DS #: 4941

APN: 125-19-401-005, -006, -009, -010, -011 & 125-19-499-002

PROJECT: Agave Crest

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:

CITY OF LAS VEGAS
NEVADA

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: January 17, 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: **Agave Crest**		**COPIES TO:** Slater Hanifan Group
Cross Streets:	NWQ of Hualapai Way & Centennial Pkwy.		Richmond American Homes
File Number:	F:\Depot\DSMemos\DS4941A.doc		Bart Anderson, P.E., DevCo
Parcel Number:	125-19-401-005, -006, -009, -010, -011, & 125-19-499-002		CCPW
Zoning Action:	TMP-71539; VAC-71538; VAR-71537; ZON-71536 & WVR-71655		
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	12/18/2017	1/3/2018 & 1/16/2018	See Comments Below	$400.00	492256: $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. 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.

2. The site is adjacent to the ongoing *Clark County Beltway* project to the north and also adjacent to the jurisdiction of *Clark County* to the south. The engineer must coordinate with *Clark County Department of Public Works* (CCPW) and incorporate any concerns for boundary conditions along the north and south borders. CCPW concurrence is required prior to final acceptance of the study.

3. Per Condition #10 of TMP-71539, quote: "*Grant a 15-foot wide Transportation Trail easement adjacent to Centennial Parkway and construct trail improvements in accordance with current City standards concurrent with onsite development.*"

   However, per Detail Sections C/D-1, 17/D-2 and 18/D-2, 10'-wide Transportation Trail is shown instead of 15'. Review and revise in the next submittal.

4. *Exhibit E*: The Q_{10} of CP2 labeled as 145 cfs appears to be excessive. Review and revise accordingly.

5. Page 8 of the *Study* under *Sub-Chapter 5.4 (Summary of Ultimate Condition Street Flows)* mentioned a Section 2, however, the Section cannot be found anywhere in *Exhibit G (Ultimate Drainage Condition Map)*. Review and revise accordingly.

6. Some contour lines in OFF1, OFF2 & OFF3 in *Exhibit F* and OFF1D, OFF2D & OFF3D in *Exhibit G* do not line up at some locations (ie, broken contour lines). Review and revise accordingly.

7. The velocity for CEN1 was calculated to be 6.31 ft/s per the Flowmaster report, but is shown as 6.27 ft/s in *Exhibit G*. Revise in the next submittal.

8. The WSPG models were not included in the report therefore the HGL in the proposed storm drain cannot be checked. Please include in the next submittal.

9. On Sheet G-1 along *Wild Senna Street* the stationing jumps from 10+00 to 20+00 in 15' (measured), Look at stationing and revise in the next submittal.

10. *Sheet G-5*: Extend the storm drain a minimum of 5' to the west and cap thereon.

11. *Sheet G-6*: Provide a nominal drop inlet, lateral and a manhole at the west side of the main driveway entrance in *Centennial Parkway*. Revise the grading plan and pertinent plan & profile accordingly.

12. *Sheet G-5 & Sheet G-6*: Provide paving transition to match existing pavements at both ends of *Centennial Parkway* improvement.

13. All proposed drainage easements must be 10'-concrete lined channels. Review all pertinent grading plans and detail sections accordingly.

14. *Sheet PP-2*: Provide headwall structure at the outlet of the bleeder line for pipe protection.

15. 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.

	TC	FF shown	Min FF
Lot 62:	2739.98'	2739.50'	2740.48'

    At this location, a possible solution would be to extend the solid grouted wall to a lower top of curb elevation on the lot.

16. Private streets must be public drainage easements. Provide a note on the grading plans "Note: All private streets are P.U.E., Public Sewer Easements, and Public Drainage Easements to be privately maintained by HOA."

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

18. 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.

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: T19S/R60E/19
AREA G-19

TRANSACTION REPORT

JAN/17/2018/WED 10:13 AM

FAX(TX)

#	DATE	START T.	RECEIVER	COM.TIME	PAGE	TYPE/NOTE	FILE
001	JAN/17	10:13AM	7022845399	0:00:45	3	MEMORY OK SG3	0326

CITY OF LAS VEGAS **INTER-OFFICE MEMORANDUM**			**DATE:** **January 17, 2018**
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TECHNICAL DRAINAGE STUDY

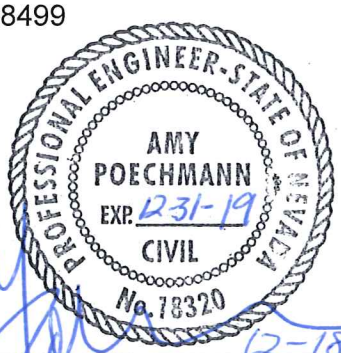
Agave Crest

City of Las Vegas, Nevada

Job No.: RAH1723.000
Date: December 2017

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

Prepared For:
Richmond American Homes
7770 Dean Martin Drive #308
Las Vegas, Nevada 89139
Phone: 702-617-8464 ▪ Fax: 702-617-8499



12-18-17

Amy Poechmann, P.E.
NV Professional Engineer No. 18320

Assisted by: Caitlyn Alcantara, E.I.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Agave Crest Date: December 2017

Location of Development:
a) Descriptive (Cross Streets): North/South: Hualapai Way
East/West: Centennial Pkwy
b) Section: 19 Township: 19S Range: 60E
c) APN: 125-19-401-011, -010, -009, -006, -005, & 125-19-499-002

Name of Owner: Richmond American Homes
Telephone No.: 702-6177-8464 Fax No.: 702-617-8499 E-mail Address: brian.walsh@mdch.com
Address: 7770 Dean Martin Drive#308 Las Vegas NV 89139

Contact Person – Name: Amy Poechmann, P.E. Telephone No.: (702) 284-5300
*E-mail Address: apoechmann@shg-inc.com Fax No.: (702) 284-5399
Firm: Slater Hanifan Group
Address: 5740 S. Arville #216 Las Vegas NV 89118

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: ±10.6 ac Being Developed/Disturbed: ±10.6 ac
2. Is a portion or all of the subject property located in a FEMA Flood Hazard Area? ☐ Yes** ☒ No
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ Yes** ☒ No
4. Proposed type of development (Residential, Commercial, Etc.): Single-Family Residential
5. Approximate upstream land area which drains to the subject site:
6. Has the site drainage been evaluated in the past? ☒ Yes** ☐ No If yes, please identify documentation: TDS for Centennial/Conquistador (HTE#06-65297), TDS for Centennial/Hualapai (HTE#06-36202)
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: All discharge to be routed to Centennial Parkway
8. Briefly describe your proposed schedule for the subject project: ASAP; single phase



Engineer's Seal 12-18-17

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

*Newly Required Field

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

Revision	Date

Local Entity File No.

REFERENCE: STANDARD FORM 1

Updated 05/01/2008

CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA
STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 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	
-	X	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.
X	-	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. Currently being pursued and will be provided with future submittal
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.)
X	-	This project uses a solid grouted stem wall (or approved alternate) at the back of sidewalk to provide erosion protection for landscaped areas where the depth of flow in the roadway exceeds the back of walk elevation. A corresponding cross-section detail is included.
X	-	Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
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.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Agave Crest	Map ID:
Firm Name: Slater Hanifan Group	Engineer: Amy Poechmann, P.E.
Address: 5740 S. Arville #216	
City: Las Vegas	State: NV Zip: 89118
Phone Number: (702) 284-5300	Fax Number: (702) 284-5399
Property Owner: Richmond American Homes	
Address: 7770 Dean Martin Drive#308	
City: Las Vegas	State: NV Zip: 89139

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.
-	N/A	Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs.
-	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.
X	-	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.
-	N/A	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.
-	N/A	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.
-	N/A	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
X	-	Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
X	-	Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, 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.
X	-	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
X	-	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

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1 INTRODUCTION

1.1 Project Overview & Study Purpose

Richmond American Homes is proposing a ±10.6 ac residential subdivision consisting of 69 residential lots identified as Agave Crest (hereafter referred to as the project site).

The purpose of this study is to provide a detailed hydrologic and hydraulic analysis for the project site is provided in order to protect the property from onsite and offsite runoff in accordance with local storm water criteria.

1.2 Description of Improvements

The project site is located within APNs 125-19-401-011, -010, -009, -006, -005, & a portion of 125-19-499-002 within Township 19 South, Range 60 East, Section 19, whose location has been shown on Exhibit A, included in Appendix A.

The project site is bound to the north by the 215 Beltway, to the east and west by undeveloped properties, and to the south by Centennial Parkway.

As well as proposed residential lots, the project site proposes half street improvements to the north half of Centennial Parkway. The lots are 6,000 square feet.

The entitlement applications (GPA-71535, TMP-71539, VAC-71538, VAR-71537, WVR-71655, and ZON-71536) are provided in Appendix F.

1.3 FEMA Flood Zone Designation

Per the FEMA FIRM Map Indexs, 32003C1750E and 32003C1745E, both dated September 27, 2002, the project site is not located within a Special Flood Hazard Area (SFHA). The project site is located within a Zone 'X' (unshaded). Zone 'X' (unshaded) is defined by FEMA as an area determined to be outside the 0.2% annual chance floodplain. The current FEMA FIRM Map, identified as Exhibit B, is included in Appendix B for reference.

1.4 CCRFCD Information

Figure F-13, from the 2013 Las Vegas Valley Flood Control Master Plan Update (MPU, Reference 1), shows that the Project site is not adjacent to any CCRFCD Facilities. Exhibit C1 and Exhibit C2 identifying the project site on the MPU figure and providing the facilities inventory, respectively, have been included in Appendix A for reference.

Per the 2008 MPU Hydrology Map, the Project Site is located within Basin BWHW1-C. This basin is intended to west then south to Basin CPHW-C. The CCRFCD 2008 MPU Figure H-13, identified as Exhibit C3, is included in Appendix A for your reference.

1.5 Referenced Studies

The following documents have been utilized as reference materials in the preparation of this drainage study. The referenced documents have been reviewed and portions determined acceptable for reference have been included in the appropriate appendix. Slater Hanifan Group concurs with all referenced and adopted hydrologic and hydraulic analyses from the studies and the results established therein.

1. The study entitled *Technical Drainage Study for Centennial/Conquistador* (hereafter referred to as the Conquistador Study), HTE#06-65297 and prepared by CVL Consultants, Inc., was referenced to establish surface and storm drain flow in Centennial Parkway. The Conquistador Study also established the future storm drain pattern to collect 10-Year flows in Centennial Parkway. Original submittals of the project proposed storm drain in Centennial Parkway south of the project site to collect flows in the south half of the road with a lateral stub for the project site's future use. An update to the Conquistador Study noted multiple utility conflicts in the south half of the street not allowing storm drain to be built. Since the Conquistador Study contributed minimally to Centennial Parkway and construction of the storm drain would be easier in the north half of the street, the update allowed for the Conquistador development to not build the Centennial Roadway storm drain adjacent to the project site. Relevant reference material from the Conquistador Study has been included in Appendix F.

2. The study entitled *Technical Drainage Study for Centennial/Hualapai* (hereafter referred to as the Hualapai Study), HTE# 06-36202 and prepared by CVL Consultants, Inc., was referenced to establish existing storm drain west of the project site. Proposed storm drain will need to be connected by adjacent properties in the future. Relevant reference material from Hualapai Study has been included in Appendix G.

2 METHODOLOGY

2.1 Compliance

The methodologies utilized in the preparation of this study are in compliance with the Clark County Regional Flood Control District's Hydrologic Criteria and Drainage Design Manual (CCRFCD Manual, Reference 2).

2.2 Hydrologic Modeling

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

Precipitation: The project site is located outside of the McCarran Airport Rainfall Area. The precipitation values utilized in the HEC-1 models, per CCRFCD Manual Figure 503 and 506, are 1.67 and 3.00 inches for the 10-year and 100-year storm events, respectively. In addition, since the drainage area of the contributing watershed is less than 8 square miles, the SDN

3 design storm distribution as taken from Table 503 in the CCRFCD Manual was used. Reference tables and figures from the CCRFCD Manual are included in Appendix B.

Soil Index: The SCS curve number loss rate methodology was utilized to approximate infiltration for the drainage basins. The soils information within the watershed was obtained from the NRCS Soil Survey of the Las Vegas Valley Area (Soil Survey, Reference 3). Exhibits D1-D3 depicts the project site boundary analyzed with this study on the soils map and have been included in Appendix A. Per the Soil Survey, the project site and all tributary areas lie within the following Soil Types:

- Soil 190 – Dalian very gravelly fine sandy loam, 2 to 4 percent slopes. This soil is comprised of 100% Hydrologic Soil Group (HSG) 'A'.
- Soil 191 – Dalian very cobbly fine sandy loam, 2 to 8 percent slopes. This soil is comprised of 100% Hydrologic Soil Group (HSG) 'A'.

Land Use: The average lot size for this project site is 6,000 square feet; therefore, the 6,000 square feet residential curve number was utilized.

An impervious curve number of 98 was used for the roadway areas. For existing areas, newly developed and desert shrub (poor) curve numbers were used to define undeveloped areas.

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

2.3 Hydraulic Modeling

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

Centennial Parkway adjacent to the project site has a right-of-way of 80-ft or more. Therefore, Centennial Parkway is required to satisfy the 10-year dry lane criteria per the CCRFCD Manual. A 19-ft dry lane, including the center turn lane, is required on both streets per Manual criteria.

Drainage Easements and Swales: The drainage easements and swales have been analyzed utilizing the Flowmaster Version 7.0 software by Haestad Methods.

Drop Inlets: Drop inlets have been evaluated as curb inlets and field grate inlets, by utilizing a balancing of weir and orifice equation with a typical CCRFCD 50% clogging factor per the CCRFCD Manual equations.

Storm Drains: The hydraulic analysis for the proposed storm drain has been performed utilizing the Water Surface and Pressure Gradient (WSPG) Hydraulic Analysis System software by the Los Angeles County Department of Public Works.

3 EXISTING DRAINAGE CONDITION

3.1 Definition of Existing Condition

The existing condition considers the site in its current mostly undeveloped state with sparse desert shrub and generally sloping in a southeasterly direction. The project site is bound by partially built Centennial Parkway to the south, the 215 Beltway to the north, and undeveloped property to the east and west. The offsite area impacting the project site extends west of the project site to Hualapai Way. An existing paved street named Darling Road travels through the project site.

Please note that the 215 Beltway is considered a hydrologic cutoff and that flow north of the 215 Beltway is assumed to not impact the project site. Flow is expected to cross Hualapai Way only at the intersection of Hualapai Way and Centennial Parkway. The offsite area contributing to Centennial Parkway is a mixture of existing developments and undeveloped property. In general, the aerial map on the existing condition exhibit shows the developments which are existing and the areas which remain undeveloped in the existing condition. The offsite area west of the site and east of Hualapai Way directly contributes flows to the project site and is mostly undeveloped with portions of newly graded land.

There is an existing storm drain system in Centennial Parkway upstream of the project site collecting 10-Year flows in the south half of the Centennial Parkway. The proposed condition considers Centennial High School, and the Centennial/Hualapai and Centennial/Conquistador developments built. Centennial Parkway is partially constructed and Darling Road is paved. The project site is composed of mostly undeveloped desert land and portions of newly graded land.

3.2 Discussion of Existing Condition

Refer to the Exhibit E – Existing Condition Drainage Map, included in Appendix A, for a detailed illustration of the existing condition drainage patterns.

Onsite: The onsite area is split into five (5) basins.

- Basin ON1 is at the southwest of the project site and flows from this basin discharge directly into Centennial Parkway.
- Basins ON2 and ON3 are south of Darling Road and flows from these basins are routed in a generally southeasterly direction.
- Basin ON4 is conveyed southeast through Basin ON2.
- Basin ON5 is north of Darling Road and flows from this basin are routed east in Darling Road.

Flows from all onsite basins end up in Centennial Parkway.

Offsite: Four (4) onsite basins are analyzed with this study. These offsite basins analyzed the flows generated by the area west of the project site, east of Hualapai Way and north of Centennial Parkway.

- Basin OFF1 is the area east of Hualapai Way and north of Centennial Parkway which impacts Centennial Parkway directly.
- Basin OFF2 is north of Basin OFF1 and flows from this basin are routed through the project site through onsite Basin ON1.
- Basin OFF3 is further north and flows from this basin are routed through the project site through onsite Basin ON2.
- Basin OFF4 is furthest north and flows from this basin are routed east through onsite Basin ON5.

Flows from all of the analyzed offsite basins end up in Centennial Parkway.

Centennial Parkway: The flows in Centennial Parkway come from the analyzed onsite and offsite basins above along with flow from the intersection of Hualapai Way and Centennial Parkway and street flows from Centennial Parkway itself. Note that the area south of Centennial Parkway generally drains southeast and does not impact Centennial Parkway.

There is a total flow rate of 227/114 cfs (Q_{100}/Q_{10}) at the intersection of Hualapai Way and Centennial Parkway based on CP13 from the Conquistador Study Future Conditions. This flow is routed east in Centennial Parkway. The street basins CNTL, CNTL1 and CNTL3 are referenced for the street flows in Centennial Parkway between Hualapai Way and the east edge of the project site. These referenced flows are algebraically added to the basins analyzed with this study to determine the total flows in Centennial Parkway. Refer to Appendix F for relevant reference material.

3.3 Summary of Existing Condition Flows

Existing condition flow rates, as determined by HEC-1 analysis, have been summarized in a table on Exhibit E of Appendix A. Refer to Appendix B for review of the applicable HEC-1 analysis. Note that the referenced flows for Centennial Parkway have been algebraically added to the total from the HEC-1 at the concentration points and are not included in the HEC-1 model itself.

4 PROPOSED DRAINAGE CONDITION

4.1 Definition of Proposed Conditions

The proposed condition considers offsite contributing areas as discussed in the existing condition. The project site is considered developed and half street improvements to the north half of Centennial Parkway adjacent to the project site are considered complete.

4.2 Discussion of Proposed Condition

Refer to the Exhibit F – Proposed Condition Drainage Map, included in Appendix A, for a detailed illustration of the proposed condition drainage patterns.

Onsite: The onsite area is analyzed as a single basin in the proposed condition (Basin ON1D). All onsite flows are routed into Centennial Parkway at the project entrance. It is acknowledged that while all of the onsite flows eventually discharged to Centennial Parkway, the flows did not all impact Centennial Parkway by the site entrance where the flows are now discharged. However, this was discussed with City of Las Vegas staff prior to design and it

was determined that the discharge of the flows into Centennial Parkway was acceptable. Please refer to Appendix F for e-mail correspondence.

Offsite: The offsite basins analyzed with this study (Basins OFF1 thru OFF4) remain generally as in the existing condition. Refer to Section 3.2 of this report for further discussion. Note that Basin OFF1 is routed directly into Centennial Parkway at the west of the project site similar to the existing condition and the remaining offsite basins (Basins OFF2 thru OFF4) are routed through the project site in three (3) separate easements and then into Centennial Parkway at the site entrance along with the onsite flows.

Centennial Parkway: The referenced flows in Centennial Parkway remain the same as in the existing condition. Refer to Section 3.2 of this report for further discussion. Note that the concentration points in Centennial Parkway have been adjusted to reflect the proposed condition so flow rates in Centennial Parkway are not the same as in the existing condition.

4.3 Summary of Proposed Condition Flows

Proposed condition flow rates, as determined by HEC-1 analysis, have been summarized in a table on Exhibit F of Appendix A. Refer to Appendix B for review of the applicable HEC-1 analysis. Note that the referenced flows for Centennial Parkway have been algebraically added to the total from the HEC-1 at the concentration points and are not included in the HEC-1 model itself.

4.4 Proposed Condition Street Flows

Refer to Exhibit F, provided in Appendix A, for an illustration and summarization of the proposed hydraulic roadway sections. The design of the onsite streets remains the same from the proposed to the ultimate condition and the ultimate condition generates higher flow rates. Therefore, the onsite streets are only analyzed in the ultimate condition. Refer to Section 5.4 of this report for further discussion of the onsite street hydraulics.

Centennial Parkway: The proposed condition of Centennial Parkway adjacent to the project site is a full build-out condition with full width street improvements in place. Flow rates are higher in the ultimate condition. However, street hydraulics computations are still provided in the proposed condition for a 10-year storm event to check if 10-year dry lane requirements are met in the proposed condition in which the storm drain in Centennial Parkway is not connected to upstream or downstream storm drain.

Centennial Parkway is a 100-ft section with L-curb and gutter and landscaping on either side. Sections CEN1, CEN2, and CEN3 have been created to analyze dry lane, flow depth, and velocity during a 10-year storm event.

- Section CEN1 illustrates the flow depth at the upstream end of Centennial Parkway before SDD#1 collects any flow.
- Section CEN2 illustrates the flow depth in Centennial Parkway after SDD#1.
- Section CEN3 illustrates the flow depth in Centennial Parkway just after flow is introduced to Centennial Parkway via Fairy Duster Street (the site entrance).

Section CEN2 applies from SDDI#1 near the west end of the project site to the site entrance near the east end of the project site and shows that dry lane is met in the proposed condition with the flows collected at SDDI#1 being conveyed in the proposed storm drain. However,

dry lane is not met for Sections CEN1 and CEN3. This is acceptable for the following reasons.

- Section CEN1 is only applicable for a short section of Centennial Parkway upstream of the proposed SDDI#1 near the west end of the project site and the proposed SDDI#1 collects enough flow so that 10-year dry lane is met in Section CEN2.
- Section CEN3 is after the site entrance and shows an 18-ft dry lane where 19-ft is required. This is considered acceptable in the proposed condition because it is a temporary condition which will be addressed by the installation of upstream storm drain and because this condition is only applicable for the short distance from the site entrance to the east end of the project site.

Section 5.4 of this report discusses the street hydraulics and dry lane in Centennial Parkway in the ultimate condition and shows that 10-year dry lane criteria is met. Therefore, the proposed condition is considered acceptable since the minor deviations from the Manual requirements will be addressed and are only temporary until the upstream infrastructure is installed to collect additional 10-year flows upstream.

4.5 Summary of Recommended Facilities

Refer to Exhibit F, provided in Appendix A, for an illustration and summary table of the existing and recommended drainage facilities. Refer to Appendix C for the drop inlet and storm drain computations.

Drop Inlets: A single drop inlet (SDDI#1) is proposed with this project site in order to collect enough flows to meet 10-year dry lane requirements in the ultimate condition for Centennial Parkway. The drop inlet is also analyzed in the proposed condition to determine the flow rate collected in the proposed condition which is higher than in the ultimate condition since the ultimate condition assumes that additional flows are collected upstream of the project site.

Storm Drain: There is a proposed 36-inch storm drain main in Centennial Parkway with a 24-inch lateral to connect the drop inlet and mainline. The system ends in a bleeder line to daylight the flows in the proposed condition. The 24-inch lateral is analyzed with the higher proposed condition flow rate. Note that the main line is not analyzed in the proposed condition because the main has a higher flow rate in the ultimate condition. The starting hydraulic grade line (HGL) for the WSPG model for the lateral (LAT) is taken from the ultimate condition WSPG model for the main. This is conservative since the flow rate in the main is higher in the ultimate condition. The lateral meets applicable Manual criteria as described in Section 2.3 of this report. Refer to Section 5.5 of this report for discussion of the storm drain main analysis for the ultimate condition.

5 ULTIMATE DRAINAGE CONDITION

5.1 Definition of Ultimate Conditions

The ultimate condition considers the project site developed as described in the proposed condition and the offsite area contributing to the onsite project site flows as developed commercial properties. Centennial Parkway is considered fully developed and all flows contributing to Centennial Parkway are considered fully developed as well.

5.2 Discussion of Ultimate Condition

Refer to the Exhibit G – Ultimate Condition Drainage Map, included in Appendix A, for a detailed illustration of the proposed condition drainage patterns.

Onsite: The onsite basin (ON1D) remains as in the proposed condition. Refer to Section 4.2 of this report for further discussion.

Offsite: The four offsite basins from the existing and proposed conditions (OFF1 thru OFF4) remains similar in this condition, but the curve numbers have been adjusted to reflect development of the offsite area. This area is analyzed with a curve number associated with a commercial land use. The zoning for this area is generally rural estate, but the commercial land use has been conservatively utilized for this area since it seems more consistent with the other developments in the area.

Centennial Parkway: The referenced flows and basins for Centennial Parkway remain the same as in the previous conditions because the CP13 flow rate from the intersection was taken from the future condition of the Conquistador Study and assumed fully developed offsites. Therefore, no adjustment to the flow rates is required.

5.3 Summary of Ultimate Condition Flows

Ultimate condition flow rates, as determined by HEC-1 analysis, have been summarized in a table on Exhibit E of Appendix A. Refer to Appendix B for review of the applicable HEC-1 analysis. Note that the referenced flows for Centennial Parkway have been algebraically added to the total from the HEC-1 at the concentration points and are not included in the HEC-1 model itself.

5.4 Summary of Ultimate Condition Street Flows

Refer to Exhibit G, provided in Appendix A, for an illustration and summarization of the proposed hydraulic roadway sections.

Section 1 has been provided to analyze the onsite streets. This section is a 49-ft onsite section with roll curb and sidewalk on either side. The section has been analyzed conservatively with the entire onsite flow from Basin ON1D. Both minimum and maximum slopes for the onsite streets have been analyzed. At the maximum slope, Section 1 shows erosive velocities, however, the flow depth overtops the curb on either end by 0.02-ft which is considered negligible.

Three 100-Year street sections were created, two to define onsite flow depths and velocities and one to define the flow depth in Centennial Parkway.

- Section 1 is a 49-ft onsite section with roll curb and sidewalk on either side.
- Section 2 is a 68.33-ft entryway street section with roll curb and sidewalk on either side.
- Section CEN is a 100-ft street section defined by the limits of the right-of-way boundary. The most conservative amount of surface flow adjacent to the project site occurs at concentration point CP3U and is utilized for Section CEN.

Both onsite sections were analyzed conservatively with the entirety of the project site flow. Two variations of Sections 1 were provided for maximum velocities and flow depths. At Section 1's maximum slope, the velocity is erosive, however, the flow depth does not overtop the adjacent sidewalk and therefore erosion resistant landscaping is not recommended.

Centennial Parkway: Centennial Parkway is a 100-ft section with L-curb and gutter and landscaping on either side. Sections CEN1, CEN2, and CEN3 have been created to analyze dry lane, flow depth, and velocity during a 10-year storm event. Dry lane criteria is met in the ultimate condition when flow is collected in the Centennial Parkway storm drain system both upstream of the project site and adjacent to the project site. Section CEN contains erosive flows therefore erosion mitigation measures are proposed along Centennial Parkway adjacent to the project site.

5.5 Summary of Recommended Facilities

Refer to Exhibit G, provided in Appendix A, for an illustration and summary of the existing and recommended drainage facilities. Refer to Appendix C for the drop inlet, storm drain and drainage easement computations.

Drainage Easements: Three (3) drainage easements are proposed along the project site's western boundary to collect offsite flow and route it into the project site. The three drainage easement sections are named with respect to the drainage easement's location on the western boundary of the project site.

- Section DEN is the northern most drainage easement and conveys the flow generated by Basin OFF4D. The velocity of flow in Section DEN are erosive but the flow is contained by the U-channel and therefore no specific erosion protection is recommended.
- Section DEM is the middle drainage easement and conveys the flow generated by Basin OFF3D. Flow is erosive in Section DEM so 6-inch rip rap is recommended for the middle drainage easement.
- Section DES is the southernmost drainage easement and conveys the flow generated by Basin OFF2D. Flow is erosive in Section DEM so 3-inch rip rap is recommended for the middle drainage easement to prevent erosion.

All three drainage easements follow a similar geometry: 10-ft wide drainage easement with a 2-ft U-channel and 3.5-ft landscaping on either side. Flows are routed from the western property line between lots into the adjacent onsite streets.

Drop Inlet: A 15-ft Type CM2 sump inlet is proposed in the north half of Centennial Parkway at the southwest corner of the project site. The inlet will convey flow into a 24-inch RCP storm drain lateral that connects to the proposed 36-inch mainline in Centennial Parkway. The drop inlet is sized to collect enough flow to meet 10-year dry lane in the ultimate condition. Refer to Appendix C for the drop inlet computations. As discussed in Section 4.5 of this report, the drop inlet and lateral collect more flow in the proposed condition so the analysis of the lateral utilizes the higher proposed condition flow rate.

Storm Drain: As discussed in Section 4.5 of this report, a 36-inch storm drain main is proposed in Centennial Parkway. A WSPG model has been provided for the storm drain main. Refer to Section 5.6 below for further discussion of the storm drain.

5.6 Analysis of Centennial Parkway Storm Drain

The Centennial Parkway mainline is comprised of three portions of storm drain: existing, proposed, the future connection of existing and proposed, and future downstream facilities.

The Conquistador Study established how flow should be collected in the Centennial Parkway storm drain for the future condition to meet 10-year dry lane criteria. Upstream of the project site, 40 cfs needs to be collected in the future by existing and future storm drain to meet dry lane criteria, 20 cfs in each the north and south half of the Centennial Parkway.

The project site and the Conquistador Study were projected to collect 10 cfs in each half of the road for a total of 60 cfs in the storm drain. However, as discussed in Section 1.5 of this report, the Conquistador development did not install any storm drain in Centennial Parkway. Therefore, this project proposes to collect a minimum of 20 cfs to meet dry lane criteria. The project site also proposes to construct the portion of the Centennial storm drain mainline south of the project site which was originally proposed by the Conquistador development.

The WSPG model CEN, depicting the Centennial storm drain mainline assumes that the future stretch of pipe connecting the existing to the proposed storm drain is constructed and that 40 cfs has been collected upstream of the project site. The project site contributes 25 cfs to the storm drain via a 24-inch lateral and 15-ft Type CM2 drop inlet (Facility P2). The downstream top-of-pipe was utilized as the starting water surface elevation.

The CCRFCD Manual storm drain facility requirements state flow velocities in the facility should be more than 3ft/s and less than 25 ft/s and maintain its hydraulic gradient line (HGL) a minimum of 1-ft below above finished grade. All CCRFCD requirements are met for the storm drain system.

6 Summary of Proposed Finished Floors

The proposed finished floors have been adequately flood protected above twice the depth of flow in the adjacent street, up to 18-inches, measured at the high side of the lot. Additionally, proposed finished floors have been elevated a minimum vertical distance above the adjacent curb of 6-inches, measured at the high side of the lot. Lots adjacent to flows turning 90 degrees are assessed with the specific energy of the approaching flows. A spreadsheet showing the finished floor analysis and the supplemental drainage easement assessments have been included in Appendix D.

7 CONCLUSIONS & RECOMMENDATIONS

1. The project site is not located within a FEMA designated SFHA.
2. Street flow in onsite and offsite streets meets CLV criteria.
3. The proposed storm drain meets applicable CLV criteria.
4. All proposed finished floor elevations meet or are flood protected to meet local City of Las Vegas minimum flood protection criteria.

5. The project's grading plan and detail sheets included in Appendix H of this study support the drainage patterns, conclusions and/or recommendations detailed in this study.

8 REFERENCES

1. *Las Vegas Valley Flood Control Master Plan Update.* PBS&J, Louis Berger Group and Parsons Brinckerhoff, October 2013.

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

3. *Soil Survey of Las Vegas Valley Area, Nevada.* U.S. Department of Agriculture, Natural Resources Conservation Services, August 2014.

4. *Technical Drainage Study for Centennial/Conquistador*, by CVL Consultants, Inc., February 2006.

5. *Technical Drainage Study for Centennial/Hualapai*, by CVL Consultants, Inc., February 2006.

LIST OF APPENDICES

Appendix A Drainage Exhibits
- Exhibit A – Location Map
- Exhibit B – FEMA FIRM Panel Map
- Exhibit C1 – CCRFCD 2013 MPU Facilities Exhibit
- Exhibit C2 – CCRFCD 2013 MPU Facilities Inventory
- Exhibit C3 – CCRFCD 2008 MPU Hydrologic Facilities
- Exhibit D – Soils Map
- Exhibit E – Existing Condition Drainage Map
- Exhibit F – Proposed Condition Drainage Map
- Exhibit G – Ultimate Condition Drainage Map

Appendix B Hydrologic Computations
- Precipitation Data
- Soil and Curve Number Data
- Standard Form 4
- HEC-1 Models

Appendix C Hydraulic Computations
- Interior Street Computations
- Proposed Condition Street Computations
- Ultimate Condition Street Computations
- Drainage Easement Computations
- Drop Inlet Computations
- WSPG Models

Appendix D Finished Floor Analyses

Appendix E City of Las Vegas Correspondence

Appendix F Entitlement Information

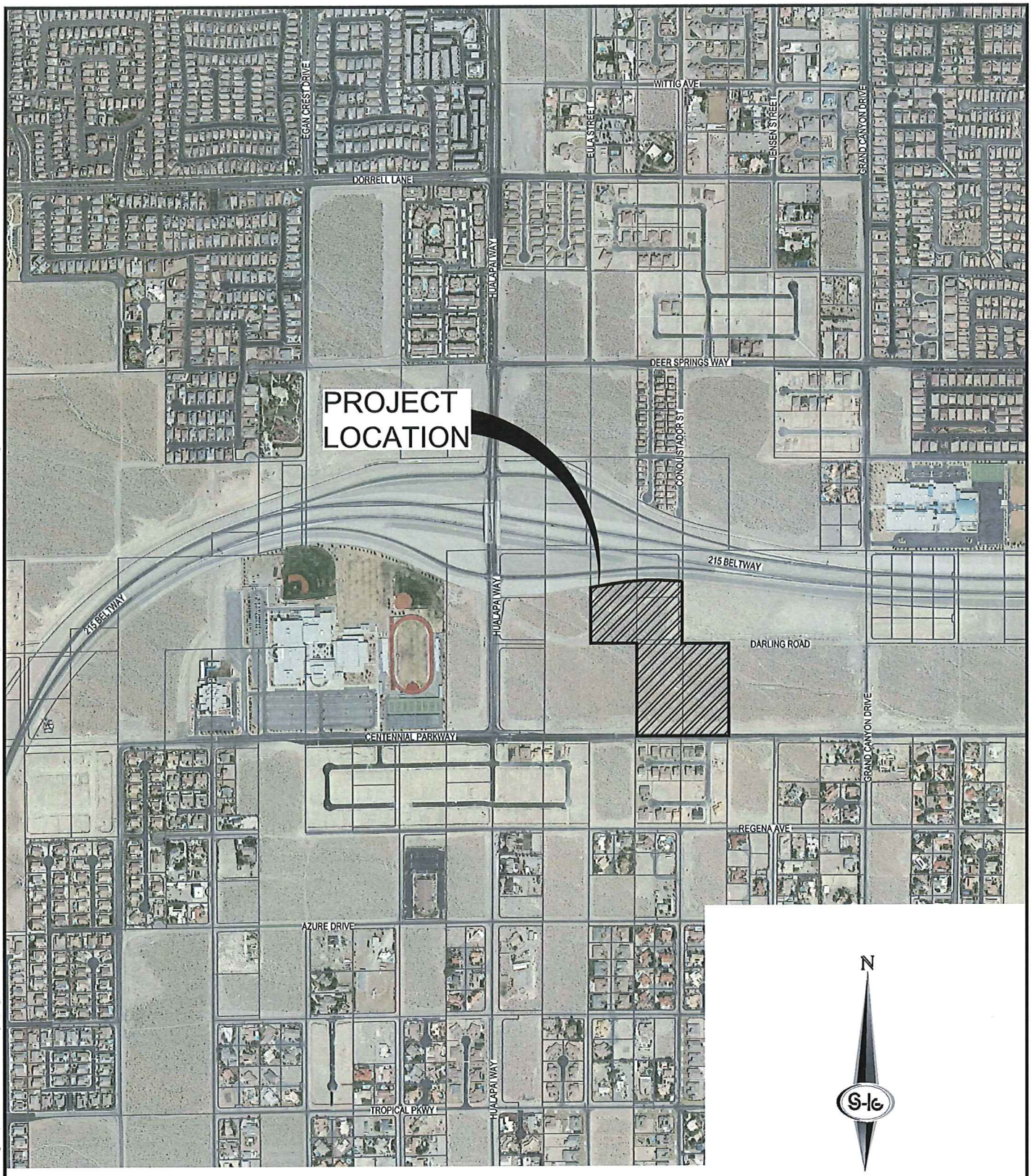
Appendix G Reference Material
Technical Drainage Study for Centennial/Conquistador,
by *CVL Consultants, Inc., (HTE#06-65297)*
- Approval Letters
- Referenced Drainage Exhibits

Appendix H Reference Material
Technical Drainage Study for Centennial/Hualapai,
by *CVL Consultants, Inc. (HTE#06-36202)*
- Approval Letter
- Referenced Improvement Plans

Appendix I Grading Plan, Profile & Detail Sheets

APPENDIX A

Drainage Exhibits



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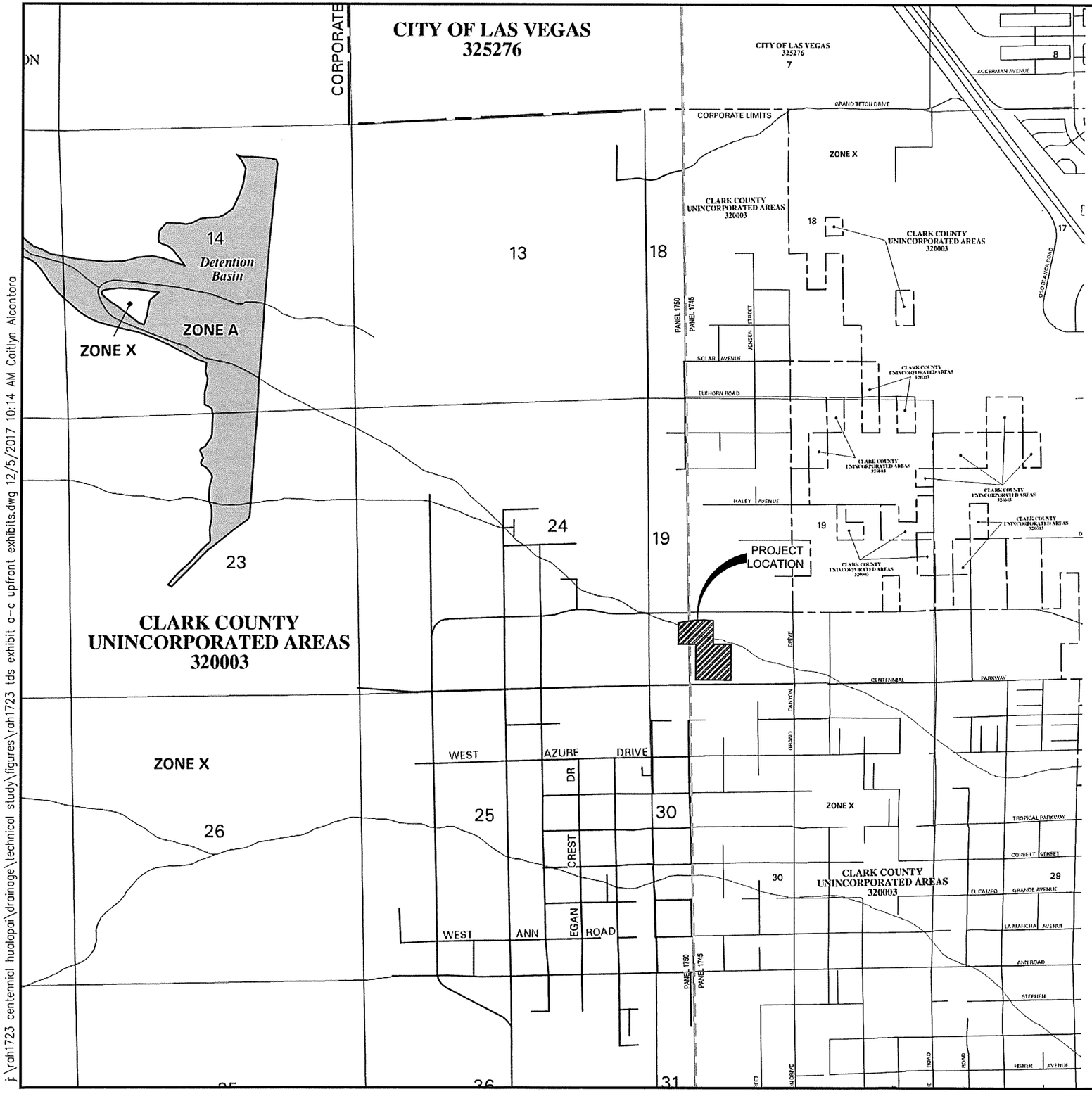
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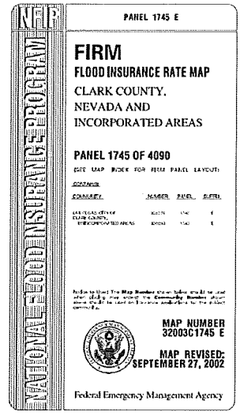
RICHMOND AMERICAN HOMES

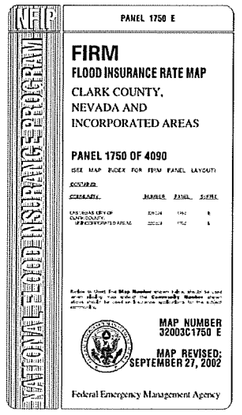
AGAVE CREST

LOCATION MAP

DATE: DEC 2017	PROJECT NO. RAH1723-000
DRAFTER: CAA	
DESIGNER: CAA	EXHIBIT A
CHECKED: ARP	SHEET 1 OF 1







LEGEND

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

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

ZONE A No base flood elevations determined.

ZONE AE Base flood elevations determined.

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

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

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

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

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

*Referenced to the North American Vertical Datum of 1988

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

MAP REPOSITORY
Refer to Repository Listing on Index Map

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

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

September 27, 2002: to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to delete special flood hazard areas, to change zone designations, to add roads and road names, to incorporate previously issued letters of map revision, to incorporate previously issued letters of map amendment, and to change floodway.

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

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

N

0 2000 4000

SCALE – 1"=2000' FEET

SLATER HANIFAN GROUP
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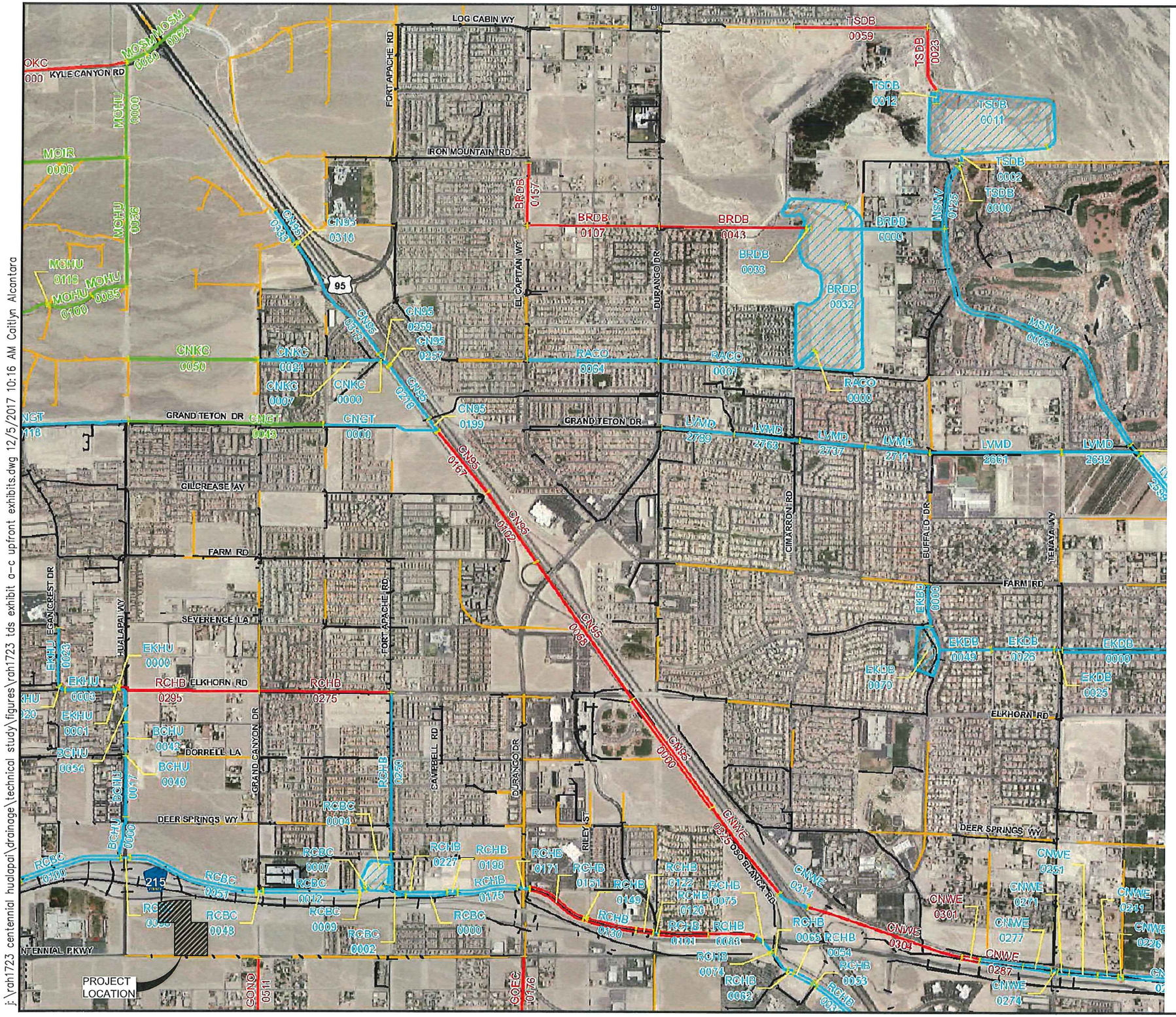
RICHMOND AMERICAN HOMES

AGAVE CREST
FEMA FIRM PANEL MAP

DATE: DEC 2017
DRAFTER: CAA
DESIGNER: CAA
CHECKED: ARP
PROJECT NO.
RAH1723-000

EXHIBIT B
SHEET 1 OF 1

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REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 13
FLOOD CONTROL FACILITIES

LEGEND

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

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

N

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



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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

RICHMOND AMERICAN HOMES
AGAVE CREST
CCRFCD MPU FACILITIES EXHIBIT

DATE:	DEC 2017
DRAFTER:	CAA
DESIGNER:	CAA
CHECKED:	ARP
PROJECT NO.	RAH1723-000

EXHIBIT C1
SHEET 1 OF 1

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ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
BCHU		BELTWAY CHANNEL - HUALAPAI						
0000	E	12' X 5' RCAP	853	501	CBA3-C	WEST3	0.84	1.11
0017	E	8' X 5' RCAP	1216	501	CBA3-C	WEST3	0.84	1.33
0040	E	66" RCP	60	222	DNW26-C	WEST3	0.51	1.04
0042	E	60" RCP	615	222	DNW26-C	WEST3	0.51	1.42
0054	E	54" RCP	770	222	DNW26-C	WEST3	0.51	1.23
BRDB		BRENT DRAINAGE SYSTEM						
0000	E	36" RCP with 18" Orifice Plate	2170	37	BRDB	WEST3	2.48	0.40
0031	E	45,080 cfs PMF Spillway		45080	CBRDB	WEST3	2.48	
0032	E	450 ac-ft South Environmental Enhancement Area		1902	CBRDB	WEST3	2.48	
0033	E	Energy Dissipator	100	957	CNW113-C	WEST3	1.58	
0043	P1	8' X 6' RCB	2920	957	CNW113-C	WEST3	1.58	2.10
0107	P1	8' X 6' RCB	2660	957	CNW113-C	WEST3	1.58	2.40
0157	P1	12' X 6' RCB	1260	741	CNW96-C	WEST3	0.95	0.25
CN95		CENTENNIAL PKWY CHANNEL WEST / U.S 95 BRANCH						
0000	P1	Conc Chnl 22'W 10'D 0:1 SS	2690	3340	CNWBB3-C	WEST3	3.35	2.17
0068	P1	3: 8' X 7' RCB	3380	3216	CNW103-C	WEST3	3.05	2.12
0102	P1	3: 8' X 6' RCB	1710	2888	2CNW89-C	WEST3	2.66	2.09
0167	P1	2: 10' X 6' RCB	1580	2160	2CNW71-E	WEST3	1.64	1.50
0199	E	2: 10' X 6' RCB	320	1423	2CNW72-C	WEST3	1.14	0.82
0218	E	15' X 9' RCB	1127	1423	2CNW72-C	WEST3	1.14	0.82
0257	E	Transition Structure	59	1423	2CNW72-C	WEST3	1.14	0.77
0259	E	15' X 9' RCB	290	653	CNW74-C	WEST3	0.44	0.77
0313	E	10' X 6' RCB	2680	653	CNW74-C	WEST3	0.44	2.50
0318	E	Transition Structure	60	653	CNW74-C	WEST3	0.44	1.50
0333	E	5' X 5' RCB	670	339	NW62-S	WEST3	0.22	1.50
CNGT		CENTENNIAL PKWY CHANNEL WEST / GRAND TETON BRANCH						
0000	E	10' X 5' RCB	2376	600	CNW71-E	WEST3	0.47	2.58
0043	P0	6' X 6' RCB	3980	600	CNW71-E	WEST3	0.47	3.00
0118	E	6' X 5' RCAP	5472	363	KYLEDET*	KYLEDB	57.73	3.72
CNKC		CENTENNIAL PKWY CHANNEL WEST / KYLE CANYON BRANCH						
0000	E	12' X 4' RCB	377	999	CNW72-C	WEST3	0.71	4.58
0007	E	10' X 5' RCB	874	999	CNW72-C	WEST3	0.71	3.28
0024	E	8' X 5' RCB	1385	999	CNW72-C	WEST3	0.71	2.40
0050	P0	84" RCP	2610	854	CNW72-C	WEST3	0.71	3.60
CNWE		CENTENNIAL PKWY CHANNEL WEST						
0150	E	Conc Chnl 40'W 9.5'D 0:1 SS	2279	4233	CNW3B3-C	WEST3	5.64	0.42
0173	E	3: 18' X 8' RCBC @ Torrey Pines	200	4233	CNW3B3-C	WEST3	5.64	0.42
0176	E	Conc Chnl 40'W 9'D 0:1 SS	150	4233	CNW3B3-C	WEST3	5.64	0.41
0189	E	Conc Chnl 36'W 10'D 0:1 SS	1200	4067	CNW2D4-C	WEST3	5.15	0.42
0200	E	Conc Chnl 36'W 9'D 0:1 SS	2470	4067	CNW2D4-C	WEST3	5.15	1.00
0226	E	2: 18' X 8.5' RCBC @ Rio Vista	100	4067	CNW2D4-C	WEST3	5.15	0.51
0241	E	Conc Chnl 36'W 9.5'D 0:1 SS	405	3951	CNW2D3-C	WEST3	4.65	0.51
0251	E	Conc Chnl 36'W 9'D 0:1 SS	575	3951	CNW2D3-C	WEST3	4.65	0.51
0271	E	Conc Chnl 32'W 10'D 0:1 SS	229	3951	CNW2D3-C	WEST3	4.65	0.51
0274	E	32' X 10' RCBC @ Tenaya	142	3951	CNW2D3-C	WEST3	4.65	0.51
0277	E	Conc Chnl 32'W 9'D 0:1 SS	579	3951	CNW2D3-C	WEST3	4.65	0.64
0287	E	Conc Chnl 13'W 10'D 2:1 SS	605	3593	CNW2B2-C	WEST3	3.84	1.19
0301	P2	Conc Chnl 32'W 10'D 0:1 SS	235	3593	CNW2B2-C	WEST3	3.84	1.19
0304	P2	32' X 10' RCB	3259	3593	CNW2B2-C	WEST3	3.84	1.79
0314	E	22' X 7' RCB	785	3593	CNW2B2-C	WEST3	3.84	1.79
0325	P1	32' X 10' RCB	2200	3593	CNW2B2-C	WEST3	3.84	1.75
EKBU		ELKHORN SPRINGS AND BUFFALO						
0000	E	60" RCP	1046	375	NW134-C	WEST3	0.46	1.00
EKDB		ELKHORN SPRINGS DETENTION BASIN						
0000	E	Grass Chnl 15'W 5.8'D 3.5:1 SS	2575	238	CNW150-C	WEST3	1.41	0.39
0025	E	4' X 3' RCB	160	120	ELKBASIN	WEST3	0.84	0.50
0026	E	48" RCP	1270	120	ELKBASIN	WEST3	0.84	1.23
0049	E	60" RCP	1095	120	ELKBASIN	WEST3	0.84	0.13
0070	E	48 ac-ft Elkhorn Springs Detention Basin		629	CNW133-C	WEST3	0.84	

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
EKHU		ELKHORN AND HUALAPAI						
0000	E	6' X 5' RCB Overflow Structure	48	638	CNW26-C	WEST3	0.51	0.91
0001	E	6' X 5' RCAP	72	638	CNW26-C	WEST3	0.51	0.91
0003	E	6' X 4' RCAP	980	638	CNW26-C	WEST3	0.51	3.61
0020	E	6' X 5' RCAP	150	638	CNW26-C	WEST3	0.51	3.61
0023	E	8' X 5' RCAP	1200	638	CNW26-C	WEST3	0.51	0.90
GOEC		GOWAN NORTH - EL CAPITAN BRANCH						
0176	P1	78" RCP	1320	363	CCPFR-C	ALLGOW3	0.46	1.15
GONO		GOWAN NORTH SYSTEM						
0511	P1	7' X 6' RCB	1320	546	CCPHW-C	ALLGOW3	0.60	1.14
LVMD		LAS VEGAS WASH - MIDDLE						
2490	E	2: 13' X 7' RCB	2555	2278	CNW168-C	CWEST3	4.69	0.40
2507	E	2: 13' X 9' RCB	2831	2278	CNW168-C	CWEST3	4.69	0.36
2525	E	24' X 8' RCB	1140	1913	CNW159-C	CWEST3	3.91	0.40
2550	E	24' X 8' RCB	1445	1664	CD161-C	CWEST3	3.41	0.40
2574	E	24' X 8' RCB	1430	1664	CD161-C	CWEST3	3.41	0.40
2599	E	Conc Chnl 24'W 7'D 2:1 SS	1577	1585	CNW162-C	CWEST3	3.08	0.50
2632	E	18' X 5' RCB	1580	968	CNW138-C	WEST3	1.16	0.46
2661	E	18' X 5' RCB	2640	968	CNW138-C	WEST3	1.16	0.46
2711	E	10' X 5' RCB	1320	968	CNW138-C	WEST3	1.16	1.54
2737	E	10' X 5' RCB	1320	818	CNW139-C	WEST3	0.93	2.22
2763	E	6' X 5' RCB	1320	818	CNW139-C	WEST3	0.93	1.79
2789	E	6' X 5' RCB	1470	818	CNW139-C	WEST3	0.93	2.17
MOHU		MOCCASIN - HUALAPAI BRANCH						
0000	P0	14' X 8' RCB	1920	761	2CNW45-N	LOWER3	2.10	0.50
0036	P0	10' X 8' RCB	2590	368	CNW45-N	LOWER3	1.15	0.50
0085	P0	72" RCP	790	368	CNW45-N	LOWER3	1.15	3.00
0100	P0	Natural Wash	850	65	DMODB1	LOWER3	0.81	3.00
0116	P0	60" RCPC	12	65	DMODB1	LOWER3	0.81	3.00
0118	P0	Natural Wash	3485	65	DMODB1	LOWER3	0.81	3.00
MOIR		MOCCASIN - IRON MOUNTAIN BRANCH						
0000	P0	66" RCP	2770	446	2CNW33-C	LOWER3	1.76	3.60
MOKC		MOCCASIN AND KYLE CANYON						
0000	P1	11' X 8' RCB	5450	2662	CNW35-C	LOWER3	2.69	3.40
MOSM		MOCCASIN AND SHEEP MOUNTAIN PARKWAY						
0000	P0	14' X 9' RCB	3370	3778	CNW84-C	LOWER3	5.32	2.40
0064	P0	14' X 8' RCB	880	3505	CNW50-C	LOWER3	4.99	3.00
0080	P0	14' X 8' RCB	710	3325	2CNW35-C	LOWER3	4.80	3.00
MSNV		MOUNTAIN SPA/VISTA RANCH						
0000	E	6: 12' X 5' RCBC @ Grand Teton	273	679	CNW163-C	CWEST3	1.67	0.40
0005	E	Grass Chnl 100'W 4.5'D 10:1 SS	6325	679	CNW163-C	CWEST3	1.67	0.40
0125	E	Grass Chnl 100'W 4.5'D 10:1 SS	1300	116	CNW147E	WEST3	1.54	0.40
RACO		RACEL STREET COLLECTOR						
0000	E	66" RCP Baffled Energy Dissipator	54	497	CNW111S	WEST3	0.55	4.20
0001	E	78" RCP	3245	497	CNW111S	WEST3	0.55	2.46
0064	E	78" RCP	2650	423	DNW111S	WEST3	0.44	2.09
RCBC		RANCHO ROAD SYSTEM - BELTWAY CHANNEL						
0000	E	6' X 5' RCB	1062	222	FADB	WEST3	1.60	1.04
0002	E	54" RCP Outlet with 41" Orifice	503	222	FADB	WEST3	1.60	2.38
0003	E	2,341 cfs PMF Spillway		2341	FADBIN	WEST3	1.60	
0004	E	76 ac-ft Fort Apache Detention Basin		1255	FADBIN	WEST3	1.60	
0007	E	Energy Dissipator	100	1255	FADBIN	WEST3	1.60	
0009	E	12' X 6' RCBC @ Fort Apache Detention Basin	133	1255	FADBIN	WEST3	1.60	1.79
0012	E	Conc Chnl 12'W 6'-7'D 0:1 SS	1937	1255	FADBIN	WEST3	1.60	3.15
0048	E	12' X 6' RCBC @ Grand Canyon	140	1040	CMNA1	WEST3	1.32	3.15
0051	E	Conc Chnl 12'W 6'-8'D 0:1 SS	2660	1040	CMNA1	WEST3	1.32	3.44
0096	E	1: 10' X 6' and 1: 6' X 6' RCBC @ Hualapai Way	190	1040	CMNA1	WEST3	1.32	1.93
0100	E	Conc Chnl 12'W 5.5'D 0:1 SS	2085	598	CDMNA1	WEST3	0.48	2.88
0140	E	Conc Chnl 10'W 5'D 0:1 SS	2155	598	CDMNA1	WEST3	0.48	1.65

