

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		November 20, 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:	COPIES TO:
	Centennial Jensen 5	GCW Inc.
Cross Streets:	SWC of Centennial Parkway & Jensen Street	D.R. Horton
File Number:	F:\Depot\DSMemos\DS5056A.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-30-101-006	CCPW
Zoning Action:	TMP-XXXXX	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	11/1/2018	11/19/2018	See Comments Below	\$400.00	500566: \$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.

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

Full street improvements may be required in all perimeter streets which may cause a substantial re-design of the subject grading plans.
- The site is adjacent to the jurisdiction of Clark County to the east. The engineer must coordinate with *Clark County Department of Public Works* (CCPW) and incorporate any concerns for boundary conditions along the east border. CCPW concurrence is required prior to final acceptance of the drainage study.
- Identify an existing 36"-storm drain system in *Centennial Parkway* adjacent to the west of the subject project frontage. Replace an existing 12"-bleeder line and extend the 36"-storm drain in the frontage of the subject site. Provide a 12"-bleeder line at the east end of the project frontage in *Centennial Parkway*.
- "**DS #4941**" is not a basin name but is displayed as one on the Exhibits. Review and revise accordingly.

5. **Figure 5 (Existing Condition Drainage Map)** shows that the flows in *Centennial Parkway* (133/289cfs) split about half into *Jensen Street* (67/145cfs) through the unobstructed onsite property. However, in **Figure 6 (Proposed Condition Drainage Map)**, it still shows that about half of the flows in *Centennial Parkway* split into *Jensen Street*.

Because of the proposed development with walls along *Centennial Parkway*, it is not probable that half of the flows will split into *Jensen* anymore. Provide split flow calculation in the next submittal to find out the exact flow into *Jensen Street*. The post-development condition should improve the impact at *Concentration Point CP2*.

Address and resolve in the next submittal.

6. **Figure 6:** The basin area shown for OFF1 is 8.47 acres, but per the provided *Standard Form 4* and Proposed HEC-1 it should be 3.08 acres.
7. **Figure 6:** The slope shown for *Hydraulic Section 5* is 0.29%, but the flow master reports show a slope of 1.45%. Review and revise the slope and all the subsequent calculation results accordingly.
8. **Sheet G1:** Cross Sections A/D1, B/D1, E/D1, and M/D1 do not match the detail sections shown on Sheet D1.
9. **Sheet G2:** Cross section E/D1 does not match the detail section shown on Sheet D1.
10. **Sheet G2:** Provide finished floor elevation of existing houses to the south and east of the project.
11. **Sheet D1:** There are two "E" cross sections, rename one to remove confusion.
12. Provide preliminary plan and profile sheets for all proposed perimeter streets (*Centennial Parkway* and *Jensen Street*). Plan and profile sheets must show existing and proposed grades at centerline, but may be preliminary in all other respects. These plans are necessary to determine the effect of the proposed development on the adjacent properties.
13. The *City Council* of the *City of Las Vegas* adopted an amendment to Title 20 of the Municipal Code in which Section 20.10.030 requires all public drainage easements to be concrete lined. Revise the grading plan and *Detail Section J/D1* and all pertinent plans and construction notes accordingly.
14. 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".
15. 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.
16. 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/30
AREA G-30

TRANSACTION REPORT

NOV/21/2018/WED 09:46 AM

FAX(TX)

#	DATE	START T.	RECEIVER	COM.TIME	PAGE	TYPE/NOTE	FILE
001	NOV/21	09:46AM	7028042299	0:00:42	2	MEMORY OK	SG3 2593

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

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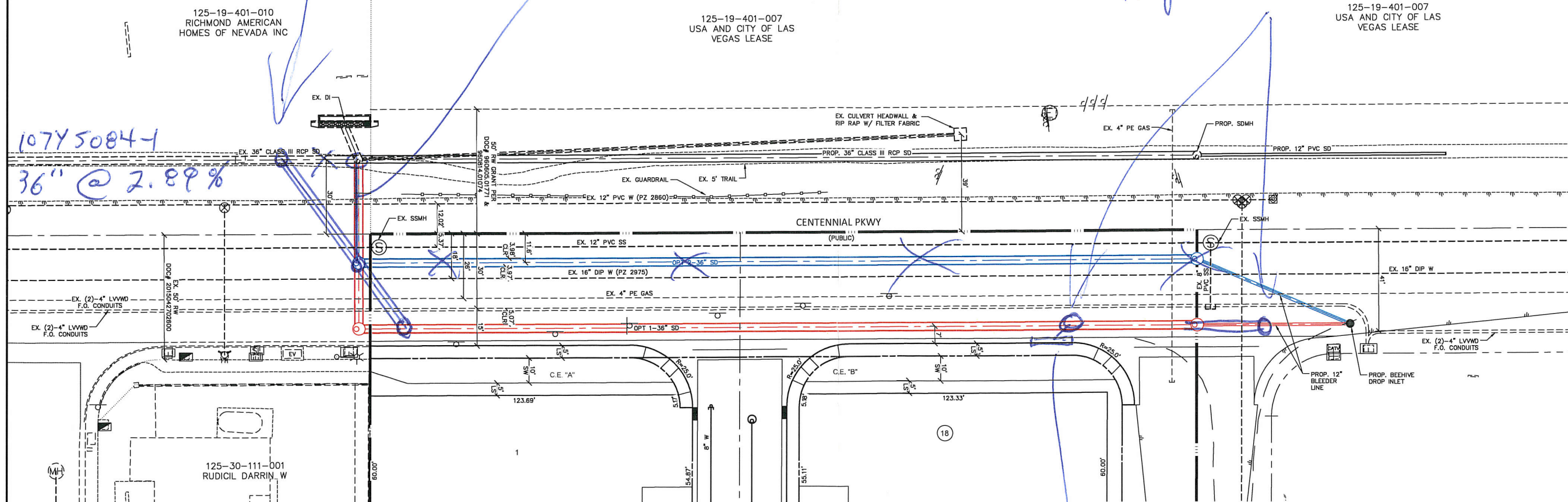
2. The site is adjacent to the jurisdiction of Clark County to the east. The engineer must coordinate with *Clark County Department of Public Works (CCPW)* and incorporate any concerns for boundary conditions along the east border. CCPW concurrence is required prior to final acceptance of the drainage study.
3. Identify an existing 36"-storm drain system in *Centennial Parkway* adjacent to the west of the subject project frontage. Replace an existing 12"-bleeder line and extend the 36"-storm drain in the frontage of the subject site. Provide a 12"-bleeder line at the east end of the project frontage in *Centennial Parkway*.
4. "DS #4941" is not a basin name but is displayed as one on the Exhibits. Review and revise accordingly.

January 10, 2019

Extend Storm Drain past
Water Line. The downstream
manholes shall be 60"
with slotted & linged cover.
Requires extended concrete

125-19-401-007
USA AND CITY OF LAS
VEGAS LEASE

New Lateral to Inlet



Option #1

Bufler Inlet
Max bufler height calculation
 $H = 1.5$ foot

DR HORTON

CENTENNIAL JENSEN 5

UTILITY CROSSINGS EXHIBIT

PROJECT NO.
767-639

1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146

ed

GCW
ENGINEERS SURVEYORS
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

\\PROJECTS\700\767-639\DWG\EXHIBITS\639C-UTL CROSSINGS.DWG
JUKY ROXANA LOPEZ

DRAWING
EXH

1 OF 1 SHTS

**TECHNICAL DRAINAGE STUDY
FOR
CENTENNIAL JENSEN 5**

767-639

November 2018

Prepared for:

**D.R. Horton
1081 Whitney Ranch Drive
Henderson, Nevada 89014
Phone: (702) 635-3600**

Prepared By:

**GCW, Inc.
1555 S. Rainbow Blvd.
Las Vegas, Nevada 89146
Phone: (702) 804-2000
Fax: (702) 804-2299**

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Centennial Jensen 5 Date: 11/01/18

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

East/West: Centennial Parkway

b) Section: 30 Township: 19S Range: 60E

c) APN : 125-30-101-006

Name of Owner: Barbier Aleksandra Living Trust

Telephone No.: _____ Fax No.: Not Available E-Mail Address: _____

Address: 3188 Brazos Street, Las Vegas NV, 89109

Contact Person-Name: Said A. Mohammed, P.E., Ph.D., CFM Telephone No.: 702.804.2000

* E-Mail Address: smohammed@gcwengineering.com Fax No.: 702.804.2299

Firm: GCW

Address: 1555 South Rainbow Boulevard Las Vegas, Nevada 89146

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: +/- 5.00 acres Being Developed/Disturbed: +/- 5.00 acres

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

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

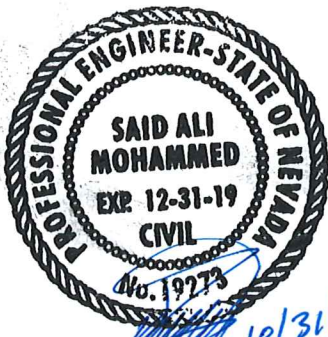
4. Proposed type of development (Residential, Commercial, Etc.): Residential +/- 8,000 SF lots

5. Approximate upstream land area which drains to the subject site: +/- 50 acres

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

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: A portion of the site will drain to Centennial Avenue. The remaining portions of the site will drain to Jensen Street and Regena Avenue.

8. Briefly describe your proposed schedule for the subject project: The Client intends to start construction as soon as practical. Any expediting of this process is appreciated.



Engineer's Seal

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

***New Required Field**

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

Revision	Date

Local Entity File No. _____

REFERENCE:

STANDARD FORM 1

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL		
DRAINAGE SUBMITTAL CHECKLIST		
Project Name: Centennial Jensen 5	Map ID: 125-30-101-006	
Firm Name: GCW	Engineer: Said A. Mohammed, P.E., Ph.D.,CFM	
Address: 1555 South Rainbow Boulevard		
City: Las Vegas	State: Nevada	Zip: 89146
Phone Number: 702.804.2000	Fax Number: 702.804.2299	
Property Owner: Barbier Aleksandra Living Trust		
Address: 3188 Brazos Street		
City: Las Vegas	State: NV	Zip: 89109
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 (CCRFCDD) 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 <u>X</u> _____ Design Manual Standard Form 1 with the engineer's seal and signature. <u>X</u> _____ Design Manual Standard Form 4. <u>X</u> _____ 2 copies of the 24" x 36" Drainage Plan. _____ <u>N/A</u> A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge. II. MAPS AND EXHIBITS Yes No <u>X</u> _____ A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated. <u>X</u> _____ A copy of the current CCRFCDD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated.		
REFERENCE:		STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

Yes No

- ☒ ☐ Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
- ☒ ☐ 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.
- ☒ ☐ Vicinity Map with local and major cross streets identified and a north arrow.

III. DRAINAGE PLAN

Yes No

- ☒ ☐ Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada.
- ☒ ☐ Minimum scale: 1" = 60'.
- ☒ ☐ Project name.
- ☒ ☐ Vicinity Map with local and major cross streets.
- ☒ ☐ Revision box.
- ☒ ☐ North arrow and bar scale.
- ☒ ☐ Engineer's/consultant's address and phone number.
- ☒ ☐ Elevation datum and benchmark.
- ☒ ☐ Legend for symbols and abbreviations.
- ☒ ☐ Cut/fill scarps, where applicable.
- ☒ ☐ Street names, grades, widths.
- ☒ ☐ 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.
- ☒ ☐ Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
- ☒ ☐ Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
- ☒ ☐ Proposed typical street sections.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes No

- | | | |
|-------------------------------------|--------------------------|---|
| ☐ | <u>N/A</u> | Streets with off-set crowns. |
| ☒ | ☐ | Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes. |
| ☒ | ☐ | Property lines. |
| ☒ | ☐ | Right-of-way lines and widths, existing and proposed. |
| ☒ | ☐ | Existing improvements and their elevations. |
| ☒ | ☐ | Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points. |
| ☒ | ☐ | Concentration points and drainage flow direction with Q100 and V100 and D100 in streets. |
| ☒ | ☐ | Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows. |
| ☒ | ☐ | Location and cross-section of street capacity calculations. |
| ☒ | ☐ | Cross-sectional detail for channels, including cutoff wall locations. |
| ☒ | ☐ | 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. |
| ☒ | ☐ | Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement. |
| ☐ | <u>N/A</u> | 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. |
| ☐ | <u>N/A</u> | Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc. |
| ☒ | ☐ | 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. |
| ☒ | ☐ | Building and/or lot numbers. |
| ☒ | ☐ | Alignment of all existing, proposed, or future Regional Facilities adjacent to the site. |
| ☒ | ☐ | 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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

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.
- ☒ ☐ 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 Q100 flows.
- ☒ ☐ 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

- ☒ ☐ Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated.
- ☒ ☐ 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.
- ☒ ☐ 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.
- ☒ ☐ Use of correct precipitation values in and around the McCarran Airport rainfall area.
- ☒ ☐ A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations.
- ☒ ☐ A summary table of stormwater flows showing basin area, Q10 and Q100 for both individual basins and combined basin flows, where applicable.
- ☒ ☐ Copies of supporting technical information referenced from a previously approved study and a statement accepting these results.
- ☒ ☐ 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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
☐	<u>N/A</u>	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
<u>X</u>	☐	Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q100 and Q10 flows representing the worst case for interior and all perimeter streets. Q100 d x v < 8. Q10 d x v < 6 and 12 foot dry lane for rights-of-way > 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
<u>X</u>	☐	A summary table of interior and exterior street capacity calculations showing the street name, Q100 flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
☐	<u>N/A</u>	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
<u>X</u>	☐	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.
<u>X</u>	☐	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 Q100 weir height or flow depth, whichever is greater.
☐	<u>N/A</u>	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.
☐	<u>N/A</u>	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
☐	<u>N/A</u>	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.
<u>X</u>	☐	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
☐	<u>N/A</u>	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2



CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

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

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

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

I. GENERAL REQUIREMENT		
Yes	No	
	N/A	A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.)
	N/A	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. <u>Said</u> 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.)

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

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

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
	N/A	Concrete valley gutters are required in parking lots with slopes less than 1 percent. Slopes through cul-de-sac must be at a 1 percent minimum where flow is drained through the cul-de-sac.
	N/A	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.

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

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.

**TECHNICAL DRAINAGE STUDY
FOR
CENTENNIAL JENSEN 5**

767-639

November 2018

**Author:
Cody Beck, E.I.
GCW, Inc.**

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I. INTRODUCTION

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The purpose of this study is to accompany the improvement plans and provide a detailed hydrologic and hydraulic analysis of the site in accordance with the CCRFCD HCDDM (Reference 1, hereafter referred to as the Manual) and local drainage criteria. The following tasks were performed in the preparation of this report:

- Review pertinent approved drainage studies in the area for evaluation of drainage impacts affecting the project site.
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III. LOCATION AND DESCRIPTION

The project site is located on Section 30 of Township 19 South, Range 60 East, in Clark County, Nevada. The project site has been indicated on Figure 1 located in Appendix D. The project site is currently undeveloped and generally slopes from the northwest to the southeast. Improvements to the project site will include 19 single family residential lots with developed streets.

IV. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD HAZARD ANALYSIS

Figure 2 located in Appendix D shows the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) containing Community Panel Number 32003C1745F, dated September 27, 2002. The project site lies within a FEMA designated Zone X area. Areas designated as Zone X are described as areas outside the 0.2 percent annual chance floodplain. Therefore, the project site is not located within a FEMA designated Special Flood Hazard Area (SFHA).

V. CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT (CCRFCD) FACILITIES

Figures 3 and 4 are reproductions of Figure F-19 and H-19 of the CCRFCD 2013 Las Vegas Valley Master Plan Update (Reference 2, hereinafter referred to as the 2013 MPU). As shown on Figure 3, there are no regional facilities adjacent to the project site. However, a local proposed storm drain facility is located along Centennial Parkway which will discharge to the future Regional Facility GONO 0511.

VI. HYDROLOGY

The methodology presented in this study is in compliance with the *CCRFCD Hydrologic Criteria and Drainage Design Manual*. (Reference 1)

Model Description

The watersheds were modeled using the SCS Unit Hydrograph method within the Army Corps of Engineers *HEC-1 Flood Hydrograph Package* (Reference 3).

Drainage Areas and Flow Patterns

The subbasins and flow patterns have been determined by combining the information from: the *Centennial Study*, 1-ft aerial topography of the project site, 2-ft GIS contours, and proposed grading.

VII. EXISTING CONDITION

The existing condition is defined as the project site undeveloped and the upstream watershed in a developed condition. As stated above, the Developed Condition surface flow rate of 133/289 cfs in Centennial Parkway has been referenced from the *Agave Study* instead of the Ultimate Condition flow rate of 92/266 (65/65 underground) to be conservative. Refer to Figure 5 in Appendix A for an illustration of the existing condition.

Offsite Runoff

The drainage areas that affect the project site include: The residential development to the west of the project site, Centennial Parkway, Regena Avenue and undeveloped land to the north of Centennial Parkway (OFF1). OFF1 will discharge into the Centennial Parkway right-of-way. OFF2 drains southeast into an existing drainage easement. This easement conveys runoff east into the Grand Canyon Drive right-of-way.

Onsite Runoff

The project site encompasses approximately 5.0 acres which has been delineated into 4 drainage basins. EON1 drains southeast across Jensen Street into OFF2. EON2 drains southeast into Jensen Street. Jensen Street then conveys runoff from EON2 and JEN1 into REG1. REG1 encompasses the Regena Avenue right-of-way adjacent to the project site. Table 1 contains a summary of the existing condition flow rates for the project site.

Table 1: Existing Condition Flow Rate Summary.

Basin ID	Area (ac)	10-Year Flow Rate (cfs)	100-Year Flow Rate (cfs)
^CP4	-	133	289
CEN1	1.52	3	6
OFF1	3.08	<1	2
CP1	-	3	7
CP1+ 1/2 *CP4	-	69	151
EON1	1.84	<1	1
OFF2	2.16	<1	1
CP2	-	<1	2
CP2 + 1/2 *CP4	-	67	147
EON2	2.64	<1	1
JEN1	0.20	<1	1
REG1	0.50	1	2
CP3	-	2	4
*CP3	-	11	36
CP3+*CP3	-	13	40

VIII. PROPOSED CONDITION

The proposed condition is defined as the project site fully developed and the upstream watershed fully developed. Refer to Figure 6 in Appendix D for an illustration of the proposed condition.

Offsite Runoff

The offsite area discussed previously will not be affected by the development of the project site. The runoff generated by the offsite areas will continue to drain as they do in the existing condition.

Onsite Runoff

The project site has been delineated into four basins in the proposed condition. PON1 drains north into Centennial Parkway. PON2 drains south into Regena Avenue. REG1 encompasses the Regena Avenue right-of-way which drains east. JEN1 encompasses the Jensen Street right-of-way which drains south into Regena Avenue. Table 2 contains a summary of the proposed condition flow rates for the project site.

Table 2: Proposed Condition Flow Rate Summary.

Basin ID	Area (ac)	10-Year Flow Rate (cfs)	100-Year Flow Rate (cfs)
^CP4	-	133	289
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IX. SURFACE HYDRAULICS

Hydraulic cross sections have been prepared to show the water surface elevations at key locations throughout the project site. The hydraulics for each section have been analyzed to determine if the proposed improvements are adequately raised above the adjacent water surface elevations and to ensure the proposed improvements do not adversely impact the existing improvements downstream of the project site. Refer to Figure 6 for the location of each hydraulic section. The results of the surface hydraulic analysis shows that the proposed improvements are adequately raised above the adjacent water surface elevations and the proposed improvements do not adversely impact the existing downstream improvements. Furthermore, the proposed driveway along Centennial Parkway has been raised 6 inches above the water surface elevation within Centennial Parkway.

X. FINISH FLOOR ELEVATION

All finished floor elevations proposed for this project will meet CCRFCD finish floor criteria. The buildings have been raised above twice the depth of flow in the adjacent flow lines or solid grouted walls have been proposed to provide flood protection.

XI. CONCLUSIONS

1. Methodology used in this report is in compliance with the Clark County Regional Flood Control District (CCRFCD) criteria.
2. The project site lies within a Zone X.
3. There are no existing CCRFCD Regional Facilities adjacent to the project site. A proposed local facility is located along Centennial Parkway. Note that the future CCRFCD Facility GONO 0511 is located in Grand Canyon Drive to the east of the project site.
4. The development of the project site, as proposed, does not adversely impact the downstream facilities.

