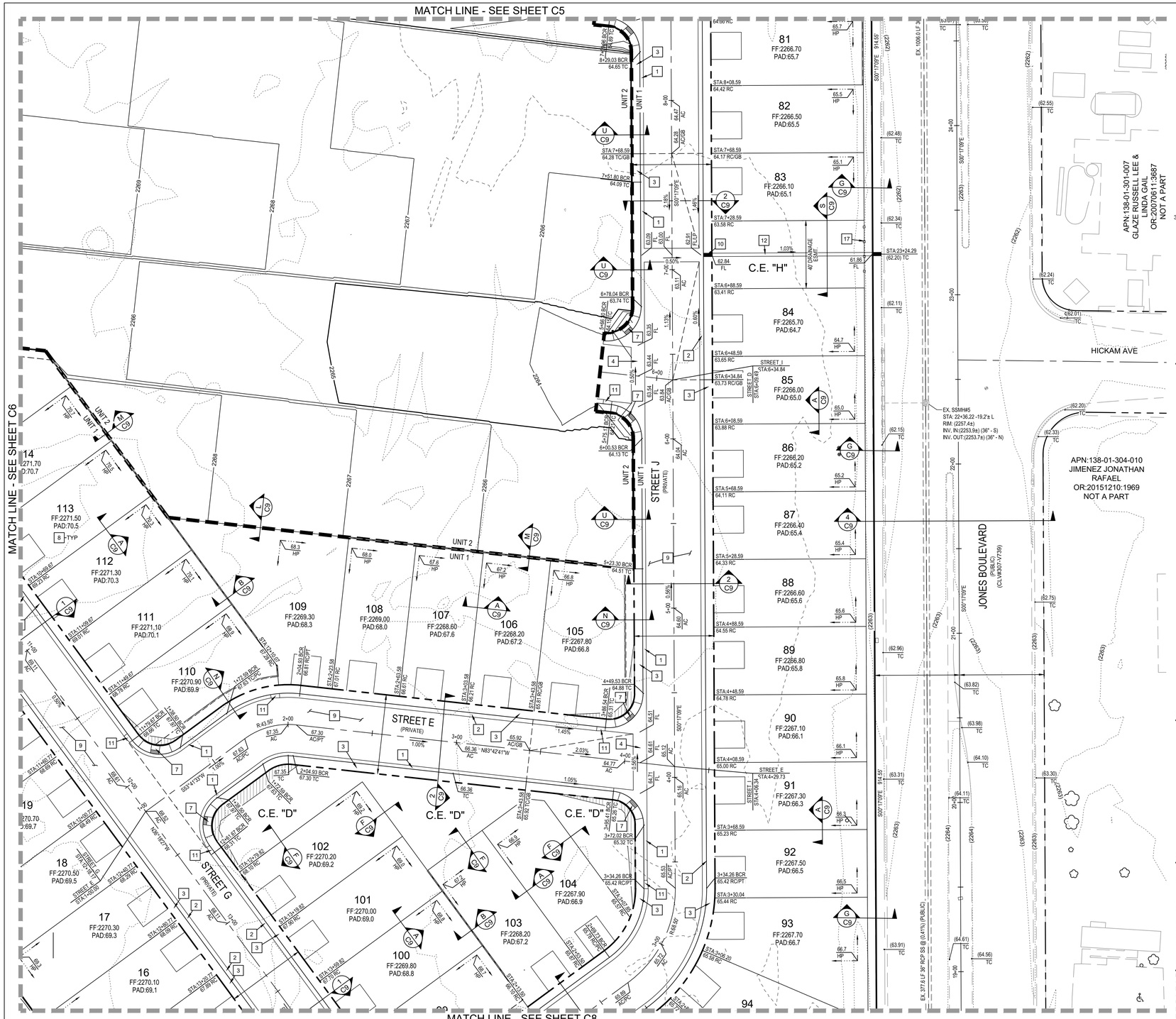
DATE	11/06/2018
DRAWN	RLS
DESIGNED	ALW
CHECKED	DCL
PROJECT #	BZR011812

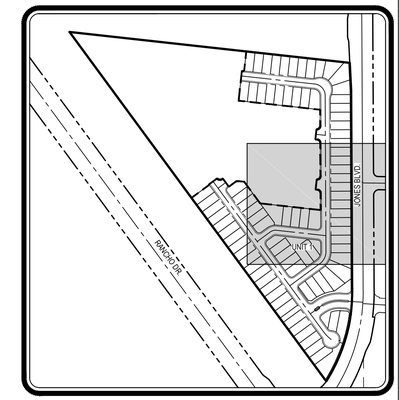
SHEET TITLE
GRADING

SHEET NUMBER
C6

CLV# N/A — SHEET# 6 OF ###

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File: P:\BZR011812 - Rancho Jones\Civil_CD\Unit 1\BZR011812-CD-UTIL 1-GRAD.dwg, Tab: C6 - Grading 4





KEY MAP
SCALE: NTS

SCALE: 1"=30'
30 15 0 30

GRADING CONSTRUCTION NOTES

1. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
2. CONSTRUCT "ROLL" TYPE CURB AND GUTTER PER CCAUSD #217.2.S1
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		CENTER LINE
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1.00%		GRADE SLOPE
1 C9		SECTION MARKER-DETAIL NUMBER ABOVE SHEET NUMBER
		SIGHT VISIBILITY ZONE
FILL CUT		CUT / FILL LINE

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SOILS NOTE

ALL GRADING SHALL CONFORM TO GEOTECHNICAL REPORT
BY: SOUTHWEST GEOTECHNICAL
ORIGINAL PROJECT NUMBER: 182158
DATED: APRIL 17, 2018

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FLOOD DESIGNATION PROVIDED BY FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

ESTIMATED QUANTITIES

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DARRYL LATTIMORE, P.E. — DATE 11/06/2018

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OR
1-800-227-2600

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS CONDUIT. IT'S COSTLY
CALL BEFORE YOU DIG
Call before you
Underground
1-702-432-5300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (FAST)

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
1-702-257-2929

BASIS OF BEARING

SOUTH 00°17'09" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 2, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS PER MAP RECORDED IN FILE 123, PAGE 39 OF PARCEL MAPS IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDERS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK

MONUMENT ID: 5LV002E4

RIVET & PLATE IN TOP OF CURB @ NW CORNER OF CRAIG & JONES

ELEVATION: 2,261.88 (FEET)
689.423 (METERS)

CITY OF LAS VEGAS VERTICAL CONTROL BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

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3283 E. Warm Springs Rd., Suite 300
Las Vegas, NV 89120
www.Actus-NV.com
(702) 586-9266
Engineering - Surveying - Consulting - Planning

GRADING PLAN 5
RANCHO JONES - UNIT 1
BEAZER HOMES
CITY OF LAS VEGAS, NEVADA

NO.	DATE	DESCRIPTION	BY
A			

PROFESSIONAL ENGINEER — DARRYL C. LATTIMORE — EXP: 12/31/19 — CIVIL — No. 17516 — STATE OF NEVADA
11/6/2018

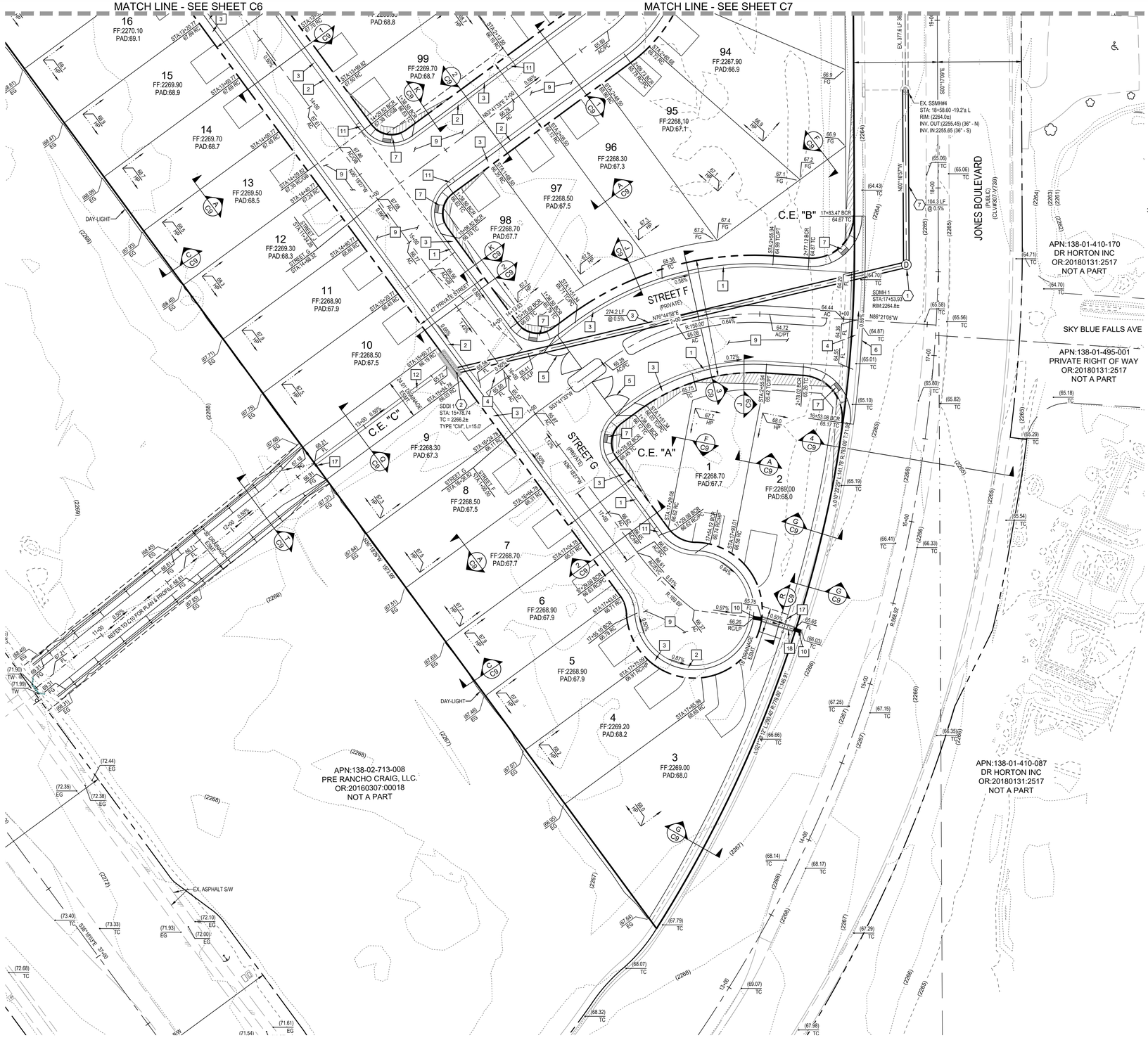
DATE	11/06/2018
DRAWN	RLS
DESIGNED	ALW
CHECKED	DCL
PROJECT #	BZR011812

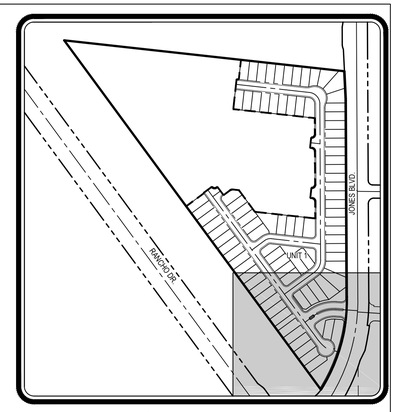
SHEET TITLE
GRADING

SHEET NUMBER
C7

CLV# N/A — SHEET# 7 OF ###

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GRADING CONSTRUCTION NOTES

1. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
2. CONSTRUCT "ROLL" TYPE CURB AND GUTTER PER CCAUSD #217.2.S1
3. CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD #234
4. CONSTRUCT 8' WIDE CROSS GUTTER PER CCAUSD #228
5. CONSTRUCT ENTRY GATES PER LANDSCAPE PLANS AND DETAILS
6. MATCH EXISTING ASPHALT, CURB, SIDEWALK, GUTTER, OR VALLEY GUTTER. SAWCUT CLEAN EDGE FOR CONNECTION
7. CONSTRUCT SIDEWALK RAMP PER CCAUSD #235 CASE I. "A" & "B" = 8' UNLESS OTHERWISE NOTED
8. CONSTRUCT PAD PER TYPICAL PAD SECTION DETAIL "5" ON SHEET C9
9. INSTALL 2.5" AC OVER 6.5" TYPE II AGGREGATE BASE
10. CONSTRUCT SIDEWALK DRAIN PER CCAUSD #236
11. 5' TRANSITION "L" CURB TO "R" CURB PER DETAIL "7" ON SHEET C9
12. CONSTRUCT 2' WIDE CONCRETE VALLEY GUTTER PER DETAIL "8" ON SHEET C9
13. EXISTING POWER/UTILITY POLE TO BE REMOVED, RESET OR RELOCATED AS SHOWN PER NV ENERGY PLANS
14. EXISTING POWER/UTILITY POLE TO BE PROTECTED IN PLACE
15. EXISTING UTILITY TO BE ADJUSTED TO GRADE
16. INSTALL 5.5" AC OVER 13" TYPE II AGGREGATE BASE
17. CONSTRUCT WROUGHT IRON FENCE PER DETAIL "10", SHEET C9
18. CONSTRUCT 2' WIDE CONCRETE FLUME PER DETAIL "9" ON SHEET C9