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
RCHB		RANCHO ROAD SYSTEM - BELTWAY						
0034	E	Conc Chnl 21'W 8'D 0:1 SS	1000	2631	CNW1C-W	WEST3	4.68	1.19
0053	E	2: 12' X 8' RCBC @ South Ramp Connector	85	2304	CDW1C1	WEST3	4.31	1.40
0054	E	Conc Chnl 21'W 8'D 0:1 SS	432	2304	CDW1C1	WEST3	4.31	1.51
0062	E	Transition Structure	130	2304	CDW1C1	WEST3	4.31	1.51
0065	E	24' X 7' RCB	480	2304	CDW1C1	WEST3	4.31	0.30
0074	E	24' X 6' RCB	50	2226	CNWBC6-C	WEST3	4.17	0.30
0075	E	20' X 6' RCBC @ Beltway	428	2226	CNWBC6-C	WEST3	4.17	2.81
0083	P1	20' X 6' RCB	950	2226	CNWBC6-C	WEST3	4.17	2.49
0101	P1	Conc Chnl 20'W 7'D 0:1 SS	980	2226	CNWBC6-C	WEST3	4.17	2.38
0120	E	20' X 6' RCBC @ Grand Montecito	120	2226	CNWBC6-C	WEST3	4.17	1.00
0122	P1	Conc Chnl 16'-20'W 6'D 0:1 SS	350	2226	CNWBC6-C	WEST3	4.17	1.84
0130	P1	Conc Chnl 16'W 6'D 0:1 SS	1012	2226	CNWBC6-C	WEST3	4.17	2.67
0149	P1	Conc Chnl 16'W 6'-7'D 0:1 SS	87	1888	CNWBC3	WEST3	3.75	2.27
0151	P1	Conc Chnl 16'W 7'D 0:1 SS	1255	1888	CNWBC3	WEST3	3.75	2.65
0171	E	16' X 6' RCBC @ El Capitan Way	234	1888	CNWBC3	WEST3	3.75	1.75
0175	E	Conc Chnl 14'W 7'D 0:1 SS	1220	1888	CNWBC3	WEST3	3.75	2.93
0198	E	Conc Chnl 14'W 7'D 0:1 SS	225	1402	CNWBA6-C	WEST3	3.61	2.93
0227	E	12' X 6' RCB	1885	1402	CNWBA6-C	WEST3	3.61	1.02
0250	E	12' X 6' RCB	3200	1402	CNWBA6-C	WEST3	3.61	1.00
0275	P1	7' X 6' RCB	2650	973	CNW66-C	WEST3	1.75	3.30
0295	P1	7' X 6' RCB	2875	973	CNW66-C	WEST3	1.75	3.30
TSDB		TULE SPRINGS DRAINAGE SYSTEM						
0000	E	2: 10' X 4' RCBC @ Echo Grande	100	26	TULEDB	WEST3	1.35	1.04
0002	E	36" RCP with 22" Orifice Plate	320	26	TULEDB	WEST3	1.35	0.33
0010	E	14,013 cfs PMF Spillway		14013	CTULEDB	WEST3	1.35	
0011	E	117 ac-ft North Environmental Enhancement Area		804	CTULEDB	WEST3	1.35	
0012	E	Energy Dissipator	260	376	CNW148-C	WEST3	0.52	
0023	P1	84" RCP	1320	376	CNW148-C	WEST3	0.52	0.80
0059	P1	78" RCP	2640	376	CNW148-C	WEST3	0.52	1.03

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

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

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

REGIONAL FLOOD CONTROL DISTRICT

2013 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

FACILITY INVENTORY FIGURE F - 13

LEGEND

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

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

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

Construction Features

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

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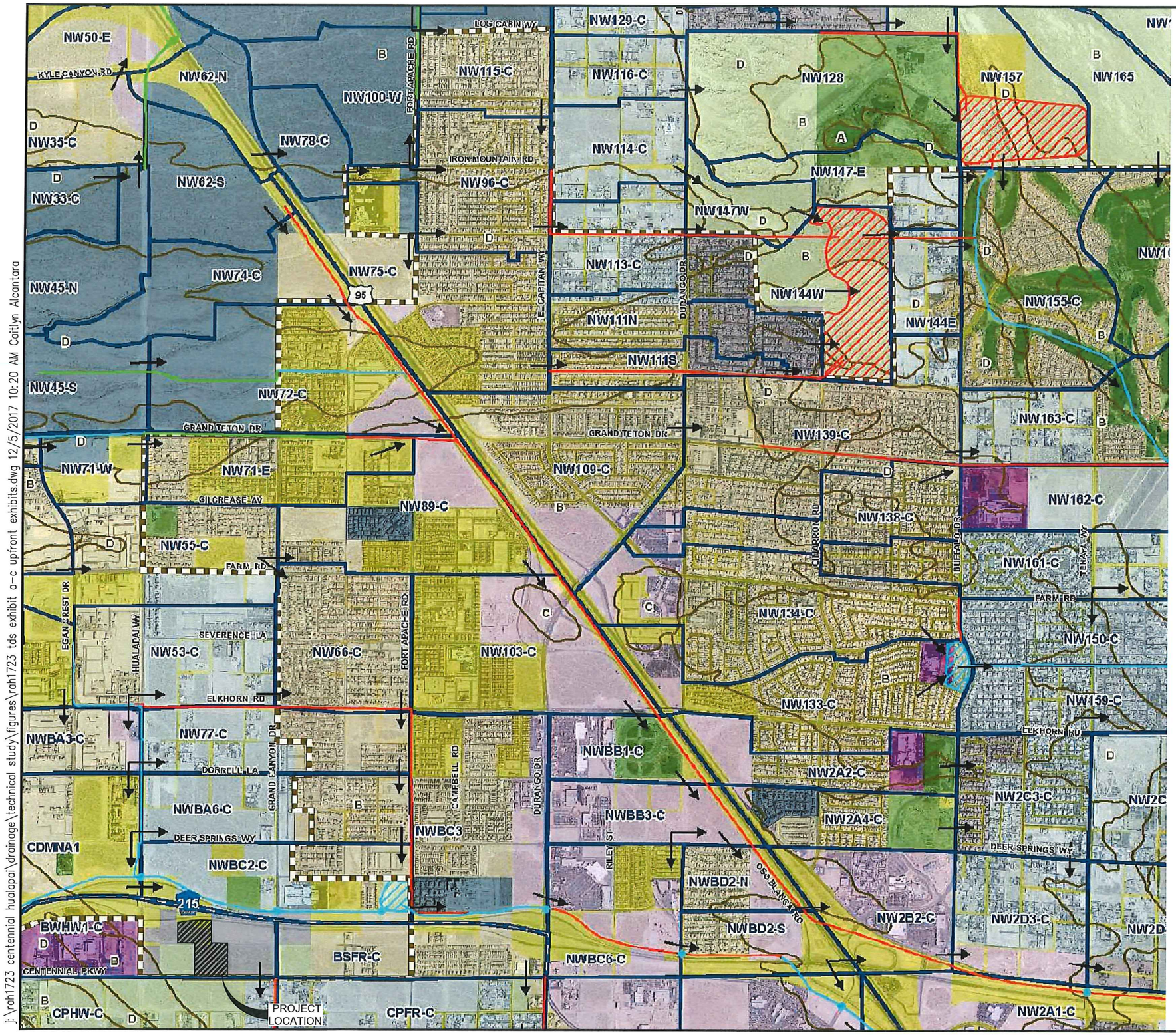
NO.	DESCRIPTION	DATE	BY	APP. DATE	APP

RICHMOND AMERICAN HOMES
AGAVE CREST
CCRFCD MPU FACILITIES INVENTORY

DATE: DEC 2017
DRAFTER: CAA
DESIGNER: CAA
CHECKED: ARP
PROJECT NO. RAH1723-000

EXHIBIT C2
SHEET 1 OF 1

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REGIONAL FLOOD CONTROL DISTRICT

2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE H-13
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

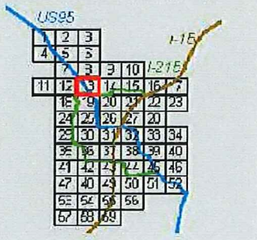
Typical Land Use

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, Resicential
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)



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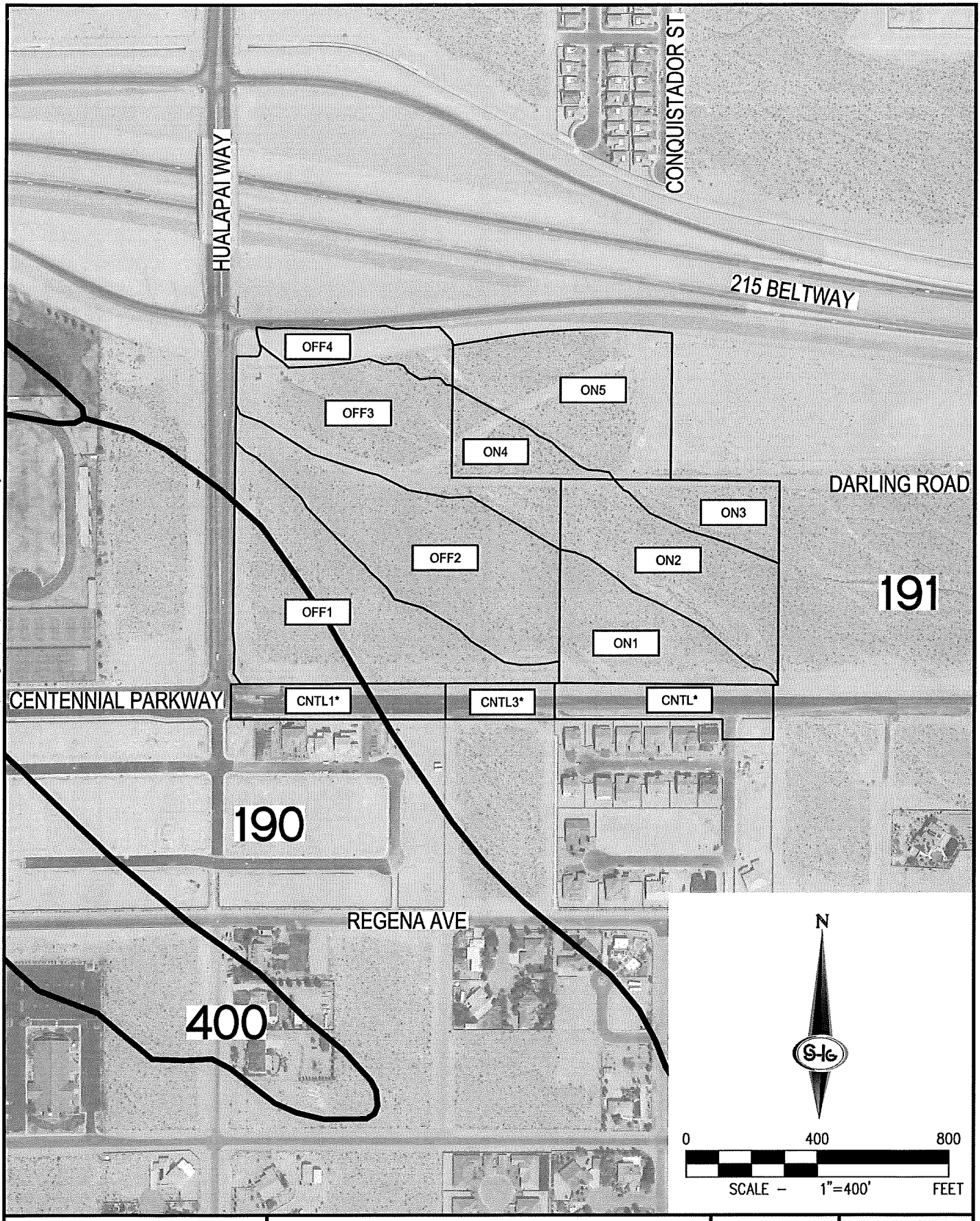
NO.	DESCRIPTION	DATE	BY	APP. DATE	APP

RICHMOND AMERICAN HOMES
AGAVE CREST
CCRFCD MPU HYDROLOGIC FACILITIES

DATE:	DEC 2017
DRAFTER:	CAA
DESIGNER:	CAA
CHECKED:	ARP
PROJECT NO.	RAH1723-000

EXHIBIT C3
SHEET 1 OF 1

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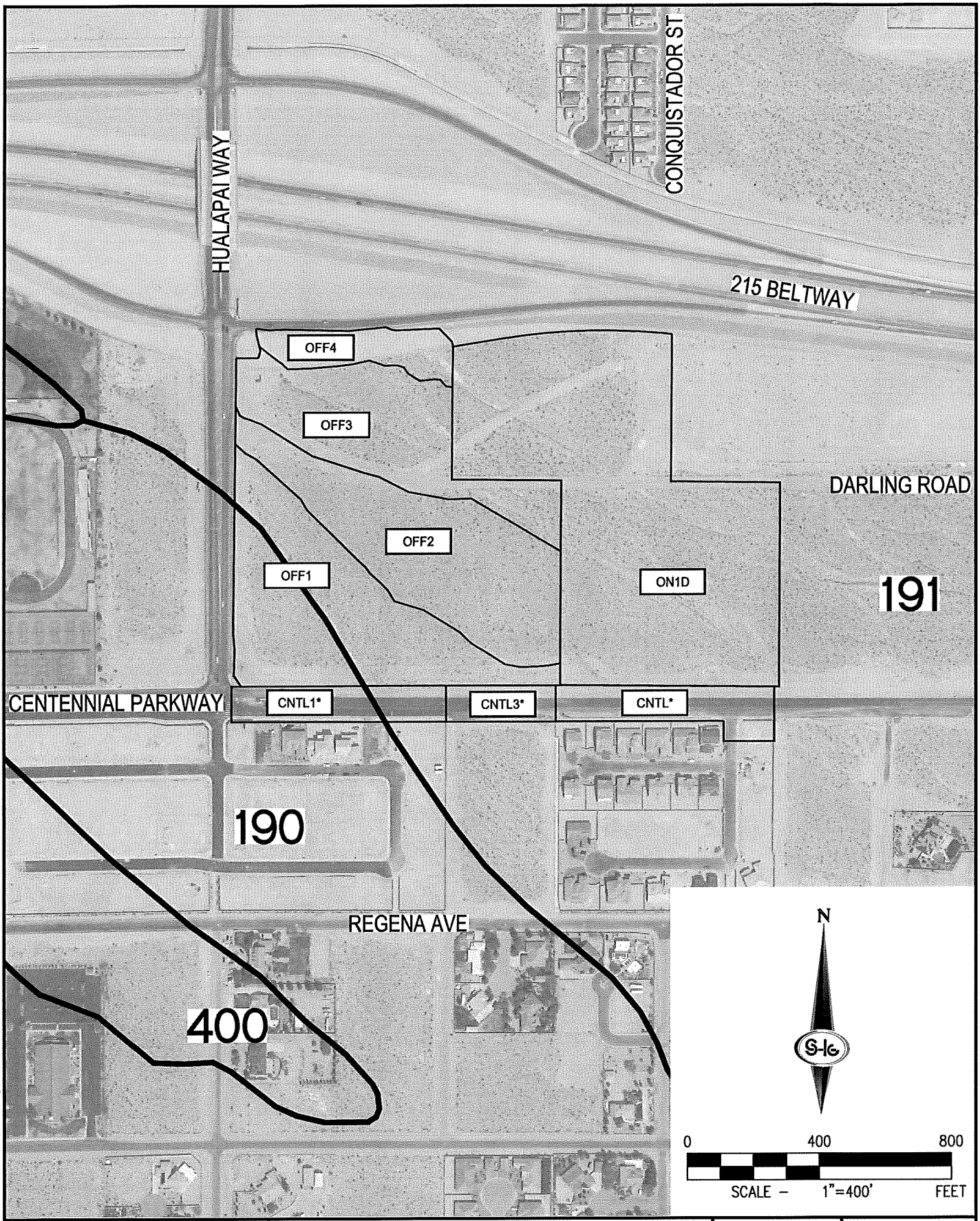
RICHMOND AMERICAN HOMES

AGAVE CREST

EXISTING CONDITION SOILS MAP

DATE: DEC 2017	PROJECT NO. RAH1723-000
DRAFTER: CAA	
DESIGNER: CAA	EXHIBIT D1
CHECKED: ARP	SHEET 1 OF 1

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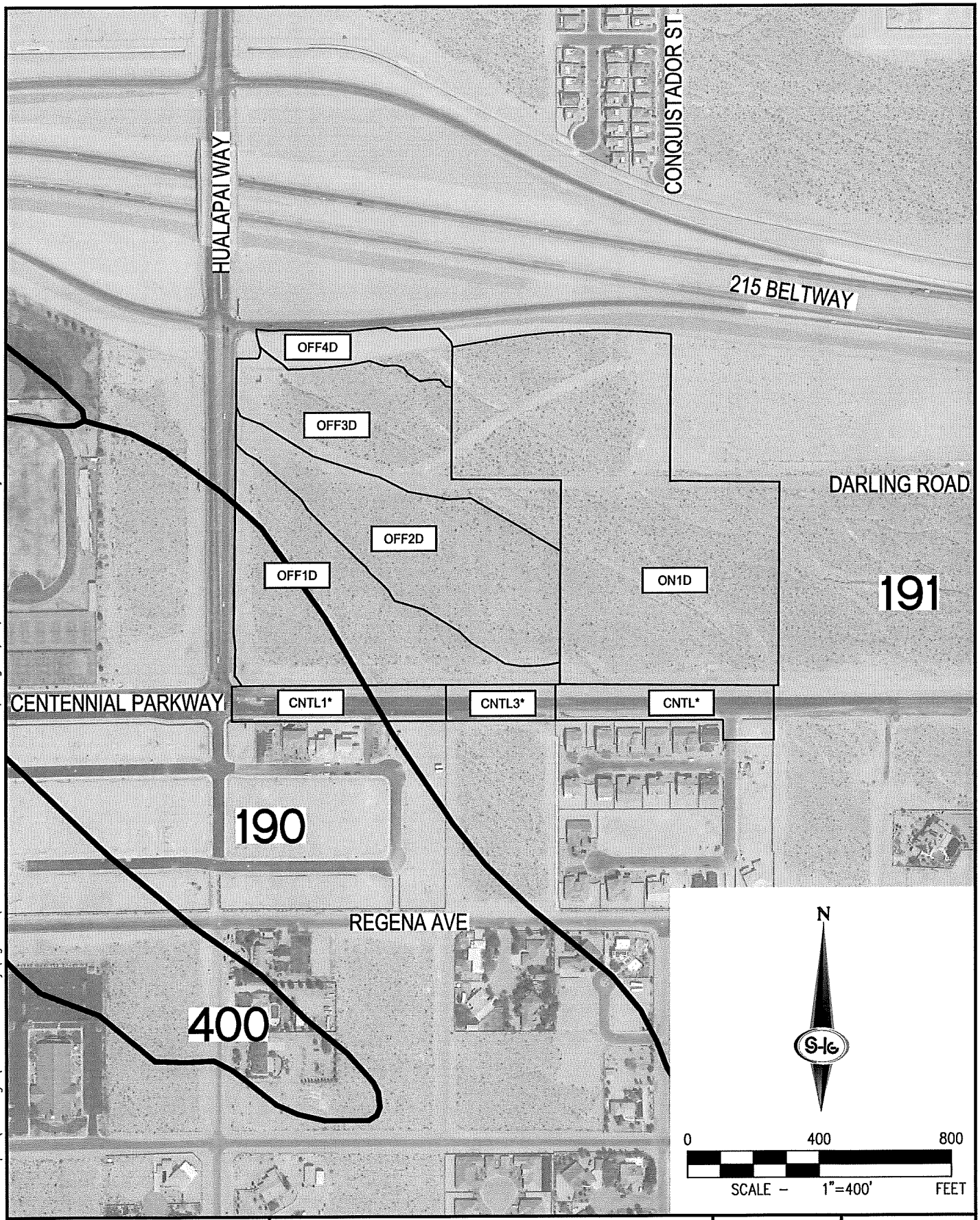
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RICHMOND AMERICAN HOMES

AGAVE CREST

PROPOSED CONDITION SOILS MAP

DATE: DEC 2017	PROJECT NO. RAH1723-000
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DESIGNER: CAA	EXHIBIT D2
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RICHMOND AMERICAN HOMES

AGAVE CREST

ULTIMATE CONDITION SOILS MAP

DATE: DEC 2017	PROJECT NO. RAH1723-000
DRAFTER: CAA	
DESIGNER: CAA	EXHIBIT D3
CHECKED: ARP	SHEET 1 OF 1

215 BELTWAY

HUALAPAI WAY

DARLING ROAD

CENTENNIAL PARKWAY

CENTENNIAL
HIGH SCHOOL
(HTE# 97-28895)

CENTENNIAL
AND HUALAPAI
(HTE# 06-36202)

CENTENNIAL AND
CONQUISTADOR
(HTE# 06-35297)

OFF4

OFF3

OFF2

OFF1

ON5

ON4

ON3

ON2

ON1

CP13*

CP2

CP1

CNTL1*

CNTL3*

CNTL*

EXISTING STORM DRAIN

N

0 100 200

SCALE — 1"=100' FEET

LEGEND

	BASIN BOUNDARY
ID	BASIN ID
(ID)	CONCENTRATION POINT ID
	FLOW DIRECTION
	EXISTING STORM DRAIN FACILITY

Existing Condition Flow Rate Summary

Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
ON1	3.4	2	<1
ON2	4.3	3	<1
ON3	1.7	1	<1
ON4	1.6	1	<1
ON5	5.1	5	<1
OFF1	7.3	5	<1
OFF2	6.8	4	<1
OFF3	5.3	5	1
OFF4	1.6	2	<1
CNTL1*	1.5	6	3
CNTL3*	0.78	3	2
CNTL*	1.91	8	4
CP13*	N/A	227	114
CP1 Q = CP13* + CNTL1* + CNTL3* + CNTL* + OFF1 + OFF2 + ON1	N/A	256	135
CP2 Q = CP1 + OFF3 + ON2 + ON4	N/A	266	145

*Referenced from Centennial / Conquistador Study

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RICHMOND AMERICAN HOMES

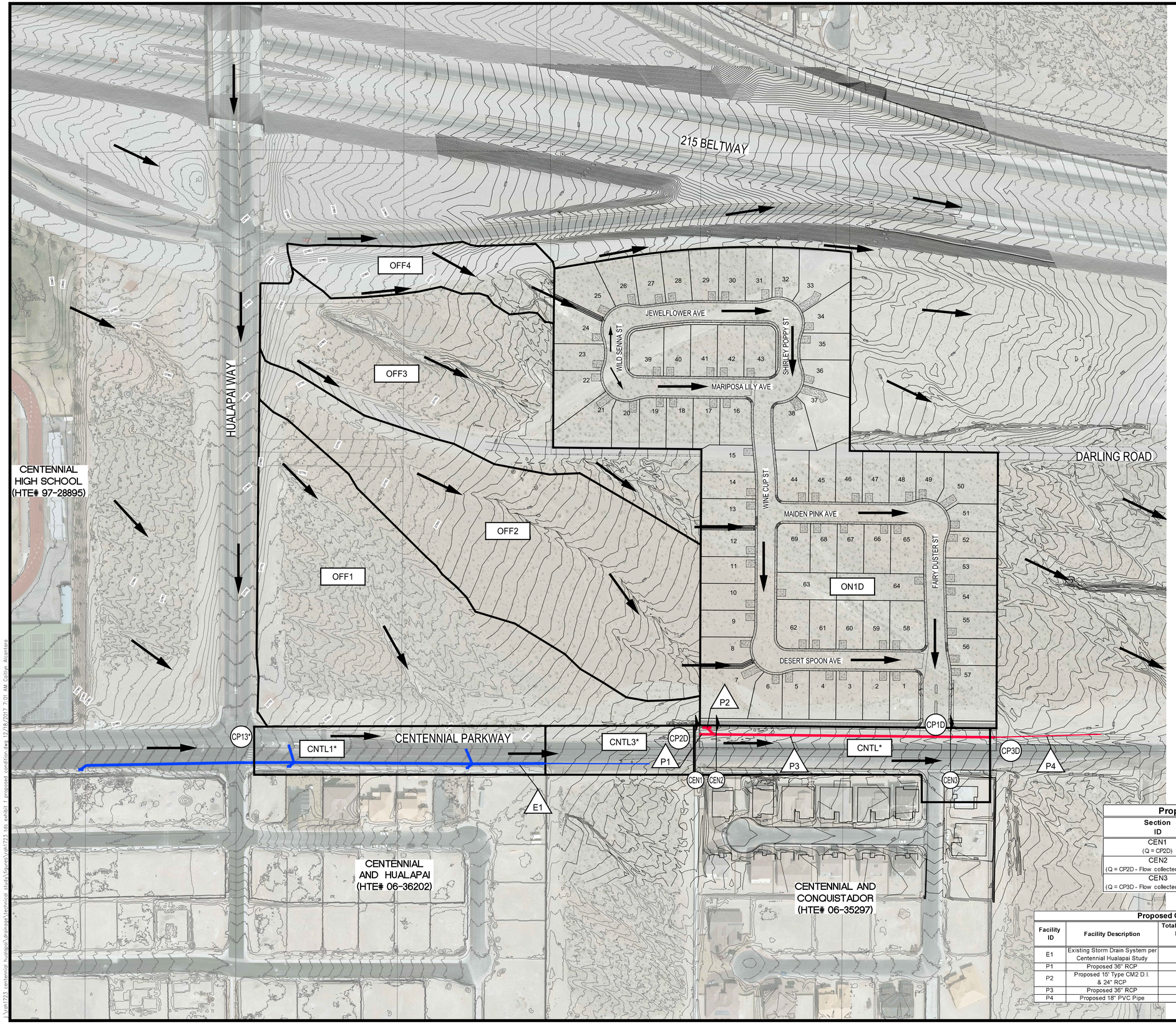
AGAVE CREST

EXISTING CONDITION DRAINAGE MAP

DATE: NOV 2017
DRAFTER: CAA
DESIGNER: CAA
CHECKED: ARP
PROJECT NO.
RAH1723-000

EXHIBIT E
SHEET 1 OF 1

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SCALE – 1"=100' FEET

LEGEND

- BASIN BOUNDARY
- ID — BASIN ID
- ID — CONCENTRATION POINT ID
- FLOW DIRECTION
- ID — FLOWMASTER SECTION
- ID — FACILITY ID
- EXISTING STORM DRAIN FACILITY
- PROPOSED STORM DRAIN FACILITY

Proposed Condition Flow Rate Summary

Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
ON1D	16.9	28	8
OFF1	7.3	5	<1
OFF2	6.8	4	<1
OFF3	5.3	5	1
OFF4	1.6	2	<1
CNTL1*	1.5	6	3
CNTL3*	0.78	3	2
CNTL*	1.91	8	4
CP1D Q = ON1D + OFF2 + OFF3 + OFF4	N/A	40	9
CP13*	N/A	227	114
CP2D Q = OFF1 + CNTL1* + CNTL3* + CP13*	N/A	241	120
CP3D Q = CP1D + CP2D + CNTL	N/A	289	133

*Referenced from Centennial / Conquistador Study

Proposed Condition 10-Year Street Flow Summary

Section ID	Q_{10} (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	DxV	Dry Lane (ft)
CEN1 (Q = CP2D)	120	2.80	0.70	6.71	4.7	16.5
CEN2 (Q = CP2D - Flow collected by SDD#1)	89	2.80	0.65	6.28	4.1	19.0
CEN3 (Q = CP3D - Flow collected by SDD#1)	102	2.80	0.67	6.47	4.3	18.0

Proposed Condition Flood Control Facility Summary

Facility ID	Facility Description	Total/Approaching Flow (cfs) Q_{100}/Q_{10}	Facility Flow (cfs) Q_{100}/Q_{10}	Surface/Bypass Flow (cfs) Q_{100}/Q_{10}	Notes
E1	Existing Storm Drain System per Centennial Hualapai Study	241/120	12.3/12.3	253.3/107.7	
P1	Proposed 36" RCP	241/120	0/0	241/120	
P2	Proposed 15' Type CM2 D.I. & 24" RCP	241/120	31/31	210/89	SDD#1
P3	Proposed 36" RCP	241/120	31/31	210/89	
P4	Proposed 18" PVC Pipe	289/133	31/31	258/102	Temporary Facility

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RICHMOND AMERICAN HOMES

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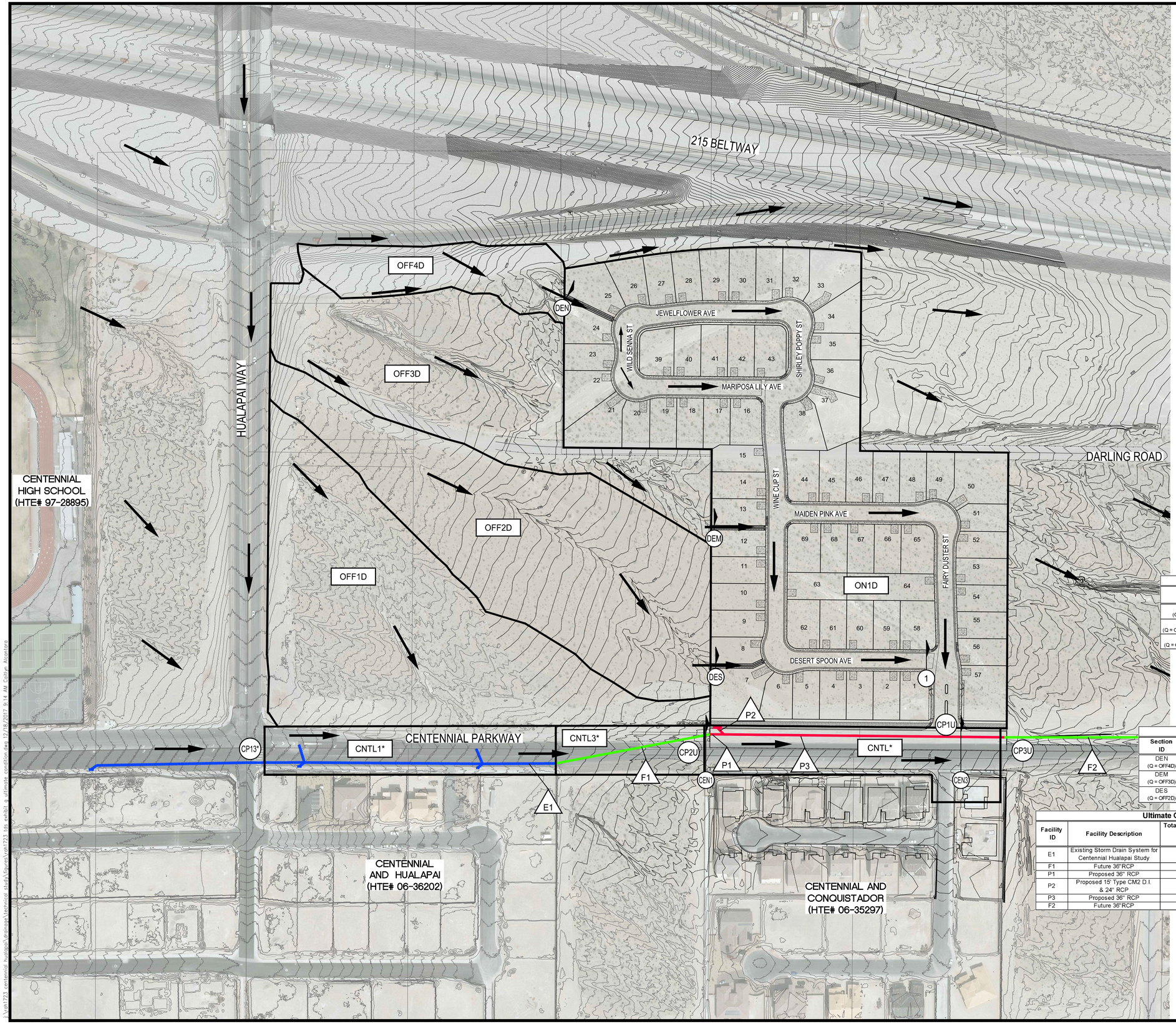
PROPOSED DRAINAGE CONDITION

DATE: DEC 2017
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DESIGNER: CAA
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PROJECT NO. RAH1723-000

EXHIBIT F

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0 100 200
SCALE – 1"=100' FEET

LEGEND

- BASIN BOUNDARY
- ID — BASIN ID
- ID — CONCENTRATION POINT ID
- FLOW DIRECTION
- ID — FLOWMASTER SECTION
- ID — FACILITY ID
- EXISTING STORM DRAIN FACILITY
- PROPOSED STORM DRAIN FACILITY
- FUTURE STORM DRAIN FACILITY

Ultimate Condition Flow Rate Summary

Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
ON1D	16.9	28	8
OFF1D	7.3	19	8
OFF2D	6.8	18	8
OFF3D	5.3	14	6
OFF4D	1.6	3	1
CNTL1*	1.5	6	3
CNTL3*	0.78	3	2
CNTL*	1.91	8	4
CP1U Q = ON1D + OFF2D + OFF3D + OFF4D	N/A	60	22
CP13*	N/A	227	114
CP2U Q = OFF1D + CNTL3 + CP13	N/A	263	131
CP3U Q = CP1U + CP2U + CNTL	N/A	331	157

*Referenced from Centennial / Conquistador Study

Ultimate Condition 10-Year Street Flow Summary

Section ID	Q_{10} (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	DxV	Dry Lane (ft)
CEN1 (Q = Facility P1 Surface Flow)	91	2.80	0.65	6.27	4.1	19.0
CEN2 (Q = CP2U - Flow collected by SDD#1)	66	2.80	0.59	5.94	3.5	22.0
CEN3 (Q = CP3U - Facility F2 Surface Flow)	92	2.80	0.65	6.32	4.1	19.0

Ultimate Condition 100-Year Street Flow Summary

Section ID	Q_{100} (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	DxV
1 (Q = CP1U)	60	3.95	0.50	6.44	3.22
		0.53	0.65	3.52	2.29
CEN (Q = Facility F2 Surface Flow)	266	2.80	0.89	8.16	7.3

Ultimate Condition Drainage Easement Hydraulic Summary

Section ID	Q_{100} (cfs)	Width (ft)	Type of Analysis	Depth (ft)	Velocity (fps)
DEN (Q = OFF4D)	3	10	Normal Depth	0.25	6.04
			Weir	0.26	1.15
DEM (Q = OFF3D)	14	10	Normal Depth	0.89	5.34
			Weir	0.92	1.52
DES (Q = OFF2D)	18	10	Normal Depth	1.05	5.04
			Weir	1.09	1.66

Ultimate Condition Flood Control Facility Summary

Facility ID	Facility Description	Total/Approaching Flow (cfs) Q_{100}/Q_{10}	Facility Flow (cfs) Q_{100}/Q_{10}	Surface/Bypass Flow (cfs) Q_{100}/Q_{10}	Notes
E1	Existing Storm Drain System for Centennial Hualapai Study	263/131	40/40	223/91	
F1	Future 36"RCP	263/131	40/40	223/91	Future Facility
P1	Proposed 36" RCP	263/131	40/40	223/91	
P2	Proposed 15' Type CM2 D.I. & 24" RCP	223/91	25/25	198/66	SDD#1
P3	Proposed 36" RCP	263/131	65/65	198/66	
F2	Future 36"RCP	331/157	65/65	266/92	Future Facility

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RICHMOND AMERICAN HOMES

AGAVE CREST

ULTIMATE DRAINAGE CONDITION

DATE: DEC 2017
DRAFTER: CAA
DESIGNER: CAA
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PROJECT NO. RAH1723-000

EXHIBIT G
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APPENDIX B

Hydrologic Computations

Precipitation Data

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

Rainfall and Precipitation Computation

Project Name: Centennial Hualapai
Date: 11/14/2017
File Name: RAH1723 Precipitation Calcs.xls
By: CAA

Data:

Reference:

Project is located in: Township: 19 S. Range: 60 E. Section: 19 — APN Map

Site is NOT located in the McCarran Airport Rainfall Area — Figure 513*

Rainfall Depth-Duration-Frequency 10-Year, 6-Hour: 1.35 inches — Figure 503*

Rainfall Depth-Duration-Frequency 100-Year, 6-Hour: 2.10 inches — Figure 506*

Precipitation Adjustment Ratios:

10-Year: 1.24 — Table 501*
100-Year: 1.43 — Table 501*

Six Hour Depth Area Reduction Factors (DARF):
Area (gross acres): 10.0 = 0.0156 square miles — Table 502*
DARF = 1.00

Calculations:

P_{10} = 1.67 10-Year Precipitation (in)
P_{100} = 3.00 100-Year Precipitation (in)

P10/P100= 0.56 HEC-1 Multiple Ratio Value

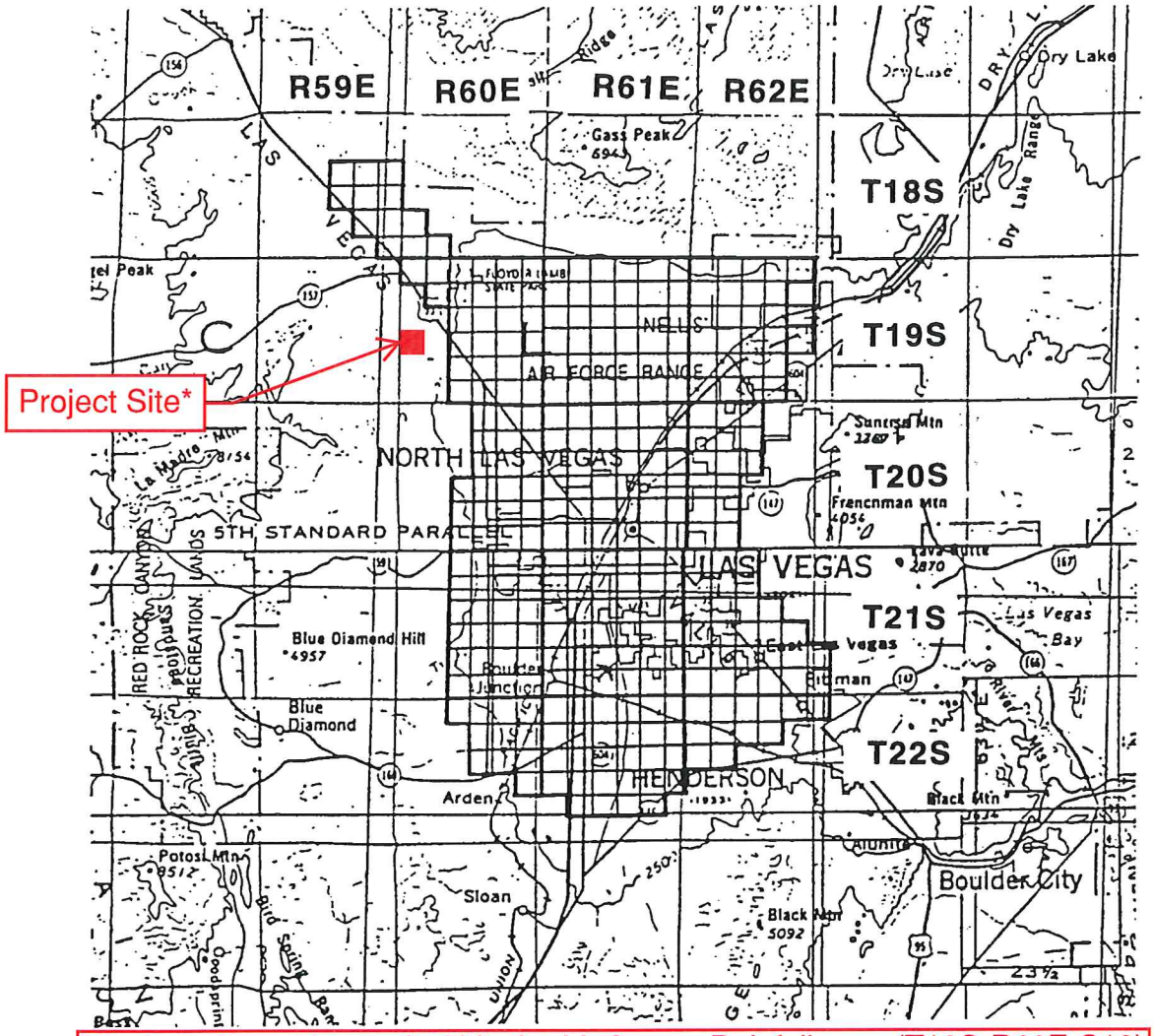
Equations:

P=(Rainfall)*(Precipitation Adjustment Ratio)*(Depth Area Reduction Factor)

* Equations taken from the Clark County Regional Flood Control District - Hydrologic Criteria and Drainage Desi

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McCARRAN AIRPORT RAINFALL AREA



*Project site not located within the McCarran Rainfall area (T19S-R60E-S19)

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.

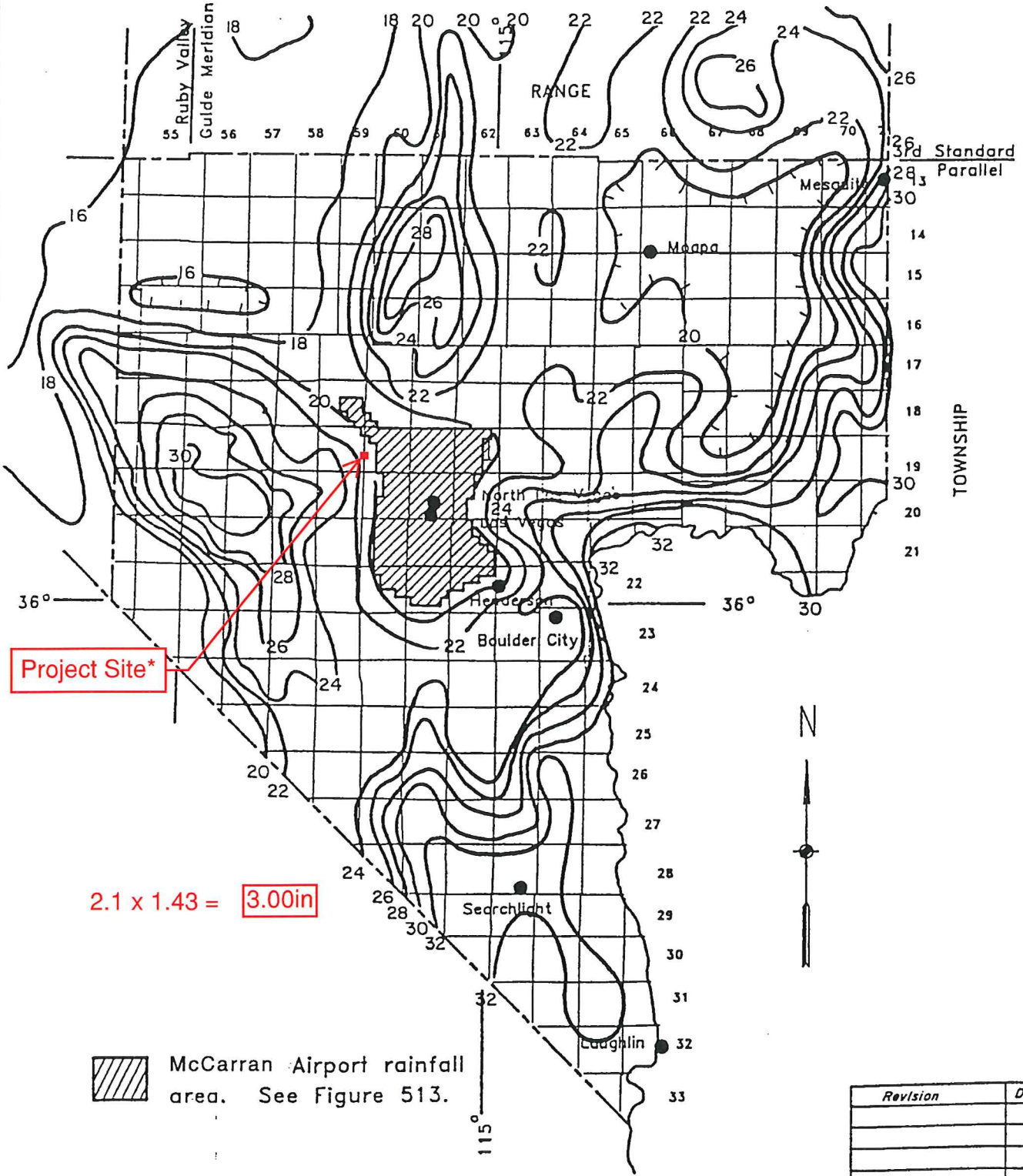
Revision	Date

WRC ENGINEERING

REFERENCE:
USACE, Los Angeles District, 1988

FIGURE 513

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



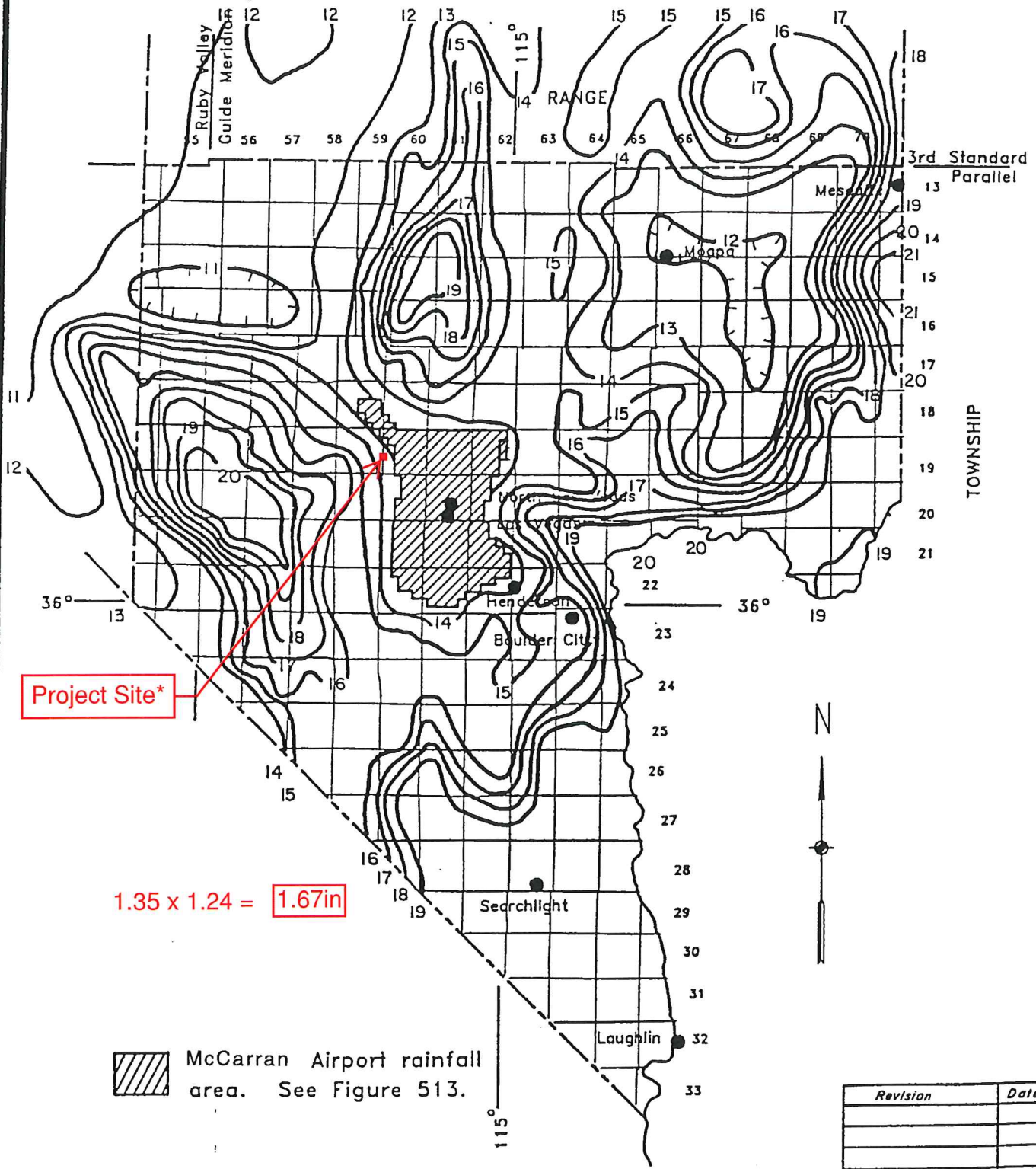
Revision	Date

WRC ENGINEERING

REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 506

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



Revision	Date

WRC ENGINEERING

REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 503

PRECIPITATION ADJUSTMENT RATIOS

Recurrence Interval	Ratio to NOAA Atlas 2
2-year	1.00
5-year	1.16
10-year	1.24
25-year	1.33
50-year	1.39
100-year	1.43

NOTE:
1. Multiply the values obtained from the NOAA Atlas 2 by the above ratios to obtain the adjusted precipitation values.
2. NOAA Atlas 2 values for use with TR-55 shall not be adjusted by the above ratios.
3. Tables 505 and 506 require no adjustments.