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1. Clark County Regional Flood Control District. *Hydrologic Criteria and Drainage Design Manual*. August 1999.
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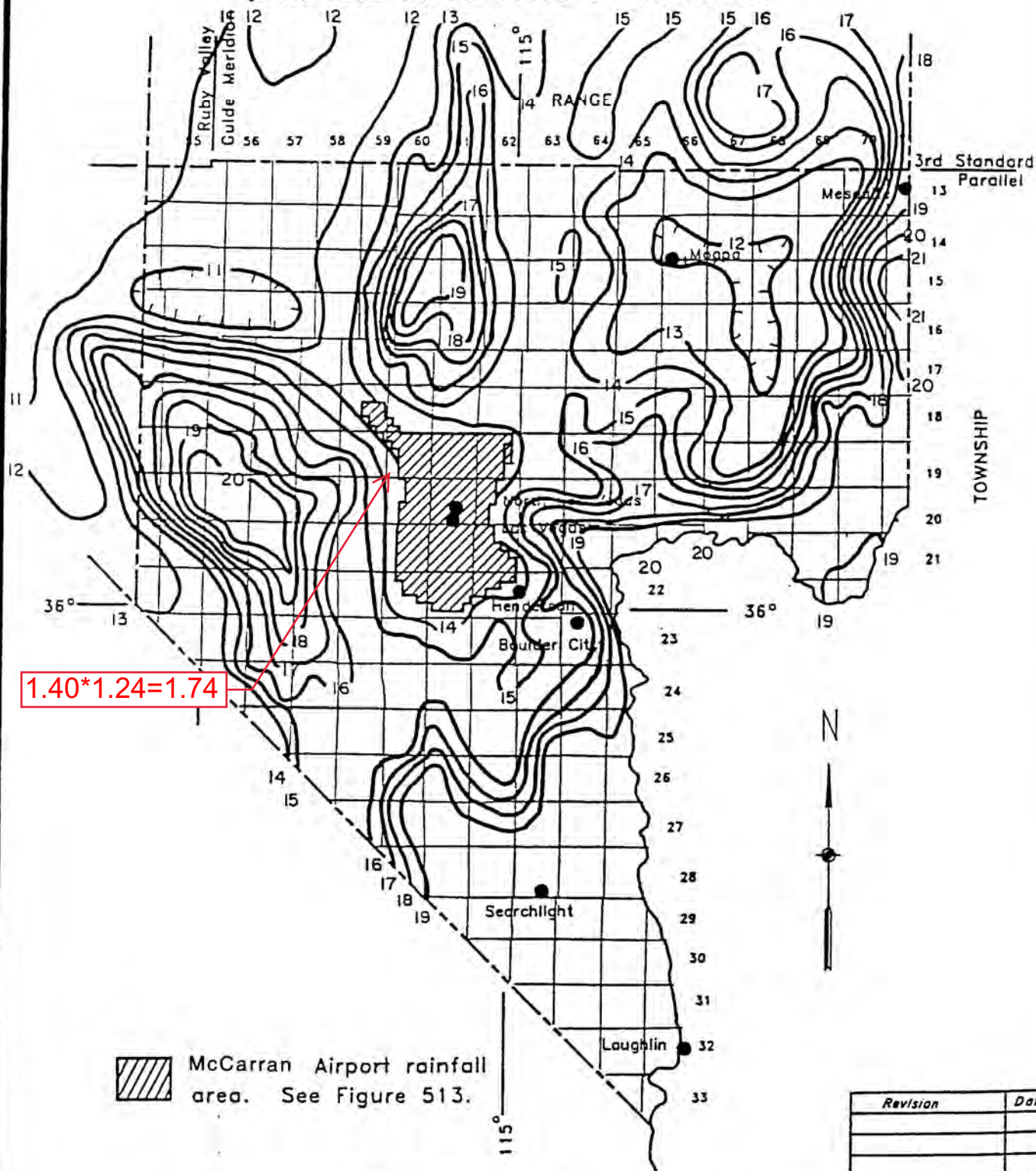
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APPENDIX A

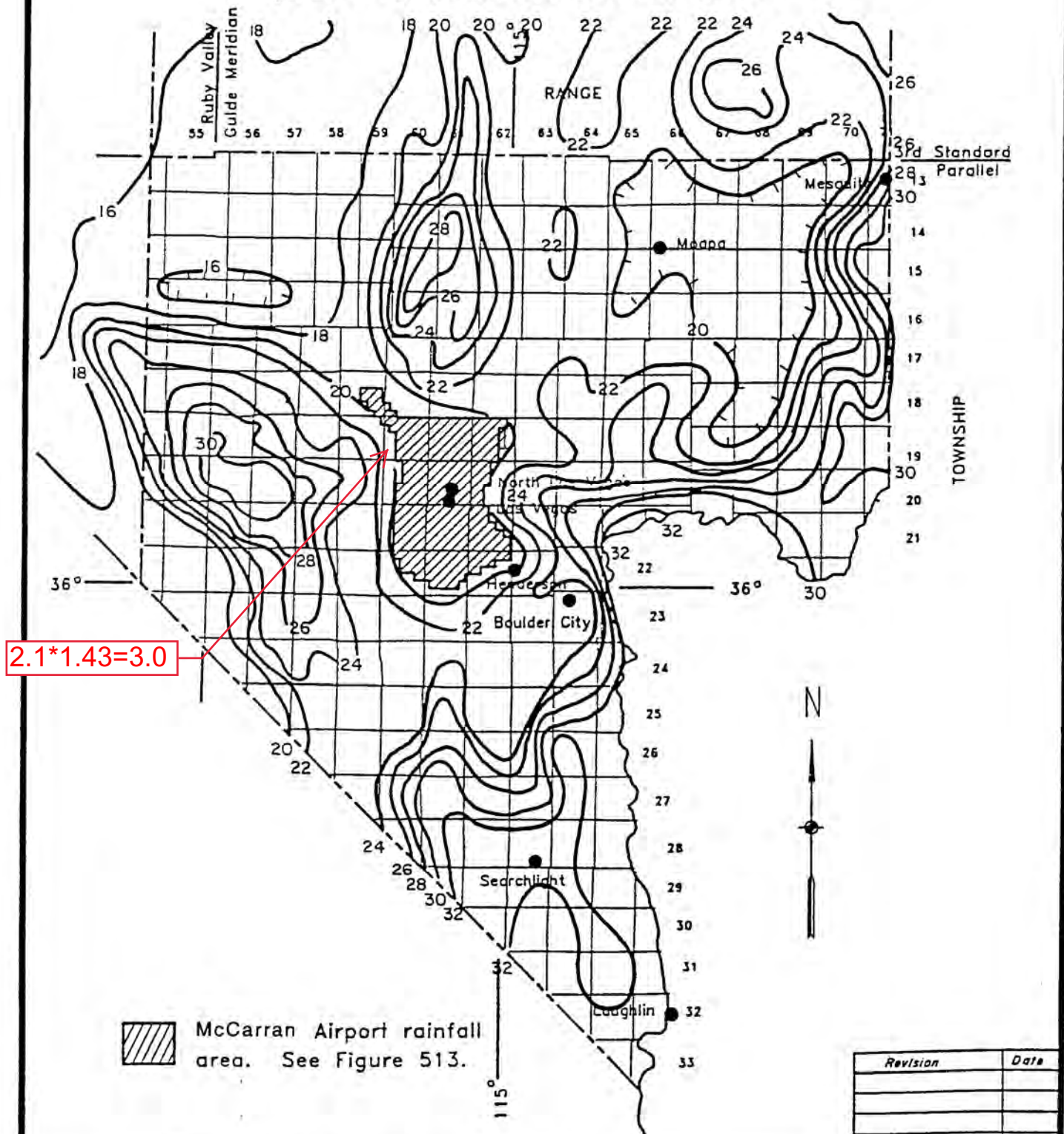
Hydrologic Calculations and Information

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



Revision	Date

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



PRECIPITATION ADJUSTMENT RATIOS

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

$$1.74/3.00=0.58$$

- 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.

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

RUNOFF CURVE NUMBERS (URBAN AREAS¹)

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

See Table 602A

Developing urban areas

Newly graded areas (pervious areas only, no vegetation) ⁵	77	86	91	94
--	----	----	----	----

1 Average runoff condition, and $I_p = 0.25$.

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

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

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

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

Revision	Date

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS - RESIDENTIAL DISTRICTS

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

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

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

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

Revision	Date

REFERENCE:

TABLE 602A



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**



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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

Custom Soil Resource Report

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

Soil Map

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

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

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: Sep 26, 2013—Feb 25, 2014

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

MAP LEGEND

MAP INFORMATION

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
190	Dalian very gravelly fine sandy loam, 2 to 4 percent slopes	7.4	8.1%
191	Dalian very cobbly fine sandy loam, 2 to 8 percent slopes	83.7	91.9%
Totals for Area of Interest		91.1	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

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Custom Soil Resource Report

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HYDROLOGIC CRITERIA AND DESIGN MANUAL

TIME OF CONCENTRATION



**Centenial Jensen
Existing Condition**

Project No: 767-639

Date: 25-Sep-18

Calculated by: CB

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK URBANIZED BASINS		Tc	Tlag	REMARKS
BASIN ID (1)	DEV./EX. (D or E)	CN (16)	K (2)	AREA Ac (3)	AREA Sq Mi (4)	INITIAL LENGTH Feet (5)	SLOPE % (6)	Ti Min (7)	TRAVEL LENGTH Feet (8)	SLOPE % (9a)	V1 VELOCITY fps (9b)	V2 VELOCITY fps (10)	Tt Min (11)	TOTAL LENGTH Feet (12)	Tc = (L/180)+10 Min (13)	Min (14)	Tlag = 0.6Tc/60 Hours (15)	Remarks:
CEN1	D	98.0	0.9036	1.52	0.0024	50.00	2.00	2.0	665.00	3.00	3.5	5.3	2.9	715	14.0	4.9	0.0500	
OFF1	E	63.0	0.4416	3.08	0.0048	130.00	4.00	8.5	1200.00	3.50	2.8	5.5	5.1	1330	N/A	13.6	0.1364	
EON1	E	63.0	0.4416	1.84	0.0029	80.00	5.00	6.2	330.00	2.42	2.3	4.6	2.4	410	N/A	8.6	0.1000	
OFF2	E	63.0	0.4416	2.16	0.0034	65.00	6.00	5.3	385.00	3.10	2.6	5.2	2.5	450	N/A	7.7	0.1000	
EON2	E	63.0	0.4416	2.64	0.0041	195.00	3.10	11.3	340.00	2.65	2.4	4.8	2.4	535	N/A	13.7	0.1370	
JEN1	D	98.0	0.9036	0.20	0.0003	25.00	2.00	1.4	305.00	2.00	2.9	4.3	1.8	330	11.8	3.2	0.0500	
REG1	D	98.0	0.9036	0.50	0.0008	30.00	2.00	1.5	360.00	3.00	3.5	5.3	1.7	390	12.2	3.3	0.0500	

$T_c = T_i + T_t$
 $T_i = 1.8 (1.1 - K) L^{1/2} / S^{1/3}$
 $K = 0.0132 (CN) - 0.39$

$T_{lag} = 0.6 T_c$

For the travel time (Tt) calculations,

V1 applies to the first 500 feet of travel distance;

V2 applies to the remaining travel distance.

Existing: $V1 = 14.8 * (S/100)^{1/2}$
 $V2 = 29.4 * (S/100)^{1/2}$

Developed: $V1 = 20.2 * (S/100)^{1/2}$
 $V2 = 30.6 * (S/100)^{1/2}$

REFERENCE:

STANDARD FORM 4


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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   JUN 1998
*   VERSION 4.1
*
* RUN DATE 30OCT18 TIME 12:48:14
*
*****

EXCOND.OUT

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

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

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

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

1 HEC-1 INPUT PAGE 1

```

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

*** FREE ***

*DIAGRAM
1 ID *****
2 ID *
3 ID * : CENTENNIAL JENSEN
4 ID * : EXISTING CONDITION
5 ID * :
6 ID * :
7 ID * : RETURN PERIOD _ _ _ 10 & 100-YEAR
8 ID * : DISTRIBUTION _ _ _ 6-HOUR SDN3
9 ID * : PROJECT NO _ _ _ 767-636
10 ID * : FILENAME _ _ _ EXCOND.H1
11 ID * : DATE _ _ _ 09/24/2018
12 ID * : MODELED BY _ _ _ CB
13 ID * :
14 ID * :
15 ID * :
16 ID *****
17 ID
18 ID
19 ID STORM EVENT RATIO
20 ID 100-YR STORM 1.00
21 ID 10-YR STORM 0.58
22 IT 5 0 0 200
23 IO 5 0
24 IN 5 0
25 JR PREC 0.58 1.00
*
*
26 KK CEN1
27 KM CENTENNIAL PARKWAY
28 BA .0024
29 PB 3.00
30 PC 0.000 .0200 .0570 .0700 .0870 .1080 .1240 .1300 .1300 .1300
31 PC .1300 .1300 .1300 .1330 .1400 .1420 .1480 .1580 .1720 .1810
32 PC .1900 .1970 .1990 .2000 .2010 .2040 .2140 .2290 .2410 .2490
33 PC .2510 .2560 .2700 .2780 .2810 .2830 .2950 .3220 .3520 .4090
34 PC .4990 .5900 .7100 .7440 .7810 .8120 .8190 .8350 .8510 .8560
35 PC .8600 .8680 .8760 .8880 .9100 .9260 .9370 .9500 .9700 .9760
36 PC .9820 .9850 .9870 .9890 .9900 .9930 .9930 .9940 .9950 .9980
37 PC .9980 .9990 1.000
38 LS 0 98.0
39 UD .0500
*
40 KK OFF1
41 KM OFFSITE BASIN 1
42 BA .0048
43 LS 0 63.0
44 UD .1364

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1

HEC-1 INPUT

PAGE 2

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
45	KK CP1
46	KM
47	HC 2
	*
48	KK EON1
49	KM ONSITE BASIN 1
50	BA .0029
51	LS 0 63.0
52	UD .1000
	*
53	KK OFF2
54	KM ONSITE BASIN 3
55	BA .0034
56	LS 0 63.0
57	UD .1000
	*
58	KK CP2
59	KM
60	HC 2
	*
61	KK EON2
62	KM ONSITE BASIN 2
63	BA .0041
64	LS 0 63.0
65	UD .1370
	*
66	KK JEN1
67	KM JENSEN STREET
68	BA .0003
69	LS 0 98.0
70	UD .0500
	*
71	KK REG1
72	KM REGENA AVENUE
73	BA .0008
74	LS 0 98.0
75	UD .0500
	*
76	KK CP3
77	KM
78	HC 3
	*
79	ZZ

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
26	CEN1	
	.	
40	.	OFF1
	.	
45	CP1.....	
	.	
48	.	EON1
	.	
53	.	OFF2
	.	
58	.	CP2.....
	.	
61	.	EON2
	.	
66	.	JEN1
	.	
71	.	REG1
	.	

CP3.....

1*****

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*****
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*      HYDROLOGIC ENGINEERING CENTER
*      609 SECOND STREET
*      DAVIS, CALIFORNIA 95616
*      (916) 756-1104
*
*****
```

[illegible]

STORM EVENT	RATIO
100-YR STORM	1.00
10-YR STORM	0.58

23	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	200	NUMBER OF HYDROGRAPH ORDINATES
		NDDATE	1 0	ENDING DATE
		NDTIME	1635	ENDING TIME
		ICENT	19	CENTURY MARK

```
COMPUTATION INTERVAL      .08 HOURS
TOTAL TIME BASE          16.58 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
	.58 1.00

1

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1	RATIO 2
HYDROGRAPH AT +	CEN1	.00	1 FLOW TIME	.58	1.00
HYDROGRAPH AT +	OFF1	.00	1 FLOW	3. 3.50	6. 3.50
				0.	2.

					TIME	4.92	3.58	EXCOND.OUT
2 COMBINED AT								
+	CP1	.01	1	FLOW	3.	7.		
				TIME	3.50	3.50		
HYDROGRAPH AT								
+	EON1	.00	1	FLOW	0.	1.		
				TIME	4.83	3.58		
HYDROGRAPH AT								
+	OFF2	.00	1	FLOW	0.	1.		
				TIME	4.83	3.58		
2 COMBINED AT								
+	CP2	.01	1	FLOW	0.	2.		
				TIME	4.83	3.58		
HYDROGRAPH AT								
+	EON2	.00	1	FLOW	0.	1.		
				TIME	4.92	3.58		
HYDROGRAPH AT								
+	JEN1	.00	1	FLOW	0.	1.		
				TIME	3.50	3.50		
HYDROGRAPH AT								
+	REG1	.00	1	FLOW	1.	2.		
				TIME	3.50	3.50		
3 COMBINED AT								
+	CP3	.01	1	FLOW	2.	4.		
				TIME	3.50	3.50		

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

HYDROLOGIC CRITERIA AND DESIGN MANUAL

TIME OF CONCENTRATION



Centennial Jensen
Proposed Condition

Project No: 767-639

Date: 25-Sep-18

Calculated by: CB

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK URBANIZED BASINS		Tc	Tlag	REMARKS
BASIN ID	DEV./EX. (D or E)	CN	K	AREA Ac	AREA Sq Mi	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY fps	V2 VELOCITY fps	Tt Min	TOTAL LENGTH Feet	Tc = (L/180)+10 Min	Min	Tlag = 0.6Tc/60 Hours	Remarks:
(1)		(16)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(11)	(12)	(13)	(14)	(15)	
CEN1	D	98.0	0.9036	1.52	0.0024	50.00	2.00	2.0	665.00	3.00	3.5	5.3	2.9	715	14.0	4.9	0.0500	
OFF1	E	63.0	0.4416	3.08	0.0048	130.00	4.00	8.5	1200.00	3.50	2.8	5.5	5.1	1330	N/A	13.6	0.1364	
PON1	D	73.0	0.5736	0.78	0.0012	130.00	1.00	10.8	95.00	1.44	2.4	3.7	0.7	225	11.3	11.5	0.1125	
OFF2	E	63.0	0.4416	2.16	0.0034	65.00	6.00	5.3	385.00	3.10	2.6	5.2	2.5	450	N/A	7.7	0.1000	
PON2	D	73.0	0.5736	3.29	0.0051	130.00	1.00	10.8	475.00	3.00	3.5	5.3	2.3	605	13.4	13.1	0.1307	
JEN1	D	98.0	0.9036	0.80	0.0013	25.00	2.00	1.4	305.00	2.00	2.9	4.3	1.8	330	11.8	3.2	0.0500	
REG1	D	98.0	0.9036	0.50	0.0008	30.00	2.00	1.5	360.00	3.00	3.5	5.3	1.7	390	12.2	3.3	0.0500	
Tc = Ti + Tt Ti = 1.8 (1.1 - K) L^{1/2} / S^{1/3} K = 0.0132 (CN) - 0.39 Tlag = 0.6 Tc V1 applies to the first 500 feet of travel distance; V2 applies to the remaining travel distance. Existing: V1 = 14.8*(S/100)^{1/2} V2 = 29.4*(S/100)^{1/2} Developed: V1 = 20.2*(S/100)^{1/2} V2 = 30.6*(S/100)^{1/2}																		
REFERENCE:														STANDARD FORM 4				

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 30OCT18 TIME 12:48:30
*
*****

PRCOND.OUT

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

```

```

X X XXXXXX XXXX X
X X X X X XX
X X X X X
XXXXXX XXXX X XXXX X
X X X X X
X X X X X
X X XXXXXX XXXX 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

*** FREE ***

```

1 ID *****
2 ID *
3 ID * : CENTENNIAL JENSEN 5 : *
4 ID * : PROPOSED CONDITION : *
5 ID * : : : *
6 ID * : : : : *
7 ID * : RETURN PERIOD _ _ _ 10 & 100-YEAR : *
8 ID * : DISTRIBUTION _ _ _ 6-HOUR SDN3 : *
9 ID * : PROJECT NO _ _ _ 767-636 : *
10 ID * : FILENAME _ _ _ PRCOND.H1 : *
11 ID * : DATE _ _ _ 10/24/2018 : *
12 ID * : MODELED BY _ _ _ CB : *
13 ID * : : : : *
14 ID * : : : : *
15 ID * : : : : *
16 ID *****
17 ID
18 ID
19 ID STORM EVENT RATIO
20 ID 100-YR STORM 1.00
21 ID 10-YR STORM 0.58
22 IT 5 0 0 200
23 IO 5 0
24 IN 5 0
25 JR PREC 0.58 1.00
*
*

```

```

26 KK CEN1
27 KM CENTENNIAL PARKWAY
28 BA .0024
29 PB 3.00
30 PC 0.000 .0200 .0570 .0700 .0870 .1080 .1240 .1300 .1300 .1300
31 PC .1300 .1300 .1300 .1330 .1400 .1420 .1480 .1580 .1720 .1810
32 PC .1900 .1970 .1990 .2000 .2010 .2040 .2140 .2290 .2410 .2490
33 PC .2510 .2560 .2700 .2780 .2810 .2830 .2950 .3220 .3520 .4090
34 PC .4990 .5900 .7100 .7440 .7810 .8120 .8190 .8350 .8510 .8560
35 PC .8600 .8680 .8760 .8880 .9100 .9260 .9370 .9500 .9700 .9760
36 PC .9820 .9850 .9870 .9890 .9900 .9930 .9930 .9940 .9950 .9980
37 PC .9980 .9990 1.000
38 LS 0 98.0
39 UD .0500
*

```

```

40 KK OFF1
41 KM OFFSITE BASIN 1
42 BA .0048
43 LS 0 63.0
44 UD .1364

```

1

HEC-1 INPUT

PAGE 2

LINE	ID	1	2	3	4	5	6	7	8	9	10
45	KK	CP1									
46	KM										
47	HC	2									
	*										
48	KK	PON1									
49	KM	ONSITE BASIN 1									
50	BA	.0012									
51	LS	0	73.0								
52	UD	.1125									
	*										
53	KK	OFF2									
54	KM	ONSITE BASIN 3									
55	BA	.0034									
56	LS	0	63.0								
57	UD	.1000									
	*										
58	KK	CP2									
59	KM										
60	HC	2									
	*										
61	KK	PON2									
62	KM	ONSITE BASIN 2									
63	BA	.0051									
64	LS	0	73.0								
65	UD	.1307									
	*										
66	KK	JEN1									
67	KM	JENSEN STREET									
68	BA	.0013									
69	LS	0	98.0								
70	UD	.0500									
	*										
71	KK	REG1									
72	KM	REGENA AVENUE									
73	BA	.0008									
74	LS	0	98.0								
75	UD	.0500									
	*										
76	KK	CP3									
77	KM										
78	HC	3									
	*										
79	ZZ										

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
26	CEN1	
	.	
	.	
40	OFF1	
	.	
	.	
45	CP1.....	
	.	
	.	
48	PON1	
	.	
	.	
53	OFF2	
	.	
	.	
58	CP2.....	
	.	
	.	
61	PON2	
	.	
	.	
66	JEN1	
	.	
	.	
71	REG1	
	.	
	.	

76

CP3.....

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*   JUN 1998                      *
*   VERSION 4.1                    *
* RUN DATE 30OCT18 TIME 12:48:30 *
*                               *
*****

```

```

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

```

```

*****
* .....*
* : CENTENNIAL JENSEN 5 :
* : PROPOSED CONDITION :
* : .....*
* : RETURN PERIOD_ _ _ 10 & 100-YEAR :
* : DISTRIBUTION_ _ _ 6-HOUR SDN3 :
* : PROJECT NO_ _ _ _ 767-636 :
* : FILENAME_ _ _ _ _ PRCOND.H1 :
* : DATE_ _ _ _ _ 10/24/2018 :
* : MODELED BY_ _ _ _ _ CB :
* : .....*
* : .....*
* : .....*
*****

```

```

          STORM EVENT  RATIO
        100-YR STORM  1.00
         10-YR STORM  0.58

```

23 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        200 NUMBER OF HYDROGRAPH ORDINATES
      NDDATE     1 0 ENDING DATE
      NDTIME    1635 ENDING TIME
      ICENT     19 CENTURY MARK

```