STORM DRAIN CONSTRUCTION NOTES

1. CONSTRUCT 48" TYPE I STORM DRAIN MANHOLE PER CCAUSD #403
2. CONSTRUCT 15' TYPE "CM" DROP INLET PER CCAUSD #422 & 421
3. INSTALL 36" CLASS III RCP (PUBLIC)

LEGEND

PROPOSED	EXISTING	
		PUBLIC ROW LINE
		PRVT STREET/PROPERTY LINE
		BOUNDARY/PROPERTY LINE
		EASEMENT LINE
		CENTER LINE
		EDGE OF ASPHALT
		CURB & GUTTER
		RETAINING WALL
		SAWCUT LINE
		FLOW LINE
		GRADE BREAK
2500	(2500)	MAJOR 5' CONTOUR
2501	(2501)	MINOR 1' CONTOUR
		SCARP (3:1 MAX)
		CONCRETE SURFACE PER PLAN
		PROPOSED ASPHALT
		REMOVE AND REPLACE EX. ASPHALT
		MATCH LINE
[98.72] XX		FUTURE GRADE TAG
(98.72) XX		EXISTING GRADE TAG
98.72 XX		PROPOSED GRADE TAG
FF		FINISHED FLOOR
RC		TOP OF "ROLL" CURB
TC		TOP OF CURB
AC		TOP OF PAVEMENT
FL		FLOW LINE GRADE
EP		EDGE OF PAVEMENT
TB		TOP OF BERM
TW		TOP OF RETAINING WALL
TF		TOP OF WALL FOOTING
PRIV. ST.		PRIVATE STREET
TYP.		TYPICAL
1.00%		GRADE SLOPE
1 C9		SECTION MARKER-DETAIL NUMBER ABOVE SHEET NUMBER
		SIGHT VISIBILITY ZONE
FILL CUT		CUT / FILL LINE

GRADING NOTES

1. ACTUS SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES IN THE PLANS OR CONDITIONS IN THE FILED.
2. FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS, THE CONTRACTOR SHALL VERIFY CROSS SLOPES FROM EXISTING PAVEMENT SAWCUT LINE TO PROPOSED EDGE OF PAVEMENT OR PROJECTED LIP OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM OR MAXIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER.
3. WALL DETAILS ARE FOR REFERENCE ONLY AND DO NOT CONSTITUTE A STRUCTURAL DESIGN.
4. CONSTRUCTION OF BLOCK WALLS REQUIRE A SEPARATE BUILDING PERMIT AND APPROVAL BY THE BUILDING DEPARTMENT.

SIGHT VISIBILITY ZONE NOTE

NO WALLS, FENCES SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAT TRAFFIC CONTROL DEVICES, FIRE HYDRANTS, TREES, AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM TOP OF CURB, OR WHERE NO CURB EXISTS, A HEIGHT OF 27 INCHES MEASURED FROM THE TOP OF ADJACENT ASPHALT, GRAVEL OR PAVEMENT STREET SURFACE. THIS RESTRICTION EXTENDS ALONG THE SIGHT VISIBILITY LINE THROUGH LANDSCAPED MEDIANS.

PLEASE REFER TO TRAFFIC SHEET ? FOR SIGHT VISIBILITY ZONE DIMENSIONS.

SOILS NOTE

ALL GRADING SHALL CONFORM TO GEOTECHNICAL REPORT
BY: SOUTHWEST GEOTECHNICAL
ORIGINAL PROJECT NUMBER: 182158
DATED: APRIL 17, 2018

STORM DRAIN CONNECTIONS NOTE

WHEN CONNECTING TO EXISTING RCP, CONTRACTOR SHALL REMOVE THE EXISTING RCP TO THE NEAREST BELL CONNECTION, CONNECT NEW RCP TO EXISTING RCP AND MATCH EXISTING PIPE SLOPE.

FLOOD ZONE DESCRIPTION

THIS SITE IS LOCATED IN ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN, PER THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL 32003C2155F CLARK COUNTY, NEVADA DATED NOVEMBER 16, 2011.

FLOOD DESIGNATION PROVIDED BY FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

ESTIMATED QUANTITIES

NOTE: QUANTITIES SHOWN ARE RAW QUANTITIES AND APPROXIMATE. CONTRACTOR TO DETERMINE HIS OWN QUANTITIES FOR GRADING PURPOSES.

WORK UNDER THIS PLAN CONSTITUTES GRADING IN ACCORDANCE WITH 2012 IBC; ENGINEERING REPORTS AND CERTIFICATIONS IN CONFORMANCE WITH IBC SHALL BE FILED WITH THE CITY OF LAS VEGAS PRIOR TO CITY OF LAS VEGAS APPROVAL AT FINAL INSPECTION.

CUT:	28,295 CY
FILL:	30,880 CY
BALANCE:	2,585 CY (FILL)

DISCLAIMER NOTE

THE UNDERGROUND UTILITIES AS SHOWN HEREON HAVE BEEN LOCATED FROM OBSERVED FIELD SURVEY EVIDENCE AND EXISTING DRAWINGS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING; PLANS PROVIDED BY THE CLIENT, UTILITY COMPANIES, AND MUNICIPAL AGENCIES. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

PRIVATE STREET NOTE

ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS, AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY THE HOA.

ENGINEER'S CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED UPDATED DRAINAGE STUDY CLV# N/A ON FILE WITH THE CITY OF LAS VEGAS.

11/06/2018
DARRYL LATTIMORE, P.E. — DATE







BASIS OF BEARING

SOUTH 00°17'09" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 2, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS PER MAP RECORDED IN FILE 123, PAGE 39 OF PARCEL MAPS IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDERS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK

MONUMENT ID: 5LV002E4

RIVET & PLATE IN TOP OF CURB @ NW CORNER OF CRAIG & JONES

ELEVATION: 2,261.88 (FEET)
689.423 (METERS)

CITY OF LAS VEGAS VERTICAL CONTROL BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

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Engineering - Surveying - Consulting - Planning

GRADING PLAN 6
RANCHO JONES - UNIT 1
BEAZER HOMES
CITY OF LAS VEGAS, NEVADA

NO.	DATE	DESCRIPTION	BY
A			

PROFESSIONAL ENGINEER — STATE OF NEVADA
DARRYL C. LATTIMORE
EXP: 12/31/19
CIVIL
No. 17516
11/6/2018

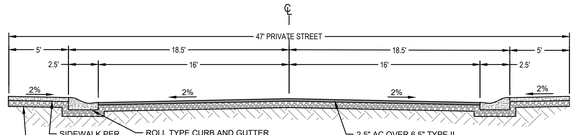
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DRAWN	RLS
DESIGNED	ALW
CHECKED	DCL
PROJECT #	BZR011812

SHEET TITLE
GRADING

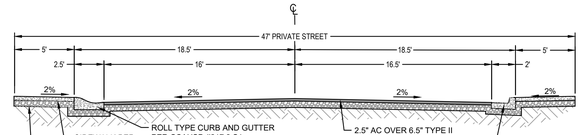
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CLV# N/A — SHEET# 8 OF ###

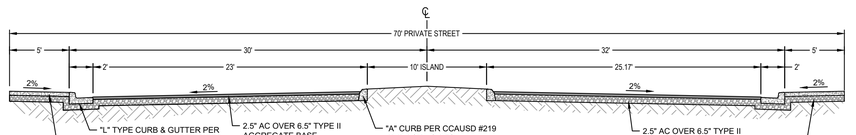
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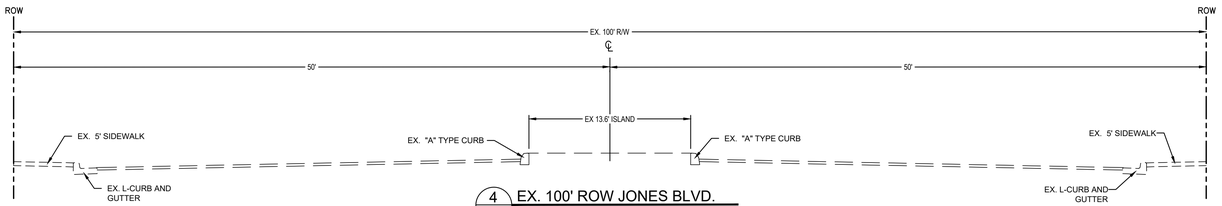
1 - 47' PRIVATE STREET
NOT TO SCALE



2 - 47' PRIVATE STREET
NOT TO SCALE



3 - 70' PRIVATE ENTRY STREET
NOT TO SCALE



4 - EX. 100' ROW JONES BLVD.
NOT TO SCALE

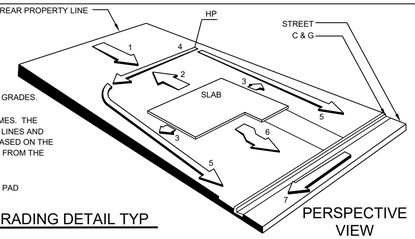
1. SLOPE FROM REAR TO SWALE (MIN. 2%)
2. SLOPE FROM HOUSE TO SWALE (MIN. 5%)
3. SLOPE FROM HOUSE TO SIDE SWALE (MIN. 5%)
4. REAR SWALE (10' MIN. FROM REAR OF HOUSE)
5. SIDE SWALE (MIN. 1%)
6. SLOPE FROM HOUSE TO BACK OF CURB (MIN. 2%)
7. SLOPE OF STREET

A. INDICATED GRADES OTHER THAN TC, FG & GUTTER FL ARE ROUGH GRADES. (0.3' LOWER THAN FINISHED GRADE).

B. THE ROUGH GRADING PLANS SHALL BE ON THE JOB SITE AT ALL TIMES. THE ROUGH GRADING SHALL BE FINISHED IN CONFORMANCE WITH THE LINES AND GRADES SHOWN ON THE PLANS. THE GRADING QUANTITIES ARE BASED ON THE ELEVATION AND DETAILS SHOWN ON THE PLANS. ANY DEVIATIONS FROM THE PLANS WILL RESULT IN QUANTITY CHANGES.

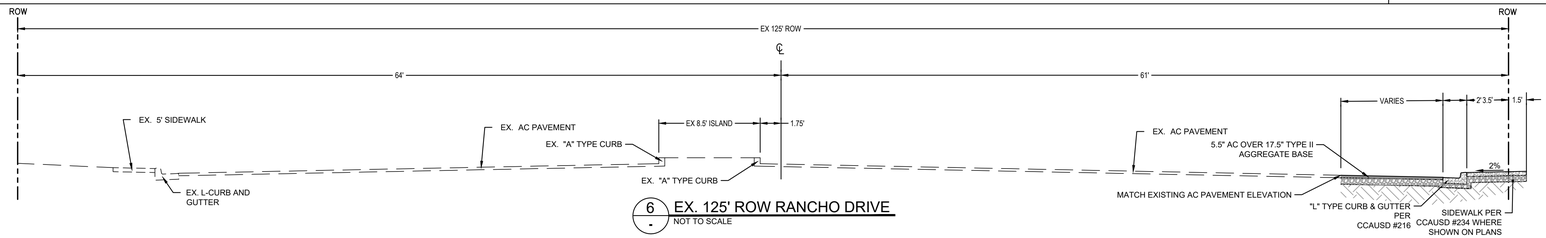
C. CARE SHALL BE EXERCISED IN GRADING CORNER LOTS.