Revision	Date

SIX HOUR DEPTH-AREA REDUCTION FACTORS

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

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

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

Revision	Date

SIX-HOUR STORM DISTRIBUTIONS

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

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

Revision	Date

REFERENCE:

TABLE 503

Soils and Curve Number Data

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

Soil Data & Curve Number Computation

Project Name & Number: RAH1723: Centennial Hualapai
Date: 12/18/2017
By: CAA

Data:

Reference: Exhibit D NRCS Soil Data

Soil Type - Soil Survey Area & Version, Soil Description				A	B	C	D
LV	191	Las Vegas Valley 2016	Dalian very cobbly fine sandy loam, 2 to 8 percent slopes	100%	0%	0%	0%
LV	190	Las Vegas Valley 2016	Dalian very gravelly fine sandy loam, 2 to 4 percent slopes	100%	0%	0%	0%

Land Use	A	B	C	D
Residential (6,000 sf)	80	87	90	92
Newly Graded	77	86	91	94
Desert Shrub (poor)	63	77	85	88
Roadway	98	98	98	98
Commercial	89	92	94	95

*Commercial land use per Note 3

EXISTING CONDITION

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
ON1	LV	191	100.0%	Desert Shrub (poor)	100%	0%	0%	0%	63	77	85	88	3.39	63.00
	TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									3.39	63.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
ON2	LV	191	98.4%	Desert Shrub (poor)	100%	0%	0%	0%	63	77	85	88	4.25	61.98
	LV	191	1.6%	Roadway	100%	0%	0%	0%	98	98	98	98	0.07	1.59
	TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									4.32	63.6

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
ON3	LV	191	88.4%	Desert Shrub (poor)	100%	0%	0%	0%	63	77	85	88	1.53	55.72
	LV	191	11.6%	Roadway	100%	0%	0%	0%	98	98	98	98	0.20	11.33
	TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									1.73	67.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
ON4	LV	191	79.6%	Desert Shrub (poor)	100%	0%	0%	0%	63	77	85	88	1.25	50.16
	LV	191	8.9%	Roadway	100%	0%	0%	0%	98	98	98	98	0.14	8.74
	LV	191	11.5%	Newly Graded	100%	0%	0%	0%	77	86	91	94	0.18	8.83
	TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									1.57	67.7

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
ON5	LV	191	68.1%	Desert Shrub (poor)	100%	0%	0%	0%	63	77	85	88	3.50	42.90
	LV	191	1.0%	Roadway	100%	0%	0%	0%	98	98	98	98	0.05	0.95
	LV	191	30.9%	Newly Graded	100%	0%	0%	0%	77	86	91	94	1.59	23.82
	TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									5.14	67.7

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
OFF1	LV	191	57.9%	Desert Shrub (poor)	100%	0%	0%	0%	63	77	85	88	4.22	36.47
	LV	191	4.0%	Newly Graded	100%	0%	0%	0%	77	86	91	94	0.29	3.06
	LV	190	21.9%	Desert Shrub (poor)	100%	0%	0%	0%	63	77	85	88	1.60	13.83
	LV	190	16.2%	Newly Graded	100%	0%	0%	0%	77	86	91	94	1.18	12.46
	TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									7.29	65.8

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
OFF2	LV	191	92.8%	Desert Shrub (poor)	100%	0%	0%	0%	63	77	85	88	6.27	58.43
	LV	191	0.6%	Roadway	100%	0%	0%	0%	98	98	98	98	0.04	0.58
	LV	191	6.7%	Newly Graded	100%	0%	0%	0%	77	86	91	94	0.45	5.13
	TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									6.76	64.1

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
OFF3	LV	191	78.5%	Desert Shrub (poor)	100%	0%	0%	0%	63	77	85	88	4.17	49.47
	LV	191	19.2%	Roadway	100%	0%	0%	0%	98	98	98	98	1.02	18.82
	LV	191	2.3%	Newly Graded	100%	0%	0%	0%	77	86	91	94	0.12	1.74
	TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									5.31	70.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF4	LV	191	22.4%	Desert Shrub (poor)	100%	0%	0%	0%	63	77	85	88	0.35	14.13
	LV	191	77.6%	Newly Graded	100%	0%	0%	0%	77	86	91	94	1.21	59.72
		TOTAL PERCENT	100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									1.56	73.9

PROPOSED CONDITION

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
ON1D	LV	191	100.0%	Residential (6,000 sf)	100%	0%	0%	0%	80	87	90	92	16.93	80.00
		TOTAL PERCENT	100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									16.93	80.0

ULTIMATE CONDITION

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF1D	LV	191	62.1%	Commercial	100%	0%	0%	0%	89	92	94	95	4.53	55.30
	LV	190	37.9%	Commercial	100%	0%	0%	0%	89	92	94	95	2.76	33.70
		TOTAL PERCENT	100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									7.29	89.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF2D	LV	191	100.0%	Commercial	100%	0%	0%	0%	89	92	94	95	6.07	89.00
		TOTAL PERCENT	100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									6.07	89.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF3D	LV	191	100.0%	Commercial	100%	0%	0%	0%	89	92	94	95	6.00	89.00
		TOTAL PERCENT	100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									6.00	89.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF4D	LV	191	22.4%	Commercial	100%	0%	0%	0%	89	92	94	95	0.35	19.97
	LV	191	77.6%	Newly Graded	100%	0%	0%	0%	77	86	91	94	1.21	59.72
		TOTAL PERCENT	100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									1.56	79.7

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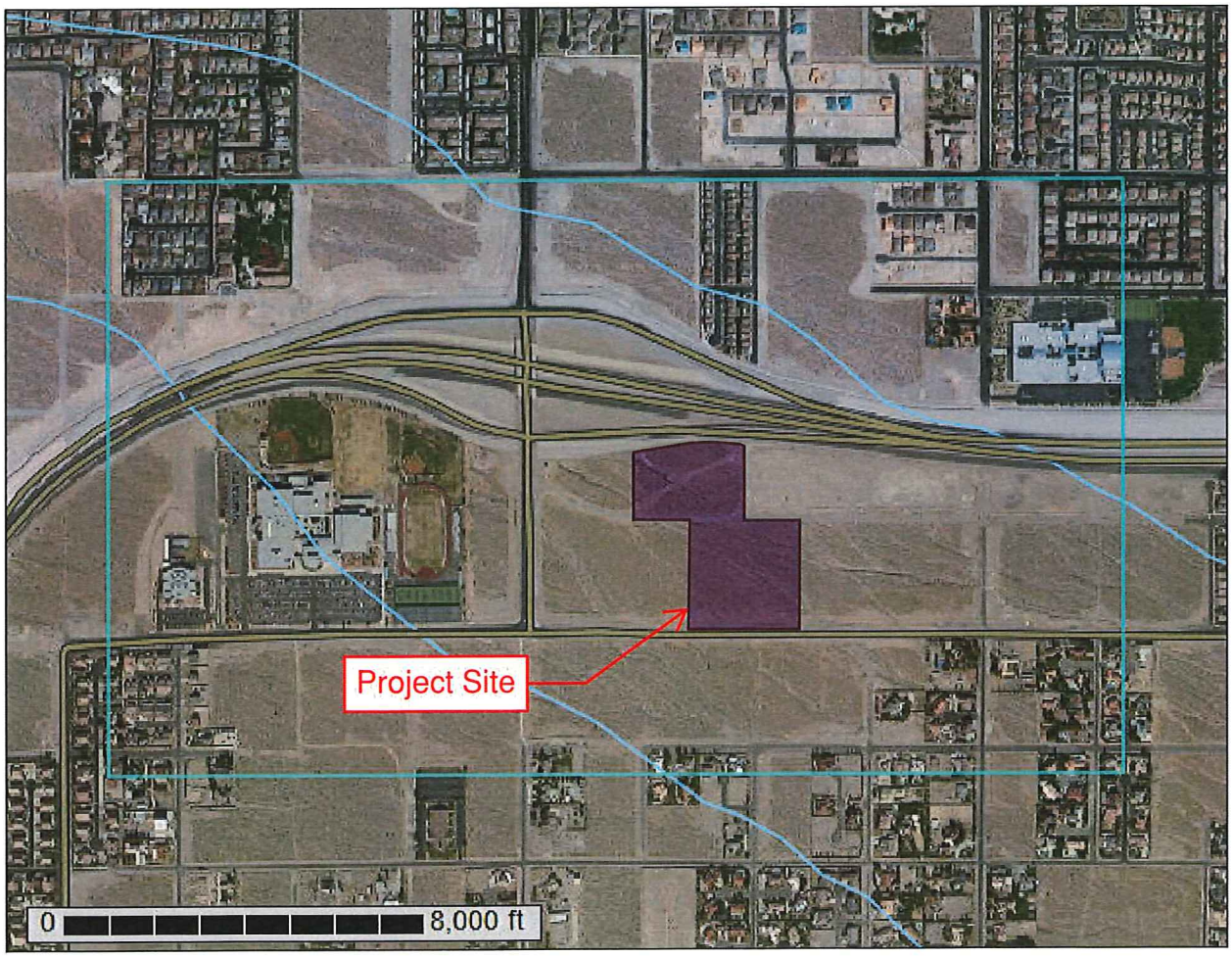
United States Department of Agriculture

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



November 14, 2017

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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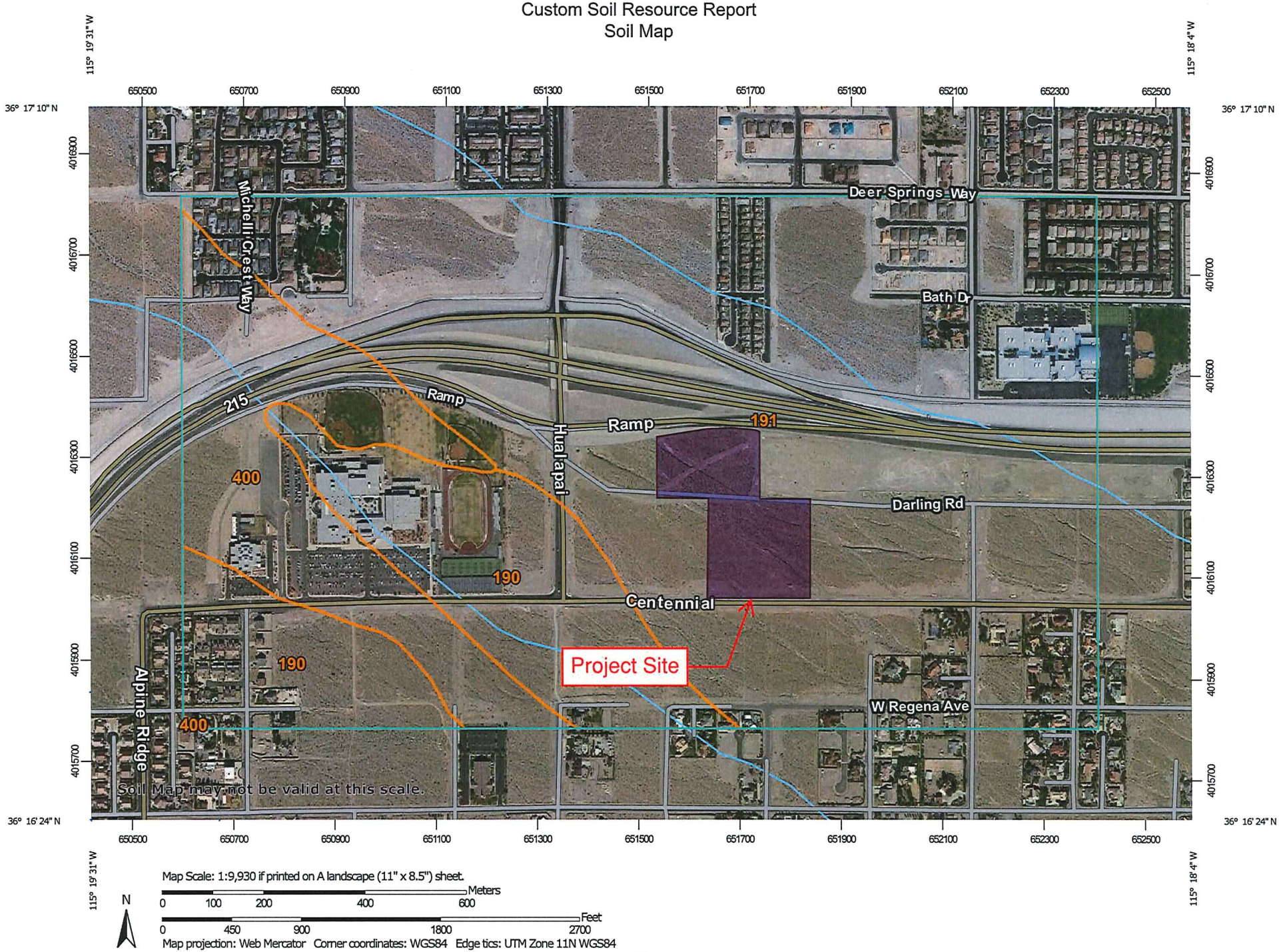
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Soil Map

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.

Custom Soil Resource Report
Soil Map



Map Scale: 1:9,930 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 450 900 1800 2700

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 27, 2017

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

MAP LEGEND

MAP INFORMATION

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
190	Dalian very gravelly fine sandy loam, 2 to 4 percent slopes	84.6	18.0%
191	Dalian very cobbly fine sandy loam, 2 to 8 percent slopes	319.6	67.9%
400	Tencee very gravelly fine sandy loam, 2 to 8 percent slopes	66.6	14.1%
Totals for Area of Interest		**470.8**	**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

190—Dalian very gravelly fine sandy loam, 2 to 4 percent slopes

Map Unit Setting

National map unit symbol: hrb3
Elevation: 2,200 to 3,400 feet
Mean annual precipitation: 4 to 6 inches
Mean annual air temperature: 61 to 66 degrees F
Frost-free period: 210 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Dalian

Setting

Landform: Fan skirts
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from limestone and dolostone

Typical profile

H1 - 0 to 4 inches: very gravelly fine sandy loam
H2 - 4 to 61 inches: extremely gravelly fine sandy loam

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 60 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Hydric soil rating: No

191—Dalian very cobbly fine sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hrb4
Elevation: 2,200 to 3,400 feet
Mean annual precipitation: 4 to 6 inches
Mean annual air temperature: 61 to 66 degrees F
Frost-free period: 210 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Dalian

Setting

Landform: Fan skirts
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from limestone and dolostone

Typical profile

H1 - 0 to 5 inches: very cobbly fine sandy loam
H2 - 5 to 60 inches: very gravelly fine sandy loam

Properties and qualities

Slope: 2 to 8 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): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 60 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Hydric soil rating: No

400—Tencee very gravelly fine sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hrc1
Elevation: 2,400 to 5,700 feet
Mean annual precipitation: 4 to 10 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 180 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Tencee

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from limestone and dolomite

Typical profile

H1 - 0 to 9 inches: very gravelly fine sandy loam
H2 - 9 to 15 inches: very gravelly sandy loam
H3 - 15 to 19 inches: indurated

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 7 to 20 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 to 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: 40 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Water Features

This folder contains tabular reports that present soil hydrology information. The reports (tables) include all selected map units and components for each map unit. Water Features include ponding frequency, flooding frequency, and depth to water table.

Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

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 four hydrologic soil groups are:

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.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Hydrologic Soil Group and Surface Runoff–Las Vegas Valley Area, Nevada, Part of Clark County			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
190—Dalian very gravelly fine sandy loam, 2 to 4 percent slopes			
Dalian	100	Very low	A
191—Dalian very cobbly fine sandy loam, 2 to 8 percent slopes			
Dalian	100	Low	A
400—Tencee very gravelly fine sandy loam, 2 to 8 percent slopes			
Tencee	100	Very high	D

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Standard Form 4

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
TIME OF CONCENTRATION

Project Name & Number: RAH1723: Centennial Hualapai
Description: Existing, Proposed, and Ultimate Condition
By: CAA
Date: 12/18/2017

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 CONDITION																	
ON1	E	63.0	0.442	3.39	0.0053	85	4.71	6.52	680	2.94	2.54	5.04	3.88	10.40			0.104
ON2	E	63.6	0.450	4.32	0.0068	80	3.75	6.74	825	3.27	2.68	5.32	4.13	10.87			0.109
ON3	E	67.0	0.494	1.73	0.0027	95	4.21	6.58	435	3.45	2.75	5.46	2.64	9.22			0.100
ON4	E	67.7	0.504	1.57	0.0025	100	3.50	7.07	475	3.16	2.63	5.22	3.01	10.08			0.101
ON5	E	67.7	0.504	5.14	0.0080	85	4.71	5.91	735	3.54	2.78	5.53	3.70	9.61			0.100
OFF1	E	65.8	0.479	7.29	0.0114	125	6.40	6.74	1190	2.77	2.46	4.90	5.73	12.47			0.125
OFF2	E	64.1	0.456	6.76	0.0106	115	6.96	6.51	1110	3.42	2.74	5.44	4.91	11.42			0.114
OFF3	E	70.0	0.534	5.31	0.0083	140	7.14	6.26	1050	3.43	2.74	5.44	4.72	10.98			0.110
OFF4	E	73.9	0.585	1.56	0.0024	150	6.67	6.03	500	3.20	2.65	5.26	3.15	9.17			0.100
PROPOSED CONDITION																	
ON1D	D	80.0	0.666	16.93	0.0265	110	1.00	8.19	1780	1.85	2.75	4.17	8.15	16.34	1890	20.500	0.163
ULTIMATE CONDITION																	
OFF1D	D	89.0	0.785	7.29	0.0114	100	1.00	5.67	1190	2.77	3.36	5.10	4.73	10.41	1290	17.167	0.104
OFF2D	D	89.0	0.785	6.76	0.0106	100	1.00	5.67	1110	3.42	3.74	5.66	4.03	9.70	1210	16.722	0.097
OFF3D	D	89.0	0.785	5.31	0.0083	100	1.00	5.67	1050	3.43	3.74	5.67	3.85	9.52	1150	16.389	0.095
OFF4D	D	79.7	0.662	1.56	0.0024	150	6.67	5.13	500	3.20	3.61	5.47	2.31	7.44	650	13.611	0.074

[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

HEC-1 Models

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN  1998               *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   14DEC17  TIME  13:03:40  *
*                                      *
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```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

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

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

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

1 HEC-1 INPUT PAGE 1

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

              *DIAGRAM
    1         ID     SLATER HANIFAN GROUP
    2         ID     CENTENNIAL HUALAPAI
    3         ID     TECHNICAL DRAINAGE STUDY
    4         ID     EXISTING DRAINAGE CONDITION
    5         ID
    6         ID     RETURN PERIOD ------- 100 & 10-YEAR
    7         ID     DISTRIBUTION -------- 6-HOUR SDN3
    8         ID     PROJECT NO. --------- RAH1723.000
    9         ID     FILENAME ------------ EX.H1
   10         ID     DATE ---------------- DEC 2017
   11         ID     MODELED BY ---------- CAA
   12         ID
   13         ID        PRECIPITATION STORM EVENT RATIOS
   14         ID        STORM EVENT             RATIO
   15         ID        100-YR                   1.00
   16         ID        10-YR                    0.56
   17         ID
   18         IT       5       0       0     300
   19         IO       5       0       0
   20         IN       5       0       0
   21         JR    PREC    1.00    0.56
              *

   22         KK    OFF1
   23         BA  0.0114
   24         PB    3.00
   25         PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   26         PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   27         PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   28         PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   29         PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   30         PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   31         PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   32         PC   0.998   0.999       1
   33         LS       0    65.8
   34         UD   0.125
              *

   35         KK    OFF2
   36         BA  0.0106
   37         LS       0    64.1
   38         UD   0.114
              *

   39         KK     ON1
   40         BA  0.0053
   41         LS       0    63.0
   42         UD   0.104
              *
```

1 HEC-1 INPUT PAGE 2

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

   43         KK     CP1
   44         HC       3
              *

   45         KK    OFF3
   46         BA  0.0083
   47         LS       0    70.0
   48         UD   0.110
              *

   49         KK     ON2
   50         BA  0.0068
   51         LS       0    63.6
```

```
            52          UD   0.109
                        *

            53          KK     ON4
            54          BA  0.0025
            55          LS       0    67.7
            56          UD   0.101
                        *

            57          KK     CP2
            58          HC       3
                        *

            59          KK    OFF4
            60          BA  0.0024
            61          LS       0    73.9
            62          UD   0.100
                        *

            63          KK     ON3
            64          BA  0.0027
            65          LS       0    67.0
            66          UD   0.100
                        *

            67          KK     ON5
            68          BA  0.0080
            69          LS       0    67.7
            70          UD   0.100
                        *

            71          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    22        OFF1
                .
                .
    35          .        OFF2
                .          .
                .          .
    39          .          .         ON1
                .          .          .
                .          .          .
    43         CP1.....................
                .
                .
    45          .        OFF3
                .          .
                .          .
    49          .          .         ON2
                .          .          .
                .          .          .
    53          .          .          .         ON4
                .          .          .          .
                .          .          .          .
    57          .         CP2.....................
                .          .
                .          .
    59          .          .        OFF4
                .          .          .
                .          .          .
    63          .          .          .         ON3
                .          .          .          .
                .          .          .          .
    67          .          .          .          .         ON5

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *             JUN  1998                *
 *           VERSION 4.1                *
 *                                      *
 *  RUN DATE   14DEC17  TIME  13:03:40  *
 *                                      *
 ****************************************

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

 SLATER HANIFAN GROUP
 CENTENNIAL HUALAPAI
 TECHNICAL DRAINAGE STUDY
 EXISTING DRAINAGE CONDITION

 RETURN PERIOD ------- 100 & 10-YEAR
 DISTRIBUTION -------- 6-HOUR SDN3
 PROJECT NO. --------- RAH1723.000
 FILENAME ------------ EX.H1
 DATE ---------------- DEC 2017
 MODELED BY ---------- CAA

    PRECIPITATION STORM EVENT RATIOS
    STORM EVENT             RATIO
    100-YR                  1.00
    10-YR                   0.56

   19 IO          OUTPUT CONTROL VARIABLES
                        IPRNT          5  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
```

```
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

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

                   COMPUTATION INTERVAL     .08 HOURS
                       TOTAL TIME BASE   24.92 HOURS

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

      JP          MULTI-PLAN OPTION
                        NPLAN          1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                    1.00      .56
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
                                                               1.00      .56

 HYDROGRAPH AT
+                  OFF1       .01     1   FLOW                  5.       0.
                                           TIME                3.58     4.92

 HYDROGRAPH AT
+                  OFF2       .01     1   FLOW                  4.       0.
                                           TIME                3.58     4.92

 HYDROGRAPH AT
+                   ON1       .01     1   FLOW                  2.       0.
                                           TIME                3.58     4.83

   3 COMBINED AT
+                   CP1       .03     1   FLOW                 12.       1.
                                           TIME                3.58     4.92

 HYDROGRAPH AT
+                  OFF3       .01     1   FLOW                  5.       1.
                                           TIME                3.58     3.58

 HYDROGRAPH AT
+                   ON2       .01     1   FLOW                  3.       0.
                                           TIME                3.58     4.83

 HYDROGRAPH AT
+                   ON4       .00     1   FLOW                  1.       0.
                                           TIME                3.58     3.75

   3 COMBINED AT
+                   CP2       .02     1   FLOW                 10.       1.
                                           TIME                3.58     3.75

 HYDROGRAPH AT
+                  OFF4       .00     1   FLOW                  2.       0.
                                           TIME                3.58     3.58

 HYDROGRAPH AT
+                   ON3       .00     1   FLOW                  1.       0.
                                           TIME                3.58     3.75

 HYDROGRAPH AT
+                   ON5       .01     1   FLOW                  5.       0.
                                           TIME                3.58     3.75


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

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1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   14DEC17  TIME  12:29:52   *
*                                       *
*****************************************
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*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

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

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

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

1 HEC-1 INPUT PAGE 1

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

              *DIAGRAM
    1         ID     SLATER HANIFAN GROUP
    2         ID     CENTENNIAL HUALAPAI
    3         ID     TECHNICAL DRAINAGE STUDY
    4         ID     PROPOSED DRAINAGE CONDITION
    5         ID
    6         ID     RETURN PERIOD -------- 100 & 10-YEAR
    7         ID     DISTRIBUTION -------- 6-HOUR SDN3
    8         ID     PROJECT NO. ---------- RAH1723.000
    9         ID     FILENAME ------------- PRO.H1
   10         ID     DATE ----------------- NOV 2017
   11         ID     MODELED BY ----------- CAA
   12         ID
   13         ID        PRECIPITATION STORM EVENT RATIOS
   14         ID        STORM EVENT             RATIO
   15         ID        100-YR                  1.00
   16         ID        10-YR                   0.56
   17         ID
   18         IT       5       0       0     300
   19         IO       5       0       0
   20         IN       5       0       0
   21         JR    PREC    1.00    0.56
              *
   22         KK    OFF2
   23         BA  0.0106
   24         PB    3.00
   25         PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   26         PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   27         PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   28         PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   29         PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   30         PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   31         PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   32         PC   0.998   0.999       1
   33         LS       0    64.1
   34         UD   0.114
              *
   35         KK    OFF3
   36         BA  0.0083
   37         LS       0    70.0
   38         UD   0.110
              *
   39         KK    OFF4
   40         BA  0.0024
   41         LS       0    73.9
   42         UD   0.100
              *
```

1 HEC-1 INPUT PAGE 2

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

   43         KK    ON1D
   44         BA  0.0265
   45         LS       0    80.0
   46         UD   0.163
              *
   47         KK    CP1D
   48         HC       4
              *
   49         KK    OFF1
   50         BA  0.0114
   51         LS       0    65.8
```

```
            52          UD   0.125
                        *
            53          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    22        OFF2
                .
                .
    35          .        OFF3
                .          .
                .          .
    39          .          .        OFF4
                .          .          .
                .          .          .
    43          .          .          .        ON1D
                .          .          .          .
                .          .          .          .
    47        CP1D.................................
                .
                .
    49          .        OFF1

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *             JUN  1998                *
 *           VERSION 4.1                *
 *                                      *
 *  RUN DATE   14DEC17  TIME  12:29:52  *
 *                                      *
 ****************************************

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

                          SLATER HANIFAN GROUP
                          CENTENNIAL HUALAPAI
                          TECHNICAL DRAINAGE STUDY
                          PROPOSED DRAINAGE CONDITION

                          RETURN PERIOD ------- 100 & 10-YEAR
                          DISTRIBUTION -------- 6-HOUR SDN3
                          PROJECT NO. --------- RAH1723.000
                          FILENAME ------------ PRO.H1
                          DATE ---------------- NOV 2017
                          MODELED BY ---------- CAA

                             PRECIPITATION STORM EVENT RATIOS
                             STORM EVENT            RATIO
                             100-YR                 1.00
                             10-YR                  0.56


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

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

                     COMPUTATION INTERVAL     .08 HOURS
                         TOTAL TIME BASE   24.92 HOURS

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

      JP          MULTI-PLAN OPTION
                       NPLAN          1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                    1.00       .56
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
                                                       1.00      .56

 HYDROGRAPH AT
+                  OFF2       .01     1   FLOW          4.        0.
                                           TIME        3.58      4.92
```

HYDROGRAPH AT						
+	OFF3	.01	1	FLOW	5.	1.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	OFF4	.00	1	FLOW	2.	0.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	ON1D	.03	1	FLOW	28.	8.
				TIME	3.58	3.58
4 COMBINED AT						
+	CP1D	.05	1	FLOW	40.	9.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	OFF1	.01	1	FLOW	5.	0.
				TIME	3.58	4.92

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

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN  1998                *
*          VERSION 4.1                 *
*                                      *
*  RUN DATE   14DEC17  TIME  12:29:56  *
*                                      *
****************************************
```

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

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

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

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

1 HEC-1 INPUT PAGE 1

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

              *DIAGRAM
    1         ID     SLATER HANIFAN GROUP
    2         ID     CENTENNIAL HUALAPAI
    3         ID     TECHNICAL DRAINAGE STUDY
    4         ID     ULTIMATE DRAINAGE CONDITION
    5         ID
    6         ID     RETURN PERIOD ------- 100 & 10-YEAR
    7         ID     DISTRIBUTION -------- 6-HOUR SDN3
    8         ID     PROJECT NO. ---------- RAH1723.000
    9         ID     FILENAME ------------ ULT.H1
   10         ID     DATE ----------------- DEC 2017
   11         ID     MODELED BY ---------- CAA
   12         ID
   13         ID        PRECIPITATION STORM EVENT RATIOS
   14         ID        STORM EVENT            RATIO
   15         ID        100-YR                  1.00
   16         ID        10-YR                   0.56
   17         ID
   18         IT       5       0       0     300
   19         IO       5       0       0
   20         IN       5       0       0
   21         JR    PREC    1.00    0.56
              *

   22         KK   OFF2D
   23         BA  0.0106
   24         PB    3.00
   25         PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   26         PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   27         PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   28         PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   29         PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   30         PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   31         PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   32         PC   0.998   0.999       1
   33         LS       0    89.0
   34         UD   0.097
              *

   35         KK   OFF3D
   36         BA  0.0083
   37         LS       0    89.0
   38         UD   0.095
              *

   39         KK   OFF4D
   40         BA  0.0024
   41         LS       0    79.7
   42         UD   0.074
              *
```

1 HEC-1 INPUT PAGE 2

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

   43         KK    ON1D
   44         BA  0.0265
   45         LS       0    80.0
   46         UD   0.163
              *

   47         KK    CP1U
   48         HC       4
              *

   49         KK   OFF1D
   50         BA  0.0114
   51         LS       0    89.0
```

```
            52           UD   0.104
                         *
            53           ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    22       OFF2D
                .
                .
    35          .       OFF3D
                .           .
                .           .
    39          .           .       OFF4D
                .           .           .
                .           .           .
    43          .           .           .       ON1D
                .           .           .          .
                .           .           .          .
    47       CP1U.....................................
                .
                .
    49          .       OFF1D

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   14DEC17  TIME  12:29:56   *
*                                       *
*****************************************

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

                            SLATER HANIFAN GROUP
                            CENTENNIAL HUALAPAI
                            TECHNICAL DRAINAGE STUDY
                            ULTIMATE DRAINAGE CONDITION

                            RETURN PERIOD ------- 100 & 10-YEAR
                            DISTRIBUTION -------- 6-HOUR SDN3
                            PROJECT NO. --------- RAH1723.000
                            FILENAME ------------ ULT.H1
                            DATE ---------------- DEC 2017
                            MODELED BY ---------- CAA

                               PRECIPITATION STORM EVENT RATIOS
                               STORM EVENT            RATIO
                               100-YR                 1.00
                               10-YR                  0.56


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

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

                    COMPUTATION INTERVAL     .08 HOURS
                        TOTAL TIME BASE   24.92 HOURS

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

      JP          MULTI-PLAN OPTION
                       NPLAN          1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                      RATIOS OF PRECIPITATION
                     1.00       .56
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
                                                              1.00      .56

 HYDROGRAPH AT
+                 OFF2D       .01     1   FLOW              18.       8.
                                           TIME             3.50     3.50
```

HYDROGRAPH AT						
+	OFF3D	.01	1	FLOW	14.	6.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	OFF4D	.00	1	FLOW	3.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	ON1D	.03	1	FLOW	28.	8.
				TIME	3.58	3.58
4 COMBINED AT						
+	CP1U	.05	1	FLOW	60.	22.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	OFF1D	.01	1	FLOW	19.	8.
				TIME	3.50	3.50

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

APPENDIX C

Hydraulic Computations

Interior Street Computations

Section 1: Interior Street (Max Slope)
Worksheet for Irregular Channel

Project Description	
Worksheet	Section 1: Interior Street (Max Slope)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	3.95	%
Discharge	60.00	cfs

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

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.50	ft
Elevation Range	0.00 to 0.48	
Flow Area	9.3	ft²
Wetted Perimeter	49.25	ft
Top Width	49.00	ft
Actual Depth	0.50	ft
Critical Elevation	0.66	ft
Critical Slope	0.48	%
Velocity	6.44	ft/s
Velocity Head	0.64	ft
Specific Energy	1.14	ft
Froude Number	2.60	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.15261345e-1 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+07.50	0.013
0+07.50	0+41.50	0.016
0+41.50	0+49.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.00	0.38
0+05.38	0.38
0+06.50	0.00
0+07.50	0.08
0+07.50	0.12
0+24.50	0.46
0+41.50	0.12
0+41.50	0.08

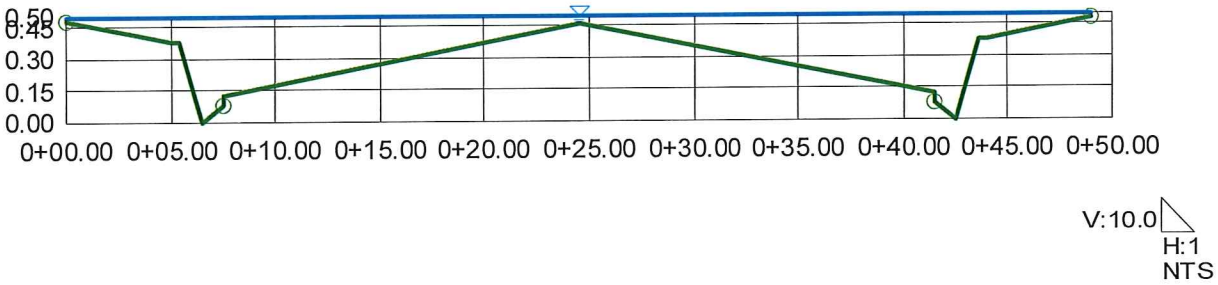
Section 1: Interior Street (Max Slope)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+42.50	0.00
0+43.63	0.38
0+44.00	0.38
0+49.00	0.48

Section 1: Interior Street (Max Slope)
Cross Section for Irregular Channel

Project Description	
Worksheet	Section 1: Interior Street (Max Slope)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	3.95	%
Water Surface Elevation	0.50	ft
Elevation Range	0.00 to 0.48	
Discharge	60.00	cfs



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Section 1: Interior Street (Min Slope)
Worksheet for Irregular Channel

Project Description	
Worksheet	Section 1: Interior Street (Min Slope)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	0.53	%
Discharge	60.00	cfs

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

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.65	ft
Elevation Range	0.00 to 0.48	
Flow Area	17.0	ft²
Wetted Perimeter	49.57	ft
Top Width	49.00	ft
Actual Depth	0.65	ft
Critical Elevation	0.66	ft
Critical Slope	0.47	%
Velocity	3.52	ft/s
Velocity Head	0.19	ft
Specific Energy	0.85	ft
Froude Number	1.05	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.17274501 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+07.50	0.013
0+07.50	0+41.50	0.016
0+41.50	0+49.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.00	0.38
0+05.38	0.38
0+06.50	0.00
0+07.50	0.08
0+07.50	0.12
0+24.50	0.46
0+41.50	0.12
0+41.50	0.08

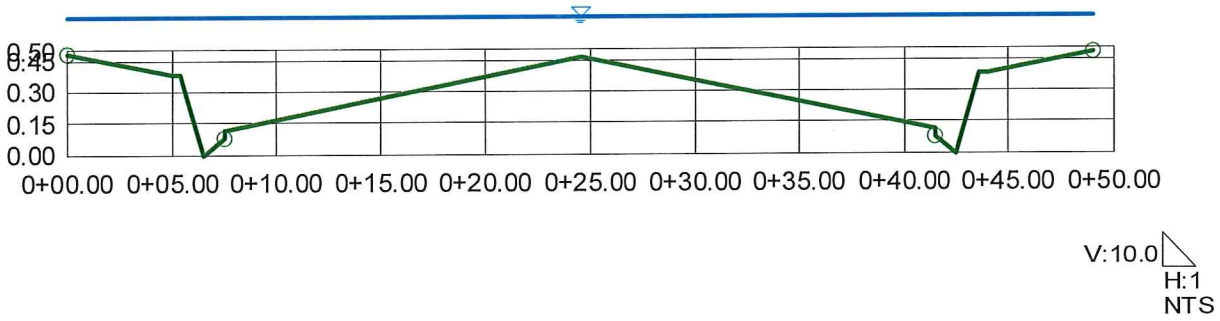
Section 1: Interior Street (Min Slope)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+42.50	0.00
0+43.63	0.38
0+44.00	0.38
0+49.00	0.48

Section 1: Interior Street (Min Slope)
Cross Section for Irregular Channel

Project Description	
Worksheet	Section 1: Interior Street (Min Slope)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	0.53	%
Water Surface Elevation	0.65	ft
Elevation Range	0.00 to 0.48	
Discharge	60.00	cfs



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Section 2: Interior Entryway Street
Worksheet for Irregular Channel

Project Description	
Worksheet	Section 2: Interior Entryway Street
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	1.46	%
Discharge	60.00	cfs

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

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.57	ft
Elevation Range	0.00 to 0.70	
Flow Area	13.7	ft²
Wetted Perimeter	60.69	ft
Top Width	60.29	ft
Actual Depth	0.57	ft
Critical Elevation	0.67	ft
Critical Slope	0.51	%
Velocity	4.39	ft/s
Velocity Head	0.30	ft
Specific Energy	0.87	ft
Froude Number	1.63	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.90235327e-1 ft.
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+07.50	0.013
0+07.50	0+65.84	0.016
0+65.84	0+73.34	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.00	0.38
0+05.38	0.38
0+06.50	0.00
0+07.50	0.08
0+07.50	0.12
0+36.67	0.70
0+65.84	0.12

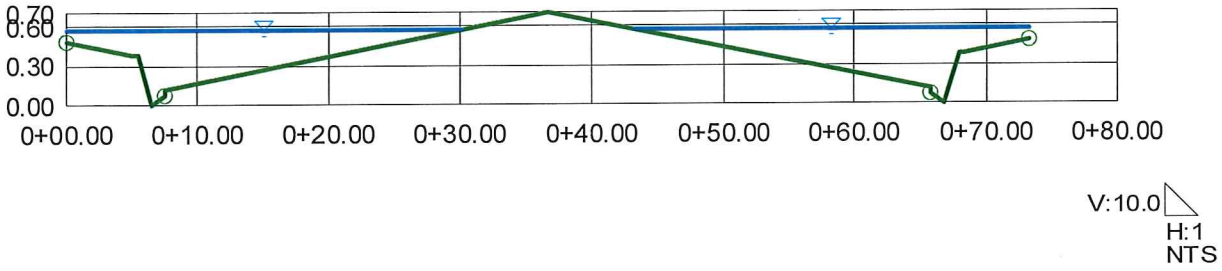
Section 2: Interior Entryway Street
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+65.84	0.08
0+66.84	0.00
0+67.96	0.38
0+68.34	0.38
0+73.34	0.48

Section 2: Interior Entryway Street
Cross Section for Irregular Channel

Project Description	
Worksheet	Section 2: Interior Entryway Street
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Channel Slope	1.46 %
Water Surface Elevation	0.57 ft
Elevation Range	0.00 to 0.70
Discharge	60.00 cfs



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Proposed Condition Street Computations

Section CEN1: 10-Year (Proposed)
Worksheet for Irregular Channel

Project Description	
Worksheet	Section CEN1: 10-Year (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.80	%
Discharge	120.00	cfs

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

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.70	ft
Elevation Range	0.00 to 1.03	
Flow Area	17.9	ft²
Wetted Perimeter	68.61	ft
Top Width	67.34	ft
Actual Depth	0.70	ft
Critical Elevation	0.91	ft
Critical Slope	0.47	%
Velocity	6.71	ft/s
Velocity Head	0.70	ft
Specific Energy	1.40	ft
Froude Number	2.29	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.10338397 ft.
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+05.00	0.020
0+05.00	0+07.00	0.013
0+07.00	0+93.00	0.016
0+93.00	0+95.00	0.013
0+95.00	1+00.00	0.020

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17

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Section CEN1: 10-Year (Proposed)
Worksheet for Irregular Channel

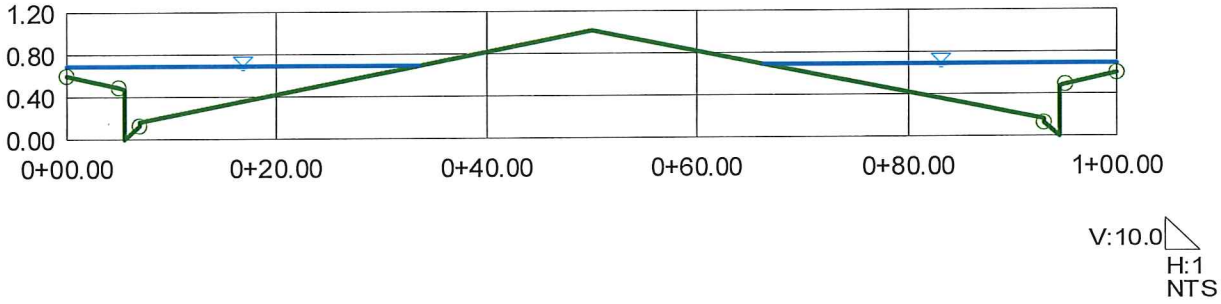
Natural Channel Points	
Station (ft)	Elevation (ft)
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.48
0+95.00	0.50
1+00.00	0.60

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Section CEN1: 10-Year (Proposed)
Cross Section for Irregular Channel

Project Description	
Worksheet	Section CEN1: 10-Year (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	2.80	%
Water Surface Elevation	0.70	ft
Elevation Range	0.00 to 1.03	
Discharge	120.00	cfs



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Section CEN2: 10-Year (Proposed)
Worksheet for Irregular Channel

Project Description	
Worksheet	Section CEN2: 10-Year (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.80	%
Discharge	89.00	cfs

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

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.65	ft
Elevation Range	0.00 to 1.03	
Flow Area	14.2	ft²
Wetted Perimeter	62.73	ft
Top Width	61.57	ft
Actual Depth	0.65	ft
Critical Elevation	0.83	ft
Critical Slope	0.46	%
Velocity	6.28	ft/s
Velocity Head	0.61	ft
Specific Energy	1.26	ft
Froude Number	2.31	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.45726265e-1 ft.
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+05.00	0.020
0+05.00	0+07.00	0.013
0+07.00	0+93.00	0.016
0+93.00	0+95.00	0.013
0+95.00	1+00.00	0.020

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17

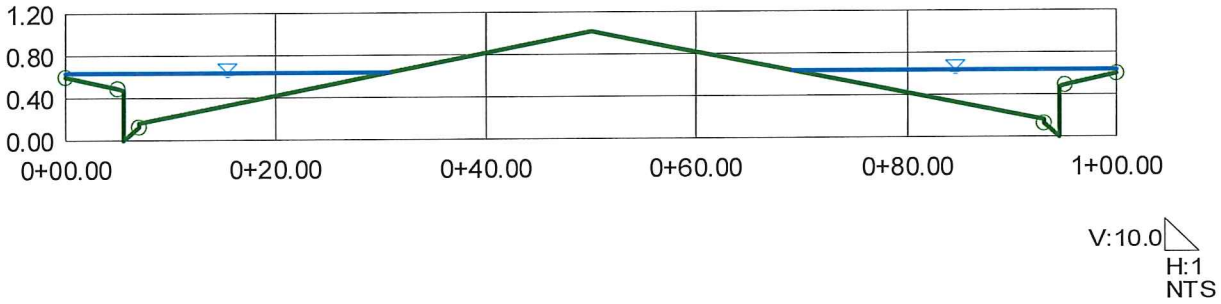
Section CEN2: 10-Year (Proposed)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.48
0+95.00	0.50
1+00.00	0.60

Section CEN2: 10-Year (Proposed)
Cross Section for Irregular Channel

Project Description	
Worksheet	Section CEN2: 10-Year (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	2.80	%
Water Surface Elevation	0.65	ft
Elevation Range	0.00 to 1.03	
Discharge	89.00	cfs



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Section CEN3: 10-Year (Proposed)
Worksheet for Irregular Channel

Project Description	
Worksheet	Section CEN3: 10-Year (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.80	%
Discharge	102.00	cfs

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

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.67	ft
Elevation Range	0.00 to 1.03	
Flow Area	15.8	ft²
Wetted Perimeter	65.33	ft
Top Width	64.12	ft
Actual Depth	0.67	ft
Critical Elevation	0.86	ft
Critical Slope	0.47	%
Velocity	6.47	ft/s
Velocity Head	0.65	ft
Specific Energy	1.32	ft
Froude Number	2.30	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.71225589e-1 ft.
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+05.00	0.020
0+05.00	0+07.00	0.013
0+07.00	0+93.00	0.016
0+93.00	0+95.00	0.013
0+95.00	1+00.00	0.020

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17

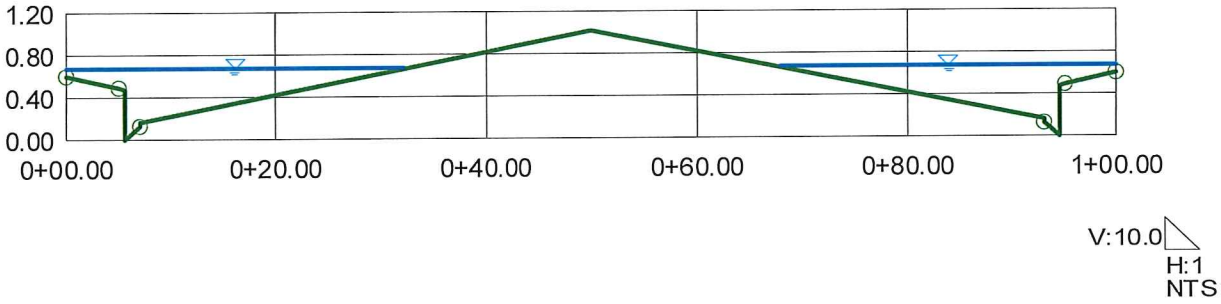
Section CEN3: 10-Year (Proposed)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.48
0+95.00	0.50
1+00.00	0.60

Section CEN3: 10-Year (Proposed)
Cross Section for Irregular Channel

Project Description	
Worksheet	Section CEN3: 10-Year (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	2.80	%
Water Surface Elevation	0.67	ft
Elevation Range	0.00 to 1.03	
Discharge	102.00	cfs



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Ultimate Condition Street Computations

Section CEN1: 10-Year (Ultimate)
Worksheet for Irregular Channel

Project Description	
Worksheet	Section CEN1: 10-Year (Ultimate)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.80	%
Discharge	91.00	cfs

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

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.65	ft
Elevation Range	0.00 to 1.03	
Flow Area	14.4	ft²
Wetted Perimeter	63.14	ft
Top Width	61.98	ft
Actual Depth	0.65	ft
Critical Elevation	0.83	ft
Critical Slope	0.46	%
Velocity	6.31	ft/s
Velocity Head	0.62	ft
Specific Energy	1.27	ft
Froude Number	2.31	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.49795954e-1 ft.
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+05.00	0.020
0+05.00	0+07.00	0.013
0+07.00	0+93.00	0.016
0+93.00	0+95.00	0.013
0+95.00	1+00.00	0.020

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17

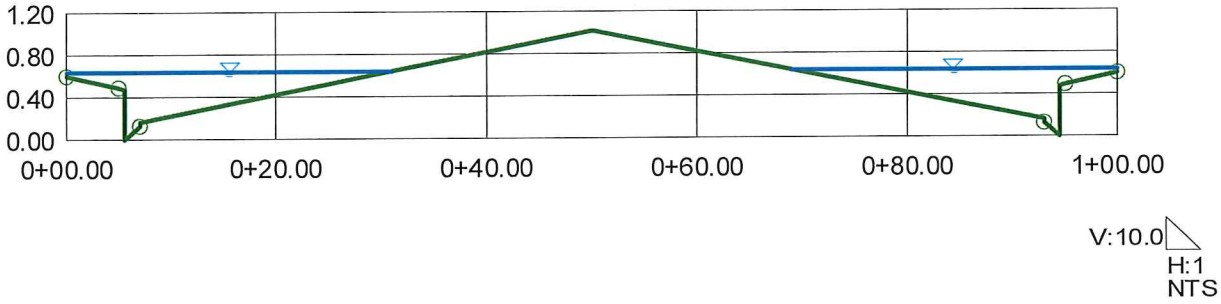
Section CEN1: 10-Year (Ultimate)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.48
0+95.00	0.50
1+00.00	0.60

Section CEN1: 10-Year (Ultimate)
Cross Section for Irregular Channel

Project Description	
Worksheet	Section CEN1: 10-Year (Ultimate)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	2.80	%
Water Surface Elevation	0.65	ft
Elevation Range	0.00 to 1.03	
Discharge	91.00	cfs



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Section CEN2: 10-Year (Ultimate)
Worksheet for Irregular Channel

Project Description	
Worksheet	Section CEN2: 10-Year (Ultimate)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.80	%
Discharge	66.00	cfs

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

Results		
Mannings Coefficient	0.014	
Water Surface Elevation	0.59	ft
Elevation Range	0.00 to 1.03	
Flow Area	11.1	ft²
Wetted Perimeter	56.83	ft
Top Width	55.76	ft
Actual Depth	0.59	ft
Critical Elevation	0.75	ft
Critical Slope	0.45	%
Velocity	5.94	ft/s
Velocity Head	0.55	ft
Specific Energy	1.14	ft
Froude Number	2.35	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+05.00	0.020
0+05.00	0+07.00	0.013
0+07.00	0+93.00	0.016
0+93.00	0+95.00	0.013
0+95.00	1+00.00	0.020

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+50.00	1.03

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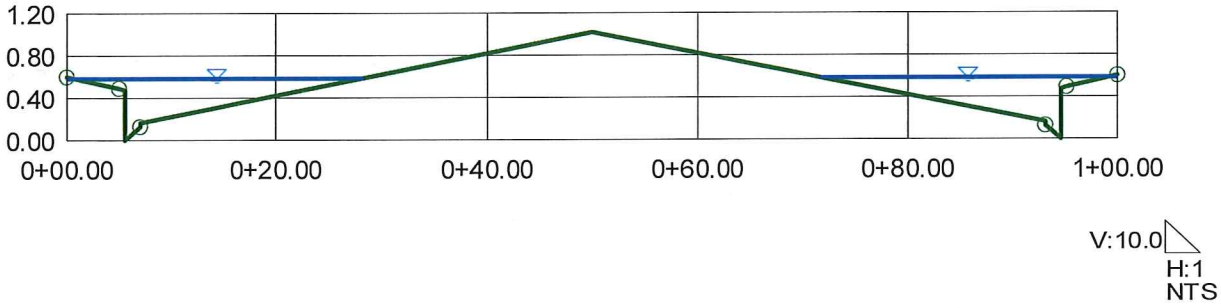
Section CEN2: 10-Year (Ultimate)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.48
0+95.00	0.50
1+00.00	0.60

Section CEN2: 10-Year (Ultimate)
Cross Section for Irregular Channel

Project Description	
Worksheet	Section CEN2: 10-Year (Ultimate)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.014	
Channel Slope	2.80	%
Water Surface Elevation	0.59	ft
Elevation Range	0.00 to 1.03	
Discharge	66.00	cfs



Section CEN3: 10-Year (Ultimate)
Worksheet for Irregular Channel

Project Description	
Worksheet	Section CEN3: 10-Year (Ultimate)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.80	%
Discharge	92.00	cfs

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

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.65	ft
Elevation Range	0.00 to 1.03	
Flow Area	14.5	ft²
Wetted Perimeter	63.35	ft
Top Width	62.18	ft
Actual Depth	0.65	ft
Critical Elevation	0.84	ft
Critical Slope	0.46	%
Velocity	6.32	ft/s
Velocity Head	0.62	ft
Specific Energy	1.27	ft
Froude Number	2.31	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.51809482e-1 ft.
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+05.00	0.020
0+05.00	0+07.00	0.013
0+07.00	0+93.00	0.016
0+93.00	0+95.00	0.013
0+95.00	1+00.00	0.020

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17

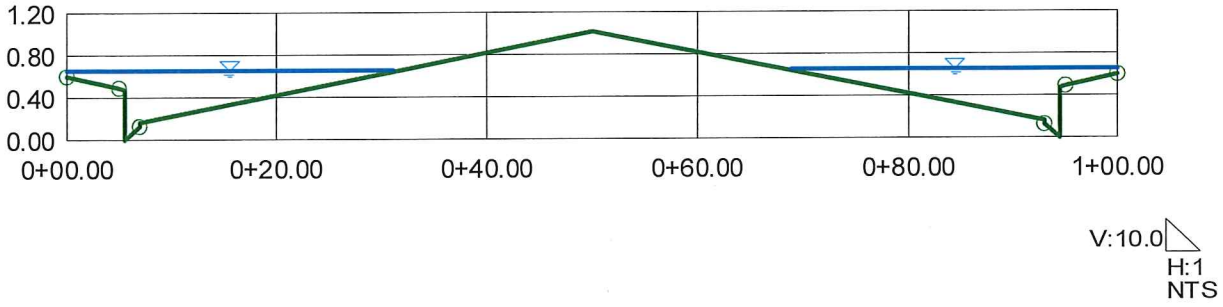
Section CEN3: 10-Year (Ultimate)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.48
0+95.00	0.50
1+00.00	0.60

Section CEN3: 10-Year (Ultimate)
Cross Section for Irregular Channel

Project Description	
Worksheet	Section CEN3: 10-Year (Ultimate)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Channel Slope	2.80 %
Water Surface Elevation	0.65 ft
Elevation Range	0.00 to 1.03
Discharge	92.00 cfs



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Section CEN: 100-Year (Ultimate)
Worksheet for Irregular Channel

Project Description	
Worksheet	Section CEN: 100-Year (Ultimate)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.80	%
Discharge	266.00	cfs

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

Results		
Mannings Coefficient	0.016	
Water Surface Elevation	0.89	ft
Elevation Range	0.00 to 1.03	
Flow Area	32.6	ft²
Wetted Perimeter	88.12	ft
Top Width	86.46	ft
Actual Depth	0.89	ft
Critical Elevation	1.18	ft
Critical Slope	0.44	%
Velocity	8.16	ft/s
Velocity Head	1.04	ft
Specific Energy	1.93	ft
Froude Number	2.34	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.2946064 ft.
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+05.00	0.020
0+05.00	0+07.00	0.013
0+07.00	0+93.00	0.016
0+93.00	0+95.00	0.013
0+95.00	1+00.00	0.020

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17

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Section CEN: 100-Year (Ultimate)
Worksheet for Irregular Channel

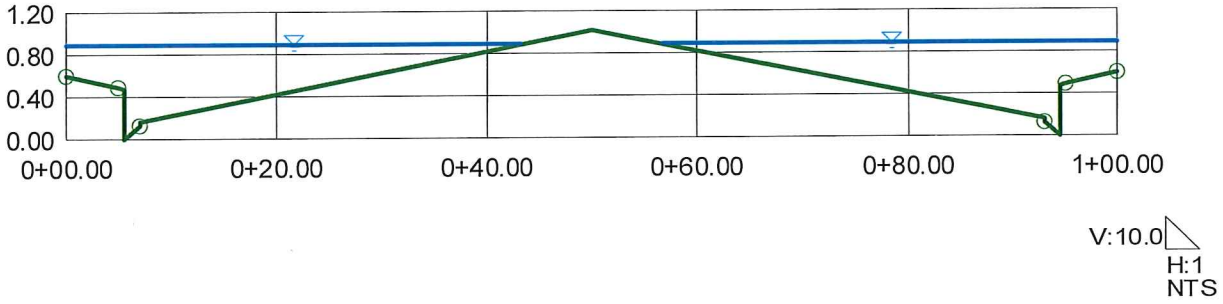
Natural Channel Points	
Station (ft)	Elevation (ft)
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.48
0+95.00	0.50
1+00.00	0.60

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Section CEN: 100-Year (Ultimate)
Cross Section for Irregular Channel

Project Description	
Worksheet	Section CEN: 100-Year (Ultimate)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.016	
Channel Slope	2.80	%
Water Surface Elevation	0.89	ft
Elevation Range	0.00 to 1.03	
Discharge	266.00	cfs



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SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

Rip Rap Sizing Computation

Project Name & Number: RAH1723.000
Date: 12/18/2017
By: CAA

Location: Centennial Parkway

Known Information: **Reference:**

Rip Rap protection at

V = Velocity (fps)	8.16	WSPG Hydraulic / Flowmaster Calculations
S_g = Specific Gravity of Rock (typ=2.5)	2.5	Use Typical
s = Longitudinal Channel Slope (ft/ft)	0.028	Grading Plan

Solve For:

d_{50} = 0.97 ft - Average Rock Size

d_{50} =	**12**	**in**	**- Average Rock Size**
Thickness =	**24**	**in**	**- Thickness of Rip Rap protection**
Manning's 'n' =	**0.040**		**- Roughness Coefficient**

Equations:

Based upon a Stable Channel Lining

$d_{50} = ((vel*S^{0.17})/(3*(S_g-1)))^2$ Equation 734*

$n = 0.0395(d_{50})^{1/6}$ Equation 732*

Recommendations:

* Provided 12-in Riprap

* Equations taken from the Clark County Regional Flood Control District - Hydrologic Criteria and Drainage Design Manual

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Ph. 702-284-5300 - Fx. 702-284-5399

Drainage Easement Computations

Section DEN: North Drainage Easement (Normal Depth)
Worksheet for Irregular Channel

Project Description	
Worksheet	Section DEN: North Drainage Easement (Normal Depth)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.40	%
Discharge	3.00	cfs

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

Results		
Mannings Coefficient	0.013	
Water Surface Elevation	0.25	ft
Elevation Range	0.00 to 1.67	
Flow Area	0.5	ft²
Wetted Perimeter	2.50	ft
Top Width	2.00	ft
Actual Depth	0.25	ft
Critical Elevation	0.41	ft
Critical Slope	0.52	%
Velocity	6.04	ft/s
Velocity Head	0.57	ft
Specific Energy	0.81	ft
Froude Number	2.13	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.00	0+03.50	0.035
0+03.50	0+06.50	0.013
0+06.50	0+10.00	0.035

Natural Channel Points

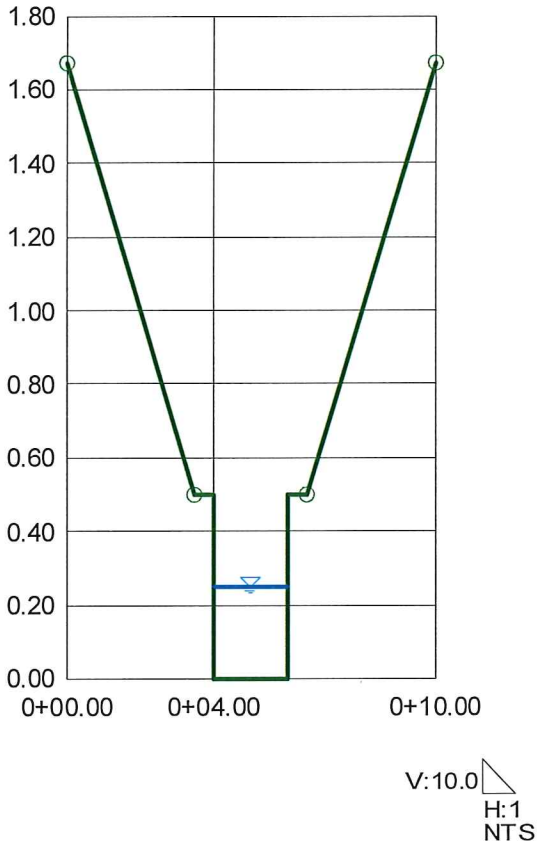
Station (ft)	Elevation (ft)
0+00.00	1.67
0+03.50	0.50
0+04.00	0.50
0+04.00	0.00
0+05.00	0.00
0+06.00	0.00
0+06.00	0.50
0+06.50	0.50
0+10.00	1.67

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Section DEN: North Drainage Easement (Normal Depth)
Cross Section for Irregular Channel

Project Description	
Worksheet	Section DEN: North Drainage Easement (Normal Depth)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.013
Channel Slope	2.40 %
Water Surface Elevation	0.25 ft
Elevation Range	0.00 to 1.67
Discharge	3.00 cfs



Section DEN: North Drainage Easement (Weir)
Worksheet for Broad Crested Weir

Project Description	
Worksheet	Section DEN: North Drainage Easement (Weir)
Type	Broad Crested Weir
Solve For	Headwater Elevation

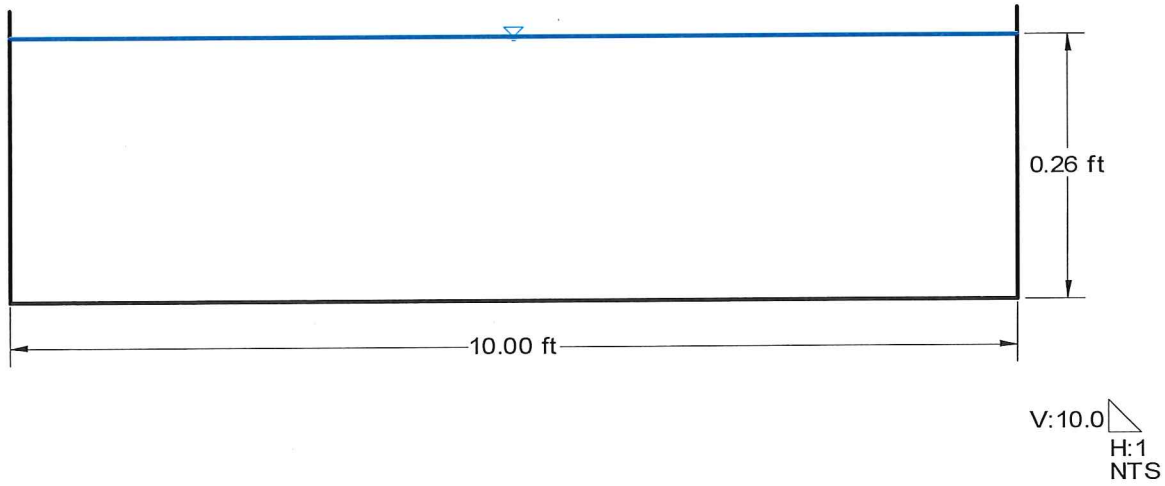
Input Data		
Discharge	3.00	cfs
Crest Elevation	0.00	ft
Tailwater Elevation	0.25	ft
Crest Surface Type	Paved	
Crest Breadth	0.50	ft
Crest Length	10.00	ft