```

      COMPUTATION INTERVAL .08 HOURS
      TOTAL TIME BASE 16.58 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
      .58      1.00

```

1

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1	RATIO 2
				.58	1.00
HYDROGRAPH AT					
+	CEN1	.00	1 FLOW	3.	6.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	OFF1	.00	1 FLOW	0.	2.

					PRCOND.OUT	
			TIME		4.92	3.58
2 COMBINED AT						
+	CP1	.01	1	FLOW	3.	7.
			TIME		3.50	3.50
HYDROGRAPH AT						
+	PON1	.00	1	FLOW	0.	1.
			TIME		3.58	3.58
HYDROGRAPH AT						
+	OFF2	.00	1	FLOW	0.	1.
			TIME		4.83	3.58
2 COMBINED AT						
+	CP2	.00	1	FLOW	0.	2.
			TIME		3.75	3.58
HYDROGRAPH AT						
+	PON2	.01	1	FLOW	1.	4.
			TIME		3.58	3.58
HYDROGRAPH AT						
+	JEN1	.00	1	FLOW	2.	3.
			TIME		3.50	3.50
HYDROGRAPH AT						
+	REG1	.00	1	FLOW	1.	2.
			TIME		3.50	3.50
3 COMBINED AT						
+	CP3	.01	1	FLOW	4.	9.
			TIME		3.50	3.50

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

APPENDIX B

Hydraulic Calculations and Information

Cross Section for Section 1 - Centennial Parkway Q10

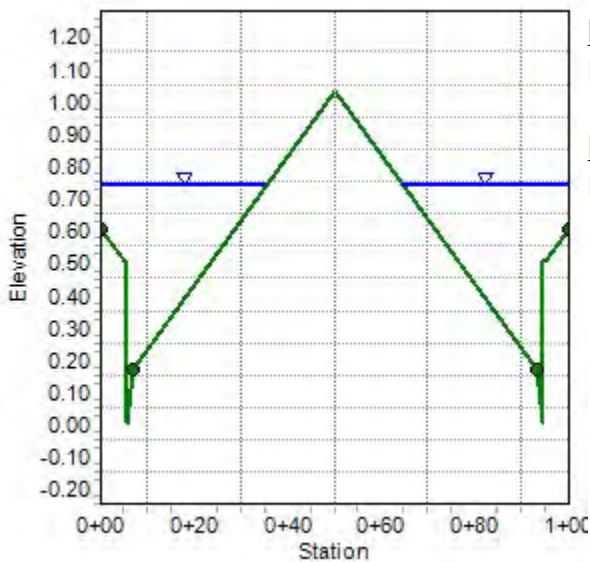
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.79000	%
Normal Depth	0.74	ft
Discharge	133.00	ft ³ /s

Cross Section Image



Minor Storm Check

$DxV = 0.74 * 6.56 = 4.90 < 6$; OK

Dry Lane Check

$DxV = (1.03 - 0.74) / 0.02 = 14.50 > 12$; OK

Worksheet for Section 1 - Centennial Parkway Q10

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.79000 %
Discharge 133.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.17
0+50.00	1.03
0+93.00	0.17
0+94.50	0.00
0+94.50	0.50
0+95.00	0.50
1+00.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+93.00, 0.17)	0.017
(0+93.00, 0.17)	(1+00.00, 0.60)	0.013

Options

Current Roughness weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Worksheet for Section 1 - Centennial Parkway Q10

Results

Normal Depth		0.74	ft
Elevation Range	0.00 to 1.03 ft		
Flow Area		20.28	ft ²
Wetted Perimeter		72.22	ft
Hydraulic Radius		0.28	ft
Top Width		70.91	ft
Normal Depth		0.74	ft
Critical Depth		0.94	ft
Critical Slope		0.53272	%
Velocity		6.56	ft/s
Velocity Head		0.67	ft
Specific Energy		1.41	ft
Froude Number		2.16	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.74	ft
Critical Depth	0.94	ft
Channel Slope	2.79000	%
Critical Slope	0.53272	%

Cross Section for Section 1 - Centennial Parkway Q100

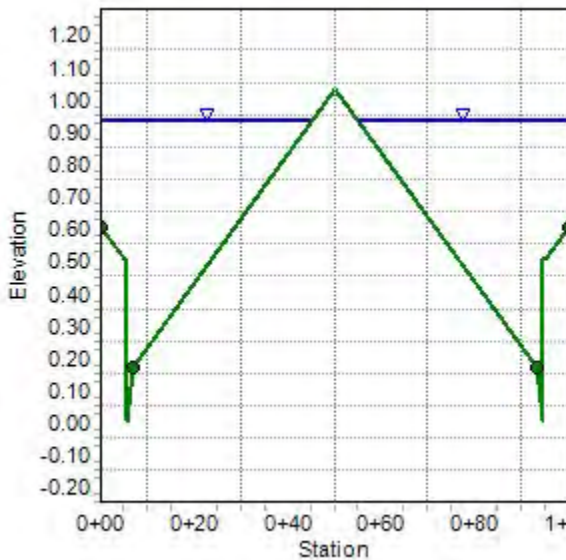
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.79000	%
Normal Depth	0.93	ft
Discharge	289.00	ft ³ /s

Cross Section Image



Major Storm Check

$D \times V = 0.93 \times 8.08 = 7.50 < 8$; OK

FFE Check

$D = 0.93$

$2D = 1.86$

$FL = 19.41$

$FL + 2D = 21.27$

FFE = 19.00; Solid Grout wall bottom 4 coarses

DWY Check

$D = 0.93$

$D + 6" = 1.43$

$FL = 15.23$

$FL + D + 6" = 16.66$

DWY HP = 16.66

Worksheet for Section 1 - Centennial Parkway Q100

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.79000 %
Discharge 289.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.17
0+50.00	1.03
0+93.00	0.17
0+94.50	0.00
0+94.50	0.50
0+95.00	0.50
1+00.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+93.00, 0.17)	0.017
(0+93.00, 0.17)	(1+00.00, 0.60)	0.013

Options

Current Roughness weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Worksheet for Section 1 - Centennial Parkway Q100

Results

Normal Depth		0.93	ft
Elevation Range	0.00 to 1.03 ft		
Flow Area		35.76	ft ²
Wetted Perimeter		91.83	ft
Hydraulic Radius		0.39	ft
Top Width		90.13	ft
Normal Depth		0.93	ft
Critical Depth		1.22	ft
Critical Slope		0.46838	%
Velocity		8.08	ft/s
Velocity Head		1.02	ft
Specific Energy		1.95	ft
Froude Number		2.26	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.93	ft
Critical Depth	1.22	ft
Channel Slope	2.79000	%
Critical Slope	0.46838	%

Cross Section for Section 2 - Centennial Parkway Q10

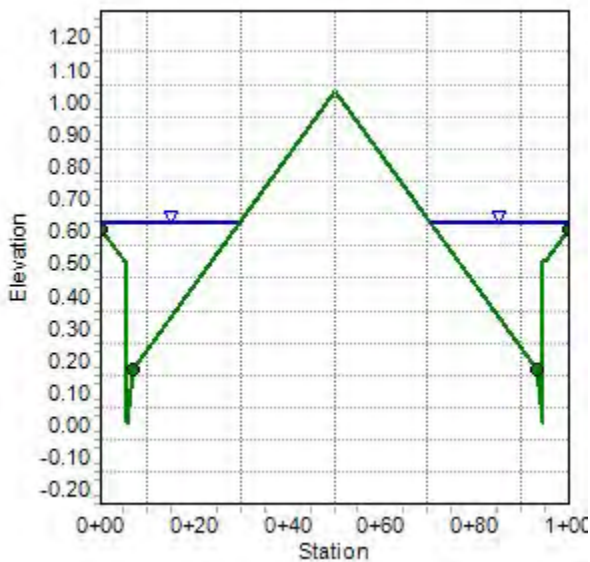
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.79000	%
Normal Depth	0.62	ft
Discharge	69.00	ft ³ /s

Cross Section Image



Minor Storm Check

$DxV = 0.62 * 5.45 = 3.40 < 6$; OK

Dry Lane Check

$DxV = (1.03 - 0.62) / 0.02 = 20.50 > 12$; OK

Worksheet for Section 2 - Centennial Parkway Q10

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.79000 %
Discharge 69.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.17
0+50.00	1.03
0+93.00	0.17
0+94.50	0.00
0+94.50	0.50
0+95.00	0.50
1+00.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+93.00, 0.17)	0.017
(0+93.00, 0.17)	(1+00.00, 0.60)	0.013

Options

Current Roughness weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Worksheet for Section 2 - Centennial Parkway Q10

Results

Normal Depth		0.62	ft
Elevation Range	0.00 to 1.03 ft		
Flow Area		12.66	ft ²
Wetted Perimeter		60.26	ft
Hydraulic Radius		0.21	ft
Top Width		59.18	ft
Normal Depth		0.62	ft
Critical Depth		0.76	ft
Critical Slope		0.57689	%
Velocity		5.45	ft/s
Velocity Head		0.46	ft
Specific Energy		1.08	ft
Froude Number		2.08	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.62	ft
Critical Depth	0.76	ft
Channel Slope	2.79000	%
Critical Slope	0.57689	%

Cross Section for Section 2 - Centennial Parkway Q100

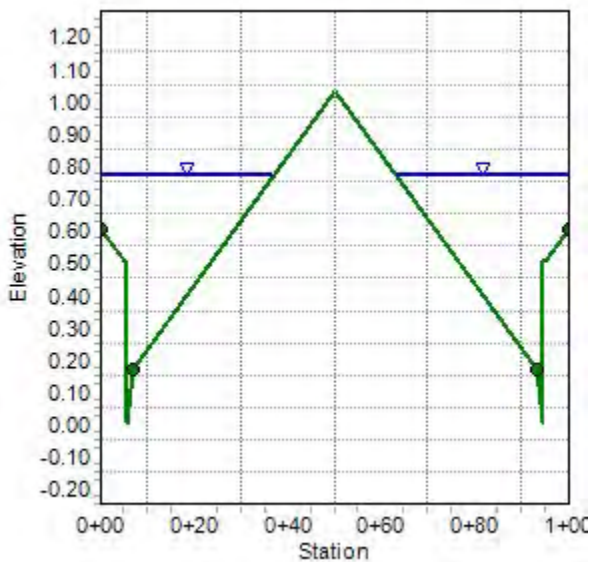
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.79000	%
Normal Depth	0.77	ft
Discharge	151.00	ft ³ /s

Cross Section Image



Major Storm Check

$D \times V = 0.77 \times 6.79 = 5.20 < 8$; OK

Worksheet for Section 2 - Centennial Parkway Q100

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.79000 %
Discharge 151.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.17
0+50.00	1.03
0+93.00	0.17
0+94.50	0.00
0+94.50	0.50
0+95.00	0.50
1+00.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+93.00, 0.17)	0.017
(0+93.00, 0.17)	(1+00.00, 0.60)	0.013

Options

Current Roughness weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Worksheet for Section 2 - Centennial Parkway Q100

Results

Normal Depth		0.77	ft
Elevation Range	0.00 to 1.03 ft		
Flow Area		22.23	ft ²
Wetted Perimeter		74.96	ft
Hydraulic Radius		0.30	ft
Top Width		73.60	ft
Normal Depth		0.77	ft
Critical Depth		0.99	ft
Critical Slope		0.52472	%
Velocity		6.79	ft/s
Velocity Head		0.72	ft
Specific Energy		1.48	ft
Froude Number		2.18	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.77	ft
Critical Depth	0.99	ft
Channel Slope	2.79000	%
Critical Slope	0.52472	%

Cross Section for Section 3 - Regina Avenue Q10

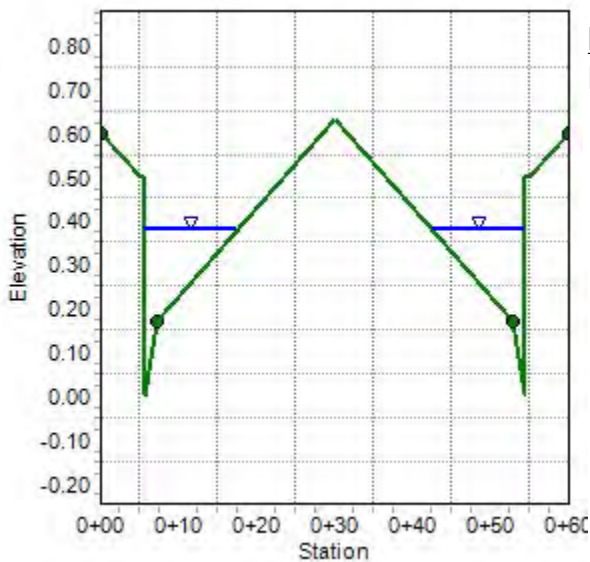
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.49000	%
Normal Depth	0.38	ft
Discharge	11.00	ft ³ /s

Cross Section Image



Minor Storm Check

$D \times V = 0.38 \times 5.56 = 1.40 < 6$; OK

Worksheet for Section 3 - Regina Avenue Q10

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.49000 %
Discharge 11.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+54.50	0.00
0+54.50	0.50
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+53.00, 0.17)	0.017
(0+53.00, 0.17)	(0+60.00, 0.60)	0.013

Options

Current Roughness weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Worksheet for Section 3 - Regina Avenue Q10

Results

Normal Depth		0.38	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		3.09	ft ²
Wetted Perimeter		24.79	ft
Hydraulic Radius		0.12	ft
Top Width		24.01	ft
Normal Depth		0.38	ft
Critical Depth		0.44	ft
Critical Slope		0.75704	%
Velocity		3.56	ft/s
Velocity Head		0.20	ft
Specific Energy		0.58	ft
Froude Number		1.75	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.38	ft
Critical Depth	0.44	ft
Channel Slope	2.49000	%
Critical Slope	0.75704	%

Cross Section for Section 3 - Regina Avenue Q100

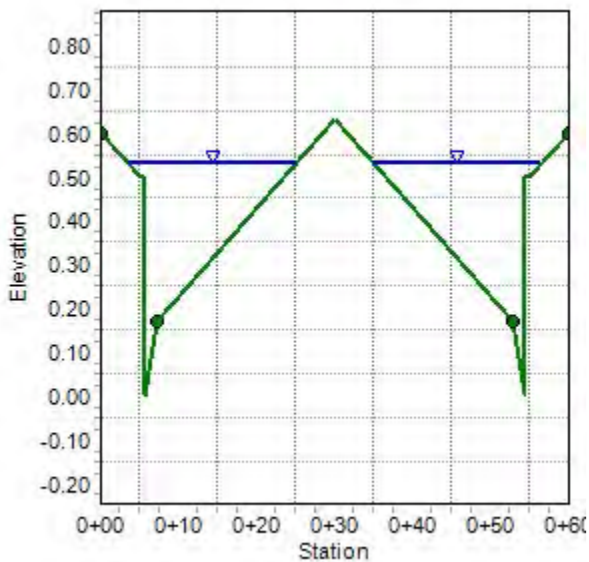
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.49000	%
Normal Depth	0.53	ft
Discharge	36.00	ft ³ /s

Cross Section Image



Major Storm Check

$D \times V = 0.53 \times 4.56 = 2.4 < 8$; OK

FFE Check

$D = 0.53$
 $2D = 1.06$
 $FL = 9.60$
 $FL + 2D = 10.66$
 $FFE = 12.50$; OK

Project Description

Manning Formula

Normal Depth

Channel Slope	2.49000	%
Discharge	36.00	ft³/s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+54.50	0.00
0+54.50	0.50
0+55.00	0.50
0+60.00	0.60

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+53.00, 0.17)	0.017
(0+53.00, 0.17)	(0+60.00, 0.60)	0.013

Current Roughness weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Worksheet for Section 3 - Regina Avenue Q100

Results

Normal Depth		0.53	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		7.89	ft ²
Wetted Perimeter		44.04	ft
Hydraulic Radius		0.18	ft
Top Width		43.01	ft
Normal Depth		0.53	ft
Critical Depth		0.63	ft
Critical Slope		0.65694	%
Velocity		4.56	ft/s
Velocity Head		0.32	ft
Specific Energy		0.85	ft
Froude Number		1.88	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.53	ft
Critical Depth	0.63	ft
Channel Slope	2.49000	%
Critical Slope	0.65694	%

Cross Section for Section 4 - Regina Avenue Q10

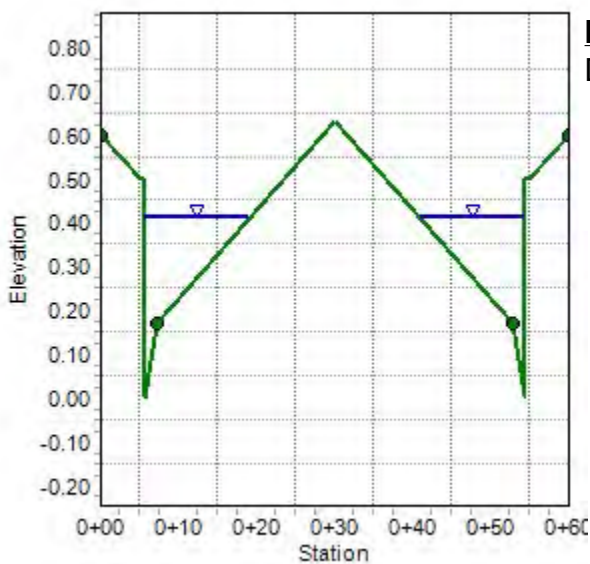
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.75000	%
Normal Depth	0.41	ft
Discharge	15.00	ft ³ /s

Cross Section Image



Minor Storm Check

$D \times V = 0.41 \times 3.97 = 1.60 < 6$; OK

Worksheet for Section 4 - Regina Avenue Q10

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.75000 %
Discharge 15.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+54.50	0.00
0+54.50	0.50
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+53.00, 0.17)	0.017
(0+53.00, 0.17)	(0+60.00, 0.60)	0.013

Options

Current Roughness weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Worksheet for Section 4 - Regina Avenue Q10

Results

Normal Depth		0.41	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		3.78	ft ²
Wetted Perimeter		27.56	ft
Hydraulic Radius		0.14	ft
Top Width		26.72	ft
Normal Depth		0.41	ft
Critical Depth		0.49	ft
Critical Slope		0.73032	%
Velocity		3.97	ft/s
Velocity Head		0.24	ft
Specific Energy		0.65	ft
Froude Number		1.86	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.41	ft