D. ROUGH PAD ELEVATIONS SHALL BE GRADED TO WITHIN 0.3' OF THE PAD ELEVATIONS SHOWN ON THE PLANS.

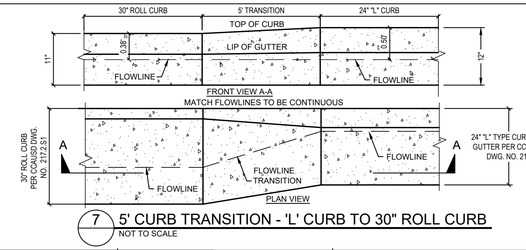


PERSPECTIVE VIEW

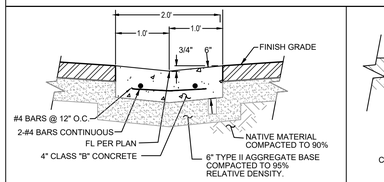
5 - TYPE "A" PAD GRADING DETAIL TYP
NOT TO SCALE



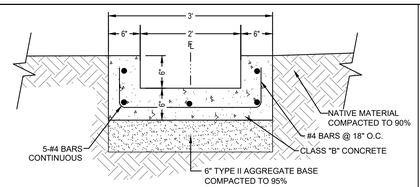
6 - EX. 125' ROW RANCHO DRIVE
NOT TO SCALE



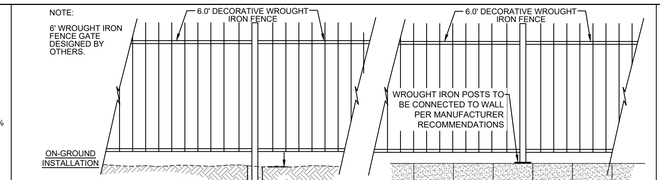
7 - 5' CURB TRANSITION - 'L' CURB TO 30" ROLL CURB
NOT TO SCALE



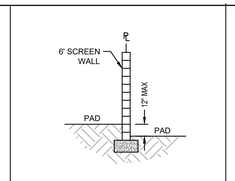
8 - 2.0' WIDE VALLEY GUTTER
NOT TO SCALE



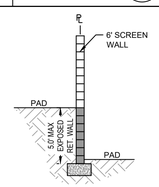
9 - 2' CONCRETE FLUME
NOT TO SCALE



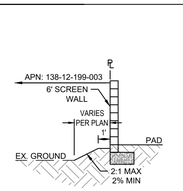
10 - WROUGHT IRON FENCE
NOT TO SCALE



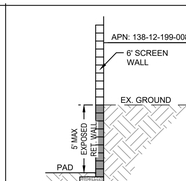
A - INTERIOR SECTION
NOT TO SCALE



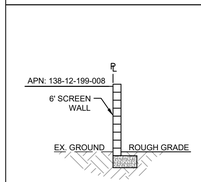
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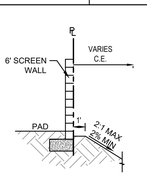
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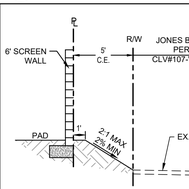
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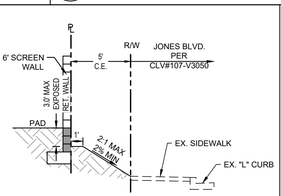
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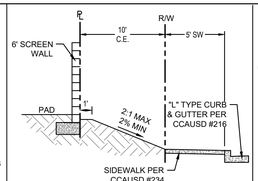
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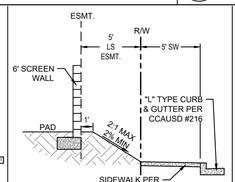
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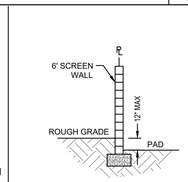
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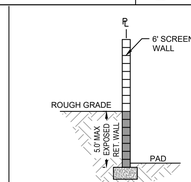
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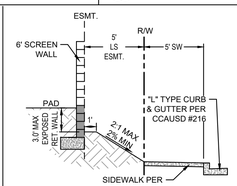
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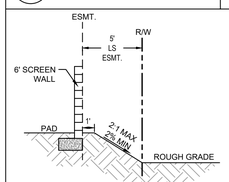
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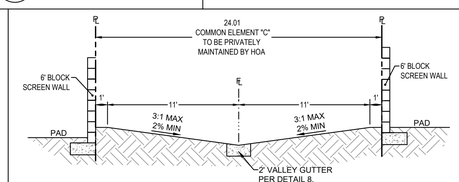
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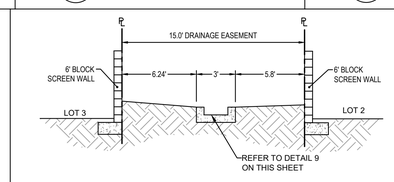
N - INTERIOR SECTION
NOT TO SCALE



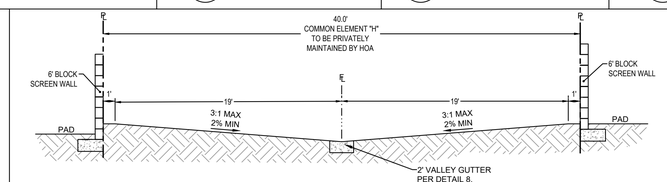
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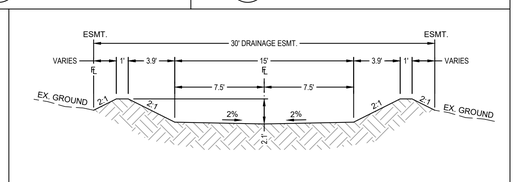
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NOT TO SCALE



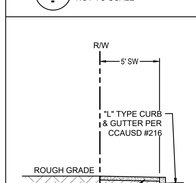
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NOT TO SCALE



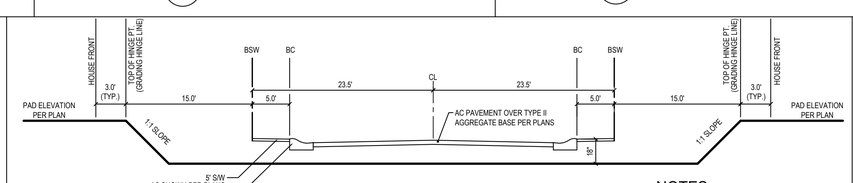
S - INTERIOR SECTION
NOT TO SCALE



T - CHANNEL SECTION
NOT TO SCALE



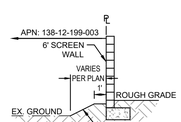
U - INTERIOR SECTION
NOT TO SCALE



V - ROUGH GRADING STREET SECTION
NOT TO SCALE - FOR CONTRACTOR REFERENCE ONLY

NOTES

1. ROUGH GRADING STREET SECTIONS ARE INTENDED FOR REFERENCE ONLY.
2. CONTRACTOR SHALL VERIFY ALL HINGE LINE LOCATIONS AND INFORMATION WITH THE DEVELOPER.



W - PERIMETER SECTION
NOT TO SCALE

NOTE:
ALL AGGREGATE BASES SHALL BE COMPACTED PER GEOTECHNICAL REPORT PW18-13003. PRELIMINARY PAVEMENT SECTIONS SHALL BE VERIFIED WITH THE FINAL PAVEMENT SECTION RECOMMENDATION REPORT (MPSR) PRIOR TO CONSTRUCTION. IF PAVEMENT SECTIONS ARE DIFFERENT, A REVISION TO THE IMPROVEMENT PLANS WILL BE REQUIRED.

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DETAIL SHEET

RANCHO JONES - UNIT 1

BEAZER HOMES

CITY OF LAS VEGAS, NEVADA

NO.	DATE	DESCRIPTION	BY



11/6/2018

DATE	11/06/2018
DRAWN	RLS
DESIGNED	ALW
CHECKED	DCL
PROJECT #	BZR011812

SHEET TITLE
DETAILS

SHEET NUMBER
C9

CLV# N/A SHEET# ---- OF ###

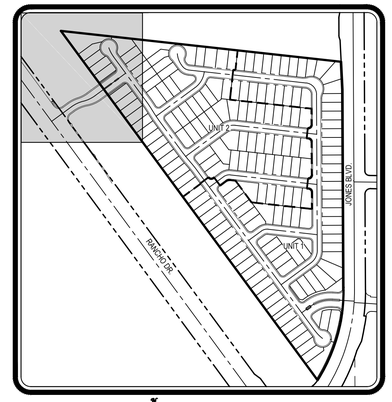
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REFERENCES

Grading and Drainage Plans (Overall Plans)







KEY MAP
SCALE: NTS

GRADING CONSTRUCTION NOTES

1. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
2. CONSTRUCT "ROLL" TYPE CURB AND GUTTER PER CCAUSD #217.2.S1
3. CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD #234
4. CONSTRUCT 8' WIDE CROSS GUTTER PER CCAUSD #228
5. CONSTRUCT ENTRY GATES PER LANDSCAPE PLANS AND DETAILS
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7. CONSTRUCT SIDEWALK RAMP PER CCAUSD #235 CASE I. "A" & "B" = 8' UNLESS OTHERWISE NOTED
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10. CONSTRUCT SIDEWALK DRAIN PER CCAUSD #236
11. 5' TRANSITION "L" CURB TO "R" CURB PER DETAIL "8" ON SHEET C9
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13. EXISTING POWER/UTILITY POLE TO BE REMOVED. RESET OR RELOCATED AS SHOWN PER NV ENERGY PLANS
14. EXISTING POWER/UTILITY POLE TO BE PROTECTED IN PLACE
15. EXISTING UTILITY TO BE ADJUSTED TO GRADE
16. INSTALL 5.5" AC OVER 13" TYPE II AGGREGATE BASE
17. CONSTRUCT WROUGHT IRON FENCE PER DETAIL "12", SHEET C9
18. CONSTRUCT 2' WIDE CONCRETE FLUME PER DETAIL "11" ON SHEET C9

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1. CONSTRUCT 48" TYPE I STORM DRAIN MANHOLE PER CCAUSD #403
2. CONSTRUCT 15' TYPE "CM" DROP INLET PER CCAUSD #422 & 421
3. INSTALL 36" CLASS III RCP (PUBLIC)

LEGEND

PROPOSED	EXISTING	
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		PRVT STREET/PROPERTY LINE
		BOUNDARY/PROPERTY LINE
		EASEMENT LINE
		CENTER LINE
		EDGE OF ASPHALT
		CURB & GUTTER
		RETAINING WALL
		SAWCUT LINE
		FLOW LINE
		GRADE BREAK
2500	(2500)	MAJOR 5' CONTOUR
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TB		TOP OF BERM
TW		TOP OF RETAINING WALL
TF		TOP OF WALL FOOTING
PRIV. ST.		PRIVATE STREET
TYP.		TYPICAL
1.00%		GRADE SLOPE
1 C9		SECTION MARKER-DETAIL NUMBER ABOVE SHEET NUMBER
		SIGHT VISIBILITY ZONE
FILL CUT		CUT / FILL LINE

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4. CONSTRUCTION OF BLOCK WALLS REQUIRE A SEPARATE BUILDING PERMIT AND APPROVAL BY THE BUILDING DEPARTMENT.

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SOILS NOTE

ALL GRADING SHALL CONFORM TO GEOTECHNICAL REPORT
BY: SOUTHWEST GEOTECHNICAL
ORIGINAL PROJECT NUMBER: 182158
DATED: APRIL 17, 2018

STORM DRAIN CONNECTIONS NOTE

WHEN CONNECTING TO EXISTING RCP, CONTRACTOR SHALL REMOVE THE EXISTING RCP TO THE NEAREST BELL CONNECTION, CONNECT NEW RCP TO EXISTING RCP AND MATCH EXISTING PIPE SLOPE.

FLOOD ZONE DESCRIPTION

THIS SITE IS LOCATED IN ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN. PER THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL 32003C2155F CLARK COUNTY, NEVADA DATED NOVEMBER 16, 2011.

FLOOD DESIGNATION PROVIDED BY FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

ESTIMATED QUANTITIES

NOTE: QUANTITIES SHOWN ARE RAW QUANTITIES AND APPROXIMATE. CONTRACTOR TO DETERMINE HIS OWN QUANTITIES FOR GRADING PURPOSES.

WORK UNDER THIS PLAN CONSTITUTES GRADING IN ACCORDANCE WITH 2012 IBC; ENGINEERING REPORTS AND CERTIFICATIONS IN CONFORMANCE WITH IBC SHALL BE FILED WITH THE CITY OF LAS VEGAS PRIOR TO CITY OF LAS VEGAS APPROVAL AT FINAL INSPECTION.