Results		
Headwater Elevation	0.26	ft
Headwater Height Above Crest	0.26	ft
Tailwater Height Above Crest	0.25	ft
Discharge Coefficient	3.09	US
Submergence Factor	0.72	
Adjusted Discharge Coefficient	2.24	US
Flow Area	2.6	ft²
Velocity	1.15	ft/s
Wetted Perimeter	10.52	ft
Top Width	10.00	ft

Section DEN: North Drainage Easement (Weir)
Cross Section for Broad Crested Weir

Project Description	
Worksheet	Section DEN: North Drainage Easement (Weir)
Type	Broad Crested Weir
Solve For	Headwater Elevation

Section Data		
Discharge	3.00	cfs
Headwater Elevation	0.26	ft
Crest Elevation	0.00	ft
Tailwater Elevation	0.25	ft
Crest Surface Type	Paved	
Crest Breadth	0.50	ft
Crest Length	10.00	ft



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Section DEM: Middle Drainage Easement (Normal Depth)
Worksheet for Irregular Channel

Project Description	
Worksheet	Section DEM: Middle Drainage Easement (Normal Depth)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.20	%
Discharge	14.00	cfs

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

Results		
Mannings Coefficient	0.023	
Water Surface Elevation	0.89	ft
Elevation Range	0.00 to 1.67	
Flow Area	2.6	ft²
Wetted Perimeter	6.46	ft
Top Width	5.33	ft
Actual Depth	0.89	ft
Critical Elevation	1.01	ft
Critical Slope	1.16	%
Velocity	5.34	ft/s
Velocity Head	0.44	ft
Specific Energy	1.33	ft
Froude Number	1.34	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.00	0+03.50	0.035
0+03.50	0+06.50	0.013
0+06.50	0+10.00	0.035

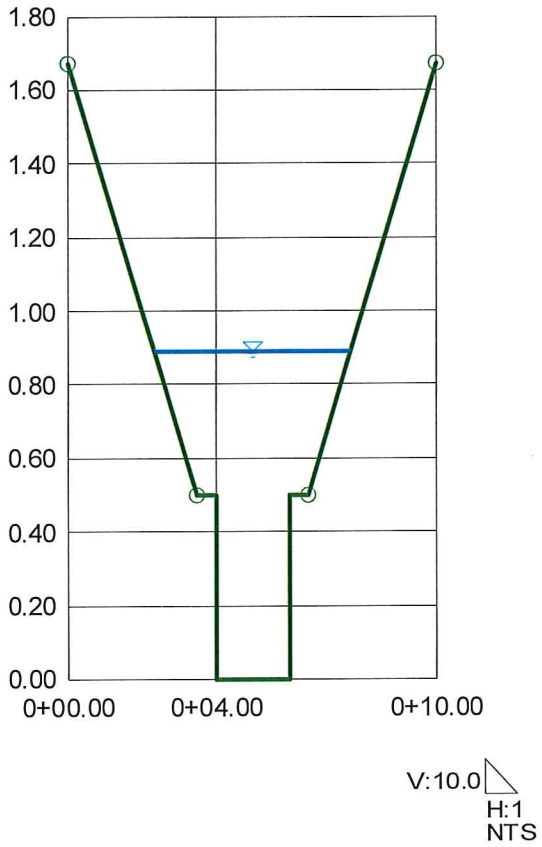
Natural Channel Points

Station (ft)	Elevation (ft)
0+00.00	1.67
0+03.50	0.50
0+04.00	0.50
0+04.00	0.00
0+05.00	0.00
0+06.00	0.00
0+06.00	0.50
0+06.50	0.50
0+10.00	1.67

Section DEM: Middle Drainage Easement (Normal Depth)
Cross Section for Irregular Channel

Project Description	
Worksheet	Section DEM: Middle Drainage Easement (Normal Depth)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.023
Channel Slope	2.20 %
Water Surface Elevation	0.89 ft
Elevation Range	0.00 to 1.67
Discharge	14.00 cfs



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Section DEM: Middle Drainage Easement (Weir)
Worksheet for Broad Crested Weir

Project Description	
Worksheet	Section DEM: Middle Drainage Easement (Weir)
Type	Broad Crested Weir
Solve For	Headwater Elevation

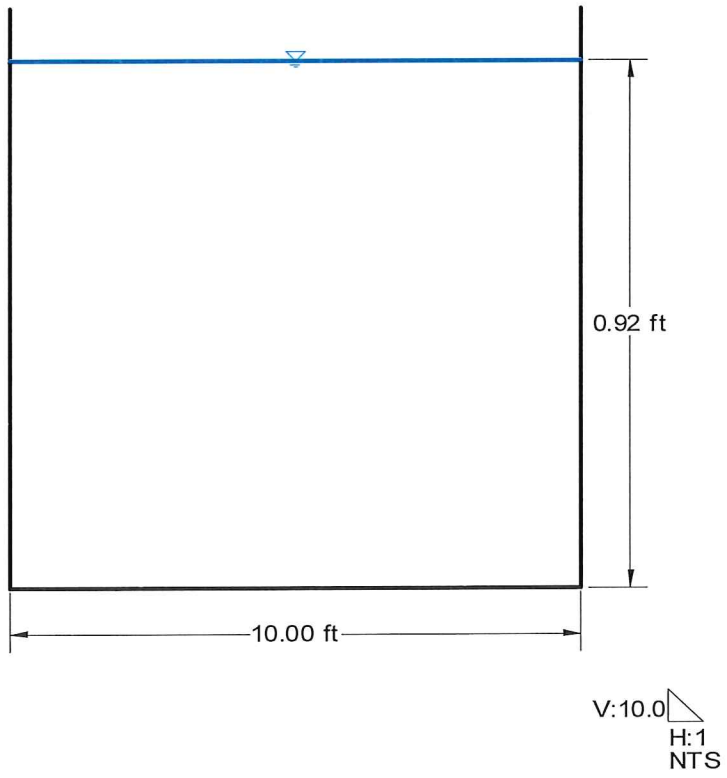
Input Data		
Discharge	14.00	cfs
Crest Elevation	0.00	ft
Tailwater Elevation	0.89	ft
Crest Surface Type	Paved	
Crest Breadth	0.50	ft
Crest Length	10.00	ft

Results		
Headwater Elevation	0.92	ft
Headwater Height Above Crest	0.92	ft
Tailwater Height Above Crest	0.89	ft
Discharge Coefficient	3.09	US
Submergence Factor	0.51	
Adjusted Discharge Coefficient	1.59	US
Flow Area	9.2	ft²
Velocity	1.52	ft/s
Wetted Perimeter	11.84	ft
Top Width	10.00	ft

Section DEM: Middle Drainage Easement (Weir)
Cross Section for Broad Crested Weir

Project Description	
Worksheet	Section DEM: Middle Drainage Easement (Weir)
Type	Broad Crested Weir
Solve For	Headwater Elevation

Section Data		
Discharge	14.00	cfs
Headwater Elevation	0.92	ft
Crest Elevation	0.00	ft
Tailwater Elevation	0.89	ft
Crest Surface Type	Paved	
Crest Breadth	0.50	ft
Crest Length	10.00	ft



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Rip Rap Sizing Computation

Project Name & Number: RAH1723.000
Date: 12/14/2017
By: CAA

Location: Drainage Easement Middle

Known Information: **Reference:**

Rip Rap protection at

V =	Velocity (fps)	5.34	WSPG Hydraulic / Flowmaster Calculations
S_g =	Specific Gravity of Rock (typ=2.5)	2.5	Use Typical
s =	Longitudinal Channel Slope (ft/ft)	0.022	Grading Plan

Solve For:

d_{50} = 0.38 ft - Average Rock Size

d_{50} =	**5**	**in**	**- Average Rock Size**
Thickness =	**10**	**in**	**- Thickness of Rip Rap protection**
Manning's 'n' =	**0.034**		**- Roughness Coefficient**

Equations:

Based upon a Stable Channel Lining

$d_{50} = ((vel*S^{0.17})/(3*(S_g-1)))^2$ Equation 734*

$n = 0.0395(d_{50})^{1/6}$ Equation 732*

Recommendations:

* Provided 6-in Riprap

* Equations taken from the Clark County Regional Flood Control District - Hydrologic Criteria and Drainage Design Manual

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Section DES: South Drainage Easement (Normal Depth)
Worksheet for Irregular Channel

Project Description	
Worksheet	Section DES: South Drainage Easement (Normal Depth)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	1.00	%
Discharge	18.00	cfs

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

Results		
Mannings Coefficient	0.022	
Water Surface Elevation	1.05	ft
Elevation Range	0.00 to 1.67	
Flow Area	3.6	ft²
Wetted Perimeter	7.49	ft
Top Width	6.31	ft
Actual Depth	1.05	ft
Critical Elevation	1.13	ft
Critical Slope	1.07	%
Velocity	5.04	ft/s
Velocity Head	0.39	ft
Specific Energy	1.45	ft
Froude Number	1.18	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.00	0+03.50	0.031
0+03.50	0+06.50	0.013
0+06.50	0+10.00	0.031

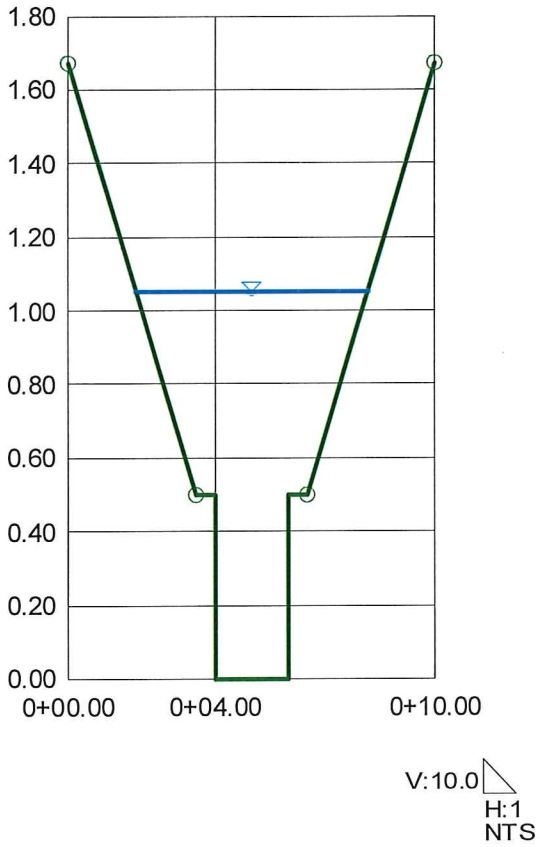
Natural Channel Points

Station (ft)	Elevation (ft)
0+00.00	1.67
0+03.50	0.50
0+04.00	0.50
0+04.00	0.00
0+05.00	0.00
0+06.00	0.00
0+06.00	0.50
0+06.50	0.50
0+10.00	1.67

Section DES: South Drainage Easement (Normal Depth)
Cross Section for Irregular Channel

Project Description	
Worksheet	Section DES: South Drainage Easement (Normal Depth)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.022
Channel Slope	1.00 %
Water Surface Elevation	1.05 ft
Elevation Range	0.00 to 1.67
Discharge	18.00 cfs



Section DES: South Drainage Easement (Weir)
Worksheet for Broad Crested Weir

Project Description	
Worksheet	Section DES: South Drainage Easement (Weir)
Type	Broad Crested Weir
Solve For	Headwater Elevation

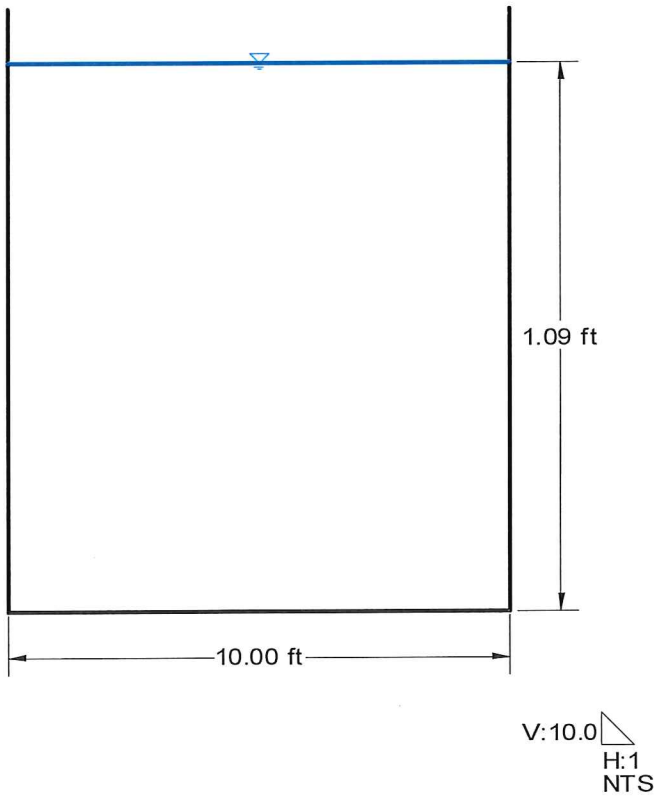
Input Data		
Discharge	18.00	cfs
Crest Elevation	0.00	ft
Tailwater Elevation	1.05	ft
Crest Surface Type	Paved	
Crest Breadth	0.50	ft
Crest Length	10.00	ft

Results		
Headwater Elevation	1.09	ft
Headwater Height Above Crest	1.09	ft
Tailwater Height Above Crest	1.05	ft
Discharge Coefficient	3.09	US
Submergence Factor	0.52	
Adjusted Discharge Coefficient	1.59	US
Flow Area	10.9	ft²
Velocity	1.66	ft/s
Wetted Perimeter	12.17	ft
Top Width	10.00	ft

Section DES: South Drainage Easement (Weir)
Cross Section for Broad Crested Weir

Project Description	
Worksheet	Section DES: South Drainage Easement (Weir)
Type	Broad Crested Weir
Solve For	Headwater Elevation

Section Data		
Discharge	18.00	cfs
Headwater Elevation	1.09	ft
Crest Elevation	0.00	ft
Tailwater Elevation	1.05	ft
Crest Surface Type	Paved	
Crest Breadth	0.50	ft
Crest Length	10.00	ft



SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

Rip Rap Sizing Computation

Project Name & Number: RAH1723.000
Date: 12/14/2017
By: CAA

Location: Drainage Easement South

Known Information: **Reference:**

Rip Rap protection at

V =	Velocity (fps)	5.04	WSPG Hydraulic / Flowmaster Calculations
S_g =	Specific Gravity of Rock (typ=2.5)	2.5	Use Typical
s =	Longitudinal Channel Slope (ft/ft)	0.01	Grading Plan

Solve For:

d_{50} = 0.26 ft - Average Rock Size

d_{50} =	**3**	**in**	**- Average Rock Size**
Thickness =	**6**	**in**	**- Thickness of Rip Rap protection**
Manning's 'n' =	**0.031**		**- Roughness Coefficient**

Equations:

Based upon a Stable Channel Lining

$d_{50} = ((vel*S^{0.17})/(3*(S_g-1)))^2$ Equation 734*

$n = 0.0395(d_{50})^{1/6}$ Equation 732*

Recommendations:

* Provided 3-in Riprap

* Equations taken from the Clark County Regional Flood Control District - Hydrologic Criteria and Drainage Design Manual

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Drop Inlet Computations

Curb Inlet Sizing Computation

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

Project Name & Number:	**RAH1723: Agave Crest**	
Date:	**12/17/2017**	
By:	**CAA**	
Notes:		
Facility ID:	SDDI#1	
Drainage Condition:	Proposed	
Source of Flow:	Q10 = 1/2 of CP2D	
Inlet Type:	Type CM2 (Continuous Grade)	
Inlet Length:	17.5-ft	
Number of Grates	6	
Input:	**Variable:**	**Input:**
Street Flow (cfs)	Q	60.0
Longitudinal Slope (ft/ft)	S_o	0.0280
Manning's Coefficient	n	0.016
Street Flow Velocity (fps)	V	6.71
Street Flow Depth (ft)	D	0.70
Street Cross Slope (ft/ft)	S_x	0.02
Grate Width (ft)	W	1.5
Grate Depression (in)	D_g	2.0
Length of Grate (ft)	L_g	15.0
Length of Curb Opening (ft)	L_c	17.50
Clogging Factor - Grate (%)	CF_g	50%
Clogging Factor - Curb (%)	CF_c	50%
Effective Grate Length (ft)	L_{ge}	7.5
Effective Curb Opening Length (ft)	L_{ce}	8.75
Output (Grate):	**Equation:**	**Output (Grate):**
[1] R_f - Frontal Flow Factor	1-0.09*(V-V_x) if V>V_x; else Frontal Flow Factor=1	1.00
[2] V_o - Splash Over Velocity (fps)	V_x=p+q*Lg-r*L_{ge}^2+sy*L_{ge}^3 ; where	26.27
	p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	
[1] E - Grate Flow Ratio	Frontal Flow/Side Flow	0.14
[2] Q_w - Frontal Flow (cfs)	$Q_w = Q[1-(1-(W/T))^{2.67}]$	8.59
[1] Q_s - Side Flow (cfs)	Q_s = Q-Qw	51.4
T - Side Flow Spread (ft)	$(D-D_g)/S_x$	26.67
[1] R_s - Side Flow Factor	$1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$	0.31
[1] Q_{gi} - Intercepted Flow (cfs)	$(R_f*E+R_s*(1-E))*Q$	24.5
Output (Curb):	**Equation:**	**Output (Curb):**
[1] S_e - Equivalent Cross Slope (ft/ft)	S_x+S_g*E	0.036
Q_{sx} - Remaining Flow After Grate Interception (cfs)	$Q-Q_{gi}$	35.547
S_g - Gutter Cross Slope (ft/ft)	D_g/W	0.111
[1] L_t - Effective Interception Length (ft)	$0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$	80.91
[1] Q_{ci} - Intercepted Flow (cfs)	$(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$	6.6
	or Q_{sx} if L_t is less than L_{ce}	
Output (Combination):	**Equation:**	**Output (Combination):**
Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	**31**
Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	**29**

[1] Formula referenced from the CCRFCD Manual

[2] Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

Section CEN: Half Street - 10-Year (Proposed)
Worksheet for Irregular Channel

Project Description	
Worksheet	Section CEN: Half Street - 10-Year (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.80	%
Discharge	60.00	cfs

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

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.70	ft
Elevation Range	0.00 to 1.03	
Flow Area	8.9	ft²
Wetted Perimeter	34.30	ft
Top Width	33.67	ft
Actual Depth	0.70	ft
Critical Elevation	0.91	ft
Critical Slope	0.47	%
Velocity	6.71	ft/s
Velocity Head	0.70	ft
Specific Energy	1.40	ft
Froude Number	2.29	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.10338508 ft.

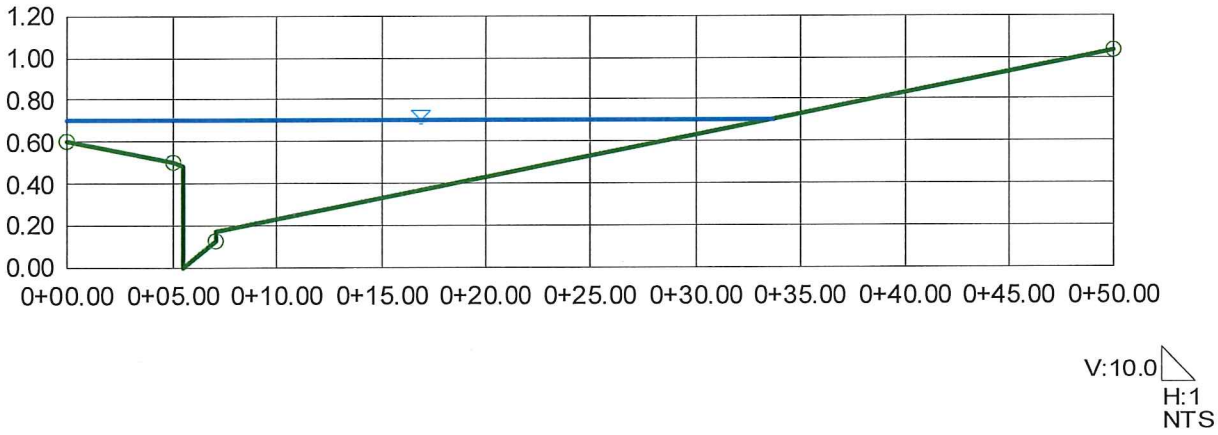
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+05.00	0.020
0+05.00	0+07.00	0.013
0+07.00	0+50.00	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+50.00	1.03

Section CEN: Half Street - 10-Year (Proposed)
Cross Section for Irregular Channel

Project Description	
Worksheet	Section CEN: Half Street - 10-Year (Proposed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	2.80	%
Water Surface Elevation	0.70	ft
Elevation Range	0.00 to 1.03	
Discharge	60.00	cfs



Curb Inlet Sizing Computation

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

Project Name & Number:	**RAH1723: Agave Crest**
Date:	**12/17/2017**
By:	**CAA**

	Notes:		
	Facility ID:	SDDI#1 [1]	
	Drainage Condition:	Ultimate	
	Source of Flow:	Q10 = 1/2 of Facility P1 Surface Flow	
	Inlet Type:	Type CM2 (Continuous Grade)	
	Inlet Length:	17.5-ft	
	Number of Grates	6	
	Input:	**Variable:**	**Input:**
	Street Flow (cfs)	Q	45.5
	Longitudinal Slope (ft/ft)	S_o	0.0280
	Manning's Coefficient	n	0.016
	Street Flow Velocity (fps)	V	6.31
	Street Flow Depth (ft)	D	0.65
	Street Cross Slope (ft/ft)	S_x	0.02
	Grate Width (ft)	W	1.5
	Grate Depression (in)	D_g	2.0
	Length of Grate (ft)	L_g	15.0
	Length of Curb Opening (ft)	L_c	17.50
	Clogging Factor - Grate (%)	CF_g	50%
	Clogging Factor - Curb (%)	CF_c	50%
	Effective Grate Length (ft)	L_{ge}	7.5
	Effective Curb Opening Length (ft)	L_{ce}	8.75
	Output (Grate):	**Equation:**	**Output (Grate):**
[1]	R_f - Frontal Flow Factor	1-0.09*(V-V_x) if V>V_x; else Frontal Flow Factor=1	1.00
[2]	V_o - Splash Over Velocity (fps)	V_x=p+q*Lg-r*L_{ge}^2+sy*L_{ge}^3 ; where	26.27
		p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	
[1]	E - Grate Flow Ratio	Frontal Flow/Side Flow	0.16
[2]	Q_w - Frontal Flow (cfs)	$Q_w = Q[1-(1-(W/T))^{2.67}]$	7.16
[1]	Q_s - Side Flow (cfs)	Q_s = Q-Qw	38.3
	T - Side Flow Spread (ft)	$(D-D_g)/S_x$	24.17
[1]	R_s - Side Flow Factor	$1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$	0.33
[1]	Q_{gi} - Intercepted Flow (cfs)	$(R_f*E+R_s*(1-E))*Q$	19.9
	Output (Curb):	**Equation:**	**Output (Curb):**
[1]	S_e - Equivalent Cross Slope (ft/ft)	S_x+S_g*E	0.037
	Q_{sx} - Remaining Flow After Grate Interception (cfs)	$Q-Q_{gi}$	25.592
	S_g - Gutter Cross Slope (ft/ft)	D_g/W	0.111
[1]	L_t - Effective Interception Length (ft)	$0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$	68.71
[1]	Q_{ci} - Intercepted Flow (cfs)	$(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$	5.6
		or Q_{sx} if L_t is less than L_{ce}	
	Output (Combination):	**Equation:**	**Output (Combination):**
	Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	**25**
	Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	**20**

[1] Formula referenced from the CCRFCD Manual

[2] Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

Section CEN: Half Street - 10-Year (Ultimate)
Worksheet for Irregular Channel

Project Description	
Worksheet	Section CEN: Half Street - 10-Year (Ultimate)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.80	%
Discharge	45.50	cfs

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

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.65	ft
Elevation Range	0.00 to 1.03	
Flow Area	7.2	ft²
Wetted Perimeter	31.57	ft
Top Width	30.99	ft
Actual Depth	0.65	ft
Critical Elevation	0.83	ft
Critical Slope	0.46	%
Velocity	6.31	ft/s
Velocity Head	0.62	ft
Specific Energy	1.27	ft
Froude Number	2.31	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.49795977e-1 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+05.00	0.020
0+05.00	0+07.00	0.013
0+07.00	0+50.00	0.016

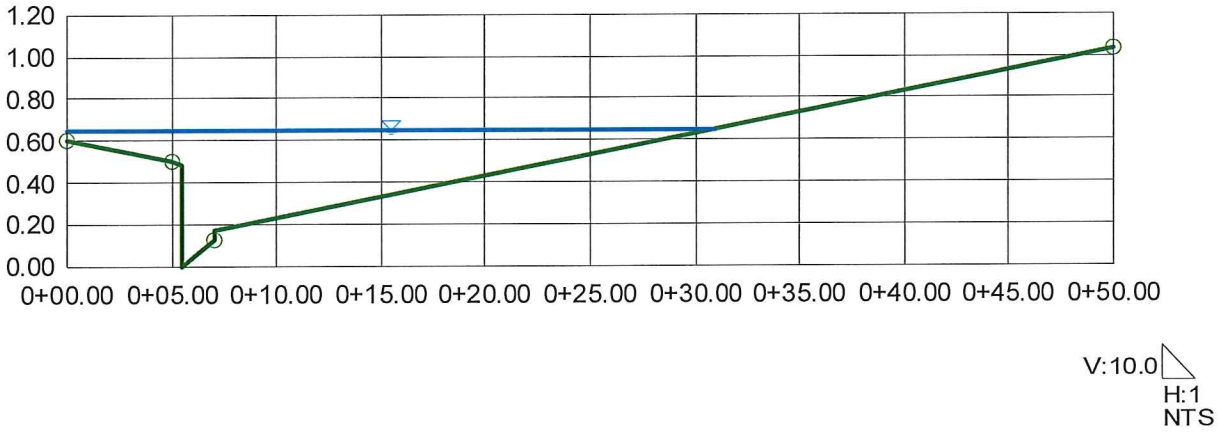
Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+50.00	1.03

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Section CEN: Half Street - 10-Year (Ultimate)
Cross Section for Irregular Channel

Project Description	
Worksheet	Section CEN: Half Street - 10-Year (Ultimate)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	2.80	%
Water Surface Elevation	0.65	ft
Elevation Range	0.00 to 1.03	
Discharge	45.50	cfs



WSPG Models

Ultimate Condition WSPG Summary

Mainline in Centennial Parkway along Southern Boundary of Project Site

WSPG Station	Equivalent Roadway Station	Improvement Plan Sheet	Storm Drain Dimension	Invert Elevation (ft)	Q_{100} (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check
1000.00	35+62.09	PP-2	36" RCP	2714.42	65.00	2716.05	16.59	2720.09		OK
1327.35	32+34.75	PP-1	36" RCP	2723.89	65.00	2725.55	16.25	2729.26		OK
1628.35	29+33.75	PP-1	36" RCP	2732.31	65.00	2734.90	10.03	2737.82		OK
1628.35	29+02.05	PP-1	36" RCP	2732.31	40.00	2736.20	5.66	2737.82	SDDI#1	OK
1660.05	29+02.05	PP-1	36" RCP	2733.20	40.00	2736.32	5.66	2740.09		OK

```
T1 RAH1723: Agave Crest
T2 Centennial Parkway Storm Drain - Mainline
T3 Ultimate Drainage Condition - Modeling through Proposed Facilities
SO   1000.0002714.420 36      .013                2717.420
R    1327.3502723.890 36      .013                                          0.0   1
R    1628.3502732.310 36      .013                                          0.0   1
JX   1628.3502732.310 36 24   .013   25.0           2733.310        45.0
R    1660.0502733.200 36      .013
SH   1660.0502733.200 36      .013                0.000
CD  24  4    0   0.000   2.000    0.000 0.000 0.000  0.000
CD  36  4    0   0.000   3.000    0.000 0.000 0.000  0.000
Q            40.000
```

FILE: CEN.WSW W S P G W - EDIT LISTING - Version 14.06 Date:12-15-2017 Time: 9:38:42

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	24	4	0		2.000														
CD	36	4	0		3.000														

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
RAH1723: Agave Crest

HEADING LINE NO 2 IS -
Centennial Parkway Storm Drain - Mainline

HEADING LINE NO 3 IS -
Ultimate Drainage Condition - Modeling through Proposed Facilities

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1000.000	2714.420	36	2717.420

ELEMENT NO 2 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1327.350	2723.890	36	.013	.000	.000	.000	1

ELEMENT NO 3 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1628.350	2732.310	36	.013	.000	.000	.000	1

ELEMENT NO 4 IS A JUNCTION

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1628.350	2732.310	36	24	0	.013	25.000	.000	2733.310	.000	45.000	.000

RADIUS	ANGLE
.000	.000

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 5 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1660.050	2733.200	36	.013	.000	.000	.000	0

ELEMENT NO 6 IS A SYSTEM HEADWORKS

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1660.050	2733.200	36	.000

RAH1723: Agave Crest
Centennial Parkway Storm Drain - Mainline
Ultimate Drainage Condition - Modeling through Proposed Facilities

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2714.420	1.628	2716.048	65.00	16.59	4.28	2720.32	.00	2.59	2.99	3.000	.000	.00	0 .0
136.499	.0289					.0289	3.95	1.63	2.55	1.63	.013	.00	.00	PIPE
1136.499	2718.369	1.628	2719.997	65.00	16.59	4.28	2724.27	.00	2.59	2.99	3.000	.000	.00	0 .0
190.851	.0289					.0282	5.37	1.63	2.55	1.63	.013	.00	.00	PIPE
1327.350	2723.890	1.655	2725.546	65.00	16.25	4.10	2729.65	.00	2.59	2.98	3.000	.000	.00	0 .0
45.695	.0280					.0272	1.24	1.66	2.47	1.64	.013	.00	.00	PIPE
1373.046	2725.168	1.662	2726.831	65.00	16.17	4.06	2730.89	.00	2.59	2.98	3.000	.000	.00	0 .0
119.439	.0280					.0254	3.04	1.66	2.45	1.64	.013	.00	.00	PIPE
1492.484	2728.510	1.728	2730.238	65.00	15.41	3.69	2733.93	.00	2.59	2.97	3.000	.000	.00	0 .0
48.344	.0280					.0225	1.09	1.73	2.28	1.64	.013	.00	.00	PIPE
1540.828	2729.862	1.798	2731.660	65.00	14.70	3.35	2735.01	.00	2.59	2.94	3.000	.000	.00	0 .0
28.711	.0280					.0199	.57	1.80	2.11	1.64	.013	.00	.00	PIPE
1569.539	2730.665	1.871	2732.536	65.00	14.01	3.05	2735.59	.00	2.59	2.91	3.000	.000	.00	0 .0
19.170	.0280					.0176	.34	1.87	1.95	1.64	.013	.00	.00	PIPE
1588.709	2731.201	1.950	2733.152	65.00	13.36	2.77	2735.92	.00	2.59	2.86	3.000	.000	.00	0 .0
13.649	.0280					.0157	.21	1.95	1.81	1.64	.013	.00	.00	PIPE
1602.359	2731.583	2.034	2733.617	65.00	12.74	2.52	2736.14	.00	2.59	2.80	3.000	.000	.00	0 .0
9.916	.0280					.0139	.14	2.03	1.66	1.64	.013	.00	.00	PIPE

RAH1723: Agave Crest
Centennial Parkway Storm Drain - Mainline
Ultimate Drainage Condition - Modeling through Proposed Facilities

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch

1612.275	2731.861	2.124	2733.985	65.00	12.15	2.29	2736.28	.00	2.59	2.73	3.000	.000	.00	0	.0
7.169	.0280					.0125	.09	2.12	1.53	1.64	.013	.00	.00	PIPE	
1619.444	2732.061	2.221	2734.282	65.00	11.58	2.08	2736.36	.00	2.59	2.63	3.000	.000	.00	0	.0
4.899	.0280					.0112	.05	2.22	1.40	1.64	.013	.00	.00	PIPE	
1624.343	2732.198	2.328	2734.526	65.00	11.04	1.89	2736.42	.00	2.59	2.50	3.000	.000	.00	0	.0
2.967	.0280					.0101	.03	2.33	1.27	1.64	.013	.00	.00	PIPE	
1627.310	2732.281	2.447	2734.728	65.00	10.53	1.72	2736.45	.00	2.59	2.33	3.000	.000	.00	0	.0
1.040	.0280					.0092	.01	2.45	1.14	1.64	.013	.00	.00	PIPE	
1628.350	2732.310	2.585	2734.895	65.00	10.03	1.56	2736.46	.00	2.59	2.07	3.000	.000	.00	0	.0
JUNCT STR	.0000					.0062	.00	2.59	1.00		.013	.00	.00	PIPE	
1628.350	2732.310	3.893	2736.203	40.00	5.66	.50	2736.70	.00	2.06	.00	3.000	.000	.00	0	.0
31.700	.0281					.0036	.11	3.89	.00	1.24	.013	.00	.00	PIPE	
1660.050	2733.200	3.117	2736.317	40.00	5.66	.50	2736.81	.00	2.06	.00	3.000	.000	.00	0	.0

RAH1723: Agave Crest

Centennial Parkway Storm Drain - Mainline

Ultimate Drainage Condition - Modeling through Proposed Facilities

1000.00 .I W C H E . R

1013.47 .

1026.94 .

1040.41 .

1053.88 .

1067.35 .

1080.82 .


1094.29
1107.76
1121.23
1134.70
1148.17
I W C H E
R
1161.64
1175.12
1188.59
1202.06
1215.53
1229.00
1242.47
1255.94
1269.41
1282.88
1296.35
1309.82
1323.29
1336.76
I W C H E
R
1350.23


1363.70
1377.17
1390.64
1404.11
1417.58
1431.05
1444.52
1457.99
1471.46
1484.93
1498.41
1511.88
1525.35
1538.82
1552.29
1565.76
1579.23
1592.70
1606.17
1619.64
1633.11
I W C H E R
I W C H E R
I W C H E R
I W CH E R
I W C H E R
I W C H E R
I W C H E R

```
   1646.58    .                                                                  I          WC H     E  .    R

   1660.05    .                                                                  I           WC H    E  .    R

            2714.420  2716.659  2718.899  2721.138  2723.378  2725.617  2727.857  2730.096  2732.336  2734.575  2736.814
```

N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   S = SUPER-ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

```
T1 RAH1723: Agave Crest
T2 Centennial Parkway Storm Drain - SDDI#1 Lateral
T3 Proposed Drainage Condition
SO   1000.0002732.310 24       .013                  2736.203
R    1021.2102732.740 24       .013
SH   1021.2102732.740 24       .013                  0.000
CD  24  4    0   0.000   2.000    0.000 0.000 0.000  0.000
CD  36  4    0   0.000   3.000    0.000 0.000 0.000  0.000
Q            31.000
```

FILE: LAT.WSW W S P G W - EDIT LISTING - Version 14.06 Date:12-15-2017 Time: 9:40: 2

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	24	4	0		2.000														
CD	36	4	0		3.000														

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
RAH1723: Agave Crest

HEADING LINE NO 2 IS -
Centennial Parkway Storm Drain - SDDI#1 Lateral

HEADING LINE NO 3 IS -
Proposed Drainage Condition

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

	STATION	INVERT	SECT	W S ELEV
U/S DATA	1000.000	2732.310	24	2736.203

ELEMENT NO 2 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1021.210	2732.740	24	.013	.000	.000	.000	0

ELEMENT NO 3 IS A SYSTEM HEADWORKS * *

	STATION	INVERT	SECT	W S ELEV
U/S DATA	1021.210	2732.740	24	.000

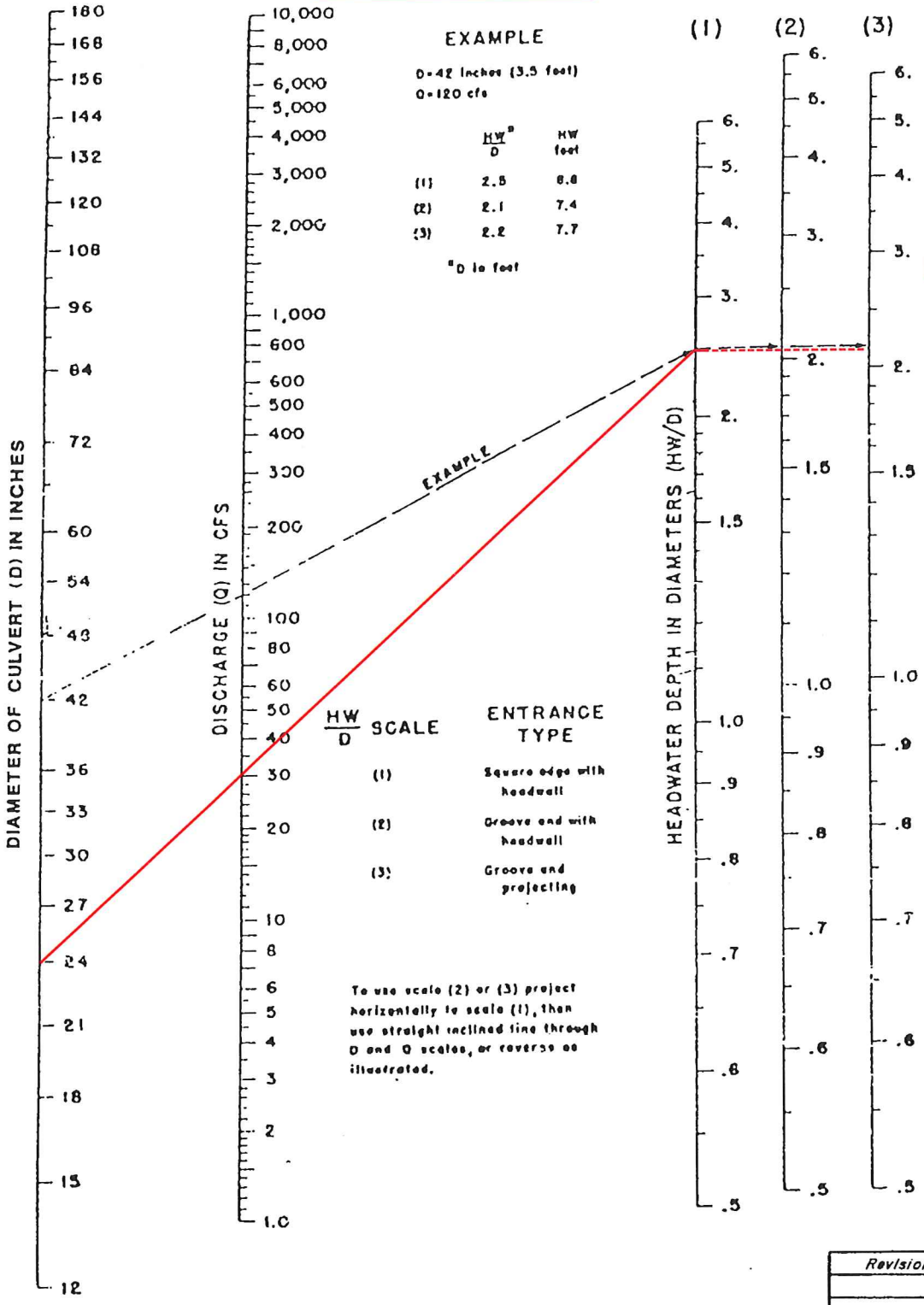
RAH1723: Agave Crest
Centennial Parkway Storm Drain - SDDI#1 Lateral
Proposed Drainage Condition

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	2732.310	3.893	2736.203	31.00	9.87	1.51	2737.71	.00	1.88	.00	2.000	.000	.00	0 .0
21.210	.0203					.0188	.40	3.89	.00	1.58	.013	.00	.00	PIPE
1021.210	2732.740	3.861	2736.601	31.00	9.87	1.51	2738.11	.00	1.88	.00	2.000	.000	.00	0 .0

♀
** WARNING NO. 22 ** - NO PLOT GENERATED, BAD DATA OR NOT ENOUGH POINTS, 3 OR LESS

NOMOGRAPH – INLET CONTROL RCP

SDDI#1: Q_{PRO}=31 CFS



HW/D 2.6

D 24

HW 4.0

Revision	Date

WRC ENGINEERING

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

FIGURE 1005

APPENDIX D

Finished Floor Analyses

AGAVE CREST FINISH FLOOR - CITY OF LAS VEGAS JURISDICTION										
INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C[1] (ft)	F/L[2] (ft)	D_{100} (ft)	Flowline $F.F._{min}$[3] (ft)	T/C + 6" $F.F._{min}$[4] (ft)	$F.F._{Design}$ (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
1	1	2728.06	2727.41	0.65	2728.71	2728.56	2729.9	OK	OK	
2	1	2730.43	2729.78	0.65	2731.08	2730.93	2732.2	OK	OK	
3	1	2732.92	2732.27	0.65	2733.57	2733.42	2734.7	OK	OK	
4	1	2735.57	2734.92	0.65	2736.22	2736.07	2737.4	OK	OK	
5	1	2737.69	2737.04	0.65	2738.34	2738.19	2739.5	OK	OK	
6	1	2738.50	2737.85	0.65	2739.15	2739.00	2740.4	OK	OK	
7	1	2739.09	2738.44	0.65	2739.74	2739.59	2741.4	OK	OK	
8	1	2740.21	2739.56	0.65	2740.86	2740.71	2742.0	OK	OK	
9	1	2741.00	2740.35	0.65	2741.65	2741.50	2742.8	OK	OK	
10	1	2741.93	2741.28	0.65	2742.58	2742.43	2743.7	OK	OK	
11	1	2742.47	2741.82	0.65	2743.12	2742.97	2744.3	OK	OK	
12	1	2742.83	2742.18	0.65	2743.48	2743.33	2744.9	OK	OK	
13	1	2743.25	2742.60	0.65	2743.90	2743.75	2745.3	OK	OK	
14	1	2743.62	2742.97	0.65	2744.27	2744.12	2745.8	OK	OK	
15	1	2743.99	2743.34	0.65	2744.64	2744.49	2746.1	OK	OK	
16	1	2747.21	2746.56	0.65	2747.86	2747.71	2749.0	OK	OK	
17	1	2750.25	2749.60	0.65	2750.90	2750.75	2752.1	OK	OK	
18	1	2754.25	2753.60	0.65	2754.90	2754.75	2756.1	OK	OK	
19	1	2757.15	2756.50	0.65	2757.80	2757.65	2759.0	OK	OK	
20	1	2758.12	2757.47	0.65	2758.77	2758.62	2759.9	OK	OK	
21	1	2758.64	2757.99	0.65	2759.29	2759.14	2761.1	OK	OK	
22	1	2759.49	2758.84	0.65	2760.14	2759.99	2761.4	OK	OK	
23	1	2759.74	2759.09	0.65	2760.39	2760.24	2762.1	OK	OK	
24	1	2759.74	2759.09	0.65	2760.39	2760.24	2761.9	OK	OK	
25	1	2759.43	2758.78	0.65	2760.08	2759.93	2762.0	OK	OK	
26	1	2759.25	2758.60	0.65	2759.90	2759.75	2761.4	OK	OK	
27	1	2758.97	2758.32	0.65	2759.62	2759.47	2760.9	OK	OK	
28	1	2758.52	2757.87	0.65	2759.17	2759.02	2760.3	OK	OK	
29	1	2756.13	2755.48	0.65	2756.78	2756.63	2757.9	OK	OK	
30	1	2752.99	2752.34	0.65	2753.64	2753.49	2754.8	OK	OK	
31	1	2750.90	2750.25	0.65	2751.55	2751.40	2752.8	OK	OK	
32	1	2749.61	2748.96	0.65	2750.26	2750.11	2751.4	OK	OK	
33	1	2748.84	2748.19	0.65	2749.49	2749.34	2751.2	OK	OK	
34	1	2748.29	2747.64	0.65	2748.94	2748.79	2750.1	OK	OK	
35	1	2747.53	2746.88	0.65	2748.18	2748.03	2749.3	OK	OK	
36	1	2746.39	2745.74	0.65	2747.04	2746.89	2748.2	OK	OK	
37	1	2745.69	2745.04	0.65	2746.34	2746.19	2748.0	OK	OK	
38	1	2745.35	2744.70	0.65	2746.00	2745.85	2747.5	OK	OK	
39	1	2759.49	2758.84	0.65	2760.14	2759.99	2760.2	OK	OK	
40	1	2754.80	2754.15	0.65	2755.45	2755.30	2756.6	OK	OK	
41	1	2750.69	2750.04	0.65	2751.34	2751.19	2752.5	OK	OK	
42	1	2747.54	2746.89	0.65	2748.19	2748.04	2749.3	OK	OK	
43	1	2745.61	2744.96	0.65	2746.26	2746.11	2748.2	OK	OK	
44	1	2742.18	2741.53	0.65	2742.83	2742.68	2744.0	OK	OK	
45	1	2739.92	2739.27	0.65	2740.57	2740.42	2741.7	OK	OK	
46	1	2736.43	2735.78	0.65	2737.08	2736.93	2738.2	OK	OK	
47	1	2733.60	2732.95	0.65	2734.25	2734.10	2735.4	OK	OK	
48	1	2731.59	2730.94	0.65	2732.24	2732.09	2733.4	OK	OK	
49	1	2730.44	2729.79	0.65	2731.09	2730.94	2732.4	OK	OK	
50	1	2729.81	2729.16	0.65	2730.46	2730.31	2732.4	OK	OK	
51	1	2729.41	2728.76	0.65	2730.06	2729.91	2731.2	OK	OK	
52	1	2728.78	2728.13	0.65	2729.43	2729.28	2730.6	OK	OK	
53	1	2727.92	2727.27	0.65	2728.57	2728.42	2729.7	OK	OK	
54	1	2727.24	2726.59	0.65	2727.89	2727.74	2729.0	OK	OK	
55	1	2726.56	2725.91	0.65	2727.21	2727.06	2728.4	OK	OK	
56	1	2725.89	2725.24	0.65	2726.54	2726.39	2727.7	OK	OK	
57	1	2725.04	2724.39	0.65	2725.69	2725.54	2726.9	OK	OK	
58	1	2728.11	2727.46	0.65	2728.76	2728.61	2729.9	OK	OK	
59	1	2730.48	2729.83	0.65	2731.13	2730.98	2732.3	OK	OK	
60	1	2732.97	2732.32	0.65	2733.62	2733.47	2734.8	OK	OK	
61	1	2735.62	2734.97	0.65	2736.27	2736.12	2737.4	OK	OK	
62	1	2737.67	2737.02	0.65	2738.32	2738.17	2739.5	OK	OK	
63	1	2742.27	2741.62	0.65	2742.92	2742.77	2744.1	OK	OK	

AGAVE CREST FINISH FLOOR - CITY OF LAS VEGAS JURISDICTION										
INPUT INFORMATION					FINISHED FLOORS					NOTES
Lot Number	Hydraulic Section Utilized	T/C[1] (ft)	F/L[2] (ft)	D_{100} (ft)	Flowline $F.F._{min}$[3] (ft)	T/C + 6" $F.F._{min}$[4] (ft)	$F.F._{Design}$ (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
64	1	2727.51	2726.86	0.65	2728.16	2728.01	2729.3	OK	OK	
65	1	2731.47	2730.82	0.65	2732.12	2731.97	2733.3	OK	OK	
66	1	2733.41	2732.76	0.65	2734.06	2733.91	2735.2	OK	OK	
67	1	2736.17	2735.52	0.65	2736.82	2736.67	2738.0	OK	OK	
68	1	2739.66	2739.01	0.65	2740.31	2740.16	2741.5	OK	OK	
69	1	2742.17	2741.52	0.65	2742.82	2742.67	2744.0	OK	OK	

Where:

1: Top of Curb at High Side of Lot

2: TC-0.38 (For Roll Curb), TC-0.5 (For L Curb)

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

4: City of Las Vegas minimum allowable finished floor elevation = T.C. @ high side of lot + 6-inches

5: These lots have an adjacent solid grouted wall that protects the FF.

City of Las Vegas Finished Floor Criteria:

-The finished floor shall be set a vertical distance above the gutter flowline of at least twice the depth of flow in the gutter flowline up to a maximum of 18 inches above the WSEL in the street.

-The finished floor shall be set a vertical distance of at least 6-inches above the highest adjacent top of curb.

Supplemental Finish Floor Checks

Drainage Easements Check

Lot Number	High TC/FL[1]	Section	Flow Depth[2]	Min FF[3]	Design FF	Check	Solid Grout
7	2742.17	DES	1.09	2744.76	2741.40	CHECK	Yes
8	2742.17	DES	1.09	2744.76	2742.00	CHECK	Yes
12	2747.37	DEM	0.92	2749.79	2744.90	CHECK	Yes
13	2747.37	DEM	0.92	2749.79	2745.30	CHECK	Yes
24	2764.17	DEN	0.26	2765.93	2761.90	CHECK	Yes
25	2764.17	DEN	0.26	2765.93	2762.00	CHECK	Yes

1: High TC/FL is at the high side of the drainage easement flowline or the highest TC adjacent to the easement if flow is weiring over the curb.

2: Flow depth is either normal depth or weir depth (whichever is higher).

3: Min FF is the High TC/FL plus the Flow Depth plus 18 inches.

Adjacent/Perimeter Street Check

Lot Number	Street	High TC[1]	High FL[2]	Section	Flow Depth[3]	Min FF[4]	Design FF	Check	Solid Grout
1	Fairy Duster Street	2725.30	2724.92	2	0.57	2726.06	2729.9	OK	No
1	Centennial Pkwy	2726.78	2726.40	CEN	0.89	2728.18	2729.9	OK	No
2	Centennial Pkwy	2728.38	2728.00	CEN	0.89	2729.78	2732.2	OK	No
3	Centennial Pkwy	2730.08	2729.70	CEN	0.89	2731.48	2734.7	OK	No
4	Centennial Pkwy	2732.18	2731.80	CEN	0.89	2733.58	2737.4	OK	No
5	Centennial Pkwy	2733.58	2733.20	CEN	0.89	2734.98	2739.5	OK	No
6	Centennial Pkwy	2735.68	2735.30	CEN	0.89	2737.08	2740.4	OK	No
7	Centennial Pkwy	2738.79	2738.41	CEN	0.89	2740.19	2741.4	OK	No
16	Winecup Street	2744.51	2744.13	1	0.65	2745.43	2749.0	OK	No
38	Winecup Street	2744.45	2744.07	1	0.65	2745.37	2747.5	OK	No
39	Wild Senna Street	2760.04	2759.66	1	0.65	2760.96	2760.2	CHECK	Yes
39	Jewelflower Ave	2759.13	2758.75	1	0.65	2760.05	2760.2	OK	No
40	Jewelflower Ave	2758.65	2758.27	1	0.65	2759.57	2756.6	CHECK	Yes
41	Jewelflower Ave	2756.45	2756.07	1	0.65	2757.37	2752.5	CHECK	Yes
42	Jewelflower Ave	2753.05	2752.67	1	0.65	2753.97	2749.3	CHECK	Yes
43	Jewelflower Ave	2750.95	2750.57	1	0.65	2751.87	2748.2	CHECK	Yes
43	Shirley Poppy St	2747.64	2747.26	1	0.65	2748.56	2748.2	CHECK	Yes
44	Winecup Street	2743.90	2743.52	1	0.65	2744.82	2744.0	CHECK	Yes
57	Centennial Pkwy	2722.31	2721.93	CEN	0.89	2723.71	2726.9	OK	No
58	Fairy Duster Street	2726.85	2726.47	1	0.65	2727.77	2729.9	OK	No
62	Winecup Street	2741.39	2741.01	1	0.65	2742.31	2739.5	CHECK	Yes
65	Fairy Duster Street	2728.75	2728.37	1	0.65	2729.67	2733.3	OK	No
69	Winecup Street	2742.83	2742.45	1	0.65	2743.75	2744.0	OK	No

1: High TC is the elevation at the high side of the adjacent perimeter street

2: 0.38-ft is subtracted from the High TC to obain the High FL elevation

3: Flow depth is the normal depth in adjacent perimeter street

4: Min FF is the High FL plus twice the depth of flow.

Specific Energy Check

Lot Number	High TC[1]	High FL[2]	Section	Specific Energy[3]	Min FF[4]	Design FF	Check
6	2738.5	2738.12	1	1.14	2739.26	2740.40	OK
7	2739.09	2738.71	1	1.14	2739.85	2741.40	OK
20	2758.12	2757.74	1	1.14	2758.88	2759.90	OK
21	2758.64	2758.26	1	1.14	2759.40	2761.10	OK
25	2759.43	2759.05	1	1.14	2760.19	2762.00	OK
26	2759.25	2758.87	1	1.14	2760.01	2761.40	OK
33	2748.84	2748.46	1	1.14	2749.60	2751.20	OK
34	2748.29	2747.91	1	1.14	2749.05	2750.10	OK
37	2745.69	2745.31	1	1.14	2746.45	2748.00	OK
38	2745.35	2744.97	1	1.14	2746.11	2747.50	OK
50	2729.81	2729.43	1	1.14	2730.57	2732.40	OK
51	2729.41	2729.03	1	1.14	2730.17	2731.20	OK

1: High TC is the elevation at the high side of the adjacent perimeter street

2: 0.38-ft is subtracted from the High TC to obain the High FL elevation

2: Specific energy depth is taken from FlowMaster calculation for street directing flow toward lot.

3: Min FF is the High FL plus the specific energy depth.

APPENDIX E

City of Las Vegas Correspondence

Caitlyn Alcantara

From: Kevin Bross
Sent: Wednesday, October 25, 2017 11:39 AM
To: Amy Poechmann
Cc: Isaac Guzman; Caitlyn Alcantara
Subject: Centennial Hualapai - Preliminary Drainage Emails with CLV

Follow Up Flag: Follow up
Flag Status: Flagged

Amy,

See below for my preliminary correspondence with CLV.

Thank you,

Kevin Bross, P.E.
Assistant Project Manager

SLATER HANIFAN GROUP
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From: Albert Sung [mailto:YSung@LasVegasNevada.GOV]
Sent: Tuesday, September 19, 2017 8:02 AM
To: Kevin Bross <kbross@shg-inc.com>
Cc: Oh-Sang Kwon <okwon@LasVegasNevada.GOV>; Steve Swanton <sswanton@LasVegasNevada.GOV>; Lucien Paet <lpaet@LasVegasNevada.GOV>
Subject: RE: Centennial Hualapai TMP

Kevin,

The minimum width for drainage easements in areas out of the Rural Neighborhood will be 10' if the 100-year flow is less than 20cfs.

Yes, you may drain the flows out of the entrance on Centennial.

Albert Y. Sung
Project Engineer
Public Works Dept. / Flood Control

(702) 229-6541
333 N. Rancho Dr. 7th Floor
Las Vegas, NV 89106



lasvegasnevada.gov



Your opinion is important! Click here to take a short survey.

From: Kevin Bross [mailto:kbross@shg-inc.com]
Sent: Monday, September 18, 2017 4:49 PM
To: Albert Sung <YSung@LasVegasNevada.GOV>
Cc: Oh-Sang Kwon <okwon@LasVegasNevada.GOV>; Steve Swanton <sswanton@LasVegasNevada.GOV>; Lucien Paet <lpaet@LasVegasNevada.GOV>; Todd Steadham <tsteadham@shg-inc.com>
Subject: RE: Centennial Hualapai TMP

Albert,

We will update our site plan based on the new policy. Since we are only adjacent, not actually in the Rural Neighborhood Preservation Area, can you confirm that we are able to use 5ft easements?