Critical Depth	0.49	ft
Channel Slope	2.75000	%
Critical Slope	0.73032	%

Cross Section for Section 4 - Regina Avenue Q100

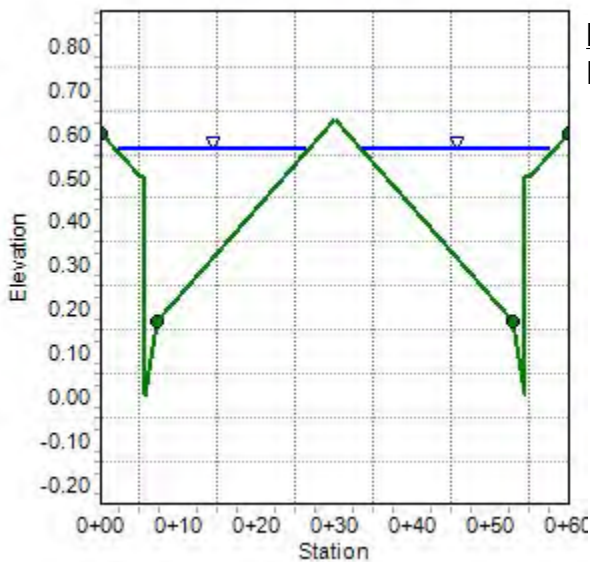
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.75000	%
Normal Depth	0.56	ft
Discharge	45.00	ft ³ /s

Cross Section Image



Major Storm Check

$D \times V = 0.56 \times 4.93 = 2.80 < 8$; OK

Worksheet for Section 4 - Regina Avenue Q100

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.75000 %
Discharge 45.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+54.50	0.00
0+54.50	0.50
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+53.00, 0.17)	0.017
(0+53.00, 0.17)	(0+60.00, 0.60)	0.013

Options

Current Roughness weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Worksheet for Section 4 - Regina Avenue Q100

Results

Normal Depth		0.56	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		9.13	ft ²
Wetted Perimeter		49.47	ft
Hydraulic Radius		0.18	ft
Top Width		48.44	ft
Normal Depth		0.56	ft
Critical Depth		0.67	ft
Critical Slope		0.61635	%
Velocity		4.93	ft/s
Velocity Head		0.38	ft
Specific Energy		0.93	ft
Froude Number		2.00	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.56	ft
Critical Depth	0.67	ft
Channel Slope	2.75000	%
Critical Slope	0.61635	%

Cross Section for Section 5 - Jensen Street Q10

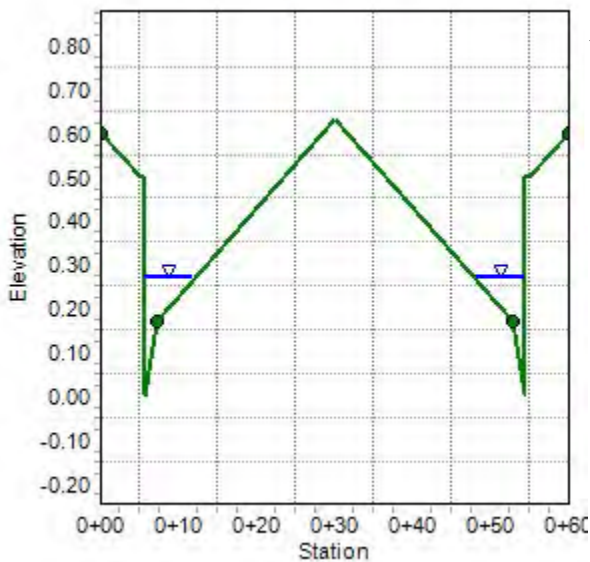
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.45000	%
Normal Depth	0.27	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Minor Storm Check

$D \times V = 0.27 \times 2.01 = 0.50 < 6$; OK

Worksheet for Section 5 - Jensen Street Q10

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.45000 %
Discharge 2.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+54.50	0.00
0+54.50	0.50
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+53.00, 0.17)	0.017
(0+53.00, 0.17)	(0+60.00, 0.60)	0.013

Options

Current Roughness weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Worksheet for Section 5 - Jensen Street Q10

Results

Normal Depth		0.27	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		0.99	ft ²
Wetted Perimeter		13.08	ft
Hydraulic Radius		0.08	ft
Top Width		12.52	ft
Normal Depth		0.27	ft
Critical Depth		0.28	ft
Critical Slope		0.89540	%
Velocity		2.01	ft/s
Velocity Head		0.06	ft
Specific Energy		0.33	ft
Froude Number		1.26	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.27	ft
Critical Depth	0.28	ft
Channel Slope	1.45000	%
Critical Slope	0.89540	%

Cross Section for Section 5 - Jensen Street Q100

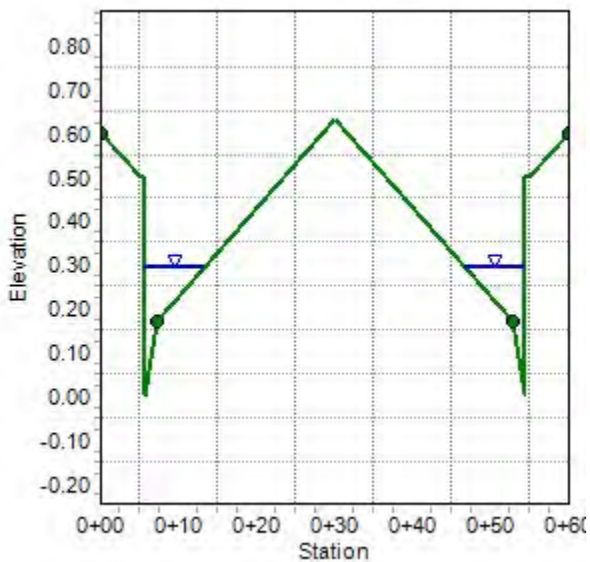
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.45000	%
Normal Depth	0.29	ft
Discharge	3.00	ft ³ /s

Cross Section Image



Major Storm Check

$D \times V = 0.29 \times 2.16 = 0.60 < 8$; OK

FFE Check

$D = 0.29$
 $2D = 0.58$
 $FL = 101.10$
 $FL + 2D = 101.68$
 $FFE = 104.40$; OK

Project Description

Input Data

Station (ft)	Elevation (ft)
--------------	----------------

Roughness Segment Definitions

Options

10/29/2018 10:06:53 AM Bentley Systems, Inc. Bentley FlowMaster V8i (SELECTseries 1) [08.11.01.03] 27 Siemens Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 Page 1 of 2

Worksheet for Section 5 - Jensen Street Q100

Results

Normal Depth		0.29	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		1.39	ft ²
Wetted Perimeter		15.95	ft
Hydraulic Radius		0.09	ft
Top Width		15.34	ft
Normal Depth		0.29	ft
Critical Depth		0.31	ft
Critical Slope		0.86882	%
Velocity		2.16	ft/s
Velocity Head		0.07	ft
Specific Energy		0.37	ft
Froude Number		1.27	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.29	ft
Critical Depth	0.31	ft
Channel Slope	1.45000	%
Critical Slope	0.86882	%

Cross Section for Section 6 - PON2 Q100

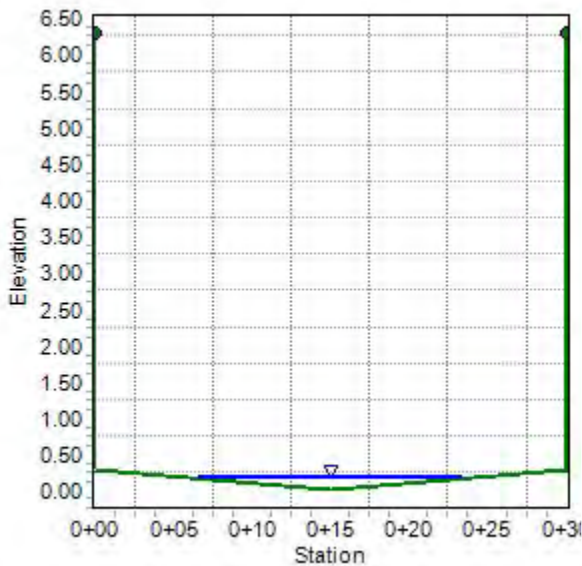
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.61000	%
Normal Depth	0.17	ft
Discharge	4.00	ft ³ /s

Cross Section Image



FFE Check

D=0.17
2D=0.34
FL=8.20
FL+2D = 8.54
FFE=6.70; Solid Grout bottom 3 coarses

Project Description

Input Data

Elevation (ft)

Roughness Segment Definitions

Roughness Coefficient

0.013

Options

Results

10/29/2018 10:07:24 AM 27 Siemens Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 Page 1 of 2

Worksheet for Section 6 - PON2 Q100

Results

Critical Slope	0.52295	%
Velocity	2.79	ft/s
Velocity Head	0.12	ft
Specific Energy	0.29	ft
Froude Number	1.69	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.17	ft
Critical Depth	0.21	ft
Channel Slope	1.61000	%
Critical Slope	0.52295	%

Cross Section for Section 7 - PON2 Q100

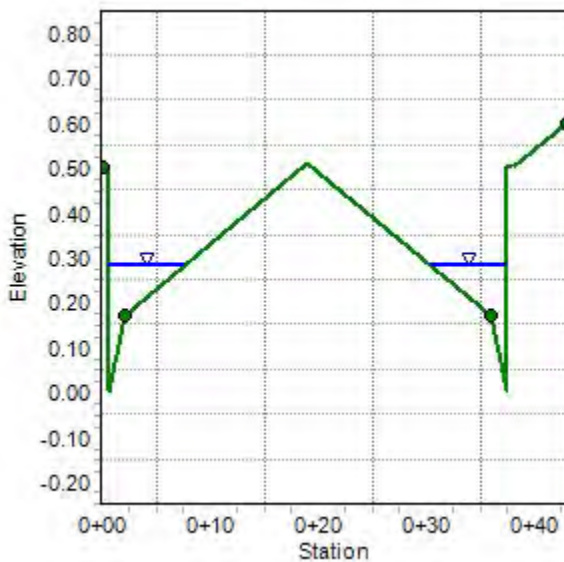
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.38000	%
Normal Depth	0.28	ft
Discharge	4.00	ft ³ /s

Cross Section Image



FFE Check

D=0.28
2D=0.56
FL=16.60
FL+2D = 17.16
FFE=19.00; OK

Project Description

Input Data

Station (ft)	Elevation (ft)
--------------	----------------

Roughness Segment Definitions

(0+00.00, 0.50)	(0+02.00, 0.17)	0.013
(0+02.00, 0.17)	(0+36.00, 0.17)	0.017
(0+36.00, 0.17)	(0+43.00, 0.60)	0.013

Current Roughness weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Normal Depth 0.28 ft

Worksheet for Section 7 - PON2 Q100

Results

Elevation Range	0.00 to 0.60 ft	
Flow Area	1.24	ft ²
Wetted Perimeter	14.94	ft
Hydraulic Radius	0.08	ft
Top Width	14.35	ft
Normal Depth	0.28	ft
Critical Depth	0.34	ft
Critical Slope	0.83189	%
Velocity	3.23	ft/s
Velocity Head	0.16	ft
Specific Energy	0.45	ft
Froude Number	1.94	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.28	ft
Critical Depth	0.34	ft
Channel Slope	3.38000	%
Critical Slope	0.83189	%

Cross Section for Section 8 - PON1 Q100

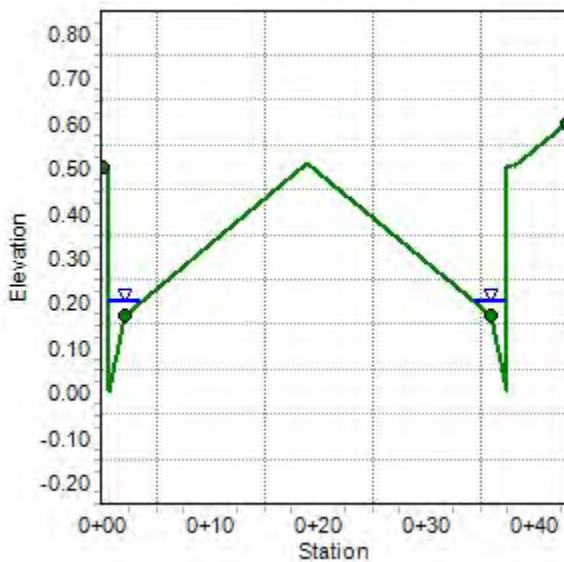
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.77000	%
Normal Depth	0.20	ft
Discharge	1.00	ft ³ /s

Cross Section Image



FFE Check

D=0.20
2D=0.40
FL=16.60
FL+2D = 17.00
FFE=19.00; OK

Project Description

Input Data

Station (ft)	Elevation (ft)
--------------	----------------

Roughness Segment Definitions

Options

Results

10/29/2018 10:08:10 AM Bentley Systems, Inc. Bentley FlowMaster V8i (SELECTseries 1) [08.11.01.03] 27 Siemens Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 Page 1 of 2

Worksheet for Section 8 - PON1 Q100

Results

Elevation Range	0.00 to 0.60 ft	
Flow Area	0.39	ft ²
Wetted Perimeter	6.47	ft
Hydraulic Radius	0.06	ft
Top Width	6.05	ft
Normal Depth	0.20	ft
Critical Depth	0.24	ft
Critical Slope	0.85372	%
Velocity	2.54	ft/s
Velocity Head	0.10	ft
Specific Energy	0.30	ft
Froude Number	1.76	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.20	ft
Critical Depth	0.24	ft
Channel Slope	2.77000	%
Critical Slope	0.85372	%

APPENDIX C

Referenced Material and Supporting Documents

06-35297

1-23-07

ADD #3

**Addendum #3
TECHNICAL DRAINAGE
STUDY

FOR
CENTENNIAL/CONQUISTADOR

CLARK COUNTY, NEVADA**

PREPARED FOR:

**REGENA TEE PEE LLC
2250 E TROPICANA AVE.
#19-468
LAS VEGAS, NV. 89119**

PREPARED BY:

**CVL Consultants, Inc.
6280 S. Valley View Blvd., Suite 200
Las Vegas, Nevada 89118**

**CVL Reference Number 09-12-0114801
JANUARY 19, 2007**



HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Centennial / Conquistador (Residential Development) Add. 3 Date: January 2007

Location of Development: a) Descriptive (Cross Streets): North/South Conquistador East/West: Centennial
b) Sect. 30 Twn. 19S Rng. 60E

Name of Owner: Regena Tee Pee LLC Assessors Parcel Number: 125-30-101-004 & -005
Telephone Number: (702) 921-8888 Facsimile Number: (702) 921-8824
Address: 2250 E Tropicana Avenue #19-468, Las Vegas, NV 89119

Contact Person Name: Geoffrey Purse, P.E. Telephone Number: (702) 368-3008
Firm: CVL Consultants, Inc. Facsimile Number: (702) 368-0047

Address: 6280 S Valley View Blvd. #200, Las Vegas, NV 89118

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At site: 10 acres Being Developed/Disturbed: 10 acres

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

3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control Master Plan Facility? YES* ☒ NO

4. Proposed type of development (Residential, Commercial, Etc.): Residential

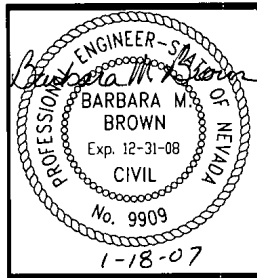
5. Approximate upstream land area which drains to the subject site: 50+ acres

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

7. If known, please identify the proposed point(s) of runoff from the site:

Discharge to concrete curb and gutter along north side of Regena along the site's southern boundary.

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



Engineer's Seal

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

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

Local Entity File Number

Revisions	Date

REFERENCE:

STANDARD FORM 1

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*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 18OCT06 TIME 16:03:59 *
*****
* U. S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 GILLESPIE AVENUE *
* DAVENPORT, IOWA 52816 *
* (319) 756-1104 *
*****
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF REC-1 KNOWN AS REC1 (JAN 73), REC1GB, REC1GBD, AND REC1GV. THE DEFINITIONS OF VARIABLES -RTDZ- AND -RTIO- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMBER- ON IN-CHARGE WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE PORTANT77 VERSION. NEW OPTIONS: DANGERBAG OUTFLOW SUBSEQUENCE, SINGLE EVENT DAMAGE CALCULATION, DBS-WRITE SPACE FREQUENCY, DBS-READ TIME SERIES AT DESIRED CALCULATION INTERVAL, LOSS RATE:GREEN AND MUD INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

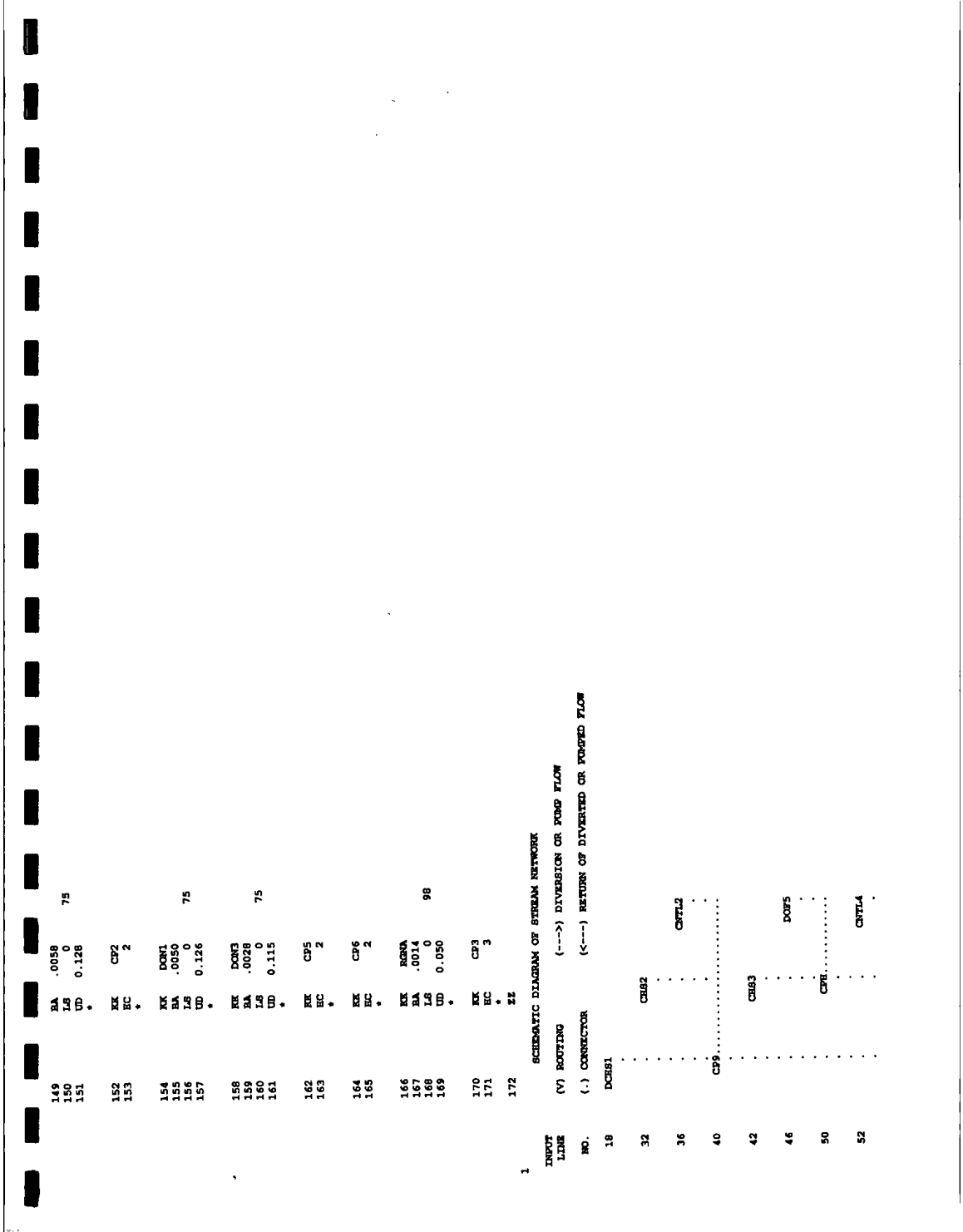
PAGE 1

REC-1 DRAFT

[illegible][illegible]

FUTURE

[illegible]



56	CP13.....	
58		DOF6
62		CNTL1
66	CP10.....	
68		CNTL3
72	CP11.....	
74		DOF3
78		CNTL
82	CP4.....	
84		DOF1
88		RENO3
92	CP6.....	
94		DOF1E
98		DOF2E
102		CP1E.....
104		RENO2
108	CP12.....	
110		DOF3E
114		DOF4E
118		CP2E.....
120		DOF5E
124		CP4E.....
126		RENO1