CUT:	28,295 CY
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BALANCE:	2,585 CY (FILL)

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PRIVATE STREET NOTE

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ENGINEER'S CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED UPDATED DRAINAGE STUDY CLV# N/A ON FILE WITH THE CITY OF LAS VEGAS.

DARRYL LATTIMORE, P.E. — 11/06/2018 — DATE

Call before you Dig
Avoid cutting underground utility lines, it's costly.
CALL
811
OR
1-800-227-2600

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS AND STREET LIGHT SYSTEM CONDUIT. IT'S COSTLY
CALL BEFORE YOU DIG UNDERGROUND
Call before you
Underground
1-702-432-5300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (FAST)

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
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BASIS OF BEARING

SOUTH 00°17'09" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 2, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS PER MAP RECORDED IN FILE 123, PAGE 39 OF PARCEL MAPS IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDERS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK

MONUMENT ID: 5LV002E4

RIVET & PLATE IN TOP OF CURB @ NW CORNER OF CRAIG & JONES

ELEVATION: 2,261.88 (FEET)
689.423 (METERS)

CITY OF LAS VEGAS VERTICAL CONTROL BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

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OVERALL GRADING PLAN 1
RANCHO JONES
BEAZER HOMES
CITY OF LAS VEGAS, NEVADA

NO.	DATE	DESCRIPTION	BY
A			

DARRYL C. LATTIMORE
STATE OF NEVADA
EXP: 12/31/19
CIVIL
No. 17516
PROFESSIONAL ENGINEER
11/6/2018

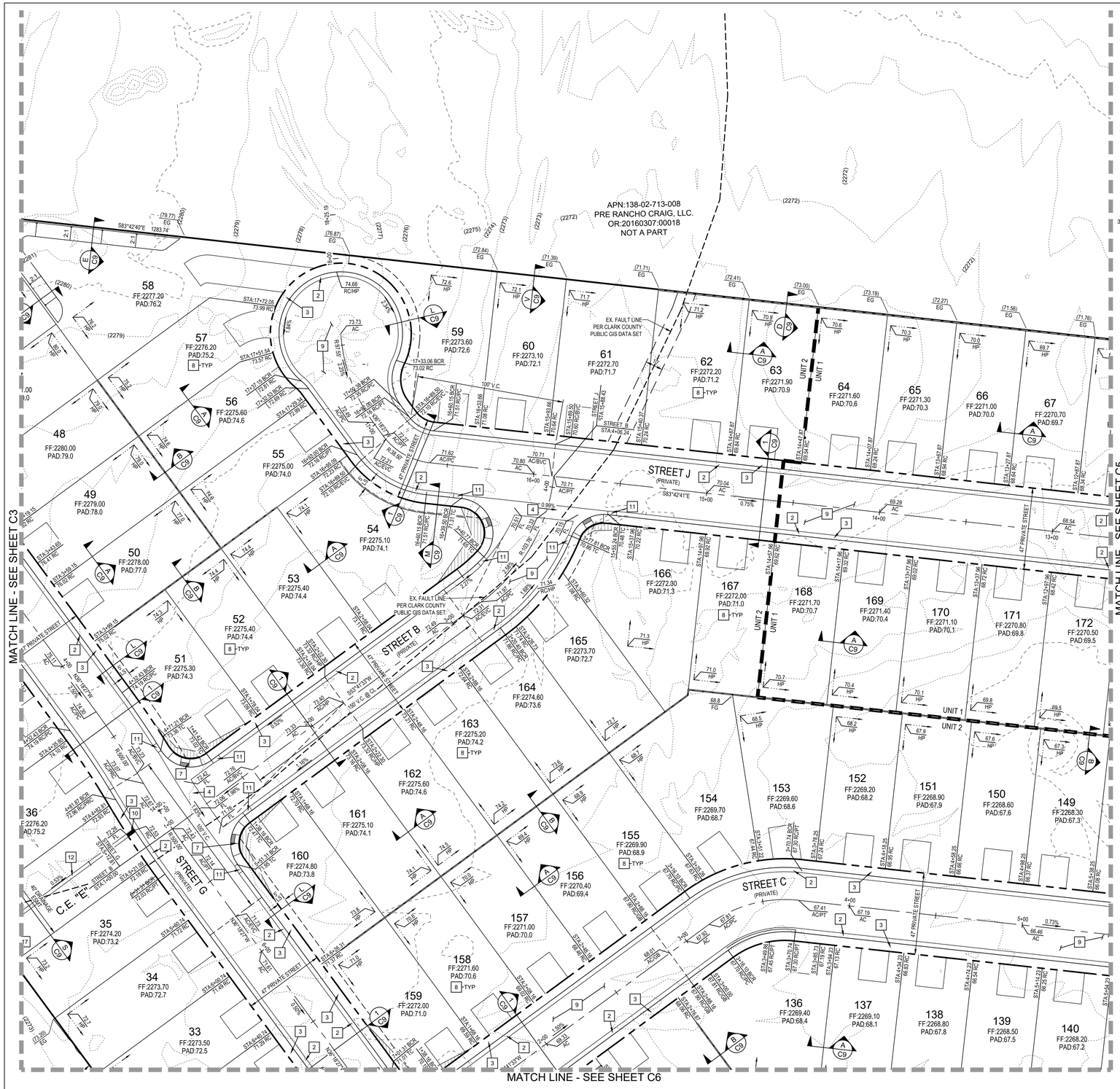
DATE	11/06/2018
DRAWN	RLS
DESIGNED	ALW
CHECKED	DCL
PROJECT #	BZR011812

SHEET TITLE
GRADING

SHEET NUMBER
C3

CLV# N/A — SHEET# 3 OF ###

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KEY MAP
SCALE: NTS

N

SCALE: 1"=30'
30 15 0 30

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BY: SOUTHWEST CEOTECHNICAL
ORIGINAL PROJECT NUMBER: 182158
DATED: APRIL 17, 2018

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11/06/2018
DARRYL LATTIMORE, P.E. — DATE

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FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (FAST)

Call before you Dig
Avoid cutting underground utility lines. It's costly.
CALL
or
1-800-227-2600

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1-702-227-2929

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SOUTH 00°17'09" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 2, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS PER MAP RECORDED IN FILE 123, PAGE 39 OF PARCEL MAPS IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDERS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK

MONUMENT ID: 5LV002E4

RIVET & PLATE IN TOP OF CURB @ NW CORNER OF CRAIG & JONES

ELEVATION: 2,261.88 (FEET)
689.423 (METERS)

CITY OF LAS VEGAS VERTICAL CONTROL BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

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OVERALL GRADING PLAN 2
RANCHO JONES
BEAZER HOMES
CITY OF LAS VEGAS, NEVADA

NO.	DATE	DESCRIPTION	BY
A			

DARRYL C. LATTIMORE
EXP: 12/31/19
CIVIL
STATE OF NEVADA
No. 17516
11/6/2018

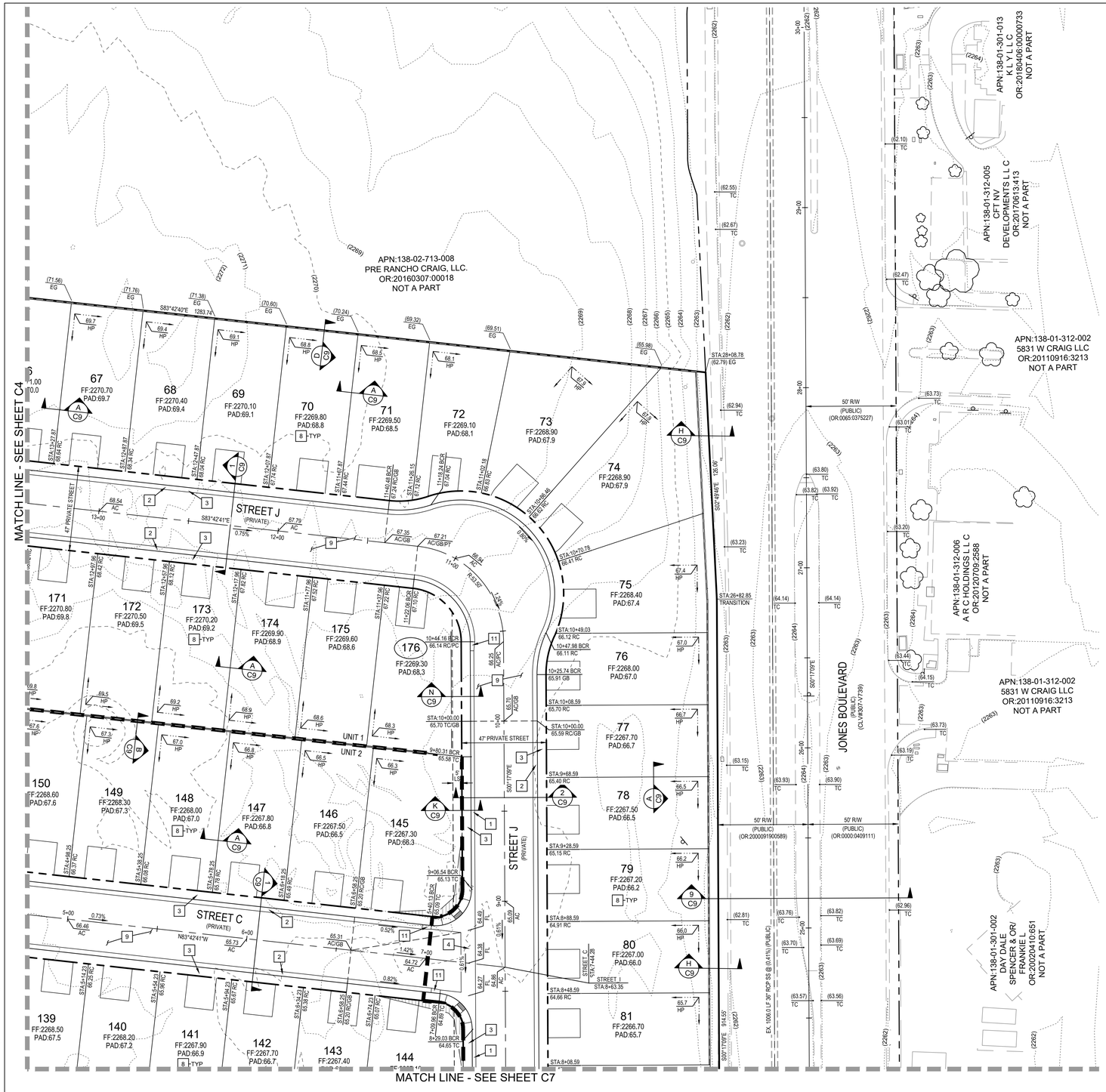
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DRAWN	RLS
DESIGNED	ALW
CHECKED	DCL
PROJECT #	BZR011812

SHEET TITLE
GRADING

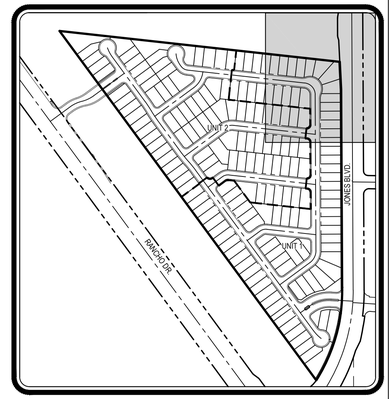
SHEET NUMBER
C4

CLV# N/A — SHEET# 4 OF ###

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KEY MAP
SCALE: NTS

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18. CONSTRUCT 2' WIDE CONCRETE FLUME PER DETAIL "11" ON SHEET C9

STORM DRAIN CONSTRUCTION NOTES

1. CONSTRUCT 48" TYPE I STORM DRAIN MANHOLE PER CCAUSD #403
2. CONSTRUCT 15' TYPE "CM" DROP INLET PER CCAUSD #422 & 421
3. INSTALL 36" CLASS III RCP (PUBLIC)

LEGEND

PROPOSED	EXISTING	
		PUBLIC ROW LINE
		PRVT STREET/PROPERTY LINE
		BOUNDARY/PROPERTY LINE
		EASEMENT LINE
		CENTER LINE
		EDGE OF ASPHALT
		CURB & GUTTER
		RETAINING WALL
		SAWCUT LINE
		FLOW LINE
		GRADE BREAK
2500	(2500)	MAJOR 5' CONTOUR
2501	(2501)	MINOR 1' CONTOUR
		SCARP (3:1 MAX)
		CONCRETE SURFACE PER PLAN
		PROPOSED ASPHALT
		REMOVE AND REPLACE EX. ASPHALT
		MATCH LINE
[98.72] XX		FUTURE GRADE TAG
(98.72) XX		EXISTING GRADE TAG
98.72 XX		PROPOSED GRADE TAG
FF		FINISHED FLOOR
RC		TOP OF "ROLL" CURB
TC		TOP OF CURB
AC		TOP OF PAVEMENT
FL		FLOW LINE GRADE
EP		EDGE OF PAVEMENT
TB		TOP OF BERM
TW		TOP OF RETAINING WALL
TF		TOP OF WALL FOOTING
PRIV. ST.		PRIVATE STREET
TYP.		TYPICAL
1.00%		GRADE SLOPE
1 C9		SECTION MARKER- DETAIL NUMBER ABOVE SHEET NUMBER
		SIGHT VISIBILITY ZONE
FILL CUT		CUT / FILL LINE

GRADING NOTES

1. ACTUS SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES IN THE PLANS OR CONDITIONS IN THE FILED.
2. FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS, THE CONTRACTOR SHALL VERIFY CROSS SLOPES FROM EXISTING PAVEMENT SAWCUT LINE TO PROPOSED EDGE OF PAVEMENT OR PROJECTED LIP OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM OR MAXIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER.
3. WALL DETAILS ARE FOR REFERENCE ONLY AND DO NOT CONSTITUTE A STRUCTURAL DESIGN.
4. CONSTRUCTION OF BLOCK WALLS REQUIRE A SEPARATE BUILDING PERMIT AND APPROVAL BY THE BUILDING DEPARTMENT.