Also, can we drain the offsite flows out our entrance on Centennial? Or would we need to allow additional easements on the east side of the site to follow the natural flow path?

Thank you,

Kevin Bross, P.E.
Assistant Project Manager

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From: Albert Sung [mailto:YSung@LasVegasNevada.GOV]
Sent: Monday, September 18, 2017 9:54 AM
To: Kevin Bross <kbross@shg-inc.com>
Cc: Oh-Sang Kwon <okwon@LasVegasNevada.GOV>; Steve Swanton <sswanton@LasVegasNevada.GOV>; Lucien Paet <lpaet@LasVegasNevada.GOV>
Subject: RE: Centennial Hualapai TMP

Hi Kevin,

The 10'-public drainage easement along the west boundary will create a playground for youngsters and may cause nuisance to the neighborhood.

According to the contours adjacent to the west of the project site, there are at most two to three distinctive low points along the west property line. It is advisable that east-west running public drainage easements (privately maintained and common elements) be provided at the low points to perpetuate offsite flows. Per new policy, if the site is located in Rural Neighborhood Preservation Area, the width of the easements may be reduced to 5' and completely concrete lined. Please revise the site plan layout accordingly.

Albert Y. Sung
Project Engineer
Public Works Dept. / Flood Control
(702) 229-6541
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Las Vegas, NV 89106

lasvegasnevada.gov

Your opinion is important! Click here to take a short survey.

From: Kevin Bross [mailto:kbross@shg-inc.com]
Sent: Monday, September 18, 2017 7:45 AM
To: Oh-Sang Kwon <okwon@LasVegasNevada.GOV>
Cc: Todd Steadham <tsteadham@shg-inc.com>; Steve Swanton <sswanton@LasVegasNevada.GOV>; Albert Sung <YSung@LasVegasNevada.GOV>
Subject: RE: Centennial Hualapai TMP

Hello Oh Sang,

Per the 1st paragraph of Steve's email below, we'd like to discuss the 10ft drainage easement shown along the west PL of our tentative map (attached). We are available to meet this week or if possible, we can discuss over a phone call.

Thank you,

Kevin Bross, P.E.
Assistant Project Manager

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Use of electronic media is at the sole risk of the user.

From: Steve Swanton [mailto:sswanton@LasVegasNevada.GOV]
Sent: Wednesday, September 13, 2017 3:45 PM
To: Roxanne Leigh <rleigh@shg-inc.com>
Cc: Todd Steadham <tsteadham@shg-inc.com>; Kevin Bross <kbross@shg-inc.com>; Chelsea Jensen <cjensen@shg-inc.com>
Subject: Centennial Hualapai TMP

Hi Roxanne,

I've discussed this map with Public Works. They have a concern regarding the 10' drainage easement along the west PL that it will become an attractive nuisance once the adjacent parcels are developed. They recommended that you meet with Flood Control to discuss whether the easement is necessary and what can be done along that west property line.

The landscape plan will need to be revised to include the required trees and shrubs. The plan must include a legend that shows the number, species and size of plants as well as the species/type of groundcovers used. The code technically requires a 6' landscape buffer along the north PL adjacent to the Beltway ROW, although I assume you do not want to chop those lots down to provide it. You will then need a waiver from the perimeter landscape standards to allow no buffer. This waiver will run with the tentative map. Staff will support the waiver.

The City has decided to leave the transportation trail alignment the way it is for now. Since you are showing conformance with the master plan trail requirements, nothing more needs to be done on your side.

Any revisions can be uploaded directly to the Applicant/Supplemental folder in CLVEPLAN. You must notify me once you have completed the upload, as staff does not need to send you a task for this purpose. You will have until Sept. 25 to provide the revised plans/docs **unless** you decide to provide the 6' buffer along the north PL, **in which case I would need everything by Monday morning, Sept. 18.**

I've been informed that we are going to add these items to the one-motion, one-vote section of the agenda. Be on the lookout for the staff report in a few weeks and look over the conditions when you receive the 1M1V notice.

Thanks.

Steve Swanton, AICP
Senior Planner
Department of Planning| Case Planning Division
Voice: (702) 229-4714 | Fax: (702) 474-7463
333 N. Rancho Drive, 3rd Floor | Las Vegas, NV 89106

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APPENDIX F

Entitlement Information

LAS VEGAS CITY COUNCIL

CAROLYN G. GOODMAN
Mayor

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Mayor Pro Tem

RICKI Y. BARLOW
STAVROS S. ANTHONY
BOB COFFIN
STEVEN G. SEROKA
MICHELE FIORE

SCOTT D. ADAMS
City Manager

November 16, 2017

Mr. David Saltman
VFR Southwest Desert Equities, LLC
8215 South Eastern Avenue, Suite #205
Las Vegas, Nevada 89123

RE: GPA-71535 [PRJ-71473] - GENERAL PLAN AMENDMENT RELATED TO ZON-71536, WVR-71655, VAR-71537, VAC-71538 AND TMP-71539
CITY COUNCIL MEETING OF NOVEMBER 15, 2017

Dear Mr. Saltman:

The City Council at a regular meeting held on November 15, 2017 voted to ***APPROVE*** a request for a General Plan Amendment FROM: R (RURAL DENSITY RESIDENTIAL) TO: L (LOW DENSITY RESIDENTIAL) on 16.95 acres on the north side of Centennial Parkway, approximately 990 feet east of Hualapai Way (APNs 125-19-401-005, 006, 009, 010 and 011), Ward 6 (Fiore) [PRJ-71473].

The Notice of Final Action was filed with the Las Vegas City Clerk on November 16, 2017.

Sincerely,

Peter Lowenstein, AICP
Acting Director
Department of Planning

PL:RTS:clb

cc: Mr. Brian Walsh
Richmond American Homes of Nevada
7770 South Dean Martin Drive, Suite #308
Las Vegas, Nevada 89139

Ms. Chelsea Jensen
Slater Hanifan Group
5740 South. Arville Street, Suite #216
Las Vegas, Nevada 89118

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CITY COUNCIL

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Mayor

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STEVEN G. SEROKA
MICHELE FIORE

SCOTT D. ADAMS
City Manager

November 16, 2017

Mr. David Saltman
VFR Southwest Desert Equities, LLC
8215 South Eastern Avenue, Suite #205
Las Vegas, Nevada 89123

RE: TMP-71539 [PRJ-71473] – TENTATIVE MAP RELATED TO GPA-71535, ZON-71536, WVR-71655, VAR-71537 AND VAC-71538 CITY COUNCIL MEETING OF NOVEMBER 15, 2017

Dear Mr. Saltman:

The City Council at a regular meeting held on November 15, 2017 voted to ***APPROVE*** a request for a Tentative Map FOR A 69-LOT SINGLE FAMILY RESIDENTIAL SUBDIVISION on 16.95 acres on the north side of Centennial Parkway, approximately 990 feet east of Hualapai Way (APNs 125-19-401-005, 006, 009, 010 and 011), U (Undeveloped) Zone [R (Rural Density Residential) General Plan Designation] [PROPOSED: R-1 (Single Family Residential)], Ward 6 (Fiore) [PRJ-71473].

This approval is subject to the following conditions:

Planning

1. Approval of the Tentative Map shall be for no more than four (4) years. If a Final Map is not recorded on all or a portion of the area embraced by the Tentative Map within four (4) years of the approval of the Tentative Map, this action is void.

2. Approval of a General Plan Amendment (GPA-71535) and Rezoning (ZON-71536) and approval of and conformance to the Conditions of Approval for Waiver (WVR-71655), Variance (VAR-71537) and Petition to Vacate (VAC-71538) shall be required, if approved.

3. A technical landscape plan, signed and sealed by a Registered Architect, Landscape Architect, Residential Designer or Civil Engineer, must be submitted prior to or at the same time as Final Map submittal. A permanent underground sprinkler system is required, and shall be permanently maintained in a satisfactory manner; the landscape plan shall include irrigation specifications. Installed landscaping shall not impede visibility of any traffic control device. The technical landscape plan shall indicate four five-gallon shrubs for each required tree within the six-foot private landscape buffer along Centennial Parkway.

4. Street names must be provided in accordance with the City's Street Naming Regulations.

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5. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.

6. In conjunction with creation, declaration and recordation of the subject common-interest community, and prior to recordation of the Covenants, Codes and Restrictions ("CC&R"), or conveyance of any unit within the community, the Developer is required to record a Declaration of Private Maintenance Requirements ("DPMR") as a covenant on all associated properties, and on behalf of all current and future property owners. The DPMR is to include a listing of all privately owned and/or maintained infrastructure improvements, along with assignment of maintenance responsibility for each to the common interest community or the respective individual property owners, and is to provide a brief description of the required level of maintenance for privately maintained components. The DPMR must be reviewed and approved by the City of Las Vegas Department of Field Operations prior to recordation, and must include a statement that all properties within the community are subject to assessment for all associated costs should private maintenance obligations not be met, and the City of Las Vegas be required to provide for said maintenance. Also, the CC&R are to include a statement of obligation of compliance with the DPMR. Following recordation, the Developer is to submit copies of the recorded DPMR and CC&R documents to the City of Las Vegas Department of Field Operations.

7. All development is subject to the conditions of City Departments and State Subdivision Statutes.

Public Works

8. A Petition of Vacation, such as VAC-71538, shall record concurrent with the recordation of a Final Map for this site.

9. Dedicate 50 feet of right-of-way for the north half of Centennial Parkway adjacent to this site.

10. Grant a 15-foot wide Transportation Trail easement adjacent to Centennial Parkway and construct trail improvements in accordance with current City standards concurrent with on-site development.

11. Private streets must be granted and labeled on the Final Map for this site as Public Utility Easements (P.U.E.), Public Sewer Easements, and Public Drainage Easements to be privately maintained by the Homeowner's Association.

12. Construct full half-street improvements on Centennial Parkway meeting Current City Standards concurrent with development of this site. All existing paving damaged or removed by this development shall be restored at its original location and to its original width concurrent with development of this site.

13. Per Clark County Area Standard Drawing #222, the minimum distance from the street to the call box shall be 100 feet. Alternatively, submit a queueing analysis prior to the submittal of construction drawings.

14. Landscape and maintain all unimproved rights-of-way on Centennial Parkway adjacent to this site. All landscaping and private improvements installed with this project shall be situated and maintained so as to not create sight visibility obstructions for vehicular traffic at all development access drives and abutting street intersections.

15. Submit a License Agreement for landscaping and private improvements in the Centennial Parkway public rights-of-way prior to this issuance of permits for these improvements. The applicant must carry an insurance policy for the term of the License Agreement and add the City of Las Vegas as an additionally insured entity on this insurance policy. If requested by the City, the applicant shall remove property encroaching in the public right-of-way at the applicant's expense pursuant to the terms of the City's License Agreement. The installation and maintenance of all private improvements in the public right-of-way shall be the responsibility of the applicant and any successors in interest to the property and assigns pursuant to the terms of the License Agreement. Coordinate all requirements for the License Agreement with the Land Development Section of the Department of Building and Safety (702-229-4836).

16. Meet with the Fire Protection Engineering Section of the Department of Fire Services to discuss fire requirements for the proposed subdivision. The design and layout of all onsite private circulation and access drives shall meet the approval of the Department of Fire Services.

17. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits, submittal of any construction drawings or the submittal of a Map subdividing this site, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage plan/study. The developer of this site shall be responsible to construct such neighborhood or local drainage facility improvements as are recommended by the City of Las Vegas Neighborhood Drainage Studies and approved Drainage Plan/Study concurrent with development of this site. In lieu of constructing improvements, in whole or in part, the developer may agree to contribute monies for the construction of neighborhood or local drainage improvements, the amount of such monies shall be determined by the approved Drainage Plan/Study and shall be contributed prior to the issuance of any building or grading permits, or the recordation of a Map subdividing this site, whichever may occur first, if allowed by the City Engineer.

The Notice of Final Action was filed with the Las Vegas City Clerk on November 16, 2017.

Sincerely,

Peter Lowenstein, AICP
Acting Director
Department of Planning

PL:RTS:clb

cc: Mr. Brian Walsh
Richmond American Homes of Nevada
7770 South Dean Martin Drive, Suite #308
Las Vegas, Nevada 89139

Ms. Chelsea Jensen
Slater Hanifan Group
5740 South. Arville Street, Suite #216
Las Vegas, Nevada 89118

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STEVEN G. SEROKA
MICHELE FIORE

SCOTT D. ADAMS
City Manager

November 16, 2017

Mr. David Saltman
VFR Southwest Desert Equities, LLC
8215 South Eastern Avenue, Suite #205
Las Vegas, Nevada 89123

RE: VAC-71538 [PRJ-71473] - VACATION RELATED TO GPA-71535, ZON-71536, WVR-71655, VAR-71537 AND TMP-71539 CITY COUNCIL MEETING OF NOVEMBER 15, 2017

Dear Mr. Saltman:

The City Council at a regular meeting held on November 15, 2017 voted to ***APPROVE*** a request for a Petition to Vacate portions of Darling Road and Conquistador Street and U.S. Government Patent Easements generally located north of Centennial Parkway, east of Hualapai Way, Ward 6 (Fiore) [PRJ-71473].

This approval is subject to the following conditions:

1. The limits of this Petition of Vacation shall be defined as the Darling Road and Conquistador Street rights-of-way located north of Centennial Parkway, east of Hualapai Way. Additionally, the U.S. Government Patent Easements adjacent to Assessor Parcel numbers #125-19-401-011, 125-19-401-005, 125-19-401-009 and 125-19-401-010 are also included with this Petition of Vacation.

2. The Orders of Vacation and Relinquishment shall record concurrently with a Final Map for this site.

3. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the recordation of the Order of Vacation for this application. Appropriate drainage easements shall be reserved if recommended by the approved Drainage Plan/Study. The drainage study required by TMP-71539 may be used to satisfy this requirement provided that it addresses the area to be vacated.

4. All public improvements, if any, adjacent to and in conflict with this vacation application are to be modified, as necessary, at the applicant's expense prior to the recordation of an Order of Vacation/Relinquishment.

5. Reservation of easements for the facilities of the various utility companies together with reasonable ingress thereto and egress there from shall be provided if required.

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6. All development shall be in conformance with code requirements and design standards of all City Departments.

7. The Orders of Vacation and Relinquishment shall not be recorded until all of the conditions of approval have been met provided, however, that conditions requiring modification of public improvements may be fulfilled for purposes of recordation by providing sufficient security for the performance thereof in accordance with the Subdivision Ordinance of the City of Las Vegas. City Staff is empowered to modify this application if necessary because of technical concerns or because of other related review actions as long as current City right-of-way requirements are still complied with and the intent of the vacation application is not changed. If applicable, a five foot wide easement for public streetlight and fire hydrant purposes shall be retained on all vacation actions abutting public street corridors that will remain dedicated and available for public use. Also, if applicable and where needed, public easement corridors and sight visibility or other easements that would/should cross any right-of-way or easement being vacated must be retained.

8. If the Orders of Vacation and Relinquishment are not recorded within two (2) years after approval by the City of Las Vegas or an Extension of Time is not granted by the Planning Director, then approval will terminate and a new petition must be submitted.

The Notice of Final Action was filed with the Las Vegas City Clerk on November 16, 2017.

Sincerely,

Peter Lowenstein, AICP
Acting Director
Department of Planning

PL:RTS:clb

cc: Mr. Brian Walsh
Richmond American Homes of Nevada
7770 South Dean Martin Drive, Suite #308
Las Vegas, Nevada 89139

Ms. Chelsea Jensen
Slater Hanifan Group
5740 South. Arville Street, Suite #216
Las Vegas, Nevada 89118

LAS VEGAS CITY COUNCIL

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MICHELE FIORE

SCOTT D. ADAMS
City Manager

November 16, 2017

Mr. David Saltman
VFR Southwest Desert Equities, LLC
8215 South Eastern Avenue, Suite #205
Las Vegas, Nevada 89123

RE: VAR-71537 [PRJ-71473] - VARIANCE RELATED TO GPA-71535, ZON-71536, WVR-71655, VAC-71538 AND TMP-71539 CITY COUNCIL MEETING OF NOVEMBER 15, 2017

Dear Mr. Saltman:

The City Council at a regular meeting held on November 15, 2017 voted to ***APPROVE*** a request for a Variance TO ALLOW A CONNECTIVITY RATIO OF 1.22 WHERE 1.30 IS REQUIRED on 16.95 acres on the north side of Centennial Parkway, approximately 990 feet east of Hualapai Way (APNs 125-19-401-005, 006, 009, 010 and 011), U (Undeveloped) Zone [R (Rural Density Residential) General Plan Designation] [PROPOSED: R-1 (Single Family Residential)], Ward 6 (Fiore) [PRJ-71473].

This approval is subject to the following conditions:

Planning

1. Approval of a General Plan Amendment (GPA-71535) and Rezoning (ZON-71536) and approval of and conformance to the Conditions of Approval for a Waiver (WVR-71655), Petition to Vacate (VAC-71538) and Tentative Map (TMP-71539) shall be required, if approved.

2. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.

3. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

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4. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.

5. All City Code requirements and design standards of all City departments must be satisfied, except as modified herein.

The Notice of Final Action was filed with the Las Vegas City Clerk on November 16, 2017.

Sincerely,

Peter Lowenstein, AICP
Acting Director
Department of Planning

PL:RTS:clb

cc: Mr. Brian Walsh
Richmond American Homes of Nevada
7770 South Dean Martin Drive, Suite #308
Las Vegas, Nevada 89139

Ms. Chelsea Jensen
Slater Hanifan Group
5740 South. Arville Street, Suite #216
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MICHELE FIORE

SCOTT D. ADAMS
City Manager

November 16, 2017

Mr. David Saltman
VFR Southwest Desert Equities, LLC
8215 South Eastern Avenue, Suite #205
Las Vegas, Nevada 89123

RE: WVR-71655 [PRJ-71473] - WAIVER RELATED TO GPA-71535, ZON-71536, VAR-71537, VAC-71538 AND TMP-71539
CITY COUNCIL MEETING OF NOVEMBER 15, 2017

Dear Mr. Saltman:

The City Council at a regular meeting held on November 15, 2017 voted to ***APPROVE*** a request for a Waiver TO ALLOW A ZERO-FOOT PERIMETER LANDSCAPE BUFFER ALONG THE NORTH PROPERTY LINE WHERE SIX FEET IS REQUIRED on 16.95 acres on the north side of Centennial Parkway, approximately 990 feet east of Hualapai Way (APNs 125-19-401-005, 006, 009, 010 and 011), U (Undeveloped) Zone [R (Rural Density Residential) General Plan Designation] [PROPOSED: R-1 (Single Family Residential)], Ward 6 (Fiore) [PRJ-71473].

This approval is subject to the following conditions:

Planning

1. Approval of a General Plan Amendment (GPA-71535) and Rezoning (ZON-71536) and approval of and conformance to the Conditions of Approval for Variance (VAR-71537), Petition to Vacate (VAC-71538) and Tentative Map (TMP-71539) shall be required, if approved.

2. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.

3. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

4. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.

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5. All City Code requirements and design standards of all City departments must be satisfied, except as modified herein.

The Notice of Final Action was filed with the Las Vegas City Clerk on November 16, 2017.

Sincerely,

Peter Lowenstein, AICP
Acting Director
Department of Planning

PL:RTS:clb

cc: Mr. Brian Walsh
Richmond American Homes of Nevada
7770 South Dean Martin Drive, Suite #308
Las Vegas, Nevada 89139

Ms. Chelsea Jensen
Slater Hanifan Group
5740 South. Arville Street, Suite #216
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LAS VEGAS CITY COUNCIL

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STEVEN G. SEROKA
MICHELE FIORE

SCOTT D. ADAMS
City Manager

November 16, 2017

Mr. David Saltman
VFR Southwest Desert Equities, LLC
8215 South Eastern Avenue, Suite #205
Las Vegas, Nevada 89123

RE: ZON-71536 [PRJ-71473] - REZONING RELATED TO GPA-71535, WVR-71655, VAR-71537, VAC-71538 AND TMP-71539
CITY COUNCIL MEETING OF NOVEMBER 15, 2017

Dear Mr. Saltman:

The City Council at a regular meeting held on November 15, 2017 voted to ***APPROVE*** a request for a Rezoning FROM: U (UNDEVELOPED) [R (RURAL DENSITY RESIDENTIAL) GENERAL PLAN DESIGNATION] TO: R-1 (SINGLE FAMILY RESIDENTIAL) on 16.95 acres on the north side of Centennial Parkway, approximately 990 feet east of Hualapai Way (APNs 125-19-401-005, 006, 009, 010 and 011), Ward 6 (Fiore) [PRJ-71473].

The Notice of Final Action was filed with the Las Vegas City Clerk on November 16, 2017.

Sincerely,

Peter Lowenstein, AICP
Acting Director
Department of Planning

PL:RTS:clb

cc: Mr. Brian Walsh
Richmond American Homes of Nevada
7770 South Dean Martin Drive, Suite #308
Las Vegas, Nevada 89139

Ms. Chelsea Jensen
Slater Hanifan Group
5740 South. Arville Street, Suite #216
Las Vegas, Nevada 89118

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APPENDIX G

Reference Material

Technical Drainage Study for Centennial/Conquistador
(HTE#06-65297, by CVL Consultants, Inc.)

Approval Letters

LTR

Department of Development Services
Civil Engineering Division

500 S Grand Central Pky 1st Fl • Box 551799 • Las Vegas NV 89155-1799
(702) 455-4600 • Fax (702) 388-2550

Phil Rosenquist, Director • Dean Friedli, Assistant Director

February 8, 2007

06-35297
LTR

CVL Consultants, Inc.
6280 S. Valley View, Suite 200
Las Vegas, NV 89118

SUBJECT: WILLDAN/Clark County Development Services Dept. Plan Review Contract
Technical Drainage Study for Centennial/Conquistador **(5338)**
1st Addendum Dated: October 23, 2006
Supplemental Dated: October 31, 2006
2nd Addendum Dated: December 18, 2006
3rd Addendum Dated: January 18, 2007
Location: Southwest of Centennial Parkway and Jensen Street
(Sec. 30, T. 19 S., R. 60 E.)
HTE# 06-35297

The Referenced **Technical Drainage Study** has been reviewed and is accepted as complying with the minimum improvement standards. As set forth in the subject drainage study, the following measures will be taken to mitigate flood hazards.

1. The site shall be graded with respect to drainage as shown on "Centennial/Conquistador," sheet C-1, signed and sealed by Geoffrey G. Purse, P.E., on January 19, 2007, and sheets GP-1, P-1, P-2, P-3, and DT-1, signed and sealed by Geoffrey G. Purse, P.E., on January 22, 2007.

2. The following drainage facilities shall be constructed:

   a. An 8-foot wide concrete cross gutter per Clark County Standard Drawing No. 228 at the following locations:

      - Crossing Street A on the south side of Centennial Parkway.
      - Crossing Street B on the west side of Street A.
      - Crossing Street C at the 25-ft wide drainage easement.

BOARD OF COUNTY COMMISSIONERS
RORY REID, Chairman • CHIP MAXFIELD, Vice Chair
SUSAN BRAGER • TOM COLLINS • YVONNE ATKINSON GATES • CHRIS GIUNCHIGLIANI • BRUCE L. WOODBURY
VIRGINIA VALENTINE, P.E., County Manager

b. A 41.2-foot **drainage easement** to be privately maintained by the HOA containing a wrought iron fence as shown on sheets GP-1 and DT-1with 3 courses solid grouted block wall per detail Q/DT-1 located at the west end of Street C.

c. A 10-foot wide **drainage easement** to be privately maintained by the HOA located east of the easement described in 2b above.

d. A 15-foot wide **drainage easement** to be privately maintained by the HOA containing bollards at the east end of the drainage easement with 2 courses solid grouted block wall per detail P/DT-1 located east of the easement described in 2c above and east of the cul-de-sac at the western end of Street C as shown on sheet GP-1.

e. A 25-foot wide concrete lined **drainage easement** to be privately maintained by the HOA containing a wrought iron fence on the north side of Regena Avenue with 3 courses solid grouted block wall per detail C/DT-1 and sidewalk underdrain at the outlet located southeast of the bulb at Street A and Street C as shown on sheet GP-1.

f. A 5-foot wide **drainage easement** to be privately maintained located along the east wall of the site as shown in detail B/DT-1 with a 3-ft wide concrete valley gutter per detail N/DT-1 and a 48" x 16" blockwall opening, a 2-foot concrete U-channel, and a sidewalk underdrain at the outlet to Regena Avenue as shown on the grading plans and in detail R/DT-1.

g. A one-foot high stem wall at the back of sidewalk along the south side of Centennial Parkway as shown in details A, I, J and O on sheet DT-1.

3. A bond estimate must be submitted to Clark County Civil Engineering Division for the above-mentioned stormwater management facilities 2a through 2f, except for solid grouted block walls and the 48" X 16" blockwall openings.

4. Please provide the following statement on each sheet of the grading plan set near the lower right corner: Section 2 or Section 3 of the Clark County Building Office Operations Division Drainage Compliance Report must be completed by the engineer for the 1-foot high stem wall.

5. The minimum finished floor elevations for the proposed structures shall be constructed as shown on the above-mentioned grading plan(s);

6. The subject site is located within Zone X, as shown on FIRM Community Panel Number 32003C1745E, revised September 27, 2002. Zone X is determined to be outside the 0.2% annual chance flood plain.

7. Mylars of the grading plan must be submitted to the Clark County Civil Engineering Division Plan Check for approval signatures prior to map recordation.

8. As a condition of final approval per request from the engineer, the Technical Drainage Study and offsites for "Centennial / Hualapai," (HTE# 06-36202) must be approved and the storm drain in Centennial Parkway constructed prior to permits. Any significant changes to the hydrology or hydraulic analysis may require an update to this Technical Drainage Study.

9. The project appears to include a retaining/screen wall combination in excess of current Clark County Code. **The engineer is directed to Title 30 of The Clark County Unified Development Code, Chapter 30.64.050 Alternative Standards.** An application for a variance may be required. The variance, if required, must be approved by the Planning Commission.

10. Right-of-way dedication must be verified.

11. **As a condition of final approval, the drainage/grading plans submitted for this project require the following modifications prior to Civil Engineering Plan Check submittal:**

    a. Consider removing sheet P-2 as the drop inlets have been moved to the "Centennial/Hualapai" project, (HTE 06-36202) or show as existing.

    b. Label additional flow line elevations in the proposed gutter along 19 to verify positive drainage to the proposed drainage easement.

    c. Label the existing storm drain facility with the HTE number 06-36202.

    d. Add the description to the 15-ft and 25-ft wide drainage easemtn to be privately maintained as common lot.

    e. Provide a detail of the 6-inch gutter as shown in detail H/DT-1 as part of the plans set.

The County's review is solely based on the information submitted by the Engineer of Record. The County's review is strictly limited to compliance with minimum County Codes and Standards. The Engineer of Record is responsible for researching and addressing situations that may require designs above and beyond the minimum codes for issues of public safety and impacts to upstream, downstream and adjacent properties. The County assumes no liability for information data, designs or conclusions of the Engineer of Record;

DEPARTMENT OF DEVELOPMENT SERVICES

BY: Glenn S. Hale

Glenn S. Hale, P.E
Senior Civil Engineer
Civil Engineering Division

GSH/ccw

cc: Regena Tee Pee LLC
Development File

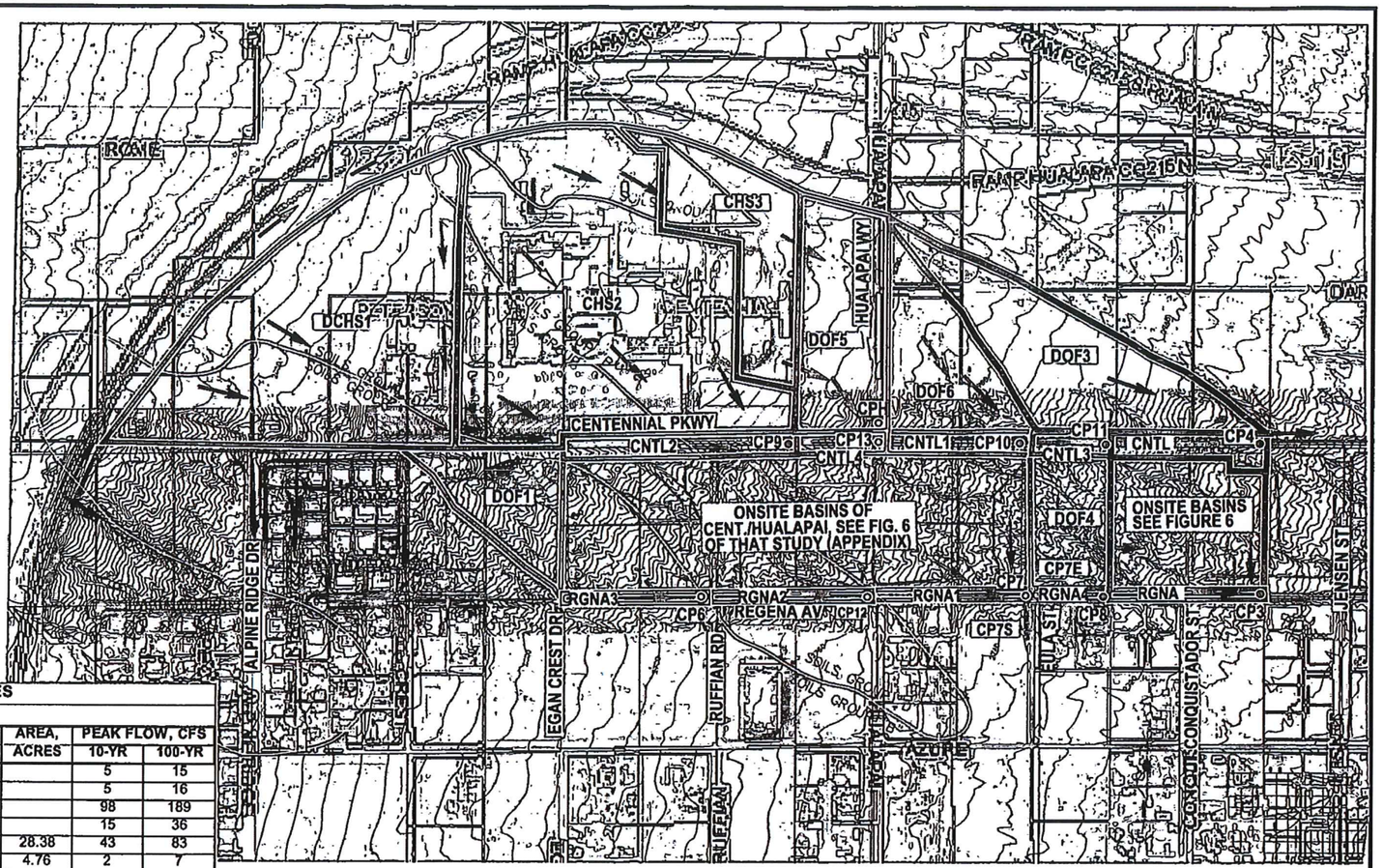
Referenced Drainage Exhibits

NORTH

500' 0 250' 500' 1000'

1 INCH = 500 FEET

CONTOUR INTERVAL = 5 FEET, 1 FOOT IN SOME AREAS
PHOTOGRAPH IMAGE IS APPROXIMATE ONLY



Referenced Basins and Concentration Point

SUMMARY OF PEAK FLOW RATES
FUTURE CONDITIONS

CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR	CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	PEAK FLOW, CFS 100-YR
CHS2	35.52	52	101	CP7S		5	15
CHS3	8.62	2	10	CP8		5	16
CNTL	1.91	4	8	CP9		98	189
CNTL1	1.52	3	6	CPH		15	36
CNTL2	2.37	5	9	DCHS1	28.38	43	83
CNTL3	0.78	2	3	DOF1	4.76	2	7
CNTL4	0.75	2	3	DOF3	11.46	16	32
CP10		127	253	DOF4	4.39	2	6
CP11		128	254	DOF5	9.48	13	26
CP12		11	29	DOF6	8.26	12	25
CP13		114	227	RGNA	0.91	2	4
CP3		11	36	RGNA1	1.05	2	4
CP4		146	292	RGNA2	1.10	2	4
CP6		4	10	RGNA3	1.00	2	4
CP7		9	30	RGNA4	0.51	1	2
CP7E		5	15				10/18/06

FIGURE 5

Centennial / Conquistador Residential Development

FUTURE CONDITIONS OFFSITE DRAINAGE BASINS

CVL CONSULTANTS, INC.

Referenced Centennial Pkwy Basins

100' 0 50' 100' 200'

1 INCH = 100 FEET

CONTOUR INTERVAL = 1 FOOT

SUMMARY OF PEAK FLOW RATES
FUTURE CONDITIONS

CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS 10-YR	100-YR
CNTL	1.91	4	8
CNTL3	0.78	2	3
CP10		128	253
CP11		129	255
CP2		3	11
CP3		11	36
CP4		146	292
CP5		2	7
CP6		5	18
CP8		5	16
DOF4	4.39	2	6
DON1	3.17	1	4
DON2	3.72	1	5
DON3	1.78	1	2
RGNA	0.91	2	4
RGNA4	0.51	1	2
			01/18/07

STREET FLOW CALCULATIONS
FUTURE CONDITIONS

CROSS SECTION NO.	STREET WIDTH, FT	SLOPE %	Q_{10} / Q_{100} CFS	D_{10} / D_{100} FEET	V_{10} / V_{100} FPS	$V_{10} * D_{10}$ / $V_{100} * D_{100}$
1	37	1.84	1 / 4	0.20 / 0.30	2.1 / 2.6	0.7 / 1.1
2	37	5.00	2 / 7	0.22 / 0.30	3.5 / 4.3	1.1 / 1.8
3	37	2.97	3 / 11	0.26 / 0.37	3.0 / 3.9	1.4 / 1.4
5	100	2.81	146 / 292	0.75 / 0.93	6.8 / 8.3	5.2 / 7.7
5(Surface Flow)	100	2.81	86 / 232	0.65 / 0.86	5.9 / 7.8	3.8 / 6.7
6	60	2.67	11 / 36	0.37 / 0.52	3.8 / 4.8	1.4 / 2.5
8	100	3.16	129 / 255	0.72 / 0.87	6.9 / 8.3	5.0 / 7.3
8(Surface Flow)	100	3.16	89 / 215	0.65 / 0.83	6.2 / 7.9	4.0 / 6.6
						18-Jan-07

EASEMENT FLOW CALCULATIONS
FUTURE CONDITIONS

LOCATION	WIDTH, FEET	SLOPE, PERCENT	Q_{100} CFS	D_{100} NORMAL FEET	VELOCITY HEAD FEET	V_{100} NORMAL FPS	WEIR DEPTH FEET
Section 4	15	1.37	6	0.21	0.14	3.00	0.14 (at 40' width)
Section 7	25	0.50	18	0.60	0.12	2.80	0.26
							18-Jan-07

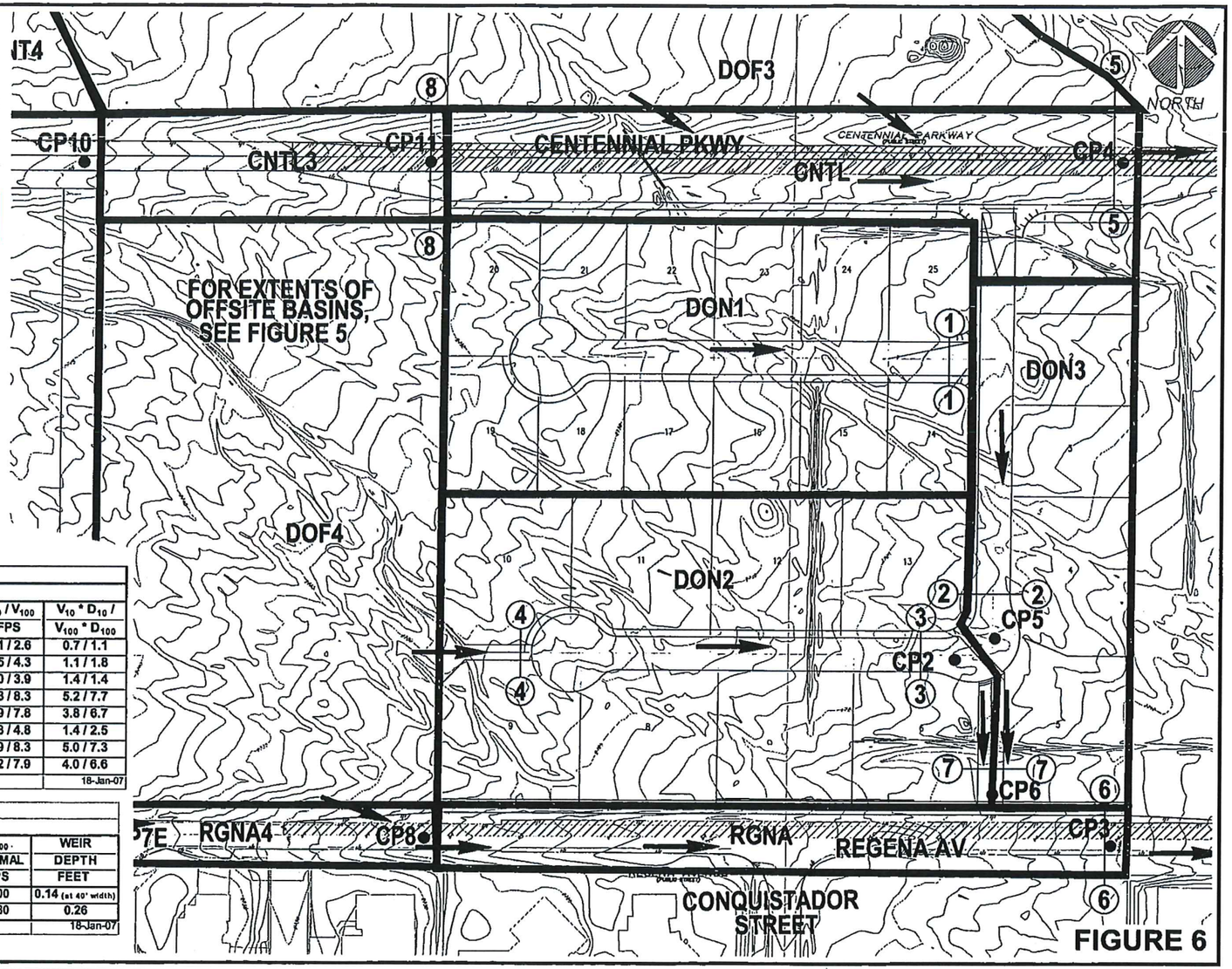
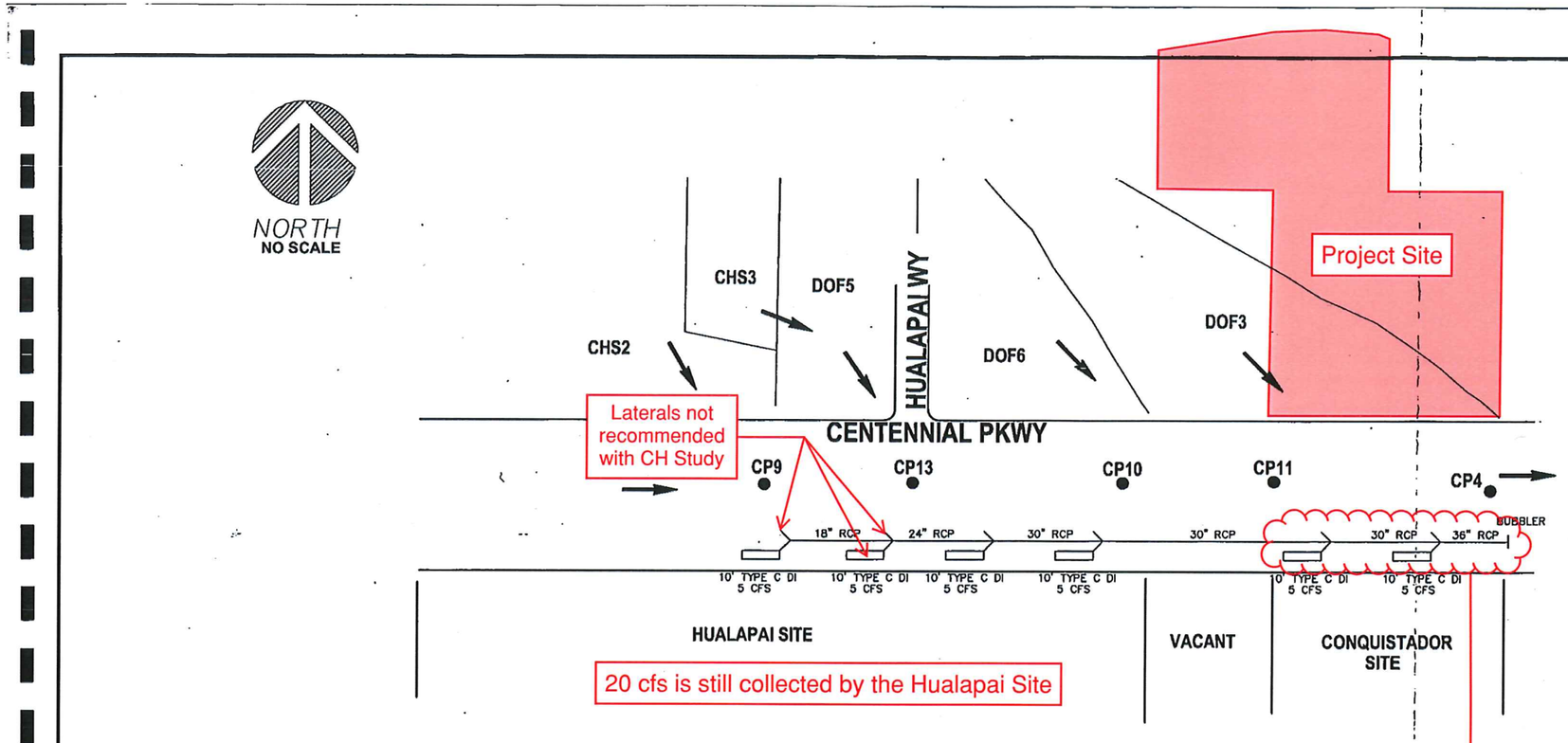


FIGURE 6

Centennial / Conquistador Residential Development

FUTURE CONDITIONS DRAINAGE BASINS

CYL CONSULTANTS, INC.



10-YEAR STORM DRAIN SUMMARY

POINT	*FULL-STREET 10YR CAPACITY, CFS	TOTAL FUTURE 10-YR FLOW RATE, CFS	REQUIRED FULL STREET COLLECTION	REQUIRED HALF ST COLLECTION	DESIGN SOUTH HALF STREET COLLECTION	**FUTURE NORTH HALF STREET COLLECTION	DESIGN PIPE CUMULATIVE FLOW
CP9	94	98	4	2	5	5	10
CP13	94	114	20	8	5	5	20
CP10	86	127	41	10.5	10	10	40
CP11	91	128	37	0	0	0	40
CP4	86	146	60	9.5	10	10	60

*Based on 19-foot dry width measured from centerline on both sides
**Lateral pipe connections will be provided to the north.

Required storm drain collection in project site's portion of Centennial Parkway

FIGURE 7

Centennial / Conquistador and Centennial / Hualapai Residential Developments

CENTENNIAL 10-YEAR STORM DRAIN SCHEMATIC

CYL CONSULTANTS, INC.

Project site

Storm drain proposed in Centennial Parkway and removed in study's update due to utility conflicts

ZONING: PUBLIC (V F R=SOUTHWEST DESERT EQUITIES) DEED# 20080924013691

APN: 125-19-401-007 ZONING: U-BF (USA) (CITY OF LAS VEGAS LEASE)

APN: 125-30-101-006 ZONING: R-E, LAND USE: RNP (HARBIER ALEKSANDRA LIVING TRUST, HARBIER ALEKSANDRA TRS) DEED# 20031202019401

MATCHLINE STA: 32+34.77 – SEE SHEET P2

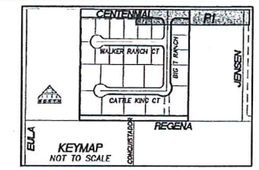
BIG T RANCH AVENUE SEE SHEET P4

FOR CENTENNIAL HYDRANT PROFILE SEE THIS SHEET

CENTENNIAL PARKWAY (PUBLIC STREET)

NORTH JENSEN STREET SEE SHEET P8

CURVE TABLE				
CURVE	RADIUS	LENGTH	TANGENT	DELTA
C1	30.00	47.25	30.12	90°14'09"
C2	30.00	47.00	29.88	89°45'51"
C3	20.00	31.33	19.92	89°45'51"
C4	20.00	31.50	20.08	90°14'09"
C5	30.00	23.77	12.55	45°24'07"
C6	30.00	23.77	12.55	45°24'07"
C7	40.50	191.42	39.94	270°48'15"
C8	25.00	39.17	24.90	89°45'51"
C9	30.00	23.77	12.55	45°24'07"
C10	30.00	23.77	12.55	45°24'07"
C11	40.50	191.42	39.94	270°48'15"
C12	30.00	15.26	7.80	29°08'30"
C13	49.00	126.61	171.15	148°01'51"
C14	30.00	15.26	7.80	29°08'30"
C15	25.00	39.37	25.10	90°14'09"
C16	25.00	39.17	24.90	89°45'51"
C17	40.50	41.72	22.92	59°01'10"
C18	40.50	53.99	31.86	76°22'58"
C19	40.50	53.99	31.86	76°22'58"
C20	40.50	41.72	22.92	59°01'10"
C21	15.00	23.62	15.06	90°14'09"
C22	25.00	12.72	6.50	29°08'30"
C23	54.00	18.85	9.52	19°59'52"
C24	54.00	51.85	28.12	55°00'46"
C25	54.00	33.91	17.53	35°58'12"
C26	54.00	34.93	18.10	37°03'41"
C27	25.00	12.72	6.50	29°08'30"
C28	40.50	22.94	11.78	32°26'48"
C29	40.50	72.77	50.87	102°52'20"
C30	40.50	64.06	40.93	90°37'52"
C31	40.50	31.65	16.68	44°46'16"



BENCHMARK
CITY OF LAS VEGAS BENCHMARK 6LV99 24SES
A RIVET AND PLATE IN THE TOP OF CURB AT THE NORTHWEST CORNER OF CENTENNIAL PARKWAY AND HUALAPAI WAY.

ELEVATION=844.924 METERS (NAVD'88)
ELEVATION=2772.06 US SURVEY FEET (NAVD'88)

BASIS OF BEARING
NORTH 88°58'34" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE 1/4) OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION 25, TOWNSHIP 19 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 114, PAGE 57 OF SURVEYS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE

FOR ALL GRADING AND STREET SECTIONS SEE DETAIL SHEET D1 AND D2 . FOR ALL NOTES SEE GENERAL NOTES SHEET C3.

INSTALL WATERLINE IN STEEL CASING FOR UDACS PLATE NO. 23. MINIMUM 18-INCH CLEARANCE IS REQUIRED ABOVE THE TOP OF THE CASING. FROM THE UPPER BENDS THROUGHOUT THE LOWERED SECTION OF THE PIPE, DUCTILE IRON PIPE WITH RESTAINED JOINTS IS REQUIRED. IN ADDITION.

ANNULAR SPACE BETWEEN PIPE AND CASING SHALL BE FILLED WITH CLASS I C3.3M. SEE UDACS PLATE 17 AND 19, FOR BEDDING AND BACKFILL REQUIREMENTS.

Call before you Dig
Avoid costly underground utility lines. It's easy.
Call
811
or
1-800-227-2600
AND
CLARK COUNTY TRAFFIC SIGNAL SIGNS
1-702-445-7544

Avoid overhead power line contact.
Call before you Overhead
1-702-227-2929
NEVADA POWER CONTRACTOR SAFETY SERVICES DEPARTMENT

Call before you UnderGround
1-702-455-7511
CLARK COUNTY WATER RECLAMATION DISTRICT
1-702-432-5300
CLARK COUNTY TRAFFIC SIGNALS
1-702-455-6581
STATE OF NEVADA DEPARTMENT OF TRANSPORTATION

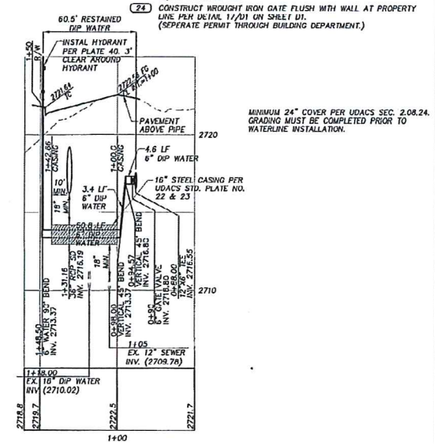
DISCLAIMER NOTE

EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND AND OVERHEAD UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATIONS.

NOTIFY ENGINEER IMMEDIATELY IF DISCREPANCIES ARE ENCOUNTERED.

CONSTRUCTION NOTES

1. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD 216
2. CONSTRUCT 30" ROLL CURB PER CCAUSD 217.51
3. CONSTRUCT 6' CROSS GUTTER PER CCAUSD 228
4. CONSTRUCT SIDEWALK PER CCAUSD 234
5. CONSTRUCT 10' CURB TRANSITION PER DETAIL SHEET D3
6. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE 1
7. ADJUST EXISTING UTILITIES & MANHOLES TO PROPOSED GRADE
8. INSTALL GROUTED CONCRETE RIPRAP D50=12", THICKNESS= 24"
9. CONSTRUCT REMOVABLE BOLLARDS @ 5' SPACING PER DETAIL SHEET D2
10. CONSTRUCT WROUGHT IRON GATE FLUSH WITH WALL AT PROPERTY LINE PER DETAIL CLV 4218 DWG ON SHEET D2. (SEPERATE PERMIT THROUGH BUILDING DEPARTMENT.)
11. INSTALL RIPRAP D50=12", THICKNESS= 24"
12. SAWCUT, REMOVE AND MATCH EDGE OF EXISTING A.C. PAVEMENT OR EXISTING IMPROVEMENT.
13. CONSTRUCT SIDEWALK UNDERDRAIN PER CCAUSD 236 TO BE PRIVATELY MAINTAINED.
14. CONSTRUCT WROUGHT IRON FENCE WITH 5' MAN ACCESS GATE. SEPERATE PERMIT BY OTHERS.
15. EXISTING UTILITIES TO BE RELOCATED OR ADJUSTED TO GRADE. (NOTIFY GOVERNING AGENCIES BEFORE CONSTRUCTION) (SEE PLANS FOR LOCATION)
16. CONSTRUCT TYPE "CM" DROP INLET PER CCASD 413, 402 & 421. OPENING, DEPTH AND INVERTS VARIES SEE PLANS.
17. CONSTRUCT N-DOT CULVERT HEAD WALL PER R-2.5.1 SEE CULVERT DETAIL ON SHEET D2. INSTALL NDOT MODIFIED PEDESTRIAN RAIL ALONG THE TOP OF WALL.
18. INSTALL RIPRAP D50=8", THICKNESS= 16"
19. INSTALL TANGENT END GUARDRAIL WITH TYPE 2 MODIFIED POST AT UNDERGROUND OBSTRUCTIONS PER NDOT DRAWINGS R-8.1.1, R-8.3.2, AND DETAILS SHEET D3
20. CONSTRUCT CONCRETE CUT-OFF WALL AT END OF EASEMENT PER DETAIL ON SHEET D1
21. RECONSTRUCT EXISTING AC. SIDEWALK
22. REMOVE EXISTING SIGNS AND RETURN TO GOVERNING AGENCY OR RELOCATE EXISTING SIGNS.
23. CONSTRUCT 16"X48" BLOCK WALL OPENING PER DETAIL 19/D3 ON SHEET D3.
24. CONSTRUCT WROUGHT IRON GATE FLUSH WITH WALL AT PROPERTY LINE PER DETAIL 1/J01 ON SHEET D1. (SEPERATE PERMIT THROUGH BUILDING DEPARTMENT.)



CENTENNIAL HYDRANT STA: 35+08.40

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER

PROJECT NO. 122283 DATE:

T THOMASON CONSULTING ENGINEERS
7080 LA CIENEGA STREET, SUITE 200
LAS VEGAS, NEVADA 89119
702-932-5125 FAX: 702-932-6129

LENNAR HOMES
2490 PASEO VERDE PARKWAY, SUITE 150, HENDERSON, NV. 89074
PH: (702) 458-7700 FAX:(702) 458-7708

CENTENNIAL AND CONQUISTADOR
PLAN AND PROFILE
CENTENNIAL PARKWAY

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA JOHN B. McAVOY CIVIL No. 22439
JOHN B. McAVOY, P.E.
R.P.E. NO. 22439
EXP. 12-31-15

DRAWN BY: BJ
DESIGNED BY: BJ
CHECKED BY: JBM
COMMENTS ADDRESSED BY:
PROJECT NO. 116.13004
REV. DATE BY
AS NOTED
SCALES N/A

SHEET P1
8 OF 22
DRAWING NO.

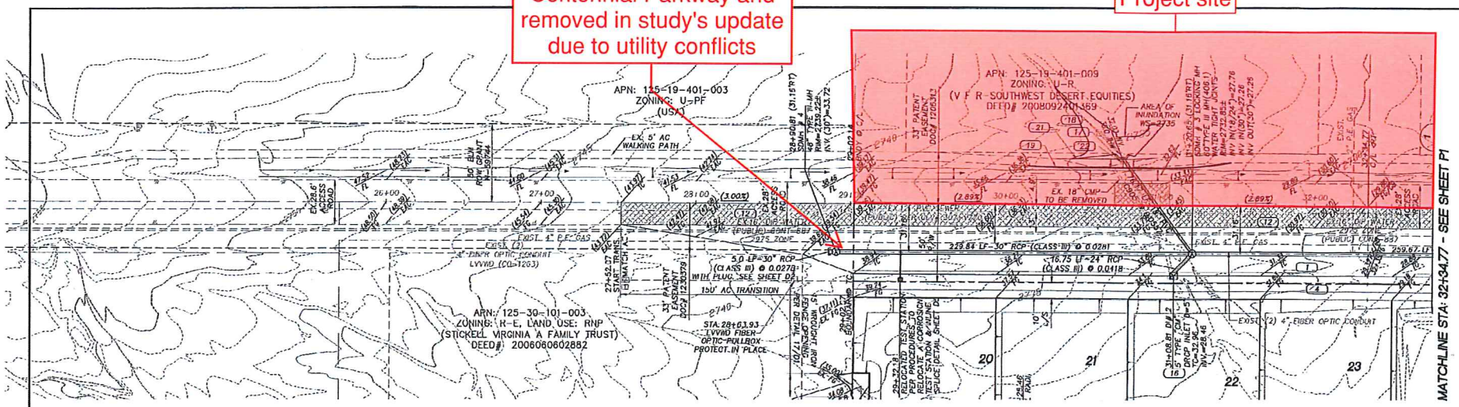
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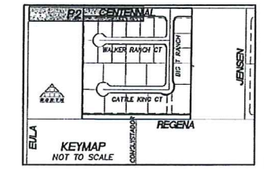
From HTE#13-50663 Applans

Storm drain proposed in Centennial Parkway and removed in study's update due to utility conflicts

Project site



CURVE TABLE				
CURVE	RADIUS	LENGTH	TANGENT	DELTA
C1	30.00	47.25	30.12	90°14'09"
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C6	30.00	23.77	12.55	45°24'07"
C7	40.50	191.42	39.94	270°48'15"
C8	25.00	39.17	24.90	89°45'51"
C9	30.00	23.77	12.55	45°24'07"
C10	30.00	23.77	12.55	45°24'07"
C11	40.50	191.42	39.94	270°48'15"
C12	30.00	15.26	7.80	29°08'30"
C13	49.00	126.61	171.15	148°02'31"
C14	30.00	15.26	7.80	29°08'30"
C15	25.00	39.37	25.10	90°14'09"
C16	25.00	39.17	24.90	89°45'51"
C17	40.50	41.72	22.92	59°01'10"
C18	40.50	53.99	31.66	76°22'58"
C19	40.50	53.99	31.66	76°22'58"
C20	40.50	41.72	22.92	59°01'10"
C21	15.00	23.62	15.06	90°14'09"
C22	25.00	12.72	6.50	29°08'30"
C23	54.00	18.85	9.53	19°59'52"
C24	54.00	51.85	28.12	55°00'46"
C25	54.00	33.91	17.53	35°58'32"
C26	54.00	34.93	18.10	37°03'41"
C27	25.00	12.72	6.50	29°08'30"
C28	40.50	22.54	11.78	32°28'48"
C29	40.50	72.77	50.87	102°57'20"
C30	40.50	64.06	40.95	90°37'52"
C31	40.50	31.65	16.68	44°46'16"



BENCHMARK
CITY OF LAS VEGAS BENCHMARK BLV99 2152ES
A RIVET AND PLATE IN THE TOP OF CURB AT THE NORTHWEST CORNER OF CENTENNIAL PARKWAY AND HIJAI APAI WAY.