```

130      . . . . . CP7.....
135      . . . . . CP7E-----> CP7S
132      . . . . .
138      . . . . . ROR04
142      . . . . . CP8.....
144      . . . . . DOR4
148      . . . . . DOR2
152      . . . . . CP2.....
154      . . . . . DOR1
158      . . . . . DOR3
162      . . . . . CP5.....
164      . . . . . CP6.....
166      . . . . . ROR0
170      . . . . . CP3.....

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(***) HENOFF ALSO COMPLETED THIS LOCATION

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1 *****
* FLOOD HYDROGRAPH PACKAGE (SEC-1)
* JUN 1998
* VERSION 4.1
* RUN DATE 18OCT06 TIME 16:03:59
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*****

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

```

FUTURE CONDITIONS MODEL
 TECHNICAL DRAINAGE STUDY FOR CENTENIAL CONQUISPADOR
 MOMENTUM ENGINEERS - - B BROWN

6-HOUR STORM DISTRIBUTION #3
 10- AND 100-YEAR STORM EVENTS
 NO RAINFALL REDUCTION FOR DEPTH-AREA
 NO LOSSES DUE TO HYDROGRAPH ROUTING

15 10 OUTPUT CONTROL VARIABLES
 1PRINT 5 PRINT CONTROL
 1PLOT 0 PLOT CONTROL
 0SCAL 0. HYDROGRAPH PLOT SCALE

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

COMPUTATION INTERVAL .08 HOURS
 TOTAL TIME BASE 24.92 HOURS

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

JP MULTI-PLAN OPTION
 NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
 RATIOS OF PRECIPITATION
 .58 1.00

1

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1	RATIO 2
+ HYDROGRAPH AT	DCHS1	.04	1	FLOW	83.
				TIME	3.58
+ HYDROGRAPH AT	CHS2	.06	1	FLOW	52. 101.
				TIME	3.58 3.58
+ HYDROGRAPH AT	CNTL2	.00	1	FLOW	5. 9.
				TIME	3.50 3.50
+ 3 COMBINED AT	CT9	.10	1	FLOW	98. 189.
				TIME	3.58 3.58
+ HYDROGRAPH AT	CHS3	.01	1	FLOW	2. 10.
				TIME	3.67 3.58
+ HYDROGRAPH AT	DOF5	.01	1	FLOW	13. 26.
				TIME	3.58 3.58
+ 2 COMBINED AT	CPH	.03	1	FLOW	15. 36.
				TIME	

HYDROGRAPH AT	CNTL4	.00	1	FLOW	3.58	3.58	3.58
+				TIME	2.	3.	
				TIME	3.50	3.50	
3 COMBINED AT	CP13	.13	1	FLOW	114.	227.	
+				TIME	3.58	3.58	
HYDROGRAPH AT	DOF6	.01	1	FLOW	12.	25.	
+				TIME	3.50	3.50	
HYDROGRAPH AT	CNTL1	.00	1	FLOW	3.	6.	
+				TIME	3.50	3.50	
3 COMBINED AT	CP10	.15	1	FLOW	127.	253.	
+				TIME	3.58	3.58	
HYDROGRAPH AT	CNTL3	.00	1	FLOW	2.	3.	
+				TIME	3.50	3.50	
2 COMBINED AT	CP11	.15	1	FLOW	128.	284.	
+				TIME	3.58	3.58	
HYDROGRAPH AT	DOF3	.02	1	FLOW	16.	32.	
+				TIME	3.58	3.58	
HYDROGRAPH AT	CNTL	.00	1	FLOW	4.	8.	
+				TIME	3.50	3.50	
3 COMBINED AT	CP4	.17	1	FLOW	146.	292.	
+				TIME	3.58	3.50	
HYDROGRAPH AT	DOF1	.01	1	FLOW	2.	7.	
+				TIME	3.58	3.58	
HYDROGRAPH AT	RNO3	.00	1	FLOW	2.	4.	
+				TIME	3.50	3.50	
2 COMBINED AT	CP6	.01	1	FLOW	4.	10.	
+				TIME	3.50	3.50	
HYDROGRAPH AT	DOF1H	.01	1	FLOW	3.	7.	
+				TIME	3.58	3.58	
HYDROGRAPH AT	DOF2H	.01	1	FLOW	3.	8.	
+				TIME	3.58	3.58	
2 COMBINED AT	CP1H	.01	1	FLOW	5.	16.	
+				TIME	3.58	3.58	
HYDROGRAPH AT	RNO2	.00	1	FLOW	2.	4.	
+				TIME	3.50	3.50	

+	3 COMBINED AT	CP12	.02	1	FLOW	11.	29.
					TIME	3.50	3.50
+	HYDROGRAPH AT	DON3H	.01	1	FLOW	4.	13.
					TIME	3.50	3.50
+	HYDROGRAPH AT	DON4H	.00	1	FLOW	1.	2.
					TIME	3.50	3.50
+	2 COMBINED AT	CP2H	.02	1	FLOW	4.	16.
					TIME	3.50	3.50
+	HYDROGRAPH AT	DON5H	.01	1	FLOW	4.	12.
					TIME	3.50	3.50
+	2 COMBINED AT	CP4H	.03	1	FLOW	8.	28.
					TIME	3.50	3.50
+	HYDROGRAPH AT	RGN1	.00	1	FLOW	2.	4.
					TIME	3.50	3.50
+	2 COMBINED AT	CP7	.03	1	FLOW	9.	30.
					TIME	3.50	3.50
+	DIVERSION TO	CP7S	.03	1	FLOW	5.	15.
					TIME	3.50	3.50
+	HYDROGRAPH AT	CP7E	.03	1	FLOW	5.	15.
					TIME	3.50	3.50
+	HYDROGRAPH AT	RGN4	.00	1	FLOW	1.	2.
					TIME	3.50	3.50
+	2 COMBINED AT	CP8	.03	1	FLOW	5.	16.
					TIME	3.50	3.50
+	HYDROGRAPH AT	DON4	.01	1	FLOW	2.	6.
					TIME	3.50	3.50
+	HYDROGRAPH AT	DON2	.01	1	FLOW	1.	5.
					TIME	3.50	3.50
+	2 COMBINED AT	CP2	.01	1	FLOW	3.	11.
					TIME	3.50	3.50
+	HYDROGRAPH AT	DON1	.00	1	FLOW	1.	4.
					TIME	3.50	3.50
+	HYDROGRAPH AT	DON3	.00	1	FLOW	1.	2.
					TIME	3.50	3.50



+ 2 COMBINED AT CP5 .01 1 FLOW 2. 7.
TIME 3.58 3.58

+ 2 COMBINED AT CP6 .02 1 FLOW 5. 18.
TIME 3.58 3.58

+ HYDROGRAPH AT RESA .00 1 FLOW 2. 4.
TIME 3.58 3.58

+ 3 COMBINED AT CP3 .05 1 FLOW 11. 36.
TIME 3.58 3.58

*** NORMAL END OF REC-1 ***

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

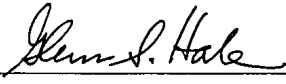
- b. A 41.2-foot **drainage easement** to be privately maintained by the HOA containing a wrought iron fence as shown on sheets GP-1 and DT-1 with 3 courses solid grouted block wall per detail Q/DT-1 located at the west end of Street C.
 - c. A 10-foot wide **drainage easement** to be privately maintained 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 easement 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.

Centennial/Conquistador (5338)
HTE# 06-35297
February 7, 2007
Page 4 of 4

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, P.E
Senior Civil Engineer
Civil Engineering Division

GSH/ccw

cc: Regena Tee Pee LLC
Development File



1/22 - CCW
181 North Arroyo Grande Blvd., Suite 190-B
Henderson, Nevada 89074
702/734-3001 fax 702/734-0888
www.willdan.com

FINAL MEMORANDUM

TO: Chris O. Stone, P.E. *COS*
FROM: Steven F. Holmstrom, P.E. *SFH*
OFFICE: Las Vegas
DATE: January 24, 2007
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
Prepared by CVL Consultants, Inc.

We have completed our final review of the above-referenced **Technical Drainage Study**. As set forth in the study and its addenda, the following steps 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, DT-1 and EX-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 cross gutter 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 on the west side of Street A
 - b. A 41.2-foot **drainage easement** to be privately maintained by the HOA located at the west end of Street C with a wrought iron fence as shown on sheets GP-1 and DT-1
 - c. A 10-foot wide **drainage easement** to be privately maintained by the HOA located east of the easement described above

Chris O. Stone, P.E.
Centennial/Conquistador (5338)
January 24, 2007
Page 2

HTE# 06-35297

- d. A 15-foot wide **drainage easement** to be privately maintained by the HOA located east of the easement described above and east of the cul-de-sac at the west end of Street C as shown on sheet GP-1, with bollards at the east end of the easement
 - e. A 25-foot wide concrete lined **drainage easement** located southeast of the bulb at Street A and Street C as shown on sheet GP-1, with a wrought iron fence on the north side of Regena Avenue
 - 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 48" x 16" blockwall opening, a 2-foot concrete U-channel and a sidewalk underdrain as shown on the 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;
 4. The minimum finished floor elevations for the proposed structures shall be constructed as shown on the above-mentioned grading plan(s);
 5. As a condition of final approval, an administrative variance to allow the finished floor elevation(s) to be set below the current Clark County criteria must be approved. The finished floor variance must be submitted to Development Services Civil Engineering front counter after drainage study approval and prior to offsite final review;
 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;
- residential* 8. The grading plan will be reviewed by the Building Office Operations Division to ensure compliance with the handicap access requirements. Revisions to the grading plan may be required if the site accessibility design does not comply with the requirements set forth in the Accessibility Chapter of the Clark County Building Code;



Chris O. Stone, P.E.
Centennial/Conquistador (5338)
January 24, 2007
Page 3

HTE# 06-35297

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

It is our recommendation that the subject Drainage Study be accepted.

CONCURRENCE BY CLARK COUNTY DEVELOPMENT SERVICES DEPARTMENT:

Glenn L. Hale, P.E.

2-8-07

Signature

Date

COMMENTS: _____

cc: Kevin K. Elliott, P.E.



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

January 9, 2007

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

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

We have completed our review of the above-referenced drainage study update and have the following comments:

1. Previous comment 14 does not appear to be addressed. The detail cross section for the 25-ft wide easement (C/DT-1) shows a single crossfall of 2% towards a proposed L-curb and does not match the provided hydraulic section 7. Verify and revise to match.
2. It appears that flows in hydraulic section 4 are confined by walls on either side of the drainage easement. However, the plans and detail cross section P/DT-1 does not show any proposed wall adjacent to the proposed easement. Clarify whether there will be proposed walls adjacent to the drainage easement with solid grouting for the 0.41-ft depth of flow in the interim condition, if the hydraulic section is correct. If no wall is to be proposed, provide a revised hydraulic calculation for the top width and revise the drainage easement as required.
3. The study's proposal to have a 6" gutter along the western boundary must have positive drainage to the drainage easement or right-of way. Section H/DT-1 must show any offsite grading that may be necessary for positive drainage to the valley gutter. Flowline elevations and daylight grading must be shown on sheet GP-1.

BOARD OF COUNTY COMMISSIONERS
RORY REID, Chairman • MYRNA WILLIAMS, Vice Chair
TOM COLLINS • YVONNE ATKINSON GATES • CHIP MAXFIELD • LYNETTE BOGGS McDONALD • BRUCE L. WOODBURY
VIRGINIA VALENTINE, P.E., County Manager

Centennial/Conquistador (5338)
HTE# 06-35297
January 9, 2007
Page 2 of 5

4. The WSPG model does not appear to match the plans. Please address the following:
 - a. Provide a standalone WSPG model for the pipes to be proposed with this project only. Refer to comment 5 below.
 - b. The "Storm drain hydraulic analysis stationing equivalents" sheet appears to be from the Technical Drainage Study for "Hualapai/Tee Pee," (HTE# 06-36202) and the plans stations does not match the stationing on the plans provided.
 - c. Elements 4 and 5 of the WSPG model shows section 4 to be 3-ft in diameter, however the plans shows this section to be a 30-inch RCP. Verify and revise to match.
 - d. Revise the starting water surface elevation on the WSPG to be at the top of the pipe. Additionally, provide an additional WSPG with the starting WSE at the normal weir depth of the beehive inlet.
 - e. Verify and revise the invert elevations at stations 1602.62 and 1739.89 to match the grading plans.
5. It appears that the proposed storm drain facility is also proposed by the Technical Drainage Study for "Hualapai/Tee Pee," (HTE# 06-36202). Clarify which project will bond and construct these facilities and revise the grading plans and any calculations as necessary.
6. **The drainage/grading plans for this project require the following modifications:**
 - a. Provide a detail or standard drawing number for drop inlets and manholes.
 - b. Change the size of the upstream pipe in Centennial to read 30" as noted on the plans.
 - c. Show Centennial Parkway and Regena Avenue as PUBLIC streets on the profiles.
 - d. Label the existing waterline on sheet P-3.

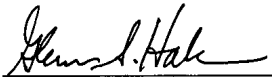
Centennial/Conquistador (5338)
HTE# 06-35297
January 9, 2007
Page 3 of 5

- e. Note that Lots 1-5 do not use the typical lot grading shown on sheet DT-1.
- f. Additional comments as shown on plans.

The grading plan has been red-lined and is being returned to the engineer. The red-lined grading plan must be resubmitted with the revised drawings. Failure to resubmit the red-lined grading plan will prevent further review of the project.

The items listed herein must be thoroughly addressed and submitted for review prior to acceptance of this study.

DEPARTMENT OF DEVELOPMENT SERVICES

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

GH/ccw

cc: Regena Tee Pee, LLC



12.20 COW

181 North Arroyo Grande Blvd., Suite 190-B
Henderson, Nevada 89074
702/734-3001 fax 702/734-0888
www.willdan.com

FINAL MEMORANDUM

Fmc

TO: Chris O. Stone, P.E. *COS*
FROM: Steven F. Holmstrom, P.E. *SFH*
OFFICE: Las Vegas
DATE: January 3, 2007
SUBJECT: WILLDAN/Clark County Development Services Dept. Plan Review Contract
Technical Drainage Study for Centennial/Conquistador (5338)
Study Dated: August 1, 2006
1st Addendum Dated: October 23, 2006
Supplemental Dated: October 31, 2006
2nd Addendum Dated: December 18, 2006
Location: Southwest of Centennial Parkway and Jensen Street
(Sec. 30, T. 19 S., R. 60 E.)
HTE# 06-35297
Prepared by CVL Consultants, Inc.

We have completed our final review of the above-referenced **Technical Drainage Study**. As set forth in the study and its addenda, the following steps will be taken to mitigate flood hazards:

1. The site shall be graded with respect to drainage as shown on "Centennial/Conquistador," sheets C-1, GP-1, P-1, P-2, P-3, DT-1 and EX-1, signed and sealed by Geoffrey G. Purse, P.E., on December 20, 2006;
2. The following drainage facilities shall be constructed:
 - a. An 8-foot wide cross gutter crossing Street A on the south side of Centennial Parkway
 - b. An 8-foot wide cross gutter crossing Street B on the west side of Street A
 - c. An 8-foot wide cross gutter crossing Street C on the west side of Street A
 - d. A storm drain system to be publicly maintained within Centennial Parkway consisting of the following items as shown on the plans:
 - Two 10-foot Type C drop inlets



Chris O. Stone, P.E.
Centennial/Conquistador (5338)
January 3, 2007
Page 2

HTE# 06-35297

- Approximately 487 LF of 30-inch RCP
 - Approximately 210 LF of 36-inch RCP
 - Approximately 350 LF of 12-inch PVC
 - Four (4) manholes
 - A beehive inlet per CCAUSD #416
 - Approximately 85 LF of 18-inch RCP
- e. A 41.2-foot drainage easement to be privately maintained by the HOA located at the west end of Street C with a wrought iron fence as shown on sheets GP-1 and DT-1
- f. A 10-foot wide drainage easement to be privately maintained by the HOA located east of the easement described above
- g. A 15-foot wide drainage easement to be privately maintained by the HOA located east of the easement described above, at the west end of Street C as shown on sheet GP-1, with bollards at the east end of the easement
- h. A 25-foot wide concrete lined drainage easement located southeast of the knuckle at Street A and Street C as shown on sheet GP-1, with a sidewalk underdrain at the outlet, and with a wrought iron fence on the north side of Regena Avenue
- i. 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 48" x 16" blockwall opening, a 2-foot concrete U-channel and a sidewalk underdrain as shown on the plans and in detail R/DT-1
- j. 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;
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);



Chris O. Stone, P.E.
Centennial/Conquistador (5338)
January 3, 2007
Page 3

HTE# 06-35297

6. As a condition of final approval, an administrative variance to allow the finished floor elevation(s) to be set below the current Clark County criteria must be approved. The finished floor variance must be submitted to Development Services Civil Engineering front counter after drainage study approval and prior to offsite final review;
7. 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;
8. Mylars of the grading plan must be submitted to the Clark County Civil Engineering Division Plan Check for approval signatures prior to map recordation;
9. Right-of-way dedication must be verified;
10. 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;
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. Provide a detail or standard drawing number for drop inlets and manholes
 - b. Change the size of the upstream pipe in Centennial to read 30" as noted on the plans
 - c. Provide a manhole at the beehive inlet on Centennial Parkway
 - d. Show Centennial Parkway and Regena Avenue as PUBLIC streets on the profiles
 - e. Label the existing waterline on sheet P-3
 - f. Note that Lots 1-5 do not use the typical lot grading shown on sheet DT-1



Chris O. Stone, P.E.
Centennial/Conquistador (5338)
January 3, 2007
Page 4

HTE# 06-35297

It is our recommendation that the subject Drainage Study be accepted.

CONCURRENCE BY CLARK COUNTY DEVELOPMENT SERVICES DEPARTMENT:

_____	_____
Signature	Date

COMMENTS: _____

cc: Kevin K. Elliott, P.E.