SIGHT VISIBILITY ZONE NOTE

NO WALLS, FENCES SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAT TRAFFIC CONTROL DEVICES, FIRE HYDRANTS, TREES, AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM TOP OF CURB, OR WHERE NO CURB EXISTS, A HEIGHT OF 27 INCHES MEASURED FROM THE TOP OF ADJACENT ASPHALT, GRAVEL OR PAVEMENT STREET SURFACE. THIS RESTRICTION EXTENDS ALONG THE SIGHT VISIBILITY LINE THROUGH LANDSCAPED MEDIANS.

PLEASE REFER TO TRAFFIC SHEET ? FOR SIGHT VISIBILITY ZONE DIMENSIONS.

SOILS NOTE

ALL GRADING SHALL CONFORM TO GEOTECHNICAL REPORT
BY: SOUTHWEST GEOTECHNICAL
ORIGINAL PROJECT NUMBER: 182158
DATED: APRIL 17, 2018

STORM DRAIN CONNECTIONS NOTE

WHEN CONNECTING TO EXISTING RCP, CONTRACTOR SHALL REMOVE THE EXISTING RCP TO THE NEAREST BELL CONNECTION, CONNECT NEW RCP TO EXISTING RCP AND MATCH EXISTING PIPE SLOPE.

FLOOD ZONE DESCRIPTION

THIS SITE IS LOCATED IN ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN, PER THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL 32003C2155F CLARK COUNTY, NEVADA DATED NOVEMBER 16, 2011.

FLOOD DESIGNATION PROVIDED BY FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

ESTIMATED QUANTITIES

NOTE: QUANTITIES SHOWN ARE RAW QUANTITIES AND APPROXIMATE. CONTRACTOR TO DETERMINE HIS OWN QUANTITIES FOR GRADING PURPOSES.

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CUT:	28,295 CY
FILL:	30,880 CY
BALANCE:	2,585 CY (FILL)

DISCLAIMER NOTE

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ENGINEER'S CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED UPDATED DRAINAGE STUDY CLV# N/A ON FILE WITH THE CITY OF LAS VEGAS.

11/06/2018
DARRYL LATTIMORE, P.E. — DATE







BASIS OF BEARING

SOUTH 00°17'09" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 2, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS PER MAP RECORDED IN FILE 123, PAGE 39 OF PARCEL MAPS IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDERS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK

MONUMENT ID: 5LV002E4

RIVET & PLATE IN TOP OF CURB @ NW CORNER OF CRAIG & JONES

ELEVATION: 2,261.88 (FEET)
689.423 (METERS)

CITY OF LAS VEGAS VERTICAL CONTROL BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

Actus
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Las Vegas, NV 89120
www.Actus-NV.com
(702) 586-9266
Engineering - Surveying - Consulting - Planning

OVERALL GRADING PLAN 3

RANCHO JONES

BEAZER HOMES

CITY OF LAS VEGAS, NEVADA

#	DATE	DESCRIPTION	BY
1			

DARRYL C LATTIMORE
STATE OF NEVADA
PROFESSIONAL ENGINEER
No. 17516
EXP: 12/31/19
CIVIL
11/6/2018

DATE	11/06/2018
DRAWN	RLS
DESIGNED	ALW
CHECKED	DCL
PROJECT #	BZR011812

SHEET TITLE
GRADING

SHEET NUMBER
C5

CLV# N/A — SHEET# 5 OF ###

Plot Stamp: 11/6/2018 1:40:11 PM - Ryan Sicner
File: P:\BZR011812 - Rancho Jones\Civil_CD\BZR011812-CD-GRAD.dwg, Tab: C5 - Grading 3

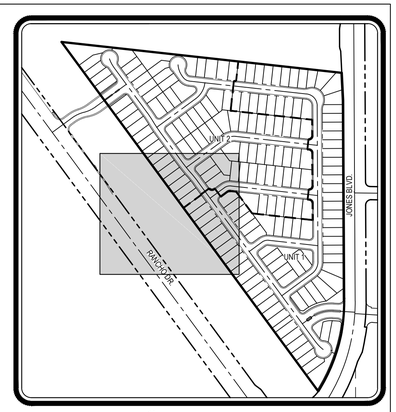
MATCH LINE - SEE SHEET C3

MATCH LINE - SEE SHEET C7

MATCH LINE - SEE SHEET C8

APN:138-02-713-008
PRE RANCHO CRAIG, LLC.
OR:20160307:00018
NOT A PART

STREET C (PRIVATE)
STREET G (PRIVATE)
47' PRIVATE STREET
RANCHO DRIVE (PUBLIC)
EX. ASPHALT S/W
EX. 125' R/W (PUBLIC) (OR:82:0254)
DAY-LIGHT
UNIT 1
UNIT 2
END SIDEWALK
START TRANSITION



KEY MAP
SCALE: NTS

SCALE: 1"=30'
30 15 0 30

GRADING CONSTRUCTION NOTES

1. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
2. CONSTRUCT "ROLL" TYPE CURB AND GUTTER PER CCAUSD #217.2.S1
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6. MATCH EXISTING ASPHALT, CURB, SIDEWALK, GUTTER, OR VALLEY GUTTER. SAWCUT CLEAN EDGE FOR CONNECTION
7. CONSTRUCT SIDEWALK RAMP PER CCAUSD #235 CASE I. "A" & "B" = 8' UNLESS OTHERWISE NOTED
8. CONSTRUCT PAD PER TYPICAL PAD SECTION DETAIL "6" ON SHEET C9
9. INSTALL 2.5" AC OVER 6.5" TYPE II AGGREGATE BASE
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14. EXISTING POWER/UTILITY POLE TO BE PROTECTED IN PLACE
15. EXISTING UTILITY TO BE ADJUSTED TO GRADE
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1.00%		GRADE SLOPE
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SOILS NOTE

ALL GRADING SHALL CONFORM TO GEOTECHNICAL REPORT
BY: SOUTHWEST GEOTECHNICAL
ORIGINAL PROJECT NUMBER: 182158
DATED: APRIL 17, 2018

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DARRYL LATTIMORE, P.E. — 11/06/2018 — DATE

Call Underground 1-702-432-5300 (AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS AND STREET LIGHT SYSTEM CONDUIT. IT'S COSTLY. CALL BEFORE YOU DIG UNDERGROUND. CALL BEFORE YOU DIG. FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (FAST))

Call before you Dig. Avoid cutting underground utility lines. It's costly. CALL 811 OR 1-800-227-2600

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

BASIS OF BEARING

SOUTH 00°17'09" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 2, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS PER MAP RECORDED IN FILE 123, PAGE 39 OF PARCEL MAPS IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDERS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK

MONUMENT ID: 5LV002E4

RIVET & PLATE IN TOP OF CURB @ NW CORNER OF CRAIG & JONES

ELEVATION: 2,261.88 (FEET)
689.423 (METERS)

CITY OF LAS VEGAS VERTICAL CONTROL BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

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Engineering - Surveying - Consulting - Planning

OVERALL GRADING PLAN 4
RANCHO JONES
BEAZER HOMES
CITY OF LAS VEGAS, NEVADA

A	11/6/2018	DESCRIPTION	BY

DARRYL C. LATTIMORE — STATE OF NEVADA — No. 17516 — EXP: 12/31/19 — CIVIL — PROFESSIONAL ENGINEER
11/6/2018

DATE	11/06/2018
DRAWN	RLS
DESIGNED	ALW
CHECKED	DCL
PROJECT #	BZR011812

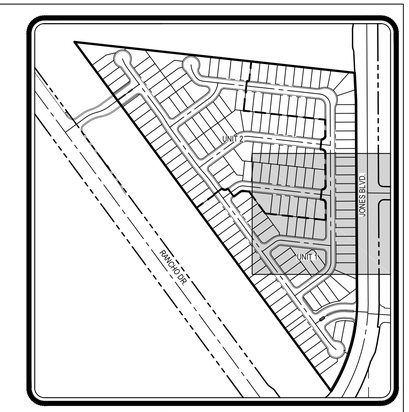
SHEET TITLE
GRADING

SHEET NUMBER
C6

CLV# N/A — SHEET# 6 OF ###

Plot Stamp: 11/6/2018 1:40:16 PM - Ryan Sicner
File: P:\BZR011812 - Rancho Jones\Civil_CD\BZR011812-CD-GRAD.dwg, Tab: C6 - Grading 4







GRADING CONSTRUCTION NOTES

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BY: SOUTHWEST GEOTECHNICAL
ORIGINAL PROJECT NUMBER: 182158
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11/06/2018
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BENCHMARK

CITY OF LAS VEGAS BENCHMARK

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Las Vegas, NV 89120
www.Actus-NV.com
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OVERALL GRADING PLAN 5
RANCHO JONES
BEAZER HOMES
CITY OF LAS VEGAS, NEVADA