ELEVATION=844.924 METERS (NAVD'88)
ELEVATION=2772.06 US SURVEY FEET (NAVD'88)

BASIS OF BEARING
NORTH 88°56'34" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION 25, TOWNSHIP 19 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 114, PAGE 57 OF SURVEYS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE

FOR ALL GRADING AND STREET SECTIONS SEE DETAIL SHEET D1 AND D2 . FOR ALL NOTES SEE GENERAL NOTES SHEET C3.

DISCLAIMER NOTE

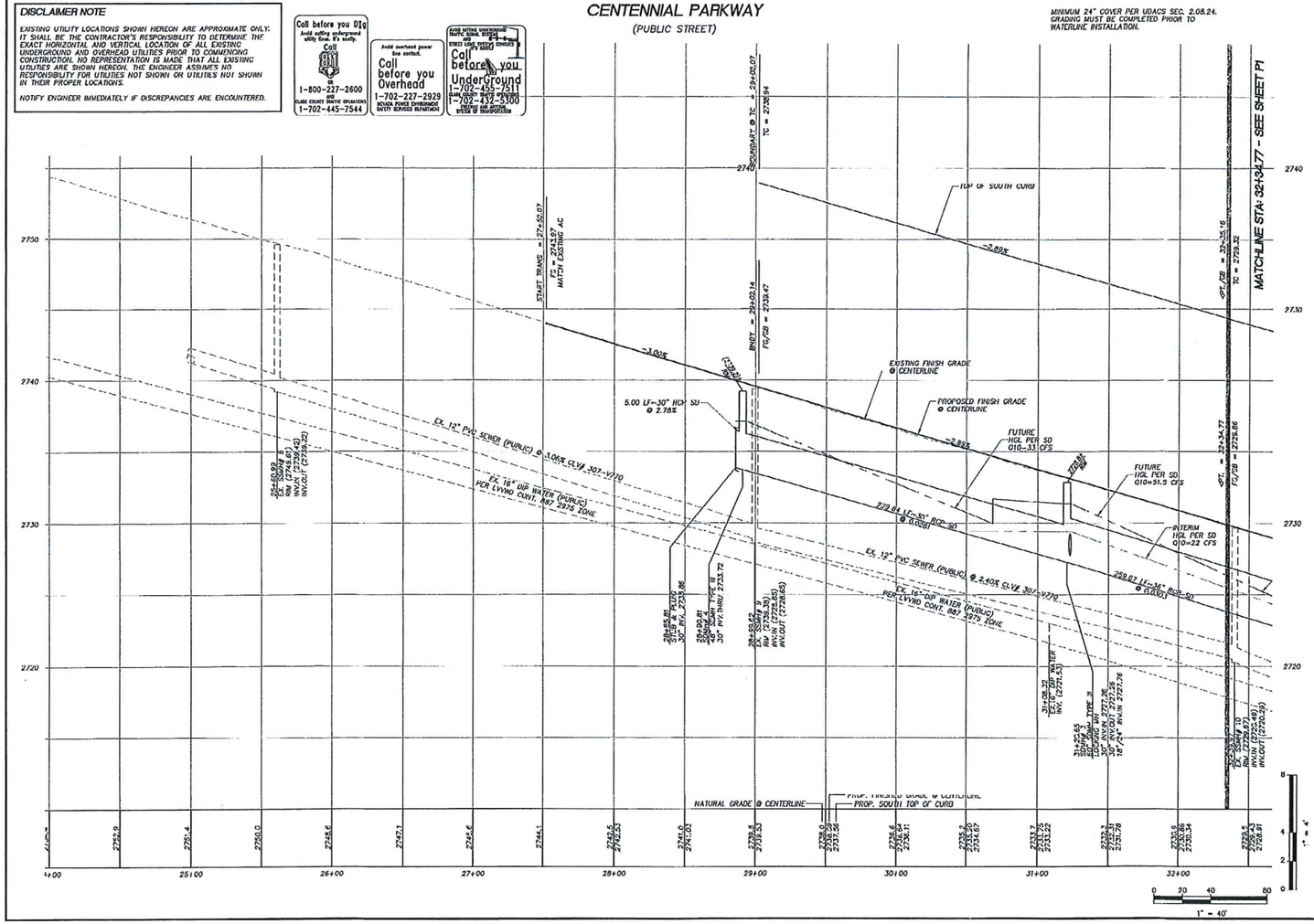
EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND AND OVERHEAD UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATIONS.

NOTIFY ENGINEER IMMEDIATELY IF DISCREPANCIES ARE ENCOUNTERED.

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811 or 1-800-227-2600
CLARK COUNTY TRAFFIC OPERATIONS 1-702-445-7544

Avoid overhead power line contact.
Call before you Overhead 1-702-227-2929
NEVADA POWER ENERGYWISE SAFETY SERVICES DEPARTMENT

AVOID BURYING UNDERGROUND TRAFFIC SIGNAL SYSTEMS
Call before you Underground
1-702-455-7511 CLARK COUNTY TRAFFIC OPERATIONS
1-702-432-5100 CITY OF LAS VEGAS DEPARTMENT OF TRANSPORTATION



IN AREAS WHERE THE EXCAVATION IS LESS THAN THREE FEET (3FT) FROM THE EDGE OF THE LVVWD 4-INCH FIBER OPTIC CONDUIT, NO EXCAVATION EQUIPMENT, OTHER THAN HAND HELD EQUIPMENT, WILL BE ALLOWED WITHIN TEN FEET (10 FT) OF THE FIBER OPTIC CONDUIT IN THESE AREAS. CONTRACTOR TO PLACE A CONCRETE BARRIER, I.E., JERSEY-NAIL TO IDENTIFY THE NO EQUIPEMENT ZONE.

CONSTRUCTION NOTES

1. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD 216
2. CONSTRUCT 30" ROLL CURB PER CCAUSD 217.51
3. CONSTRUCT 8' CROSS GUTTER PER CCAUSD 228
4. CONSTRUCT SIDEWALK PER CCAUSD 234
5. CONSTRUCT 10' CURB TRANSITION PER DETAIL SHEET D3
6. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE 1
7. ADJUST EXISTING UTILITIES & MANHOLES TO PROPOSED GRADE
8. INSTALL GROUTED CONCRETE RIPRAP D50=12", THICKNESS= 24"
9. CONSTRUCT REMOVABLE BOLLARDS @ 5' SPACING PER DETAIL SHEET D2
10. CONSTRUCT WROUGHT IRON GATE FLUSH WITH WALL AT PROPERTY LINE PER DETAIL CLV 421B DWG ON SHEET D2. (SEPERATE PERMIT THROUGH BUILDING DEPARTMENT.)
11. INSTALL RIPRAP D50=12", THICKNESS= 24"
12. SAWCUT, REMOVE AND MATCH EDGE OF EXISTING A.C. PAVEMENT OR EXISTING IMPROVEMENT.
13. CONSTRUCT SIDEWALK UNDERDRAIN PER CCAUSD 236 TO BE PRIVATELY MAINTAINED.
14. CONSTRUCT WROUGHT IRON FENCE WITH 6' MAN ACCESS GATE. SEPERATE PERMIT BY OTHERS.
15. EXISTING UTILITIES TO BE RELOCATED OR ADJUSTED TO GRADE. (NOTIFY GOVERNING AGENCIES BEFORE CONSTRUCTION) (SEE PLANS FOR LOCATION)
16. CONSTRUCT TYPE "CM" DROP INLET PER CCASD 413, 402 & 421. OPENING, DEPTH AND INVERTS VARIES SEE PLANS.
17. CONSTRUCT H-DOT CULVERT HEAD WALL PER R-2.5.1 SEE CULVERT DETAIL ON SHEET D2. INSTALL NDOT MODIFIED PEDESTRIAN RAIL ALONG THE TOP OF WALL.
18. INSTALL RIPRAP D50=8", THICKNESS= 16"
19. INSTALL TANGENT END GUARDRAIL WITH TYPE 2 MODIFIED POST AT UNDERGROUND OBSTRUCTIONS PER NDOT DRAWINGS R-8.1.1, R-8.3.2, AND DETAILS SHEET D3
20. CONSTRUCT CONCRETE CUT-OFF WALL AT END OF EASEMENT PER DETAIL ON SHEET D1
21. RECONSTRUCT EXISTING AC. SIDEWALK
22. REMOVE EXISTING SIGNS AND RETURN TO GOVERNING AGENCY OR RELOCATE EXISTING SIGNS.
23. CONSTRUCT 16"X48" BLOCK WALL OPENING PER DETAIL 19/D3 ON SHEET D3.
24. CONSTRUCT WROUGHT IRON GATE FLUSH WITH WALL AT PROPERTY LINE PER DETAIL 17/D1 ON SHEET D1. (SEPERATE PERMIT THROUGH BUILDING DEPARTMENT.)

LAS VEGAS VALLEY WATER DISTRICT
ENGINEERING SERVICES MANAGER

PROJECT NO. 122283 *DATE:* _____

T THOMASON CONSULTING ENGINEERS
7050 LA CENEGA STREET, SUITE 200
LAS VEGAS, NEVADA 89119
702-932-6125 FAX: 702-932-6129

DRAWN BY: DLG SCALES
DESIGNED BY: DLG N/A
CHECKED BY: JMJ/JBM
COMPLETE ACCESSED BY: _____
_____
_____
_____
PROJECT NO. 116.13004
REV. DATE BY REVISION
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LENNAR HOMES
2480 PASEO VERDE PARKWAY, SUITE 120, HENDERSON, NV, 89074
PH: (702) 458-7700 FAX:(702) 458-7708

CENTENNIAL AND CONQUISTADOR
PLAN AND PROFILE
CENTENNIAL PARKWAY

REGISTERED PROFESSIONAL ENGINEER — JOHN B. McAVOY — CIVIL — No. 22439 — STATE OF NEVADA
JOHN B. McAVOY, P.E.
R.E.E. NO. 22439
EXP. 12-31-15

SHEET P2
9 OF 22
DRAWING NO.

H# 55906

APPENDIX H

Reference Material

Technical Drainage Study for Centennial/Hualapai
(HTE#06-36202, by CVL Consultants, Inc.)

Approval Letter

Department of Development Services
Civil Engineering Division

500 S Grand Central Pky 1st Fl • Box 551799 • Las Vegas NV 89155-1799
(702) 455-4600 • Fax (702) 388-2550

Phil Rosenquist, Director

February 21, 2007

LTR
06-36202 (06-36202)

CVL Consultants, Inc
6280 S. Valley View Blvd #200
Las Vegas, NV 89118

Subject: **Technical Drainage Study** for Centennial / Hualapai
Study Dated: August 10, 2006
First Addendum Dated: October 23, 2006
Second Addendum Dated: December 18, 2006
Third Addendum Dated: January 22, 2007
Supplemental Dated: February 5, 2007
Location: Hualapai Way and Centennial Parkway
(Sec. 30, T. 19S., R. 60E. & Sec. 25, T. 19S., R. 59E)
HTE # 06-36202

The referenced **Technical Drainage Study** has been reviewed and is accepted as complying with minimum improvement standards. As set forth in the subject drainage study, the following measures will be taken to mitigate flood hazards.

1. The site shall be graded with respect to drainage as shown on "Centennial Hualapai," sheets C-1, G-1 through G-4, P-1 through P-5, D-1 and D-2, signed and sealed by Geoffrey G. Purse, P.E., on February 5, 2007.

2. The following drainage facilities shall be constructed:

   a. A storm drain collection system on the north side of the project site to consist of; Eight (8) 60-inch Type I manholes per Clark County Standard Drawing No. 403, Six (6) Type "C" drop inlets per Clark County Standard Drawing No. 413, One (1) 24-inch Bubbler, approximately 581 linear feet of 18-inch RCP, approximately 312 linear feet of 24-inch RCP, approximately 1254 linear feet of 30-inch RCP, approximately 291 linear feet of 36-inch RCP and 350 linear feet of 12-inch PVC.

   b. An 8-foot wide concrete valley gutter per Clark County Standard Drawing No. 228, to be located;

      - On the south side of Centennial Parkway crossing Morton Heights.
      - On the south side of Centennial Parkway crossing Bougirno Drive

BOARD OF COUNTY COMMISSIONERS
RORY REID, Chairman • CHIP MAXFIELD, Vice Chair
SUSAN BRAGER • TOM COLLINS • YVONNE ATKINSON GATES • CHRIS GIUNCHIGLIANI • BRUCE L. WOODBURY
VIRGINIA VALENTINE, P.E., County Manager

- On the west side of Morton Heights Drive crossing Buddy Blue Drive.
- On the north side of Turning Sun Drive crossing Morton Heights Drive.
- Crossing Turning Sun Drive at the drainage easement between lots 22 and 23.
- On the north side of Buddy Blue Drive crossing Bougimo Drive.
- At the drainage easement at the corner of Turning Sun Drive and Turning Sun Drive.
- Half street valley gutter on Regena Avenue between lots 17 and 18.

c. A 30-foot concrete lined drainage easement with bollards at both ends, per typical section K1 on sheet D-2, located between lots 22 and 23 to be privately maintained.

d. A 20-foot concrete lined drainage easement with wrought iron fence, per typical section K2 on sheet D-2, located between lots 13 and 14 to be privately maintained.

e. A 1-foot high stem wall and 3 courses of solid grout to the 6' CMU wall located at the back of walk along the north property boundary and entrance drive as shown on details D1, D2, D3, and D4 on sheet D-1.

f. Solid grout 3 courses of blockwall along with a 0.5 foot concrete gutter located along the western perimeter of the site

3. A bond estimate must be submitted to Clark County Civil Engineering Division for the above-mentioned stormwater management facilities, items 2a to 2d.

4. Please provide the following statement on each sheet of the grading plan set near the lower right corner: Section 2 or Section 3 of the Clark County Building Office Operations Division Drainage Compliance Report must be completed by the engineer.

5. The minimum finished floor elevations for the proposed structures shall be constructed as shown on the above-mentioned grading plan(s).

6. The subject site is located within Zone X, as shown on FIRM Community Panel Number 32003C 1750E, revised September 27, 2002. Zone X is determined to be outside the 0.2% annual chance flood plain;

7. Mylars of the grading plan must be submitted to the Clark County Civil Engineering Division Plan Check for approval signatures prior to map recordation.

8. Right-of-way dedication must be verified.

9. **As a condition of final approval, the drainage/grading plans submitted for this project require the following modifications prior to Civil Engineering Plan Check submittal:**

   a. Please include the HTE number on all drawing sheets.

   b. Grading proposed outside of the project boundary and on private property on the west side of the project site will require notarized, written permission from the offsite owner.

   c. Please review and revise roadway width on typical section F.

   d. Include the interim HGL profile on the plans/profile

   e. All other comments on the grading plan must be addressed.

The County's review is solely based on the information submitted by the Engineer of Record. The County's review is strictly limited to compliance with minimum County Codes and Standards. The Engineer of Record is responsible for researching and addressing situations that may require designs above and beyond the minimum codes for issues of public safety and impacts to upstream, downstream and adjacent properties. The County assumes no liability for information data, designs or conclusions of the Engineer of Record.

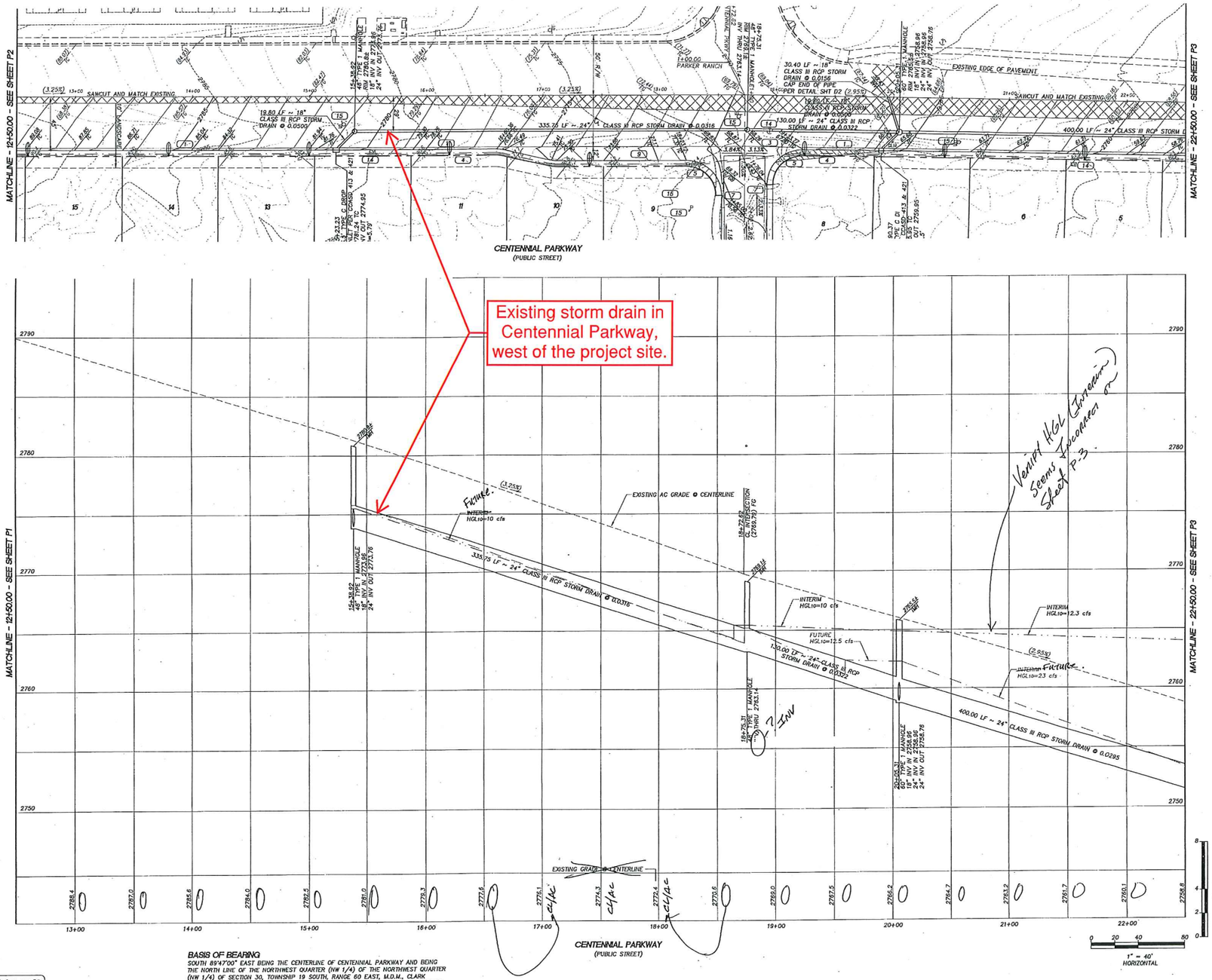
DEPARTMENT OF DEVELOPMENT SERVICES

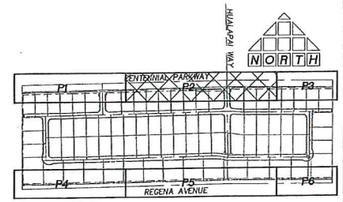
By Glenn S. Hale

Glenn S. Hale, P.E.
Senior Civil Engineer
Civil Engineering Division

Cc: Regena Tee Pee LLC
Development File

Referenced Drainage Exhibits





KEYMAP
NOT TO SCALE

NORTH

1" = 40'

CONSTRUCTION NOTES

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15. EXISTING SIGN, POLE, BOLLARD, UTILITY TO BE REMOVED

LEGEND

- PROPERTY LINE / RIGHT-OF-WAY
- "L" TYPE CURB AND GUTTER
- "A" TYPE CURB
- EXISTING CURB AND GUTTER
- EXISTING UTILITY (AS SHOWN)
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- WHEELCHAIR RAMP
- CUT OR FILL SLOPE
- XX.XX TC — PROPOSED ELEVATION (DESCRIPTION AS SHOWN)
- (XX.XX) TC — EXISTING ELEVATION (DESCRIPTION AS SHOWN)
- [XX.XX] TC — FUTURE DESIGN ELEVATION (DESCRIPTION AS SHOWN)

CLARK COUNTY
DEPARTMENT OF PUBLIC WORKS

ACCEPTANCE OF PLANS FOR FILING:

BY: DATE

ACCEPTANCE OF THESE PLANS FOR FILING SHALL NOT BE CONSTRUED AS A PERMIT FOR, OR AN APPROVAL OF, ANY VIOLATION OF ANY OF THE PROVISIONS OF THE STATE OR COUNTY LAWS AND/OR SPECIFICATIONS. CLARK COUNTY SHALL BE HELD FREE FROM DAMAGES WHICH MAY RESULT FROM THE CONSTRUCTION OF THE IMPROVEMENTS FROM THE ENGINEERING DESIGN DEPICTED HEREIN.

NOTE: POWER POLES AND/OR OTHER EXISTING FACILITIES NOT IN PROPER LOCATION, BASED ON PROPOSED IMPROVEMENTS SHOWN HEREON, WILL BE RELOCATED AT NO EXPENSE TO CLARK COUNTY.

BASIS OF BEARING

SOUTH 89°47'00" EAST BEING THE CENTERLINE OF CENTENNIAL PARKWAY AND BEING THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN IN BOOK 107, PAGE 31 OF SURVEYS IN THE RECORDER'S OFFICE OF CLARK COUNTY, NEVADA.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK 6LV99 24SES
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ELEVATION=2772.06 US SURVEY FEET (NAVD'88)

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AND CLARK COUNTY TRAFFIC OPERATIONS 1-702-445-7544

Avoid overhead power line contact.
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1-702-227-2929
NEVADA POWER ENVIRONMENT SAFETY SERVICES DEPARTMENT

BORE PITTING, HORIZONTAL DIRECTIONAL DRILLING OR SIMILAR METHODS REQUIRED WITHIN 5 FEET OF ANY EXISTING UNDERGROUND FACILITY
Call before you UnderGround
1-702-455-7511
CLARK COUNTY TRAFFIC OPERATIONS 1-702-452-5300
FEDERAL LAW REQUIRES NOTICE OF EXCAVATION

THOMASON CONSULTING ENGINEERS
7080 LA CIENEGA STREET, SUITE 200
LAS VEGAS, NEVADA 89119
702-932-6125 FAX: 702-932-6129

LENNAR
CENTENNIAL AND HUALAPAI

PLAN AND PROFILE
CENTENNIAL PARKWAY

REV	DATE	BY	REVISION

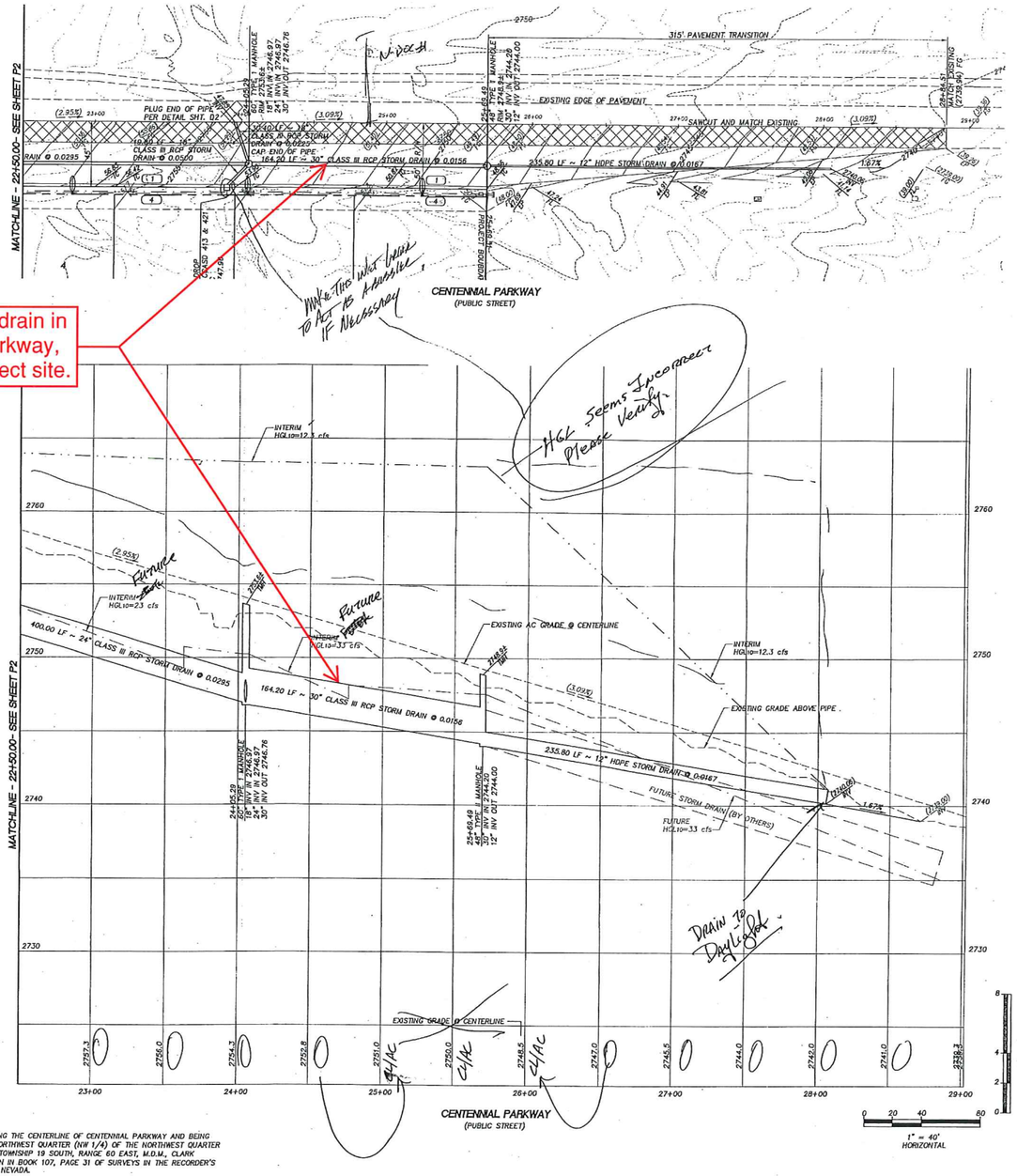
DRAWN BY: RR 12-4-13
DESIGNED BY: RR 12-4-13
CHECKED BY:
COMMENTS ADDRESSED BY:
SCALE:
PROJECT NO. 116.13003
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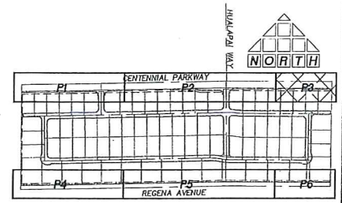
JOHN B. MCAVOY
No. 22439
PROFESSIONAL ENGINEER
CIVIL
STATE OF NEVADA
JOHN B. MCAVOY, P.E.
R.P.E. NO. 22439
EXP. 12-31-15

5/14/14

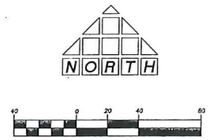
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APPROVED 12-5380





KEYMAP
NOT TO SCALE



CONSTRUCTION NOTES

1. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD 216
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- "A" TYPE CURB
- EXISTING CURB AND GUTTER
- EXISTING UTILITY (AS SHOWN)
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- XXX TC — PROPOSED ELEVATION (DESCRIPTION AS SHOWN)
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CLARK COUNTY
DEPARTMENT OF PUBLIC WORKS

ACCEPTANCE OF PLANS FOR FILING:

BY: DATE

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BENCHMARK

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ELEVATION=844.924 METERS (NAVD'88)
ELEVATION=2772.06 US SURVEY FEET (NAVD'88)

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Call 811 or 1-800-227-2600
OR CLARK COUNTY TRAFFIC OPERATIONS 1-702-445-7544

Avoid overhead power line contact.
Call before you Overhead
1-702-227-2929
NEVADA POWER EMERGENCY SAFETY SERVICES DEPARTMENT

KNOW WHAT'S UNDERGROUND BEFORE YOU DIG, DESIGN OR EXCAVATE IN NEVADA
Call before you UnderGround
1-702-455-7511
CLARK COUNTY TRAFFIC OPERATIONS
1-702-432-5300
DISTRICT NO. 1 REGIONAL SYSTEM OF DESIGNATION

DRAWN BY:	RP 12-4-13
DESIGNED BY:	RP 12-4-13
CHECKED BY:	
COMMENTS ADDRESSED BY:	
PROJECT NO.	116.13003

REV.	DATE	BY

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THOMASON CONSULTING ENGINEERS
7080 LA CIENEGA STREET, SUITE 200
LAS VEGAS, NEVADA 89119
702-932-6125 FAX: 702-932-6129

LENNAR
CENTENNIAL AND HUALAPAI

PLAN AND PROFILE
CENTENNIAL PARKWAY

REGISTERED PROFESSIONAL ENGINEER JOHN B. MCAVOY STATE OF NEVADA No. 22439 CIVIL

JOHN B. MCAVOY, P.E.
R.P.E. NO. 22439
EXP. 12-31-15

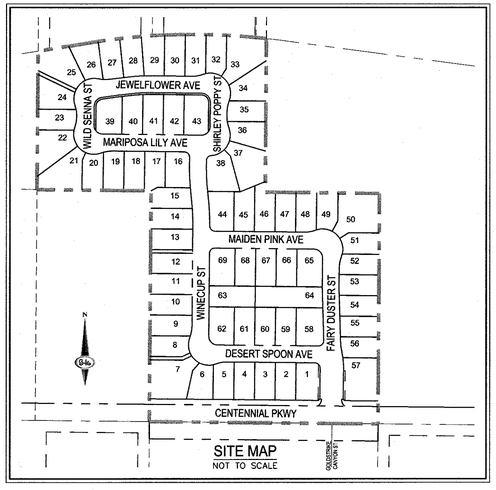
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APPROVED 13-50380

APPENDIX I

Grading Plans, Profiles and Details





RICHMOND AMERICAN HOMES

IMPROVEMENT PLANS FOR AGAVE CREST

CITY OF LAS VEGAS, NEVADA

SINGLE FAMILY RESIDENTIAL SUBDIVISION

APN: 125-19-401-005, 006, 009, 010, & 011 AND A PORTION OF 125-19-499-002

APPROVALS

CITY ENGINEER–ALLEN PAVELKA PE, #9029 DATE

APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED OF RIGHT-OF-WAY, AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS EXCEPT THOSE SPECIALLY LISTED UNDER DEVIATIONS FORM STANDARDS. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS, CLARK COUNTY AREA, NEVADA.

LAS VEGAS FIRE AND RESCUE DATE

CITY OF LAS VEGAS – PLANNING DEPARTMENT DATE

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.

CENTRAL TELEPHONE CO. DBA CENTURYLINK DATE

THE AFFIXED CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUES AND / OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT No.: ###### FIRST APPROVED DATE:
LVVWD APPROVED FIRE FLOW 1,500 GPM AT 20 PSI RESIDUAL
SHEETS:

APPROVAL BY THE FIRE DEPARTMENT HAVING JURISDICTION IS REQUIRED PRIOR TO OBTAINING FINAL APPROVAL FROM LAS VEGAS VALLEY WATER DISTRICT.

NV ENERGY DATE

NV ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.

SOUTHWEST GAS CORPORATION DATE

COX COMMUNICATIONS LAS VEGAS, INC. DATE

OWNER	DEVELOPER	ENGINEER
V F R-SOUTHWEST DESERT EQUITIES 8215 S. EASTERN AVE #205 LAS VEGAS, NV 89123	RICHMOND AMERICAN HOMES 7770 DEAN MARTIN DR #308 LAS VEGAS, NV 89139 PH: (702) 617-8464 FX: (702) 617-8499 CONTACT: BRIAN WALSH	SLATER HANIFAN GROUP, INC. 5740 S. ARVILLE STREET #216 LAS VEGAS, NV 89118 PH: (702) 284-5300 FX: (702) 284-5399 CONTACT: ISAAC M. GUZMAN

LEGAL DESCRIPTION

THOSE PORTIONS OF THE SOUTH HALF (S1/2) OF THE SOUTHWEST QUARTER (SW1/4) OF SECTION 19, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, DESCRIBED AS FOLLOWS:

PARCEL 1:

ALL OF GOVERNMENT LOT 30 OF SAID SECTION 19.

EXCEPTING THEREFROM ALL THAT PORTION OF LAND TAKEN BY FINAL ORDER OF CONDEMNATION BY CLARK COUNTY, RECORDED JUNE 5, 2001, IN BOOK 20010605 OF OFFICIAL RECORDS, AS INSTRUMENT NO. 01340.

PARCEL 2:

LOT ONE (1) OF THAT CERTAIN CERTIFICATE OF LAND DIVISION # LD 73-90 RECORDED SEPTEMBER 11, 1990, IN BOOK 900911 OF OFFICIAL RECORDS, AS INSTRUMENT NO. 00884. FURTHER DESCRIBED AS THE NORTH HALF (N1/2) OF GOVERNMENT LOT 29 OF SAID SECTION 19.

EXCEPTING THEREFROM THAT PORTION AS CONVEYED TO CLARK COUNTY BY DOCUMENT RECORDED SEPTEMBER 11, 1990, IN BOOK 900911 OF OFFICIAL RECORDS, AS INSTRUMENT NO. 00885.

FURTHER EXCEPTING THEREFROM THAT PORTION AS CONVEYED CLARK COUNTY BY DOCUMENT RECORDED MAY 26, 2000, IN BOOK 20000526 OF OFFICIAL RECORDS, AS INSTRUMENT NO. 01522.

PARCEL 3:

LOT TWO (2) OF THAT CERTAIN CERTIFICATE OF LAND DIVISION # LD 73-90 RECORDED SEPTEMBER 11, 1990, IN BOOK 900911 OF OFFICIAL RECORDS, AS INSTRUMENT NO. 00884. FURTHER DESCRIBED AS THE SOUTH HALF (S1/2) OF GOVERNMENT LOT 29 OF SAID SECTION 19.

EXCEPTING THEREFROM THAT PORTION AS CONVEYED TO CLARK COUNTY BY DOCUMENT RECORDED SEPTEMBER 11, 1990, IN BOOK 900911 OF OFFICIAL RECORDS, AS INSTRUMENT NO. 00885.

PARCEL 4:

ALL OF GOVERNMENT LOT 36 OF SAID SECTION 19.

PARCEL 5:

THE WEST HALF (W1/2) OF THE SOUTHWEST QUARTER (SW1/4) OF THE SOUTHEAST QUARTER (SE1/4) OF THE SOUTHWEST QUARTER (SW1/4) OF SAID SECTION 19.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK NUMBER: 8LV9019C4

RIVET AND PLATE IN CONCRETE PAD (ELEC) +/- 200 FEET NORTHWEST OF DEER SPRINGS AND GRAND CANYON.

ELEVATION: 832.779 METERS (2732.21 FEET) N.A.V.D 88 DATUM

PER THE CITY OF LAS VEGAS BENCHMARK WEBSITE ON JULY 27, 2017.

BASIS OF BEARINGS

THE BASIS OF BEARINGS IS NORTH 00°40'52" EAST, BEING THE BEARING OF THE WEST LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF THE SOUTHWEST QUARTER (SW1/4) OF SECTION 19, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN BOOK 147, PAGE 89 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA

FEMA FLOOD ZONE INFORMATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE "X" (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1745E, DATED SEPTEMBER 27, 2002. A ZONE "X" (UNSHADED) IS DEFINED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% (500 YEAR) ANNUAL CHANCE FLOOD PLAIN.

DEVIATIONS FROM STANDARDS

NONE

SWPPP NOTE

NOTE: ALL LAND SURFACE AREA DISTURBANCES OVER 1 ACRE REQUIRE A STORMWATER DISCHARGE PERMIT ISSUED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP). A PHASED CONSTRUCTION UNIT IN A CONTIGUOUS SUBDIVISION IS CONSIDERED UNDER CONSTRUCTION UNTIL ALL STRIPPED SURFACE AREAS HAVE BEEN COVERED BY PAVING, BUILDING CONSTRUCTION OR PLANTING. A STORMWATER DISCHARGE PERMIT APPLICATION AND ASSOCIATED INFORMATION MAY BE DOWNLOADED FROM THE WEB SITE: HTTP://WWW.STATE.NV.US/BWPC/STORMO1.HTM PROJECTS THAT DISTURB MORE THEN ONE ACRE OF LAND MUST SUBMIT TO NDEP A "NOTICE OF INTENT" FOR INCLUSION UNDER STORMWATER PERMIT NO. NVR100000 ALONG WITH THE APPROPRIATE FILLING FEE.

PROJECT INFORMATION

ACREAGE (GROSS):	= 16.91 AC
ACREAGE (NET):	= 12.79 AC
DENSITY (LOTS/NET ACRE):	= 5.39 DU/NET AC
EXISTING ZONING:	= U(R)
PROPOSED ZONING:	= R-1
TOTAL NO. OF RESIDENTIAL LOTS	= 69
TOTAL NO. OF COMMON ELEMENTS	= 6
MINIMUM LOT SIZE	= 6,533 SF±
MAXIMUM LOT SIZE	= 14,539 SF±
PROVIDED OPEN SPACE	= 15,837 SF±

EARTHWORK SUMMARY (UNADJUSTED)

CUT	29,290 CY.
FILL	26,150 CY.
NET	3,140 CY.

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

FAST
Call before you UnderGround
1-702-432-5300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.)

Call before you Dig
AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
Call 811
OR
1-800-227-2600

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

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

CITY OF LAS VEGAS, NV

RICHMOND AMERICAN HOMES

AGAVE CREST

COVER SHEET

S19 T19S R60E

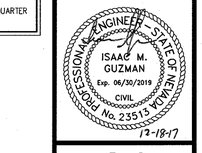
DATE: 12/18/17

DRAFTER: IG

DESIGNER: IG

CHECKED: TJS

PROJECT NO.
RAH1723



C-1

SHEET 1 OF 14

I:\rah1723_centennial hualapai\dwg\engrov\rah1723cvr.dwg 12/18/2017 11:34 AM isaac Guzmon

STORMWATER RUNOFF MANAGEMENT

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))

1. THE OWNER, SITE DEVELOPER, CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATE IN, THE PUBLIC RIGHTS OF WAYS OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN TITLE 24.40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BEST MANAGEMENT PRACTICES MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER ANY ACTUAL RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

LEGAL DESCRIPTION

THOSE PORTIONS OF THE SOUTH HALF (S1/2) OF THE SOUTHWEST QUARTER (SW1/4) OF SECTION 19, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, DESCRIBED AS FOLLOWS:

PARCEL 1:

ALL OF GOVERNMENT LOT 30 OF SAID SECTION 19.

EXCEPTING THEREFROM ALL THAT PORTION OF LAND TAKEN BY FINAL ORDER OF CONDEMNATION BY CLARK COUNTY, RECORDED JUNE 5, 2001, IN BOOK 20010605 OF OFFICIAL RECORDS, AS INSTRUMENT NO. 01340.

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ALL OF GOVERNMENT LOT 36 OF SAID SECTION 19.

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THE WEST HALF (W1/2) OF THE SOUTHWEST QUARTER (SW1/4) OF THE SOUTHEAST QUARTER (SE1/4) OF THE SOUTHWEST QUARTER (SW1/4) OF SAID SECTION 19.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK NUMBER: 8LV9019C4

RIVET AND PLATE IN CONCRETE PAD (ELEC) +/- 200 FEET NORTHWEST OF DEER SPRINGS AND GRAND CANYON.

ELEVATION: 832.779 METERS (2732.21 FEET) N.A.V.D 88 DATUM

PER THE CITY OF LAS VEGAS BENCHMARK WEBSITE ON JULY 27, 2017.

BASIS OF BEARINGS

THE BASIS OF BEARING IS NORTH 89°45'05" EAST BEING THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 35, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN BY MAP ON FILE IN FILE 91, PAGE 28 OF PARCEL MAPS IN THE CLARK A, AS SHOWN BY MAP THEREOF IN BOOK 147, PAGE 89 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA

2.2 CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS. ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
3. CHISEL "S" OR "G" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE II AGGREGATE BASE.
5. ALL MANHOLES PAVED IN STREETS EIGHTY (80') FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80') FOOT R/W WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y" 'S SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

LAS VEGAS VALLEY WATER DISTRICT (LVVWD) STANDARD NOTES

LVVWD PROJECT # _____ (REVISED 01/09/2017)

1. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVVWD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVWD COMMUNICATION SUPPORT CENTER (258-7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION FOR FUTURE INSPECTIONS. NOTICE MUST BE GIVEN BY 2:00 P.M. THE BUSINESS DAY PRIOR TO THE REQUESTED LVVWD INSPECTION. WHEN REQUESTING INSPECTIONS, PLEASE REFER TO THE PROJECT # IDENTIFIED ABOVE.
2. ALL WORK SHALL CONFORM TO LVVWD STANDARD PLATES, DRAWINGS, AND SPECIFICATIONS, AND TO THE 2010 EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS). THE LATEST EDITION OF UDACS SHALL SUPERSEDE ANY CONFLICTS CONTAINED IN THE APPROVED DRAWINGS AND/OR SPECIFICATIONS.
3. ALL WORK, EXCEPT AS MODIFIED BY THESE PLANS OR BY NOTE 2 ABOVE, SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT DRAFT OR EDITION OF THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENT, CLARK COUNTY AREA.
4. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE LVVWD.
5. ALL SERVICE LATERALS TWO (2) INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER TUBING WITH LVVWD APPROVED SERVICE SADDLES.
6. ALL WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS.
7. ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB GUTTERS.
8. ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSINGS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS.
9. ALL WATER FACILITIES SHALL BE FILLED, DISINFECTED, PRESSURE TESTED, FLUSHED, FILLED, AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION TO THE LVVWD DISTRIBUTION SYSTEM.
10. THE CONTRACTOR MUST OBTAIN ALL METERS TWO (2) INCHES AND SMALLER FROM LVVWD CENTRAL STORES. TELEPHONE 258-3152 OR 258-3802, TWO (2) WORKING DAYS PRIOR TO METER PICKUP.
11. ANY INTERRUPTION OF SERVICE MUST BE PERFORMED IN ACCORDANCE WITH UDACS SECTION 3.14.01, AND APPROVED BY THE LVVWD INSPECTION DIVISION PRIOR TO SHUTDOWN. PROPER WRITTEN NOTIFICATION MUST BE GIVEN TO ALL AFFECTED CUSTOMERS.
12. ALL WATER FACILITY CONSTRUCTION MATERIALS USED MUST BE AS LISTED ON THE LVVWD PRE-APPROVED MATERIALS AND MANUFACTURER'S LISTING FOR NEW FACILITIES. LATEST REVISION, OR SPECIFICALLY APPROVED ON THESE PLANS.
13. TELEPHONE "CALL BEFORE YOU DIG" AT "811" OR 1-800-227-2600.
14. THE INSTALLATION OF LAS VEGAS VALLEY WATER DISTRICT (LVVWD) MUNICIPAL WATER FACILITIES WITHIN ALL STREETS IS ASSUMED TO BE IN COMPLIANCE WITH THE UNIFORM STANDARDS, INCLUDING THE PLACEMENT OF ASPHALT PAVING STREET SURFACES. ANY REPAIR WORK DONE BY THE LVVWD TO THE MUNICIPAL WATER FACILITIES WILL INCLUDE THE PLACEMENT OF AN APPROPRIATELY SIZED ASPHALT REPAIR PATCH ON THE STREET SURFACE.

    ANY DECORATIVE PAVING SURFACE WITHIN THE STREET IS THE RESPONSIBILITY OF THE OWNER'S ASSOCIATION, OR THE INDIVIDUAL PROPERTY OWNERS IF NO OWNER'S ASSOCIATION IS IN EXISTENCE, OR THE AGENCY HAVING JURISDICTION. DECORATIVE SURFACE MATERIALS PLACED WITHIN THE TEN FOOT EASEMENT ABUTTING A PUBLIC OR PRIVATE STREET, IF DISTURBED BY THE LVVWD DURING THE REPAIR OR OPERATION OF ITS FACILITIES, WILL BE REPLACED BY LVVWD WITH AN APPROPRIATELY SIZED PLAIN FINISH CONCRETE PATCH. THE LVVWD WILL NOT RESTORE, AND WILL NOT BE RESPONSIBLE FOR THE RESTORATION OF, ANY DECORATIVE PAVING SURFACE WITHIN THE STREET. THE LVVWD WILL NOT ATTEMPT TO MATCH COLOR OR FINISH OF ANY ADJACENT MATERIALS.

15. NO LEAD COMPLIANCE NOTE:
TO COMPLY WITH THE FEDERAL SAFE DRINKING WATER ACT, ALL WATER WORKS BRASS PRODUCTS PROPOSED TO BE RELOCATED, OR INSTALLED AS NEW MUST BE INSTALLED WITH THE LEAD FREE APPROVED PRODUCT. THE OLD LEADED PRODUCT MAY NOT BE USED.

GRADING NOTES

1. INDICATED GRADES OTHER THAN T.C., F.G. & GUTTER F.L. ARE ROUGH GRADES.
2. 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.
3. CARE SHALL BE EXERCISED IN GRADING CORNER LOTS.
4. ROUGH PAD ELEVATIONS SHALL BE GRADED TO WITHIN 0.1' OF THE PAD ELEVATIONS SHOWN ON THE PLANS. WHEN GRADING IS COMPLETE PER THE PLANS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE LOTS CAN BE INSPECTED. AT THAT TIME THE ENGINEER SHALL ALSO DECIDE IF ANY ADDITIONAL DITCHES OR BERMS ARE REQUIRED. THE CONTRACTOR IS REQUESTED NOT TO REMOVE ANY OF HIS ROUGH GRADING EQUIPMENT UNTIL HE RECEIVES GRADING APPROVAL FROM THE ENGINEER.
5. SOILS REPORT PREPARED BY ANGLE ENGINEERING, PROJECT NO. 26203-1, DATED 7/31/2017.
6. EARTHWORK QUANTITIES (RAW):
   -CUT = 29,290 CUBIC YARDS.
   -FILL = 26,150 CUBIC YARDS

   A) THE ABOVE QUANTITIES DO NOT REFLECT LOSSES DUE TO SUBSIDENCE OR SHRINKAGE.
   B) THE ABOVE QUANTITIES DO REFLECT USING NATIVE MATERIAL IN LIEU OF TYPE I GRAVEL BASE MATERIAL FOR STREET SECTIONS.
   C) THE ABOVE QUANTITIES DO NOT REFLECT ANY EARTHWORK WHICH MAY BE REQUIRED BY THE ENGINEER TO CONSTRUCT ADDITIONAL PROTECTIVE DITCHES OR BERMS NOT SHOWN ON THESE DRAWINGS.

CITY OF LAS VEGAS FIRE AND RESCUE GENERAL NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE # 6325, FOR HYDRANT SPECIFICATIONS, AND HYDRANT INSTALLATION SPECIFICATIONS.
2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICT'S – **APPROVED PRODUCTS LIST** ARE ALLOWED TO BE INSTALLED.
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR ALL INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK [IFC 105.7.12]
4. ON ANT RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. [IFC 3310, 3312]
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. [IFC 507.5.7.3]
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. [IFC 106.3]
7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.W.A APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. [IFC 507.2.1, NFPA 24]
8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. [IFC 507]
9. PRIVATE HYDRANTS SHALL BE PAINTED RED. [IFC 507.5.7.1]
10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. [IFC 507]
11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: [IFC C102]
    - RESIDENTIAL– 500 FT UNSPRINKLERED; 600 FT SPRINKLERED.
    - COMMERCIAL– 300 FT UNSPRINKLERED; 400 FT SPRINKLERED.
12. WHERE NEW WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1,000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATING BASIS. [IFC C102.8]
13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FEET OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.
14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. [IFC C102.12]
15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. [IFC C102.4]
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. [IFC C102.7]
17. THE MINIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. [IFC C102.6]
18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE ARE 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS ARE INSTALLED ON A SINGLE SYSTEM. SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN. [IFC C104]
19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. [IFC 503.2.3]
20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12% ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FEET PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. [IFC 503.2.7, 503.2.8]
21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FEET OUTSIDE AND 28 FEET INSIDE TURNING RADIUS. [IFC 503.2.4]
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13 FT 6 INS. [IFC 503.2.1]
23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 40 FT FLOW LINE TO FLOW LINE WITH PARALLEL PARKING PERMITTED ON BOTH SIDES. NOT LESS THAN 32 FT WIDE, FLOW LINE TO FLOW LINE, WHERE PARKING IS PERMITTED ONLY ON ONE SIDE OF THE FIRE APPARATUS ACCESS ROAD. NOT LESS THAN 24 FT WIDE, FLOW LINE TO FLOW LINE, WHERE NO PARKING IS PERMITTED ON EITHER SIDE. FIRE LANES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 24 FT. [IFC 503.2.1.1]
24. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. THE DISTANCE COULD BE INCREASED TO 250 FT IF THE BUILDING IS SPRINKLERED. [IFC 503.1.1]
25. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 100 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD-ENDS OR WITH A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT. COMMERCIAL AND INDUSTRIAL DEVELOPMENTS WHERE BUILDINGS EXCEED 2 STORIES OR 30 FEET IN HEIGHT, OR EXCEEDING 62,000 SQUARE FEET IN AREA [IFC 503.1.2]
26. ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LANES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND HAVING A MINIMUM DIAMETER OF 81 FT. [IFC 503.2.5]
27. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED FIRE LANE, ONE SIGN AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FEET ALONG THE DESIGNATED FIRE LANES. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 10 FT OR LESS THAN 6 FT FROM THE ROADWAY LEVEL. THE CURB ALONG OR ON THE PAVEMENT OR CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. [IFC 503.3]
28. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. SAID SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE IFC 503.6 AND IFC APPENDIX M.

2.5 CITY OF LAS VEGAS GRADING NOTES

1. IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.
3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION, ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF THE EXCAVATION.
4. THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY THE INTENT OF THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED OR LEFTOVER MATERIAL FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.
5. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
6. CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION, IN THE AREAS INDICATED:

	HORIZONTAL	VERTICAL COMPACTION	
A. PAVEMENT AREA SUBGRADE	0.1'+	+0.0' TO -0.1'	SEE SOILS REPORT
B. ENGINEERED FILL	0.5'+	+0.1' TO -0.1'	SEE SOILS REPORT

COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE.

7. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.
8. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.
9. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC RIGHT-OF-WAY IN A CLEAN, SAFE AND USABLE CONDITION. ALL SPILLS OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.
10. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, THE OWNER AGREES TO PROVIDE AND INSTALL SUCH ITEM AT HIS OWN EXPENSE AND AT THE DIRECTION OF THE CITY ENGINEER. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

UTILITY LOCATION NOTE TO CONTRACTOR

EXISTING UTILITY LOCATIONS SHOWN HEREIN ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATIONS. CALL BEFORE YOU DIG: 1 (800) 227-2600; SOUTHWEST GAS CORPORATION: 702-400-1789 (STANDBY CONTACT NUMBER)

2.1 CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. CONTRACTOR SHALL AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCE'S WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGNS TO BE APPROVED BY THE CITY, PRIOR TO THE USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.
8. AC PAVEMENT TO BE ONE-HALF INCH (½") ABOVE

ABBREVIATIONS

AC	ASPHALTIC CONCRETE OR ACRE	FUT	FUTURE	QTY	QUANTITY
AGG	AGGREGATE BASE	GRD	GRADE OR GROUND	R	RADIUS
APN	ASSESSORS PARCEL NUMBER	GB	GRADE BREAK OR GRADE CHANGE	RCA	REINFORCED CONCRETE ARCH
APPROX OR ~	APPROXIMATE	GV	GATE VALVE	RCB	REINFORCED CONCRETE BOX
AVE	AVENUE	HDPE	HIGH DENSITY POLYETHYLENE	RCP	REINFORCED CONCRETE PIPE
@	AT	HOA	HOME OWNERS ASSOCIATION	RD	ROAD
BC	BEGIN CURVE OR BACK OF CURB	HORZ	HORIZONTAL	RDWY ESMT	ROADWAY EASEMENT
BCR	BEGINNING OF CURB RETURN	HP	HIGH POINT	REQD	REQUIRED
BHW	BOTTOM OF HEADWALL	HWL	HIGH WATER LEVEL	REV	REVISION
BLDG	BUILDING	HDWL OR HW	HEADWALL	RG	ROUGH GRADE
BLVD	BOULEVARD	HYD	HYDRAULIC OR HYDRANT	RT OR R	RIGHT
BM	BENCHMARK	ID	INSIDE DIAMETER	R/W, ROW	RIGHT OF WAY
BVC	BEGIN VERTICAL CURVE	IN	INCH	S	SLOPE
BWV	BACK WATER VALVE	INT	INTERSECTION	SCH	SCHEDULE
CC	CLARK COUNTY	INV	INVERT ELEVATION	SD	STORM DRAIN
CCAUSD	CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS	IP	IRON PIPE	SDDI	STORM DRAIN DROP INLET
CCPW	CLARK COUNTY PUBLIC WORKS	IRRG	IRRIGATION	SDMH	STORM DRAIN MANHOLE
CCRFCD	CLARK COUNTY REGIONAL FLOOD DISTRICT	LF	LINEAR FEET	SEC	SECTION
CCWRD	CLARK COUNTY WATER RECLAMATION DISTRICT	LP	LOW POINT	SF	SQUARE FEET
CE	COMMON ELEMENT	LT OR L	LEFT	SHT	SHEET
CL,C/L,C	CENTERLINE	LVWD	LAS VEGAS VALLEY WATER DISTRICT	SNWA	SOUTHERN NEVADA WATER AUTHORITY
CLR	CLEAR OR CLEARANCE	LWL	LOW WATER LEVEL	SPECS	SPECIFICATIONS
CLSM	CONTROLLED LOW STRENGTH MATERIAL	MAX	MAXIMUM	ST	STREET
CML&C	CEMENT MORTAR LINED AND COATED	MECH	MECHANICAL	SSMH	SANITARY SEWER MANHOLE
CMU	CONCRETE MASONRY UNIT	MH	MANHOLE	STA	STATION
CONC	CONCRETE	MIN	MINIMUM	STD	STANDARD
CT	COURT	MISC	MISCELLANEOUS	STL	STEEL OR STREET LIGHT
CY OR CU YD	CUBIC YARD	MUE	MUNICIPAL UTILITY EASEMENT	SW	SIDEWALK
DCWCS	DESIGN AND CONSTRUCTION FOR WASTEWATER COLLECTION SYSTEMS	NDOT	NEVADA DEPARTMENT OF TRANSPORTATION	SWG	SOUTHWEST GAS
		NPC	NEVADA POWER COMPANY	SWR OR SS	SANITARY SEWER
DET	DETAIL	NTS	NOT TO SCALE	SY	SQUARE YARD
DI	DUCTILE IRON OR DRAIN INLET	NUE	NONEXCLUSIVE UTILITY EASEMENT	TAN	TANGENT
DIA, ø	DIAMETER	OC	ON CENTER	TC	TOP OF CURB
DIP	DUCTILE IRON PIPE	OD	OUTSIDE DIAMETER OR OVERALL DIMENSION	TCD	TRAFFIC CONTROL DEVICE
DR	DRIVE	OFF	OFFSET	TF	TOP OF FLOOR OR TOP OF FOOTING
DWG(S)	DRAWING	ORIG	ORIGINAL	TG	TOP OF GRATE
DWY	DRIVEWAY	PAE	PUBLIC OR PEDESTRIAN ACCESS EASEMENT	THRU	THROUGH
EA	EACH	PB	PULL BOX	THW	TOP OF HEADWALL
ECR	END CURB RETURN	PC	POINT OF CURVE	TP	TOP OF PIPE
EG	EXISTING GROUND	PCC	POINT OF COMPOUND CURVE	TW	TOP OF WALL
EL	ELEVATION	PDE	PUBLIC DRAINAGE EASEMENT	TRW	TOP OF RETAINING WALL
ESMT	EASEMENT	P, OR PL	PROPERTY LINE	TSW	TOP OF SCREEN WALL
EP	EDGE OF PAVEMENT	POB	POINT OF BEGINNING	TYP	TYPICAL
EVC	END VERTICAL CURVE	POC	POINT OF CURVATURE	UDACS	UNIFORM DESIGN AND CONSTRUCTION
EX OR EXIST	EXISTING	POE	POINT OF ENDING		STANDARDS
FC	FACE OF CURB	PRC	POINT OF REVERSE CURVATURE	VC	VERTICAL CURVE
FF	FINISHED FLOOR	PRELIM	PRELIMINARY	VERT	VERTICAL
FG	FINISHED GRADE	PROP	PROPOSED	VG	VALLEY GUTTER
FGH	FINISHED GRADE, HIGH SIDE	PRV	PRESSURE REDUCING VALVE	WI	WROUGHT IRON
FGL	FINISHED GRADE, LOW SIDE	PUE	PUBLIC UTILITY EASEMENT	WL	WATER LINE
FH	FIRE HYDRANT	PT	POINT OF TANGENT OR POINT	WPZ	WATER PRESSURE ZONE
FL	FLOWLINE	PVC	POLYVINYL CHLORIDE	WT	WEIGHT
FT	FEET OR FOOT	PVI	POINT OF VERTICAL INTERSECTION	WTR	WATER LINE

SPECIAL NOTE

IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED WHICH IS NOT SHOWN ON THESE DRAWINGS, THE OWNER AGREES TO PROVIDE AND INSTALL SUCH ITEM AT HIS OWN EXPENSE AND AT THE DIRECTION OF THE CLARK COUNTY DEPT. OF PUBLIC WORKS. TEMPORARY CONSTRUCTION ITEMS INCLUDE: PAVEMENT TRANSITIONS, PROTECTIVE DITCHES AND BERMS, ROAD SIGNS AND BARRICADES, ETC.