11-06 CON

181 North Arroyo Grande Blvd., Suite 190-B
Henderson, Nevada 89074
702/734-3001 fax 702/734-0888
www.willdan.com

MEMORANDUM

TO: Chris O. Stone, P.E. *COS*
FROM: Steven F. Holmstrom, P.E.
OFFICE: Las Vegas
DATE: November 7, 2006
SUBJECT: WILLDAN/Clark County Development Services Dept. Plan Review Contract
Technical Drainage Study for Centennial/Conquistador (5338)
Study Dated: August 1, 2006
Addendum Dated: October 23, 2006
Supplement Dated: October 31, 2006
Location: South of Centennial Parkway at Conquistador Street
(Sec. 30, T. 19 S., R. 60 E.)
HTE# 06-35297
Prepared by CVL Consultants, Inc.

We have completed our review of the above-referenced **Technical Drainage Study**, and have the following comments:

1. *o* The 1-foot swale along the west wall does not meet the flowing criteria. Offsite runoff that is conveyed through the site must be within a drainage easement. The easement must be at least equal to the top width of the flow/channel. In addition, Clark County policy (per Section 1604 of the *CCRFCD Manual*) requires that all private drainage easements must be lined with a permanent facility. The currently accepted minimum facility consists of a 3-foot wide concrete valley gutter;
2. It is noted that the flow at CP6 does not match between the HEC-1 and figure 6, and CP5 is missing. This must be addressed;
3. It is also noted that the figure for the Centennial/Hualapai basins (referenced on figure 5) cannot be found in the appendix. This must be addressed;
4. FlowMaster sections 5 and 8, along Centennial Parkway, do not meet the following criteria. It appears the calculations provided do not represent the correct street flow with storm drain. The *CCRFCD Manual*, per section 304.4, states, "center turning lane cannot be used for a dry lane". As the future lane configuration of the roadway may include a center turn lane, or median, this criteria must be met. Using a 14-ft wide center turn lane, the dry lane provided must be increased to $12 + 14/2 = 19$ feet;



Chris O. Stone, P.E.
Centennial/Conquistador (5338)
November 7, 2006
Page 2

5. It is noted the offsite basin DOF3 is diverted into the storm drain within Centennial Parkway, then released in a beehive north of it's original flow path. This may be an adverse impact to downstream parcels and must be addressed;
6. The WSPG analysis does not match the stations on the grading plan. The grading plan station equations to the WSPG analysis, shown in the appendix, are for the Centennial/Hualapai TDS, HTE 06-36202, only. Therefore, the other plan set is required to interpret the analysis. A station equation table must be provided to relate the WSPG analysis to the stations shown on sheet PP-1 and PP-2 of the subject study. Also, the elevations must be revised to match the profile at the manhole locations (close but not exact). In addition, the flows shown on the profiles do not match the values shown in exhibit 7, but are higher or more conservative, no revisions required;
7. The width of flow in the 15-foot drainage easement west of Street C, between lots 9 and 10, is greater than the width of the easement. This must be addressed;
8. The grading of lots 1-4 shows two high points (HPs), and does not match section E/DT-1, and need to be adjusted to meet maximum slopes on the lot;
9. The drainage/grading plans for this project require the following modifications:
 - a. Correct the sheet reference for details to DT-x
 - b. Provide a detail for the concrete U-channel near section R/DT-1
 - c. Specify the type and length of the drop inlets
 - d. Additional comments as noted on plans



Chris O. Stone, P.E.
Centennial/Conquistador (5338)
November 7, 2006
Page 3

The grading plan has been red-lined and is being returned to the engineer. The red-lined grading plan must be resubmitted with the revised drawings. Failure to resubmit the red-lined grading plan will prevent further review of the project.

All addenda must be submitted directly to Clark County. Any drainage studies or addenda submitted directly to WILLDAN will be returned to Clark County for the necessary log-in procedures.

The items listed herein must be thoroughly addressed and submitted for review prior to acceptance of this study.

A study review workshop with WILLDAN may be scheduled if there are questions concerning the above listed comments.

CONCURRENCE BY CLARK COUNTY DEVELOPMENT SERVICES DEPARTMENT:

Glen S. Hale, P.E.

12-6-06

Signature

Date

COMMENTS: *CCW*

cc: Kevin K. Elliott, P.E.

Centennial/Conquistador (5338)
HTE# 06-35297
December 5, 2006
Page 4 of 5

- Item 1 – It appears from response to previous comment #8, the flow line being formed in the concrete footing would be acceptable to provide positive drainage to the proposed drainage easement to the south of the low point. No revisions required.
- Item 6 – Additionally, the WSPG analysis starting water surface elevation should be set to the soffit in order to analyze the impact of the worst case future condition.
- Item 9 –
 - e. Revise details A/DT-1 and O/DT-1 to callout and dimension the retaining wall.
 - f. Provide the block wall opening detail as specified in detail R/DT-1 of the grading plans.
 - g. Specify the manhole type and reference on the grading plans.

Additional Comments

- 10. Response to previous comment #2 states that the dry lane criteria will be met for the south side only and the north side will require an additional storm drain collection in order to meet dry lane. The study must meet the 10-year dry lane criteria for the entire width of Centennial Parkway and provide future lateral stub connections and size the mainline storm drain for the anticipated future flow. Refer to Willdan comment #4 above.
- 11. There appears to be sufficient slope to daylight the storm drain pipe in Centennial Parkway. The bubbler design is typically not accepted by CCDS per CCRFCD HCDDM Section 304.4.
- 12. Offsite flows from the existing development west of basin DOF-1 will drain additional flows to Regina Avenue. This must be accounted for in the street flow analysis.
- 13. The study must address any potential flow splits in Regina Avenue at concentration points CP12 and CP7. Drainage patterns must match those presented in the Technical Drainage Study for "Centennial/Hualapai" (HTE #06-36202).
- 14. Normal flow depth calculations for the 25-foot easement must be revised to reflect 2% cross fall slope.

Centennial/Conquistador (5338)
HTE# 06-35297
December 5, 2006
Page 5 of 5

15. The flows impacting the site's west boundary may also originate from Centennial Parkway's southern half of the right-of-way. The quantity of flow must be determined and all subsequent hydraulic calculations revised as appropriate. A normal flow depth calculation must be provided for flows conveyed adjacent to the block wall.

GH/ccw



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Henderson, Nevada 89074
702/734-3001 fax 702/734-0888
www.willdan.com

MEMORANDUM

TO: Chris O. Stone, P.E. *COS*
FROM: Steven F. Holmstrom, P.E. *SFH*
OFFICE: Las Vegas
DATE: August 9, 2006
SUBJECT: WILLDAN/Clark County Development Services Dept. Plan Review Contract
Technical Drainage Study for Centennial/Conquistador (5338)
Study Dated: August 1, 2006
Location: South of Centennial Parkway at Conquistador Street
(Sec. 30, T. 19 S., R. 60 E.)
HTE# 06-35297
Prepared by CVL Consultants, Inc.

We have completed our initial review of the above-referenced **Technical Drainage Study**, and have the following comments:

1. 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;
2. *α* The *CCRFCD Manual*, per section 304.4, states, "center turning lane cannot be used for a dry lane". As the future lane configuration of the roadway may include a center turn lane, or median, this criteria must be met. Using a 14-ft wide center turn lane, the dry lane provided must be increased to $12 + 14/2 = 19$ feet;
3. A wrought iron fence is required at the west wall opening into the 15-foot drainage easement. In addition, the FlowMaster section does not match the plans at section P/DT-1. The study must revise the FlowMaster calculation to reflect the current design and/or revise the design to contain the flow within the easement and provide flood protection to the adjacent lots;
4. The initial length of basin EXOF3 (560') is greater than the 500-foot limit in section 602 of the manual. This must be addressed;



Chris O. Stone, P.E.
Centennial/Conquistador (5338)
August 9, 2006
Page 2

5. The drainage/grading plans for this project require the following modifications:
 - a. Add the Flood Zone Note to the Grading plan
 - b. Add the channel lining and base material to section P/DT-1
 - c. Add the slope to the 15-foot drainage easement at section P/DT-1
 - d. Add the HTE number to the MSM south of the site
 - e. Clarify where construction note 9 is used or remove the note
 - f. Additional comments as noted on plans

The grading plan has been red-lined and is being returned to the engineer. The red-lined grading plan must be resubmitted with the revised drawings. Failure to resubmit the red-lined grading plan will prevent further review of the project.

All addenda must be submitted directly to Clark County. Any drainage studies or addenda submitted directly to WILLDAN will be returned to Clark County for the necessary log-in procedures.

The items listed herein must be thoroughly addressed and submitted for review prior to acceptance of this study.

A study review workshop with WILLDAN may be scheduled if there are questions concerning the above listed comments.

CONCURRENCE BY CLARK COUNTY DEVELOPMENT SERVICES DEPARTMENT:

Chris O. Stone, P.E. 8/30/06
Signature Date

COMMENTS: ccw see Attached

cc: Kevin K. Elliott, P.E.
Regena Tee Pee LLC

P:\Projects\CCPW\CCPW-3249\Project 5300\5338-1.doc

Centennial/Conquistador (5338)
HTE# 06-35297
August 30, 2006
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Item 2 – Refer to additional comment #6 below. Note that any storm drain to be proposed to meet the dry lane criteria in the "Centennial / Hualapai" (HTE# 06-36202) study will need to be coordinated between these two projects.

Item 5 –

- g. Label the ROW for Regena Avenue on the grading plans.
- h. Extend detail K/DT-1 to encompass the entire ROW.
- i. Label the description of the private interior streets used to convey flows to include drainage easement.
- j. Revise detail P/DT-1 to remove the driveway section from the drainage easement delineation.
- k. Label the drainage easements to be privately maintained by the HOA in detail P/DT-1.

Additional Comments

- 6. Coordinate the project with "Centennial/Hualapai" (HTE# 06-36202) also by CVL Consultants, Inc. The development of that project outputs flows to Regena Avenue and flow quantities appears greater than currently analyzed for the "Centennial/Conquistador" study on Regena Avenue. Provide an additional hydraulic section for Regena Avenue at the western edge of the project site with the worst case flows approaching the project site. Note that coordination also includes any future developed street conditions that will convey this flow east.
- 7. Provide an additional basin map showing the impact from the development of the "Centennial/Hualapai" (HTE# 06-36202) study. It appears that the upstream basin delineation will be changed. Verify that all hydraulic analysis is done using the worst case condition flows.
- 8. It appears that there is another low point north of the currently proposed drainage easement along the western perimeter of the project site. Provide an additional drainage easement to accept the offsite flows or provide positive drainage to the currently proposed drainage easement. Grading proposed outside of the project boundary and on private property will require notarized, written permission from the offsite owner and **included with the next submittal.**

Centennial/Conquistador (5338)
HTE# 06-35297
August 30, 2006
Page 4 of 4

9. It appears that the finished floors for lots along Centennial Parkway are set below the depth of flow in Centennial Parkway. Provide solid grouting for the proposed wall in order to provide freeboard at least twice the depth of flow in Centennial Parkway.
10. It appears that there have been no ROW dedications along Centennial Parkway and Regena Avenue outside of the project boundary for the proposed pavement transitions. If there are patent easements which permit the proposed street improvements, it must be shown on the grading plans with the document # labeled. If there are no patent easements for these lots, notarized written permission from the offsite owner will be required.
11. Clark County records shows BLM access easements dedicated along Centennial Parkway to the east and west of the project site. Verify the size and location of the access easements and show on the grading plans. Note that no permission will be required if the pavement transitions can be constructed entirely within the access easement.
12. Hydraulic section 5 shows flows along the common element along Centennial Parkway in detail O/DT-1 to be erosive and erosion protection must be provided.
13. Hydraulic section 6 shows flows along the landscape element along Regena Avenue in detail D/DT-1 to be erosive and erosion protection must be provided for the affected sections.
14. It is noted that the study is conservative with the hydrology by using type D soil in lieu type B. However, it appears that the project's proposal to convey the 71 cfs through the project site may adversely impact APN 125-30-110-003 which appears to have a finished floor set below the street as flows on Regena Avenue flow splits at Conquistador Street. Please provide a pre and post hydraulic analysis for the flows at the southeast corner of the project site. The development of the project site should not adversely impact the adjacent properties from the existing conditions. Please address any increases in the water surface elevation and whether the adjacent properties will be properly flood protected.

GH/ccw

PZ204I01

Clark County Land Development System
Location Project Inquiry Selection

8/04/06
09:20:11

Property address . : *NONE

Type options, press Enter.

1=Select 6=Gen'l info 7=Proj data 8=Proj text 9=Proj names
10=Reviews 11=Locations 12=Fees/receipts 13=Conditions 14=Key dates
15=Notice letters 16=Proj Documents

Opt	Proj Nbr	Description	Type
	06 00500019	TM/DR CENTENNIAL/CONQUISTADOR	MAP
<u>13</u>	06 00000545	WS	LAND
—	05 00100109	NZC/PUD	PRE
	05 00100088	PUD	PRE
<u>13</u>	05 00002018	ZC/UC	LAND

F3=Exit F11=Toggle description F12=Cancel

PZ501I01

Clark County Land Development System
Project Conditions Inquiry

8/04/06

Project number . . . : 06 00000545
Project description . : WS

Type options, press Enter.
5=View

Opt	Description	Status
<u>5</u>	BCC CONDITIONS	A

F3=Exit F12=Cancel

APPROVED -

Current Planning

- All applicable standard conditions for this application type.
- Applicant is advised that any change in circumstances or regulations may be justification for the denial of an extension of time; and that this application must commence within 2 years of approval date or it will expire.

Civil Engineering

- Clark County Fire Department approval for over length cul-de-sac.

PZ501I03

Clark County Land Development System
Project User Defined Condition Inquiry

8/04/06
09:20:51

Project number : 06 00000545
Project description . . . : WS
Condition desc : BCC CONDITIONS
Condition status : ADOPTED
Notify Bldg Permits . . . : N

Press Enter to continue.

F3=Exit F5=View condition text F12=Cancel

TECHNICAL DRAINAGE STUDY ADDENDUM No. 2

Agave Crest

City of Las Vegas, Nevada

Job No.: RAH1723.000

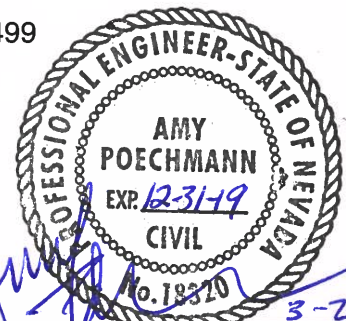
Date: March 2018

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



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 Addendum No. 2 Date: March 2018
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	☐ Subdivision Map	☐ Clearing and grading Only
☐ Parcel Map	☒ Planned Unit Development	☐ Other (Please specify below)
☐ Large Parcel Map	☐ Building Permit	☐

1. Total Owned Land Area: At Site: ±16.9 ac Being Developed/Disturbed: ±16.9 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



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.

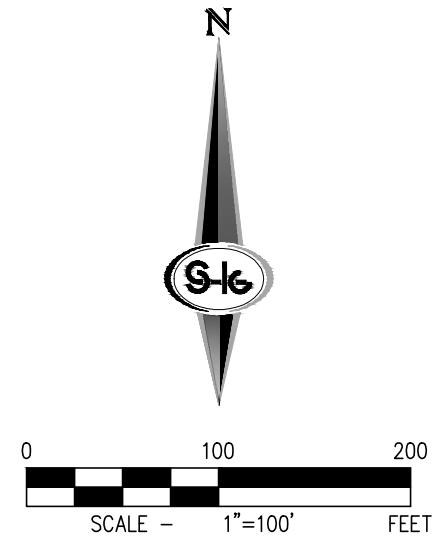
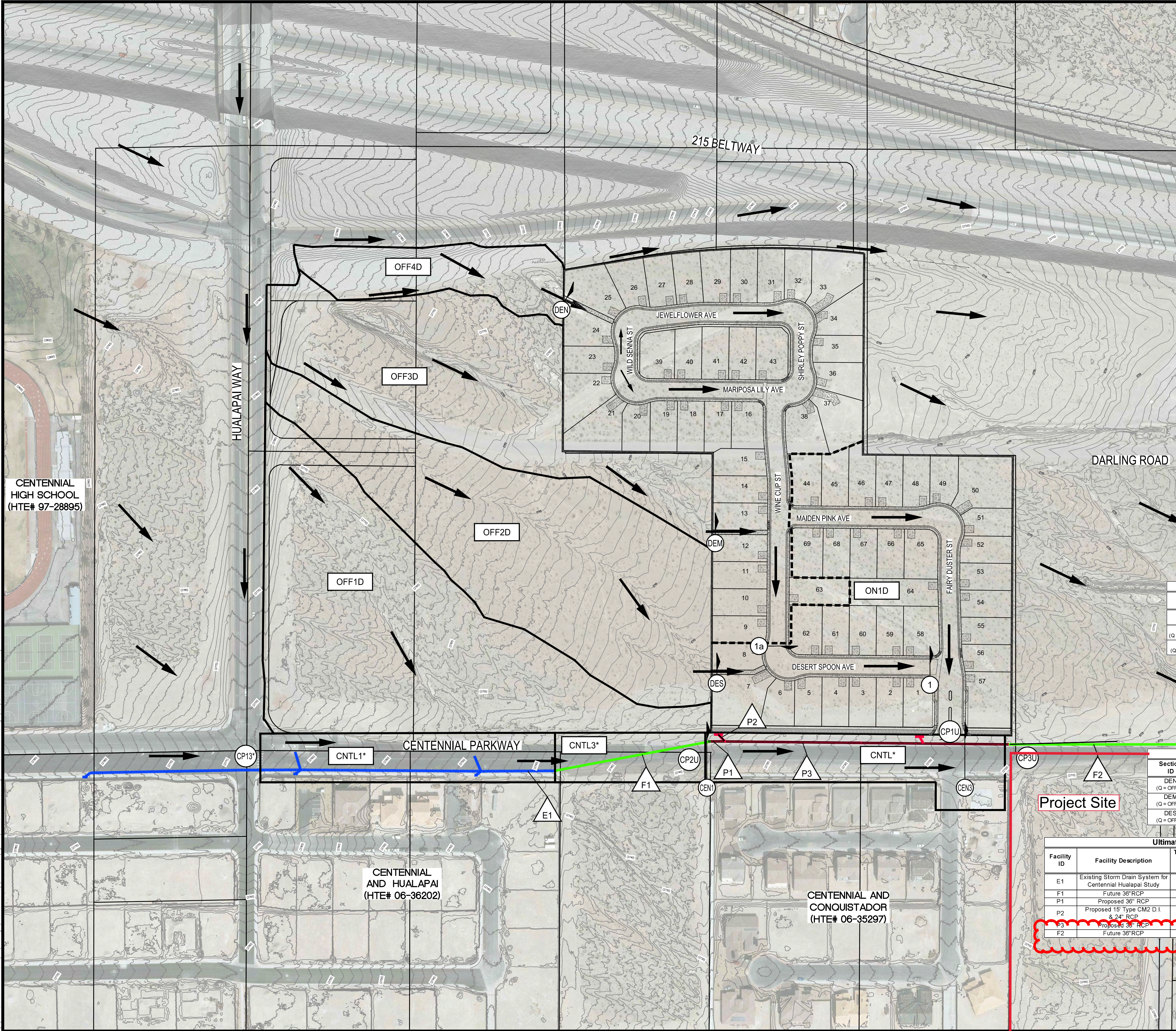