#	DATE	DESCRIPTION	BY

DARRYL C. LATTIMORE — STATE OF NEVADA — PROFESSIONAL ENGINEER — No. 17516 — EXP: 12/31/19 — CIVIL
11/6/2018

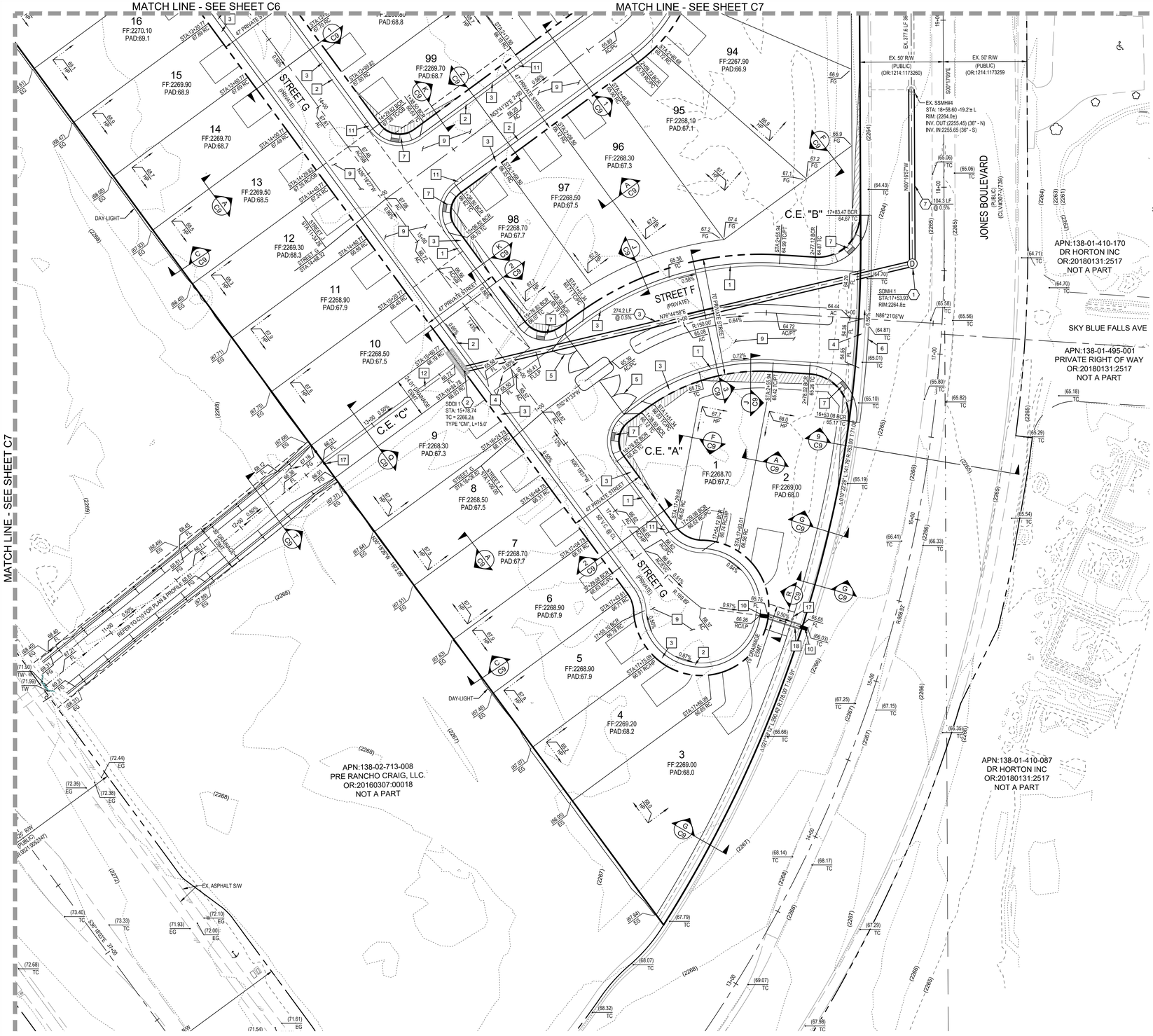
DATE	11/06/2018
DRAWN	RLS
DESIGNED	ALW
CHECKED	DCL
PROJECT #	BZR011812

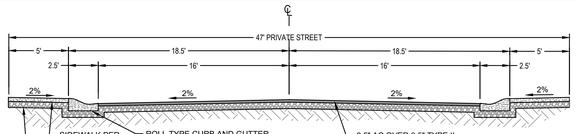
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GRADING

SHEET NUMBER
C7

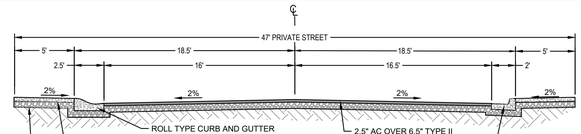
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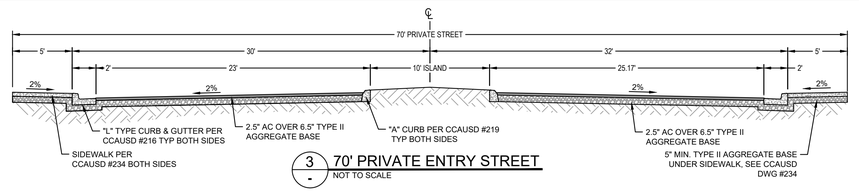

MATCH LINE - SEE SHEET C6
MATCH LINE - SEE SHEET C7
MATCH LINE - SEE SHEET C7
STREET G (PRIVATE)
STREET F (PRIVATE)
JONES BOULEVARD
(CLV/F307/1739)
EX. 50' R/W (PUBLIC) (OR:1214:1173260)
EX. 50' R/W (PUBLIC) (OR:1214:1173259)
EX. SSMH#4
STA: 16+58.60 -19.2'± L
RIM: (2264.0±)
INV. OUT:(2255.45) (36" - N)
INV. IN:2255.65 (36" - S)
SDMH 1
STA:17+53.93
RIM:2264.8±
C.E. "A"
C.E. "B"
C.E. "C"
16 FF:2270.10 PAD:69.1
15 FF:2269.90 PAD:68.9
14 FF:2269.70 PAD:68.7
13 FF:2269.50 PAD:68.5
12 FF:2269.30 PAD:68.3
11 FF:2268.90 PAD:67.9
10 FF:2268.50 PAD:67.5
9 FF:2268.30 PAD:67.3
8 FF:2268.50 PAD:67.5
7 FF:2268.70 PAD:67.7
6 FF:2268.90 PAD:67.9
5 FF:2268.90 PAD:67.9
4 FF:2269.20 PAD:68.2
3 FF:2269.00 PAD:68.0
2 FF:2269.00 PAD:68.0
1 FF:2268.70 PAD:67.7
94 FF:2267.90 PAD:66.9
95 FF:2268.10 PAD:67.1
96 FF:2268.30 PAD:67.3
97 FF:2268.50 PAD:67.5
98 FF:2268.70 PAD:67.7
99 FF:2269.70 PAD:68.7
APN:138-01-410-170
DR HORTON INC
OR:20180131:2517
NOT A PART
APN:138-01-495-001
PRIVATE RIGHT OF WAY
OR:20180131:2517
NOT A PART
APN:138-01-410-087
DR HORTON INC
OR:20180131:2517
NOT A PART
APN:138-02-713-008
PRE RANCHO CRAIG, LLC.
OR:20160307:00018
NOT A PART
SKY BLUE FALLS AVE
DAY-LIGHT
EX. ASPHALT S/W
EX. 37'± L/F 36"
EX. 24"
EX. 8" W
EX. 12" W
EX. 6" W
EX. 4" W
EX. 8" S
EX. 12" S
EX. 6" S
EX. 4" S
EX. 8" SD
EX. 12" SD
EX. 18" SD
EX. 24" SD
EX. 30" SD
EX. 36" SD
EX. 42" SD
EX. 48" SD
EX. 54" SD
EX. 60" SD
EX. 66" SD
EX. 72" SD
EX. 84" SD
EX. 96" SD
EX. 108" SD
EX. 120" SD
EX. 132" SD
EX. 144" SD
EX. 156" SD
EX. 168" SD
EX. 180" SD
EX. 192" SD
EX. 204" SD
EX. 216" SD
EX.



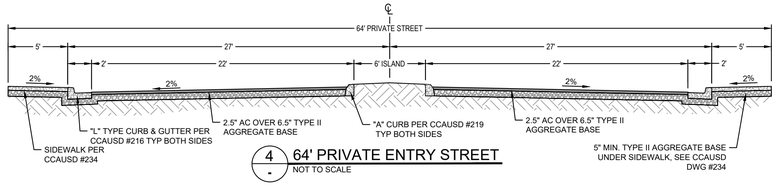
1 - 47' PRIVATE STREET
NOT TO SCALE



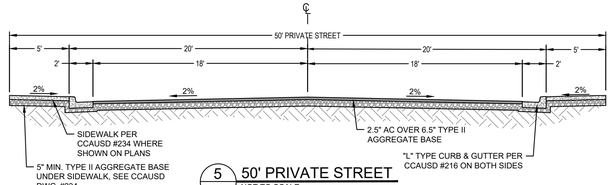
2 - 47' PRIVATE STREET
NOT TO SCALE



3 - 70' PRIVATE ENTRY STREET
NOT TO SCALE



4 - 64' PRIVATE ENTRY STREET
NOT TO SCALE



5 - 50' PRIVATE STREET
NOT TO SCALE

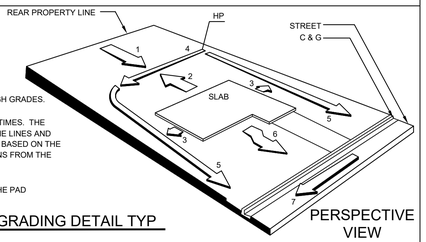
1. SLOPE FROM REAR TO SWALE (MIN. 2%)
2. SLOPE FROM HOUSE TO SWALE (MIN. 5%)
3. SLOPE FROM HOUSE TO SIDE SWALE (MIN. 5%)
4. REAR SWALE (10' MIN. FROM REAR OF HOUSE)
5. SIDE SWALE (MIN. 1%)
6. SLOPE FROM HOUSE TO BACK OF CURB (MIN. 2%)
7. SLOPE OF STREET

A. INDICATED GRADES OTHER THAN TC, FG & GUTTER FL ARE ROUGH GRADES. (0.3' LOWER THAN FINISHED GRADE).

B. THE ROUGH GRADING PLANS SHALL BE ON THE JOB SITE AT ALL TIMES. THE ROUGH GRADING SHALL BE FINISHED IN CONFORMANCE WITH THE LINES AND GRADES SHOWN ON THE PLANS. THE GRADING QUANTITIES ARE BASED ON THE ELEVATION AND DETAILS SHOWN ON THE PLANS. ANY DEVIATIONS FROM THE PLANS WILL RESULT IN QUANTITY CHANGES.

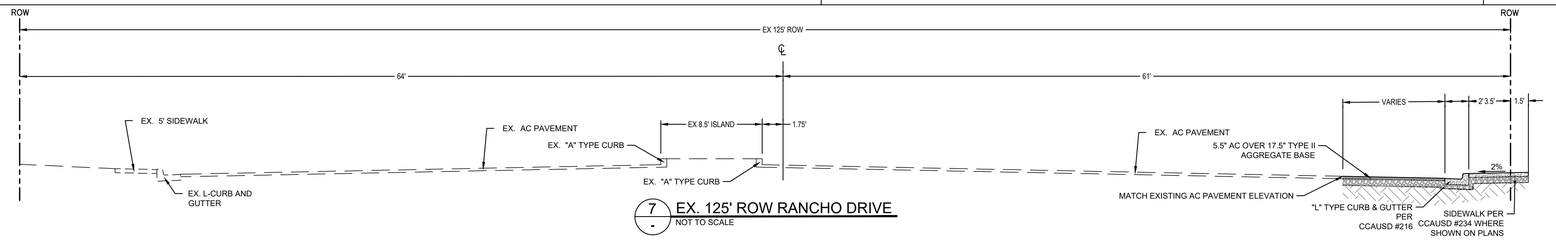
C. CARE SHALL BE EXERCISED IN GRADING CORNER LOTS.

D. ROUGH PAD ELEVATIONS SHALL BE GRADED TO WITHIN 0.3' OF THE PAD ELEVATIONS SHOWN ON THE PLANS.

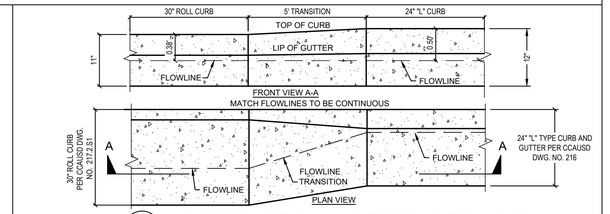


PERSPECTIVE VIEW

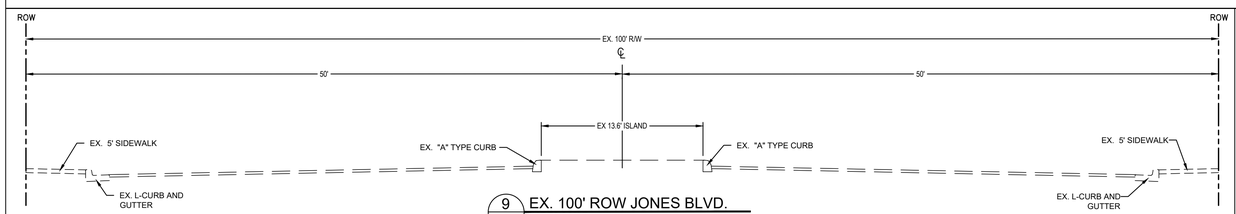
6 - TYPE "A" PAD GRADING DETAIL TYP
NOT TO SCALE



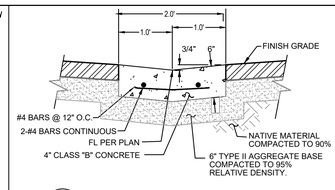
7 - EX. 125' ROW RANCHO DRIVE
NOT TO SCALE



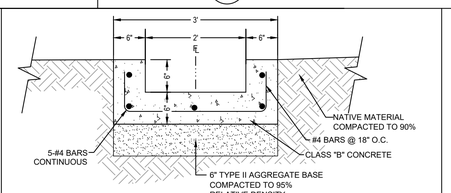
8 - 5' CURB TRANSITION - 'L' CURB TO 30" ROLL CURB
NOT TO SCALE



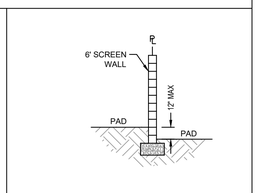
9 - EX. 100' ROW JONES BLVD.
NOT TO SCALE



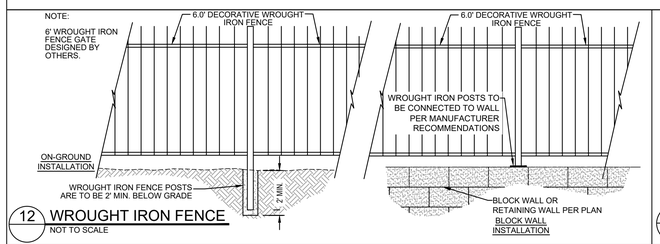
10 - 2.0' WIDE VALLEY GUTTER
NOT TO SCALE



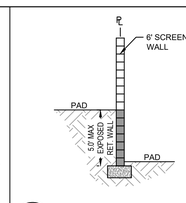
11 - 2' CONCRETE FLUME
NOT TO SCALE



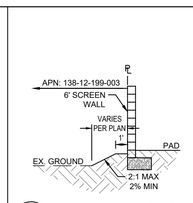
A - INTERIOR SECTION
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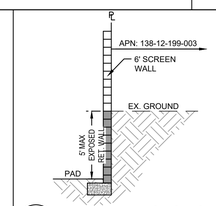
12 - WROUGHT IRON FENCE
NOT TO SCALE