NOTICE TO CONTRACTOR

-QUANTITIES SHOWN ARE ESTIMATES ONLY AND ARE INTENDED TO ILLUSTRATE SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE EXACT QUANTITIES INVOLVED.

-EXISTING UTILITY LOCATIONS SHOWN HEREIN ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATIONS. CALL BEFORE YOU DIG: (800) 227-2600

LEGEND

EXISTING	PROPOSED	DESCRIPTION
(1900)	1900	5' CONTOUR
		1' CONTOUR
		STRIPING
		SEWER MANHOLE
		CURB AND GUTTER
EX 8" PVC SS	8" PVC SS	SANITARY SEWER PIPE AND FLOW ARROW
EX 8" PVC WTR	8" PVC WTR	WATER PIPE
		WATER GATE VALVE
		FIRE HYDRANT
		WATER BLOW-OFF
		WATER LATERAL W/ METER
		SANITARY SEWER LATERAL
		STREETLIGHT
		EDGE OF PAVEMENT
		TRAFFIC SIGN
PAD= XXX.X FF = XXX.X	PAD= XXX.X FF = XXX.X	PAD ELEVATION FINISHED FLOOR ELEVATION
(00.00) TC	00.00 TC	ELEVATION
		STORM DRAIN W/ MANHOLE

	EXISTING GAS GATE VALVE
	EXISTING UNKNOWN MANHOLE
GAS	EXISTING GAS, SIZE PER PLAN
	EXISTING POWER POLE
	EXISTING TRAFFIC SIGNAL
	EXISTING WALL
	WATER PIPE FITTING
POC	WATER POINT OF CONNECTION
POC	SEWER POINT OF CONNECTION
	STREET CENTERLINE
	RIGHT-OF-WAY
	MATCHLINE
	BOUNDARY LINE
	PHASE LINE
P	PROPERTY LINE
	FLOWLINE
	SAWCUT
	CUT/FILL TRANSITION LINE
	SIDEWALK
	EX STRIPING TO BE OBLITERATED
	GRADE BREAK LINE
RWV	REFLECTIVE RAISED PAVEMENT MARKERS
BWV	BACK WATER VALVE
	TUBULAR STEEL VIEW FENCE
	TUBULAR STEEL VIEW FENCE W/ RETAINING WALL
	PONY RETAINING WALL
	PRODUCT WALL W/ RETAINING WALL
	DECORATIVE PERIMETER WALL
	DECORATIVE PERIMETER RETAINING WALL
	PROPOSED CURB AND GUTTER WITH RIGHT-OF-WAY AT BACK OF CURB
	EXISTING CURB AND GUTTER WITH RIGHT-OF-WAY AT BACK OF CURB
	FUTURE CURB AND GUTTER WITH RIGHT-OF-WAY AT BACK OF CURB

	PROPOSED SCARP AREA
	DRIVEWAY
	PROPOSED RIP RAP
	SIGHT VISIBILITY ZONE PER STD DWG NO. 201.2
	HANDICAP RAMP

QUANTITIES

			PRIVATE	PUBLIC
DRAINAGE				
1.	60" TYPE III STORM DRAIN MANHOLE W/ LOCKING MANHOLE LIDS	EA	–	2
2.	48" TYPE II STORM DRAIN MANHOLE W/ LOCKING MANHOLE LIDS	EA	–	1
3.	15.0' TYPE "CM2" DROP INLET	EA	–	1
4.	36" RCP CLASS III STORM DRAIN	LF	–	660
5.	18" RCP CLASS III STORM DRAIN	LF	–	22
6.	12" PVC STORM DRAIN	LF	–	240
7.	2' WIDE CONCRETE U-CHANNEL	SF	–	365
8.	RIP RAP W/ FILTER FABRIC D50=4", T=8"	CY	–	55
9.	RIP RAP W/ FILTER FABRIC D50=6", T=12"	CY	–	2
10.	RIP RAP W/ FILTER FABRIC D50=12", T=24"	CY	–	181
11.	SIDEWALK UNDERDRAIN	LF	–	3
12.	STANDARD "A" TYPE ISLAND CURB W/6" TYPE I AGGREGATE BASE	LF	–	575
SEWER SYSTEM				
1.	4" PVC SEWER LATERAL (PRIVATE)	LF	–	–
2.	8" PVC SEWER PIPE (PUBLIC)	LF	–	–
3.	STANDARD 48" SEWER MANHOLE (PUBLIC)	EA	–	–
4.	STANDARD 48" SEWER MANHOLE WITH CAST-IN-PLACE BASE	EA	–	–
5.	8" SEWER PIPE CAP	EA	–	–
6.	BACK WATER VALVE	EA	–	–
WATER SYSTEM				
1.	FIRE HYDRANT ASSEMBLY W/6" GATE VALVE PER UDACS PLATE NO. 40	EA	–	–
2.	6" PVC WATER PIPE	LF	–	–
3.	8" PVC WATER PIPE	LF	–	–
4.	8" GATE VALVE WITH VALVE BOX PER UDACS PLATE NO. 30 & 39	EA	–	–
5.	8" X 6" TEE PER UDACS PLATE NO. 31	EA	–	–
6.	8" X 8" TEE PER UDACS PLATE NO. 31	EA	–	–
7.	8" 5 DEGREE BEND WITH RESTRAINED JOINTS	EA	–	–
8.	8" 11.25 DEGREE BEND PER UDACS PLATE NO. 31	EA	–	–
9.	8" 22.5 DEGREE BEND PER UDACS PLATE NO. 31	EA	–	–
10.	8" 45 DEGREE BEND PER UDACS PLATE NO. 31	EA	–	–
11.	CAP AND 2" BLOW-OFF ASSEMBLY W/CAP PER UDACS PLATE NO. 36	EA	–	–
12.	1" COPPER SERVICE W/ 3/4" METER PER UDACS PLATE NO. 3	EA	–	–
13.	1" COPPER SERVICE W/ 3/4" METER & 1" RPPA PER UDACS PLATE NO. 4 & 8	EA	–	–
14.	12" X 8" REDUCER PER UDACS PLATE NO. 30	EA	–	–
15.	8" X 6" REDUCER PER UDACS PLATE NO. 30	EA	–	–
STREET IMPROVEMENTS				
1.	2" A.C. PAVEMENT W/ 4" TYPE II OVER 6" TYPE I AGGREGATE BASE	SY	–	–
2.	STANDARD "A" TYPE ISLAND CURB W/6" TYPE I AGGREGATE BASE	LF	–	–
3.	STANDARD 24" TYPE "L" CURB & GUTTER W/6" TYPE I AGGREGATE BASE	LF	–	–
4.	STANDARD 30" TYPE "ROLL" CURB & GUTTER W/6" TYPE I AGGREGATE BASE	LF	–	–
5.	4' WIDE CONCRETE SIDEWALK W/4" TYPE II AGGREGATE BASE	SF	–	–
6.	5' WIDE CONCRETE SIDEWALK W/4" TYPE II AGGREGATE BASE	SF	–	–
7.	ADA SIDEWALK RAMPS	EA	–	–
TRAFFIC SIGNALS				
1.	30" STOP SIGN WITH POST (R1-1)	EA	–	–
2.	9" STREET NAME SIGN (D-3, BROWN W/ WHITE LETTERS)(6 POLES x 2 PER POLE=12)	EA	–	–
3.	BLUE COLORED REFLECTIVE RAISED PAVEMENT MARKER	EA	–	–
4.	36" STOP SIGN WITH POST (R1-1)	EA	–	–
5.	12" STREET NAME SIGN (D-3, BROWN W/ WHITE LETTERS)(6 POLES x 2 PER POLE=12)	EA	–	–
DRY UTILITIES				
1.	100W TYPE 3B STREETLIGHT PER SUMMERLIN IMPROVEMENT STANDARDS	EA	–	–
2.	1-1/4" PVC STREET LIGHT CONDUIT WITH (2) #4 AND (1) #8 CONDUCTORS	LF	–	–
3.	NO. 3-1/2 PULL BOX W/METAL COVER	EA	–	–
4.	200 AMP SERVICE PEDESTAL (STLT)	EA	–	–

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT No. ###### FIRST APPROVED DATE: _____







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

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

CITY OF LAS VEGAS, NV

RICHMOND AMERICAN HOMES

AGAVE CREST

QUANTITIES & LEGEND

S19 T19S R60E

DATE: 12/18/17

DRAFTER: IG

DESIGNER: IG

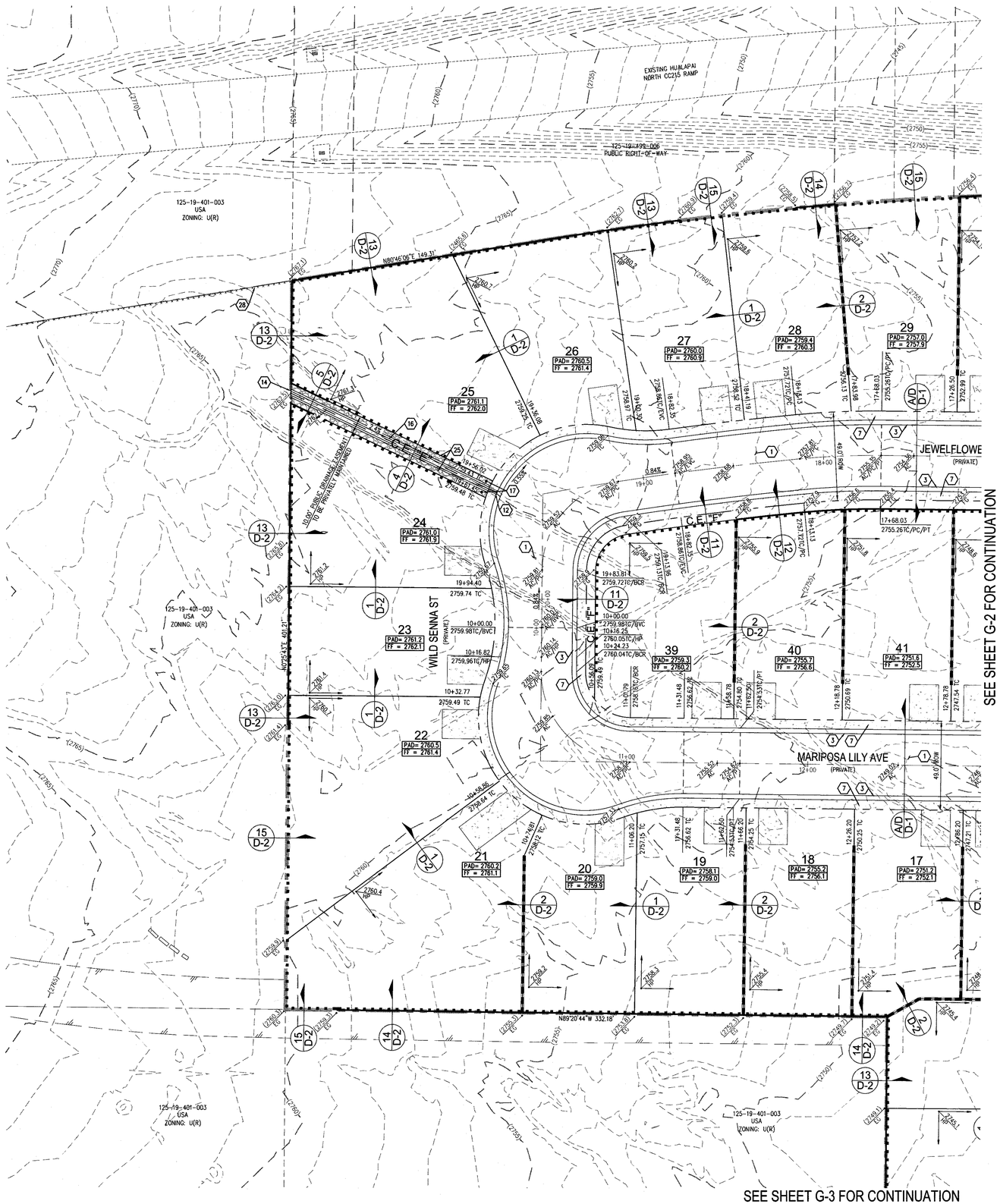
CHECKED: TJS

PROJECT NO.
RAH1723



C-3
SHEET 3 OF 14

J:\rah1723 centennial hudson\dwg\interior\rah1723cvr.dwg 12/18/2017 11:34 AM Isaac Guzman



0 30 60
SCALE – 1"=30' FEET

DRAINAGE IMPROVEMENT QUANTITIES

1.	60" TYPE III STORM DRAIN MANHOLE	EA	2
2.	48" TYPE II STORM DRAIN MANHOLE	EA	1
3.	12.5' TYPE "CM2" DROP INLET	EA	1
4.	36" RCP CLASS III STORM DRAIN	LF	660
5.	18" RCP CLASS III STORM DRAIN	LF	22
6.	12" PVC STORM DRAIN	LF	240
7.	2' WIDE CONCRETE U-CHANNEL	LF	365
8.	RIP RAP W/ FILTER FABRIC D50=4", T=8"	CY	55
9.	RIP RAP W/ FILTER FABRIC D50=6", T=12"	CY	2
10.	SIDEWALK UNDERDRAIN	EA	3
11.			
12.			

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DSXXXXX ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

ISAAC M. GUZMAN, P.E. 23513 DATE

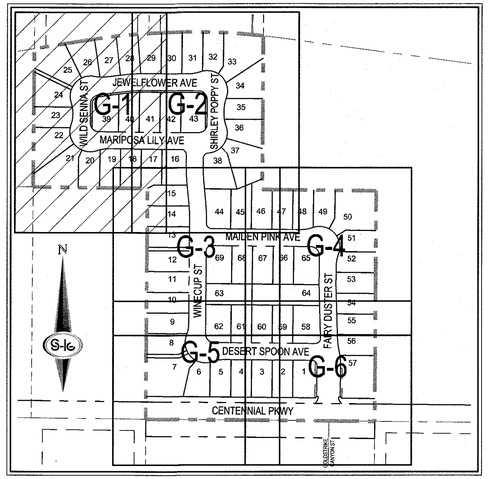
SOILS REPORT

SOILS REPORT BY ANGLE ENGINEERING
GEOTECHNICAL EXPLORATION CENTENNIAL HUALAPAI
PROJECT NO. 26203-1 DATED 7/31/2017

EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= 29,290 CU YDS
FILL= 26,150 CU YDS
NET= 3,140 CU YDS (CUT)

EXPORTED MATERIAL TO BE DISPOSED OF AT AN APPROVED LICENSED DISPOSAL FACILITY OR AT A SITE WITH AN APPROVED AND ACTIVE GRADING PERMIT.



CALL SOUTHWEST GAS AT 702-651-2111 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES

DISCLAIMER NOTE

1) EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.
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.

GENERAL NOTES

1. FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2012, SECTION 2304.11.2.2.
2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
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5. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
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7. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY OF LAS VEGAS BUILDING DEPARTMENT.
8. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE DURING CONSTRUCTION. OWNER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLEPING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
9. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXIST) WITHIN THE SIGHT VISIBILITY ZONES.

LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDELINES

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))

1. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 AND IN THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
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5. ACCUMULATED SEDIMENT IN BMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE 'X' (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1745E, DATED SEPTEMBER 27, 2002. A ZONE "X" (UNSHADED) IS DEFINED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% (500 YEAR) ANNUAL CHANCE FLOOD PLAIN.

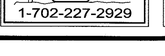
CONSTRUCTION NOTES

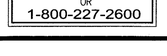
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13. INSTALL 60" X 12" BLOCK WALL OPENING PER DETAIL 19 ON SHEET D-2
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24. INSTALL RINKER REINFORCED CONCRETE PLUG (OR APPROVED EQUAL) PER DETAIL 24 ON SHEET D-2
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28. EXISTING FENCE TO REMAIN
29. EXISTING GUARDRAIL TO BE REMOVED

LEGEND

- EX. 5' CONTOUR (1900)
- EX. 1' CONTOUR
- STREET CENTERLINE
- RIGHT-OF-WAY
- BOUNDARY LINE
- PROPERTY LINE
- PRODUCT WALL W/ RETAINING WALL
- TUBULAR STEEL VIEW FENCE
- TUBULAR STEEL VIEW FENCE W/ RETAINING WALL
- PONY RETAINING WALL
- DECORATIVE PERIMETER WALL
- CUT/FILL TRANSITION LINE
- PAD= XXX.X / FF = XXX.X — PAD ELEVATION / FINISHED FLOOR ELEVATION
- 00.00 TC — ELEVATION
- PROPOSED STORM DRAIN W/ MANHOLE
- EX. STORM DRAIN W/ MANHOLE
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- PROPOSED 1' CONTOUR
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- SAWCUT
- SIDEWALK
- GRADE BREAK LINE
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SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

CITY OF LAS VEGAS, NV

RICHMOND AMERICAN HOMES

AGAVE CREST

GRADING PLAN I

S:19 T:19S R:60E

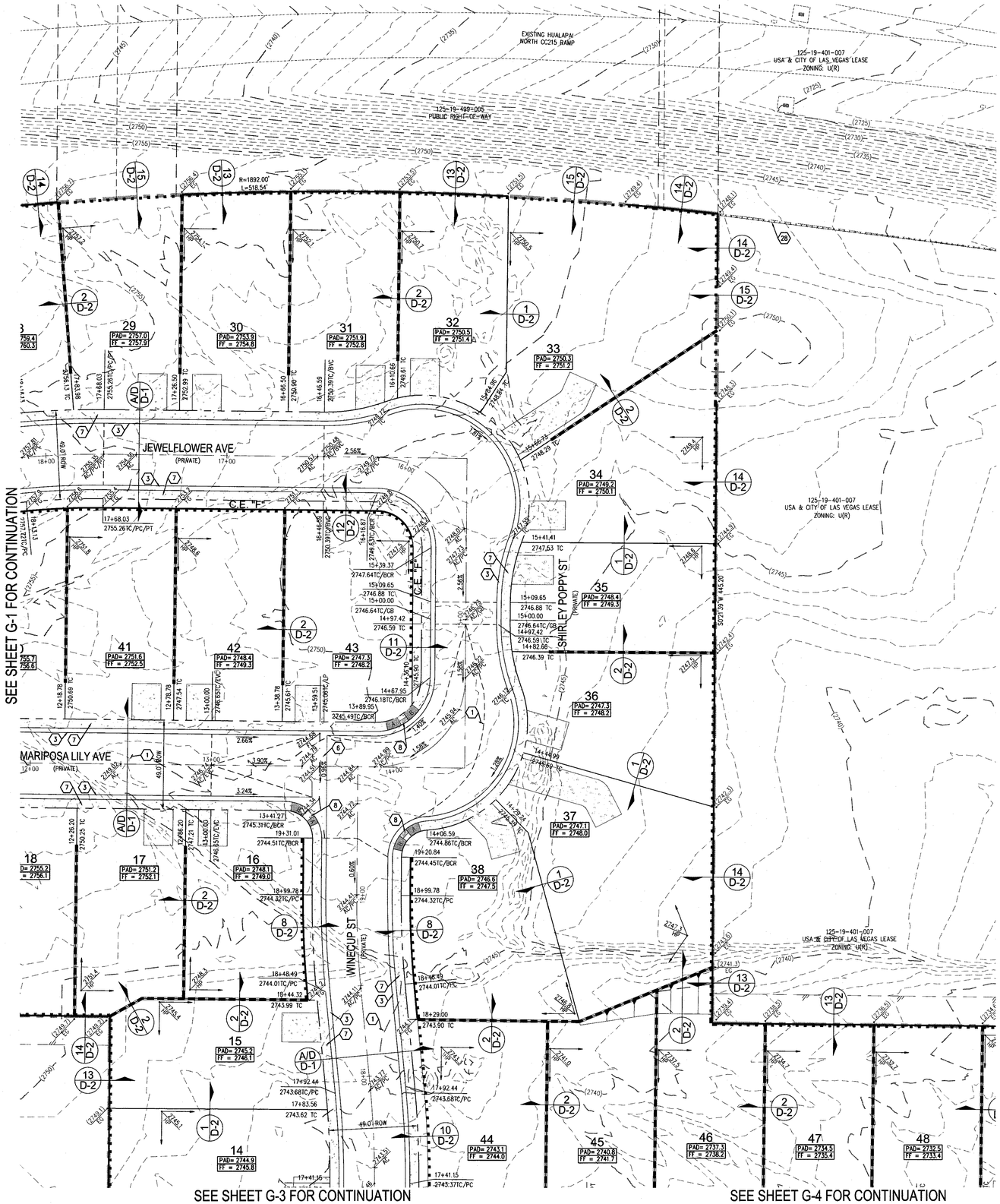
DATE: 12/18/17
DRAFTER: IG
DESIGNER: IG
CHECKED: TJS

PROJECT NO.
RAH1723



G-1
SHEET 4 OF 14

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0 30 60
SCALE – 1"=30' FEET

DRAINAGE IMPROVEMENT QUANTITIES

1.	60" TYPE III STORM DRAIN MANHOLE	EA	2
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11.			
12.			

FLOOD CERTIFICATION

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ISAAC M. GUZMAN, P.E. 23513 DATE

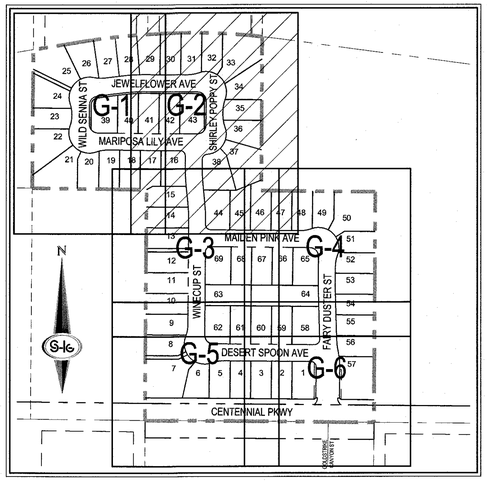
SOILS REPORT

SOILS REPORT BY ANGLE ENGINEERING
GEOTECHNICAL EXPLORATION CENTENNIAL HUALAPAI
PROJECT NO. 26203-1 DATED 7/31/2017

EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= 29,290 CU YDS
FILL= 26,150 CU YDS
NET= 3,140 CU YDS (CUT)

EXPORTED MATERIAL TO BE DISPOSED OF AT AN APPROVED LICENSED DISPOSAL FACILITY OR AT A SITE WITH AN APPROVED AND ACTIVE GRADING PERMIT.



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LEGEND

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FAST Call before you UnderGround 1-702-432-5300 FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.)

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-227-2600

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

CITY OF LAS VEGAS, NV

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

RICHMOND AMERICAN HOMES

AGAVE CREST

GRADING PLAN II

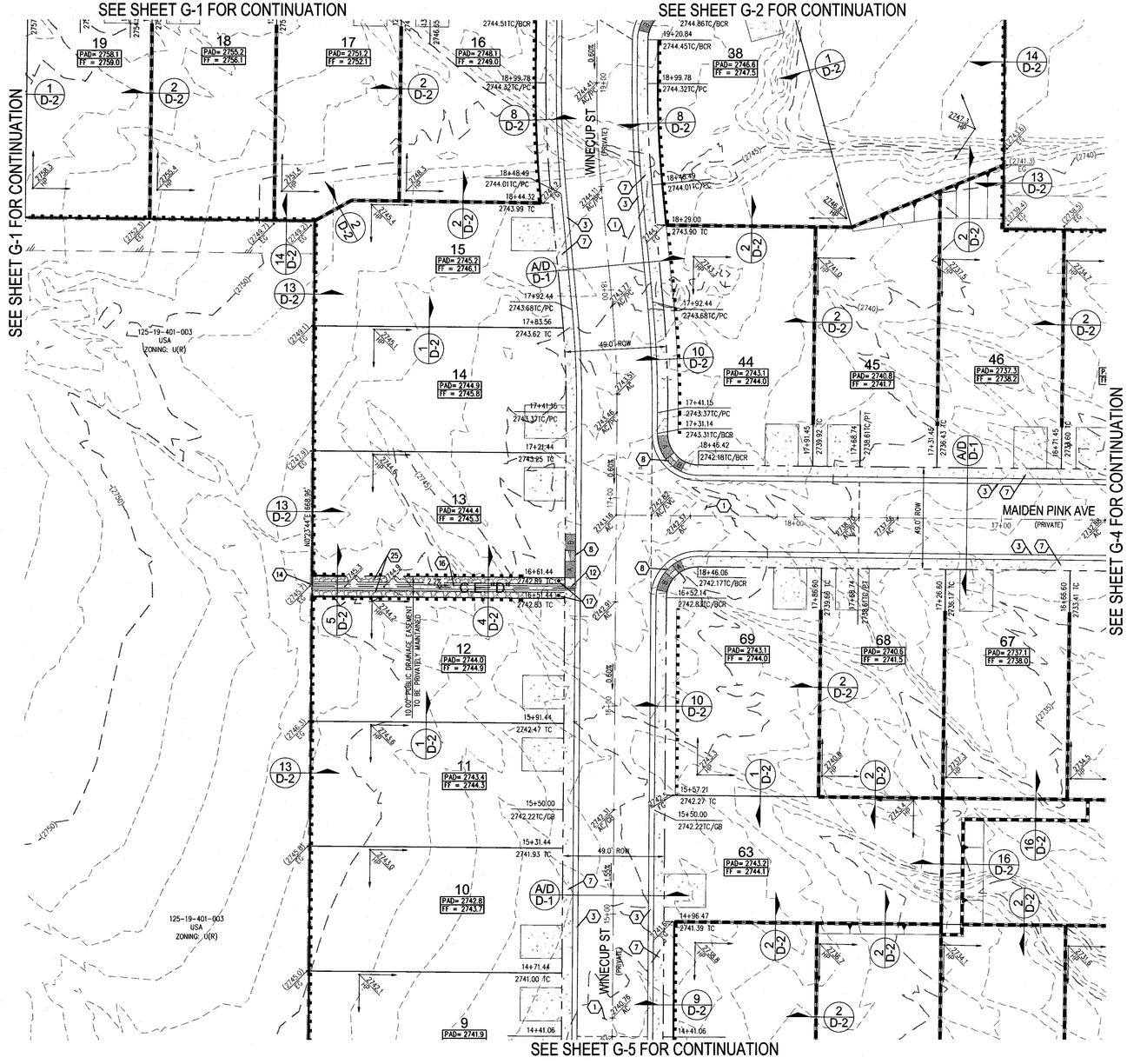
S19 T-19S R60E

DATE: 12/18/17
DRAFTER: IG
DESIGNER: TJS
CHECKED: TJS
PROJECT NO. RAH1723

PROFESSIONAL ENGINEER STATE OF NEVADA ISAAC M. GUZMAN Exp. 06/30/2019 CIVIL No. 23513 12-18-17

G-2
SHEET 5 OF 14

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DRAINAGE IMPROVEMENT QUANTITIES		
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ISAAC M. GUZMAN, P.E. 23513 — DATE

SOILS REPORT

SOILS REPORT BY ANGLE ENGINEERING
GEOTECHNICAL EXPLORATION CENTENNIAL HUALAPAI
PROJECT NO. 26203-1 DATED 7/31/2017

EARTHWORKS

EARTHWORK QUANTITIES (RAW):
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FILL= 26,150 CU YDS
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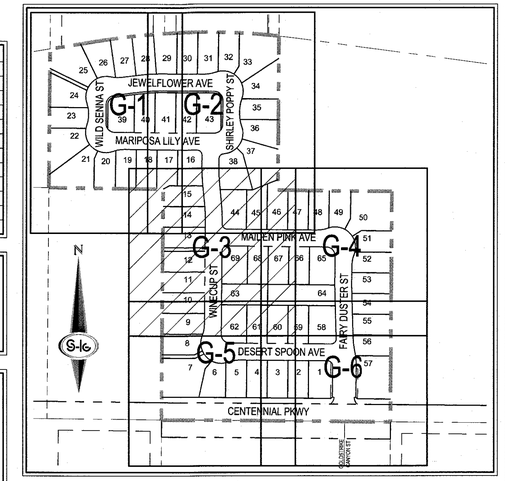
LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDELINES

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))

1. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 AND IN THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER A RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE "X" (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1745E, DATED SEPTEMBER 27, 2002. A ZONE "X" (UNSHADED) IS DEFINED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% (500 YEAR) ANNUAL CHANCE FLOOD PLAIN.



CONSTRUCTION NOTES

1. CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II AGGREGATE BASE
2. CONSTRUCT 5" AC PAVEMENT WITH 5.5" TYPE II AGGREGATE BASE
3. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD NO. 216
4. CONSTRUCT 30" ROLL CURB AND GUTTER PER CCAUSD NO. 217.1
5. CONSTRUCT "A" TYPE ISLAND CURB PER CCAUSD NO. 219
6. CONSTRUCT 8' CROSS GUTTER PER CCAUSD NO. 228
7. CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD NO. 234 (4" THICK W/ 5" TYPE II AGGREGATE BASE)
8. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE I
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10. CONSTRUCT 6" PORTLAND CEMENT CONCRETE PATH FOR MULTI-USE TRANSPORTATION TRAIL
11. SAWCUT AND MATCH EXISTING IMPROVEMENTS PER CCAUSD NO. 503 & 500.2
12. INSTALL SIDEWALK DRAIN PER CCAUSD NO. 236
13. INSTALL 60" X 12" BLOCK WALL OPENING PER DETAIL 19 ON SHEET D-2
14. INSTALL 6' HIGH TUBULAR STEEL FENCE PER DETAIL 20 ON SHEET D-2
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16. CONSTRUCT 2.0' WIDE CONCRETE U-CHANNEL PER DETAIL 22 ON SHEET D-2
17. INSTALL REMOVABLE BOLLARD PER DETAIL 23 ON SHEET D-2
18. INSTALL 18" CLASS III RCP STORM DRAIN
19. INSTALL 36" CLASS III RCP STORM DRAIN
20. INSTALL 12" PVC STORM DRAIN
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22. INSTALL 48" TYPE II STORM DRAIN MANHOLE PER CCAUSD 405.2 FOR PIPE W/ LOCKING MANHOLE LIDS
23. INSTALL 60" TYPE III STORM DRAIN MANHOLE PER CCAUSD 403 W/ LOCKING MANHOLE LIDS
24. INSTALL RINKER REINFORCED CONCRETE PLUG (OR APPROVED EQUAL) PER DETAIL 24 ON SHEET D-2
25. INSTALL RIP RAP W/ FILTER FABRIC D50=4", T=8"
26. INSTALL RIP RAP W/ FILTER FABRIC D50=6", T=12"
27. INSTALL RIP RAP W/ FILTER FABRIC D50=12", T=24"
28. EXISTING FENCE TO REMAIN
29. EXISTING GUARDRAIL TO BE REMOVED

LEGEND

- EX. 5' CONTOUR
- EX. 1' CONTOUR
- STREET CENTERLINE
- RIGHT-OF-WAY
- BOUNDARY LINE
- PROPERTY LINE
- PRODUCT WALL W/ RETAINING WALL
- TUBULAR STEEL VIEW FENCE
- TUBULAR STEEL VIEW FENCE W/ RETAINING WALL
- PONY RETAINING WALL
- DECORATIVE PERIMETER WALL
- CUT/FILL TRANSITION LINE
- PAD= XXX.X / FF = XXX.X — PAD ELEVATION / FINISHED FLOOR ELEVATION
- 00.00 TC — ELEVATION
- PROPOSED STORM DRAIN W/ MANHOLE
- EX. STORM DRAIN W/ MANHOLE
- PROPOSED 5' CONTOUR
- PROPOSED 1' CONTOUR
- FLOWLINE
- SAWCUT
- SIDEWALK
- GRADE BREAK LINE
- DECORATIVE PERIMETER RETAINING WALL







SCALE – 1"=30' — 0 30 60 FEET

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

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

CITY OF LAS VEGAS, NV

RICHMOND AMERICAN HOMES

AGAVE CREST

GRADING PLAN III

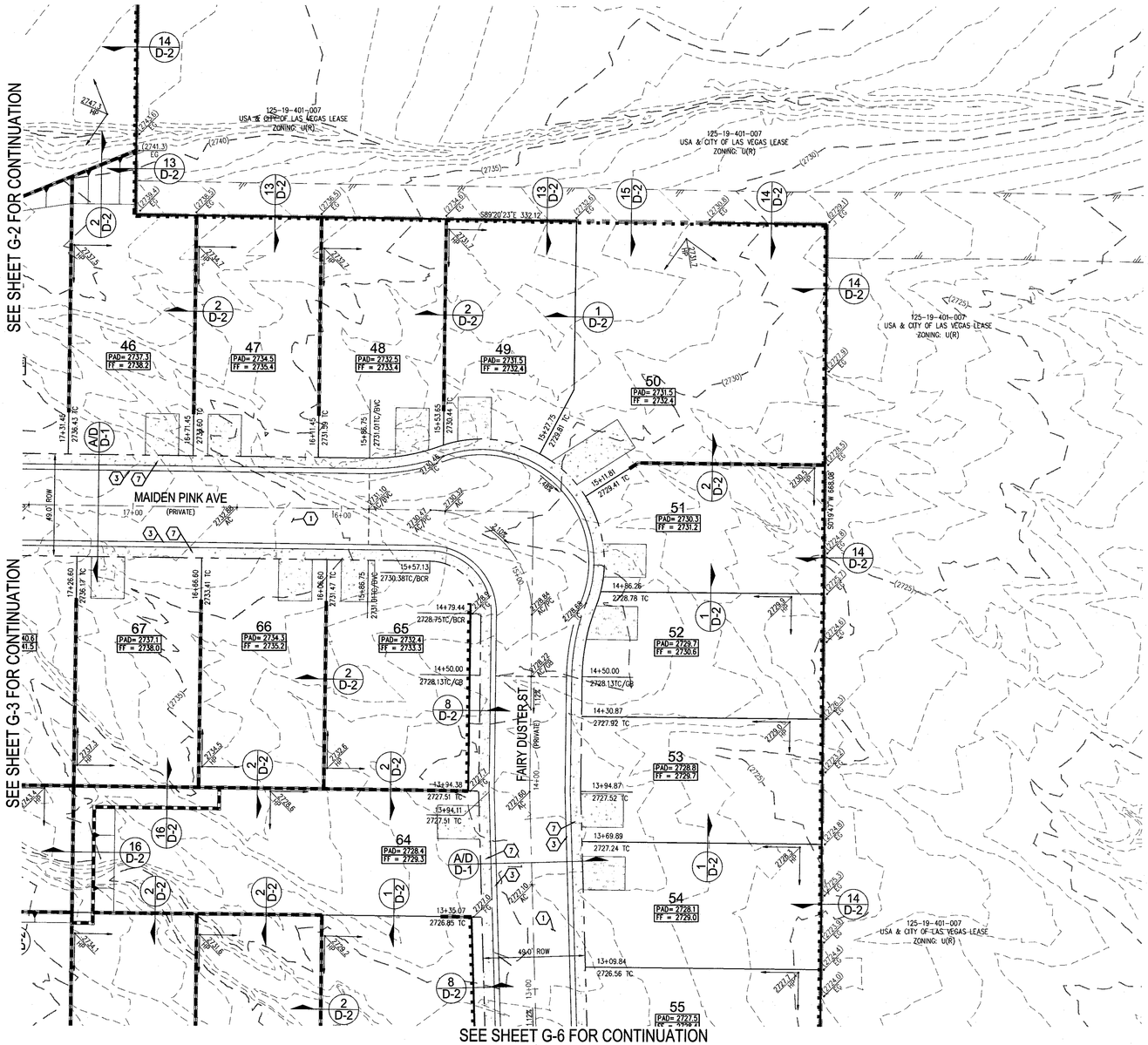
S19 T19S R60E

DATE: 12/18/17
DRAFTER: IG
DESIGNER: IG
CHECKED: TJS
PROJECT NO. RAH1723

PROFESSIONAL ENGINEER — ISAAC M. GUZMAN — Exp. 06/30/2019 — CIVIL — No. 23513 — STATE OF NEVADA — 12-18-17

G-3
SHEET 6 OF 14

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DRAINAGE IMPROVEMENT QUANTITIES			
1.	60" TYPE III STORM DRAIN MANHOLE	EA	2
2.	48" TYPE II STORM DRAIN MANHOLE	EA	1
3.	12.5' TYPE "CM2" DROP INLET	EA	1
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5.	18" RCP CLASS III STORM DRAIN	LF	22
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10.	SIDEWALK UNDERDRAIN	EA	3
11.			
12.			

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DSXXXXX ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

ISAAC M. GUZMAN, P.E. 23513 DATE

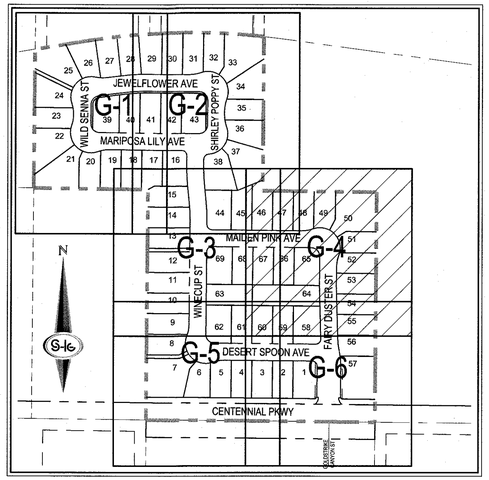
SOILS REPORT

SOILS REPORT BY ANGLE ENGINEERING
GEOTECHNICAL EXPLORATION CENTENNIAL HUALAPAI
PROJECT NO. 26203-1 DATED 7/31/2017

EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= 29,290 CU YDS
FILL= 26,150 CU YDS
NET= 3,140 CU YDS (CUT)

EXPORTED MATERIAL TO BE DISPOSED OF AT AN APPROVED LICENSED DISPOSAL FACILITY OR AT A SITE WITH AN APPROVED AND ACTIVE GRADING PERMIT.



CALL SOUTHWEST GAS AT 702-651-2111 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES

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LEGEND

- EX. 5' CONTOUR / PROPOSED 5' CONTOUR
- EX. 1' CONTOUR / PROPOSED 1' CONTOUR
- STREET CENTERLINE / FLOWLINE
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- BOUNDARY LINE / SIDEWALK
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- EX. STORM DRAIN W/ MANHOLE

FAST Call before you UnderGround 1-702-432-5300 FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.)

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-227-2600

SCALE - 1"=30' (0, 30, 60 FEET)

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

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

CITY OF LAS VEGAS, NV

RICHMOND AMERICAN HOMES

AGAVE CREST

GRADING PLAN IV

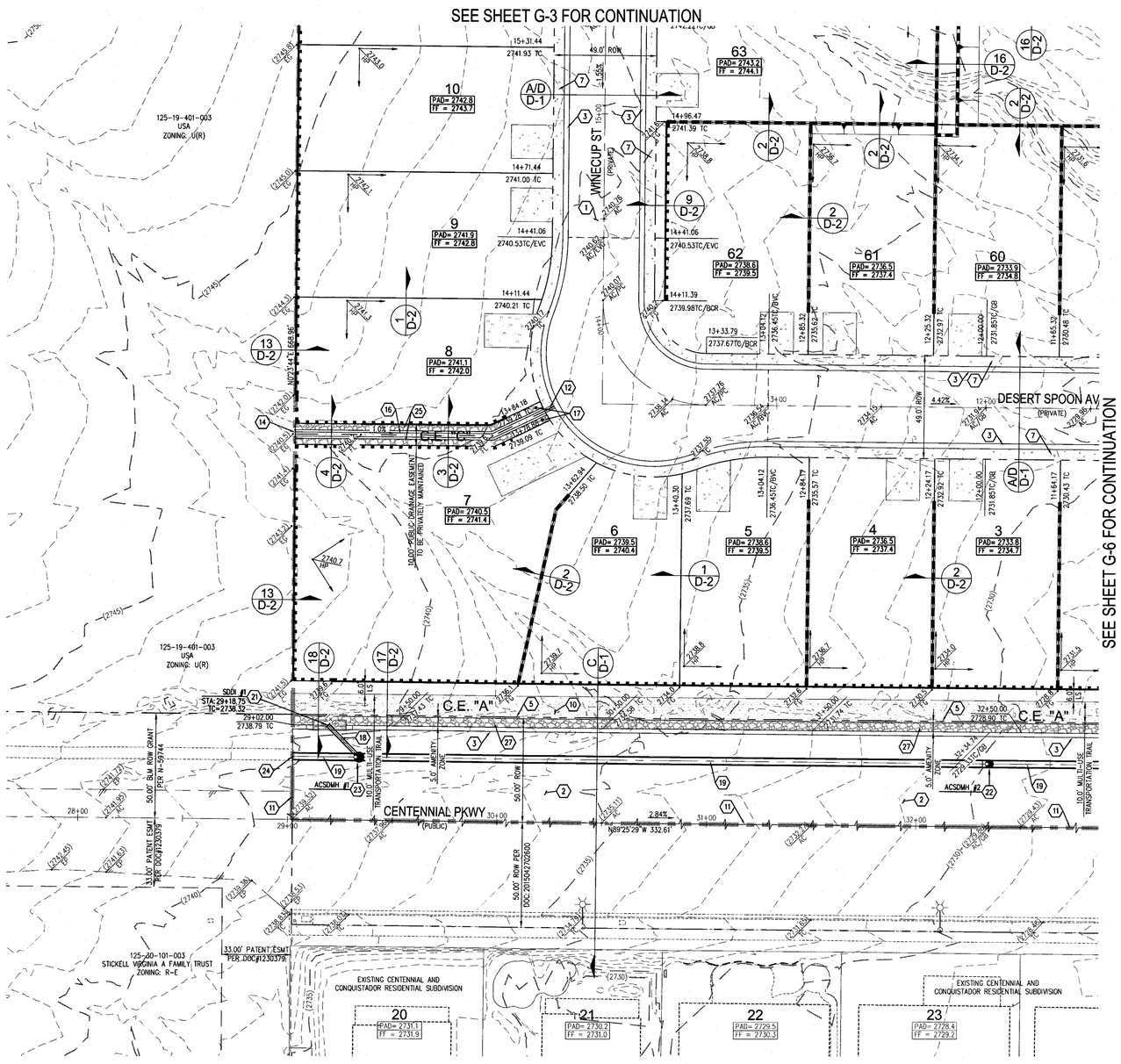
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DATE: 12/18/17
DRAFTER: IG
DESIGNER: IG
CHECKED: TJS
PROJECT NO. RAH1723

PROFESSIONAL ENGINEER STATE OF NEVADA — ISAAC M. GUZMAN Exp. 06/30/2019 CIVIL No. 23513 — 12-19-17

G-4
SHEET 7 OF 14

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DRAINAGE IMPROVEMENT QUANTITIES		
1. 60" TYPE III STORM DRAIN MANHOLE	EA	2
2. 48" TYPE II STORM DRAIN MANHOLE	EA	1
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FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DSXXXXX ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

ISAAC M. GUZMAN, P.E. 23513 DATE

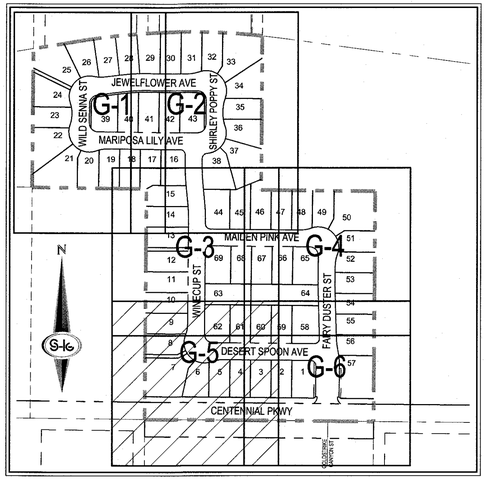
SOILS REPORT

SOILS REPORT BY ANGLE ENGINEERING
GEOTECHNICAL EXPLORATION CENTENNIAL HUALAPAI
PROJECT NO. 26203-1 DATED 7/31/2017

EARTHWORKS

EARTHWORK QUANTITIES (RAW):
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1. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 AND IN THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER A RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE "X" (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1745E, DATED SEPTEMBER 27, 2002. A ZONE "X" (UNSHADED) IS DEFINED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% (500 YEAR) ANNUAL CHANCE FLOOD PLAIN.

CONSTRUCTION NOTES

1. CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II AGGREGATE BASE
2. CONSTRUCT 5" AC PAVEMENT WITH 5.5" TYPE II AGGREGATE BASE
3. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD NO. 216
4. CONSTRUCT 30" ROLL CURB AND GUTTER PER CCAUSD NO. 217.1
5. CONSTRUCT "A" TYPE ISLAND CURB PER CCAUSD NO. 219
6. CONSTRUCT 8' CROSS GUTTER PER CCAUSD NO. 228
7. CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD NO. 234 (4" THICK W/ 5" TYPE II AGGREGATE BASE)
8. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE I
9. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE III
10. CONSTRUCT 6" PORTLAND CEMENT CONCRETE PATH FOR MULTI-USE TRANSPORTATION TRAIL
11. SAWCUT AND MATCH EXISTING IMPROVEMENTS PER CCAUSD NO. 503 & 500.2
12. INSTALL SIDEWALK DRAIN PER CCAUSD NO. 236
13. INSTALL 60" X 12" BLOCK WALL OPENING PER DETAIL 19 ON SHEET D-2
14. INSTALL 6' HIGH TUBULAR STEEL FENCE PER DETAIL 20 ON SHEET D-2
15. CONSTRUCT 5' TRANSITION FROM ROLLED CURB TO "L" TYPE CURB PER DETAIL 21 SHEET D-2
16. CONSTRUCT 2.0' WIDE CONCRETE U-CHANNEL PER DETAIL 22 ON SHEET D-2
17. INSTALL REMOVABLE BOLLARD PER DETAIL 23 ON SHEET D-2
18. INSTALL 18" CLASS III RCP STORM DRAIN
19. INSTALL 36" CLASS III RCP STORM DRAIN
20. INSTALL 12" PVC STORM DRAIN
21. INSTALL 15.0' TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
22. INSTALL 48" TYPE II STORM DRAIN MANHOLE PER CCAUSD 405.2 FOR PIPE W/ LOCKING MANHOLE LIDS
23. INSTALL 60" TYPE III STORM DRAIN MANHOLE PER CCAUSD 403 W/ LOCKING MANHOLE LIDS
24. INSTALL RINKER REINFORCED CONCRETE PLUG (OR APPROVED EQUAL) PER DETAIL 24 ON SHEET D-2
25. INSTALL RIP RAP W/ FILTER FABRIC D50=4", T=8"
26. INSTALL RIP RAP W/ FILTER FABRIC D50=6", T=12"
27. INSTALL RIP RAP W/ FILTER FABRIC D50=12", T=24"
28. EXISTING FENCE TO REMAIN
29. EXISTING GUARDRAIL TO BE REMOVED

LEGEND

- EX. 5' CONTOUR (1900)
- EX. 1' CONTOUR
- STREET CENTERLINE
- RIGHT-OF-WAY
- BOUNDARY LINE
- PROPERTY LINE
- PRODUCT WALL W/ RETAINING WALL
- TUBULAR STEEL VIEW FENCE
- TUBULAR STEEL VIEW FENCE W/ RETAINING WALL
- PONY RETAINING WALL
- DECORATIVE PERIMETER WALL
- CUT/FILL TRANSITION LINE
- PAD ELEVATION (PAD= XXX.X / FF = XXX.X)
- FINISHED FLOOR ELEVATION
- ELEVATION (00.00 TC)
- PROPOSED STORM DRAIN W/ MANHOLE
- EX. STORM DRAIN W/ MANHOLE
- PROPOSED 5' CONTOUR 1900
- PROPOSED 1' CONTOUR
- FLOWLINE
- SAWCUT
- SIDEWALK
- GRADE BREAK LINE
- DECORATIVE PERIMETER RETAINING WALL

FAST
Call before you UnderGround
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FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.)

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1-702-227-2929

Call before you Dig
AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
Call 811
OR
1-800-227-2600

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

CITY OF LAS VEGAS, NV

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

RICHMOND AMERICAN HOMES

AGAVE CREST

GRADING PLAN V

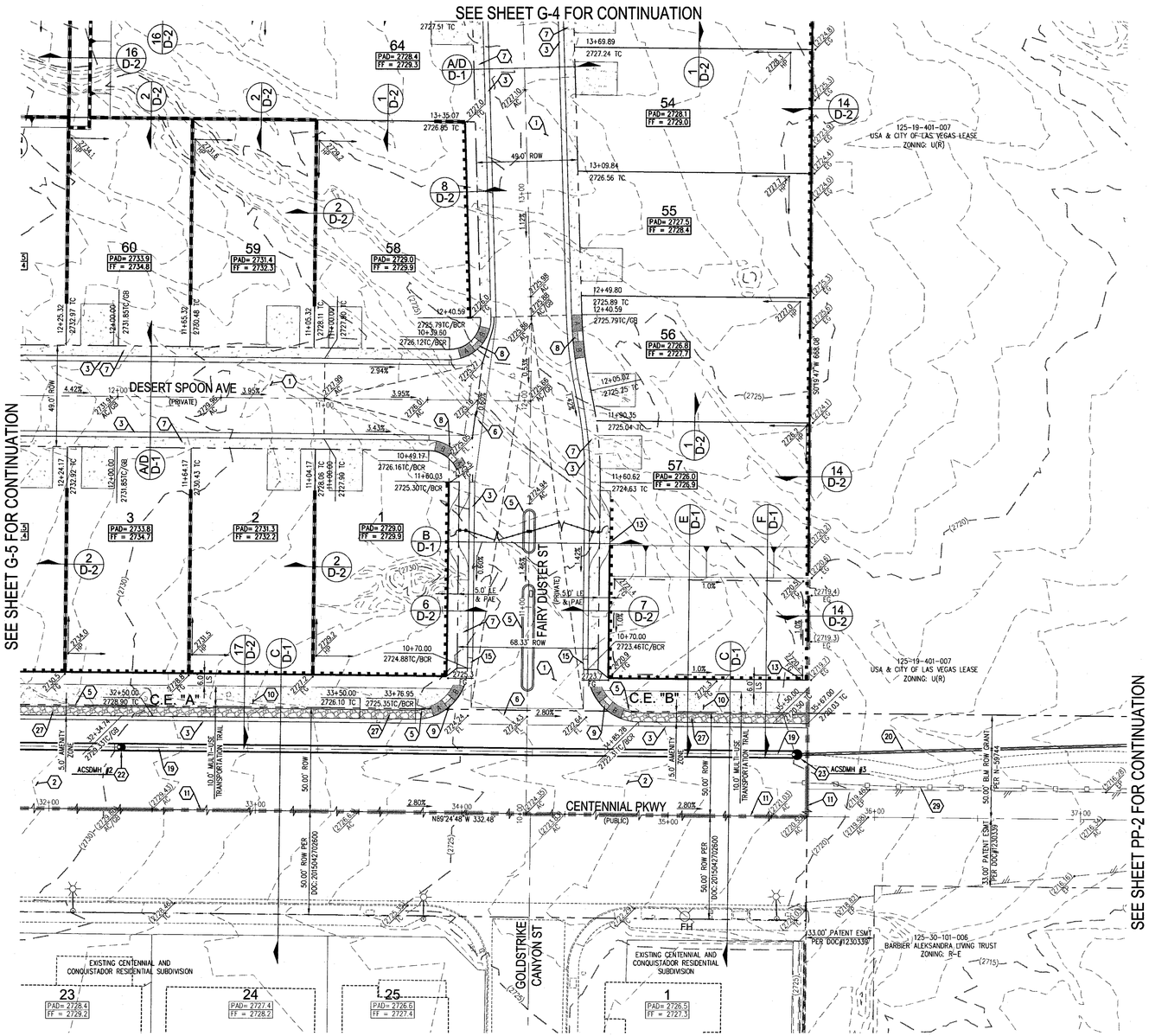
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DATE: 12/18/17
DRAFTER: IG
DESIGNER: IG
CHECKED: TJS
PROJECT NO. RAH1723

PROFESSIONAL ENGINEER STATE OF NEVADA ISAAC M. GUZMAN Exp. 06/30/2019 CIVIL No. 23513
12-18-17

G-5
SHEET 8 OF 14

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SCALE ~ 1"=30' (0 30 60 FEET)

DRAINAGE IMPROVEMENT QUANTITIES

1.	60" TYPE III STORM DRAIN MANHOLE	EA	2
2.	48" TYPE II STORM DRAIN MANHOLE	EA	1
3.	12.5' TYPE "CM2" DROP INLET	EA	1
4.	36" RCP CLASS III STORM DRAIN	LF	660
5.	18" RCP CLASS III STORM DRAIN	LF	22
6.	12" PVC STORM DRAIN	LF	240
7.	2' WIDE CONCRETE U-CHANNEL	LF	365
8.	RIP RAP W/ FILTER FABRIC D50=4", T=8"	CY	55
9.	RIP RAP W/ FILTER FABRIC D50=6", T=12"	CY	2
10.	SIDEWALK UNDERDRAIN	EA	3
11.			
12.			

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DSXXXXX ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

ISAAC M. GUZMAN, P.E. 23513 DATE

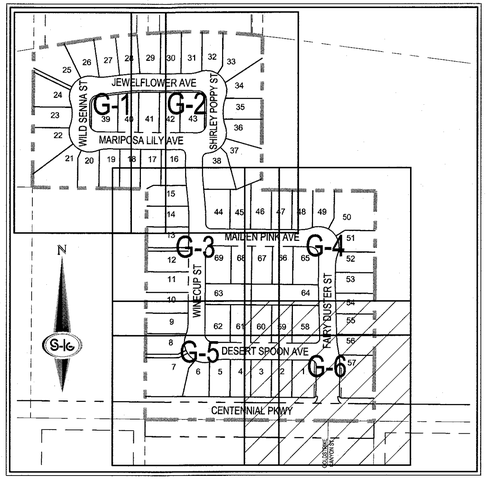
SOILS REPORT

SOILS REPORT BY ANGLE ENGINEERING
GEOTECHNICAL EXPLORATION CENTENNIAL HUALAPAI
PROJECT NO. 26203-1 DATED 7/31/2017

EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= 29,290 CU YDS
FILL= 26,150 CU YDS
NET= 3,140 CU YDS (CUT)

EXPORTED MATERIAL TO BE DISPOSED OF AT AN APPROVED LICENSED DISPOSAL FACILITY OR AT A SITE WITH AN APPROVED AND ACTIVE GRADING PERMIT.