*Newly Required Field

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

Local Entity File No.	Revision	Date

REFERENCE: STANDARD FORM 1

Updated 05/01/2008



LEGEND	
	BASIN BOUNDARY
	SUBBASIN BOUNDARY
	BASIN ID
	CONCENTRATION POINT ID
	FLOW DIRECTION
	FLOWMASTER SECTION
	FACILITY ID
	EXISTING STORM DRAIN FACILITY
	PROPOSED STORM DRAIN FACILITY
	FUTURE STORM DRAIN FACILITY

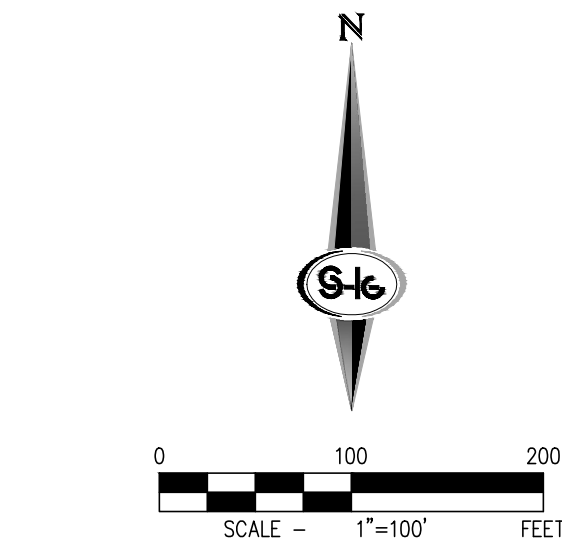
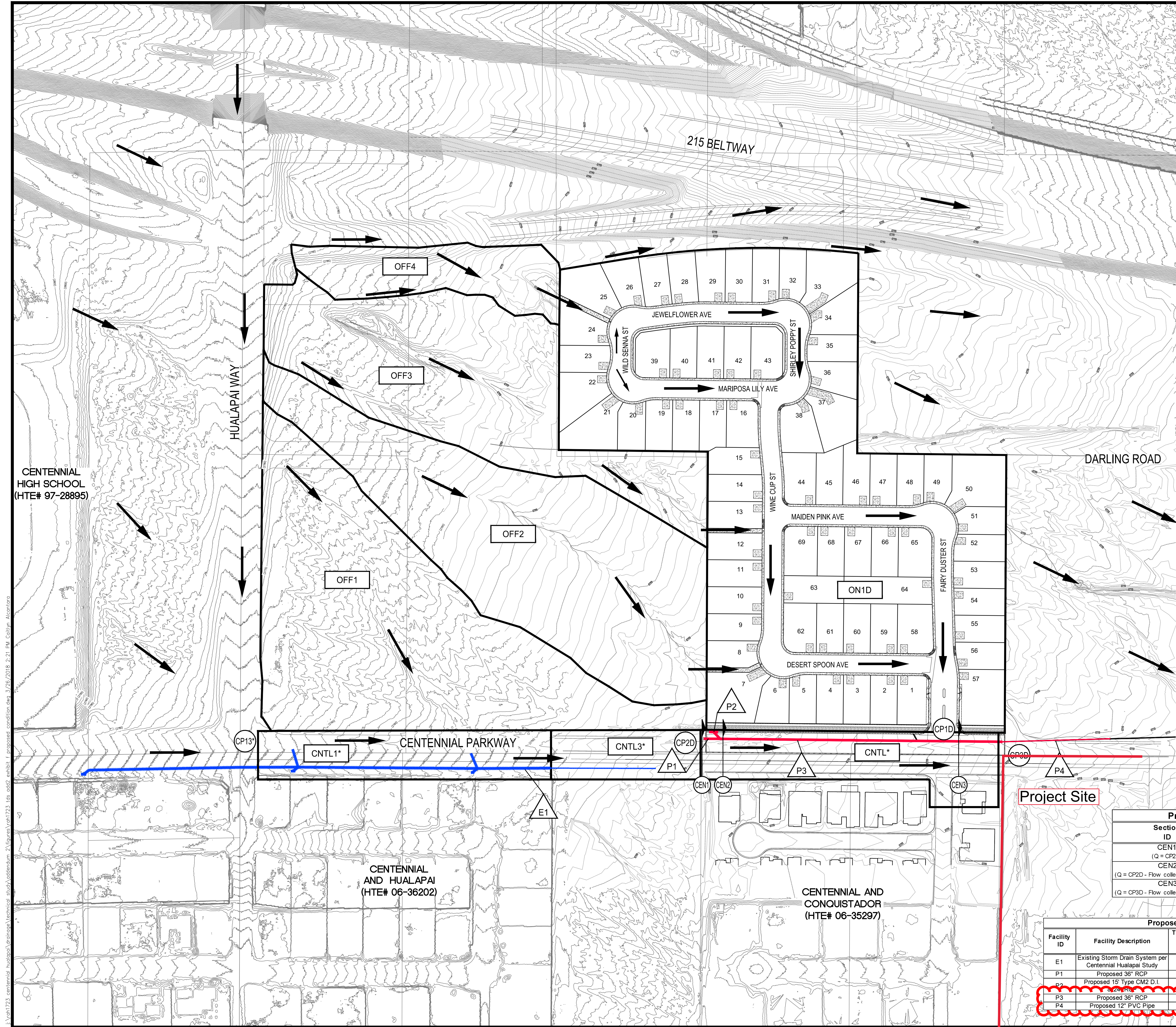
Ultimate Condition Flow Rate Summary			
Basin/Concentration Point ID	Area (ac)	Q ₁₀₀ (cfs)	Q ₁₀ (cfs)
ON1D	16.9	28	8
OFF1D	7.3	19	8
OFF2D	6.8	18	8
OFF3D	5.3	14	6
OFF4D	1.6	3	1
CNTL1*	1.5	6	3
CNTL3*	0.78	3	2
CNTL*	1.91	8	4
CP1U	N/A	60	22
CP13*	N/A	227	114
Q = OFF1D + OFF2D + OFF3D + OFF4D	N/A	26	13
Q = CP1U + CP2U + CNTL	N/A	331	157

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	6.31	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
1a (Q = OFF4 + OFF3D + ON1D(a))	31	0.53	0.65	3.52	2.29
CEN (Q = Facility F2 Surface Flow)	266	1.55	0.47	3.75	1.8
		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	0.41	5.95
DEM (Q = OFF3D)	14	10	Weir	0.42	0.72
DES (Q = OFF2D)	18	10	Normal Depth	0.74	8.46
			Weir	0.77	1.81
			Normal Depth	0.95	6.70
			Weir	0.99	1.82

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
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
P1	Proposed 36" RCP	263/131	40/40	223/91
P2	Proposed 15" Type CM2 D.I. & 24" RCP	223/91	25/25	198/96
F3	Proposed 36" RCP	263/131	65/65	198/96
F2	Future 36" RCP	331/157	65/65	266/92



LEGEND	
	BASIN BOUNDARY
	BASIN ID
	CONCENTRATION POINT ID
	FLOW DIRECTION
	FLOWMASTER SECTION
	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	N/A	241	120
CP3D	N/A	289	133
Q = CP1D + CP2D + CNTL			

*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.	241/120	21/31	210/89	SDD#1
P3	Proposed 36" RCP	241/120	31/31	210/89	
P4	Proposed 12" PVC Pipe	289/133	31/31	258/102	Temporary Facility

CENTENNIAL HIGH SCHOOL (HTE# 97-28895)

CENTENNIAL AND HUALAPAI (HTE# 06-36202)

CENTENNIAL AND CONQUISTADOR (HTE# 06-35297)

Project Site

NO.	DESCRIPTION	DATE	BY	APP.

RICHMOND AMERICAN HOMES
AGAVE CREST
PROPOSED DRAINAGE CONDITION

DATE: MAR 2018
DRAFTER: CAA
DESIGNER: CAA
CHECKED: ARP
PROJECT NO.
RAH1723-000

DS #:

4941

APN: 125-19-401-005, -006, -009, -010, -011 & 125-19-499.002

PROJECT:

Agave Crest

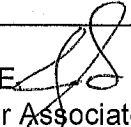
SUBMITTAL:

CCPW

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS			DATE:
INTER-OFFICE MEMORANDUM			August 23, 2018
TO: Land Development Services Department of Building & Safety			FROM: Jennifer Shinn, P.E.  Flood Control Engr Associate Department of Public Works
SUBJECT:	Drainage Study for: Agave Crest		COPIES TO: Slater Hanifan Group
Cross Streets:	NEQ of Hualapai Way & Centennial Pkwy.		Richmond American Homes
File Number:	F:\Depot\DSMemos\DS4941D.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 #
1 st Submittal	12/18/2017	1/3/2018 & 1/16/2018	See Comments Below	\$400.00	492256: \$400
2 nd Submittal	2/20/2018	3/6/2018	See Comments Below	\$400.00	493432: \$400
3 rd Submittal	3/28/2018	4/11/2018	See Comments Below	\$400.00	494444: \$400
CCPW	8/15/2018	8/23/2018	Concurrence Recv'd	N/C	N/C
TOTAL FEES (LDDRS):				\$1200.00	----

REMARKS:

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

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

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

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

END OF REMARKS

jks

T/R/S: T19S/R60E/19

AREA G-19



Department of Public Works

500 S Grand Central Pky • Box 554000 • Las Vegas NV 89155-4000
(702) 455-6000 • Fax (702) 455-6040

Denis Cederburg, P.E., Director • E-Mail: dlc@ClarkCountyNV.gov

REC'D 8/15/18
DS4941
N/C
G-19

Drainage Study Concurrence Letter

Date: May 10, 2018
Firm: Slater Hanifan Group
Engineer: Amy Poechmann, P.E.
Address: 5740 South Arville Street, Suite 216, Las Vegas, NV 89118
Phone: (702) 284-5300
Fax: (702) 284-5399
E-mail: apoechmann@shg-inc.com

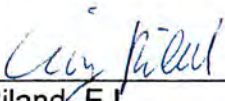
Subject: Technical Drainage Study for Agave Crest
Location: NEC of Centennial Pkwy and Hualapai Way
APN: 125-19-401-005, -006, -009, -010, -011, 125-19-499-002
Sec, Township, Range: S19, T19S, R60E
Flood Zone & Panel: Zone X, 1745E and 1750E, Dated September 27, 2002
Application Number: PW18-12942

Submittals	Date Received	Date Returned	Reviewer	Miscellaneous
Technical	04/11/2018	05/07/2018	CR	
Addendum 1	04/11/2018	05/07/2018	CR	
Addendum 2	04/11/2018	05/07/2018	CR	
Supplement	05/09/2018	05/10/2018	CR	Email and delivery at counter

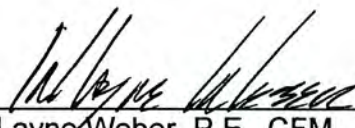
The above-referenced project is located within the **City of Las Vegas** adjacent to Clark County unincorporated areas. The drainage study was submitted to the County for concurrence on April 11, 2018. In addition, the County has received the City of Las Vegas acceptance letter dated April 11, 2018 for the Technical Drainage Study (DS4941C).

The County concurs with the acceptance of this Drainage Study by the City of Las Vegas. Please note that the County's review of this development is limited to drainage issues significant to Clark County unincorporated areas.

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.



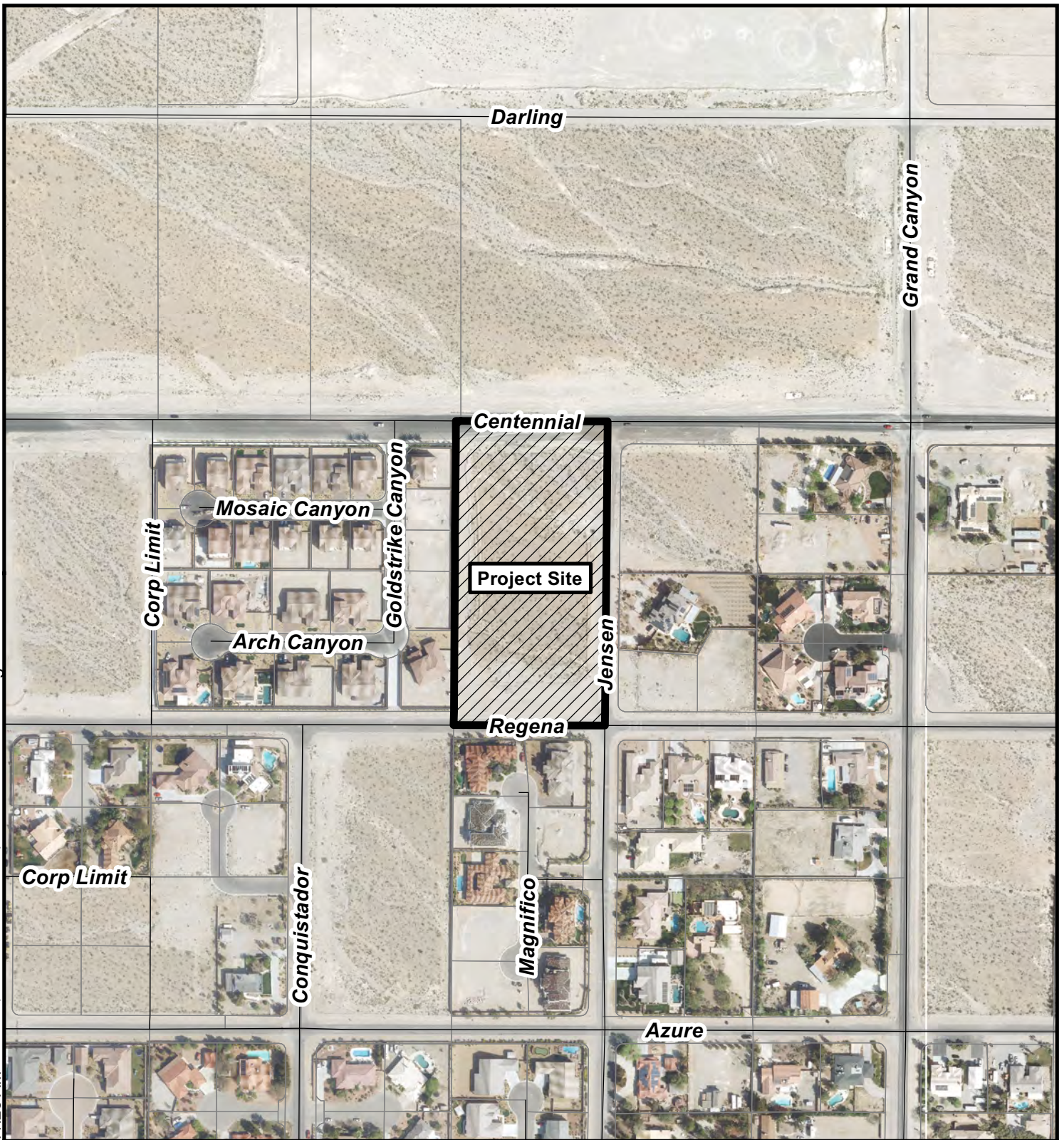
Crissy Riland, E.I.
Associate Engineer
Development Review
crissy@ClarkCountyNV.gov



W. Layne Weber, P.E., CFM
Principal Engineer
Development Review
wlweber@ClarkCountyNV.gov

APPENDIX D

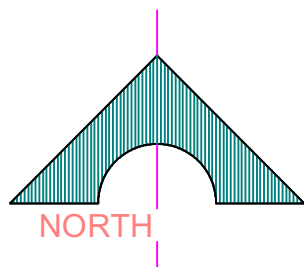
Figures



GRAPHIC SCALE



1 in = 300 ft



DEVELOPER
PROJECT NAME

FIGURE 1
VICINITY MAP

GCV
ENGINEERS SURVEYORS

1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

National Flood Hazard Layer FIRMette



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
MAP PANELS		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/21/2018 at 11:21:19 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Figure 2



ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
GOEC		GOWAN NORTH - EL CAPITAN BRANCH						
0000	P1	10" X 7" RCB	1445	1233	CLWFR-C	ALLGOW3	2.20	1.36
0026	P1	10" X 8" RCB	1320	1162	CWRJS-C	ALLGOW3	1.95	0.91
0051	P1	10" X 7" RCB	1320	1027	CHLFR-C	ALLGOW3	1.69	1.06
0076	P1	10" X 6" RCB	1320	894	CARFR-C	ALLGOW3	1.45	1.06
0100	P1	10" X 6" RCB	1320	745	CEAFR-C	ALLGOW3	1.21	0.76
0126	P1	10" X 7" RCB	1320	635	CTRFR-C	ALLGOW3	0.96	0.38
0152	P1	7" X 6" RCB	1320	485	CARFF-C	ALLGOW3	0.70	0.77
0176	P1	78" RCP	1320	363	CCPFR-C	ALLGOW3	0.46	1.15
GOL2		GOWAN LONE MOUNTAIN SYSTEM-BRANCH 2						
0000	E	5' X 4" RCB	150	461	CRBW	ALLGOW3	0.44	14.60
0003	E	66" RCP	607	461	CRBW	ALLGOW3	0.44	1.97
0014	E	84" RCPC @ Alexander	125	461	CRBW	ALLGOW3	0.44	4.00
GOLM		GOWAN LONE MOUNTAIN SYSTEM						
0000	E	78" RCP	2590	345	CLV15-C	ALLGOW4	11.88	1.80
0049	E	6' X 5" RCB	585	345	CLV15-C	ALLGOW4	11.88	1.87
0060	E	66" RCP	817	345	CLV15-C	ALLGOW4	11.88	2.40
0075	E	60" RCP	1385	345	CLV15-C	ALLGOW4	11.88	2.55
0101	E	54" RCP	701	190	LMTNDB	ALLGOW4	11.52	1.74
0115	E	48" RCP	1799	190	LMTNDB	ALLGOW4	11.52	3.08
0140	E	42" RCP	439	190	LMTNDB	ALLGOW4	11.52	1.60
0142	E	48" RCP	348	190	LMTNDB	ALLGOW4	11.52	2.14
0144	E	66" RCP	196	190	LMTNDB	ALLGOW4	11.52	5.44
0145	E	66" RCP Outlet	378	190	LMTNDB	ALLGOW4	11.52	0.90
0146	E	888 ac-ft Lone Mountain Detention Basin		7252	LMTNIN	GW3SC	6.13	
0147	E	36,000 cfs PMF Spillway		36000	LMTNIN	GW3SC	6.13	
0150	E	Drop Structure	481	6323	CGABW	GW3SC	5.12	
0162	E	28' X 8' RCBC @ Hualapai	625	6323	CGABW	GW3SC	5.12	1.86
0174	E	Conc Chnl 28"W 8'D 0:1 SS	2715	6173	CCLMT5	GW3SC	4.92	3.20
GOLO		GOWAN OUTFALL - LONE MTN. ROAD BRANCH						
0275	E	8' X 6" RCB	3000	590	CPT3AA2	ALLGOW3	1.16	0.77
GONO		GOWAN NORTH SYSTEM						
0000	E	8' X 8" RCB Outlet	184	558	GWNNDB	ALLGOW5	68.49	0.51
0001	E	8' X 8" RCB Outlet	156	558	GWNNDB	ALLGOW5	68.49	0.63
0006	E	30,780 cfs PMF Spillway		30780	GWNNDB	ALLGOW5	68.49	
0008	E	921 ac-ft Gowan North Detention Basin		4937	CCLV43-C*	GW4SC	11.93	
0009	E	3: 13" X 8" RCB	1662	4563	CLV43-C	GW4SC	11.24	0.62
0012	E	Conc Chnl 30"W 8"-9.5'D 0:1 SS	2665	4117	CCLV36-C	GW4SC	8.54	1.18
0062	E	Bridge 30"W 8.5'D @ Cimarron	80	3844	CCLV15-C	GW4SC	8.03	0.30
0063	E	Conc Chnl 30"W 8.5'-10'D 0:1 SS	2302	3844	CCLV15-C	GW4SC	8.03	1.00
0110	E	2: 12" X 8" RCAC @ Alexander	547	3352	CCRSFR-C*	GW3SC	6.10	1.00
0117	E	2: 12" X 8" RCAP	424	3352	CCRSFR-C*	GW3SC	6.10	1.10
0124	E	Conc Chnl 24"W 9'D 0:1 SS	887	3352	CCRSFR-C*	GW3SC	6.10	1.36
0141	E	Conc Chnl 24"W 9'-10.5'D 0:1 SS	2064	3352	CCRSFR-C	GW3SC	6.10	0.59
0181	E	Bridge 30"W 7'D @ Craig	142	2846	CRSFR-C	GW3SC	5.20	0.65
0183	E	Conc Chnl 22"W 8'-10.6'D 0:1 SS	2193	2846	CRSFR-C	GW3SC	5.20	0.72
0225	E	Conc Chnl Width Varies Depth Varies 0:1 SS	508	2605	CCLWFR-C	GW3SC	4.54	1.05
0230	E	13' X 5' RCB	256	1486	CCWRHW-C	GW3SC	2.34	2.78
0234	E	12' X 6' RCB	2010	1486	CCWRHW-C	GW3SC	2.34	1.67
0272	E	10' X 6' RCB	2797	1486	CCWRHW-C	GW3SC	2.34	3.15
0325	E	15' X 7' RCB	291	1486	CCWRHW-C	GW3SC	2.34	1.79
0335	E	15' X 7' RCB	529	1486	CWRHW-C	ALLGOW3	2.34	1.79
0350	P1	10' X 9' RCB	3473	1486	CWRHW-C	ALLGOW3	2.34	0.88
0411	P1	10' X 9' RCB	1320	1404	CARHW-C	ALLGOW3	1.89	0.76
0436	P1	10' X 7' RCB	1320	1173	CEAHW-C	ALLGOW3	1.53	1.14
0461	P1	10' X 9' RCB	1320	959	CTRHW-C	ALLGOW3	1.22	0.38
0486	P1	8' X 7' RCB	1320	747	CADHW-C	ALLGOW3	0.90	0.76
0511	P1	7' X 6' RCB	1320	546	CCPHW-C	ALLGOW3	0.60	1.14

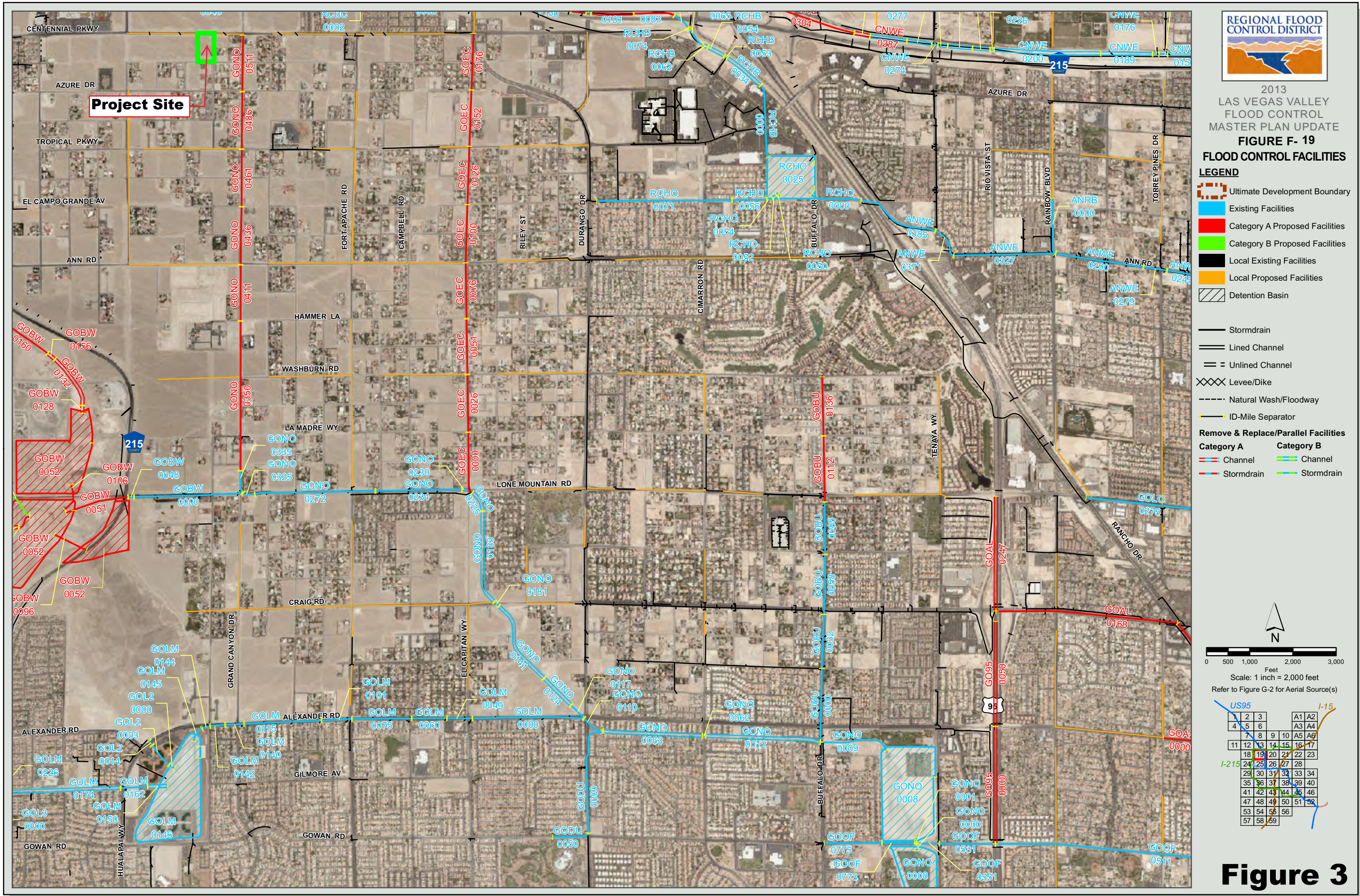
* The HEC-1 node shown identifies the controlling concentration point for the associated facility and is located upstream of this facility due to decreasing peak flow with increasing tributary area caused by storm distribution transitions, depth area reduction factors, or attenuation of flow from routing.

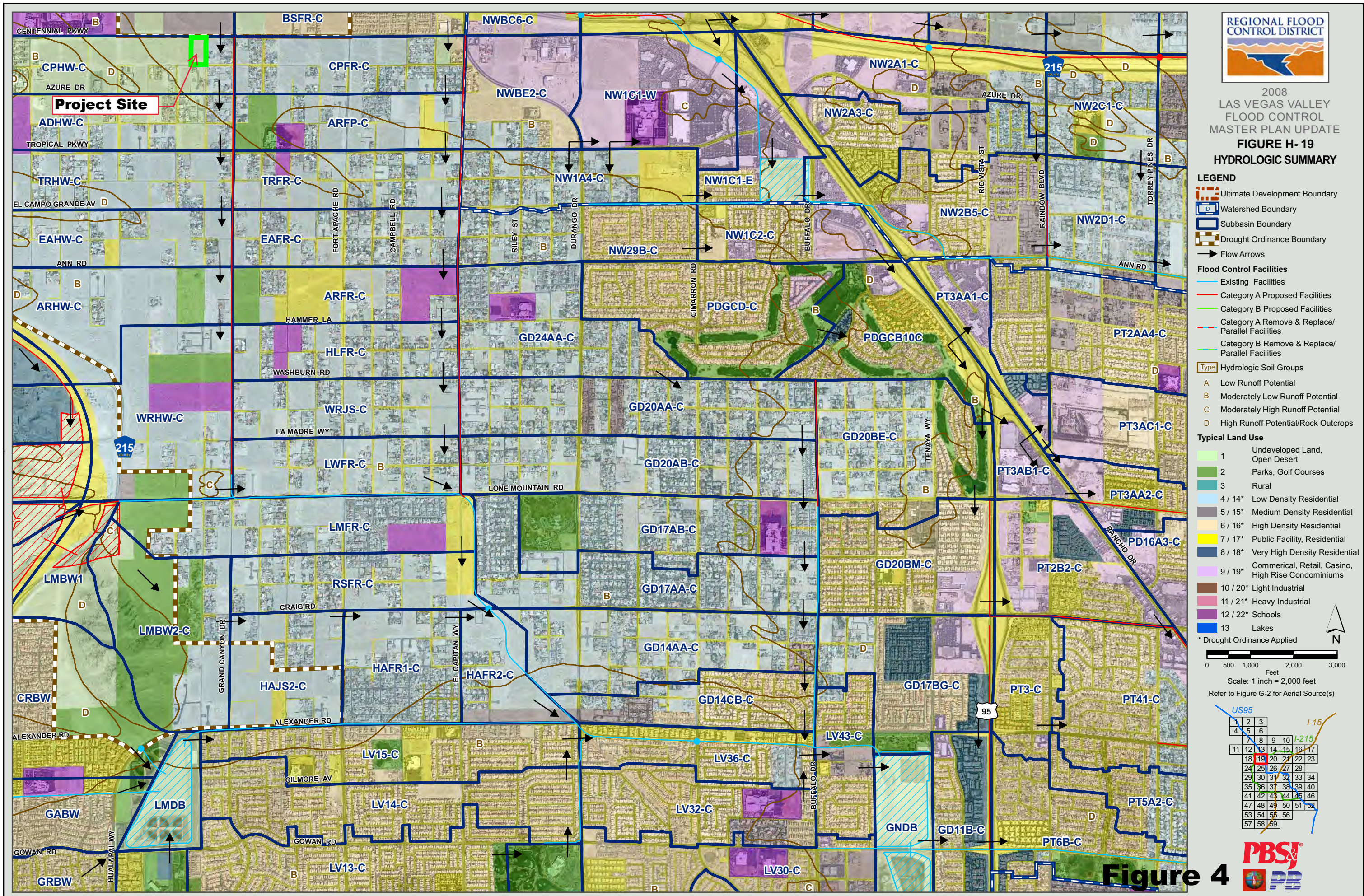
** As-built or design slopes were used when available. All other slopes are based on existing topography. The user should verify the facility slope listed prior to performing any facility specific analysis.

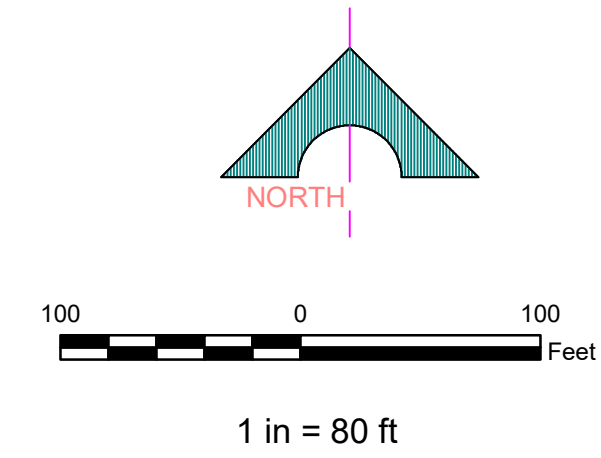
^ For parallel facilities, the existing facility flow equals its normal depth capacity, and the proposed parallel facility flow equals the remaining flow (i.e., HEC-1 Node flow = existing facility normal depth capacity + proposed parallel facility flow).



Figure 3





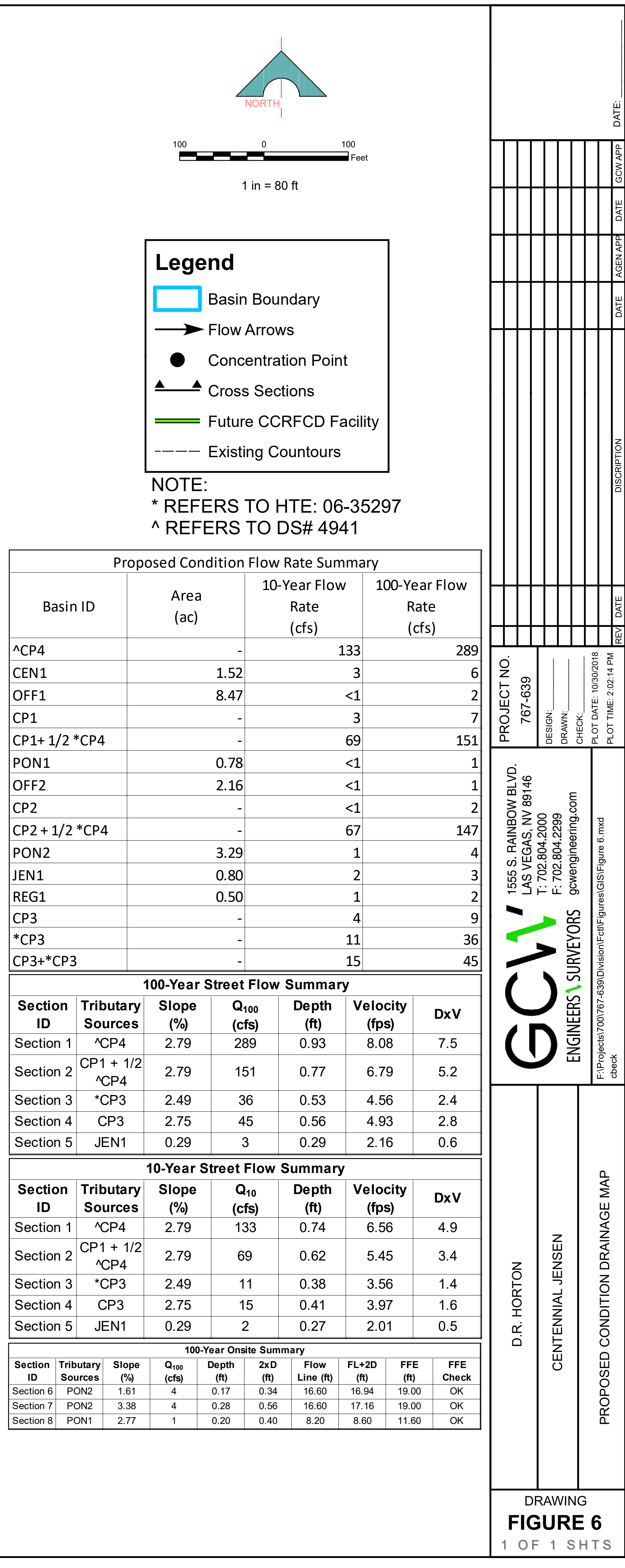


- Basin Boundary
- Flow Arrows
- Concentration Point
- Future CCRFCD Facility
- Existing Countours

Existing Condition Flow Rate Summary

Existing Condition Flow Rate Summary			
Basin ID	Area (ac)	10-Year Flow Rate (cfs)	100-Year Flow Rate (cfs)
^CP4	-	133	289
CEN1	1.52	3	6
OFF1	3.08	<1	2
CP1	-	3	7
CP1+ 1/2 *CP4	-	69	151
EON1	1.84	<1	1
OFF2	2.16	<1	1
CP2	-	<1	2
CP2 + 1/2 *CP4	-	67	147
EON2	2.64	<1	1
JEN1	0.20	<1	1
REG1	0.50	1	2
CP3	-	2	4
*CP3	-	11	36
CP3+*CP3	-	13	40

GCL
ENGINEERS & SURVEYORS
Projects\700\767-639\Division\Fc11\Fig1
eck



830

LOT NUMBER

PAD= 00.0

F.F.= 00.0

PAD ELEVATION
FINISH FLOOR ELEVATION

PAD= (00.0)

F.F.= (00.0)

EXISTING PAD ELEVATION
EXIST. FINISH FLOOR ELEV.

SCARP

4510

EXISTING CONTOUR
(5' INTERVAL)

EXISTING CONTOUR
(1' INTERVAL)

CONCRETE DRIVEWAY

SDMH

STORM DRAIN MANHOLE

SVZ SIGHT VISIBILITY
ZONE, NO STRUCTURES/
LANDSCAPING TALLER
THAN 24

FIRE HYDRANT

RIPRAP

GROUTED RIPRAP

DROP INLET

59.33

GB

PROPOSED ELEVATION

56.22

TC OF FG

EXISTING ELEVATION

56.01

EG

RIGHT-OF-WAY

PROPERTY LINE

CENTER LINE

RETAINING WALL

MATCHLINE

SIDEWALK

DITCH OR SWALE

CURB TRANSITION AT
SIDEWALK RAMP (R
CURB TO L CURB)

PROPOSE 8 SEWER

PROPOSE 8 WATER

PROPOSE STORM DRAIN

EXITING STORM DRAIN

LEGEND

ABBREVIATIONS

AC

BSW

BVN

C.C.A.S.D.

CONC

EVC

FF

FG

FL

GB

HP

INV

LF

NVE

P.U.E.

RET.

R.O.W., R/W

SW

STLT

TF

TW

TWF

TB

UDACS

(F.A.S.T.)

ASPHALTIC CONCRETE

BACK OF SIDEWALK

BEGIN VERTICAL CURVE

CLARK COUNTY AREA STANDARD DRAWING

CONCRETE

END VERTICAL CURVE

FINISH FLOOR

FINISH GRADE

GRADE LINE

GRADE BREAK

HIGH POINT

INVERT ELEVATION

LINEAR FEET

NEVADA ENERGY

PUBLIC UTILITY EASEMENT

RETAINING WALL

RIGHT OF WAY

SIDEWALK

STREETLIGHT

TOP OF CURB

TOP OF FOOTING

TOP OF WALL

TOP OF WROUGHT IRON FENCE.

TOP OF BERM

UNIFORM DESIGN AND CONSTRUCTION STANDARDS

FREWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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:

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. COMPACTION SHALL COMPLY WITH THE REQUIREMENTS OF THE ENGINEER.

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, SUCH ITEM SHALL BE PROVIDED, AS DIRECTED BY THE CITY ENGINEER, AT NO EXPENSE TO THE CITY OF LAS VEGAS. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

REVISED 4/15/10

CITY OF LAS VEGAS TRAFFIC NOTES

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.

2. THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.

3. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAIL SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.

4. WHEN A DESIGNATED "SUGGESTED ROUTE TO SCHOOL" IS ENCLOSED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD", THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.

5. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.

6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PERMANENT SIGNS SHOWN ON THE PLANS. ALL NEW TRAFFIC SIGNS SHALL UTILIZE TYPE XI RETROREFLECTIVE SHEETING IN ACCORDANCE WITH CCAUSS 627 AND 716 AND SHALL HAVE AN ANTI-GRAFFITI PROTECTIVE OVERLAY FILM THAT IS A MATCHING COMPONENT TO AND OF THE SAME MANUFACTURER AS THE RETROREFLECTIVE SHEETING TO WHICH IT IS APPLIED. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.

7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE (5') FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.

8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HERE UNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.

9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.

10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR MSA WORK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT OF WAY.

11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.

12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING REGIONAL TRANSPORTATION COMMISSION OF SOUTHERN NEVADA (RTC), IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET TO ARRANGE FOR TEMPORARY RELOCATION OF STOP.

13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE # 828-3442) WHO WILL PROVIDE OFFICERS TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THESE OFFICERS SHALL BE SET BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.

14. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.

15. THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT'S OFFSITE INSPECTOR PRIOR TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY TEMPORARY OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION SUPERVISOR TO THE FINAL PAVEMENT MARKINGS AND SIGNAGE, WHICH MAY INCLUDE OMITTING, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

REVISED JUNE 4, 2018

SOUTHERN NEVADA - SOUTHWEST GAS CORPORATION GENERAL NOTES

1. IN THE EVENT OF NATURAL GAS EMERGENCIES CALL 911 AND 1-877-860-6020 THERE SHALL BE A MINIMUM HORIZONTAL AND VERTICAL CLEARANCE OF 12-INCHES BETWEEN NATURAL GAS FACILITIES AND ANY UNDERGROUND FACILITIES AND/OR STRUCTURES, INCLUDING BUT NOT LIMITED TO WATER, SEWER, STORM DRAIN, COMMUNICATIONS, AND ELECTRIC.

3. FOR VALVE ADJUSTMENT CONTACT 702-668-6107 48 HOURS PRIOR TO CONSTRUCTION

4. IN THE EVENT OF A NATURAL GAS CONFLICT WITH PROPOSED UTILITIES AND/OR STRUCTURES CONTACT 702-365-2099

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 THE INSTALLATION OF ON-SITE, WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK. [IFC SECTION 105.7.12]

4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. [IFC SECTION 3310, SECTION 3312]

5. TO IDENTIFY FIRE HYDRANT LOCATIONS, CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF STREET ADJACENT TO THE FIRE HYDRANTS [IFC SECTION 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 SECTION 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 SECTION 507.2.1]

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 SECTION 507]

9. PRIVATE FIRE HYDRANTS SHALL BE PAINTED RED. [IFC SECTION 507]

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 SECTION 507]