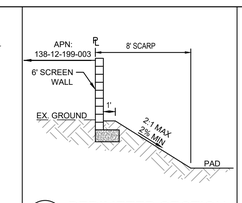
B - INTERIOR SECTION
NOT TO SCALE



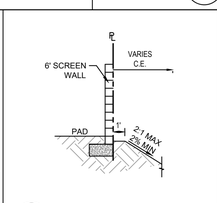
C - PERIMETER SECTION
NOT TO SCALE



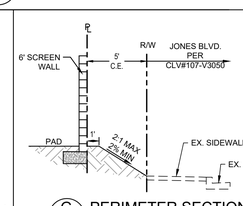
D - PERIMETER SECTION
NOT TO SCALE



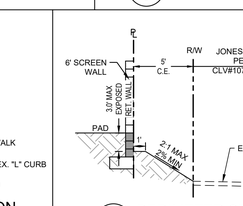
E - PERIMETER SECTION
NOT TO SCALE



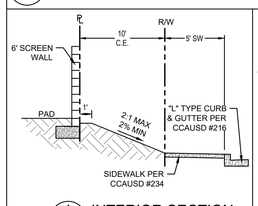
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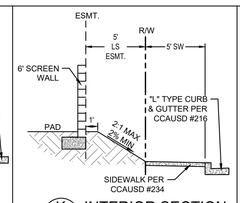
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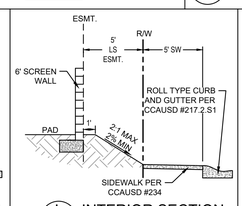
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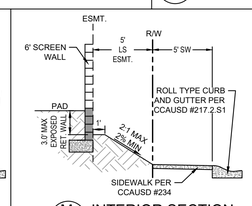
J - INTERIOR SECTION
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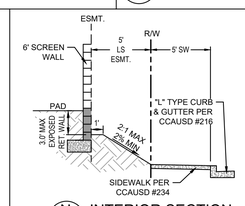
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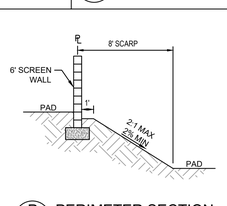
L - INTERIOR SECTION
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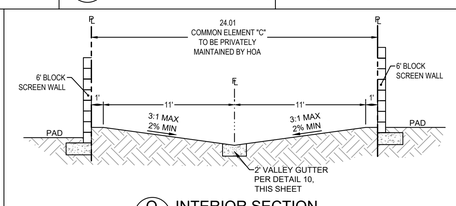
M - INTERIOR SECTION
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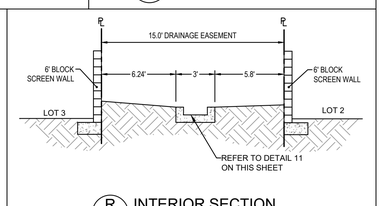
N - INTERIOR SECTION
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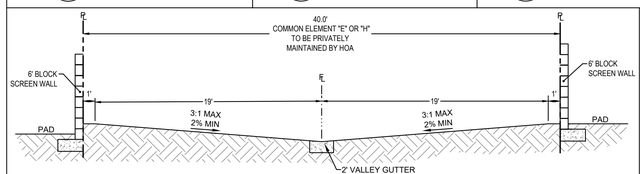
P - PERIMETER SECTION
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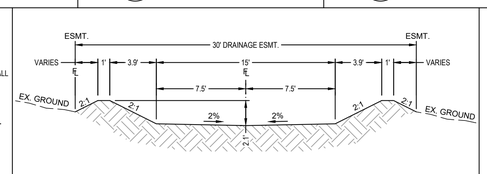
Q - INTERIOR SECTION
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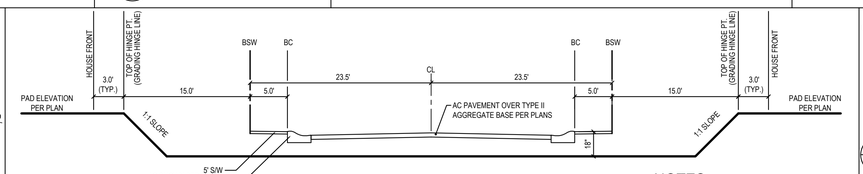
R - INTERIOR SECTION
NOT TO SCALE



S - INTERIOR SECTION
NOT TO SCALE

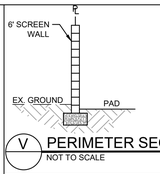


T - CHANNEL SECTION
NOT TO SCALE



U - ROUGH GRADING STREET SECTION
NOT TO SCALE - FOR CONTRACTOR REFERENCE ONLY

NOTES
1. ROUGH GRADING STREET SECTIONS ARE INTENDED FOR REFERENCE ONLY.
2. CONTRACTOR SHALL VERIFY ALL HINGE LINE LOCATIONS AND INFORMATION WITH THE DEVELOPER.



V - PERIMETER SECTION
NOT TO SCALE

NOTE:
ALL AGGREGATE BASES SHALL BE COMPACTED PER GEOTECHNICAL REPORT PW18-13003. PRELIMINARY PAVEMENT SECTIONS SHALL BE VERIFIED WITH THE FINAL PAVEMENT SECTION RECOMMENDATION REPORT (MPSR) PRIOR TO CONSTRUCTION. IF PAVEMENT SECTIONS ARE DIFFERENT, A REVISION TO THE IMPROVEMENT PLANS WILL BE REQUIRED.

Actus
3283 E. Warm Springs Rd., Suite 300
Las Vegas, NV 89120
www.Actus-NV.com
(702) 586-9286
Engineering - Surveying - Consulting - Planning

DETAIL SHEET 1

RANCHO JONES

BEAZER HOMES

CITY OF LAS VEGAS, NEVADA

BY	DESCRIPTION	DATE
A		

PROFESSIONAL ENGINEER
STATE OF NEVADA
DARRYL C. LATTIMORE
EXP: 12/31/19
CIVIL
No. 17516
11/6/2018

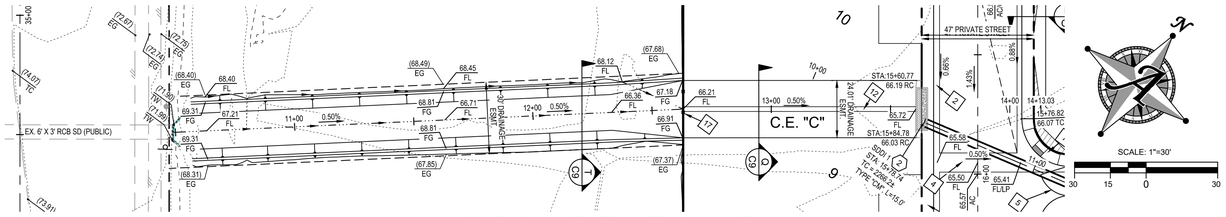
DATE	11/06/2018
DRAWN	RLS
DESIGNED	ALW
CHECKED	DCL
PROJECT #	BZR011812

SHEET TITLE
DETAILS

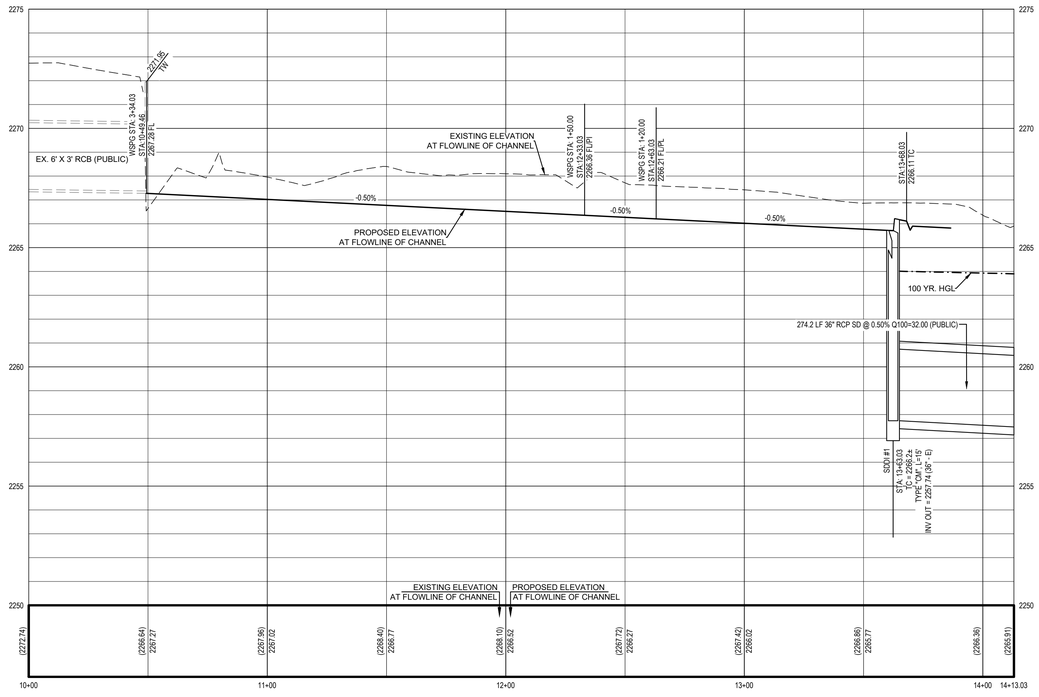
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C9

CLV# N/A SHEET# 9 OF ###

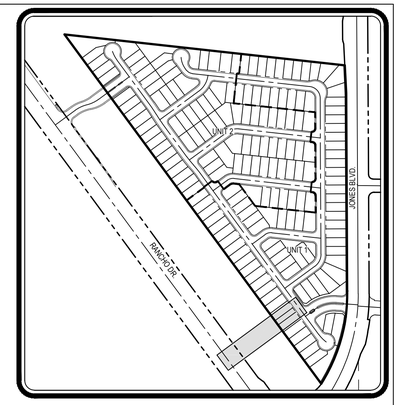
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File: P:\BZR011812 - Rancho Jones\Civil_CD\BZR011812_CD-DTLS.dwg, Tab: C9 - Detail Sheet 1



SOUTH CHANNEL (PRIVATE) - PLAN VIEW
SCALE: 1" = 30'



SOUTH CHANNEL (PRIVATE) - PROFILE VIEW
HORIZONTAL SCALE: 1" = 30' | VERTICAL SCALE: 1" = 3'