CALL SOUTHWEST GAS AT 702-651-2111 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES

DISCLAIMER NOTE

1) EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.
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.

GENERAL NOTES

1. FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2012, SECTION 2304.11.2.2.
2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
3. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
4. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
5. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
6. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
7. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY OF LAS VEGAS BUILDING DEPARTMENT.
8. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLEPING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
9. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXIST) WITHIN THE SIGHT VISIBILITY ZONES.

LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDELINES

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))

1. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE, DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
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4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER A RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
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CONSTRUCTION NOTES

1. CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II AGGREGATE BASE
2. CONSTRUCT 5" AC PAVEMENT WITH 5.5" TYPE II AGGREGATE BASE
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4. CONSTRUCT 30" ROLL CURB AND GUTTER PER CCAUSD NO. 217.1
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6. CONSTRUCT 8' CROSS GUTTER PER CCAUSD NO. 228
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27. INSTALL RIP RAP W/ FILTER FABRIC D50=12", T=24"
28. EXISTING FENCE TO REMAIN
29. EXISTING GUARDRAIL TO BE REMOVED

LEGEND

- EX. 5' CONTOUR / EX. 1' CONTOUR
- STREET CENTERLINE
- RIGHT-OF-WAY
- BOUNDARY LINE
- PROPERTY LINE
- PRODUCT WALL W/ RETAINING WALL
- TUBULAR STEEL VIEW FENCE
- TUBULAR STEEL VIEW FENCE W/ RETAINING WALL
- PONY RETAINING WALL
- DECORATIVE PERIMETER WALL
- CUT/FILL TRANSITION LINE
- PAD= XXX.X / FF = XXX.X — PAD ELEVATION / FINISHED FLOOR ELEVATION
- 00.00 TC — ELEVATION
- PROPOSED STORM DRAIN W/ MANHOLE
- EX. STORM DRAIN W/ MANHOLE
- PROPOSED 5' CONTOUR / PROPOSED 1' CONTOUR
- FLOWLINE
- SAWCUT
- SIDEWALK
- GRADE BREAK LINE
- DECORATIVE PERIMETER RETAINING WALL

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE 'X' (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1745E, DATED SEPTEMBER 27, 2002. A ZONE "X" (UNSHADED) IS DEFINED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% (500 YEAR) ANNUAL CHANCE FLOOD PLAIN.







SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

CITY OF LAS VEGAS, NV

RICHMOND AMERICAN HOMES

AGAVE CREST

GRADING PLAN VI

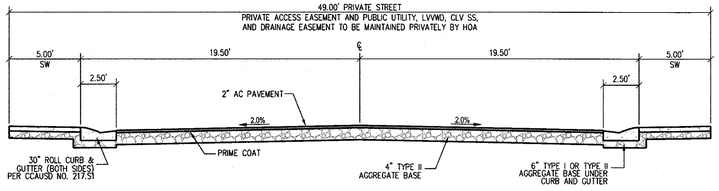
S 19 T19S R60E

DATE: 12/18/17
DRAFTER: IG
DESIGNER: IG
CHECKED: TJS
PROJECT NO. RAH1723

NEVADA — ISAAC M. GUZMAN — Exp. 06/30/2019 — CIVIL — No. 23513 — STATE OF NEVADA — PROFESSIONAL ENGINEER — 12-18-17

G-6
SHEET 9 OF 14

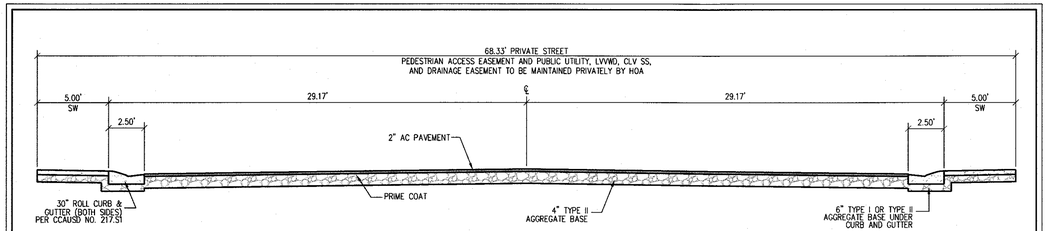
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A. PRIVATE STREET SECTION

INTERIOR STREET

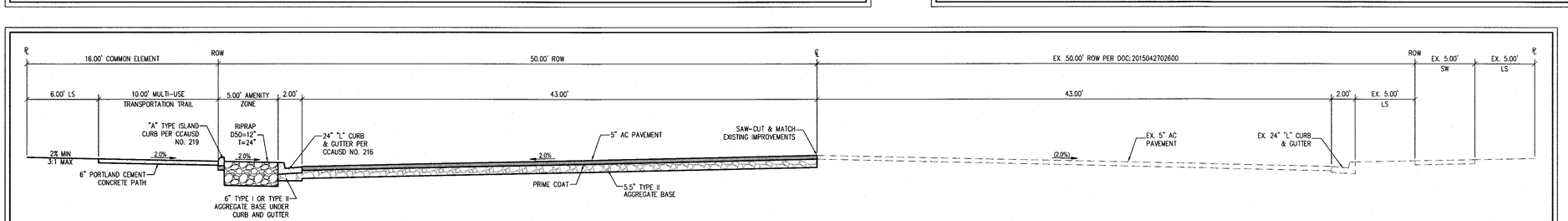
NOT TO SCALE



B. PRIVATE STREET SECTION

STREET ENTRY

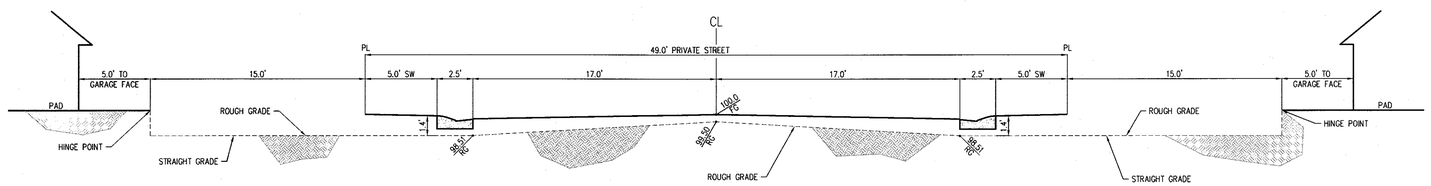
NOT TO SCALE



C. PUBLIC STREET SECTION

CENTENNIAL PKWY

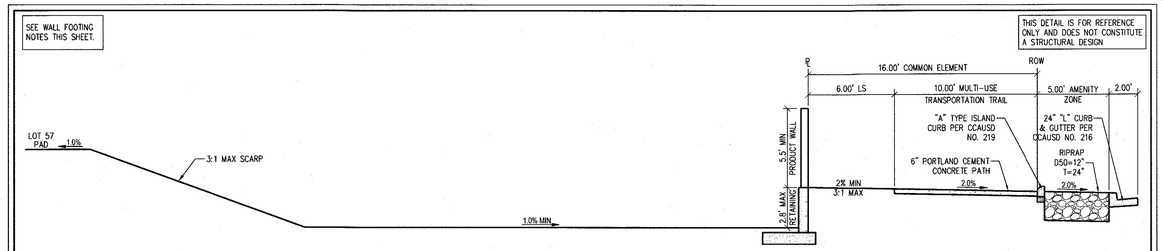
NOT TO SCALE



D. 49' WIDE INTERIOR PRIVATE STREET SUBSECTION

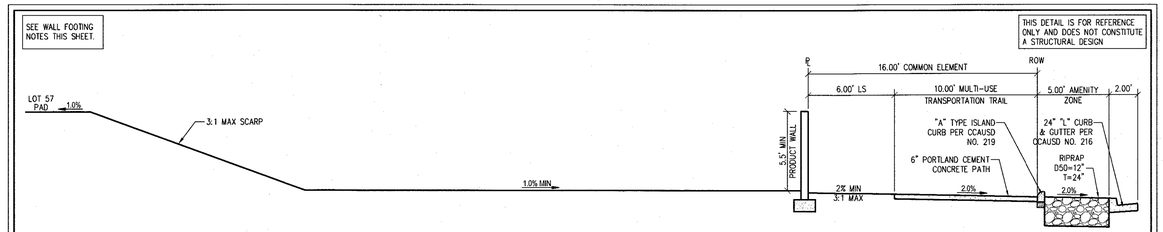
NOT TO SCALE – INTERIOR STREET ROUGH GRADE

FAIRY DUSTER ST, DESERT SPOON AVE, WINECUP ST, JEWELFLOWER AVE
SHIRLEY POPPY ST, MAIDEN PINK AVE, MARIPOSA LILY AVE, & WILD SENNA ST



E. LOT 57 RETAINING WALL SECTION

NOT TO SCALE

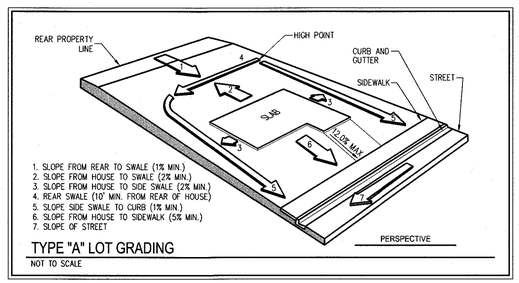


F. LOT 57 WALL SECTION

NOT TO SCALE

WALL FOOTING NOTES:

1. PROVIDE MINIMUM 4" COVER FROM TOP OF FOOTING TO LOWEST ADJACENT FINISHED GRADE OR PER GEOTECH REPORT RECOMMENDATION
2. SEE GEOTECH REPORT RECOMMENDATIONS FOR THE FOOTING DEPTH FROM THE LOWEST ADJACENT GRADE TO BOTTOM OF FOOTING



TYPE "A" LOT GRADING

NOT TO SCALE

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

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

CITY OF LAS VEGAS, NV

RICHMOND AMERICAN HOMES

AGAVE CREST

STREET AND LOT SECTIONS

S 19 T 19S R 60E

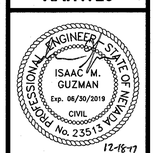
DATE: 12/18/17

DRAFTER: IG

DESIGNER: IG

CHECKED: TJS

PROJECT NO.
RAH1723

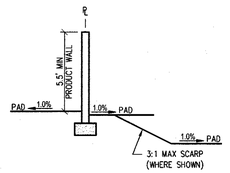


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SHEET 10 OF 14

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SEE WALL FOOTING NOTES THIS SHEET.

THIS DETAIL IS FOR REFERENCE ONLY AND DOES NOT CONSTITUTE A STRUCTURAL DESIGN

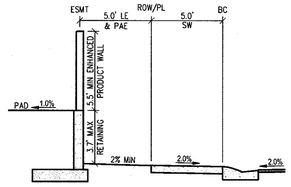


1. WALL SECTION

NOT TO SCALE

SEE WALL FOOTING NOTES THIS SHEET.

THIS DETAIL IS FOR REFERENCE ONLY AND DOES NOT CONSTITUTE A STRUCTURAL DESIGN.

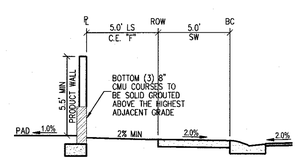


6. RETAINING WALL SECTION

NOT TO SCALE

SEE WALL FOOTING NOTES THIS SHEET.

THIS DETAIL IS FOR REFERENCE ONLY AND DOES NOT CONSTITUTE A STRUCTURAL DESIGN

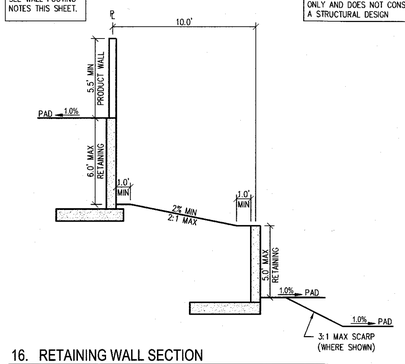


11. WALL SECTION

NOT TO SCALE

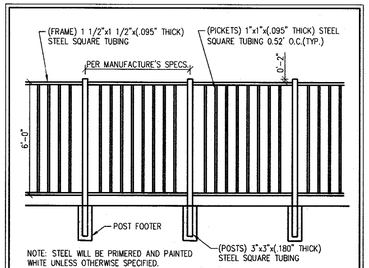
SEE WALL FOOTING NOTES THIS SHEET.

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16. RETAINING WALL SECTION

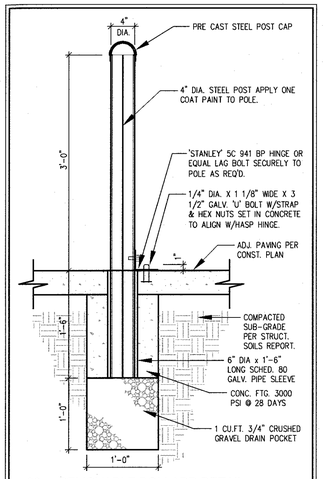
NOT TO SCALE



NOTE: STEEL WILL BE PRIMERED AND PAINTED WHITE UNLESS OTHERWISE SPECIFIED.

20. TUBULAR STEEL FENCE DETAIL

NOT TO SCALE

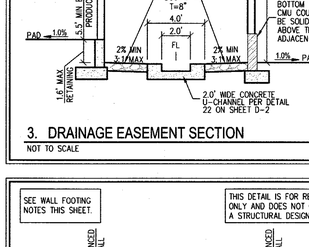


23. REMOVABLE BOLLARD DETAIL

NOT TO SCALE

SEE WALL FOOTING NOTES THIS SHEET.

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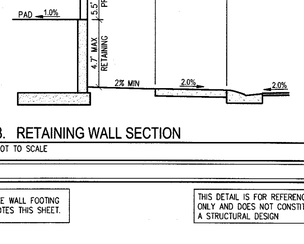


2. RETAINING WALL SECTION

NOT TO SCALE

SEE WALL FOOTING NOTES THIS SHEET.

THIS DETAIL IS FOR REFERENCE ONLY AND DOES NOT CONSTITUTE A STRUCTURAL DESIGN

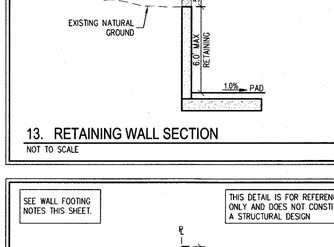


7. RETAINING WALL SECTION

NOT TO SCALE

SEE WALL FOOTING NOTES THIS SHEET.

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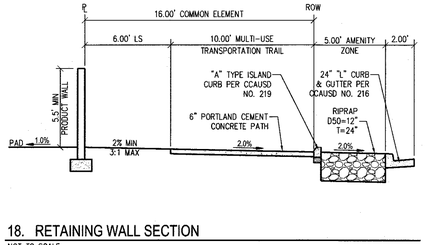


12. RETAINING WALL SECTION

NOT TO SCALE

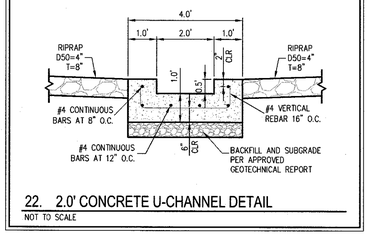
SEE WALL FOOTING NOTES THIS SHEET.

THIS DETAIL IS FOR REFERENCE ONLY AND DOES NOT CONSTITUTE A STRUCTURAL DESIGN



17. RETAINING WALL SECTION

NOT TO SCALE



21. 5' TRANSITION FROM 24" "L" CURB & GUTTER TO 30" ROLL CURB AND GUTTER

NOT TO SCALE

SEE WALL FOOTING NOTES THIS SHEET.

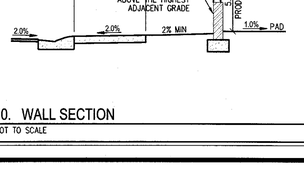
THIS DETAIL IS FOR REFERENCE ONLY AND DOES NOT CONSTITUTE A STRUCTURAL DESIGN

3. DRAINAGE EASEMENT SECTION

NOT TO SCALE

SEE WALL FOOTING NOTES THIS SHEET.

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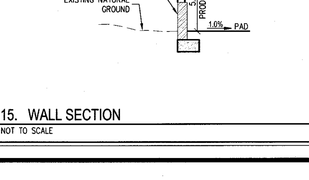


8. RETAINING WALL SECTION

NOT TO SCALE

SEE WALL FOOTING NOTES THIS SHEET.

THIS DETAIL IS FOR REFERENCE ONLY AND DOES NOT CONSTITUTE A STRUCTURAL DESIGN



13. RETAINING WALL SECTION

NOT TO SCALE

SEE WALL FOOTING NOTES THIS SHEET.

THIS DETAIL IS FOR REFERENCE ONLY AND DOES NOT CONSTITUTE A STRUCTURAL DESIGN

18. RETAINING WALL SECTION

NOT TO SCALE

GENERAL STRUCTURAL NOTES:

CONCRETE: ALL CONCRETE SHALL BE CLASS D WITH A MINIMUM ULTIMATE COMPRESSIVE STRENGTH f'c=4500psi AT 28 DAYS. ALL CONCRETE SHALL BE MADE USING TYPE V CEMENT. ALL EXPOSED CORNERS SHALL BE BEVELED 3/4" UNLESS OTHERWISE NOTED.

REINFORCING STEEL: ALL REINFORCING STEEL SHALL BE ASTM A615, GRADE 60. DIMENSIONS RELATING TO BAR SPACING ARE CENTER TO CENTER. BENDING DIMENSIONS ARE FROM OUT TO OUT OF BARS.

JOINTS: PROVIDE 3/4" EXPANSION JOINT AT MAXIMUM SPACING OF 90'-0" OC. PROVIDE CONTRACTION JOINTS (SAW CUT OR TOOLED 1/2" DEEP) AT MAXIMUM 15'-0" O.C.

22. 2.0' CONCRETE U-CHANNEL DETAIL

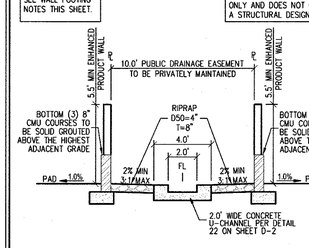
NOT TO SCALE

WALL FOOTING NOTES:

1. PROVIDE MINIMUM 4" COVER FROM TOP OF FOOTING TO LOWEST ADJACENT FINISHED GRADE OR PER GEOTECH REPORT RECOMMENDATION
2. SEE GEOTECH REPORT RECOMMENDATIONS FOR THE FOOTING DEPTH FROM THE LOWEST ADJACENT GRADE TO BOTTOM OF FOOTING

SEE WALL FOOTING NOTES THIS SHEET.

THIS DETAIL IS FOR REFERENCE ONLY AND DOES NOT CONSTITUTE A STRUCTURAL DESIGN

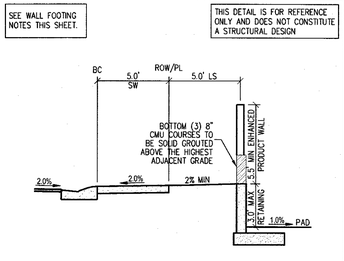


4. DRAINAGE EASEMENT SECTION

NOT TO SCALE

SEE WALL FOOTING NOTES THIS SHEET.

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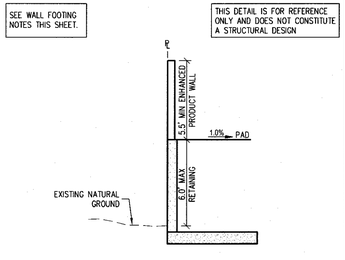


9. RETAINING WALL SECTION

NOT TO SCALE

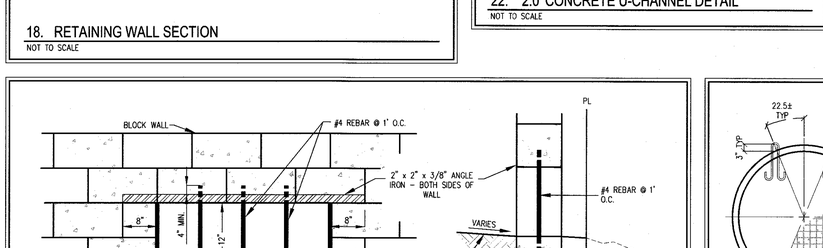
SEE WALL FOOTING NOTES THIS SHEET.

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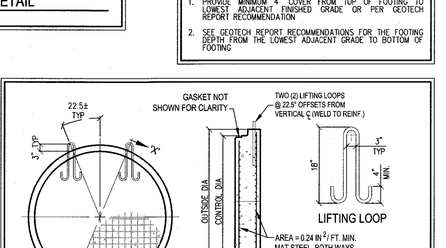
14. RETAINING WALL SECTION

NOT TO SCALE



19. 60" X 12" BLOCK WALL OPENING SECTION

NOT TO SCALE



PIPE I.D.	CONTROL DIA.	OUTSIDE DIA.
18"Ø	22 1/8"Ø	27"Ø
24"Ø	28 13/16"Ø	35 1/2"Ø
36"Ø	42 3/8"Ø	50 1/4"Ø

SECTION : 'X' - 'X'

24. RINKER REINFORCED CONCRETE PLUG DETAIL

NOT TO SCALE

SEE WALL FOOTING NOTES THIS SHEET.

THIS DETAIL IS FOR REFERENCE ONLY AND DOES NOT CONSTITUTE A STRUCTURAL DESIGN

5. DRAINAGE EASEMENT SECTION

NOT TO SCALE

SEE WALL FOOTING NOTES THIS SHEET.

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10. WALL SECTION

NOT TO SCALE

SEE WALL FOOTING NOTES THIS SHEET.

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15. WALL SECTION

NOT TO SCALE

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

CITY OF LAS VEGAS, NV

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

RICHMOND AMERICAN HOMES

AGAVE CREST

GRADING DETAILS

S19 T19S R60E

DATE: 12/18/17

DRAFTER: IG

DESIGNER: IG

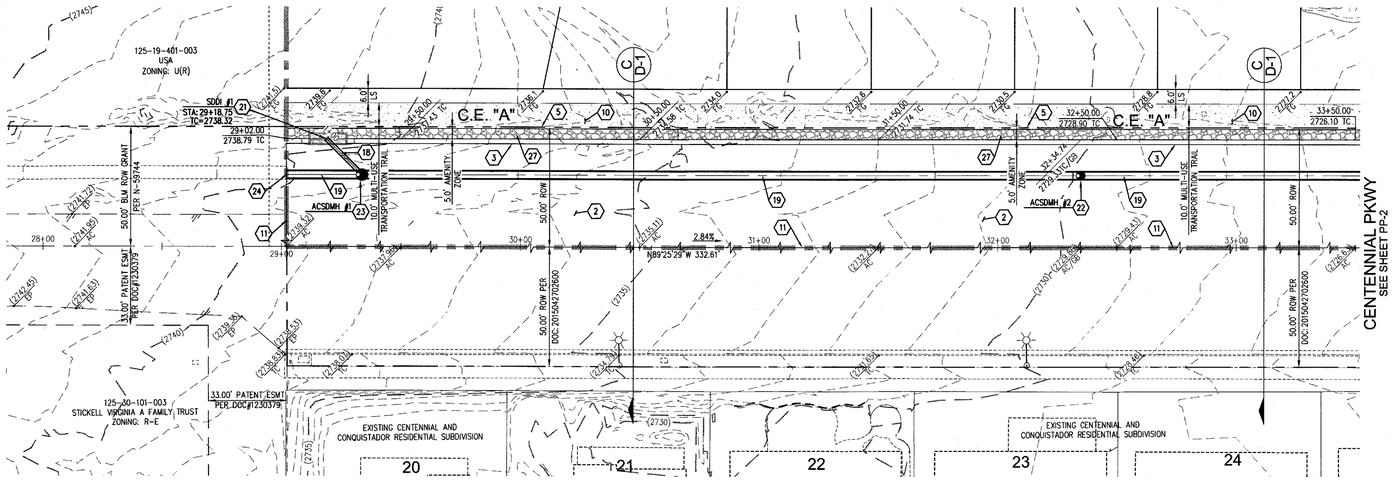
CHECKED: TJS

PROJECT NO.
RAH1723

PROFESSIONAL ENGINEER STATE OF NEVADA
ISAAC M. GUZMAN
Exp. 06/30/2019
CIVIL
No. 23513
12-18-17

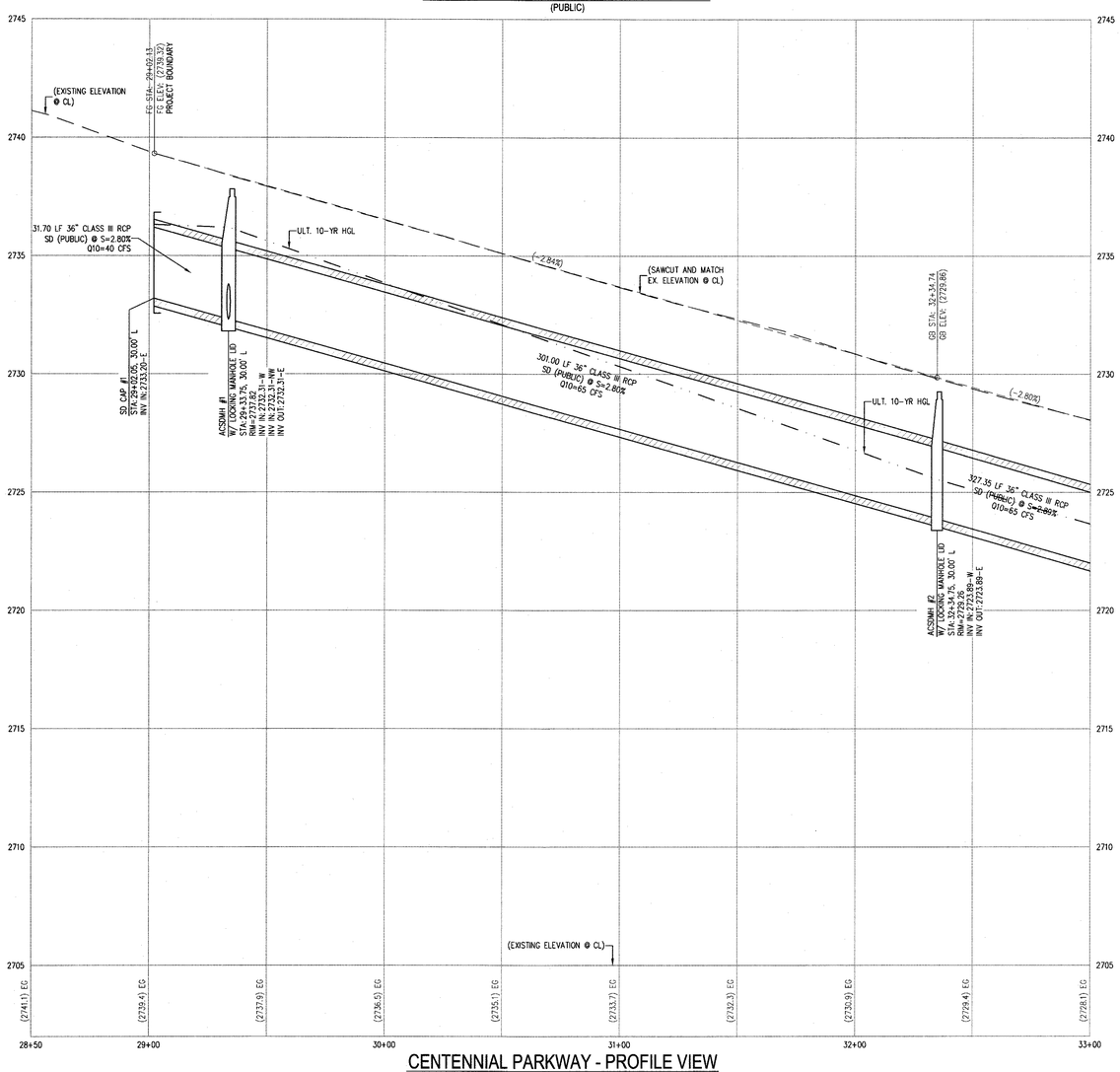
D-2
SHEET 11 OF 14

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CENTENNIAL PARKWAY - PLAN VIEW

(PUBLIC)

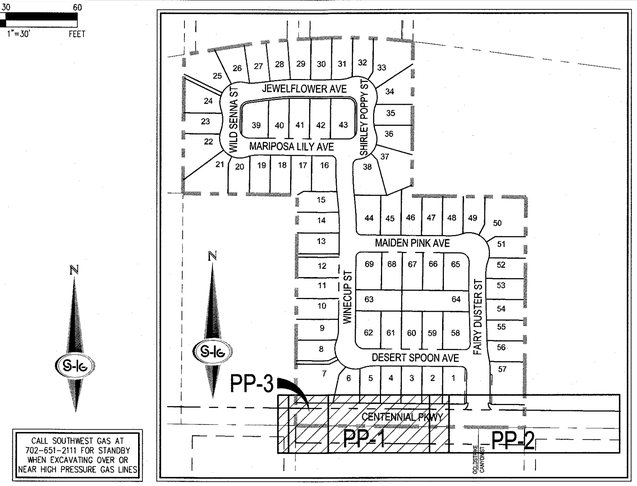


CENTENNIAL PARKWAY - PROFILE VIEW

HORIZ: 1" = 30'
VERT: 1" = 3'

J:\rah1723 centennial hualapai\dwg\improv\rah1723imp.dwg 12/18/2017 11:36 AM Isaac Guzman

SCALE – 1"=30' (0, 30, 60 FEET)



CALL SOUTHWEST GAS AT 702-651-2111 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES

DISCLAIMER NOTE

1) EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.
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.

GENERAL NOTES

1. FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2012, SECTION 2304.11.2.2.
2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
3. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
4. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
5. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
6. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
7. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY OF LAS VEGAS BUILDING DEPARTMENT.
8. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLEPING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
9. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXIST) WITHIN THE SIGHT VISIBILITY ZONES.

WATER NOTES

1. ALL SEWER/ STORM DRAINS CROSSING WATER LINES MUST CONFORM TO SECTION 2.22 OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS) FOR WATER AND STORM MAIN CROSSINGS AND CLEARANCES.
2. INSTALL PIPELINE MARKER BALLS IN TRENCH ABOVE EACH HORIZONTAL ELBOW FITTING, PER UDACS PLATE NO. 15.
3. WATER MAIN JOINT DEFLECTION (PVC: 4"–24"):
   PVC PIPE SHALL BE DEFLECTED AT THE JOINT ONLY. THE MAXIMUM ALLOWABLE DEFLECTION SHALL BE ONE (1) DEGREE PER JOINT WITH A MINIMUM RADIUS OF CURVATURE OF 1,150 FEET, PER UDACS 2.07.01 AND 2.07.02. FOR CHANGES IN DIRECTION EXCEEDING THE MAXIMUM ALLOWABLE JOINT DEFLECTION, FITTINGS SHALL BE USED.
4. CONTROLLED LOW STRENGTH MATERIAL (CLSM):
   PROTECT WATERLINES IN PLACE. WHERE/VER A WATERLINE IS ABOVE A STORM DRAIN OR SEWER WHERE COMPACTION REQUIREMENTS UNDER A WATERLINE CANNOT BE MET, BACKFILL TRENCH WITH CLASS I CONTROLLED LOW STRENGTH MATERIAL (CLSM) TO THE SPRINGLINE OF THE WATERLINE. THIS REQUIREMENT IS FOR STRUCTURAL SUPPORT ONLY. ADDITIONAL HEALTH REGULATIONS MAY APPLY PER UDACS 2.22.
5. INSTALL WATERLINE IS STEEL CASING PER UDACS PLATE NO. 21 AND 23. MINIMUM 18-INCH CLEARANCE IS REQUIRED ABOVE THE TOP OF PIPE. DUCTILE IRON PIPE WITH RESTRAINED JOINTS IS REQUIRED. IN ADDITION, THRUST BLOCKS ARE TO BE INSTALLED AT THE UPPER BENDS.
6. ANNULAR SPACE BETWEEN PIPE AND CASING SHALL BE FILLED WITH CLASS I CLSM. SEE UDACS PLATES 17 AND 19, FOR BEDDING AND BACKFILL REQUIREMENTS.
7. REDUCED PRESSURE PRINCIPLE ASSEMBLY (XX LOTS) 1" DIA.
   APPROVED REDUCED PRESSURE PRINCIPLE ASSEMBLY(S) SHALL BE INSTALLED PER THE UDACS PLATE NO. 8. NO WATER SHALL BE TAKEN FROM A SERVICE REQUIRING BACKFLOW PREVENTION UNTIL THE REDUCED PRESSURE PRINCIPLE ASSEMBLY HAS BEEN SUCCESSFULLY TESTED BY THE LVVWD. ANY BLOCK WALL OR OTHER FENCE MATERIAL SHALL BE DESIGNED AND CONSTRUCTED AROUND THE OUTSIDE OF THE EASEMENT(S) TO ALLOW THE DISTRICT DIRECT ACCESS FROM THE ADJACENT RIGHT-OF-WAY. EASEMENTS SHALL BE CLEARLY MARKED OR STAKED PRIOR TO THE START OF CONSTRUCTION.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT No. ▮▮▮▮▮▮ FIRST APPROVED DATE _____

CONSTRUCTION NOTES

1. CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II AGGREGATE BASE
2. CONSTRUCT 5" AC PAVEMENT WITH 5.5" TYPE II AGGREGATE BASE
3. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD NO. 216
4. CONSTRUCT 30" ROLL CURB AND GUTTER PER CCAUSD NO. 217.1
5. CONSTRUCT "A" TYPE ISLAND CURB PER CCAUSD NO. 219
6. CONSTRUCT 8' CROSS GUTTER PER CCAUSD NO. 228
7. CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD NO. 234 (4" THICK W/ 5" TYPE II AGGREGATE BASE)
8. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE I
9. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE III
10. CONSTRUCT 6" PORTLAND CEMENT CONCRETE PATH FOR MULTI-USE TRANSPORTATION TRAIL
11. SAWCUT AND MATCH EXISTING IMPROVEMENTS PER CCAUSD NO. 503 & 500.2
12. INSTALL SIDEWALK DRAIN PER CCAUSD NO. 236
13. INSTALL 60" X 12" BLOCK WALL OPENING PER DETAIL 19 ON SHEET D-2
14. INSTALL 6' HIGH TUBULAR STEEL FENCE PER DETAIL 20 ON SHEET D-2
15. CONSTRUCT 5' TRANSITION FROM ROLLED CURB TO "L" TYPE CURB PER DETAIL 21 SHEET D-2
16. CONSTRUCT 2.0' WIDE CONCRETE U-CHANNEL PER DETAIL 22 ON SHEET D-2
17. INSTALL REMOVABLE BOLLARD PER DETAIL 23 ON SHEET D-2
18. INSTALL 18" CLASS III RCP STORM DRAIN
19. INSTALL 36" CLASS III RCP STORM DRAIN
20. INSTALL 12" PVC STORM DRAIN
21. INSTALL 15.0' TYPE "CM2" DROP INLET PER CCAUSD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
22. INSTALL 48" TYPE II STORM DRAIN MANHOLE PER CCAUSD 405.2 FOR PIPE W/ LOCKING MANHOLE LIDS
23. INSTALL 60" TYPE III STORM DRAIN MANHOLE PER CCAUSD 403 W/ LOCKING MANHOLE LIDS
24. INSTALL RINKER REINFORCED CONCRETE PLUG (OR APPROVED EQUAL) PER DETAIL 24 ON SHEET D-2
25. INSTALL RIP RAP W/ FILTER FABRIC D50=4", T=8"
26. INSTALL RIP RAP W/ FILTER FABRIC D50=6", T=12"
27. INSTALL RIP RAP W/ FILTER FABRIC D50=12", T=24"
28. EXISTING FENCE TO REMAIN
29. EXISTING GUARDRAIL TO BE REMOVED

LEGEND

- EX. 5' CONTOUR (1900)
- EX. 1' CONTOUR
- PROPOSED 5' CONTOUR 1900
- PROPOSED 1' CONTOUR
- PROPOSED STORM DRAIN W/ MANHOLE
- EX. STORM DRAIN W/ MANHOLE
- EXISTING WALL
- STREET CENTERLINE
- RIGHT-OF-WAY
- MATCHLINE
- BOUNDARY LINE
- PROPERTY LINE
- FLOWLINE
- SAWCUT
- CUT/FILL TRANSITION LINE
- SIDEWALK
- GRADE BREAK LINE
- TUBULAR STEEL VIEW FENCE
- PROPOSED CURB AND GUTTER WITH RIGHT-OF-WAY AT BACK OF CURB
- EXISTING CURB AND GUTTER WITH RIGHT-OF-WAY AT BACK OF CURB
- 00.00 TC ELEVATION

FAST
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FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.)

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

Call before you Dig
AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
Call 811
OR
1-800-227-2600

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

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

CITY OF LAS VEGAS, NV

RICHMOND AMERICAN HOMES

AGAVE CREST

PLAN AND PROFILE - CENTENNIAL PKWY I

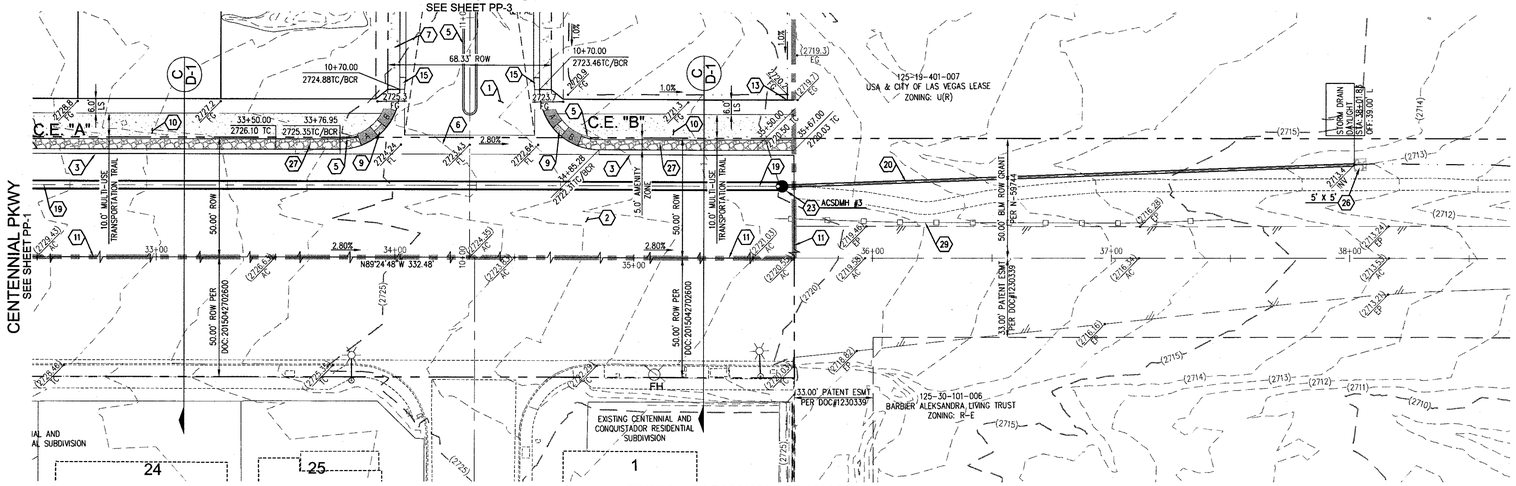
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DATE: 12/18/17
DRAFTER: IG
DESIGNER: IG
CHECKED: TJS

PROJECT NO.
RAH1723

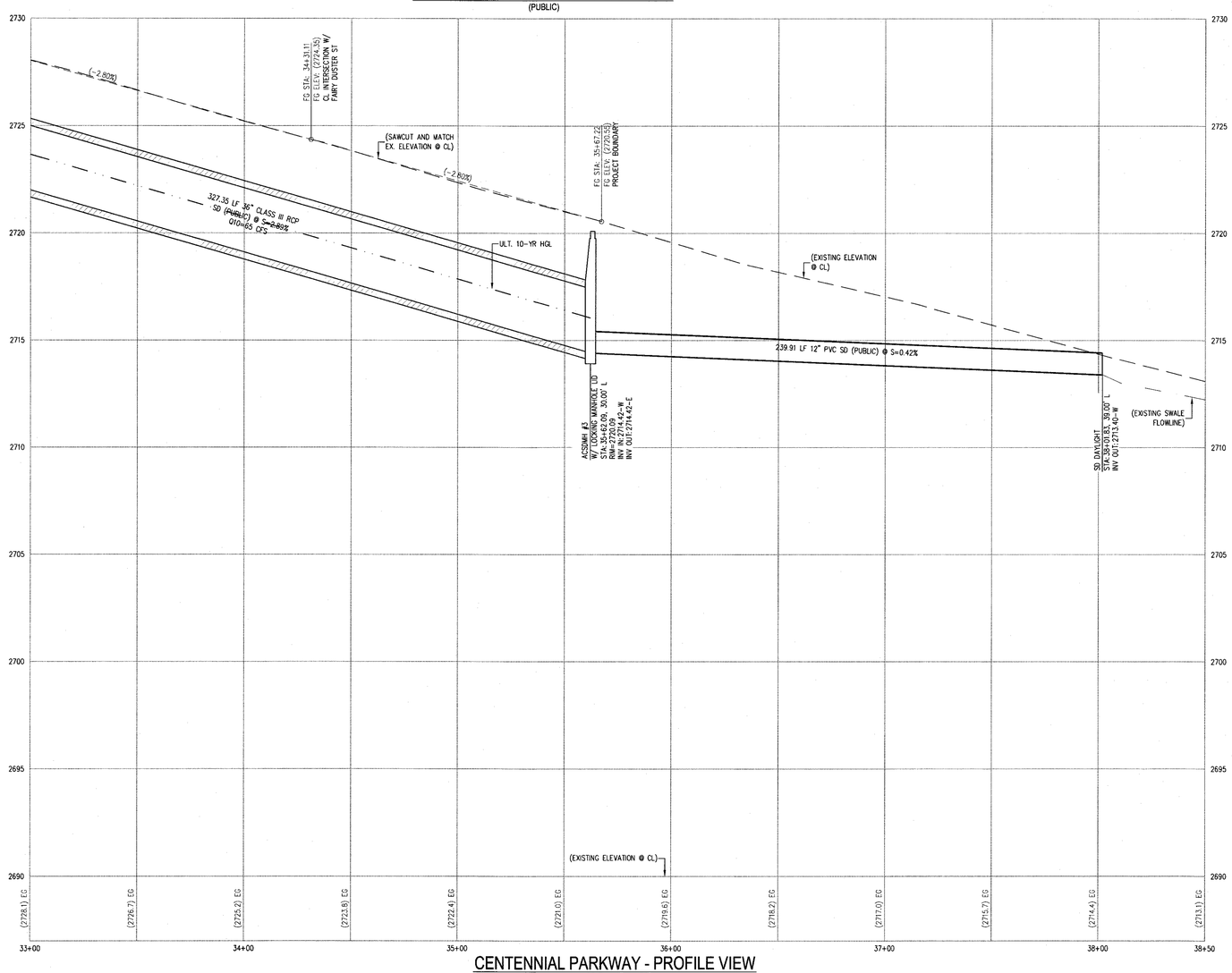
PROFESSIONAL ENGINEER — STATE OF NEVADA — ISAAC M. GUZMAN — Exp. 06/30/2019 — CIVIL — No. 23513 — PROF — 12-18-17

PP-1
SHEET 12 OF 14



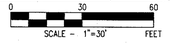
CENTENNIAL PARKWAY - PLAN VIEW

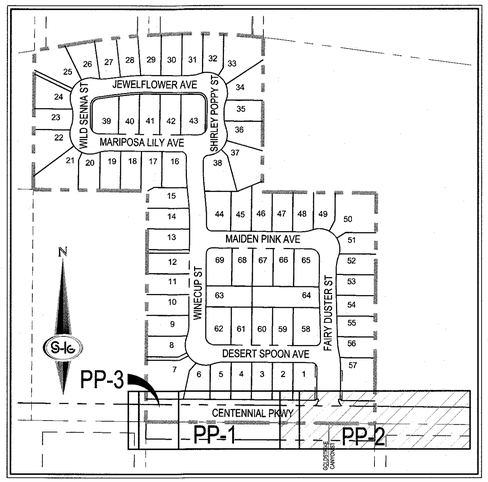
(PUBLIC)



CENTENNIAL PARKWAY - PROFILE VIEW

HORIZ: 1" = 30'
VERT: 1" = 3'





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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.

GENERAL NOTES

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3. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
4. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
5. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
6. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
7. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY OF LAS VEGAS BUILDING DEPARTMENT.
8. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLEPING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
9. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXIST) WITHIN THE SIGHT VISIBILITY ZONES.

WATER NOTES

1. ALL SEWER/ STORM DRAINS CROSSING WATER LINES MUST CONFORM TO SECTION 2.22 OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS) FOR WATER AND STORM MAIN CROSSINGS AND CLEARANCES.
2. INSTALL PIPELINE MARKER BALLS IN TRENCH ABOVE EACH HORIZONTAL ELBOW FITTING, PER UDACS PLATE NO. 15.
3. WATER MAIN JOINT DEFLECTION (PVC 4"-24"): PVC PIPE SHALL BE DEFLECTED AT THE JOINT ONLY. THE MAXIMUM ALLOWABLE DEFLECTION, SHALL BE ONE (1) DEGREE PER JOINT WITH A MINIMUM RADIUS OF CURVATURE OF 1,150 FEET, PER UDACS 2.07.01 AND 2.07.02. FOR CHANGES IN DIRECTION EXCEEDING THE MAXIMUM ALLOWABLE JOINT DEFLECTION, FITTINGS SHALL BE USED.
4. CONTROLLED LOW STRENGTH MATERIAL (CLSM): PROTECT WATERLINES IN PLACE. WHEREVER A WATERLINE IS ABOVE A STORM DRAIN OR SEWER WHERE COMPACTION REQUIREMENTS UNDER A WATERLINE CANNOT BE MET, BACKFILL TRENCH WITH CLASS I CONTROLLED LOW STRENGTH MATERIAL (CLSM) TO THE SPRINGLINE OF THE WATERLINE. THIS REQUIREMENT IS FOR STRUCTURAL SUPPORT ONLY. ADDITIONAL HEALTH REGULATIONS MAY APPLY PER UDACS 2.22.
5. INSTALL WATERLINE IS STEEL CASING PER UDACS PLATE NO. 21 AND 23. MINIMUM 18-INCH CLEARANCE IS REQUIRED ABOVE THE TOP OF PIPE. DUCTILE IRON PIPE WITH RESTRAINED JOINTS IS REQUIRED. IN ADDITION, THRUST BLOCKS ARE TO BE INSTALLED AT THE UPPER BENDS.
6. ANNULAR SPACE BETWEEN PIPE AND CASING SHALL BE FILLED WITH CLASS I CLSM. SEE UDACS PLATES 17 AND 19, FOR BEDDING AND BACKFILL REQUIREMENTS.
7. REDUCED PRESSURE PRINCIPLE ASSEMBLY (XX LOTS) 1" DIA. APPROVED REDUCED PRESSURE PRINCIPLE ASSEMBLY(S) SHALL BE INSTALLED PER THE UDACS PLATE NO. 8. NO WATER SHALL BE TAKEN FROM A SERVICE REQUIRING BACKFLOW PREVENTION UNTIL THE REDUCED PRESSURE PRINCIPLE ASSEMBLY HAS BEEN SUCCESSFULLY TESTED BY THE LVVWD. ANY BLOCK WALL OR OTHER FENCE MATERIAL SHALL BE DESIGNED AND CONSTRUCTED AROUND THE OUTSIDE OF THE EASEMENT(S) TO ALLOW THE DISTRICT DIRECT ACCESS FROM THE ADJACENT RIGHT-OF-WAY. EASEMENTS SHALL BE CLEARLY MARKED OR STAKED PRIOR TO THE START OF CONSTRUCTION.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT No. ###### FIRST APPROVED DATE

CONSTRUCTION NOTES

1. CONSTRUCT 2" AC PAVEMENT WITH 4" TYPE II AGGREGATE BASE
2. CONSTRUCT 5" AC PAVEMENT WITH 5.5" TYPE II AGGREGATE BASE
3. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD NO. 216
4. CONSTRUCT 30" ROLL CURB AND GUTTER PER CCAUSD NO. 217.1
5. CONSTRUCT "A" TYPE ISLAND CURB PER CCAUSD NO. 219
6. CONSTRUCT 8' CROSS GUTTER PER CCAUSD NO. 228
7. CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD NO. 234 (4" THICK W/ 5" TYPE II AGGREGATE BASE)
8. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE I
9. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD NO. 235, CASE III
10. CONSTRUCT 6" PORTLAND CEMENT CONCRETE PATH FOR MULTI-USE TRANSPORTATION TRAIL
11. SAWCUT AND MATCH EXISTING IMPROVEMENTS PER CCAUSD NO. 503 & 500.2
12. INSTALL SIDEWALK DRAIN PER CCAUSD NO. 236
13. INSTALL 60" X 12" BLOCK WALL OPENING PER DETAIL 19 ON SHEET D-2
14. INSTALL 6' HIGH TUBULAR STEEL FENCE PER DETAIL 20 ON SHEET D-2
15. CONSTRUCT 5' TRANSITION FROM ROLLED CURB TO "L" TYPE CURB PER DETAIL 21 SHEET D-2
16. CONSTRUCT 2.0' WIDE CONCRETE U-CHANNEL PER DETAIL 22 ON SHEET D-2
17. INSTALL REMOVABLE BOLLARD PER DETAIL 23 ON SHEET D-2
18. INSTALL 18" CLASS III RCP STORM DRAIN
19. INSTALL 36" CLASS III RCP STORM DRAIN
20. INSTALL 12" PVC STORM DRAIN
21. INSTALL 15.0' TYPE "CMP" DROP INLET PER CCAUSD NO. 412.1 AND STORM WATER QUALITY MANAGEMENT STAMP PER CCAUSD NO. 421
22. INSTALL 48" TYPE II STORM DRAIN MANHOLE PER CCAUSD 405.2 FOR PIPE W/ LOCKING MANHOLE LIDS
23. INSTALL 60" TYPE III STORM DRAIN MANHOLE PER CCAUSD 403 W/ LOCKING MANHOLE LIDS
24. INSTALL RINKER REINFORCED CONCRETE PLUG (OR APPROVED EQUAL) PER DETAIL 24 ON SHEET D-2
25. INSTALL RIP RAP W/ FILTER FABRIC D50=4", T=8"
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28. EXISTING FENCE TO REMAIN
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LEGEND

- (1900) EX. 5' CONTOUR
- EX. 1' CONTOUR
- 1900 PROPOSED 5' CONTOUR
- PROPOSED 1' CONTOUR
- PROPOSED STORM DRAIN W/ MANHOLE
- EX. STORM DRAIN W/ MANHOLE
- EXISTING WALL
- STREET CENTERLINE
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- PROPOSED CURB AND GUTTER WITH RIGHT-OF-WAY AT BACK OF CURB
- EXISTING CURB AND GUTTER WITH RIGHT-OF-WAY AT BACK OF CURB
- 00.00 TC ELEVATION

FAST Call before you UnderGround 1-702-432-5300 FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.)

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-227-2600

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

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

CITY OF LAS VEGAS, NV

RICHMOND AMERICAN HOMES

AGAVE CREST

PLAN AND PROFILE - CENTENNIAL PKWY II

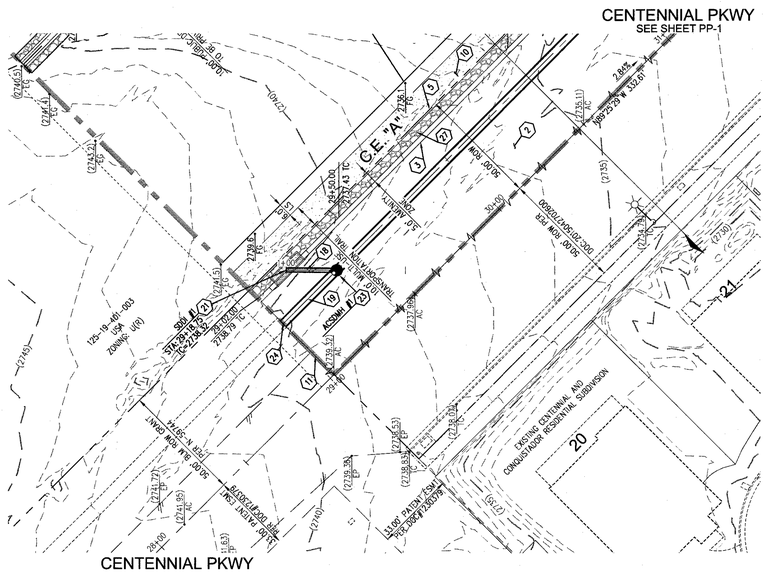
S19 T19S R60E

DATE: 12/18/17
DRAFTER: IG
DESIGNER: IG
CHECKED: TJS
PROJECT NO. RAH1723

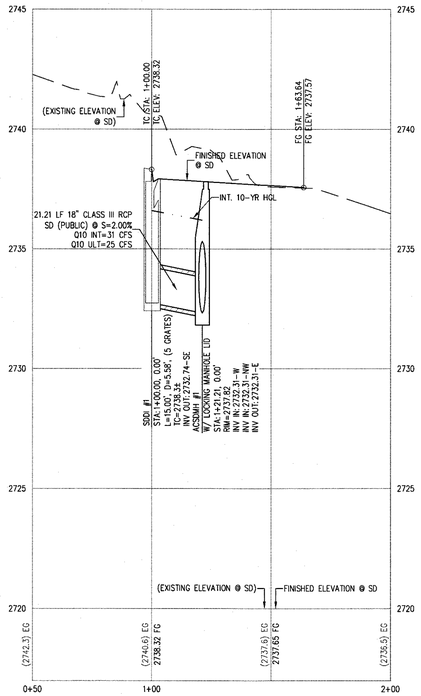
PROFESSIONAL ENGINEER — STATE OF NEVADA — ISAAC M. GUZMAN — Exp. 08/30/2019 — CIVIL — No. 23513 — 12-18-17

PP-2
SHEET 13 OF 14

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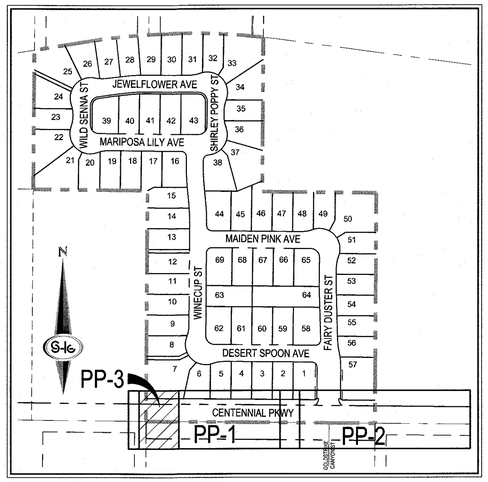
STORM DRAIN LATERAL - PLAN VIEW



CENTENNIAL PARKWAY - PROFILE VIEW

HORIZ: 1" = 30'
VERT: 1" = 3'

SCALE - 1"=30' (0, 30, 60 FEET)



CALL SOUTHWEST GAS AT 702-651-2111 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES

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- EX. 1' CONTOUR
- PROPOSED 5' CONTOUR
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OR
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CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

CITY OF LAS VEGAS, NV

RICHMOND AMERICAN HOMES

AGAVE CREST

PLAN AND PROFILE - STORM DRAIN LATERAL

S19 T19S R60E

DATE: 12/18/17
DRAFTER: IG
DESIGNER: IG
CHECKED: TJS
PROJECT NO. RAH1723

PROFESSIONAL ENGINEER — STATE OF NEVADA — ISAAC M. GUZMAN — Exp. 06/30/2019 — CIVIL — No. 23515
12-18-17

PP-3
SHEET 14 OF 14

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