11. FIRE HYDRANTS SPACING SHALL BE AS FOLLOWS: [IFC SECTION 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 1,000 FOOT 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 FEET ON AN ALTERNATING BASIS. [IFC SECTION 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 FEET OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. [IFC SECTION 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 SECTION C102.4]

16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FEET, AS MEASURED BY AN APPROVED ROUTE. [IFC SECTION C102.7]

17. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. [IFC SECTION C102.6]

18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE IS 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS ARE INSTALLED ON A SINGLE SYSTEM. SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN. [IFC SECTION 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 SECTION 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 SECTION 503.2.7, SECTION 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 FEET 6 INCHES. [IFC SECTION 503.2.1]

23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 40FT 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 NOT BE LESS THAN 24 FT. [IFC SECTION 503.2.1.1]

24. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL FO THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. THIS DISTANCE COULD BE INCREASED TO 250 FT IF THE BUILDING IS SPRINKLERED. [IFC SECTION 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 SECTION 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 SECTION 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 FT 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 IN STALLED NO HIGHER THAN 10 FT OR LESS THAN 6 FT FROM THE ROADWAY FLOW LINE. THE CURB ALONG OR ON THE PAVEMENT OR GEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. [IFC SECTION 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 SECTION 503.6 AND IFC APPENDIX M.

LAS VEGAS FIRE DEPARTMENT

DATE

REVISED MARCH 1, 2016

Call before you Dig

Avoid cutting underground utility lines. It's costly.

Call 811

OR 1-800-227-2600

FAST

Call before you UnderGround

1-702-432-5300

FREWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

CALL BEFORE YOU DO OVERHEAD

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.

1-702-227-2929

QUANTITY ESTIMATE

NOTE: CONTRACTOR TO VERIFY QUANTITIES FOR BIDDING PURPOSES

DESCRIPTION	UNIT	TOTAL
2" AC PAVEMENT (PRIVATE)	SY	
4" AC PAVEMENT (PUBLIC)	SY	
6" AC PAVEMENT (PUBLIC)	SY	
TYPE II AGGREGATE BASE MATERIAL (PRIVATE)	CY	
TYPE I AGGREGATE BASE MATERIAL (PUBLIC)	CY	
TYPE I AGGREGATE BASE MATERIAL (PUBLIC)	CY	
"L" TYPE CURB (PRIVATE)	LF	
"L" TYPE CURB (PUBLIC)	LF	
"R" TYPE CURB (PRIVATE)	LF	
4" SIDEWALK (PRIVATE)	SF	
4" SIDEWALK (PUBLIC)	SF	
SIDEWALK DRAIN	EA	
CROSS GUTTER (PRIVATE)	SF	
CROSS GUTTER (PUBLIC)	SF	
2" WIDE FLUME	LF	
SIDEWALK RAMP (PRIVATE)	EA	
SIDEWALK RAMP (PUBLIC)	EA	
5" TYPE CM2 DROP INLET	EA	
18" RCP SD	LF	

DESCRIPTION	UNIT	TOTAL
12" PVC WATERLINE	LF	
8" PVC WATERLINE	LF	
6" PVC WATERLINE	LF	
12" X 12" TEE	EA	
12" X 8" TEE	EA	
8" X 8" TEE	EA	
12" X 8" REDUCER	EA	
8" X 6" REDUCER	EA	
GATE VALVE SAME SIZE AS LINE	EA	
FIRE HYDRANT, VALVES, TEES, AND 6" WATERLINE	LF	
3/4" WATER METER	EA	
3/4" IRRIGATION METER AND RPPA	EA	
IRRIGATION SLEEVES	LF	
STEEL CASING	LF	
WATER LATERAL	LF	

DESCRIPTION	UNIT	TOTAL
100 W STREET LIGHT	EA	
250 W STREET LIGHT	EA	
RELOCATE STREET LIGHT	EA	
STREET NAME SIGN AND STOP SIGN	EA	
CURB PAINTED RED	LF	
6" SOLID WHITE LINE	LF	
TYPE 4 LANE LINE	LF	
LEFT TURN LANE LINE	LF	
BLUE COLORED MARKERS	EA	
1-1/4" STREET LIGHT CONDUIT	LF	

DESCRIPTION	UNIT	TOTAL
48" SANITARY SEWER MANHOLE	LF	
8" PVC SEWER PIPE	LF	
SEWER LATERAL	EA	
LOW DROP MANHOLE	EA	
CORROSION PROTECTION	EA	
4" PVC SEWER PIPE	LF	
ABANDON SEWER	LF	

FLOOD ZONE NOTE

THIS PROJECT IS LOCATED WITHIN A FEMA DESIGNATED FLOOD ZONE X PER FIRM PANEL 1745 OF 4090 MAP NUMBER 32003C1745 E REVISED SEPTEMBER 27, 2002. A ZONE X IS DEFINED AS BEING OUTSIDE THE 100-YEAR FLOODPLAIN AND NOT LOCATED WITHIN A FEMA-DESIGNATED SPECIAL FLOOD HAZARD AREA.

SOUTHWEST GAS APPROVAL

SOUTHWEST GAS CORP. DATE

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT NO. FIRST APPROVED DATE:

H# CLV DWG#

STORMWATER RUNOFF MANAGEMENT

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 THE CITY OF LAS VEGAS 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 THE CITY OF LAS VEGAS 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.

CITY OF LAS VEGAS STREETLIGHT NOTES

CITY OF LAS VEGAS STREET LIGHT NOTES

1. ALL STREET LIGHTING INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST REVISION (USS), AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA" (USD), LATEST REVISION.

2. DESIGN PROFESSIONAL AND CONTRACTOR SHALL VERIFY CITY'S LATEST LED FIXTURE SPECIFICATIONS AND APPROVED FIXTURES PER CLV WEBSITE, UNDER BUILDING AND SAFETY FORMS, PRIOR TO ORDERING MATERIALS.

3. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS, ETC., LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF THE TRAFFIC AND CITY ENGINEER. ANY DEVIATION FROM THE PLAN LOCATION WILL REQUIRE COMPLIANCE WITH SECTION 623 OF THE USS.

4. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION IN ACCORDANCE WITH SECTION 623 G.03.01 OF THE USS.

5. ALL EMPTY CONDUIT SHALL HAVE AT LEAST ONE GREEN NO. #8 AWG WIRE INSTALLED AS TRACER WIRE IN ACCORDANCE WITH SECTION 623 G.02.01 OF THE USS PRIOR TO BACKFILLING AND FINAL INSPECTION.

6. ANY STRUCTURE SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, ETC. SHALL LEAVE A MINIMUM CLEARANCE IN COMPLIANCE WITH USD NO. 320A WHEN POLE IS INSTALLED BEHIND SIDEWALK, AND SHALL AT NO TIME COMPLETELY ENCLOSE THE STREET LIGHTING POLE.

7. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE TRAFFIC ENGINEERING DIVISION PRIOR TO ANY PRE-FINAL INSPECTION. THE AS-BUILT DRAWING NEEDS TO BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.

8. SERVICE POINTS SHALL BE COORDINATED WITH NV ENERGY, AND WHEREVER POSSIBLE, BE LOCATED NEAR THE CENTER OF THE CIRCUIT. SERVICE POINTS SHALL BE SHOWN ON THE PLANS.

9. WHEREVER THERE IS AN OVERHEAD UTILITY THAT MAY CONFLICT WITH THE INSTALLATION OF STREETLIGHTING CIRCUITS AND/OR POLES, THESE CONFLICTS MUST BE RESOLVED BETWEEN THE DEVELOPER AND THE UTILITIES INVOLVED BEFORE STREETLIGHT BASES ARE INSTALLED, AT NO EXPENSE TO THE CITY OF LAS VEGAS.

10. THE CONTRACTOR SHALL FURNISH COMPLETE CONDUIT, WIRE, ETC. FROM SERVICE TO TRANSFORMERS AND CONTROL SYSTEMS IF REQUIRED ON THE PLANS.

REVISED JUNE 4, 2018 (LD VERSION)

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 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 DRIVEWAY AREAS.

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 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 UNIFORMED STANDARDS, INCLUDING THE PLACEMENT OF ASPHALT PAVING STREET SURFACE. 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 ADJUTING A PUBLIC OR PRIVATE STREET, IF DISTURBED BY THE LVVWD DURING 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.

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 REUSED.

STATE OF NEVADA

KIRBY P. ADAMS

17NOV2018

17NOV2018

PROJECT NO.

767-639

DESIGN

DRAWN

CHECK

PLOT DATE: 10-31-18

14:12:45

1555 S. RAINBOW BLVD.

LAS VEGAS, NV 89146

T: 702.804.2000

F: 702.804.2299

gownengineering.com

DR HORTON

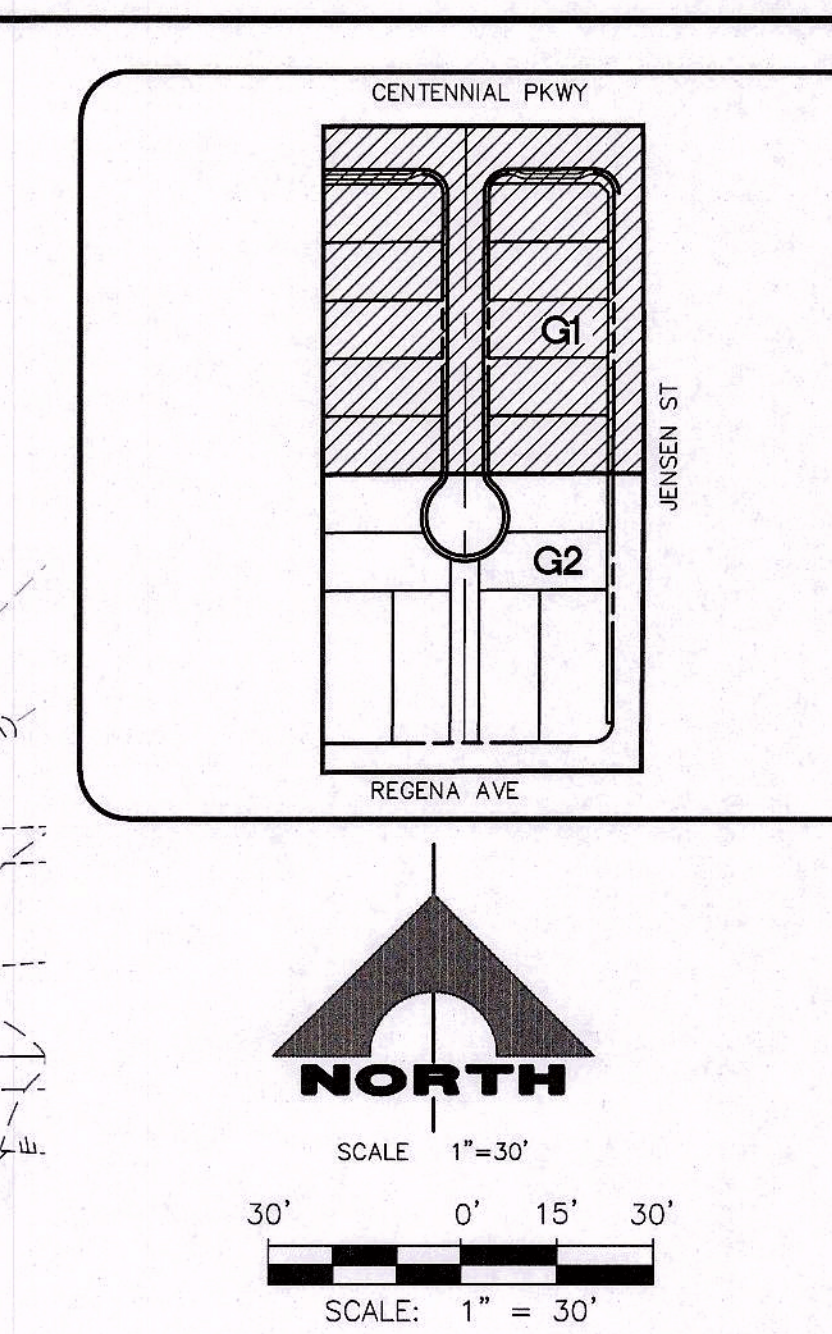
CENTENNIAL JENSEN 5

GENERAL NOTES & QUANTITIES

DRAWING

C2

2 OF 5 SHTS



- 1 CONSTRUCT CONCRETE SIDEWALK PER USDOCA NO. 234.
- 2 CONSTRUCT 8" WIDE VALLEY GUTTER PER USDOCA NO.
- 3 228.8 & 229.
- 4 CONSTRUCT R CURB PER USDOCA NO. 217.3.51.
- 5 SAWCUT & MATCH EXISTING PAVEMENT.
- 6 SAWCUT & MATCH TO EXISTING CURB & SIDEWALK. CONTRACTOR
- 7 SHALL VERIFY EX. LOCATION & PAVEMENT PRIOR TO
- 8 CONSTRUCTION.
- 9 CONSTRUCT "L" CURB PER USDOCA NO. 216.
- 10 CONSTRUCT 2" AC OVER 4" TYPE II BASE PER GEOTECHNICAL H
- 11 # XX-XXXX.
- 12 CONSTRUCT 3" AC OVER 4" TYPE II BASE PER GEOTECHNICAL H
- 13 # XX-XXXX.
- 14 CONSTRUCT HANDICAP RAMP PER USDOCA NO. 235 CASE 1. SEE
- 15 PLAN FOR "A" & "B" DIMENSION.
- 16 CONSTRUCT 5" TRANSITION FROM "L" CURB TO R CURB PER DET
- 17 "L" SHEET DT1.
- 18 SAWCUT & TRENCH PER CCAUSD NO. 500.4, 500.5 & 503.
- 19 EXISTING UTILITY BOX ADJUST TO GRADE.
- 20 EXISTING GATE VALVE & BLOW-OFF ADJUST TO GRADE.
- 21 EXISTING SEWER MANHOLE PROTECT-IN-PLACE.
- 22 CONSTRUCT 5" TRANSITION FROM "R" CURB TO "O" CURB PER
- 23 DETAIL "K" SHEET DT1.

SOUTH 89°47'09" EAST, BEING THE BEARING OF THE NORTH LINE OF NORTHEAST QUARTER (NE 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M. AS SHOWN IN BOOK 149, PAGE 27 OF PLATS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

CITY OF LAS VEGAS VERTICAL CONTROL POINT "1C9030N4", BEING A RIVET & PLATE ELECTRIC PAD 197 SW OF PI OF CENTENNIAL PKWY AND GRAND CANYON DR..

CITY OF LAS VEGAS VERTICAL CONTROL (RE-OBSERVED 2005-2007)
BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

THIS PROJECT IS LOCATED WITHIN A FEMA DESIGNATED FLOOD ZONE PER FIRM PANEL 1745 OF 4090 MAP NUMBER 32003C1745 E REVISED SEPTEMBER 27, 2002. A ZONE X IS DEFINED AS BEING OUTSIDE THE 100-YEAR FLOODPLAIN AND NOT LOCATED WITHIN A FEMA-DESIGNATED SPECIAL FLOOD HAZARD AREA.

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY DS4783 ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

H#	CLV DWG#
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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 OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

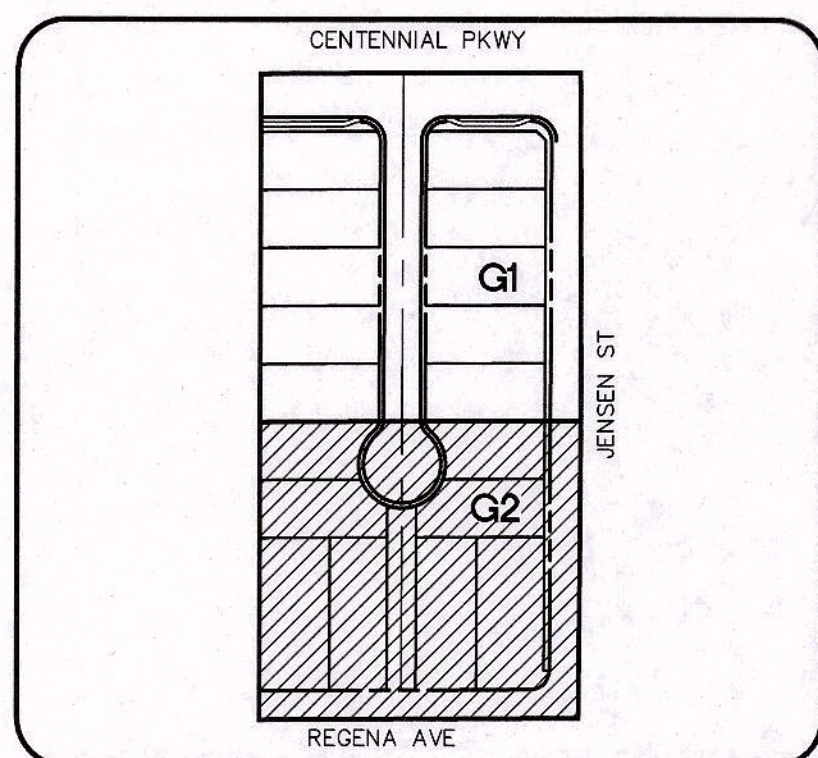


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811
OR
1-800-227-2600



1. THE GEOTECHNICAL EXPLORATION PROPOSED SINGLE FAMILY RESIDENTIAL DEVELOPMENT CENTENNIAL PARKWAY AND JENSEN STREET LAS VEGAS, NEVADA AS PREPARED BY ANGLE ENGINEERING, PROJECT NUMBER 37305-1, DATED JULY 3, 2018.
2. CONSTRUCTION FOR BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE BUILDING SAFETY AND MAINTENANCE DEPARTMENT
3. WALLS CONSTRUCTED OTHER THAN THOSE AS DETAILED ON THIS SHEET ARE TO BE CONSTRUCTED BY WALL SUB-CONTRACTOR, DETAILS AND STRUCTURAL CALCULATIONS AS PREPARED BY OTHERS.
4. NO OBJECT OVER 24" OTHER THAN TRAFFIC CONTROL DEVICES AND STREET LIGHT POLES CAN BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE.
5. ALL PRIVATE STREETS ARE TO BE DEDICATED AS PUBLIC DRAINAGE, EASEMENT AND PUBLIC UTILITY EASEMENT TO BE PRIVATELY MAINTAINED.

1. STANDARD NOTE NO. 1: THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MINOR CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF THE CITY OF LAS VEGAS 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. STANDARD NOTE NO. 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 THE TITLE 24.40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. STANDARD NOTE NO. 3: TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS FEASIBLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY AT THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY, REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR 100000, SECTION III.A.5.
4. STANDARD NOTE NO. 4: AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS OF STORMWATER STORAGE, AND MATERIALS STORAGE AREAS FOR EROSION, POLLUTION, VEHICLE ENTRANCES AND EXIT LOCATIONS AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER ANY 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 NVR 100000, SECTION III.A.12.
5. STANDARD NOTE NO. 5: NO SEDIMENT IN BULKY SEDIMENT PILES SHALL REMAIN WITHIN SEVENTEEN FEET 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.



CONSTRUCTION NOTES

- 1) CONSTRUCT CONCRETE SIDEWALK PER USDOCA NO. 234.
- 2) CONSTRUCT 8" WIDE VALLEY GUTTER PER USDOCA NO. 228 & 229.
- 3) CONSTRUCT R CURB PER USDOCA NO. 217.3.51.
- 4) SAWCUT & MATCH EXISTING PAVEMENT.
- 5) SAWCUT & MATCH TO EXISTING CURB & SIDEWALK. CONTRACTOR SHALL VERIFY EX. LOCATION & PAVEMENT PRIOR TO CONSTRUCTION.
- 6) CONSTRUCT "L" CURB PER USDOCA NO. 216.
- 7) CONSTRUCT 3" AC OVER 4" TYPE II BASE PER GEOTECHNICAL HTE # XX-XXXX.
- 8) CONSTRUCT 3" AC OVER 4" TYPE II BASE PER GEOTECHNICAL HTE # XX-XXXX.
- 9) CONSTRUCT HANDICAP RAMP PER USDOCA NO. 235 CASE 1. SEE PLAN FOR "A" & "B" DIMENSION.
- 10) CONSTRUCT 5" TRANSITION FROM "L" CURB TO R CURB PER DETAIL "L" SHEET D11.
- 11) SAWCUT & TRENCH PER CAUSD NO. 500.4, 500.5 & 503.
- 12) EXISTING UTILITY BOX ADJUST TO GRADE.
- 13) EXISTING GATE VALVE & BLOW-OFF ADJUST TO GRADE.
- 14) EXISTING SEWER MANHOLE PROTECT-IN-PLACE.
- 15) CONSTRUCT 5" TRANSITION FROM "R" CURB TO "O" CURB PER DETAIL "X" SHEET D11.

BASIS OF BEARING

SOUTH 89°47'09" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 30, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M. AS SHOWN IN BOOK 149, PAGE 27 OF PLATS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT "1C9030N4", BEING A RIVET & PLATE ELECTRIC PAD 197 SW OF PI OF CENTENNIAL PKWY & GRAND CANYON DR..

ELEVATION: 2688.53 (FEET)
819.467 (METERS)

CITY OF LAS VEGAS VERTICAL CONTROL (RE-OBSERVED 2005-2007)
BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

FLOOD ZONE NOTE

THIS PROJECT IS LOCATED WITHIN A FEMA DESIGNATED FLOOD ZONE X PER FIRM PANEL 1745 OF 4090 MAP NUMBER 32003C1745 E REVISED SEPTEMBER 27, 2002. A ZONE X IS DEFINED AS BEING OUTSIDE THE 100-YEAR FLOODPLAIN AND NOT LOCATED WITHIN A FEMA-DESIGNATED SPECIAL FLOOD HAZARD AREA.

DRAINAGE STUDY COMPLIANCE

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY DS4783 ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT

KIRBY P. ADAMS, P.E.
NEVADA PE #15522

DATE _____

H#

CLV DWG#

NOTES TO CONTRACTOR

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 OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

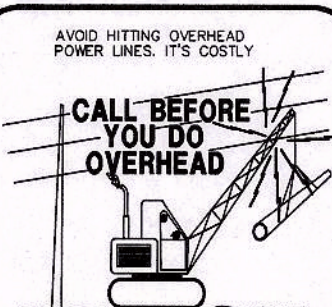


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NOTE

1. THE GEOTECHNICAL EXPLORATION PROPOSED SINGLE FAMILY RESIDENTIAL DEVELOPMENT CENTENNIAL PARKWAY AND JENSEN STREET LAS VEGAS, NEVADA AS PREPARED BY ANGLE ENGINEERING, PROJECT NUMBER 57035-1, DATED JULY 3, 2018.
2. CONSTRUCTION FOR BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE BUILDING SAFETY AND MAINTENANCE DEPARTMENT
3. WALLS CONSTRUCTED OTHER THAN THOSE AS DETAILED ON THIS SHEET ARE TO BE CONSTRUCTED BY WALL SUB-CRACKATOR, DETAILS AND STRUCTURAL CALC'S AS PREPARED BY OTHERS.
4. NO OBJECT OVER 24" OTHER THAN TRAFFIC CONTROL DEVICES AND STREET LIGHT POLES CAN BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE.
5. ALL PRIVATE STREETS ARE TO BE DEDICATED AS PUBLIC DRAINAGE, EASEMENT AND PUBLIC UTILITY EASEMENT TO BE PRIVATELY MAINTAINED

STORMWATER MANAGEMENT NOTES - CLV

1. STANDARD NOTE NO. 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 THE CITY OF LAS VEGAS AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. STANDARD NOTE NO. 2: ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE CONTRACTOR BY THE CITY OF LAS VEGAS IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN THE TITLE 24-40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. STANDARD NOTE NO. 3: TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND MAINTAINED UNTIL PERMANENT STABILIZATION PRACTICES ARE IN PLACE. IF THE DISTURBED AREA HAS TEMPORARILY OR PERMANENTLY CEASED, SOME EXCEPTIONS MAY APPLY, REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NRP 100000, SECTION II.A.5.
4. STANDARD NOTE NO. 4: THE CONTRACTOR SHALL INSPECT ALL DISTURBED AREAS, AREAS OF ACCUMULATED SEDIMENT, AND AREAS OF EROSION WEEKLY, AND REPORT ANY PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. FOR CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL REPORT ANY EROSION OR SEDIMENTATION ACTIVITIES, REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NRP 100000, SECTION II.A.12.
5. STANDARD NOTE NO. 5: ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER EVENT OR RAIN EVENT OF 0.5 INCHES OR MORE. IF THE RAIN EVENT IS EARLIER, SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT, OR MORE.

PROJECT NO.
767-639

1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146

GCL
ENGINEERS SURVEYORS

LUKY ROXANA LOPEZ

DR HORTON

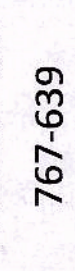
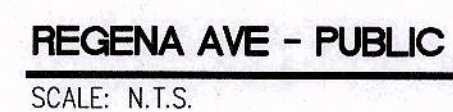
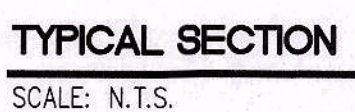
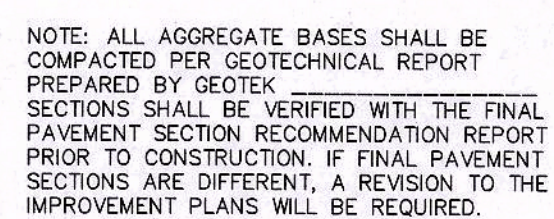
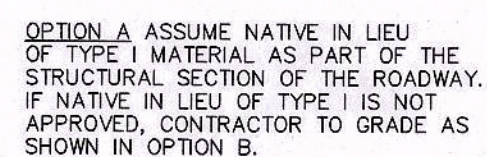
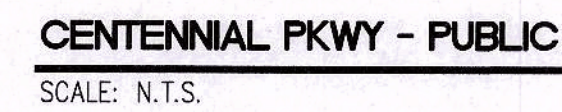
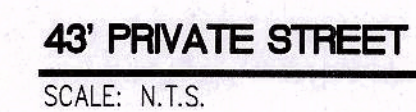
CENTENNIAL JENSEN 5

GRADING PLAN 2

DRAWING

G2

4 OF 5 SHTS



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ENGINEERS \ SURVEYORS
1555 S. HAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

DR HORTON CENTENNIAL JENSEN 5 GRADING SECTIONS & DETAILS

DRAWING

D1

5 OF 5 SHOTS

H#

CLV DWG#