KEY MAP
SCALE: NTS

GRADING CONSTRUCTION NOTES

1. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
2. CONSTRUCT "ROLL" TYPE CURB AND GUTTER PER CCAUSD #217.2.S1
3. CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD #234
4. CONSTRUCT 8' WIDE CROSS GUTTER PER CCAUSD #228
5. CONSTRUCT ENTRY GATES PER LANDSCAPE PLANS AND DETAILS
6. MATCH EXISTING ASPHALT, CURB, SIDEWALK, GUTTER, OR VALLEY GUTTER. SAWCUT CLEAN EDGE FOR CONNECTION
7. CONSTRUCT SIDEWALK RAMP PER CCAUSD #235 CASE I. "A" & "B" = 8' UNLESS OTHERWISE NOTED
8. CONSTRUCT PAD PER TYPICAL PAD SECTION DETAIL "6" ON SHEET C9
9. INSTALL 2.5" AC OVER 6.5" TYPE II AGGREGATE BASE
10. CONSTRUCT SIDEWALK DRAIN PER CCAUSD #236
11. 5' TRANSITION "L" CURB TO "R" CURB PER DETAIL "8" ON SHEET C9
12. CONSTRUCT 2' WIDE CONCRETE VALLEY GUTTER PER DETAIL "10" ON SHEET C9
13. EXISTING POWER/UTILITY POLE TO BE REMOVED, RESET OR RELOCATED AS SHOWN PER NV ENERGY PLANS
14. EXISTING POWER/UTILITY POLE TO BE PROTECTED IN PLACE
15. EXISTING UTILITY TO BE ADJUSTED TO GRADE
16. INSTALL 5.5" AC OVER 13" TYPE II AGGREGATE BASE
17. CONSTRUCT WROUGHT IRON FENCE PER DETAIL "12", SHEET C9
18. CONSTRUCT 2' WIDE CONCRETE FLUME PER DETAIL "11" ON SHEET C9

STORM DRAIN CONSTRUCTION NOTES

1. CONSTRUCT 48" TYPE I STORM DRAIN MANHOLE PER CCAUSD #403
2. CONSTRUCT 15' TYPE "CM" DROP INLET PER CCAUSD #422 & 421
3. INSTALL 36" CLASS III RCP (PUBLIC)

LEGEND

PROPOSED	EXISTING	
		PUBLIC ROW LINE
		PRVT STREET/PROPERTY LINE
		BOUNDARY/PROPERTY LINE
		EASEMENT LINE
		CENTER LINE
		EDGE OF ASPHALT
		CURB & GUTTER
		RETAINING WALL
		SAWCUT LINE
		FLOW LINE
		GRADE BREAK
2500	(2500)	MAJOR 5' CONTOUR
2501	(2501)	MINOR 1' CONTOUR
		SCARP (3:1 MAX)
		CONCRETE SURFACE PER PLAN
		PROPOSED ASPHALT
		REMOVE AND REPLACE EX. ASPHALT
		MATCH LINE
[98.72] XX		FUTURE GRADE TAG
(98.72) XX		EXISTING GRADE TAG
98.72 XX		PROPOSED GRADE TAG
FF		FINISHED FLOOR
RC		TOP OF "ROLL" CURB
TC		TOP OF CURB
AC		TOP OF PAVEMENT
FL		FLOW LINE GRADE
EP		EDGE OF PAVEMENT
TB		TOP OF BERM
TW		TOP OF RETAINING WALL
TF		TOP OF WALL FOOTING
PRIV. ST.		PRIVATE STREET
TYP.		TYPICAL
1.00%		GRADE SLOPE
		SECTION MARKER- DETAIL NUMBER ABOVE SHEET NUMBER
		SIGHT VISIBILITY ZONE
FILL / CUT		CUT / FILL LINE

GRADING NOTES

1. ACTUS SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES IN THE PLANS OR CONDITIONS IN THE FILED.
2. FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS, THE CONTRACTOR SHALL VERIFY CROSS SLOPES FROM EXISTING PAVEMENT SAWCUT LINE TO PROPOSED EDGE OF PAVEMENT OR PROJECTED LIP OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM OR MAXIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER.
3. WALL DETAILS ARE FOR REFERENCE ONLY AND DO NOT CONSTITUTE A STRUCTURAL DESIGN.
4. CONSTRUCTION OF BLOCK WALLS REQUIRE A SEPARATE BUILDING PERMIT AND APPROVAL BY THE BUILDING DEPARTMENT.

SIGHT VISIBILITY ZONE NOTE

NO WALLS, FENCES SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAT TRAFFIC CONTROL DEVICES, FIRE HYDRANTS, TREES, AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM TOP OF CURB, OR WHERE NO CURB EXISTS, A HEIGHT OF 27 INCHES MEASURED FROM THE TOP OF ADJACENT ASPHALT, GRAVEL OR PAVEMENT STREET SURFACE. THIS RESTRICTION EXTENDS ALONG THE SIGHT VISIBILITY LINE THROUGH LANDSCAPED MEDIANS.

PLEASE REFER TO TRAFFIC SHEET ? FOR SIGHT VISIBILITY ZONE DIMENSIONS.

SOILS NOTE

ALL GRADING SHALL CONFORM TO GEOTECHNICAL REPORT
BY: SOUTHWEST GEOTECHNICAL
ORIGINAL PROJECT NUMBER: 182158
DATED: APRIL 17, 2018

STORM DRAIN CONNECTIONS NOTE

WHEN CONNECTING TO EXISTING RCP, CONTRACTOR SHALL REMOVE THE EXISTING RCP TO THE NEAREST BELL CONNECTION, CONNECT NEW RCP TO EXISTING RCP AND MATCH EXISTING PIPE SLOPE.

FLOOD ZONE DESCRIPTION

THIS SITE IS LOCATED IN ZONE "X", AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN, PER THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL 32003C2155F CLARK COUNTY, NEVADA DATED NOVEMBER 16, 2011.

FLOOD DESIGNATION PROVIDED BY FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

ESTIMATED QUANTITIES

NOTE: QUANTITIES SHOWN ARE RAW QUANTITIES AND APPROXIMATE. CONTRACTOR TO DETERMINE HIS OWN QUANTITIES FOR GRADING PURPOSES.

WORK UNDER THIS PLAN CONSTITUTES GRADING IN ACCORDANCE WITH 2012 IBC. ENGINEERING REPORTS AND CERTIFICATIONS IN CONFORMANCE WITH IBC SHALL BE FILED WITH THE CITY OF LAS VEGAS PRIOR TO CITY OF LAS VEGAS APPROVAL AT FINAL INSPECTION.

CUT:	28,295 CY
FILL:	30,880 CY
BALANCE:	2,585 CY (FILL)

DISCLAIMER NOTE

THE UNDERGROUND UTILITIES AS SHOWN HEREON HAVE BEEN LOCATED FROM OBSERVED FIELD SURVEY EVIDENCE AND EXISTING DRAWINGS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING: PLANS PROVIDED BY THE CLIENT, UTILITY COMPANIES, AND MUNICIPAL AGENCIES. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

PRIVATE STREET NOTE

ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS, AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY THE HOA.

ENGINEER'S CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED UPDATED DRAINAGE STUDY CLV# N/A ON FILE WITH THE CITY OF LAS VEGAS.

DARRYL LATTIMORE, P.E. — DATE 11/06/2018

APPROVAL

SOUTHWEST GAS CORPORATION — DATE

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT NO. BZR011812 FIRST APPROVED DATE:

LVVWD APPROVED FIRE FLOW N/A GPM AT 20 PSI RESIDUAL
MAXIMUM AVAILABLE FIRE SPRINKLER FLOW 0 GPM

SHEETS:
###

Call before you Dig
Avoid cutting underground utility lines. It's costly.
CALL 811
OR
1-800-227-2600

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

Call before you Dig
Underground
1-702-432-5300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (FAST)

BASIS OF BEARING

SOUTH 00°17'09" EAST, BEING THE BEARING OF THE EAST LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 2, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS PER MAP RECORDED IN FILE 123, PAGE 39 OF PARCEL MAPS IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDERS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK

MONUMENT ID: 5LV002E4

RIVET & PLATE IN TOP OF CURB @ NW CORNER OF CRAIG & JONES

ELEVATION: 2,261.88 (FEET)
689.423 (METERS)

CITY OF LAS VEGAS VERTICAL CONTROL BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

Actus
3283 E. Warm Springs Rd., Suite 300
Las Vegas, NV 89120
www.Actus-NV.com
(702) 586-9266
Engineering - Surveying - Consulting - Planning

SOUTH CHANNEL PLAN & PROFILE
RANCHO JONES
BEAZER HOMES
CITY OF LAS VEGAS, NEVADA

#	DATE	DESCRIPTION	BY

PROFESSIONAL ENGINEER — STATE OF NEVADA
DARRYL C. LATTIMORE
EXP: 12/31/19
CIVIL
No. 17516
11/6/2018

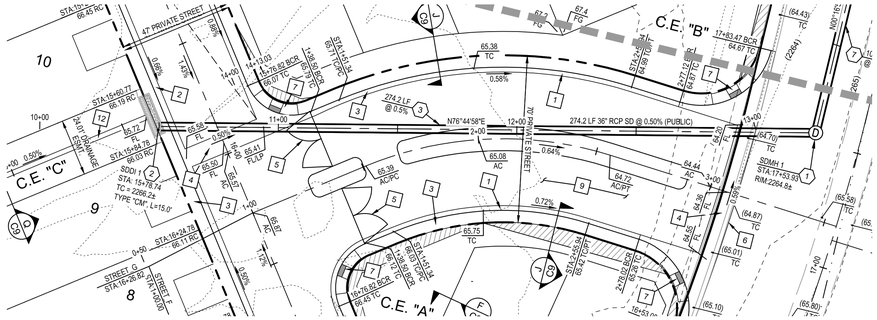
DATE	11/06/2018
DRAWN	RLS
DESIGNED	ALW
CHECKED	DCL
PROJECT #	BZR011812

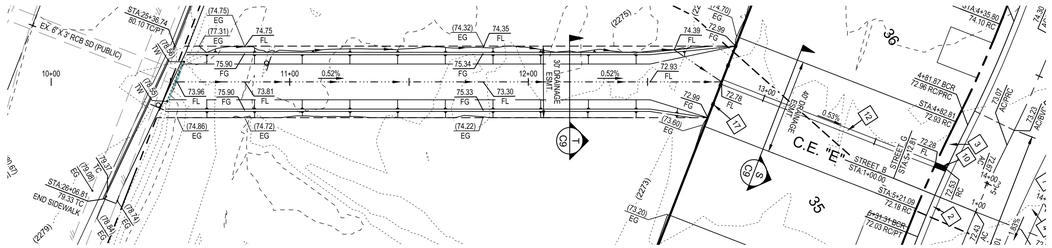
SHEET TITLE
PLAN & PROFILE

SHEET NUMBER
C10

CLV# N/A — SHEET# 10 OF ###

Plot Stamp: 11/6/2018 12:43:03 PM - Ryan Stoner
File: P:\BZR011812 - Rancho Jones\Civil_CD\BZR011812-CD-PROF.dwg, Tab: C10 - South Channel P&P


MATCH LINE - SEE BOTTOM RIGHT
C.E. "C"
C.E. "B"
C.E. "A"
47' PRIVATE STREET
70' PRIVATE STREET
STREET C
STREET F
274.2 LF 36" RCP SD @ 0.50% (PUBLIC)
SDMH 1
STA:17+53.93
RIM:2264.8±
SDDI #1
STA:15+18.14
TC = 2269.24
TYPE "CM", L=15.0'
STA:15+99.77
66.19 RC
STA:15+84.19
66.03 FC
STA:16+24.79
66.11 RC
STA:16+86.82
STA:17+01.82
STA:17+53.93
STA:18+03.93
STA:17+83.47 BCR
64.87 TC
STA:17+77.12 ECR
64.87 TC
STA:2+64.99
64.99 TC/FT
STA:2+77.12 ECR
64.87 TC
STA:17+83.47 BCR
64.87 TC
N76°44'58"E
N00°16'57"W
EX. SSMH#4
STA: 18+58.60 -19.2'± L
RIM: (2264.0±)
OUT: (2255.45) (36" - N)
INV. IN:2255.65 (36" - S)
EX. 377.6 LF 36" RCP SS @ (0.41%) (PUBLIC 15+00
(CR-12'H (11'DIA) (1960)
STA:17+53.93
RIM:2264.8±
SDMH 1
(2264)
(2265)
(64.43)
(64.70)
(64.87)
(65.01)
(65.10)
(65.38)
(65.80)
(65.88)
(65.91)
(65.93)
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(66.80)
(66.83)
(66.85)
(66.88)
(66.90)
(66.93)
(66.95)
(66.98)
(67.00)
(67.03)
(67.05)
(67.08)
(67.10)
(67.13)
(67.15)
(67.18)
(67.20)
(67.23)
(67.25)
(67.28)


EX. 6' X 3' RCB SD (PUBLIC)
STA:24+36.71
80.10 TOP/BT
10+00
11+00
12+00
13+00
0.52%
0.53%
-1.00%
-1.00%
-1.00